



**FCC Part 90 Test Report**

**On**

**Bi-Directional Amplifier  
Model: BDA510-S8  
FCC ID: NVRBDA510-S8**

**Customer Name:** Westell Inc.

**Customer P.O.:** 480897

**Date of Report:** December 20, 2016

**Test Report No.:** R-6142N-4

**Test Start Date:** November 24, 2016

**Test Finish Date:** December 5, 2016

**Test Technician:** M. Seamans

**Report Approved By:** T. Hannemann

**Report Prepared By:** J. Ramsey

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### Technical Information

**Report Number:** R-6142N-4  
**Customer:** Westell, Inc.  
**Address:** 670 North Commercial St.  
Manchester, NH 03101  
**Manufacturer:** Westell, Inc.  
**Manufacturer Address:** 670 North Commercial St.  
Manchester, NH 03101  
**Test Sample:** Bi-Directional Amplifier  
**Model Number:** BDA510-S8  
**Serial Number:** CPG62990  
**FCC ID:** NVRBDA510-S8  
**Type:** Class B Industrial Booster  
**Power Requirements:** 120 VAC, 60 Hz  
**Frequency of Operation:** 817 MHz – 824 MHz, 862 MHz – 869 MHz  
**Equipment Class:** B2I

**Test Specification:**

Nemko Test Plan Document Number: 317856-2. Rev. 4, Dated: November 29, 2016

**Test Procedures:**

FCC KDB 935210 D02 V03r02  
FCC Part 90  
FCC KDB 971168

**Test Facility:**

Retlif Testing Laboratories  
101 New Boston Road  
Goffstown, NH 03045

FCC Registered Test Site Number: 90899



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Table 1 – Tests Performed

Test Plan Paragraph	Test Method	Test Results
4.1	AGC Threshold Level	See Test Data
4.2	Out of Band Rejection	Complied
4.3	Input-Versus-Output Signal Comparison	See Test Data
4.4	Mean Output Power and Amplifier/Booster Gain	Complied
4.5	Noise Figure Measurements	Complied
4.6	Measuring Out-of-Band/Out-of-Block Emissions and Spurious Emissions	Complied
4.8	Field Strength of Spurious Emissions	Complied

**EUT Operation:**

During testing, the EUT was amplifying RF signal(s).



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## Certification and Signatures

We certify that this report is a true representation of the results obtained from the tests of the equipment stated. 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.



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Scott Wentworth  
Branch Manager  
NVLAP Approved Signatory



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Todd Hannemann  
EMC Test Engineer  
iNARTE Certified Technician ATL-0255-T

### **Non-Warranty Provision**

The testing services have been performed, findings obtained and reports prepared in accordance with generally accepted laboratory principles and practices. This warranty is in lieu of all others, either expressed or implied.

### **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 test report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.



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## Revision History

Revisions to this document are listed below; the latest revised document supersedes all previous issues of this document:

<b>Revision</b>	<b>Date</b>	<b>Pages Affected</b>
-	December 20, 2016	Original Release



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## **Requirements and Test Results**

### **NEMKO Test Plan Paragraph 4.1 – AGC Threshold Level**

Using a signal generator configured to produce a LTE modulated sinusoidal signal at the center frequency of each uplink and downlink frequency band, the input level to the test sample was increased until a 1 dB increase in the input signal power no longer caused a 1 dB increase in the output signal power. This level was recorded as the AGC threshold level. This measurement was then repeated with a GSM modulated signal. See attached test data.

### **NEMKO Test Plan Paragraph 4.2 – Out-of-Band Rejection**

Using a CW signal at a level 3 dB below the input level used during the AGC Threshold test,  $\pm 250\%$  of the manufacturer's specified pass band was swept. The spectrum analyzer was configured with the peak detector in Max-Hold. After the sweep was complete the 20 dB bandwidth of the test sample was measured. See attached test data.

### **NEMKO Test Plan Paragraph 4.3 – Input-versus-Output Signal Comparison**

Measurements were made to compare the input signal to the output signal. The signal generator output was connected to the spectrum analyzer. The signal generator output level was set to a value that produces a EUT output level that is just below the AGC threshold. A LTE modulation signal was then applied to the carrier. Two markers were placed on the signal, one at the lowest and the other at the highest frequency of the envelope of the spectral display, each marker was placed at or slightly below the  $-26$  dB down amplitude. Waveforms were then noted on an X-Y plot. Next, the signal generator was connected to the EUT input 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 the center frequency of each passband on both the uplink and downlink. Testing was then repeated with the input signal set 3dB above the AGC threshold. Testing was then repeated with the GSM modulated signal. See attached test data.



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## **Requirements and Test Results (con't)**

### **NEMKO Test Plan Paragraph 4.4 – Mean Output Power and Amplifier/Booster Gain**

A signal generator was configured to produce a LTE signal at the center frequency of each uplink and downlink frequency band. The signal generator output level was set to a value that produced a EUT output level that was just below the AGC threshold, but not more than 0.5 dB below. The output power of the EUT was measured following “Power measurement Method 1: using a spectrum or signal analyzer” this value was recorded as the output power. The signal generator was connected directly to the signal analyzer (the EUT was removed from the test setup). Using the same signal generator settings, the power measurement was repeated at the signal generator port, which was used as the input signal to the EUT, and was record as the input power. The EUT gain was calculated by  $\text{Gain (dB)} = \text{output power (dBm)} - \text{input power (dBm)}$ . Testing was then repeated with the GSM modulated signal. These measurements were repeated with the input signal amplitude set to 3 dB above the AGC threshold level. See attached test data.

### **NEMKO Test Plan Paragraph 4.5 – Noise Figure Measurements**

Using a Low ENR noise source and a signal analyzer with a noise figure measurement option, the noise figure was measured on both the uplink and downlink frequency band with AGC disabled. The EUT complies with the noise figure requirements of 90.219(e)(2). See attached test data.

### **NEMKO Test Plan Paragraph 4.6 – Measuring Out-of-Band/Out-of-Block (including intermodulation) Emissions and Spurious Emissions**

A signal generator was configured to produce two GSM signals, one at 817.300 MHz and one at 817.600 MHz on the input port of the uplink frequency band. The amplitude of the two signals was set to just below the AGC threshold. A Spectrum analyzer was connected to the output port of the EUT with a span of 100 KHz. Using a power averaging (RMS) detector the RF spectrum was swept and the markers were placed on the peak of the intermodulation signals. The EUT output plots were recorded. The input signals were increased so the composite input signal was 3dB over the AGC threshold (AGC activated) and plots of the EUT output were recorded. This was repeated for each of the following signal pairs.

Uplink upper edge: 823.400 MHz; 823.700 MHz  
Downlink lower edge: 862.300 MHz; 862.600 MHz  
Downlink upper edge: 868.400 MHz; 868.700 MHz



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## **Requirements and Test Results (con't)**

Testing was only performed with GSM modulation as multiple 5 MHz channels cannot be accommodated in this band for the LTE signals

See attached test data.

### **NEMKO Test Plan Paragraph 4.8 – Field Strength of Spurious Emissions**

- Spurious Emissions, Conducted Measurements

A signal generator was configured to produce a LTE signal at the center frequency of each uplink and downlink frequency band. The signal generator output level was set to a value that produces a EUT output level that is just below the AGC threshold. A spectrum analyzer was connected to the output of the EUT using a peak detector and Max-Hold. The input test frequencies used were three frequencies (Low, Mid and High) within each passband (uplink and downlink). A marker was placed on the highest emission(s) outside the passband. Testing was performed in the frequency range of 30MHz to 10GHz to a -13dBm limit. Testing was repeated with a GSM modulated signal. See attached test data.

- Frequency Stability Measurements

As the test sample is designed to amplify input signals from a cellular network and contains no frequency determining components frequency stability measurements were not required/performed.

- Field Strength of Spurious Emissions

The test sample was placed on a 80cm high 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 frequency range of the test was 30MHz – 10GHz to a -13dBm limit. See attached test data.



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## Equipment List

### AGC Threshold

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
1345	NARDA MICROWAVE	ATTENUATOR, COAXIAL	30 dB, DC - 18 GHz, 50 W	776B-30	10/10/2016	10/31/2017
5138	NARDA MICROWAVE	ATTENUATOR, COAXIAL	10 dB, DC - 11 GHz, 20 W	768-10	10/10/2016	10/31/2017
5179B	MICRO-COAX	CABLE, COAXIAL	10 kHz - 18 GHz	UFB311A-1-036050U50U	10/7/2016	10/31/2017
R474	AGILENT / HP	ANALYZER, SIGNAL	10 Hz - 8.5 GHz	N9020B	10/10/2016	10/10/2017
R476	AGILENT / HP	GENERATOR, SIGNAL	9 kHz - 6 GHz	N5182B	9/9/2016	9/9/2017

### Out of Band Rejection

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
1345	NARDA MICROWAVE	ATTENUATOR, COAXIAL	30 dB, DC - 18 GHz, 50 W	776B-30	10/10/2016	10/31/2017
5138	NARDA MICROWAVE	ATTENUATOR, COAXIAL	10 dB, DC - 11 GHz, 20 W	768-10	10/10/2016	10/31/2017
5179B	MICRO-COAX	CABLE, COAXIAL	10 kHz - 18 GHz	UFB311A-1-036050U50U	10/7/2016	10/31/2017
R474	AGILENT / HP	ANALYZER, SIGNAL	10 Hz - 8.5 GHz	N9020B	10/10/2016	10/10/2017
R476	AGILENT / HP	GENERATOR, SIGNAL	9 kHz - 6 GHz	N5182B	9/9/2016	9/9/2017

### Input-versus-Output Signal Comparison

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
1345	NARDA MICROWAVE	ATTENUATOR, COAXIAL	30 dB, DC - 18 GHz, 50 W	776B-30	10/10/2016	10/31/2017
5138	NARDA MICROWAVE	ATTENUATOR, COAXIAL	10 dB, DC - 11 GHz, 20 W	768-10	10/10/2016	10/31/2017
5179B	MICRO-COAX	CABLE, COAXIAL	10 kHz - 18 GHz	UFB311A-1-036050U50U	10/7/2016	10/31/2017
R474	AGILENT / HP	ANALYZER, SIGNAL	10 Hz - 8.5 GHz	N9020B	10/10/2016	10/10/2017
R476	AGILENT / HP	GENERATOR, SIGNAL	9 kHz - 6 GHz	N5182B	9/9/2016	9/9/2017

### Mean Output Power and Amplifier/Booster Gain

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
1345	NARDA MICROWAVE	ATTENUATOR, COAXIAL	30 dB, DC - 18 GHz, 50 W	776B-30	10/10/2016	10/31/2017
5138	NARDA MICROWAVE	ATTENUATOR, COAXIAL	10 dB, DC - 11 GHz, 20 W	768-10	10/10/2016	10/31/2017
5179B	MICRO-COAX	CABLE, COAXIAL	10 kHz - 18 GHz	UFB311A-1-036050U50U	10/7/2016	10/31/2017
R474	AGILENT / HP	ANALYZER, SIGNAL	10 Hz - 8.5 GHz	N9020B	10/10/2016	10/10/2017
R476	AGILENT / HP	GENERATOR, SIGNAL	9 kHz - 6 GHz	N5182B	9/9/2016	9/9/2017



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## Noise Figure Measurements

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
5179B	MICRO-COAX	CABLE, COAXIAL	10 kHz - 18 GHz	UFB311A-1-036050U50U	10/7/2016	10/31/2017
R474	AGILENT / HP	ANALYZER, SIGNAL	10 Hz - 26 GHz	N9020B	10/10/2016	10/10/2017
R475	AGILENT / HP	NOISE SOURCE	10 MHz - 26.5 GHz	N4000A	10/11/2016	10/11/2017

## Measuring Out-of-Band/Out-of-Block (including intermodulation) Emissions and Spurious Emissions

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
1232	AGILENT / HP	PRE-AMPLIFIER	1 - 26.5 GHz	8449B	6/16/2016	6/30/2017
3258	ETS / EMCO	ANTENNA, DOUBLE RIDGED GUIDE	1 - 18 GHz	3115	10/13/2016	4/30/2018
3427B	ETS / EMCO	ANTENNA, BICONICAL	20 - 200 MHz	3104	2/5/2016	8/31/2017
4029B	RETLIF	OPEN AREA TEST SITE, ATTENUATION	3 / 10 Meters	RNH	4/13/2016	4/30/2018
443	ELECTRO-METRICS	ANTENNA, LOG PERIODIC	200 MHz - 1000 MHz	LPA-25	10/6/2016	4/30/2018
5070	ROHDE & SCHWARZ	RECEIVER, EMI	20 Hz - 40 GHz	ESIB40	10/21/2016	10/31/2017
1345	NARDA MICROWAVE	ATTENUATOR, COAXIAL	30 dB, DC - 18 GHz, 50 W	776B-30	10/10/2016	10/31/2017
5138	NARDA MICROWAVE	ATTENUATOR, COAXIAL	10 dB, DC - 11 GHz, 20 W	768-10	10/10/2016	10/31/2017
5179B	MICRO-COAX	CABLE, COAXIAL	10 kHz - 18 GHz	UFB311A-1-036050U50U	10/7/2016	10/31/2017
R474	AGILENT / HP	ANALYZER, SIGNAL	10 Hz - 8.5 GHz	N9020B	10/10/2016	10/10/2017
R476	AGILENT / HP	GENERATOR, SIGNAL	9 kHz - 6 GHz	N5182B	9/9/2016	9/9/2017
R469	AGILENT / HP	ANALYZER, SPECTRUM	100 Hz - 26.5 GHz	E7405A,A	12/1/2016	12/30/2017



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**Test Photographs**  
**AGC Threshold**



Test Setup



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**AGC Threshold  
Test Data**

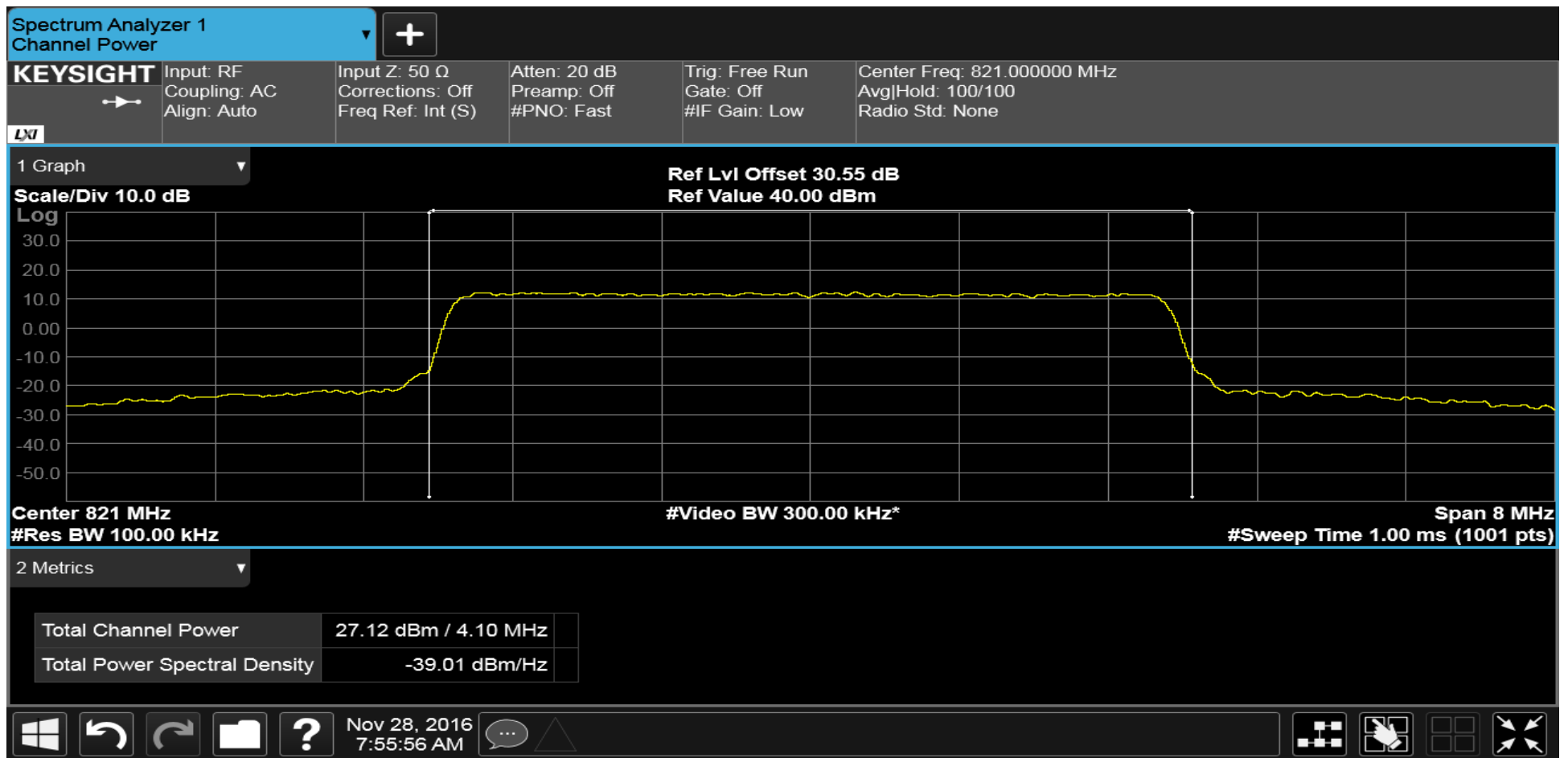


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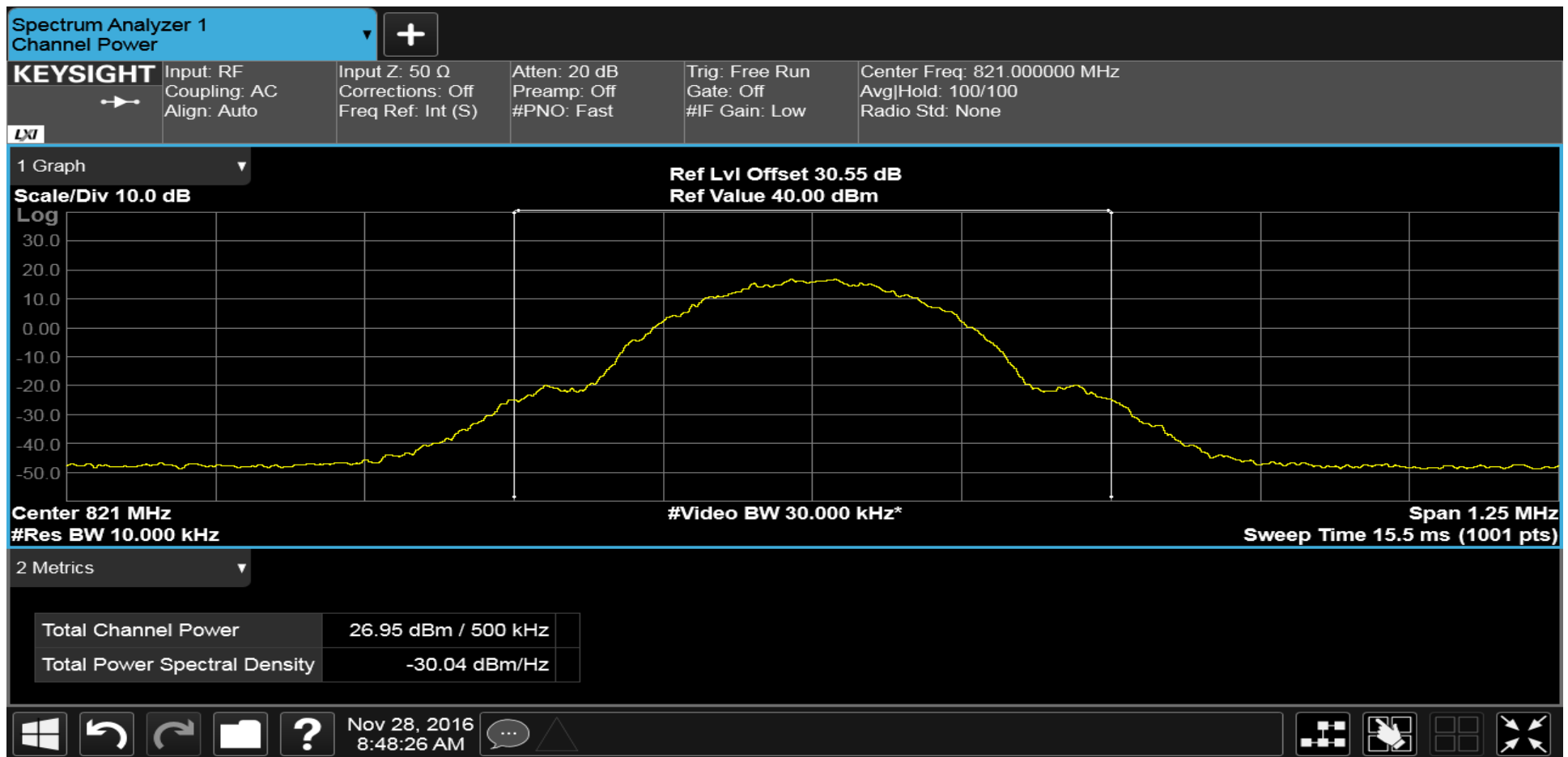
# RETLIF TESTING LABORATORIES

<b>Test Method</b>	AGC Threshold		
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4
<b>Test Sample</b>	Bi-Directional Amplifier		
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990
<b>Operating Mode</b>	Amplifying LTE signal at 821MHz		
<b>Test Specification</b>	Nemko Test Plan 317856-2		
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %		
<b>Notes</b>	Uplink    Signal Generator Setting: -54.20dBm (-53.35dBm measured signal generator output) Amplifier Output: <b>27.12dBm</b> Gain: <b>80.47dB</b>		



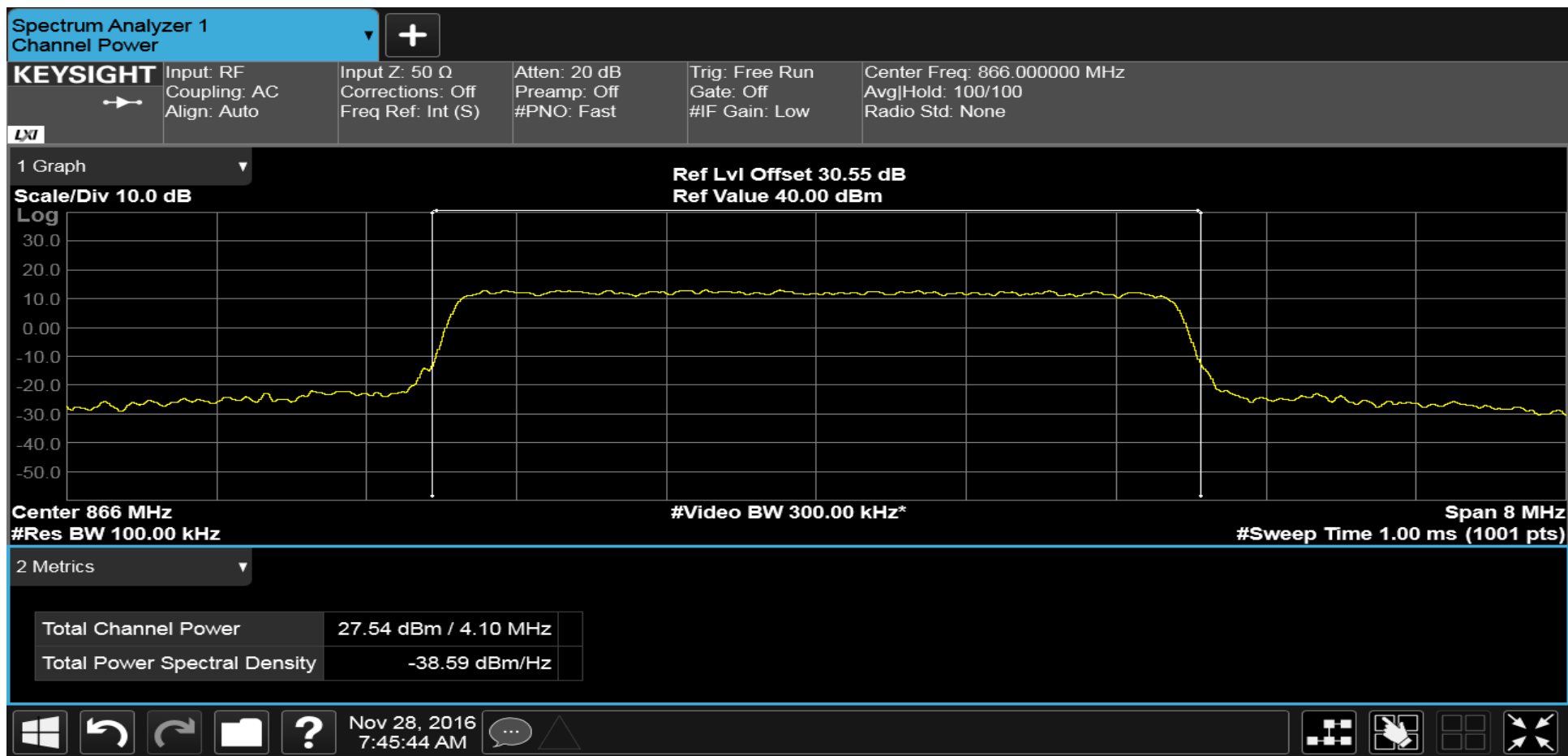
# RETLIF TESTING LABORATORIES

<b>Test Method</b>	AGC Threshold		
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4
<b>Test Sample</b>	Bi-Directional Amplifier		
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990
<b>Operating Mode</b>	Amplifying GSM signal at 821MHz		
<b>Test Specification</b>	Nemko Test Plan 317856-2		
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %		
<b>Notes</b>	Uplink    Signal Generator Setting: -54.30dBm (-53.50dBm measured signal generator output) Amplifier Output: <b>26.95dBm</b> Gain: <b>80.45dB</b>		



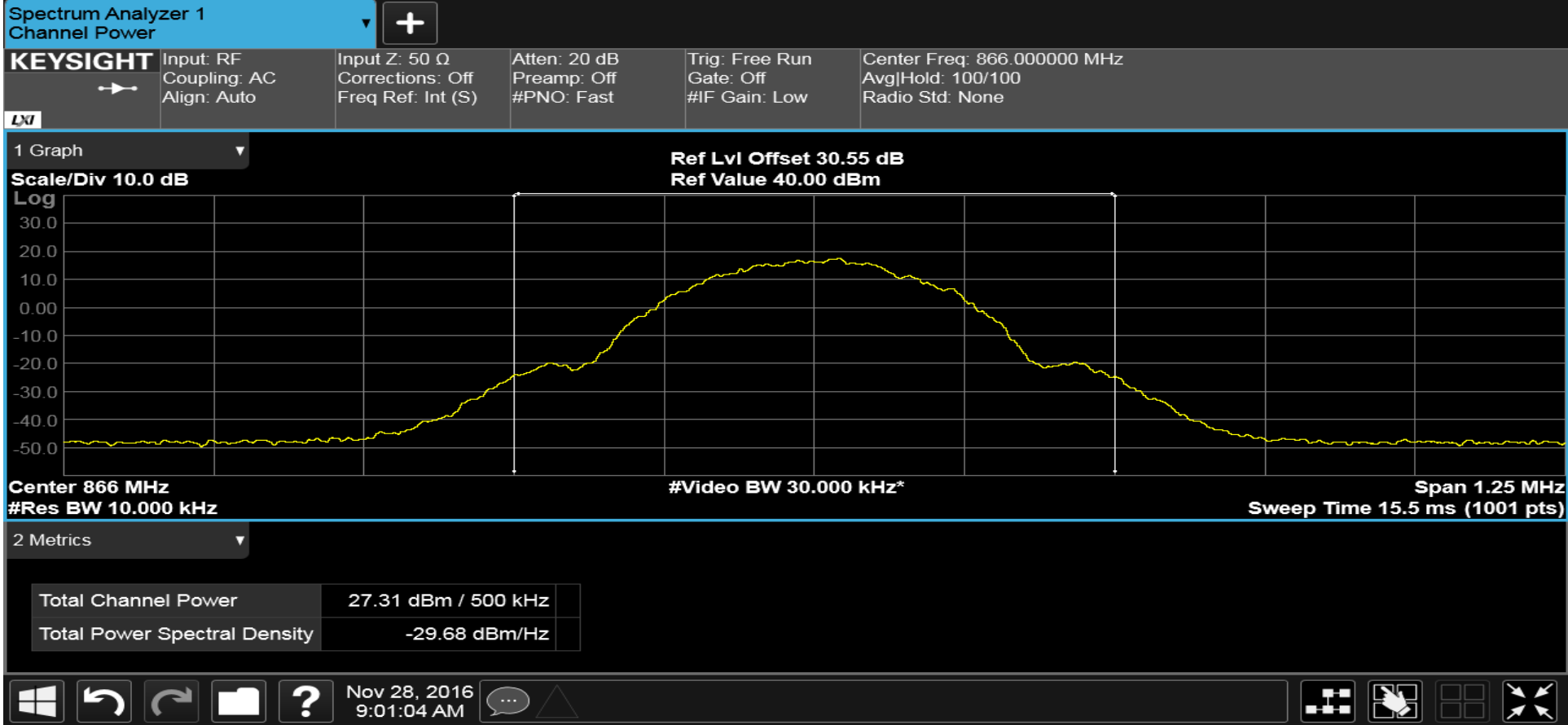
# RETLIF TESTING LABORATORIES

<b>Test Method</b>	AGC Threshold		
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4
<b>Test Sample</b>	Bi-Directional Amplifier		
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990
<b>Operating Mode</b>	Amplifying LTE signal at 866MHz		
<b>Test Specification</b>	Nemko Test Plan 317856-2		
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %		
<b>Notes</b>	Downlink    Signal Generator Setting: -54.00dBm (-53.31dBm measured signal generator output) Amplifier Output: <b>27.54dBm</b> Gain: <b>80.85dB</b>		



# RETLIF TESTING LABORATORIES

<b>Test Method</b>	AGC Threshold		
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4
<b>Test Sample</b>	Bi-Directional Amplifier		
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990
<b>Operating Mode</b>	Amplifying GSM signal at 866MHz		
<b>Test Specification</b>	Nemko Test Plan 317856-2		
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %		
<b>Notes</b>	Downlink    Signal Generator Setting: -53.70dBm (-53.01dBm measured signal generator output) Amplifier Output: <b>27.31dBm</b> Gain: <b>80.32dB</b>		





**Test Photographs**  
**Out of Band Rejection**



Test Setup



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**Out of Band Rejection  
Test Data**

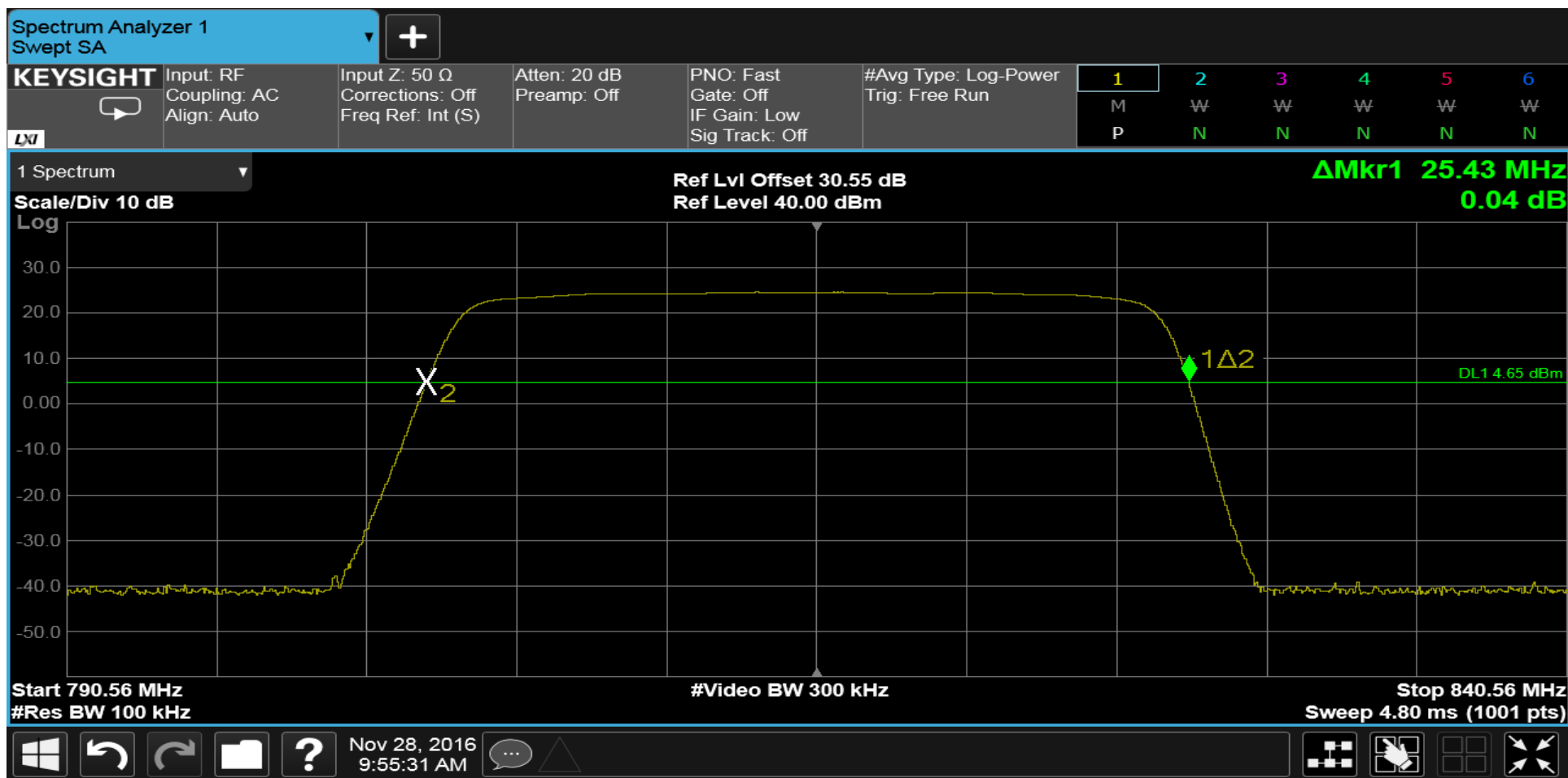


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# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Out-of-Band Rejection				
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4		
<b>Test Sample</b>	Bi-Directional Amplifier				
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990		
<b>Operating Mode</b>	Amplifying CW signals				
<b>Test Specification</b>	Nemko Test Plan 317856-2				
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016		
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %				
<b>Notes</b>	Uplink    Signal Generator Setting: -57.00dBm (-56.31dBm measured signal generator output) 20dB Bandwidth: <b>25.43 MHz</b>				



# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Out-of-Band Rejection				
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4		
<b>Test Sample</b>	Bi-Directional Amplifier				
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990		
<b>Operating Mode</b>	Amplifying CW signals				
<b>Test Specification</b>	Nemko Test Plan 317856-2				
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016		
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %				
<b>Notes</b>	Downlink    Signal Generator Setting: -57.00dBm (-56.31dBm measured signal generator output) 20dB Bandwidth: <b>25.05 MHz</b>				



**Test Photographs**  
**Input-versus-Output Signal Comparison**



Test Setup



**Retlif Testing Laboratories**

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**Input-versus-Output Signal Comparison  
Test Data**

