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

Table of Contents

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

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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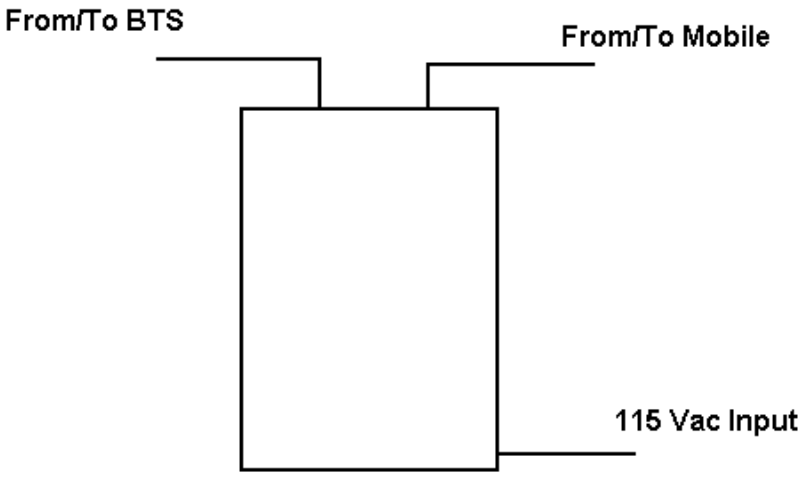
Section 2. General Equipment Specification

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** ☐

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



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 %

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

Test Data – Occupied Bandwidth

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

Nemko Dallas, Inc.

Data Plot — **Occupied Bandwidth**

Page 1 of 5 — Complete: X — Preliminary:

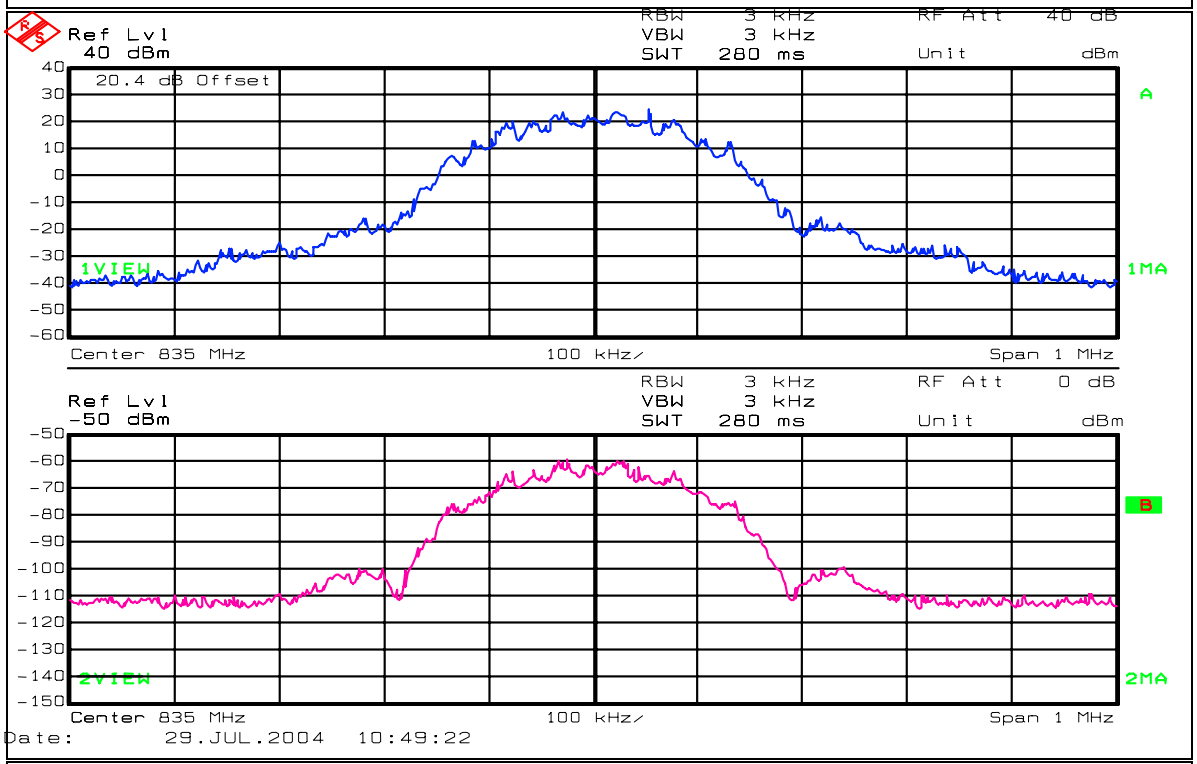
Job No.:	4L0458R	Date:	7/29/2004		
Specification:	PT22	Temperature(°C):	22		
Tested By:	David Light	Relative Humidity(%)	40		
E.U.T.:	CELL BAND REPEATER				
Configuration:	TX				
Sample Number:	1				
Location:	Lab 1	RBW:	Refer to plots	Measurement Distance:	NA m
Detector Type:	Peak	VBW:	Refer to plots		

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



Notes: EDGE

Test Data – Occupied Bandwidth

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

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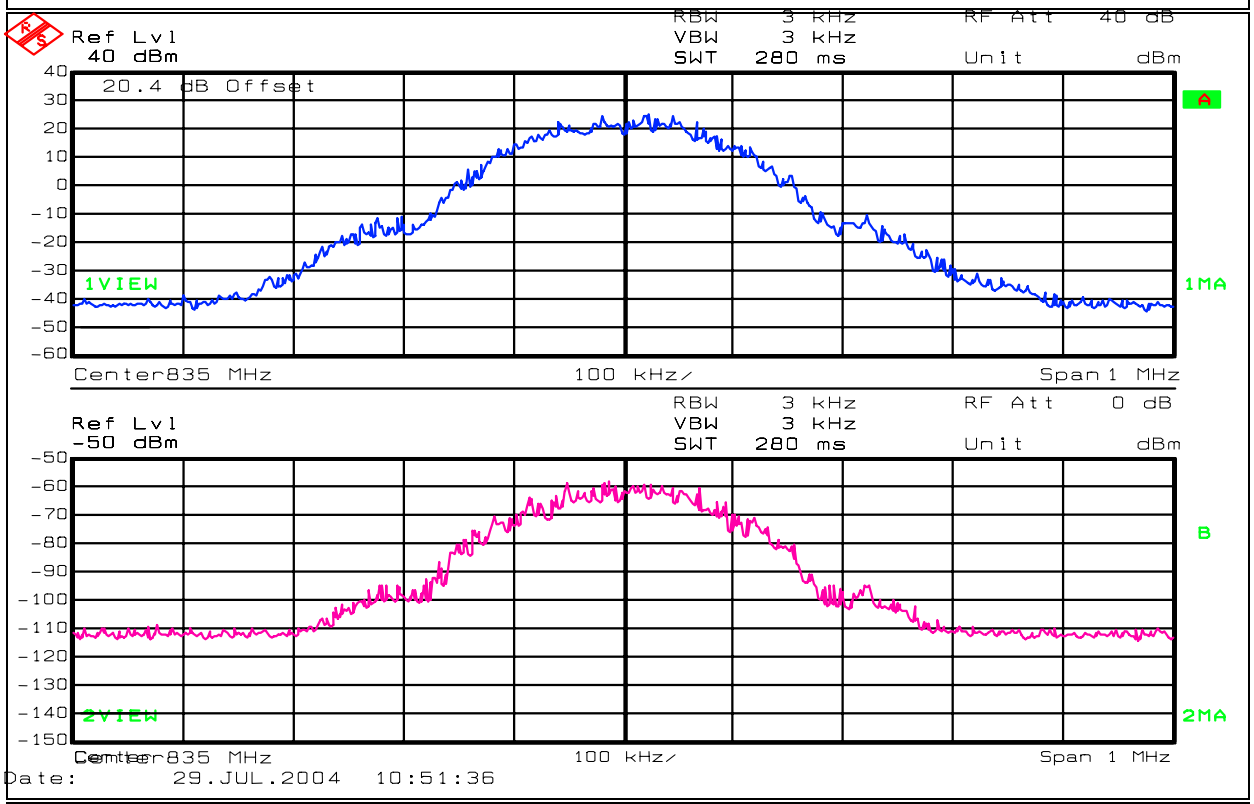
Data Plot — **Occupied Bandwidth**

Page 2 of 5

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		



Notes: GSM

Test Data – Occupied Bandwidth

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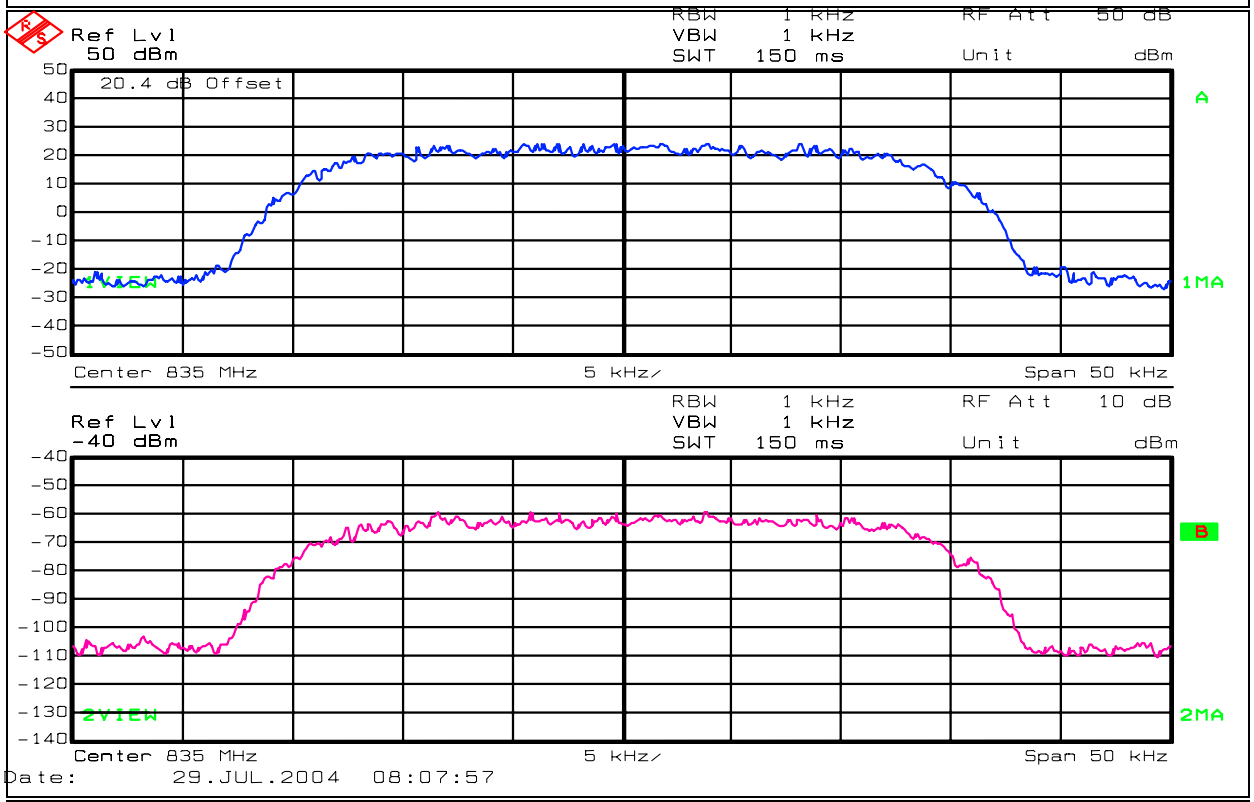
Data Plot — **Occupied Bandwidth**

Page 3 of 5

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		



Notes: TDMA

Test Data – Occupied Bandwidth

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Data Plot — **Occupied Bandwidth**

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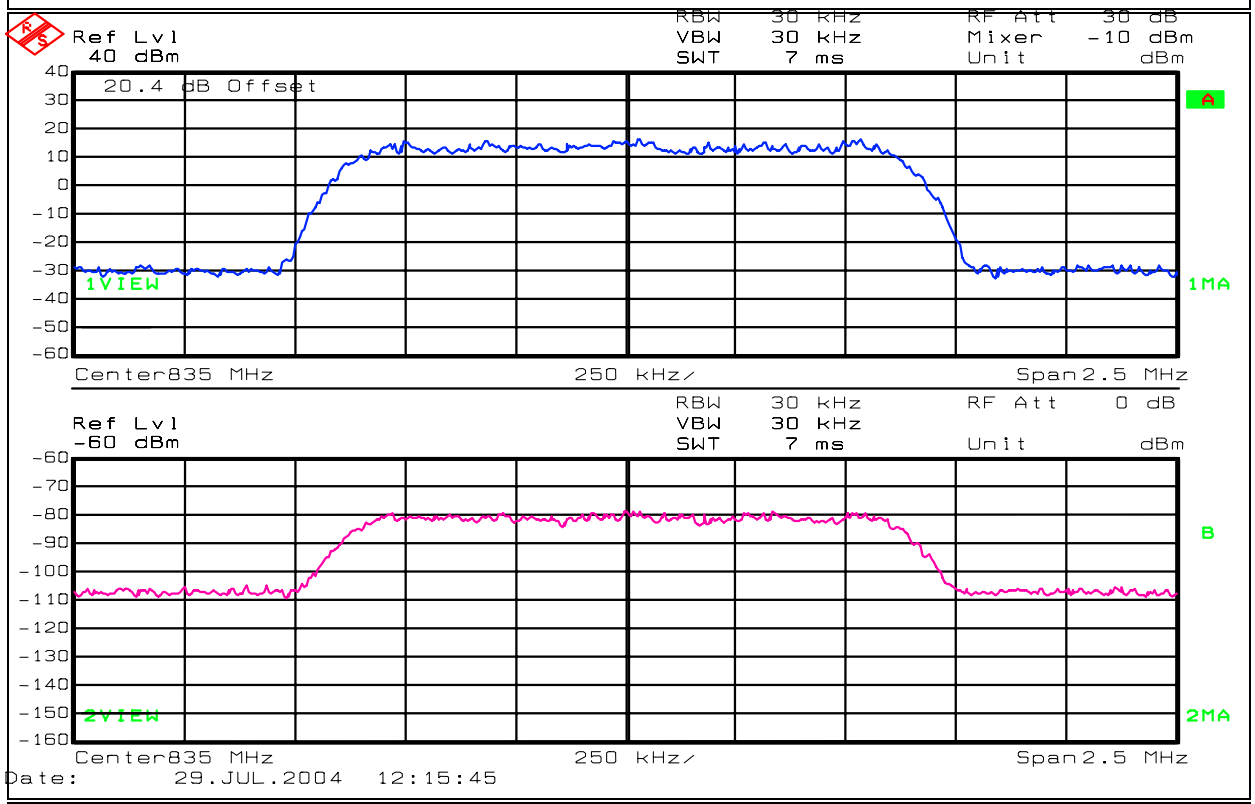
Job No.:	4L0458R	Date:	7/29/2004
Specification:	PT22	Temperature(°C):	22
Tested By:	David Light	Relative Humidity(%)	40
E.U.T.:	CELL BAND REPEATER		
Configuration:	TX		



Notes: CDMA

Test Data – Occupied Bandwidth

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Data Plot — **Occupied Bandwidth**

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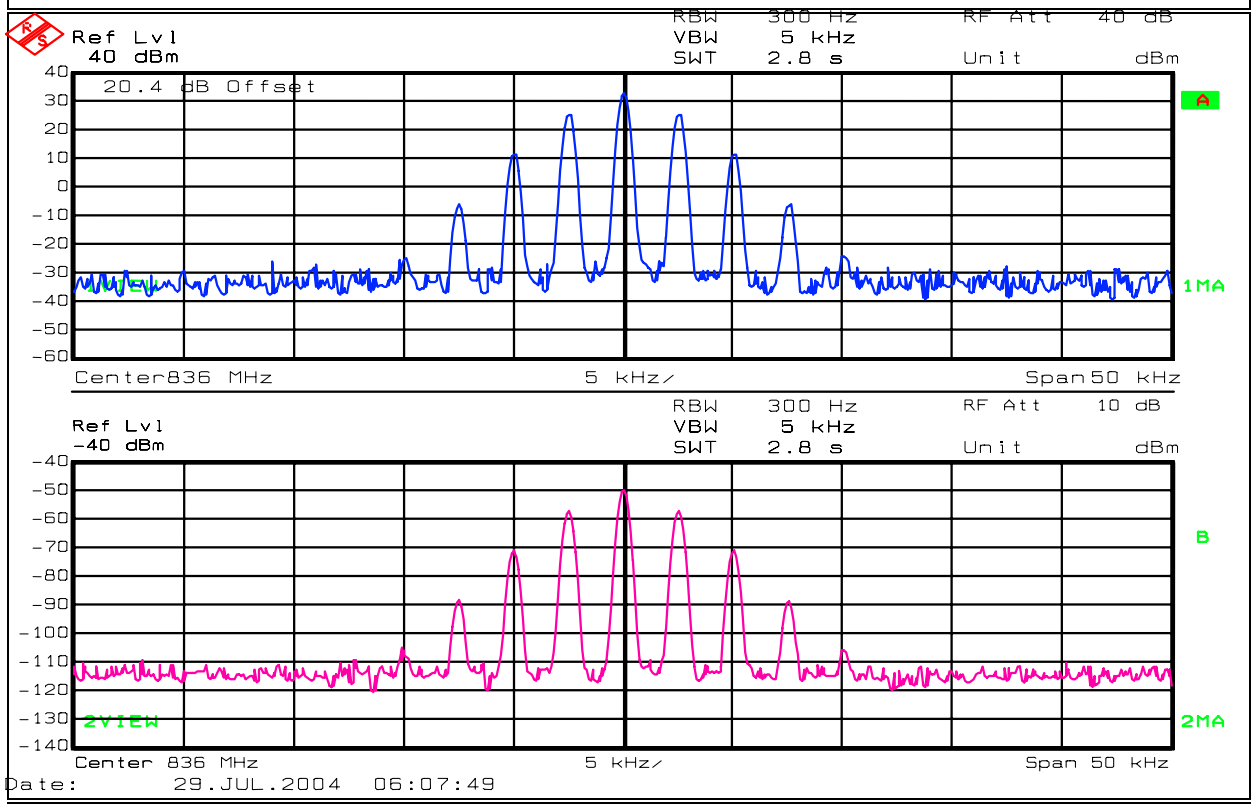
Job No.:	4L0458R	Date:	7/29/2004
Specification:	PT22	Temperature(°C):	22
Tested By:	David Light	Relative Humidity(%)	40
E.U.T.:	CELL BAND REPEATER		
Configuration:	TX		



Notes: **ANALOG**
2.5 kHz TONE - 2 kHz DEVIATION

Test Data – Occupied Bandwidth

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Data Plot — **Occupied Bandwidth**

Page 1 of 5 — Complete X — Preliminary:

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:		VBW:	Refer to plots

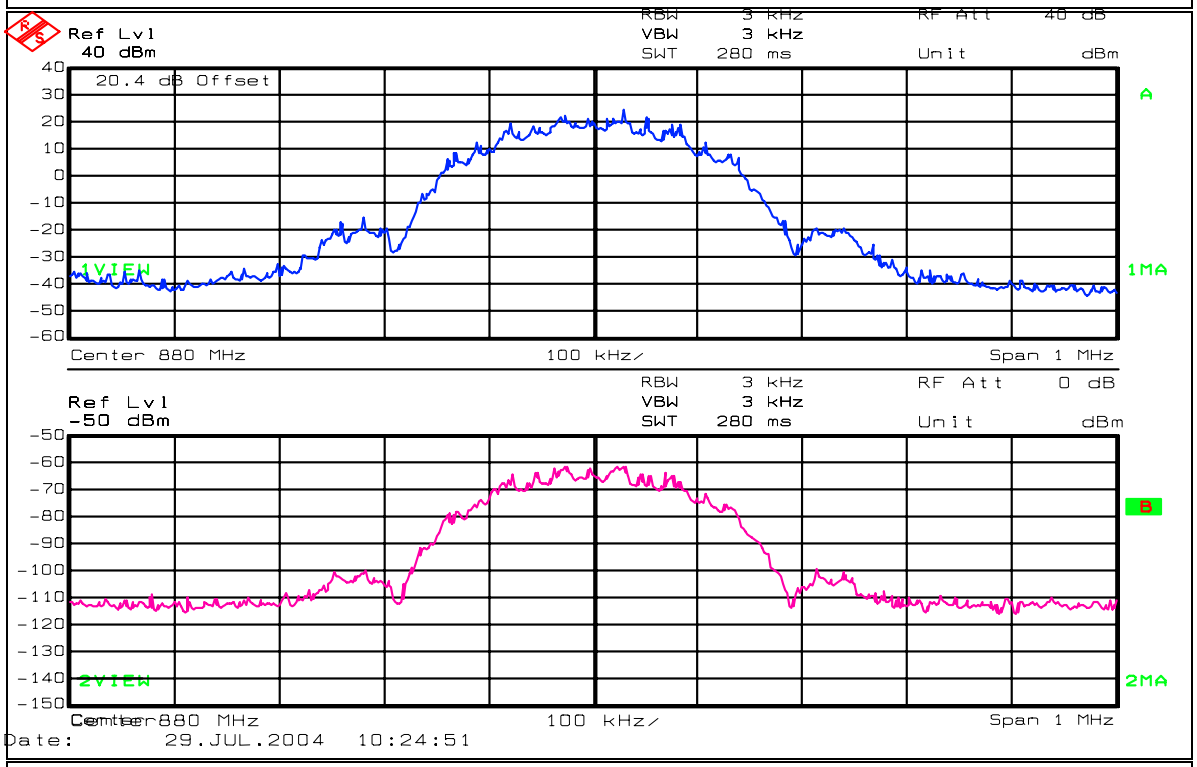
Measurement Distance: NA m

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



Notes: **EDGE**

Test Data – Occupied Bandwidth

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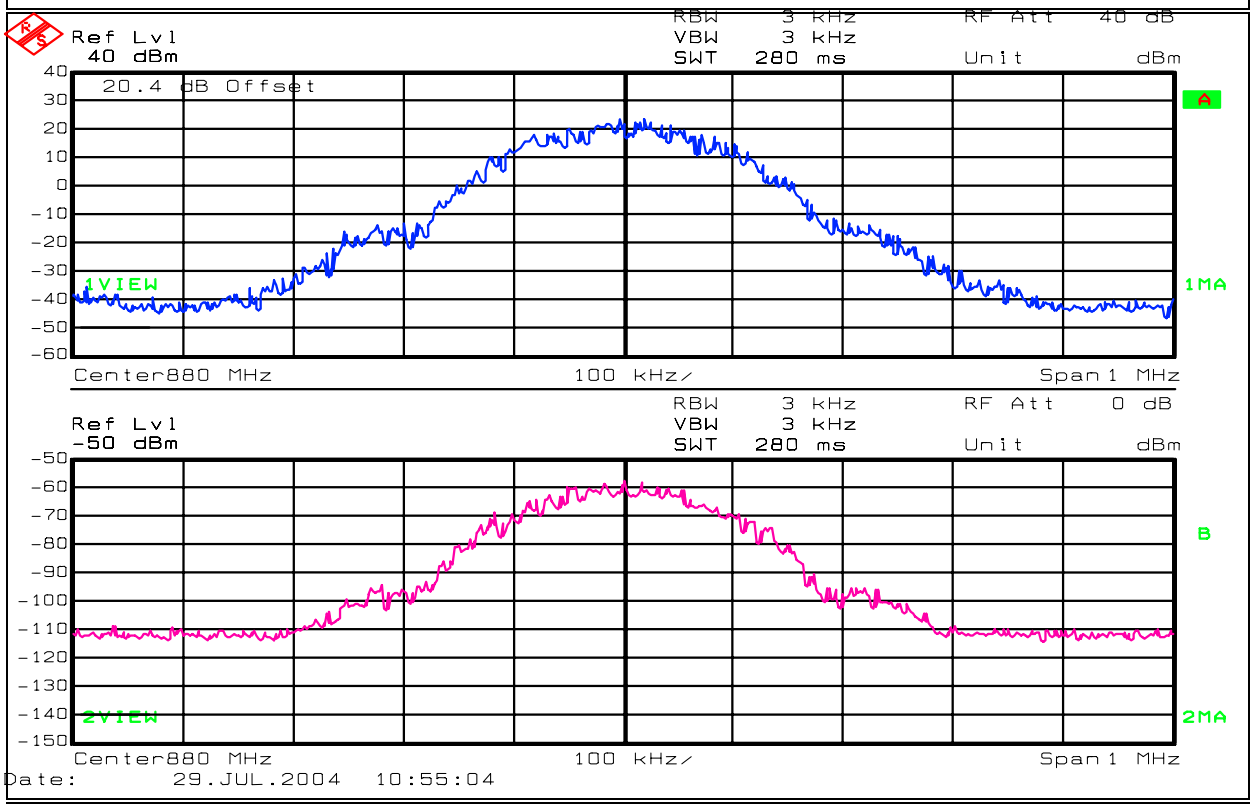
Nemko Dallas, Inc.

Data Plot — **Occupied Bandwidth**

Page 2 of 5

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		



Notes: GSM

Test Data – Occupied Bandwidth

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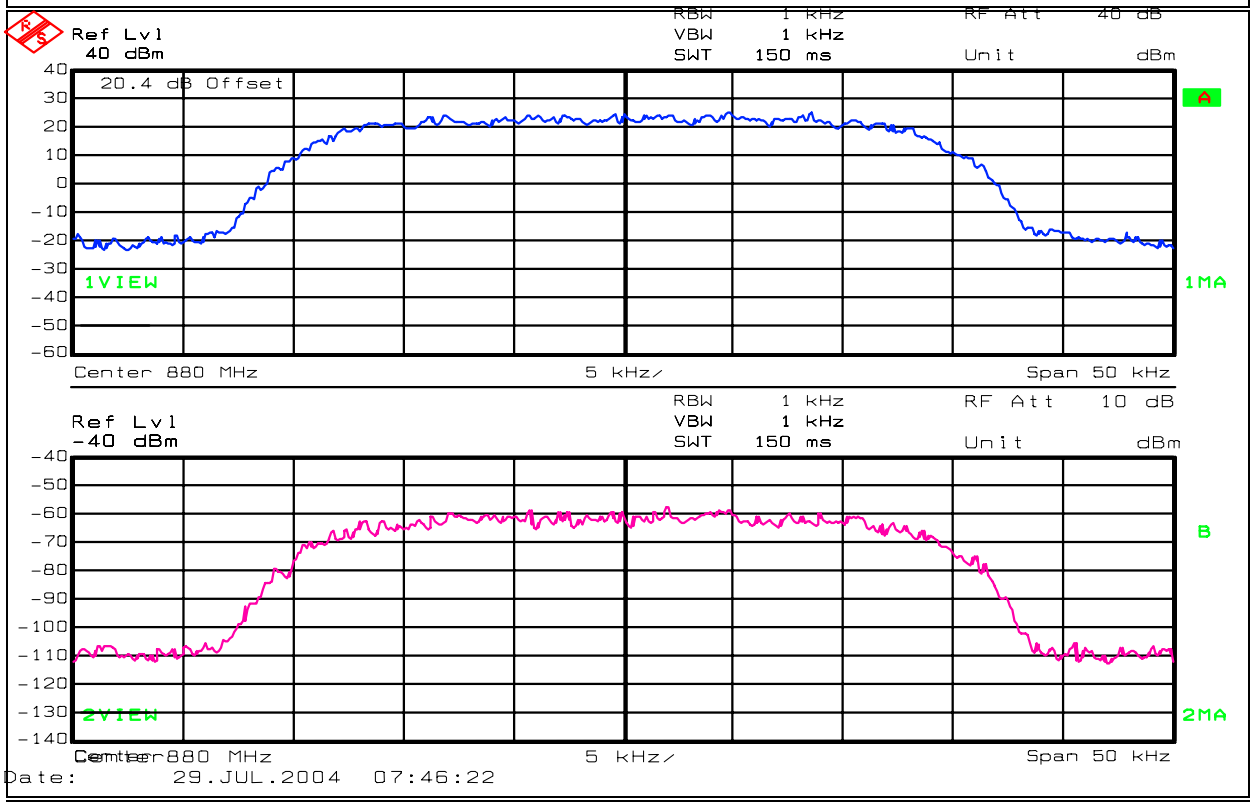
Data Plot — **Occupied Bandwidth**

Page 3 of 5

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		



Notes: TDMA

Test Data – Occupied Bandwidth

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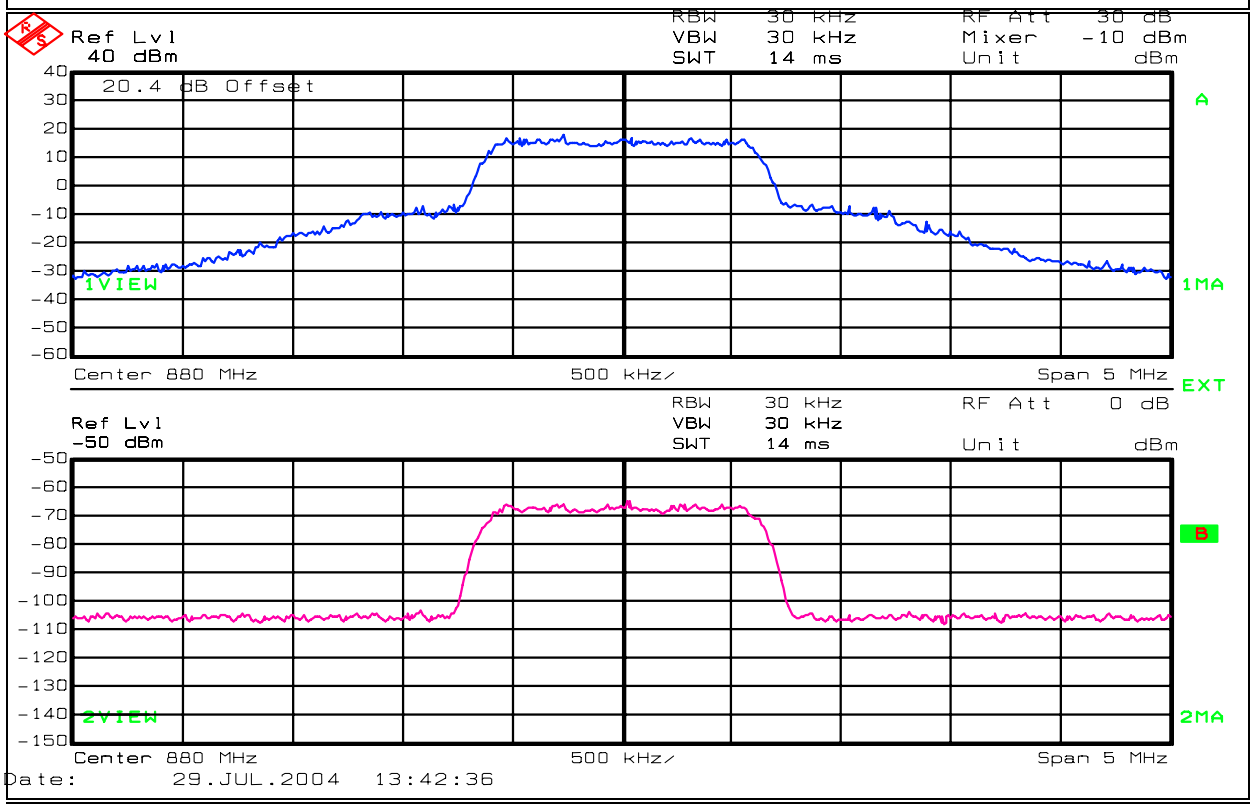
Data Plot — **Occupied Bandwidth**

Page 4 of 5

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		



Notes: CDMA

Test Data – Occupied Bandwidth

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Data Plot — **Occupied Bandwidth**

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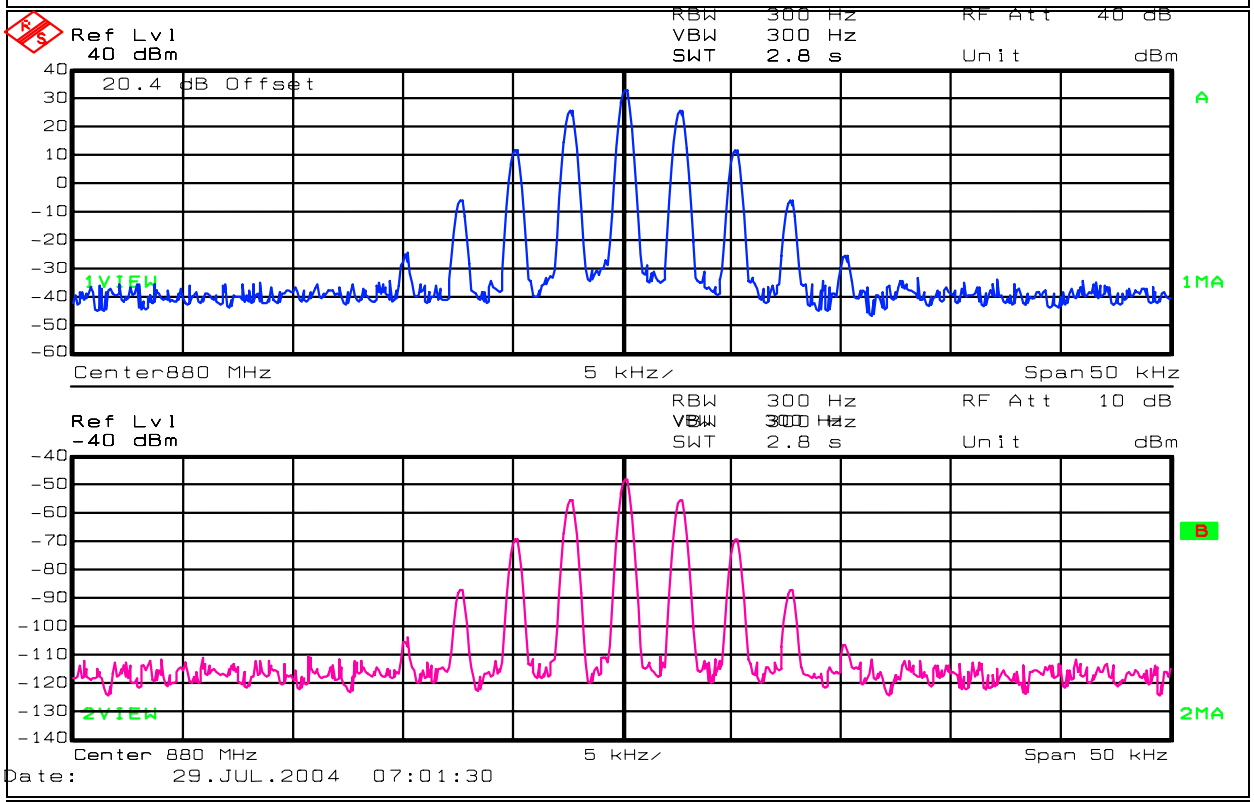
Job No.:	4L0458R	Date:	7/29/2004
Specification:	PT22	Temperature(°C):	22
Tested By:	David Light	Relative Humidity(%)	40
E.U.T.:	CELL BAND REPEATER		
Configuration:	TX		



Notes: ANALOG

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

Test Data – Spurious Emissions at Antenna Terminals (Analog)

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 X

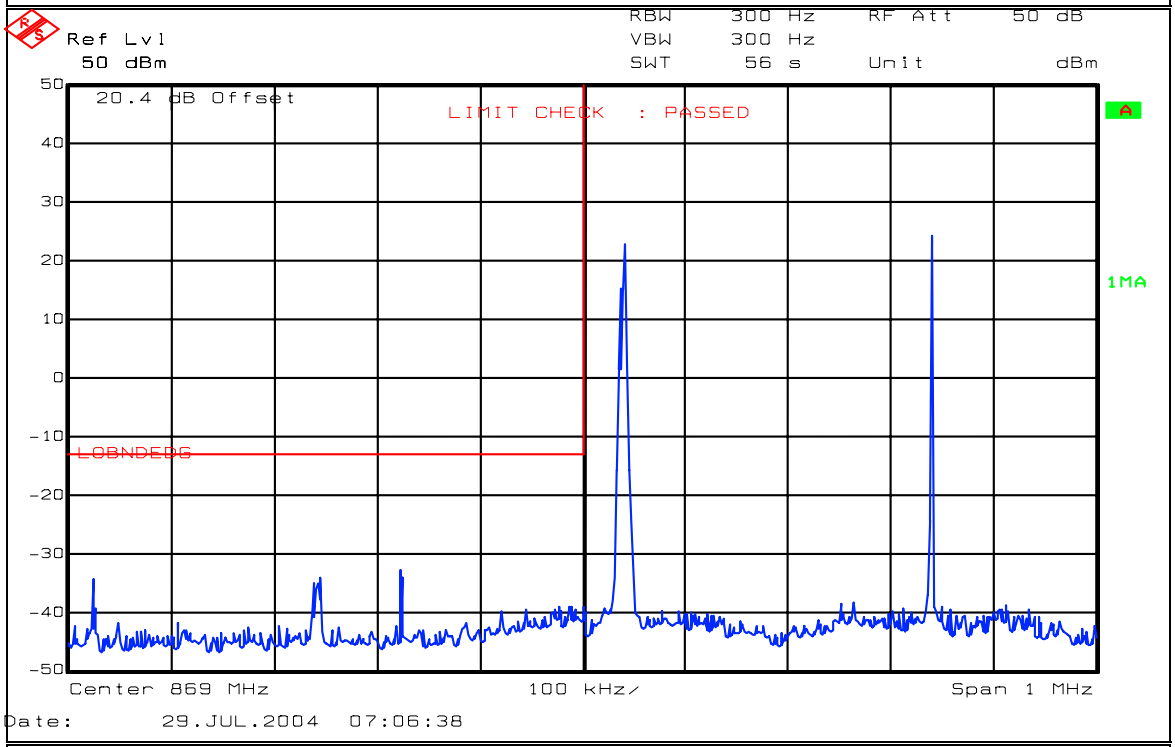
Job No.:	4L0458R	Date:	7/29/2004	Preliminary:	
Specification:	PT22	Temperature(°C):	22		
Tested By:	David Light	Relative Humidity(%)	40		
E.U.T.:	CELL BAND REPEATER				
Configuration:	TX				
Sample Number:	1				
Location:	Lab 1	RBW:	Refer to plots	Measurement	
Detector Type:	Peak	VBW:	Refer to plots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



Notes: **2 CHANNEL INTERMOD**
24 dBm per carrier
869.04 and 869.34

Test Data – Spurious Emissions at Antenna Terminals (Analog)

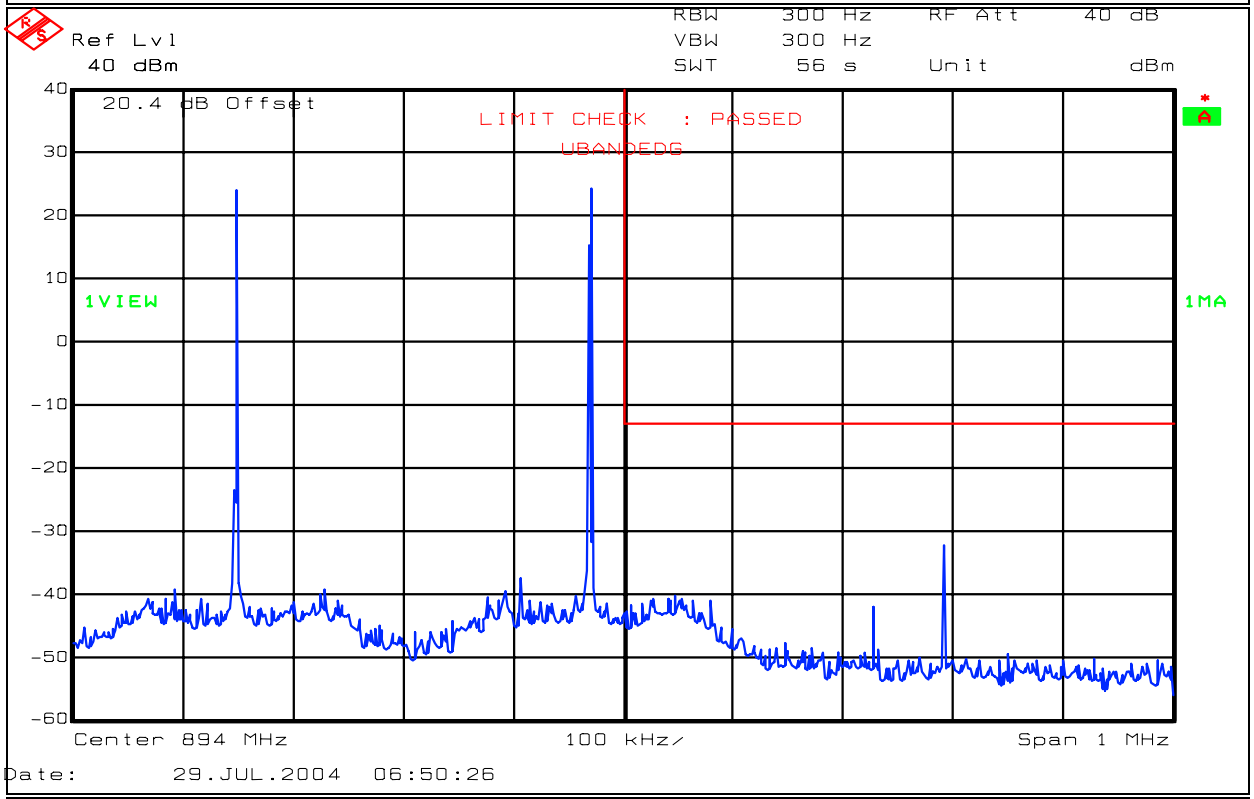
Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.

