

**Nemko Test Report No.:**

2L0027RUS2

**Applicant:**

Andrew Corporation  
2601 Telecom Parkway  
Richardson, TX 7508

**Equipment Under Test:**

Enhanced Remote Antenna Unit (ERAU)  
Part No. AEO4A-D0602-001

**In Accordance With:**

**FCC Part 24, Subpart E**  
Broadband PCS Repeaters

**Tested By:**

Nemko Dallas Inc.  
802 N. Kealy  
Lewisville, Texas 75057-3136



**Authorized By:**

Tom Tidwell, RF Group Manager

**Date:**

3/22/02

**Total Number of Pages:**

45

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EQUIPMENT: **Enhanced Remote Antenna Unit  
(ERAU)**

PROJECT NO: **2L0027RUS2**

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**Section 1. Summary of Test Results**

Manufacturer: Andrew Corporation  
:  
Model No.: Enhanced Remote Antenna Unit (ERAU)  
Serial No.: None

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 E.

- |                                     |                            |                                     |                     |
|-------------------------------------|----------------------------|-------------------------------------|---------------------|
| <input checked="" type="checkbox"/> | New Submission             | <input checked="" type="checkbox"/> | Production Unit     |
| <input type="checkbox"/>            | Class II Permissive Change | <input type="checkbox"/>            | 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.  
See " Summary of Test Data".

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EQUIPMENT: **Enhanced Remote Antenna Unit  
(ERAU)**

PROJECT NO: **2L0027RUS2**

**Summary Of Test Data**

<b>NAME OF TEST</b>	<b>PARA. NO.</b>	<b>SPEC.</b>	<b>RESULT</b>
RF Power Output	24.232	100W	Complies
Occupied Bandwidth (CDMA)	24.238	Input/Output	Complies
Occupied Bandwidth (GSM)	24.238	Input/Output	Complies
Occupied Bandwidth (NADC)	24.238	Input/Output	Complies
Spurious Emissions at Antenna Terminals	24.238(a)	-13 dBm	Complies
Field Strength of Spurious Emissions	24.238(a)	-13 dBm E.I.R.P.	Complies
Frequency Stability	24.235		N/A

**Footnotes:**

(1) Modulation characteristics were not tested since the E.U.T. processes but does not produce a modulated waveform.

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

**Section 2. General Equipment Specification**

<b>Frequency Bands:</b>	<b>Downlink:</b>	<input checked="" type="checkbox"/> Block A 1930 – 1945 MHz		
		⋮		
		<input checked="" type="checkbox"/> Block D 1945 – 1950 MHz		
		<input checked="" type="checkbox"/> Block B 1950 – 1965 MHz		
		⋮		
		<input checked="" type="checkbox"/> Block E 1965 – 1970 MHz		
		⋮		
		<input checked="" type="checkbox"/> Block F : 1970 – 1975 MHz		
		<input checked="" type="checkbox"/> Block C 1975 – 1990 MHz		
<b>Frequency Bands:</b>	<b>Uplink:</b>	<input type="checkbox"/> Block A 1850 – 1865 MHz		
		⋮		
		<input type="checkbox"/> Block B 1865 – 1870 MHz		
		⋮		
		<input type="checkbox"/> Block C 1870 – 1885 MHz		
		⋮		
		<input type="checkbox"/> Block D 1885 – 1890 MHz		
		⋮		
		<input type="checkbox"/> Block E 1890 – 1895 MHz		
		⋮		
		<input type="checkbox"/> Block F : 1895 – 1910 MHz		
<b>Type of Modulation and Designator:</b>		<b>CDMA (G7W)</b>	<b>GSM (GXW)</b>	<b>NADC (DXW)</b>
		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>Output Impedance:</b>		50 ohms		
<b>Max Input:</b>		0 dBm		
<b>RF Output (Rated):</b>	<b>Uplink</b>	Per channel:	N/A	W
		Total:	N/A	W
<b>RF Output (Rated):</b>	<b>Downlink</b>	Per channel:	0.5	W
		Total:	1.0	W
<b>Frequency Translation:</b>		<b>F1-F1</b>	<b>F1-F2</b>	<b>N/A</b>
		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

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FCC PART 24, SUBPART E  
BROADBAND PCS REPEATERS

*EQUIPMENT:* **Enhanced Remote Antenna Unit  
(ERAU)**

PROJECT NO: **2L0027RUS2**

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<b>Band Selection:</b>	<b>Software</b>	<b>Duplexer</b>	<b>Fullband</b>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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FCC PART 24, SUBPART E  
BROADBAND PCS REPEATERS

*EQUIPMENT:* **Enhanced Remote Antenna Unit  
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**Description of Modifications For Class II Permissive Change**

**Not Applicable**

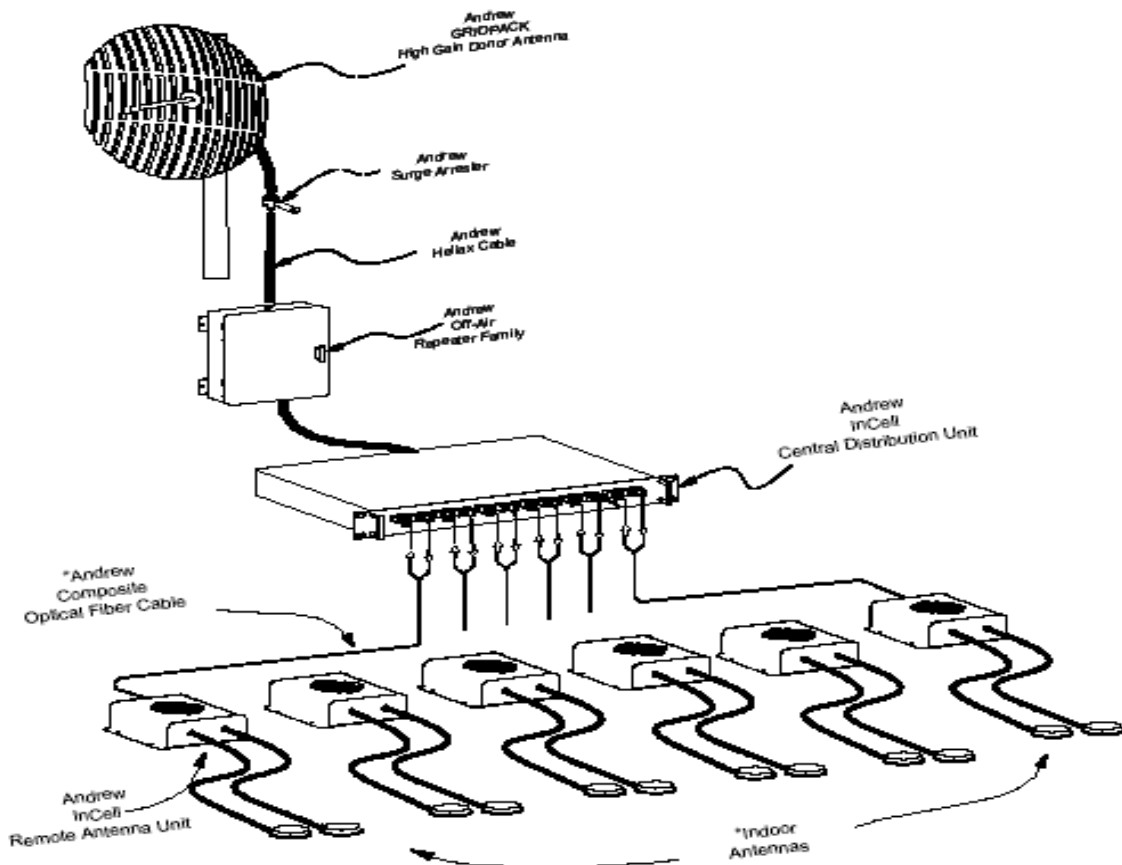
**Modifications Made During Testing**

**Not Applicable**

### Description of Operation

The Andrew InCell™ Fiber Distributed Antenna System is designed to provide improved RF performance in buildings that suffer from poor wireless coverage. The InCell™ interfaces directly with a BTS or off-air antenna and distributes RF signals to indoor antennas that provide improved downlink and uplink performance. The InCell™ system uses multiple Enhanced Remote Antenna Units (ERAU) located within the building to optimize communications with handheld mobile phones and wireless office equipment. Each ERAU is connected to a central distribution unit (CDU) by two low-loss, single mode fiber optic cables that provide downlink signals to the remote antenna and uplink signals from the mobile phone or wireless office equipment.

### System Diagram





EQUIPMENT: Enhanced Remote Antenna Unit  
(ERAU)

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**Section 3. RF Power Output**

NAME OF TEST: RF Power Output	PARA. NO.: 2.1046
TESTED BY: David Light	DATE:3/19/2002

**Test Results:** Complies.

**Measurement Data:**

	Modulation Type	Per Channel Output Power 2 Carriers (dBm)	Composite Output Power (dBm)
Uplink	CDMA	N/A	N/A
Downlink	CDMA	25.8	28.8
Uplink	GSM	N/A	N/A
Downlink	GSM	26.0	29.0
Uplink	NADC	N/A	N/A
Downlink	NADC	26.0	29.0

**Note 1** – The device was tested at +/- 15% of nominal (48 Vdc) with no change in output power.

**Note 2** – The device will output 30.0 dBm with one carrier only.

**Equipment Used:** 1036-1429-1478-1471

**Measurement Uncertainty:** +/- 1.6 dB

**Temperature:** 20 °C

**Relative Humidity:** 60 %

EQUIPMENT: Enhanced Remote Antenna Unit  
(ERAU)

PROJECT NO: 2L0027RUS2

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**Section 4. Occupied Bandwidth**

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 2.1049
TESTED BY: David Light	DATE:3/19/2002

**Test Results:** Complies.

**Test Data:** See attached plot(s).

**Measurement Uncertainty:** +/- 1.6 dB

EQUIPMENT: Enhanced Remote Antenna Unit  
(ERAU)

PROJECT NO: 2L0027RUS2

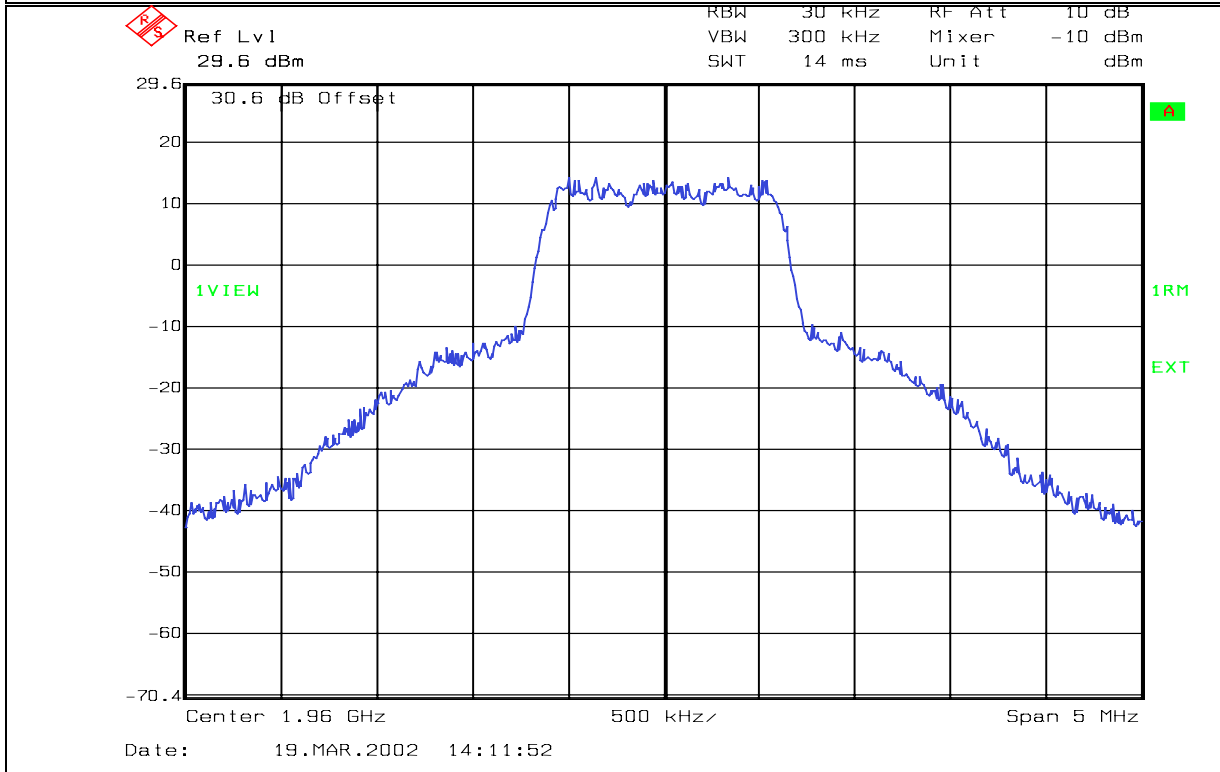
Test Data – Occupied Bandwidth



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Fax: (972) 436-2667

Data Plot		OCCUPIED BANDWIDTH	
Page <u>1</u> of <u>6</u>			Complete: <u>X</u>
Job No.: 2L0027R	Date: <u>3/19/2002</u>		Preliminary: _____
Specification: PT 24	Temperature(°C): <u>22</u>		
Tested By: <u>David Light</u>	Relative Humidity(%): <u>60</u>		
E.U.T.: <u>DUAL BAND REPEATER</u>			
Configuration: <u>TX FULL POWER</u>			
Sample Number: <u>1</u>			
Location: <u>Lab 1</u>	RBW: <u>Refer to plots</u>	Measurement	
Detector Type: <u>Refer to plot</u>	VBW: <u>Refer to plots</u>	Distance: <u>N/A</u> m	
<b>Test Equipment Used</b>			
Antenna: _____	Directional Coupler: _____		
Pre-Amp: _____	Cable #1: <u>1627</u>		
Filter: _____	Cable #2: <u>1628</u>		
Receiver: <u>1036</u>	Cable #3: <u>1629</u>		
Attenuator #1: <u>1478</u>	Cable #4: _____		
Attenuator #2: <u>1471</u>	Mixer: _____		
Additional equipment used: <u>1052 1051 1092 1053</u>			
Measurement Uncertainty: <u>+/-1.7 dB</u>			