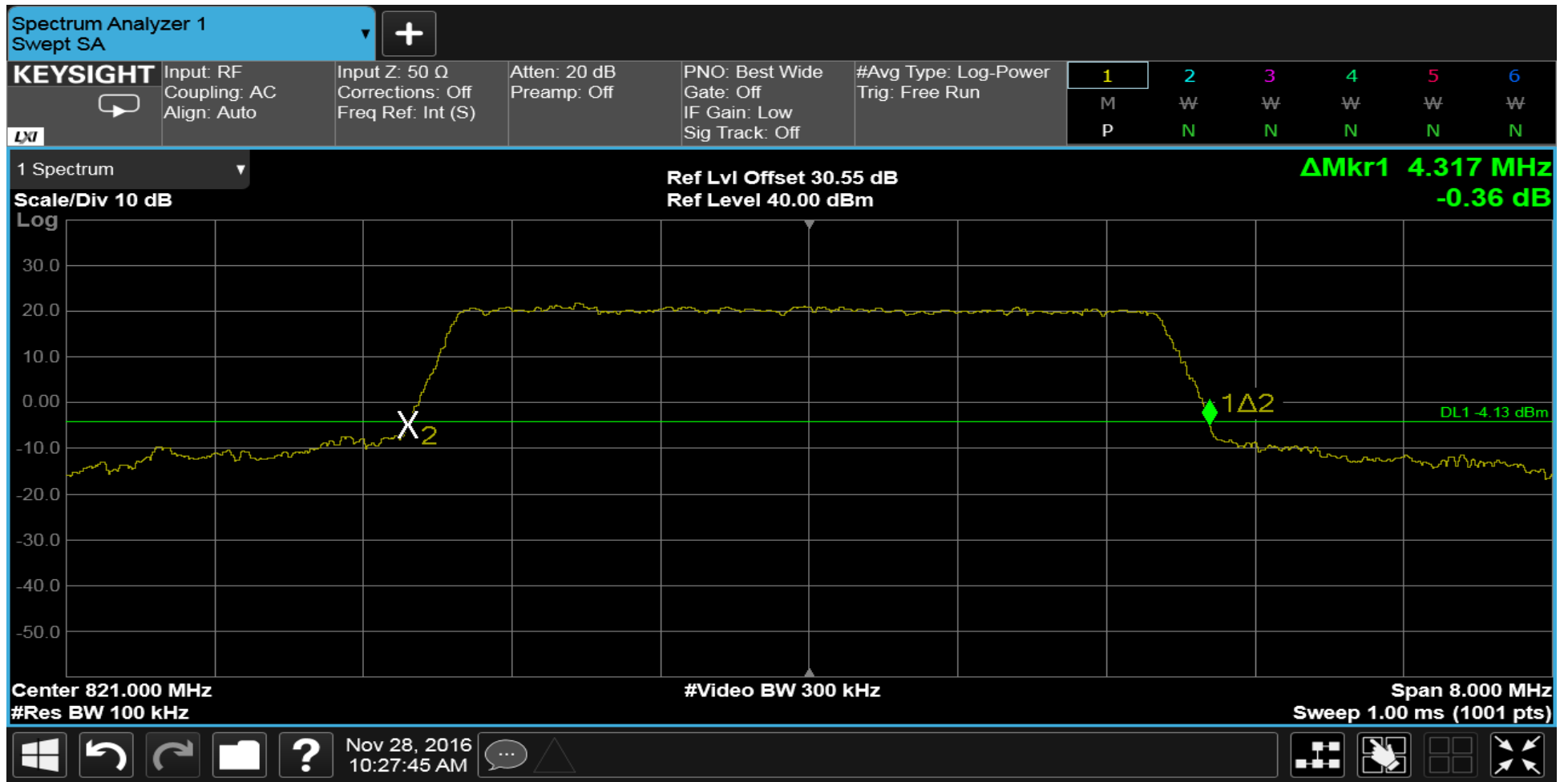


**Retlif Testing Laboratories**

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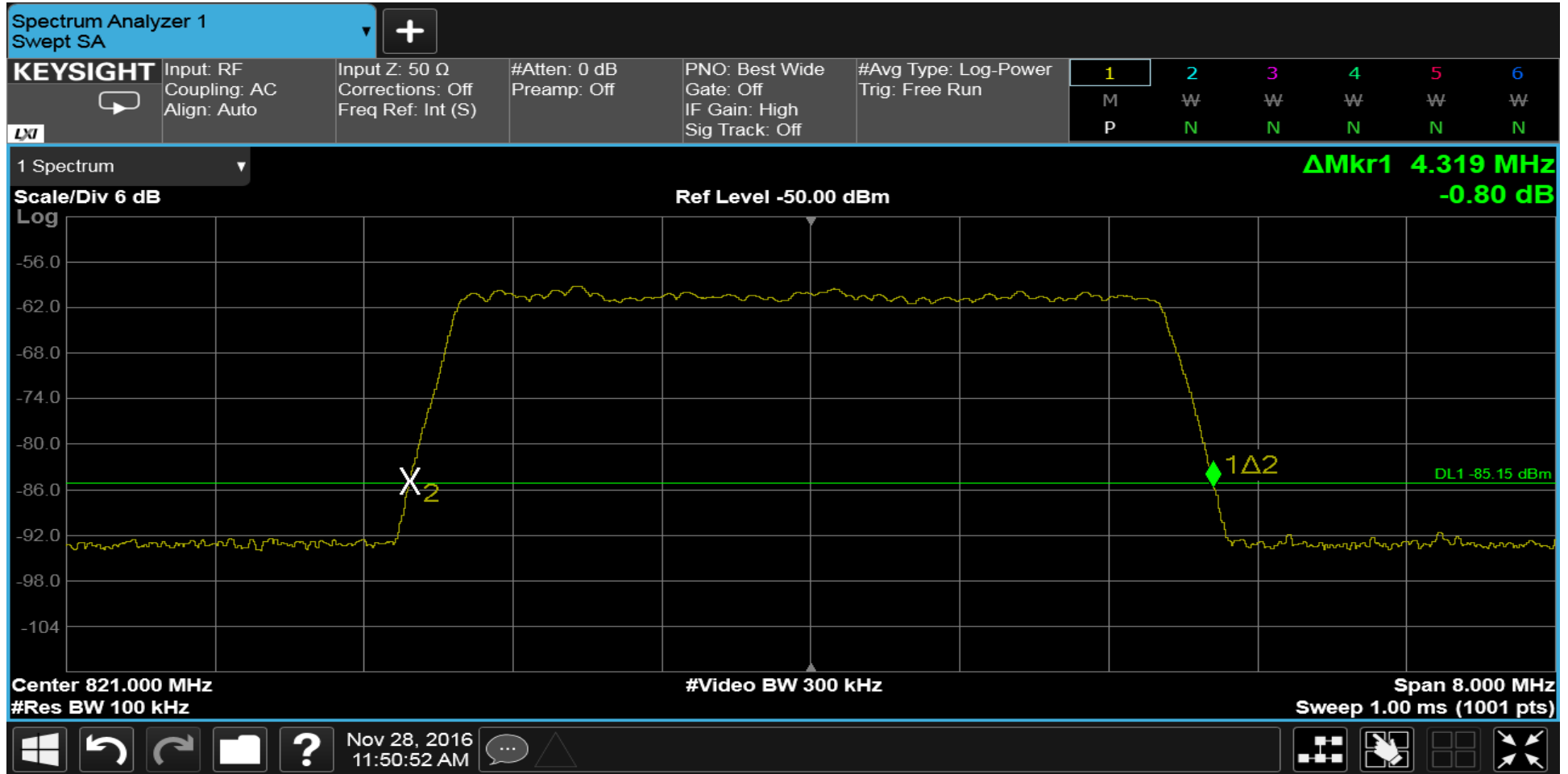
# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Input-v-Output Signal Comparison				
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4		
<b>Test Sample</b>	Bi-Directional Amplifier				
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990		
<b>Operating Mode</b>	Amplifying LTE Signal at 821MHz				
<b>Test Specification</b>	Nemko Test Plan 317856-2				
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016		
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %				
<b>Notes</b>	Uplink    26dB Bandwidth: <b>4.317 MHz</b>				



# RETLIF TESTING LABORATORIES

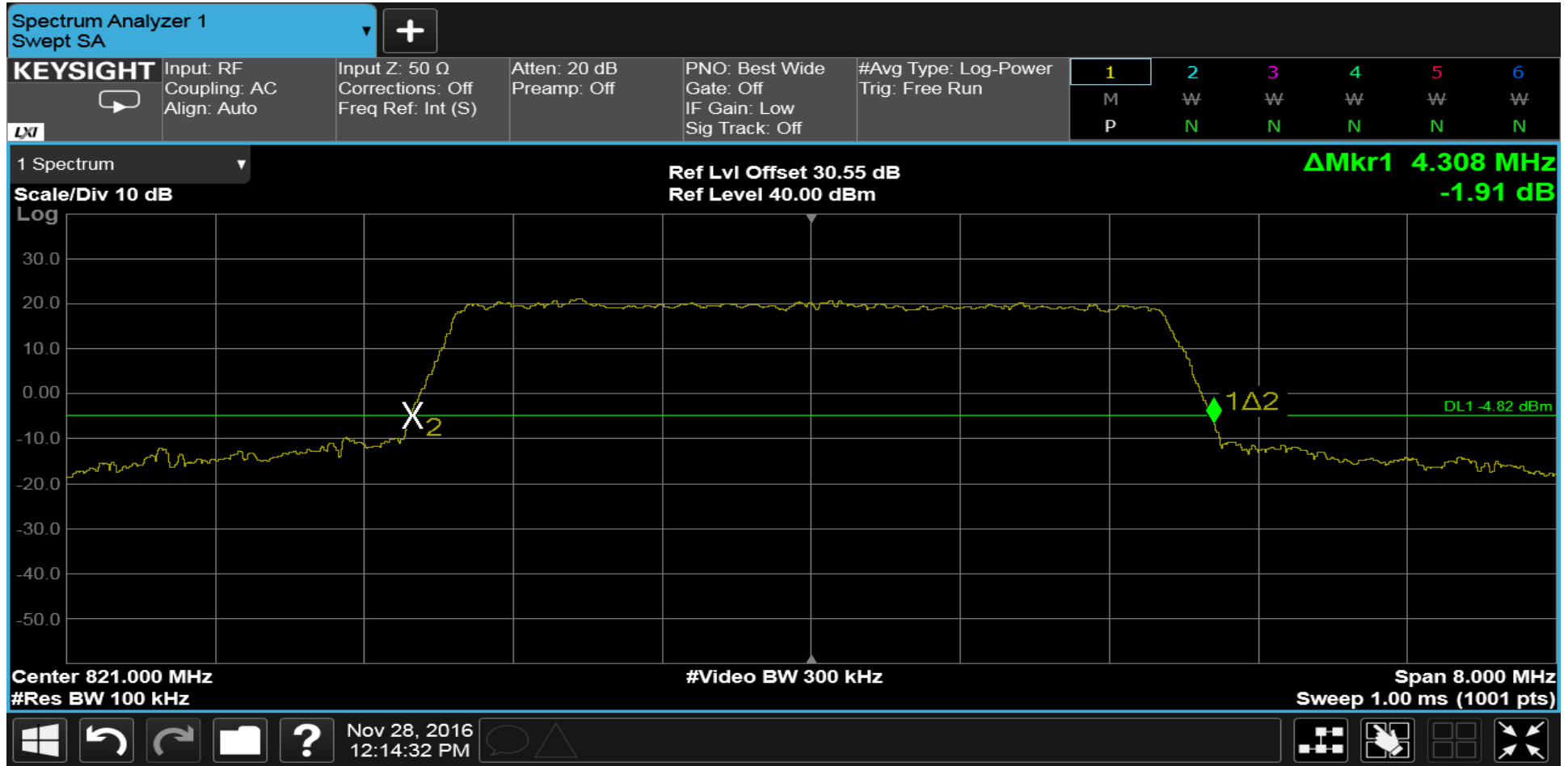
<b>Test Method</b>	Input-v-Output Signal Comparison				
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4		
<b>Test Sample</b>	Bi-Directional Amplifier				
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990		
<b>Operating Mode</b>	Signal Generator LTE Output at 821MHz				
<b>Test Specification</b>	Nemko Test Plan 317856-2				
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016		
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %				
<b>Notes</b>	Uplink    26dB Bandwidth: <b>4.319 MHz</b>				





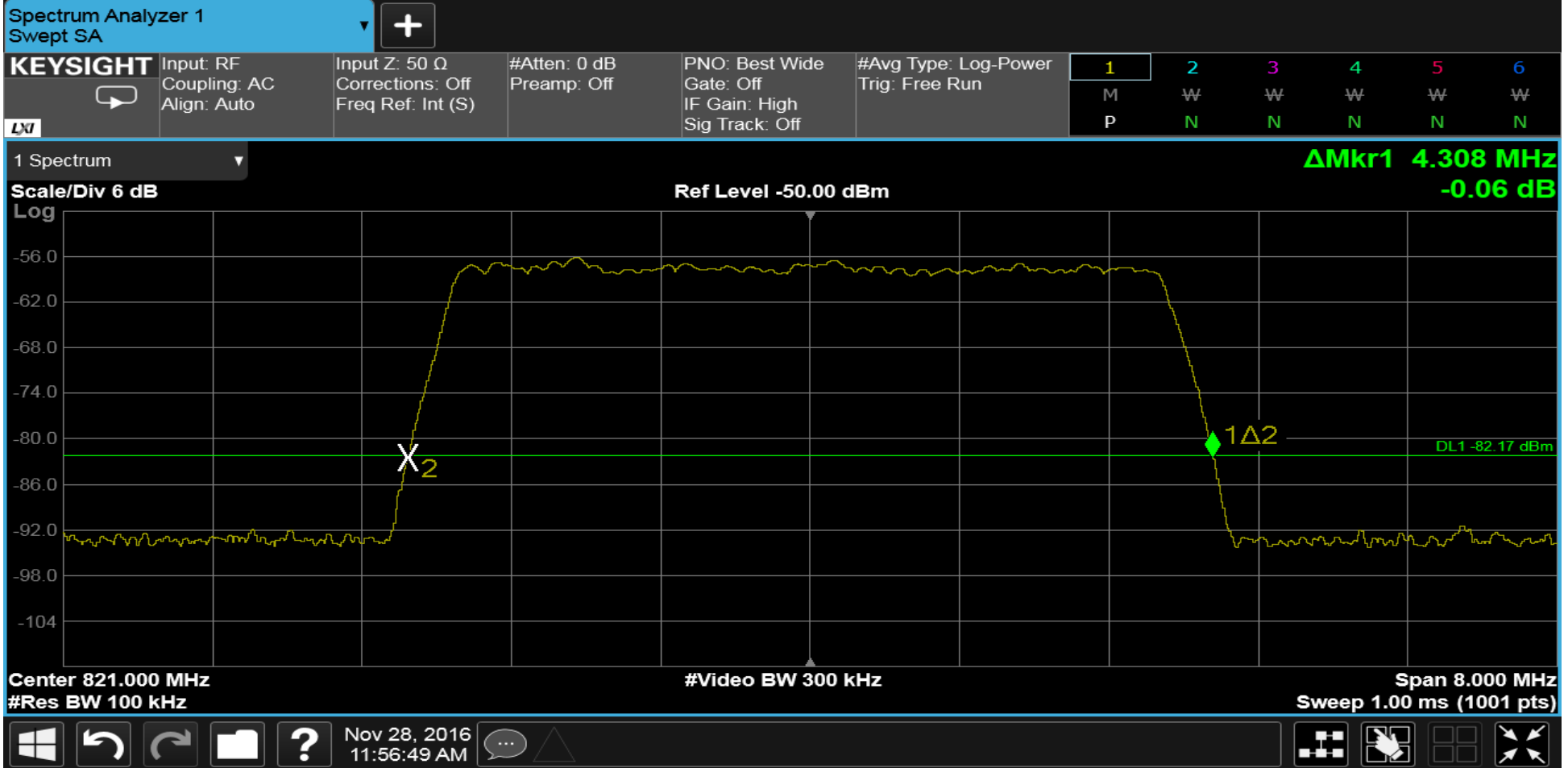
# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Input-v-Output Signal Comparison				
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4		
<b>Test Sample</b>	Bi-Directional Amplifier				
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990		
<b>Operating Mode</b>	Amplifying LTE Signal at 821MHz, AGC Activated				
<b>Test Specification</b>	Nemko Test Plan 317856-2				
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016		
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %				
<b>Notes</b>	Uplink    26dB Bandwidth: <b>4.308 MHz</b>				



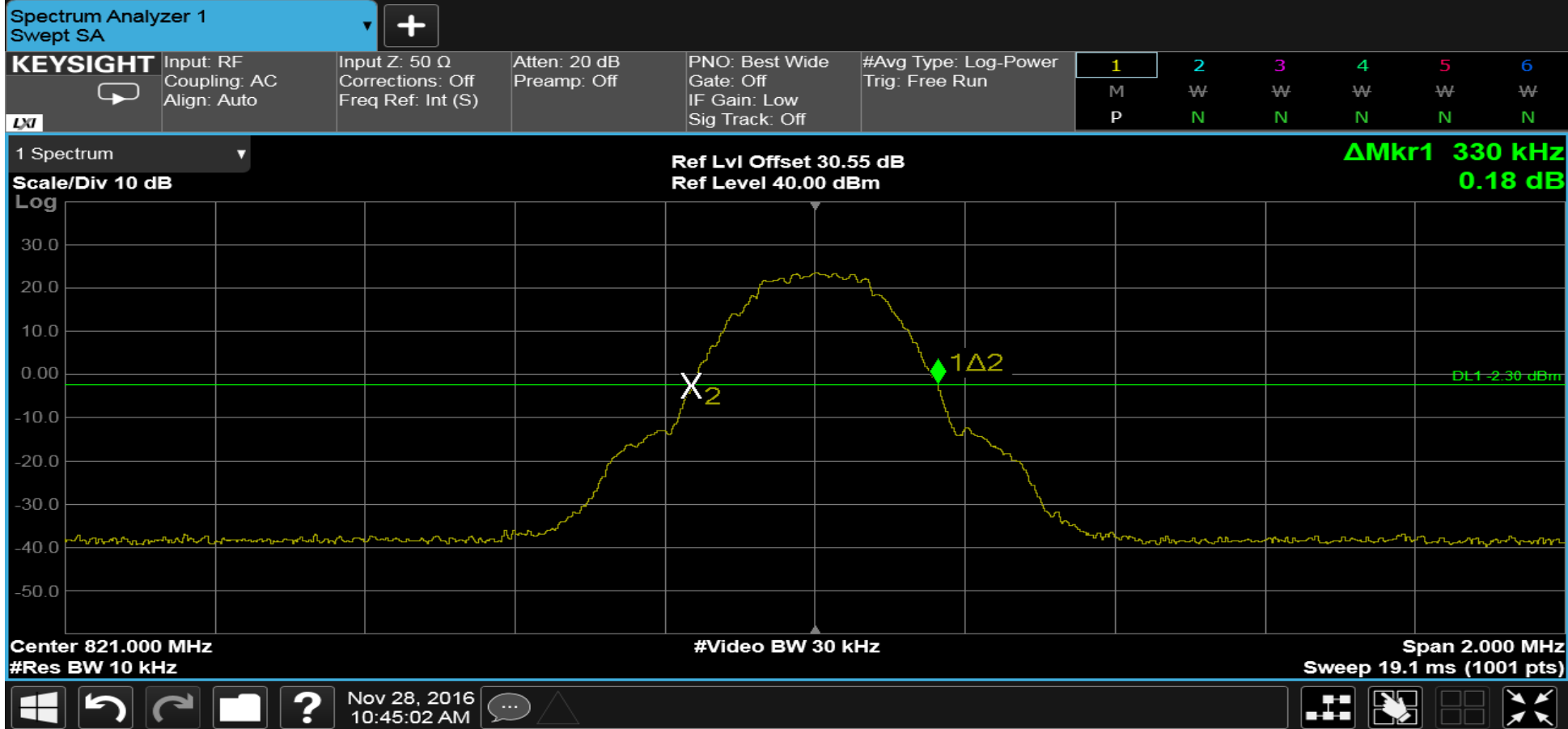
# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Input-v-Output Signal Comparison				
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4		
<b>Test Sample</b>	Bi-Directional Amplifier				
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990		
<b>Operating Mode</b>	Signal Generator LTE Output at 821MHz, AGC Activated				
<b>Test Specification</b>	Nemko Test Plan 317856-2				
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016		
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %				
<b>Notes</b>	Uplink    26dB Bandwidth: <b>4.308 MHz</b>				



# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Input-v-Output Signal Comparison				
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4		
<b>Test Sample</b>	Bi-Directional Amplifier				
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990		
<b>Operating Mode</b>	Amplifying GSM Signal at 821MHz				
<b>Test Specification</b>	Nemko Test Plan 317856-2				
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016		
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %				
<b>Notes</b>	Uplink    26dB Bandwidth: 330 kHz				

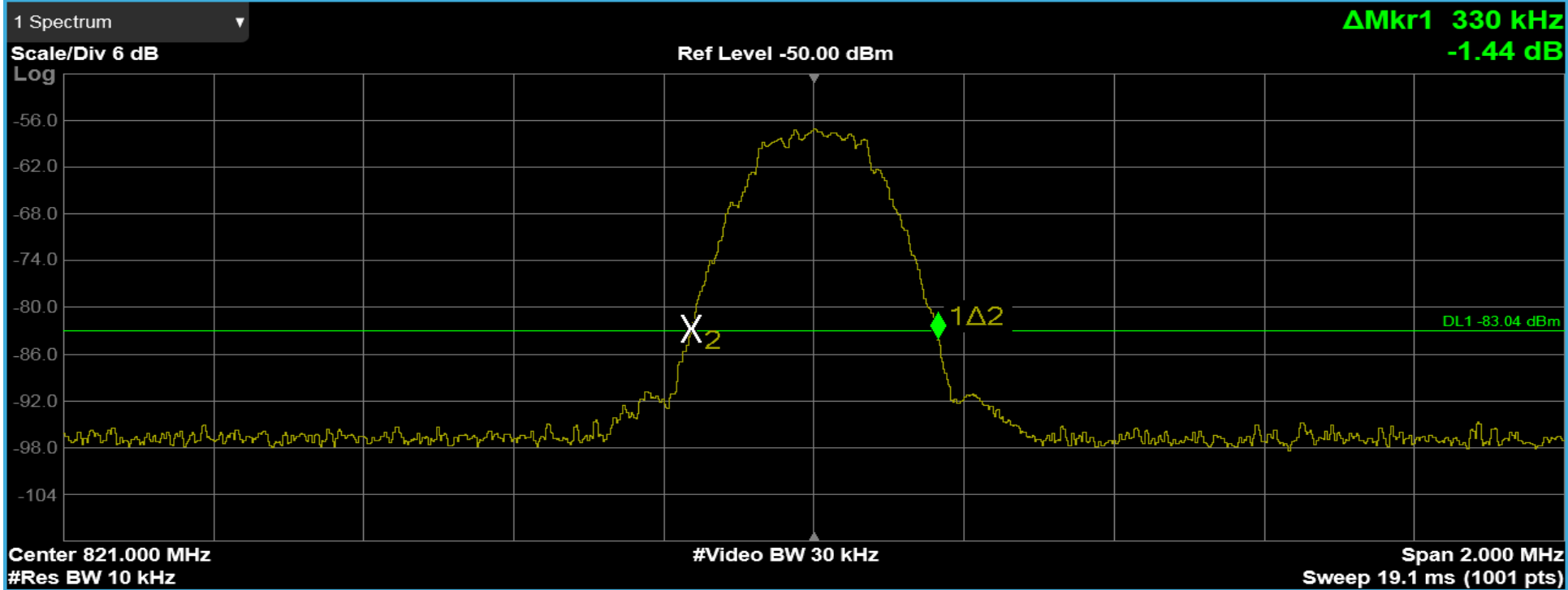


# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Input-v-Output Signal Comparison				
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4		
<b>Test Sample</b>	Bi-Directional Amplifier				
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990		
<b>Operating Mode</b>	Signal Generator GSM Output at 821MHz				
<b>Test Specification</b>	Nemko Test Plan 317856-2				
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016		
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %				
<b>Notes</b>	Uplink    26dB Bandwidth: 330 kHz				

**Spectrum Analyzer 1** Swept SA +

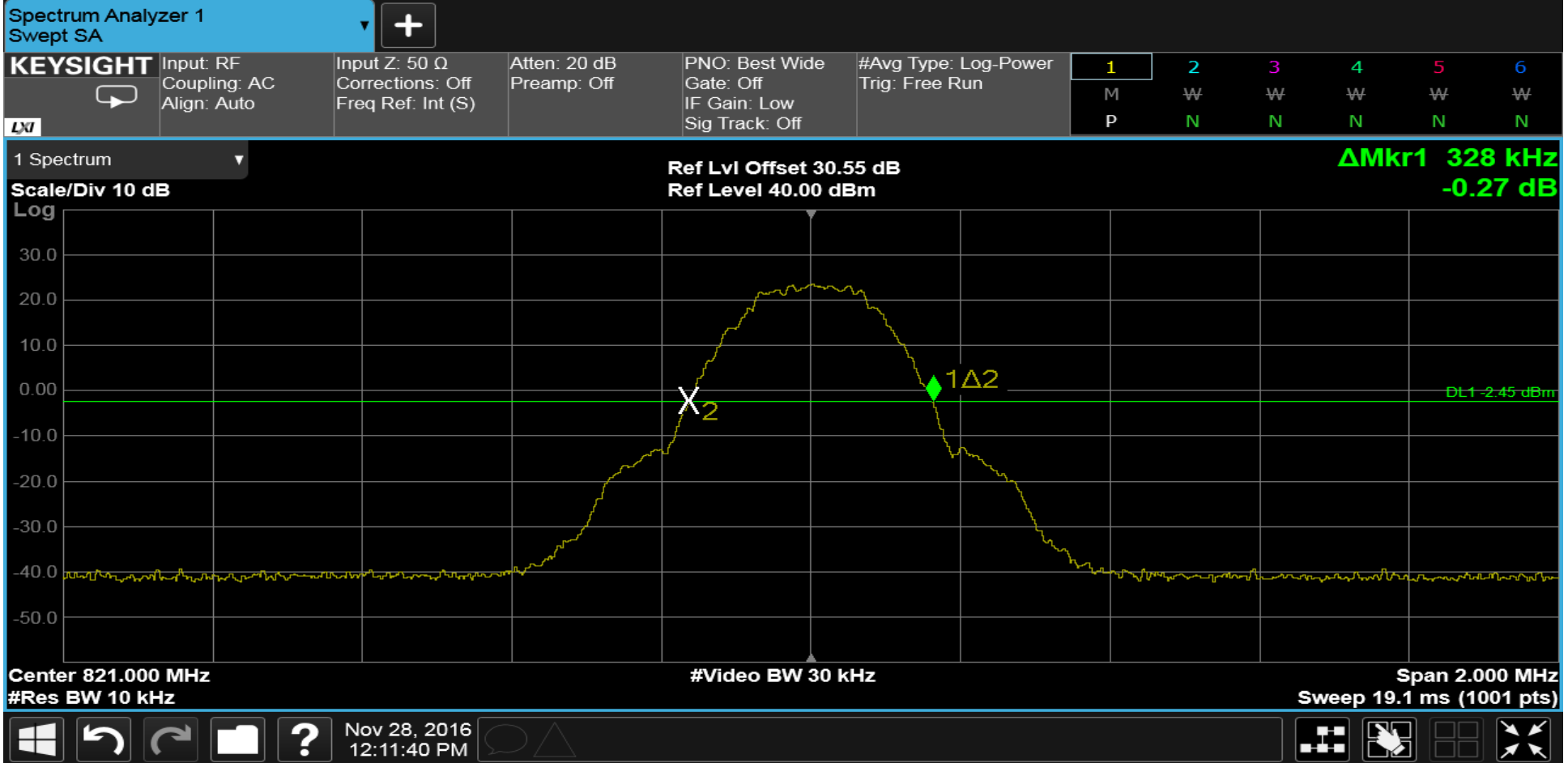
<b>KEYSIGHT</b>	Input: RF	Input Z: 50 Ω	Atten: 6 dB	PNO: Best Wide	#Avg Type: Log-Power	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
	Coupling: AC	Corrections: Off	Preamp: Off	Gate: Off	Trig: Free Run	M	W	W	W	W	W
	Align: Auto	Freq Ref: Int (S)		IF Gain: Low		P	N	N	N	N	N



Windows
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Undo
Print
Help
Nov 28, 2016 11:40:37 AM
Chat
Cursor
Grid
Zoom

# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Input-v-Output Signal Comparison				
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4		
<b>Test Sample</b>	Bi-Directional Amplifier				
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990		
<b>Operating Mode</b>	Amplifying GSM Signal at 821MHz, AGC Activated				
<b>Test Specification</b>	Nemko Test Plan 317856-2				
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016		
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %				
<b>Notes</b>	Uplink    26dB Bandwidth: <b>328 kHz</b>				

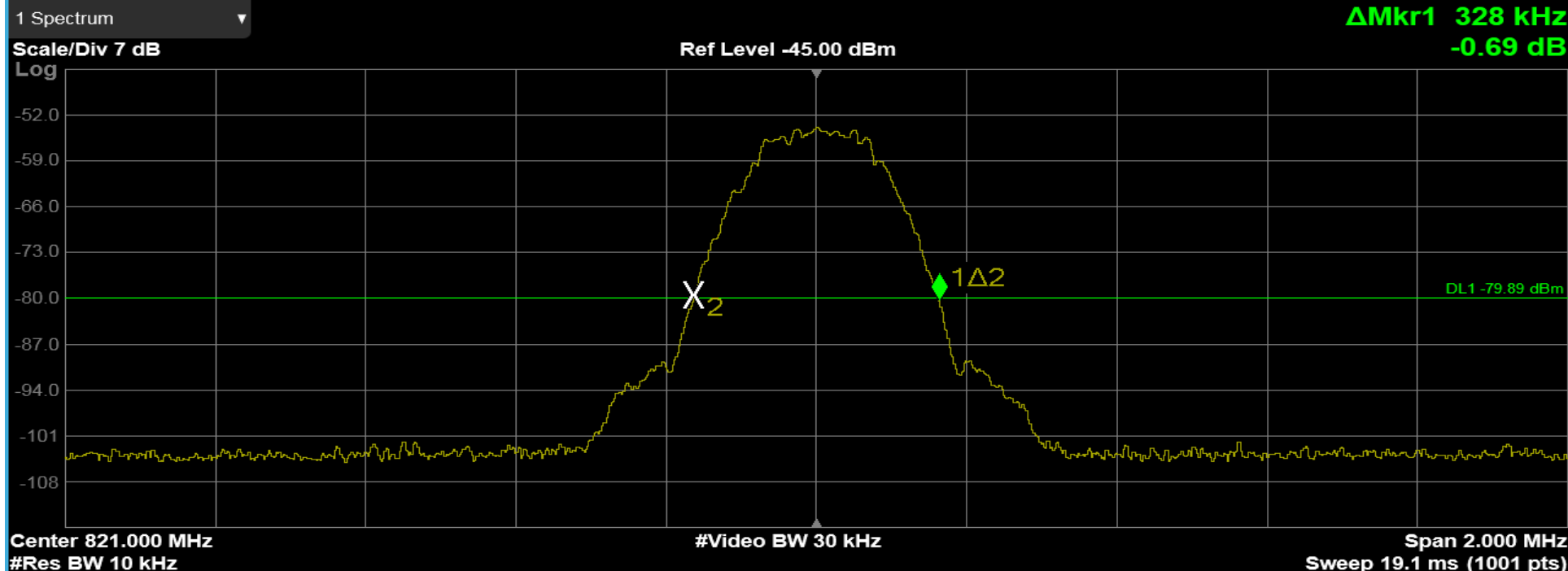


# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Input-v-Output Signal Comparison				
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4		
<b>Test Sample</b>	Bi-Directional Amplifier				
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990		
<b>Operating Mode</b>	Signal Generator GSM Output at 821MHz, AGC Activated				
<b>Test Specification</b>	Nemko Test Plan 317856-2				
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016		
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %				
<b>Notes</b>	Uplink    26dB Bandwidth: <b>328 kHz</b>				

Spectrum Analyzer 1 Swept SA +

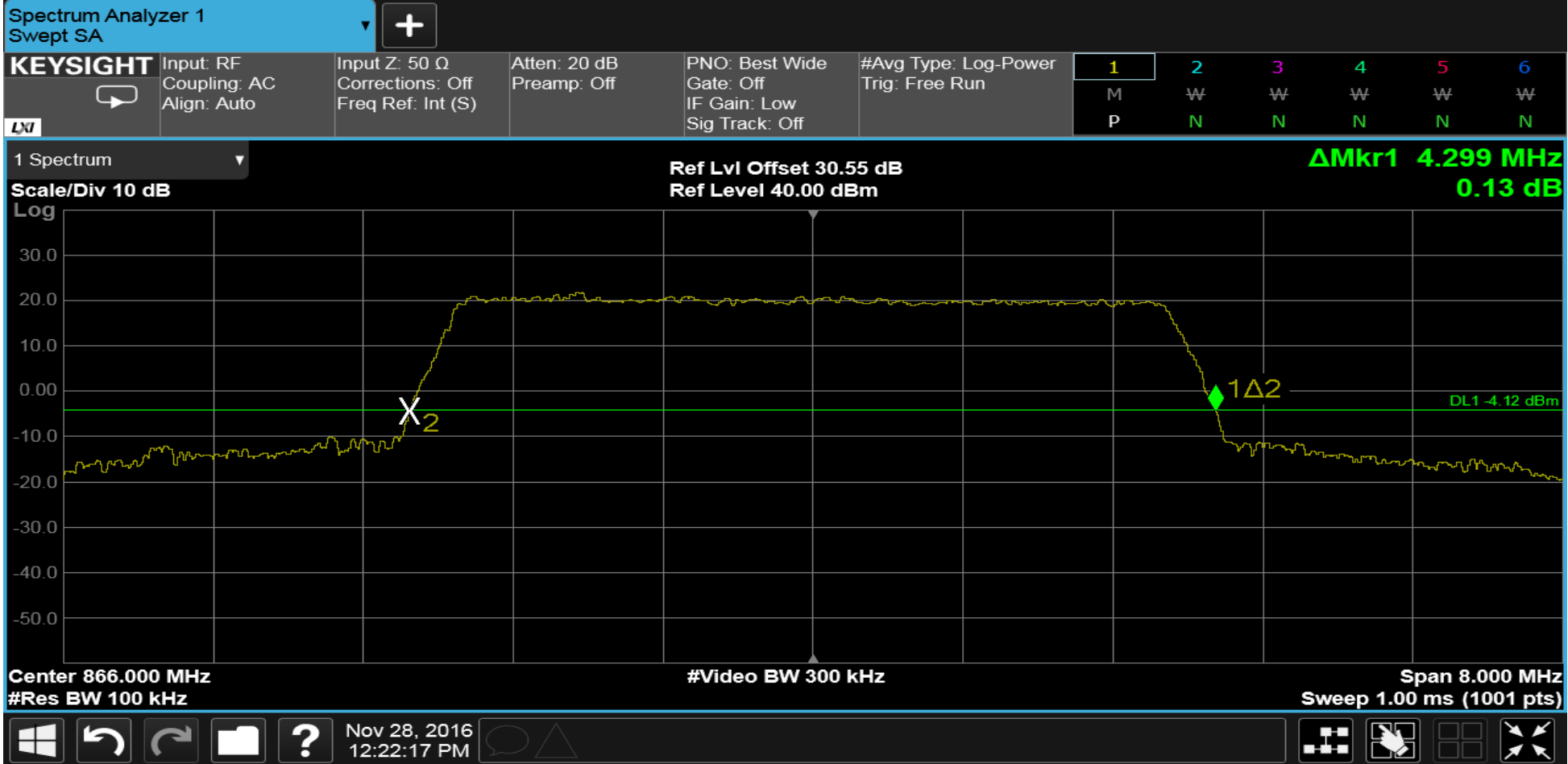
<b>KEYSIGHT</b>	Input: RF Coupling: AC Align: Auto	Input Z: 50 Ω Corrections: Off Freq Ref: Int (S)	#Atten: 0 dB Preamp: Off	PNO: Best Wide Gate: Off IF Gain: High Sig Track: Off	#Avg Type: Log-Power Trig: Free Run	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
						M	W	W	W	W	W
<b>DT</b>						P	N	N	N	N	N



Windows
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Undo
File Explorer
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Nov 28, 2016 12:03:29 PM
Chat
Cursor
Grid
Zoom