Data Plot — **Spurious Emissions at Antenna Terminals**

Page 2 of 5

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		



Notes:
2 CHANNEL INTERMOD
24 dBm per carrier
893.97 and 893.66 MHz

Test Data – Spurious Emissions at Antenna Terminals (Analog)

Nemko Dallas, Inc.

Dallas Headquarters:
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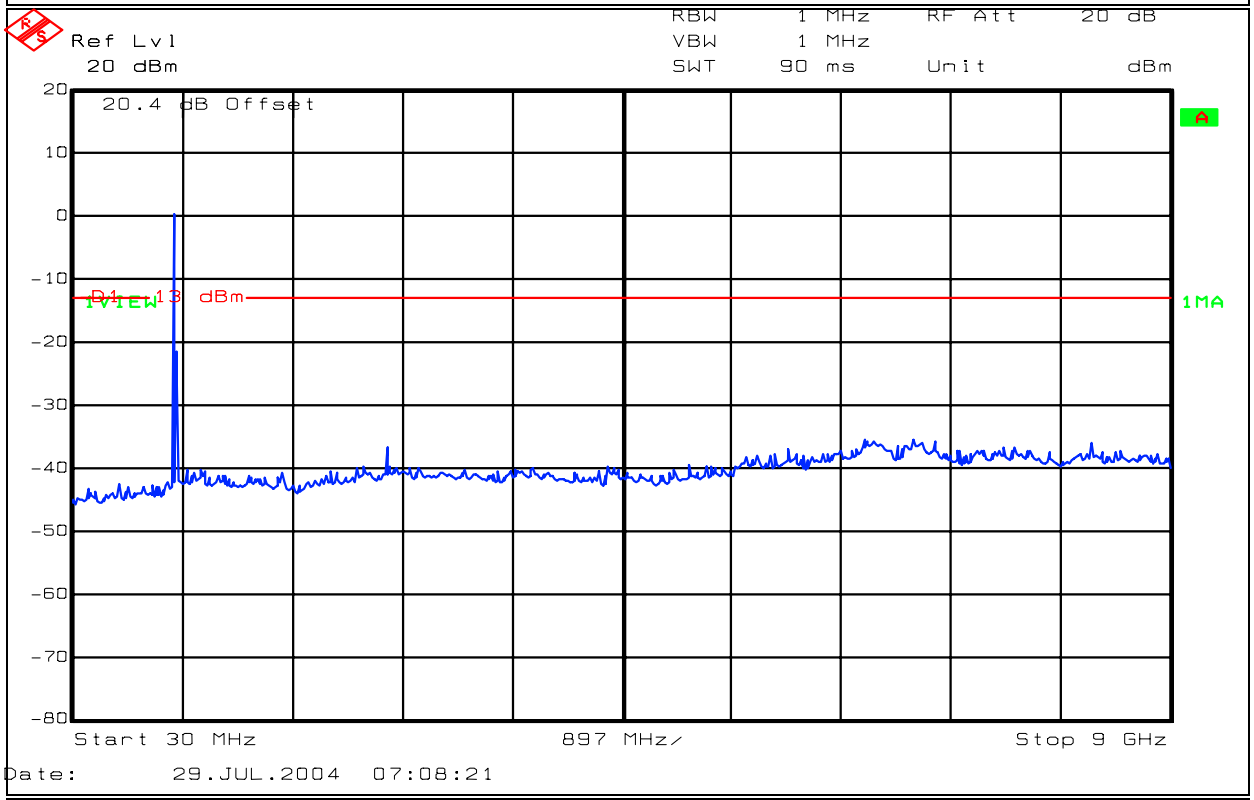
Data Plot — **Spurious Emissions at Antenna Terminals**

Page 3 of 5

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		



Notes:	
	ANALOG
	SINGLE CARRIER AT 34 dBm OUTPUT (notched)
	869.04 MHz

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

Test Data – Spurious Emissions at Antenna Terminals (Analog)

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Nemko Dallas, Inc.

Data Plot — **Spurious Emissions at Antenna Terminals**

Page 1 of 5 — Complete X

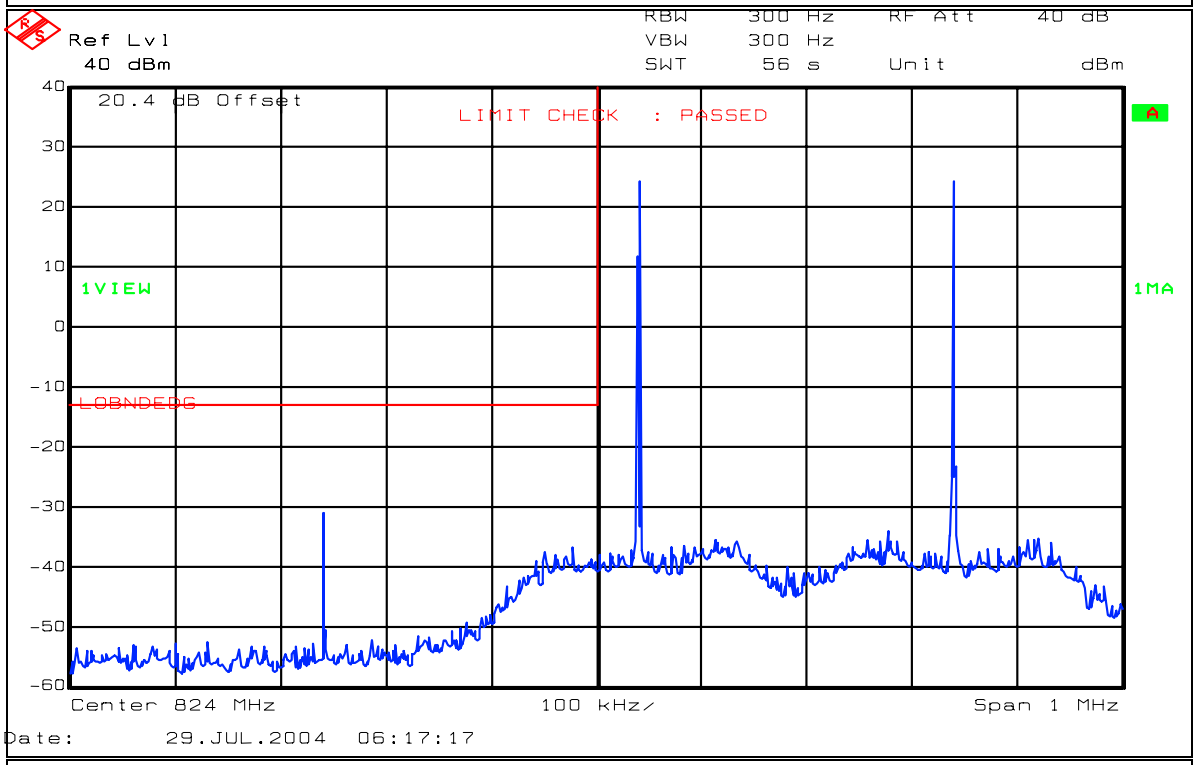
Job No.:	4L0458R	Date:	7/29/2004	Preliminary:	
Specification:	PT22	Temperature(°C):	22		
Tested By:	David Light	Relative Humidity(%)	40		
E.U.T.:	CELL BAND REPEATER				
Configuration:	TX				
Sample Number:	1				
Location:	Lab 1	RBW:	Refer to plots	Measurement	
Detector Type:	Peak	VBW:	Refer to plots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



Notes:
2 CHANNEL INTERMOD
24 dBm per carrier
824.04 and 824.34 MHz

Test Data – Spurious Emissions at Antenna Terminals (Analog)

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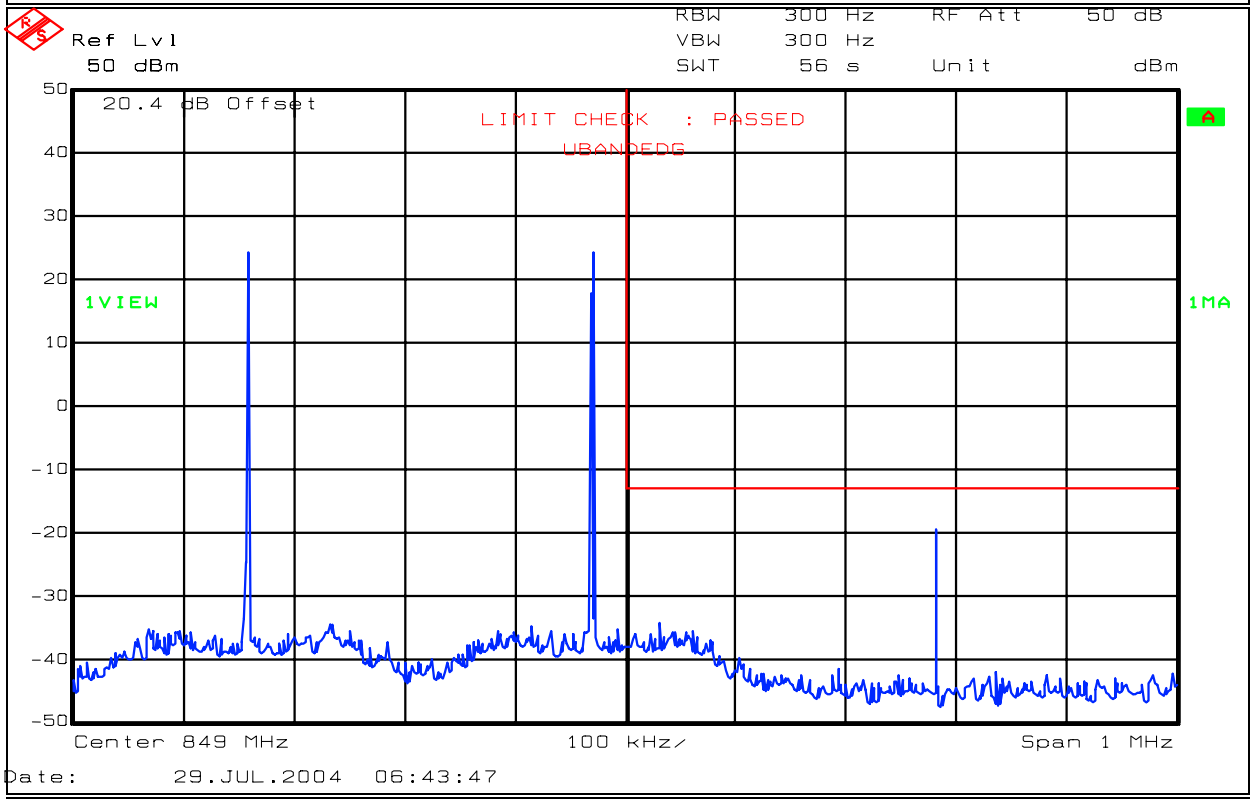
Nemko Dallas, Inc.

Data Plot — **Spurious Emissions at Antenna Terminals**

Page 2 of 5

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		



Notes:
2 CHANNEL INTERMOD
24 dBm per carrier
848.97 and 848.66 MHz

Test Data – Spurious Emissions at Antenna Terminals (Analog)

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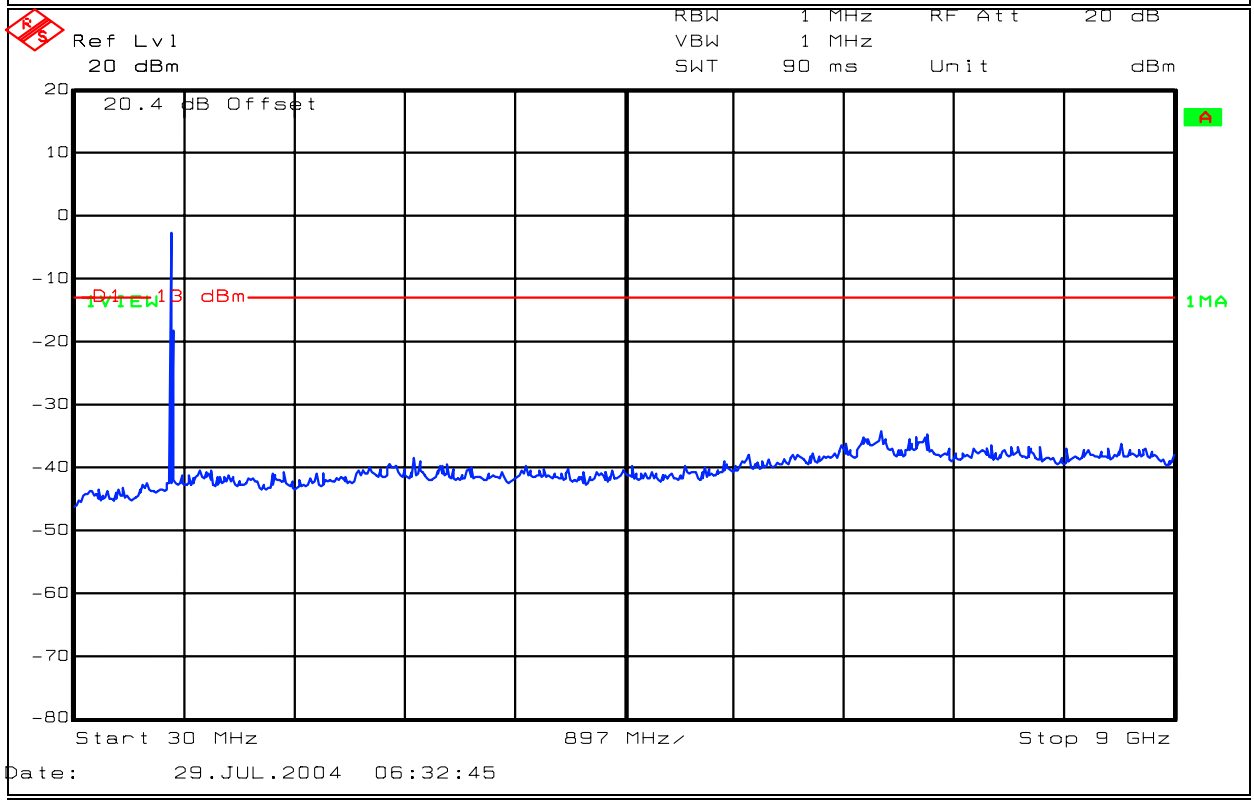
Nemko Dallas, Inc.

Data Plot — **Spurious Emissions at Antenna Terminals**

Page 3 of 5

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		



Notes:	
	ANALOG
	SINGLE CARRIER AT 34 dBm OUTPUT (notched)
	824.04 MHz

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

Test Data – Spurious Emissions at Antenna Terminals (CDMA)

Dallas Headquarters:
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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

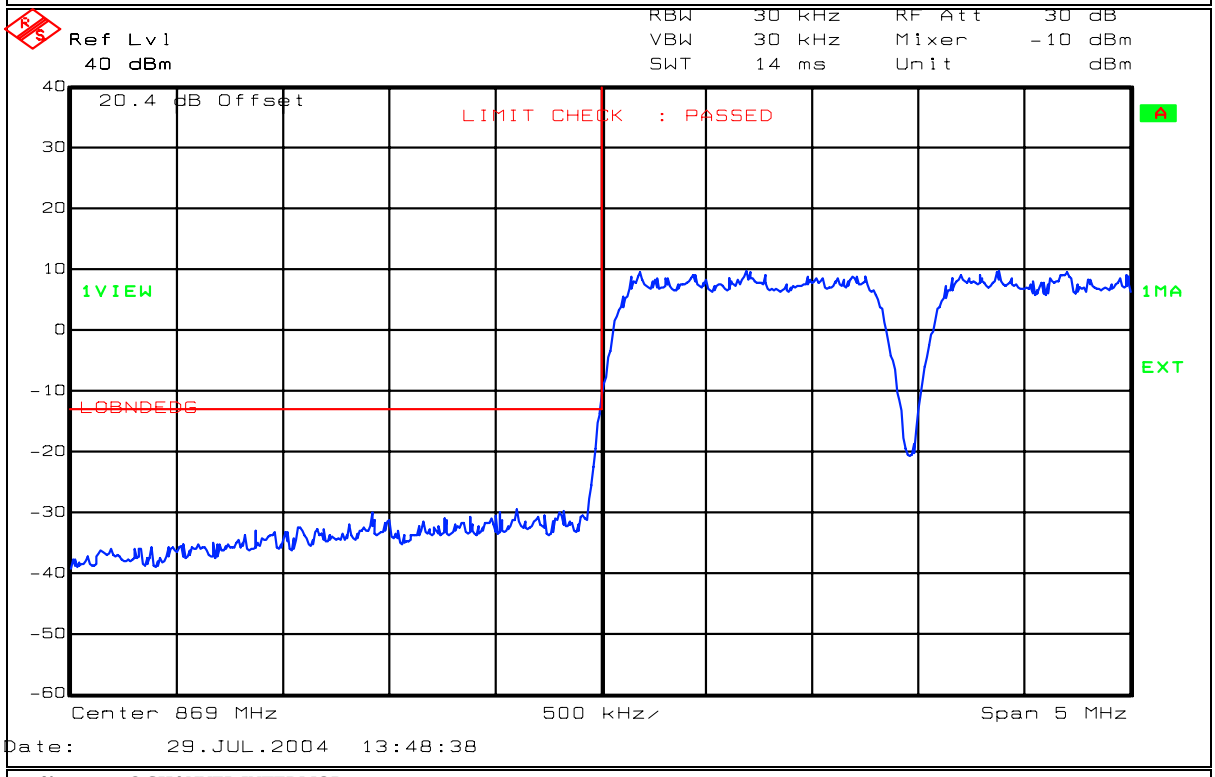
Job No.:	4L0458R	Date:	7/29/2004	Complete	X
Specification:	PT22	Temperature(°C):	22	Preliminary:	
Tested By:	David Light	Relative Humidity(%)	40		
E.U.T.:	CELL BAND REPEATER				
Configuration:	TX				
Sample Number:	1				
Location:	Lab 1	RBW:	Refer to plots	Measurement	
Detector Type:	Peak	VBW:	Refer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



Notes: **2 CHANNEL INTERMOD**
22 dBm/Carrier
CDMA

Test Data – Spurious Emissions at Antenna Terminals (CDMA)

Nemko Dallas, Inc.

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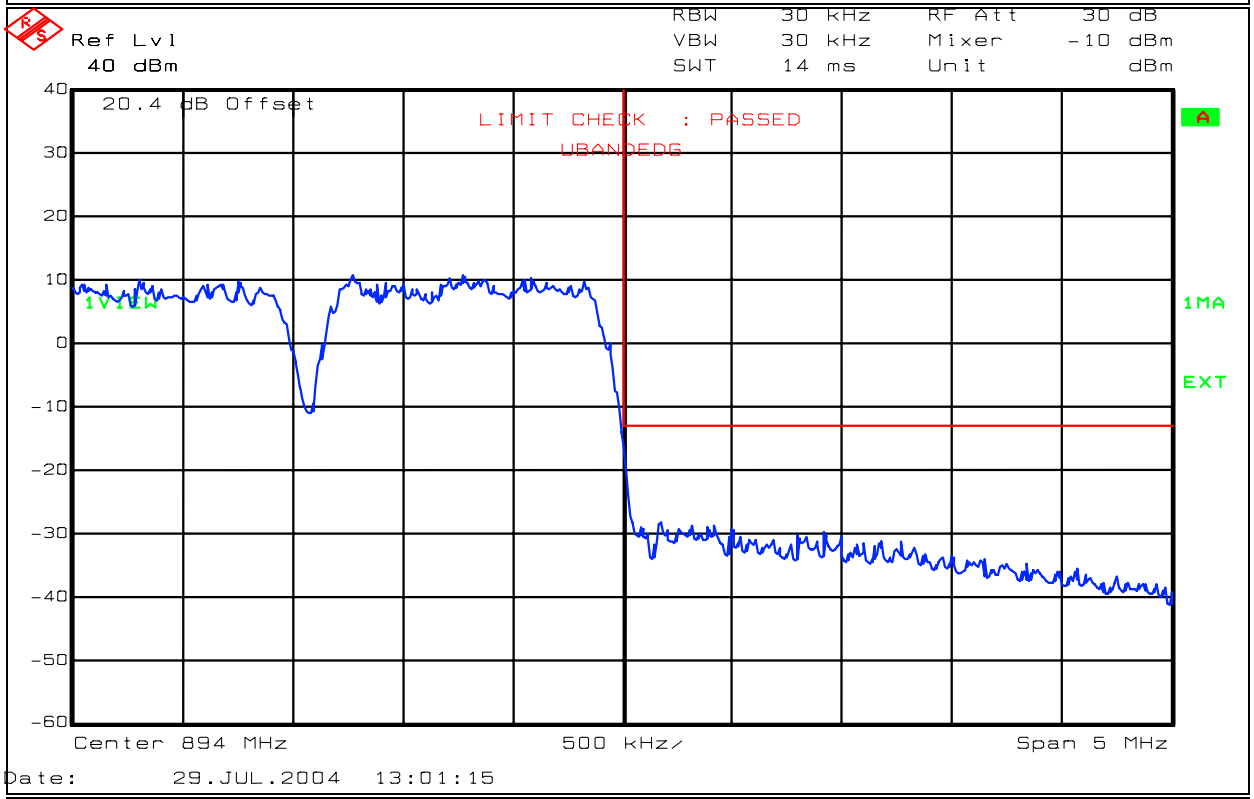
Fax: (972) 436-2667

Data Plot — **Spurious Emissions at Antenna Terminals**

Page 2 of 5

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		



Notes: **2 CHANNEL INTERMOD**
22 dBm/Carrier
CDMA

Test Data – Spurious Emissions at Antenna Terminals (CDMA)

Nemko Dallas, Inc.

