

Nemko Test Report: 4L0458RUS1

Applicant: Andrew Corporation

**Equipment Under Test:
(E.U.T.)** MR853P

In Accordance With: **FCC Part 22, Subpart H**
Cellular Band Repeaters

Tested By: Nemko Dallas Inc.
802 N. Kealy
Lewisville, TX
75057-3136

Authorized By: Tom Tidwell, Frontline Group Manager

Date: 2 August, 2004

Total Number of Pages: 70

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EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

Section 1. Summary of Test Results

Manufacturer: [Andrew Corporation](#)

Model No.: [MR853P](#)

Serial No.: [11](#)

General: **All measurements are traceable to national standards.**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 22, Subpart H.



New Submission



Production Unit



Class II Permissive Change



Pre-Production Unit

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE. NONE

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EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

Summary Of Test Data

NAME OF TEST	PARA. NO.	SPEC.	RESULT
RF Power Output	22.913(a)	500W ERP	Complies
Occupied Bandwidth (Voice & SAT)	22.917(c)	Input/Output	Complies
Spurious Emissions at Antenna Terminals	22.917	-13 dBm	Complies
Field Strength of Spurious Emissions	22.917	-13 dBm E.I.R.P.	Complies
Frequency Stability	22.355	1.5 ppm	NA

Footnotes The device processes but does not produce a modulated waveform and does not
: perform any frequency translation.

Measurement uncertainty for each test configuration is expressed to 95% probability.

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EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

Section 2. General Equipment Specification

Supply Voltage Input:		115 Vac				
Frequency Range:	Downlink:	869 – 894 MHz				
Frequency Range:	Uplink:	824 – 849 MHz				
Type of Modulation and Designator:		CDMA (F9W) ☒	GSM (GXW) ☒	NADC (DXW) ☒	EDGE (G7W) ☒	AMPS (F8W, F1D) ☒
Output Impedance:		50 ohms				
Max Input Power:		+10 dBm				
RF Output (Rated):	Downlink:	Modulation	1 Carrier	2 Carriers	4 Carriers	
		Analog	34	24	21	
		CDMA	28	22	19	
		GSM	34	24	21	
		EDGE	30.5	22.5	19.5	
		TDMA	31.5	23	20	
	Uplink:	Modulation	1 Carrier	2 Carriers	4 Carriers	
		Analog	34	24	21	
		CDMA	28	22	19	
		GSM	34	24	21	
		EDGE	30.5	22.5	19.5	
		TDMA	31.5	23	20	
Frequency Translation:		F1-F1 ☒	F1-F2 ☐	N/A ☐		
Band Selection:		Software ☒	Duplexer Change ☐	Fullband Coverage ☐		

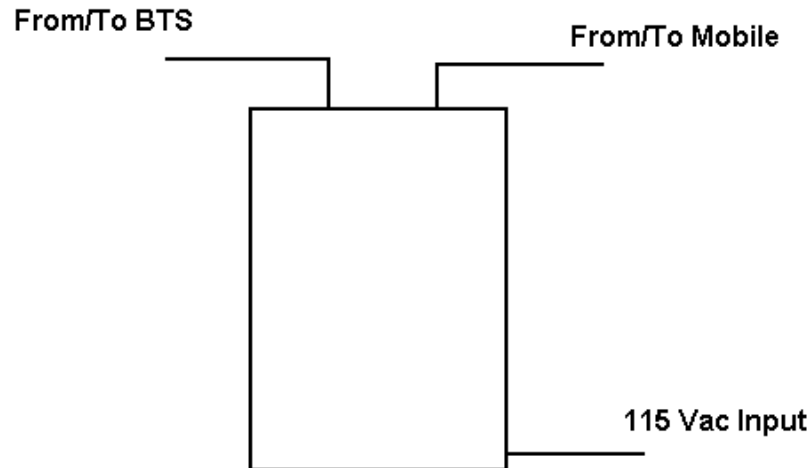
EQUIPMENT: MR853P

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Description of Operation

This is a booster operating in the 800 MHz SMR band using two 15 MHz variable bandwidth modules for uplink and downlink.

System Diagram



EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 2.1046
TESTED BY: David Light	DATE: 7/28/04

Test Results: Complies.**Test Data:**

	Modulation Type	Per Channel Power Output (dBm)	Composite Power Output (dBm)
Uplink	AMPS	24	27
Downlink	AMPS	22	25
Uplink	CDMA	24	27
Downlink	CDMA	22.5	25.5
Uplink	GSM	23	26
Downlink	GSM	24	27
Uplink	NADC	22	25
Downlink	NADC	24	27
Uplink	EDGE	22.5	25.5
Downlink	EDGE	23	26

Equipment Used: 1036-1064-1627-1628**Measurement Uncertainty:** +/- 1.7 dB**Temperature:** 22 °C**Relative Humidity:** 40 %

EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 2.1049
TESTED BY: David Light	DATE: 7/29/04

Test Results: [Complies.](#)

Test Data: [See attached plots](#)

EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

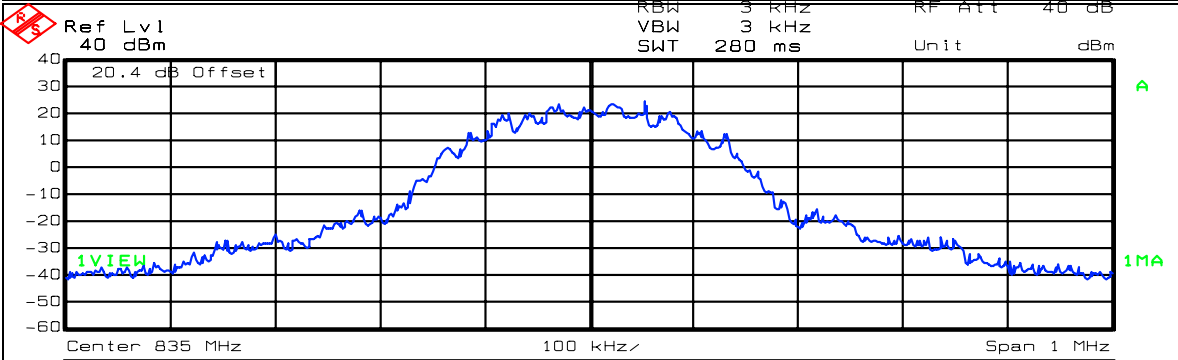
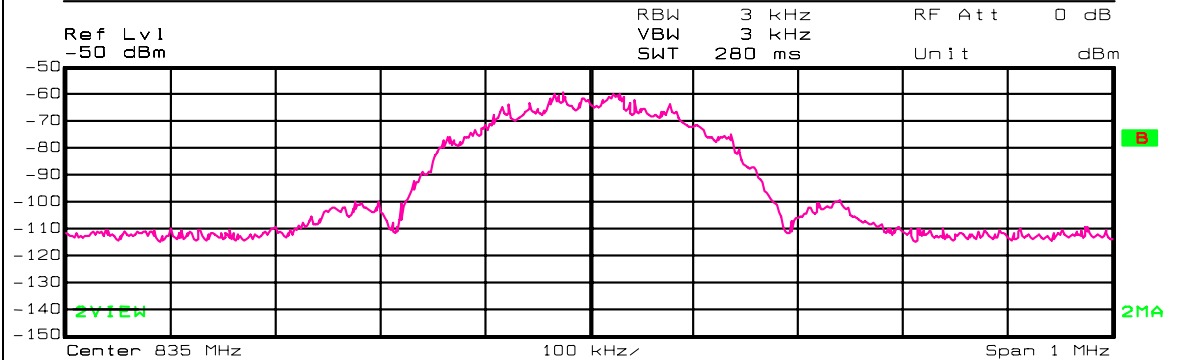
Test Data – Occupied Bandwidth



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Data Plot		Occupied Bandwidth	
Page 1 of 5		Complete <u>X</u>	
Job No.:	4L0458R	Date:	7/29/2004
Specification:	PT22	Temperature(°C):	22
Tested By:	David Light	Relative Humidity(%)	40
E.U.T.:	CELL BAND REPEATER		
Configuration:	TX		
Sample Number:	1		
Location:	Lab 1	RBW:	Refer to plots
Detector Type:	Peak	VBW:	Refer to plots
		Measurement	Distance: <u>NA</u> m
Test Equipment Used			
Antenna:		Directional Coupler:	
Pre-Amp:		Cable #1:	1628
Filter:		Cable #2:	1627
Receiver:	1036	Cable #3:	
Attenuator #1:	1064	Cable #4:	
Attenuator #2:		Mixer:	
Additional equipment used:			
Measurement Uncertainty:	+/-1.7 dB		
			
			
Date: 29.JUL.2004 10:49:22			
Notes: <u>EDGE</u>			

EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

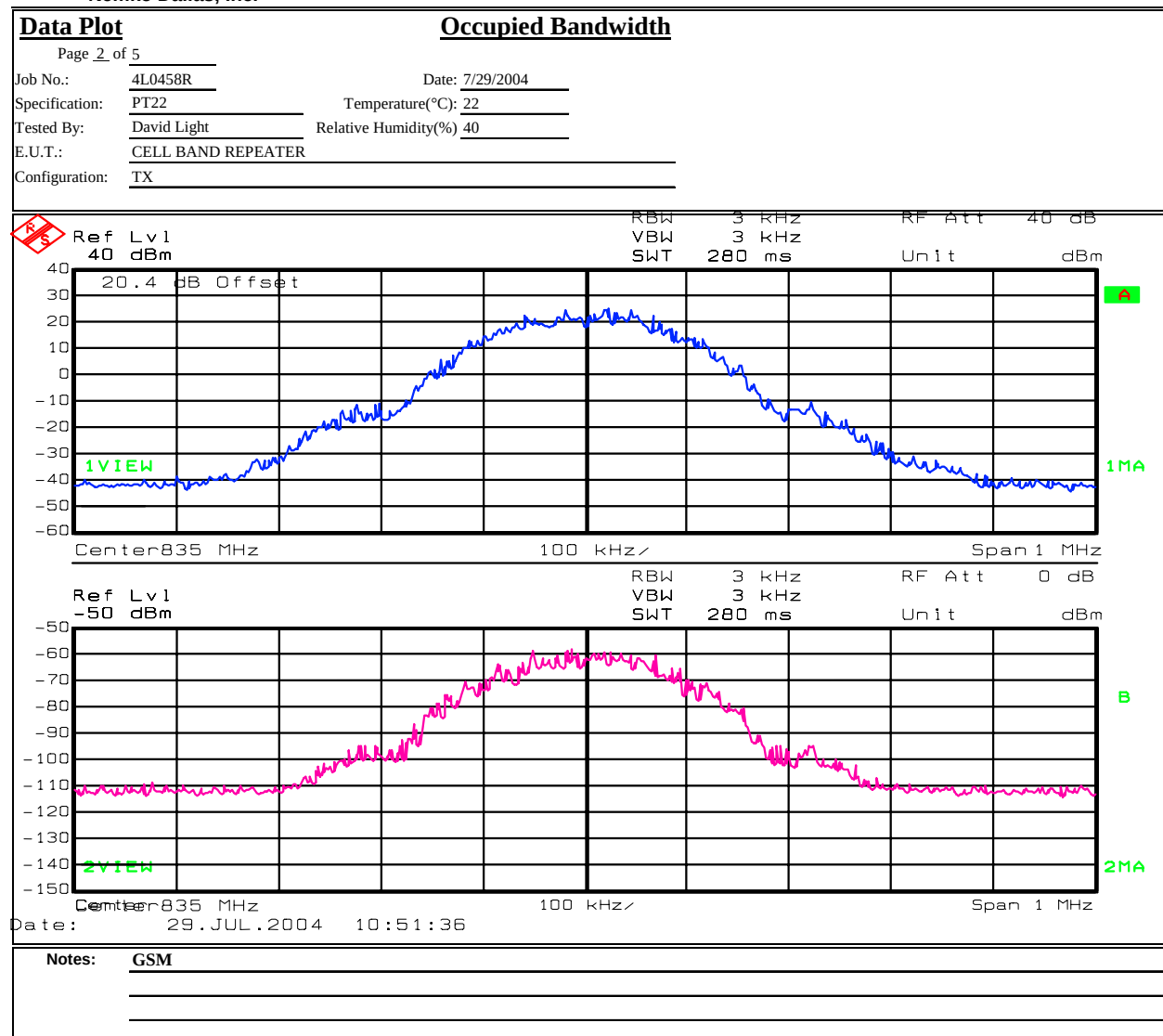
Test Data – Occupied Bandwidth



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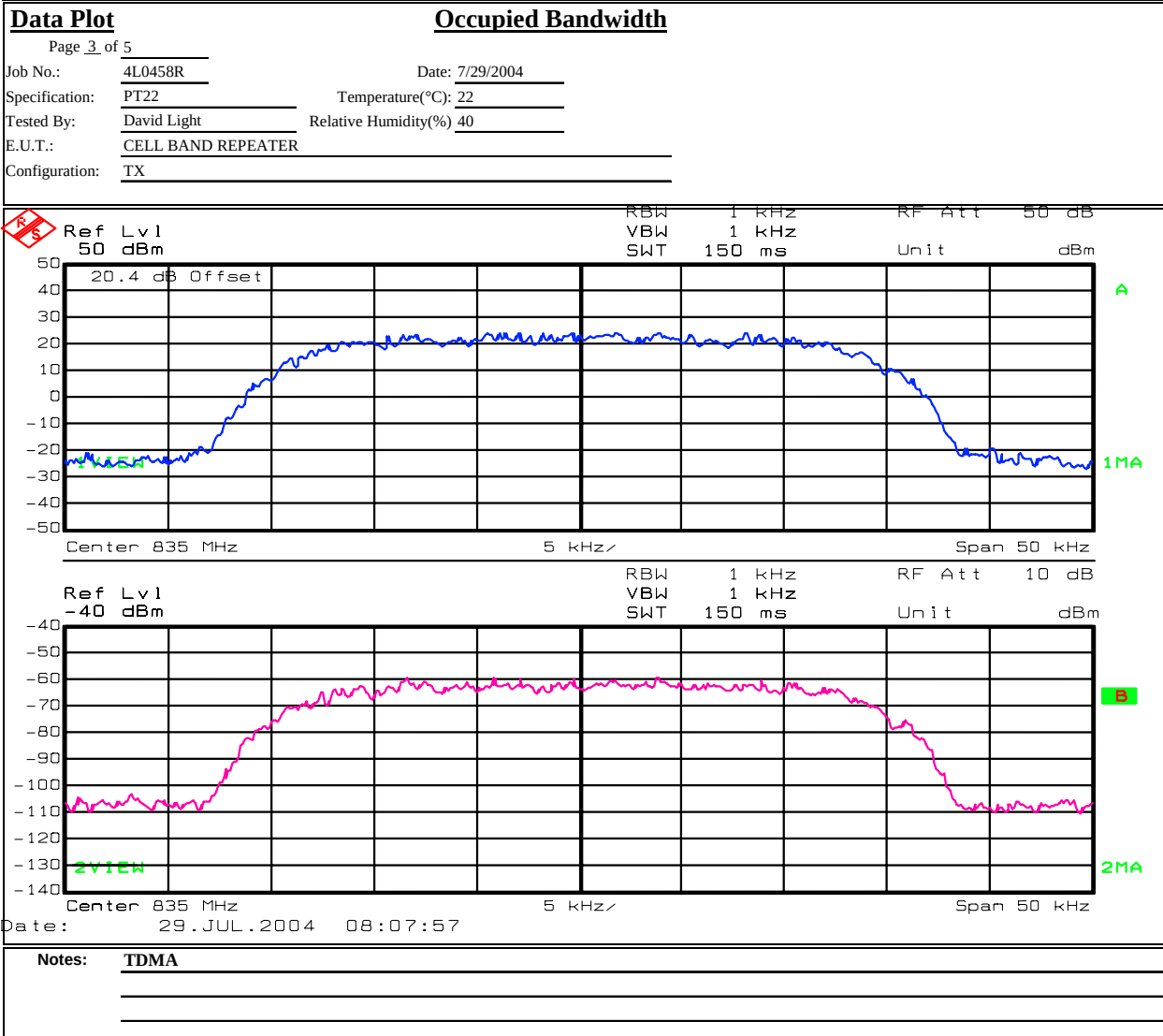
Test Data – Occupied Bandwidth



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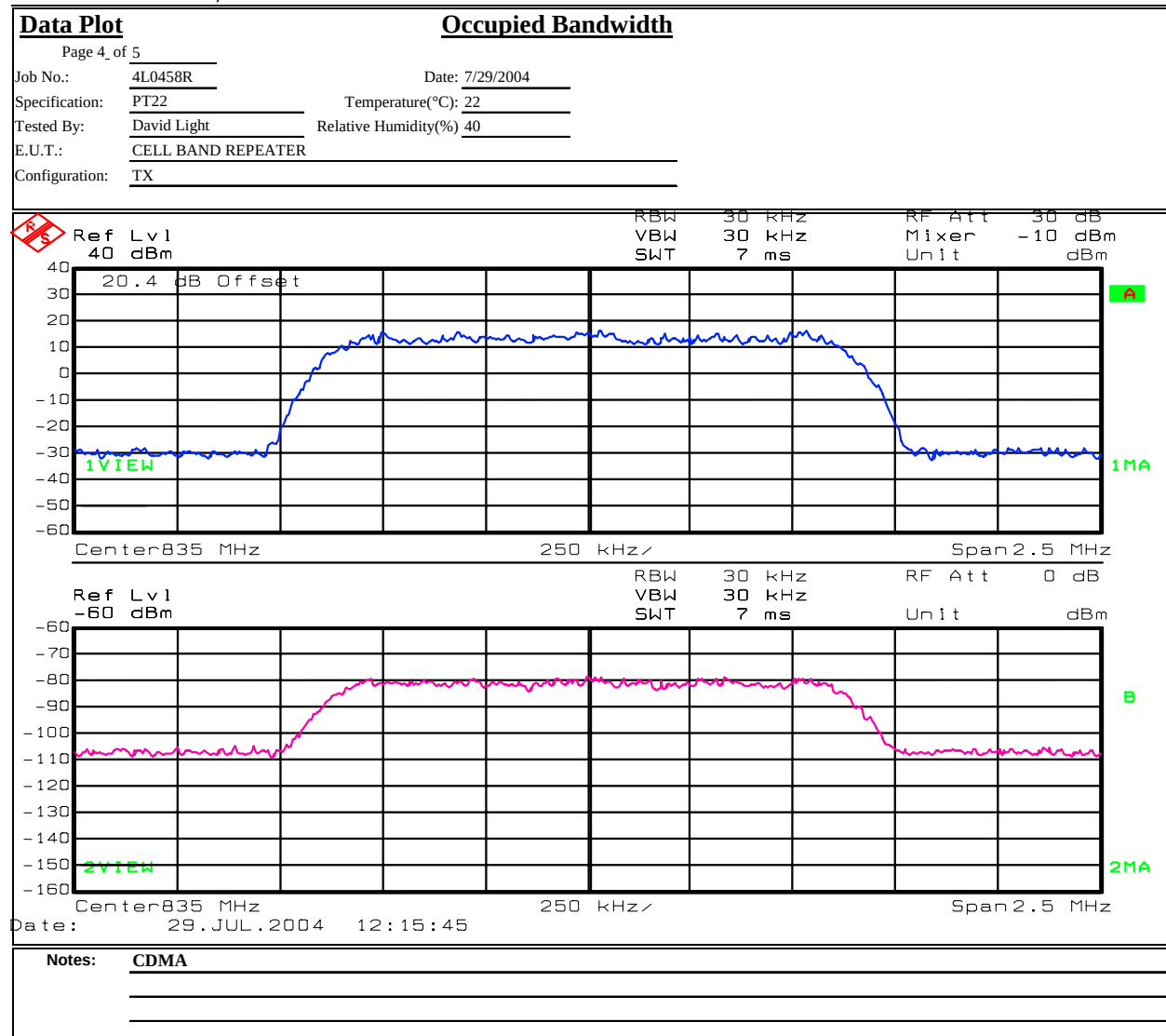
Test Report No.: 4L0458RUS1

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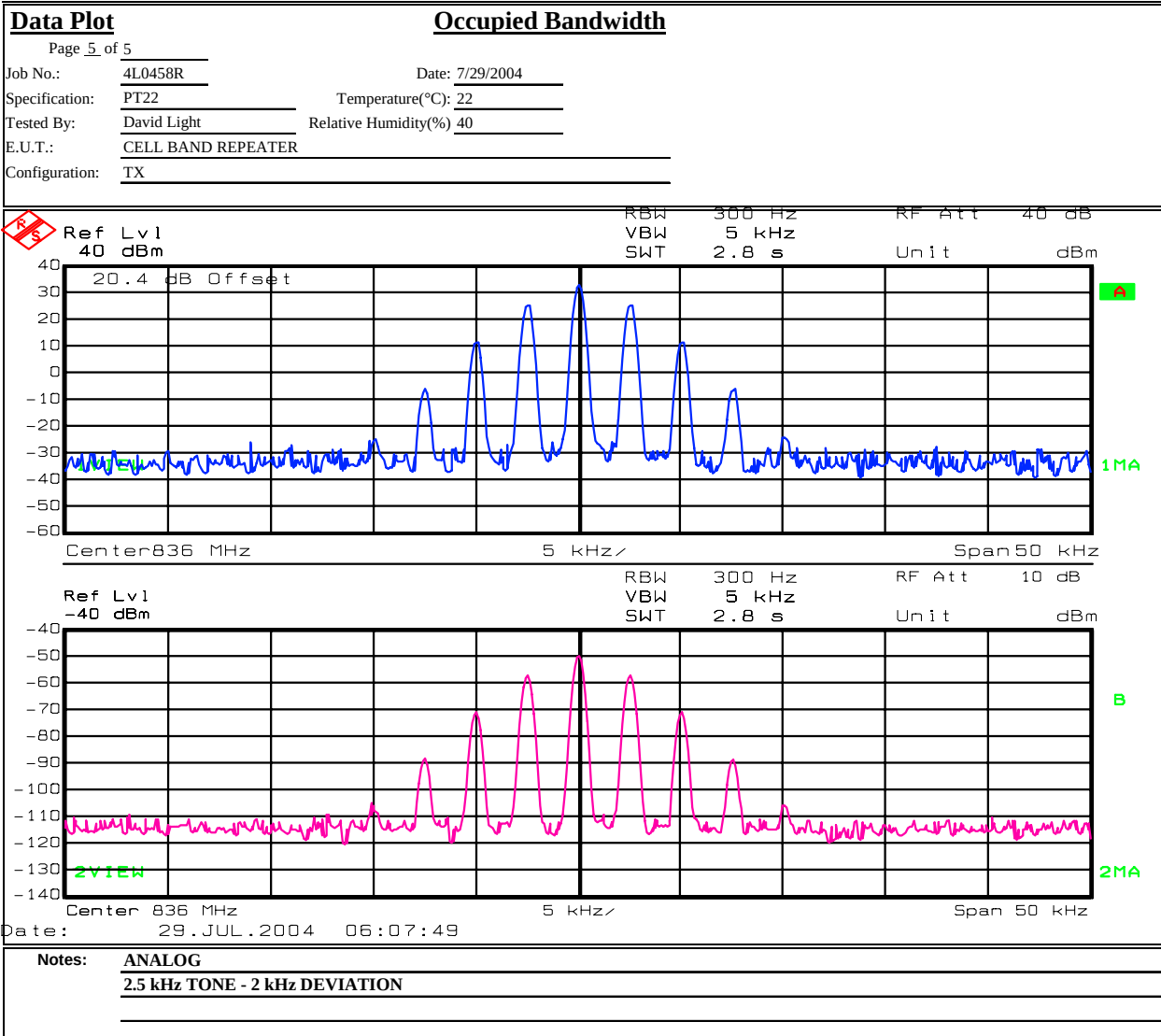
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Test Data – Occupied Bandwidth



