

Nemko Test Report No.:

2L0288RUS1

Applicant:

DeKolink Wireless

16 Bazel St. Qiryat-Arieh Petah-Tikva
Israel 49510

Equipment Under Test:

Compact Bi Directional Amplifier

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:

David Light, Wireless Lab Supervisor

Date:

5/28/02

Total Number of Pages:

51

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EQUIPMENT: Compact Bi Directional Amplifier

Section 1. Summary of Test Results

Manufacturer: DeKolink Wireless

Model No.: MW-CBDA-PCS-X-1W65 (X indicates PCS block of operation)

Serial No.: 02039040/02039042

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.



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.

See “ Summary of Test Data”.

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EQUIPMENT: Compact Bi Directional Amplifier

Summary Of Test Data

NAME OF TEST	PARA. NO.	SPEC.	RESULT
RF Power Output	24.232	100W	Complies
Occupied Bandwidth (CDMA)	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.

EQUIPMENT: Compact Bi Directional Amplifier

Section 2. General Equipment Specification

Supply Voltage Input:	115 VAC		
Frequency Bands: Downlink:	☒ Block A : 1930 – 1945 MHz ☒ Block D : 1945 – 1950 MHz ☒ Block B : 1950 – 1965 MHz ☒ Block E : 1965 – 1970 MHz ☒ Block F : 1970 – 1975 MHz ☒ Block C : 1975 – 1990 MHz		
Frequency Bands: Uplink:	☒ Block A : 1850 – 1865 MHz ☒ Block D : 1865 – 1870 MHz ☒ Block B : 1870 – 1885 MHz ☒ Block E : 1885 – 1890 MHz ☒ Block F : 1890 – 1895 MHz ☒ Block C : 1895 – 1910 MHz		
Type of Modulation and Designator:	CDMA (G7W) ☒		
System Gain (rated):	65 dB		
Output Impedance:	50 ohms		
Max Input:	-45 dBm		
RF Output (Rated):	Uplink	0.25 W	
	Downlink	Total: 0.50 W	
Frequency Translation:	F1-F1 ☒	F1-F2 ☐	N/A ☐
Band Selection:	Software ☐	Duplexer ☒	Full band ☐

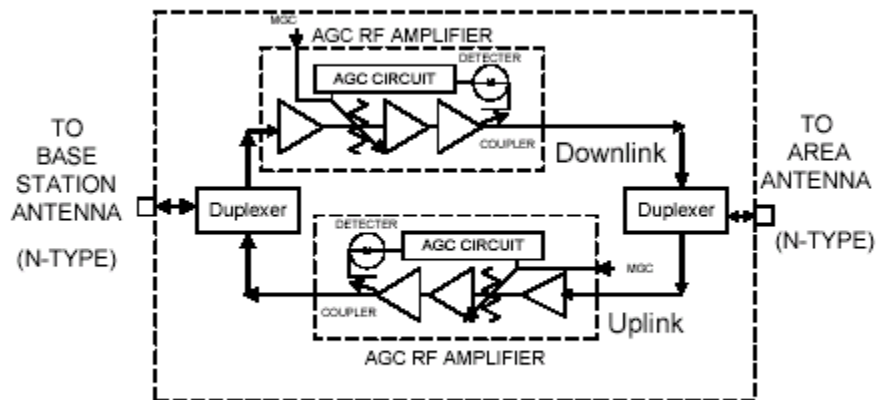
EQUIPMENT: Compact Bi Directional Amplifier

Description of Operation

The Compact Bi-Directional Amplifier (CBDA) assembly provides a repeater/booster to extend the coverage area of radio communications in buildings and RF shielded environments.

The CBDA Downlink amplifier receives the RF signals from base station amplifies and transmits them to the subscriber. The BDA Uplink amplifier receives the RF signals from the subscriber amplifies and transmits them to the base station.

Diagram



EQUIPMENT: Compact Bi Directional Amplifier

Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 2.1046
TESTED BY: Kevin Rose	DATE: 5/23/02

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

	Modulation Type	Per Channel Output Power (dBm)
Downlink A	CDMA	26.8
Uplink A	CDMA	24.1
Downlink C	CDMA	27.1
Uplink C	CDMA	23.9

Equipment Used: 1464-1604-1052-1053**Measurement Uncertainty:** +/- 1.7 dB**Temperature:** 23 °C**Relative Humidity:** 38 %

EQUIPMENT: Compact Bi Directional Amplifier

Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth (CDMA)	PARA. NO.: 2.1049
TESTED BY: Kevin Rose	DATE: 5/23/02

Test Results: Complies.**Test Data:** See attached plot(s).**Equipment Used:** 1464-1604-1052-1053**Measurement +/- 1.7 dB
Uncertainty:****Temperature:** 21 °C**Relative 35 %
Humidity:**



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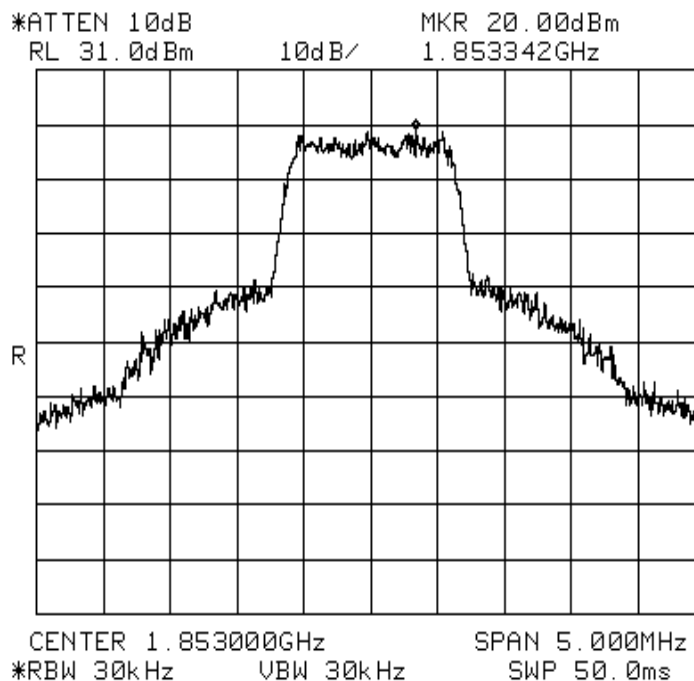
Data Plot

Occupied Bandwidth

Page 1 of 4
Job No.: 210288r Date: May 23 2002 Complete x
Specification: 2.1049 Temperature(°C): 23 Preliminary:
Tested By: Kevin Rose Relative Humidity(%) 38
E.U.T.: A Band repeater Dekolink
Configuration: TX full Power
Sample Number: 2039040
Location: Lab 1 RBW: Refer to plots
Detector Type: Peak VBW: Refer to plots

Test Equipment Used

Antenna: Directional Coupler:
Pre-Amp: Cable #1: 1043
Filter: Cable #2: 1046
Receiver: 1464 Cable #3:
Attenuator #1: 1604 Cable #4:
Attenuator #2: i wave model 392 Mixer:
Additional equipment used: 1053 1052
Measurement Uncertainty: +/-1.7 dB



Notes: Band A Output signal CDMA Uplink

EQUIPMENT: Compact Bi Directional Amplifier



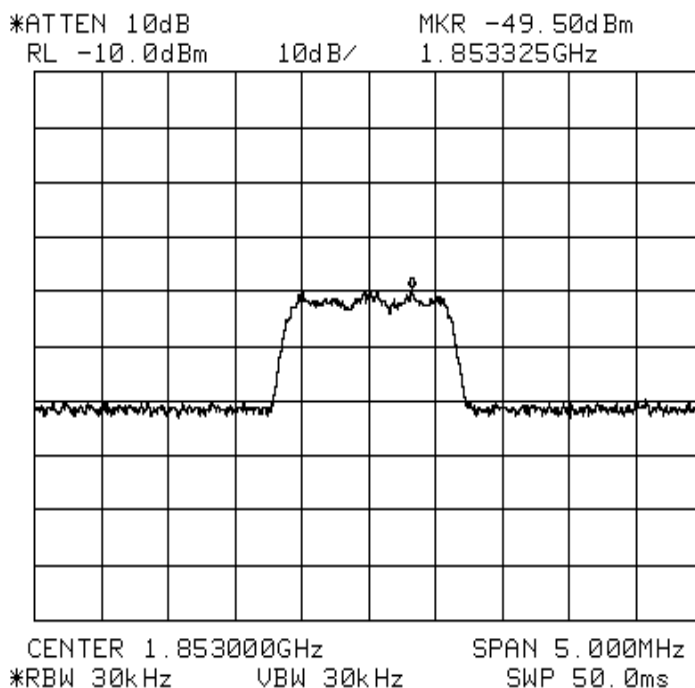
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Data Plot

Occupied Bandwidth

Page 2 of 4
Job No.: 210288r Date: May 23 2002
Specification: 2.1 Temperature(°C): 23
Tested By: Kevin Rose Relative Humidity(%) 38
E.U.T.: A Band repeater Dekolink
Configuration: TX full Power