Notes: CDMA OUTPUT

EQUIPMENT: **Enhanced Remote Antenna Unit  
(ERAU)**

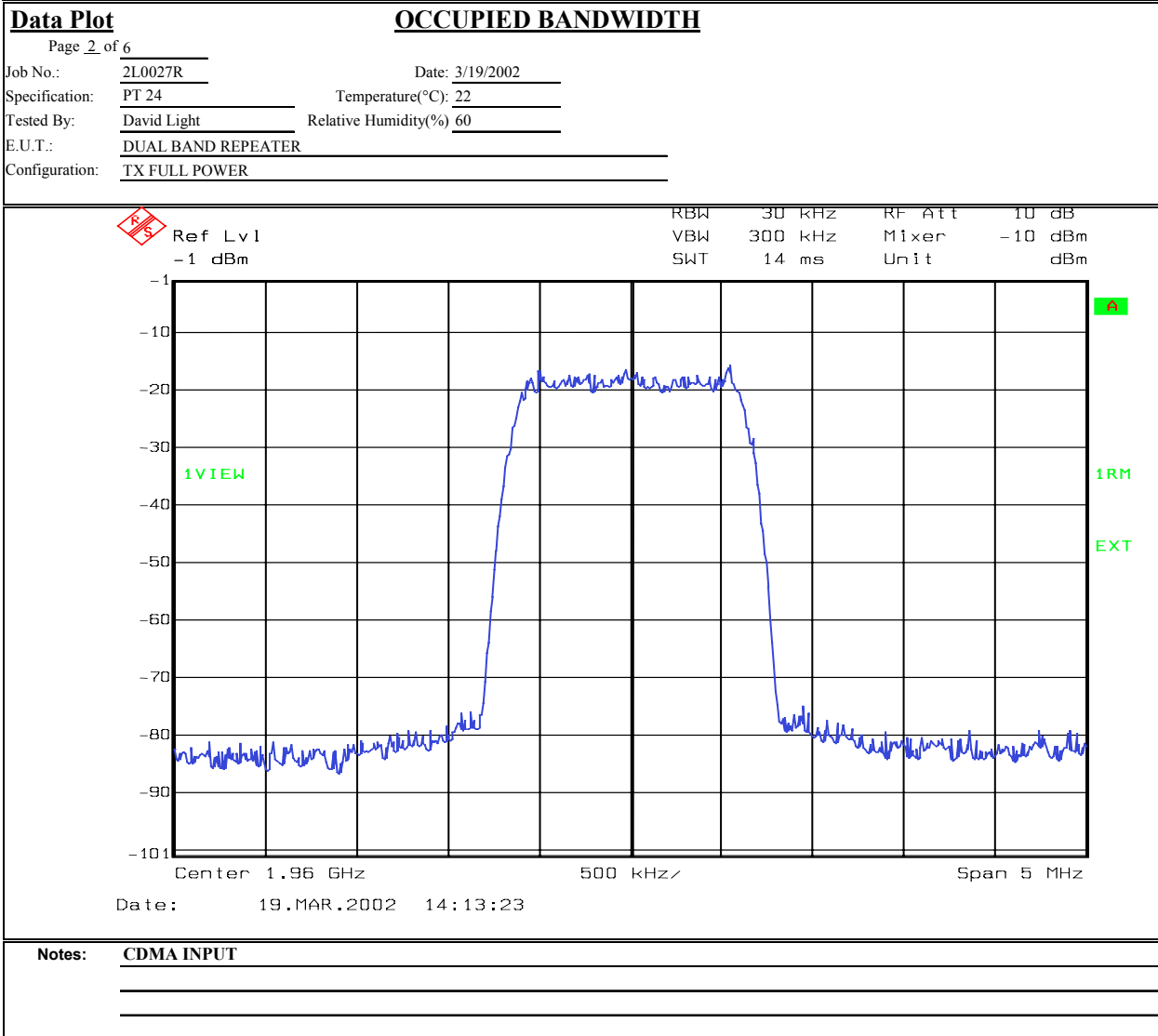
PROJECT NO: **2L0027RUS2**

**Test Data – Occupied Bandwidth**



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EQUIPMENT: **Enhanced Remote Antenna Unit  
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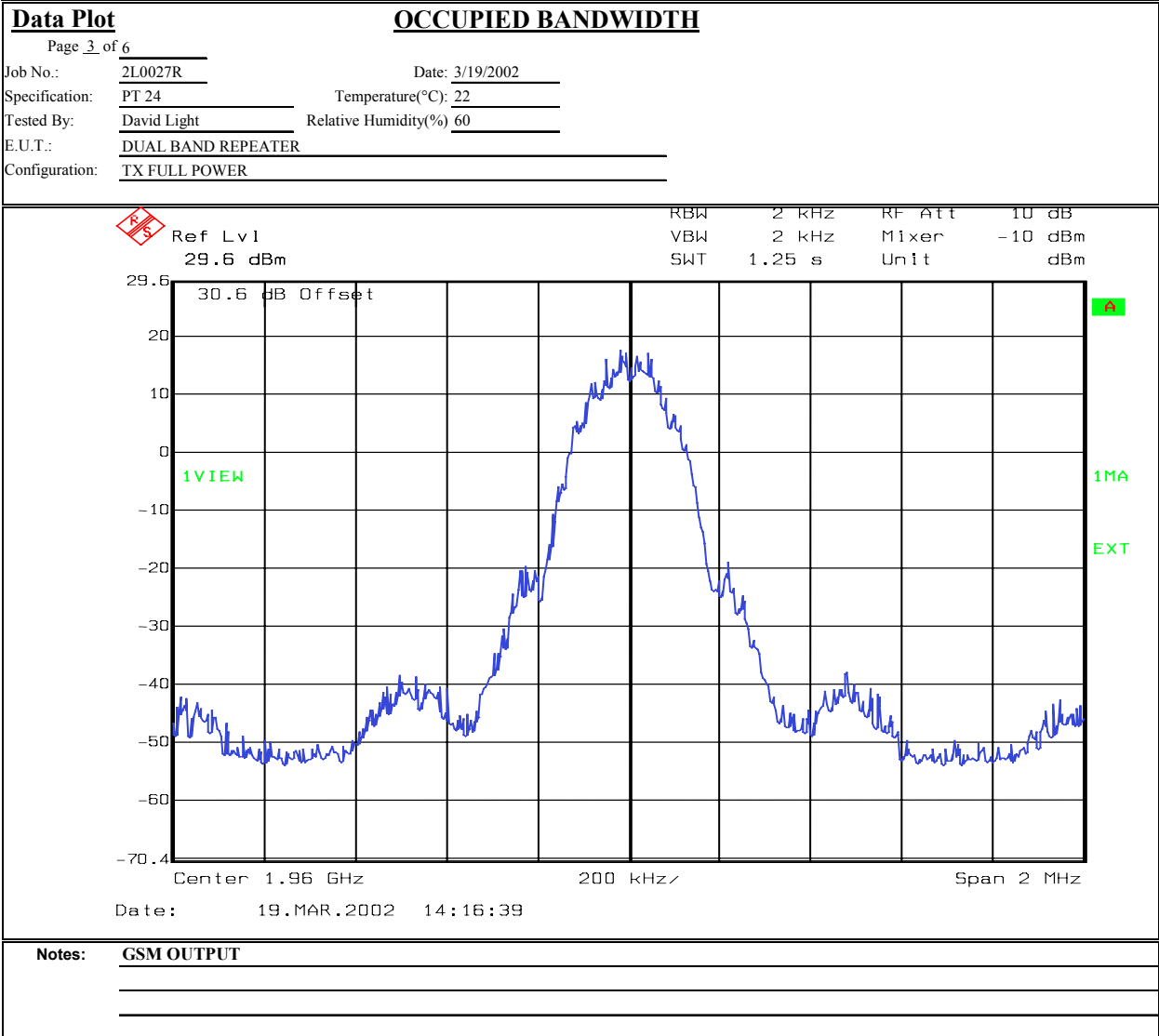
**Test Data – Occupied Bandwidth**



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EQUIPMENT: **Enhanced Remote Antenna Unit  
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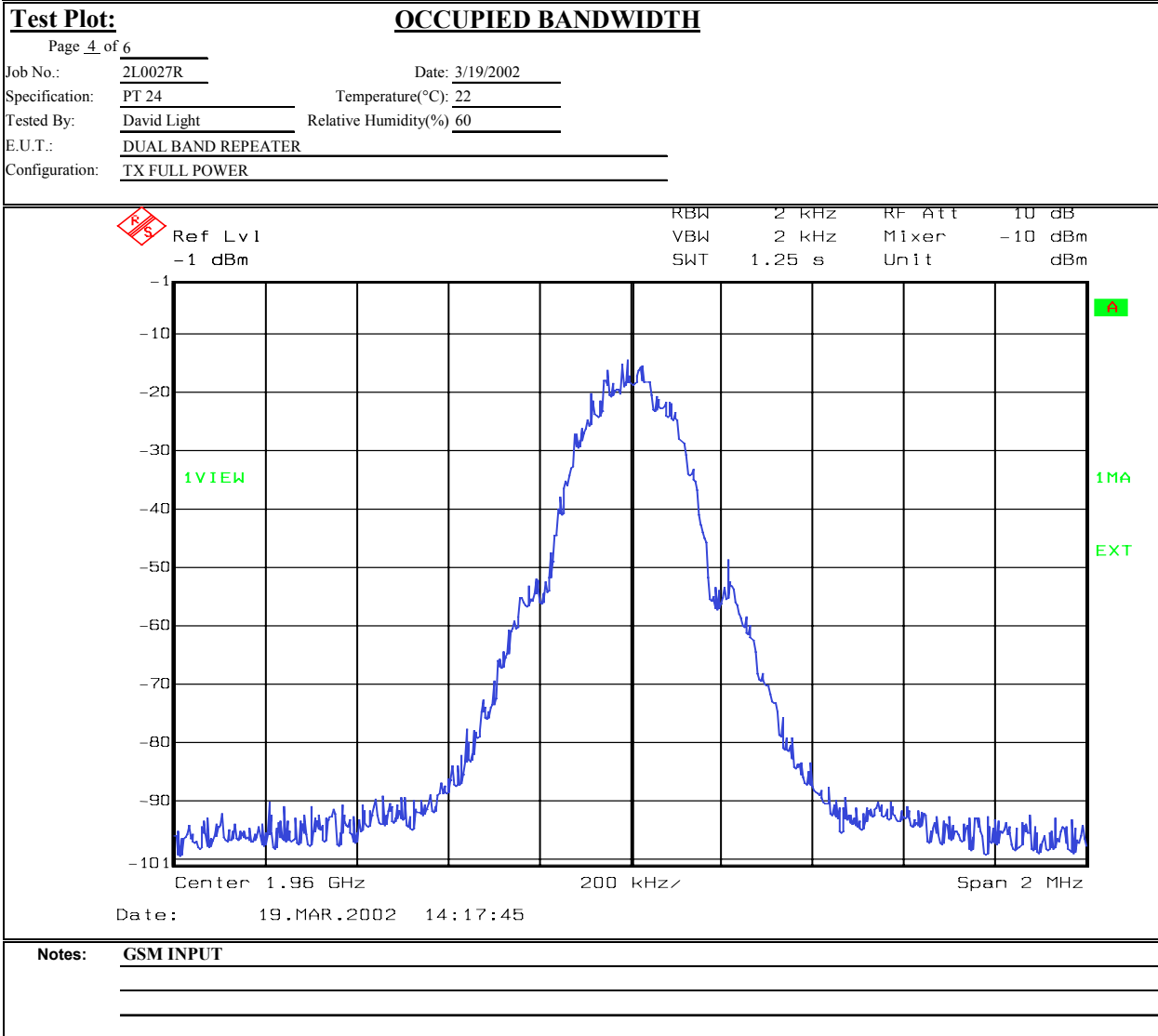
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**Test Data – Occupied Bandwidth**