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Test Data – Occupied Bandwidth



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Data Plot		Occupied Bandwidth	
Page 1 of 5		Complete <u>X</u>	
Job No.: 4L0458R	Date: 7/29/2004	Preliminary: _____	
Specification: PT22	Temperature(°C): 22		
Tested By: David Light	Relative Humidity(%): 40		
E.U.T.: CELL BAND REPEATER			
Configuration: TX			
Sample Number: 1			
Location: Lab 1	RBW: Refer to plots	Measurement	
Detector Type: _____	VBW: Refer to plots	Distance: NA m	
Test Equipment Used			
Antenna: _____	Directional Coupler: _____		
Pre-Amp: _____	Cable #1: 1627		
Filter: _____	Cable #2: 1628		
Receiver: 1036	Cable #3: _____		
Attenuator #1: 1064	Cable #4: _____		
Attenuator #2: _____	Mixer: _____		
Additional equipment used: _____			
Measurement Uncertainty: +/-1.7 dB			
Date: 29.JUL.2004 10:24:51			
Notes: EDGE			

EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

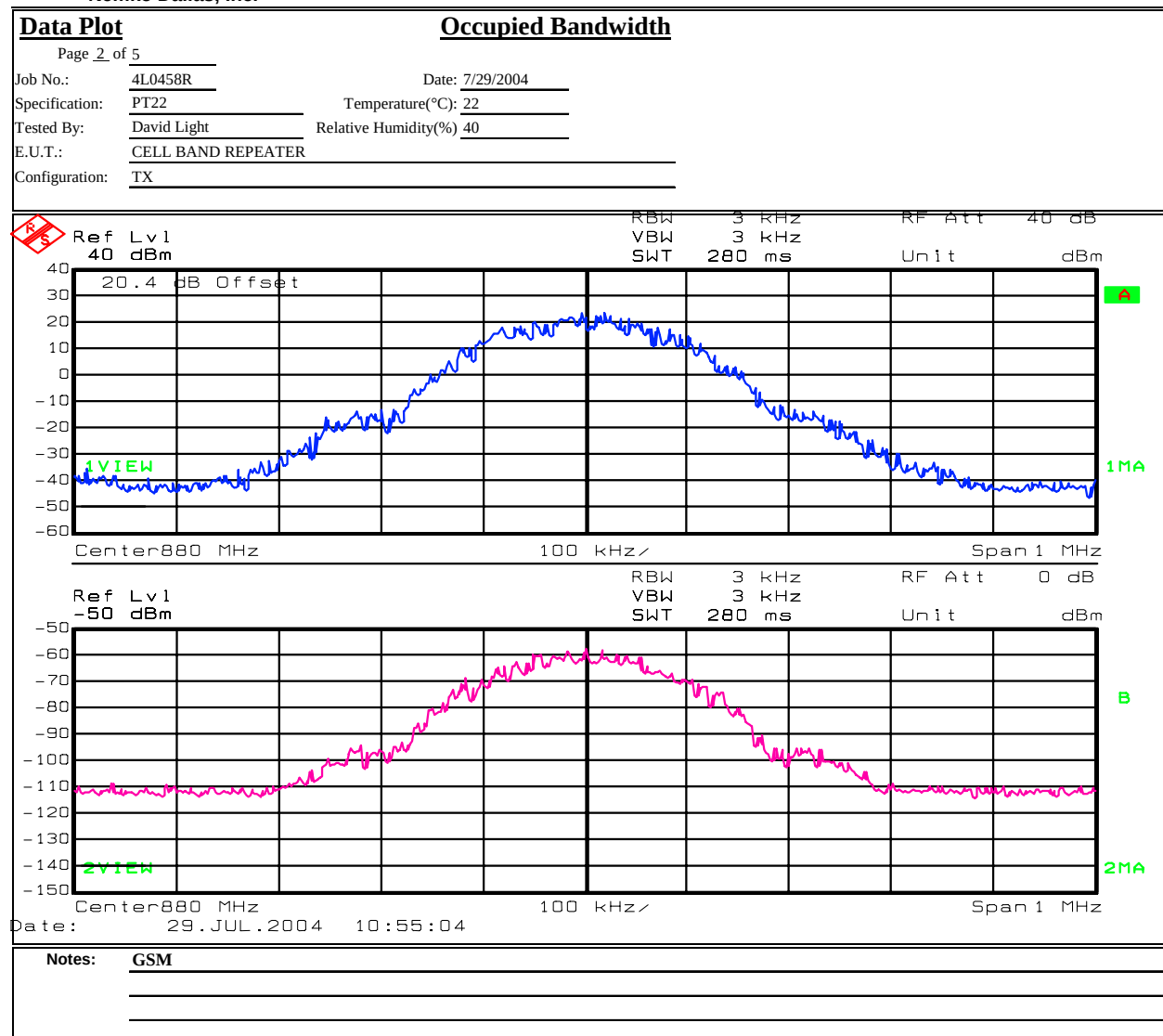
Test Data – Occupied Bandwidth



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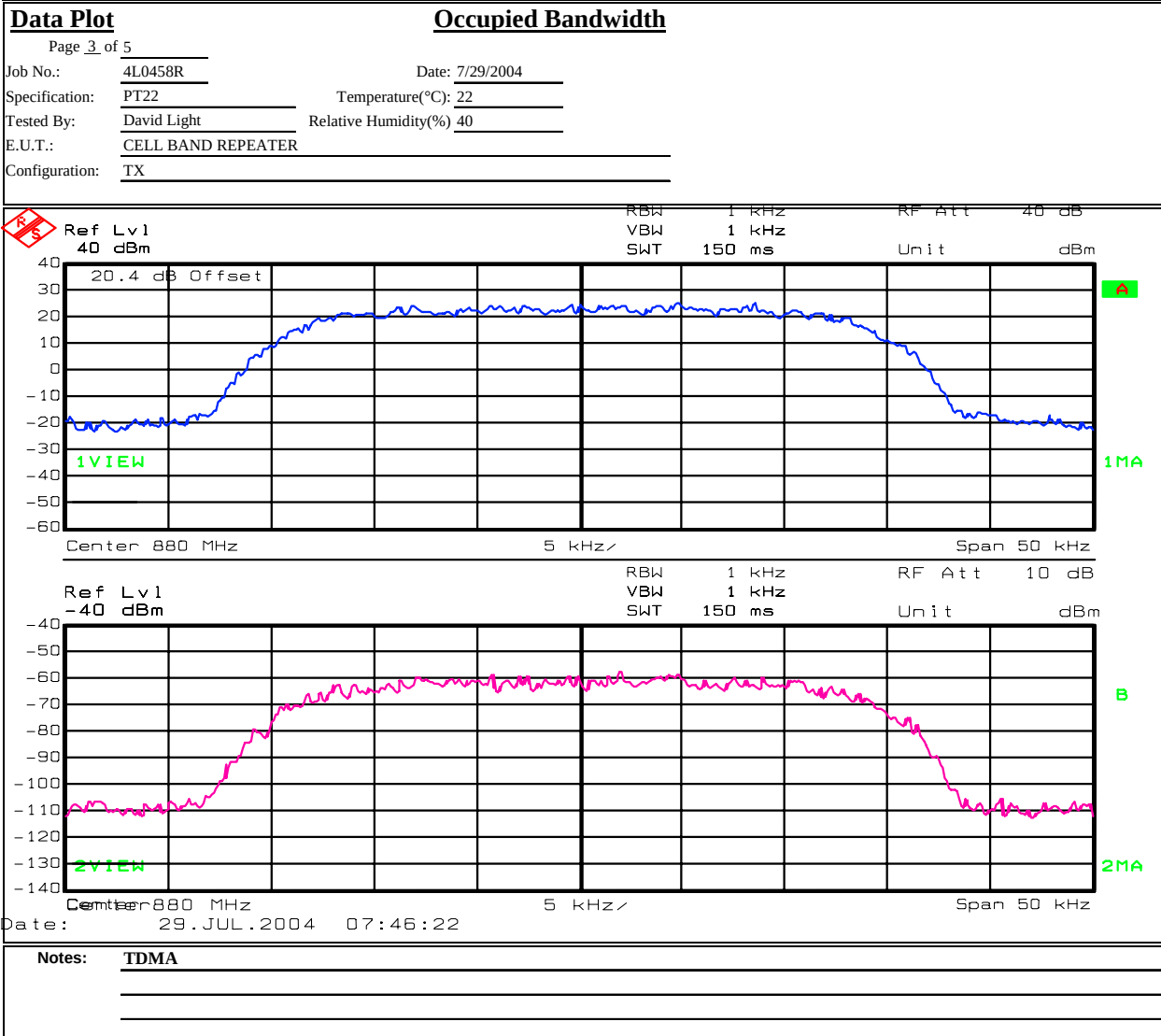
Test Report No.: 4L0458RUS1

Test Data – Occupied Bandwidth



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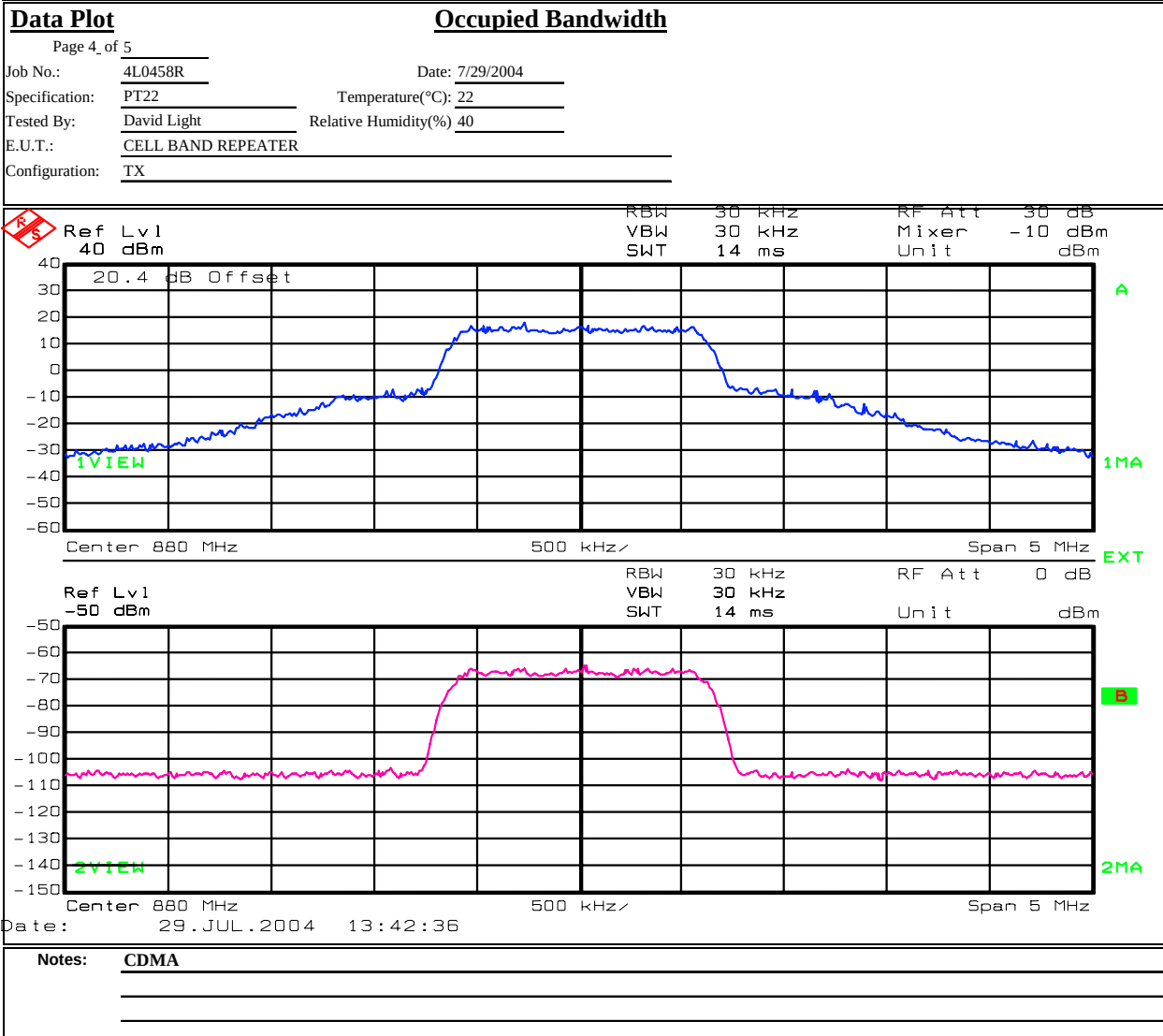
Test Data – Occupied Bandwidth



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Test Report No.: 4L0458RUS1

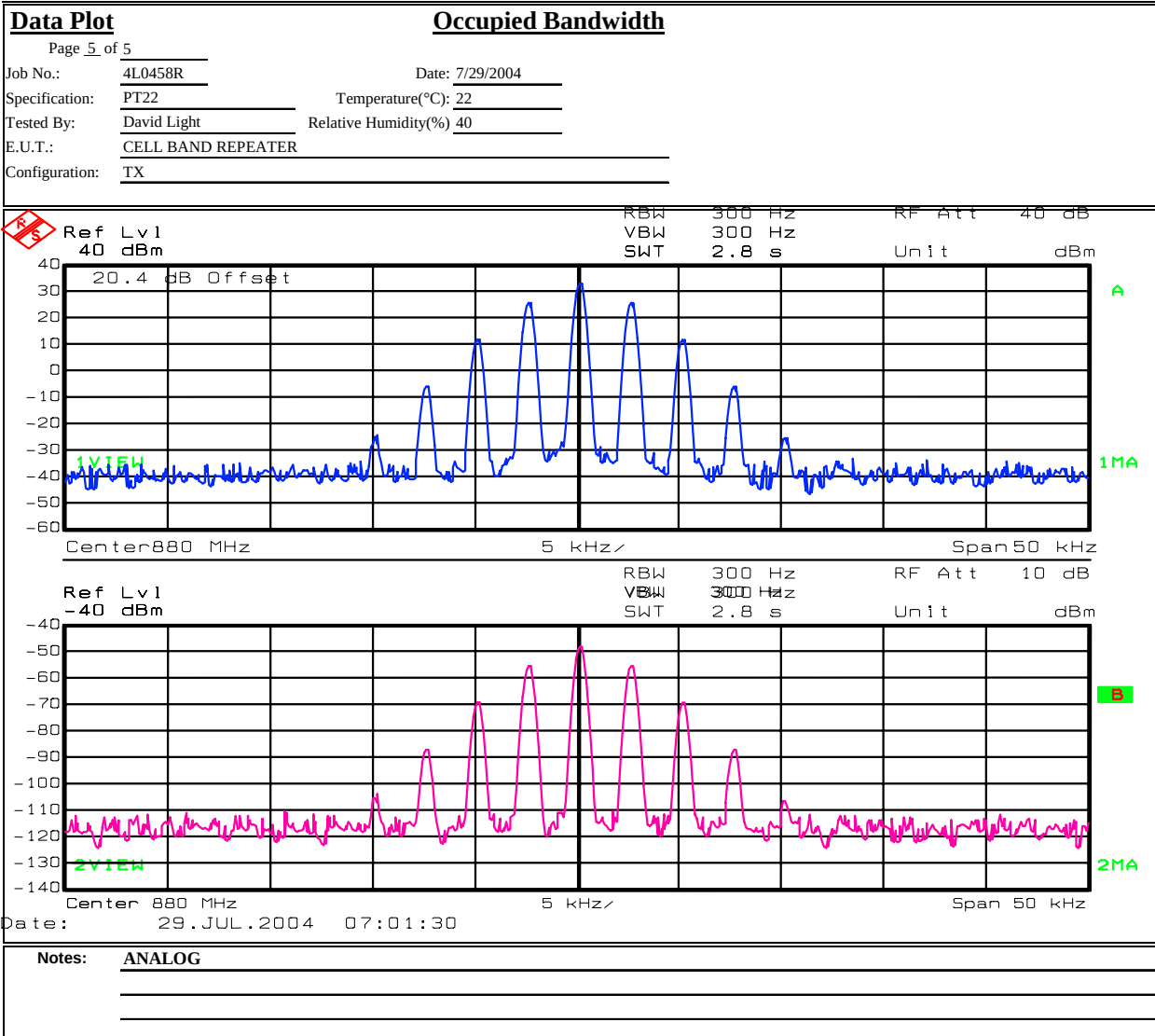
Test Data – Occupied Bandwidth



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EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 2.1051
TESTED BY: David Light	DATE: 7/29/04

Test Results: [Complies.](#)

Test Data: [See attached plots](#)

EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

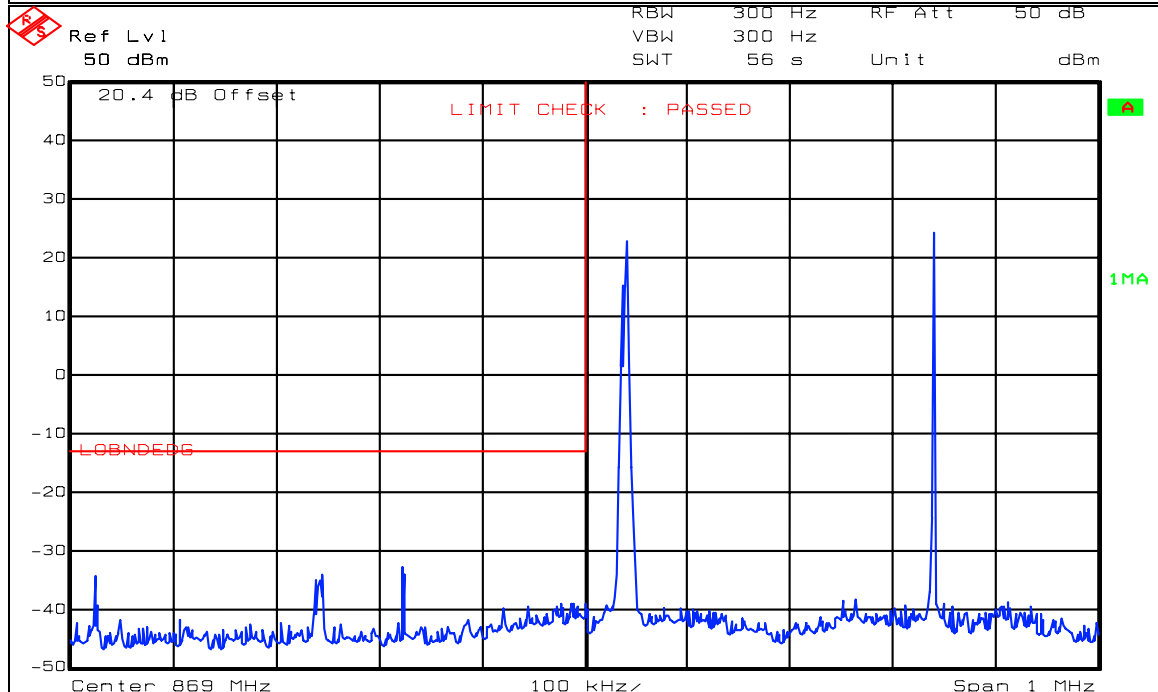
Test Data – Spurious Emissions at Antenna Terminals (Analog)



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Data Plot		Spurious Emissions at Antenna Terminals	
Page 1 of 5	Date: 7/29/2004	Complete	X
Job No.: 4L0458R	Temperature(°C): 22	Preliminary:	
Specification: PT22	Relative Humidity(%): 40		
Tested By: David Light			
E.U.T.: CELL BAND REPEATER			
Configuration: TX			
Sample Number: 1			
Location: Lab 1	RBW: Refer to plots	Measurement	
Detector Type: Peak	VBW: Refer to plots	Distance: NA	m
Test Equipment Used			
Antenna:	Directional Coupler:		
Pre-Amp:	Cable #1:	1627	
Filter:	Cable #2:	1628	
Receiver:	Cable #3:		
Attenuator #1:	Cable #4:		
Attenuator #2:	Mixer:		
Additional equipment used:			
Measurement Uncertainty:	+/-1.7 dB		
			
Date: 29.JUL.2004 07:06:38			
Notes: 2 CHANNEL INTERMOD			
24 dBm per carrier			
869.04 and 869.34			