Notes: Band A input signal CDMA UPlink

EQUIPMENT: Compact Bi Directional Amplifier



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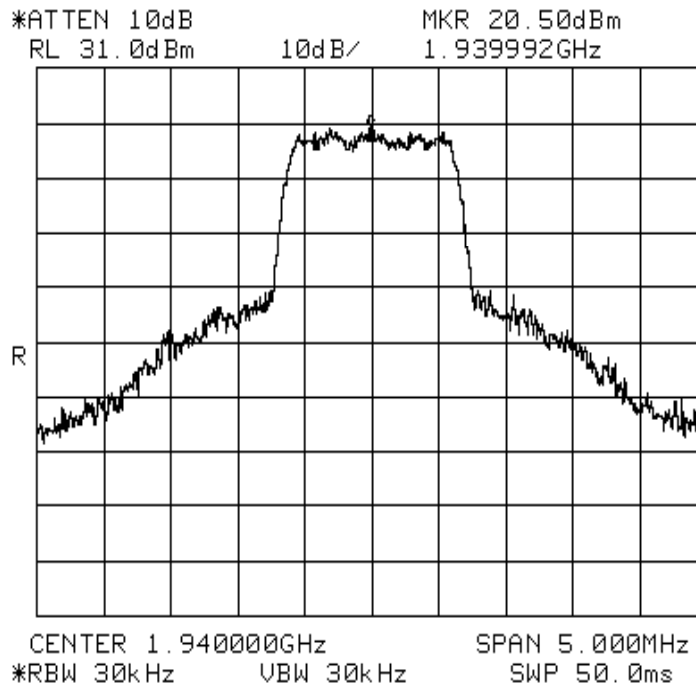
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Data Plot

Page 3 of 4

Job No.: 210288r Date: May 23 2002
Specification: 2.1049 Temperature(°C): 23
Tested By: Kevin Rose Relative Humidity(%) 38
E.U.T.: A Band repeater Dekolink
Configuration: TX full Power

Occupied Bandwidth



Notes: Band A output signal CDMA downlink

EQUIPMENT: Compact Bi Directional Amplifier



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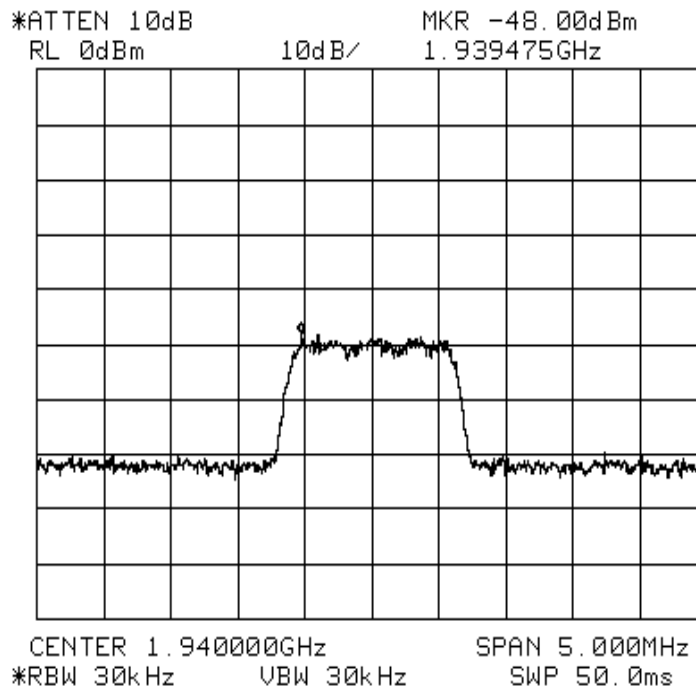
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Test Plot:

Page 4 of 4

Job No.: 210288r Date: May 23 2002
Specification: 2.1049 Temperature(°C): 23
Tested By: Kevin Rose Relative Humidity(%) 38
E.U.T.: A Band repeater Dekolink
Configuration: TX full Power

Occupied Bandwidth



Notes: Band A input signal CDMA Downlink

EQUIPMENT: Compact Bi Directional Amplifier



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Data Plot

Page 1 of 4

Job No.: 210288r

Date: May 23 2002

Specification: 2.1049

Temperature(°C): 23

Tested By: Kevin Rose

Relative Humidity(%) 38

E.U.T.: C Band repeater Dekolink

Configuration: TX full Power

Sample Number: 2039042

Location: Lab 1

RBW: Refer to plots

Detector Type: Peak

VBW: Refer to plots

Complete ☒ xPreliminary: ☐

Test Equipment Used

Antenna: Directional Coupler: Pre-Amp:

Cable #1: 1043

Filter:

Cable #2: 1046

Receiver: 1464

Cable #3:

Attenuator #1: 1604

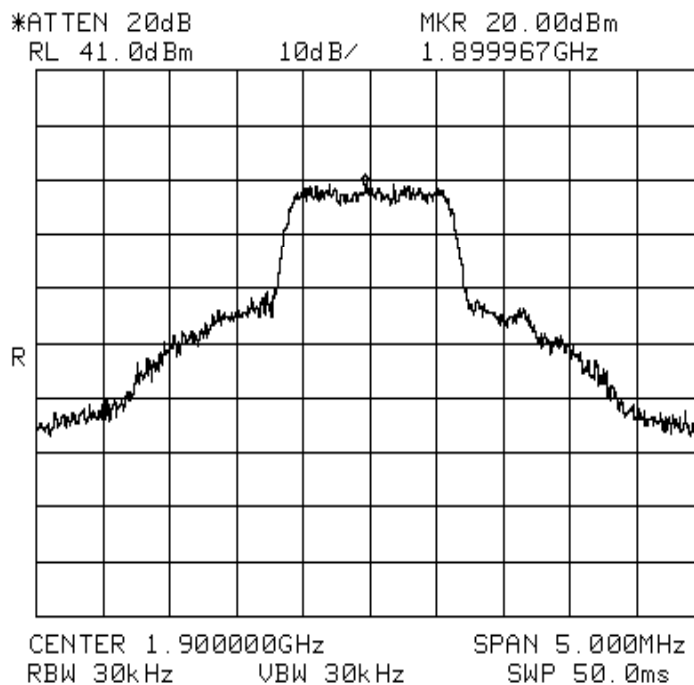
Cable #4:

Attenuator #2: i wave model 392

Mixer:

Additional equipment used: 1053 1052

Measurement Uncertainty: +/-1.7 dB



Notes: Band C Output signal CDMA uplink

EQUIPMENT: Compact Bi Directional Amplifier



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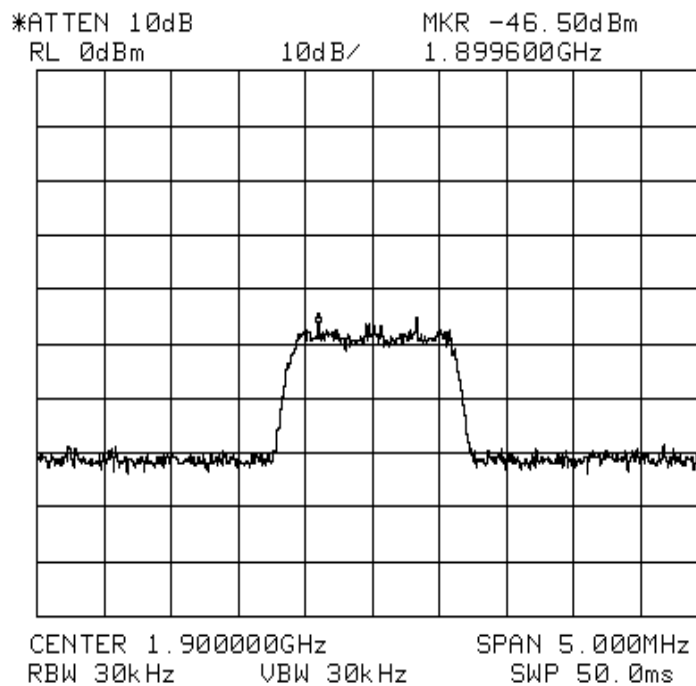
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Data Plot

Occupied Bandwidth

Page 2 of 4
Job No.: 210288r Date: May 23 2002
Specification: 2.1049 Temperature(°C): 23
Tested By: Kevin Rose Relative Humidity(%) 38
E.U.T.: C Band repeater Dekolink
Configuration: TX full Power



Notes: Band C input signal CDMA Uplink



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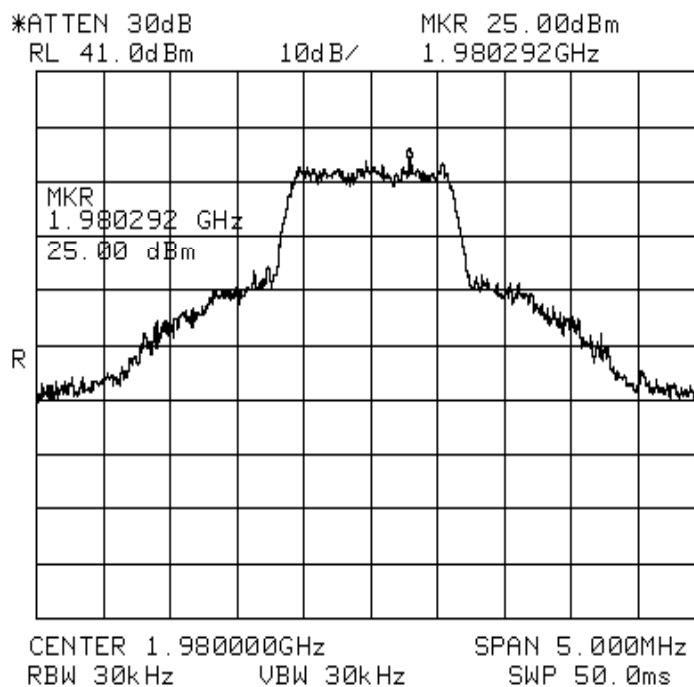
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Data Plot

