

Nemko Test Report: 2L0584RUS2

Applicant: Coverage Solutions Corp.

Equipment Under Test: BDA-PS9-1/1W-60-A
(E.U.T.)

In Accordance With: **FCC Part 24, Subpart D**
Narrowband PCS Repeater
FCC Part 90, Subpart I
SMR Repeater

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



Authorized By:

Tom Tidwell, Wireless/EMC Manager

Date: 1/8/02

Total Number of Pages: 77

Table of Contents

Section 1.	Summary of Test Results.....	3
Section 2.	General Equipment Specification.....	5
Section 3.	RF Power Output.....	7
Section 4.	Occupied Bandwidth.....	8
Section 5.	Spurious Emissions at Antenna Terminals.....	21
Section 6.	Field Strength of Spurious.....	62
Section 7.	Test Equipment List	67
ANNEX A - TEST METHODOLOGIES.....		68
ANNEX B - TEST DIAGRAMS		74

EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

Section 1. Summary of Test Results

Manufacturer: Coverage Solutions Corp.

Model No.: BDA-PS9-1/1W-60-A

Serial No.: 02111011

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 24, Subpart D.



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](#)

Nemko Dallas Inc. authorizes the above named company to reproduce this report provided it is reproduced in its entirety and for use by the company's employees only.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Nemko Dallas Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

This report applies only to the items tested.

EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

Summary Of Test Data

NAME OF TEST	SPEC.	RESULT
RF Power Output	$\leq$ Rated	Complies
Occupied Bandwidth (2FSK)	$\leq$ Rated	Complies
Occupied Bandwidth (4FSK)	$\leq$ Rated	Complies
Occupied Bandwidth (iDEN)	$\leq$ Rated	Complies
Spurious Emissions at Antenna Terminals (Part 24)	-13 dBm	Complies
Field Strength of Spurious Emissions (Part 24)	-13 dBm E.R.P.	Complies
Spurious Emissions at Antenna Terminals (Part 90)	-20 dBm	Complies
Field Strength of Spurious Emissions (Part 90)	-20 dBm E.R.P.	Complies
Frequency Stability	± 1 ppm	N/A

Footnotes:

The device has no modulation circuitry , therefore this test was not performed.

EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

Section 2. General Equipment Specification

Supply Voltage Input:		115 Vac			
Frequency Bands:	FSK	Uplink	896.015 to 901.985 MHz		
	FSK	Downlink	935.015 to 940.985 MHz		
	QAM	Uplink	896.02 to 901.98 MHz		
	QAM	Downlink	935.02 to 940.98 MHz		
		2FSK (F2D)	4FSK (F2D)	iDEN (QAM) (D7W)	
					
System Gain:		60 dB			
Output Impedance:		50 ohms			
RF Output (Rated):	Uplink	Total	2	Watts (Part 24 bands)	
	Downlink	Total	2	Watts (Part 24 bands)	
	Uplink	Total	.398	Watts (Part 90 bands)	
	Downlink	Total	.398	Watts (Part 90 bands)	

System Description

This is an F1/F1 repeater operating in the narrowband PCS band and the SMR radio band.

System Diagram



EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 2.1046
TESTED BY: David Light	DATE: 12/4/2002

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

Modulation Type	Frequency (MHz)	Output Power (dBm)	Output Power (W)
2FSK	900	+26	.398
4FSK	900	+26	.398
QAM	900	+26	.398
2FSK	940	+26	.398
4FSK	940	+26	.398
QAM	940	+26	.398

In the Part 90 bands, the maximum rf power output to meet the spurious limit is +26dBm. Intermodulation tests were performed with two carriers at +23 dBm/carrier. The ALC control on the amplifier will maintain the maximum rf output of +26 dBm (.398).

Measurement uncertainty: +/- 0.7 dB

Test Equipment: 1029-1030

Nemko Dallas

FCC PART 24, SUBPART D and FCC PART 90, SUBPART I
RADIO REPEATER

EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 2.1049
TESTED BY: David Light	DATE: 12/05/2002

Test Results: Complies.

Test Data: See attached plots.

Measurement Uncertainty: +/- 1.7 dB

EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

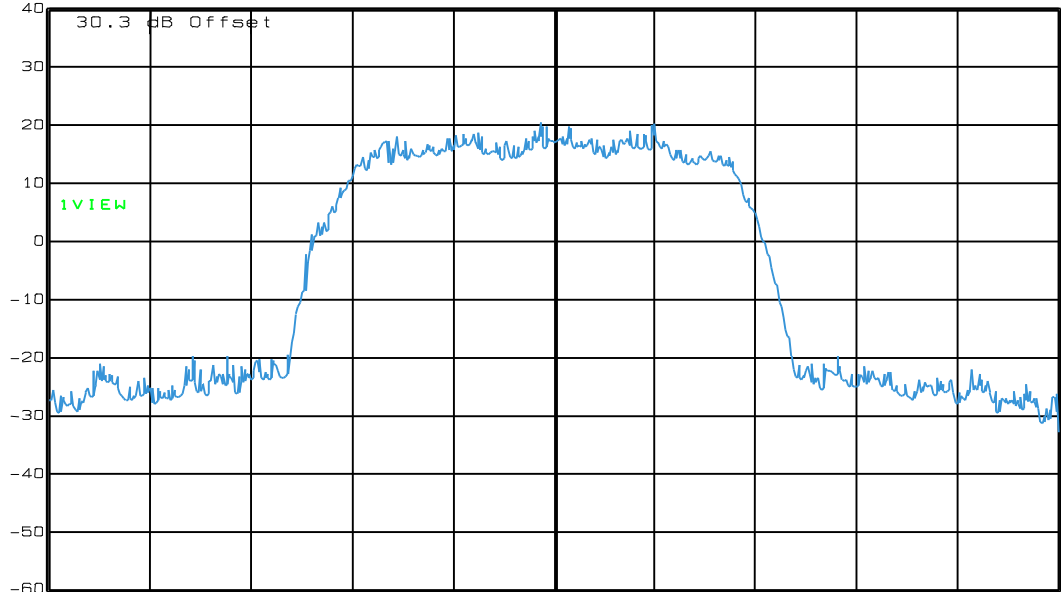
Part 24 and Part 90 Test Data – Occupied Bandwidth



Nemko Dallas, Inc.

Dallas Headquarters:

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

Data Plot		Occupied Bandwidth	
Page <u>1</u> of <u>6</u>		Complete <u>X</u>	
Job No.: 2L0585R	Date: 12/5/2002	Preliminary: _____	
Specification: PT 24	Temperature(°C): 22		
Tested By: David Light	Relative Humidity(%): 40		
E.U.T.: REPEATER			
Configuration: TX FULL POWER IN NARROWBAND PCS BAND			
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: 1083		
Filter: _____	Cable #2: _____		
Receiver: 1036	Cable #3: _____		
Attenuator #1: 1064	Cable #4: _____		
Attenuator #2: 1065	Mixer: _____		
Additional equipment used: _____			
Measurement Uncertainty: +/-1.7 dB			
 RBW 500 Hz RF Att 30 dB VBW 500 Hz SWT 1.4 s Unit dBm Ref Lvl 40 dBm 30.3 dB Offset 1 VIEW 1 MA  Center 940 MHz 7 kHz/ Span 70 kHz			

Date: 06.DEC.2002 10:14:33

Notes: **OUTPUT - QAM**
DOWNLINK

EQUIPMENT: BDA-PS9-1/1W-60-A

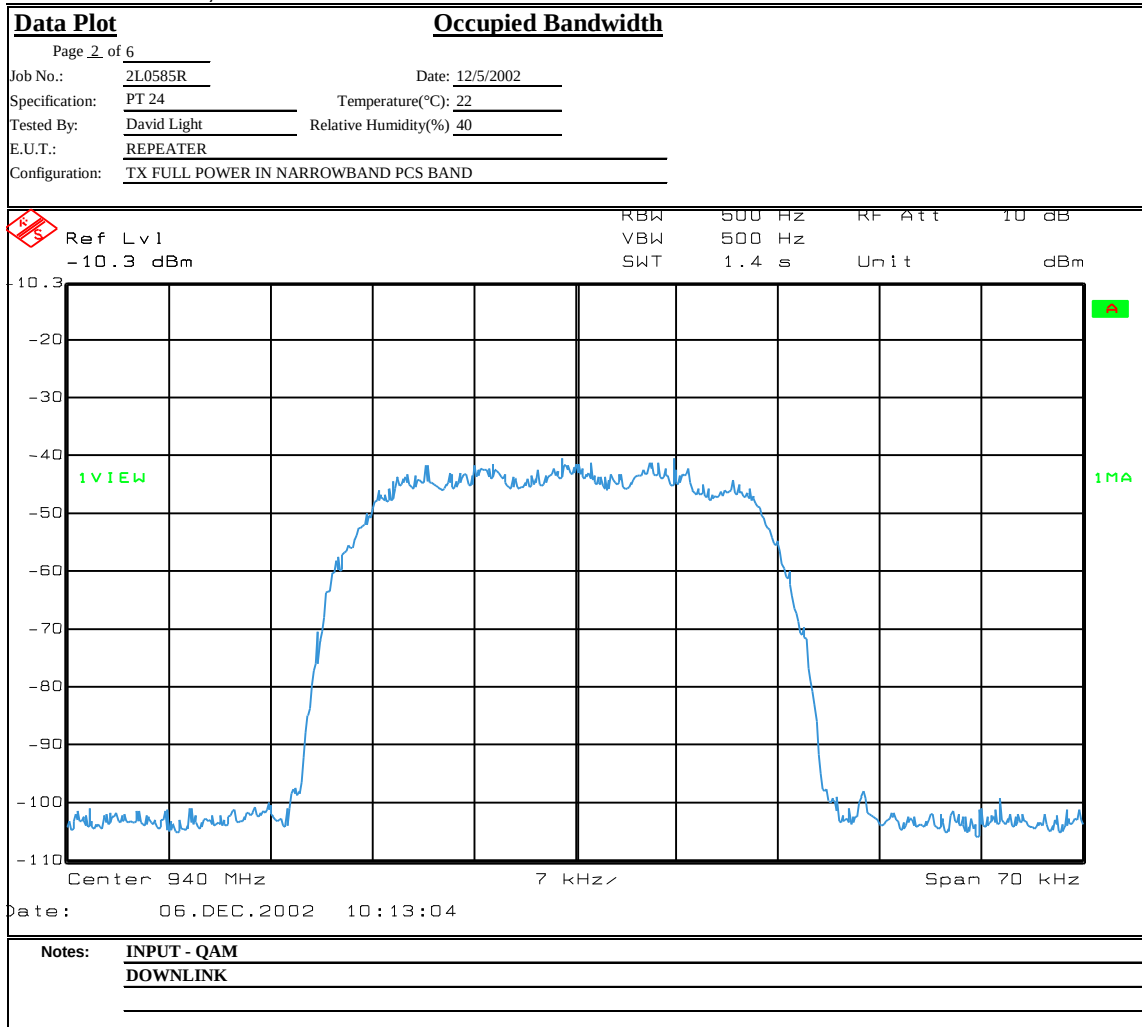
PROJECT NO.: 2L0584RUS2

Test Data – Occupied Bandwidth



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

Nemko Dallas, Inc.



EQUIPMENT: BDA-PS9-1/1W-60-A

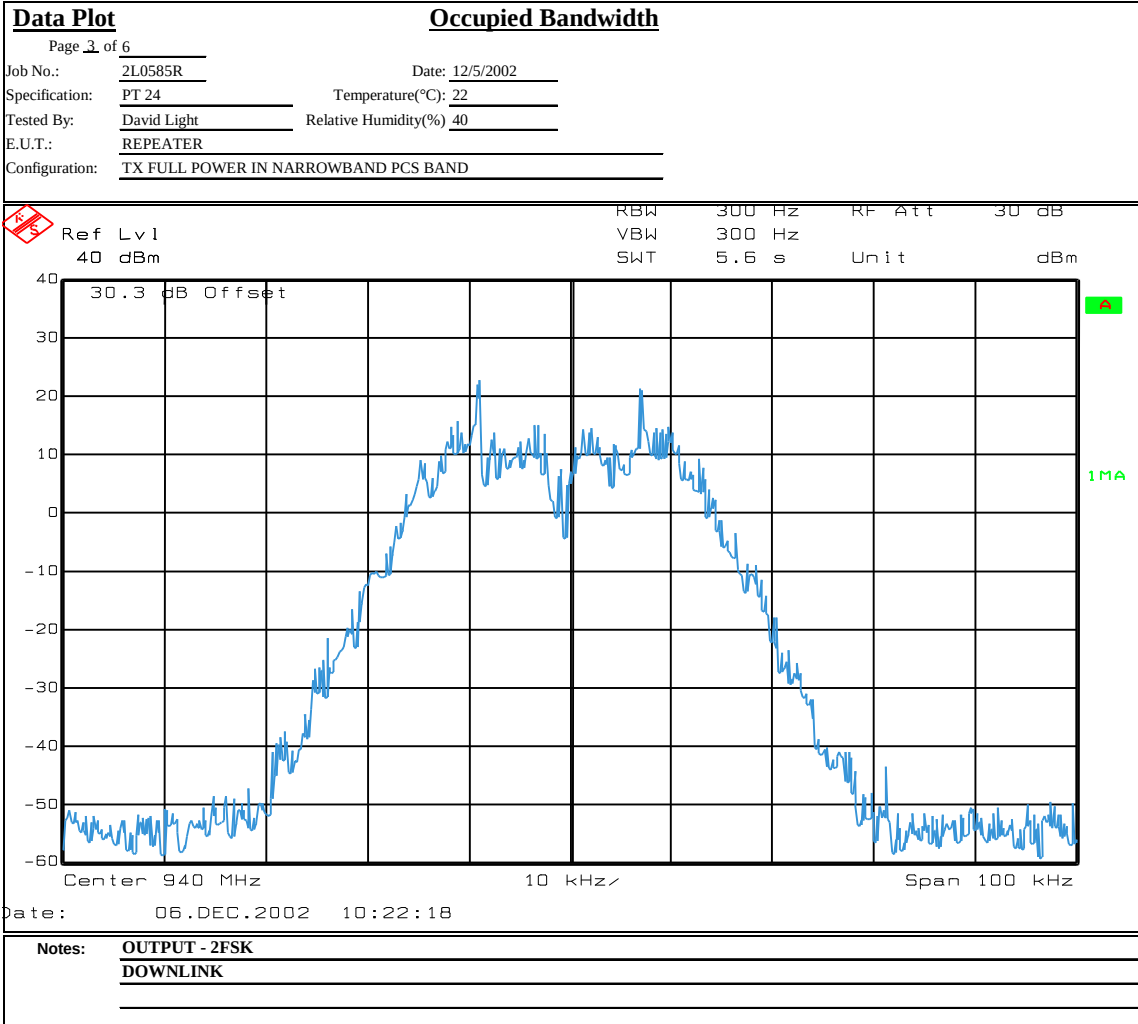
PROJECT NO.: 2L0584RUS2

Test Data – Occupied Bandwidth



Nemko Dallas, Inc.

Dallas Headquarters:

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

EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

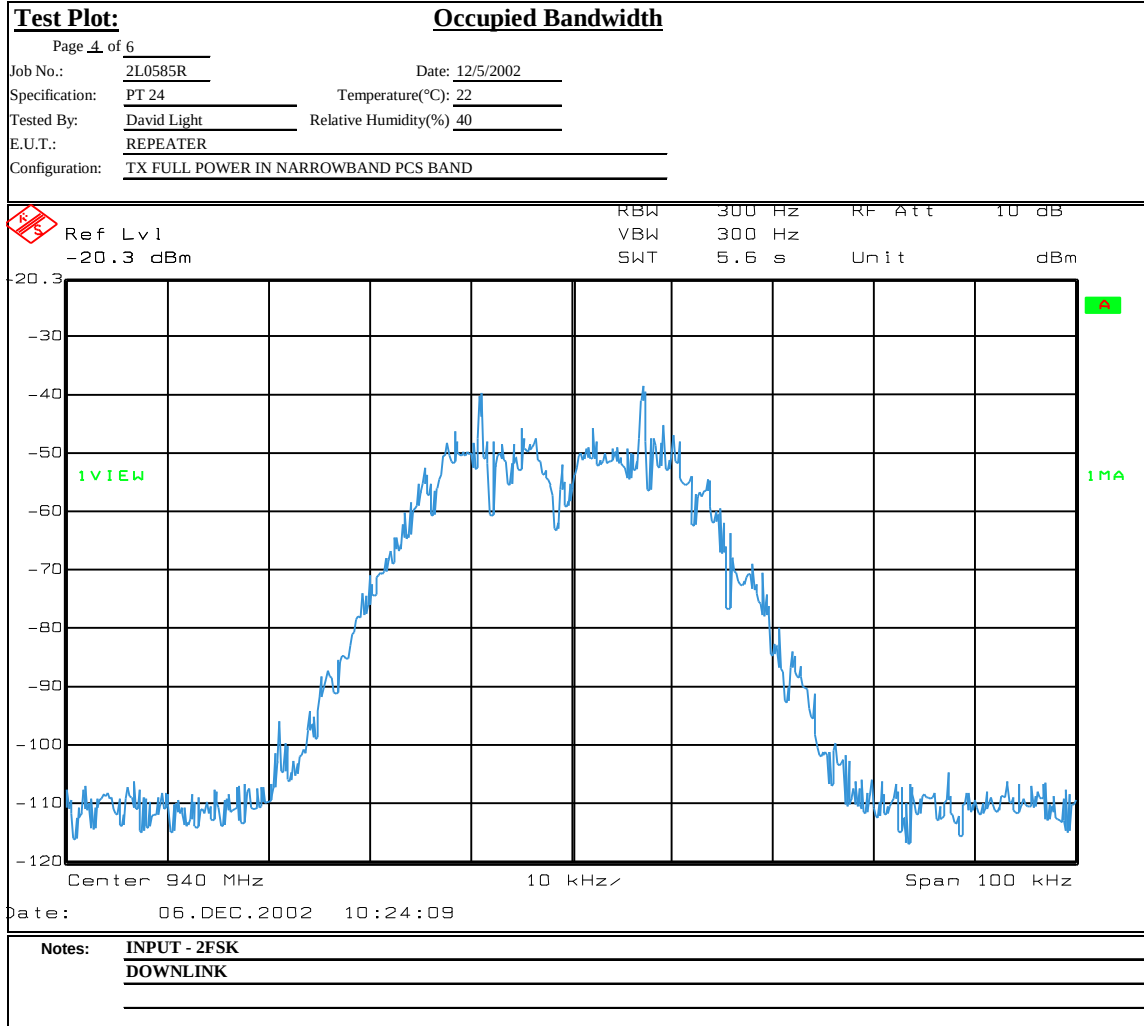
Test Data – Occupied Bandwidth



Dallas Headquarters:

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

Nemko Dallas, Inc.



EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

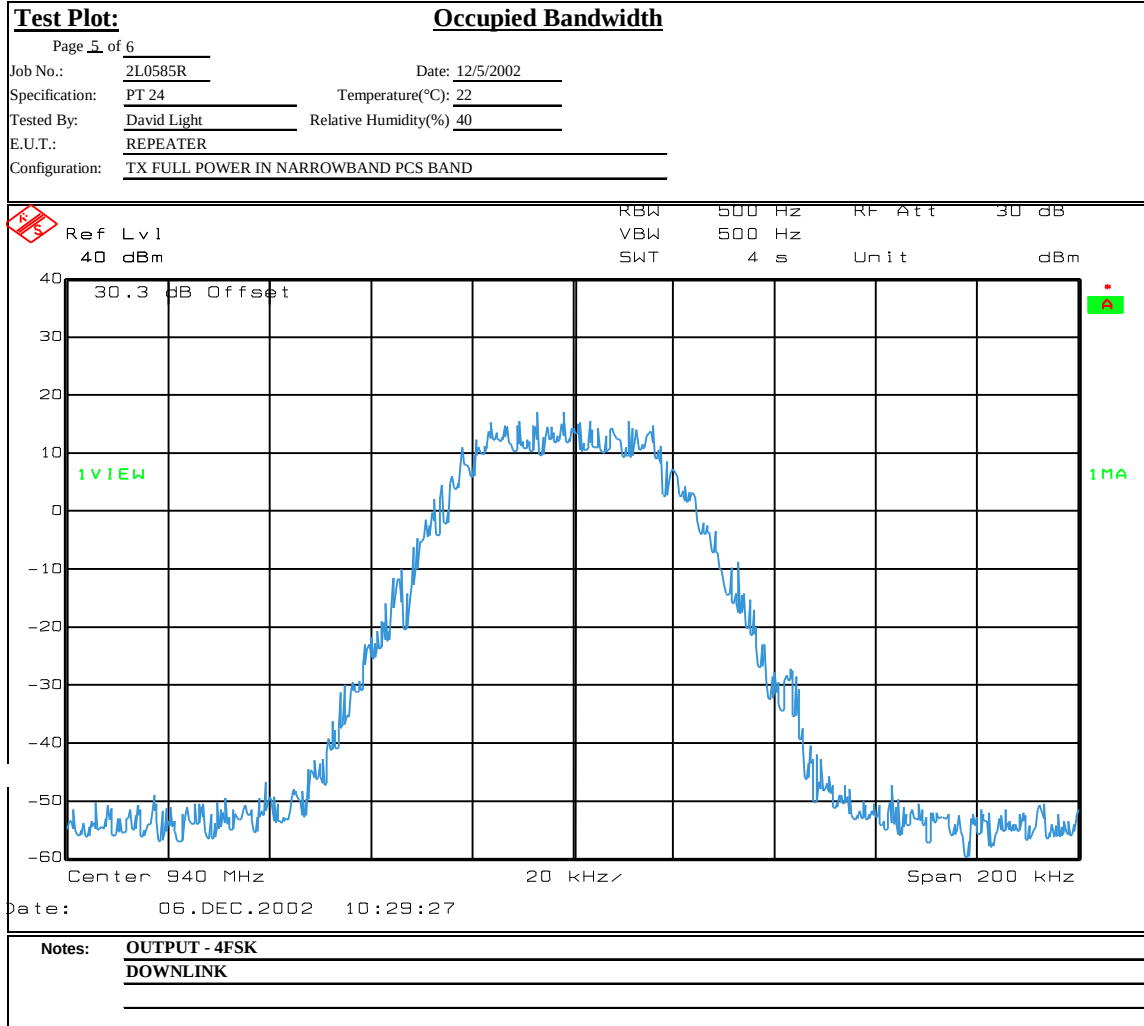
Test Data – Occupied Bandwidth



Dallas Headquarters:

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

Nemko Dallas, Inc.



EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

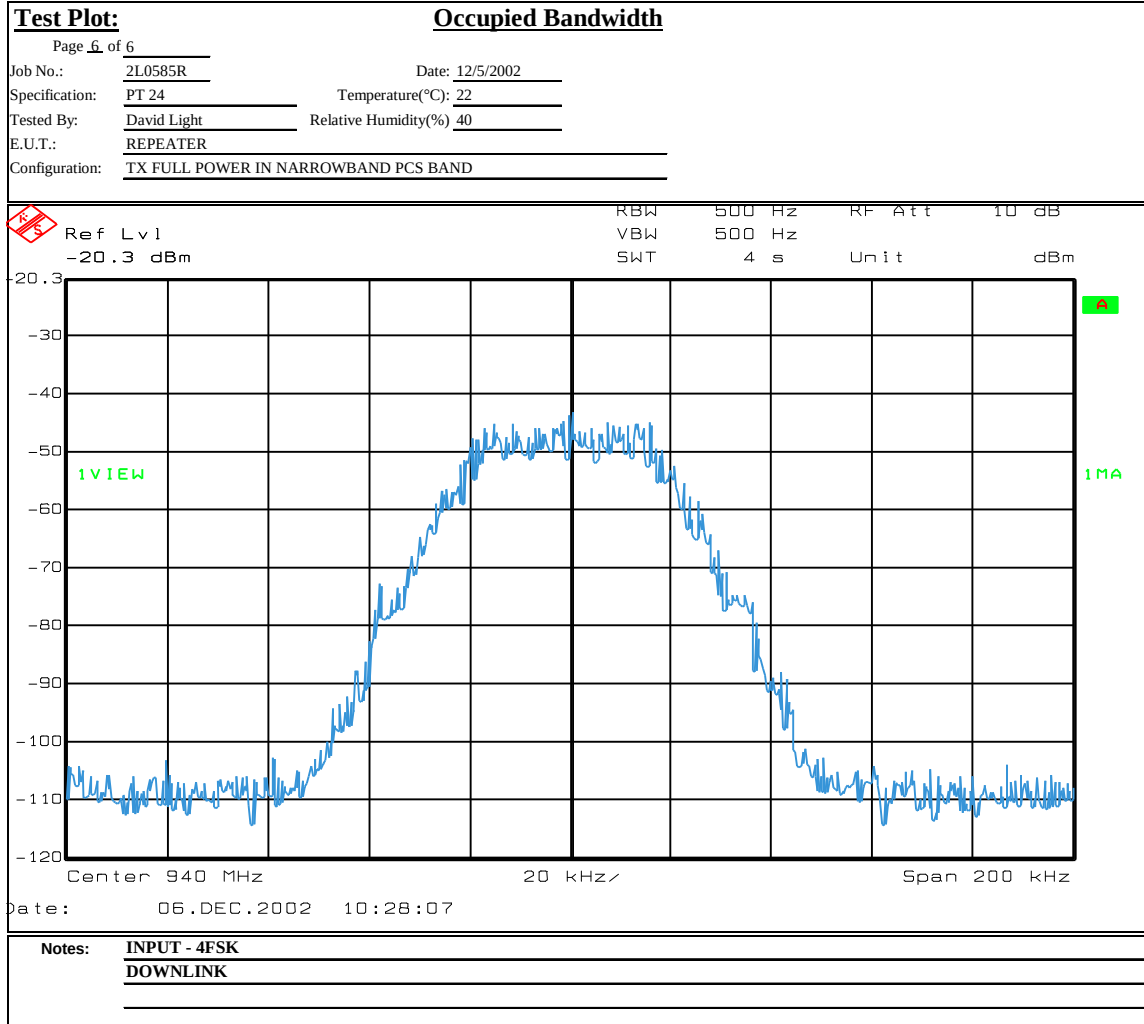
Test Data – Occupied Bandwidth



Dallas Headquarters:

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

Nemko Dallas, Inc.



EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

Test Data – Occupied Bandwidth



Nemko Dallas, Inc.