EQUIPMENT: MR853P

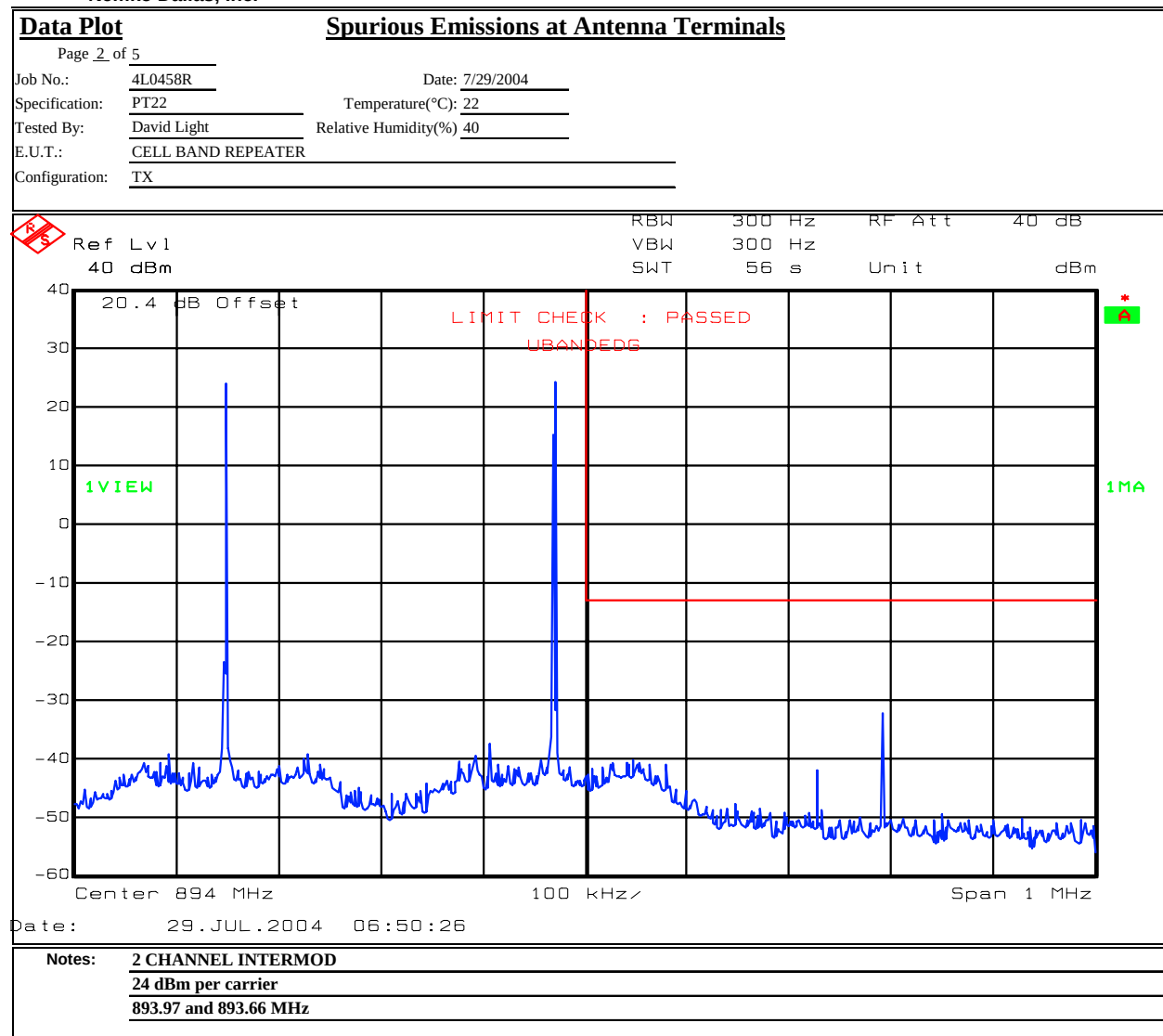
Test Report No.: 4L0458RUS1

Test Data – Spurious Emissions at Antenna Terminals (Analog)



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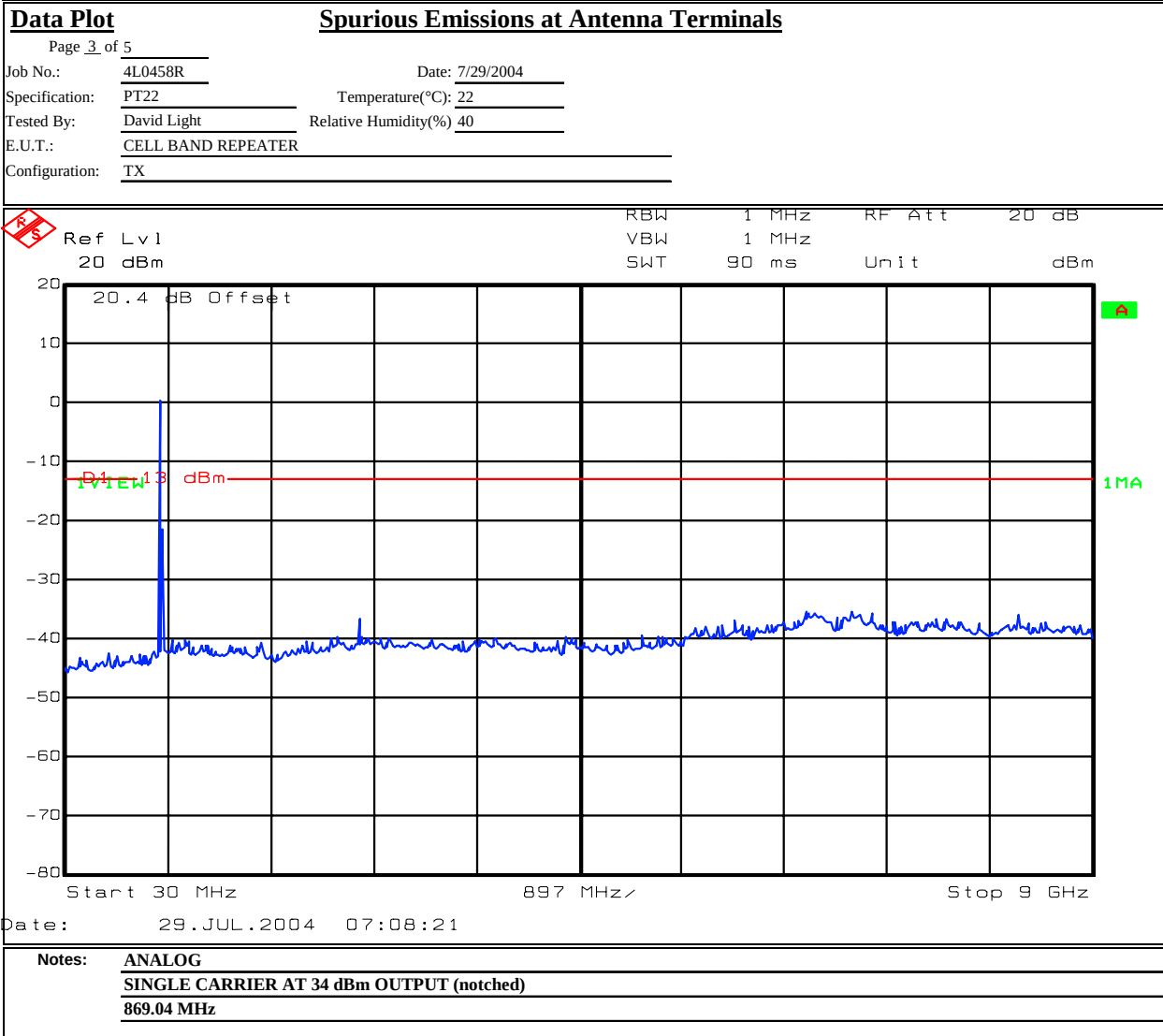
Test Data – Spurious Emissions at Antenna Terminals (Analog)



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The spectrum was searched in detail on 3 channels. The plot above is indicative of all channels measured.

EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

Test Data – Spurious Emissions at Antenna Terminals (Analog)



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Data Plot		Spurious Emissions at Antenna Terminals	
Page 1 of 5		Complete <u>X</u>	
Job No.: 4L0458R	Date: 7/29/2004	Preliminary: _____	
Specification: PT22	Temperature(°C): 22		
Tested By: David Light	Relative Humidity(%): 40		
E.U.T.: CELL BAND REPEATER			
Configuration: TX			
Sample Number: 1			
Location: Lab 1	RBW: Refer to plots	Measurement	
Detector Type: Peak	VBW: Refer to plots	Distance: NA m	
Test Equipment Used			
Antenna: _____	Directional Coupler: _____		
Pre-Amp: _____	Cable #1: 1628		
Filter: _____	Cable #2: 1627		
Receiver: 1036	Cable #3: _____		
Attenuator #1: 1064	Cable #4: _____		
Attenuator #2: _____	Mixer: _____		
Additional equipment used: _____			
Measurement Uncertainty: +/-1.7 dB			
Ref Lvl 40 dBm 20.4 dB Offset 1VIEW LOBNDESG RBW 300 Hz VBW 300 Hz SWT 56 s RF Att 40 dB Unit dBm Limit Check : PASSED 1MA Center 824 MHz 100 kHz Span 1 MHz			
Date: 29.JUL.2004 06:17:17			
Notes: 2 CHANNEL INTERMOD			
24 dBm per carrier			
824.04 and 824.34 MHz			

EQUIPMENT: MR853P

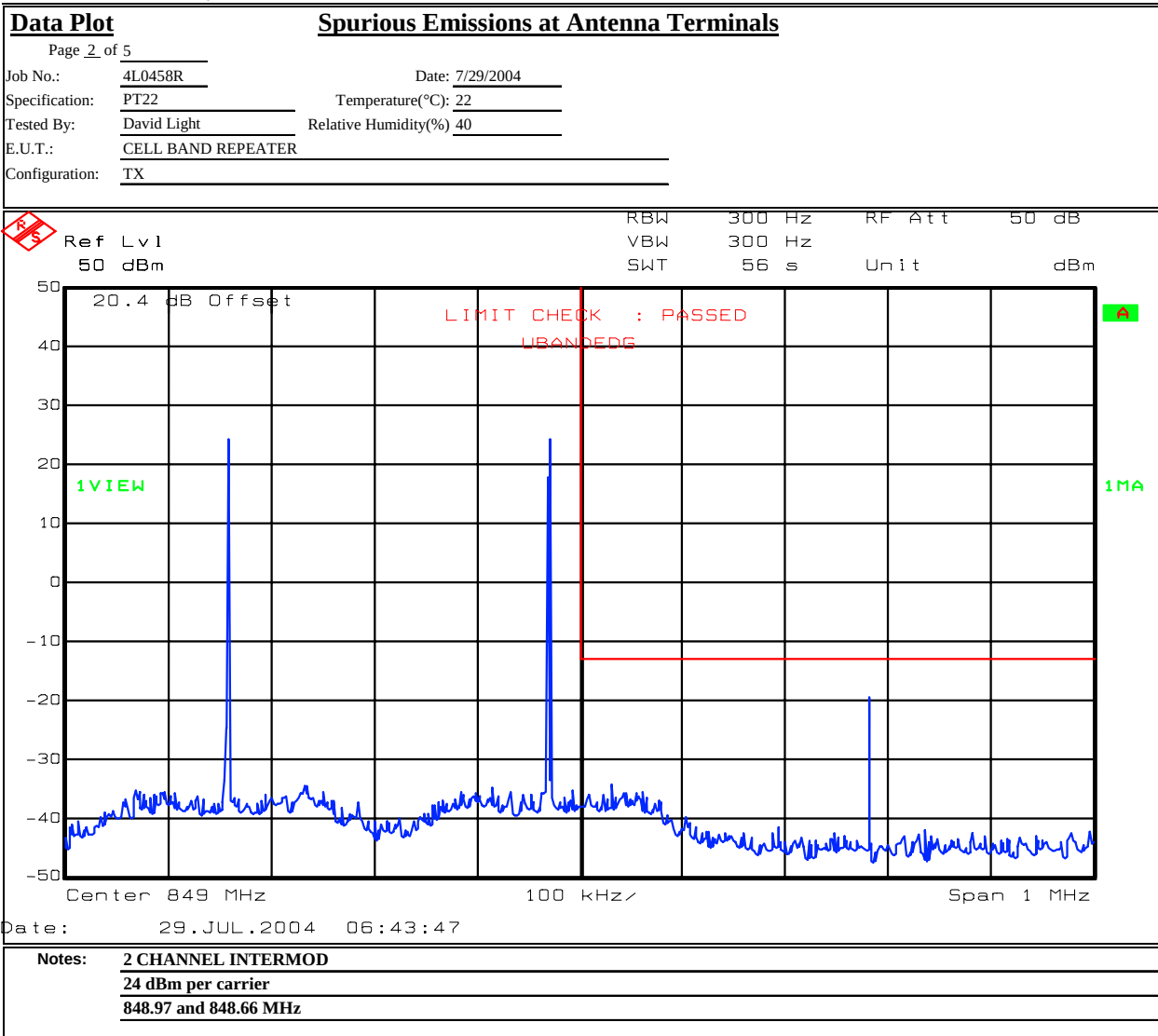
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Test Data – Spurious Emissions at Antenna Terminals (Analog)



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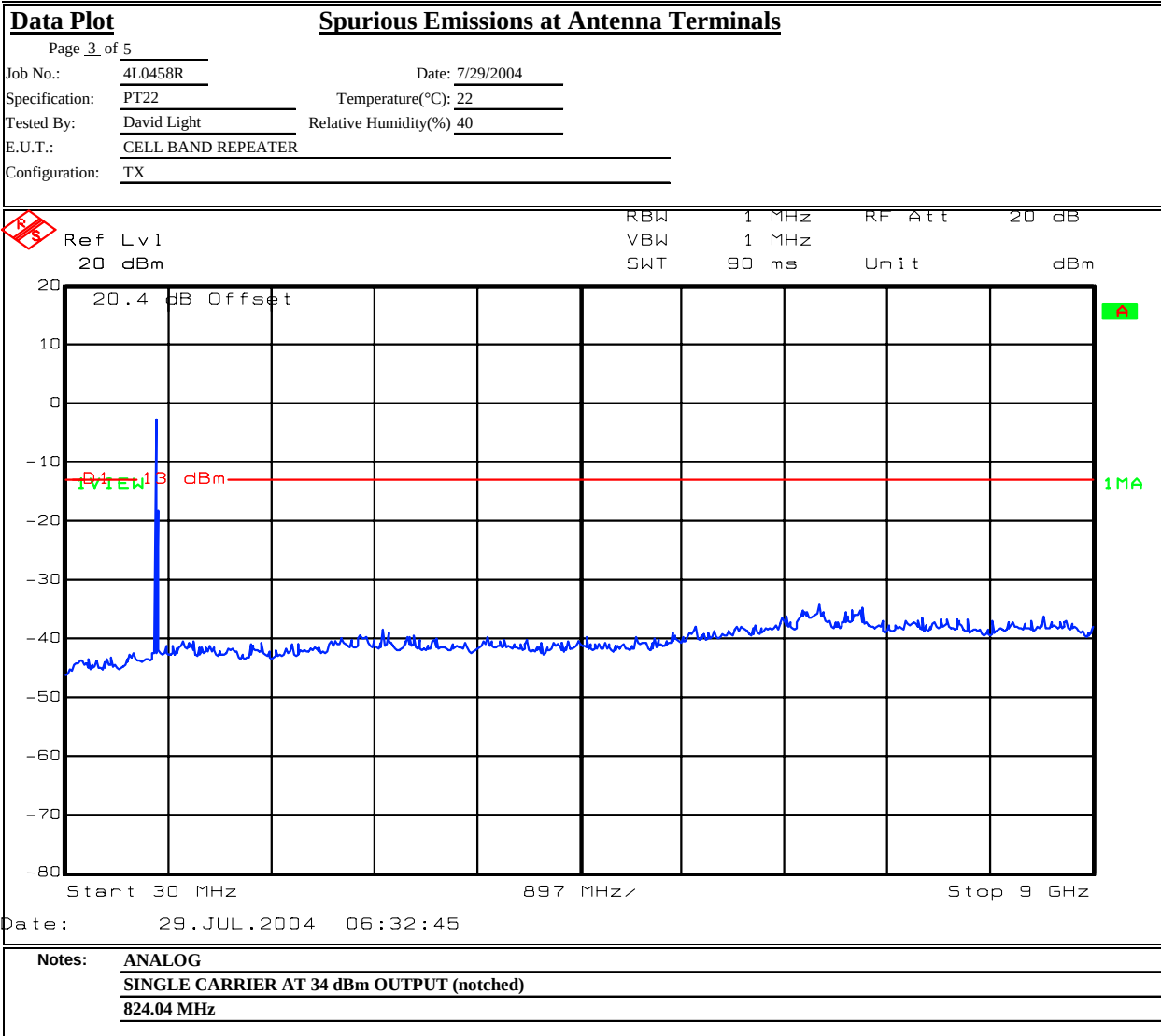
Test Data – Spurious Emissions at Antenna Terminals (Analog)



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Test Data – Spurious Emissions at Antenna Terminals (CDMA)



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Data Plot

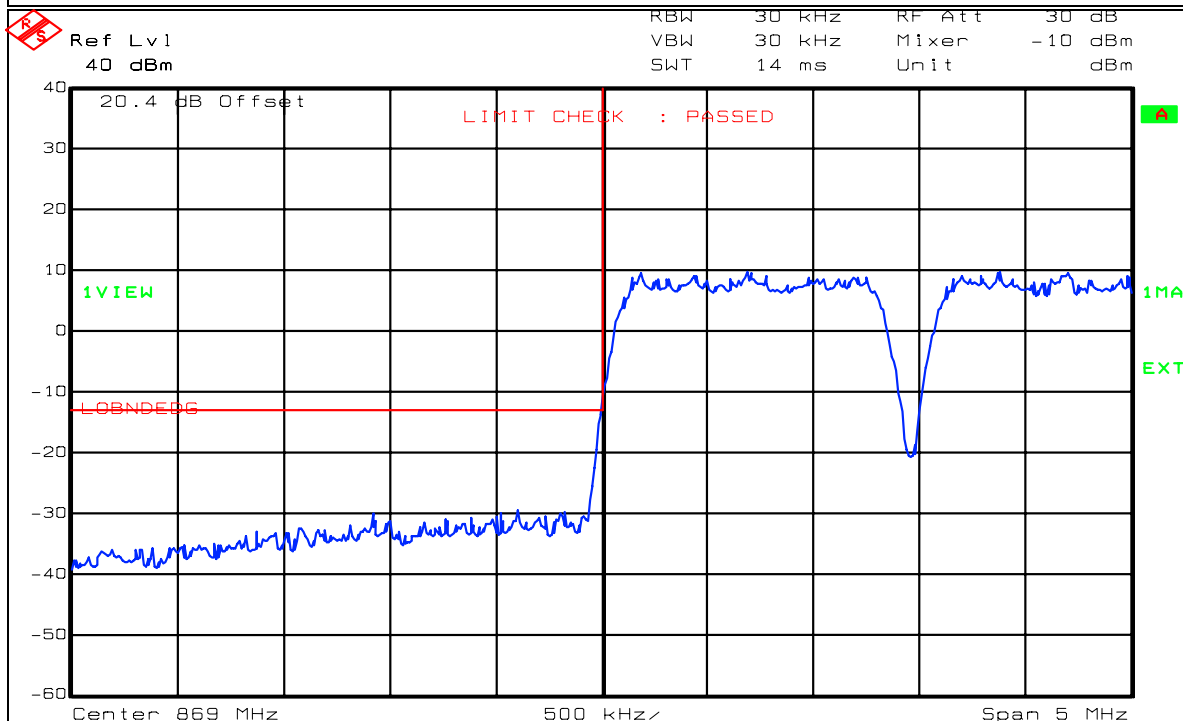
Spurious Emissions at Antenna Terminals

Page 1 of 5

Job No.: 4L0458R Date: 7/29/2004 Complete X
Specification: PT22 Temperature(°C): 22 Preliminary: _____
Tested By: David Light Relative Humidity(%): 40
E.U.T.: CELL BAND REPEATER
Configuration: TX
Sample Number: 1
Location: Lab 1 RBW: Refer to plots Measurement
Detector Type: Peak VBW: Refer to plots Distance: NA m

Test Equipment Used

Antenna: _____ Directional Coupler: _____
Pre-Amp: _____ Cable #1: 1627
Filter: _____ Cable #2: 1628
Receiver: 1036 Cable #3: _____
Attenuator #1: 1064 Cable #4: _____
Attenuator #2: _____ Mixer: _____
Additional equipment used: _____
Measurement Uncertainty: +/-1.7 dB



Date: 29.JUL.2004 13:48:38

Notes: 2 CHANNEL INTERMOD
22 dBm/Carrier
CDMA

EQUIPMENT: MR853P

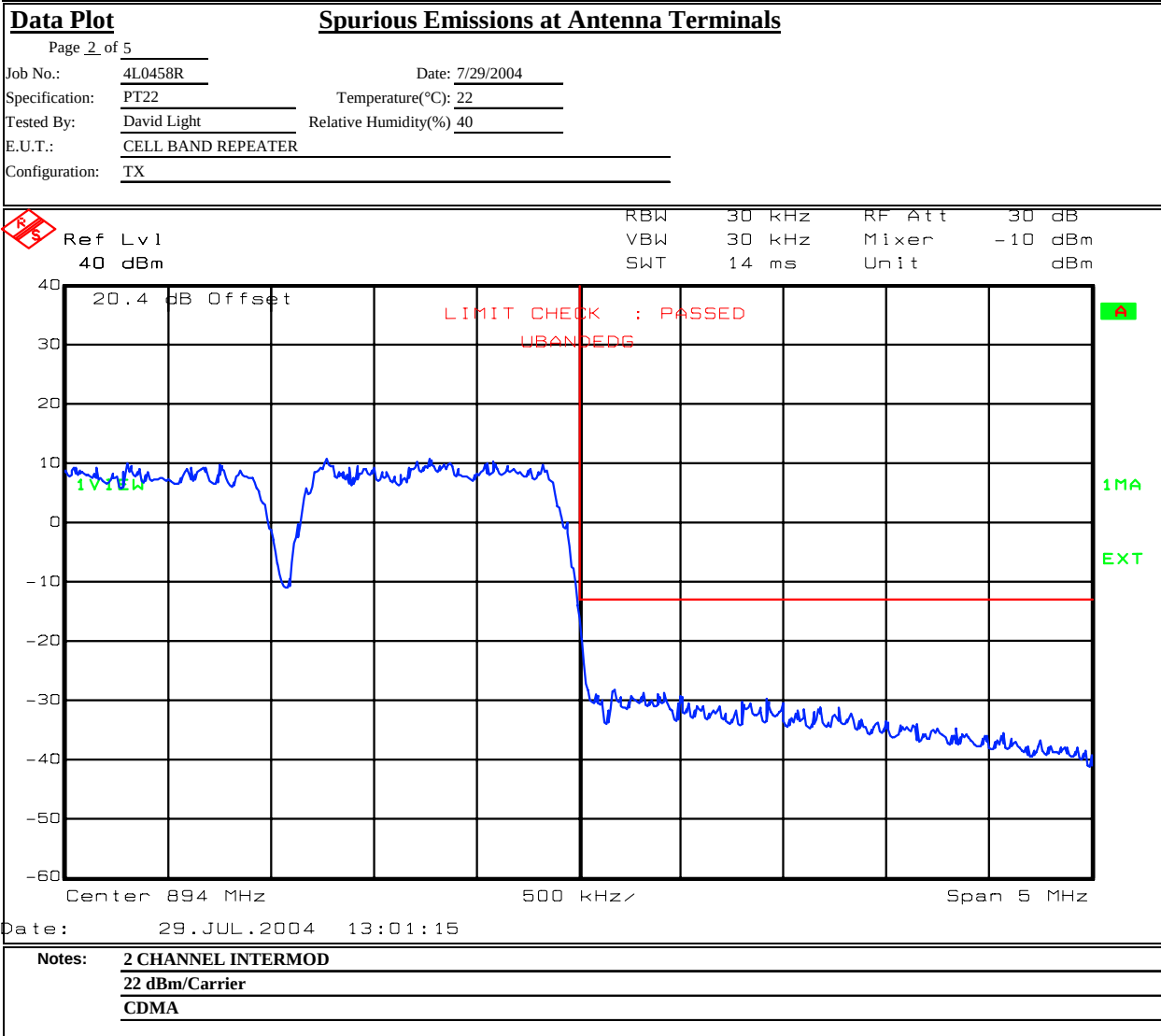
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Test Data – Spurious Emissions at Antenna Terminals (CDMA)