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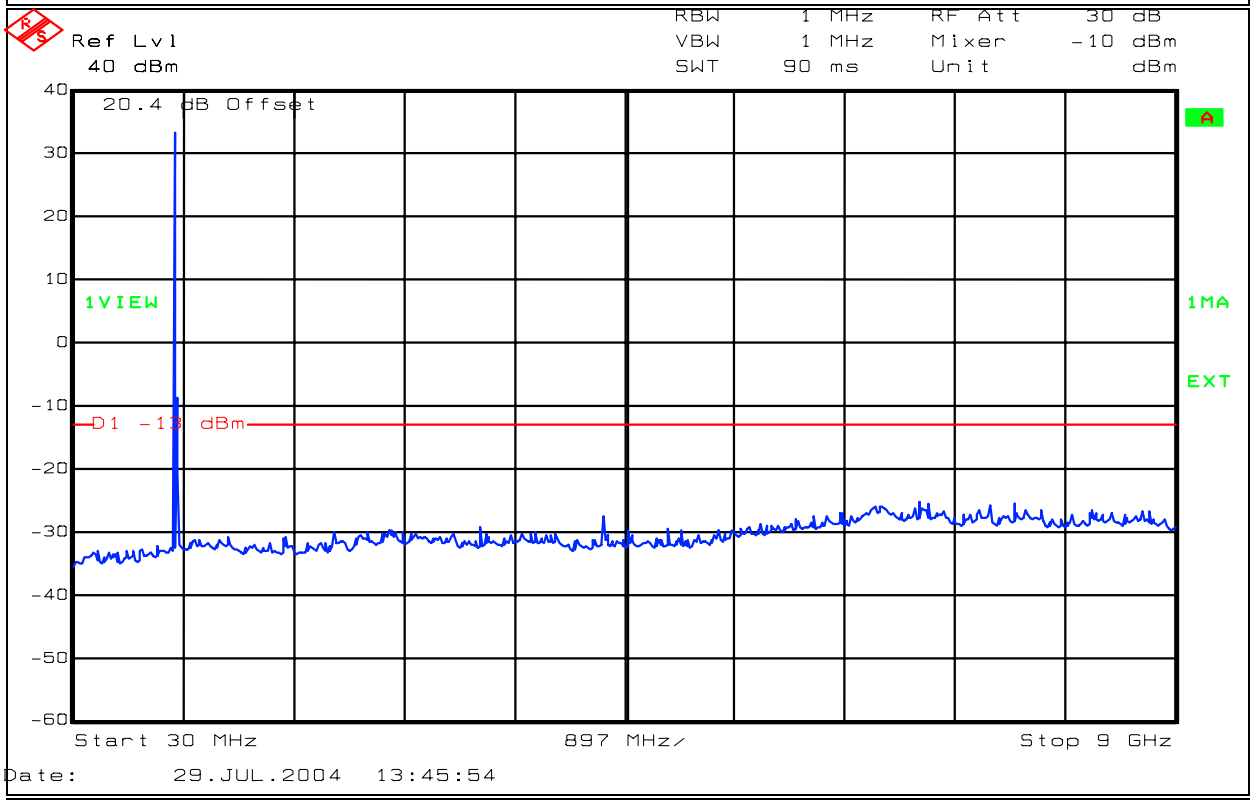
Data Plot — **Spurious Emissions at Antenna Terminals**

Page 3 of 5

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		



Notes:	
	CDMA
	SINGLE CARRIER AT 28 dBm OUTPUT
	869.7 MHz

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

Test Data – Spurious Emissions at Antenna Terminals (CDMA)

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

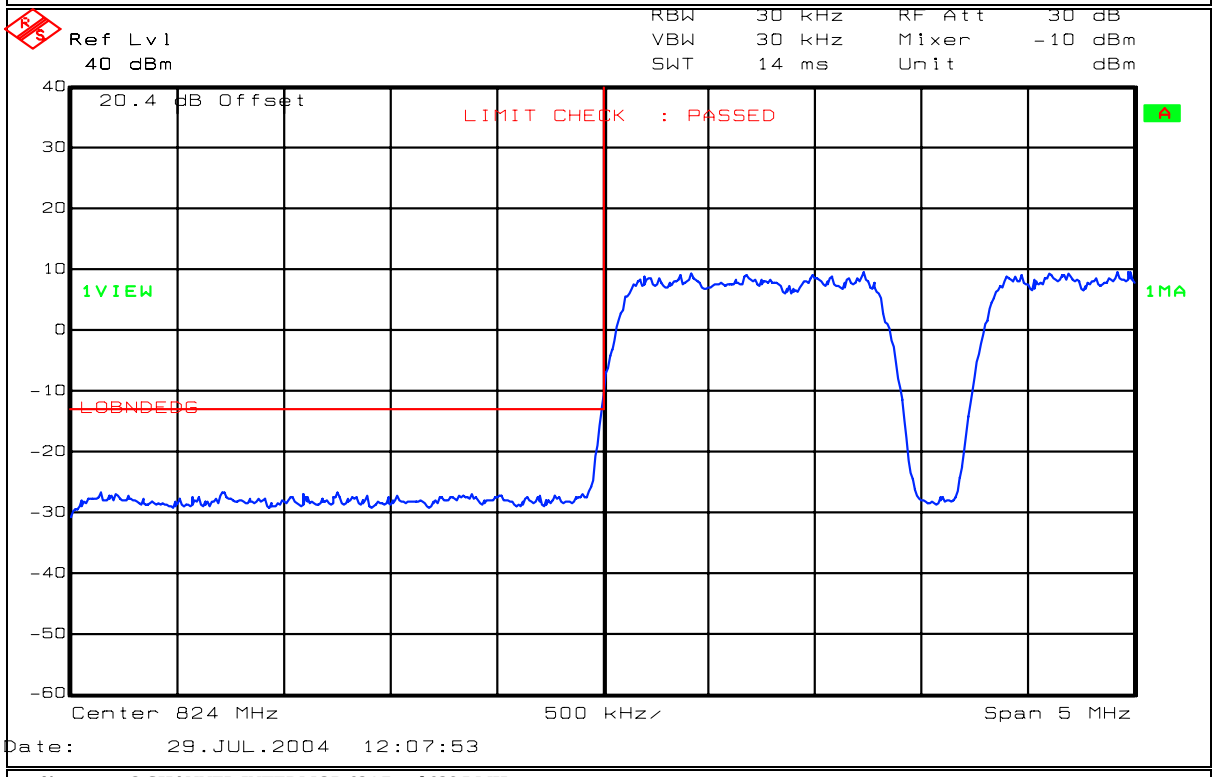
Job No.:	4L0458R	Date:	7/29/2004	Complete	X
Specification:	PT22	Temperature(°C):	22	Preliminary:	
Tested By:	David Light	Relative Humidity(%)	40		
E.U.T.:	CELL BAND REPEATER				
Configuration:	TX				
Sample Number:	1				
Location:	Lab 1	RBW:	Refer to plots	Measurement	
Detector Type:	Peak	VBW:	Refer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

Test Equipment Used

Antenna:		Directional Coupler:	
Pre-Amp:		Cable #1:	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



Notes: **2 CHANNEL INTERMOD 824.7 and 826.5 MHz**
22 dBm/Carrier
CDMA

Test Data – Spurious Emissions at Antenna Terminals (CDMA)

Nemko

Dallas Headquarters:
802 N. Kealy
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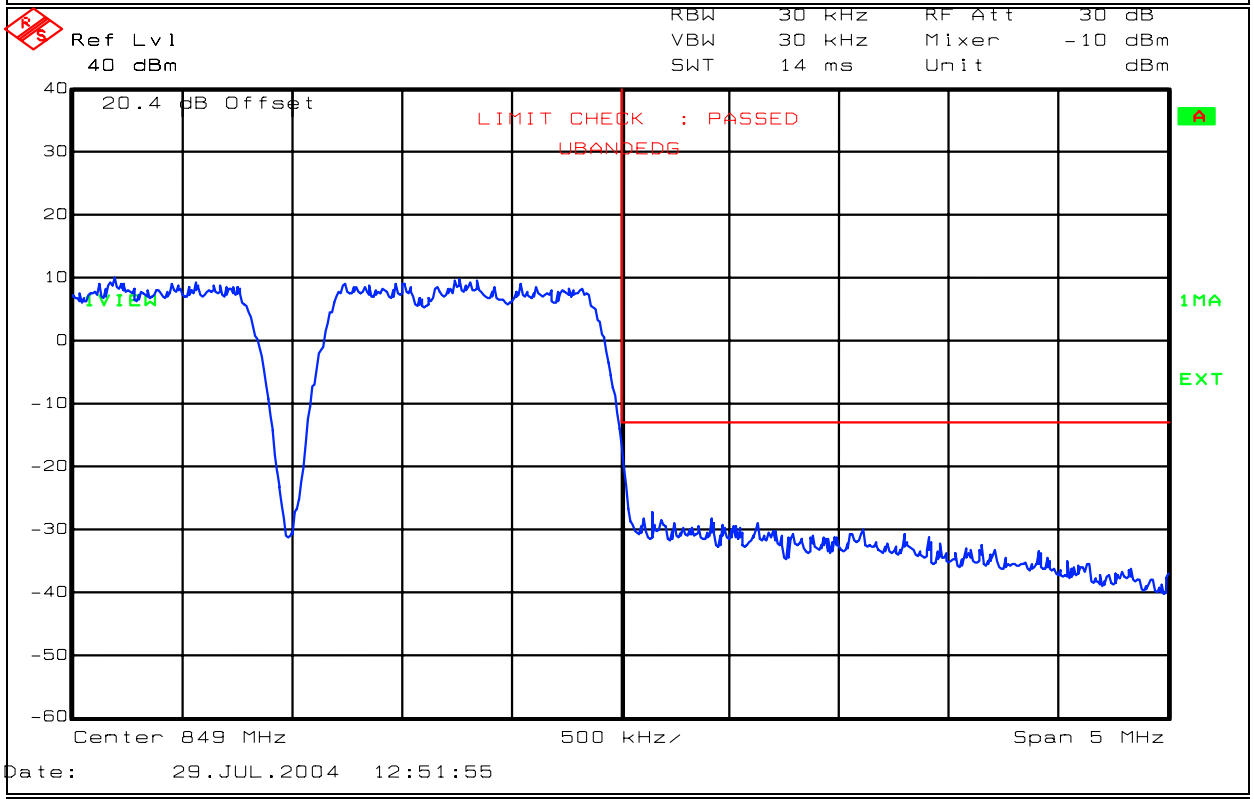
Nemko Dallas, Inc.

Data Plot — **Spurious Emissions at Antenna Terminals**

Page 2 of 5

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		



Notes: **2 CHANNEL INTERMOD 848.28 and 846.7**
22 dBm/Carrier
CDMA

Test Data – Spurious Emissions at Antenna Terminals (CDMA)

Nemko Dallas, Inc.

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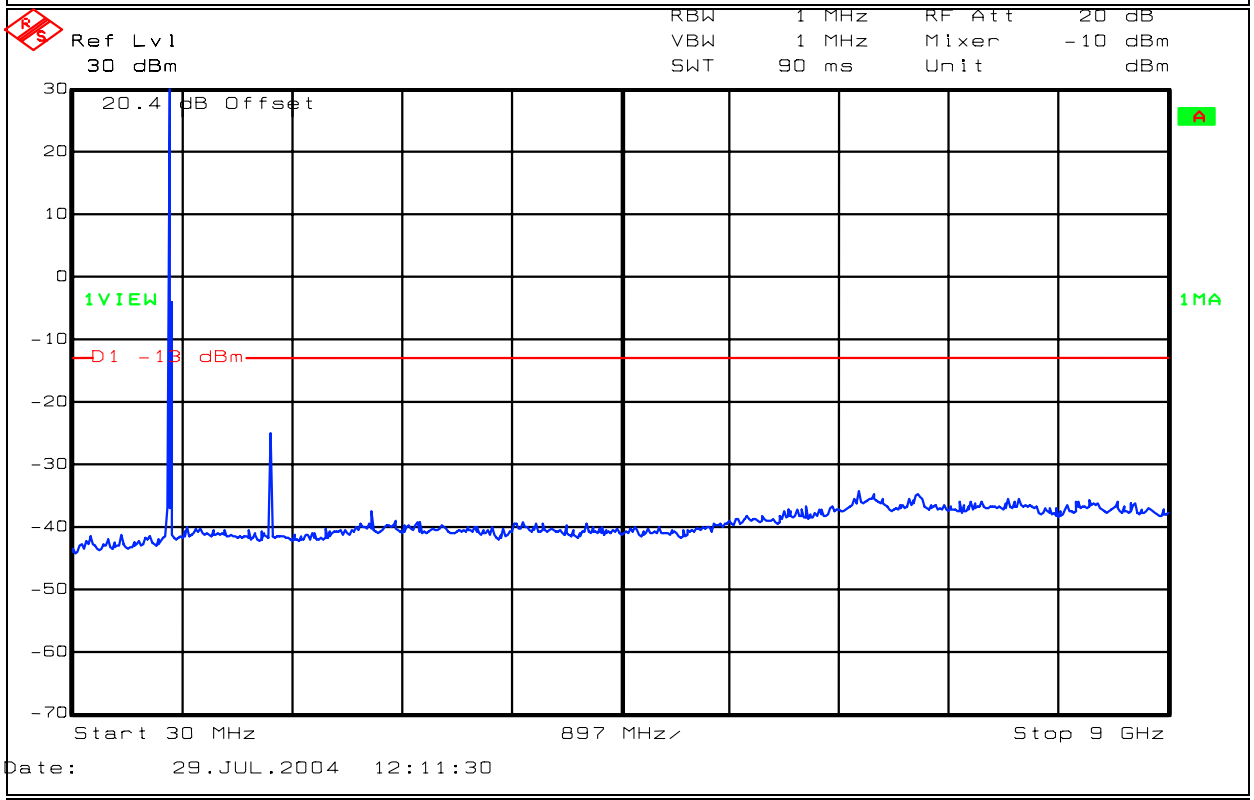
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Data Plot — **Spurious Emissions at Antenna Terminals**

Page 3 of 5

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		



Notes:
CDMA
SINGLE CARRIER AT 28 dBm OUTPUT
824.7 MHz

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

Test Data – Spurious Emissions at Antenna Terminals (EDGE)

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

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Data Plot — **Spurious Emissions at Antenna Terminals**

Page 1 of 5 | Complete: X | Preliminary:

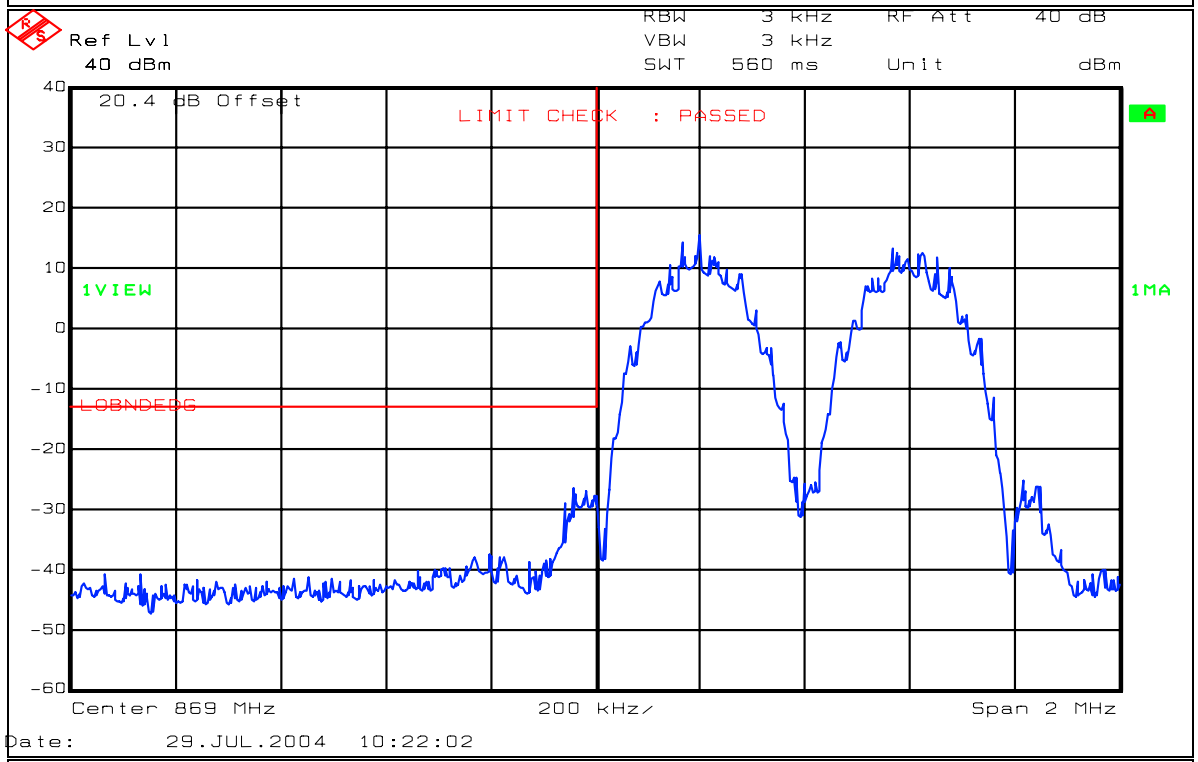
Job No.:	4L0458R	Date:	7/29/2004		
Specification:	PT22	Temperature(°C):	22		
Tested By:	David Light	Relative Humidity(%)	40		
E.U.T.:	CELL BAND REPEATER				
Configuration:	TX				
Sample Number:	1				
Location:	Lab 1	RBW:	Refer to plots	Measurement Distance:	NA m
Detector Type:	Peak	VBW:	Refer to plots		

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



Notes:
2 CHANNEL INTERMOD
22.5 dBm/Carrier 869.2 and 869.6 MHz
EDGE

Test Data – Spurious Emissions at Antenna Terminals (EDGE)

Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
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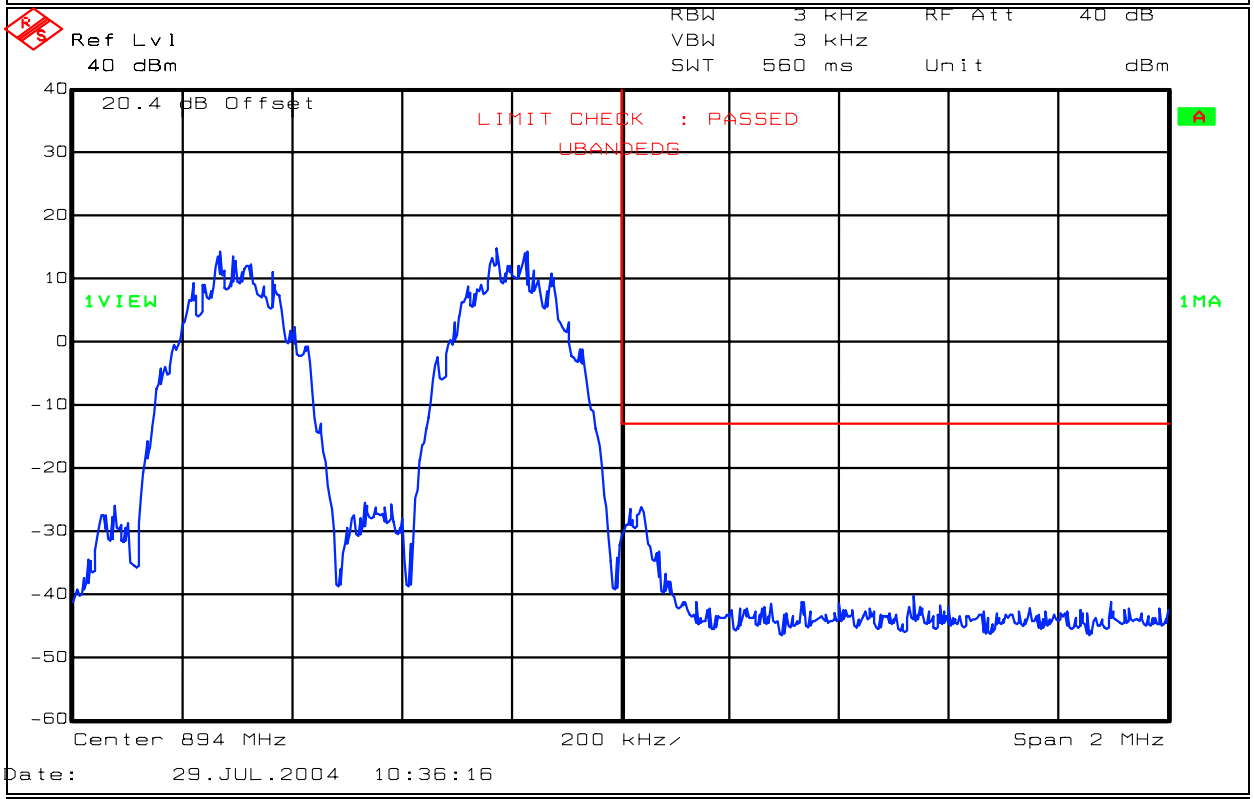
Data Plot — **Spurious Emissions at Antenna Terminals**

Page 2 of 5

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		



Notes: **2 CHANNEL INTERMOD**
22.5 dBm/Carrier 893.8 and 893.3 MHz
EDGE

Test Data – Spurious Emissions at Antenna Terminals (EDGE)

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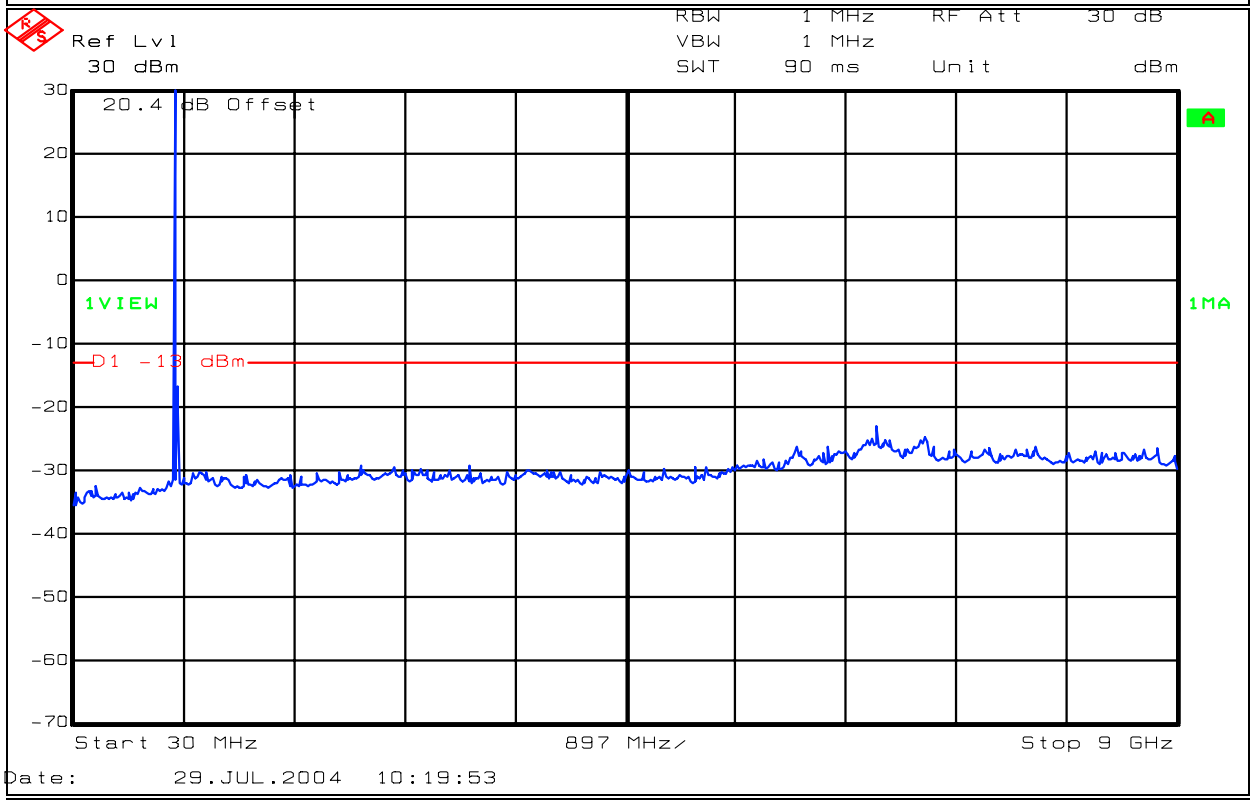
Data Plot — **Spurious Emissions at Antenna Terminals**

Page 3 of 5

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		



Notes: **1 EDGE CHANNEL AT 30.5 dBm OUTPUT**
869.2 MHz

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

Test Data – Spurious Emissions at Antenna Terminals (EDGE)

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Data Plot — **Spurious Emissions at Antenna Terminals**

Page 1 of 5 | Complete X | Preliminary:

Job No.:	4L0458R	Date:	7/29/2004
Specification:	PT22	Temperature(°C):	22
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
Detector Type:	Peak	VBW:	Refer to plots

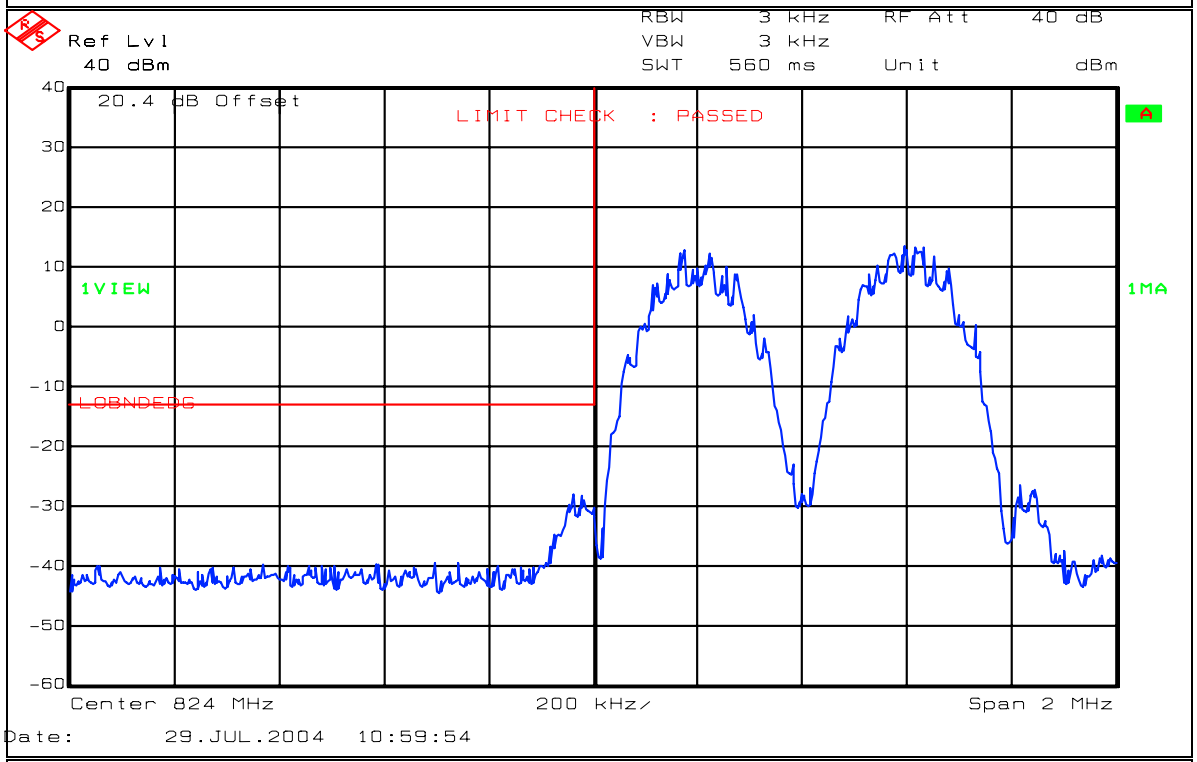
Measurement Distance: NA m

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



Notes:
2 CHANNEL INTERMOD
22.5 dBm/Carrier 824.2 and 824.4 MHz
EDGE

Test Data – Spurious Emissions at Antenna Terminals (EDGE)

Nemko Dallas, Inc.

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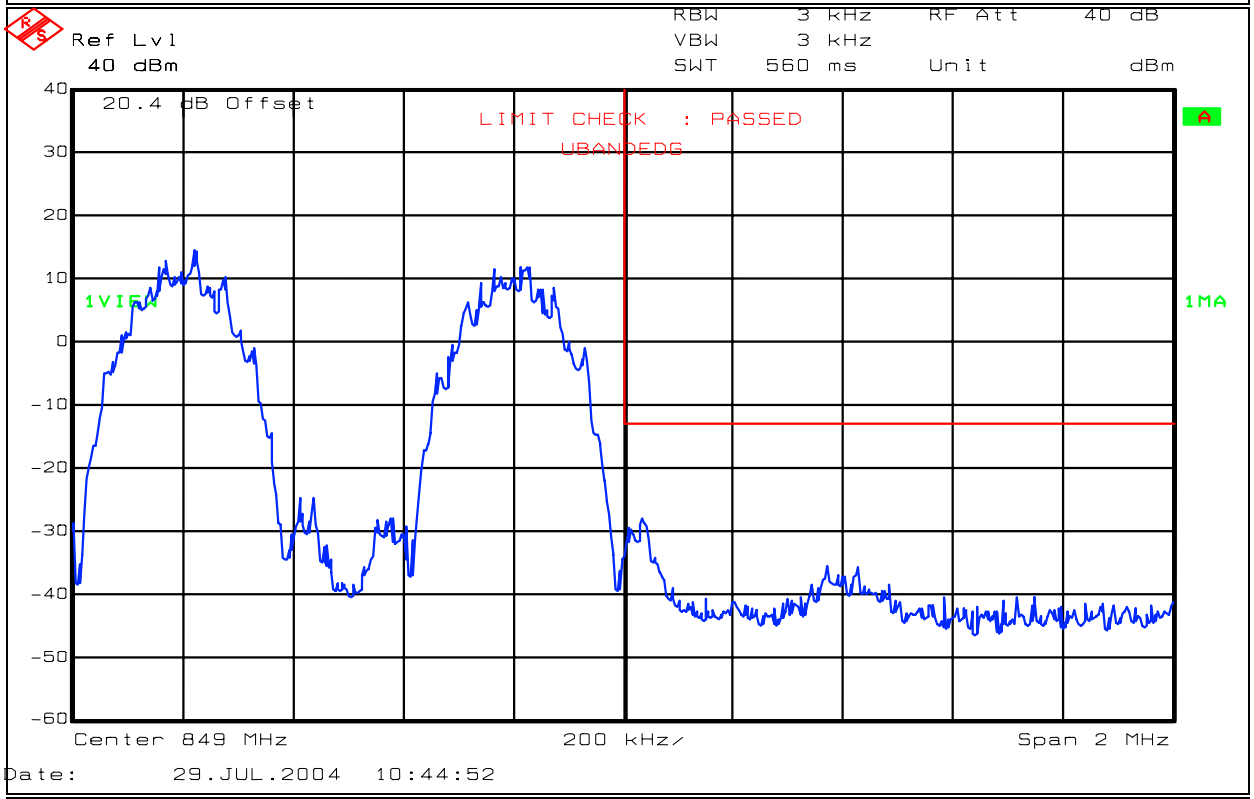
Data Plot — **Spurious Emissions at Antenna Terminals**

Page 2 of 5

Job No.:	4L0458R	Date:	7/29/2004
Specification:	PT22	Temperature(°C):	22
Tested By:	David Light	Relative Humidity(%)	45
E.U.T.:	CELL BAND REPEATER		
Configuration:	TX		



Notes: **2 CHANNEL INTERMOD**
22.5 dBm/Carrier 848.8 and 848.2 MHz
EDGE

Test Data – Spurious Emissions at Antenna Terminals (EDGE)

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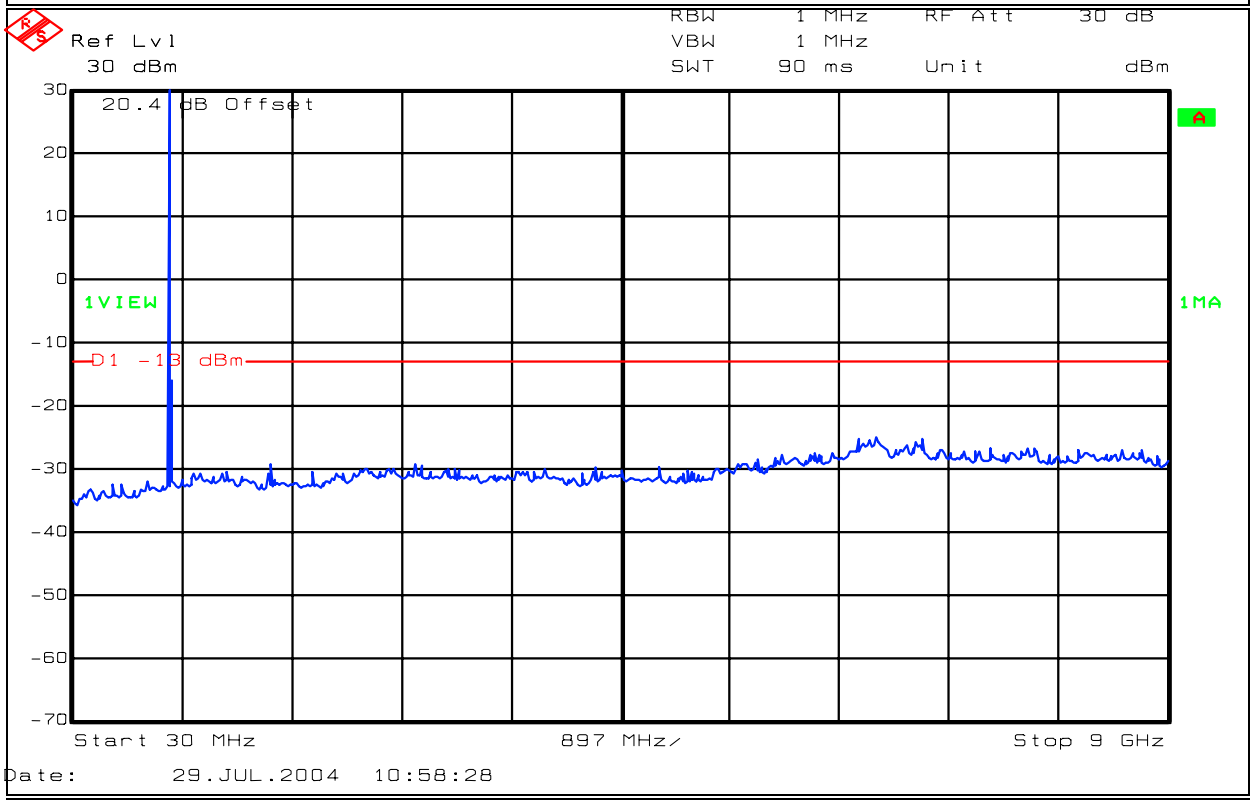
Data Plot — **Spurious Emissions at Antenna Terminals**

Page 3 of 5

Job No.:	4L0458R	Date:	7/29/2004
Specification:	PT22	Temperature(°C):	22
Tested By:	David Light	Relative Humidity(%)	45
E.U.T.:	CELL BAND REPEATER		
Configuration:	TX		



Notes: **1 EDGE CHANNEL AT 30.5 dBm OUTPUT**
824.2 MHz

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

Test Data – Spurious Emissions at Antenna Terminals (GSM)

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Data Plot — **Spurious Emissions at Antenna Terminals**

Page 1 of 5 — Complete X

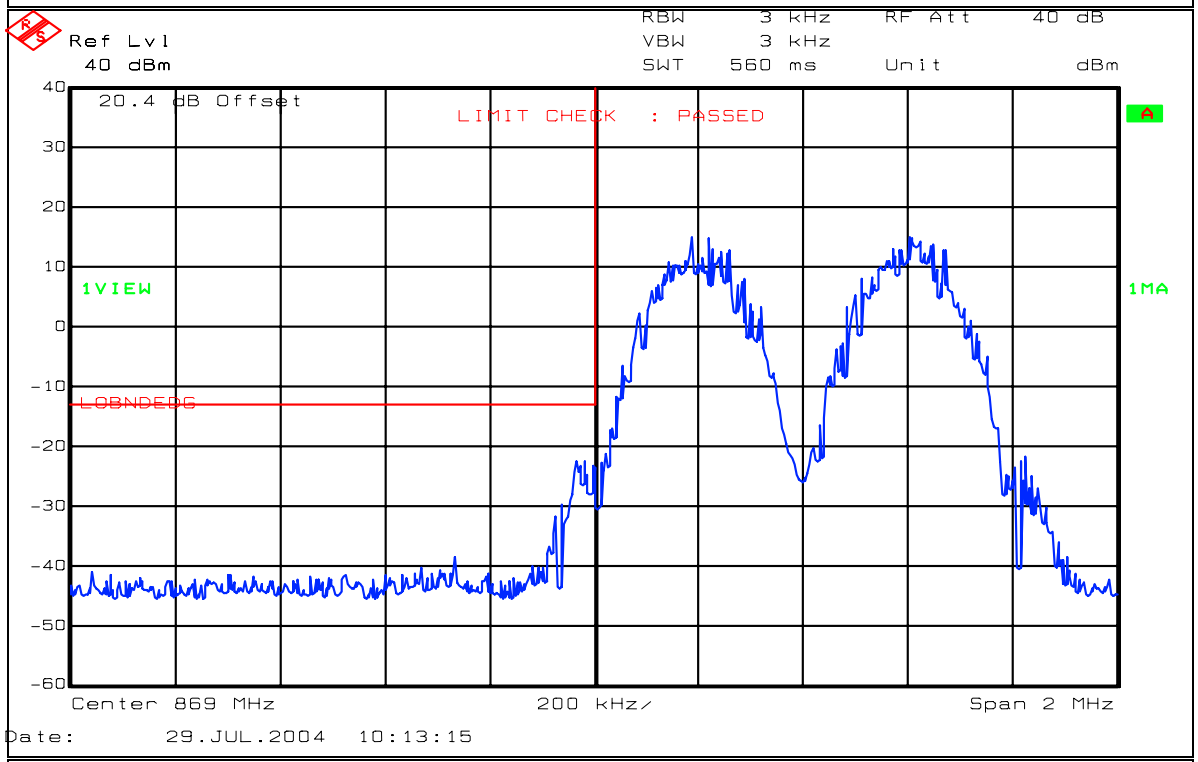
Job No.:	4L0458R	Date:	7/29/2004	Preliminary:	
Specification:	PT22	Temperature(°C):	22		
Tested By:	David Light	Relative Humidity(%)	40		
E.U.T.:	CELL BAND REPEATER				
Configuration:	TX				
Sample Number:	1				
Location:		RBW:	Refer to plots	Measurement	
Detector Type:		VBW:	Refer to plots	Distance: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



Notes: **2 CHANNEL INTERMOD**
24 dBm/Carrier 869.2 and 869.6 MHz
GSM

Test Data – Spurious Emissions at Antenna Terminals (GSM)

Nemko Dallas, Inc.