Dallas Headquarters:

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

Data Plot

Page 1 of 6

Job No.: 2L0585R Date: 12/5/2002
Specification: PT 24 Temperature(°C): 22
Tested By: David Light Relative Humidity(%): 40
E.U.T.: REPEATER
Configuration: TX FULL POWER IN NARROWBAND PCS BAND
Sample Number: 1
Location: Lab 1
Detector Type: Peak

Occupied Bandwidth

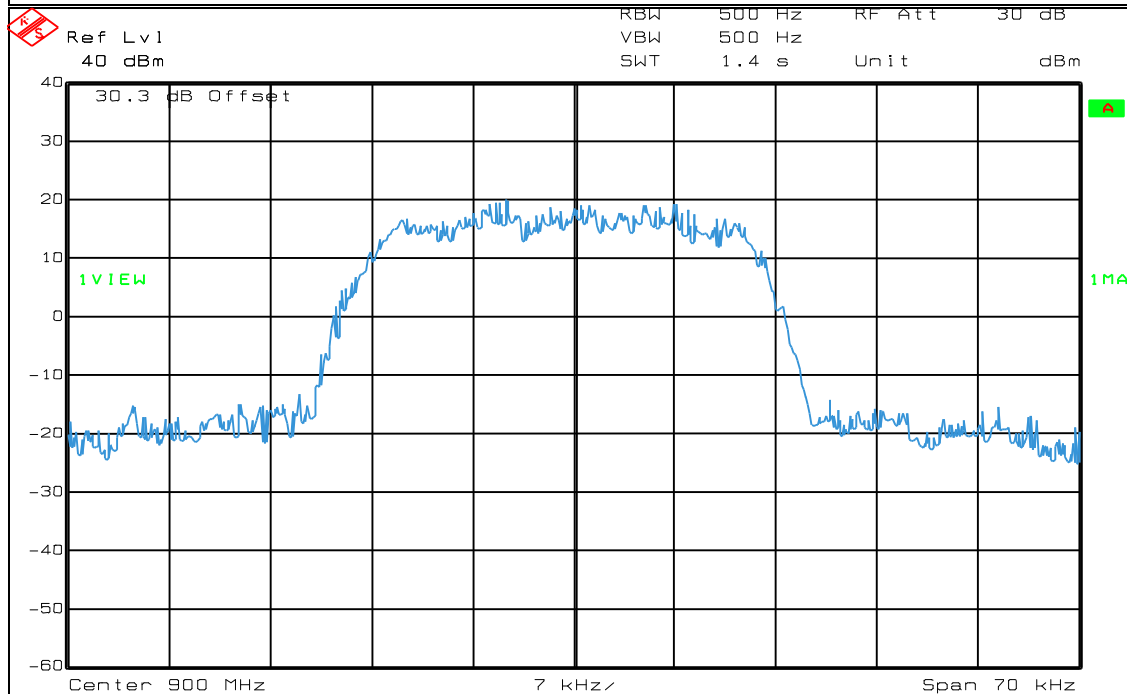
Complete X
Preliminary: _____

RBW: Refer to plots
VBW: Refer to plots

Measurement
Distance: NA m

Test Equipment Used

Antenna: _____ Directional Coupler: _____
Pre-Amp: _____ Cable #1: 1083
Filter: _____ Cable #2: _____
Receiver: 1036 Cable #3: _____
Attenuator #1: 1064 Cable #4: _____
Attenuator #2: 1065 Mixer: _____
Additional equipment used: _____
Measurement Uncertainty: +/-1.7 dB



Date: 06.DEC.2002 10:42:03

Notes: OUTPUT - QAM
UPLINK

EQUIPMENT: BDA-PS9-1/1W-60-A

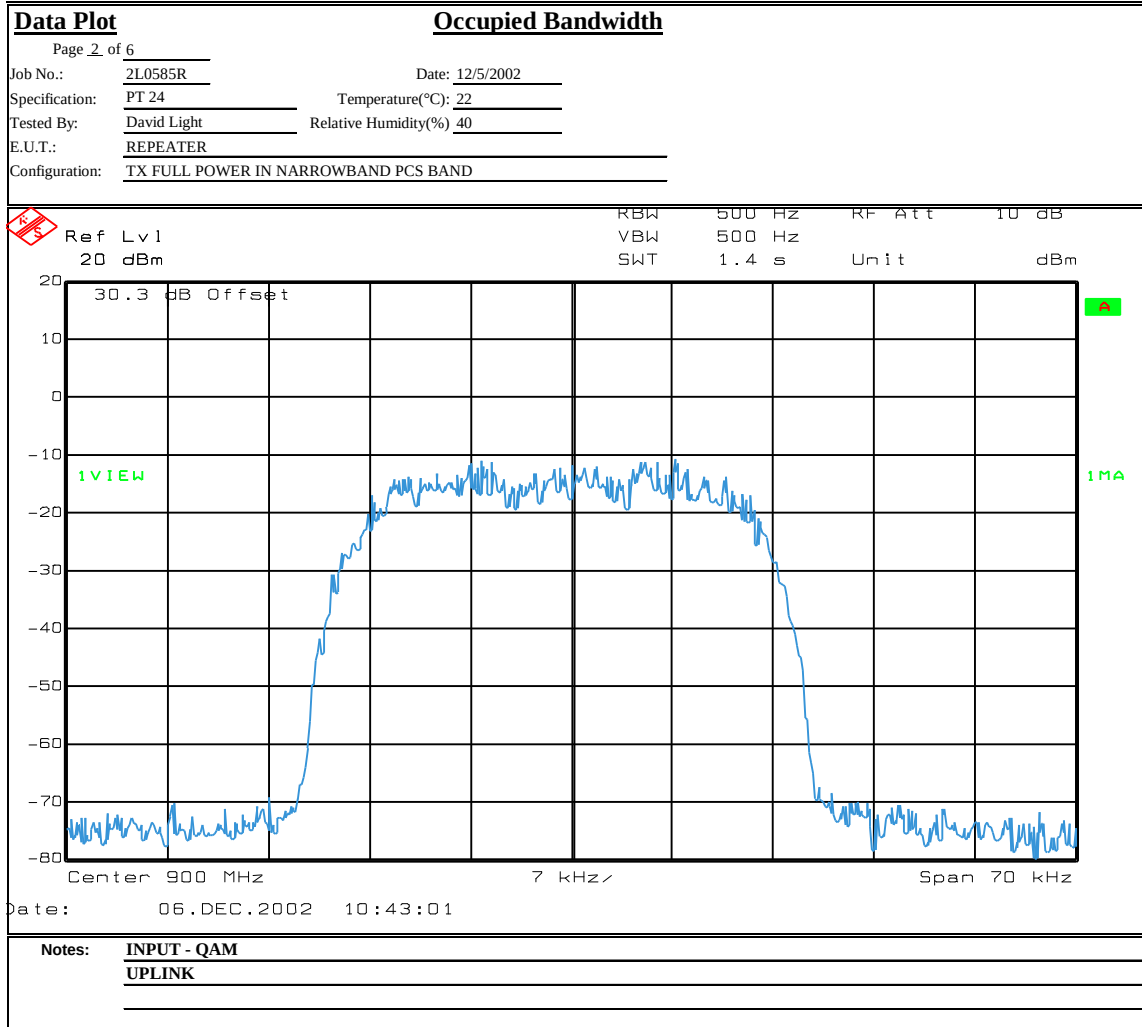
PROJECT NO.: 2L0584RUS2

Test Data – Occupied Bandwidth



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

Nemko Dallas, Inc.



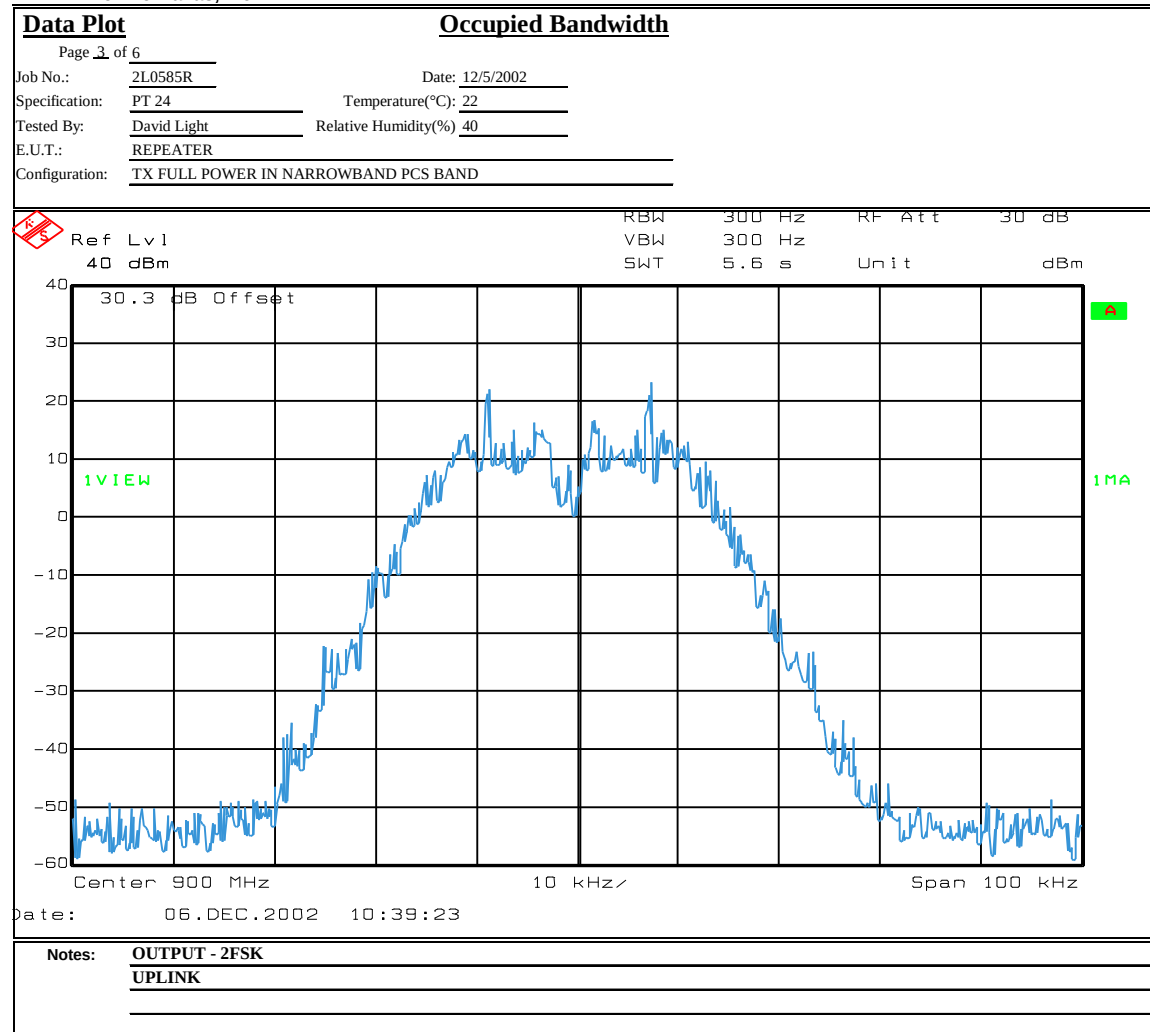
Test Data – Occupied Bandwidth



Nemko Dallas, Inc.

Dallas Headquarters:

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



EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

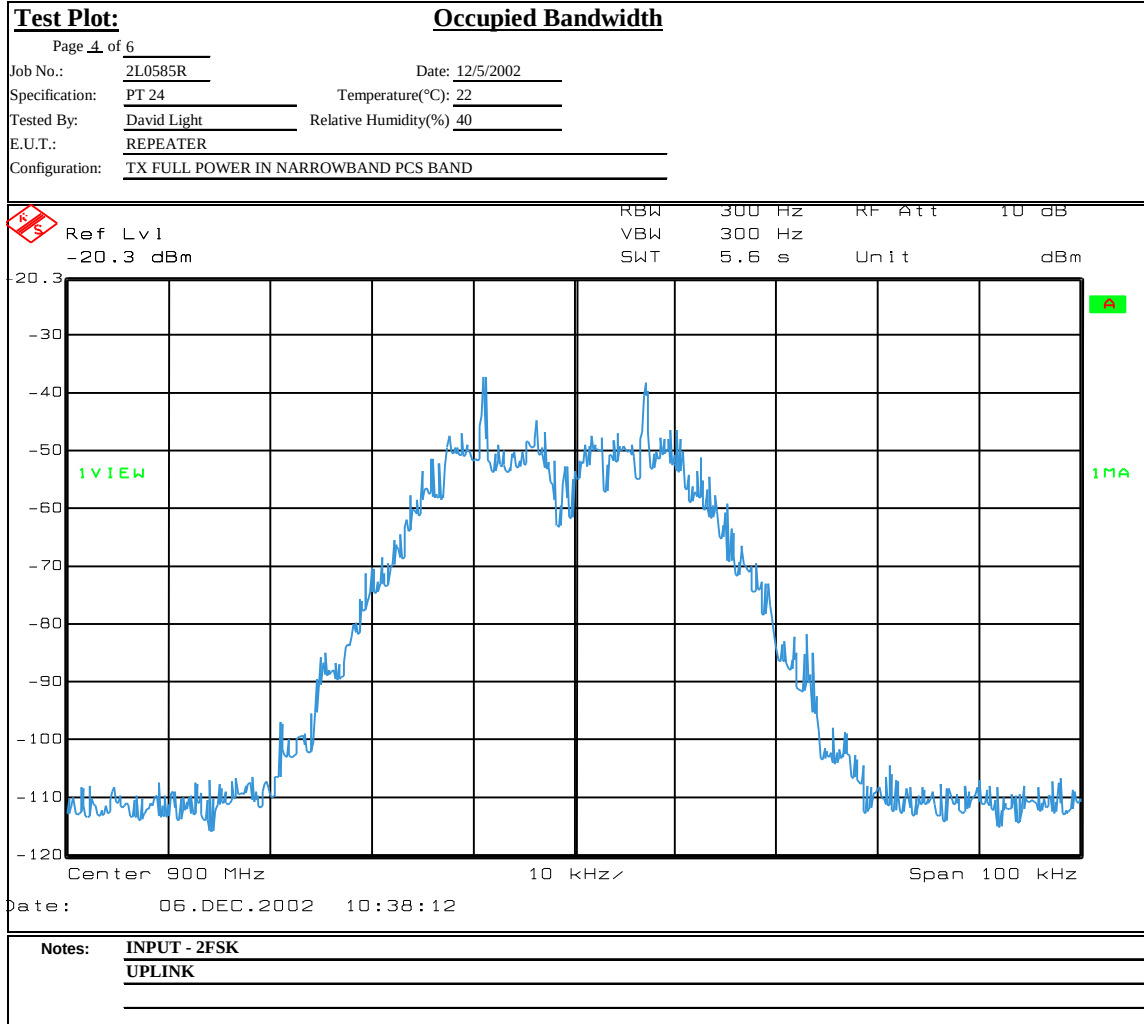
Test Data – Occupied Bandwidth



Dallas Headquarters:

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

Nemko Dallas, Inc.



EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

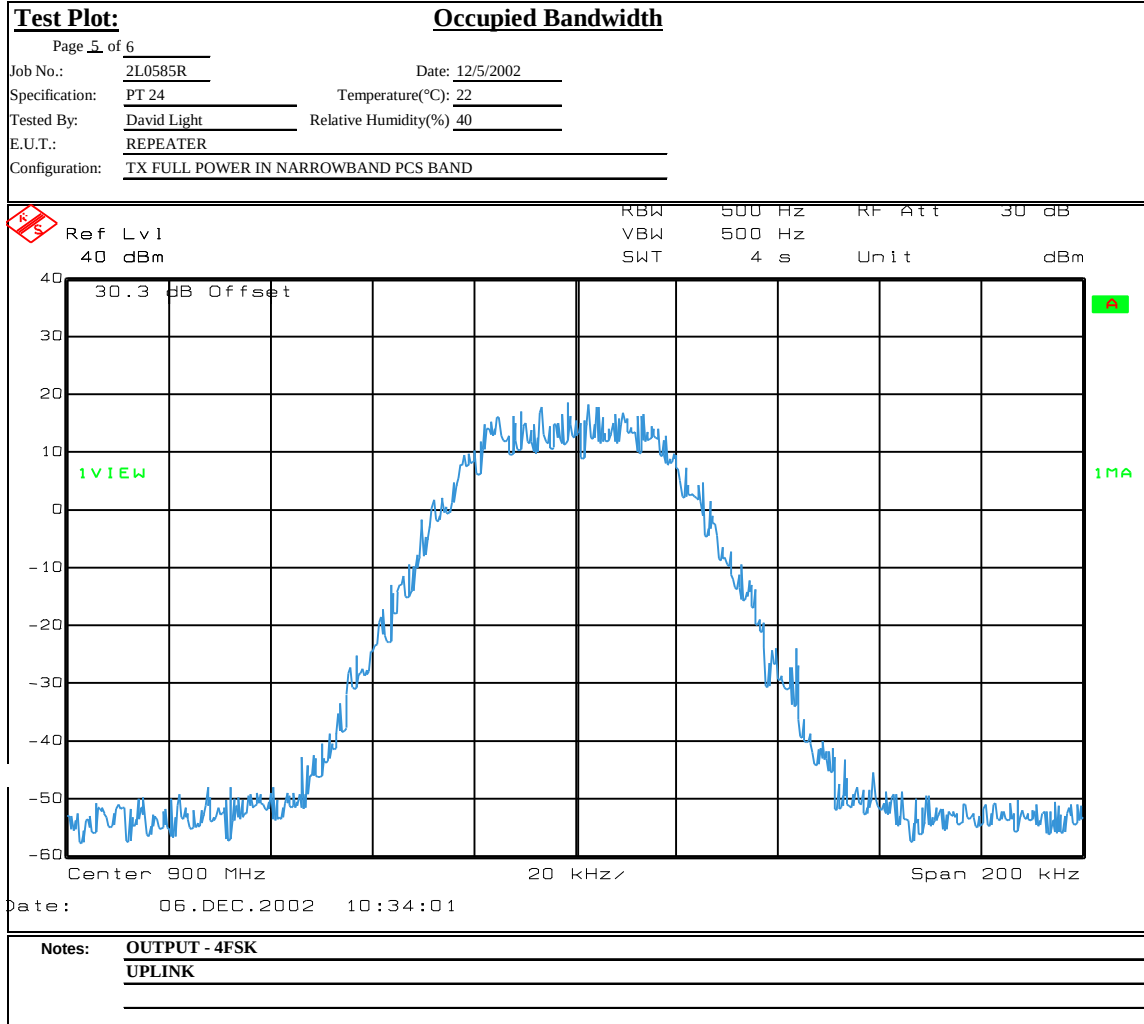
Test Data – Occupied Bandwidth



Dallas Headquarters:

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

Nemko Dallas, Inc.



EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

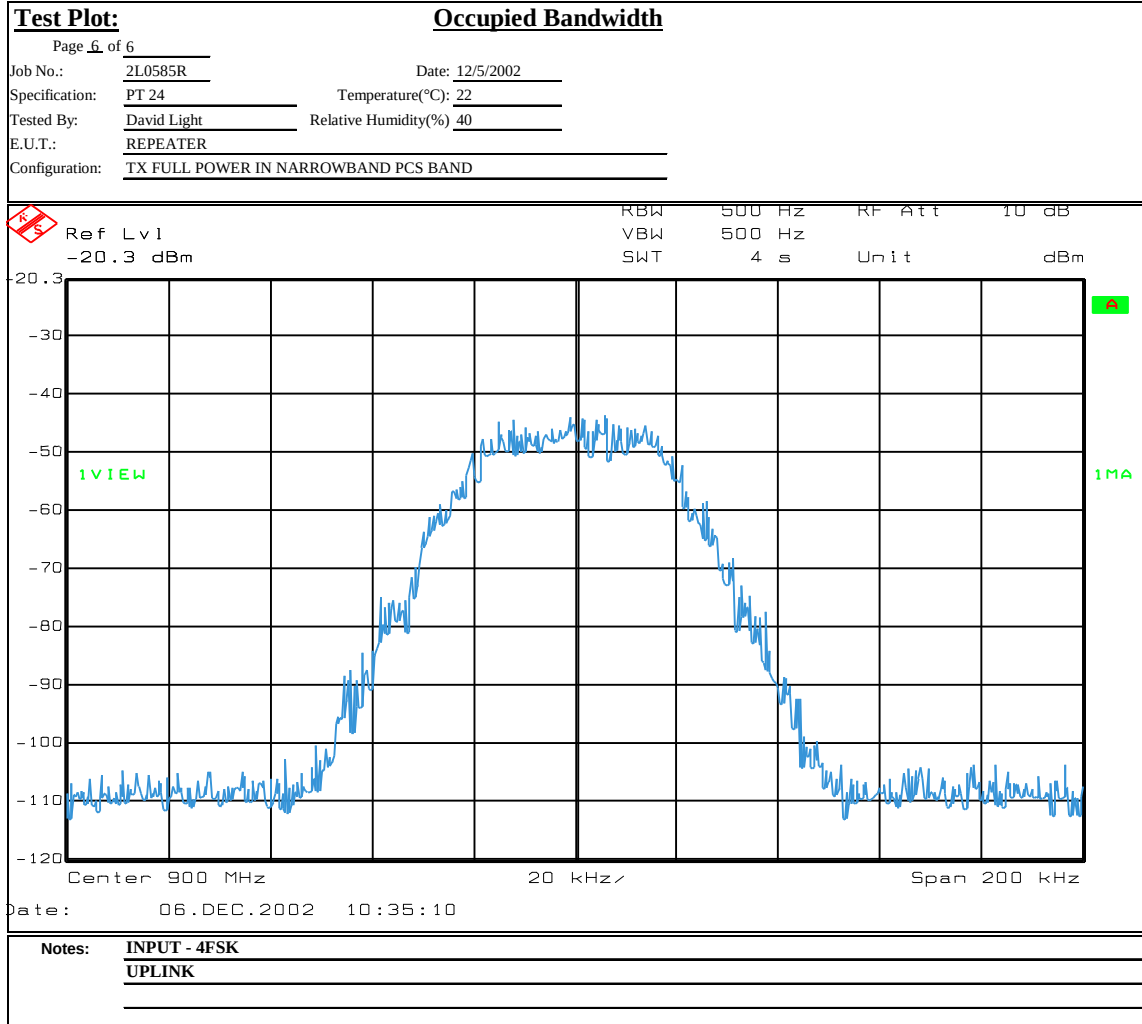
Test Data – Occupied Bandwidth



Dallas Headquarters:

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

Nemko Dallas, Inc.



EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 2.1051
TESTED BY: David Light	DATE: 12-05-2002

Test Results: Complies.**Test Data:** See attached plots**Measurement Uncertainty:** +/- 1.7 dB

EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

Part 24 Test data – Spurious Emissions at Antenna Terminals



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 <u>1</u> of 4		Complete <u>X</u>	
Job No.:	2L0585R	Date:	12/5/2002
Specification:	PT 24	Temperature(°C):	22
Tested By:	David Light	Relative Humidity(%):	40
E.U.T.:	REPEATER		
Configuration:	TX FULL POWER IN NARROWBAND PCS BAND		
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:	1083
Filter:		Cable #2:	
Receiver:	1036	Cable #3:	
Attenuator #1:	1064	Cable #4:	
Attenuator #2:	1065	Mixer:	
Additional equipment used:			
Measurement Uncertainty:	+/-1.7 dB		
Date: 06.DEC.2002 11:53:52			
Notes: SPURIOUS EMISSION - FSK MODULATION			
DOWNLINK			
MARKER INDICATES CARRIER			

EQUIPMENT: BDA-PS9-1/1W-60-A

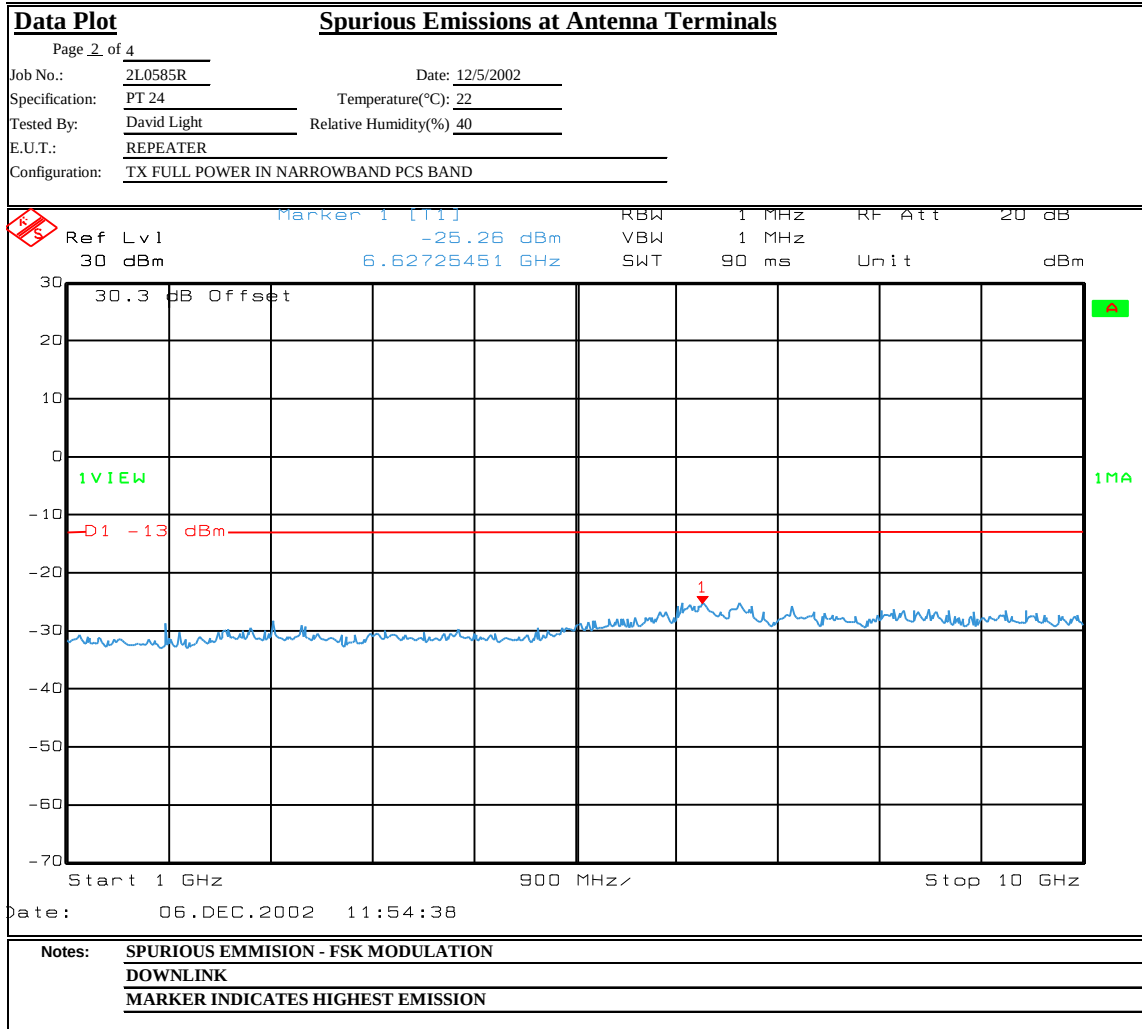
PROJECT NO.: 2L0584RUS2

Part 24 Test data – Spurious Emissions at Antenna Terminals



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

Nemko Dallas, Inc.



EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

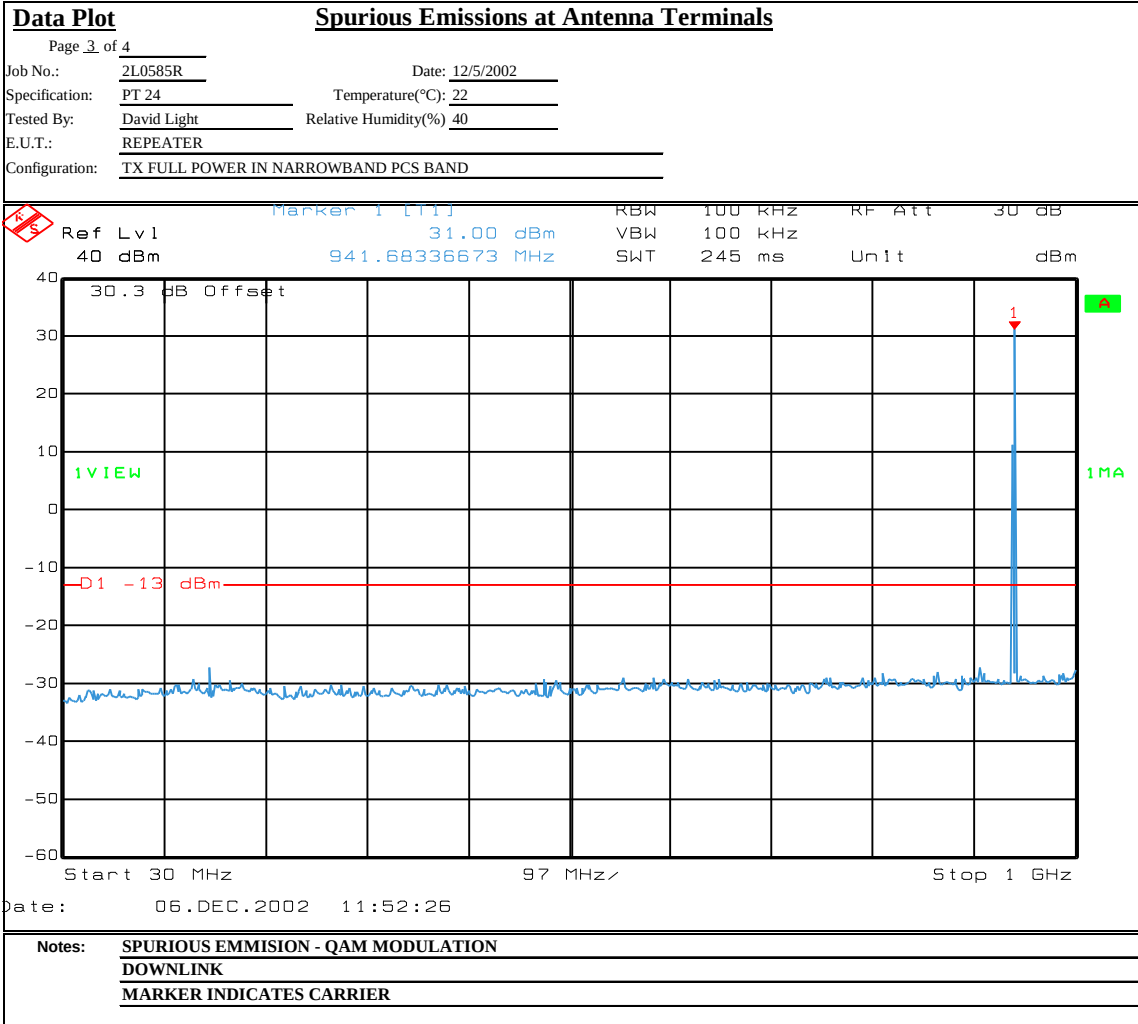
Part 24 Test data – Spurious Emissions at Antenna Terminals



Nemko Dallas, Inc.

Dallas Headquarters:

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



EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

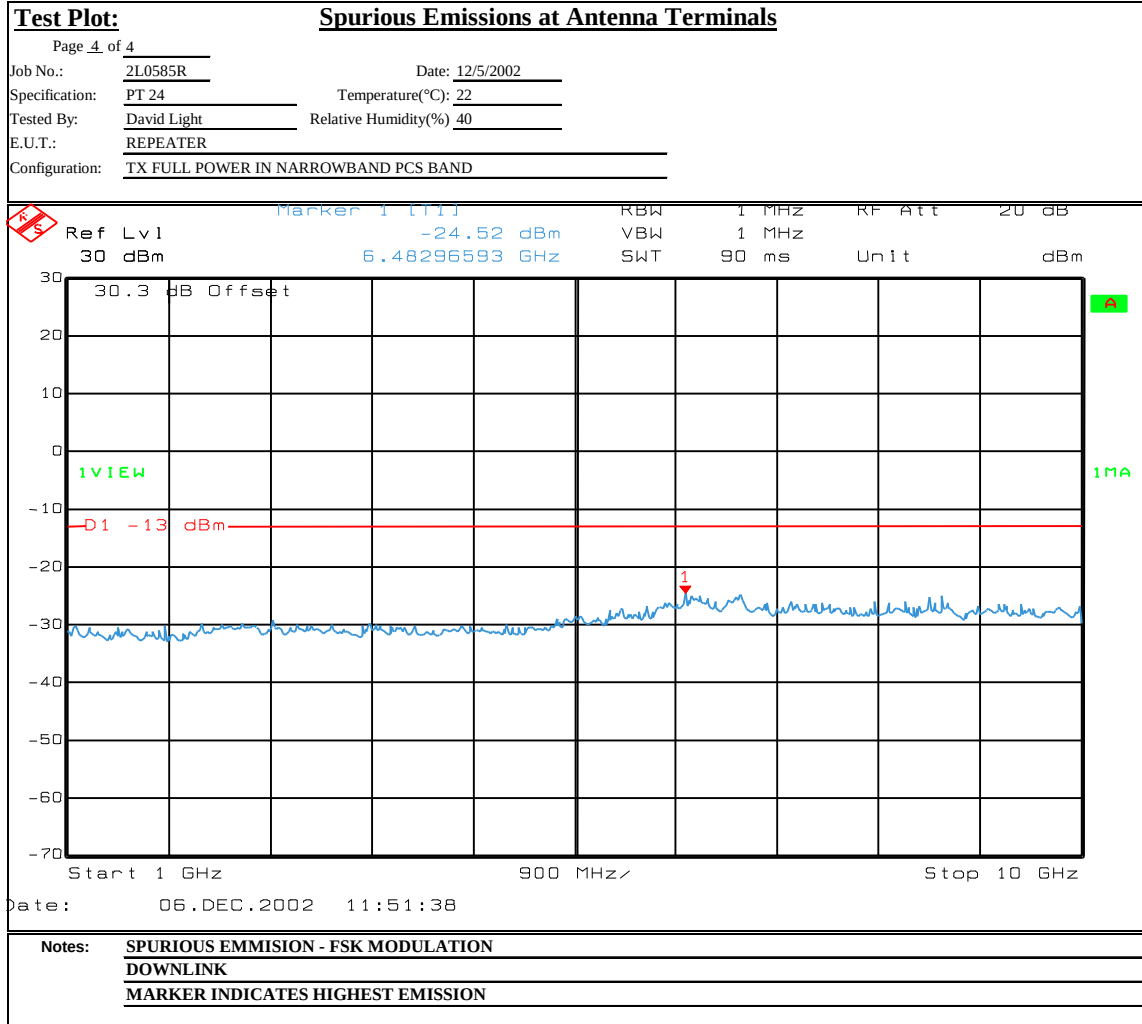
Part 24 Test data – Spurious Emissions at Antenna Terminals



Dallas Headquarters:

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

Nemko Dallas, Inc.



EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

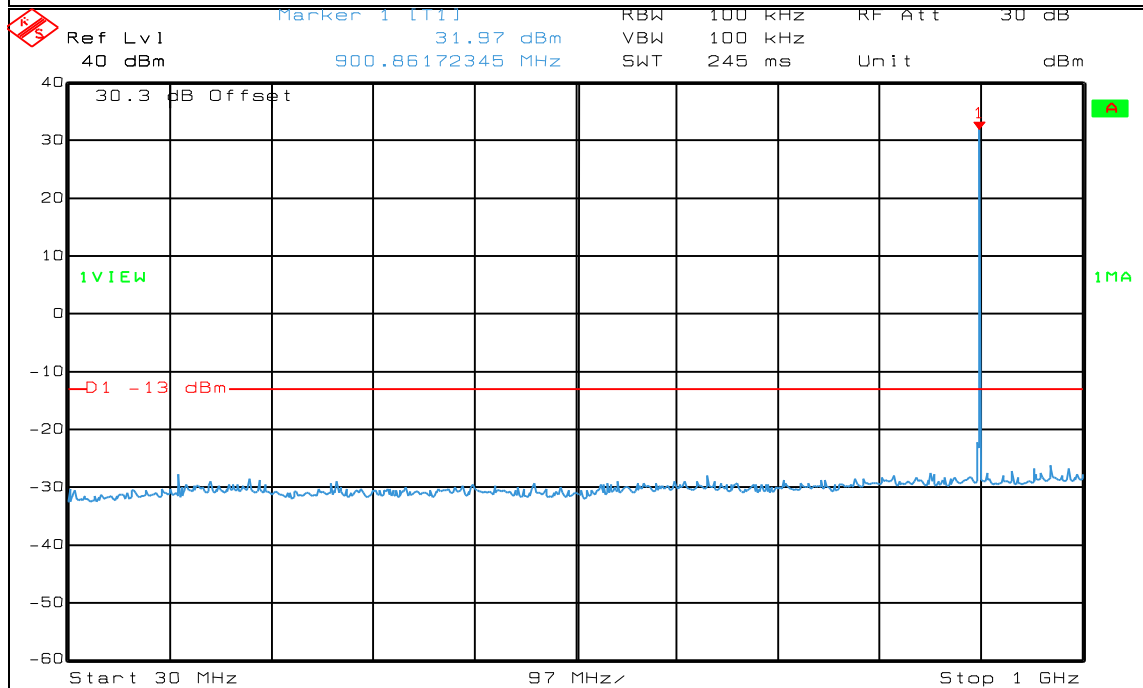
Part 24 Test data – Spurious Emissions at Antenna Terminals



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 <u>1</u> of <u>4</u>		Complete <u>X</u>	
Job No.: 2L0585R	Date: <u>12/5/2002</u>	Preliminary: _____	
Specification: PT 24	Temperature(°C): <u>22</u>		
Tested By: <u>David Light</u>	Relative Humidity(%): <u>40</u>		
E.U.T.: <u>REPEATER</u>			
Configuration: <u>TX FULL POWER IN NARROWBAND PCS BAND</u>			
Sample Number: <u>1</u>			
Location: <u>Lab 1</u>	RBW: <u>Refer to plots</u>	Measurement	
Detector Type: <u>Peak</u>	VBW: <u>Refer to plots</u>	Distance: <u>NA</u> m	
Test Equipment Used			
Antenna: _____	Directional Coupler: _____		
Pre-Amp: _____	Cable #1: <u>1083</u>		
Filter: _____	Cable #2: _____		
Receiver: <u>1036</u>	Cable #3: _____		
Attenuator #1: <u>1064</u>	Cable #4: _____		
Attenuator #2: <u>1065</u>	Mixer: _____		
Additional equipment used: _____			
Measurement Uncertainty: <u>+/-1.7 dB</u>			
			
Date: <u>06.DEC.2002</u> <u>11:39:05</u>			
Notes: <u>SPURIOUS EMISSION - FSK MODULATION</u>			
<u>UPLINK</u>			
<u>MARKER INDICATES CARRIER</u>			

EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

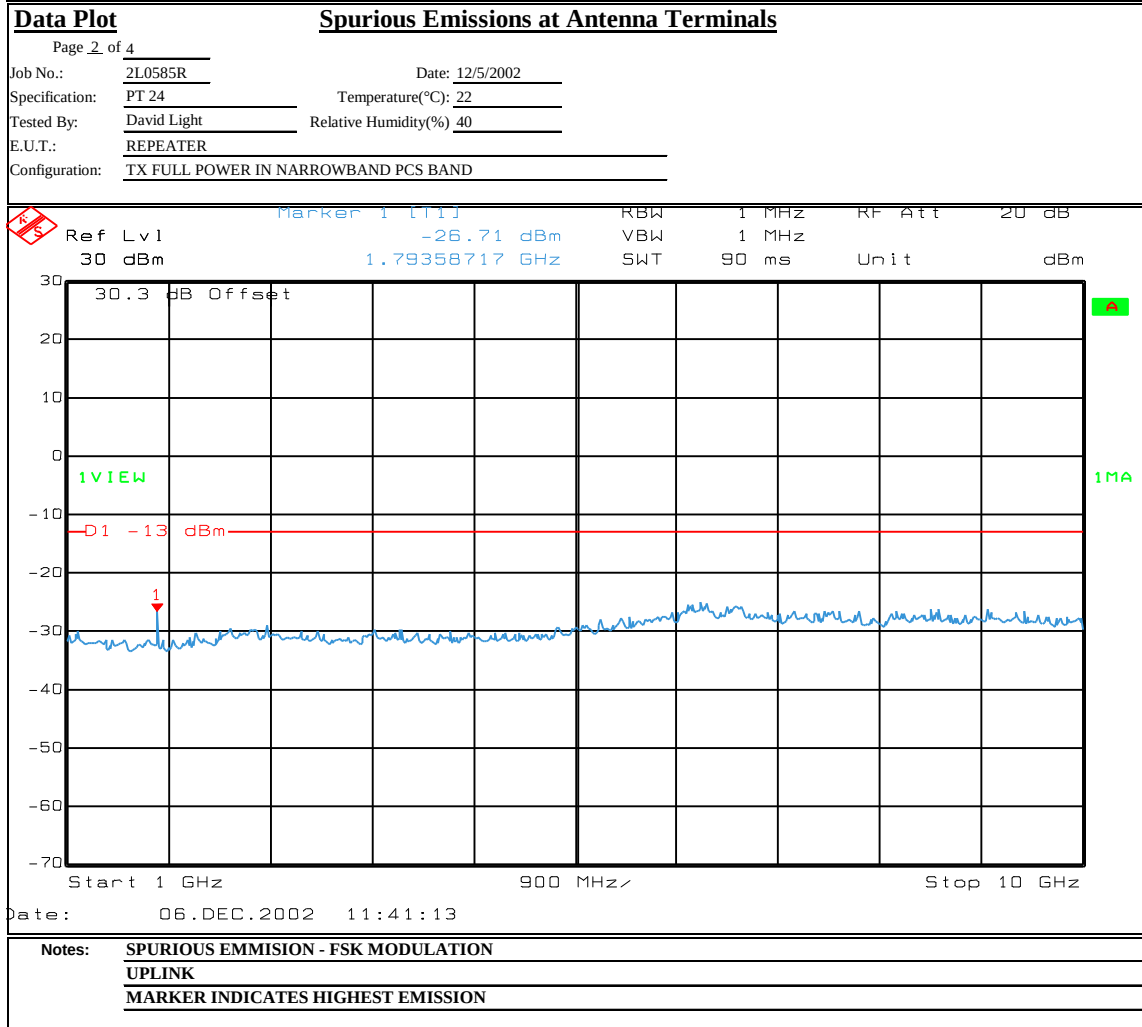
Part 24 Test data – Spurious Emissions at Antenna Terminals



Dallas Headquarters:

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

Nemko Dallas, Inc.



EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

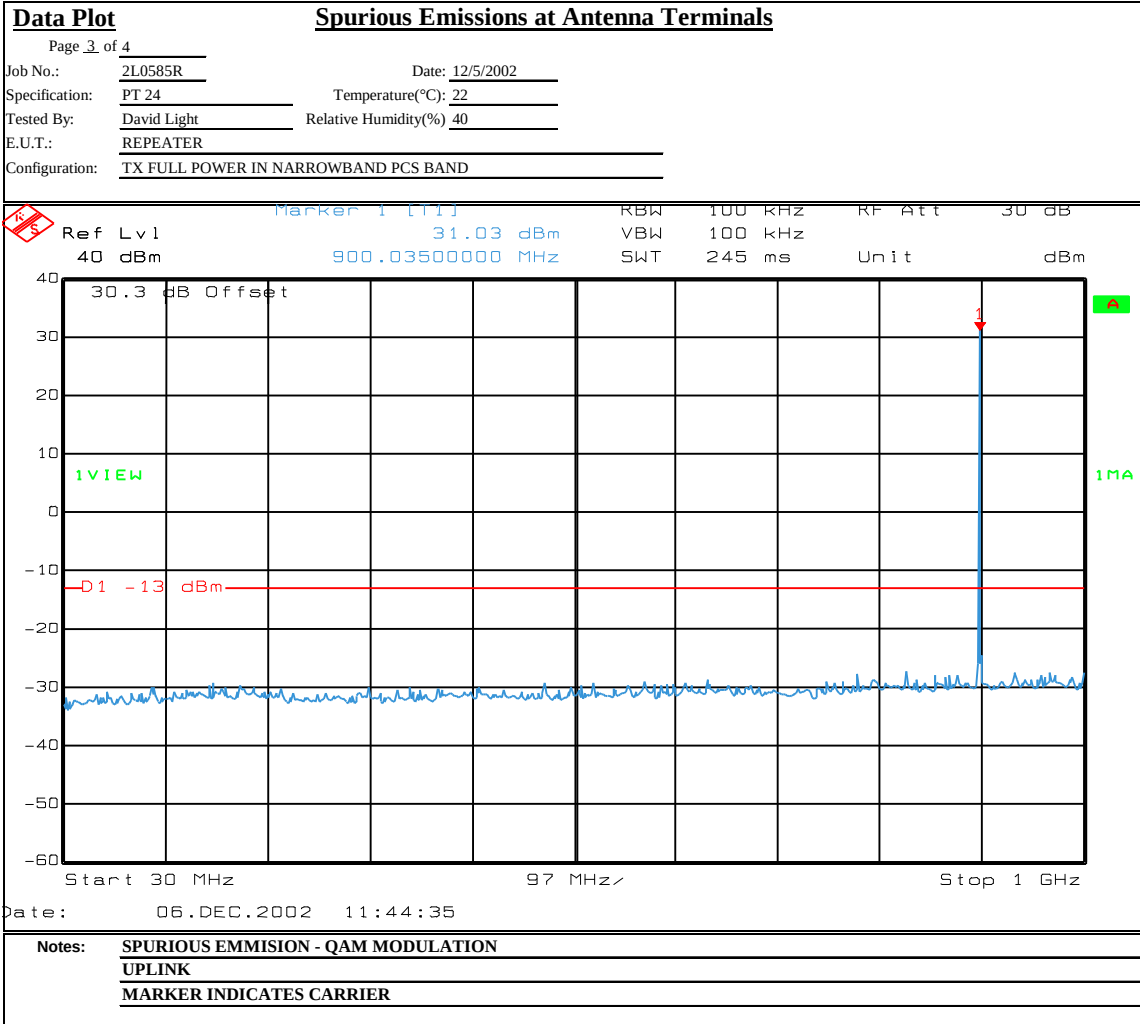
Part 24 Test data – Spurious Emissions at Antenna Terminals



Nemko Dallas, Inc.

Dallas Headquarters:

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



EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

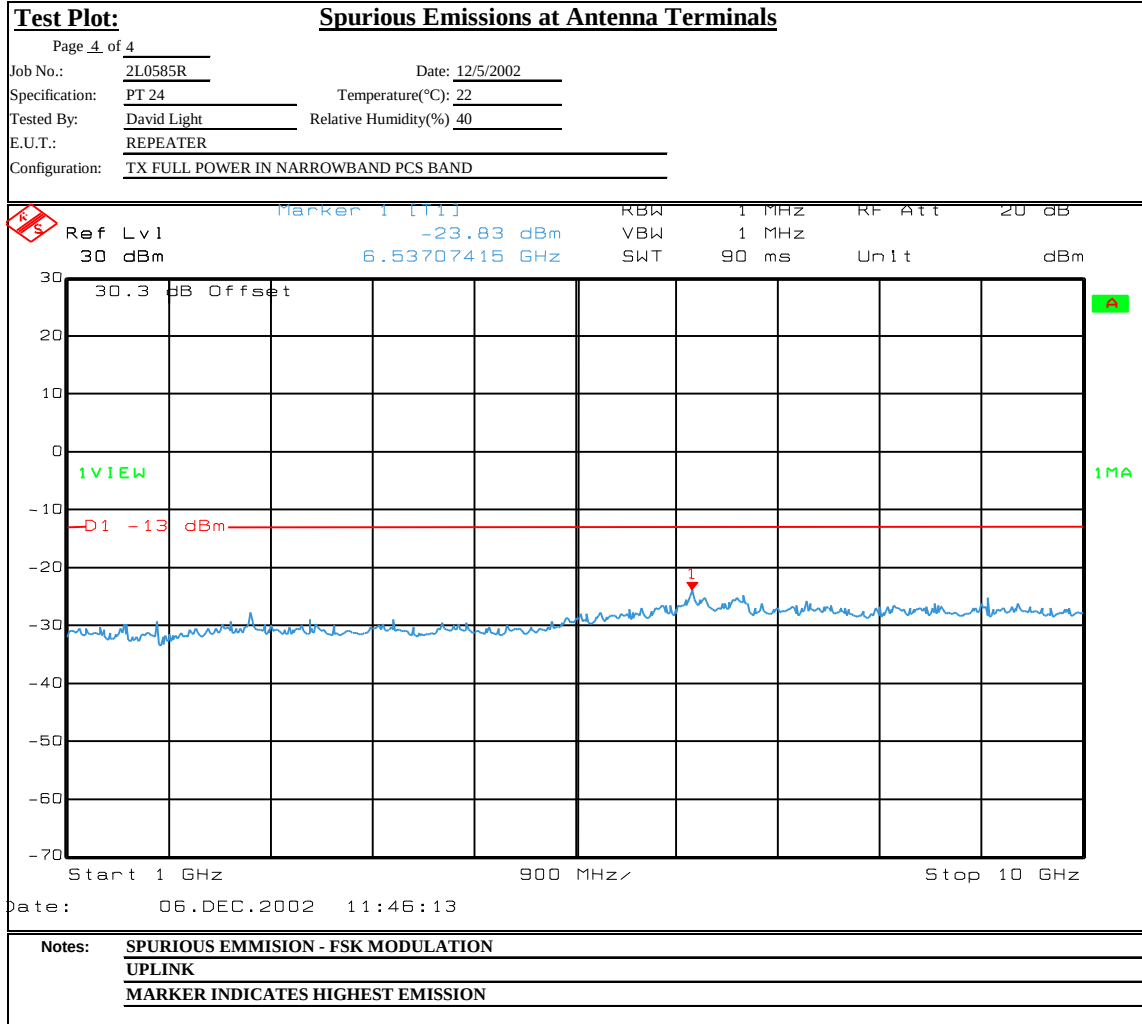
Part 24 Test data – Spurious Emissions at Antenna Terminals



Dallas Headquarters:

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

Nemko Dallas, Inc.



EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

Part 24 Test data – Spurious Emissions at Antenna Terminals



Nemko Dallas, Inc.