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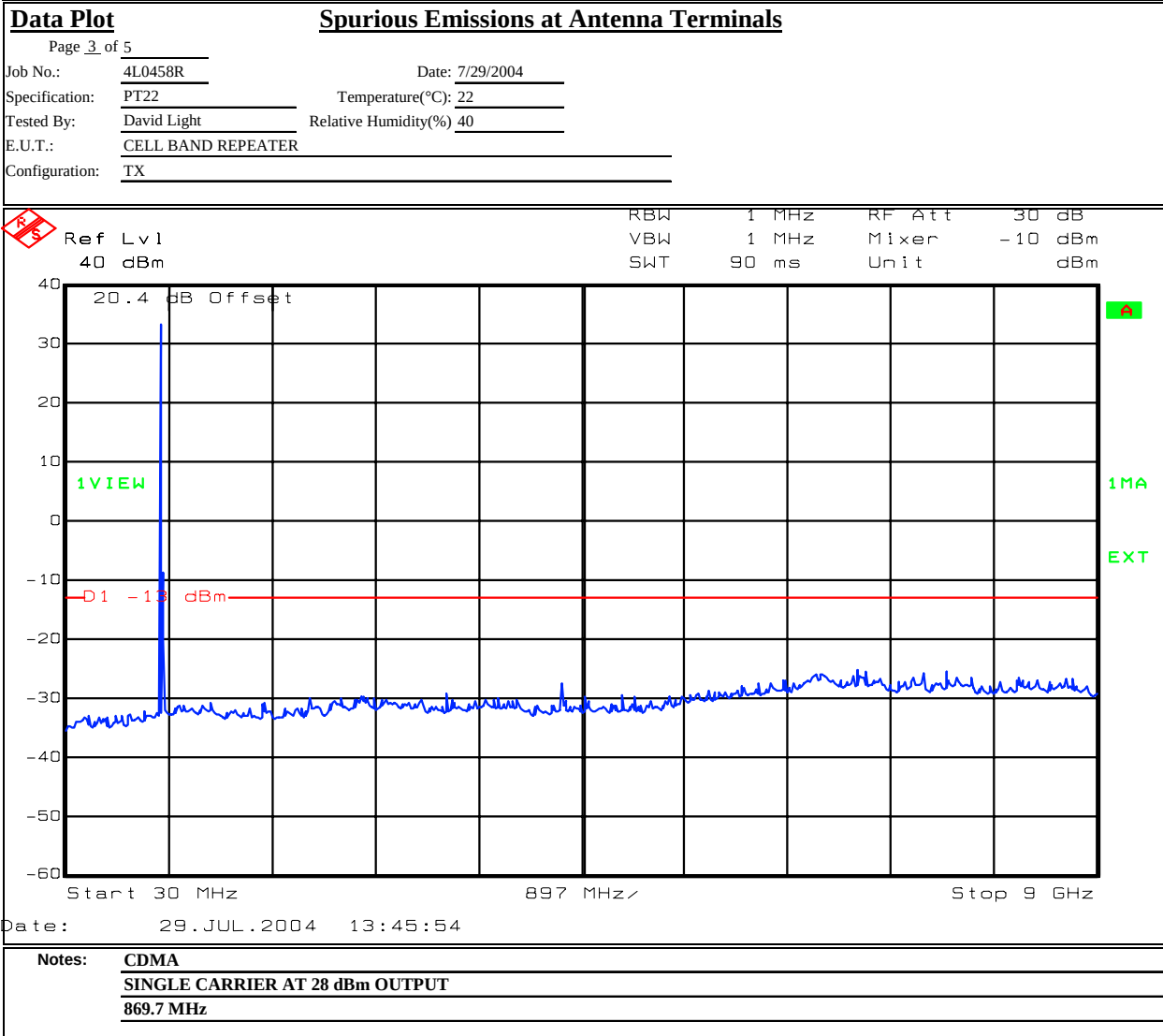
Test Data – Spurious Emissions at Antenna Terminals (CDMA)



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The spectrum was searched in detail on 3 channels. The plot above is indicative of all channels measured.

EQUIPMENT: MR853P

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Test Data – Spurious Emissions at Antenna Terminals (CDMA)



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Data Plot		Spurious Emissions at Antenna Terminals	
Page 1 of 5		Complete <u>X</u>	
Job No.: 4L0458R	Date: 7/29/2004	Preliminary: _____	
Specification: PT22	Temperature(°C): 22		
Tested By: David Light	Relative Humidity(%): 40		
E.U.T.: CELL BAND REPEATER			
Configuration: TX			
Sample Number: 1			
Location: Lab 1	RBW: Refer to plots	Measurement	
Detector Type: Peak	VBW: Refer to plots	Distance: <u>NA</u> m	
Test Equipment Used			
Antenna: _____	Directional Coupler: _____		
Pre-Amp: _____	Cable #1: 1+627		
Filter: _____	Cable #2: 1628		
Receiver: 1036	Cable #3: _____		
Attenuator #1: 1064	Cable #4: _____		
Attenuator #2: _____	Mixer: _____		
Additional equipment used: _____			
Measurement Uncertainty: +/-1.7 dB			
Ref Lvl 40 dBm 20.4 dB Offset 1VIEW LOBNDEG RBW 30 kHz VBW 30 kHz SWT 14 ms RF Att 30 dB Mixer -10 dBm Unit dBm Center 824 MHz 500 kHz Span 5 MHz			
Date: 29.JUL.2004 12:07:53			
Notes: 2 CHANNEL INTERMOD 824.7 and 826.5 MHz 22 dBm/Carrier CDMA			

EQUIPMENT: MR853P

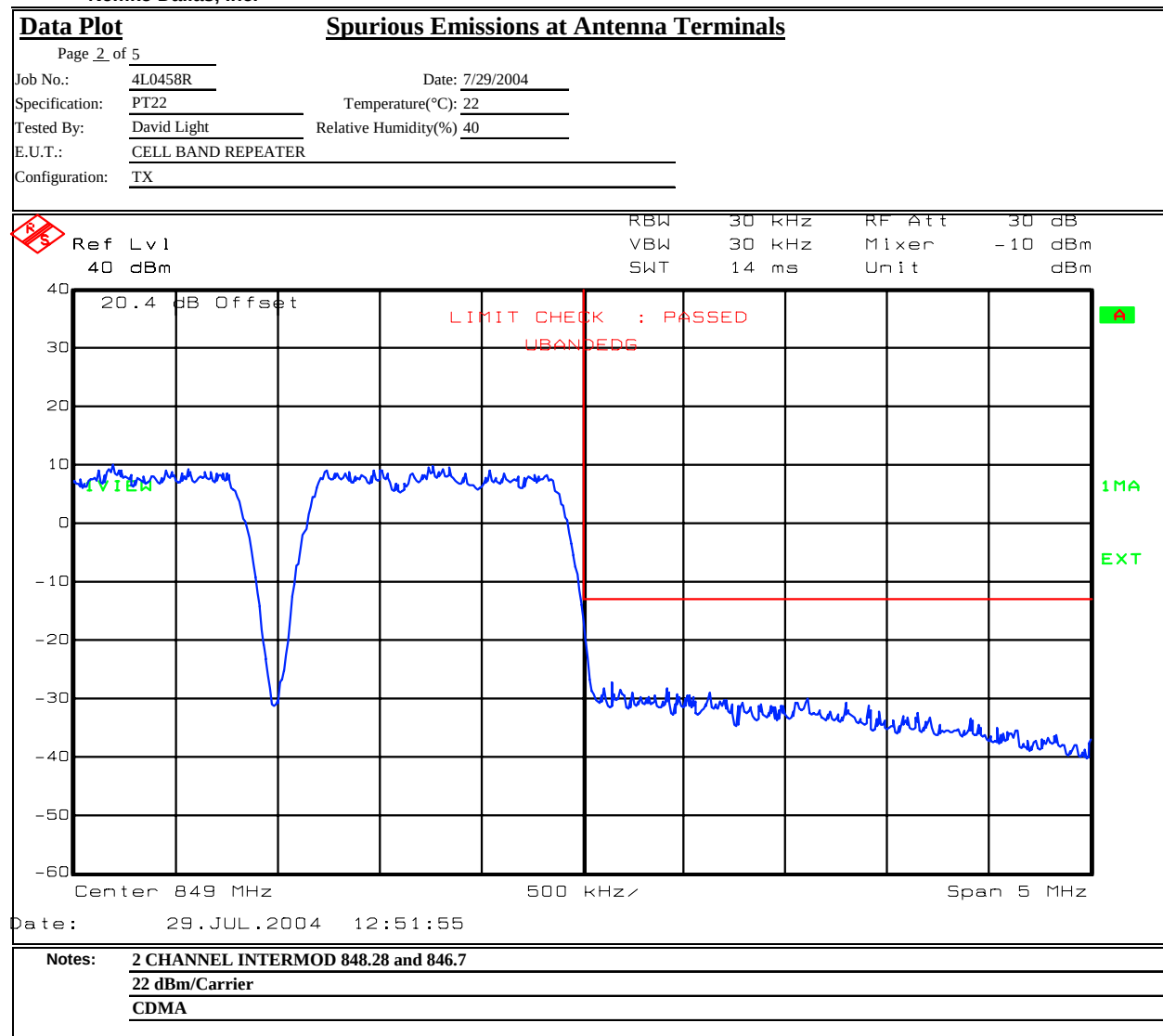
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EQUIPMENT: MR853P

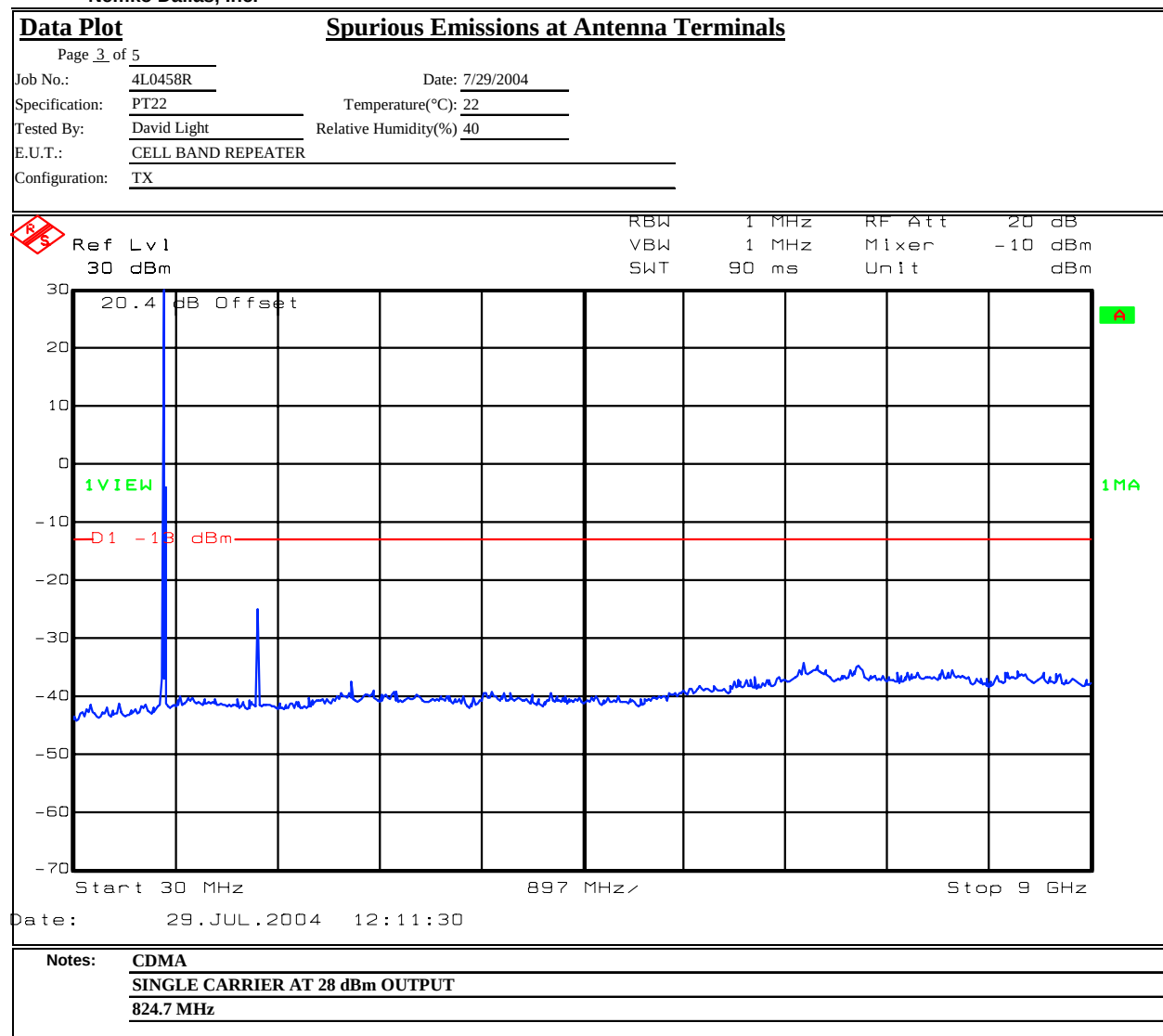
Test Report No.: 4L0458RUS1

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EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

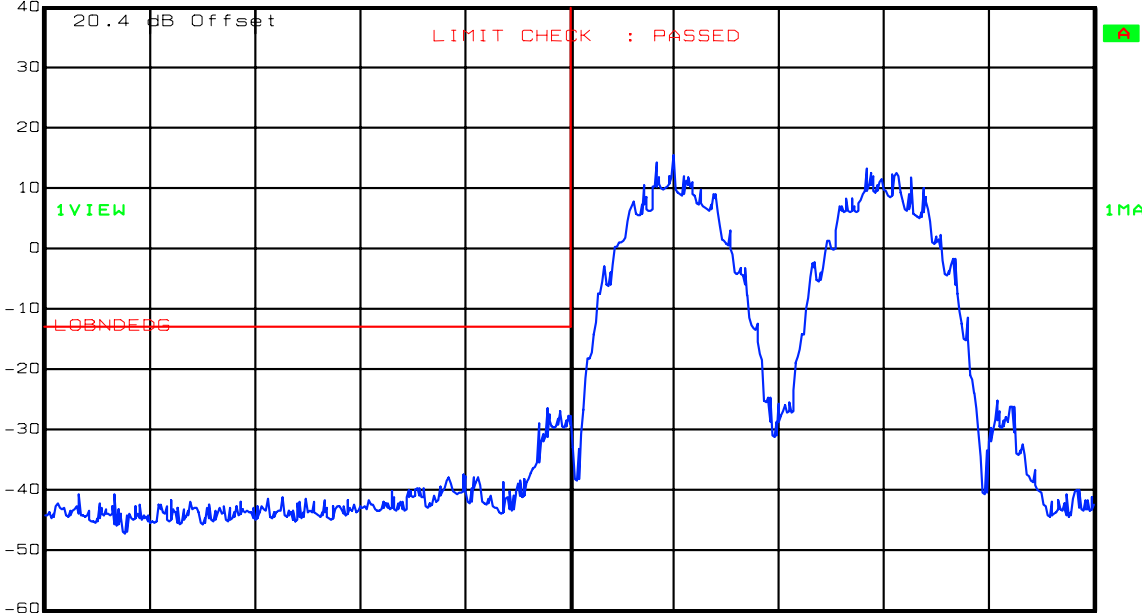
Test Data – Spurious Emissions at Antenna Terminals (EDGE)



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Data Plot		Spurious Emissions at Antenna Terminals	
Page 1 of 5		Complete <u>X</u>	
Job No.:	4L0458R	Date:	7/29/2004
Specification:	PT22	Temperature(°C):	22
Tested By:	David Light	Relative Humidity(%)	40
E.U.T.:	CELL BAND REPEATER		
Configuration:	TX		
Sample Number:	1		
Location:	Lab 1	RBW:	Refer to plots
Detector Type:	Peak	VBW:	Refer to plots
		Measurement Distance:	NA m
Test Equipment Used			
Antenna:		Directional Coupler:	
Pre-Amp:		Cable #1:	1627
Filter:		Cable #2:	1628
Receiver:	1036	Cable #3:	
Attenuator #1:	1064	Cable #4:	
Attenuator #2:		Mixer:	
Additional equipment used:			
Measurement Uncertainty:	+/-1.7 dB		
 Ref Lvl 40 dBm RBW 3 kHz RF Att 40 dB VBW 3 kHz SWT 560 ms Unit dBm  20.4 dB Offset LIMIT CHECK : PASSED 1VIEW 1MA Center 869 MHz 200 kHz Span 2 MHz Date: 29.JUL.2004 10:22:02 Notes: 2 CHANNEL INTERMOD 22.5 dBm/Carrier 869.2 and 869.6 MHz EDGE			

EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

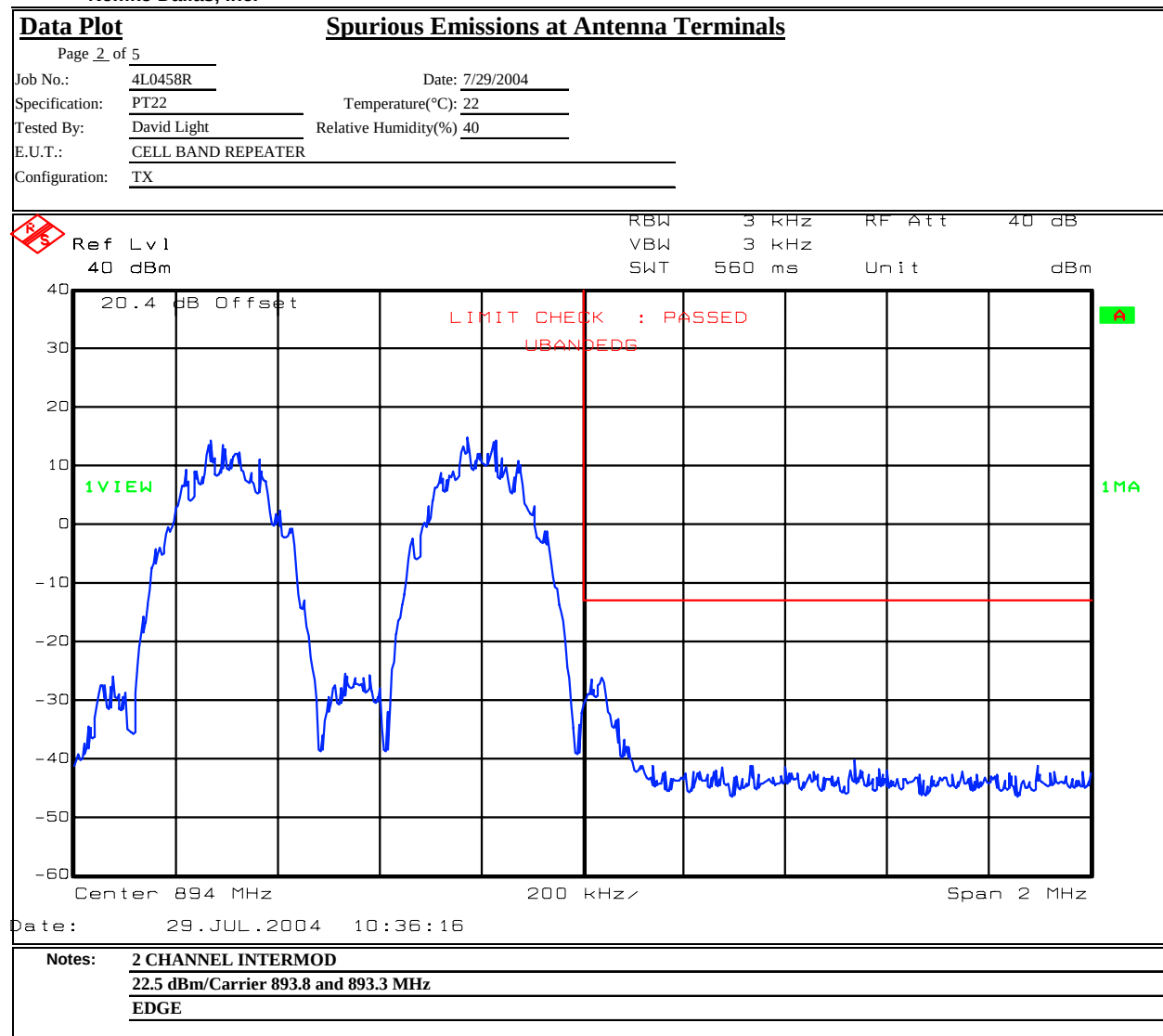
Test Data – Spurious Emissions at Antenna Terminals (EDGE)



Dallas Headquarters:

802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.