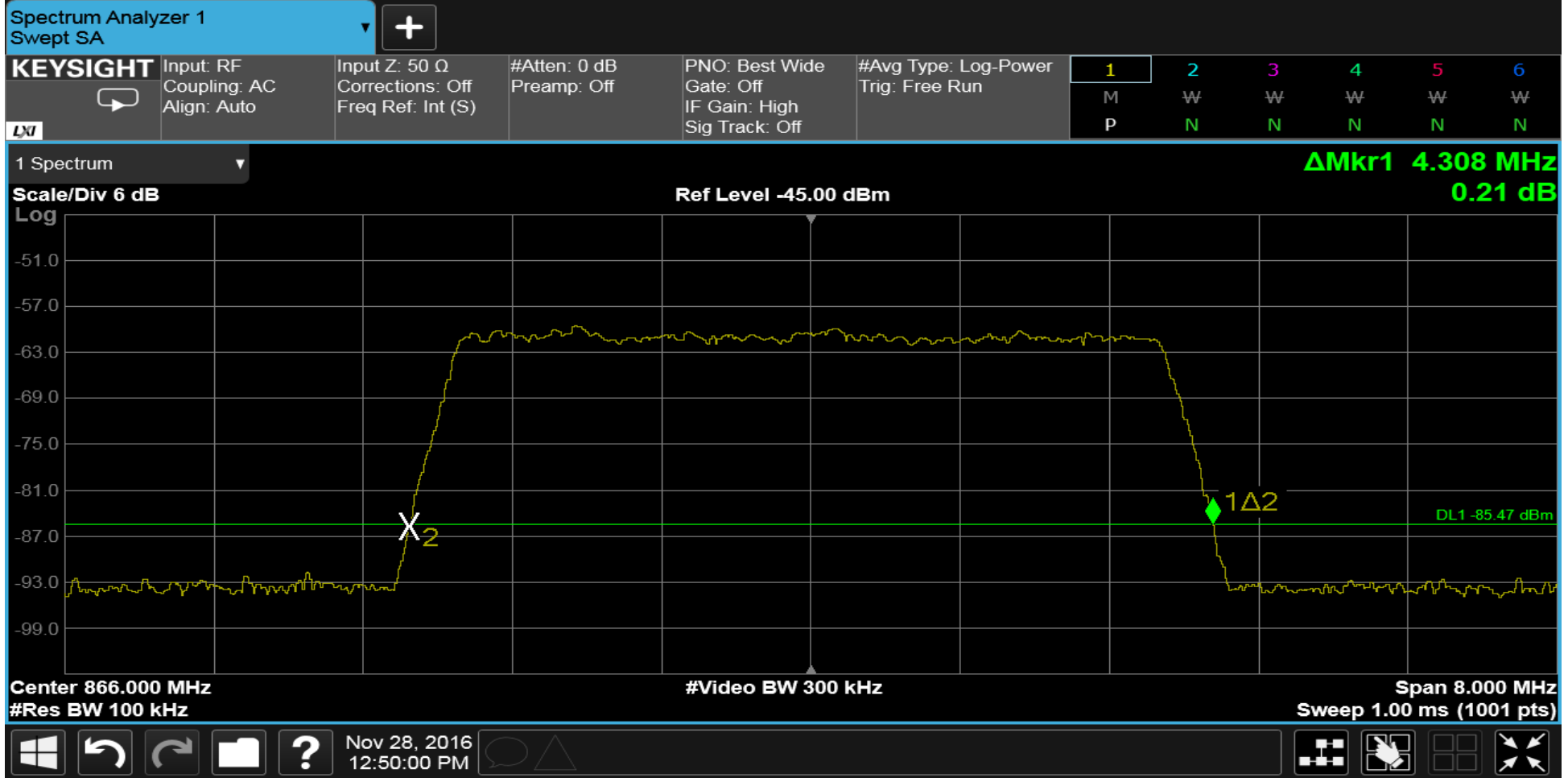
# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Input-v-Output Signal Comparison				
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4		
<b>Test Sample</b>	Bi-Directional Amplifier				
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990		
<b>Operating Mode</b>	Amplifying LTE Signal at 866MHz				
<b>Test Specification</b>	Nemko Test Plan 317856-2				
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016		
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %				
<b>Notes</b>	Downlink    26dB Bandwidth: 4.299MHz				



# RETLIF TESTING LABORATORIES

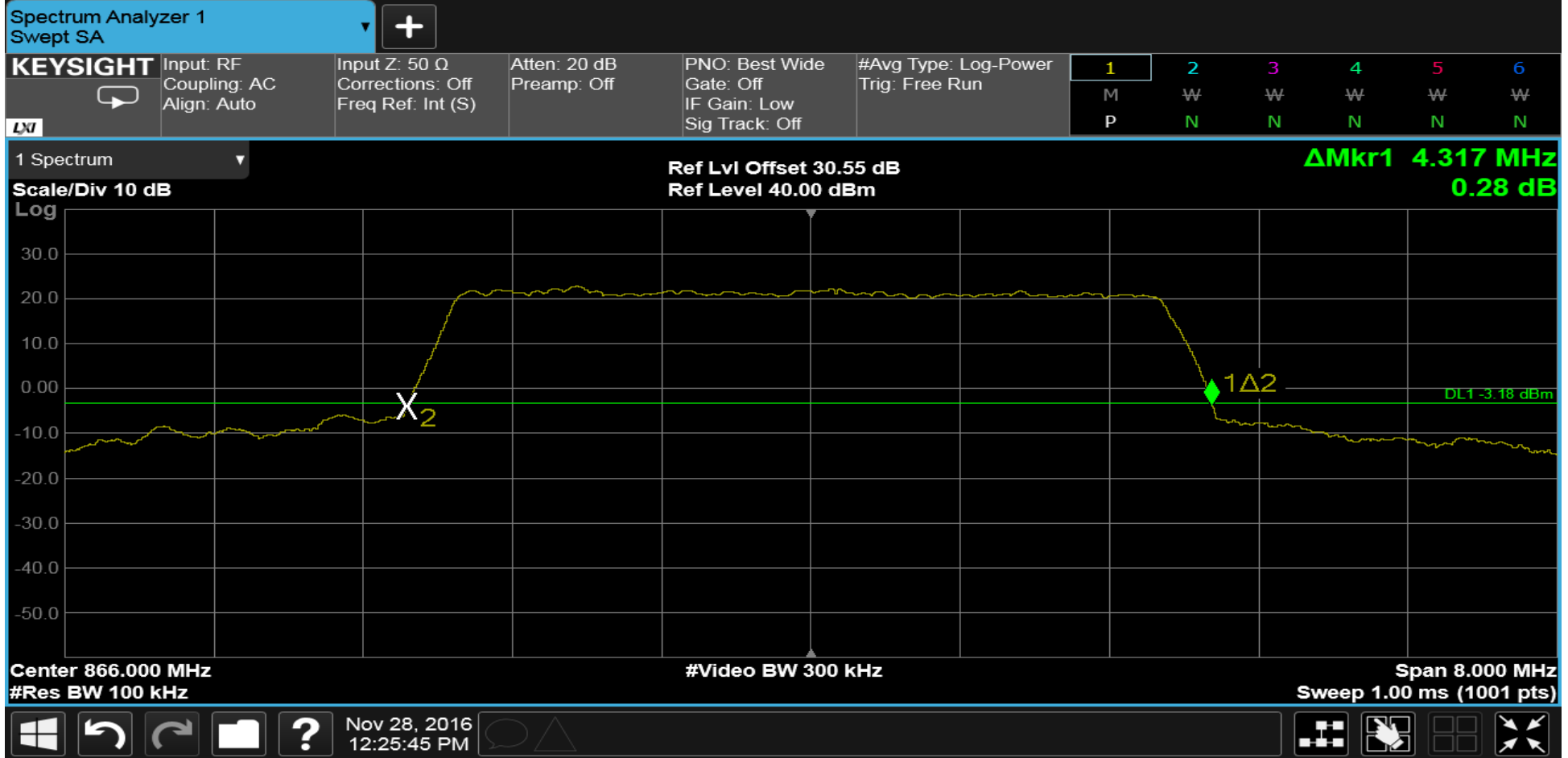
<b>Test Method</b>	Input-v-Output Signal Comparison				
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4		
<b>Test Sample</b>	Bi-Directional Amplifier				
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990		
<b>Operating Mode</b>	Signal Generator LTE Output at 866MHz				
<b>Test Specification</b>	Nemko Test Plan 317856-2				
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016		
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %				
<b>Notes</b>	Downlink    26dB Bandwidth: <b>4.308MHz</b>				





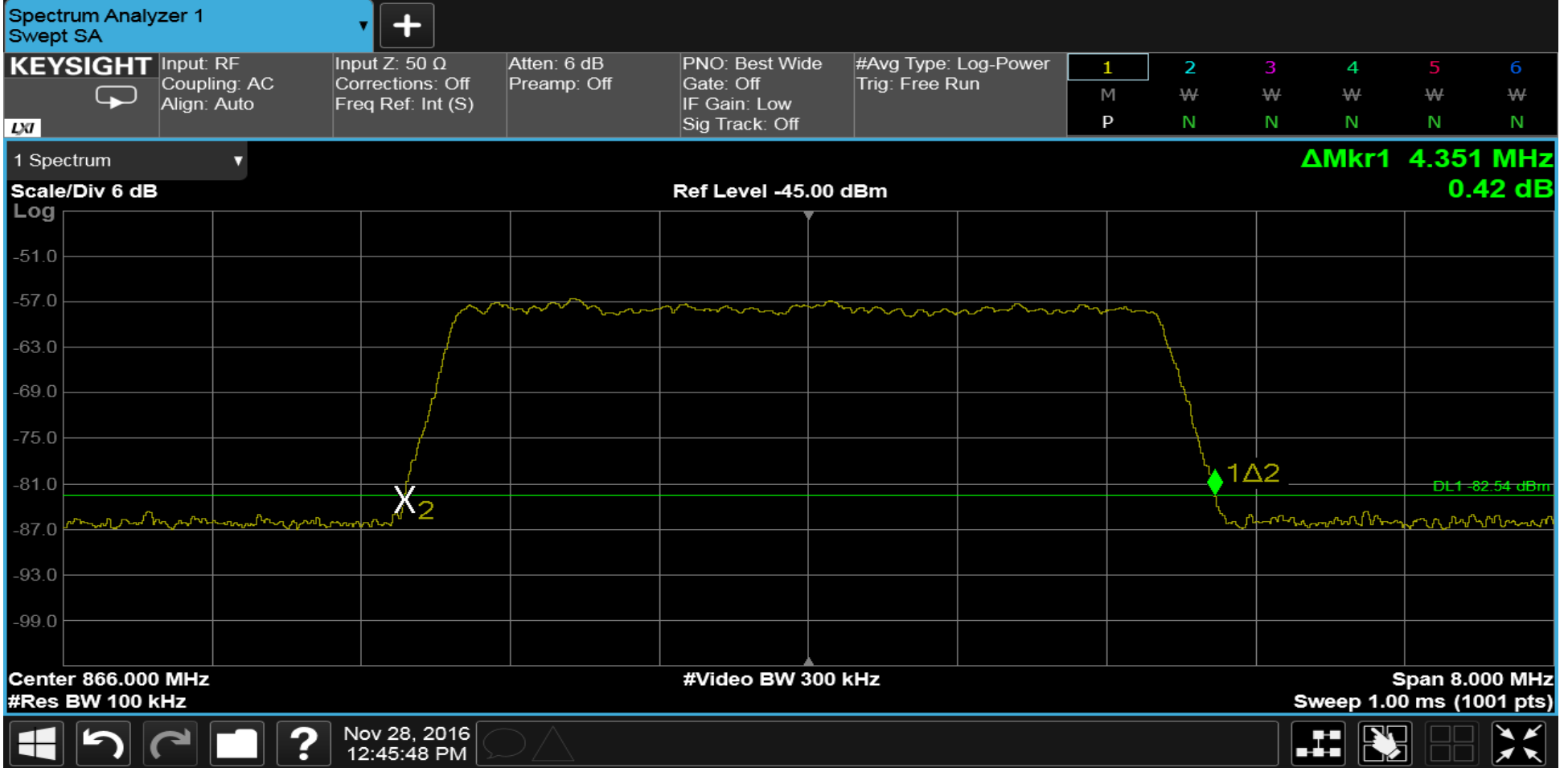
# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Input-v-Output Signal Comparison				
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4		
<b>Test Sample</b>	Bi-Directional Amplifier				
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990		
<b>Operating Mode</b>	Amplifying LTE Signal at 866MHz, AGC Activated				
<b>Test Specification</b>	Nemko Test Plan 317856-2				
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016		
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %				
<b>Notes</b>	Downlink    26dB Bandwidth: <b>4.317MHz</b>				



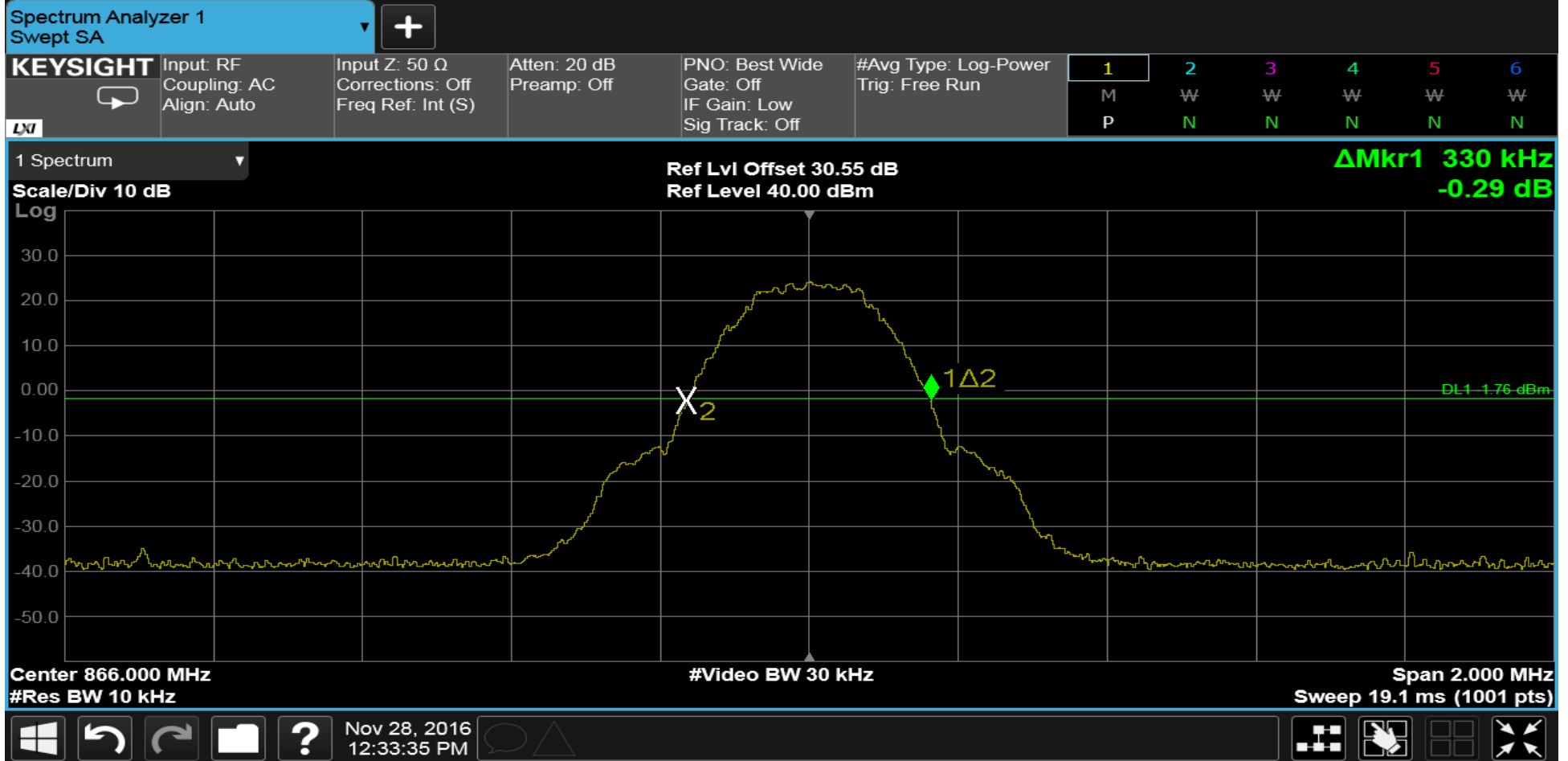
# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Input-v-Output Signal Comparison				
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4		
<b>Test Sample</b>	Bi-Directional Amplifier				
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990		
<b>Operating Mode</b>	Signal Generator LTE Output at 866MHz, AGC Activated				
<b>Test Specification</b>	Nemko Test Plan 317856-2				
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016		
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %				
<b>Notes</b>	Downlink    26dB Bandwidth: <b>4.351MHz</b>				



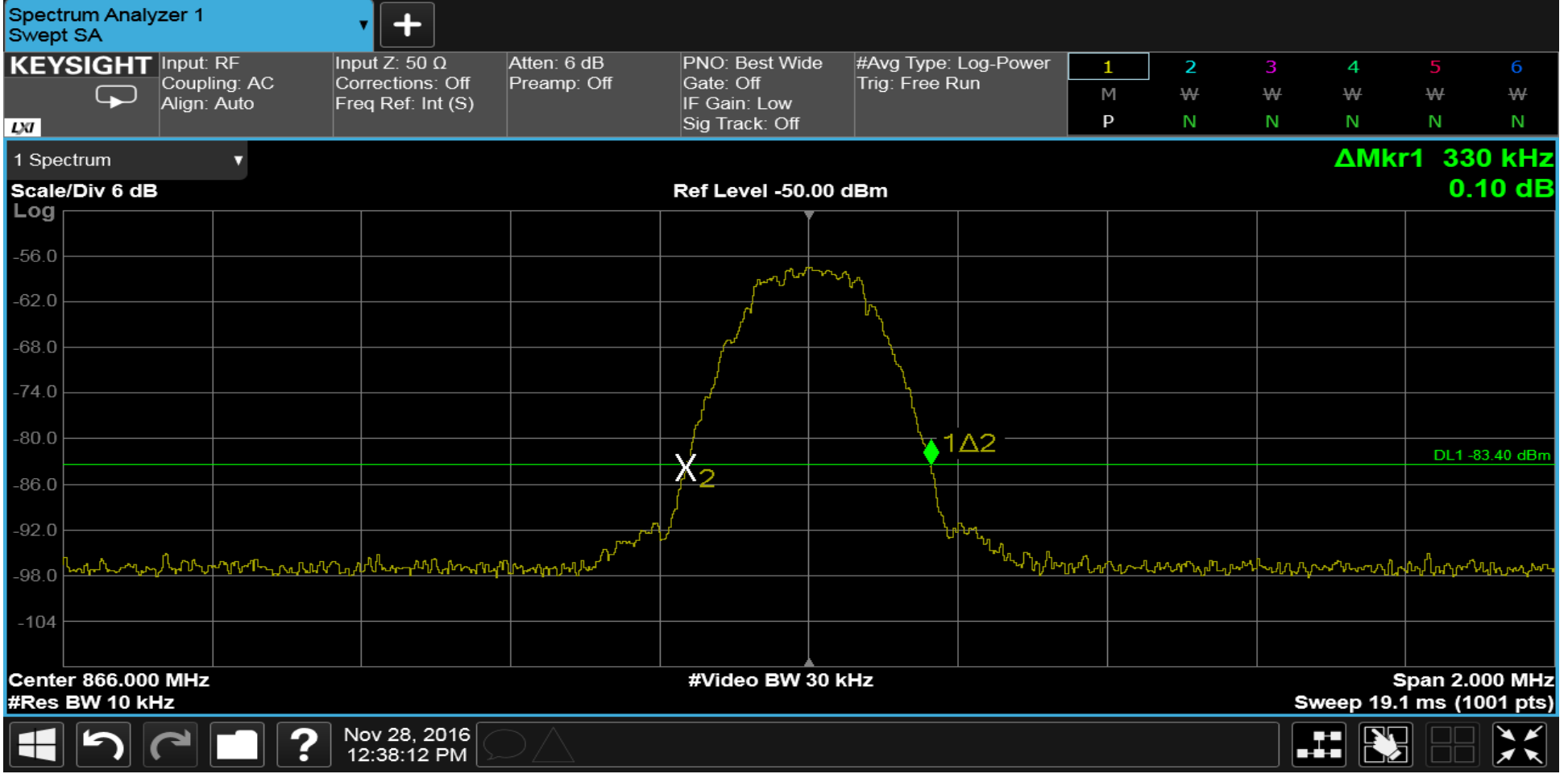
# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Input-v-Output Signal Comparison				
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4		
<b>Test Sample</b>	Bi-Directional Amplifier				
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990		
<b>Operating Mode</b>	Amplifying GSM Signal at 866MHz				
<b>Test Specification</b>	Nemko Test Plan 317856-2				
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016		
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %				
<b>Notes</b>	Downlink    26dB Bandwidth:330kHz				



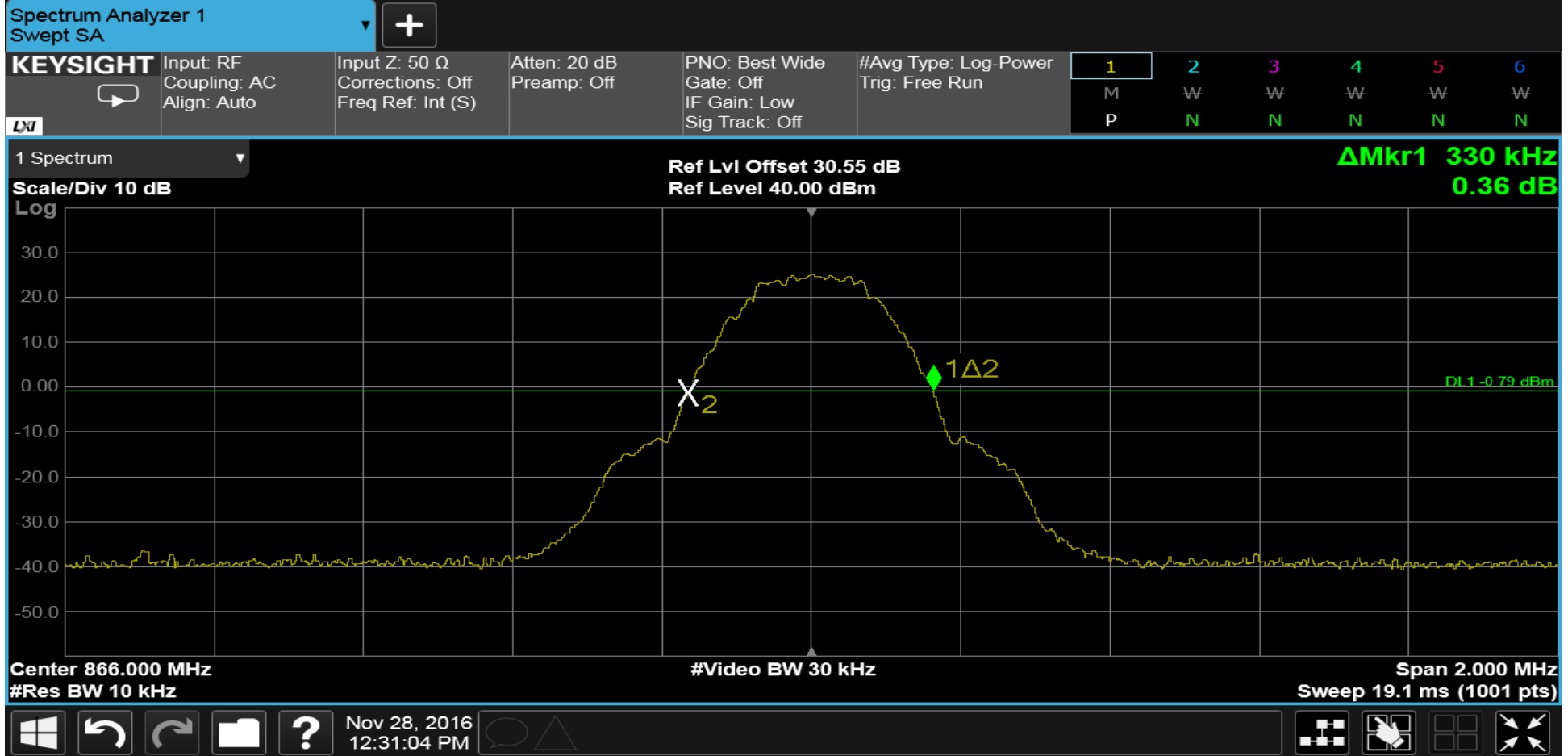
# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Input-v-Output Signal Comparison				
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4		
<b>Test Sample</b>	Bi-Directional Amplifier				
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990		
<b>Operating Mode</b>	Signal Generator GSM Output at 866MHz				
<b>Test Specification</b>	Nemko Test Plan 317856-2				
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016		
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %				
<b>Notes</b>	Downlink    26dB Bandwidth: <b>330kHz</b>				



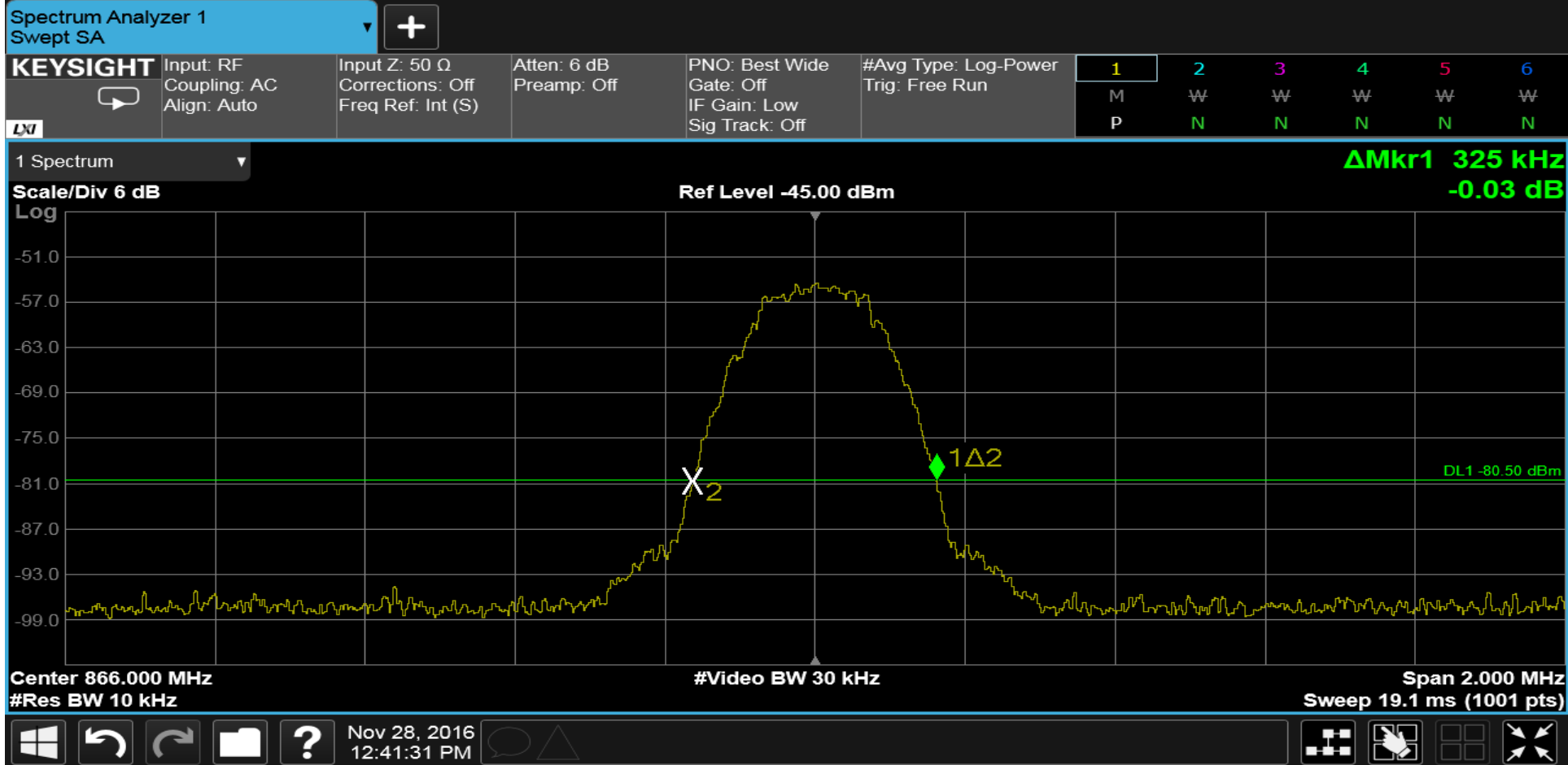
# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Input-v-Output Signal Comparison				
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4		
<b>Test Sample</b>	Bi-Directional Amplifier				
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990		
<b>Operating Mode</b>	Amplifying GSM Signal at 866MHz, AGC Activated				
<b>Test Specification</b>	Nemko Test Plan 317856-2				
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016		
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %				
<b>Notes</b>	Downlink    26dB Bandwidth: 330kHz				



# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Input-v-Output Signal Comparison				
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4		
<b>Test Sample</b>	Bi-Directional Amplifier				
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990		
<b>Operating Mode</b>	Signal Generator GSM Output at 866MHz, AGC Activated				
<b>Test Specification</b>	Nemko Test Plan 317856-2				
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016		
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %				
<b>Notes</b>	Downlink    26dB Bandwidth: <b>330kHz</b>				



**Test Photographs**  
**Mean Output Power and Amplifier/Booster Gain**



Test Setup



**Retlif Testing Laboratories**

Report No. R-6142N-4

**Mean Output Power and Amplifier/Booster Gain  
Test Data**



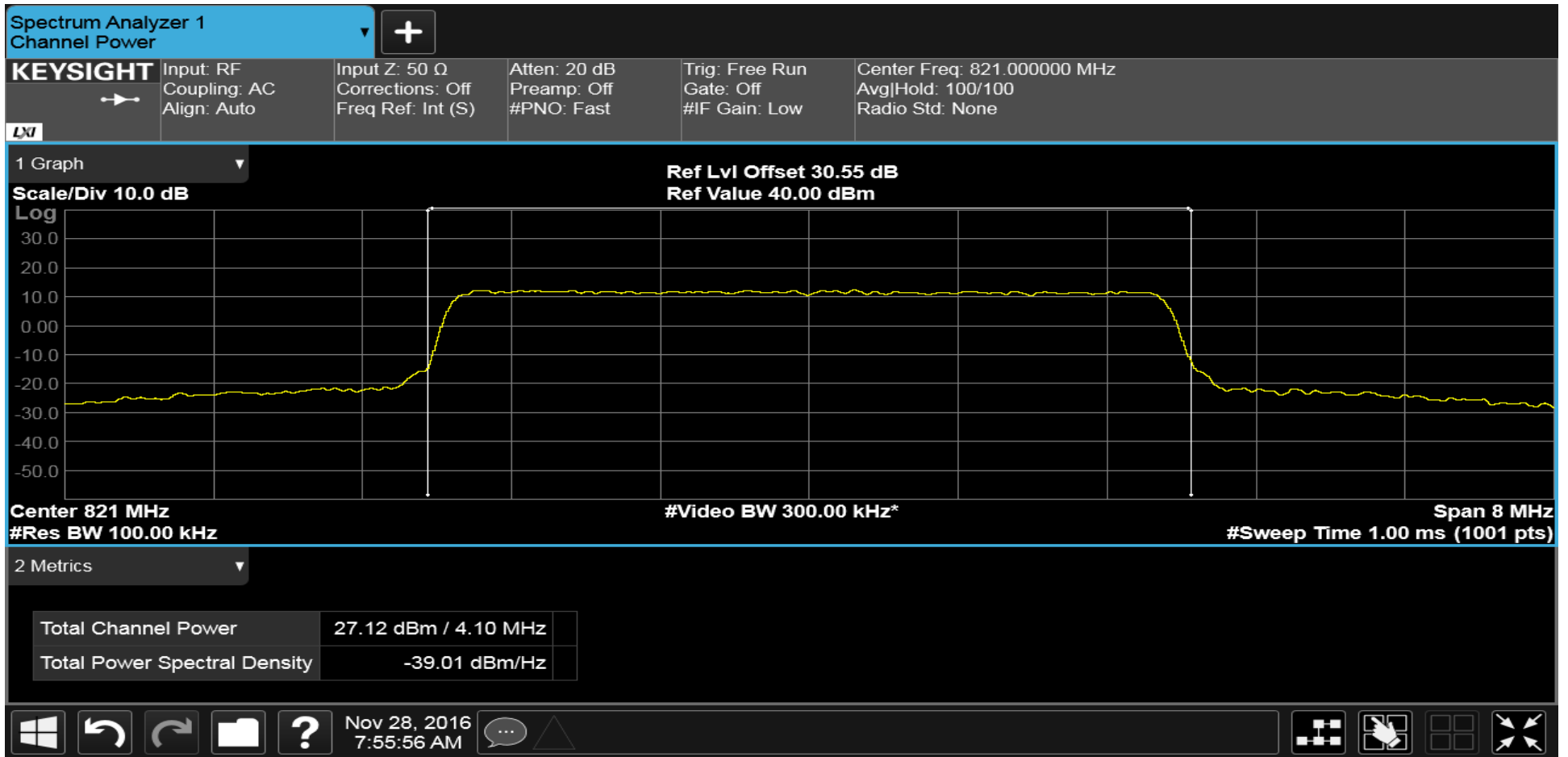
**Retlif Testing Laboratories**

Report No. R-6142N-4



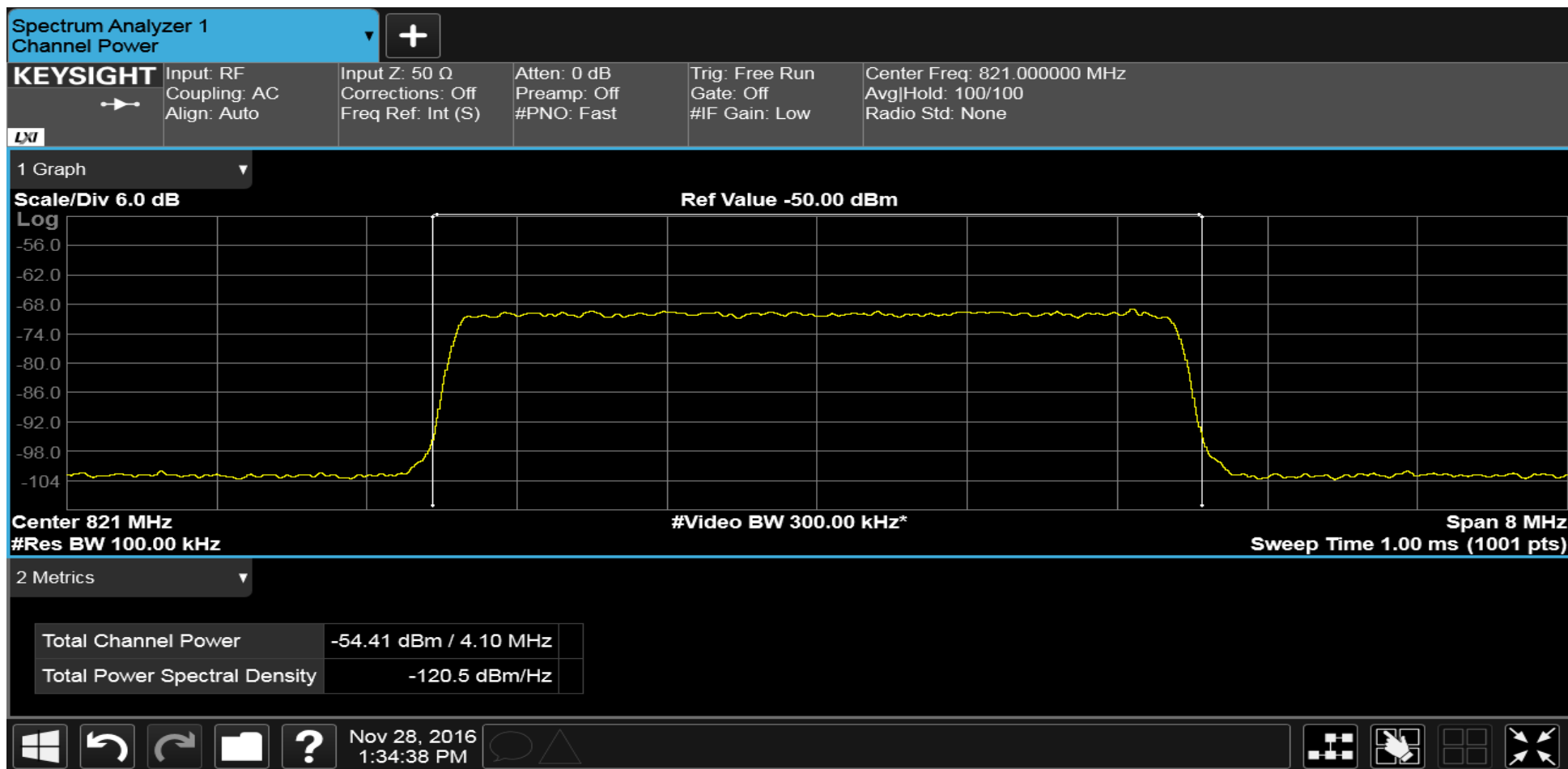
# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Mean Output Power and Amplifier-Booster Gain		
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4
<b>Test Sample</b>	Bi-Directional Amplifier		
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990
<b>Operating Mode</b>	Amplifying LTE signal at 821 MHz		
<b>Test Specification</b>	Nemko Test Plan 317856-2		
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %		
<b>Notes</b>	Uplink    Signal Generator Setting: -54.20dBm ( <b>-54.41dBm</b> measured signal generator output) Amplifier Output: <b>27.12dBm</b> Gain: <b>81.53dB</b>		