Dallas Headquarters:
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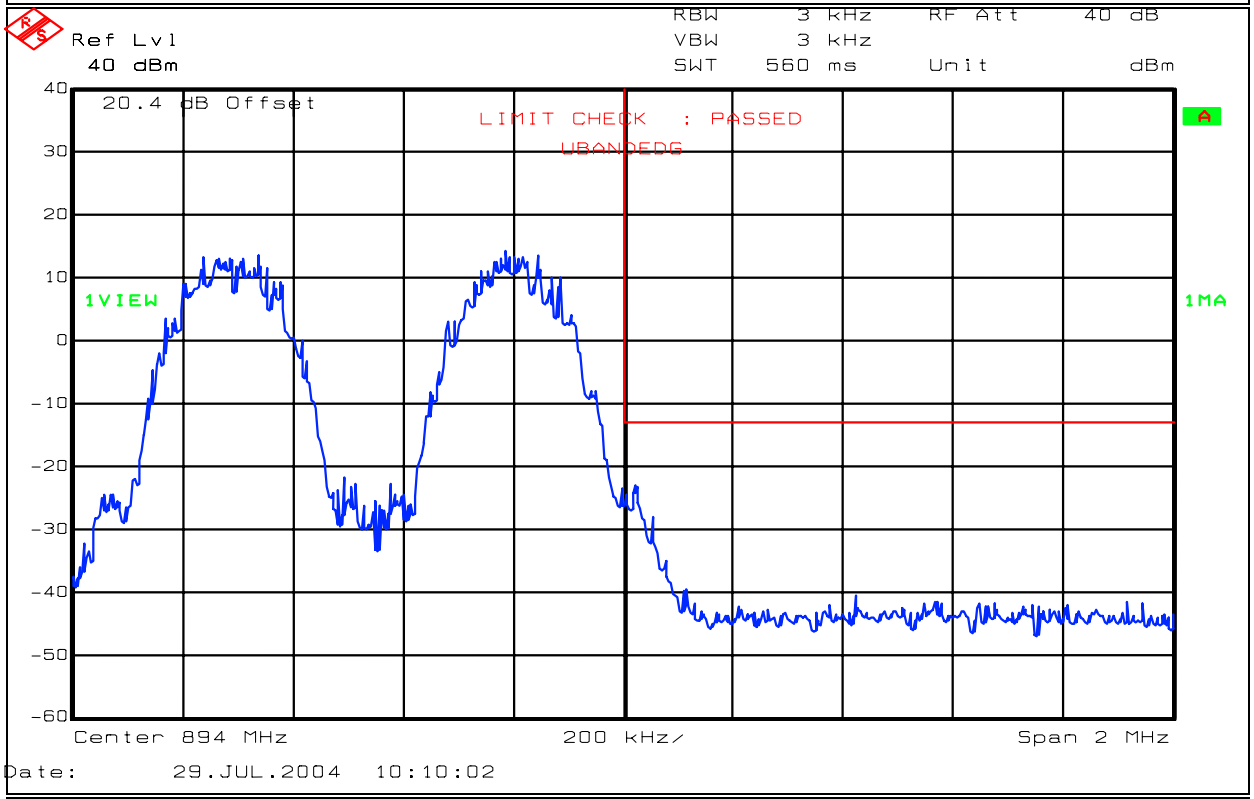
Data Plot — **Spurious Emissions at Antenna Terminals**

Page 2 of 5

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		



Notes:
2 CHANNEL INTERMOD
24 dBm/Carrier 893.7 and 893.3 MHz
GSM

Test Data – Spurious Emissions at Antenna Terminals (GSM)

Dallas Headquarters:
802 N. Kealy
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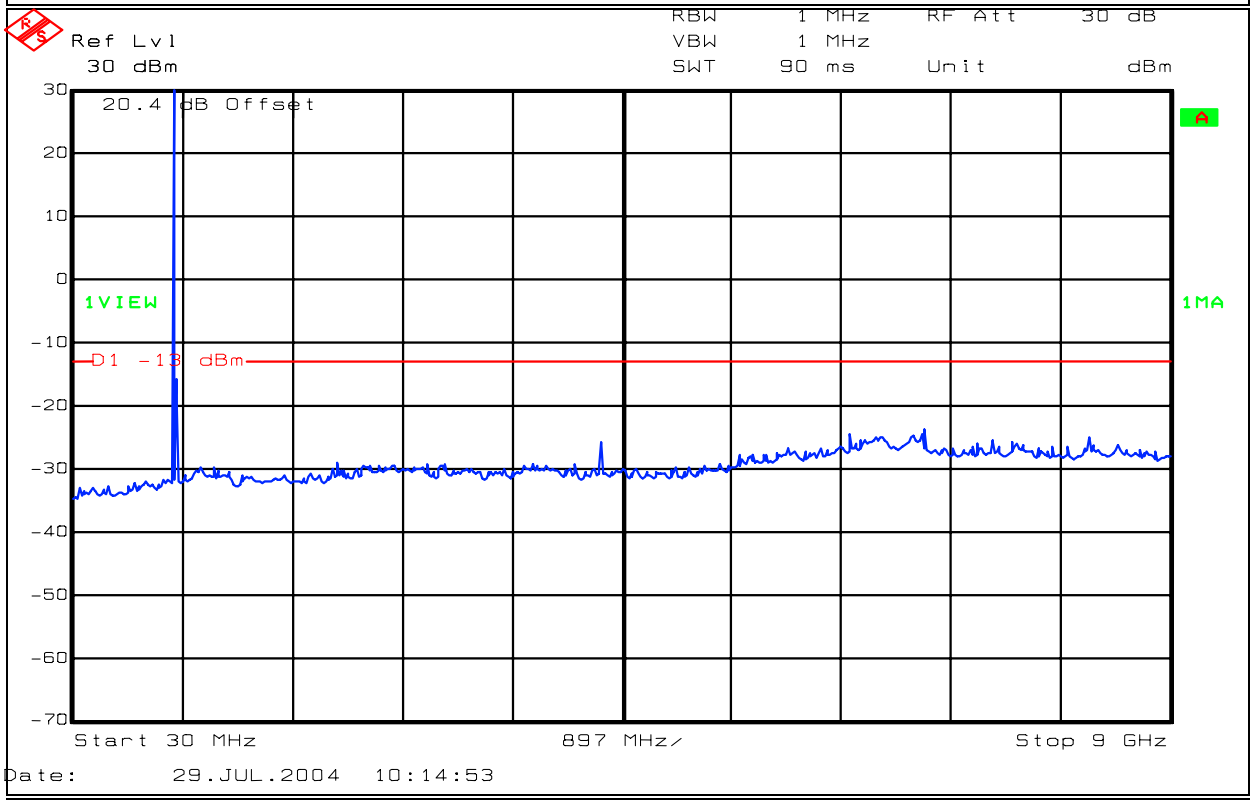
Data Plot — **Spurious Emissions at Antenna Terminals**

Page 3 of 5

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		



Notes: **1 GSM CARRIER AT 34 dBm OUTPUT**
869.2 MHz

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

Test Data – Spurious Emissions at Antenna Terminals (GSM)

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Lewisville, TX 75057
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Nemko Dallas, Inc.

Data Plot — **Spurious Emissions at Antenna Terminals**

Page 1 of 5

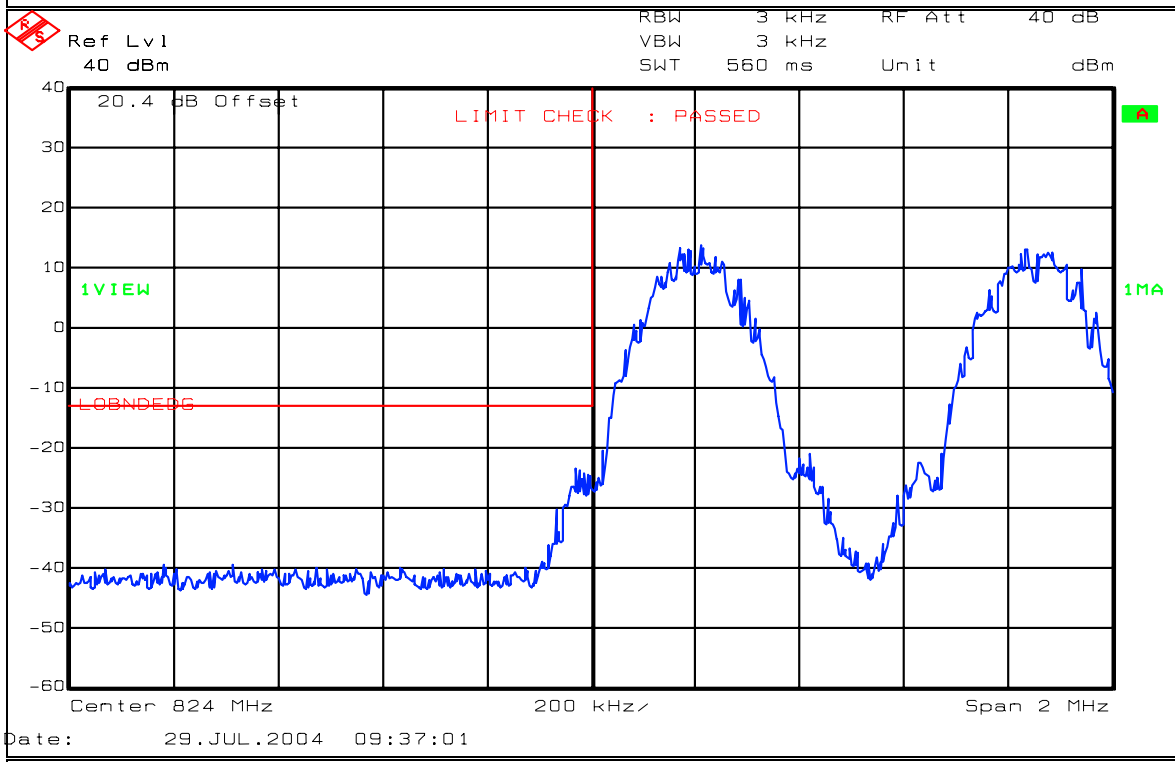
Job No.:	4L0458R	Date:	7/29/2004	Complete	X
Specification:	PT22	Temperature(°C):	22	Preliminary:	
Tested By:	David Light	Relative Humidity(%)	40		
E.U.T.:	CELL BAND REPEATER				
Configuration:	TX				
Sample Number:	1				
Location:	Lab 1	RBW:	Refer to plots	Measurement	
Detector Type:	Peak	VBW:	Refer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



Notes: **2 CHANNEL INTERMOD**
24 dBm/Carrier 824.2 and 824.85 MHz
GSM

Test Data – Spurious Emissions at Antenna Terminals (GSM)

Nemko

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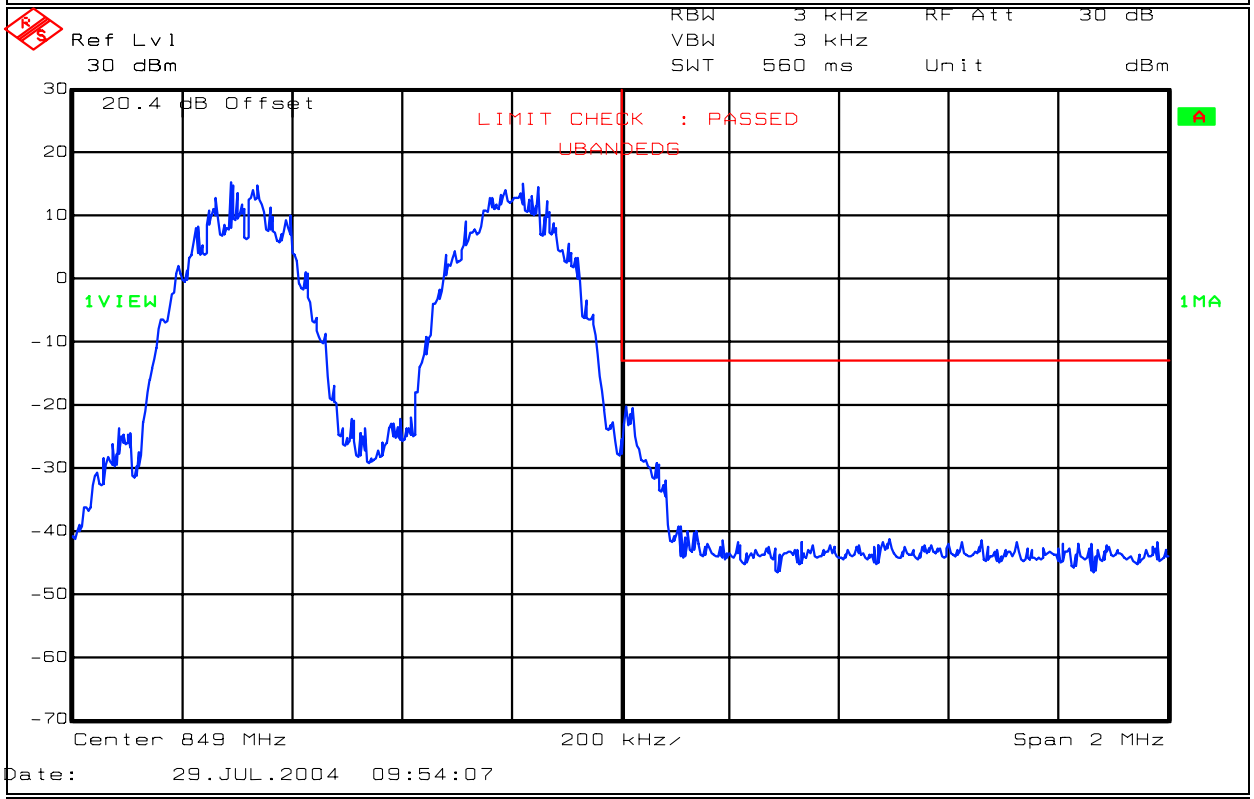
Nemko Dallas, Inc.

Data Plot — **Spurious Emissions at Antenna Terminals**

Page 2 of 5

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		



Notes: **2 CHANNEL INTERMOD**
24 dBm/Carrier 848.8 and 848.3 MHz
GSM

Test Data – Spurious Emissions at Antenna Terminals (GSM)

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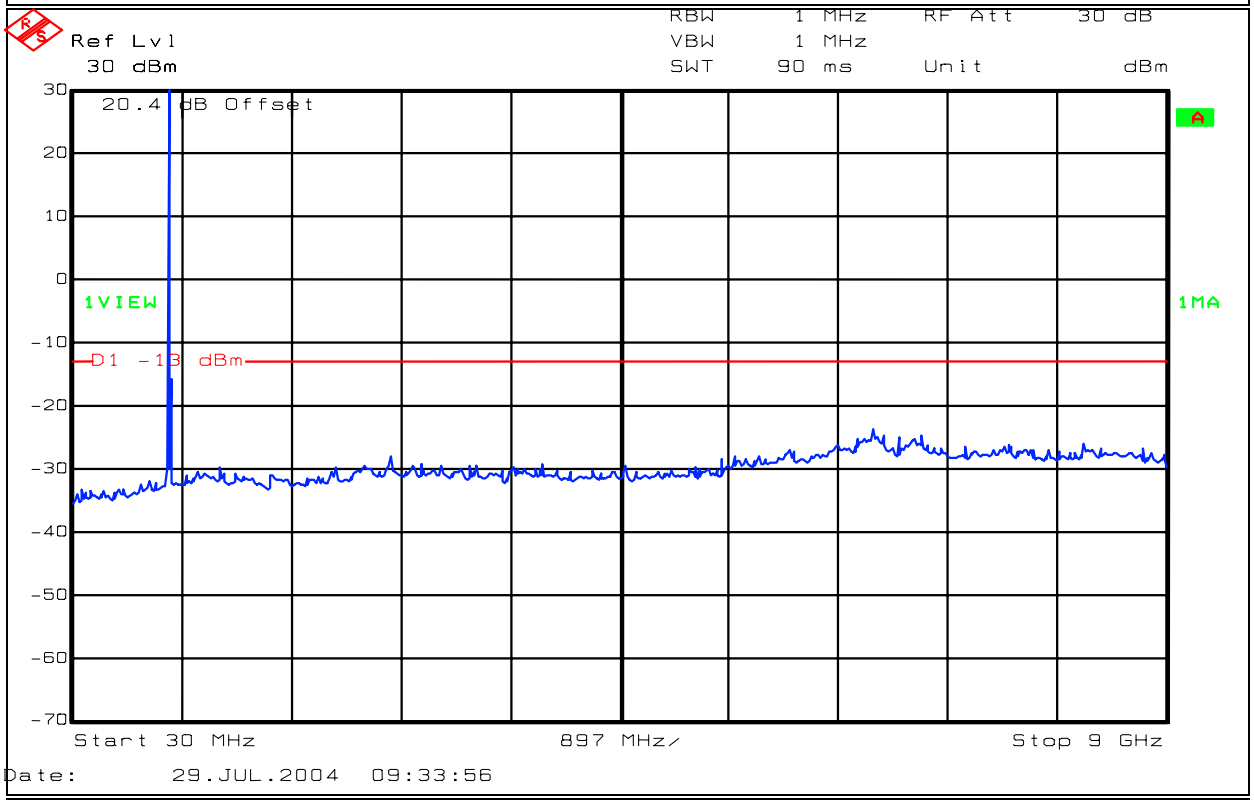
Data Plot — **Spurious Emissions at Antenna Terminals**

Page 3 of 5

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		



Notes: **1 GSM CARRIER AT 34 dBm OUTPUT**
824.2 MHz

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

Test Data – Spurious Emissions at Antenna Terminals (TDMA)

Dallas Headquarters:
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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 X

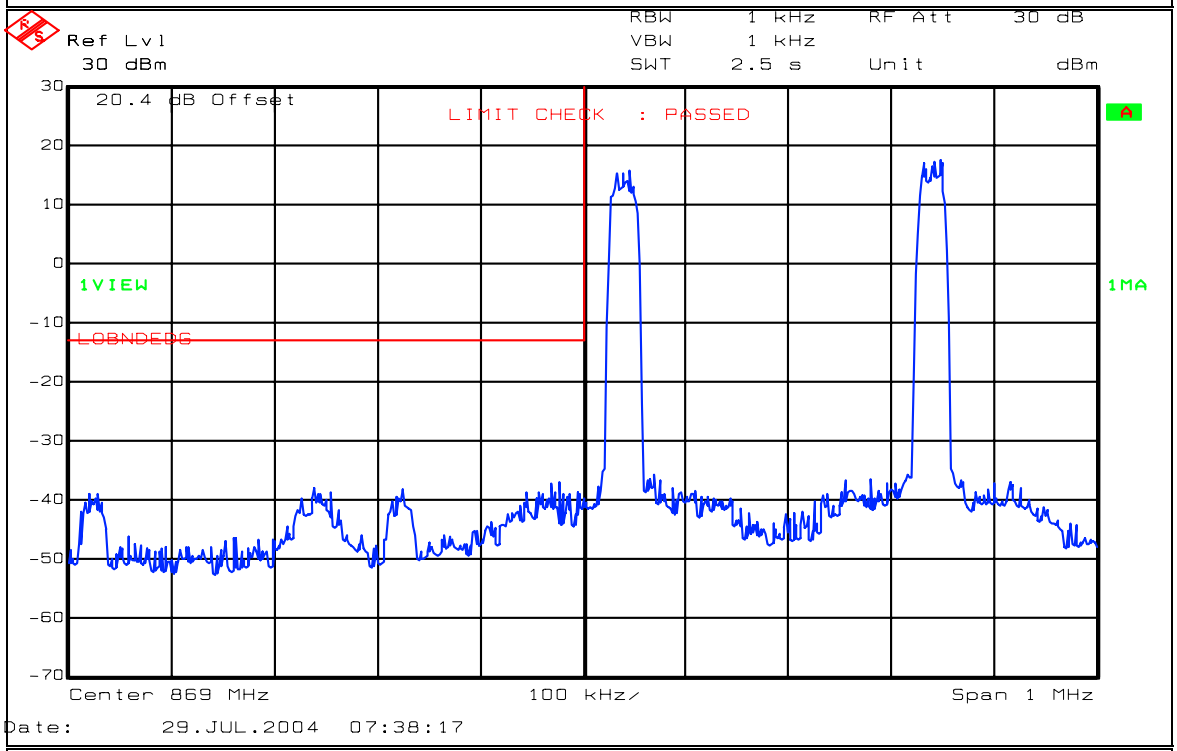
Job No.:	4L0458R	Date:	7/29/2004	Preliminary:	
Specification:	PT22	Temperature(°C):	22		
Tested By:	David Light	Relative Humidity(%)	40		
E.U.T.:	CELL BAND REPEATER				
Configuration:	TX				
Sample Number:	1				
Location:	Lab 1	RBW:	Refer to plots	Measurement	
Detector Type:	Peak	VBW:	Refer to plots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



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

Test Data – Spurious Emissions at Antenna Terminals (TDMA)

Dallas Headquarters:
802 N. Kealy
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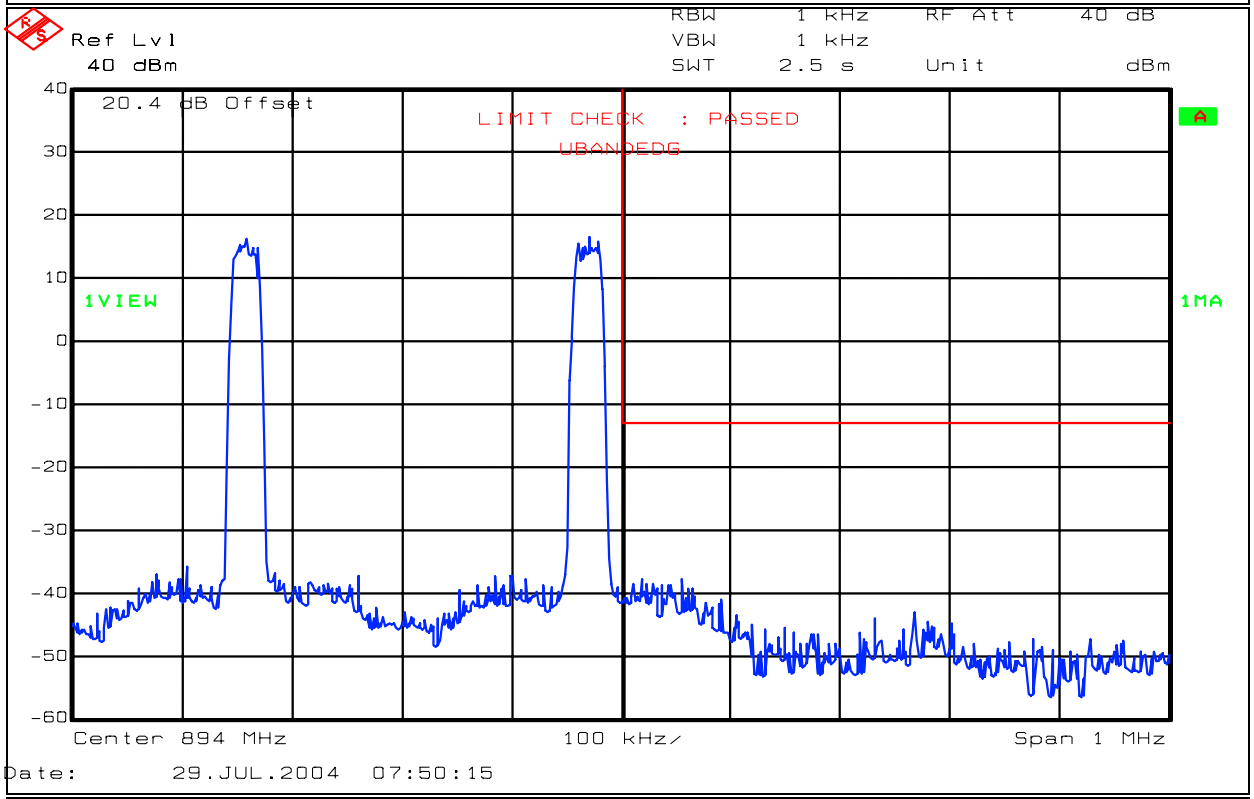
Nemko Dallas, Inc.