EQUIPMENT: MR853P

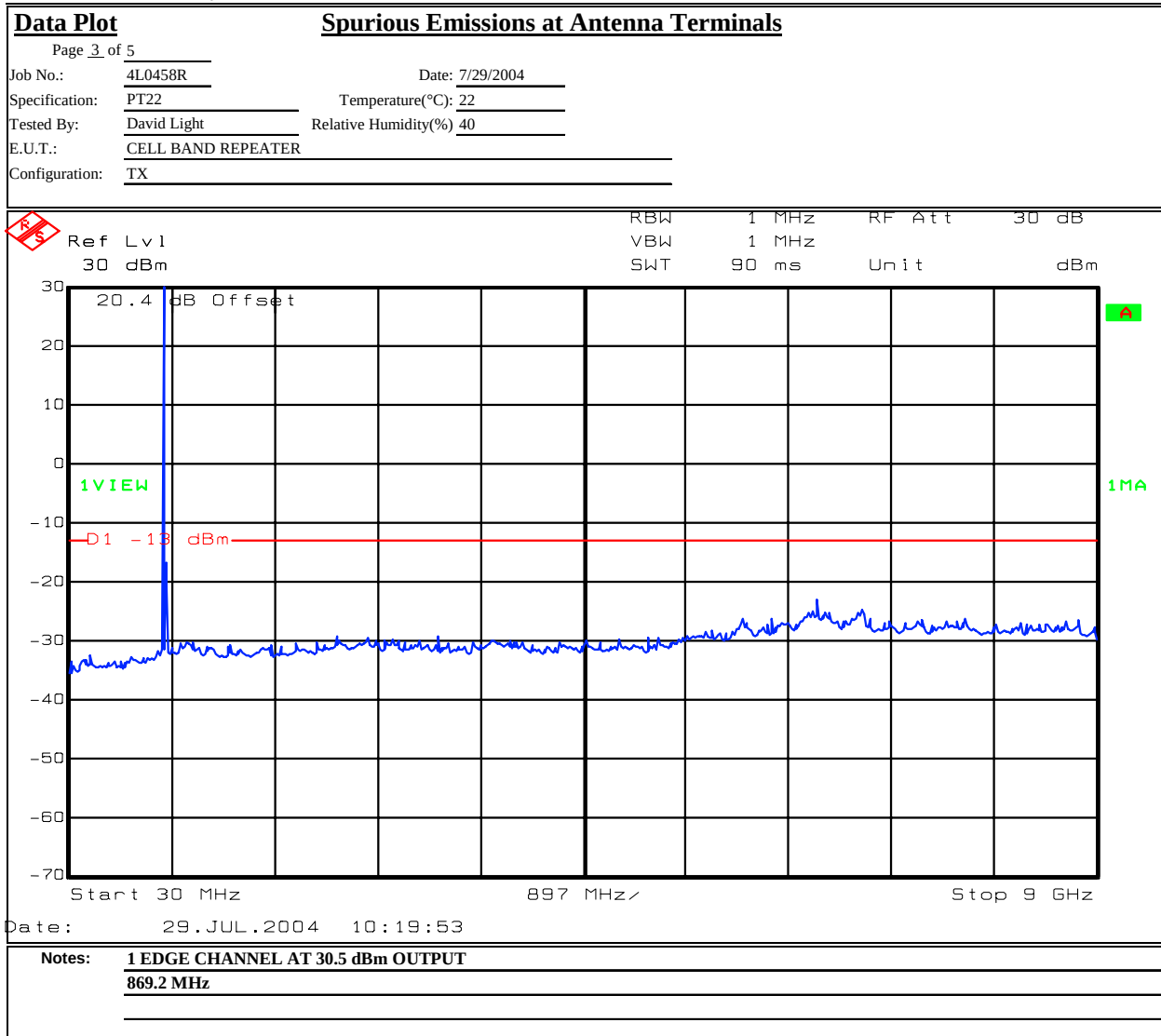
Test Report No.: 4L0458RUS1

Test Data – Spurious Emissions at Antenna Terminals (EDGE)



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Nemko Dallas, Inc.



The spectrum was searched in detail on 3 channels. The plot above is indicative of all channels measured.

EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

Test Data – Spurious Emissions at Antenna Terminals (EDGE)



Dallas Headquarters:

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Nemko Dallas, Inc.

Data Plot

Spurious Emissions at Antenna Terminals

Page 1 of 5

Job No.: 4L0458R Date: 7/29/2004 Complete X

Specification: PT22 Temperature(°C): 22 Preliminary: _____

Tested By: David Light Relative Humidity(%) 45

E.U.T.: CELL BAND REPEATER

Configuration: TX

Sample Number: 1

Location: Lab 1 RBW: Refer to plots Measurement

Detector Type: Peak VBW: Refer to plots Distance: NA m

Test Equipment Used

Antenna: _____ Directional Coupler: _____

Pre-Amp: _____ Cable #1: 1627

Filter: _____ Cable #2: 1628

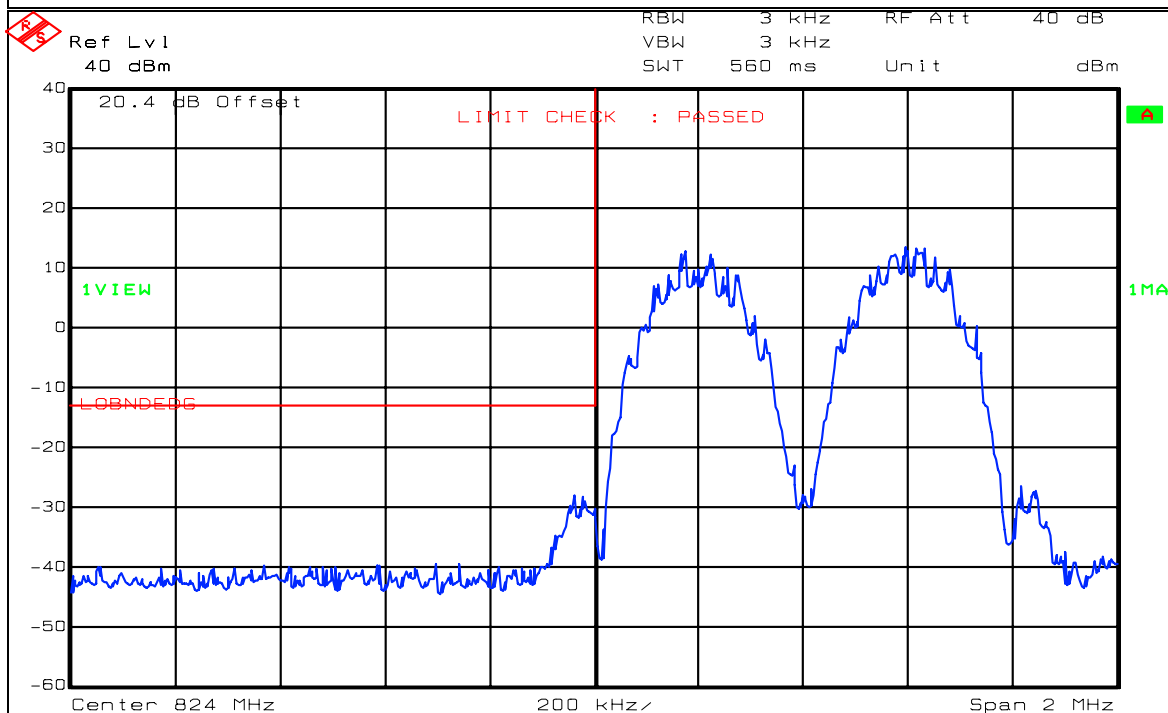
Receiver: 1036 Cable #3: _____

Attenuator #1: 1064 Cable #4: _____

Attenuator #2: _____ Mixer: _____

Additional equipment used: _____

Measurement Uncertainty: +/-1.7 dB



Date: 29.JUL.2004 10:59:54

Notes: 2 CHANNEL INTERMOD

22.5 dBm/Carrier 824.2 and 824.4 MHz

EDGE

EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

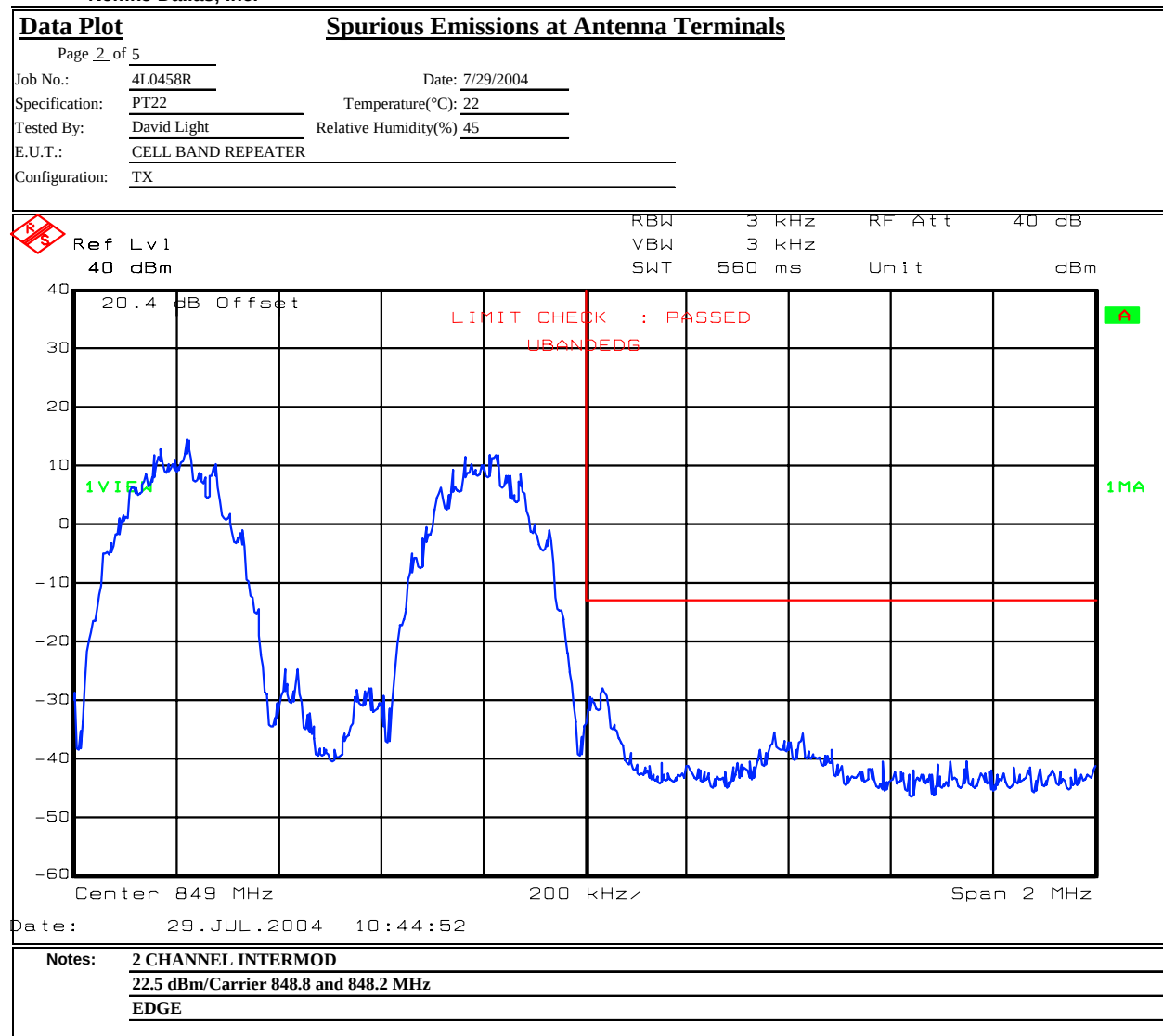
Test Data – Spurious Emissions at Antenna Terminals (EDGE)



Dallas Headquarters:

802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.



EQUIPMENT: MR853P

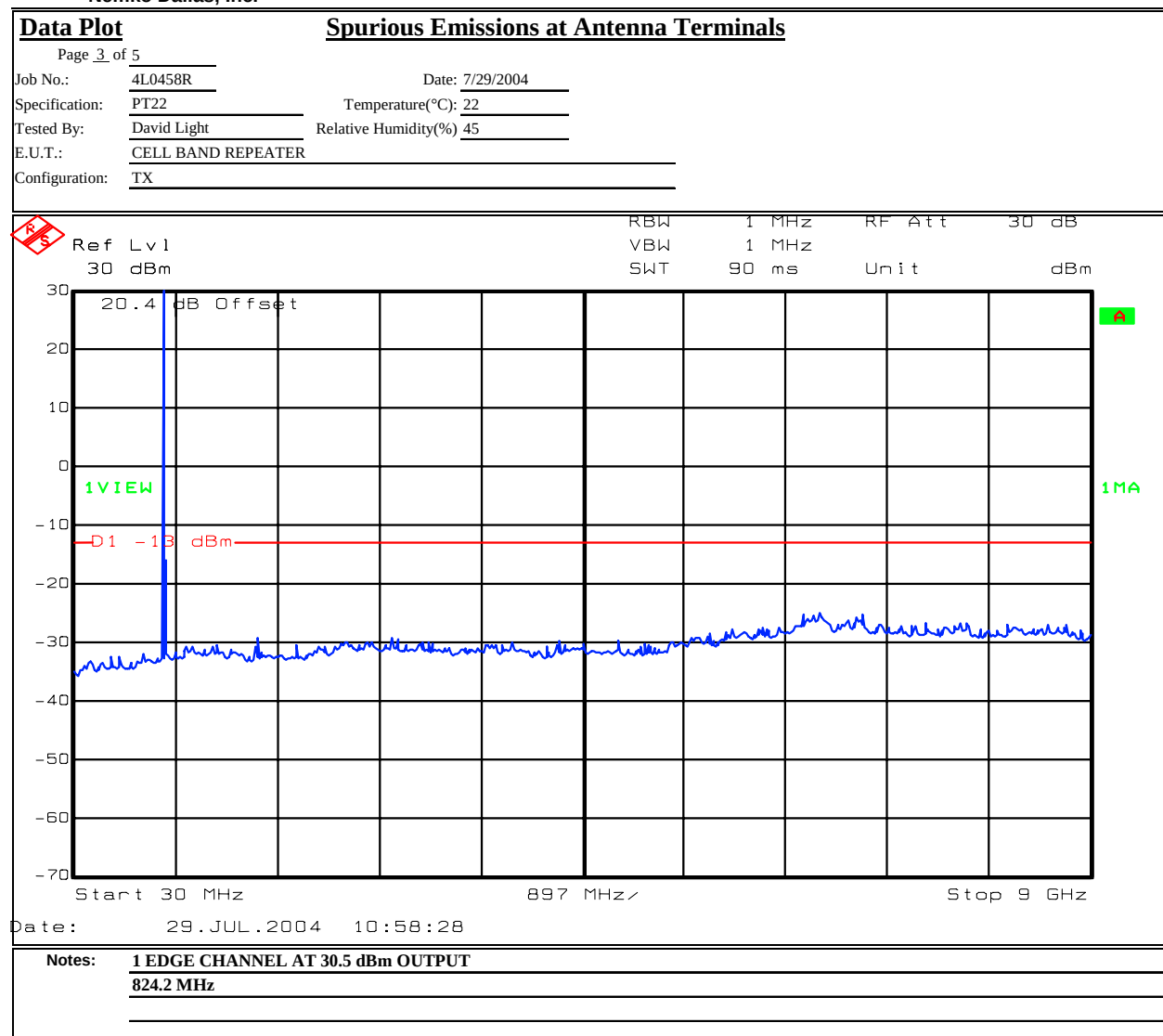
Test Report No.: 4L0458RUS1

Test Data – Spurious Emissions at Antenna Terminals (EDGE)



Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.



The spectrum was searched in detail on 3 channels. The plot above is indicative of all channels measured.

EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

Test Data – Spurious Emissions at Antenna Terminals (GSM)



Dallas Headquarters:

802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.

Data Plot		Spurious Emissions at Antenna Terminals	
Page 1 of 5		Complete <u>X</u>	
Job No.: 4L0458R	Date: 7/29/2004	Preliminary: _____	
Specification: PT22	Temperature(°C): 22		
Tested By: David Light	Relative Humidity(%): 40		
E.U.T.: CELL BAND REPEATER			
Configuration: TX			
Sample Number: 1			
Location: _____	RBW: Refer to plots	Measurement	
Detector Type: _____	VBW: Refer to plots	Distance: NA m	
Test Equipment Used			
Antenna: _____	Directional Coupler: _____		
Pre-Amp: _____	Cable #1: 1627		
Filter: _____	Cable #2: 1628		
Receiver: 1036	Cable #3: _____		
Attenuator #1: 1064	Cable #4: _____		
Attenuator #2: _____	Mixer: _____		
Additional equipment used: _____			
Measurement Uncertainty: +/-1.7 dB			
Date: 29. JUL. 2004 10:13:15			
Notes: 2 CHANNEL INTERMOD			
24 dBm/Carrier 869.2 and 869.6 MHz			
GSM			

EQUIPMENT: MR853P

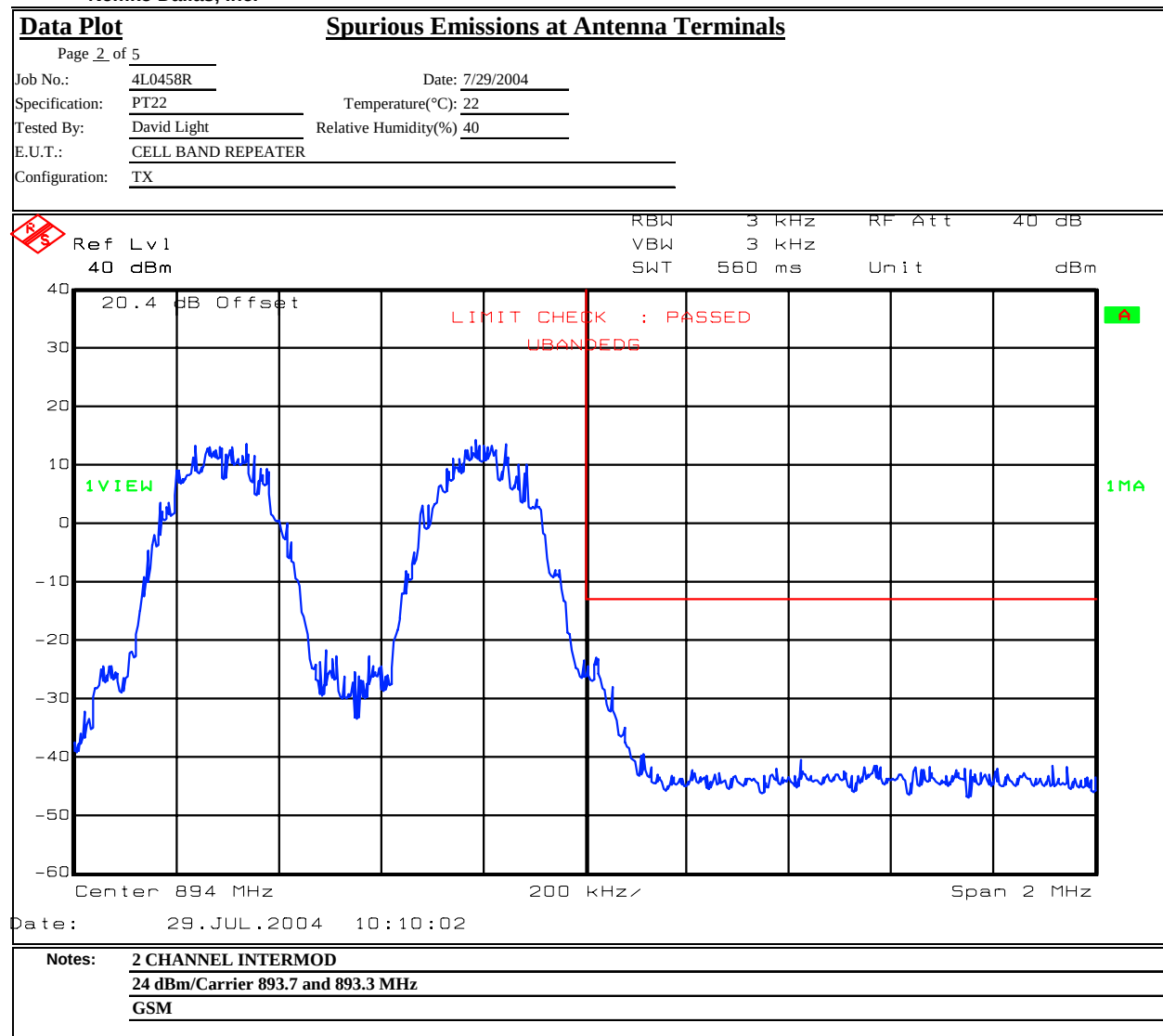
Test Report No.: 4L0458RUS1

Test Data – Spurious Emissions at Antenna Terminals (GSM)



Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

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EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

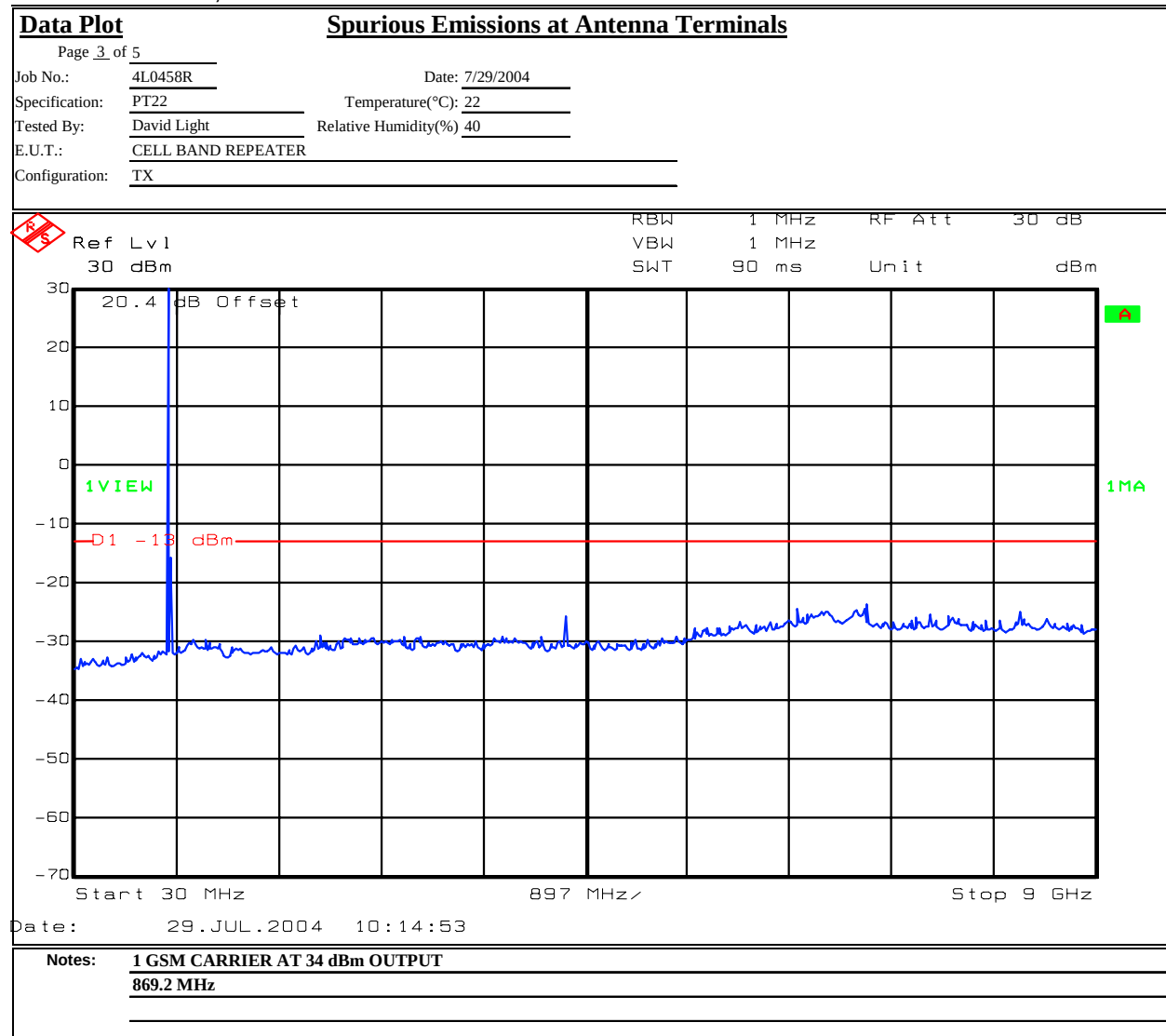
Test Data – Spurious Emissions at Antenna Terminals (GSM)



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Lewisville, TX 75057
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Nemko Dallas, Inc.