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PROJECT NO: **2L0027RUS2**

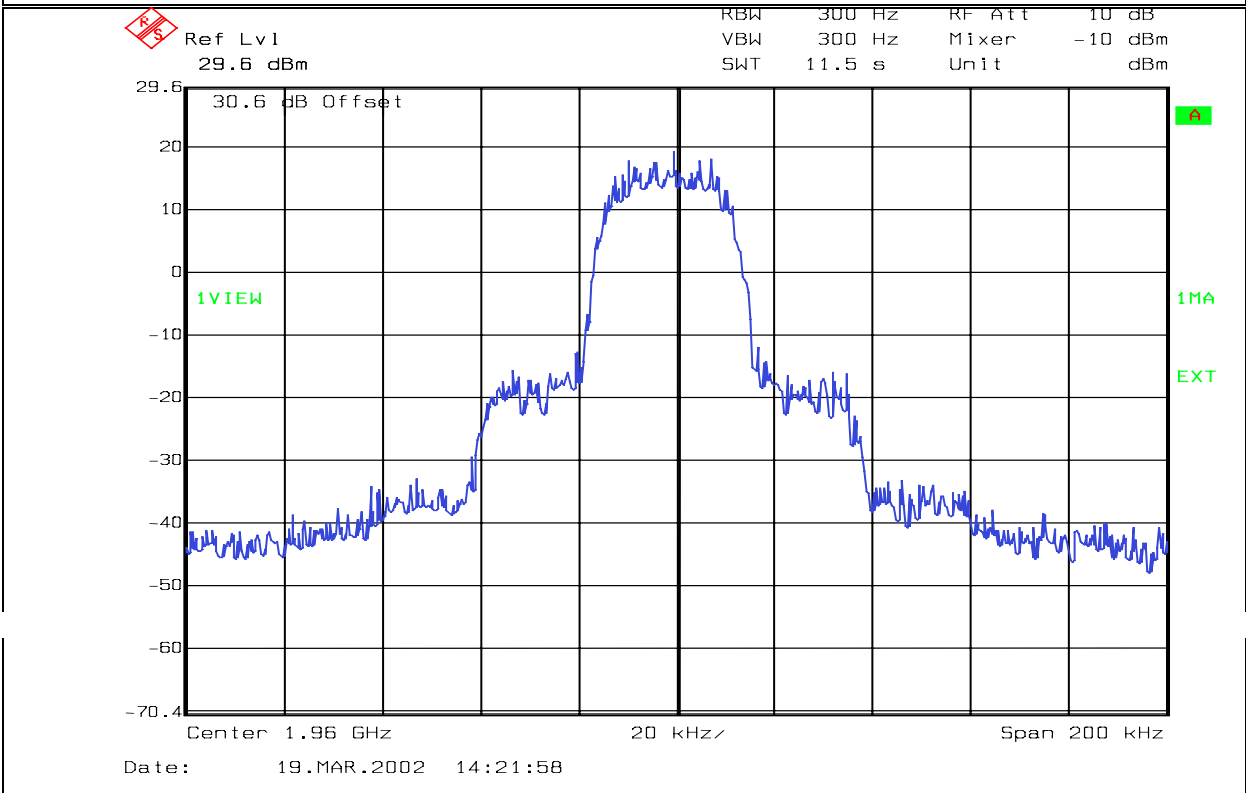
**Test Data – Occupied Bandwidth**



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<b>Test Plot:</b>		<b>OCUPIED BANDWIDTH</b>	
Page 5 of 6			
Job No.:	2L0027R	Date:	3/19/2002
Specification:	PT 24	Temperature(°C):	22
Tested By:	David Light	Relative Humidity(%)	60
E.U.T.:	DUAL BAND REPEATER		
Configuration:	TX FULL POWER		



Notes: **TDMA OUTPUT**

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EQUIPMENT: **Enhanced Remote Antenna Unit  
(ERAU)**

PROJECT NO: **2L0027RUS2**

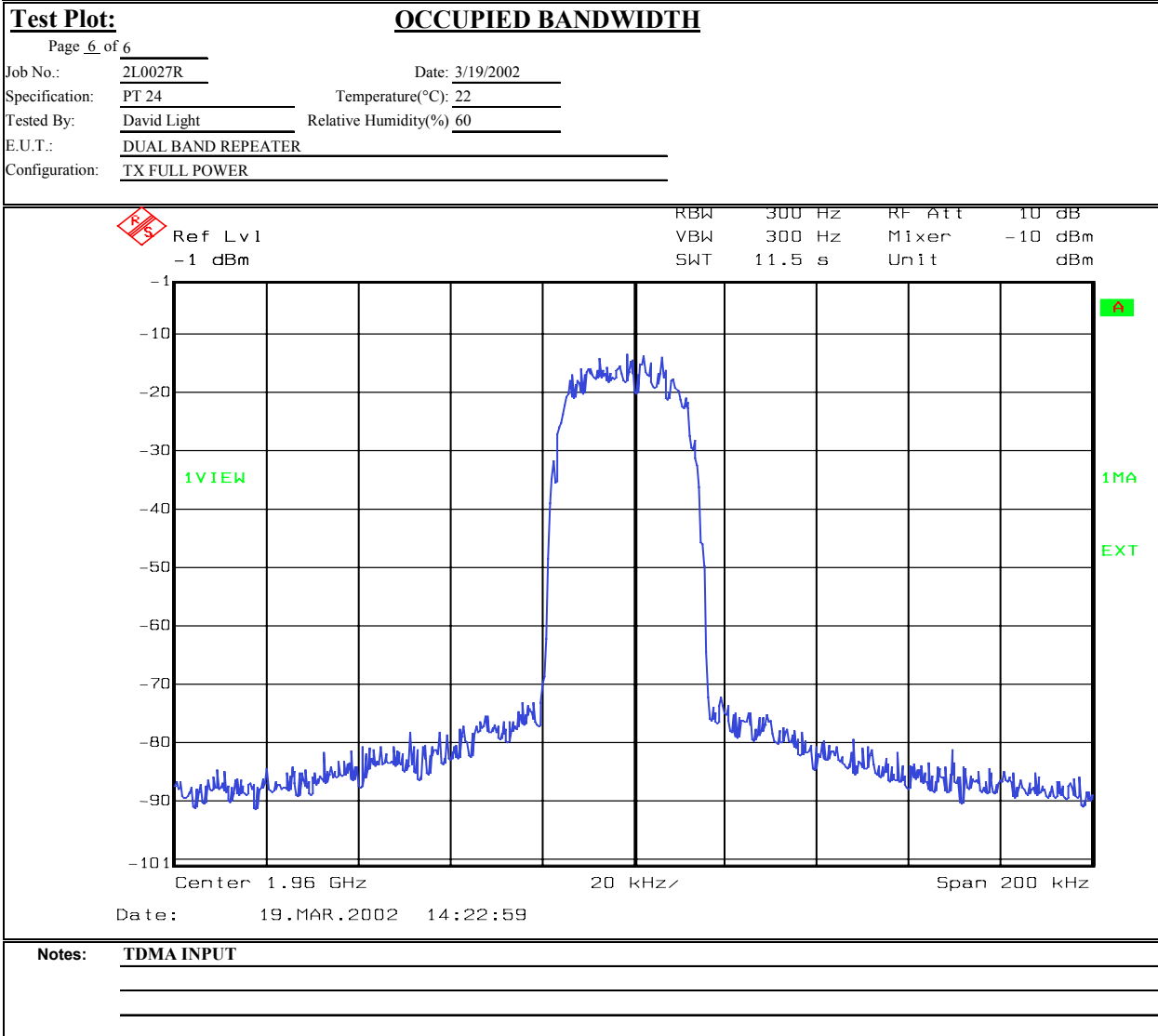
**Test Data – Occupied Bandwidth**



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EQUIPMENT: Enhanced Remote Antenna Unit  
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PROJECT NO: 2L0027RUS2

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**Section 5. Spurious Emissions at Antenna Terminals**

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 2.1051
TESTED BY: David Light	DATE: 3/19/2002

**Test Results:** Complies.

**Test Data:** See attached plot(s).

**Measurement Uncertainty:** +/- 1.6 dB

EQUIPMENT: Enhanced Remote Antenna Unit  
(ERAU)

PROJECT NO: 2L0027RUS2

Test Data – Spurious Emissions at Antenna Terminals



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Data Plot		SPURIOUS EMISSIONS AT ANTENNA TERMINALS																					
Page <u>1</u> of <u>3</u>				Complete: <u>X</u>																			
Job No.: 2L0027R	Date: 3/19/2002			Preliminary: _____																			
Specification: PT 24	Temperature(°C): 22																						
Tested By: David Light	Relative Humidity(%): 60																						
E.U.T.: DUAL BAND REPEATER																							
Configuration: TX FULL POWER																							
Sample Number: 1																							
Location: Lab 1	RBW: Refer to plots			Measurement																			
Detector Type: Peak	VBW: Refer to plots			Distance: <u>N/A</u> m																			
<b>Test Equipment Used</b>																							
Antenna: _____	Directional Coupler: _____																						
Pre-Amp: _____	Cable #1: 1627																						
Filter: _____	Cable #2: 1628																						
Receiver: 1036	Cable #3: 1629																						
Attenuator #1: 1478	Cable #4: _____																						
Attenuator #2: 1471	Mixer: _____																						
Additional equipment used: 1051 1052 1092 1053																							
Measurement Uncertainty: +/-1.7 dB																							
<table border="0"> <tr> <td></td> <td>Marker 2 [11]</td> <td>RBW</td> <td>1 MHz</td> <td>RF Att</td> <td>20 dB</td> </tr> <tr> <td>Ref Lvl</td> <td>-22.00 dBm</td> <td>VBW</td> <td>1 MHz</td> <td>Mixer</td> <td>-10 dBm</td> </tr> <tr> <td>40 dBm</td> <td>13.99699399 GHz</td> <td>SWT</td> <td>200 ms</td> <td>Unit</td> <td>dBm</td> </tr> </table>							Marker 2 [11]	RBW	1 MHz	RF Att	20 dB	Ref Lvl	-22.00 dBm	VBW	1 MHz	Mixer	-10 dBm	40 dBm	13.99699399 GHz	SWT	200 ms	Unit	dBm
	Marker 2 [11]	RBW	1 MHz	RF Att	20 dB																		
Ref Lvl	-22.00 dBm	VBW	1 MHz	Mixer	-10 dBm																		
40 dBm	13.99699399 GHz	SWT	200 ms	Unit	dBm																		
<p>30.6 dB Offset</p> <p>1VIEW</p> <p>D1 -13 dBm</p> <p>1MA</p> <p>EXT</p> <p>Start 30 MHz      1.997 GHz/      Stop 20 GHz</p>																							
Date: 19.MAR.2002 14:29:08																							
Notes: TDMA																							

EQUIPMENT: **Enhanced Remote Antenna Unit  
(ERAU)**

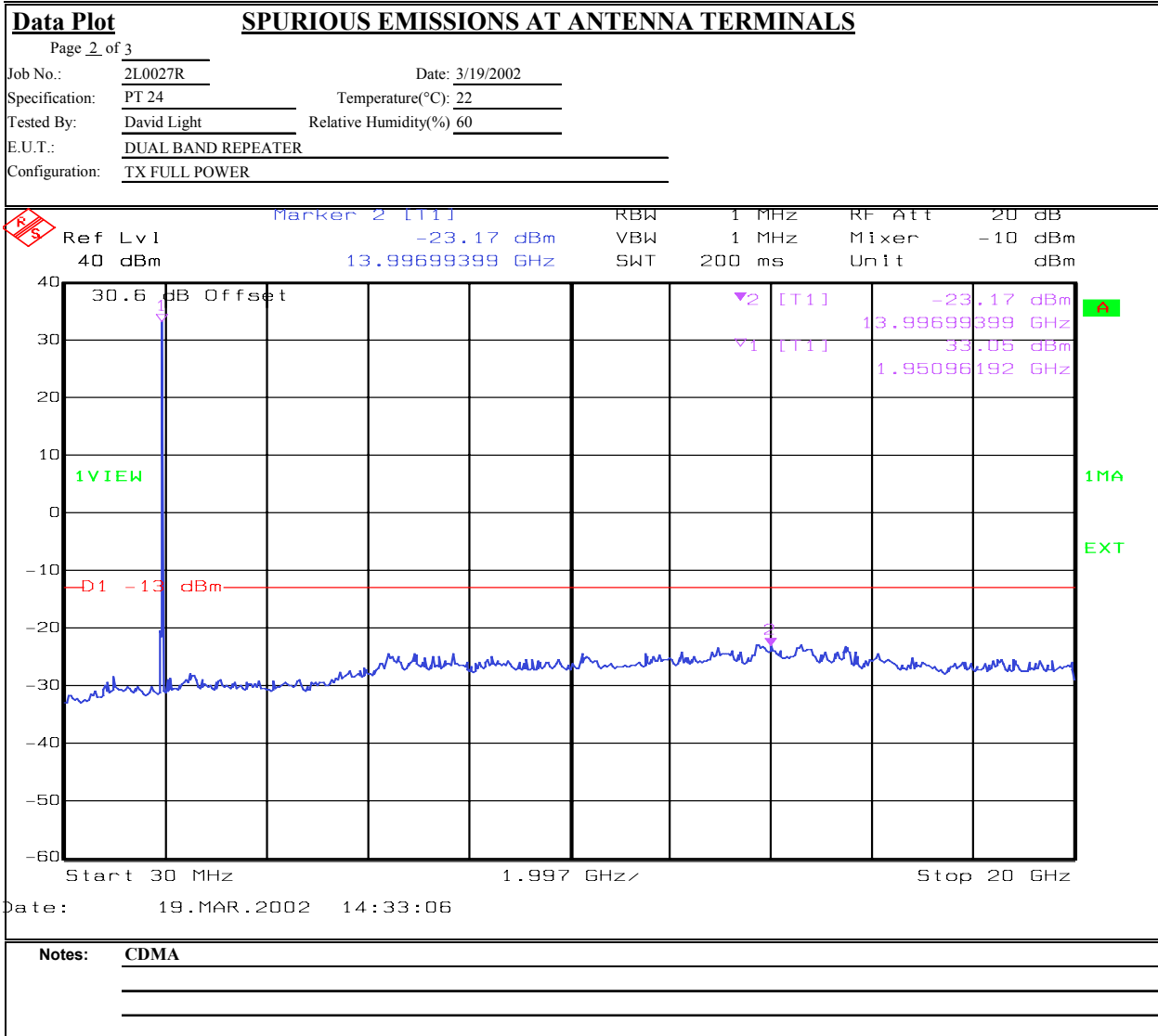
PROJECT NO: **2L0027RUS2**

**Test Data – Spurious Emissions at Antenna Terminals**



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EQUIPMENT: Enhanced Remote Antenna Unit  
(ERAU)