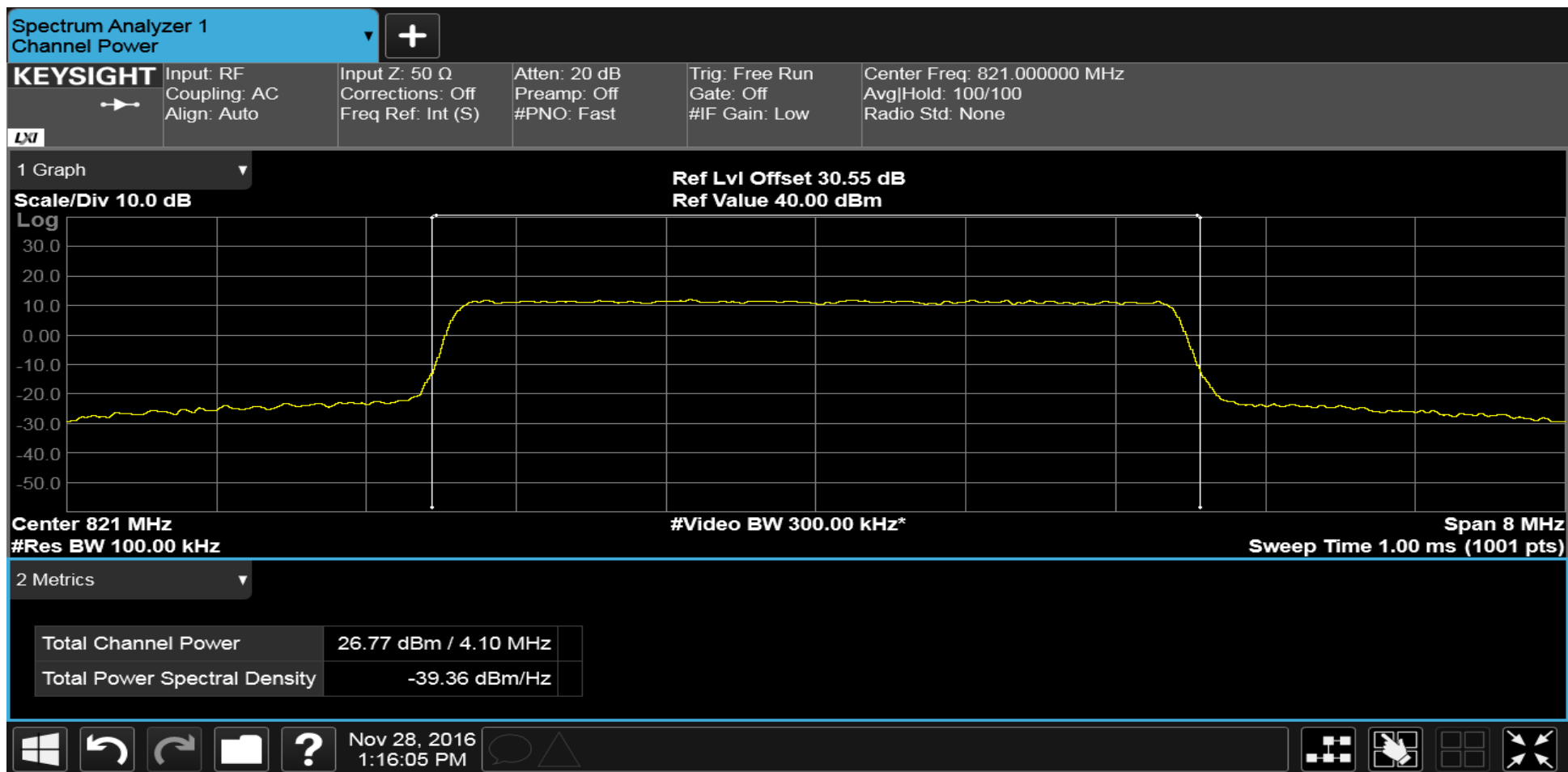
# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Mean Output Power and Amplifier-Booster Gain		
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4
<b>Test Sample</b>	Bi-Directional Amplifier		
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990
<b>Operating Mode</b>	Signal Generator LTE Output at 821MHz		
<b>Test Specification</b>	Nemko Test Plan 317856-2		
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %		
<b>Notes</b>	Signal Generator Setting: -54.20dBm (-54.41dBm measured signal generator output) Amplifier Output: <b>27.12dBm</b> Gain: <b>81.53dB</b>		



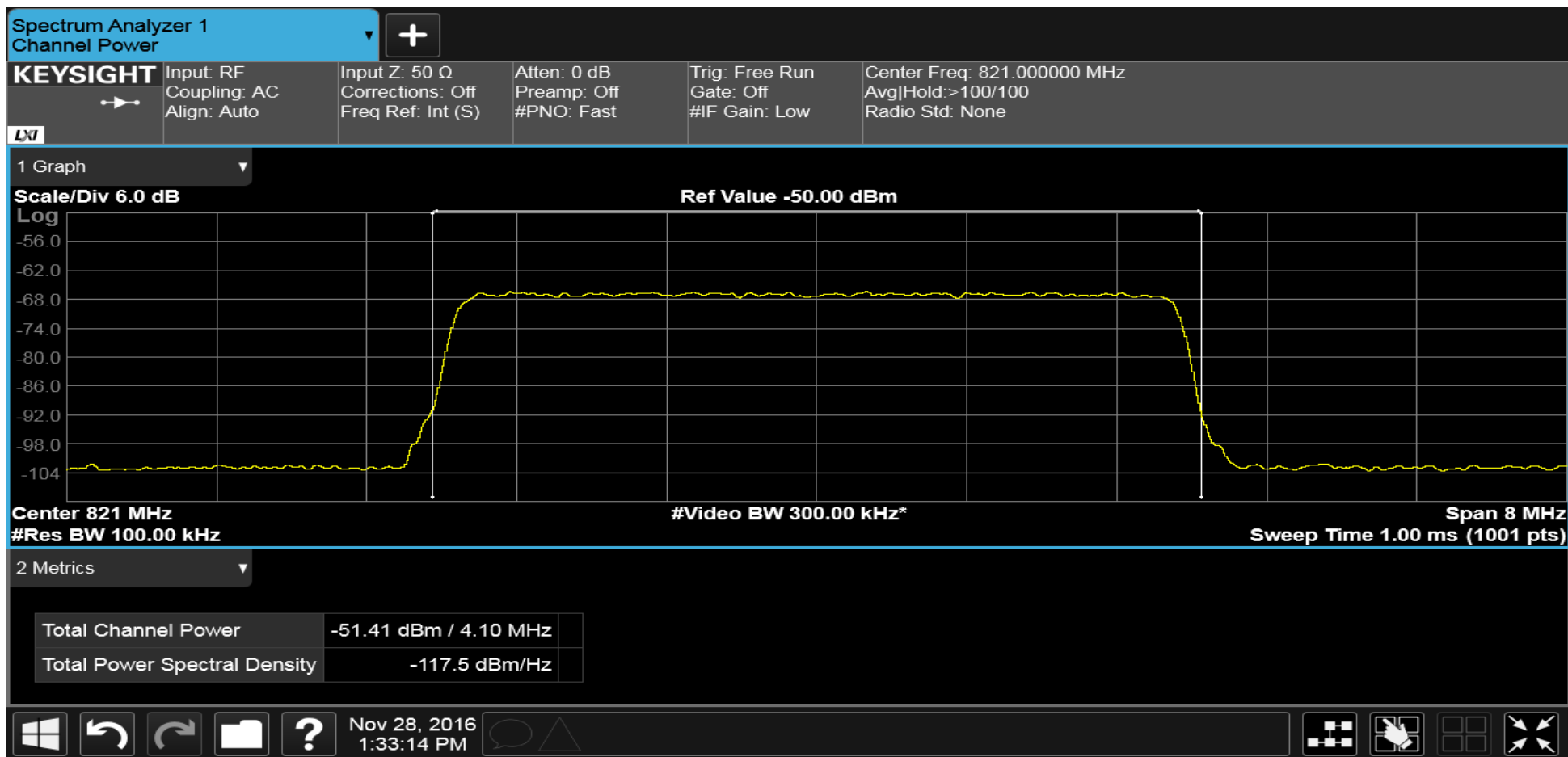
# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Mean Output Power and Amplifier-Booster Gain		
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4
<b>Test Sample</b>	Bi-Directional Amplifier		
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990
<b>Operating Mode</b>	Amplifying LTE signal at 821 MHz, AGC Activated		
<b>Test Specification</b>	Nemko Test Plan 317856-2		
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %		
<b>Notes</b>	Uplink with AGC    Signal Generator Setting: -51.20dBm ( measured signal generator output) Amplifier Output: <b>26.77dBm</b> Gain: <b>78.18dB</b>		



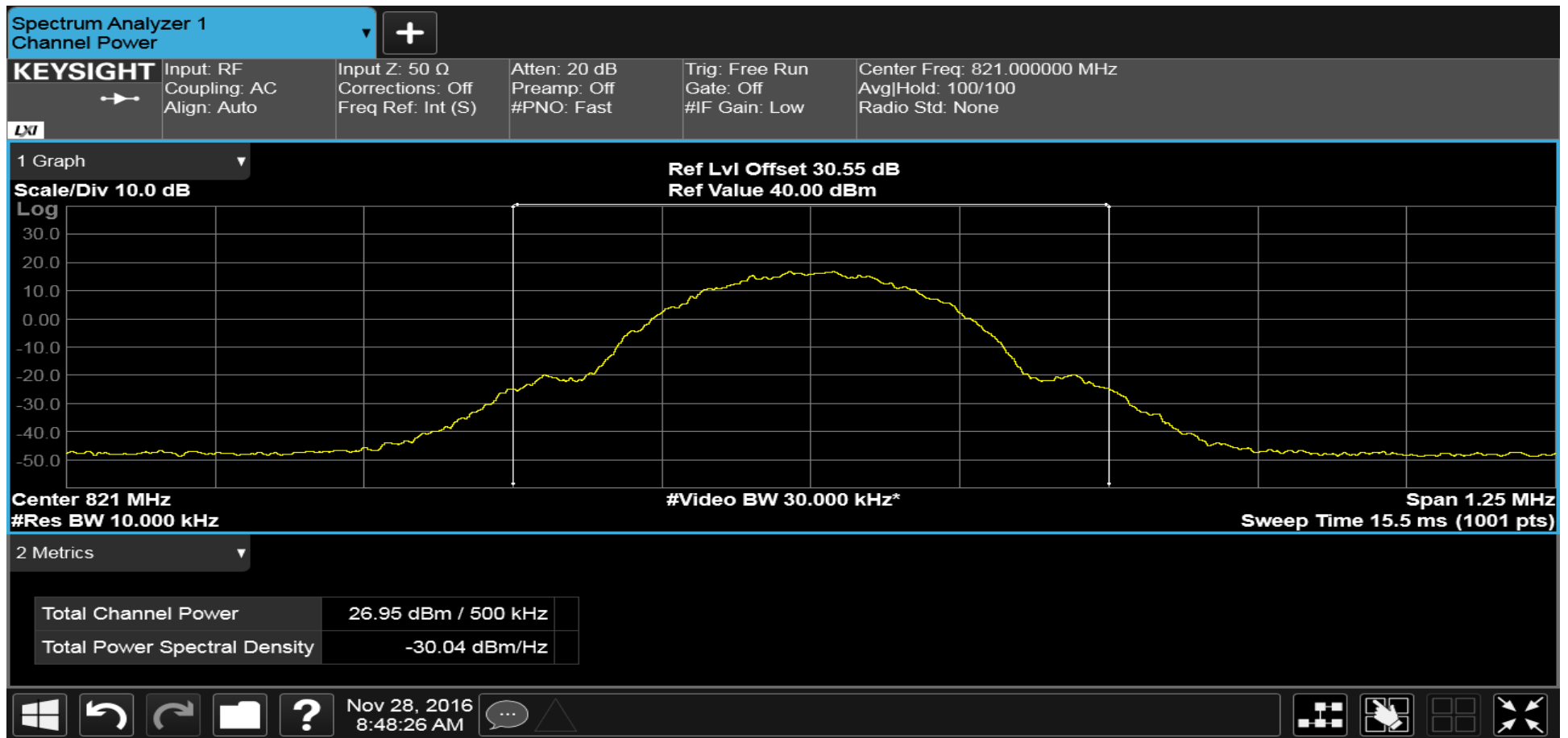
# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Mean Output Power and Amplifier-Booster Gain		
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4
<b>Test Sample</b>	Bi-Directional Amplifier		
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990
<b>Operating Mode</b>	Signal Generator LTE Output at 821MHz, AGC Activated		
<b>Test Specification</b>	Nemko Test Plan 317856-2		
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %		
<b>Notes</b>	Signal Generator Setting: -51.20dBm (-51.41dBm measured signal generator output) Amplifier Output: <b>26.77dBm</b> Gain: <b>78.18dB</b>		



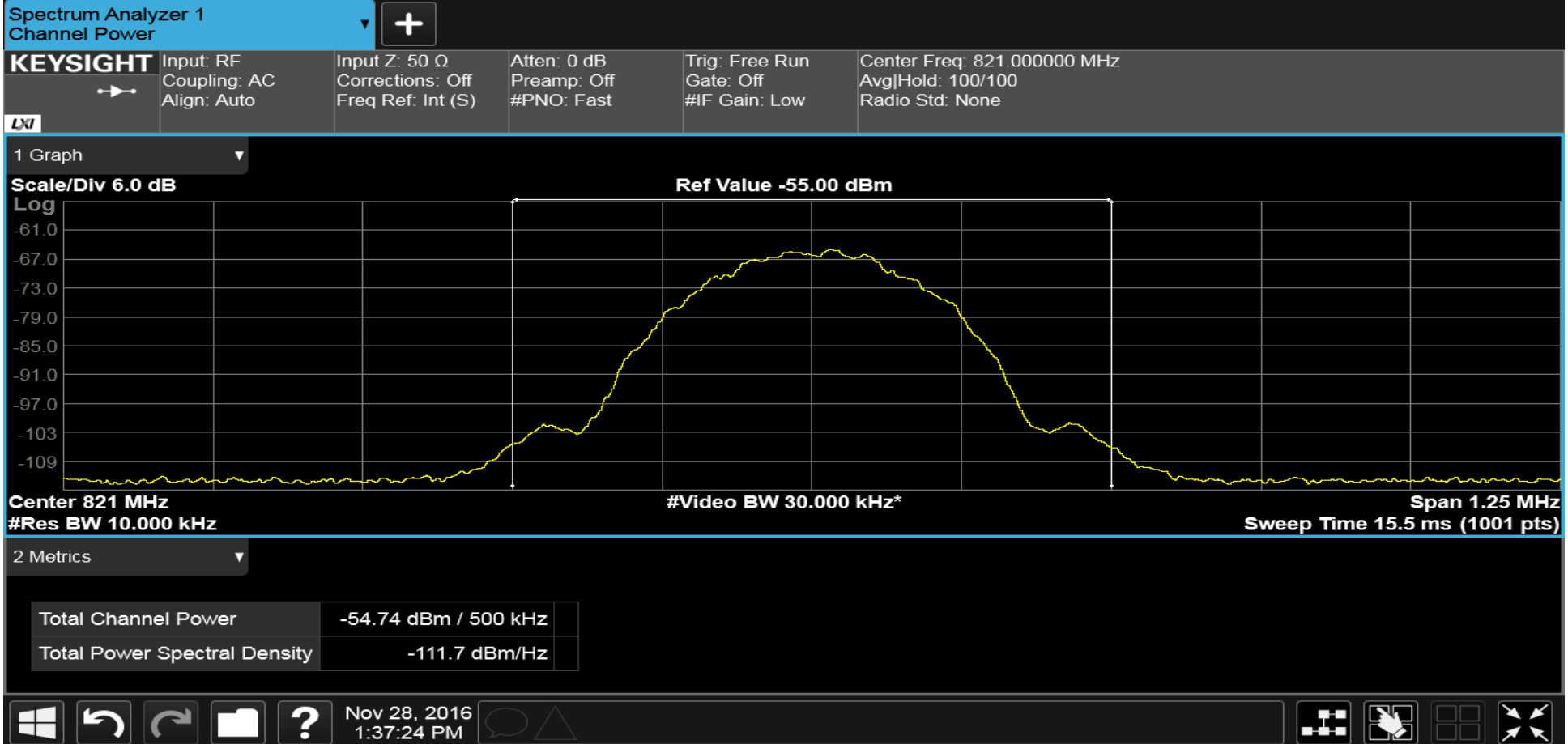
# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Mean Output Power and Amplifier-Booster Gain		
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4
<b>Test Sample</b>	Bi-Directional Amplifier		
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990
<b>Operating Mode</b>	Amplifying GSM signal at 821 MHz		
<b>Test Specification</b>	Nemko Test Plan 317856-2		
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %		
<b>Notes</b>	Uplink    Signal Generator Setting: -54.30dBm (-54.74dBm measured signal generator output) Amplifier Output: <b>26.95dBm</b> Gain: <b>81.69dB</b>		



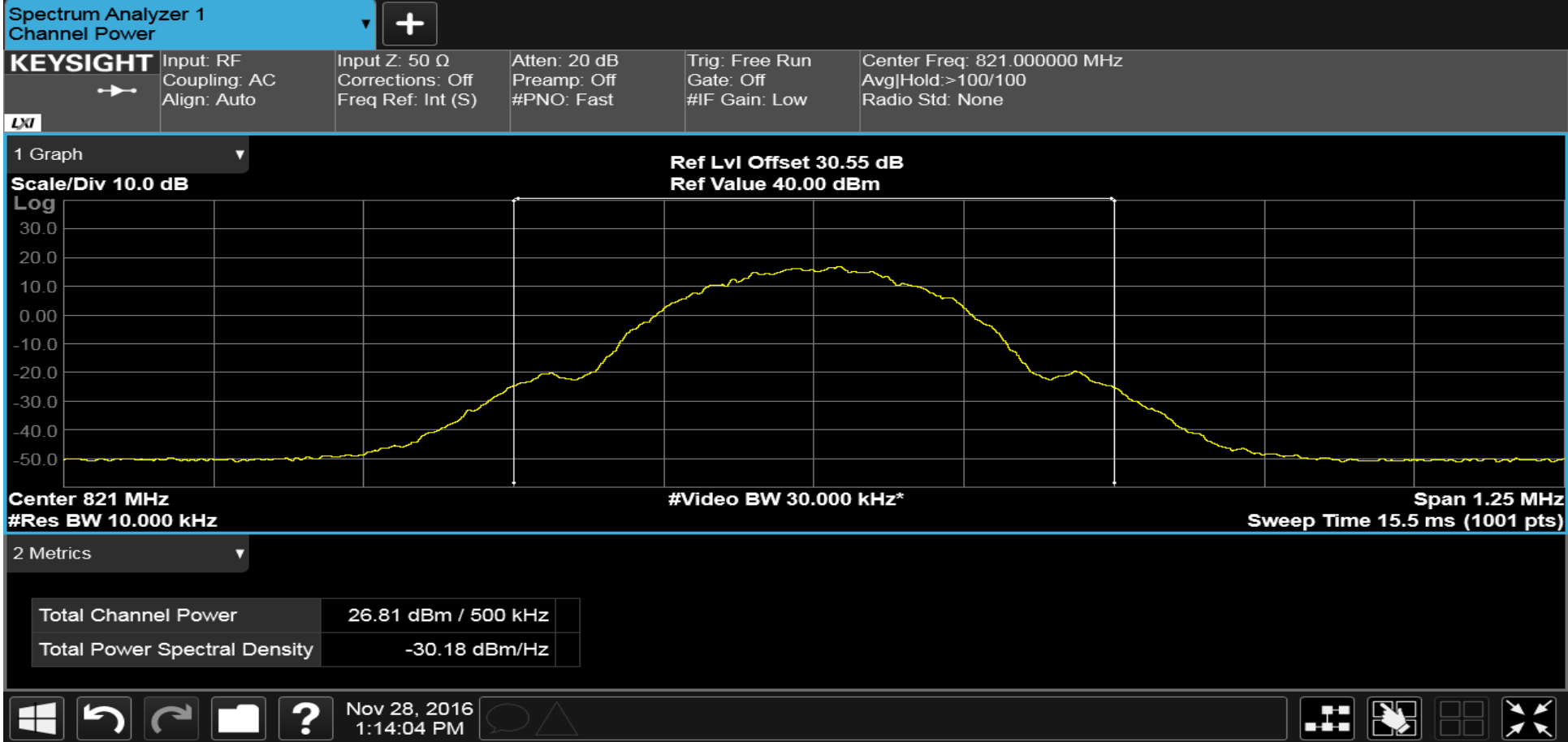
# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Mean Output Power and Amplifier-Booster Gain		
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4
<b>Test Sample</b>	Bi-Directional Amplifier		
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990
<b>Operating Mode</b>	Signal Generator GSM Output at 821MHz		
<b>Test Specification</b>	Nemko Test Plan 317856-2		
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %		
<b>Notes</b>	Signal Generator Setting: -54.30dBm (-54.74dBm measured signal generator output) Amplifier Output: <b>26.95dBm</b> Gain: <b>81.69dB</b>		



# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Mean Output Power and Amplifier-Booster Gain		
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4
<b>Test Sample</b>	Bi-Directional Amplifier		
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990
<b>Operating Mode</b>	Amplifying GSM signal at 821 MHz, AGC Activated		
<b>Test Specification</b>	Nemko Test Plan 317856-2		
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %		
<b>Notes</b>	Uplink with AGC    Signal Generator Setting: -51.30dBm (-51.68dBm measured signal generator output) Amplifier Output: <b>26.81dBm</b> Gain: <b>78.49dB</b>		



# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Mean Output Power and Amplifier-Booster Gain		
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4
<b>Test Sample</b>	Bi-Directional Amplifier		
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990
<b>Operating Mode</b>	Signal Generator GSM Output at 821MHz, AGC Activated		
<b>Test Specification</b>	Nemko Test Plan 317856-2		
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %		
<b>Notes</b>	Signal Generator Setting: -51.30dBm (-51.68dBm measured signal generator output) Amplifier Output: <b>26.81dBm</b> Gain: <b>78.49dB</b>		

Spectrum Analyzer 1  
Channel Power

KEYSIGHT

Input: RF Coupling: AC Align: Auto	Input Z: 50 Ω Corrections: Off Freq Ref: Int (S)	Atten: 0 dB Preamp: Off #PNO: Fast	Trig: Free Run Gate: Off #IF Gain: Low	Center Freq: 821.000000 MHz Avg Hold: 100/100 Radio Std: None
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1 Graph

Scale/Div 7.0 dB

Log

Ref Value -50.00 dBm

Span 1.25 MHz

Center 821 MHz

#Video BW 30.000 kHz\*

Sweep Time 15.5 ms (1001 pts)

2 Metrics

Total Channel Power	-51.68 dBm / 500 kHz
Total Power Spectral Density	-108.7 dBm/Hz

Windows
Refresh
Home
Help

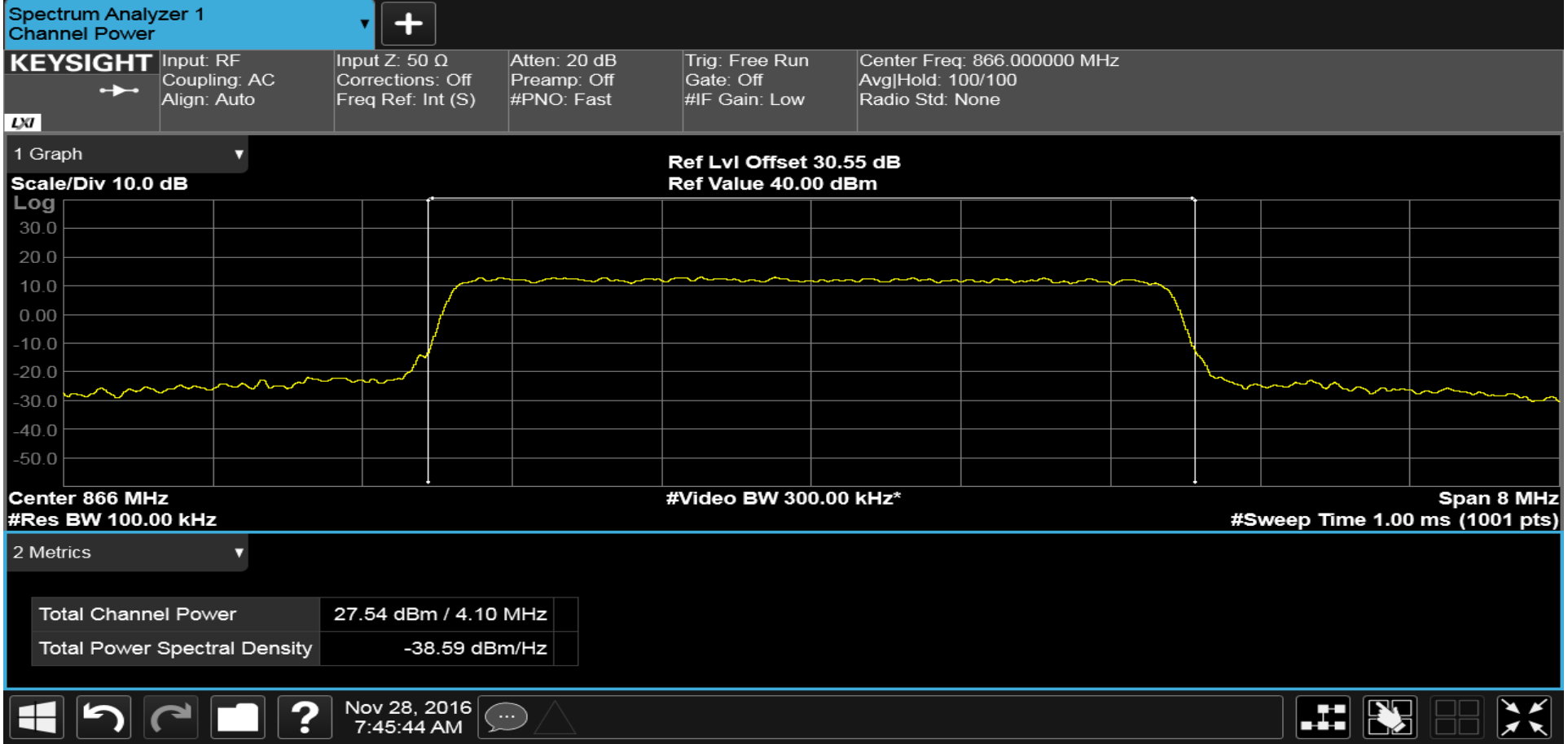
Nov 28, 2016  
1:38:58 PM

Grid
Zoom
Zoom In
Zoom Out



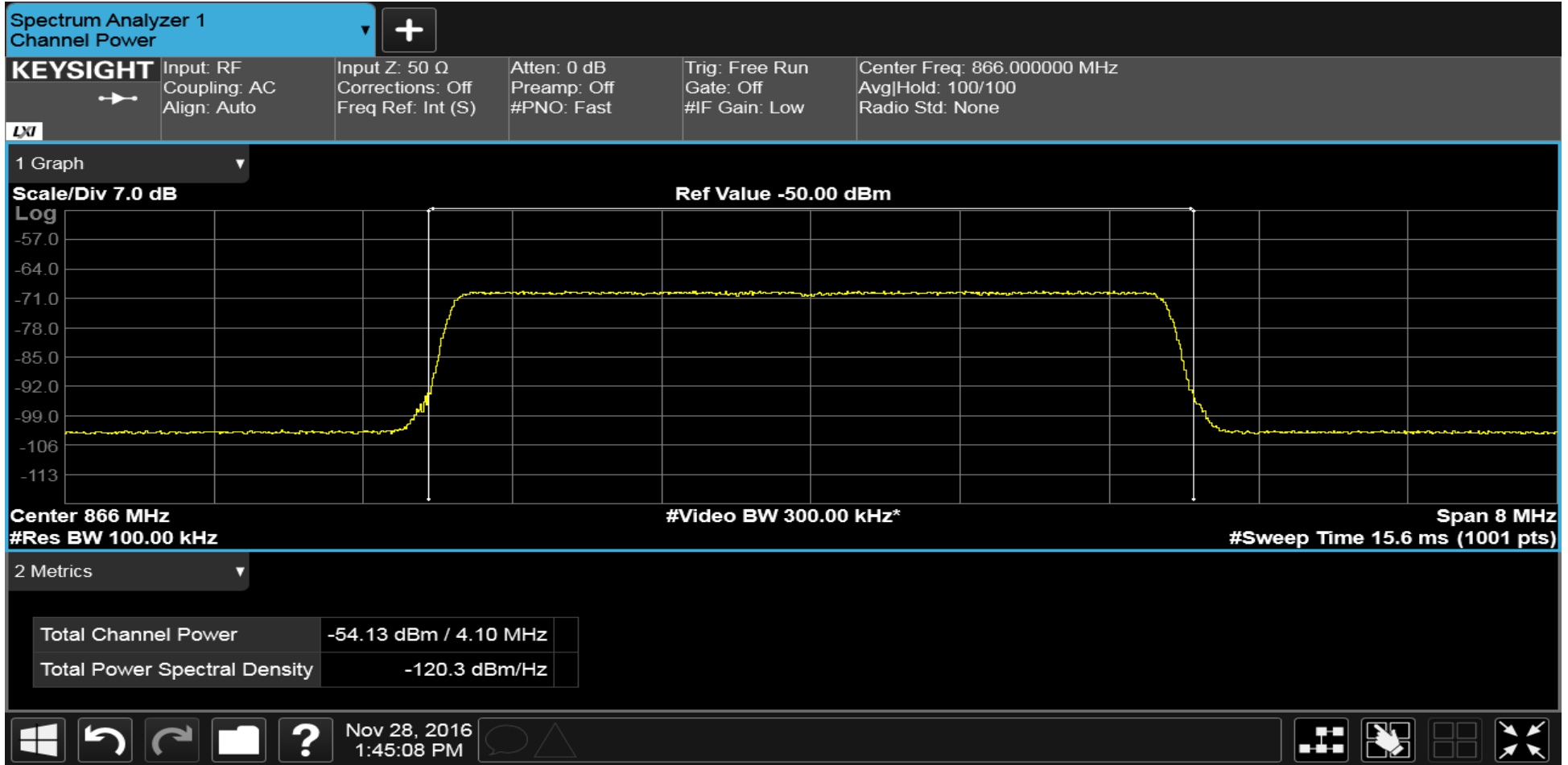
# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Mean Output Power and Amplifier-Booster Gain		
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4
<b>Test Sample</b>	Bi-Directional Amplifier		
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990
<b>Operating Mode</b>	Amplifying LTE signal at 866 MHz		
<b>Test Specification</b>	Nemko Test Plan 317856-2		
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %		
<b>Notes</b>	Downlink    Signal Generator Setting: -54.00dBm (-54.13dBm measured signal generator output) Amplifier Output: <b>27.54dBm</b> Gain: <b>81.67dB</b>		



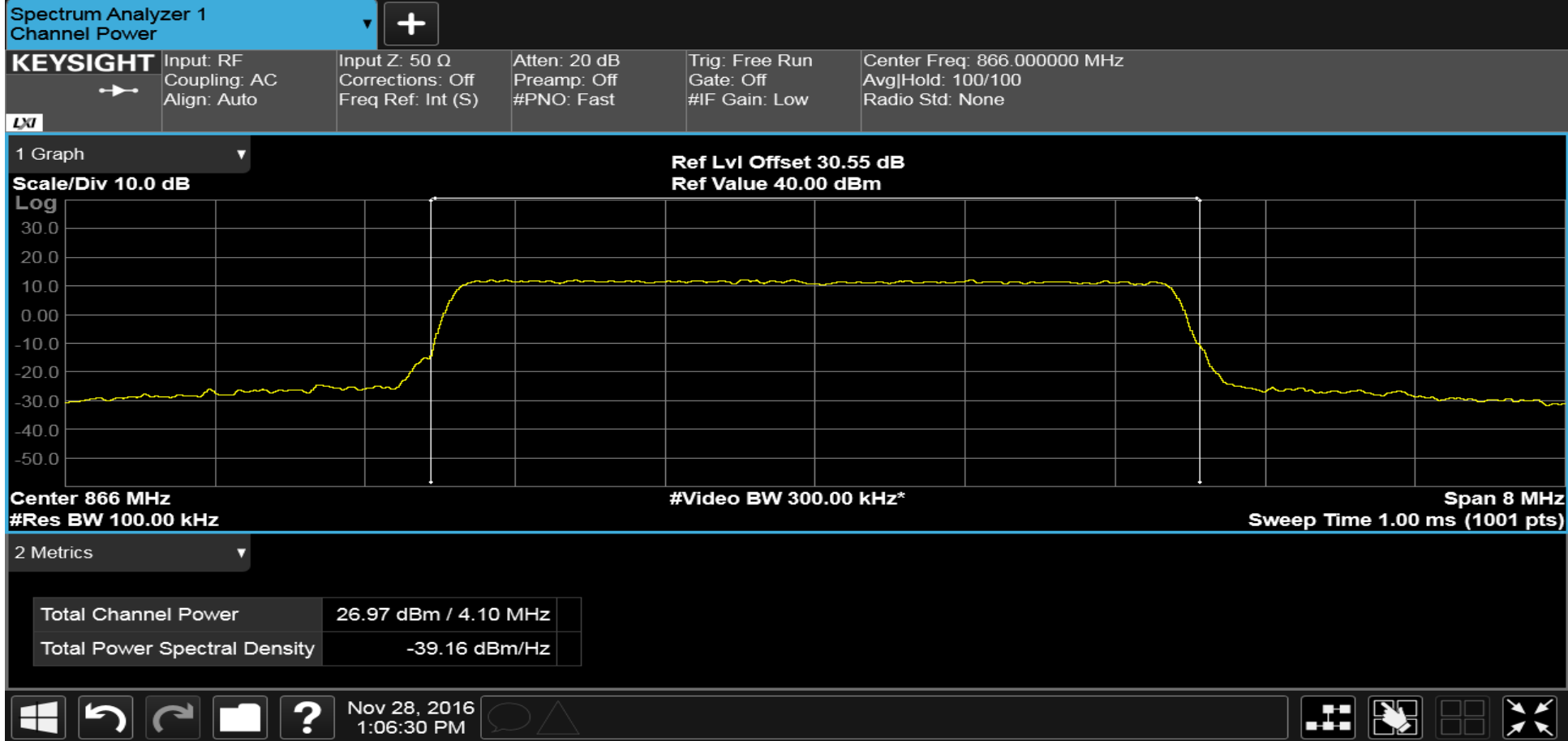
# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Mean Output Power and Amplifier-Booster Gain		
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4
<b>Test Sample</b>	Bi-Directional Amplifier		
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990
<b>Operating Mode</b>	Signal Generator LTE Output at 866MHz		
<b>Test Specification</b>	Nemko Test Plan 317856-2		
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %		
<b>Notes</b>	Signal Generator Setting: -54.00dBm (-54.13dBm measured signal generator output) Amplifier Output: <b>27.54dBm</b> Gain: <b>81.67dB</b>		



# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Mean Output Power and Amplifier-Booster Gain		
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4
<b>Test Sample</b>	Bi-Directional Amplifier		
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990
<b>Operating Mode</b>	Amplifying LTE signal at 866 MHz, AGC Activated		
<b>Test Specification</b>	Nemko Test Plan 317856-2		
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %		
<b>Notes</b>	Downlink with AGC    Signal Generator Setting: -51.00dBm (-51.13dBm measured signal generator output) Amplifier Output: <b>26.97dBm</b> Gain: <b>78.10dB</b>		



# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Mean Output Power and Amplifier-Booster Gain		
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4
<b>Test Sample</b>	Bi-Directional Amplifier		
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990
<b>Operating Mode</b>	Signal Generator LTE Output at 866MHz, AGC Activated		
<b>Test Specification</b>	Nemko Test Plan 317856-2		
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %		
<b>Notes</b>	Signal Generator Setting: -51.00dBm (-51.13dBm measured signal generator output) Amplifier Output: <b>26.97dBm</b> Gain: <b>78.10dB</b>		

Spectrum Analyzer 1 Channel Power +

<b>KEYSIGHT</b>	Input: RF Coupling: AC Align: Auto	Input Z: 50 Ω Corrections: Off Freq Ref: Int (S)	Atten: 0 dB Preamp: Off #PNO: Fast	Trig: Free Run Gate: Off #IF Gain: Low	Center Freq: 866.000000 MHz Avg/Hold: 100/100 Radio Std: None
-----------------	--	--	--	--	---

1 Graph

Scale/Div 7.0 dB      Ref Value -50.00 dBm

Center 866 MHz	#Video BW 300.00 kHz*	Span 8 MHz
#Res BW 100.00 kHz		#Sweep Time 15.6 ms (1001 pts)

2 Metrics

Total Channel Power	-51.13 dBm / 4.10 MHz
Total Power Spectral Density	-117.3 dBm/Hz

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# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Mean Output Power and Amplifier-Booster Gain		
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4
<b>Test Sample</b>	Bi-Directional Amplifier		
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990
<b>Operating Mode</b>	Amplifying GSM signal at 866 MHz		
<b>Test Specification</b>	Nemko Test Plan 317856-2		
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %		
<b>Notes</b>	Downlink    Signal Generator Setting: -53.70dBm (-53.95dBm measured signal generator output) Amplifier Output: <b>27.31dBm</b> Gain: <b>81.26dB</b>		