The spectrum was searched in detail on 3 channels. The plot above is indicative of all channels measured.

EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

Test Data – Spurious Emissions at Antenna Terminals (GSM)



Dallas Headquarters:

802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.

Data Plot		Spurious Emissions at Antenna Terminals	
Page 1 of 5		Complete <u>X</u>	
Job No.: 4L0458R	Date: 7/29/2004	Preliminary: _____	
Specification: PT22	Temperature(°C): 22		
Tested By: David Light	Relative Humidity(%): 40		
E.U.T.: CELL BAND REPEATER			
Configuration: TX			
Sample Number: 1			
Location: Lab 1	RBW: Refer to plots	Measurement	
Detector Type: Peak	VBW: Refer to plots	Distance: NA m	
Test Equipment Used			
Antenna: _____	Directional Coupler: _____		
Pre-Amp: _____	Cable #1: 1627		
Filter: _____	Cable #2: 1628		
Receiver: 1036	Cable #3: _____		
Attenuator #1: 1064	Cable #4: _____		
Attenuator #2: _____	Mixer: _____		
Additional equipment used: _____			
Measurement Uncertainty: +/-1.7 dB			
Date: 29 JUL 2004 09:37:01			
Notes: 2 CHANNEL INTERMOD			
24 dBm/Carrier 824.2 and 824.85 MHz			
GSM			

EQUIPMENT: MR853P

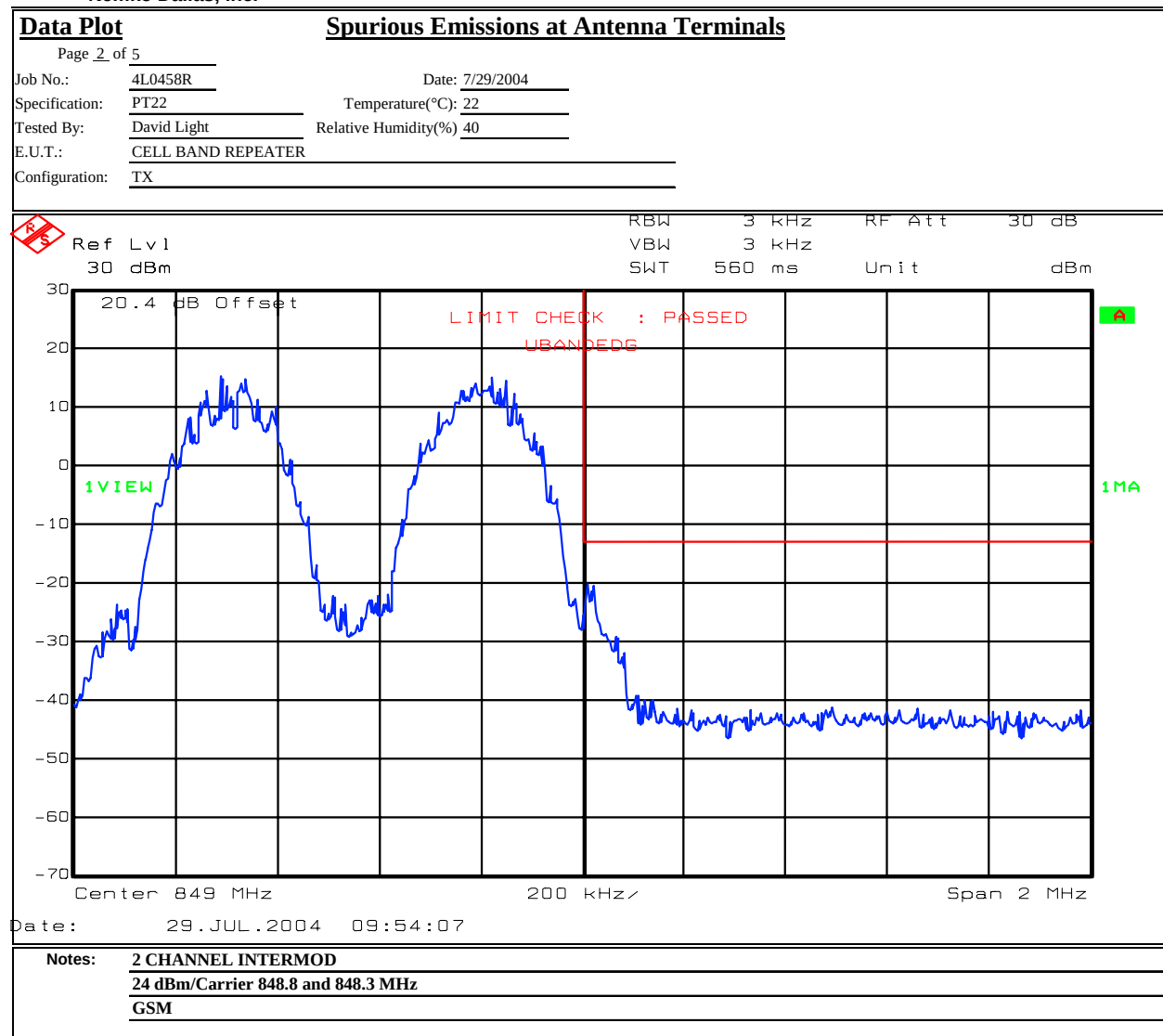
Test Report No.: 4L0458RUS1

Test Data – Spurious Emissions at Antenna Terminals (GSM)



Dallas Headquarters:
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Lewisville, TX 75057
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Nemko Dallas, Inc.



EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

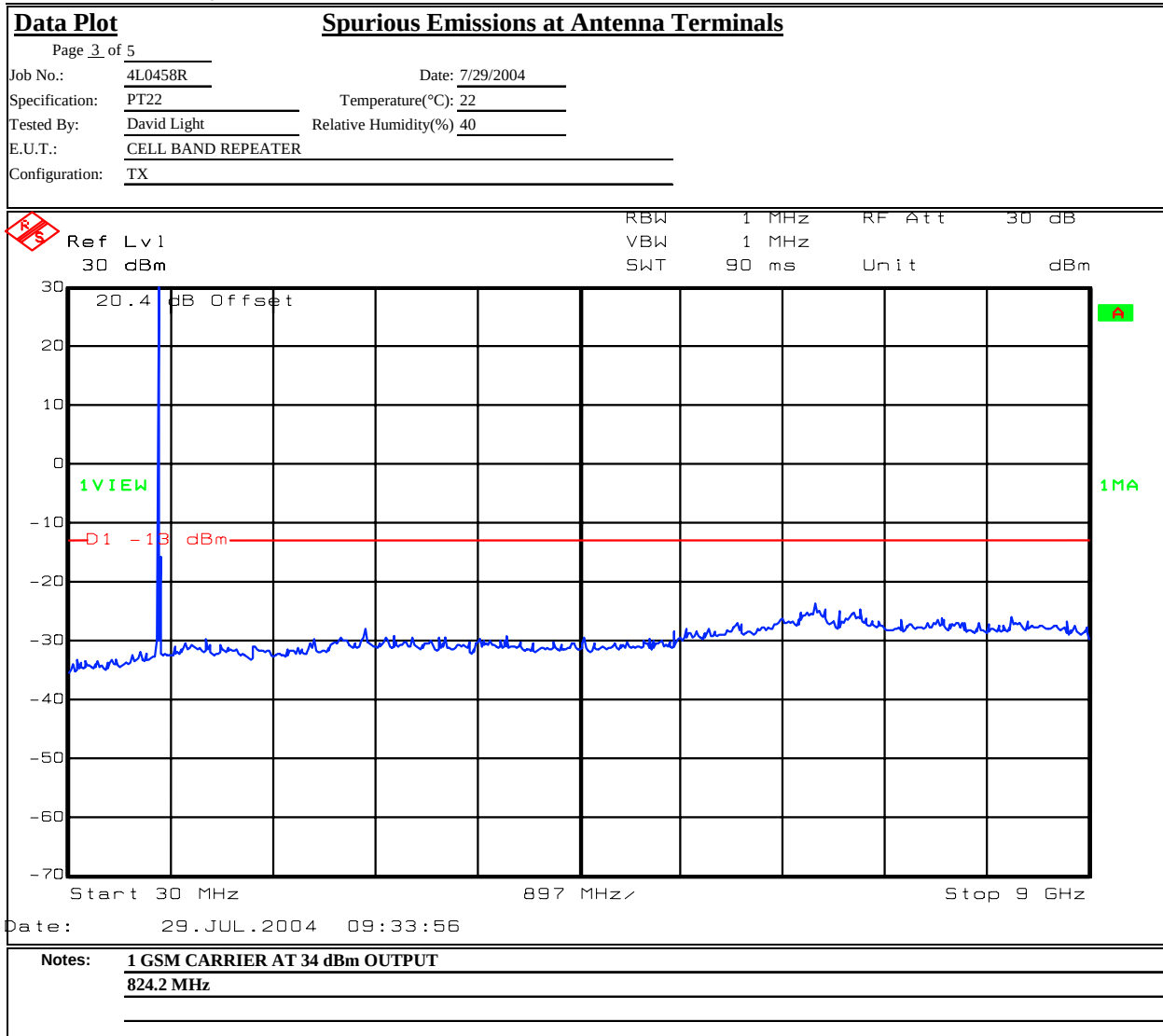
Test Data – Spurious Emissions at Antenna Terminals (GSM)



Dallas Headquarters:

802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.



The spectrum was searched in detail on 3 channels. The plot above is indicative of all channels measured.

EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

Test Data – Spurious Emissions at Antenna Terminals (TDMA)



Nemko Dallas, Inc.

Dallas Headquarters:

802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

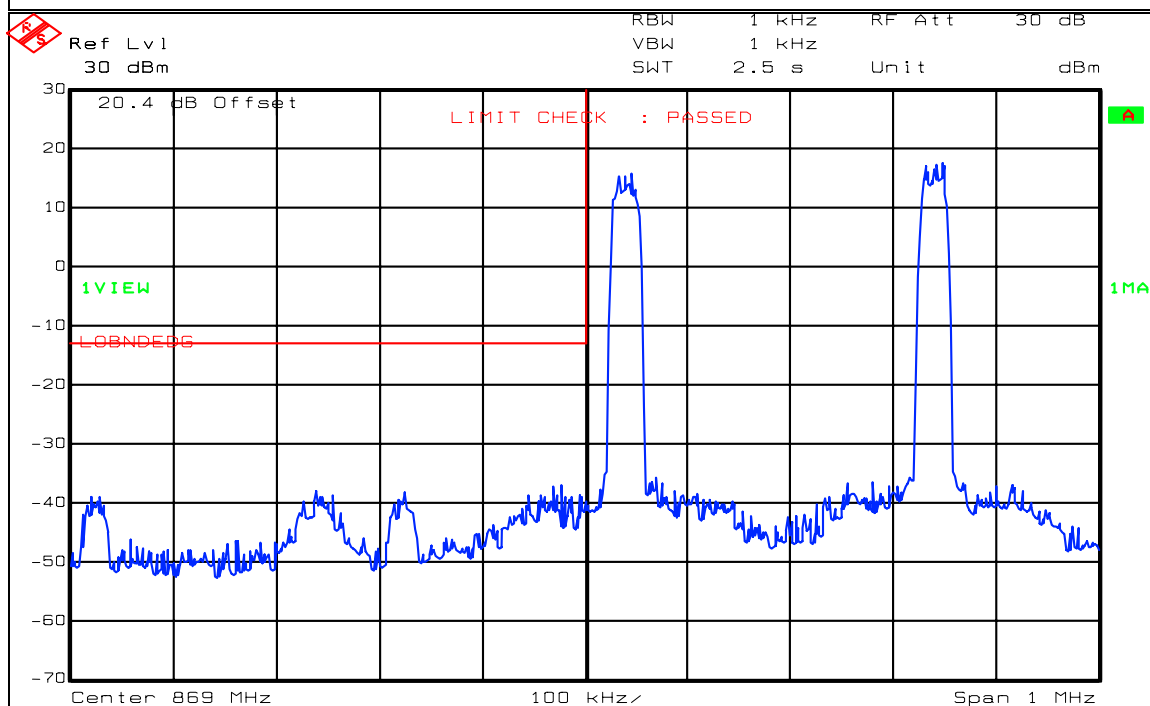
Data Plot

Spurious Emissions at Antenna Terminals

Page 1 of 5
Job No.: 4L0458R Date: 7/29/2004 Complete X
Specification: PT22 Temperature(°C): 22 Preliminary: _____
Tested By: David Light Relative Humidity(%): 40
E.U.T.: CELL BAND REPEATER
Configuration: TX
Sample Number: 1
Location: Lab 1 RBW: Refer to plots Measurement
Detector Type: Peak VBW: Refer to plots Distance: NA m

Test Equipment Used

Antenna: _____ Directional Coupler: _____
Pre-Amp: _____ Cable #1: 1627
Filter: _____ Cable #2: 1628
Receiver: 1036 Cable #3: _____
Attenuator #1: 1064 Cable #4: _____
Attenuator #2: _____ Mixer: _____
Additional equipment used: _____
Measurement Uncertainty: +/-1.7 dB



Date: 29.JUL.2004 07:38:17

Notes: 2 CHANNEL INTERMOD
23 dBm/Carrier 869.04 and 869.34 MHz
TDMA

EQUIPMENT: MR853P

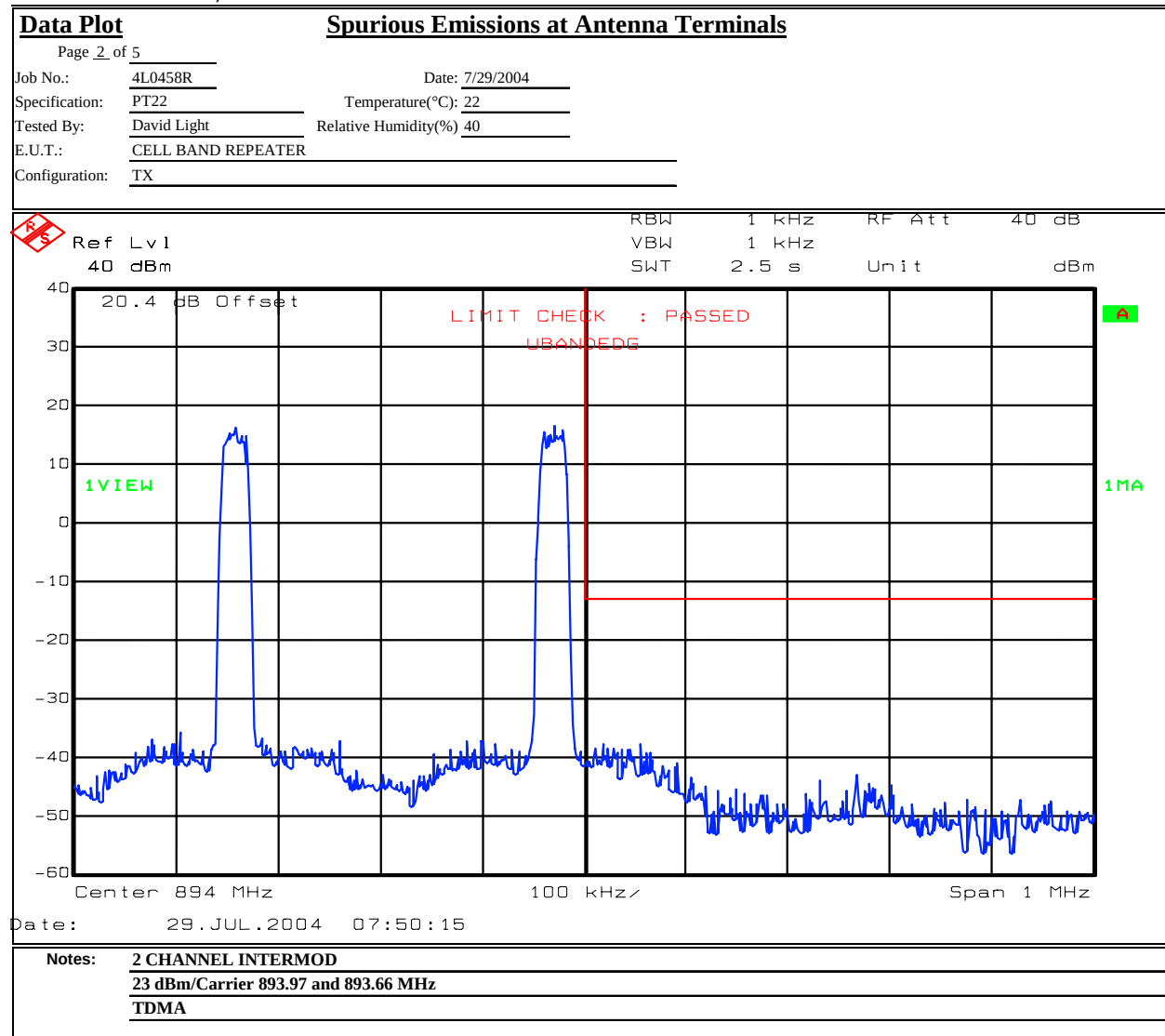
Test Report No.: 4L0458RUS1

Test Data – Spurious Emissions at Antenna Terminals (TDMA)



Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.



EQUIPMENT: MR853P

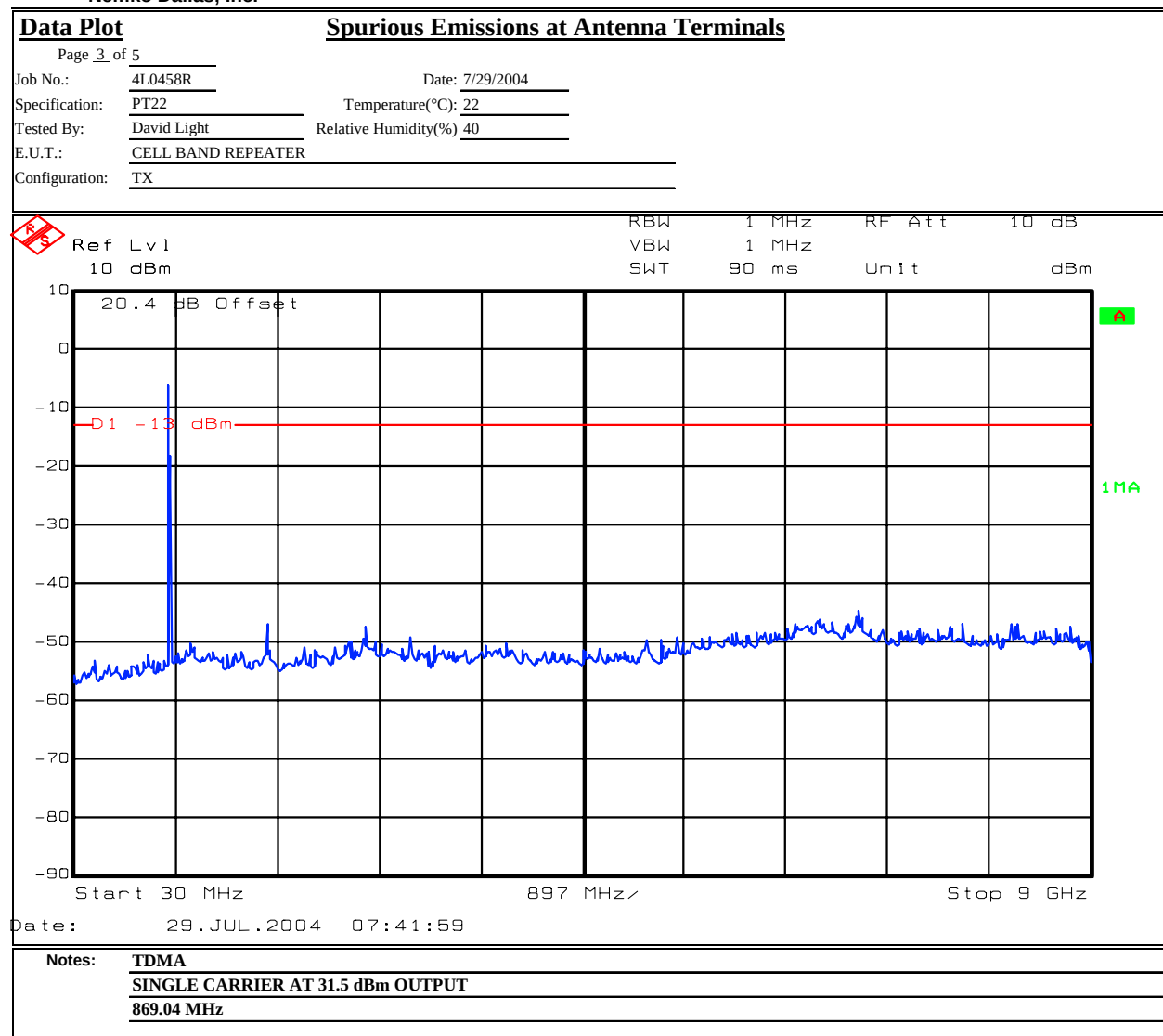
Test Report No.: 4L0458RUS1

Test Data – Spurious Emissions at Antenna Terminals (TDMA)



Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.



The spectrum was searched in detail on 3 channels. The plot above is indicative of all channels measured.

EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

Test Data – Spurious Emissions at Antenna Terminals (TDMA)



Dallas Headquarters:

802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.