Page 3 of 4

Occupied Bandwidth

Job No.: 210288r Date: May 23 2002
Specification: 2.1049 Temperature(°C): 23
Tested By: Kevin Rose Relative Humidity(%) 38
E.U.T.: C Band repeater Dekolink
Configuration: TX full Power



Notes: Band C output signal CDMA Downlink

EQUIPMENT: Compact Bi Directional Amplifier



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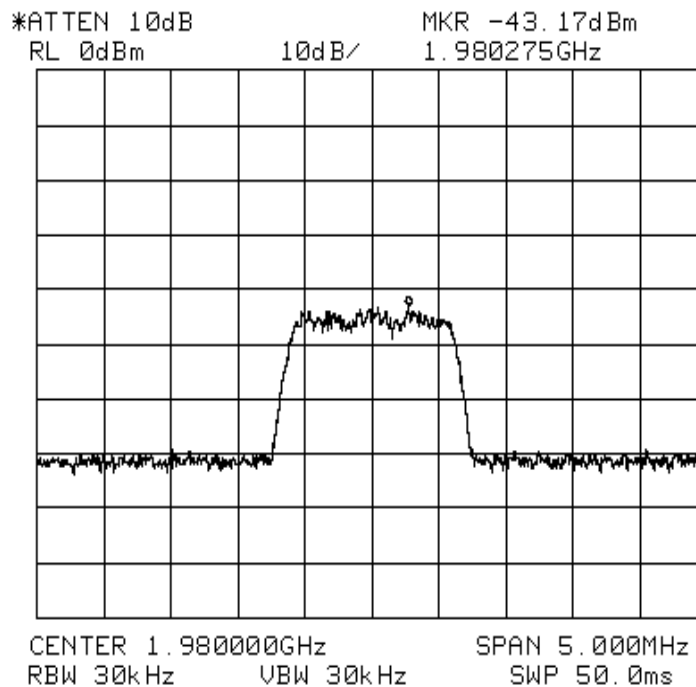
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Test Plot:

Page 4 of 4
Job No.: 210288r Date: May 23 2002
Specification: 2.1049 Temperature(°C): 23
Tested By: Kevin Rose Relative Humidity(%) 38
E.U.T.: C Band repeater Dekolink
Configuration: TX full Power

Occupied Bandwidth



Notes: Band C input signal CDMA Downlink

EQUIPMENT: Compact Bi Directional Amplifier

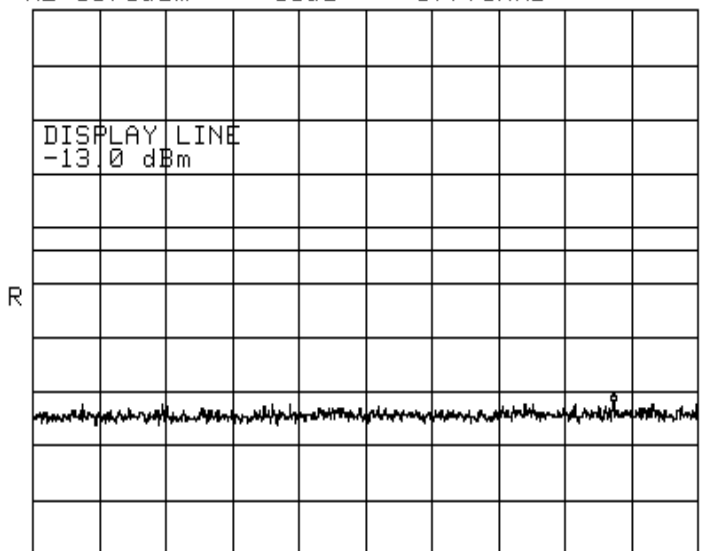
Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 2.1051
TESTED BY: Kevin Rose	DATE: 5/23/02

Test Results: Complies.**Test Data:** See attached plot(s).**Equipment Used:** 1464-1604-1052-1053**Measurement
Uncertainty:** +/- 1.6 dB**Temperature:** 23 °C**Relative
Humidity:** 38 %

EQUIPMENT: Compact Bi Directional Amplifier

Test Data --- Spurious Emissions at Antenna Terminals

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Data Plot		Spurious Emissions at Antenna Terminals	
Page 1 of 4		Complete <u>x</u>	
Job No.: 210288r	Date: May 23 2002	Preliminary: _____	
Specification: 2.1051	Temperature(°C): 23		
Tested By: Kevin Rose	Relative Humidity(%) 38		
E.U.T.: A Band repeater Dekolink			
Configuration: TX full Power			
Sample Number: 2039040			
Location: Lab 1	RBW: Refer to plots		
Detector Type: Peak	VBW: Refer to plots		
Test Equipment Used			
Antenna: _____	Directional Coupler: _____		
Pre-Amp: _____	Cable #1: 1043		
Filter: _____	Cable #2: 1046		
Receiver: 1464	Cable #3: _____		
Attenuator #1: 1604	Cable #4: _____		
Attenuator #2: i wave model 392	Mixer: _____		
Additional equipment used: 1053 1052			
Measurement Uncertainty: +/-1.7 dB			
*ATTEN 10dB MKR -41.00dBm RL 31.0dBm 10dB/ 877.1MHz			
			
START 30.0MHz STOP 1.0000GHz *RBW 100kHz VBW 100kHz SWP 250ms			
Notes: Band A 30 Mhz - 1 Ghz display line -13dBm			
Downlink. Marker indicates the highest emission			



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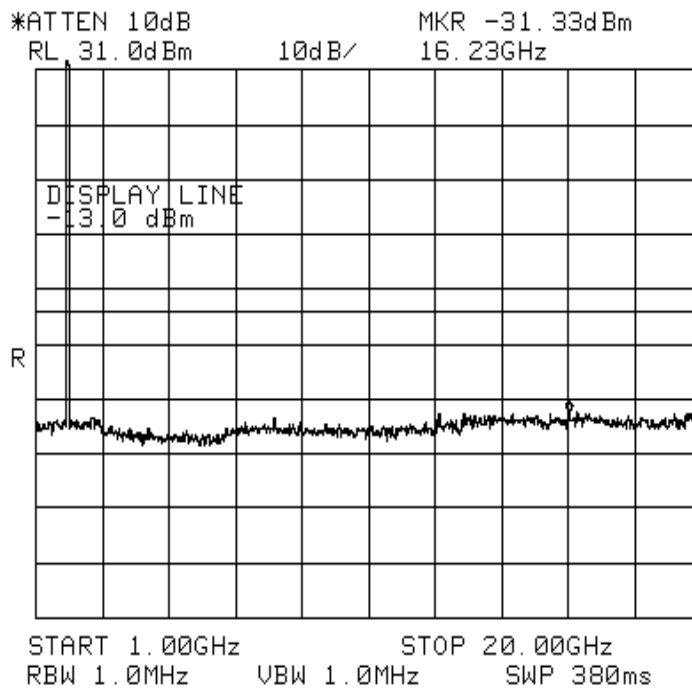
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Data Plot

Spurious Emissions at Antenna Terminals

Page 2 of 4
Job No.: 210288r Date: May 23 2002
Specification: 2.1051 Temperature(°C): 23
Tested By: Kevin Rose Relative Humidity(%) 38
E.U.T.: A Band repeater Dekolink
Configuration: TX full Power



Notes: Band A 1Ghz-20Ghz display line -13dBm
Downlink. Marker indicates the highest emission

EQUIPMENT: Compact Bi Directional Amplifier



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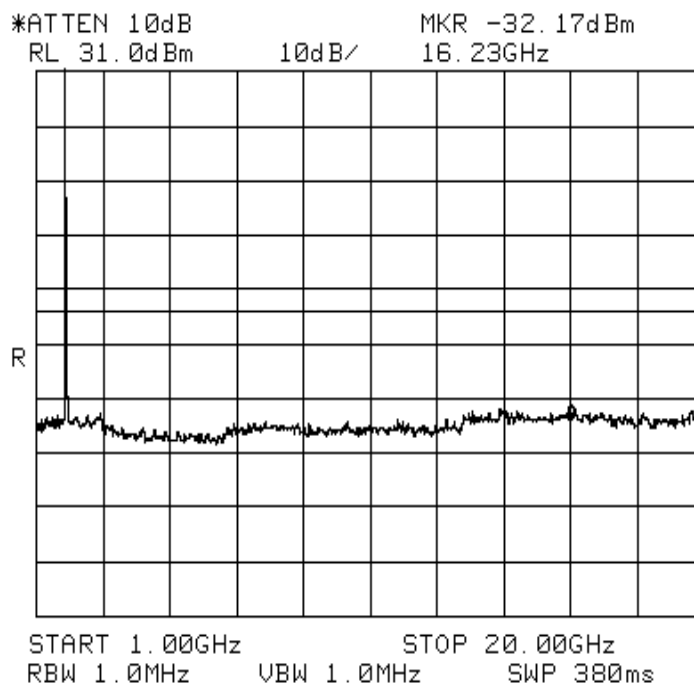
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Data Plot

Page 3 of 4

Spurious Emissions at Antenna Terminals

Job No.: 210288r Date: May 23 2002
Specification: 2.1051 Temperature(°C): 23
Tested By: Kevin Rose Relative Humidity(%) 38
E.U.T.: A Band repeater Dekolink
Configuration: TX full Power