Spectrum Analyzer 1  
Channel Power

**KEYSIGHT**

Input: RF  
Coupling: AC  
Align: Auto

Input Z: 50 Ω  
Corrections: Off  
Freq Ref: Int (S)

Atten: 20 dB  
Preamp: Off  
#PNO: Fast

Trig: Free Run  
Gate: Off  
#IF Gain: Low

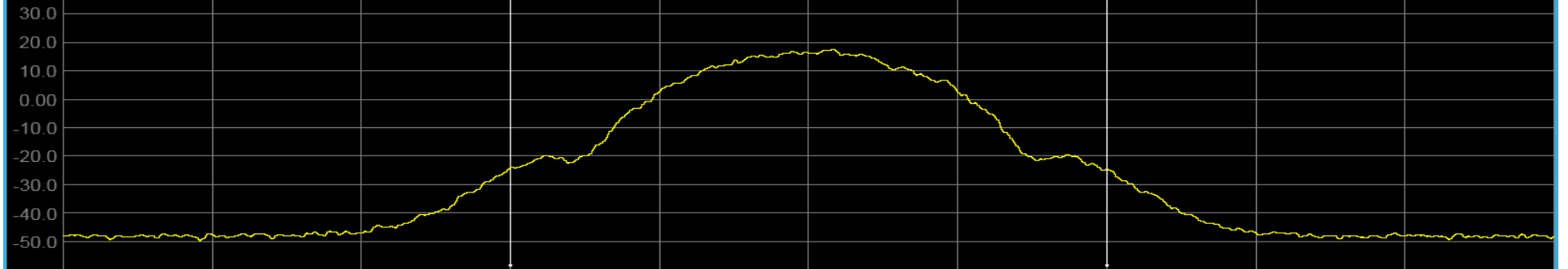
Center Freq: 866.000000 MHz  
Avg|Hold: 100/100  
Radio Std: None

**L1**

1 Graph

Scale/Div 10.0 dB

Log



Center 866 MHz

#Res BW 10.000 kHz

#Video BW 30.000 kHz\*

Span 1.25 MHz  
Sweep Time 15.5 ms (1001 pts)

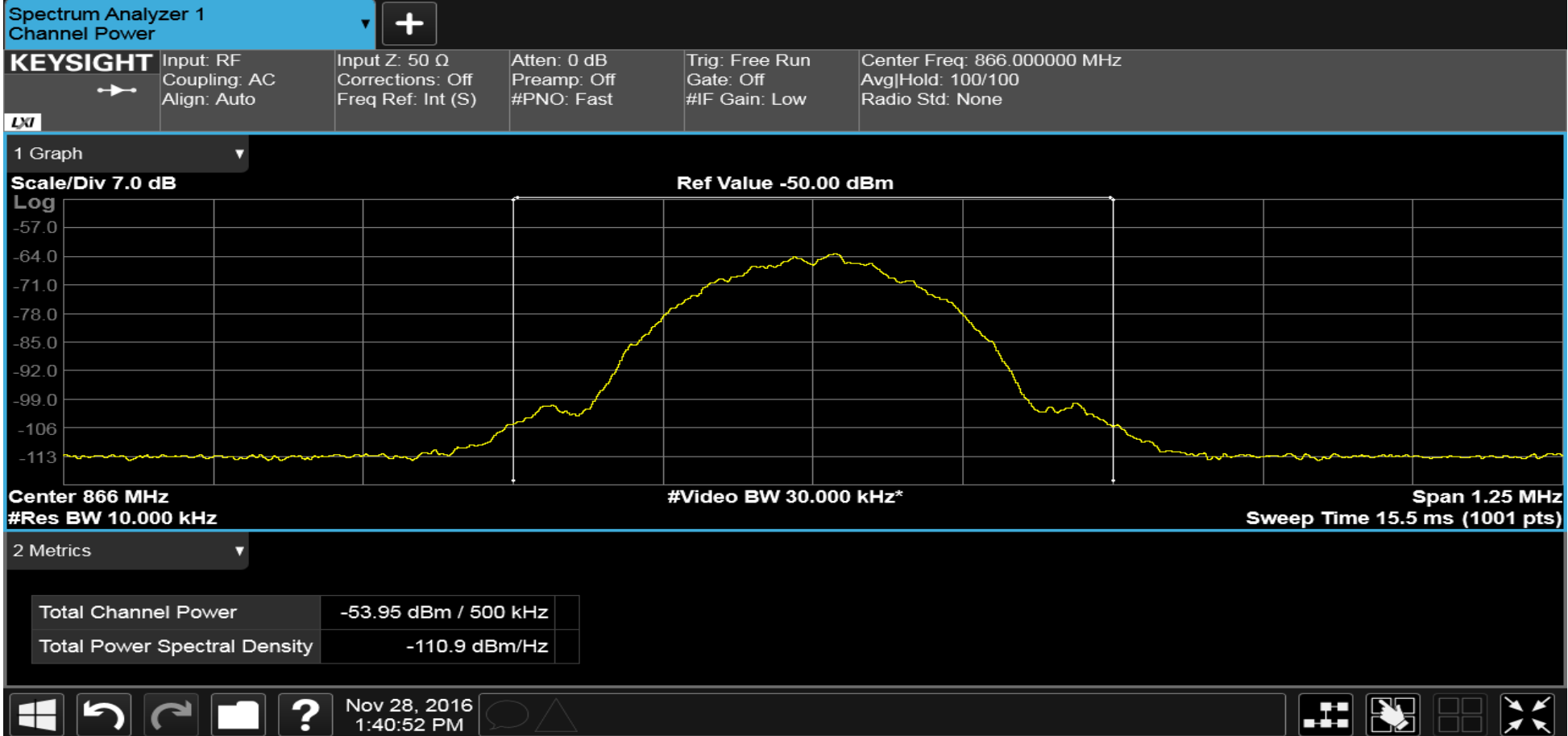
2 Metrics

Total Channel Power	27.31 dBm / 500 kHz
Total Power Spectral Density	-29.68 dBm/Hz

Windows
Refresh
Undo
Save
Help
Nov 28, 2016 9:01:04 AM
Chat
Home
Grid
Zoom

# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Mean Output Power and Amplifier-Booster Gain		
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4
<b>Test Sample</b>	Bi-Directional Amplifier		
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990
<b>Operating Mode</b>	Signal Generator GSM Output at 866MHz		
<b>Test Specification</b>	Nemko Test Plan 317856-2		
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %		
<b>Notes</b>	Signal Generator Setting: -53.70dBm (-53.95dBm measured signal generator output) Amplifier Output: <b>27.31dBm</b> Gain: <b>81.26dB</b>		



# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Mean Output Power and Amplifier-Booster Gain		
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4
<b>Test Sample</b>	Bi-Directional Amplifier		
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990
<b>Operating Mode</b>	Amplifying GSM signal at 866 MHz, AGC Activated		
<b>Test Specification</b>	Nemko Test Plan 317856-2		
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %		
<b>Notes</b>	Downlink with AGC    Signal Generator Setting: -50.70dBm ( <b>-51.01dBm</b> measured signal generator output) Amplifier Output: <b>27.29dBm</b> Gain: <b>78.30dB</b>		

Spectrum Analyzer 1  
Channel Power



**KEYSIGHT**

Input: RF  
Coupling: AC  
Align: Auto

Input Z: 50 Ω  
Corrections: Off  
Freq Ref: Int (S)

Atten: 20 dB  
Preamp: Off  
#PNO: Fast

Trig: Free Run  
Gate: Off  
#IF Gain: Low

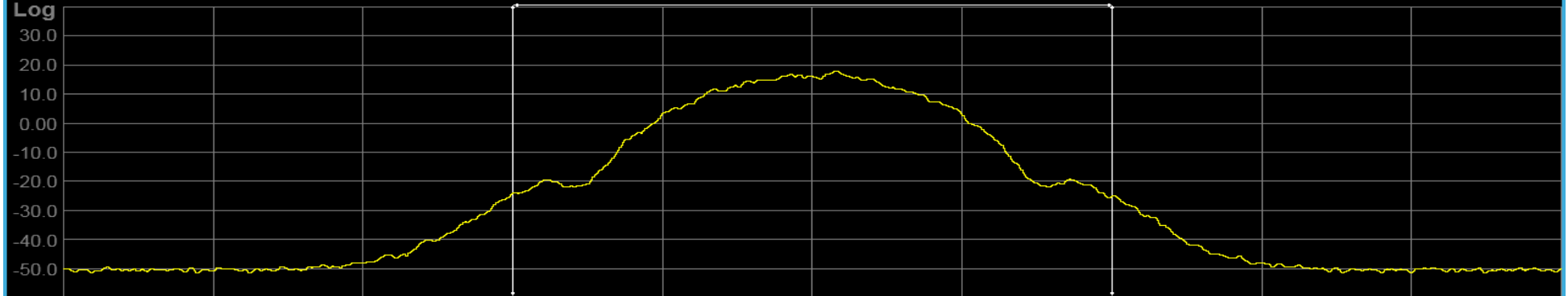
Center Freq: 866.000000 MHz  
Avg|Hold: 100/100  
Radio Std: None

LT

1 Graph

Ref Lvl Offset 30.55 dB  
Ref Value 40.00 dBm

Scale/Div 10.0 dB



Center 866 MHz  
#Res BW 10.000 kHz

#Video BW 30.000 kHz\*

Span 1.25 MHz  
Sweep Time 15.5 ms (1001 pts)

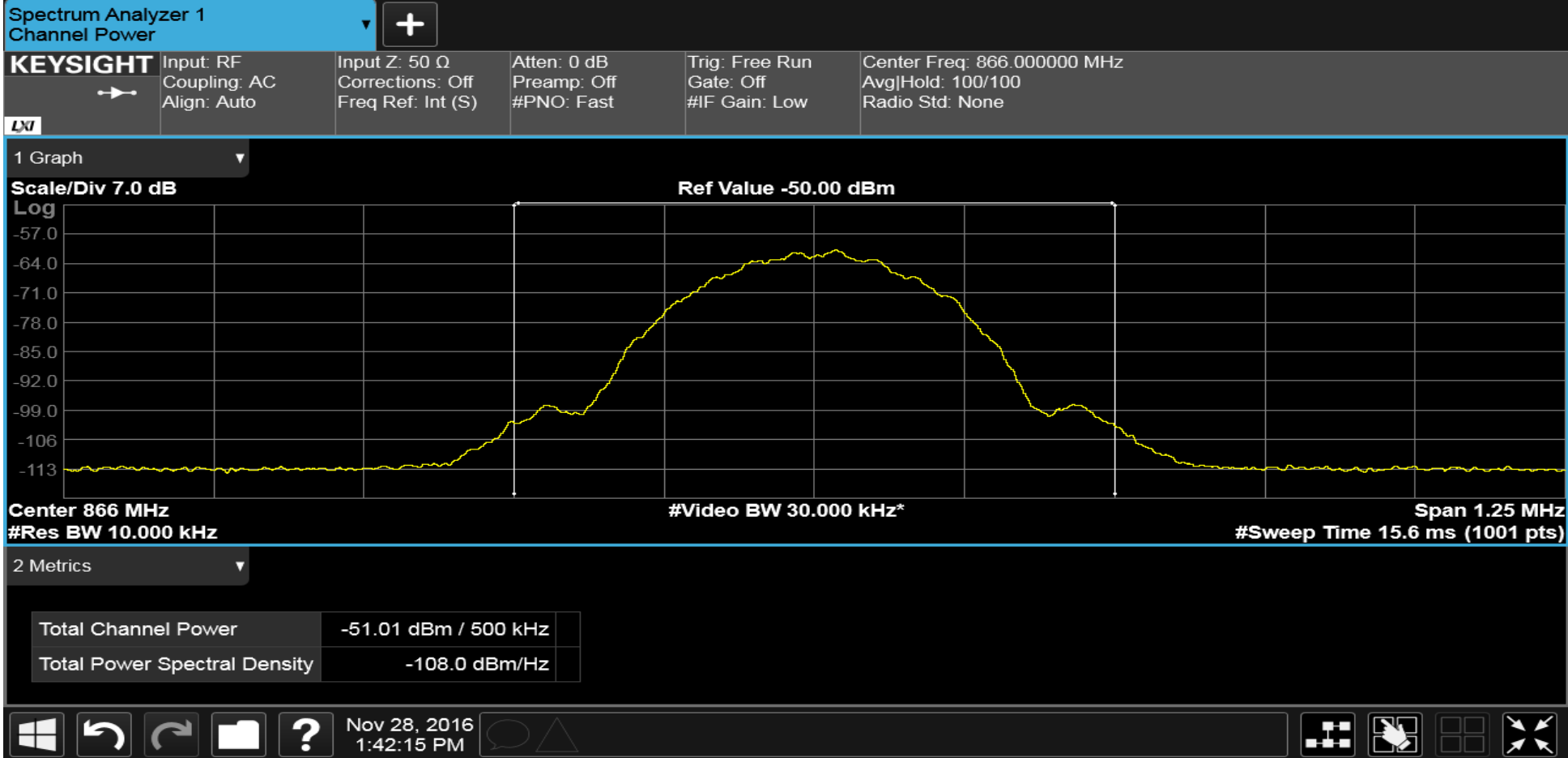
2 Metrics

Total Channel Power	27.29 dBm / 500 kHz
Total Power Spectral Density	-29.70 dBm/Hz

Windows taskbar area showing icons for Start, Back, Forward, File Explorer, Help, and system tray with date/time (Nov 28, 2016 1:09:46 PM) and window management icons.

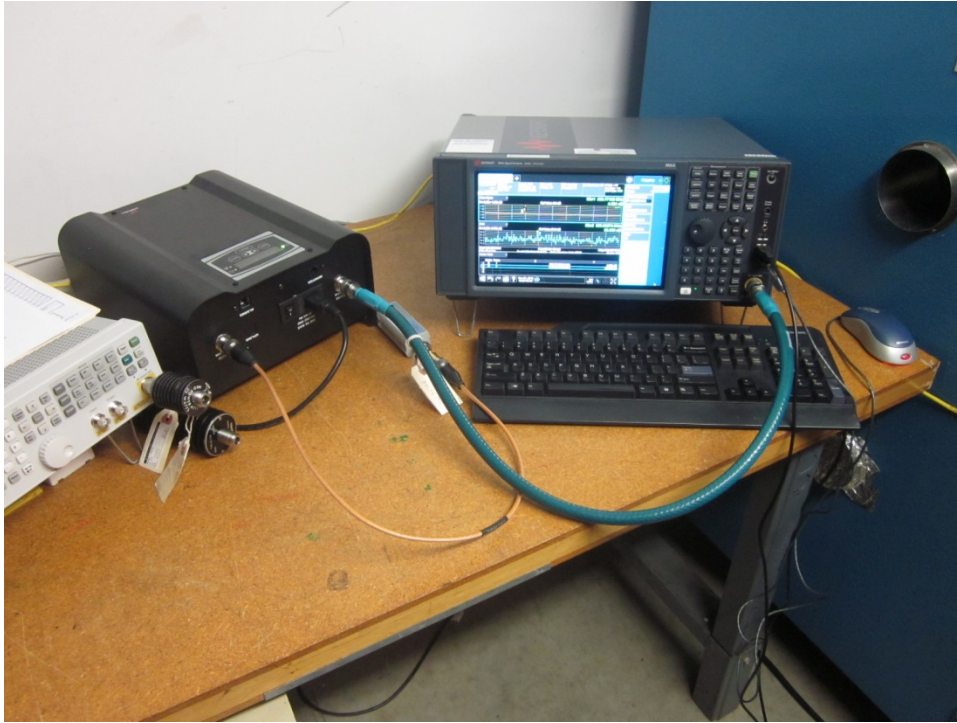
# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Mean Output Power and Amplifier-Booster Gain		
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4
<b>Test Sample</b>	Bi-Directional Amplifier		
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990
<b>Operating Mode</b>	Signal Generator GSM Output at 866MHz, AGC Activated		
<b>Test Specification</b>	Nemko Test Plan 317856-2		
<b>Technician</b>	M. Seamans	<b>Date</b>	November 28 <sup>th</sup> , 2016
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %		
<b>Notes</b>	Signal Generator Setting: -50.70dBm (-51.01dBm measured signal generator output) Amplifier Output: <b>27.29dBm</b> Gain: <b>78.30dB</b>		





## Test Photographs Noise Figure Measurements



Test Configuration



Retlif Testing Laboratories

Report No. R-6142N-4

**Noise Figure Measurements  
Test Data**

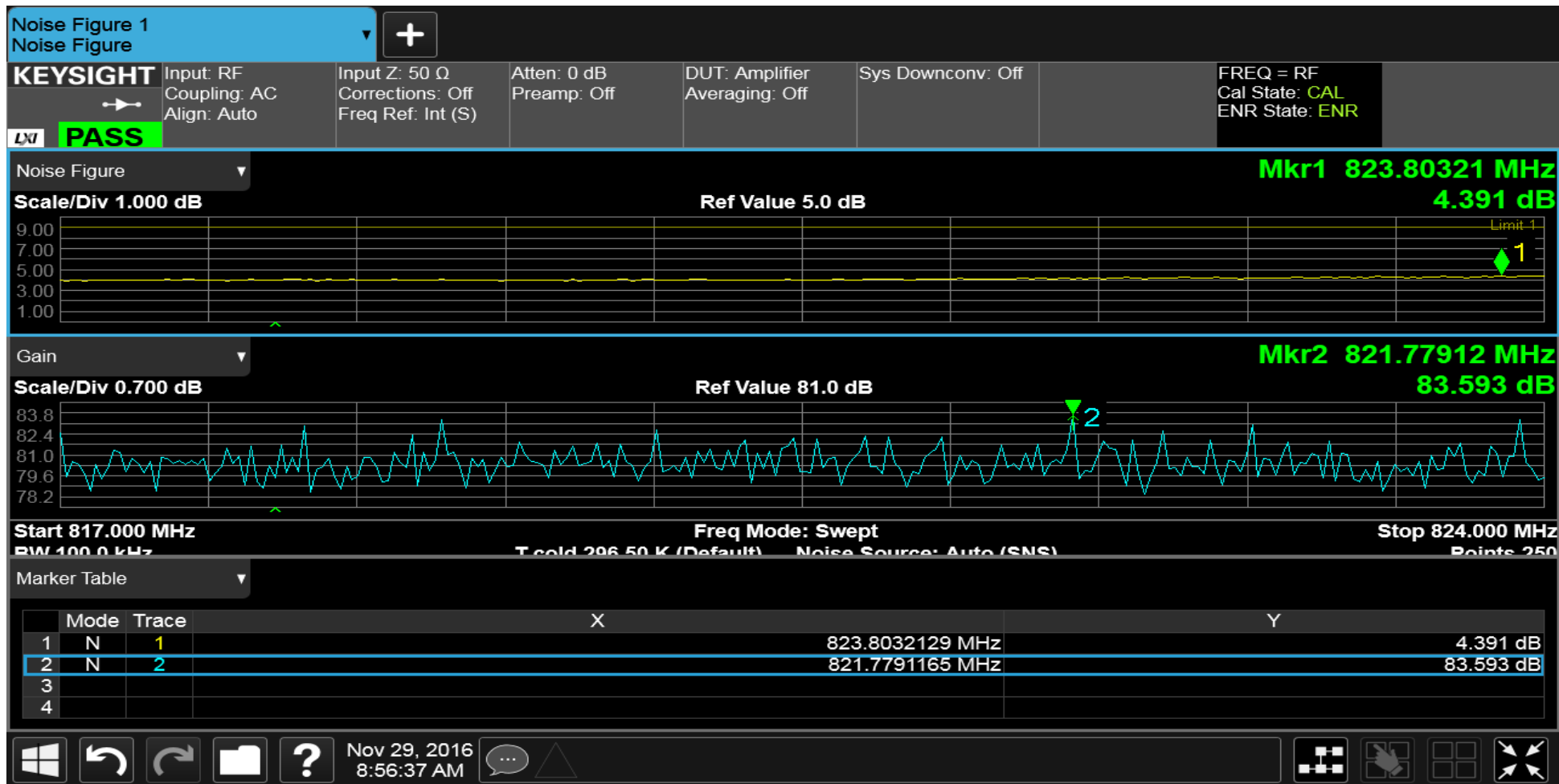


**Retlif Testing Laboratories**

Report No. R-6142N-4

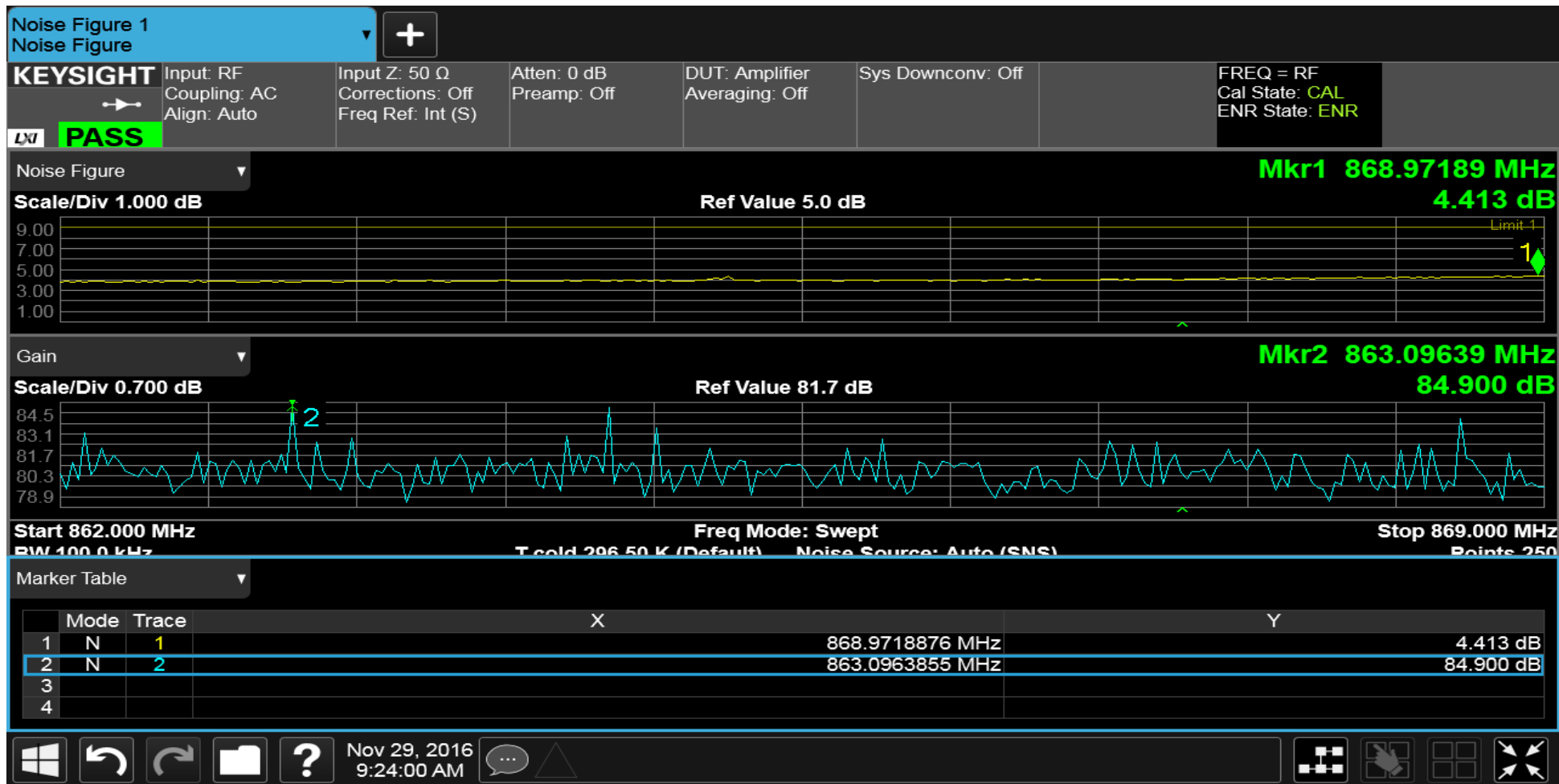
# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Noise Figure		
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4
<b>Test Sample</b>	Bi-Directional Amplifier		
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990
<b>Operating Mode</b>	Amplifying signals		
<b>Test Specification</b>	Nemko Test Plan 317856-2		
<b>Technician</b>	M. Seamans	<b>Date</b>	November 29 <sup>th</sup> , 2016
<b>Climatic Conditions</b>	Temp: 19.7 °C    Relative Humidity: 28.5 %		
<b>Notes</b>	Uplink    Noise Figure: 4.391dB    Gain: 83.593dB		



# RETLIF TESTING LABORATORIES

Test Method	Noise Figure		
Customer	Westell, Inc.	Job No.	R-6142N-4
Test Sample	Bi-Directional Amplifier		
Model Number	BDA510-S8	Serial No.	CPG62990
Operating Mode	Amplifying signals		
Test Specification	Nemko Test Plan 317856-2		
Technician	M. Seamans	Date	November 29 <sup>th</sup> , 2016
Climatic Conditions	Temp: 19.7 °C    Relative Humidity: 28.5 %		
Notes	Downlink    Noise Figure: 4.413dB    Gain: 84.90dB		



**Test Photographs**  
**Measuring Out-of-Band/Out-of-Block (including intermodulation)**  
**Emissions and Spurious Emissions**



Out of Band/Out of Block, Test Setup



Spurious Emissions Conducted, Test Setup



**Retlif Testing Laboratories**

Report No. R-6142N-4



**Test Photographs**  
**Measuring Out-of-Band/Out-of-Block (including intermodulation)**  
**Emissions and Spurious Emissions**



Spurious Emissions, Radiated, Test Setup



Spurious Emissions, Biconical, 30 MHz to 200 MHz, Horizontal Polarization



**Retlif Testing Laboratories**

Report No. R-6142N-4

**Test Photographs**  
**Measuring Out-of-Band/Out-of-Block (including intermodulation)**  
**Emissions and Spurious Emissions**



Spurious Emissions, Biconical, 30 MHz to 200 MHz, Vertical Polarization



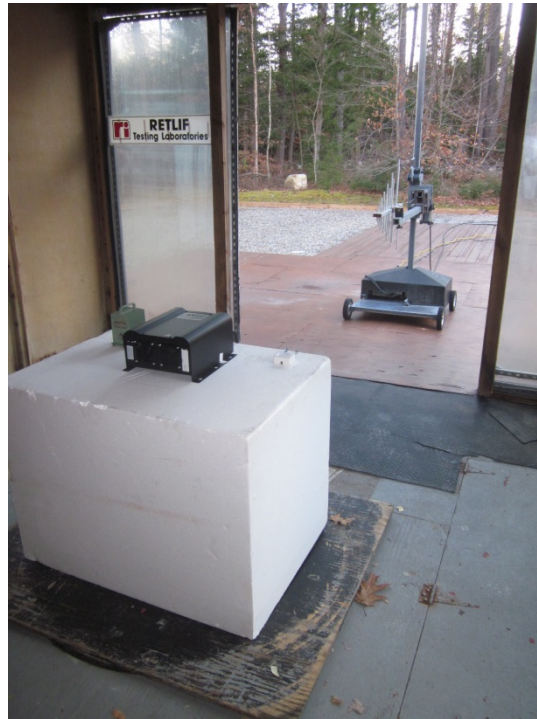
Spurious Emissions, Log Periodic, 200 MHz to 1 GHz, Horizontal Polarization



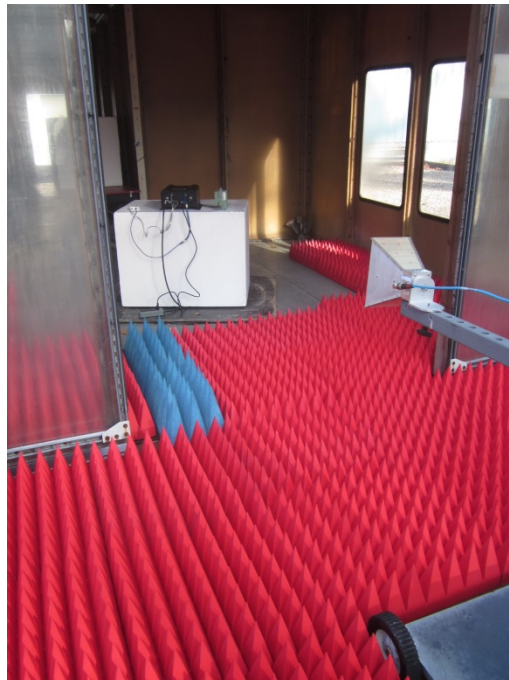
**Retlif Testing Laboratories**

Report No. R-6142N-4

**Test Photographs**  
**Measuring Out-of-Band/Out-of-Block (including intermodulation)**  
**Emissions and Spurious Emissions**



Spurious Emissions, Log Periodic, 200 MHz to 1 GHz, Vertical Polarization



Spurious Emissions, Double Ridge Guide, 1-10 GHz, Horizontal Polarization



**Retlif Testing Laboratories**

Report No. R-6142N-4



**Test Photographs**  
**Measuring Out-of-Band/Out-of-Block (including intermodulation)**  
**Emissions and Spurious Emissions**



Spurious Emissions, Double Ridge Guide, 1-10 GHz, Vertical Polarization



**Retlif Testing Laboratories**

Report No. R-6142N-4

**Measuring Out-of-Band/Out-of-Block (including intermodulation)  
Emissions and Spurious Emissions  
Test Data**



**Retlif Testing Laboratories**

Report No. R-6142N-4

**Measuring Out-of-Band/Out-of-Block  
Test Data**

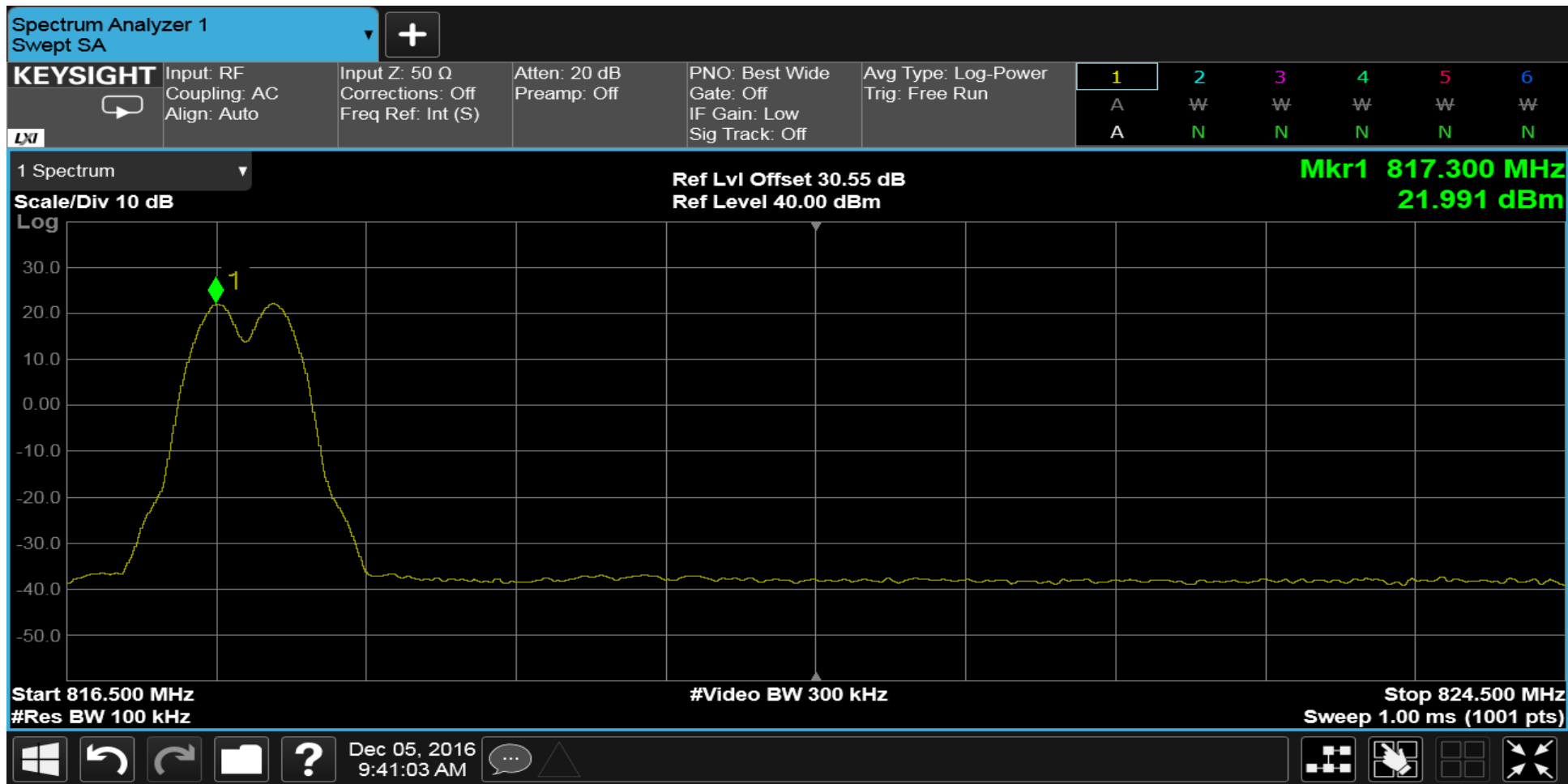


**Retlif Testing Laboratories**

Report No. R-6142N-4

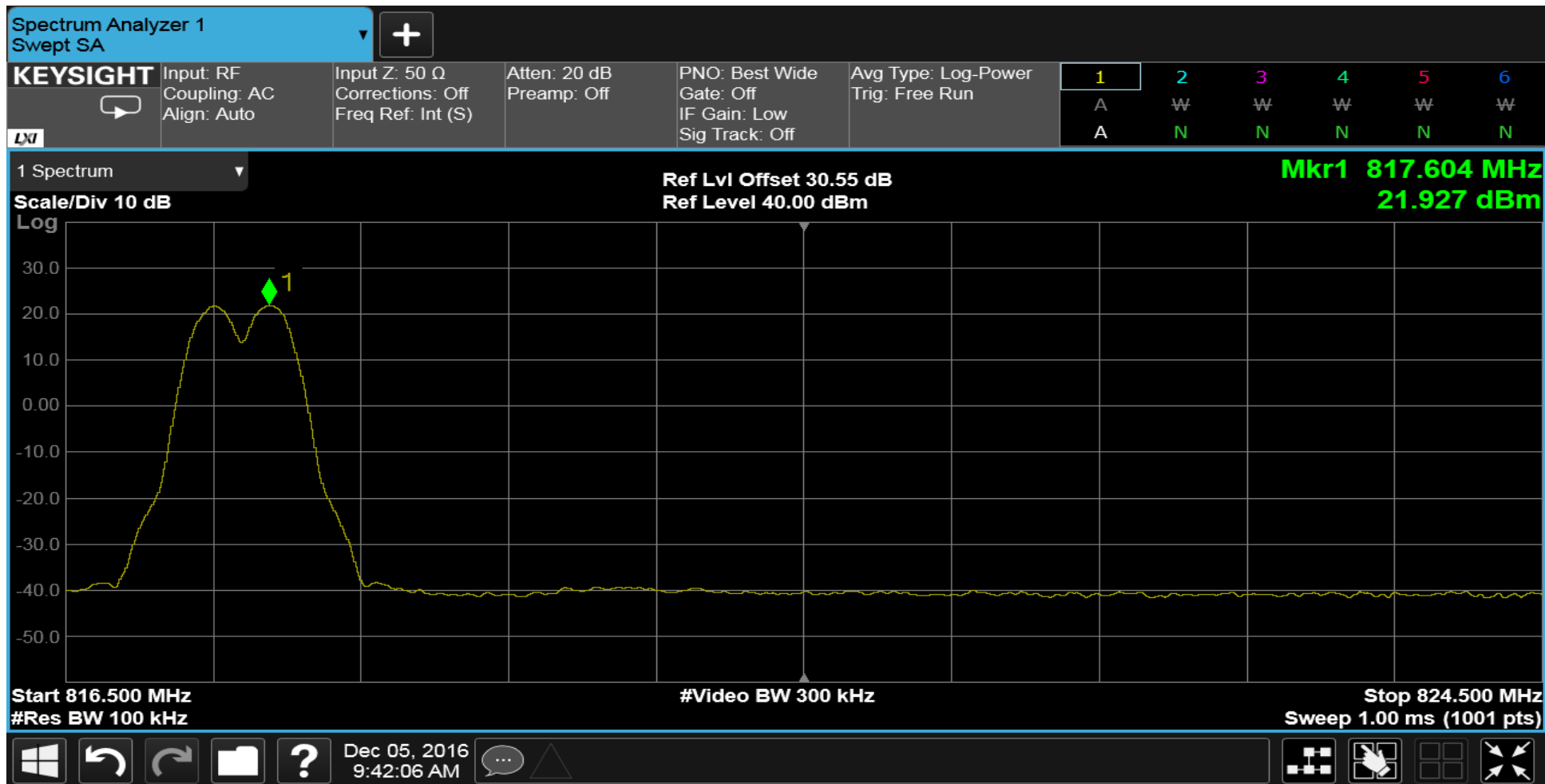
# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Out-of-Band/Out-of-Block				
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4		
<b>Test Sample</b>	Bi-Directional Amplifier				
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990		
<b>Operating Mode</b>	Amplifying Multi-tone signals				
<b>Test Specification</b>	Nemko Test Plan 317856-2				
<b>Technician</b>	M. Seamans	<b>Date</b>	December 5 <sup>th</sup> , 2016		
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %				
<b>Notes</b>	Uplink: GSM 817.3MHz and 817.6MHz				