Data Plot

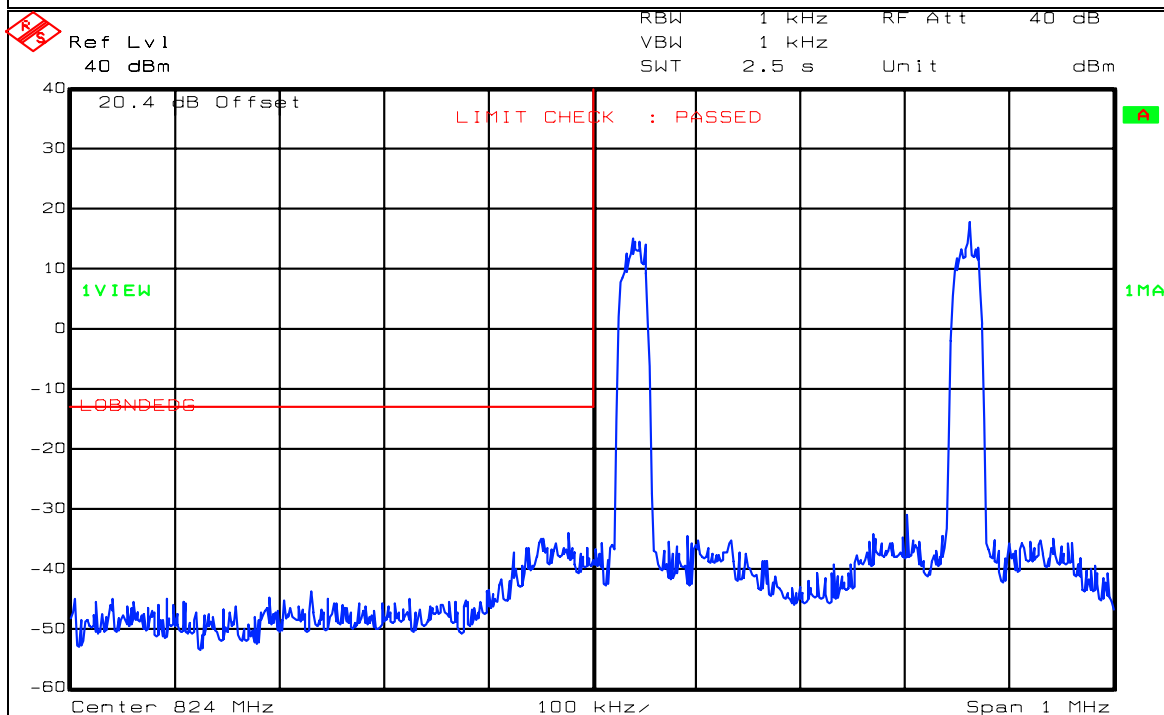
Spurious Emissions at Antenna Terminals

Page 1 of 5

Job No.: 4L0458R Date: 7/29/2004 Complete X
Specification: PT22 Temperature(°C): 22 Preliminary: _____
Tested By: David Light Relative Humidity(%) 40
E.U.T.: CELL BAND REPEATER
Configuration: TX
Sample Number: 1
Location: Lab 1 RBW: Refer to plots Measurement
Detector Type: Peak VBW: Refer to plots Distance: NA m

Test Equipment Used

Antenna: _____ Directional Coupler: _____
Pre-Amp: _____ Cable #1: 1627
Filter: _____ Cable #2: 1628
Receiver: 1036 Cable #3: _____
Attenuator #1: 1064 Cable #4: _____
Attenuator #2: _____ Mixer: _____
Additional equipment used: _____
Measurement Uncertainty: +/-1.7 dB



Date: 29.JUL.2004 08:04:09

Notes: 2 CHANNEL INTERMOD
23 dBm/Carrier 824.04 and
TDMA

EQUIPMENT: MR853P

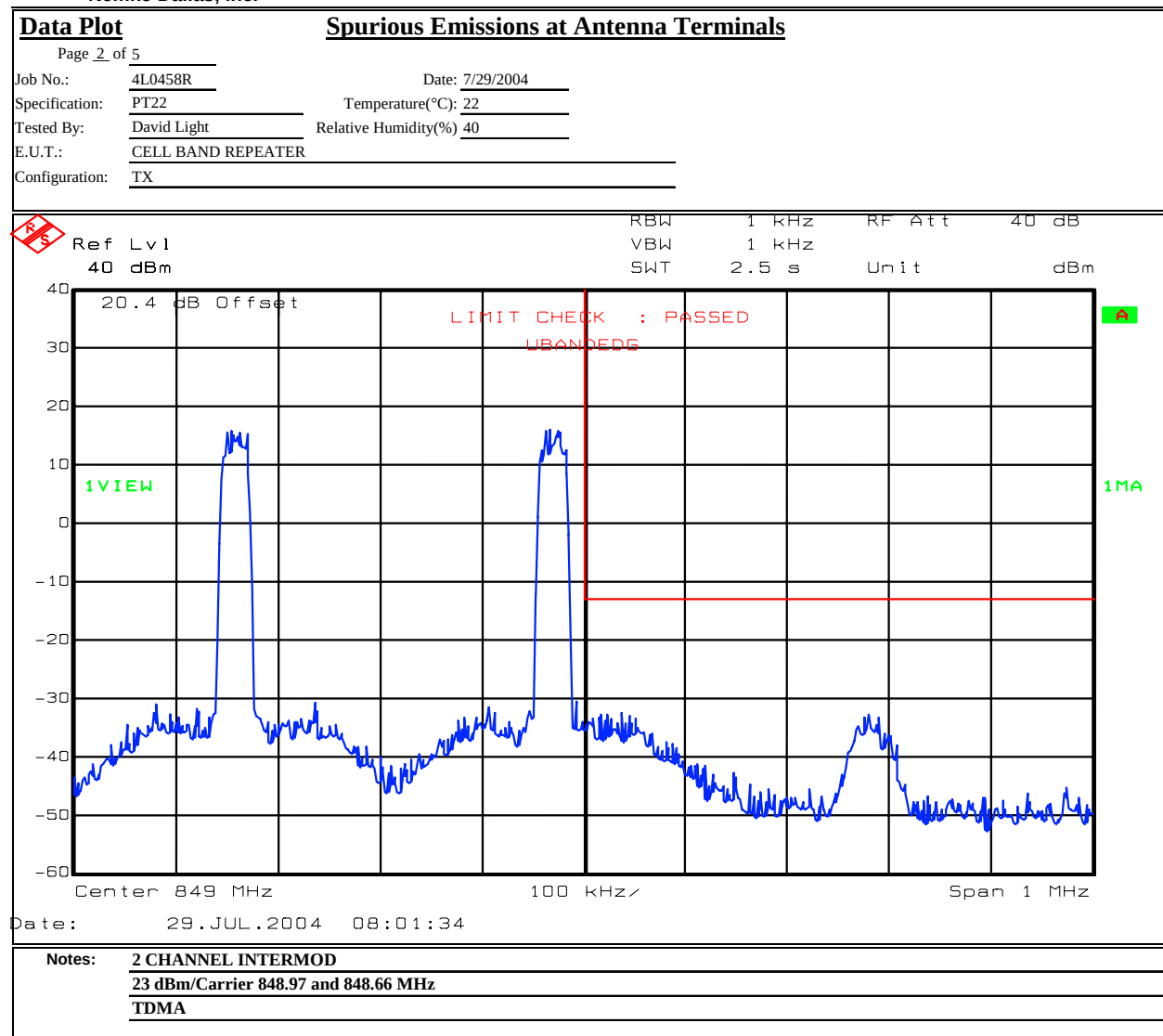
Test Report No.: 4L0458RUS1

Test Data – Spurious Emissions at Antenna Terminals (TDMA)



Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.



EQUIPMENT: MR853P

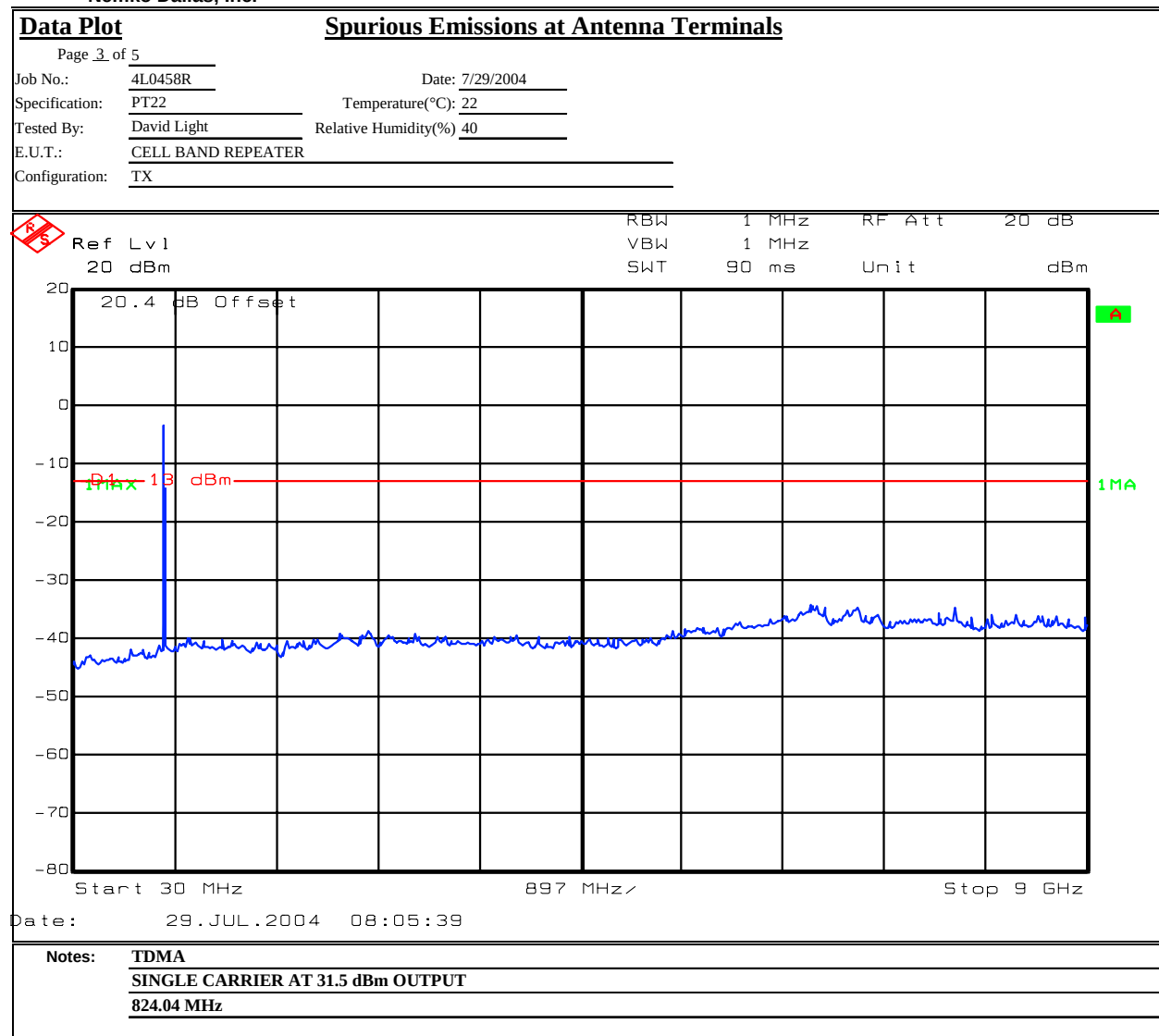
Test Report No.: 4L0458RUS1

Test Data – Spurious Emissions at Antenna Terminals (TDMA)



Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.



The spectrum was searched in detail on 3 channels. The plot above is indicative of all channels measured.

EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

Section 6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious	PARA. NO.: 2.1053
TESTED BY: Brian Boyea	DATE: 7/29/04

Test Results: [Complies.](#)**Test Data:** [There were no emissions detected above the noise floor which was at least 20 dB below the specification limit of -13 dBm ERP.](#)**Equipment Used:** [1304-1016-1484-1485-1464](#)**Measurement
Uncertainty:** [+/- 1.7 dB](#)**Temperature:** [22 °C](#)**Relative
Humidity:** [40 %](#)

EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

ERP Substitution Method										
Page <u>1</u> of <u>1</u>							Complete <u>X</u>			
Job No.: 4L0458R		Date: 7/30/04					Preliminary _____			
Specification: CFR 47, Part 22		Temperature(°C): <u>23</u>								
Tested By: <u>Brian Boyea</u>		Relative Humidity(%) <u>43</u>								
E.U.T.: <u>MR803P-CE</u>										
Configuration: <u>Uplink</u>										
Sample No: _____										
Location: <u>AC 3</u>		RBW: <u>1 MHz</u>		Measurement						
Detector Type: <u>Peak</u>		VBW: <u>1 MHz</u>		Distance: <u>3 m</u>						
Test Equipment Used										
Antenna: <u>1304</u>		Directional Coupler: _____								
Pre-Amp: <u>1016</u>		Cable #1: <u>1484</u>								
Filter: _____		Cable #2: <u>1485</u>								
Receiver: <u>795</u>		Cable #3: <u>1483</u>								
Attenuator #1: _____		Cable #4: _____								
Attenuator #2: _____		Mixer: _____								
Additional equipment used: _____										
Measurement Uncertainty: <u>+/-3.6 dB</u>										
Frequency (MHz)	Meter Reading (dBm)	Correction Factor (dB)		Pre-Amp Gain (dB)	Substitution Antenna Gain (dB)	Limit (dBm)	ERP (dBm)	ERP (mW)	Polarity	Comments
1670	-64.3	33.0		32.9	9.4	-13	-54.8	0.000003	H	Uplink 835 Channel
2505	-63.5	35.5		33	10.1	-13	-50.9	0.000008	H	
3340	-65.7	36.3		32.7	10.1	-13	-52.0	0.000006	H	
4175	-64.2	34.8		33.3	10.3	-13	-52.4	0.00	H	
5010	-64.3	38.3		32.7	10.3	-13	-48.4	0.000015	H	
5845	-65.5	37.8		31.7	11.4	-13	-48.0	0.000016	H	
6680	-65.5	39.2		31.6	11.5	-13	-46.4	0.000023	H	
7515	-65.8	41.5		32.5	11.3	-13	-45.5	0.000028	H	
8350	-65.3	42.5		33.6	11.2	-13	-45.2	0.000030	H	
1670	-63.3	31.0		32.9	9.4	-13	-55.8	0.000003	V	Uplink 835 Channel
2505	-62.7	35.5		33	10.1	-13	-50.1	0.000010	V	
3340	-64.5	39.8		32.7	10.1	-13	-47.3	0.000019	V	
4175	-64.7	45.3		33.3	10.3	-13	-42.4	0.00	V	
5010	-64.7	41.3		32.7	10.3	-13	-45.8	0.000027	V	
5845	-64.8	39.8		31.7	11.4	-13	-45.3	0.000030	V	
6680	-65.7	41.3		31.6	11.5	-13	-44.5	0.000036	V	
7515	-66.7	41.8		32.5	11.3	-13	-46.1	0.000025	V	
8350	-65.0	42.8		33.6	11.2	-13	-44.6	0.000035	V	
Notes: _____										

EQUIPMENT: MR853P

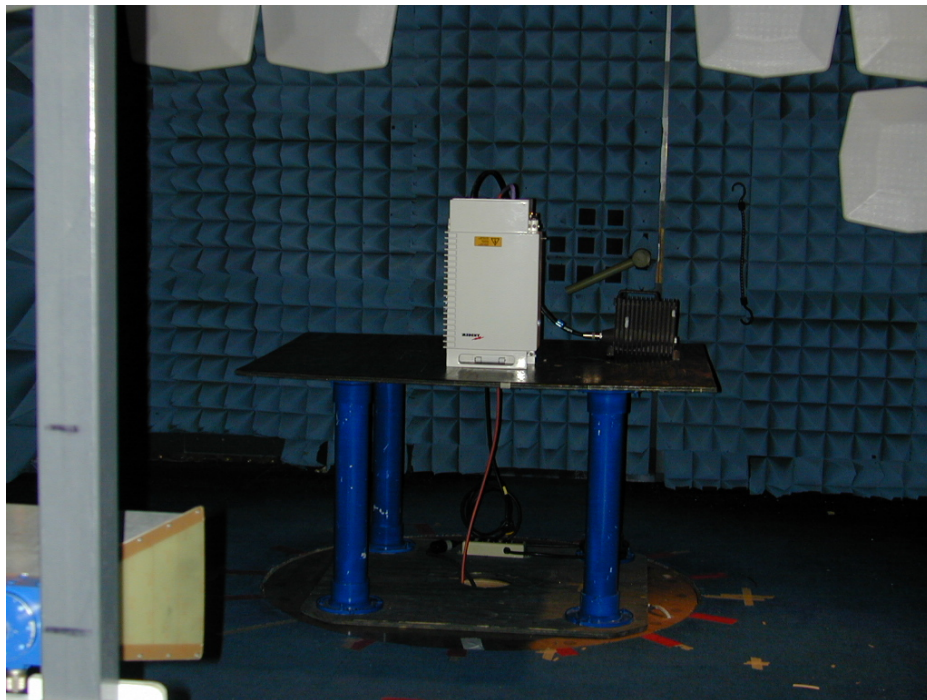
Test Report No.: 4L0458RUS1

ERP Substitution Method										
Page <u>1</u> of <u>1</u>						Complete <u>X</u>				
Job No.: 4L0458R		Date: 7/30/04				Preliminary _____				
Specification: CFR 47, Part 22		Temperature(°C): <u>23</u>								
Tested By: <u>Brian Boyea</u>		Relative Humidity(%) <u>43</u>								
E.U.T.: <u>MR803P-CE</u>										
Configuration: <u>Downlink</u>										
Sample No: _____										
Location: <u>AC 3</u>		RBW: <u>1 MHz</u>		Measurement						
Detector Type: <u>Peak</u>		VBW: <u>1 MHz</u>		Distance: <u>3</u> m						
Test Equipment Used										
Antenna: <u>1304</u>		Directional Coupler: _____								
Pre-Amp: <u>1016</u>		Cable #1: <u>1484</u>								
Filter: _____		Cable #2: <u>1485</u>								
Receiver: <u>795</u>		Cable #3: <u>1483</u>								
Attenuator #1: _____		Cable #4: _____								
Attenuator #2: _____		Mixer: _____								
Additional equipment used: _____										
Measurement Uncertainty: <u>+/-3.6 dB</u>										
Frequency (MHz)	Meter Reading (dBm)	Correction Factor (dB)		Pre-Amp Gain (dB)	Substitution Antenna Gain (dB)	Limit (dBm)	ERP (dBm)	ERP (mW)	Polarity	Comments
1760	-67.8	33.0		32.9	9.4	-13	-58.3	0.000001	H	Downlink 880 Channel
2640	-63.3	35.5		33.1	10.1	-13	-50.8	0.000008	H	
3520	-64.0	35.5		32.7	10.7	-13	-50.5	0.000009	H	
4400	-62.5	34.8		33.4	10.3	-13	-50.8	0.00	H	
5280	-65.0	38.3		32.3	10.3	-13	-48.7	0.000014	H	
6160	-64.7	38.7		31.9	11.7	-13	-46.2	0.000024	H	
7040	-65.3	40.3		32.1	10.9	-13	-46.2	0.000024	H	
7920	-66.3	41.5		32.9	11.3	-13	-46.4	0.000023	H	
8800	-65.3	42.2		33.9	11.5	-13	-45.5	0.000028	H	
1760	-67.5	31.0		32.9	9.4	-13	-60.0	0.000001	V	Downlink 880 Channel
2640	-62.5	35.5		33.1	10.1	-13	-50.0	0.000010	V	
3520	-64.8	43.3		32.7	10.7	-13	-43.5	0.000045	V	
4400	-61.0	45.3		33.4	10.3	-13	-38.8	0.00	V	
5280	-65.5	41.3		32.3	10.3	-13	-46.2	0.000024	V	
6160	-64.5	40.5		31.9	11.7	-13	-44.2	0.000038	V	
7040	-66.0	40.8		32.1	10.9	-13	-46.4	0.000023	V	
7920	-66.3	41.8		32.9	11.3	-13	-46.1	0.000025	V	
8800	-64.8	44.8		33.9	11.5	-13	-42.4	0.000058	V	
Notes: _____										

EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

Setup Photos – Radiated Spurious Emissions



EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

Section 7. Test Equipment List

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	03/22/04	03/23/06
1064	ATTENUATOR	NARDA 776B-20	NONE	CBU	N/A
1627	CABLE, 5 ft	MEGAPHASE 10312 1GVT4	N/A	CBU	CBU
1628	CABLE, 6 ft	MEGAPHASE TM26 S1S5 72	N/A	CBU	CBU
1304	HORN ANTENNA	ELECTRO METRICS RGA-60	6151	09/22/03	09/22/05
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	10/27/03	10/26/04
1484	Cable 2.0-18.0 Ghz	Storm PR90-010-072	N/A	07/30/04	07/30/05
1485	Cable 2.0-18.0 Ghz	Storm PR90-010-216	N/A	07/30/04	07/30/05
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	02/11/03	02/11/05

Nemko Dallas

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

ANNEX A - TEST DETAILS

EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

NAME OF TEST: RF Power Output	PARA. NO.: 2.1046
--------------------------------------	--------------------------

Minimum Standard: Para. No. 22.913(a). The maximum effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 watts.

Method Of Measurement:

Detachable Antenna:

The peak power at antenna terminals is measured using an in-line peak power meter. Power output is measured with the maximum rated input level.

EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

NAME OF TEST: Occupied Bandwidth (Voice & SAT)**PARA. NO.: 2.1049**

Minimum Standard: 22.917(c) The mean power of any emission removed from the carrier frequency by a displacement frequency (f_d in kHz) must be attenuated below the mean power of the unmodulated carrier (P) as follows:

- (i) On any frequency removed from the carrier frequency by more than 12 kHz but not more than 20 kHz:

at least $117 \log(f_d/12)$

- (ii) On any frequency removed from the carrier frequency by more than 20 kHz, up to the first multiple of the carrier frequency:

at least $100 \log(f_d/11)$ dB or $43 + 10 \log(P)$ dB, whichever is the lesser attenuation.

Method Of Measurement:

Spectrum Analyzer Settings:

RBW: 300 Hz

VBW: $\geq$ RBW

Span: 100 kHz

Sweep: Auto

Input Signal Characteristics (F3E/F3D):

RF level: Maximum recommended by manufacturer

AF1 frequency: 6 kHz

AF1 level: sufficient to produce 2 kHz deviation

AF2 frequency: 2.5 kHz

AF2 level: sufficient to produce 12 kHz deviation.

EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

NAME OF TEST: Occupied Bandwidth (WB Data)	PARA. NO.: 2.1049
---	--------------------------

Minimum Standard: 22.917(c) The mean power of any emission removed from the carrier frequency by a displacement frequency (f_d in kHz) must be attenuated below the mean power of the unmodulated carrier (P) as follows:

(1) On any frequency removed from the carrier frequency by more than 20 kHz but not more than 45 kHz:

at least 26 dB

(2) On any frequency removed from the carrier frequency by more than 45 kHz but not more than 90 kHz:

at least 45 dB

(3) On any frequency removed from the carrier frequency by more than 90 kHz, up to the first multiple of the carrier frequency:

at least 60 dB or $43 + 10 \log (P)$ dB, whichever is the lesser attenuation.