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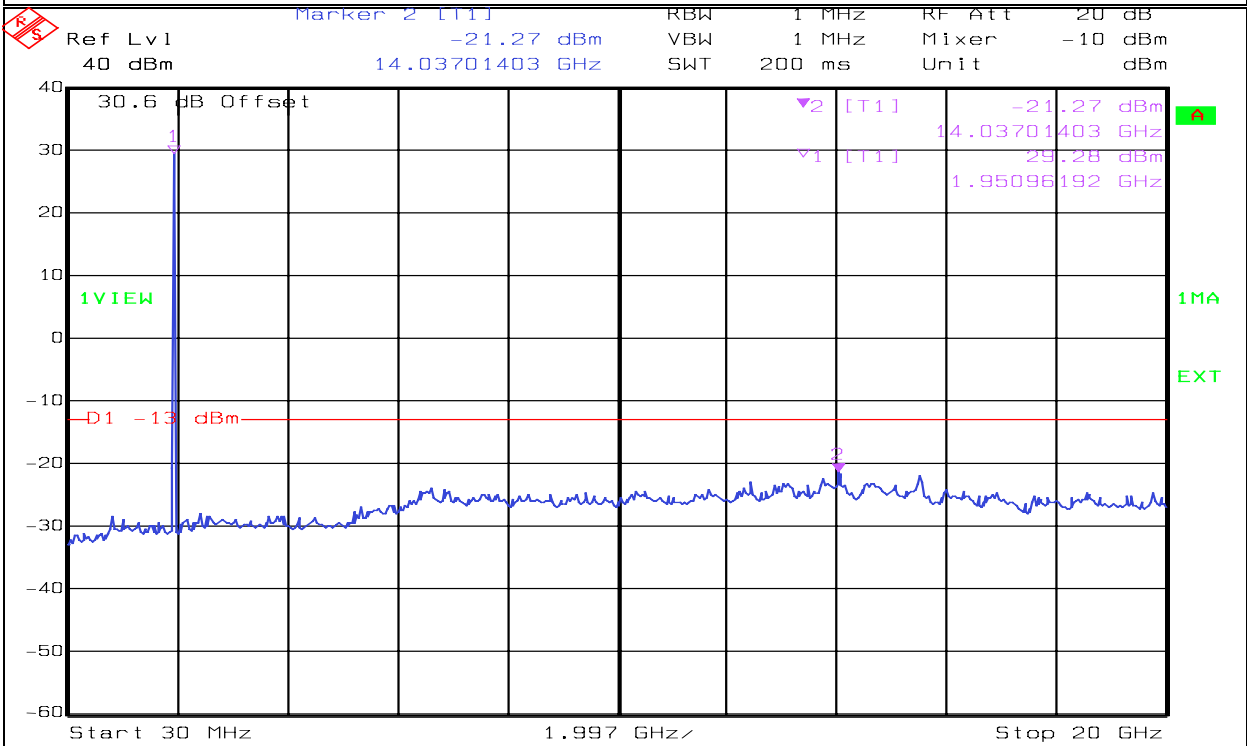
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Data Plot		SPURIOUS EMISSIONS AT ANTENNA TERMINALS	
Page 3 of 3			
Job No.:	2L0027R	Date:	3/19/2002
Specification:	PT 24	Temperature(°C):	22
Tested By:	David Light	Relative Humidity(%)	60
E.U.T.:	DUAL BAND REPEATER		
Configuration:	TX FULL POWER		



Date: 19.MAR.2002 14:34:41

Notes: GSM

EQUIPMENT: Enhanced Remote Antenna Unit  
(ERAU)

PROJECT NO: 2L0027RUS2

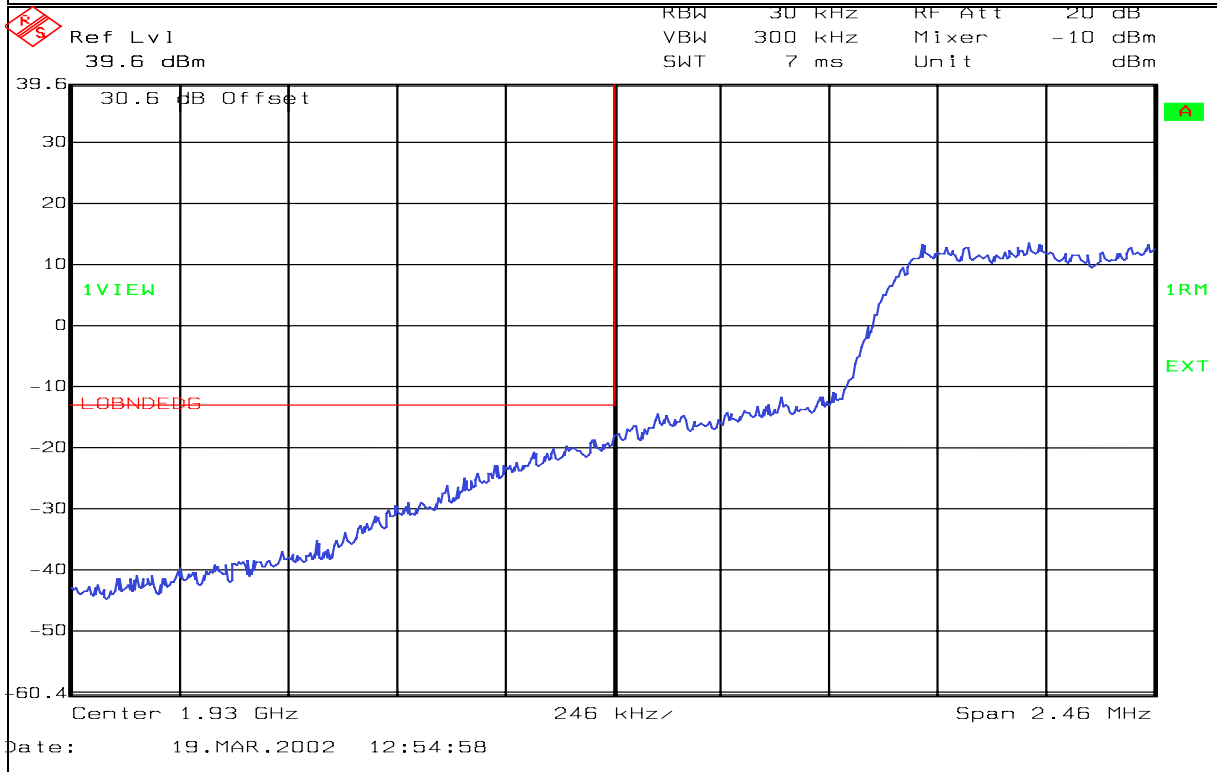
Test Data – Spurious Emissions at Antenna Terminals



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Data Plot		BANDEDGE PLOTS	
Page <u>1</u> of <u>6</u>			Complete <u>X</u>
Job No.: 2L0027R	Date: 3/19/2002		Preliminary: _____
Specification: PT 24	Temperature(°C): 22		
Tested By: David Light	Relative Humidity(%): 60		
E.U.T.: DUAL BAND REPEATER			
Configuration: TX FULL POWER			
Sample Number: 1			
Location: Lab 1	RBW: Refer to plots	Measurement	
Detector Type: Refer to plots	VBW: Refer to plots	Distance: N/A m	
<b>Test Equipment Used</b>			
Antenna: _____	Directional Coupler: _____		
Pre-Amp: _____	Cable #1: 1627		
Filter: _____	Cable #2: 1628		
Receiver: 1036	Cable #3: 1629		
Attenuator #1: 1478	Cable #4: _____		
Attenuator #2: 1471	Mixer: _____		
Additional equipment used: 1051 1052 1092 1053			
Measurement Uncertainty: +/-1.7 dB			