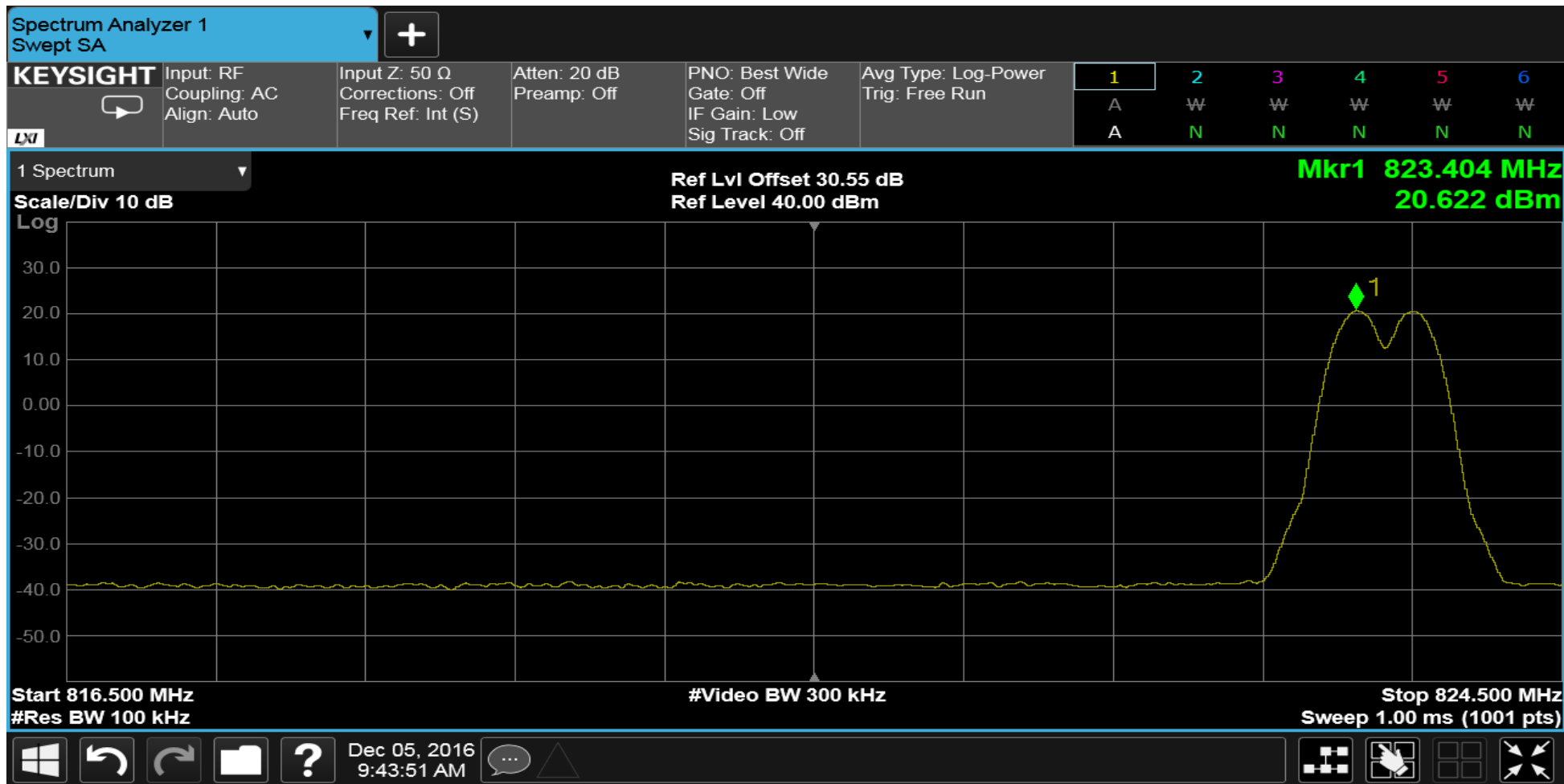
# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Out-of-Band/Out-of-Block				
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4		
<b>Test Sample</b>	Bi-Directional Amplifier				
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990		
<b>Operating Mode</b>	Amplifying Multi-tone signals, AGC Activated				
<b>Test Specification</b>	Nemko Test Plan 317856-2				
<b>Technician</b>	M. Seamans	<b>Date</b>	December 5 <sup>th</sup> , 2016		
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %				
<b>Notes</b>	Uplink: GSM 817.3MHz and 817.6MHz				



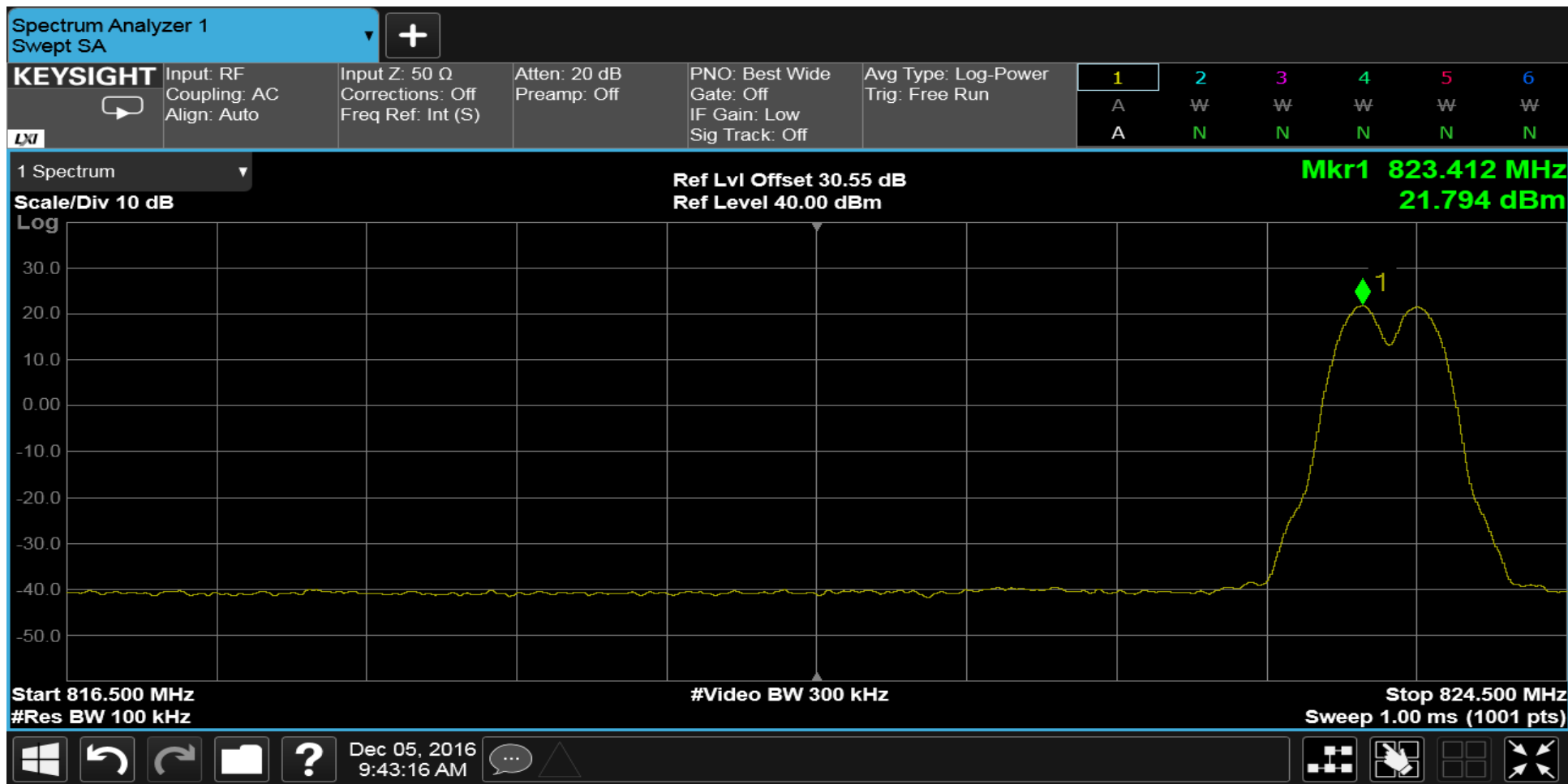
# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Out-of-Band/Out-of-Block				
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4		
<b>Test Sample</b>	Bi-Directional Amplifier				
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990		
<b>Operating Mode</b>	Amplifying Multi-tone signals				
<b>Test Specification</b>	Nemko Test Plan 317856-2				
<b>Technician</b>	M. Seamans	<b>Date</b>	December 5 <sup>th</sup> , 2016		
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %				
<b>Notes</b>	Uplink: GSM 823.4MHz and 823.7MHz				



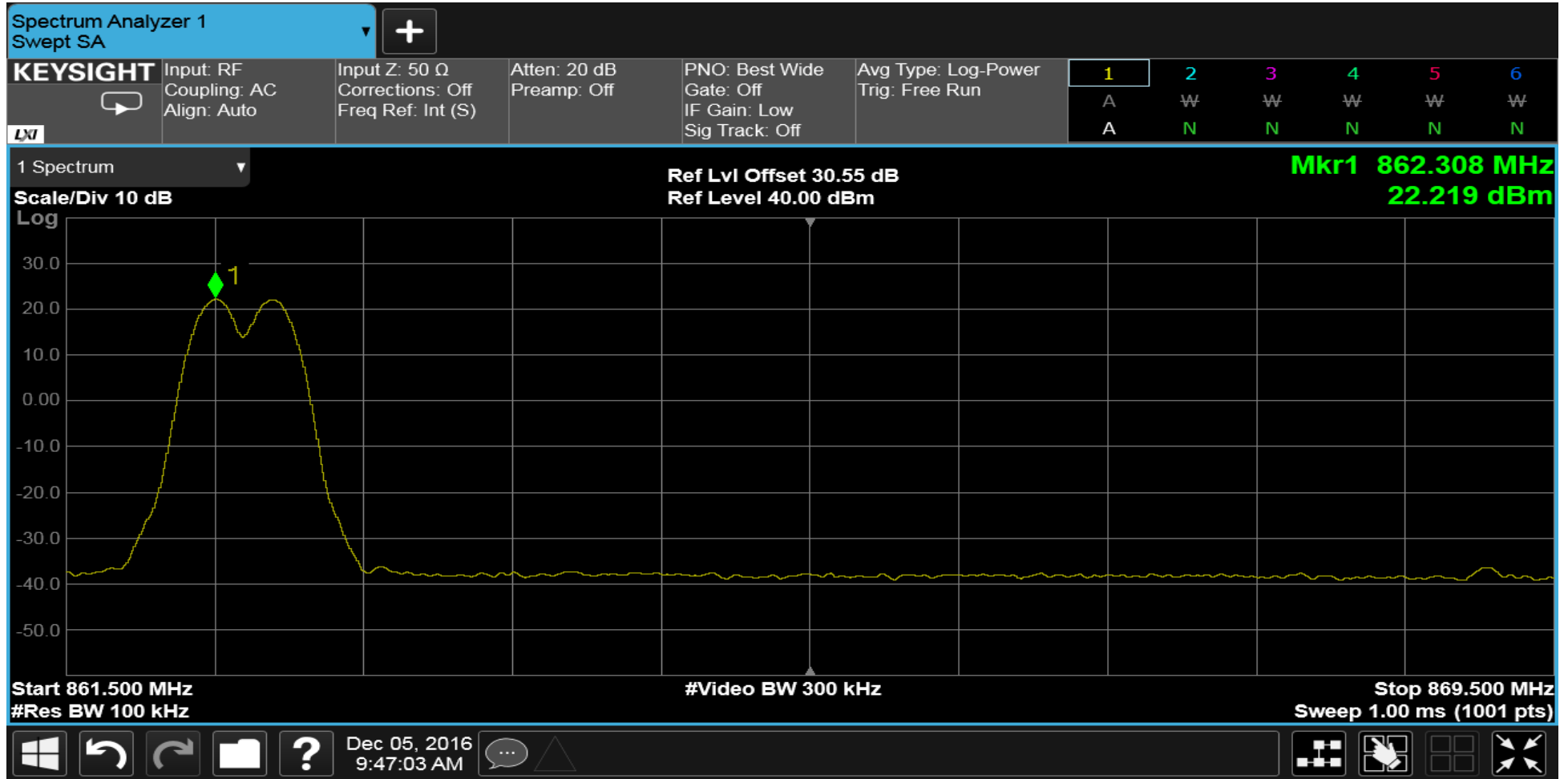
# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Out-of-Band/Out-of-Block				
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4		
<b>Test Sample</b>	Bi-Directional Amplifier				
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990		
<b>Operating Mode</b>	Amplifying Multi-tone signals, AGC Activated				
<b>Test Specification</b>	Nemko Test Plan 317856-2				
<b>Technician</b>	M. Seamans	<b>Date</b>	December 5 <sup>th</sup> , 2016		
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %				
<b>Notes</b>	Uplink: GSM 823.4MHz and 823.7MHz				



# RETLIF TESTING LABORATORIES

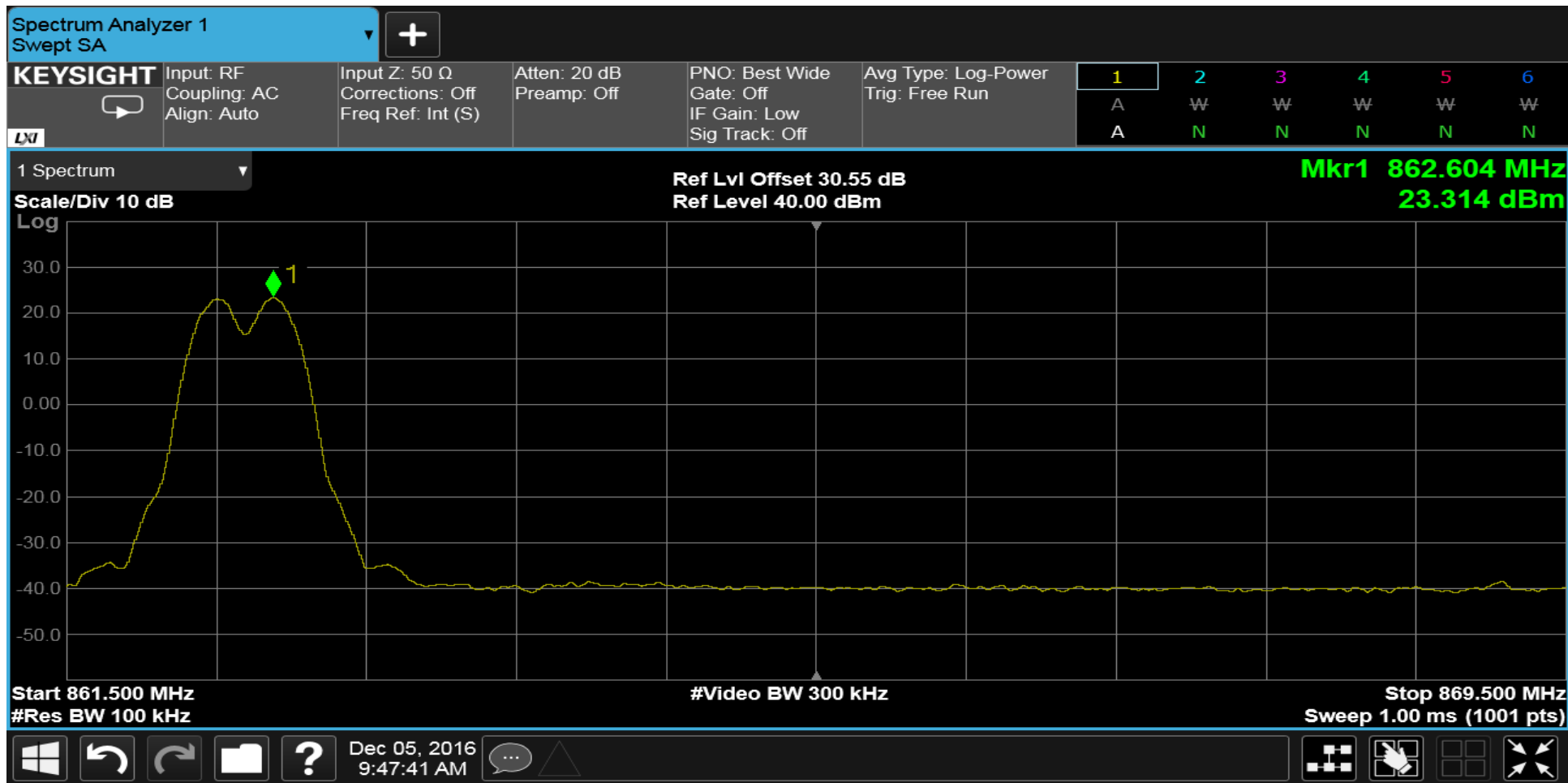
<b>Test Method</b>	Out-of-Band/Out-of-Block				
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4		
<b>Test Sample</b>	Bi-Directional Amplifier				
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990		
<b>Operating Mode</b>	Amplifying Multi-tone signals				
<b>Test Specification</b>	Nemko Test Plan 317856-2				
<b>Technician</b>	M. Seamans	<b>Date</b>	December 5 <sup>th</sup> , 2016		
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %				
<b>Notes</b>	Downlink: GSM 862.3MHz and 862.6MHz				





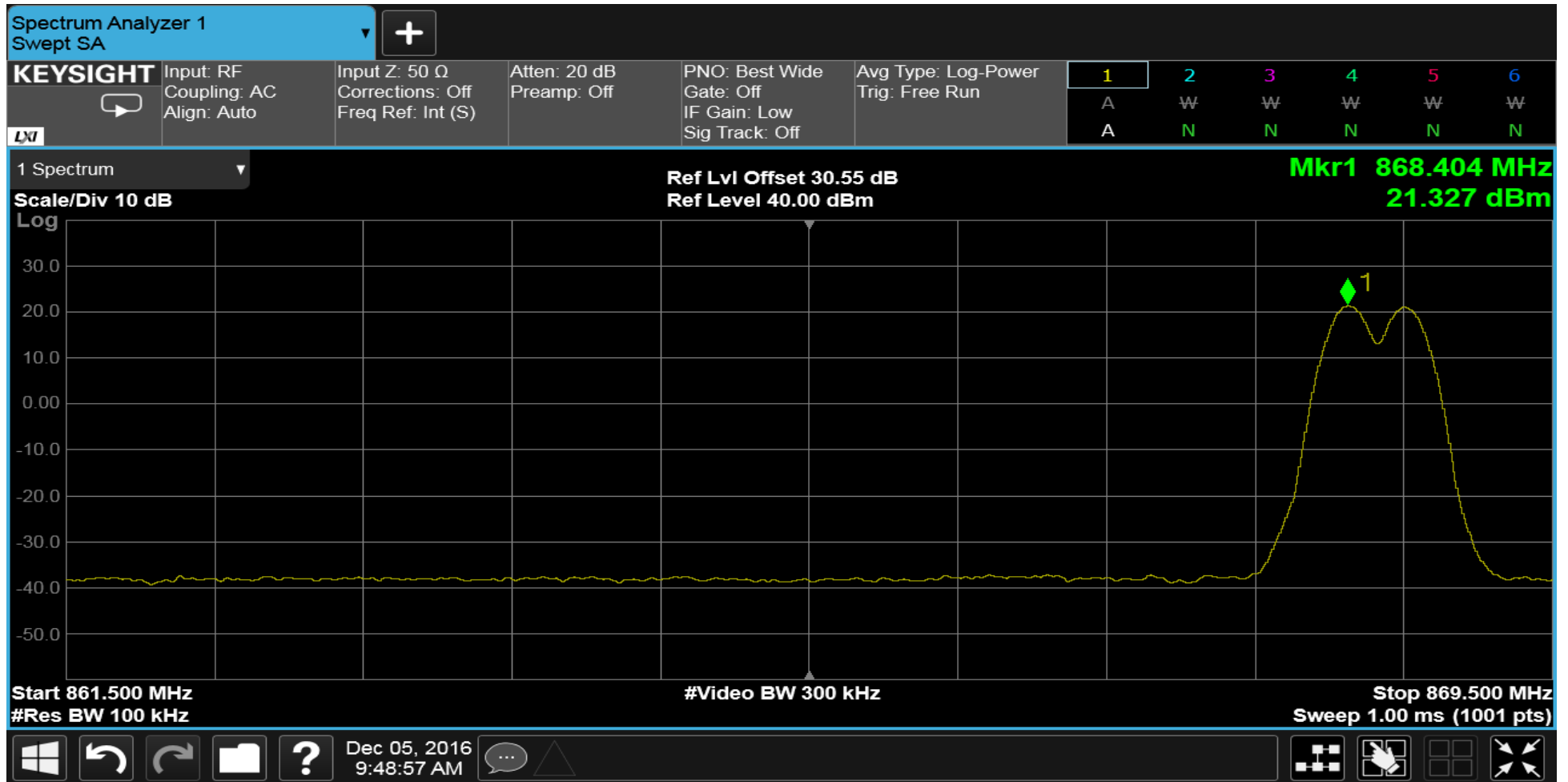
# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Out-of-Band/Out-of-Block				
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4		
<b>Test Sample</b>	Bi-Directional Amplifier				
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990		
<b>Operating Mode</b>	Amplifying Multi-tone signals, AGC Activated				
<b>Test Specification</b>	Nemko Test Plan 317856-2				
<b>Technician</b>	M. Seamans	<b>Date</b>	December 5 <sup>th</sup> , 2016		
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %				
<b>Notes</b>	Downlink: GSM 862.3MHz and 862.6MHz				



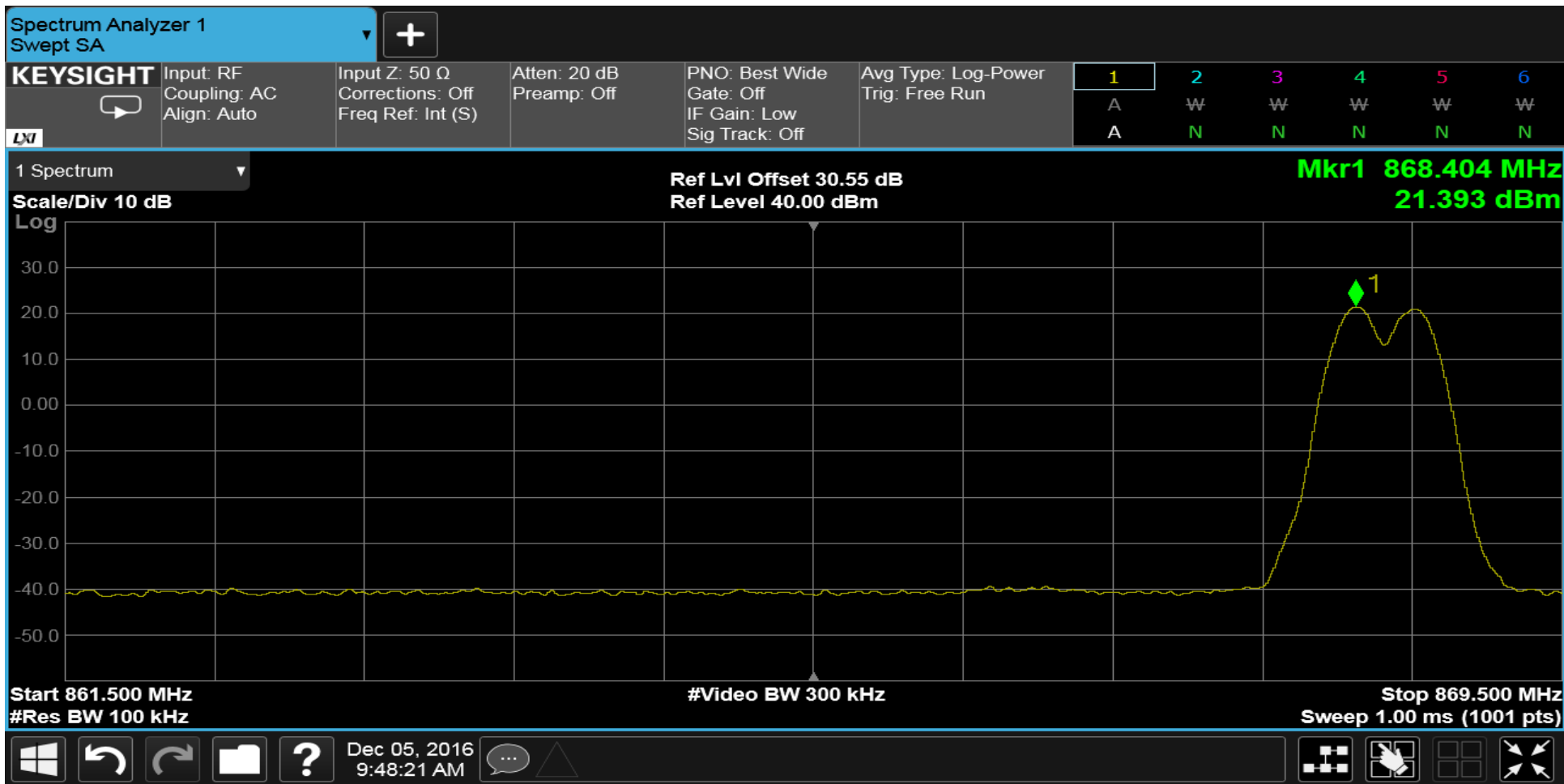
# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Out-of-Band/Out-of-Block				
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4		
<b>Test Sample</b>	Bi-Directional Amplifier				
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990		
<b>Operating Mode</b>	Amplifying Multi-tone signals				
<b>Test Specification</b>	Nemko Test Plan 317856-2				
<b>Technician</b>	M. Seamans	<b>Date</b>	December 5 <sup>th</sup> , 2016		
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %				
<b>Notes</b>	Downlink: GSM 862.3MHz and 862.6MHz				



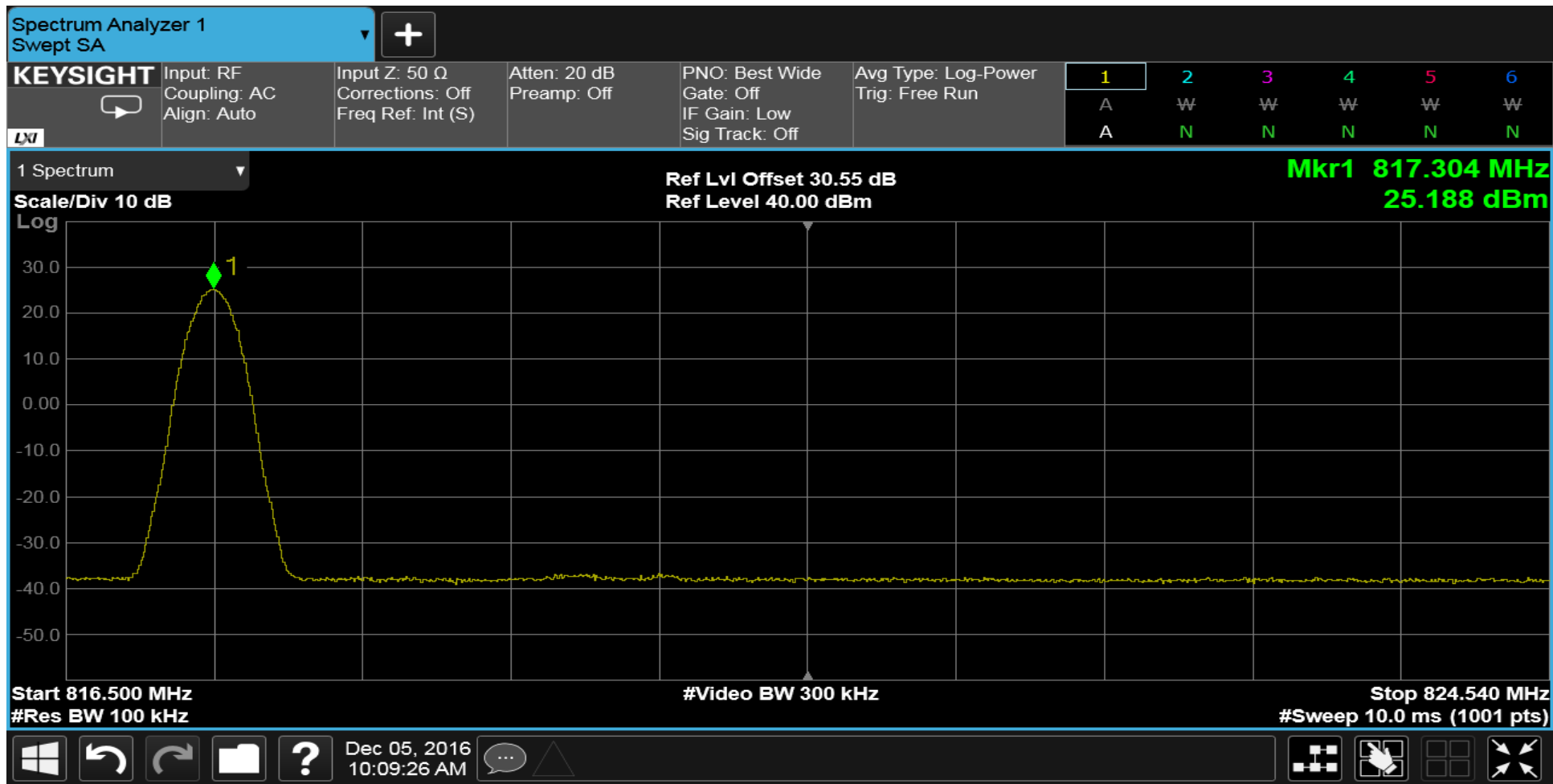
# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Out-of-Band/Out-of-Block				
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4		
<b>Test Sample</b>	Bi-Directional Amplifier				
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990		
<b>Operating Mode</b>	Amplifying Multi-tone signals, AGC Activated				
<b>Test Specification</b>	Nemko Test Plan 317856-2				
<b>Technician</b>	M. Seamans	<b>Date</b>	December 5 <sup>th</sup> , 2016		
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %				
<b>Notes</b>	Downlink: GSM 862.3MHz and 862.6MHz				



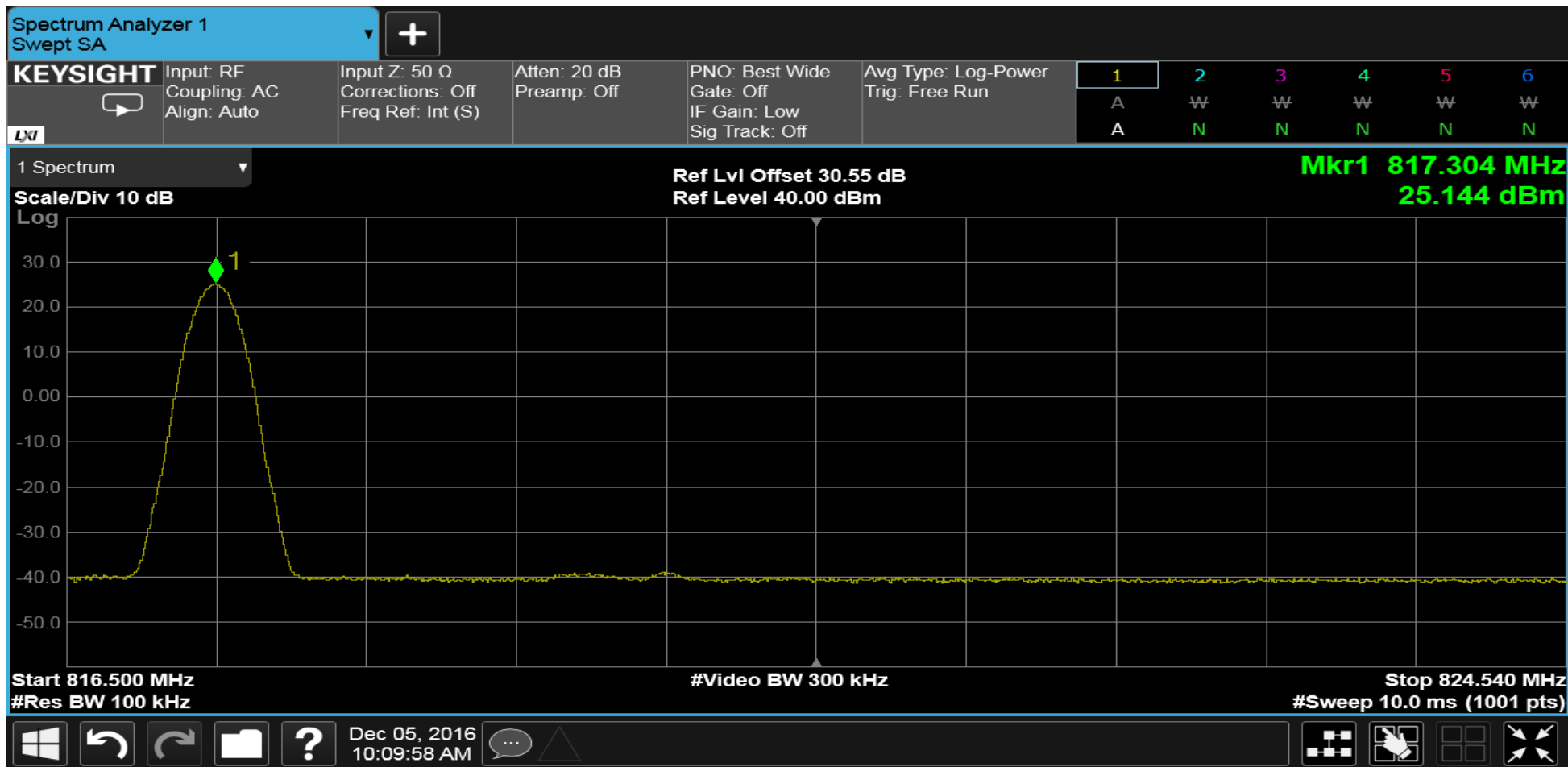
# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Out-of-Band/Out-of-Block				
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4		
<b>Test Sample</b>	Bi-Directional Amplifier				
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990		
<b>Operating Mode</b>	Amplifying GSM signal				
<b>Test Specification</b>	Nemko Test Plan 317856-2				
<b>Technician</b>	M. Seamans	<b>Date</b>	December 5 <sup>th</sup> , 2016		
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %				
<b>Notes</b>	Uplink: GSM 817.3MHz				



# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Out-of-Band/Out-of-Block				
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4		
<b>Test Sample</b>	Bi-Directional Amplifier				
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990		
<b>Operating Mode</b>	Amplifying GSM signal, AGC Activated				
<b>Test Specification</b>	Nemko Test Plan 317856-2				
<b>Technician</b>	M. Seamans	<b>Date</b>	December 5 <sup>th</sup> , 2016		
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %				
<b>Notes</b>	Uplink: GSM 817.3MHz				