Data Plot — **Spurious Emissions at Antenna Terminals**

Page 2 of 5

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		



Notes: **2 CHANNEL INTERMOD**
23 dBm/Carrier 893.97 and 893.66 MHz
TDMA

Test Data – Spurious Emissions at Antenna Terminals (TDMA)

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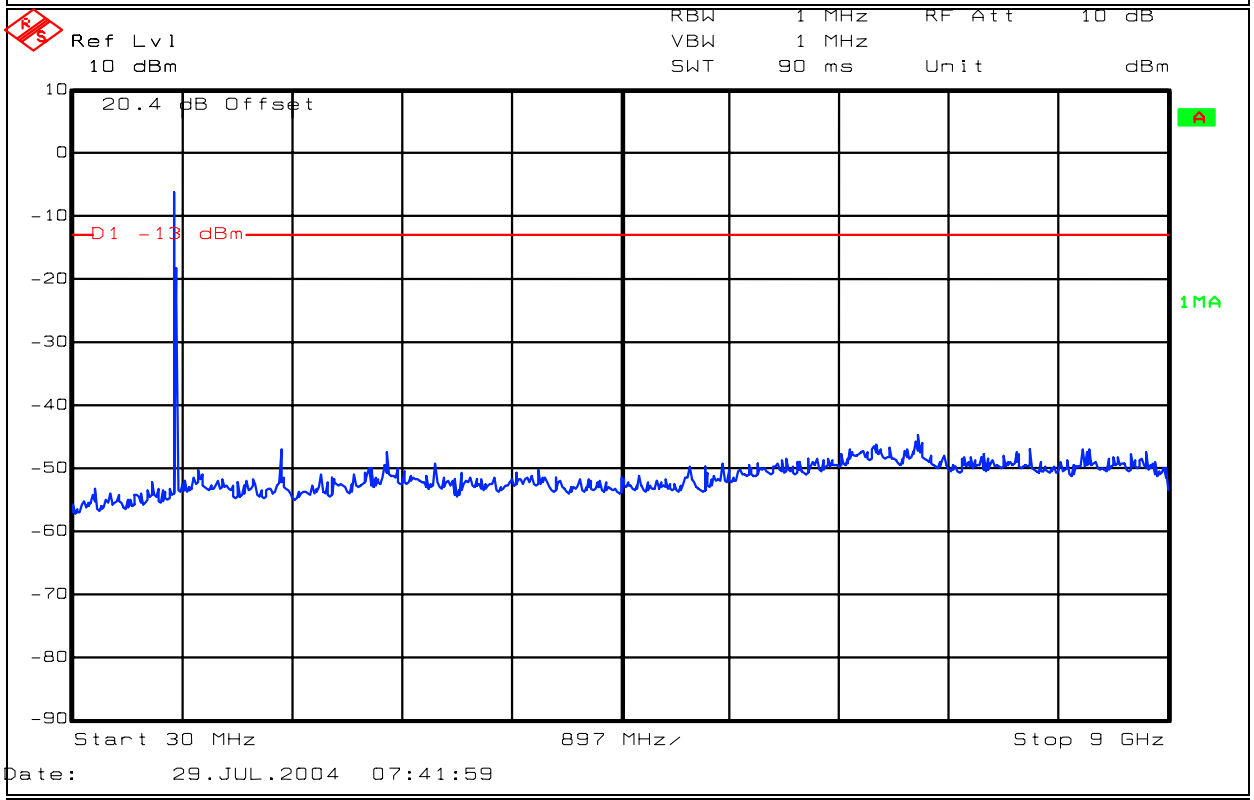
Data Plot — **Spurious Emissions at Antenna Terminals**

Page 3 of 5

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		



Notes: **TDMA**
SINGLE CARRIER AT 31.5 dBm OUTPUT
869.04 MHz

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

Test Data – Spurious Emissions at Antenna Terminals (TDMA)

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Data Plot — **Spurious Emissions at Antenna Terminals**

Page 1 of 5 — Complete X

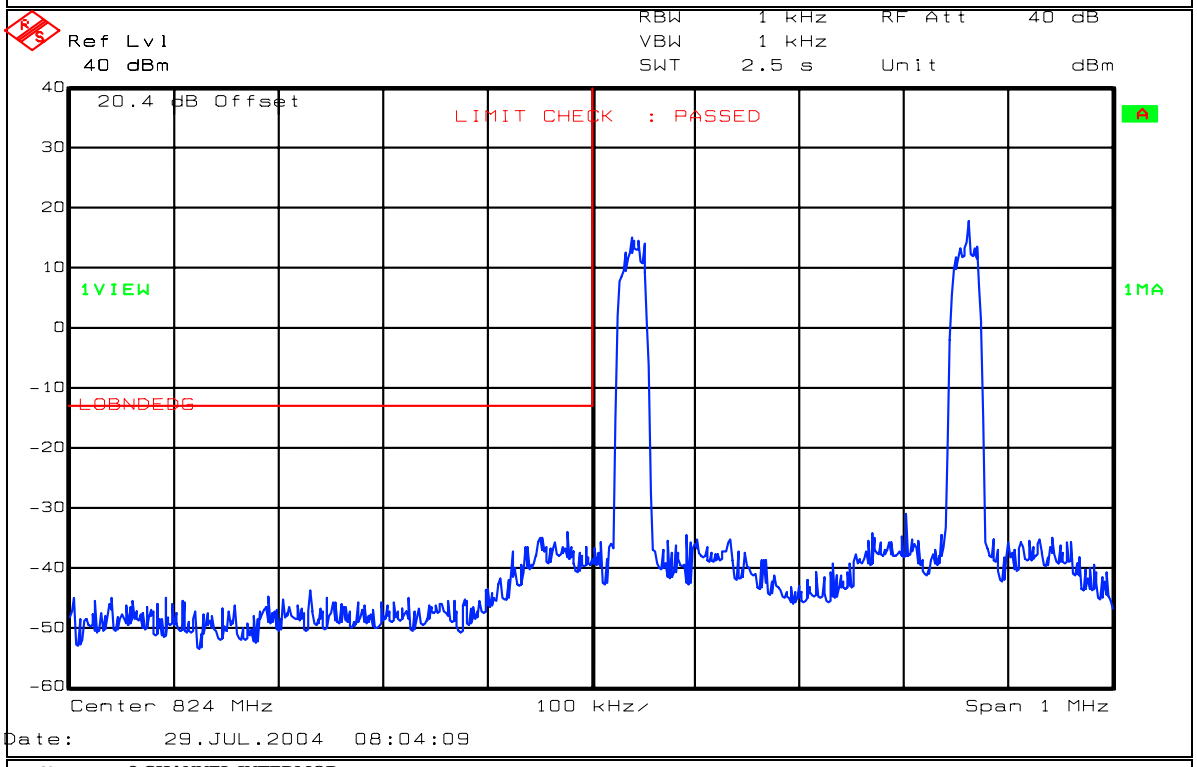
Job No.:	4L0458R	Date:	7/29/2004	Preliminary:	
Specification:	PT22	Temperature(°C):	22		
Tested By:	David Light	Relative Humidity(%)	40		
E.U.T.:	CELL BAND REPEATER				
Configuration:	TX				
Sample Number:	1				
Location:	Lab 1	RBW:	Refer to plots	Measurement	
Detector Type:	Peak	VBW:	Refer to plots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



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

Test Data – Spurious Emissions at Antenna Terminals (TDMA)

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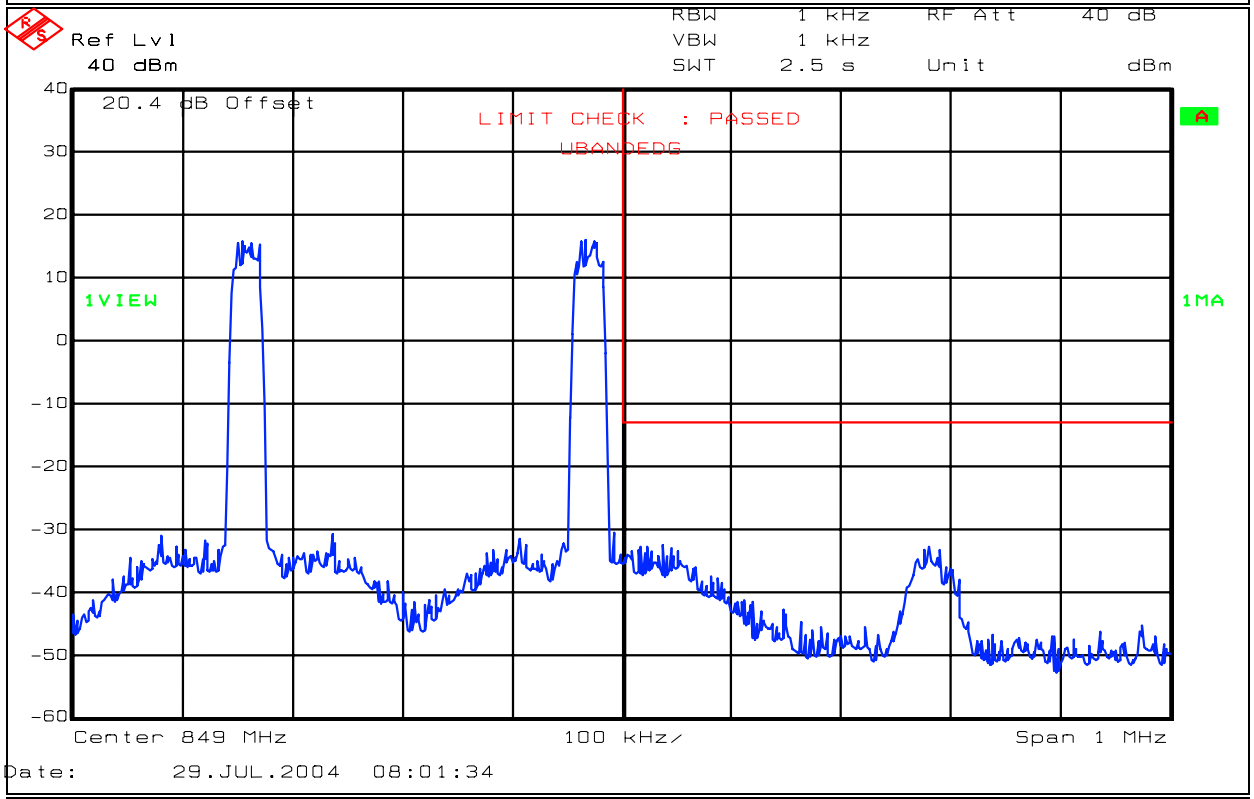
Data Plot — **Spurious Emissions at Antenna Terminals**

Page 2 of 5

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		



Notes: **2 CHANNEL INTERMOD**
23 dBm/Carrier 848.97 and 848.66 MHz
TDMA

Test Data – Spurious Emissions at Antenna Terminals (TDMA)

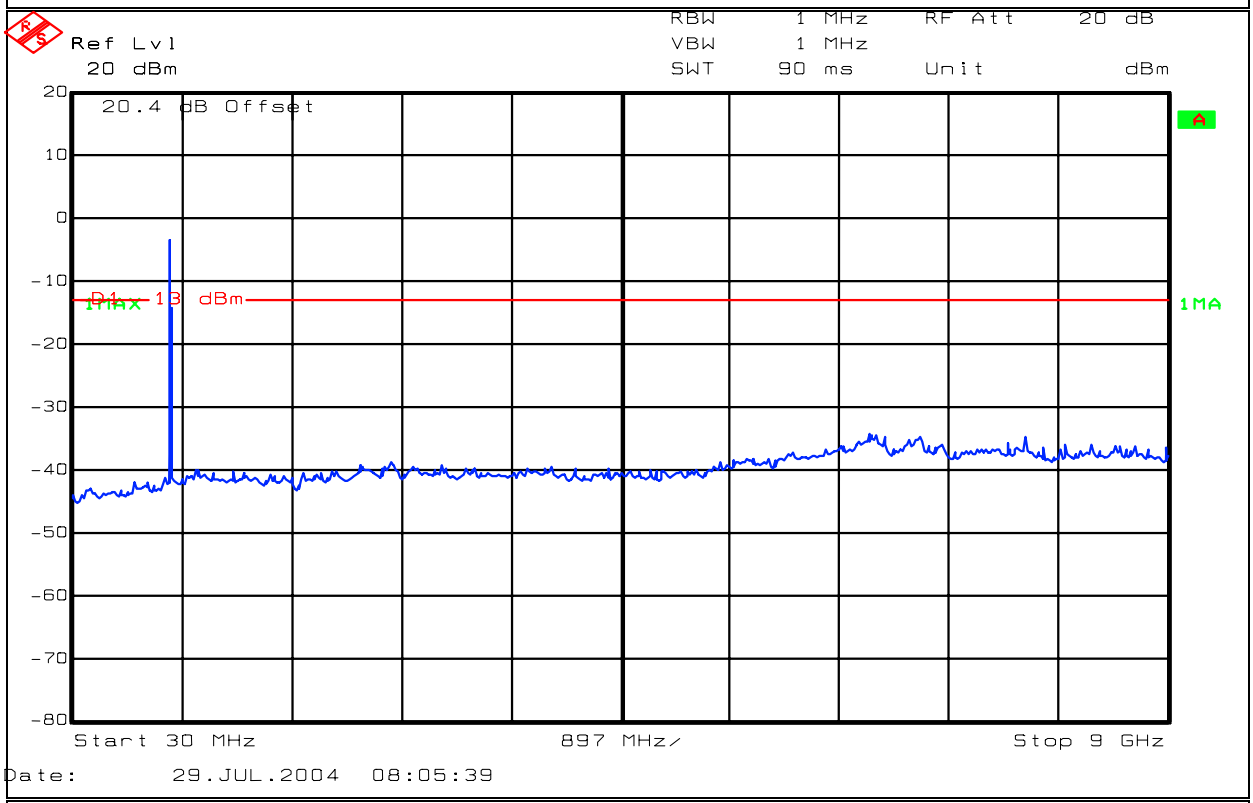
Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.

Data Plot — **Spurious Emissions at Antenna Terminals**

Page 3 of 5

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		



Notes: **TDMA**
SINGLE CARRIER AT 31.5 dBm OUTPUT
824.04 MHz

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

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 %

ERP Substitution Method

Page 1 of 1 — Complete X

Job No.: 4L0458R — Date: 7/30/04 — Preliminary

Specification: CFR 47, Part 22 — Temperature(°C): 23

Tested By: Brian Boyea — Relative Humidity(%) 43

E.U.T.: MR803P-CE

Configuration: Uplink

Sample No:

Location: AC 3 — RBW: 1 MHz — Measurement

Detector Type: Peak — VBW: 1 MHz — Distance: 3 m

Test Equipment Used

Antenna: 1304 — Directional Coupler:

Pre-Amp: 1016 — Cable #1: 1484

Filter: — Cable #2: 1485

Receiver: 795 — Cable #3: 1483

Attenuator #1 — Cable #4:

Attenuator #2: — Mixer:

Additional equipment used:

Measurement Uncertainty: +/-3.6 dB

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:

ERP Substitution Method

Page 1 of 1 — Complete X — Preliminary

Job No.: 4L0458R — Date: 7/30/04

Specification: CFR 47, Part 22 — Temperature(°C): 23

Tested By: Brian Boyea — Relative Humidity(%) 43

E.U.T.: *MR803P-CE*

Configuration: Downlink

Sample No:

Location: AC 3 — RBW: 1 MHz — Measurement

Detector Type: Peak — VBW: 1 MHz — Distance: 3 m

Test Equipment Used

Antenna:	1304	Directional Coupler:	
Pre-Amp:	1016	Cable #1:	1484
Filter:		Cable #2:	1485
Receiver:	795	Cable #3:	1483
Attenuator #1		Cable #4:	
Attenuator #2:		Mixer:	

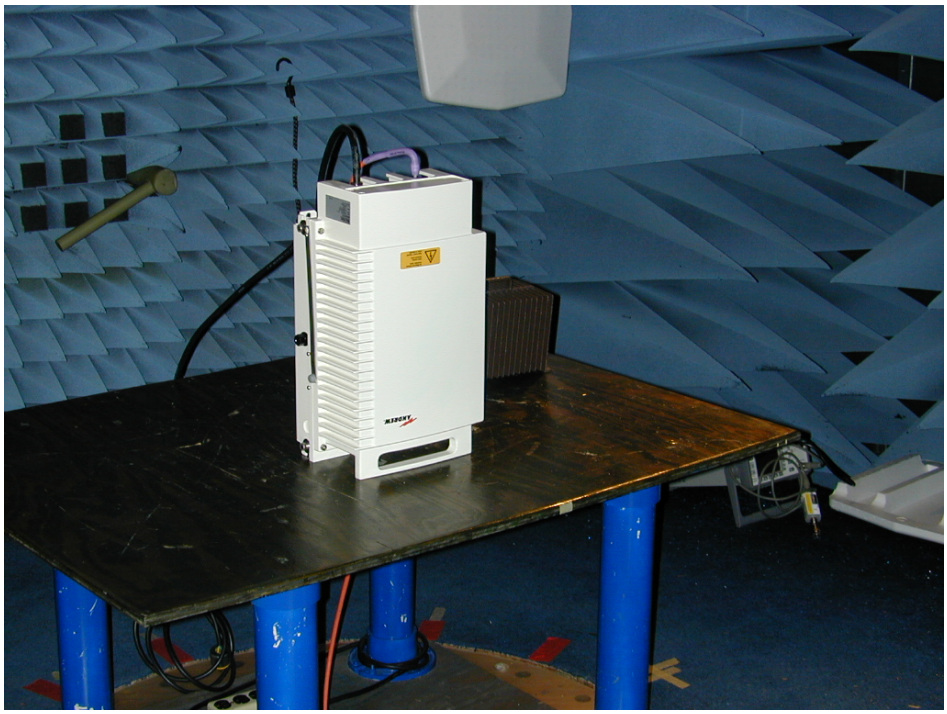
Additional equipment used:

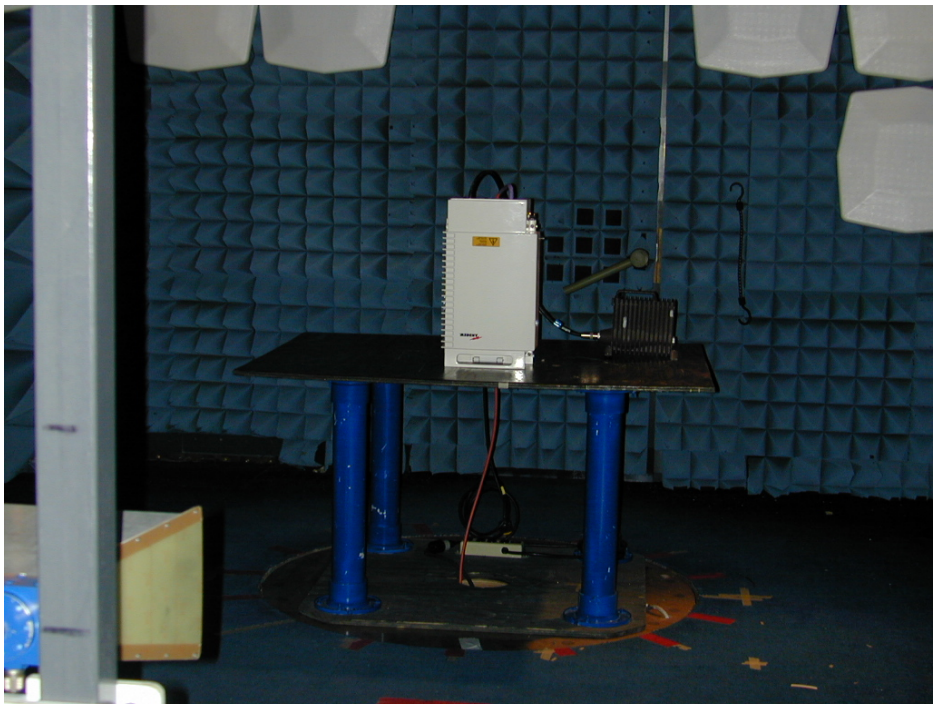
Measurement Uncertainty: +/-3.6 dB

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:

Setup Photos – Radiated Spurious Emissions





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

ANNEX A - TEST DETAILS

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.