Method Of Measurement:

Spectrum Analyzer Settings:

RBW: 300 Hz

VBW: $\geq$ RBW

Span: 200 kHz

Sweep: Auto

Input Signal Characteristics:

RF level: Maximum recommended by manufacturer

AF1 frequency: 10 kHz, random bit sequence

AF1 level: sufficient to produce 8 kHz deviation

EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

NAME OF TEST: Occupied Bandwidth (ST)	PARA. NO.: 2.1049
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Minimum Standard: 22.917(c) The mean power of any emission removed from the carrier frequency by a displacement frequency (f_d in kHz) must be attenuated below the mean power of the unmodulated carrier (P) as follows:

(1) On any frequency removed from the carrier frequency by more than 20 kHz but not more than 45 kHz:

at least 26 dB

(2) On any frequency removed from the carrier frequency by more than 45 kHz but not more than 90 kHz:

at least 45 dB

(3) On any frequency removed from the carrier frequency by more than 90 kHz, up to the first multiple of the carrier frequency:

at least 60 dB or $43 + 10 \log (P)$ dB, whichever is the lesser attenuation.

Method Of Measurement:

Spectrum Analyzer Settings:

RBW: 300 Hz

VBW: $\geq$ RBW

Span: 200 kHz

Sweep: Auto

Input Signal Characteristics:

RF level: Maximum recommended by manufacturer

AF1 frequency: 10 kHz tone

AF1 level: sufficient to produce 8 kHz deviation

EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

NAME OF TEST: Occupied Bandwidth (Digital Modulation) PARA. NO.: 2.1049

Minimum Standard: Not defined by FCC. Input vs. Output.

Method Of Measurement:

Spectrum Analyzer Settings:

RBW: CDMA (30 kHz), GSM (30 kHz), NADC (1 kHz) and CDPD (1 kHz)

VBW: $\geq$ RBW

Span: As required

Sweep: Auto

Input Signal Characteristics:

RF level: Maximum recommended by manufacturer

EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

NAME OF TEST: Spurious Emission at Antenna Terminals	PARA. NO.: 2.1051
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Minimum Standard: Para. No. 22.917(e). The mean power of emissions must be attenuated below the mean power of the unmodulated carrier on any frequency twice or more than twice the fundamental emission by at least $43 + 10 \log P$. This is equivalent to -13 dBm absolute power.

Method Of Measurement:

Spectrum Analyzer Settings:

RBW: 30 kHz (AMPS). As required for digital modulations.

VBW: $\geq$ RBW

Start Frequency: 0 MHz

Stop Frequency: 10 GHz

Sweep: Auto

EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

NAME OF TEST: Field Strength of Spurious Radiation**PARA. NO.: 2.1053****Minimum Standard:**

Para. No. 22.917(e). The mean power of emissions must be attenuated below the mean power of the unmodulated carrier on any frequency twice or more than twice the fundamental emission by at least $43 + 10 \log P$. This is equivalent to -13 dBm absolute power.

Test Method:

The substitution antenna method was used to measure erp of spurious emissions. This method is described in EIA/TIA 603. The field strength of the emission is measured and recorded. The EUT is then replaced with a substitution antenna of known gain against a dipole. The substitution antenna is fed with a calibrated signal which is adjusted until the previously recorded value is repeated. The erp of the spurious signal is the level required to repeat the previously measured level. If the substitution antenna gain is calibrated and expressed as dBi (referenced to an isotropic radiator instead of a dipole), the result is adjusted by 2.15 dB so that the result is erp not eirp.

The spectrum is searched to 10 GHz.

EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

NAME OF TEST: Frequency Stability**PARA. NO.: 2.1055**

Minimum Standard: Para. No. 22.355. The transmitter carrier frequency shall remain within the tolerances given in Table C-1.

Table C-1

Freq. Range (MHz)	Base, fixed	Mobile > 3 W	Mobile ≤ 3 W
821 to 896	1.5	2.5	2.5

Method Of Measurement:Frequency Stability With Voltage Variation:

The E.U.T. is placed in an environmental chamber and allowed to stabilize at +20 degrees Celsius for at least 15 minutes. The frequency counter and signal generator are phase locked with the same 10 MHz reference frequency by connecting the 10 MHz ref. out of the counter to the 10 MHz ref, in of the signal generator. With the voltage input to the E.U.T. set to 85% S.T.V., the frequency is measured in 30 second intervals for a period of 5 minutes. This procedure is repeated at 100% S.T.V. and 115% S.T.V.

Frequency Stability With Temperature Variation:

The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30 second intervals for a period of 5 minutes.

Nemko Dallas

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS

EQUIPMENT: MR853P

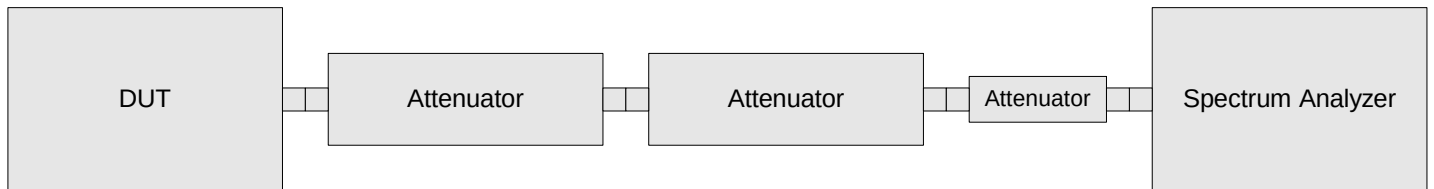
Test Report No.: 4L0458RUS1

ANNEX B - TEST DIAGRAMS

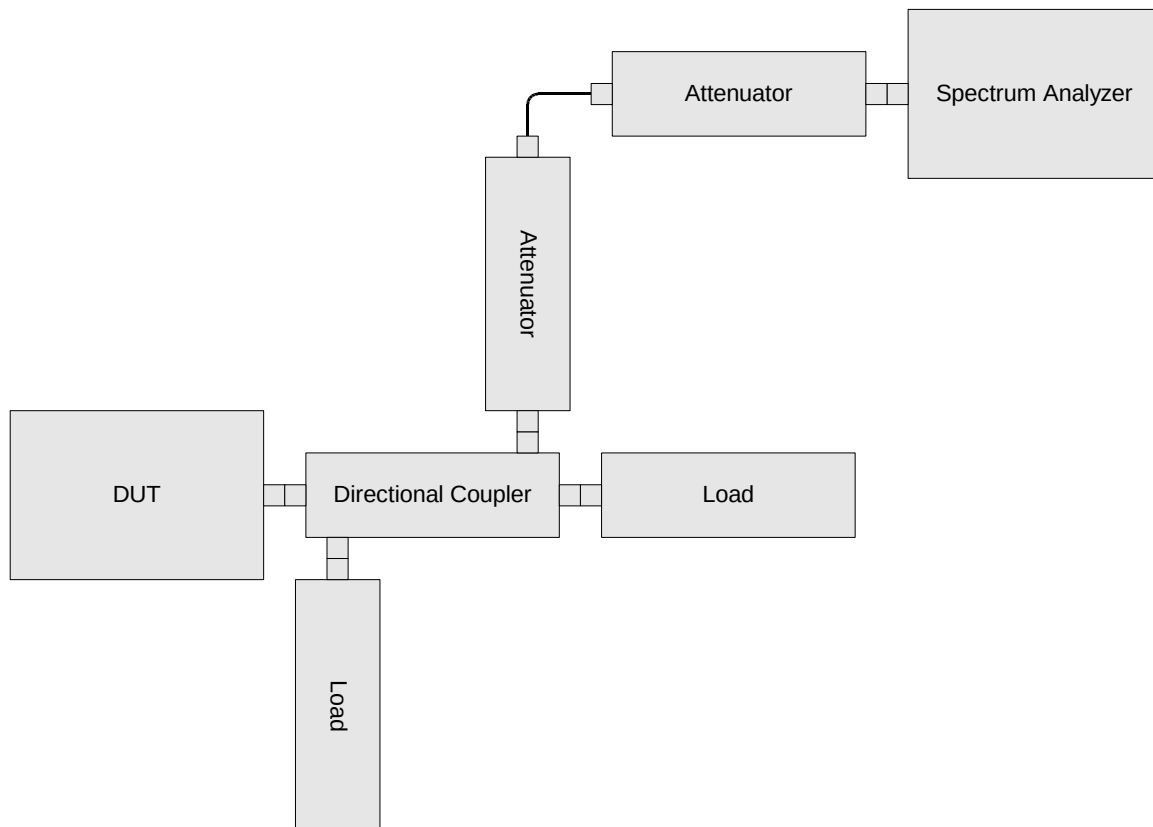
EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

Para. No. 2.1046 - R.F. Power Output



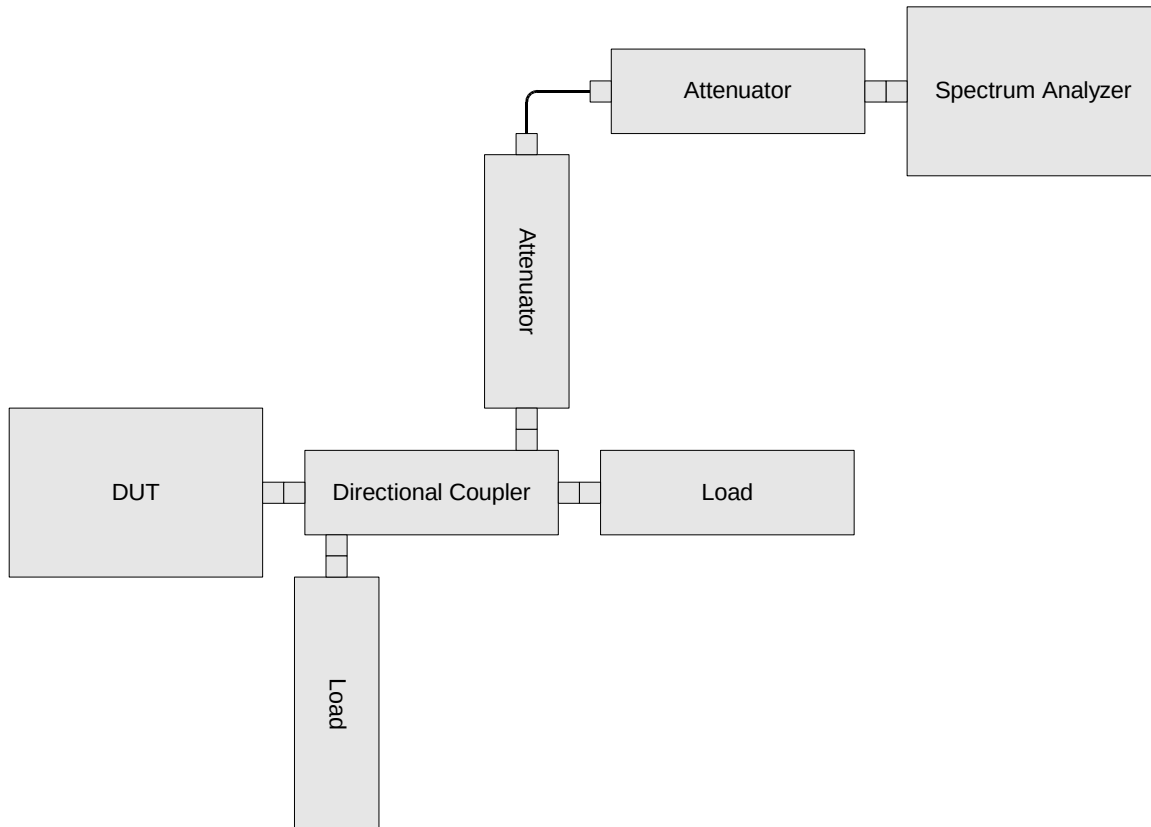
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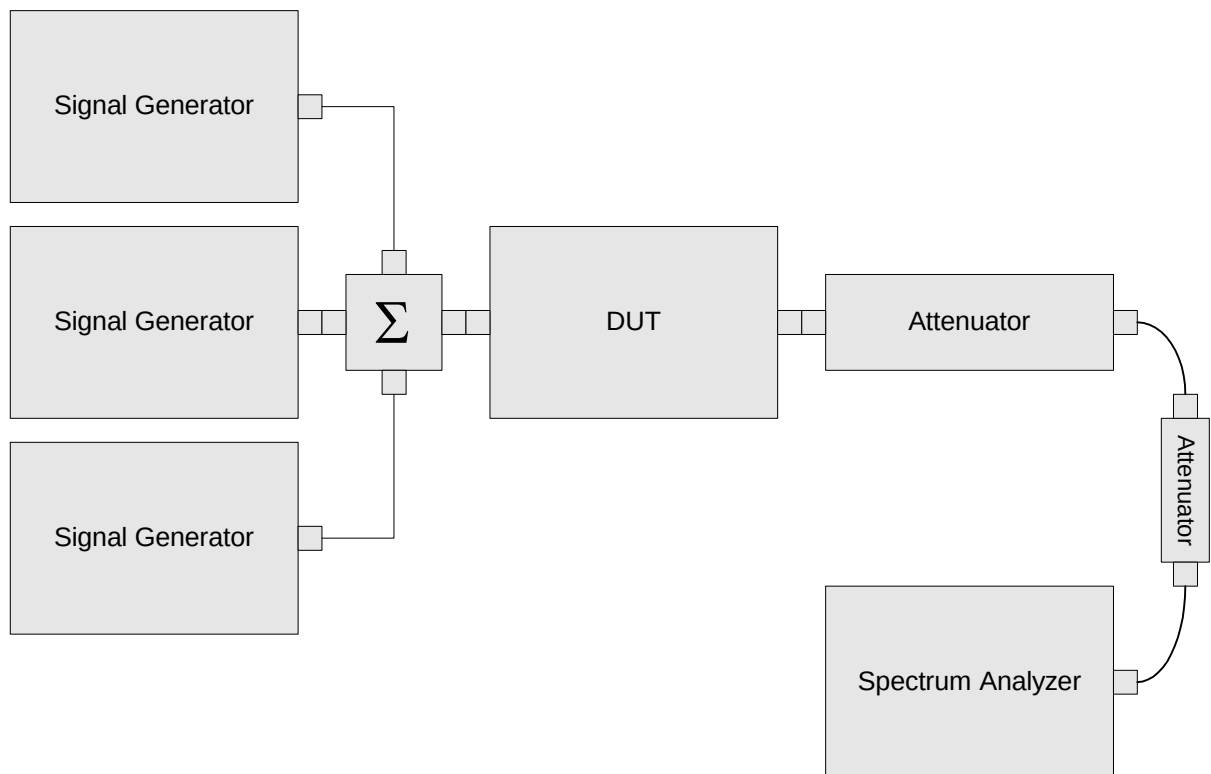


EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

Para. No. 2.1051 Spurious Emissions at Antenna Terminals

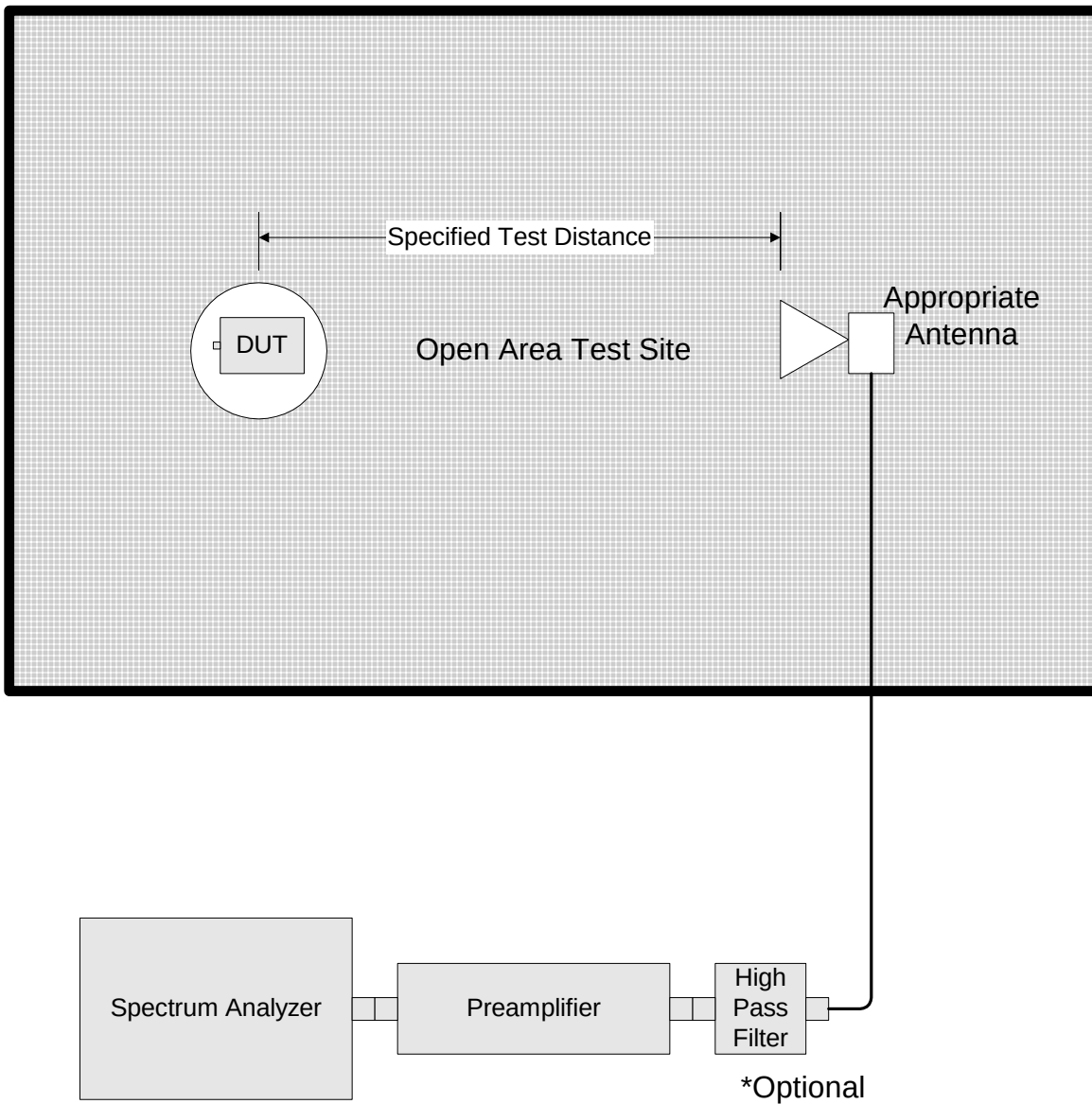


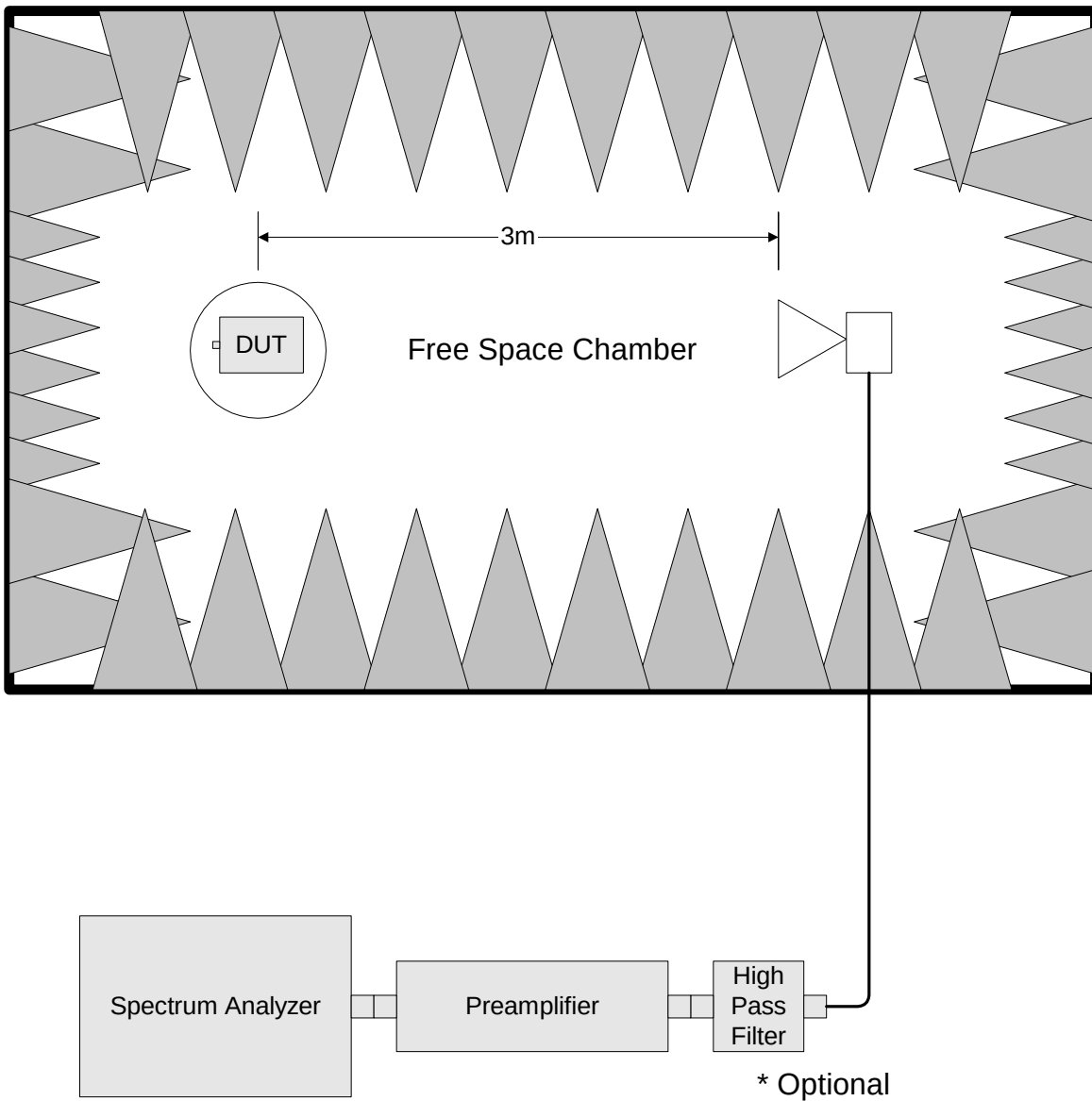


EQUIPMENT: MR853P

Test Report No.: 4L0458RUS1

Para. No. 2.1053 - Field Strength of Spurious Radiation





Para. No. 2.1055 - Frequency Stability