Dallas Headquarters:

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

Data Plot

Page 1 of 6

Job No.: 2L0585R Date: 12/5/2002
Specification: PT24 Temperature(°C): 22
Tested By: David Light Relative Humidity(%) 40
E.U.T.: REPEATER
Configuration: TX FULL POWER IN NARROWBAND PCS BAND
Sample Number: 1
Location: Lab 1
Detector Type: Peak

Bandedges

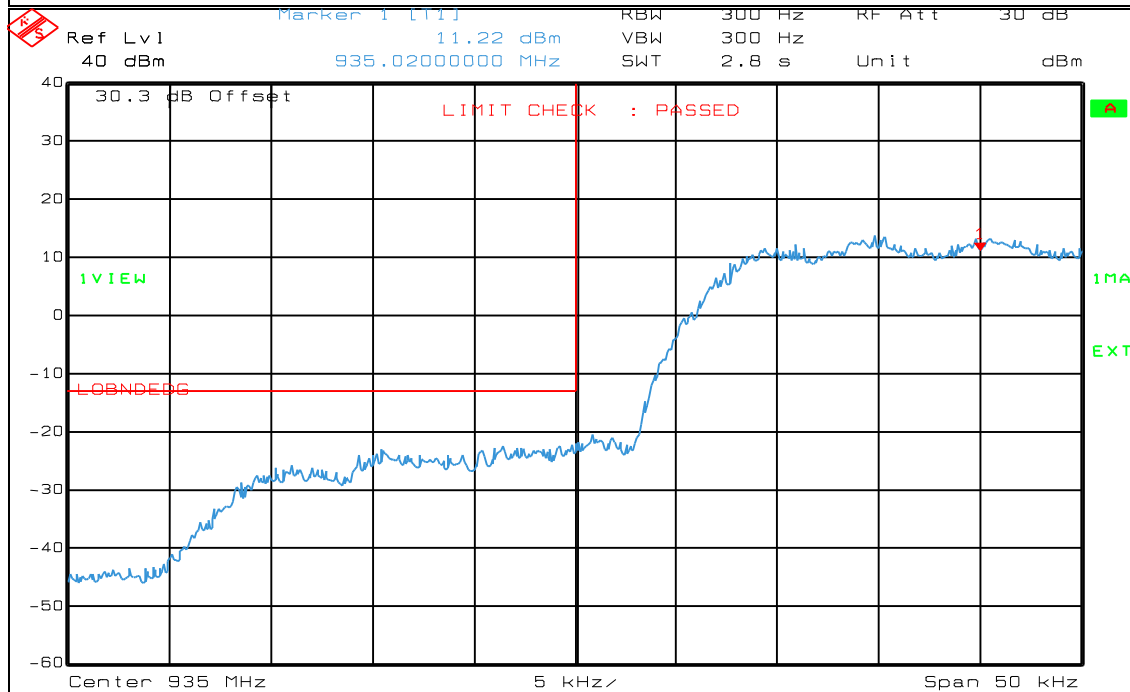
RBW: Refer to plots
VBW: Refer to plots

Complete X
Preliminary:

Measurement
Distance: NA m

Test Equipment Used

Antenna: Directional Coupler:
Pre-Amp: Cable #1: 1083
Filter: Cable #2:
Receiver: 1036 Cable #3:
Attenuator #1: 1064 Cable #4:
Attenuator #2: 1065 Mixer:
Additional equipment used:
Measurement Uncertainty: +/-1.7 dB



Date: 06.DEC.2002 14:52:24

Notes: LOWER BANDEDGE - QAM MODULATION
DOWNLINK
LOWEST PERMISSIBLE FREQ 935.02 MHz

EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

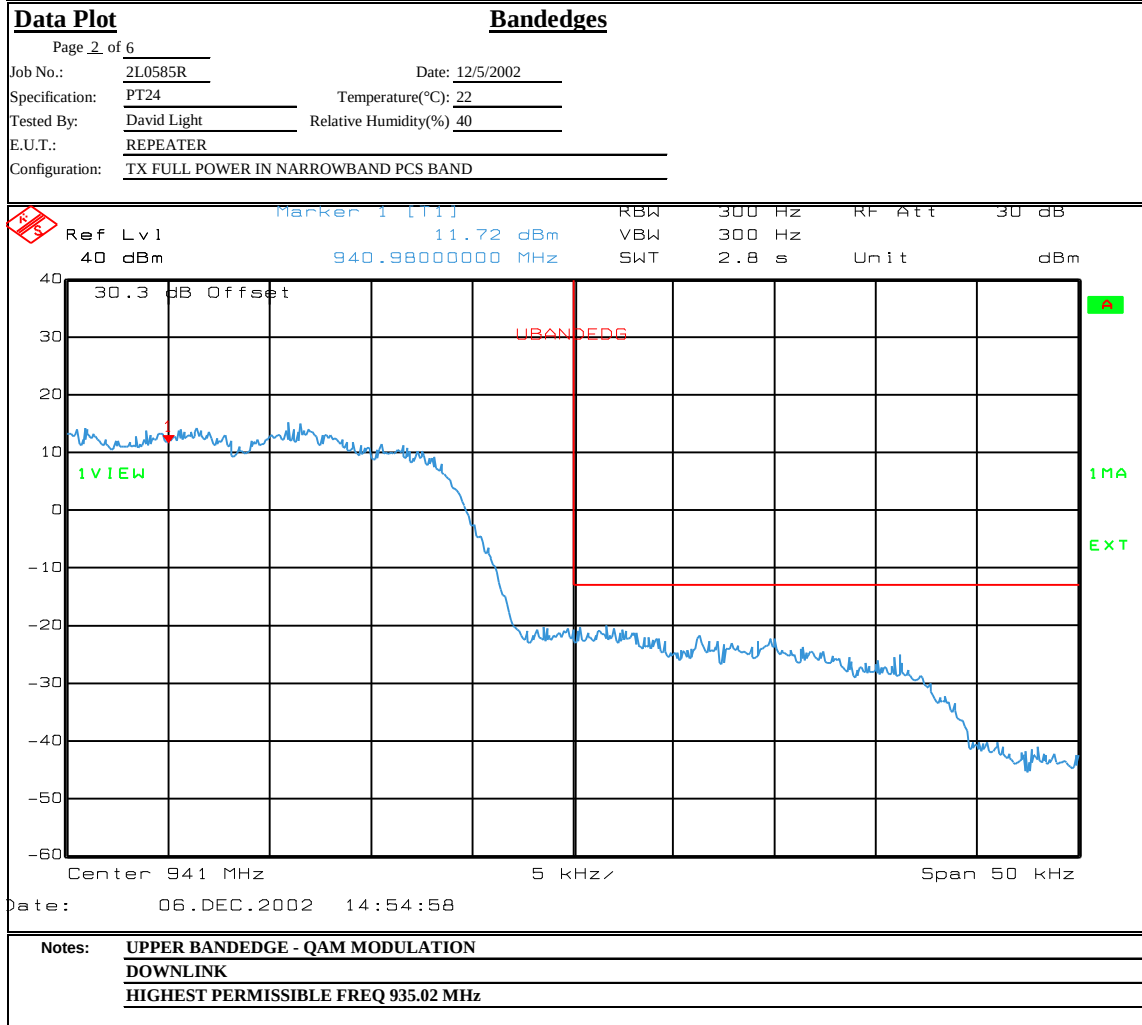
Part 24 Test data – Spurious Emissions at Antenna Terminals



Dallas Headquarters:

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

Nemko Dallas, Inc.



EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

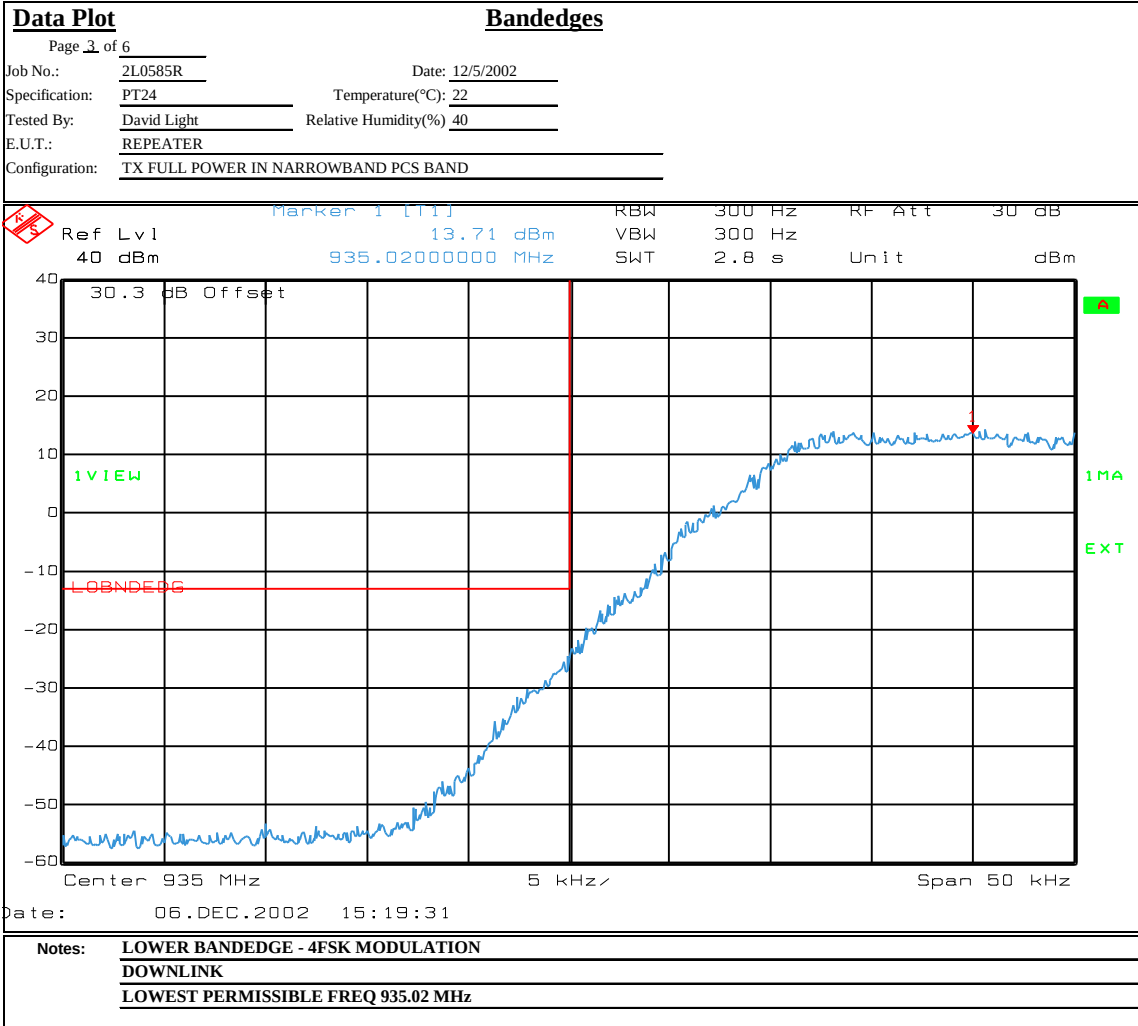
Part 24 Test data – Spurious Emissions at Antenna Terminals



Nemko Dallas, Inc.

Dallas Headquarters:

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



EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

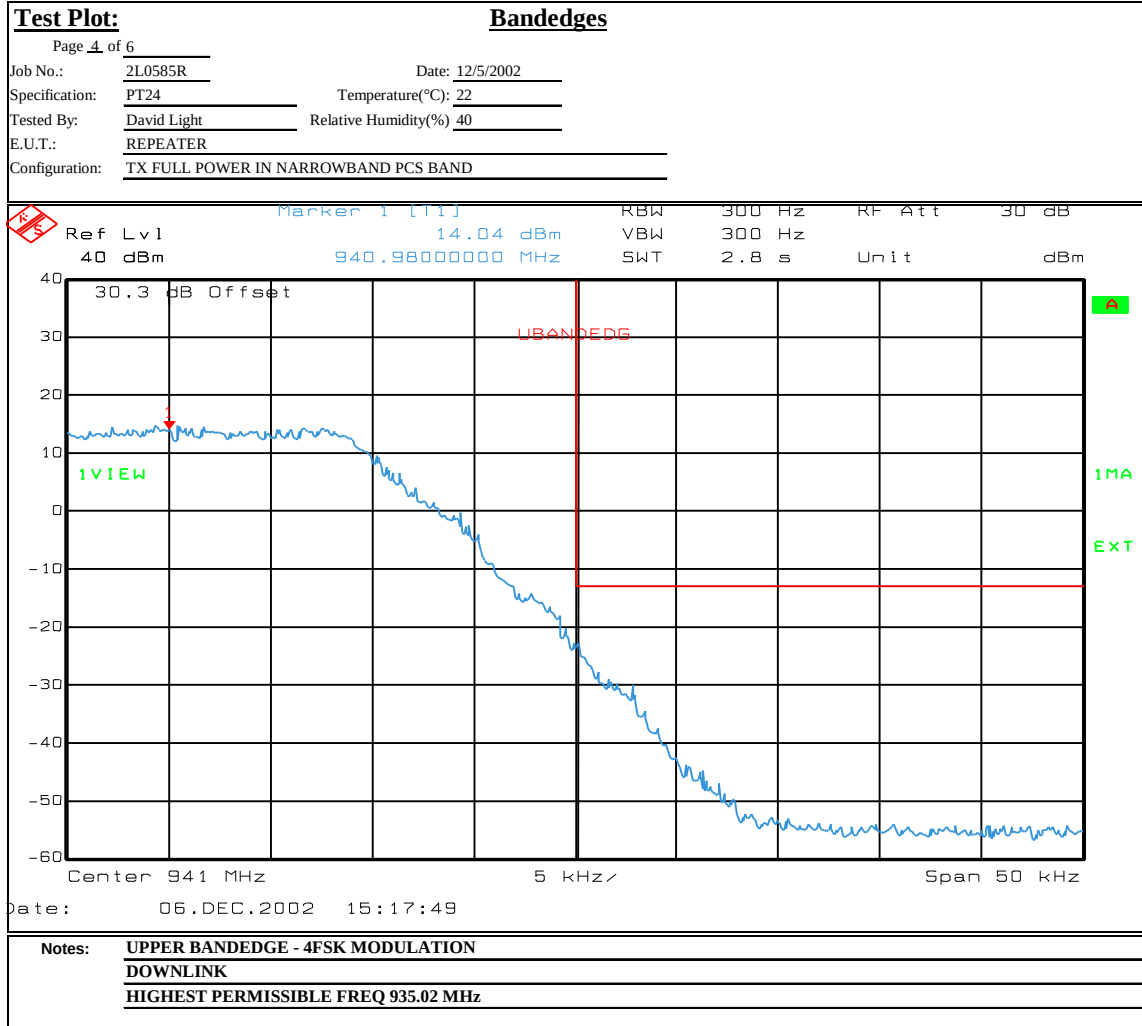
Part 24 Test data – Spurious Emissions at Antenna Terminals



Dallas Headquarters:

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

Nemko Dallas, Inc.



EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

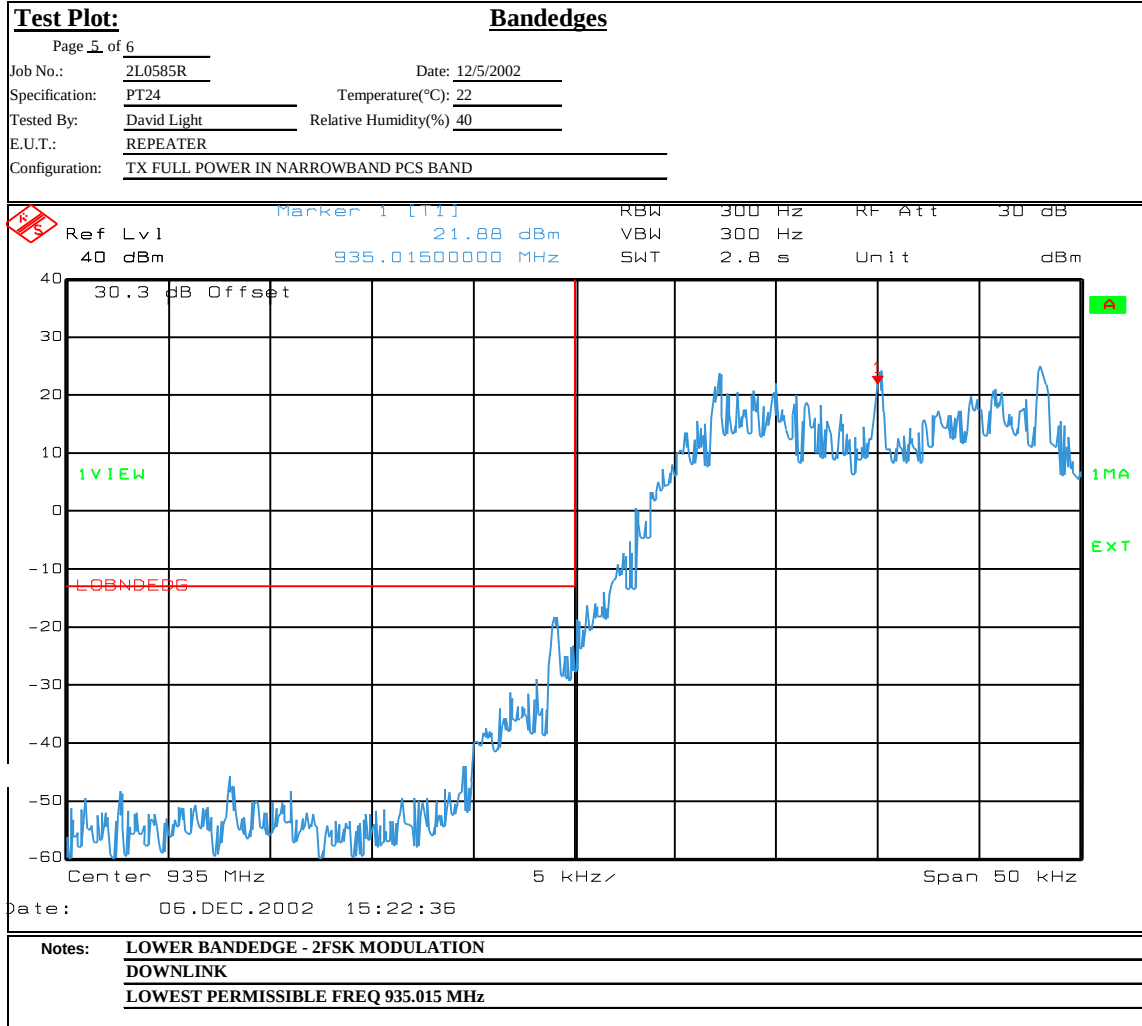
Part 24 Test data – Spurious Emissions at Antenna Terminals



Dallas Headquarters:

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

Nemko Dallas, Inc.



EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

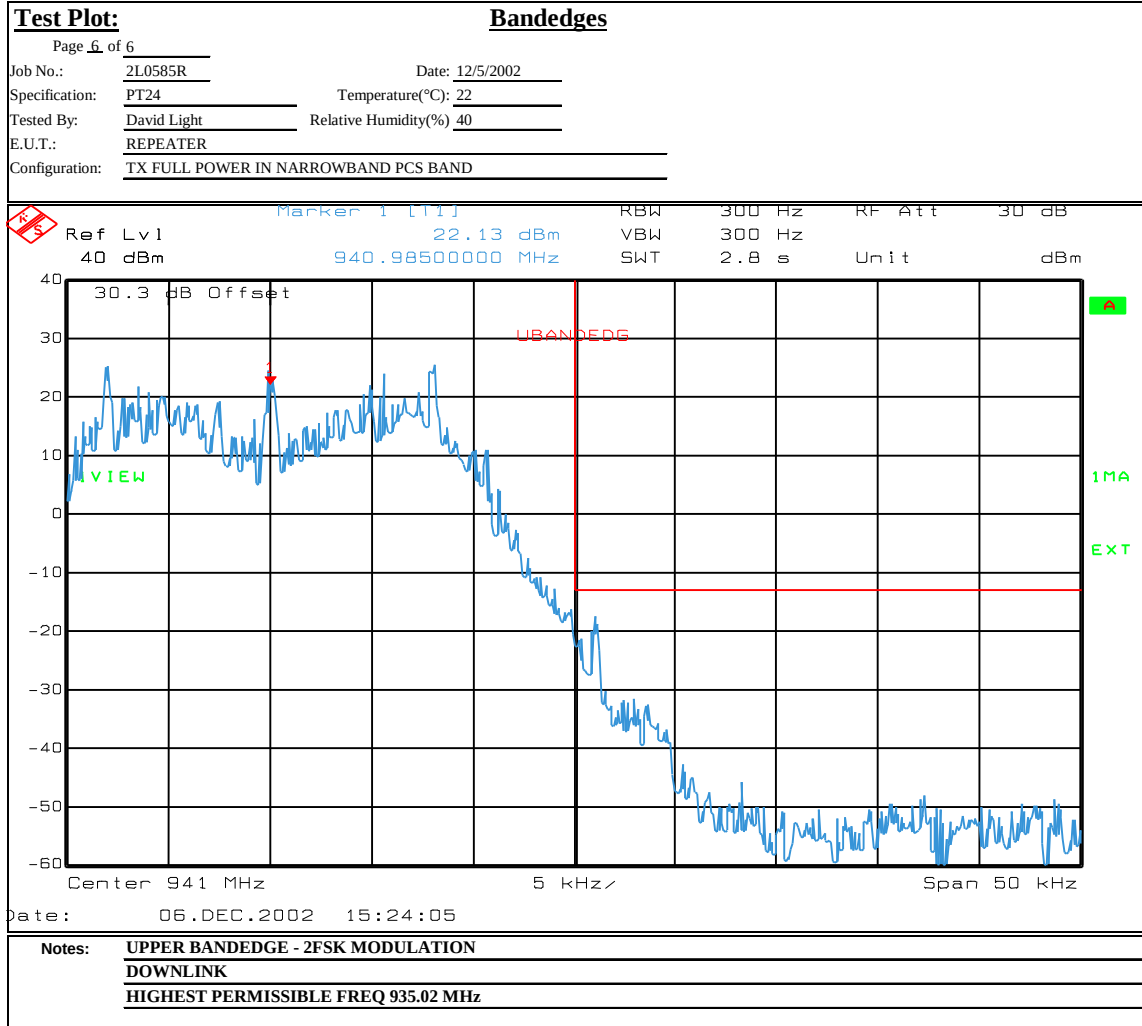
Part 24 Test data – Spurious Emissions at Antenna Terminals



Dallas Headquarters:

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

Nemko Dallas, Inc.



EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

Part 24 Test data – Spurious Emissions at Antenna Terminals



Nemko Dallas, Inc.

Dallas Headquarters:

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

Data Plot

Page 1 of 6

Job No.: 2L0585R Date: 12/5/2002
Specification: PT24 Temperature(°C): 22
Tested By: David Light Relative Humidity(%) 40
E.U.T.: REPEATER
Configuration: TX FULL POWER IN NARROWBAND PCS BAND
Sample Number: 1
Location: Lab 1
Detector Type: Peak

Bandedges

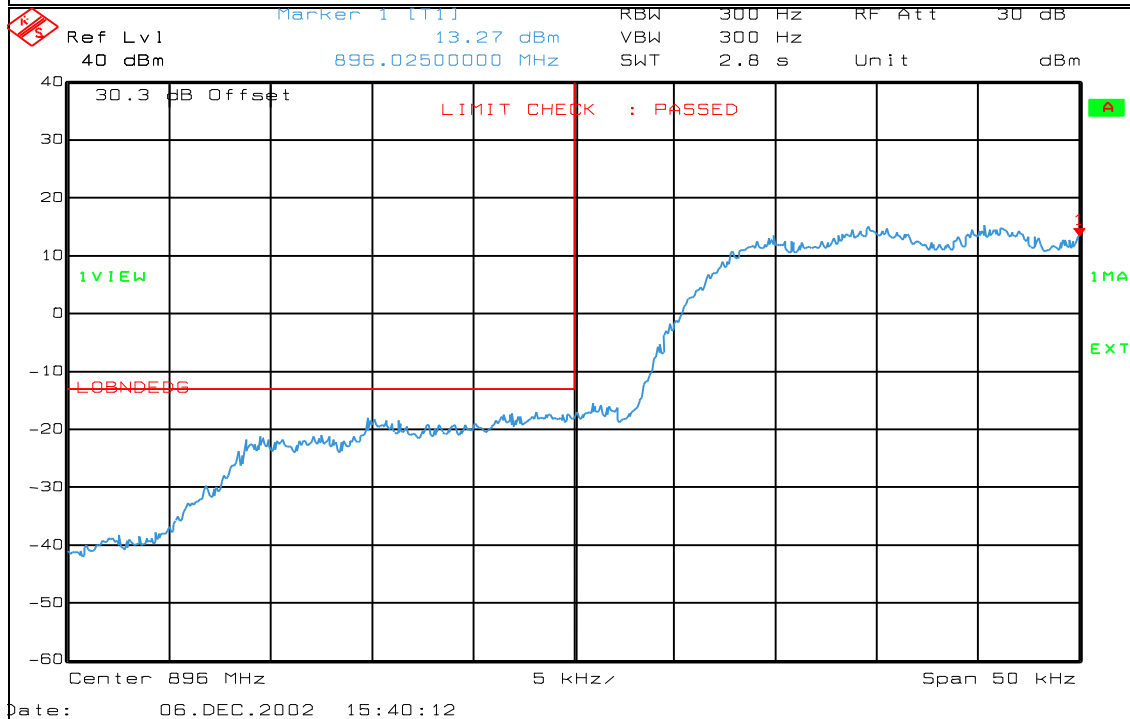
RBW: Refer to plots
VBW: Refer to plots

Complete X
Preliminary: _____

Measurement
Distance: NA m

Test Equipment Used

Antenna: _____ Directional Coupler: _____
Pre-Amp: _____ Cable #1: 1083
Filter: _____ Cable #2: _____
Receiver: 1036 Cable #3: _____
Attenuator #1: 1064 Cable #4: _____
Attenuator #2: 1065 Mixer: _____
Additional equipment used: _____
Measurement Uncertainty: +/-1.7 dB



Notes: LOWER BANDEDGE - QAM MODULATION
UPLINK
LOWEST PERMISSIBLE FREQ 896.02 MHz

EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

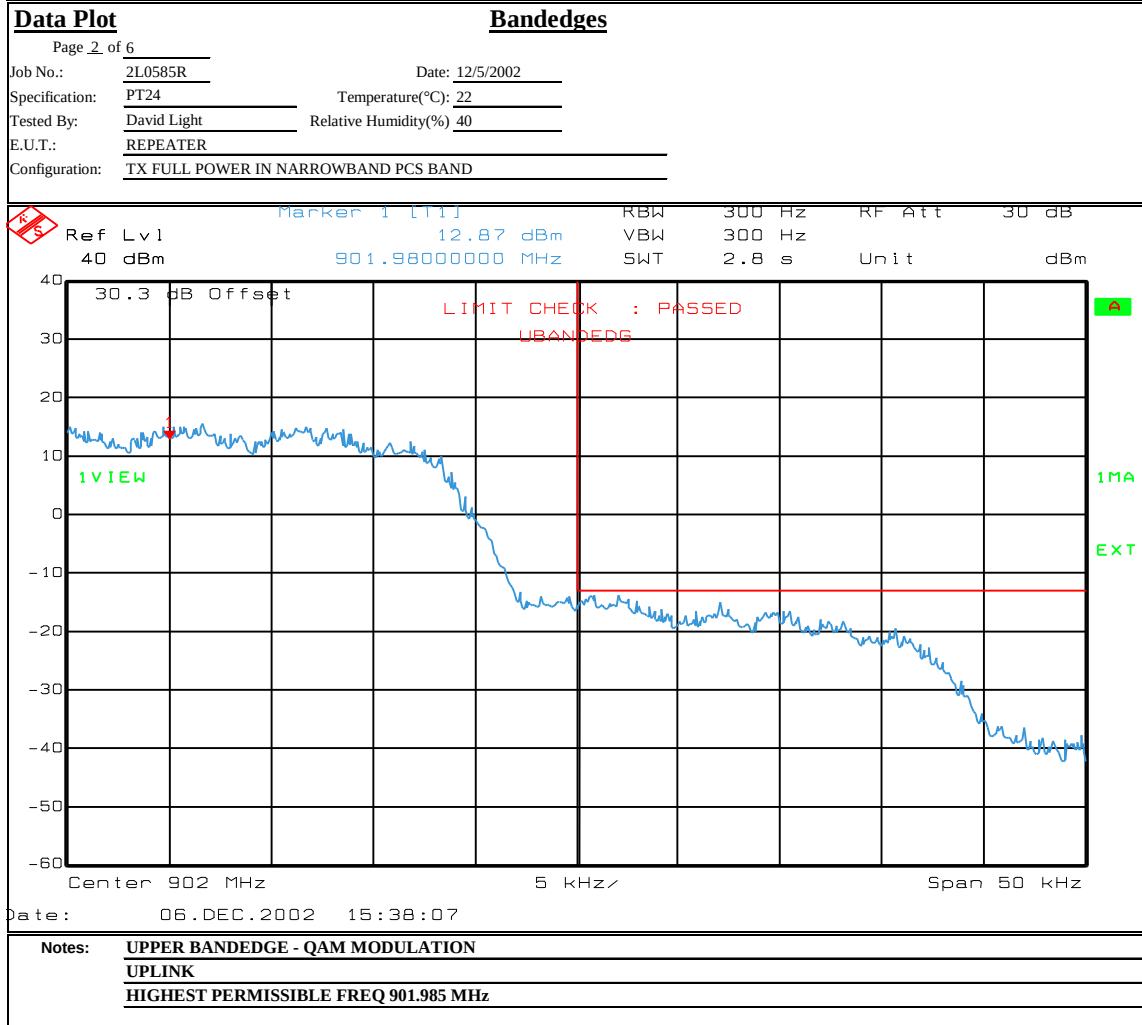
Part 24 Test data – Spurious Emissions at Antenna Terminals



Dallas Headquarters:

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

Nemko Dallas, Inc.