Notes: Band A 1Ghz-20Ghz display line -13dBm
Uplink marker indicates the highest emission

EQUIPMENT: Compact Bi Directional Amplifier



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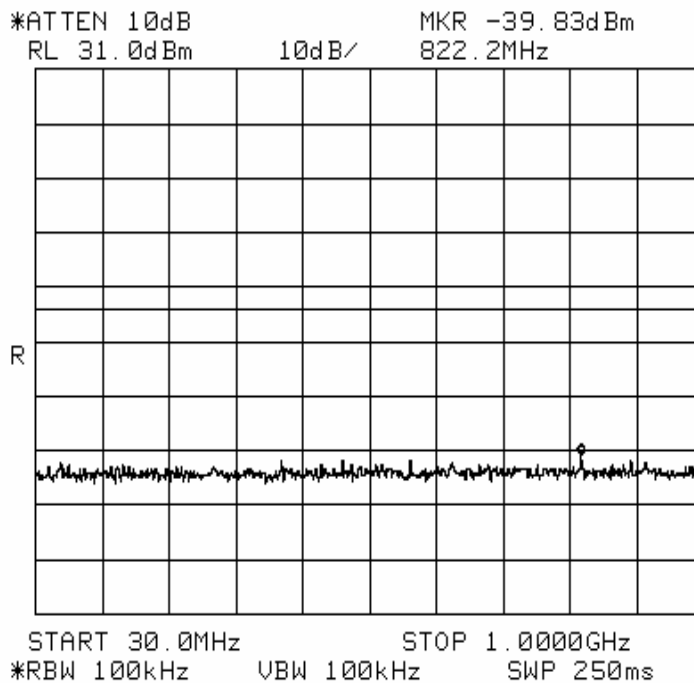
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Test Plot:

Page 4 of 4

Spurious Emissions at Antenna Terminals

Job No.: 210288r Date: May 23 2002
Specification: 2.1051 Temperature(°C): 23
Tested By: Kevin Rose Relative Humidity(%) 38
E.U.T.: A Band repeater Dekolink
Configuration: TX full Power



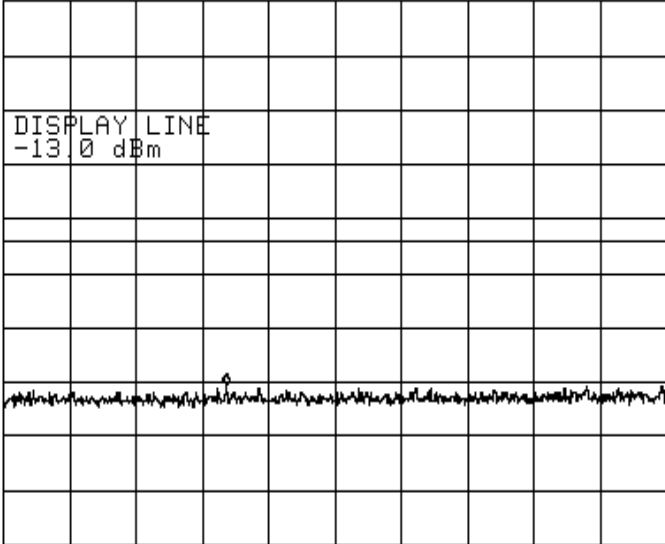
Notes: Band A 30 Mhz - 1 Ghz display line -13dBm
Uplink. Marker indicates the highest emission

EQUIPMENT: Compact Bi Directional Amplifier

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Data Plot		Spurious Emissions at Antenna Terminals	
Page <u>1</u> of <u>2</u>		Complete <u>x</u>	
Job No.:	210288r	Date:	May 23 2002
Specification:	2.1051	Temperature(°C):	23
Tested By:	Kevin Rose	Relative Humidity(%)	38
E.U.T.:	C Band repeater Dekolink		
Configuration:	TX full Power		
Sample Number:	2039042		
Location:	Lab 1	RBW:	Refer to plots
Detector Type:	Peak	VBW:	Refer to plots
Test Equipment Used			
Antenna:		Directional Coupler:	
Pre-Amp:		Cable #1:	1043
Filter:		Cable #2:	1046
Receiver:	1464	Cable #3:	
Attenuator #1:	1604	Cable #4:	
Attenuator #2:	i wave model 392		
Additional equipment used:	1053 1052		
Measurement Uncertainty:	+/-1.7 dB		

ATTEN 10dB MKR -39.50dBm

RL 31.0dBm 10dB/ 356.6MHz



START 30.0MHz STOP 1.0000GHz

*RBW 100kHz VBW 100kHz SWP 250ms

Notes:	Band C 30 Mhz - 1 Ghz display line -13dBm
	downlink marker indicates the highest emission



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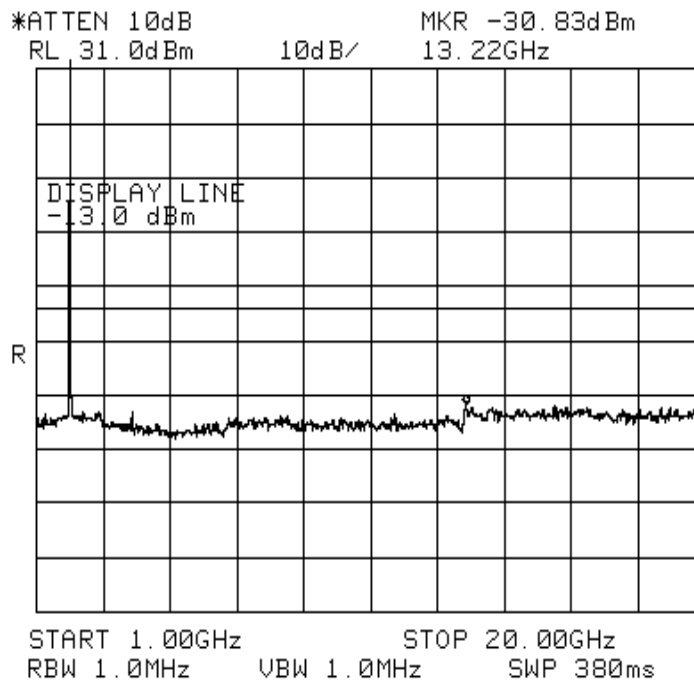
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Data Plot

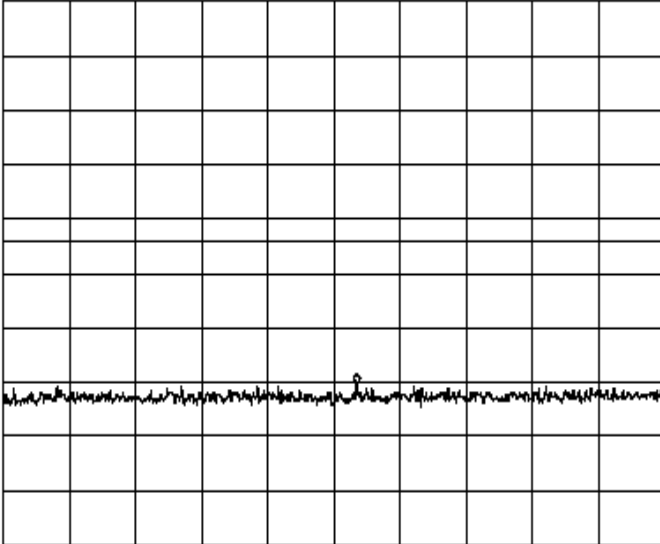
Spurious Emissions at Antenna Terminals

Page 2 of 2
Job No.: 210288r Date: May 23 2002
Specification: 2.1051 Temperature(°C): 23
Tested By: Kevin Rose Relative Humidity(%) 38
E.U.T.: C Band repeater Dekolink
Configuration: TX full Power



Notes: Band C 1Ghz-20Ghz display line -13dBm
Downlink. Marker indicates the highest emission

EQUIPMENT: Compact Bi Directional Amplifier

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Data Plot Spurious Emissions at Antenna Terminals		
Page <u>1</u> of <u>2</u>		Complete <u>x</u>
Job No.: 210288r	Date: <u>May 23 2002</u>	Preliminary: <u> </u>
Specification: 2.1051	Temperature(°C): <u>23</u>	
Tested By: <u>Kevin Rose</u>	Relative Humidity(%) <u>38</u>	
E.U.T.: <u>C Band repeater Dekolink</u>		
Configuration: <u>TX full Power</u>		
Sample Number: <u>2039042</u>		
Location: <u>Lab 1</u>	RBW: <u>Refer to plots</u>	
Detector Type: <u>Peak</u>	VBW: <u>Refer to plots</u>	
Test Equipment Used		
Antenna: <u> </u>	Directional Coupler: <u> </u>	
Pre-Amp: <u> </u>	Cable #1: <u>1043</u>	
Filter: <u> </u>	Cable #2: <u>1046</u>	
Receiver: <u>1464</u>	Cable #3: <u> </u>	
Attenuator #1: <u>1604</u>	Cable #4: <u> </u>	
Attenuator #2: <u>i wave model 392</u>	Mixer: <u> </u>	
Additional equipment used: <u>1053 1052</u>		
Measurement Uncertainty: <u>+/-1.7 dB</u>		
ATTEN 10dBMKR -39.33dBm RL 31.0dBm10dB/549.0MHz  START 30.0MHzSTOP 1.0000GHz *RBW 100kHzVBW 100kHzSWP 250ms		
Notes: <u>Band C 30MHz - 1GHz display line -13dBm</u>		
<u>Uplink. Marker indicates the highest emission</u>		