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: ≥ 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.

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: ≥ 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

NAME OF TEST: Occupied Bandwidth (ST)	**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: ≥ 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

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: ≥ RBW
Span: As required
Sweep: Auto

Input Signal Characteristics:
RF level: Maximum recommended by manufacturer

NAME OF TEST: Spurious Emission at Antenna Terminals PARA. NO.: 2.1051

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: ≥ RBW
Start Frequency: 0 MHz
Stop Frequency: 10 GHz
Sweep: Auto

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.

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

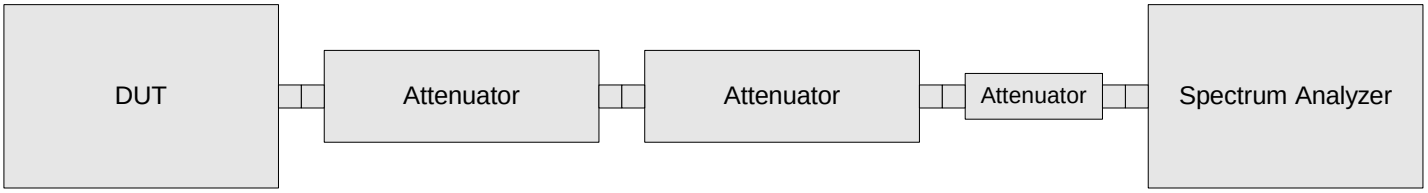
Method Of Measurement:

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.

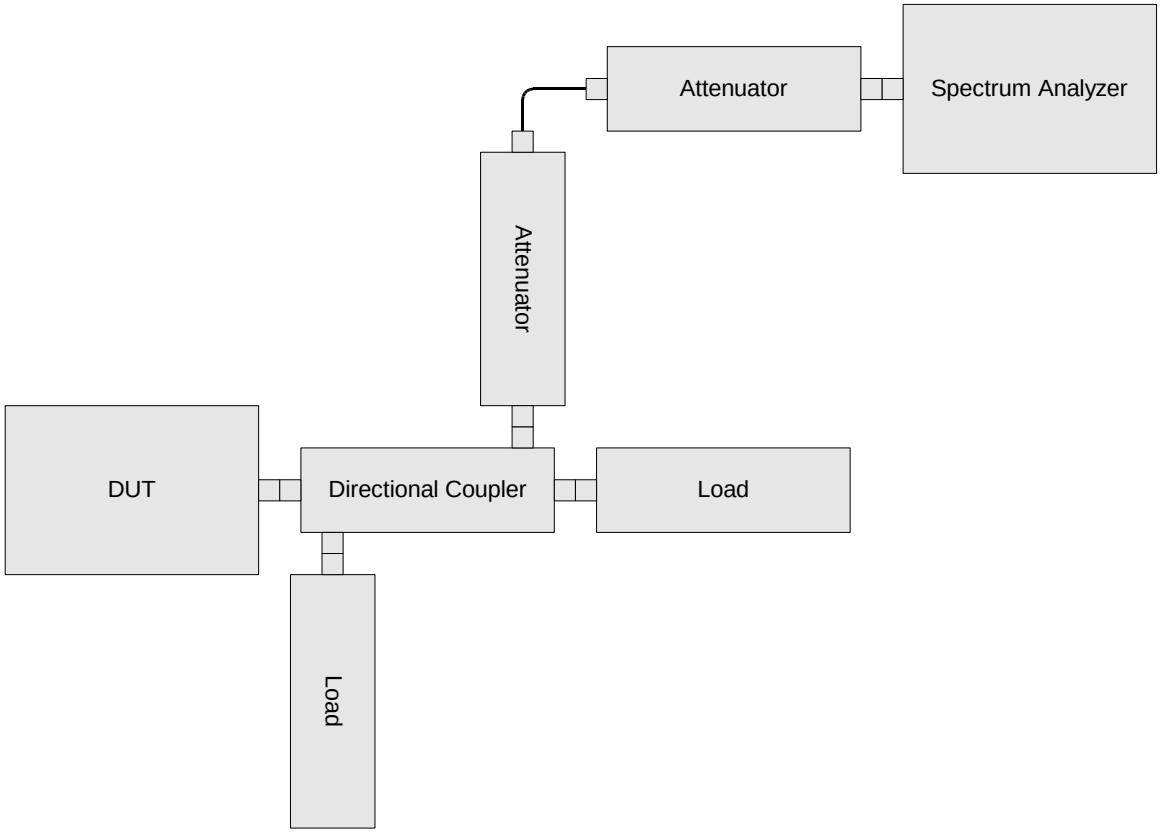
Frequency Stability With Temperature Variation:
The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30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

ANNEX B - TEST DIAGRAMS

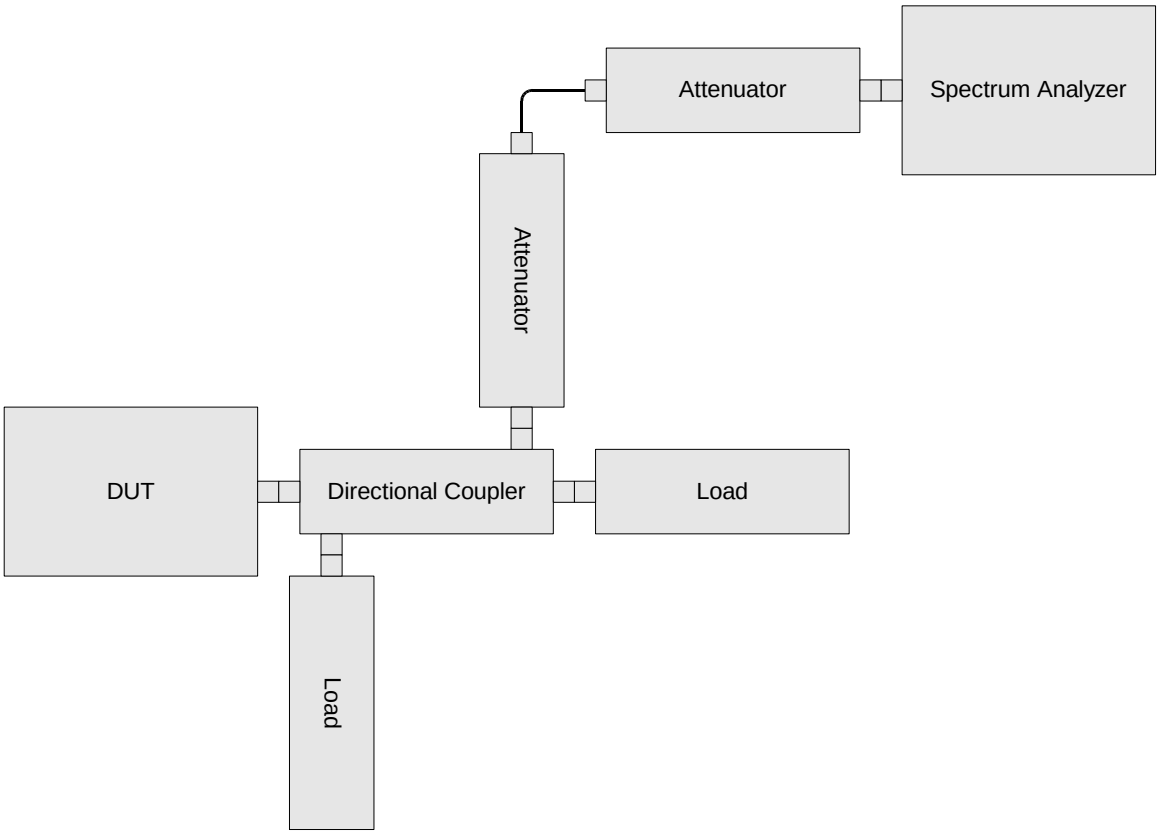
Para. No. 2.1046 - R.F. Power Output

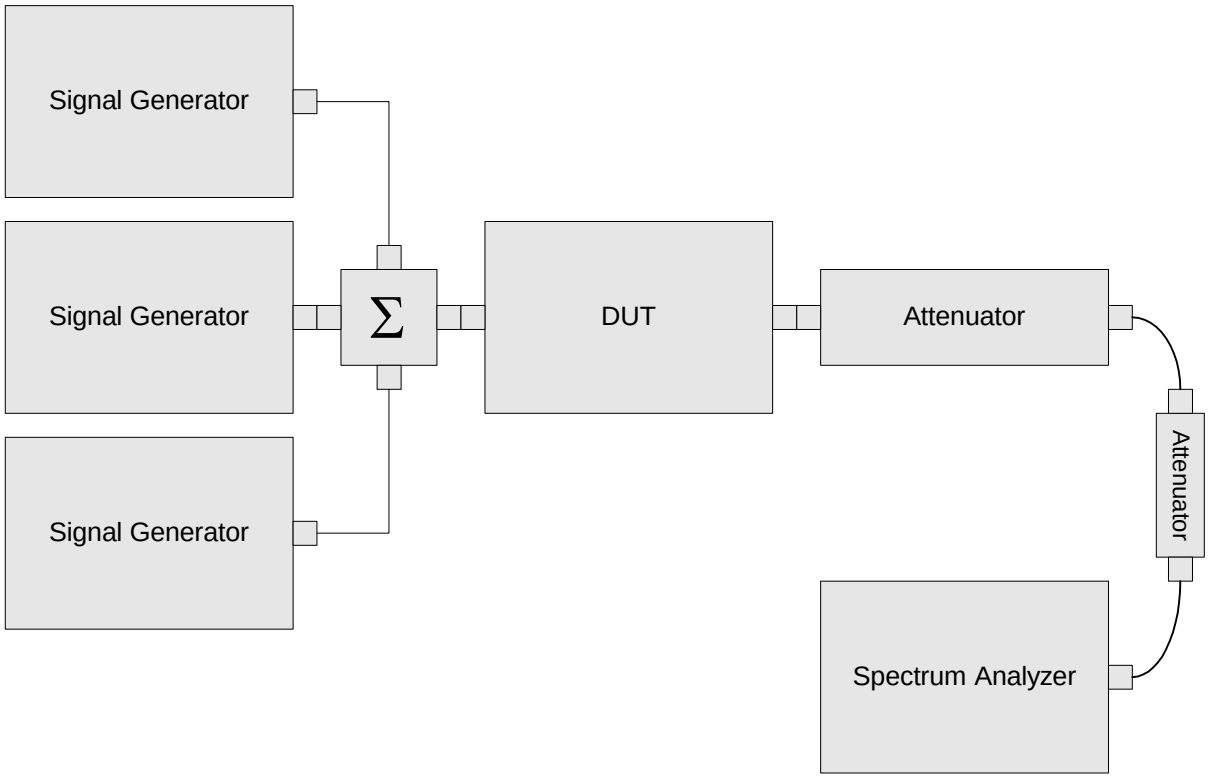


Para. No. 2.1049 - Occupied Bandwidth

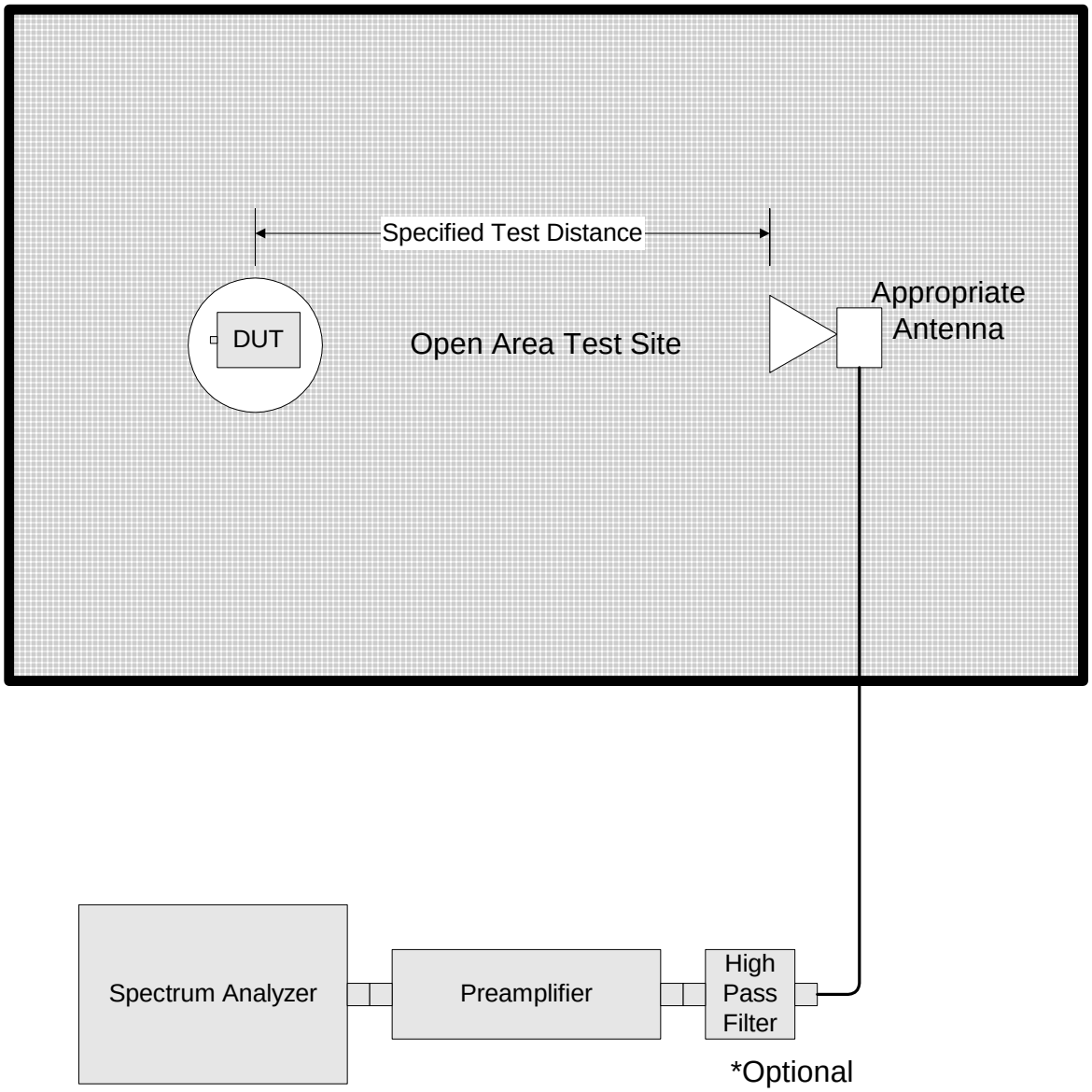


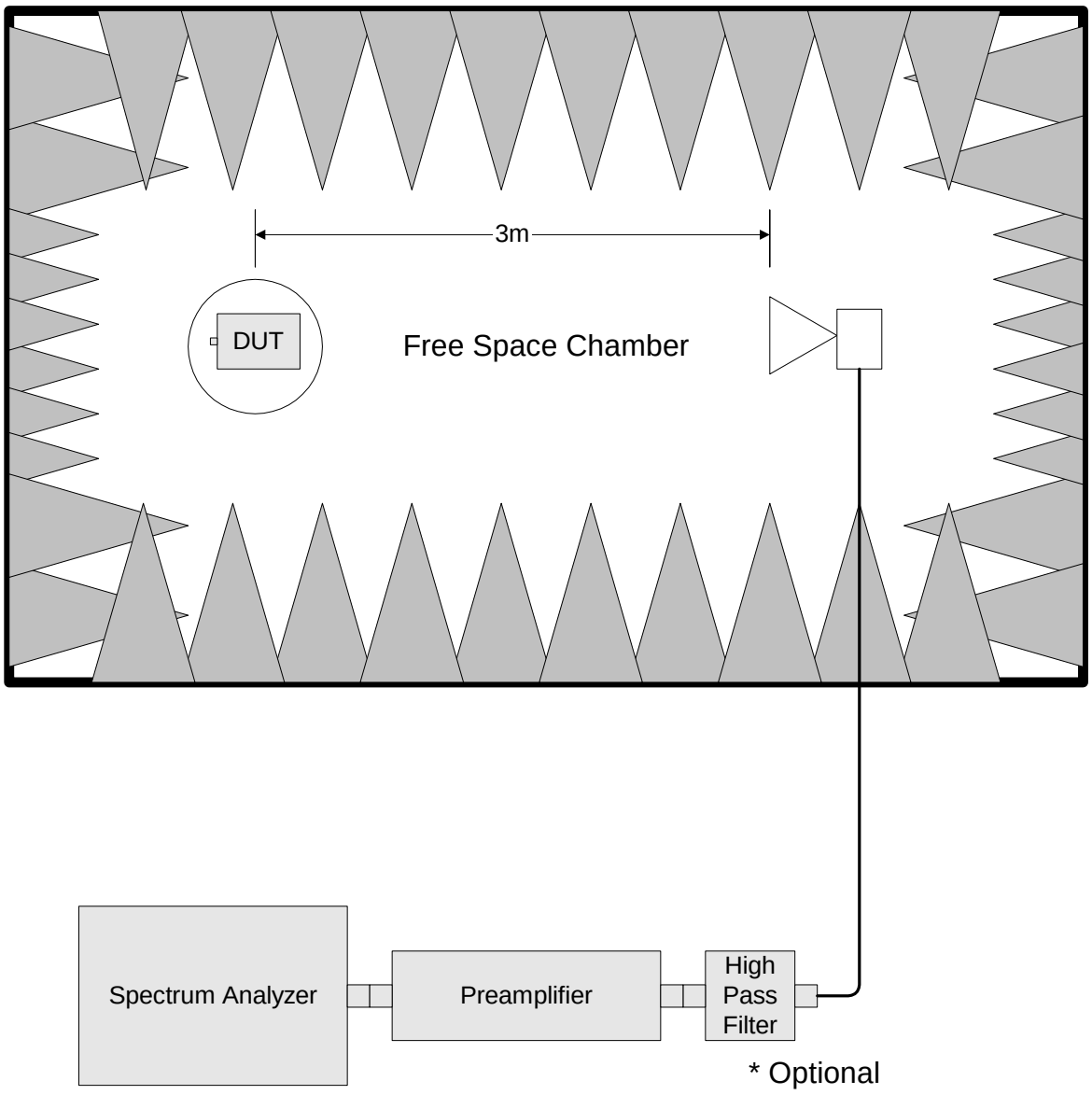
Para. No. 2.1051 Spurious Emissions at Antenna Terminals




Signal Generator
Signal Generator
Signal Generator
∑
DUT
Attenuator
Attenuator
Spectrum Analyzer

Para. No. 2.1053 - Field Strength of Spurious Radiation




3m
DUT
Free Space Chamber
Spectrum Analyzer
Preamplifier
High
Pass
Filter
* Optional

Para. No. 2.1055 - Frequency Stability