Notes: CDMA

EQUIPMENT: **Enhanced Remote Antenna Unit  
(ERAU)**

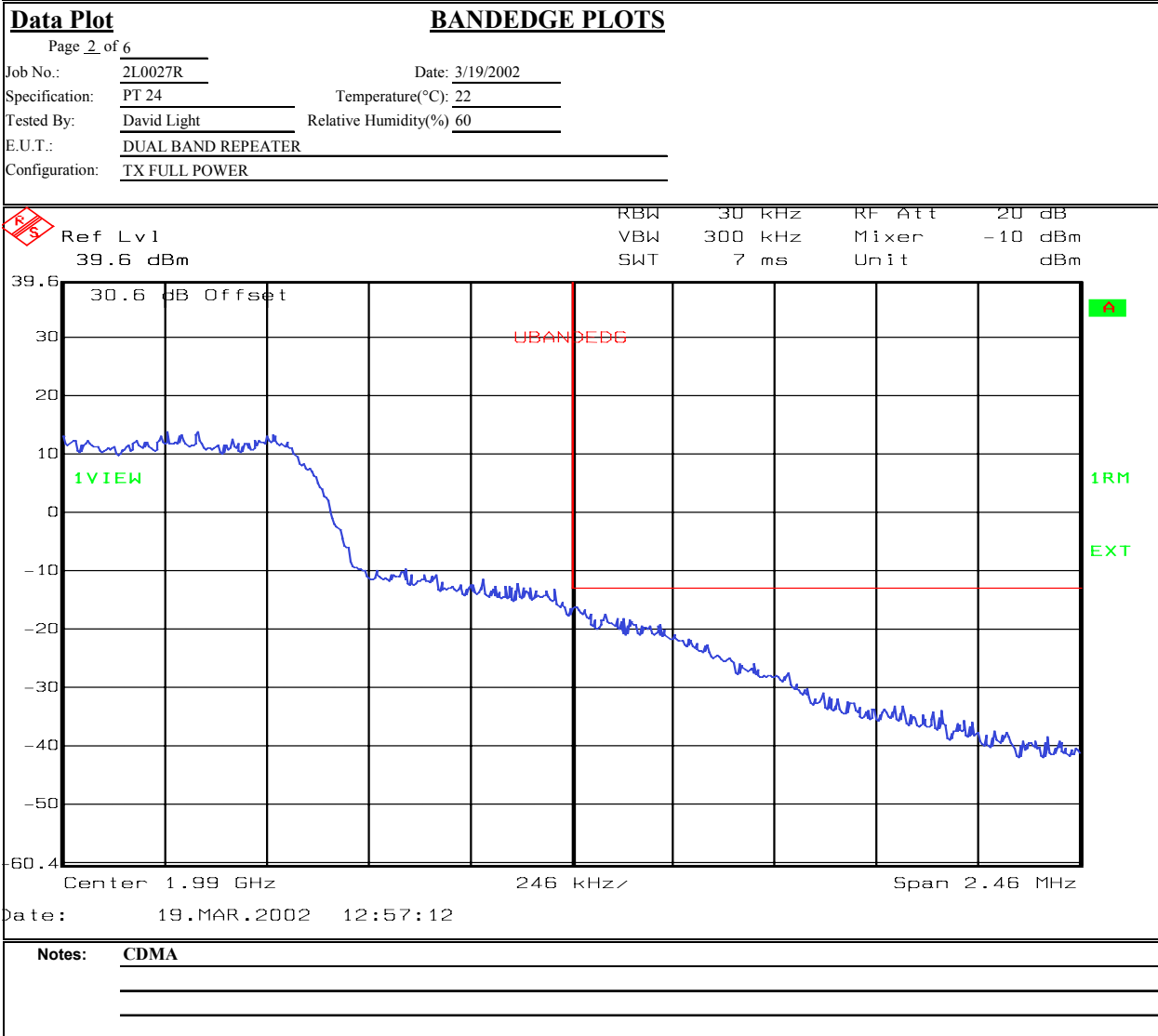
PROJECT NO: **2L0027RUS2**

**Test Data – Spurious Emissions at Antenna Terminals**



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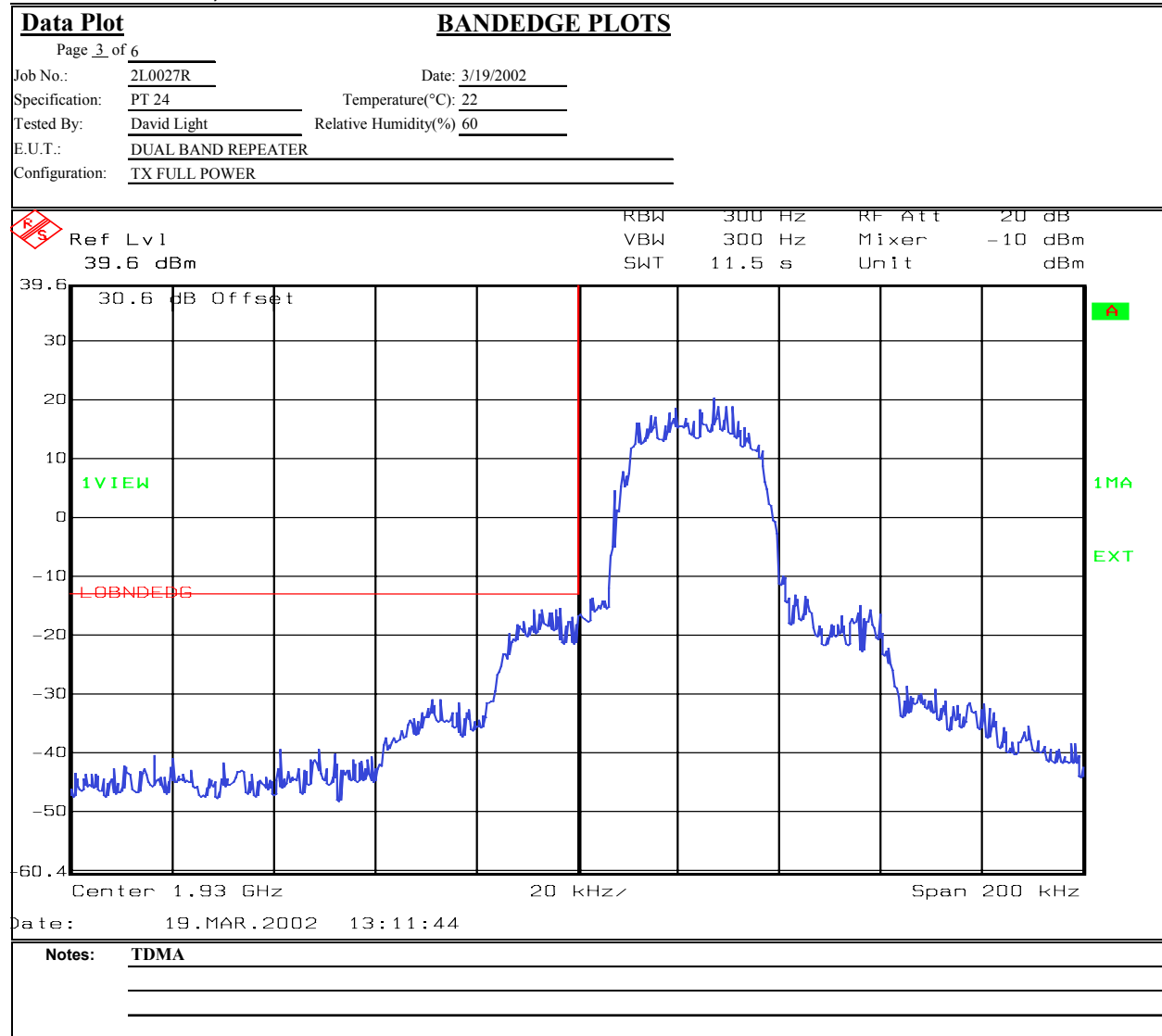
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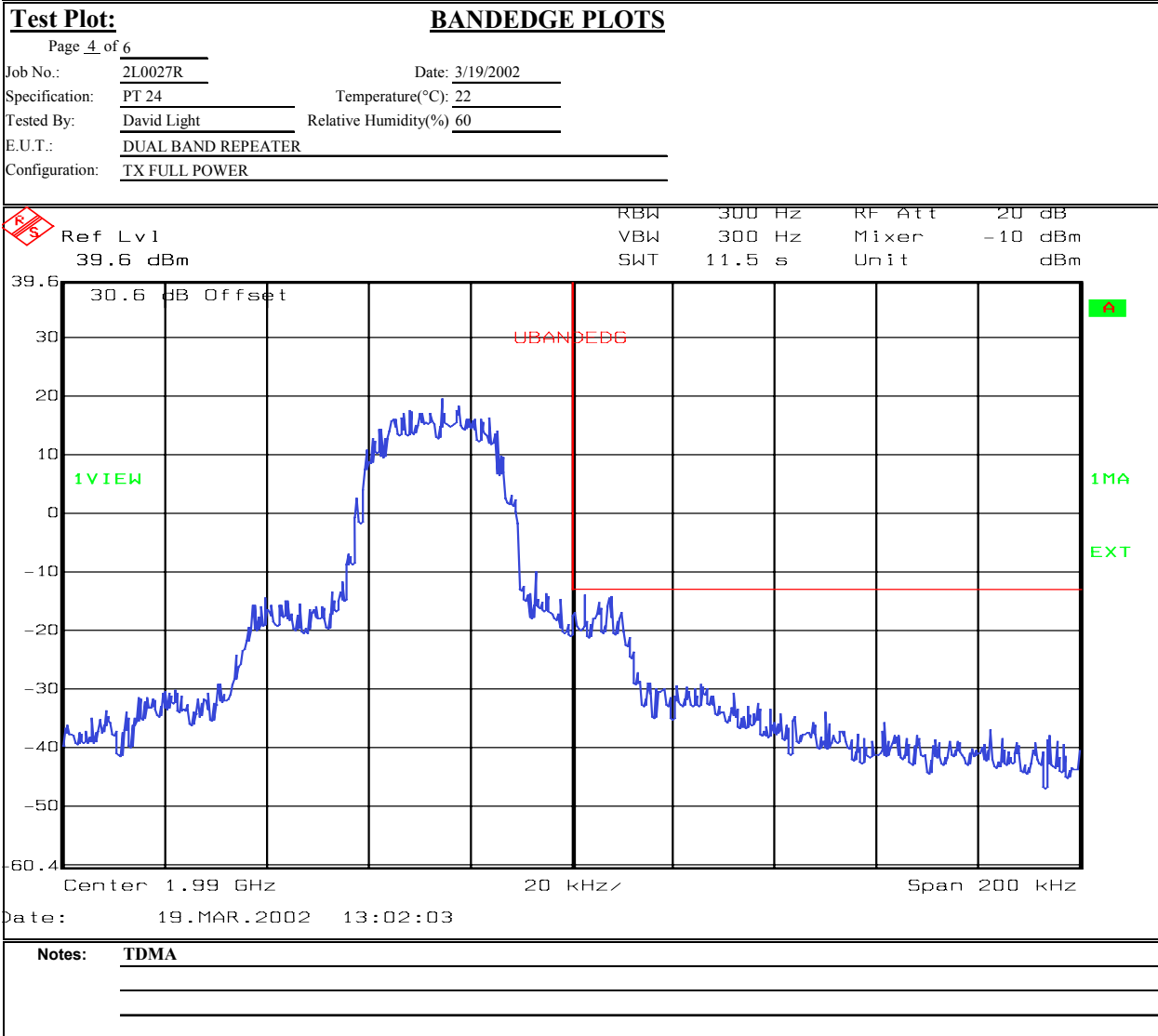
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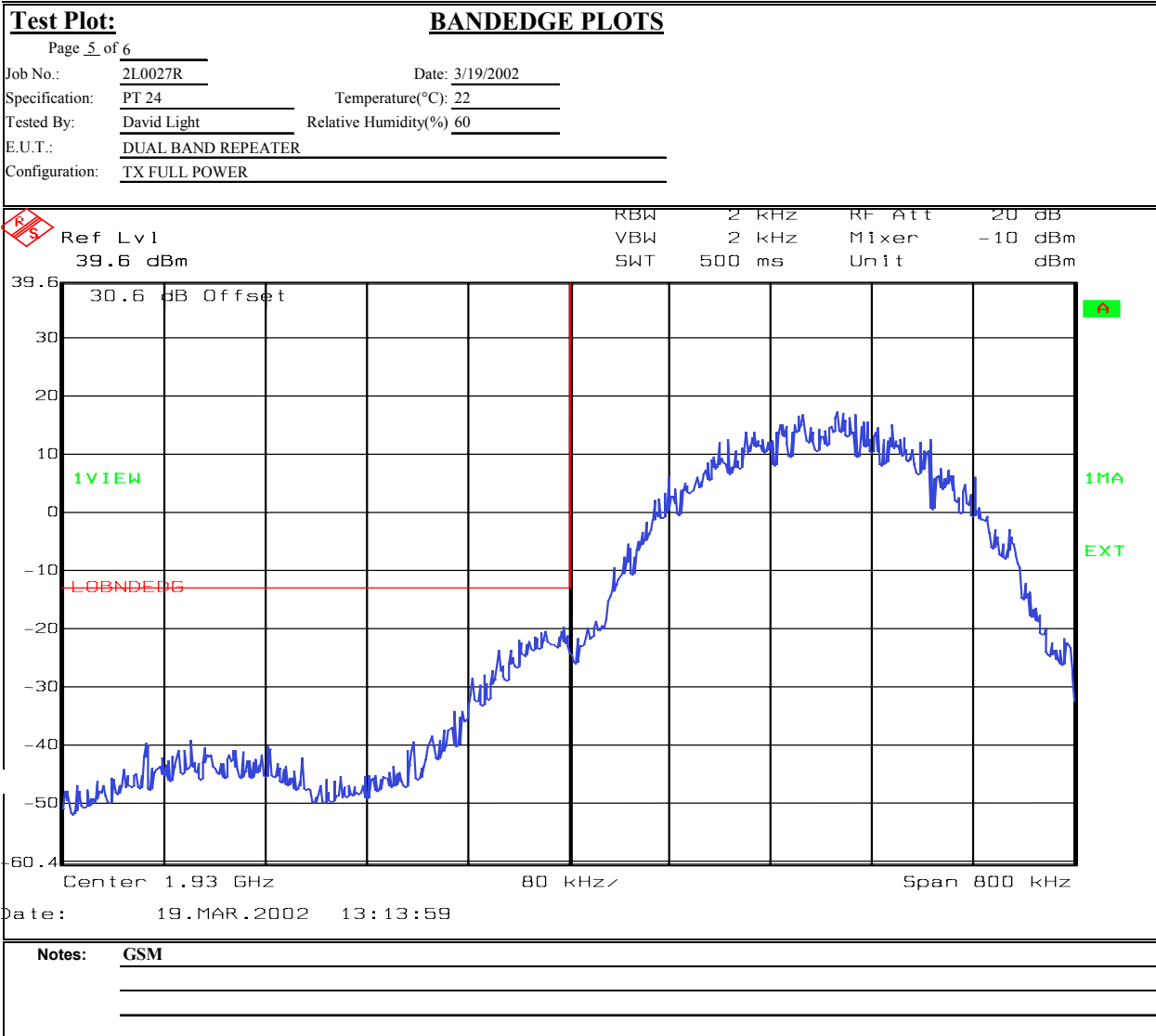
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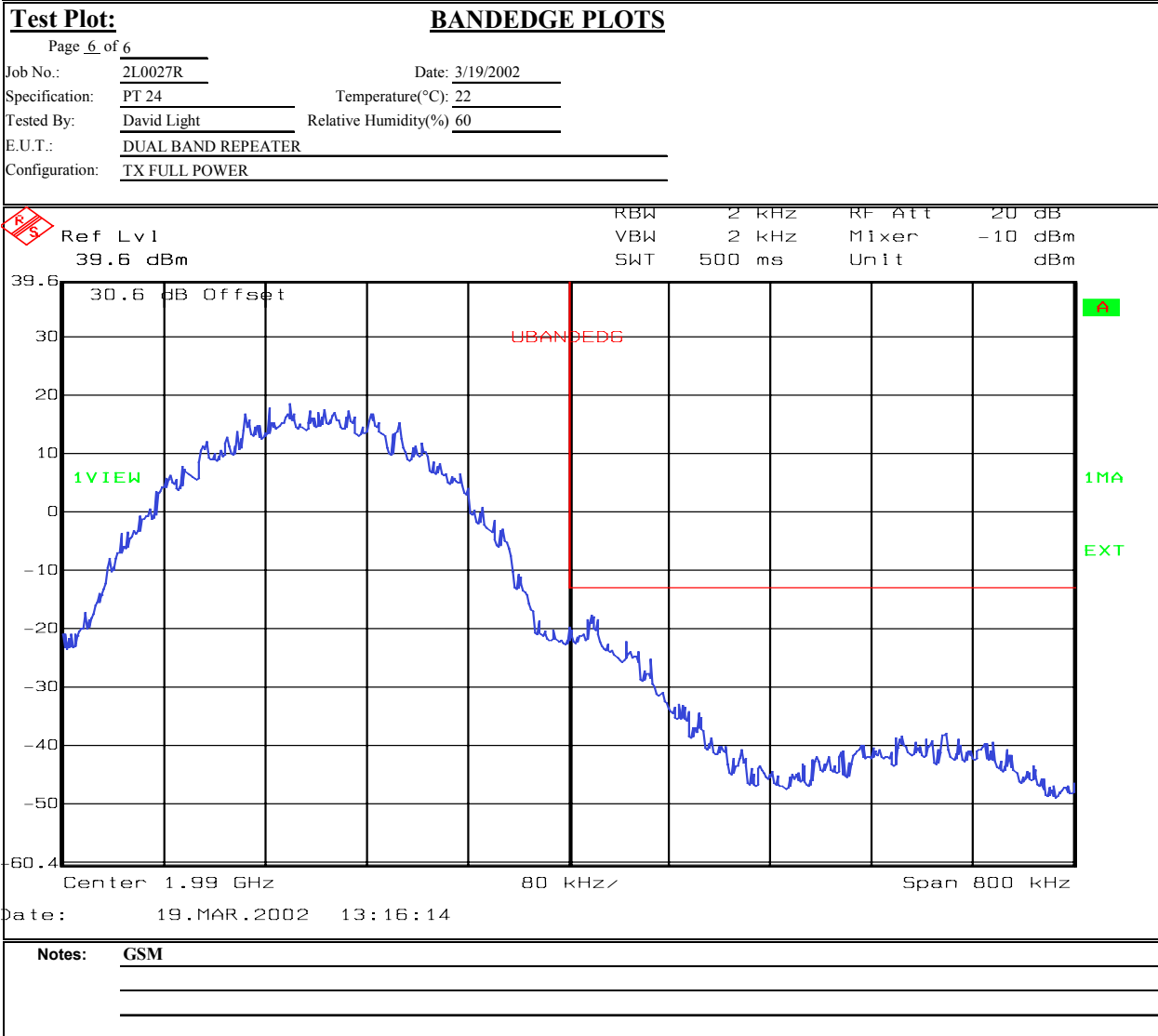
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Test Data – Spurious Emissions at Antenna Terminals