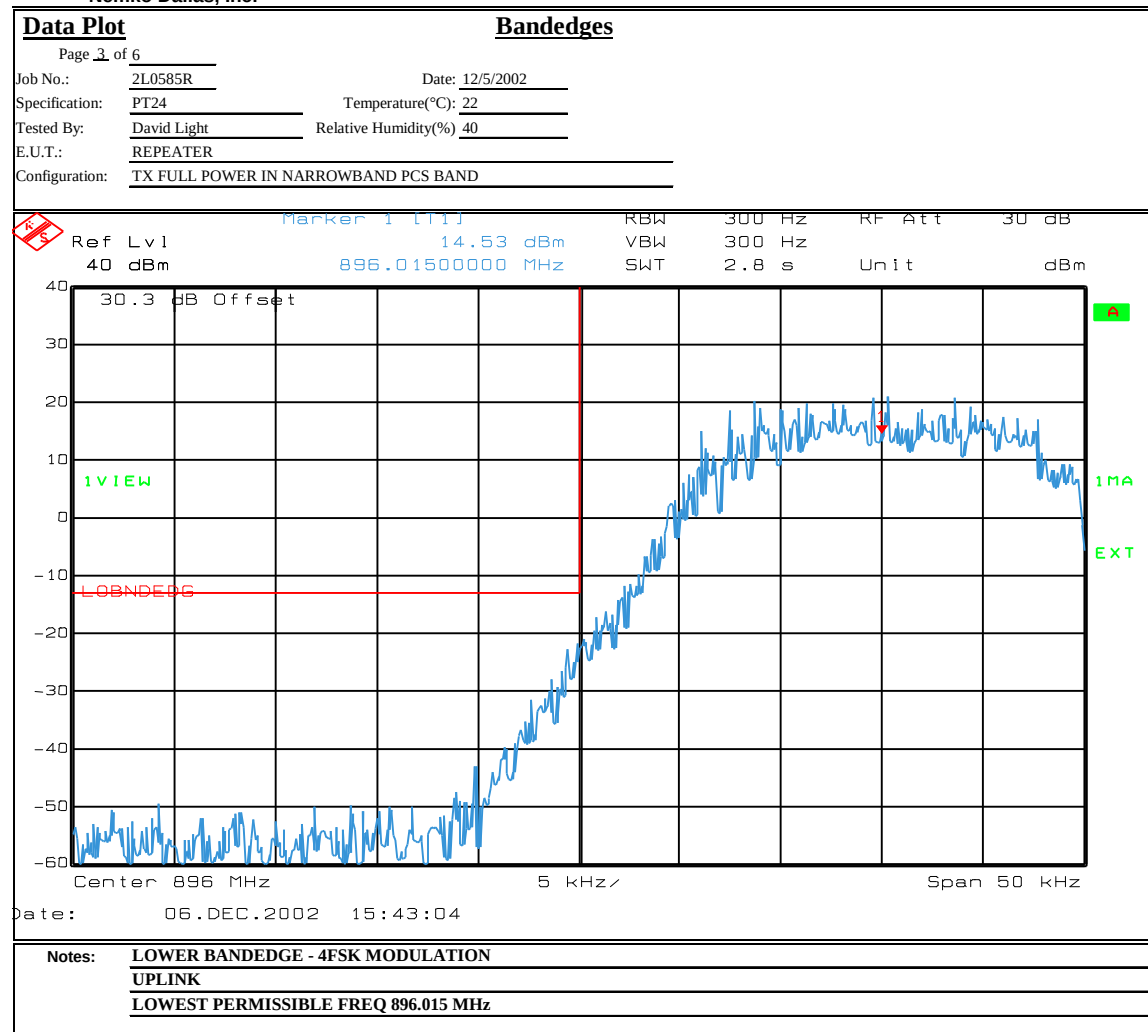
Part 24 Test data – Spurious Emissions at Antenna Terminals



Nemko Dallas, Inc.

Dallas Headquarters:

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



EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

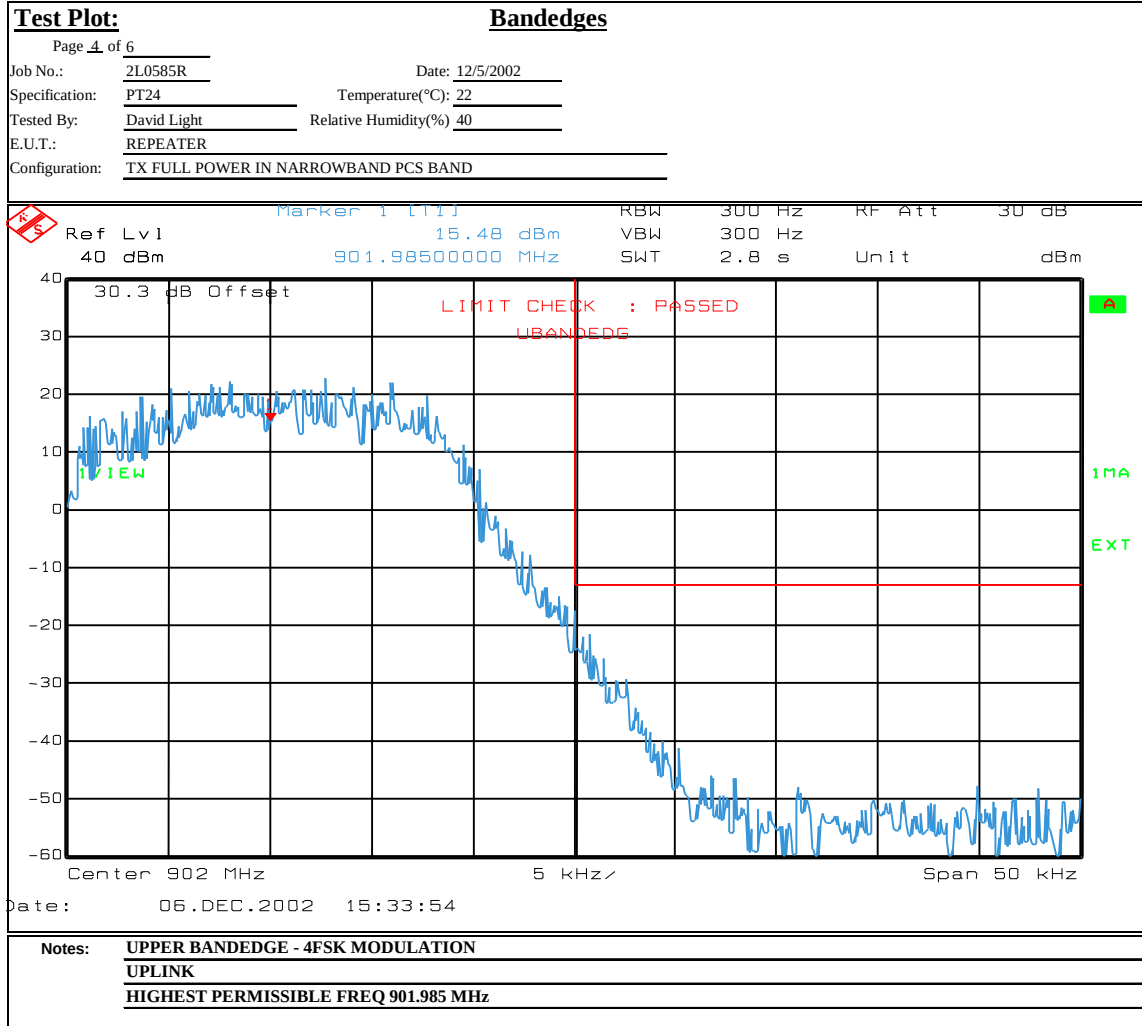
Part 24 Test data – Spurious Emissions at Antenna Terminals



Dallas Headquarters:

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

Nemko Dallas, Inc.



EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

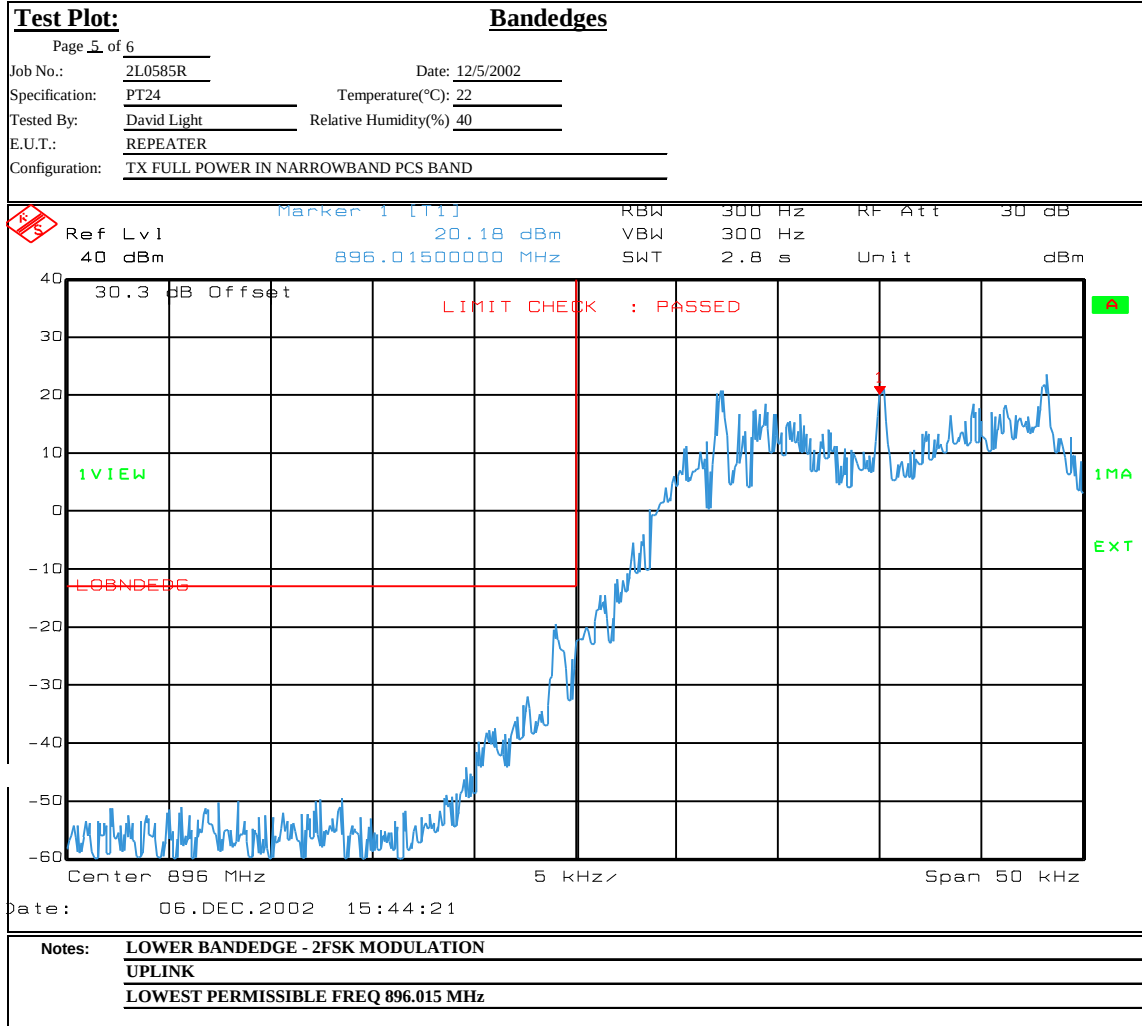
Part 24 Test data – Spurious Emissions at Antenna Terminals



Dallas Headquarters:

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

Nemko Dallas, Inc.



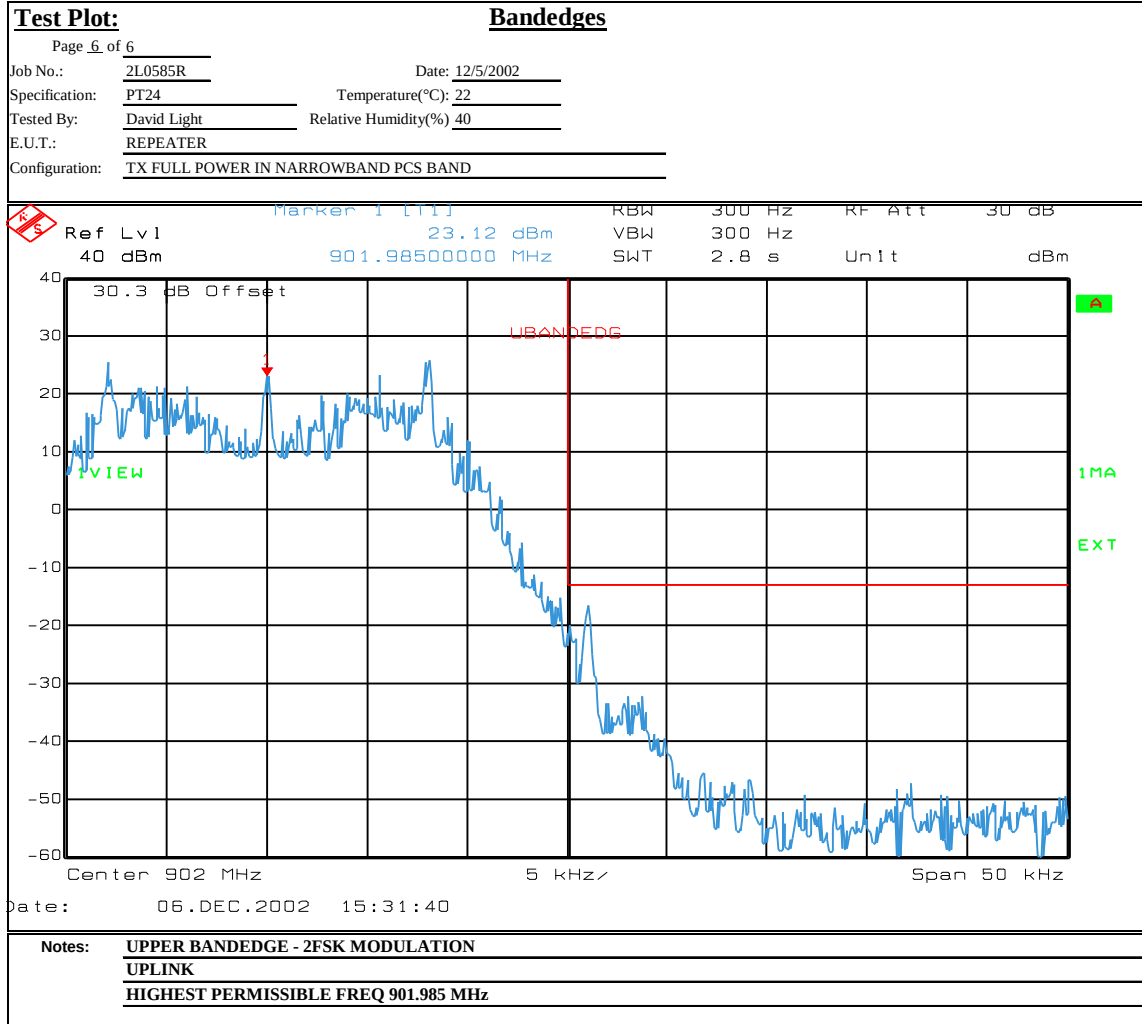
Part 24 Test data – Spurious Emissions at Antenna Terminals



Dallas Headquarters:

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

Nemko Dallas, Inc.



EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

Part 24 Test data – Spurious Emissions at Antenna Terminals



Nemko Dallas, Inc.

Dallas Headquarters:

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

Data Plot		Intermodulation Characteristics	
Page 1 of 4		Complete ☒ Preliminary ☐	
Job No.:	2L0585R	Date:	12/5/2002
Specification:	PT24	Temperature(°C):	22
Tested By:	David Light	Relative Humidity(%):	40
E.U.T.:	REPEATER		
Configuration:	TX FULL POWER IN NARROWBAND PCS BAND		
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:	1083
Filter:		Cable #2:	
Receiver:	1036	Cable #3:	
Attenuator #1:	1064	Cable #4:	
Attenuator #2:	1065	Mixer:	
Additional equipment used:			
Measurement Uncertainty: +/-1.7 dB			
Ref Lvl 40 dBm RBW 1 kHz VBW 1 kHz SWT 800 ms RF Att 30 dB Unit dBm 30.3 dB Offset 1 VIEW D1 -13 dBm 1MA Center 935 MHz 31.25 kHz Span 312.5 kHz			
Date: 06.DEC.2002 13:24:25			
Notes: LOWER BANDEDGE INTERMOD - FSK MODULATION DOWNLINK			

EQUIPMENT: BDA-PS9-1/1W-60-A

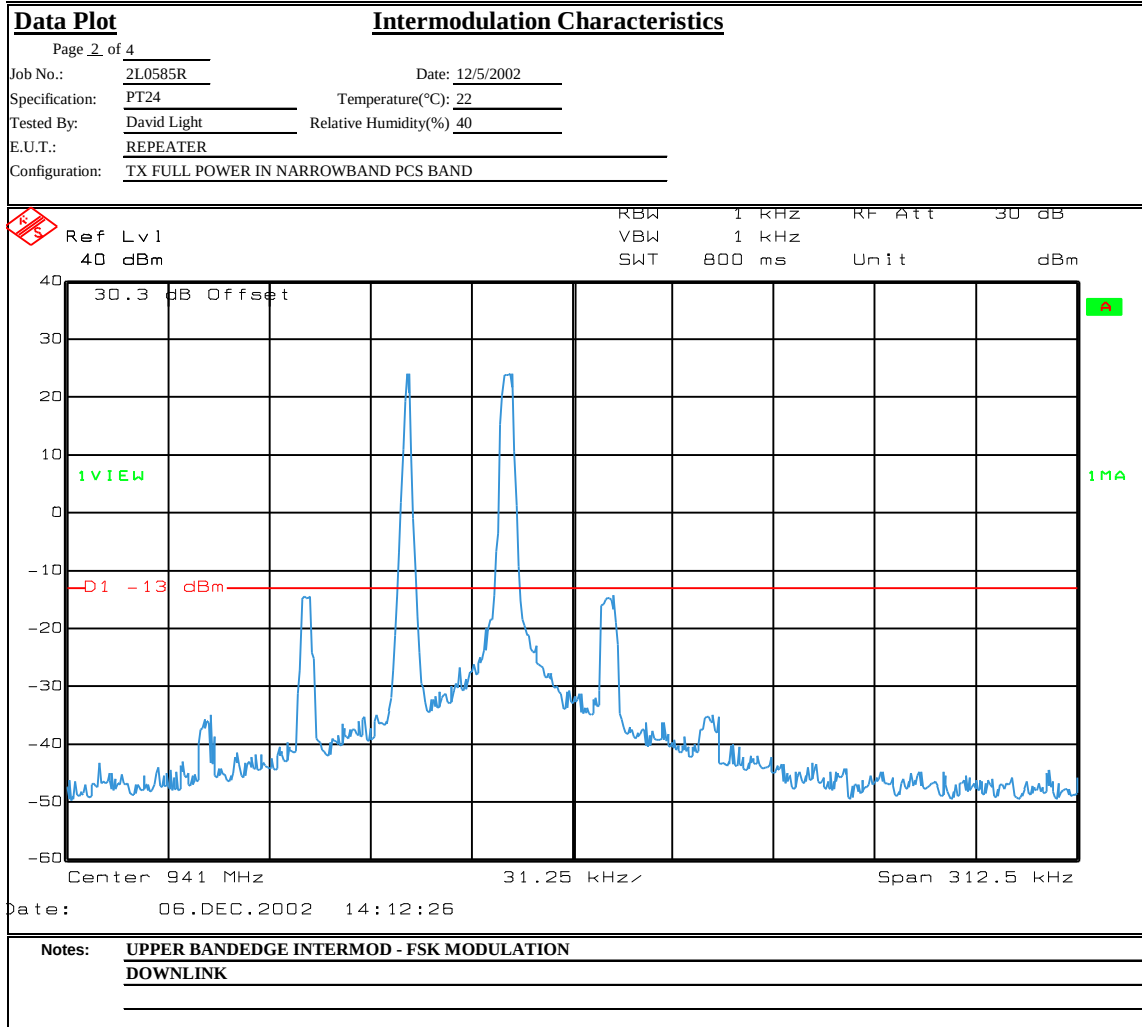
PROJECT NO.: 2L0584RUS2

Part 24 Test data – Spurious Emissions at Antenna Terminals



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

Nemko Dallas, Inc.



EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

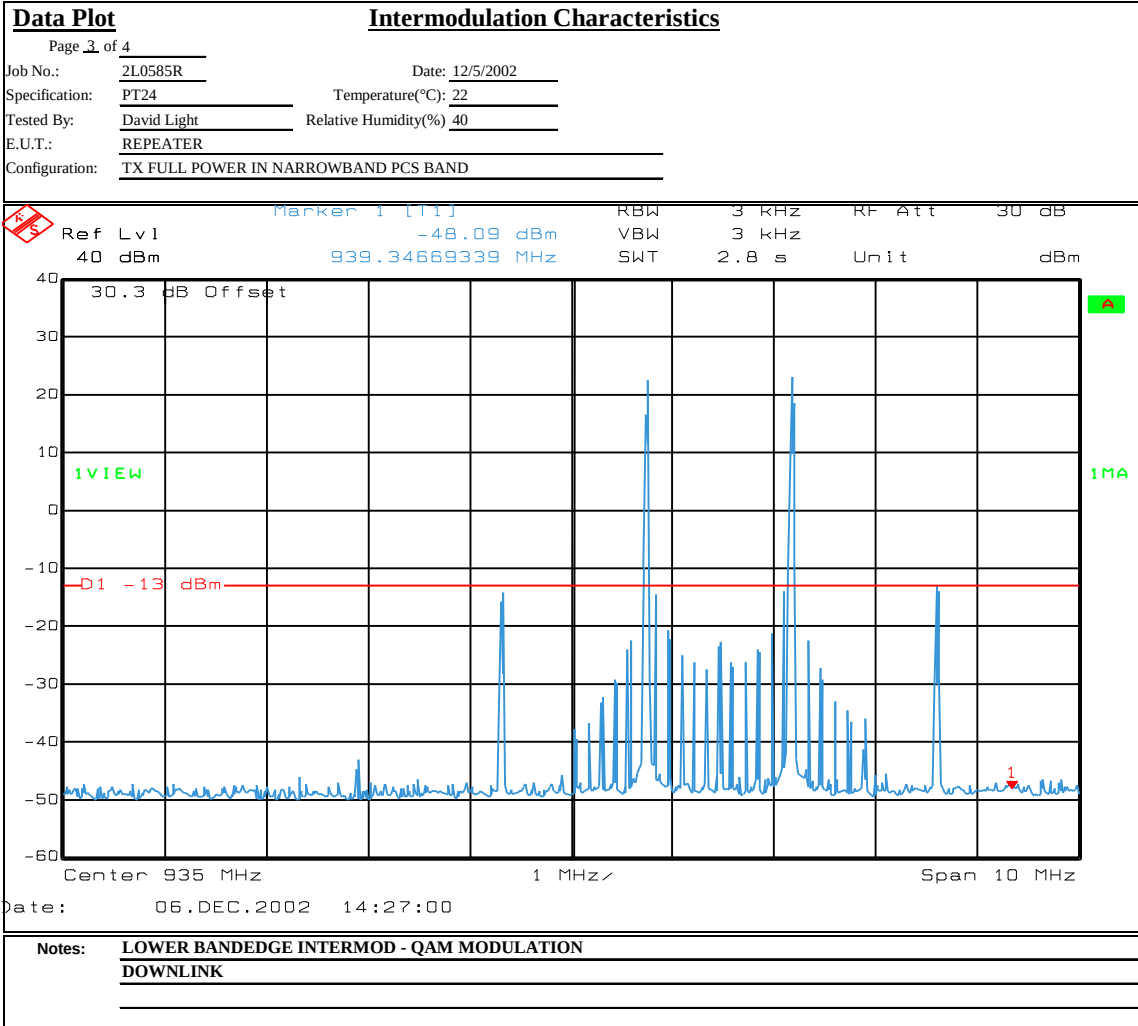
Part 24 Test data – Spurious Emissions at Antenna Terminals



Nemko Dallas, Inc.

Dallas Headquarters:

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



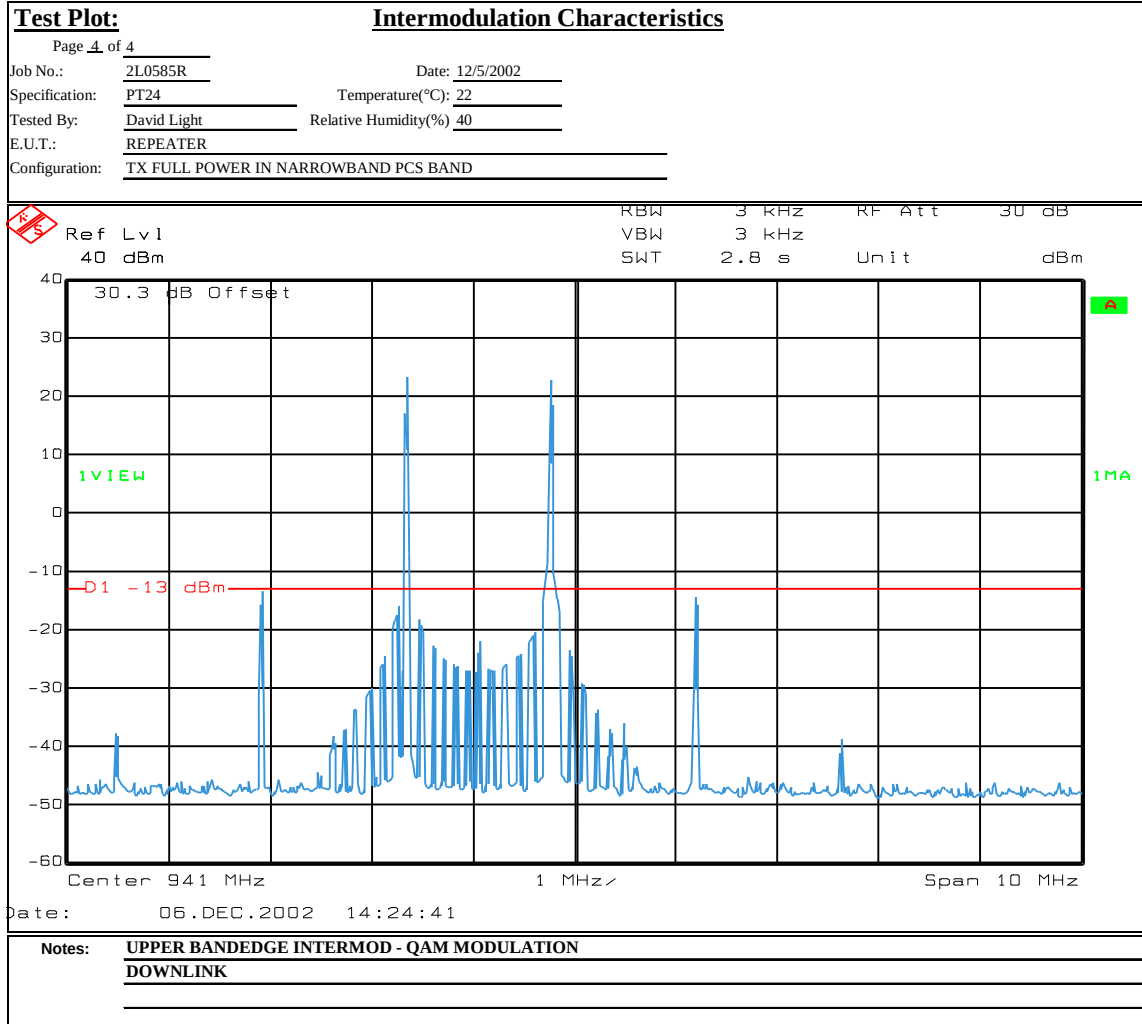
Part 24 Test data – Spurious Emissions at Antenna Terminals



Dallas Headquarters:

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

Nemko Dallas, Inc.



EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

Part 24 Test data – Spurious Emissions at Antenna Terminals



Nemko Dallas, Inc.

Dallas Headquarters:

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

Data Plot

Page 1 of 4

Job No.: 2L0585R Date: 12/5/2002
Specification: PT24 Temperature(°C): 22
Tested By: David Light Relative Humidity(%) 40
E.U.T.: REPEATER
Configuration: TX FULL POWER IN NARROWBAND PCS BAND
Sample Number: 1
Location: Lab 1
Detector Type: Peak

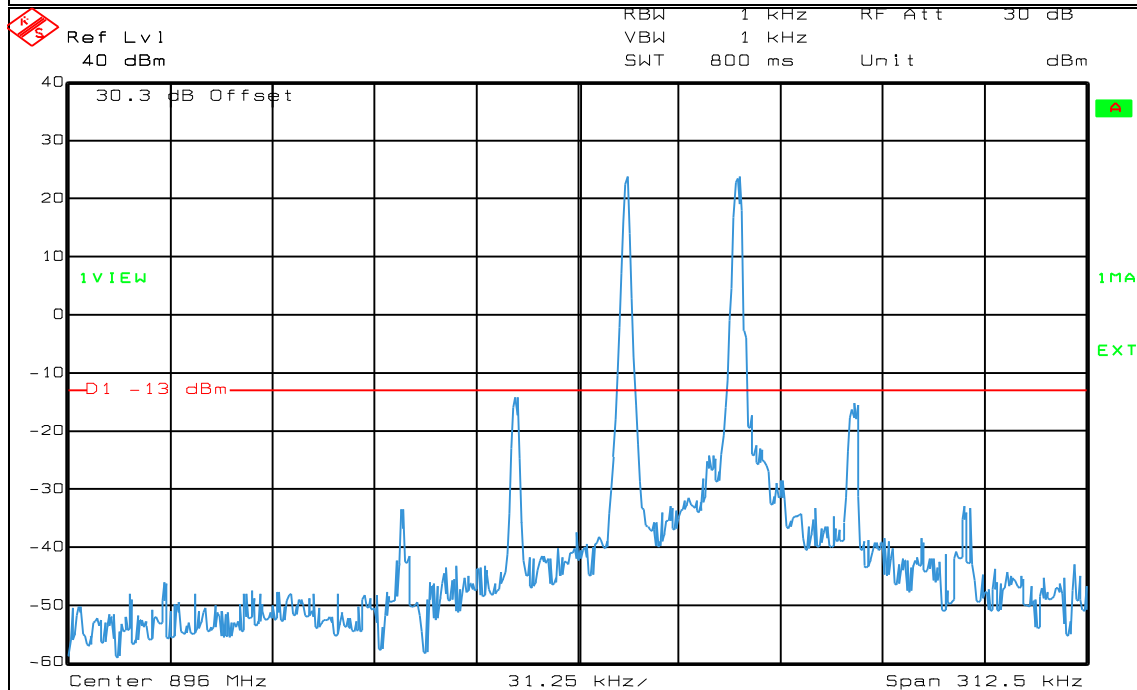
Complete X
Preliminary:

RBW: Refer to plots
VBW: Refer to plots

Measurement
Distance: NA m

Test Equipment Used

Antenna: Directional Coupler:
Pre-Amp: Cable #1: 1083
Filter: Cable #2:
Receiver: 1036 Cable #3:
Attenuator #1: 1064 Cable #4:
Attenuator #2: 1065 Mixer:
Additional equipment used:
Measurement Uncertainty: +/-1.7 dB



Date: 06.DEC.2002 16:03:49

Notes: LOWER BANDEDGE INTERMOD - FSK MODULATION
UPLINK

EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

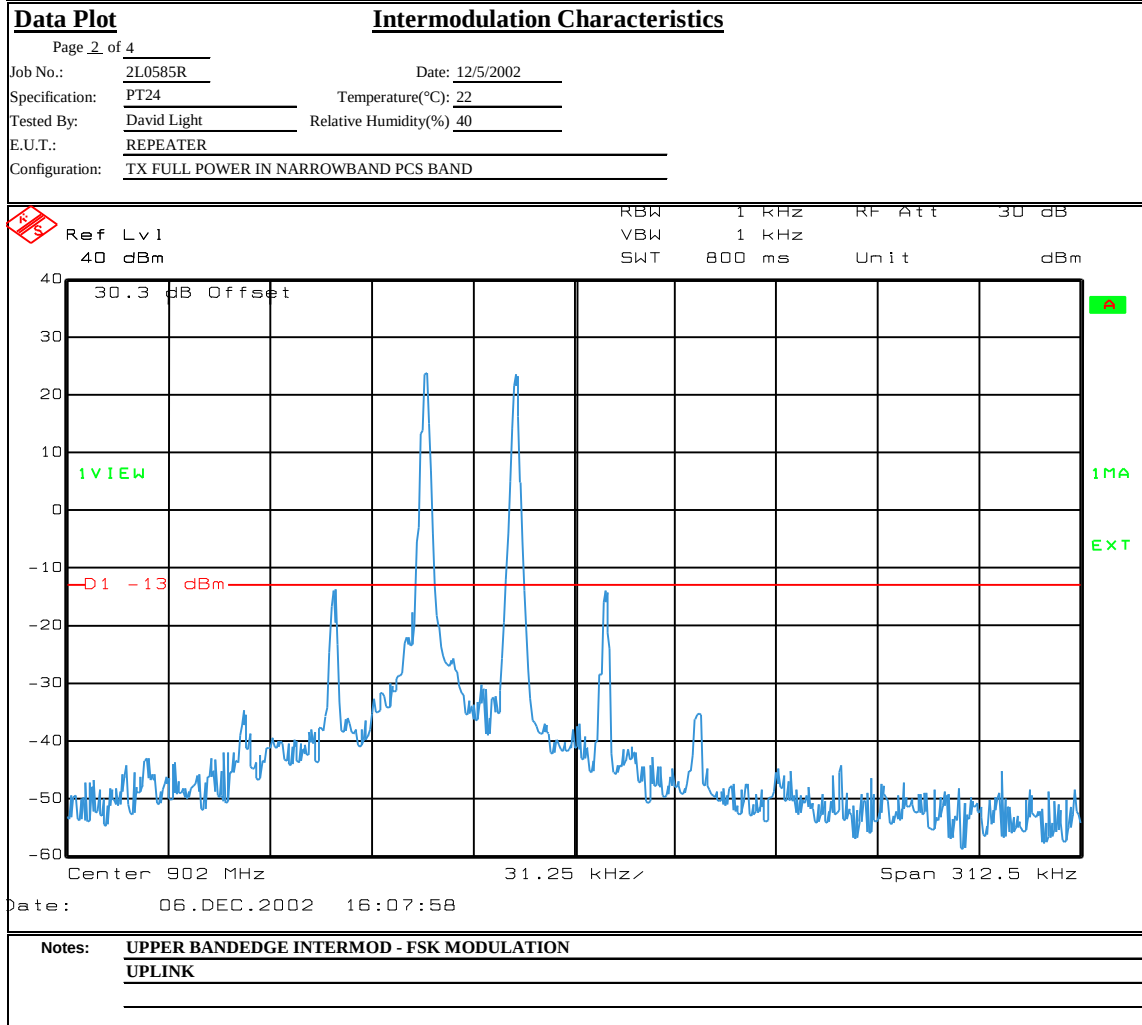
Part 24 Test data – Spurious Emissions at Antenna Terminals



Dallas Headquarters:

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

Nemko Dallas, Inc.



EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

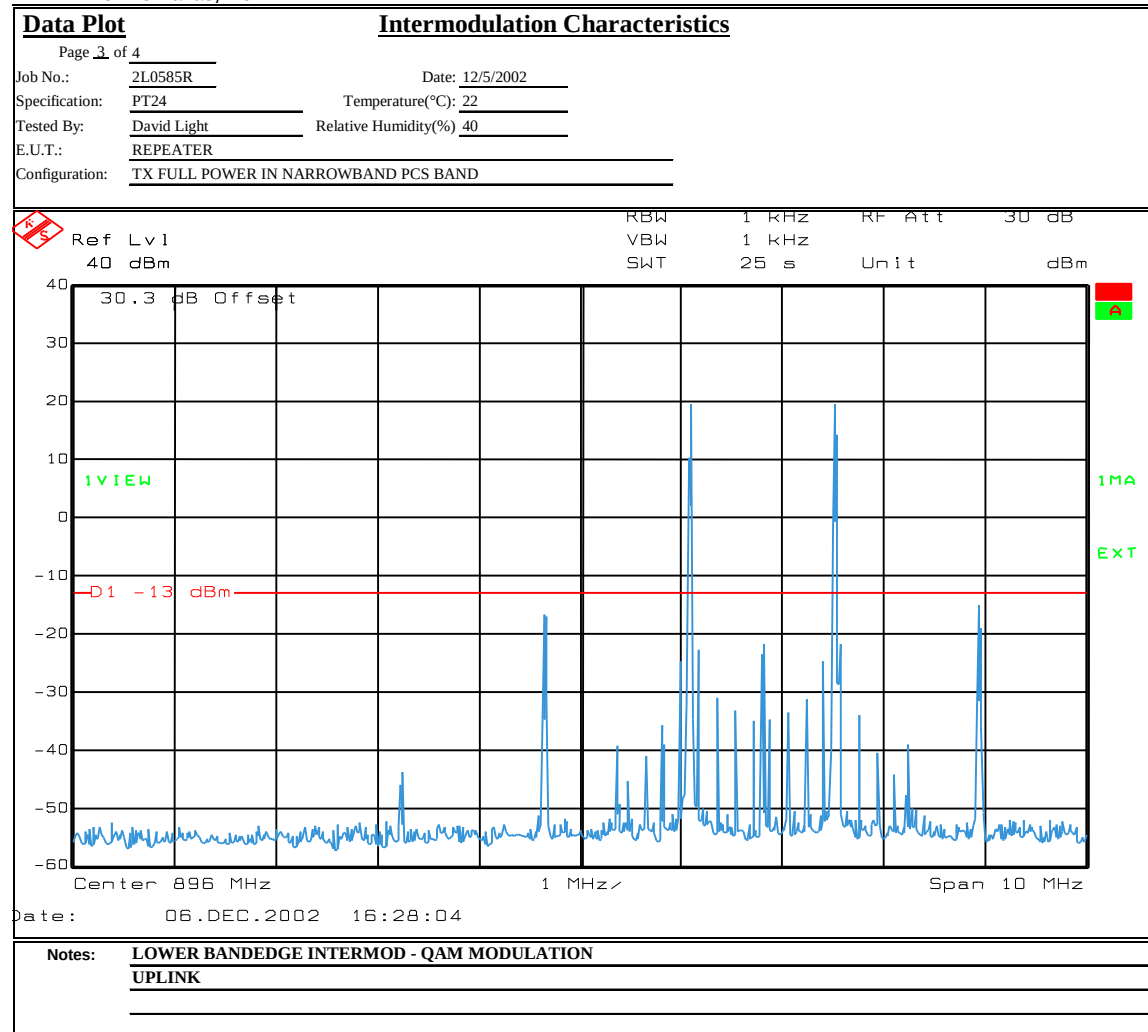
Part 24 Test data – Spurious Emissions at Antenna Terminals



Nemko Dallas, Inc.

Dallas Headquarters:

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



EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

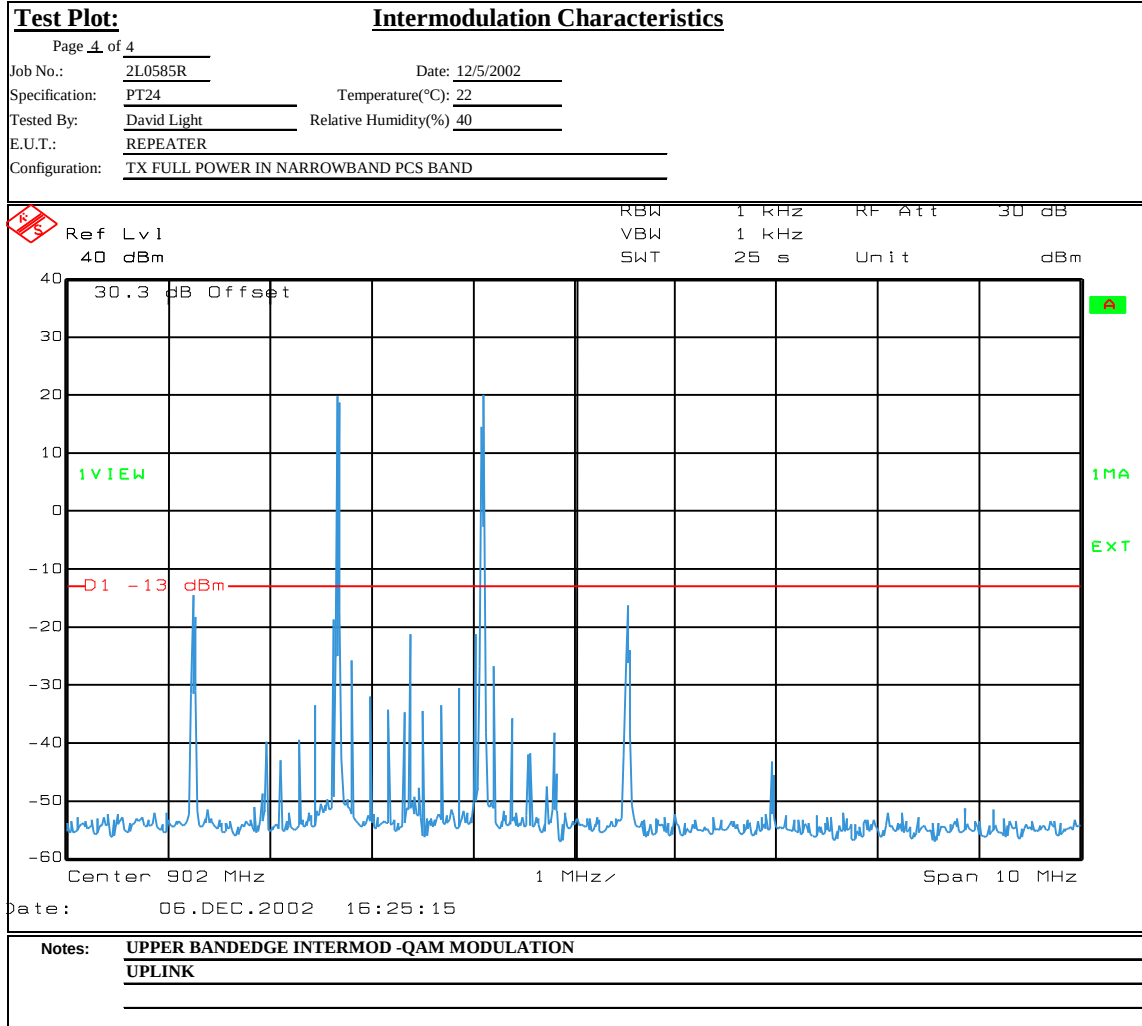
Part 24 Test data – Spurious Emissions at Antenna Terminals



Dallas Headquarters:

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

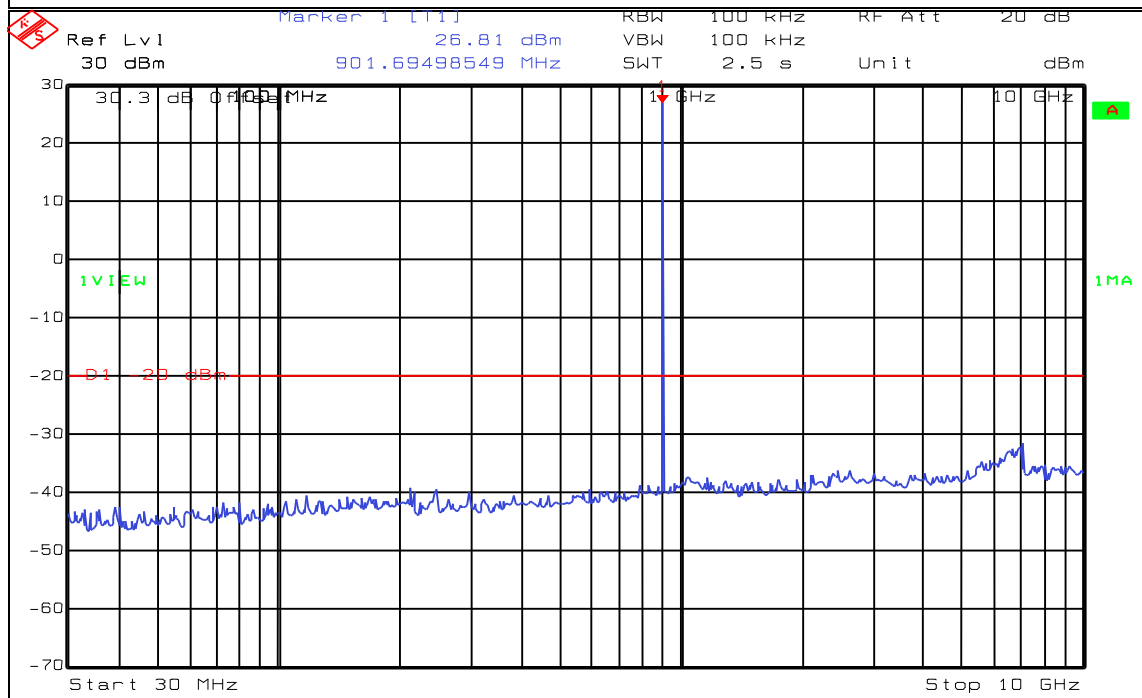
Nemko Dallas, Inc.



EQUIPMENT: BDA-PS9-1/1W-60-A

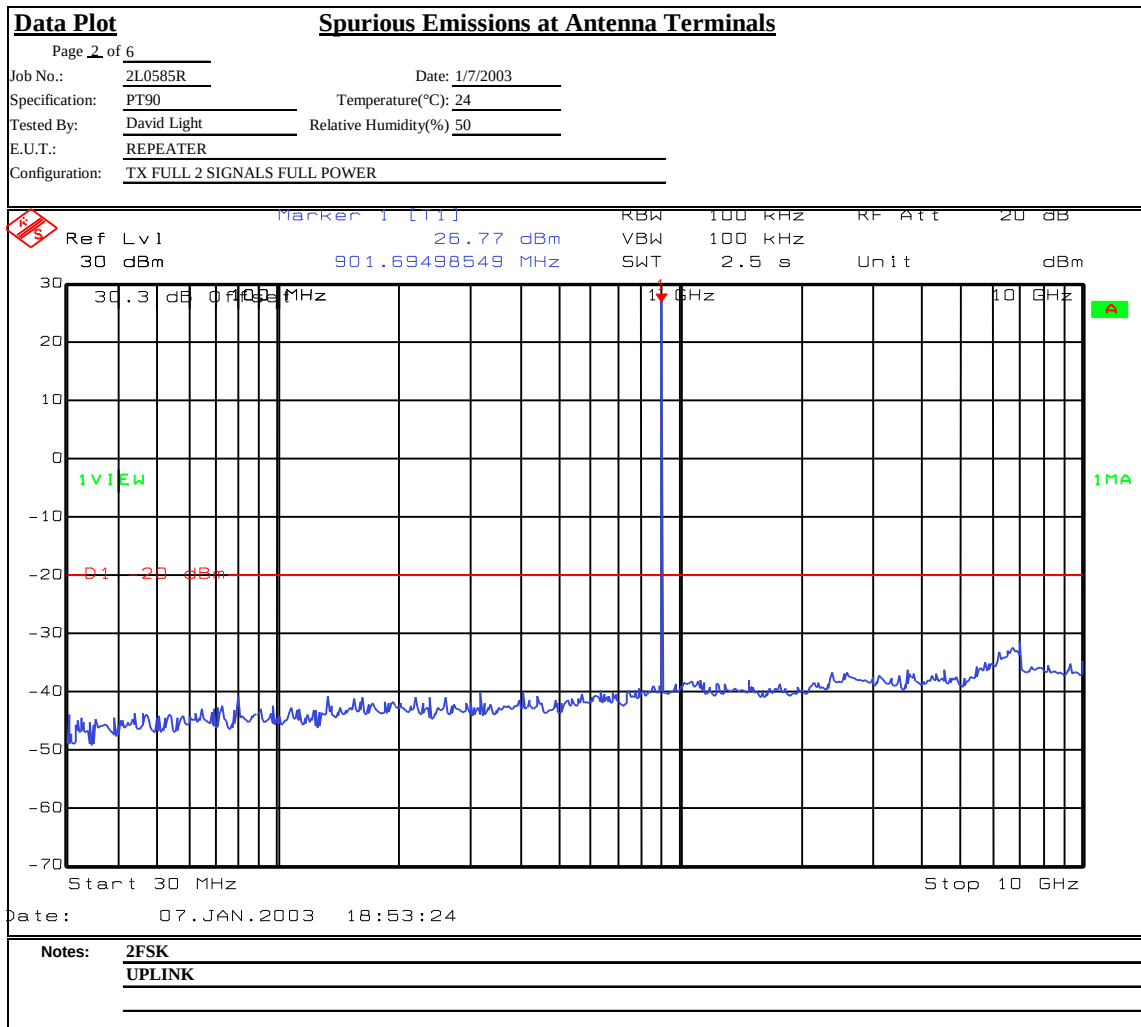
PROJECT NO.: 2L0584RUS2

Part 90 Test data – Spurious Emissions at Antenna Terminals

Data Plot		Spurious Emissions at Antenna Terminals	
Page <u>1</u> of <u>6</u>		Complete <u>X</u>	
Job No.: 2L0585R	Date: <u>1/7/2003</u>	Preliminary: _____	
Specification: PT90	Temperature(°C): <u>24</u>		
Tested By: <u>David Light</u>	Relative Humidity(%): <u>50</u>		
E.U.T.: <u>REPEATER</u>			
Configuration: <u>TX FULL 2 SIGNALS FULL POWER</u>			
Sample Number: <u>1</u>			
Location: <u>Lab 1</u>	RBW: <u>Refer to plots</u>	Measurement	
Detector Type: <u>Peak</u>	VBW: <u>Refer to plots</u>	Distance: <u>NA</u> m	
Test Equipment Used			
Antenna: _____	Directional Coupler: _____		
Pre-Amp: _____	Cable #1: <u>1083</u>		
Filter: _____	Cable #2: _____		
Receiver: <u>1036</u>	Cable #3: _____		
Attenuator #1: <u>1064</u>	Cable #4: _____		
Attenuator #2: <u>1065</u>	Mixer: _____		
Additional equipment used: _____			
Measurement Uncertainty: <u>+/-1.7 dB</u>			
			
Date: <u>07.JAN.2003 18:52:48</u>			
Notes: <u>4FSK</u>			
<u>UPLINK</u>			

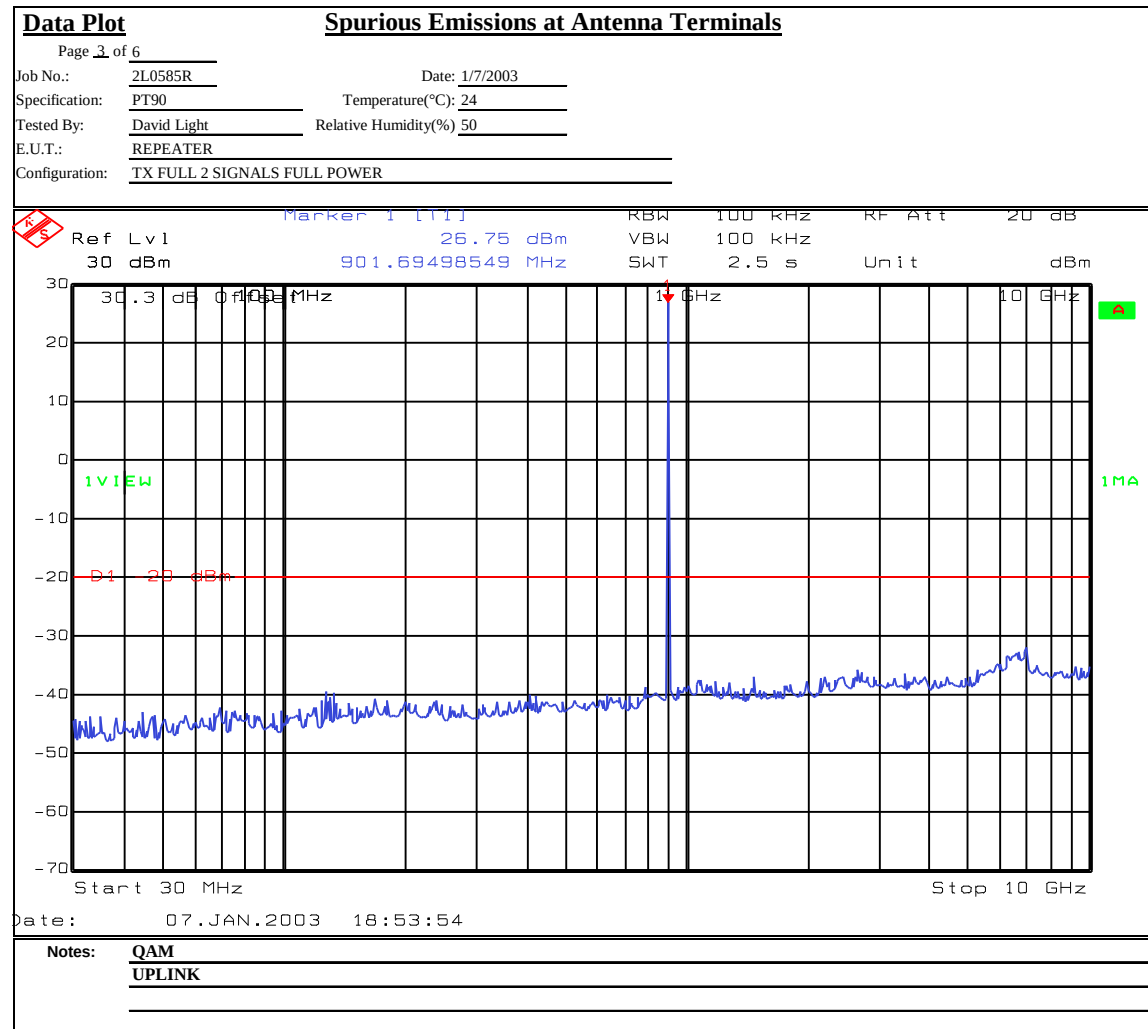
EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2