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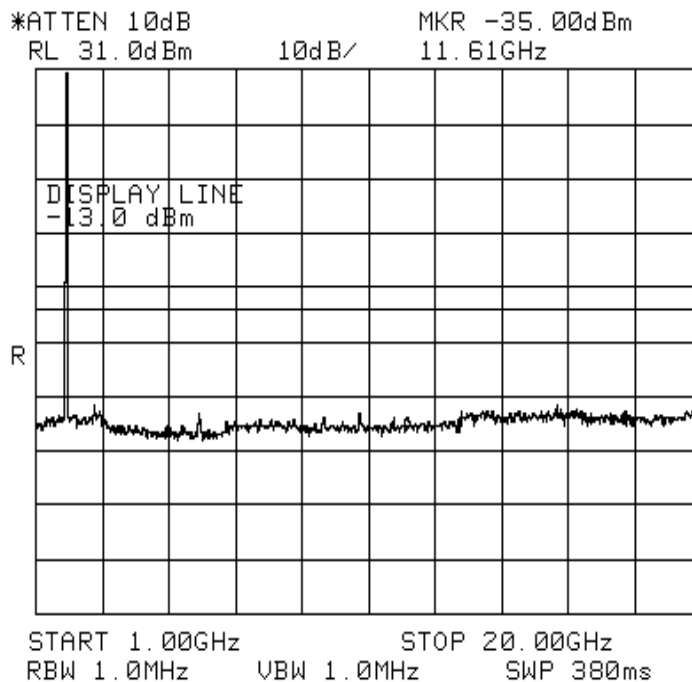
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Data Plot

Spurious Emissions at Antenna Terminals

Page 2 of 2
Job No.: 210288r Date: May 23 2002
Specification: 2.1051 Temperature(°C): 23
Tested By: Kevin Rose Relative Humidity(%) 38
E.U.T.: C Band repeater Dekolink
Configuration: TX full Power



Notes: Band C 1GHz-20GHz display line -13dBm
Uplink. Marker indicates the highest emission

EQUIPMENT: Compact Bi Directional Amplifier



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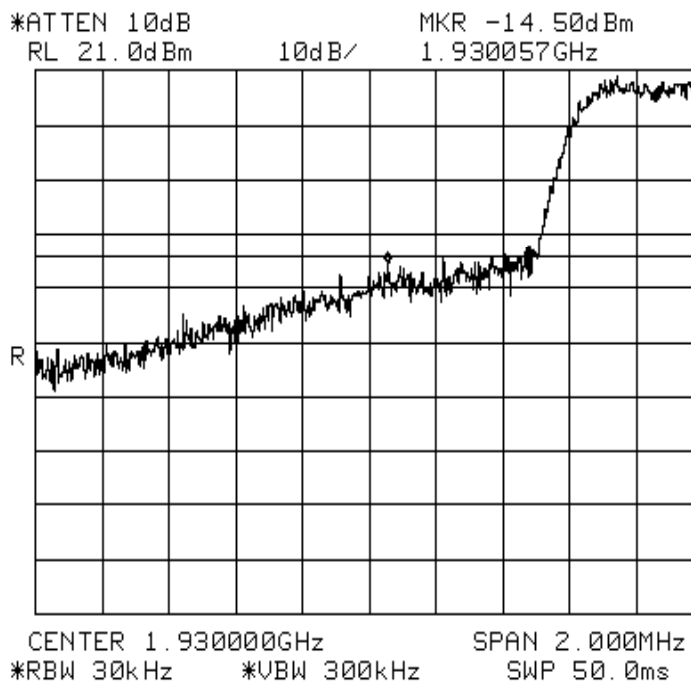
Data Plot

Bandedges

Page 1 of 2
 Job No.: 210288r Date: May 23 2002 Complete x
 Specification: 24.238 Temperature(°C): 23 Preliminary: _____
 Tested By: Kevin Rose Relative Humidity(%) 38
 E.U.T.: A Band repeater Dekolink
 Configuration: TX full Power
 Sample Number: 2039040
 Location: Lab 1 RBW: Refer to plots
 Detector Type: Peak VBW: Refer to plots

Test Equipment Used

Antenna: _____ Directional Coupler: _____
 Pre-Amp: _____ Cable #1: 1043
 Filter: _____ Cable #2: 1046
 Receiver: 1464 Cable #3: _____
 Attenuator #1: 1604 Cable #4: _____
 Attenuator #2: i wave model 392 Mixer: _____
 Additional equipment used: 1053 1052
 Measurement Uncertainty: +/-1.7 dB



Notes: Band A Output signal CDMA downlink
band edge 1.93GHz display line is -13dBm

EQUIPMENT: Compact Bi Directional Amplifier



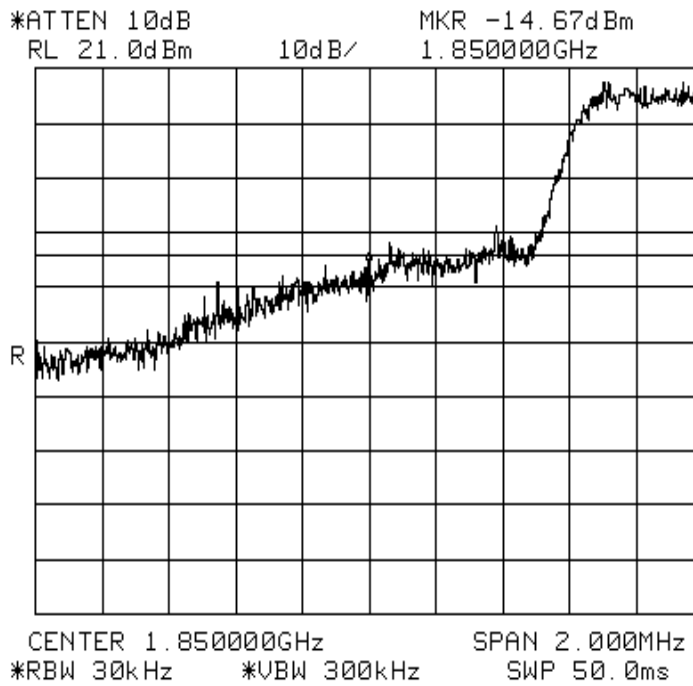
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Data Plot

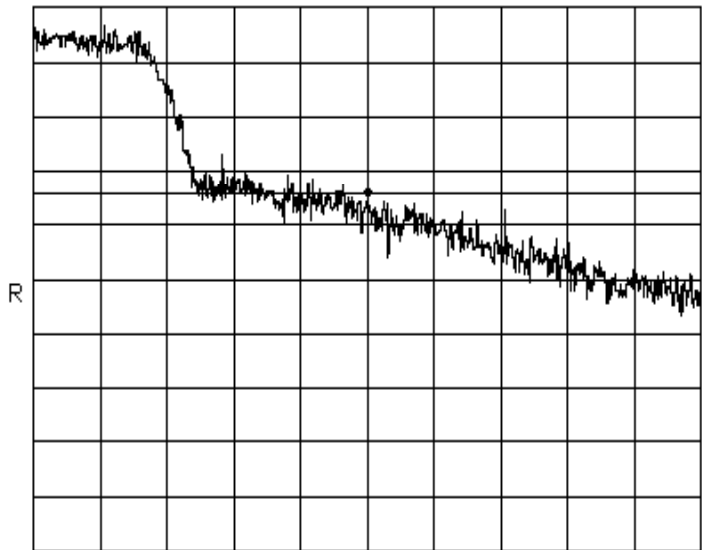
Page 2 of 2
Job No.: 210288r Date: May 23 2002
Specification: 24.2380 Temperature(°C): 23
Tested By: Kevin Rose Relative Humidity(%) 38
E.U.T.: A Band repeater Dekolink
Configuration: TX full Power

Bandedges



Notes: Band C input signal CDMA Downlink
Band Edge 1.85Ghz display line is -13dBm