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Data Plot		INTERMODULATION CHARACTERISTICS													
Page 1 of 6		Complete <u>X</u>	Preliminary: _____												
Job No.: 2L0027R	Date: 3/19/2002														
Specification: PT24	Temperature(°C): 22														
Tested By: David Light	Relative Humidity(%): 60														
E.U.T.: DUAL BAND REPEATER															
Configuration: TX 2 CARRIERS															
Sample Number: 1															
Location: Lab 1	RBW: Refer to plots	Measurement													
Detector Type: Refer to plot	VBW: Refer to plots	Distance: N/A m													
<b>Test Equipment Used</b>															
Antenna: _____	Directional Coupler: _____														
Pre-Amp: _____	Cable #1: 1627														
Filter: _____	Cable #2: 1628														
Receiver: 1036	Cable #3: 1629														
Attenuator #1: 1478	Cable #4: _____														
Attenuator #2: 1471	Mixer: _____														
Additional equipment used: 1051 1052 1092 1053															
Measurement Uncertainty: +/-1.7 dB															
<table border="0"> <tr> <td>RBW</td> <td>30 kHz</td> <td>RF Att</td> <td>10 dB</td> </tr> <tr> <td>VBW</td> <td>300 kHz</td> <td>Mixer</td> <td>-10 dBm</td> </tr> <tr> <td>SWT</td> <td>28 ms</td> <td>Unit</td> <td>dBm</td> </tr> </table>				RBW	30 kHz	RF Att	10 dB	VBW	300 kHz	Mixer	-10 dBm	SWT	28 ms	Unit	dBm
RBW	30 kHz	RF Att	10 dB												
VBW	300 kHz	Mixer	-10 dBm												
SWT	28 ms	Unit	dBm												
<p>Ref Lvl 29.6 dBm</p> <p>30.6 dB Offset</p> <p>Center 1.93 GHz 1 MHz/ Span 10 MHz</p>															
Date: 19.MAR.2002 14:06:30															
Notes: CDMA															

EQUIPMENT: **Enhanced Remote Antenna Unit  
(ERAU)**

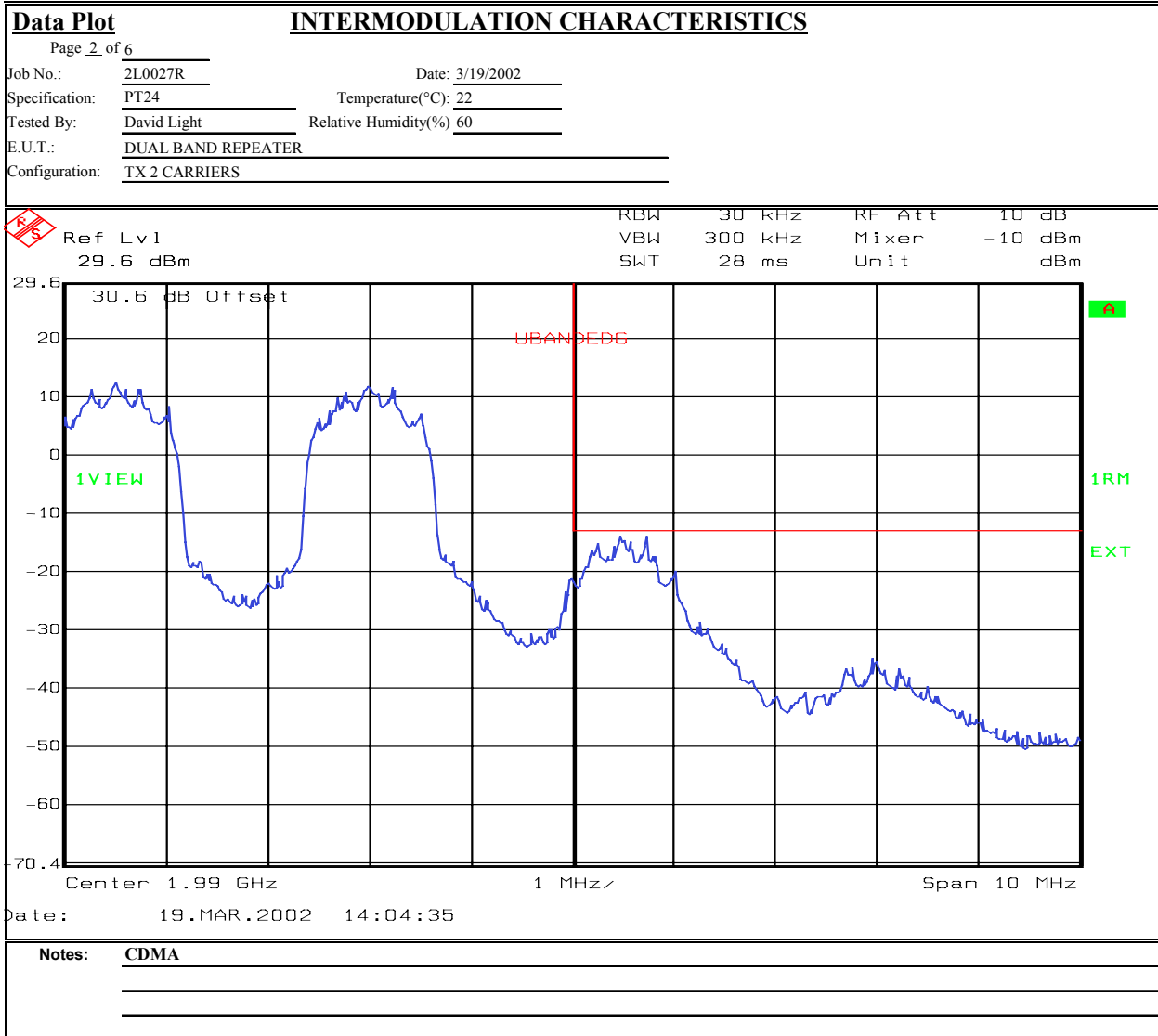
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Lewisville, TX 75057  
Tel: (972) 436-9600  
Fax: (972) 436-2667

Nemko Dallas, Inc.



EQUIPMENT: Enhanced Remote Antenna Unit  
(ERAU)

PROJECT NO: 2L0027RUS2

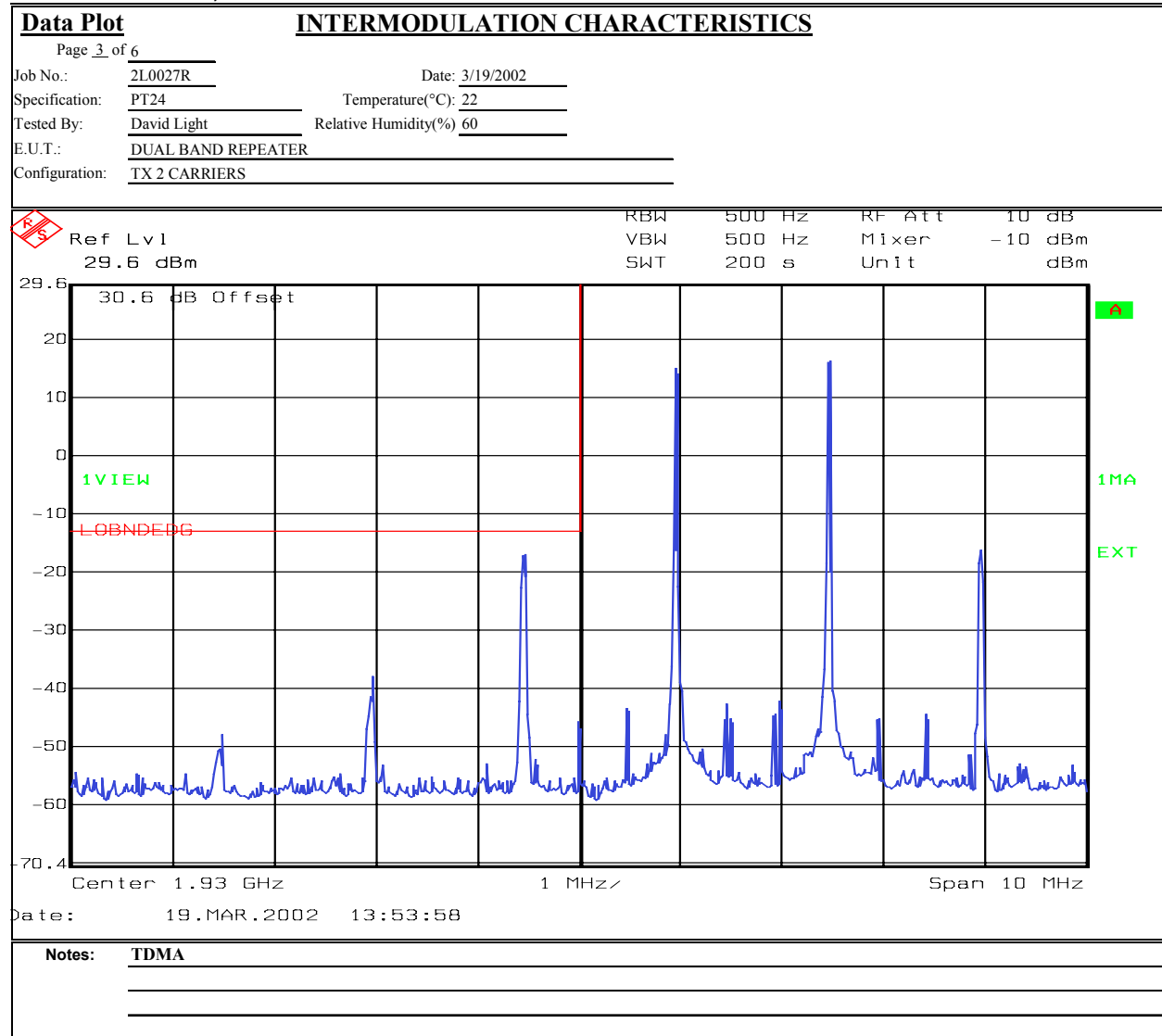
Test Data – Spurious Emissions at Antenna Terminals



Nemko Dallas, Inc.

Dallas Headquarters:

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



EQUIPMENT: **Enhanced Remote Antenna Unit  
(ERAU)**

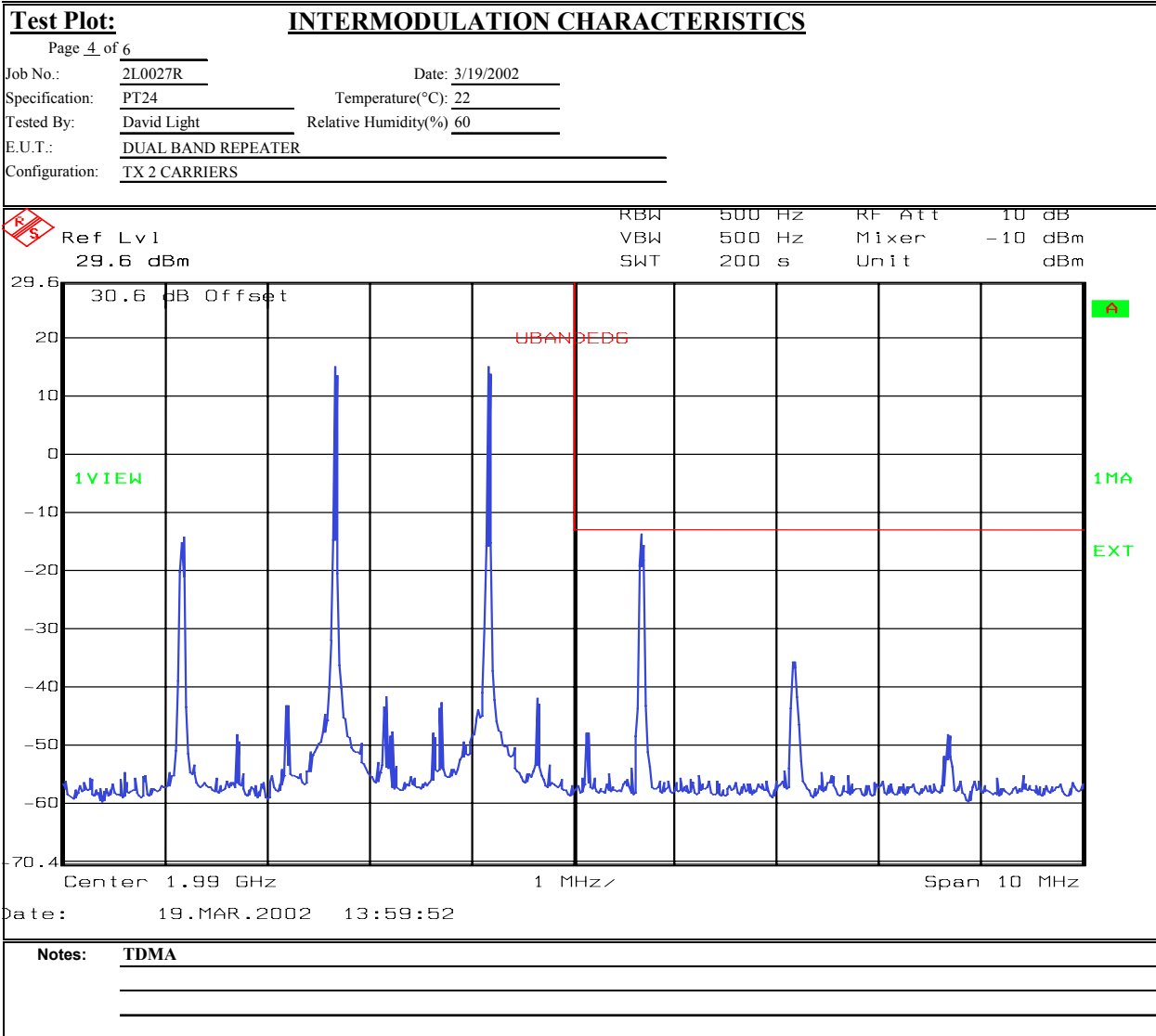
PROJECT NO: **2L0027RUS2**

**Test Data – Spurious Emissions at Antenna Terminals**



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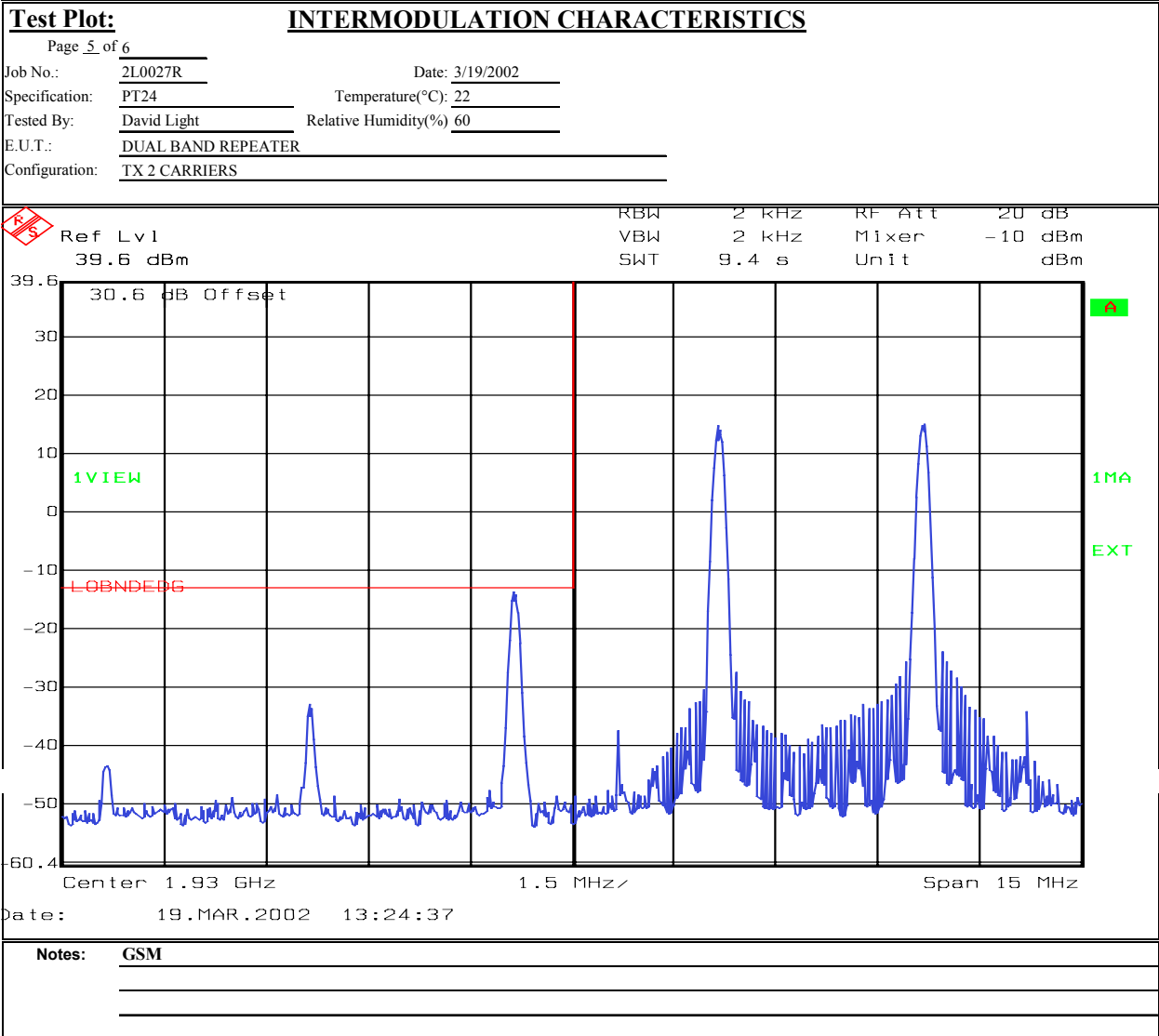
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PROJECT NO: **2L0027RUS2**

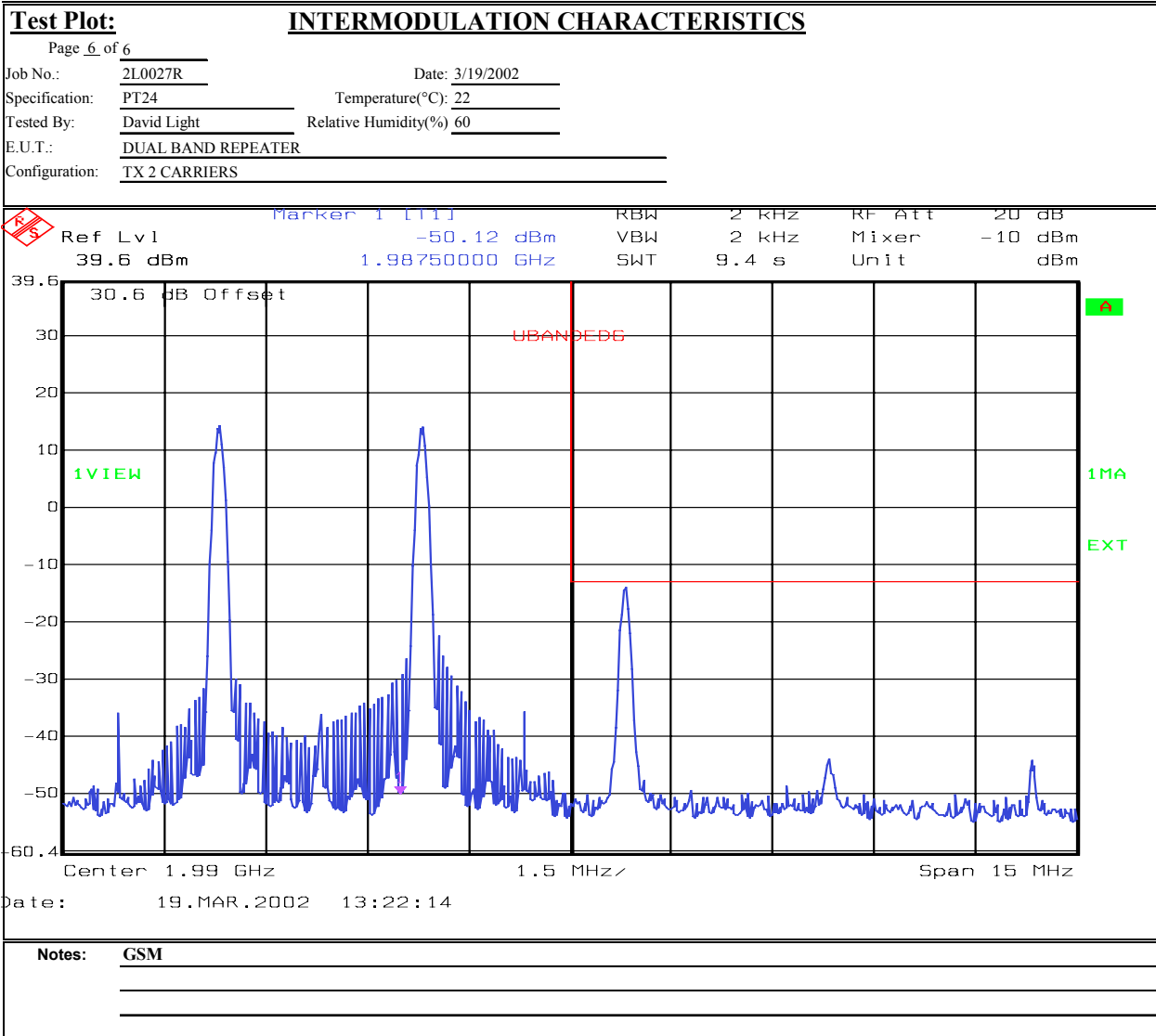
**Test Data – Spurious Emissions at Antenna Terminals**



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EQUIPMENT: Enhanced Remote Antenna Unit  
(ERAU)

PROJECT NO: 2L0027RUS2

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**Section 6. Field Strength of Spurious**

NAME OF TEST: Field Strength of Spurious Emissions	PARA. NO.: 2.1051
TESTED BY: David Light	DATE:3/19/2002

**Test Results:** Complies.

**Test Data:** See attached table.

**Measurement Uncertainty:** +/- 3.6 dB

EQUIPMENT: Enhanced Remote Antenna Unit  
(ERAU)

PROJECT NO: 2L0027RUS2

Test Data - Radiated Emissions - Downlink



Nemko Dallas, Inc.

Dallas Headquarters:

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Tel: (972) 436-9600  
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<b>FIELD STRENGTH OF SPURIOUS EMISSIONS</b>											
Page <u>1</u> of <u>1</u>								Complete <u>  X  </u>			
Job No.:	<u>2L0027R</u>	Date:	<u>3/19/2002</u>				Preliminary				
Specification:	<u>PT24</u>	Temperature(°C):	<u>20</u>								
Tested By:	<u>David Light</u>	Relative Humidity(%)	<u>60</u>								
E.U.T.:	<u>DUAL BAND REPEATER</u>										
Configuration:	<u>TX @ 1960 MHz</u>										
Sample No:	<u>1</u>										
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>			
<b>Test Equipment Used</b>											
Antenna:	<u>1304</u>	Directional Coupler:									
Pre-Amp:	<u>1016</u>	Cable #1:	<u>1484</u>								
Filter:	<u></u>	Cable #2:	<u>1485</u>								
Receiver:	<u>1464</u>	Cable #3:	<u></u>								
Attenuator #1:	<u></u>	Cable #4:	<u></u>								
Attenuator #2:	<u></u>	Mixer:	<u></u>								
Additional equipment used:	<u></u>										
Measurement Uncertainty:	<u>+/-3.6 dB</u>										
Frequency (MHz)	Meter Reading (dBm)	Correction Factor (dB)		Pre-Amp Gain (dB)	Substitution Antenna Gain (dBd)		ERP (dBm)	ERP (mW)	Polarity	Comments	
3920	-63.0	35.5		33.3	8.6		-52.3	0.0000	H	NOISE FLOOR	
5880	-64.0	37.8		33.3	9.3		-50.2	0.0000	H	NOISE FLOOR	
7840	-65.3	41.5		33.3	9.2		-48.0	0.0000	H	NOISE FLOOR	
9800	-64.3	43.3		36	10.3		-46.7	0.0000	H	NOISE FLOOR	
3920	-60.7	43.3		33.3	8.6		-42.1	0.0001	V		
5880	-64.0	39.8		33.3	9.3		-48.2	0.0000	V	NOISE FLOOR	
7840	-65.3	41.8		33.3	9.2		-47.6	0.0000	V	NOISE FLOOR	
9800	-64.3	41.8		36	10.3		-48.2	0.0000	V	NOISE FLOOR	
<b>Notes:</b> Scanned spectrum to the tenth harmonic											

**Photographs of Test Setup**

FRONT VIEW



REAR VIEW



EQUIPMENT: Enhanced Remote Antenna Unit  
(ERAU)

PROJECT NO: 2L0027RUS2

**Section 7. Test Equipment List**

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date
1304	HORN ANTENNA	ELECTRO METRICS RGA-60	6151	07/30/01
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	01/02/01
1484	Cable 2.0-18.0 Ghz	Storm PR90-010-072	N/A	06/01/01
1485	Cable 2.0-18.0 Ghz	Storm PR90-010-216	N/A	06/01/01
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	12/18/01
1052	I/Q MODULATION GENERATOR	Rhode & Schwarz AMIQ	DE30619	09/25/00
1051	Radio Communication Analyzer	Rhode & Schwarz CMTA-54	835875/002	CBU
1478	20db Attenuator DC 18 Ghz	MCL Inc. BW-S20W6	NONE	CBU
1471	10 db Attenuator DC 18 Ghz	MCL Inc. BW-S10W2 10db-2WDC	NONE	CBU
1628	CABLE, 6 ft	MEGAPHASE TM26 S1S5 72	N/A	CBU
1627	CABLE, 5 ft	MEGAPHASE 10312 1GVT4	N/A	CBU
1629	CABLE, 6 ft	MEGAPHASE 10311 1GVT4	N/A	CBU
1092	COMBINER	MINI-CIRCUITS ZA3PD-1.5	NONE	CBU
1053	SIGNAL GENERATOR	ROHDE & SCHWARZ SMIQ 03	DE22081	08/09/01

**Nemko Dallas**

FCC PART 24, SUBPART E  
BROADBAND PCS REPEATERS

*EQUIPMENT:* **Enhanced Remote Antenna Unit  
(ERAU)**

PROJECT NO: **2L0027RUS2**

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## **ANNEX A - TEST DETAILS**

EQUIPMENT: **Enhanced Remote Antenna Unit  
(ERAU)**

PROJECT NO: **2L0027RUS2**

<b>NAME OF TEST: RF Power Output</b>	<b>PARA. NO.: 2.1046</b>
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**Minimum Standard:** Para. No.24.232. Base stations are limited to 1640 watts peak E.I.R.P. with an antenna height up to 300 meters HAAT. In no case may the peak output power of a base station transmitter exceed 100 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.