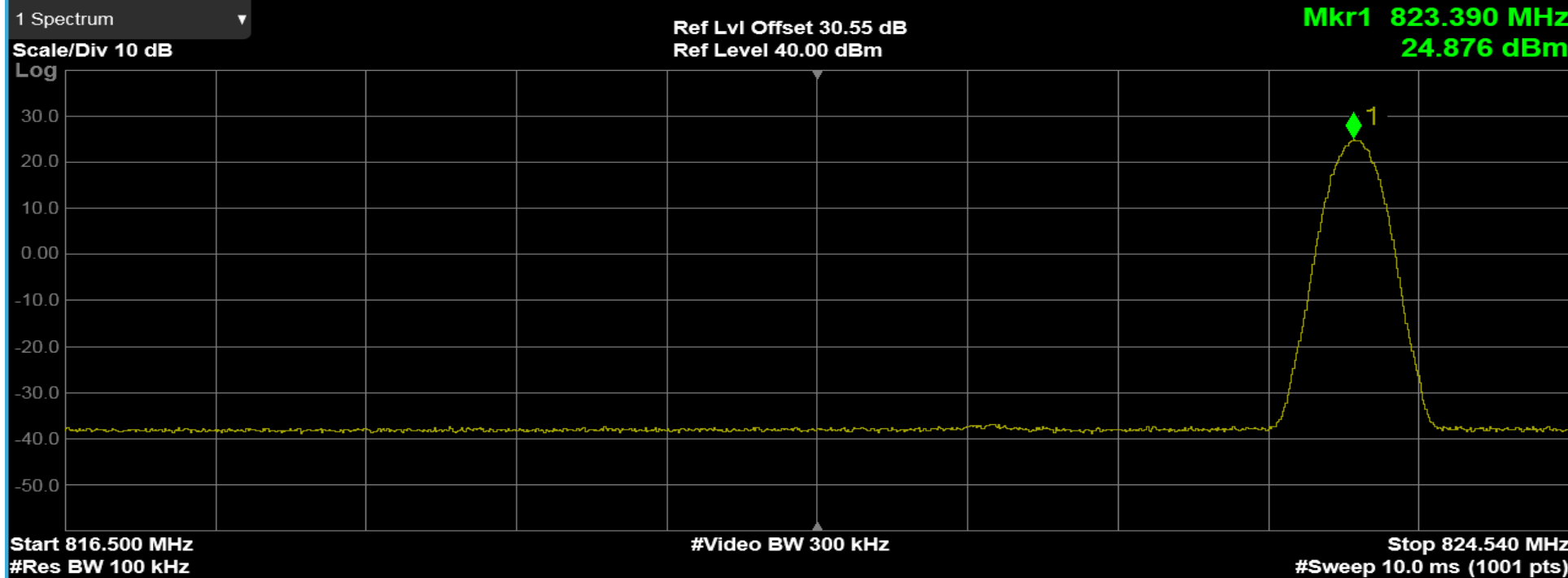


# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Out-of-Band/Out-of-Block				
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4		
<b>Test Sample</b>	Bi-Directional Amplifier				
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990		
<b>Operating Mode</b>	Amplifying GSM signal				
<b>Test Specification</b>	Nemko Test Plan 317856-2				
<b>Technician</b>	M. Seamans	<b>Date</b>	December 5 <sup>th</sup> , 2016		
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %				
<b>Notes</b>	Uplink: GSM 823.7MHz				

Spectrum Analyzer 1  
Swept SA
+

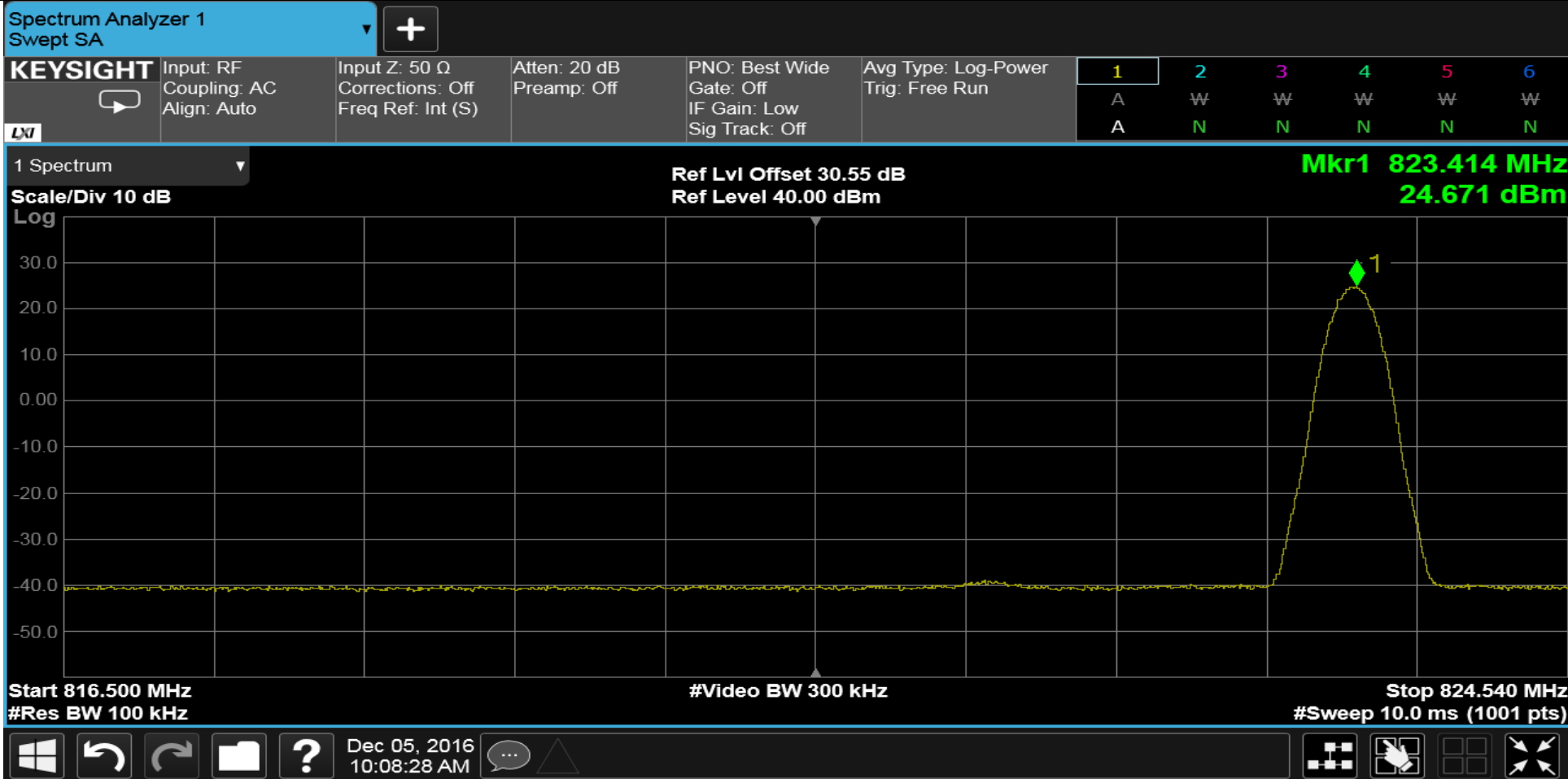
<b>KEYSIGHT</b>	Input: RF Coupling: AC Align: Auto	Input Z: 50 Ω Corrections: Off Freq Ref: Int (S)	Atten: 20 dB Preamp: Off	PNO: Best Wide Gate: Off IF Gain: Low Sig Track: Off	Avg Type: Log-Power Trig: Free Run	<b>1</b>	2	3	4	5	6
						A	W	W	W	W	W
						A	N	N	N	N	N



Dec 05, 2016  
10:08:58 AM

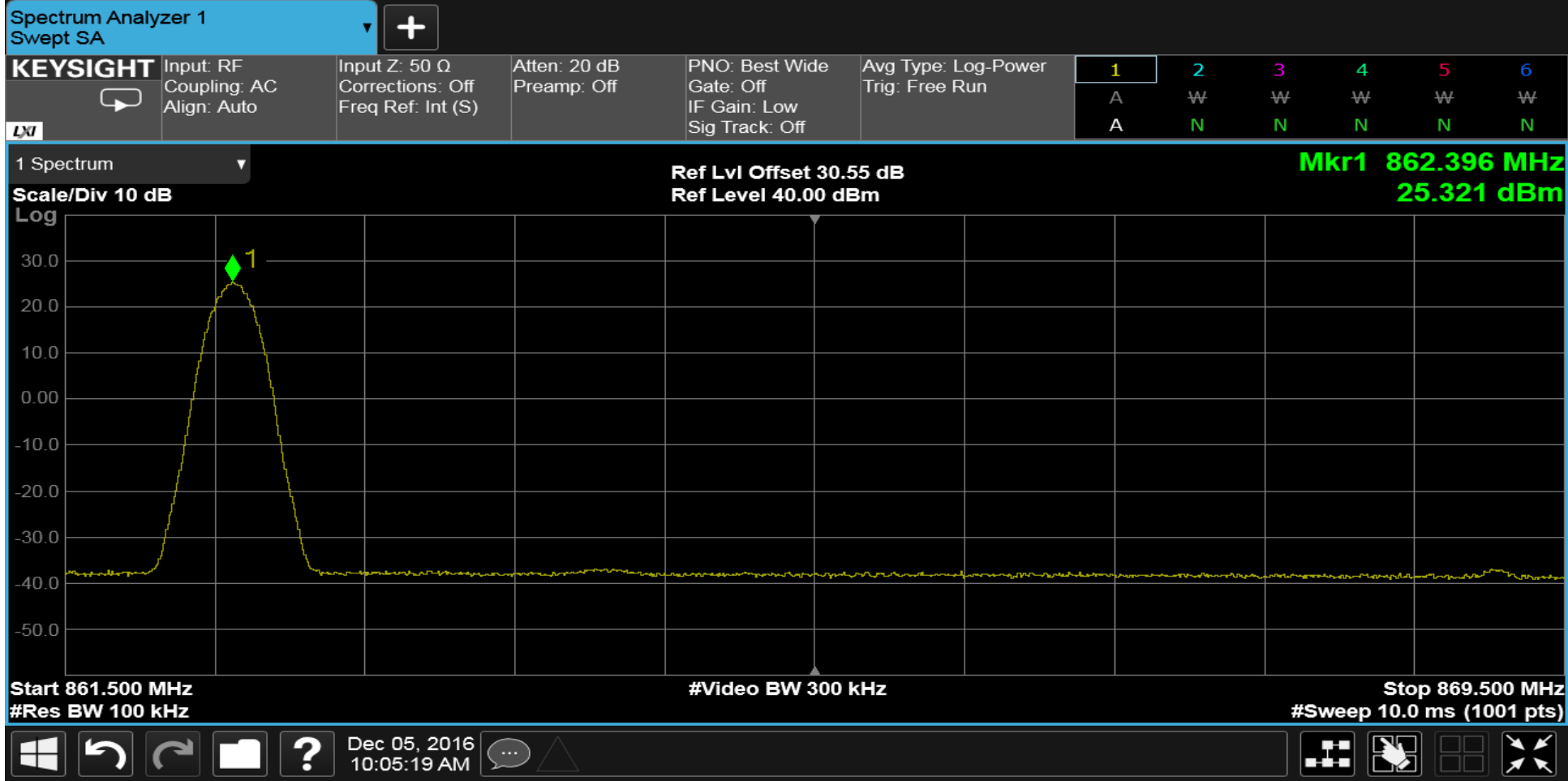
# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Out-of-Band/Out-of-Block				
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4		
<b>Test Sample</b>	Bi-Directional Amplifier				
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990		
<b>Operating Mode</b>	Amplifying GSM signal, AGC Activated				
<b>Test Specification</b>	Nemko Test Plan 317856-2				
<b>Technician</b>	M. Seamans	<b>Date</b>	December 5 <sup>th</sup> , 2016		
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %				
<b>Notes</b>	Uplink: GSM 823.7MHz				



# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Out-of-Band/Out-of-Block				
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4		
<b>Test Sample</b>	Bi-Directional Amplifier				
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990		
<b>Operating Mode</b>	Amplifying GSM signal				
<b>Test Specification</b>	Nemko Test Plan 317856-2				
<b>Technician</b>	M. Seamans	<b>Date</b>	December 5 <sup>th</sup> , 2016		
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %				
<b>Notes</b>	Downlink: GSM 862.3MHz				



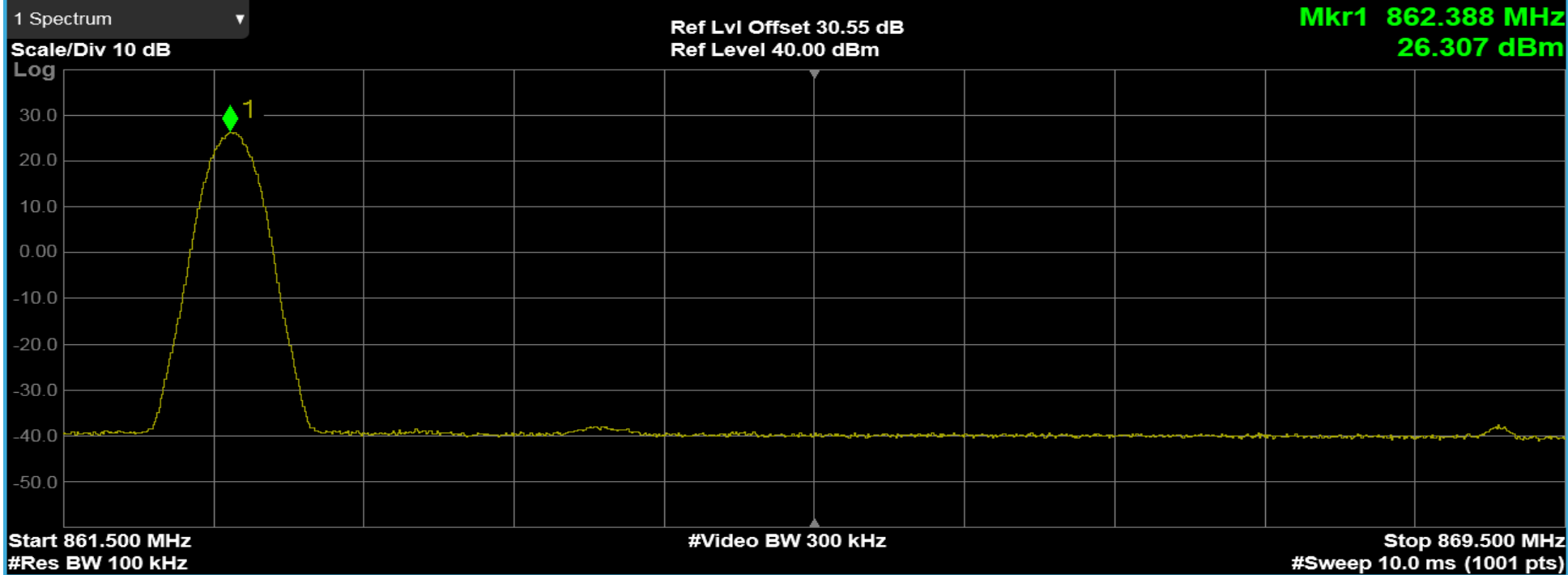


# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Out-of-Band/Out-of-Block				
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4		
<b>Test Sample</b>	Bi-Directional Amplifier				
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990		
<b>Operating Mode</b>	Amplifying GSM signal, AGC Activated				
<b>Test Specification</b>	Nemko Test Plan 317856-2				
<b>Technician</b>	M. Seamans	<b>Date</b>	December 5 <sup>th</sup> , 2016		
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %				
<b>Notes</b>	Downlink: GSM 862.3MHz				

Spectrum Analyzer 1  
Swept SA

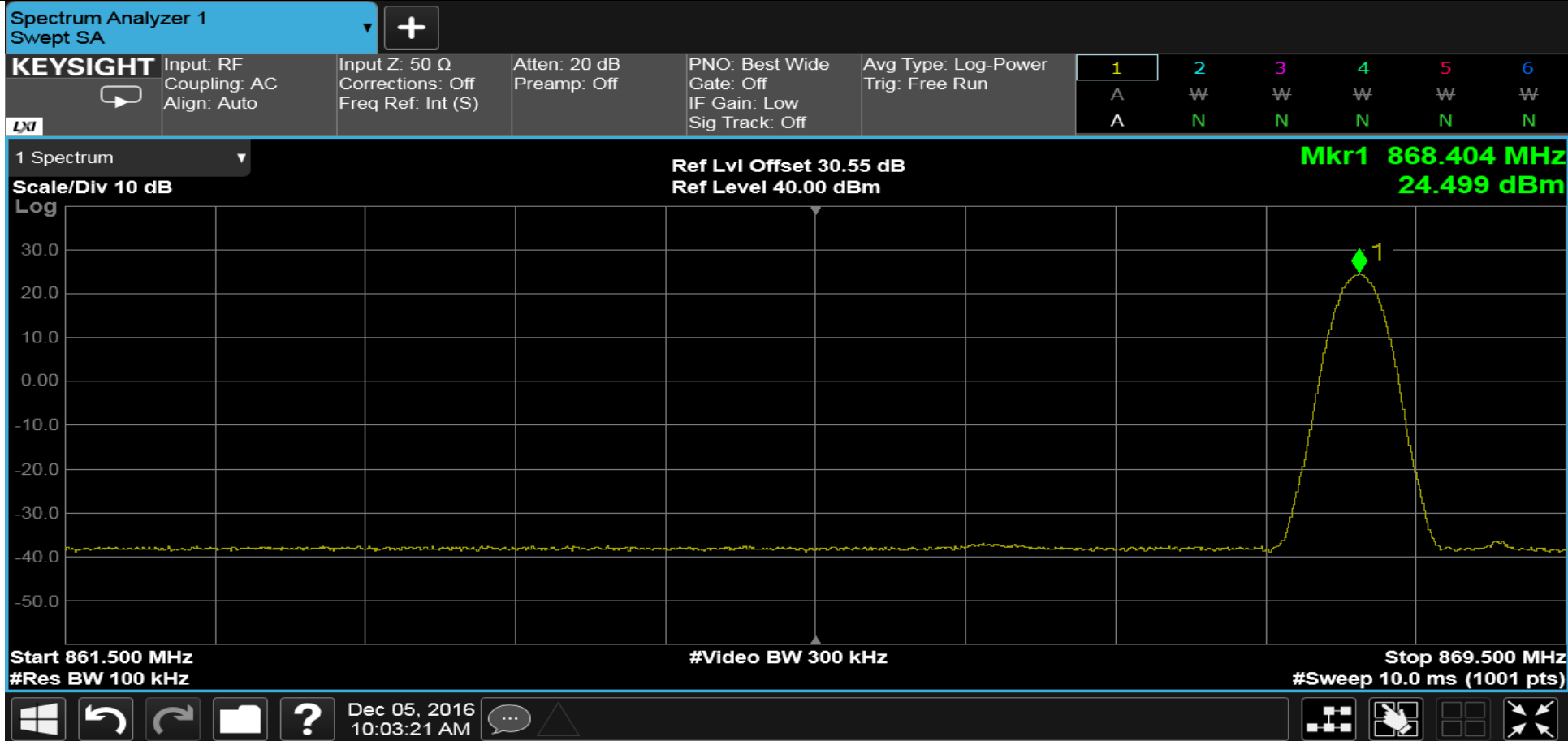
<b>KEYSIGHT</b>	Input: RF Coupling: AC Align: Auto	Input Z: 50 Ω Corrections: Off Freq Ref: Int (S)	Atten: 20 dB Preamp: Off	PNO: Best Wide Gate: Off IF Gain: Low Sig Track: Off	Avg Type: Log-Power Trig: Free Run	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
						A	W	W	W	W	W
						A	N	N	N	N	N



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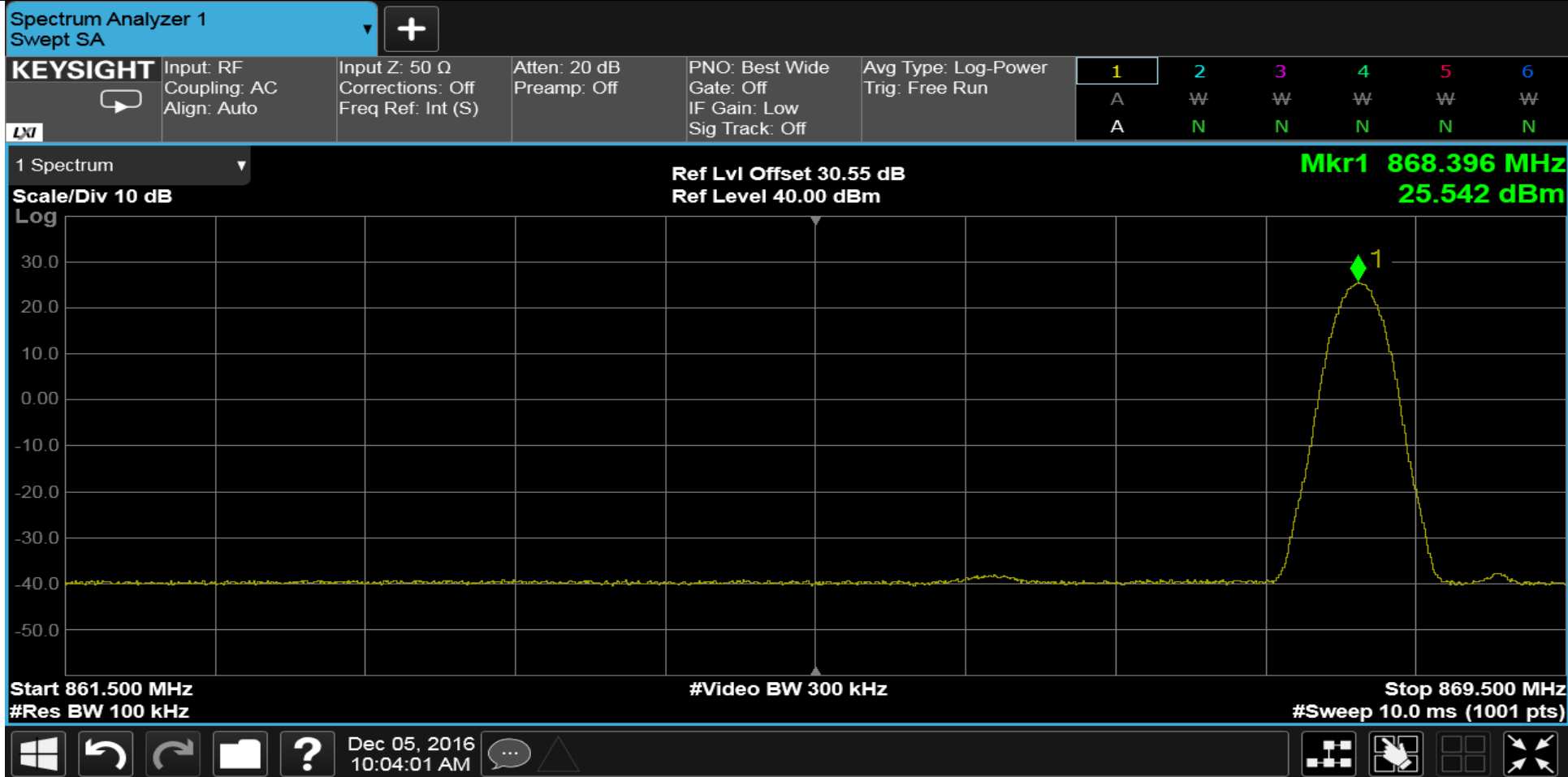
# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Out-of-Band/Out-of-Block				
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4		
<b>Test Sample</b>	Bi-Directional Amplifier				
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990		
<b>Operating Mode</b>	Amplifying GSM signal				
<b>Test Specification</b>	Nemko Test Plan 317856-2				
<b>Technician</b>	M. Seamans	<b>Date</b>	December 5 <sup>th</sup> , 2016		
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %				
<b>Notes</b>	Downlink: GSM 868.7MHz				



# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Out-of-Band/Out-of-Block				
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4		
<b>Test Sample</b>	Bi-Directional Amplifier				
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990		
<b>Operating Mode</b>	Amplifying GSM signal, AGC Activated				
<b>Test Specification</b>	Nemko Test Plan 317856-2				
<b>Technician</b>	M. Seamans	<b>Date</b>	December 5 <sup>th</sup> , 2016		
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %				
<b>Notes</b>	Downlink: GSM 868.7MHz				



**Spurious Emissions Conducted  
Test Data**

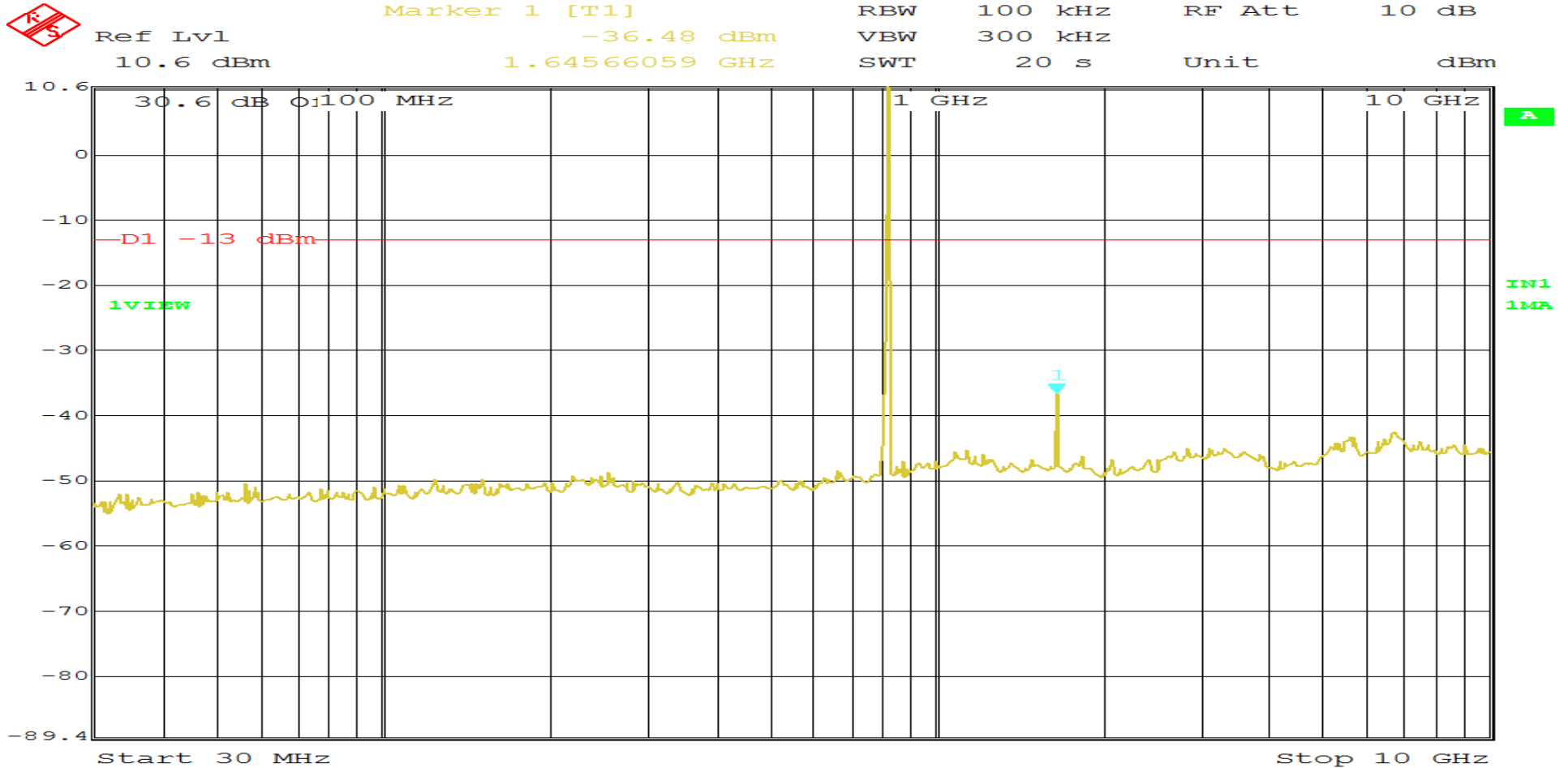


**Retlif Testing Laboratories**

Report No. R-6142N-4

# RETLIF TESTING LABORATORIES

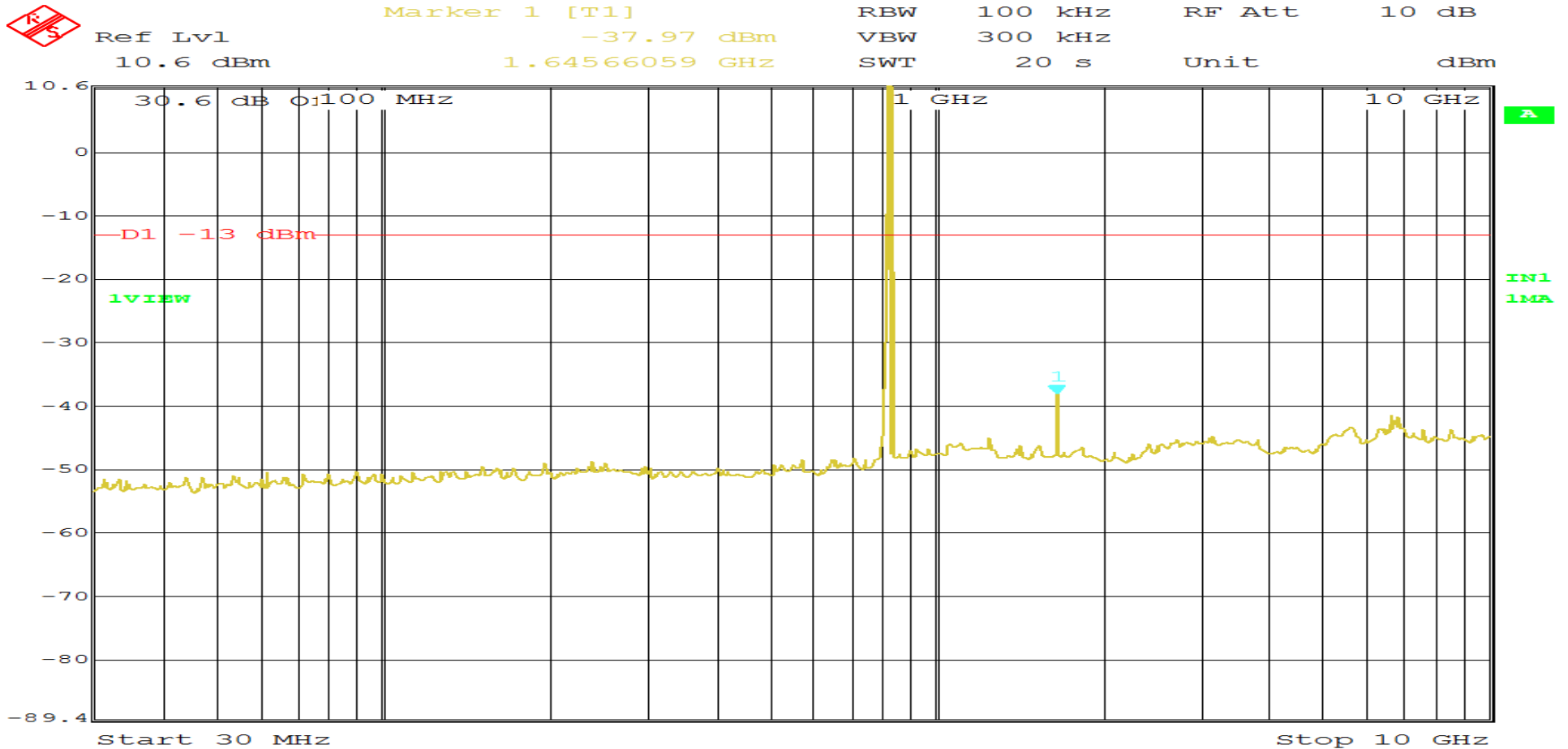
<b>Test Method</b>	Spurious Emissions Conducted		
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4
<b>Test Sample</b>	Bi-Directional Amplifier		
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990
<b>Operating Mode</b>	Amplifying signal		
<b>Test Specification</b>	Nemko Test Plan 317856-2		
<b>Technician</b>	M. Seamans	<b>Date</b>	December 5 <sup>th</sup> , 2016
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %		
<b>Notes</b>	Uplink: LTE Low		



Date: 1.JAN.1997 01:06:18  
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# RETLIF TESTING LABORATORIES

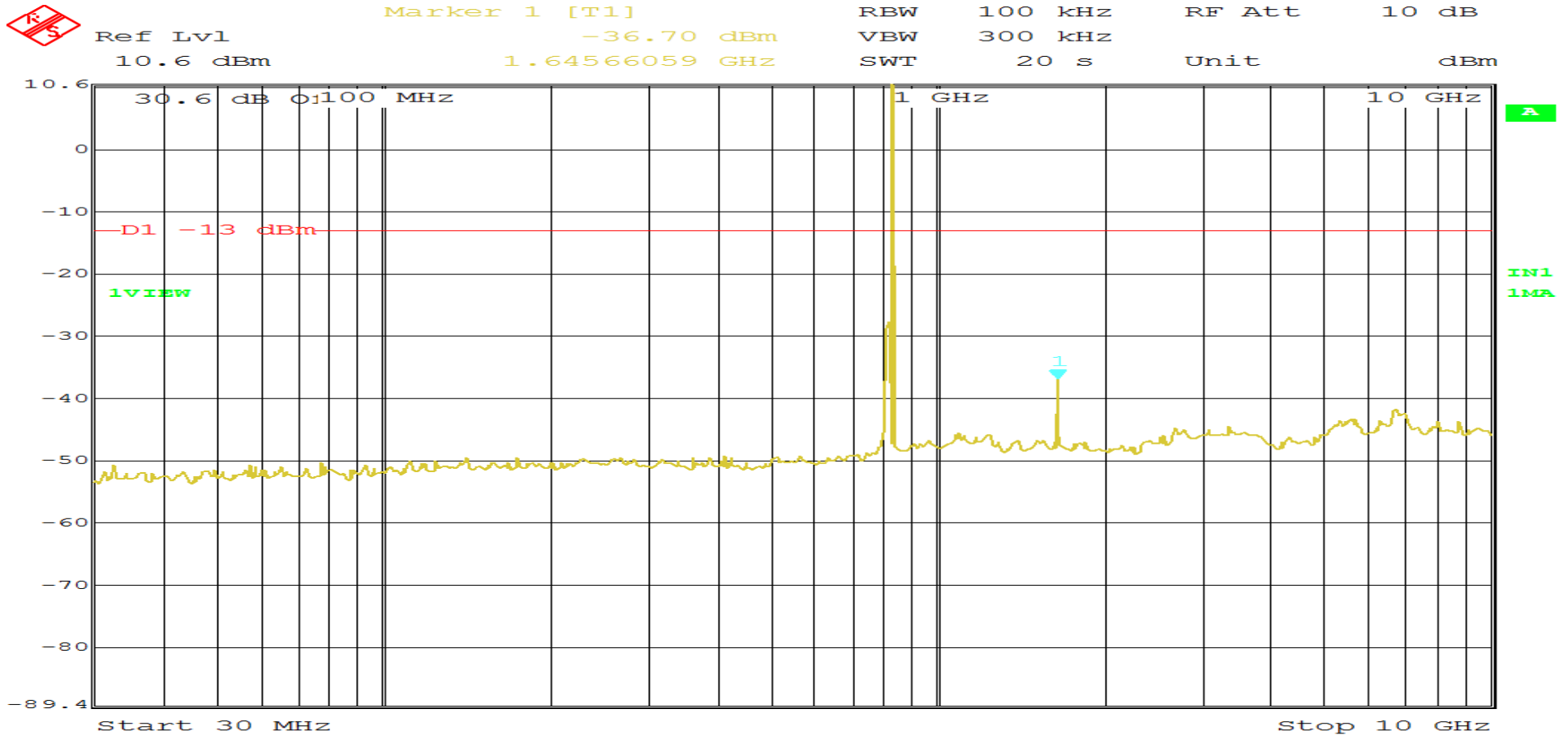
<b>Test Method</b>	Spurious Emissions Conducted		
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4
<b>Test Sample</b>	Bi-Directional Amplifier		
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990
<b>Operating Mode</b>	Amplifying signal		
<b>Test Specification</b>	Nemko Test Plan 317856-2		
<b>Technician</b>	M. Seamans	<b>Date</b>	December 5 <sup>th</sup> , 2016
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %		
<b>Notes</b>	Uplink: LTE Mid		



Date: 1.JAN.1997 01:12:34  
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# RETLIF TESTING LABORATORIES