EQUIPMENT: Compact Bi Directional Amplifier

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Nemko Dallas, Inc.																		
Data Plot Page <u>1</u> of <u>2</u> Job No.: <u>210288r</u> Specification: <u>24.238</u> Tested By: <u>Kevin Rose</u> E.U.T.: <u>C Band repeater Dekolink</u> Configuration: <u>TX full Power</u> Sample Number: <u>2039042</u> Location: <u>Lab 1</u> Detector Type: <u>Peak</u>		Bandedges Date: <u>May 23 2002</u> Temperature(°C): <u>23</u> Relative Humidity(%): <u>38</u> RBW: <u>Refer to plots</u> VBW: <u>Refer to plots</u> Complete <u>x</u> Preliminary: _____																
Test Equipment Used <table style="width: 100%;"><tr><td>Antenna: _____</td><td>Directional Coupler: _____</td></tr><tr><td>Pre-Amp: _____</td><td>Cable #1: <u>1043</u></td></tr><tr><td>Filter: _____</td><td>Cable #2: <u>1046</u></td></tr><tr><td>Receiver: <u>1464</u></td><td>Cable #3: _____</td></tr><tr><td>Attenuator #1: <u>1604</u></td><td>Cable #4: _____</td></tr><tr><td>Attenuator #2: <u>i wave model 392</u></td><td>Mixer: _____</td></tr><tr><td>Additional equipment used: <u>1053 1052</u></td><td></td></tr><tr><td>Measurement Uncertainty: <u>+/-1.7 dB</u></td><td></td></tr></table>			Antenna: _____	Directional Coupler: _____	Pre-Amp: _____	Cable #1: <u>1043</u>	Filter: _____	Cable #2: <u>1046</u>	Receiver: <u>1464</u>	Cable #3: _____	Attenuator #1: <u>1604</u>	Cable #4: _____	Attenuator #2: <u>i wave model 392</u>	Mixer: _____	Additional equipment used: <u>1053 1052</u>		Measurement Uncertainty: <u>+/-1.7 dB</u>	
Antenna: _____	Directional Coupler: _____																	
Pre-Amp: _____	Cable #1: <u>1043</u>																	
Filter: _____	Cable #2: <u>1046</u>																	
Receiver: <u>1464</u>	Cable #3: _____																	
Attenuator #1: <u>1604</u>	Cable #4: _____																	
Attenuator #2: <u>i wave model 392</u>	Mixer: _____																	
Additional equipment used: <u>1053 1052</u>																		
Measurement Uncertainty: <u>+/-1.7 dB</u>																		
*ATTEN 10dBMKR -14.00dBm RL 21.0dBm10dB/1.910003GHz  CENTER 1.910000GHzSPAN 2.000MHz *RBW 30kHz*VBW 300kHzSWP 50.0ms																		
Notes: <u>Band C Output signal CDMA uplink</u> <u>band edge 1.91Ghz</u>																		

EQUIPMENT: Compact Bi Directional Amplifier



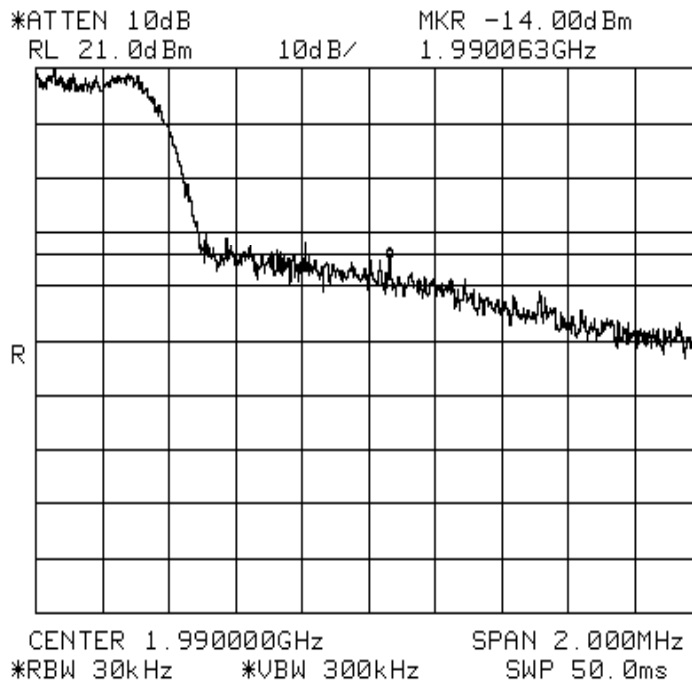
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Data Plot

Bandedges

Page 2 of 2
Job No.: 210288r Date: May 23 2002
Specification: 24.2 Temperature(°C): 23
Tested By: Kevin Rose Relative Humidity(%) 38
E.U.T.: C Band repeater Dekolink
Configuration: TX full Power



Notes: Band C input signal CDMA downlink
Band Edge 1.99Mhz



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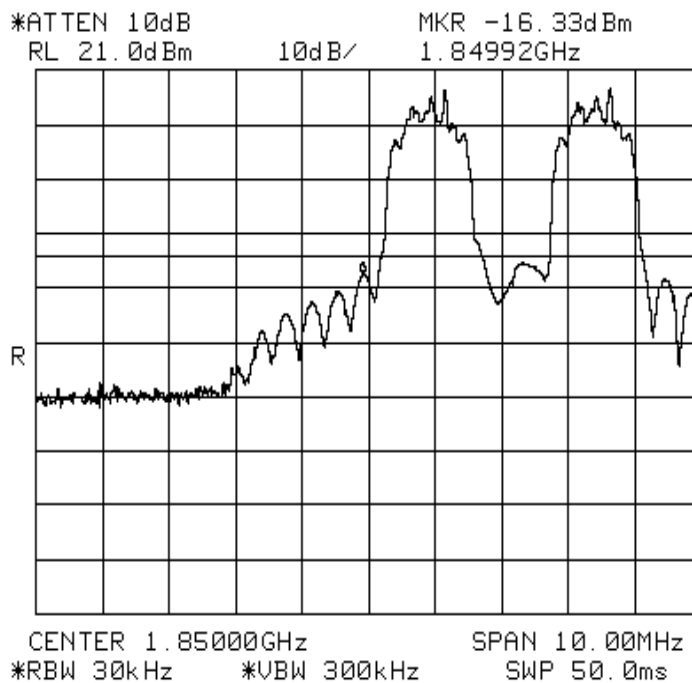
Data Plot

Intermodulation Characteristics

Page 1 of 4
Job No.: 210288r Date: May 23 2002 Complete x
Specification: 2.1049 Temperature(°C): 23 Preliminary:
Tested By: Kevin Rose Relative Humidity(%) 38
E.U.T.: A Band repeater Dekolink
Configuration: TX full Power
Sample Number: 2039042
Location: Lab 1 RBW: Refer to plots
Detector Type: Peak VBW: Refer to plots

Test Equipment Used

Antenna: Directional Coupler:
Pre-Amp: Cable #1: 1043
Filter: Cable #2: 1046
Receiver: 1464 Cable #3:
Attenuator #1: 1604 Cable #4:
Attenuator #2: i wave model 392 Mixer:
Additional equipment used: 1053 1052
Measurement Uncertainty: +/-1.7 dB



Notes: Band A band peak emission out of band CDMA
down link



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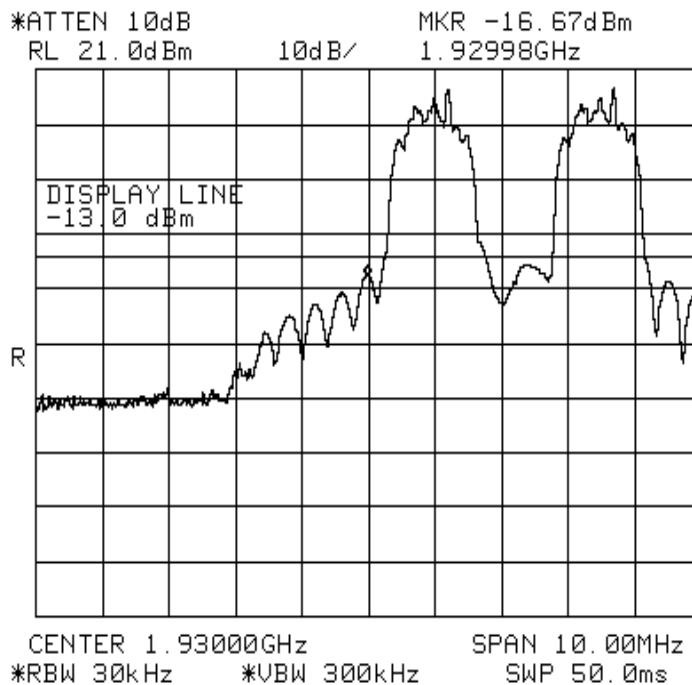
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Data Plot

Page 3 of 4

Intermodulation Characteristics

Job No.: 210288r Date: May 23 2002
Specification: 2.1049 Temperature(°C): 23
Tested By: Kevin Rose Relative Humidity(%) 38
E.U.T.: A Band repeater Dekolink
Configuration: TX full Power



Notes: Band A band peak emission out of band CDMA Uplink

EQUIPMENT: Compact Bi Directional Amplifier



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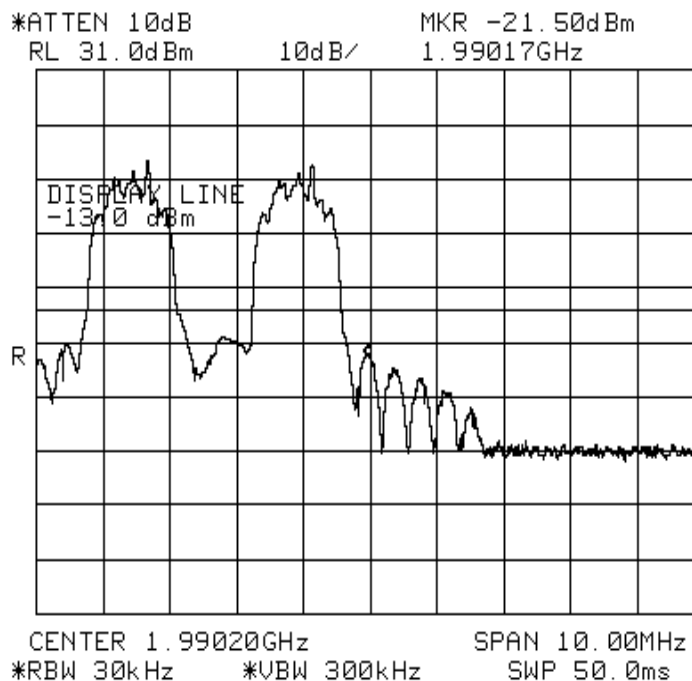
Data Plot