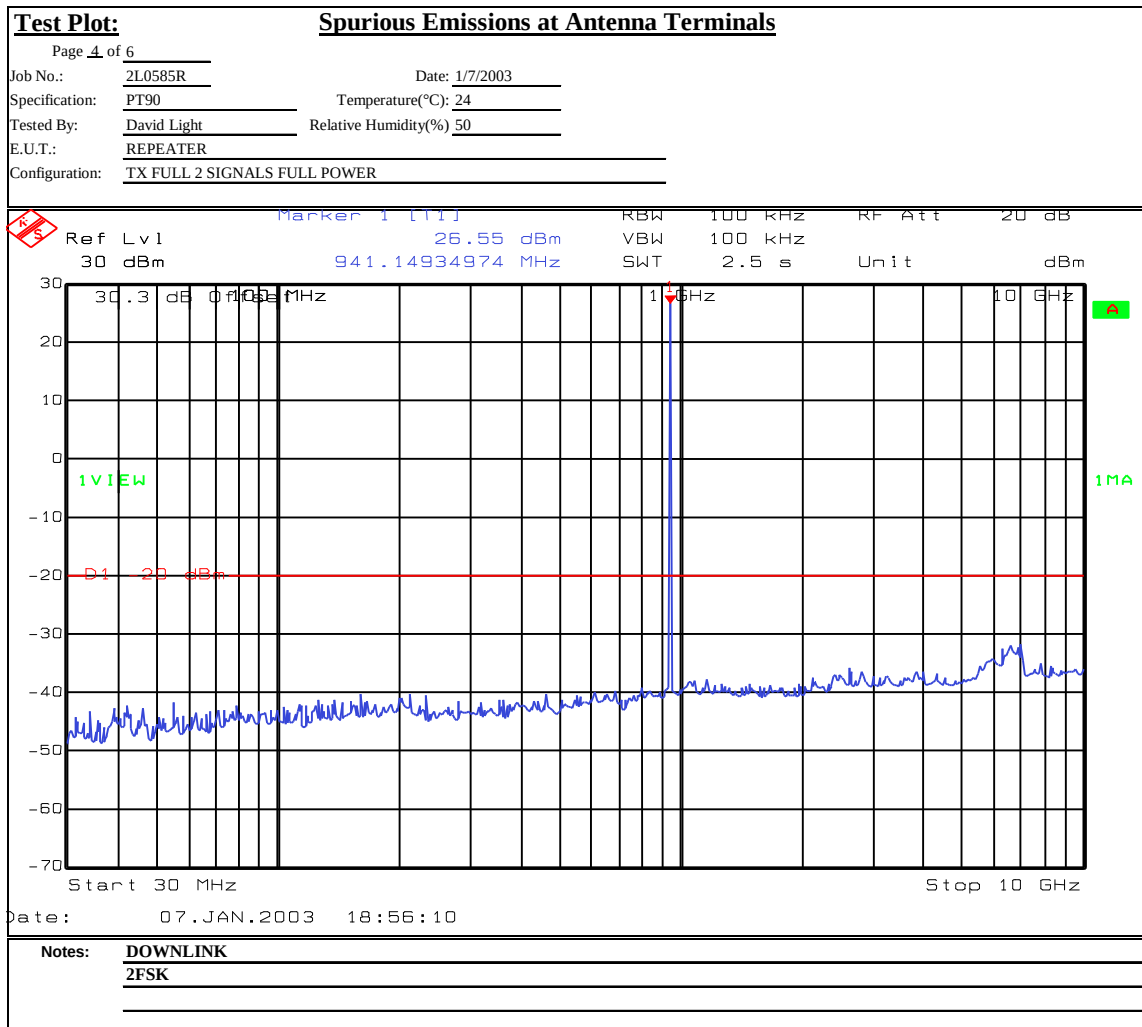
EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2



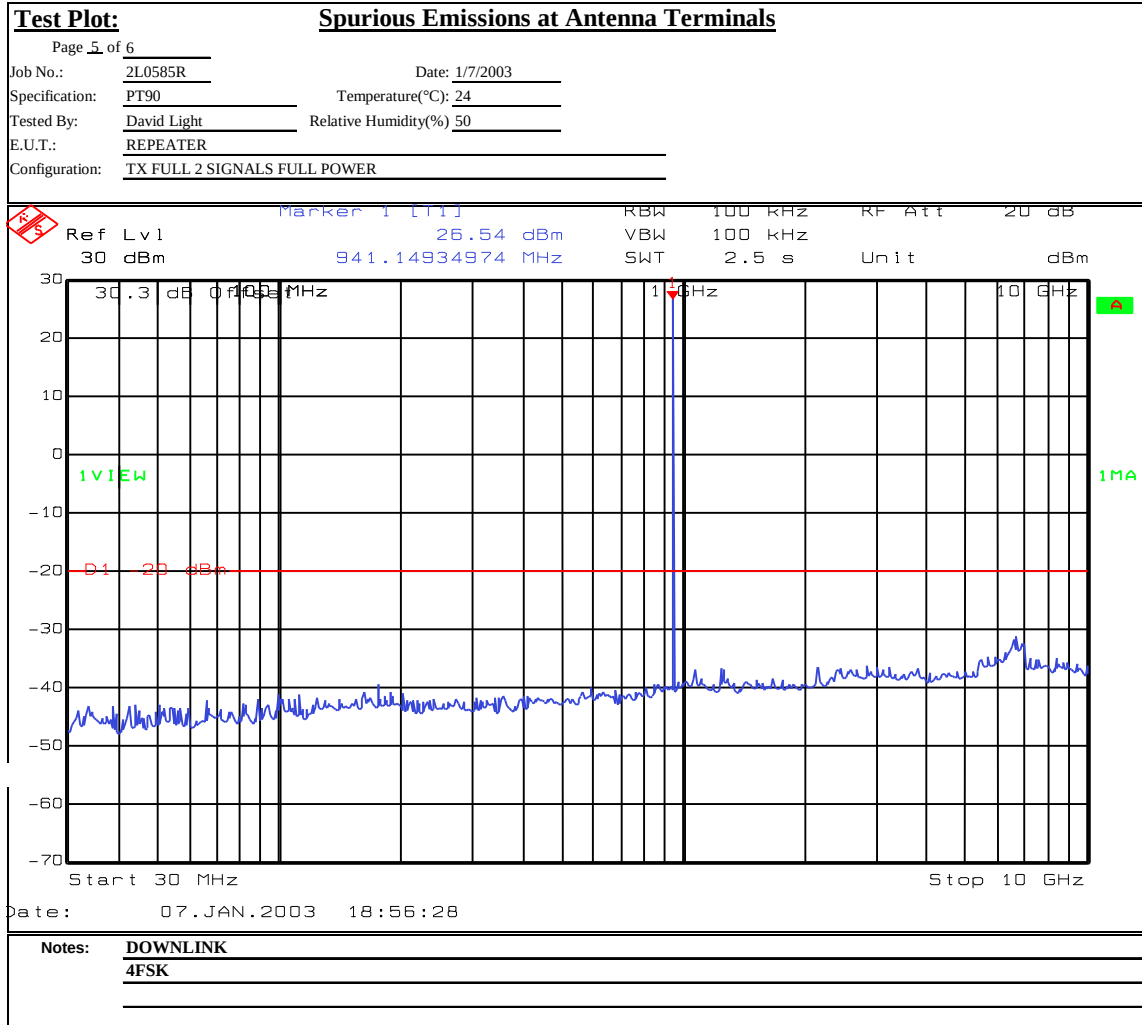
EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2



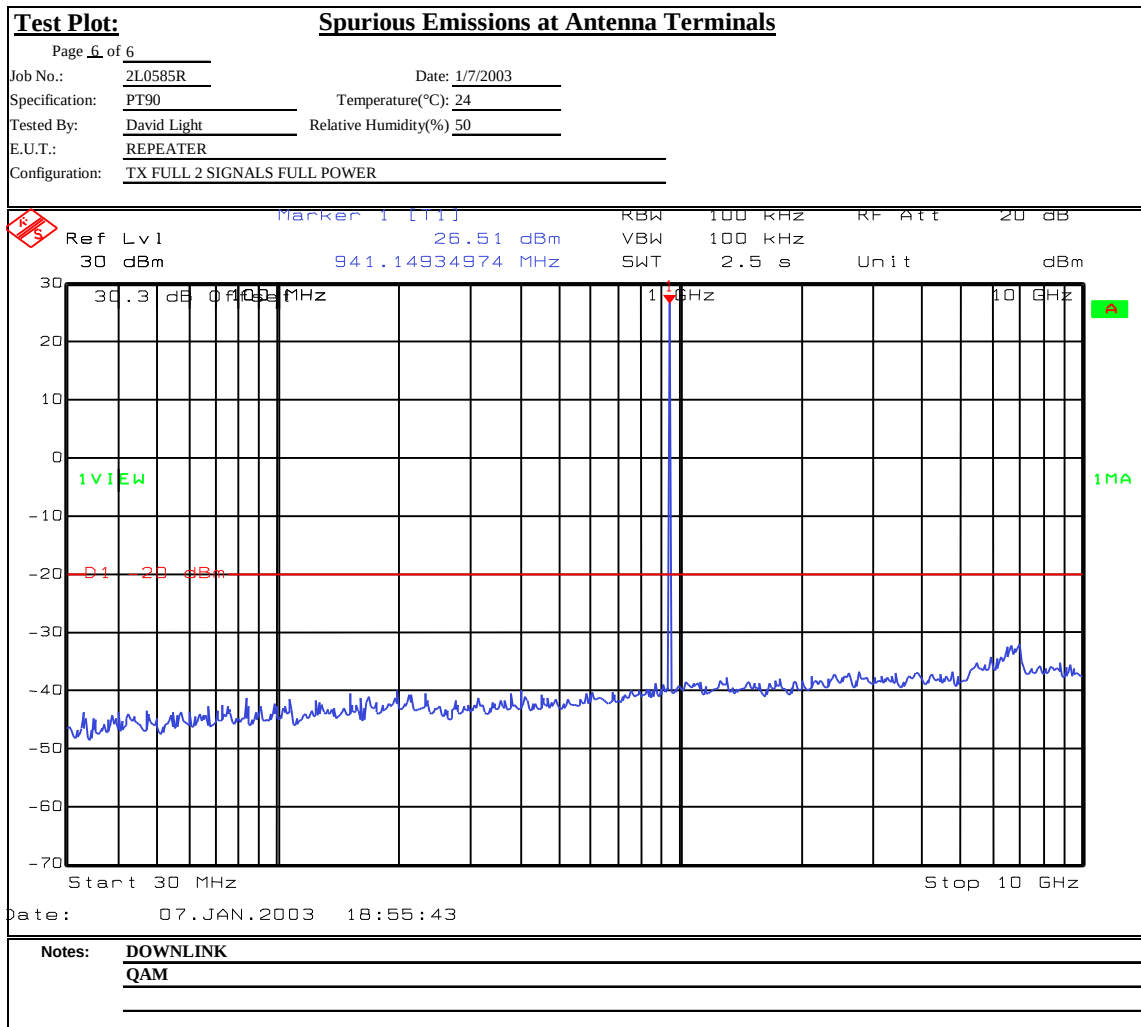
EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2



EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2



EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

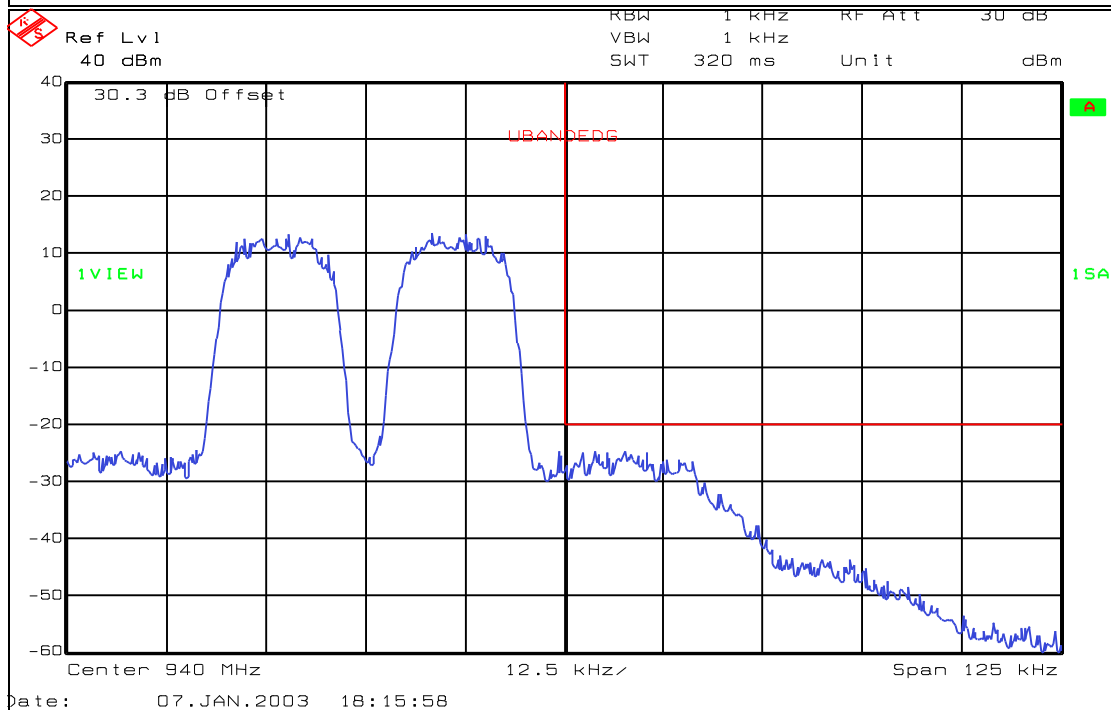
Data Plot

Page 1 of 6
Job No.: 2L0585R Date: 1/7/2003
Specification: PT90 Temperature(°C): 24
Tested By: David Light Relative Humidity(%): 50
E.U.T.: REPEATER
Configuration: TX FULL 2 SIGNALS FULL POWER
Sample Number: 1
Location: Lab 1 RBW: Refer to plots
Detector Type: Peak VBW: Refer to plots

Complete X
Preliminary: _____

Test Equipment Used

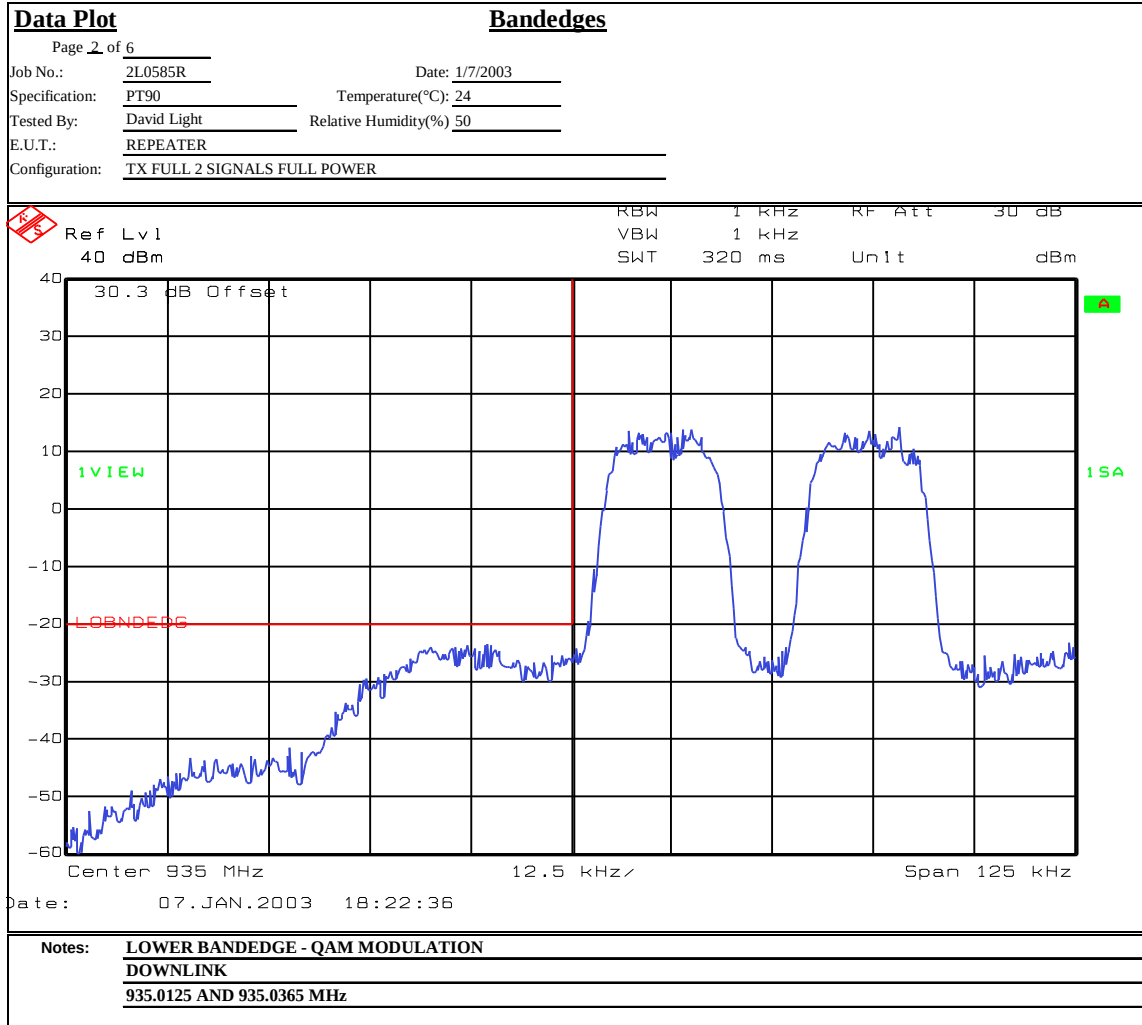
Antenna: _____ Directional Coupler: _____
Pre-Amp: _____ Cable #1: 1083
Filter: _____ Cable #2: _____
Receiver: 1036 Cable #3: _____
Attenuator #1: 1064 Cable #4: _____
Attenuator #2: 1065 Mixer: _____
Additional equipment used: _____
Measurement Uncertainty: +/-1.7 dB



Notes: UPPER BANDEGE - QAM MODULATION
DOWNLINK
939.9875 AND 939.9625

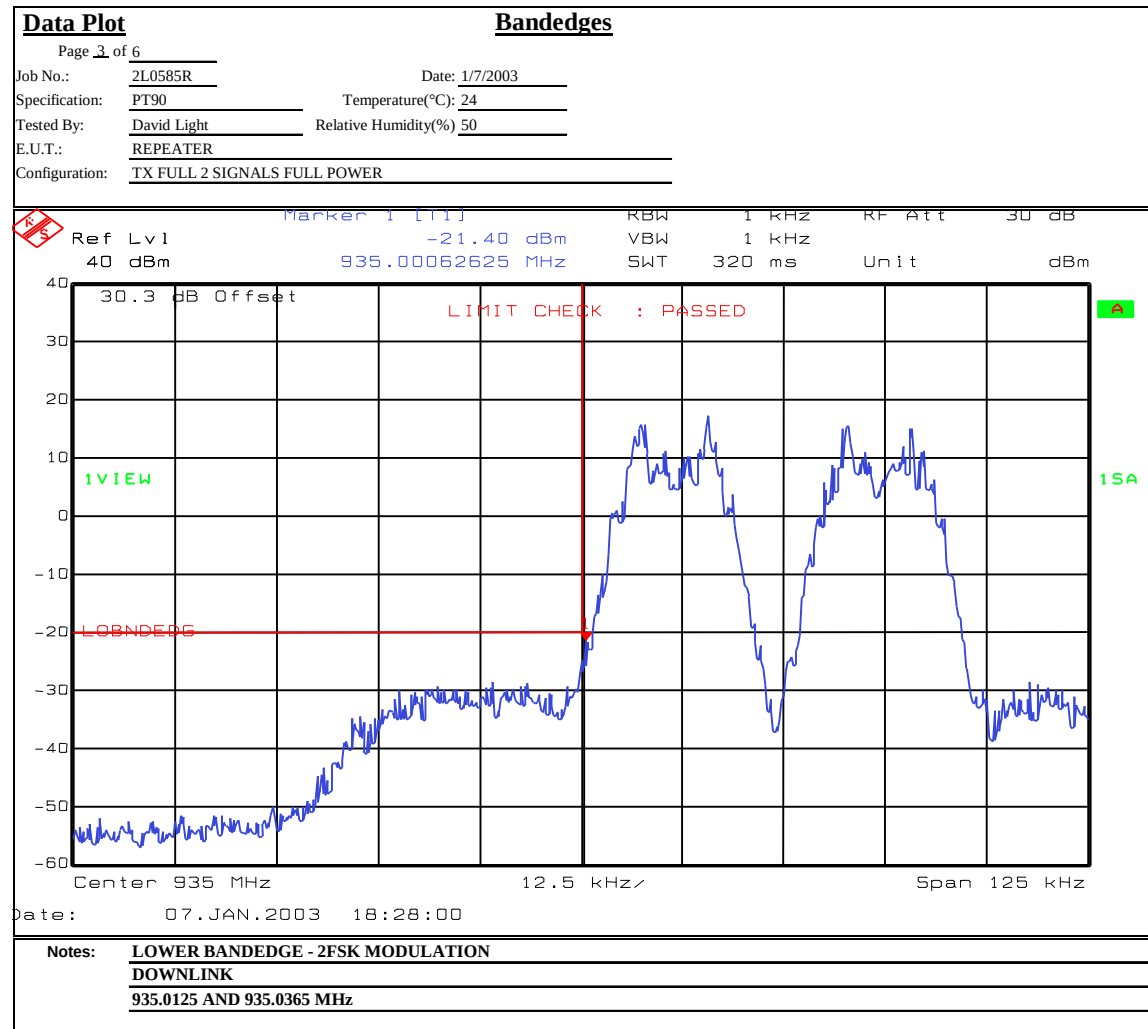
EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2



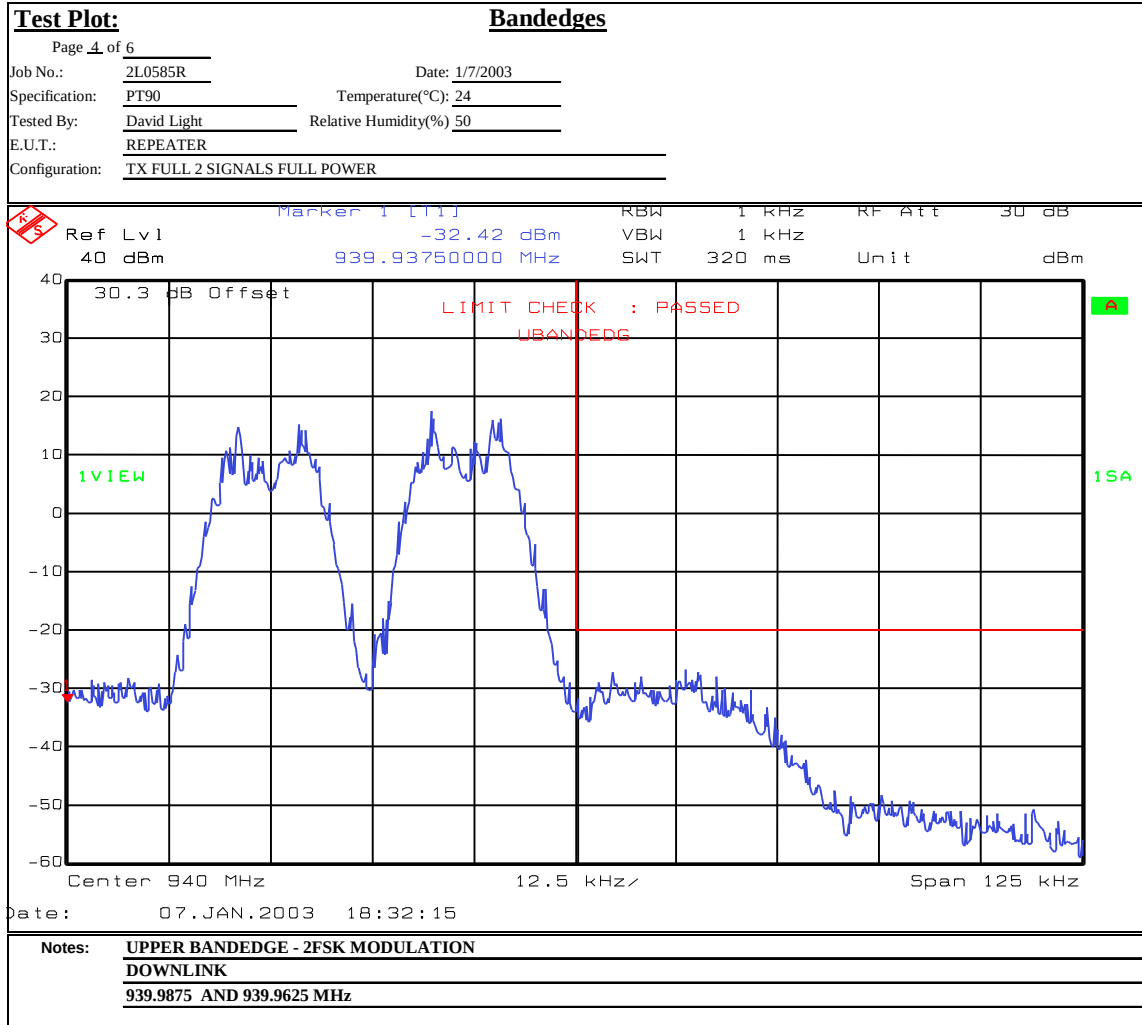
EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2