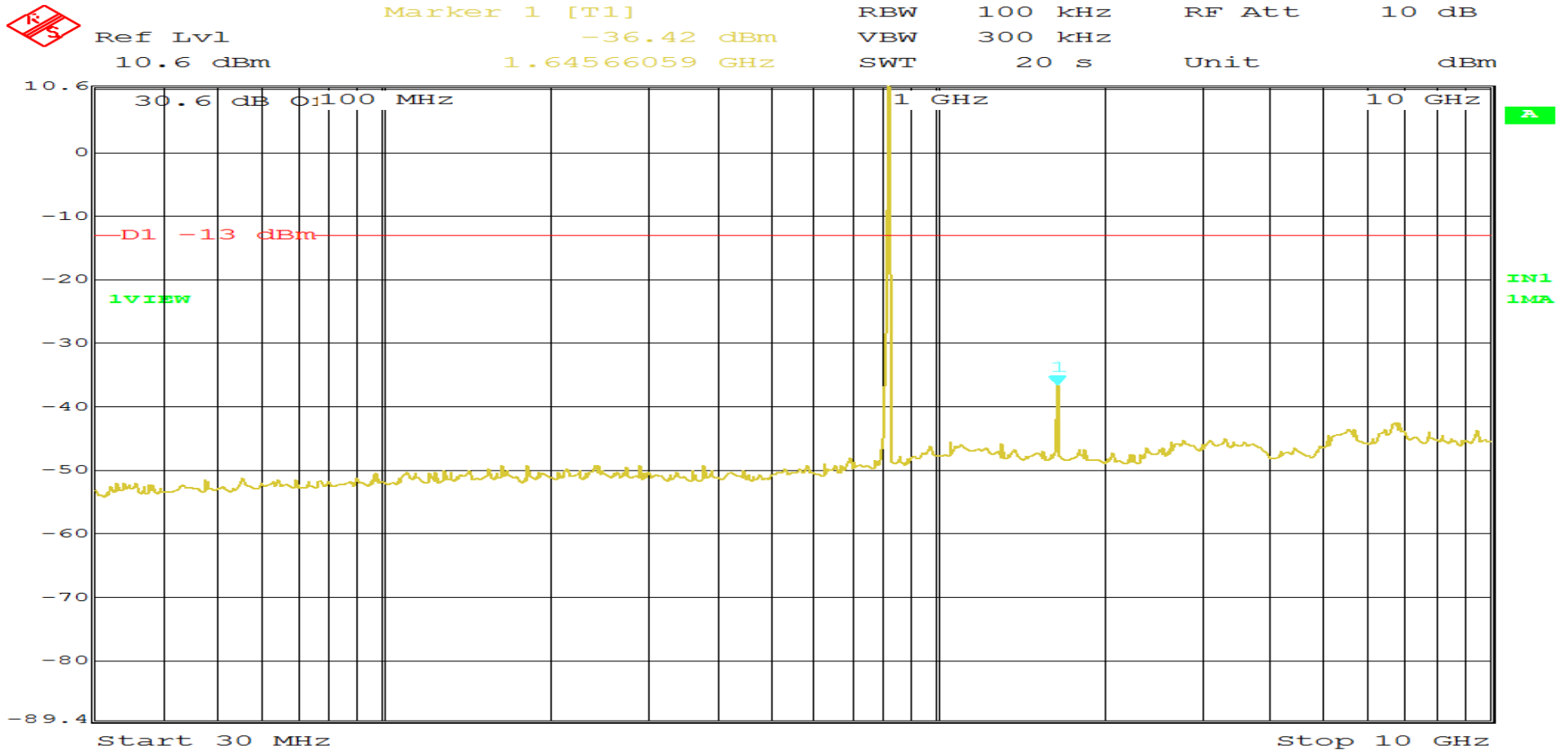
<b>Test Method</b>	Spurious Emissions Conducted		
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4
<b>Test Sample</b>	Bi-Directional Amplifier		
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990
<b>Operating Mode</b>	Amplifying signal		
<b>Test Specification</b>	Nemko Test Plan 317856-2		
<b>Technician</b>	M. Seamans	<b>Date</b>	December 5 <sup>th</sup> , 2016
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %		
<b>Notes</b>	Uplink: LTE High		



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# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Spurious Emissions Conducted		
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4
<b>Test Sample</b>	Bi-Directional Amplifier		
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990
<b>Operating Mode</b>	Amplifying signal		
<b>Test Specification</b>	Nemko Test Plan 317856-2		
<b>Technician</b>	M. Seamans	<b>Date</b>	December 5 <sup>th</sup> , 2016
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %		
<b>Notes</b>	Uplink: GSM Low		

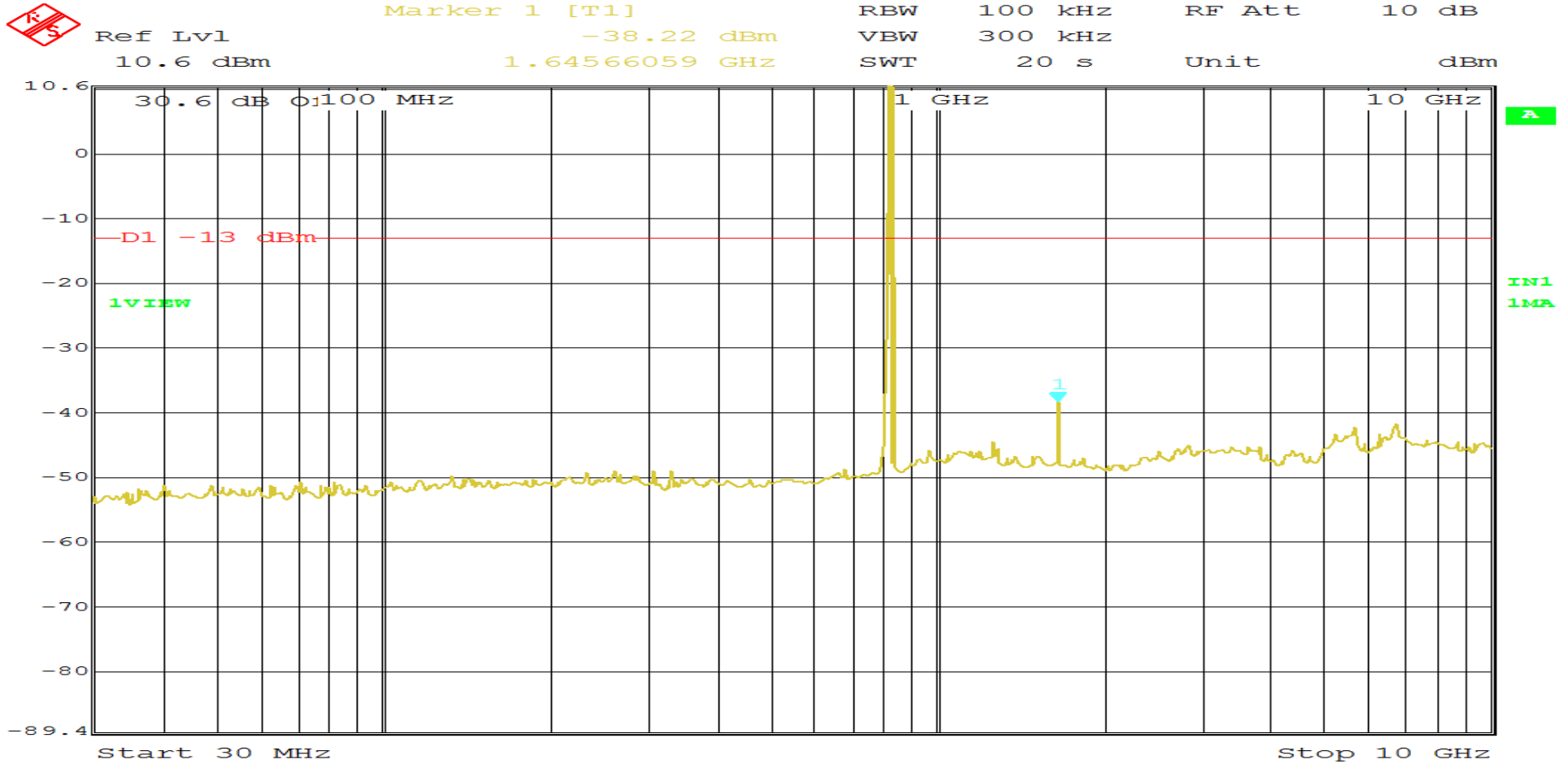


Date: 1.JAN.1997 01:23:21  
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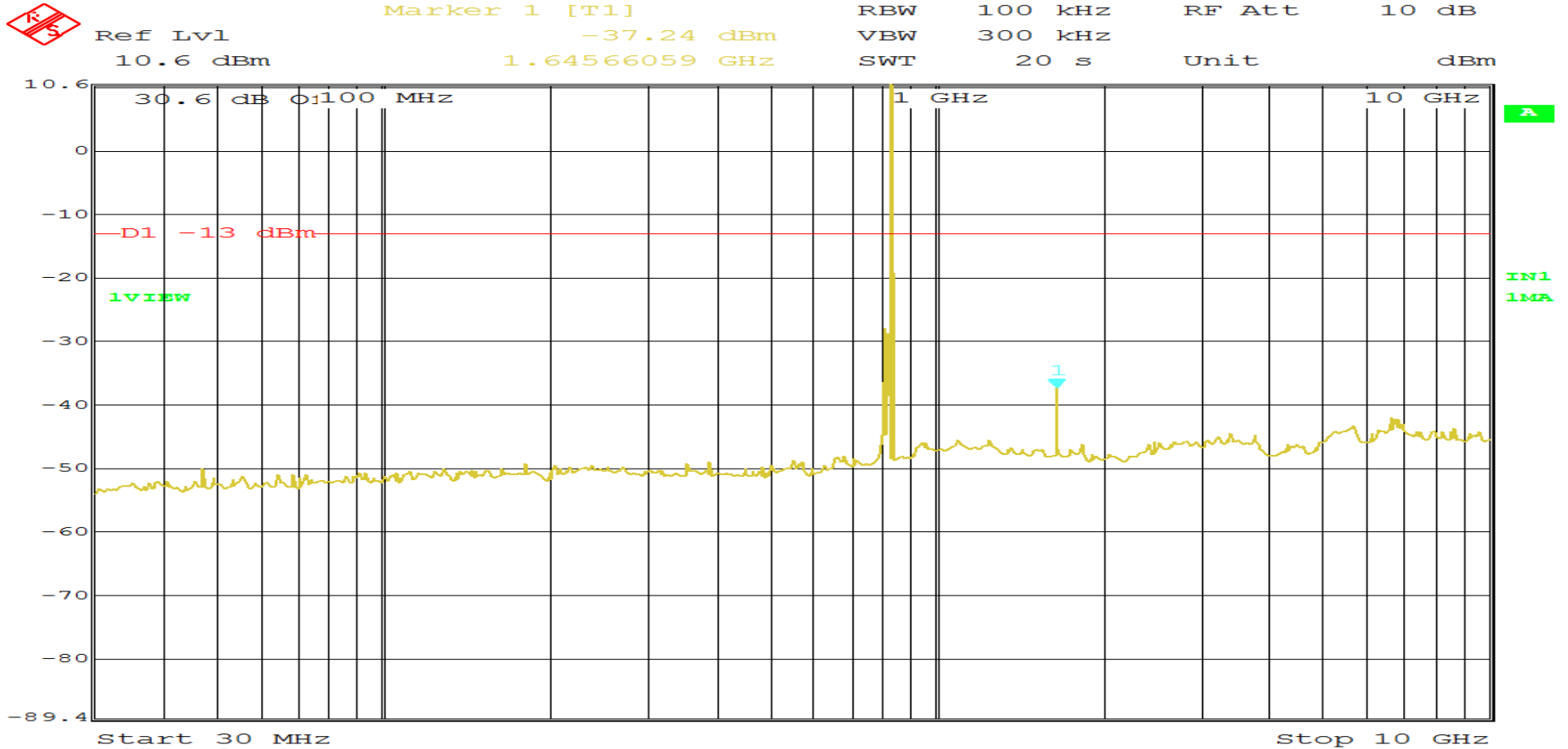
# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Spurious Emissions Conducted		
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4
<b>Test Sample</b>	Bi-Directional Amplifier		
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990
<b>Operating Mode</b>	Amplifying CW signals		
<b>Test Specification</b>	Nemko Test Plan 317856-2		
<b>Technician</b>	M. Seamans	<b>Date</b>	December 5 <sup>th</sup> , 2016
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %		
<b>Notes</b>	Uplink: GSM Mid		



# RETLIF TESTING LABORATORIES

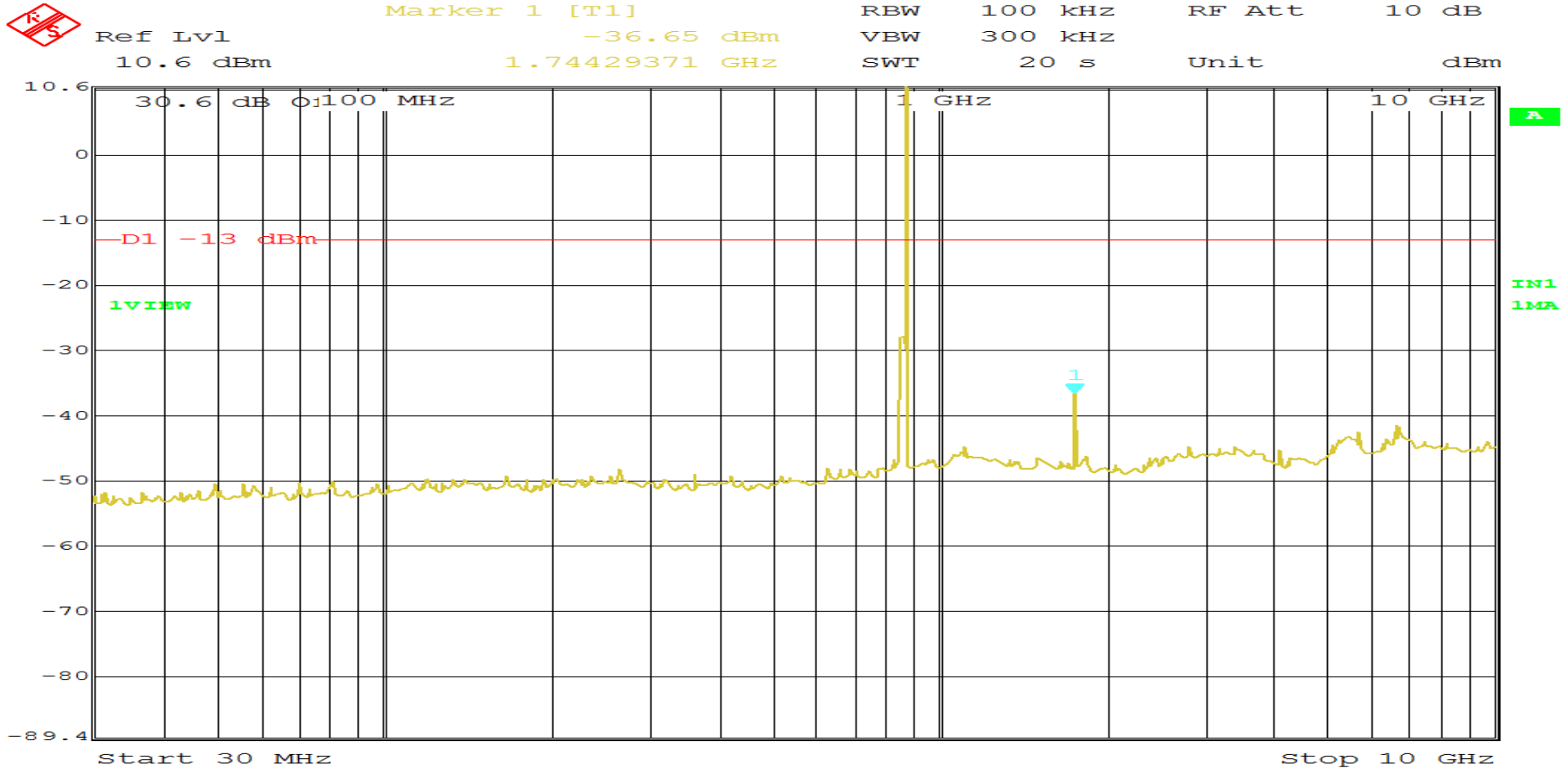
<b>Test Method</b>	Spurious Emissions Conducted		
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4
<b>Test Sample</b>	Bi-Directional Amplifier		
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990
<b>Operating Mode</b>	Amplifying signal		
<b>Test Specification</b>	Nemko Test Plan 317856-2		
<b>Technician</b>	M. Seamans	<b>Date</b>	December 5 <sup>th</sup> , 2016
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %		
<b>Notes</b>	Uplink: GSM High		



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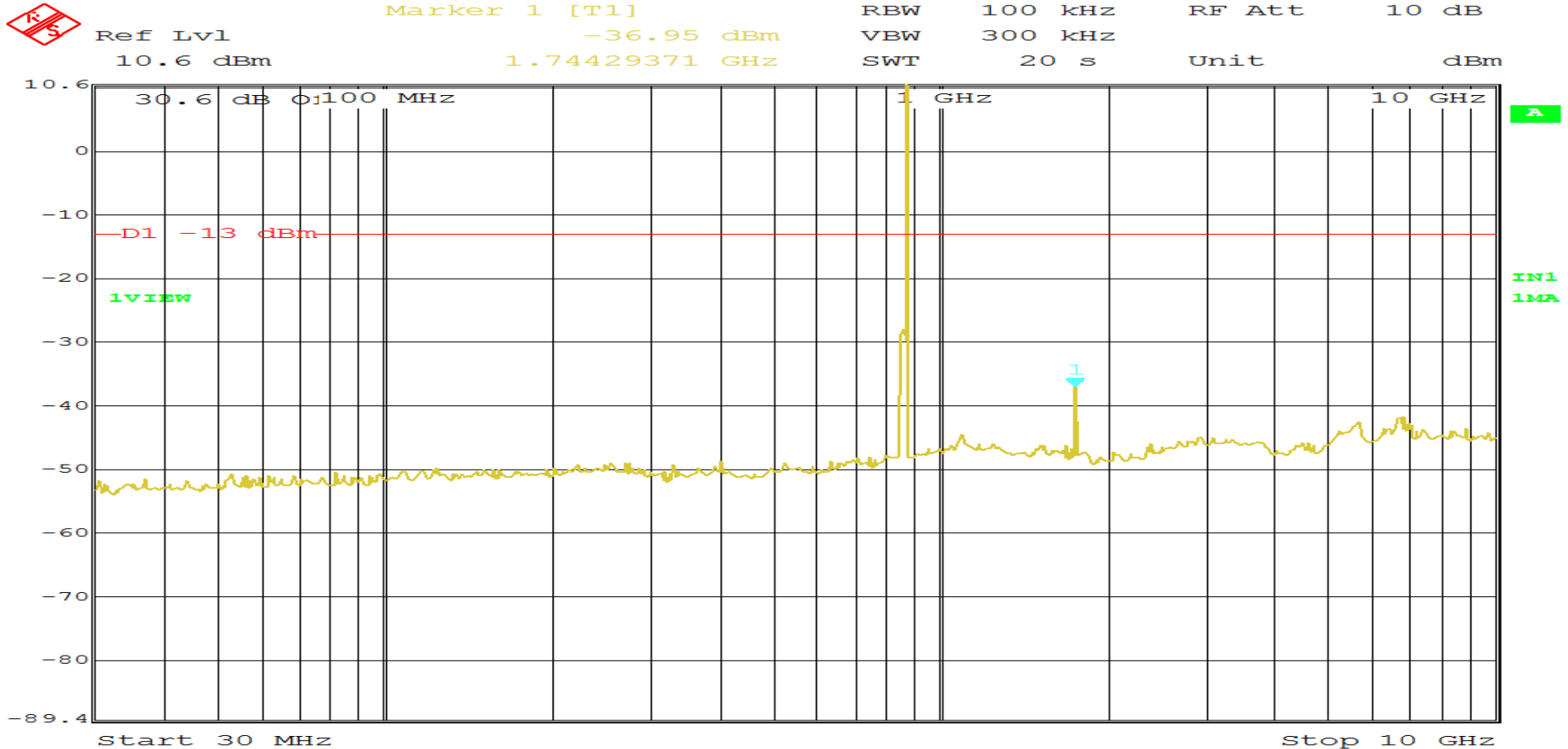
# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Spurious Emissions Conducted		
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4
<b>Test Sample</b>	Bi-Directional Amplifier		
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990
<b>Operating Mode</b>	Amplifying signal		
<b>Test Specification</b>	Nemko Test Plan 317856-2		
<b>Technician</b>	M. Seamans	<b>Date</b>	December 5 <sup>th</sup> , 2016
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %		
<b>Notes</b>	Downlink: LTE Low		



# RETLIF TESTING LABORATORIES

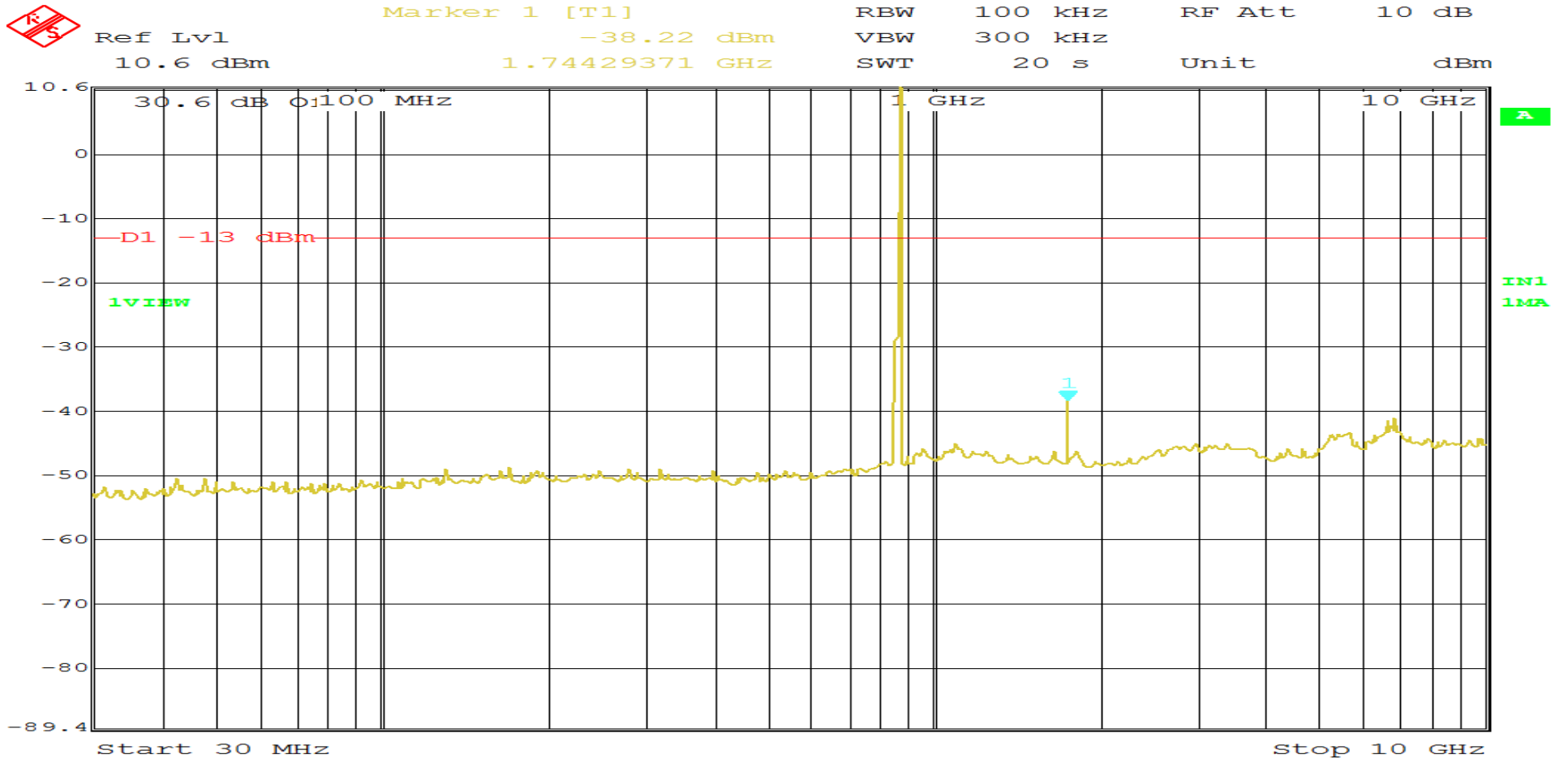
<b>Test Method</b>	Spurious Emissions Conducted		
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4
<b>Test Sample</b>	Bi-Directional Amplifier		
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990
<b>Operating Mode</b>	Amplifying signal		
<b>Test Specification</b>	Nemko Test Plan 317856-2		
<b>Technician</b>	M. Seamans	<b>Date</b>	December 5 <sup>th</sup> , 2016
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %		
<b>Notes</b>	Downlink: LTE Mid		



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# RETLIF TESTING LABORATORIES

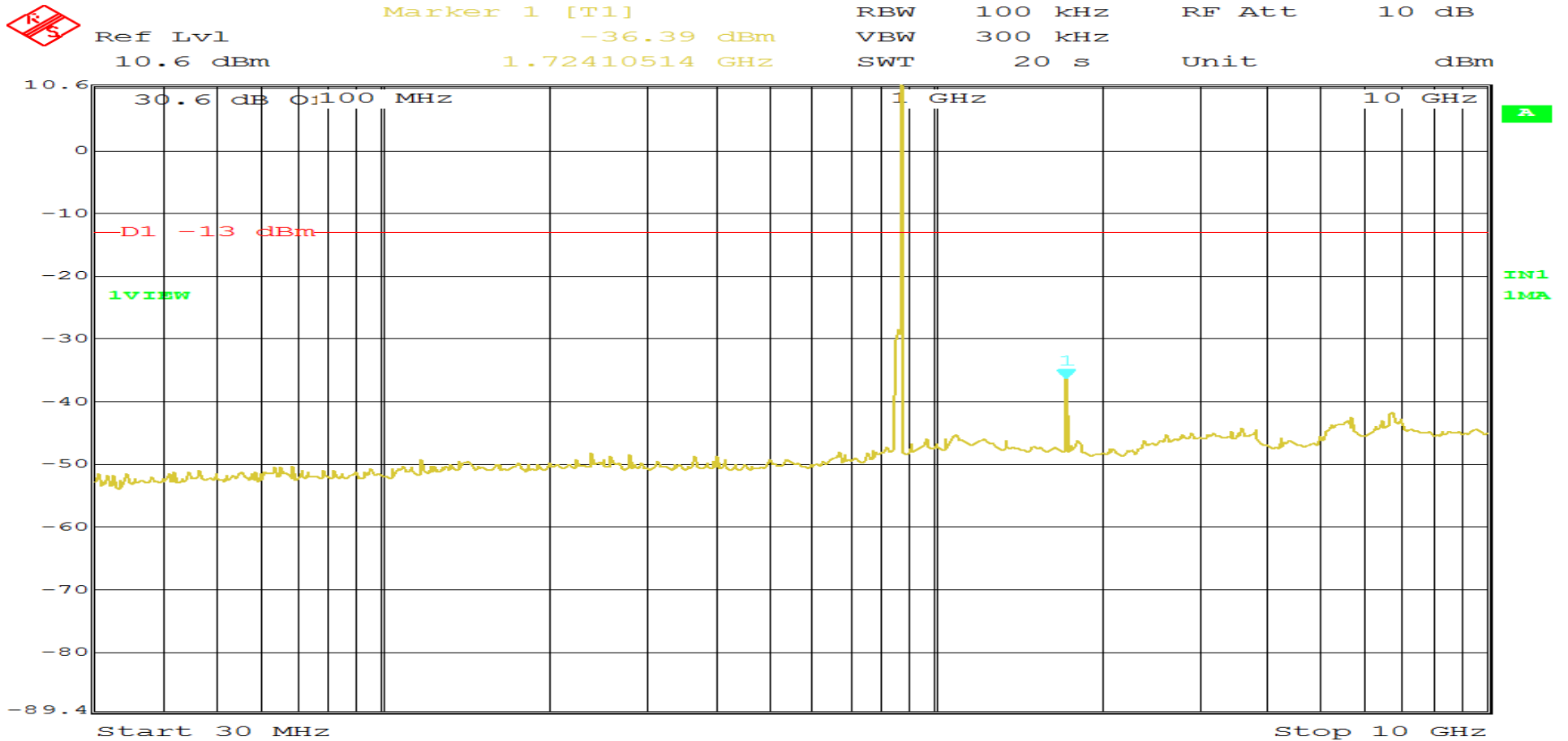
<b>Test Method</b>	Spurious Emissions Conducted		
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4
<b>Test Sample</b>	Bi-Directional Amplifier		
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990
<b>Operating Mode</b>	Amplifying signal		
<b>Test Specification</b>	Nemko Test Plan 317856-2		
<b>Technician</b>	M. Seamans	<b>Date</b>	December 5 <sup>th</sup> , 2016
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %		
<b>Notes</b>	Downlink: LTE High		



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# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Spurious Emissions Conducted		
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4
<b>Test Sample</b>	Bi-Directional Amplifier		
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990
<b>Operating Mode</b>	Amplifying signal		
<b>Test Specification</b>	Nemko Test Plan 317856-2		
<b>Technician</b>	M. Seamans	<b>Date</b>	December 5 <sup>th</sup> , 2016
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %		
<b>Notes</b>	Downlink: GSM Low		



Date: 1.JAN.1997 01:43:53

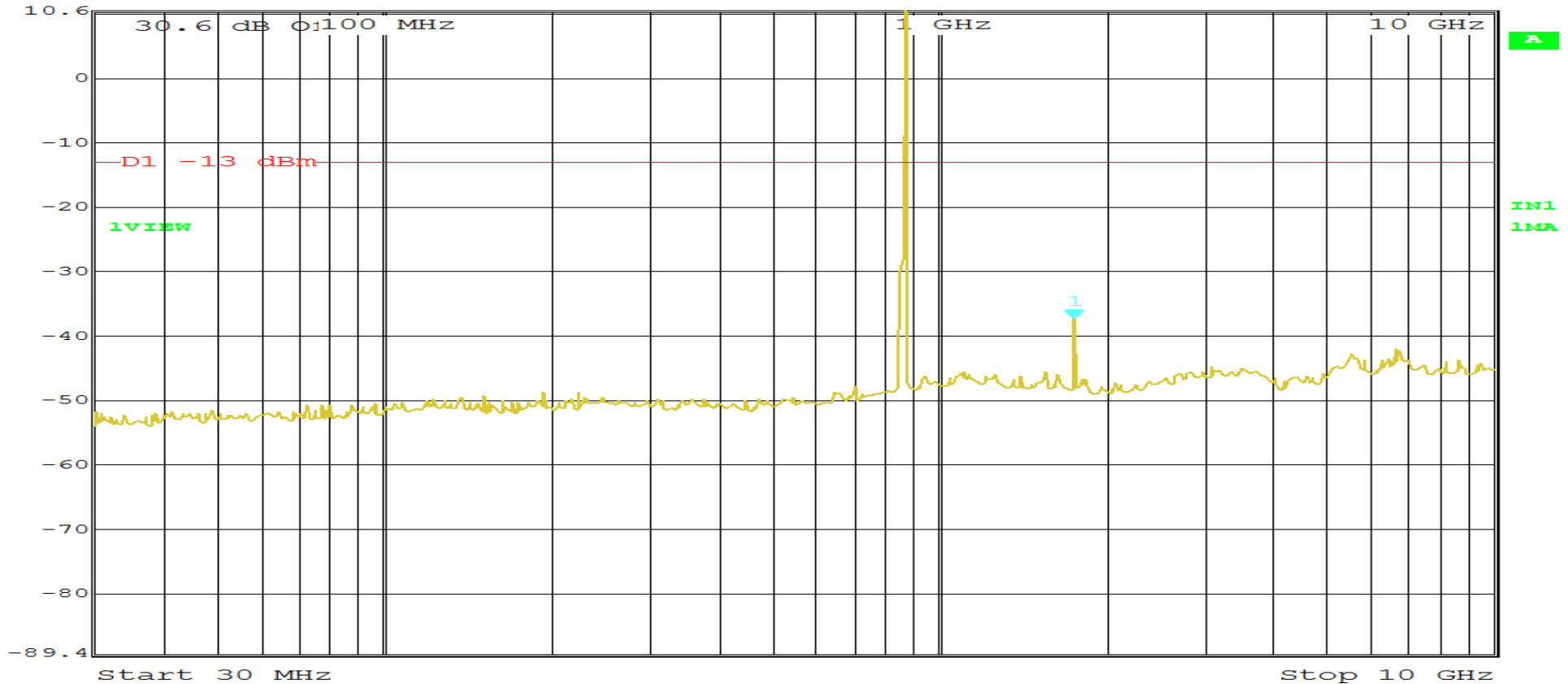
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# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Spurious Emissions Conducted		
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4
<b>Test Sample</b>	Bi-Directional Amplifier		
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990
<b>Operating Mode</b>	Amplifying signal		
<b>Test Specification</b>	Nemko Test Plan 317856-2		
<b>Technician</b>	M. Seamans	<b>Date</b>	December 5 <sup>th</sup> , 2016
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %		
<b>Notes</b>	Downlink: GSM Mid		

◆ ◆ ◆

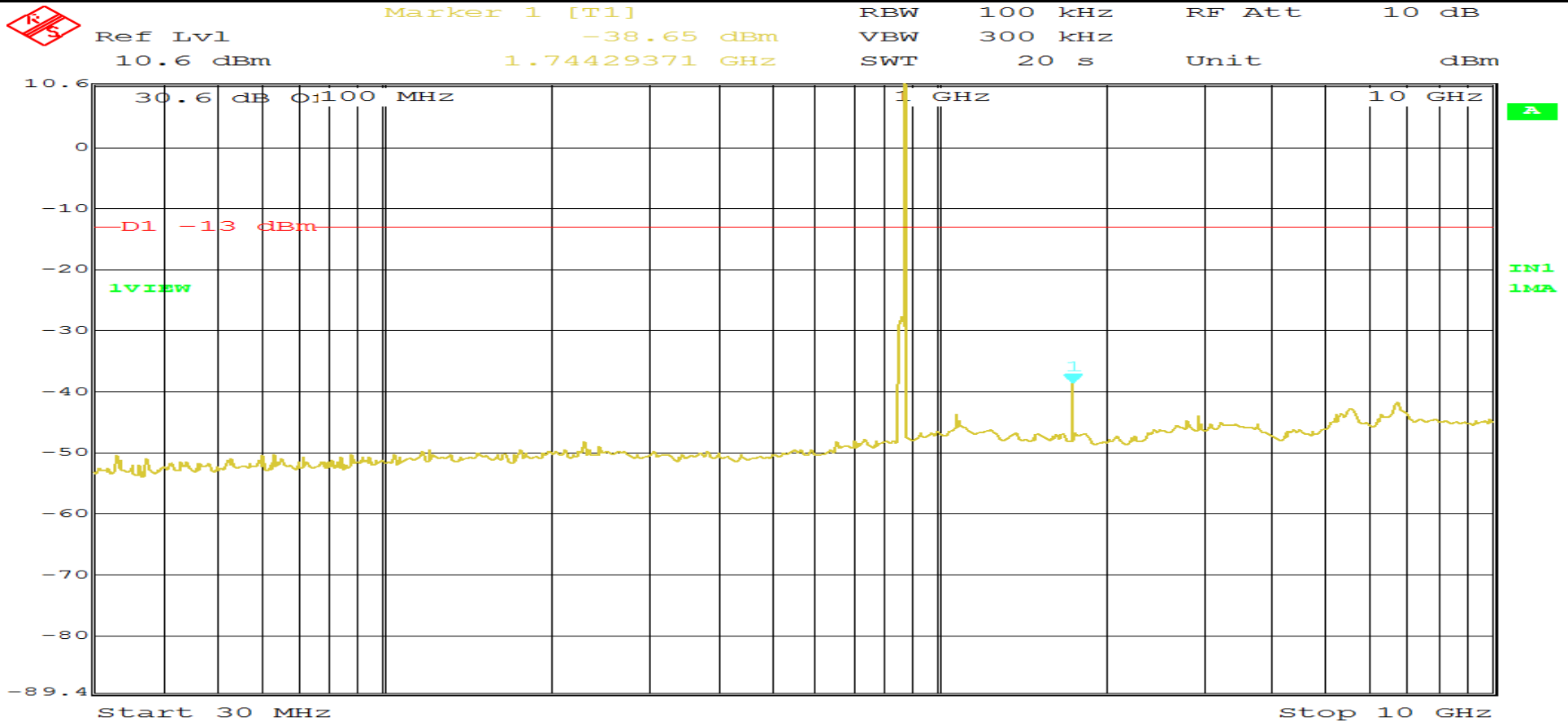
**Marker 1 [T1]**      RBW    100 kHz      RF Att    10 dB  
 Ref Lvl                      -37.22 dBm      VBW    300 kHz  
 10.6 dBm                    1.74429371 GHz      SWT    20 s      Unit      dBm



Date:            1.JAN.1997    01:48:22  
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# RETLIF TESTING LABORATORIES

<b>Test Method</b>	Spurious Emissions Conducted		
<b>Customer</b>	Westell, Inc.	<b>Job No.</b>	R-6142N-4
<b>Test Sample</b>	Bi-Directional Amplifier		
<b>Model Number</b>	BDA510-S8	<b>Serial No.</b>	CPG62990
<b>Operating Mode</b>	Amplifying signal		
<b>Test Specification</b>	Nemko Test Plan 317856-2		
<b>Technician</b>	M. Seamans	<b>Date</b>	December 5 <sup>th</sup> , 2016
<b>Climatic Conditions</b>	Temp: 19.3 °C    Relative Humidity: 29.6 %		
<b>Notes</b>	Downlink: GSM High		



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**Field Strength of Spurious Emissions  
Test Data**



**Retlif Testing Laboratories**

Report No. R-6142N-4