Intermodulation Characteristics

Page 1 of 4
Job No.: 210288r Date: May 23 2002 Complete x
Specification: 2.1049 Temperature(°C): 23 Preliminary:
Tested By: Kevin Rose Relative Humidity(%) 38
E.U.T.: C Band repeater Dekolink
Configuration: TX full Power
Sample Number: 2039042
Location: Lab 1 RBW: Refer to plots
Detector Type: Peak VBW: Refer to plots

Test Equipment Used

Antenna: Directional Coupler:
Pre-Amp: Cable #1: 1043
Filter: Cable #2: 1046
Receiver: 1464 Cable #3:
Attenuator #1: 1604 Cable #4:
Attenuator #2: i wave model 392 Mixer:
Additional equipment used: 1053 1052
Measurement Uncertainty: +/-1.7 dB



Notes: Band C upper band peak emission out of band CDMA Uplink
down link



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Dallas Headquarters:

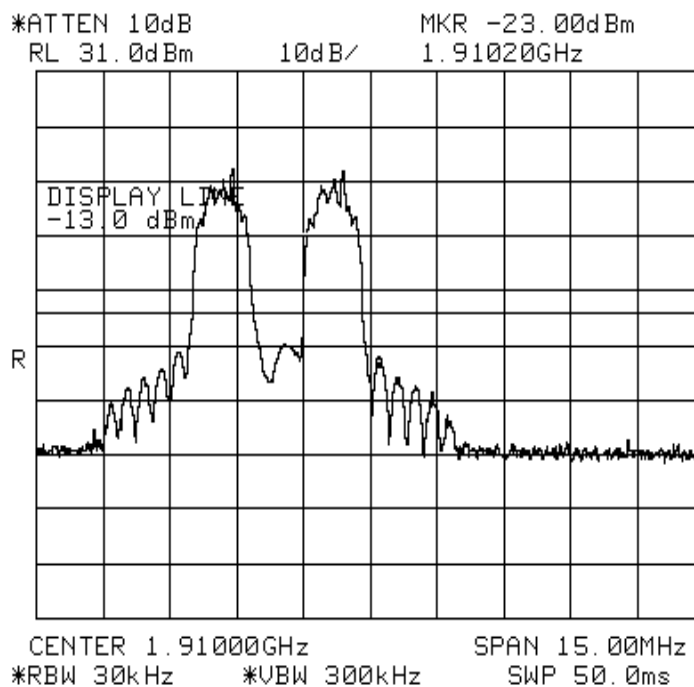
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Data Plot

Intermodulation Characteristics

Page 3 of 4

Job No.: 210288r Date: May 23 2002
Specification: 2.1049 Temperature(°C): 23
Tested By: Kevin Rose Relative Humidity(%) 38
E.U.T.: C Band repeater Dekolink
Configuration: TX full Power



Notes: Band C upper band peak emission out of band CDMA Uplink
uplink

EQUIPMENT: Compact Bi Directional Amplifier

Section 6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious Emissions	PARA. NO.: 2.1051
TESTED BY: Kevin Rose	DATE: 5/24/02

Test Results: Complies.**Test Data:** See attached table.**Equipment Used:** 1016-1464-1043-1484-1485**Measurement +/-1.7 dB
Uncertainty:****Temperature:** 23 °C**Relative 38 %
Humidity:**

Test Data --- Field Strength of Spurious

						Dallas Headquarters: 802 N. Kealy Lewisville, TX 75057 Tel: (972) 436-9600 Fax: (972) 436-2667				
Nemko Dallas, Inc.										
Field Strength of Spurious Emissions										
Page <u>1</u> of <u>1</u> Job No.: <u>210288r</u> Date: <u>5/24/2002</u> Specification: <u>2.1053</u> Temperature(°C): <u>21</u> Tested By: <u>Kevin Rose</u> Relative Humidity(%) <u>48</u> E.U.T.: <u>band A PCS CDMA repeater uplink</u> Configuration: <u>Tx Full Power</u> Sample No: <u>2039040</u> Location: <u>AC 3</u> RBW: <u>1 MHz</u> Detector Type: <u>Peak</u> VBW: <u>1 MHz</u> Measurement Distance: <u>3</u> m						Complete <u>X</u> Preliminary _____				
Test Equipment Used Antenna: <u>1304</u> Directional Coupler: _____ Pre-Amp: <u>1016</u> Cable #1: <u>1043</u> Filter: _____ Cable #2: <u>1484</u> Receiver: <u>1464</u> Cable #3: <u>1485</u> Attenuator #1: _____ Cable #4: _____ Attenuator #2: _____ Mixer: _____ Additional equipment used: _____ Measurement Uncertainty: <u>+/-3.6 dB</u>										
Frequency (MHz)	Meter Reading (dBm)	Correction Factor (dB)		Pre-Amp Gain (dB)	Substitution Antenna Gain (dBd)		ERP (dBm)	ERP (mW)	Polarity	Comments
3706	-59.3	40.4		33.3	8.0		-44.2	0.000038	V	uplink
5559	-62.4	38.5		32.5	9.1		-47.3	0.000018	V	uplink
7412	-61.3	39.4		33.4	10.0		-45.3	0.000030	V	uplink
9265	-61.6	39.3		36.1	10.1		-48.4	0.000015	V	uplink
11118	-61.5	42.0		36.1	11.1		-44.6	0.000035	V	uplink / NF
12971	-61.3	44.5		34.2	11.7		-39.3	0.000118	V	uplink / NF
14824	-62.4	48.1		34.5	10.1		-38.7	0.000135	V	uplink / NF
16677	-62.5	44.3		34.9	13.0		-40.1	0.000099	V	uplink / NF
18530	-61.2	53.1		34.2	6.4		-36.0	0.000254	V	uplink / NF
3706	-58.3	34.3		33.3	8.0		-49.3	0.000012	H	uplink
5559	-61.7	36.0		32.5	9.1		-49.1	0.000012	H	uplink
7412	-61.5	38.7		33.4	10.0		-46.2	0.000024	H	uplink
9265	-62.1	41.4		36.1	10.1		-46.8	0.000021	H	uplink
11118	-62.3	44.4		36.1	11.1		-42.9	0.000051	H	uplink / NF
12971	-62.4	47.5		34.2	11.7		-37.4	0.000183	H	uplink / NF
14824	-61.8	48.7		34.5	10.1		-37.5	0.000177	H	uplink / NF
16677	-61.5	46.1		34.9	13.0		-37.2	0.000189	H	uplink / NF
18530	-60.9	54.6		34.2	6.4		-34.1	0.000393	H	uplink / NF
Notes: <u>uplink 1853 MHz / Scanned to the 10th harmonic</u>										

EQUIPMENT: Compact Bi Directional Amplifier

						Dallas Headquarters: 802 N. Kealy Lewisville, TX 75057 Tel: (972) 436-9600 Fax: (972) 436-2667				
Nemko Dallas, Inc.										
<u>Field Strength of Spurious Emissions</u>										
Page <u>1</u> of <u>1</u> Job No.: 210288r Date: 5/24/2002 Specification: 2.1053 Temperature(°C): <u>21</u> Tested By: <u>Kevin Rose</u> Relative Humidity(%) <u>48</u> E.U.T.: <u>band A PCS CDMA repeater downlink</u> Configuration: <u>Tx Full Power</u> Sample No: <u>2039040</u> Location: <u>AC 3</u> RBW: <u>1 MHz</u> Measurement Distance: <u>3</u> m Detector Type: <u>Peak</u> VBW: <u>1 MHz</u>						Complete <u>X</u> Preliminary _____				
Test Equipment Used Antenna: <u>1304</u> Directional Coupler: _____ Pre-Amp: <u>1016</u> Cable #1: <u>1043</u> Filter: _____ Cable #2: <u>1484</u> Receiver: <u>1464</u> Cable #3: <u>1485</u> Attenuator #1: _____ Cable #4: _____ Attenuator #2: _____ Mixer: _____ Additional equipment used: _____ Measurement Uncertainty: <u>+/-3.6 dB</u>										
Frequency (MHz)	Meter Reading (dBm)	Correction Factor (dB)		Pre-Amp Gain (dB)	Substitution Antenna Gain (dBd)		ERP (dBm)	ERP (mW)	Polarity	Comments
3880	-60.8	40.4		33.3	8.0		-45.7	0.000027	V	downlink
5820	-61.0	38.5		32.5	9.1		-45.9	0.000025	V	downlink
7760	-61.5	40.4		33.4	9.4		-45.0	0.000031	V	downlink
9700	-61.8	40.4		36.1	10.5		-47.0	0.000020	V	downlink
77640	-61.3	53.1		36.1	6.4		-38.0	0.000160	V	downlink / NF
13580	-61.5	47.6		34.2	10.4		-37.7	0.000171	V	downlink / NF
15520	-60.8	43.2		34.5	13.6		-38.5	0.000142	V	downlink / NF
17460	-62.3	47.0		34.9	11.7		-38.4	0.000143	V	downlink / NF
19400	-61.9	53.1		34.2	6.4		-36.7	0.000216	V	downlink / NF
3880	-59.3	34.3		33.3	8.0		-50.3	0.000009	H	downlink
5820	-61.2	36.0		32.5	9.1		-48.6	0.000014	H	downlink
7760	-60.3	39.8		33.4	9.4		-44.5	0.000036	H	downlink
9700	-60.5	42.6		36.1	10.5		-43.5	0.000045	H	downlink
77640	-61.2	54.6		36.1	6.4		-36.3	0.000237	H	downlink / NF
13580	-61.5	50.8		34.2	10.4		-34.5	0.000359	H	downlink / NF
15520	-61.9	44.0		34.5	13.6		-38.8	0.000132	H	downlink / NF
17460	-61.8	50.5		34.9	11.7		-34.5	0.000357	H	downlink / NF
19400	-60.9	54.6		34.2	6.4		-34.1	0.000393	H	downlink / NF
Notes: <u>downlink 1940 MHz / Scanned to the 10th harmonic</u>										