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

EQUIPMENT: Enhanced Remote Antenna Unit  
(ERAU)

PROJECT NO: 2L0027RUS2

**NAME OF TEST: Occupied Bandwidth**

**PARA. NO.: 2.1047**

**Minimum Standard:** Para. No. 24.238(b). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB.

**Method Of Measurement:**

CDMA

Spectrum analyzer settings:

RBW: 30 kHz

VBW:  $\geq$  RBW

Span: 5 MHz

Sweep: Auto

Mask: Set markers to -26 dB from peak of CW.

GSM

RBW: 3 kHz

VBW:  $\geq$  RBW

Span: 2 MHz

Sweep: Auto

Mask: Set markers to -26 dB from peak of CW.

NADC

RBW: 1 kHz

VBW:  $\geq$  RBW

Span: 1 MHz

Sweep: Auto

Mask: Set markers to -26 dB from peak of CW.

EQUIPMENT: **Enhanced Remote Antenna Unit  
(ERAU)**

PROJECT NO: **2L0027RUS2**

<b>NAME OF TEST: Spurious Emission at Antenna Terminals</b>	<b>PARA. NO.: 2.1051</b>
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**Minimum Standard:** Para. No.24.238(a). On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power by at least  $43 + 10 \log (P)$  dB.

**Method Of Measurement:**

Spectrum analyzer settings:

CDMA

RBW: 1 MHz (> 1 MHz from Band Edge)  
 RBW: 30 kHz (< 1MHz from Band Edge)  
 VBW: ≥ RBW  
 Sweep: Auto  
 Video Avg: 6 Sweeps

GSM

RBW: 1 MHz (> 1 MHz from Band Edge)  
 RBW: 3 kHz (< 1 MHz from Band Edge)  
 VBW: ≥ RBW  
 Sweep: Auto  
 Video Avg: Disabled

NADC

RBW: 1 MHz (> 1 MHz from Band Edge)  
 RBW: 3 kHz (< 1 MHz from Band Edge)  
 VBW: ≥ RBW  
 Sweep: Auto  
 Video Avg: Disabled

To demonstrate compliance at band edges the frequency of the input signal is set to the lowest and highest assigned channel and the center frequency of the spectrum analyzer is set to the upper and lower edges of the appropriate frequency block.



*EQUIPMENT:* Enhanced Remote Antenna Unit  
(ERAU)

PROJECT NO: 2L0027RUS2

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

Para. No.24.238(a). On any frequency outside a licensee's

frequency block, the power of any emission shall be attenuated below the transmitter power by at least  $43 + 10 \log (P)$  dB.

**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.

The spectrum is searched up to the 10<sup>th</sup> harmonic of the fundamental emission.

EQUIPMENT: **Enhanced Remote Antenna Unit  
(ERAU)**

PROJECT NO: **2L0027RUS2**

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**NAME OF TEST: Frequency Stability**

**PARA. NO.: 2.1055**

**Minimum Standard:** Para. No. 24.235. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

**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 24, SUBPART E  
BROADBAND PCS REPEATERS

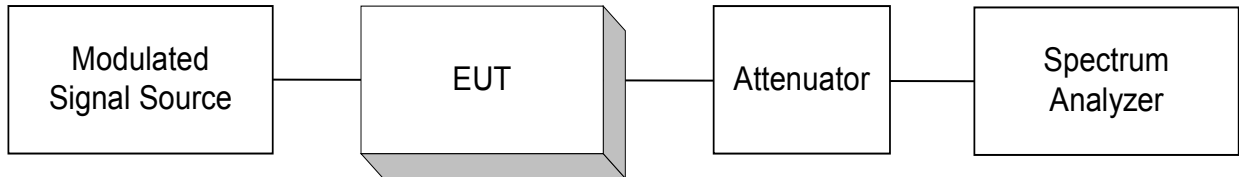
*EQUIPMENT:* **Enhanced Remote Antenna Unit  
(ERAU)**

PROJECT NO: **2L0027RUS2**

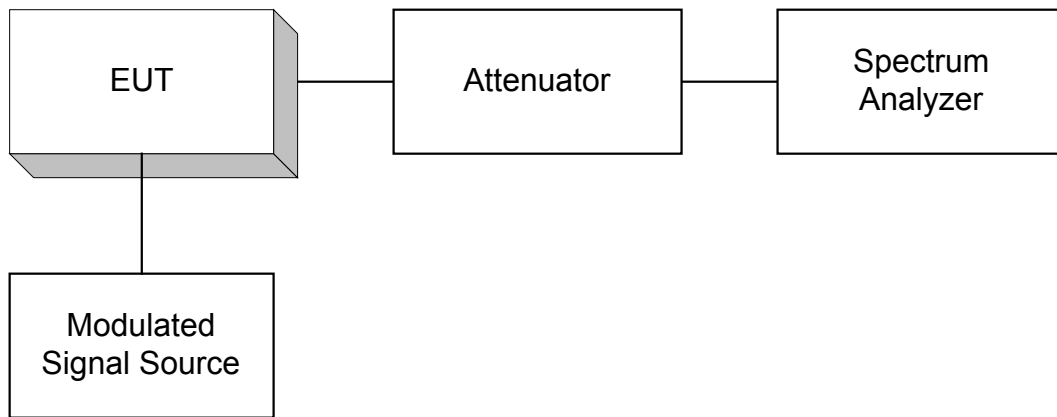
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## **ANNEX B - TEST DIAGRAMS**

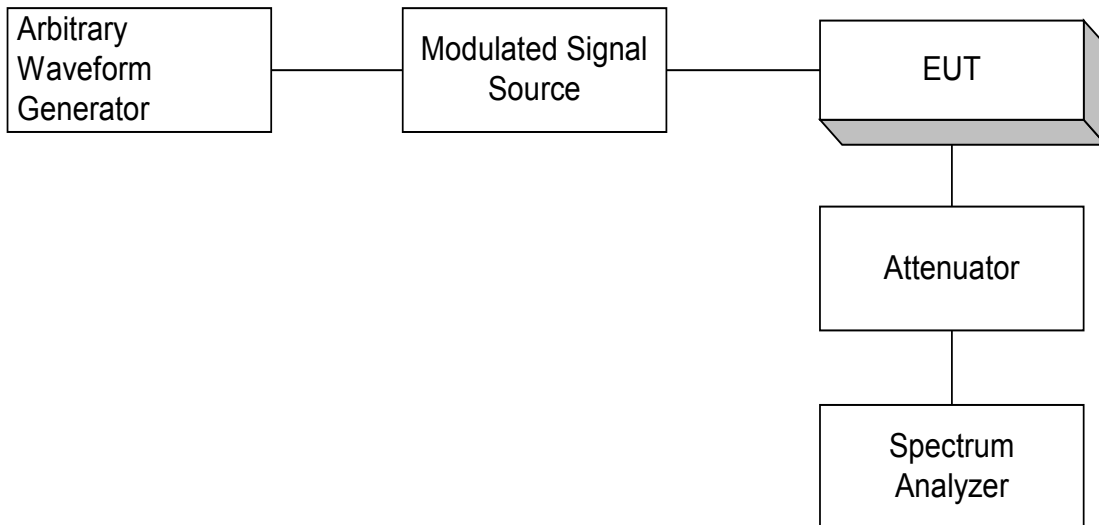
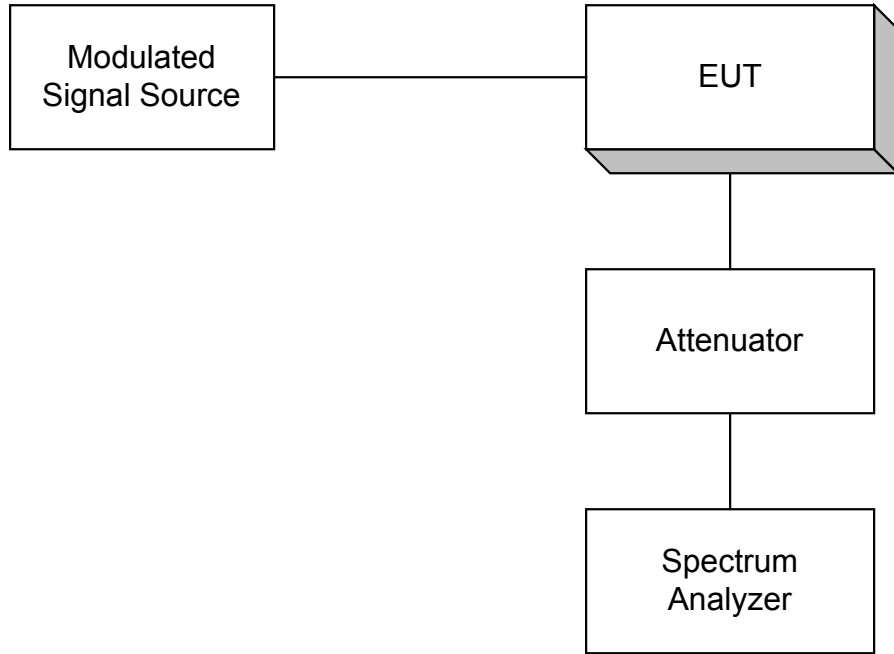
**Para. No. 2.985 - R.F. Power Output**



**Para. No. 2.989 - Occupied Bandwidth**



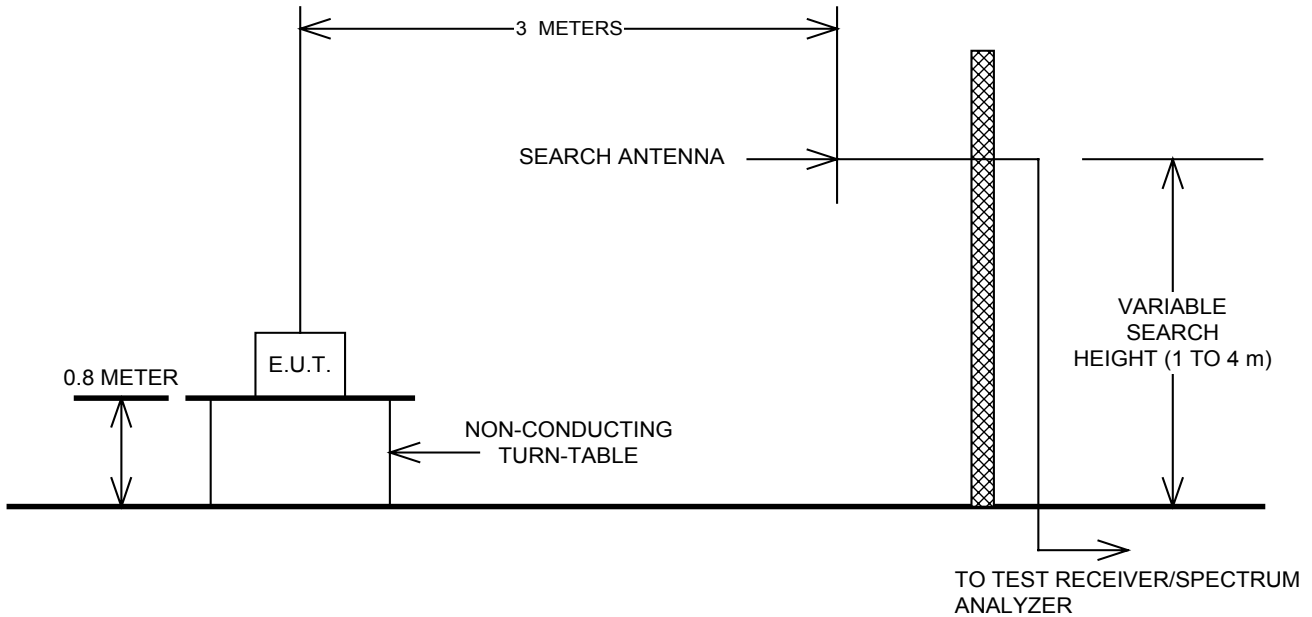
**Para. No. 2.991 Spurious Emissions at Antenna Terminals**



EQUIPMENT: **Enhanced Remote Antenna Unit  
(ERAU)**

PROJECT NO: **2L0027RUS2**

**Para. No. 2.993 - Field Strength of Spurious Radiation**



**Para. No. 2.995 - Frequency Stability**