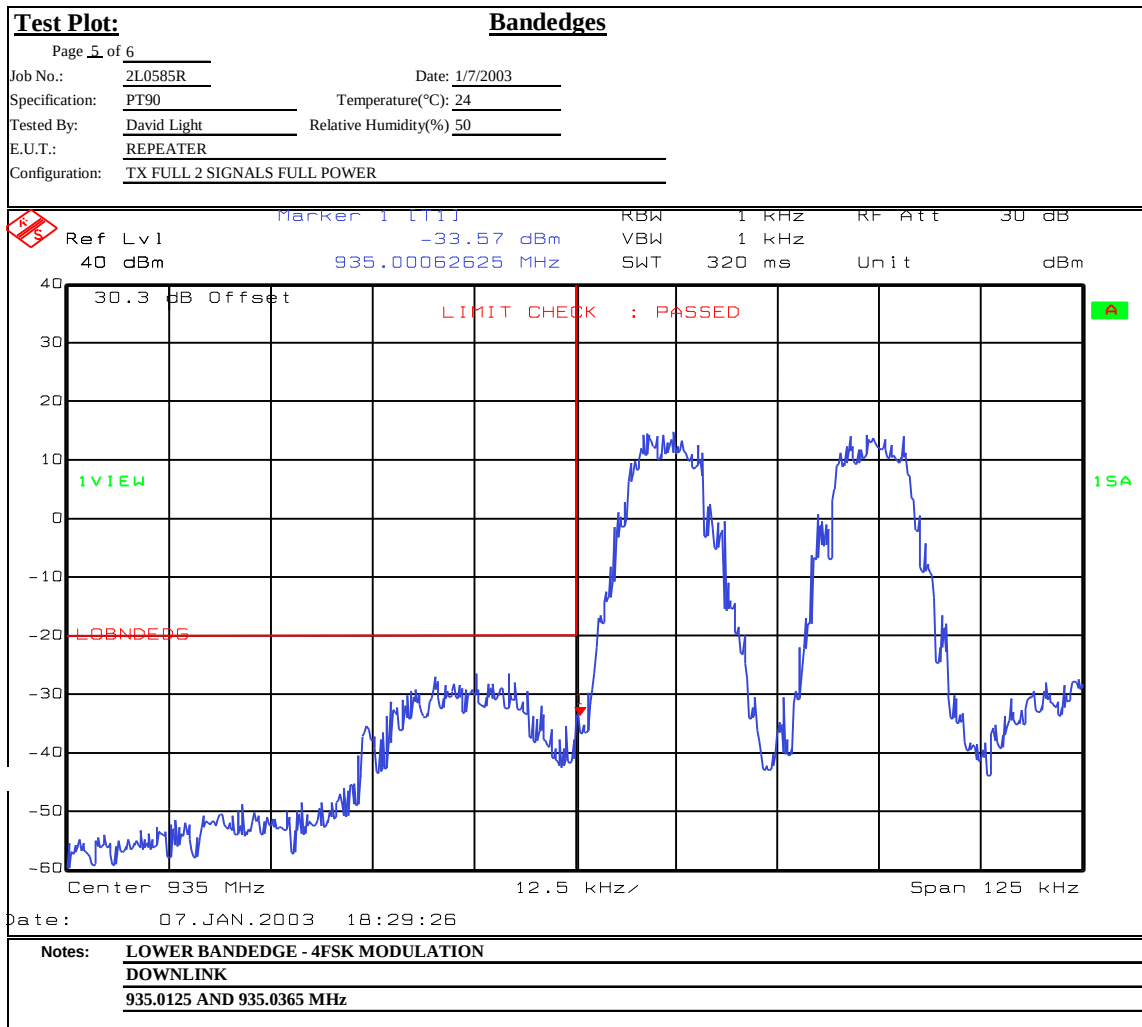
EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2



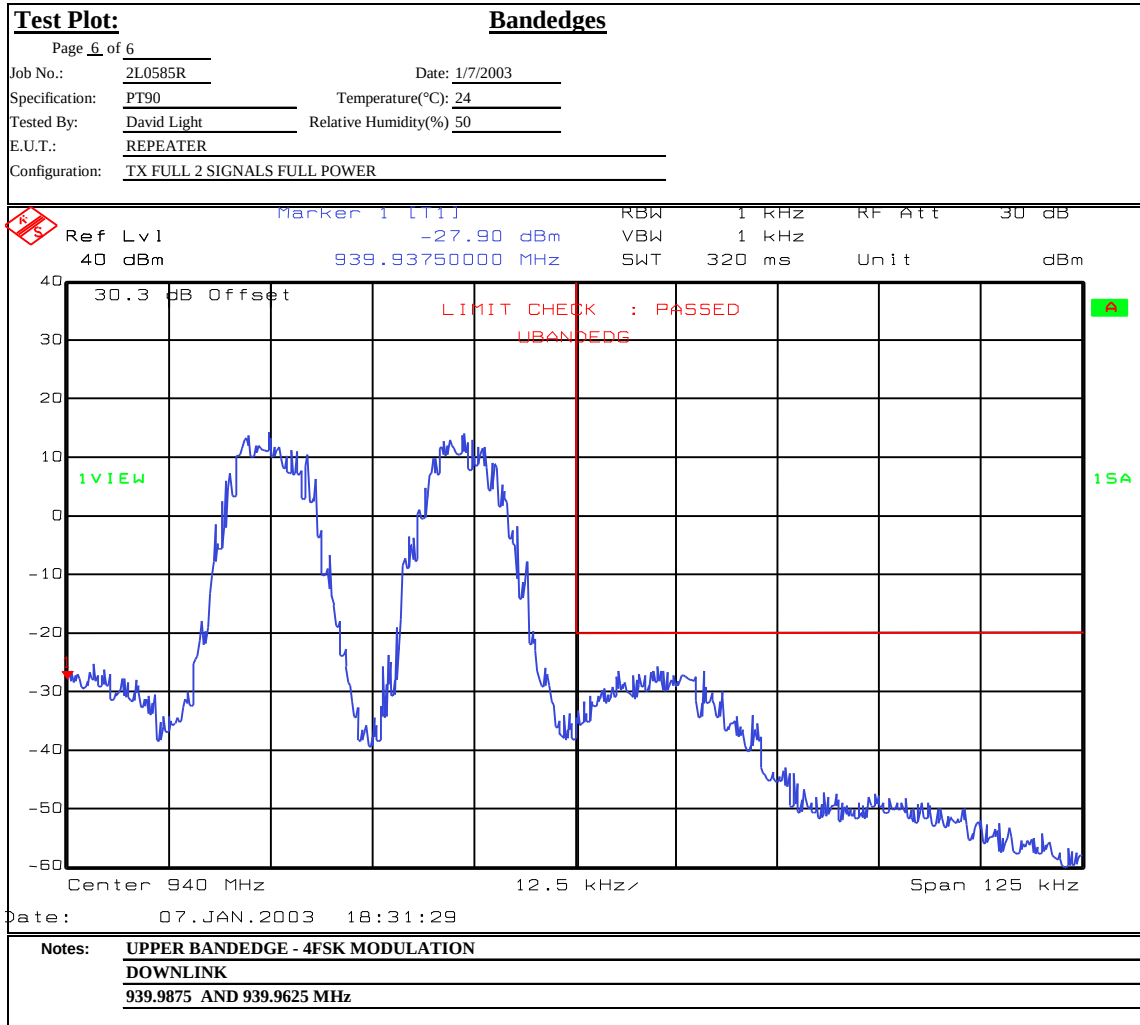
EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2



EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2



EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

Section 6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious	PARA. NO.: 2.1053
TESTED BY: David Light	DATE: 12/10/2002

Test Results: Complies.**Test Data:** See attached table.

Measurement Uncertainty: +/- 1.7 dB

EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

Test Data - Radiated Emissions

		Dallas Headquarters: 802 N. Kealy Lewisville, TX 75057 Tel: (972) 436-9600 Fax: (972) 436-2667							
Nemko Dallas, Inc.									
ERP Substitution Method									
Page 1 of 2		Complete <u> X </u>							
Job No.: 2L0585R	Date: 12/10/02	Preliminary <u> </u>							
Specification: PT24 and PT90	Temperature(°C) <u>22</u>								
Tested By: David Light	Relative Humidity(%) <u>40</u>								
E.U.T.: NARROWBAND PCS									
Configuration: TX FULL POWER									
Sample: 1									
Location: AC 3	RBW: 100 kHz	Measuremen							
Detector: Peak	VBW: 100 kHz	Distance: 3 m							
Test Equipment									
Antenna: 1304	Directional	Cable #1: 1484							
Pre-Amp: 1016		Cable #2: 1485							
Filter:		Cable #3:							
Receiver: 1036		Cable #4:							
Attenuator #1:		Mixer:							
Attenuator #2:									
Additional equipment									
Measurement	+/-1.7 dB								
Frequency (MHz)	Meter Reading (dBm)	Correction Factor (dB)	Pre-Amp Gain (dB)	Substitution Antenna (dBd)	Limit (dBm)	ERP (dBm)	ERP (mW)	Polarity	Comment
Tx@ 900 MHz									UPLINK
1800	-66.0	31.0	32.9	7.3	-13	-60.7	0.0000	V	
2700	-51.8	35.5	33.1	8.0	-13	-41.5	0.0001	V	
3600	-61.6	43.3	32.6	8.6	-13	-42.3	0.0001	V	
4500	-72.7	44.0	33.4	8.7	-13	-53.5	0.0000	V	
5400	-76.0	41.3	33.0	8.2	-13	-59.5	0.0000	V	
6300	-73.0	40.5	31.8	9.6	-13	-54.8	0.0000	V	
7200	-77.0	40.8	32.8	8.8	-13	-60.2	0.0000	V	
8100	-77.0	42.8	32.9	9.1	-13	-58.0	0.0000	V	
9000	-76.0	41.3	34.0	9.6	-13	-59.1	0.0000	V	
1800	-69.6	33.0	32.9	7.3	-13	-62.3	0.0000	H	
2700	-56.1	35.5	33.1	8.0	-13	-45.8	0.0000	H	
3600	-65.1	35.5	32.6	8.6	-13	-53.7	0.0000	H	
4500	-72.7	35.5	33.4	8.7	-13	-62.0	0.0000	H	
5400	-76.0	38.3	33.0	8.2	-13	-62.5	0.0000	H	
6300	-70.0	38.7	31.8	9.6	-13	-53.6	0.0000	H	
7200	-77.0	40.3	32.8	8.8	-13	-60.7	0.0000	H	
8100	-77.0	42.5	32.9	9.1	-13	-58.3	0.0000	H	
9000	-76.0	42.3	34.0	9.6	-13	-58.1	0.0000	H	
Notes: Searched spectrum to 10th harmonic of carrier									

EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

Test Data - Radiated Emissions



Nemko

Nemko Dallas, Inc.

Dallas Headquarters:

802 N. Kealy

Lewisville, TX 75057

Tel: (972) 436-9600

Fax: (972) 436-2667

Field Strength of Spurious Emissions

Page 1 of 2

Job No.: 2L0585R Date: 12/10/02

Specification: PT24 and PT90 Temperature(°C) 22

Tested By: David Light Relative Humidity(%) 40

E.U.T.: NARROWBAND PCS

Configuration: TX FULL POWER

Sample: 1

Complete X

Preliminary _____

Frequenc (MHz)	Meter Reading (dBm)	Correction Factor (dB)		Pre-Amp Gain (dB)	Substitutio Antenna (dBd)	Limit (dBm)	ERP (dBm)	ERP (mW)	Polarity	Comment
Tx@ 940 MHz										DOWNLINK
1880	-66.1	33.0		32.9	7.3	-13	-58.8	0.0000	H	
2820	-61.3	35.5		33.1	8.0	-13	-51.0	0.0000	H	
3760	-71.2	35.5		32.6	8.6	-13	-59.8	0.0000	H	
4700	-71.0	35.5		33.4	8.7	-13	-60.3	0.0000	H	
5640	-75.0	37.8		33.0	9.3	-13	-60.9	0.0000	H	
6580	-76.0	39.2		31.8	9.4	-13	-59.3	0.0000	H	
7520	-77.0	41.5		32.8	9.2	-13	-59.2	0.0000	H	
8460	-77.0	42.5		32.9	9.1	-13	-58.3	0.0000	H	
9400	-76.0	42.3		34.0	9.6	-13	-58.1	0.0000	H	
1880	-65.0	31.0		32.9	7.3	-13	-59.7	0.0000	V	
2820	-58.4	35.5		33.1	8.0	-13	-48.1	0.0000	V	
3760	-69.6	43.3		32.6	8.6	-13	-50.3	0.0000	V	
4700	-66.4	44.0		33.4	8.7	-13	-47.2	0.0000	V	
5640	-75.0	39.8		33.0	9.3	-13	-58.9	0.0000	V	
6580	-76.0	41.3		31.8	9.4	-13	-57.1	0.0000	V	
7520	-77.0	41.8		32.8	9.2	-13	-58.8	0.0000	V	
8460	-77.0	42.8		32.9	9.1	-13	-58.0	0.0000	V	
9400	-76.0	41.3		34.0	9.6	-13	-59.1	0.0000	V	

Notes: Searched spectrum to 10th harmonic of carrier

Photographs of Test Setup

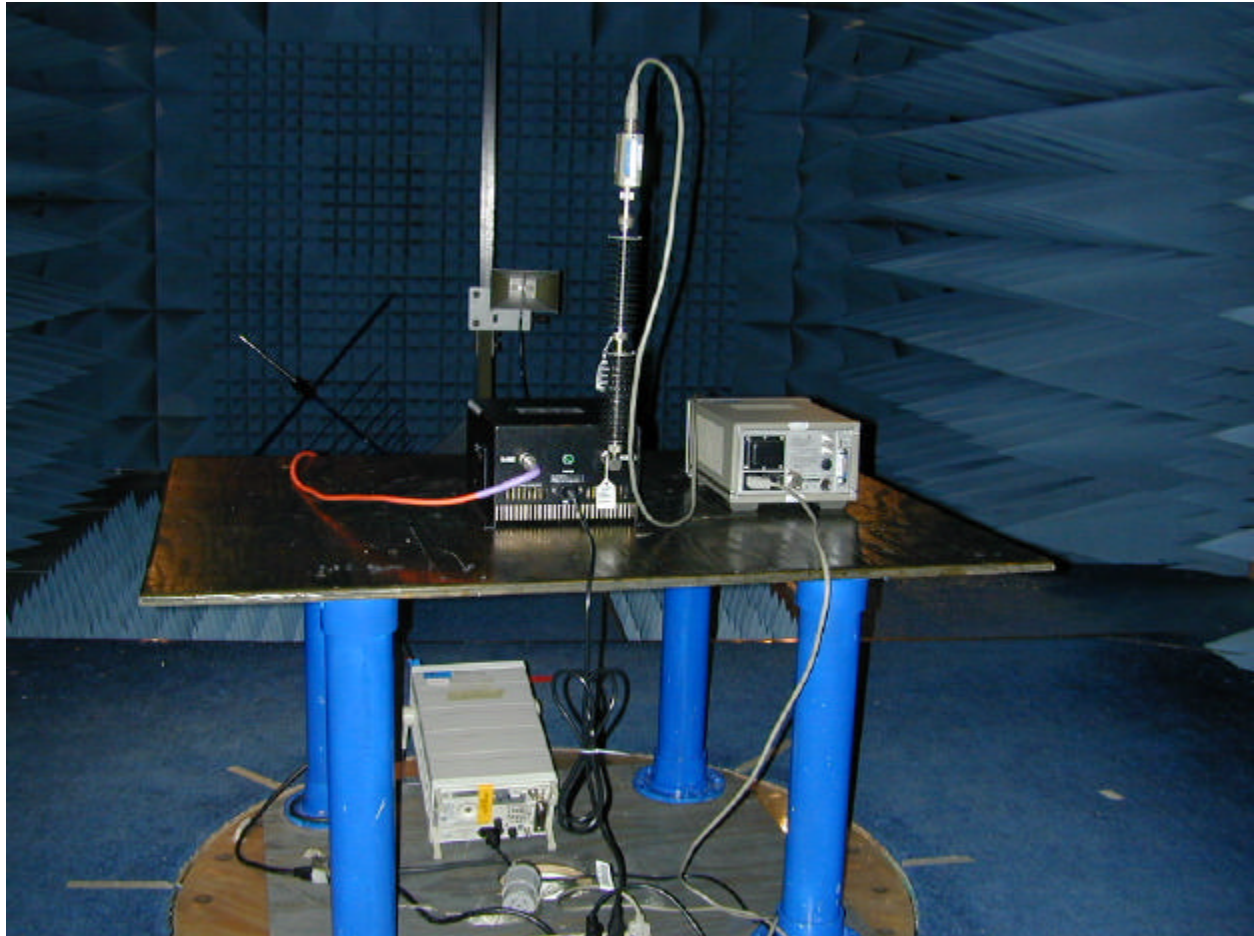


Nemko Dallas

FCC PART 24, SUBPART D and FCC PART 90, SUBPART I
RADIO REPEATER

EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2



EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

Section 7. Test Equipment List

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	01/02/01	01/03/03
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	12/18/01	12/19/03
1064	ATTENUATOR	NARDA 776B-20	NONE	CBU	N/A
1065	ATTENUATOR	NARDA 776B-10	NONE	CBU	N/A
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	07/15/02	07/15/03
1484	Cable 2.0-18.0 Ghz	Storm PR90-010-072	N/A	07/15/02	07/15/03
1485	Cable 2.0-18.0 Ghz	Storm PR90-010-216	N/A	07/15/02	07/15/03
1304	HORN ANTENNA	ELECTRO METRICS RGA-60	6151	07/30/01	07/31/03
1083	Cable 2m	Astrolab 32027-2-29094-72TC	N/A	CBU	N/A

Nemko Dallas

FCC PART 24, SUBPART D and FCC PART 90, SUBPART I

RADIO REPEATER

EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

ANNEX A - TEST METHODOLOGIES

NAME OF TEST: RF Power Output**PARA. NO.: 2.985****Minimum Standard:**

Para. No.24.132.

(a) Stations transmitting in the 901-902 MHz band are limited to 7 watts e.r.p.

(b) Mobile stations transmitting in the 930-931 MHz and 940-941 MHz bands are limited to 7 watts e.r.p.

(c) Base stations transmitting in the 930-931 MHz and 940-941 MHz bands are limited to 3500 watts e.r.p. per authorized channel and are unlimited in antenna height except as provided in paragraph (d) of this section.

Method Of Measurement:Detachable Antenna:

The peak power at antenna terminals is measured using an in-line peak power meter or a spectrum analyzer.

Integral Antenna:

If the antenna is not detachable from the circuit then the Peak Power Output is derived from the peak radiated field strength of the fundamental emission by using the plane wave relation $GP/4\pi R^2 = E^2/120\pi$ and proceeding as follows:

$$P = \frac{E^2 R^2}{30G} = \frac{E^2 3^2}{30G}$$

where,

P = the equivalent isotropic radiated power in watts

E = the maximum measured field strength in V/m

R = the measurement range (3 meters)

G = the numeric gain of the transmit antenna in relation to an isotropic radiator

Nemko Dallas

FCC PART 24, SUBPART D and FCC PART 90, SUBPART I

RADIO REPEATER

EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 2.989
---	-------------------------

Minimum Standard:

Since the device tested is an amplifier, the input waveform is compared to the input waveform to determine if there is a degradation of the signal that would be likely to cause out-of-band spurious emissions exceeding the specification limit. It is assumed that the input waveform is a compliant transmitter.

Method Of Measurement:

EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

NAME OF TEST: Spurious Emission at Antenna Terminals	PARA. NO.: 2.991
---	-------------------------

Part 24 Minimum Standard:

On any frequency outside the authorized bandwidth and removed from the edge of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 40 kHz: at least $43 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation.

Part 90 Minimum Standard: $50 + 10 \log(P)$ **Method Of Measurement:**

Spectrum analyzer settings:

30 MHz to 1000 MHz: $RBW \geq 300 \text{ Hz}$
 $VBW \geq RBW$
 Sweeptime – Auto
 Video Averaging – Off
 Detector type - Peak

Greater than 1000 MHz $RBW \geq 300 \text{ Hz}$
 $VBW \geq RBW$
 Sweeptime – Auto
 Video Averaging – Off
 Detector type - Peak

NAME OF TEST: Field Strength of Spurious Radiation**PARA. NO.: 2.993**

Part 24 Minimum Standard: Para. No.24.133. On any frequency outside the authorized bandwidth and removed from the edge of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 40 kHz: at least $43 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation.

Part 90 Minimum Standard: $50 + 10 \log(P)$

Test Method: TIA/EIA-603-1992, Section 2.2.12

The antenna substitution method was used to determine the equivalent radiated power at spurious frequencies. The spurious emissions were measured at a distance of 3 meters. The EUT was then replaced with a reference substitution antenna with a known gain referenced to a dipole. This antenna was fed with a signal at the spurious frequency. The level of the signal was adjusted to repeat the previously measured level. The resulting erp is the signal level fed to the reference antenna corrected for gain referenced to a dipole.

EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

NAME OF TEST: Frequency Stability**PARA. NO.: 2.995****Minimum Standard:** Para. No. 24.135. The frequency stability shall be $\pm 1\%$ **Method Of Measurement:** CDMA Per ANSI/J-STD-008
TDMA Per ANSI/J-STD-007
NADC Per IS-136Frequency 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. 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.

Digitally Modulated Signals

Equipment that produces a digitally modulated carrier is tested using a vector modulation analyzer. Frequency accuracy and rho are measured over the specified environmental extremes.

Nemko Dallas

FCC PART 24, SUBPART D and FCC PART 90, SUBPART I

RADIO REPEATER

EQUIPMENT: BDA-PS9-1/1W-60-A

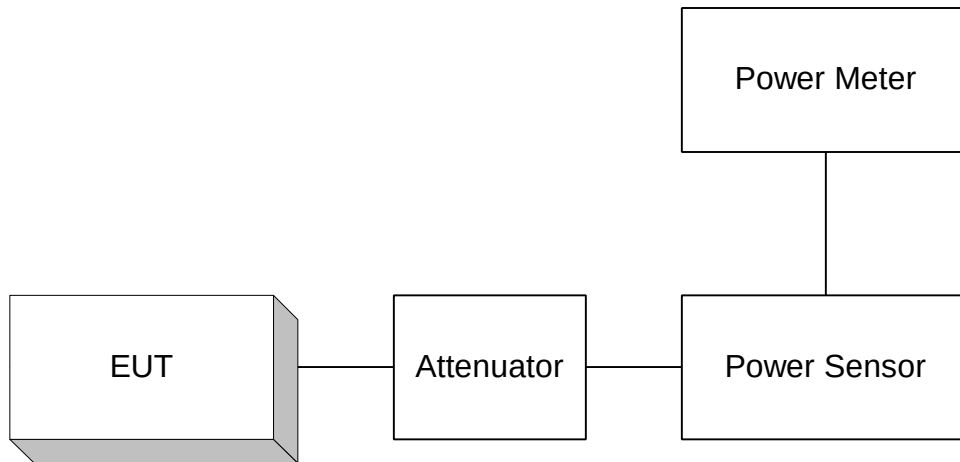
PROJECT NO.: 2L0584RUS2

ANNEX B - TEST DIAGRAMS

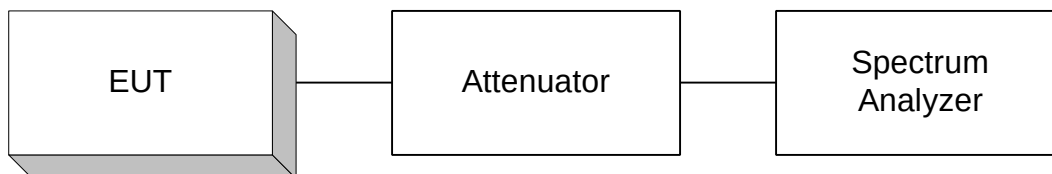
EQUIPMENT: BDA-PS9-1/1W-60-A

PROJECT NO.: 2L0584RUS2

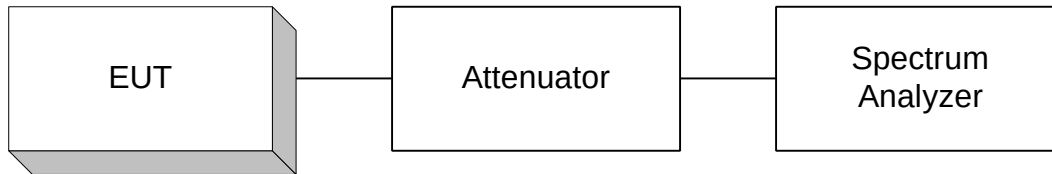
Para. No. 2.985 - R.F. Power Output



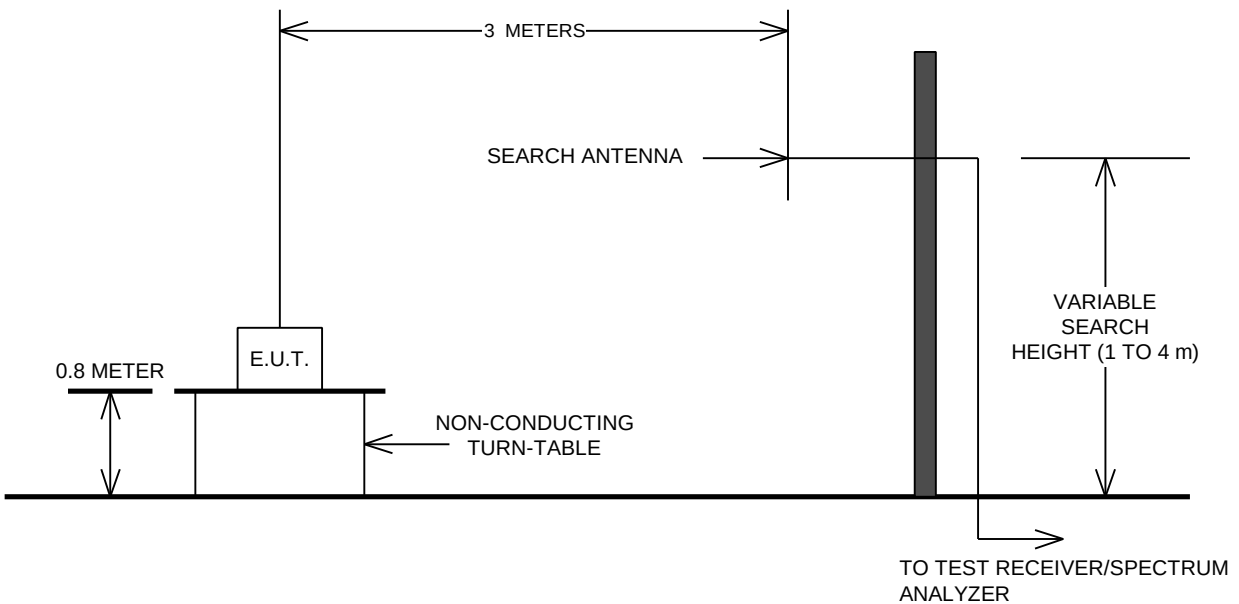
Para. No. 2.989 - Occupied Bandwidth



Para. No. 2.991 Spurious Emissions at Antenna Terminals



Para. No. 2.993 - Field Strength of Spurious Radiation



Para. No. 2.995 - Frequency Stability