EQUIPMENT: Compact Bi Directional Amplifier

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Nemko Dallas, Inc.								
<u>Field Strength of Spurious Emissions</u>								
Page <u>1</u> of <u>1</u>		Complete <u>X</u> Preliminary _____						
Job No.: 210288r Specification: 2.1053 Tested By: Kevin Rose E.U.T.: band C PCS CDMA repeater downlink Configuration: Tx Full Power Sample No: 2039042 Location: AC 3 Detector Type: Peak	Date: 5/24/2002 Temperature(°C): 21 Relative Humidity(%) 48 RBW: 1 MHz VBW: 1 MHz	Measurement Distance: <u>3</u> m						
Test Equipment Used								
Antenna: 1304 Pre-Amp: 1016 Filter: Receiver: 1464 Attenuator #1: Attenuator #2:	Directional Coupler: Cable #1: 1043 Cable #2: 1484 Cable #3: 1485 Cable #4: Mixer:	Additional equipment used: Measurement Uncertainty: +/-3.6 dB						
Frequency (MHz)	Meter Reading (dBm)	Correction Factor (dB)	Pre-Amp Gain (dB)	Substitution Antenna Gain (dBd)	ERP (dBm)	ERP (mW)	Polarity	Comments
3960	-61.5	40.4	33.3	8.0	-46.4	0.000023	V	Downlink
5940	-61.0	38.5	32.5	9.1	-45.9	0.000025	V	Downlink
7920	-61.8	40.4	33.4	9.4	-45.3	0.000029	V	Downlink
9900	-60.8	40.4	36.1	10.5	-46.0	0.000025	V	Downlink
11880	-60.2	-49.3	36.1	11.0	-134.6	0.000000	V	Downlink / NF
13860	-60.4	47.6	34.2	10.4	-36.6	0.000221	V	Downlink / NF
15840	-60.9	43.2	34.5	13.6	-38.6	0.000138	V	Downlink / NF
17820	-61.2	51.0	34.9	8.7	-36.4	0.000229	V	Downlink / NF
19800	-60.9	53.1	34.2	6.4	-35.7	0.000272	V	Downlink / NF
3960	-61.8	34.3	33.3	8.0	-52.8	0.000005	H	Downlink
5940	-61.0	36.0	32.5	9.1	-48.4	0.000014	H	Downlink
7920	-63.0	39.8	33.4	9.4	-47.2	0.000019	H	Downlink
9900	-61.8	42.6	36.1	10.5	-44.8	0.000033	H	Downlink
11880	-62.0	46.0	36.1	11.0	-41.1	0.000078	H	Downlink / NF
13860	-61.0	50.8	34.2	10.4	-34.0	0.000403	H	Downlink / NF
15840	-61.0	44.0	34.5	13.6	-37.9	0.000162	H	Downlink / NF
17820	-61.3	53.6	34.9	8.7	-33.9	0.000407	H	Downlink / NF
19800	-62.2	54.6	34.2	6.4	-35.4	0.000291	H	Downlink / NF
Notes: Downlink 1980 MHz / Scanned to the 10th harmonic								

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<u>Field Strength of Spurious Emissions</u>										
Page <u>1</u> of <u>1</u>		Complete <u>X</u> Preliminary _____								
Job No.: 210288r Specification: 2.1053 Tested By: Kevin Rose E.U.T.: band C PCS CDMA repeater uplink Configuration: Tx Full Power Sample No: 2039042 Location: AC 3 Detector Type: Peak	Date: 5/24/2002 Temperature(°C): 21 Relative Humidity(%) 48 RBW: 1 MHz VBW: 1 MHz	Measurement Distance: <u>3</u> m								
Test Equipment Used										
Antenna: 1304 Pre-Amp: 1016 Filter: Receiver: 1464 Attenuator #1: Attenuator #2:	Directional Coupler: Cable #1: 1043 Cable #2: 1484 Cable #3: 1485 Cable #4: Mixer:	Additional equipment used: Measurement Uncertainty: +/-3.6 dB								
Frequency (MHz)	Meter Reading (dBm)	Correction Factor (dB)		Pre-Amp Gain (dB)	Substitution Antenna Gain (dBd)		ERP (dBm)	ERP (mW)	Polarity	Comments
3802	-58.7	40.4		33.3	8.0		-43.6	0.000043	V	uplink
5703	-63.5	38.5		32.5	9.1		-48.4	0.000014	V	uplink
7604	-63.0	40.4		33.4	9.4		-46.5	0.000022	V	uplink
9505	-60.1	40.4		36.1	10.5		-45.3	0.000030	V	uplink
1140.6	-61.2	31.5		36.1	4.8		-61.1	0.000001	V	uplink / NF
1330.7	-62.5	31.5		34.2	4.8		-60.5	0.000001	V	uplink / NF
1520.8	-60.9	29.9		34.5	6.4		-59.2	0.000001	V	uplink / NF
1710.9	-61.3	29.9		34.9	6.4		-60.0	0.000001	V	uplink / NF
1901	-61.6	29.9		34.2	6.4		-59.6	0.000001	V	uplink / NF
3802	-59.5	34.3		33.3	8.0		-50.5	0.000009	H	uplink
5703	-62.3	36.0		32.5	9.1		-49.7	0.000011	H	uplink
7604	-62.0	39.8		33.4	9.4		-46.2	0.000024	H	uplink
9505	-62.2	42.6		36.1	10.5		-45.2	0.000030	H	uplink
1140.6	-62.6	31.1		36.1	4.8		-62.9	0.000001	H	uplink / NF
1330.7	-61.3	31.1		34.2	4.8		-59.7	0.000001	H	uplink / NF
1520.8	-62.5	32.7		34.5	6.4		-58.0	0.000002	H	uplink / NF
1710.9	-61.8	32.7		34.9	6.4		-57.7	0.000002	H	uplink / NF
1901	-61.3	32.7		34.2	6.4		-56.5	0.000002	H	uplink / NF
Notes: <u>uplink 1901 MHz / Scanned to the 10th harmonic</u>										

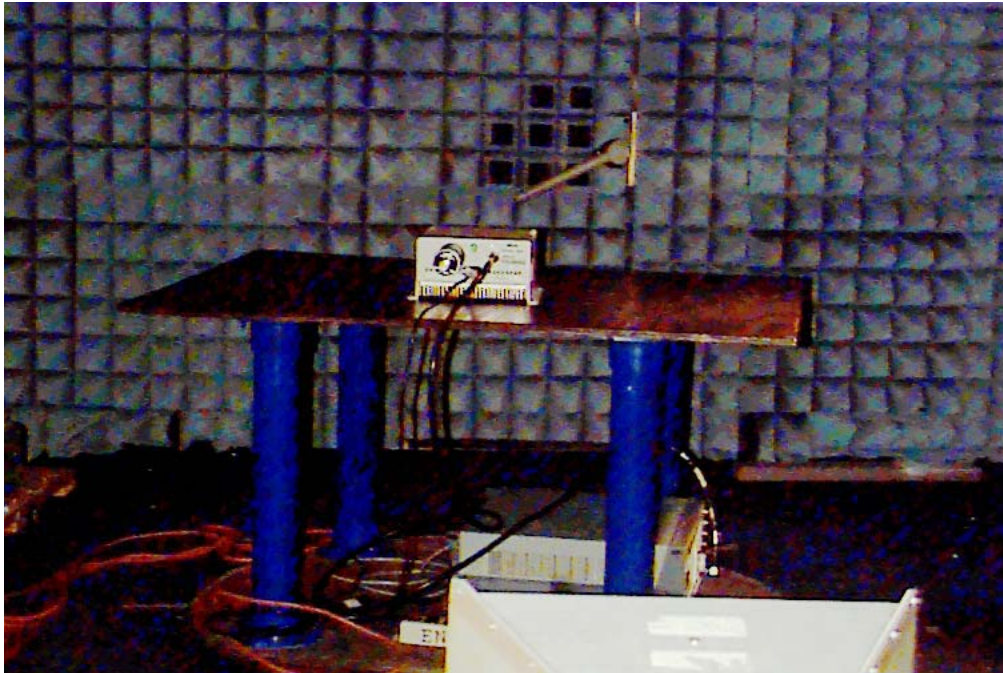
EQUIPMENT: Compact Bi Directional Amplifier

Photographs of Test Setup

FRONT VIEW



REAR VIEW



EQUIPMENT: Compact Bi Directional Amplifier**Section 7. Frequency Stability**

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

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

Standard Test Frequency: MHz

Standard Test Voltage:

Equipment Used:**Measurement
Uncertainty:** +/- 1.6 dB**Lab Temperature:** °C**Relative
Humidity:** %

EQUIPMENT: Compact Bi Directional Amplifier

Section 8. Test Equipment List

NEMKO	Description	Manufacturer	Model	Serial #	Cal. Date	Due Date
1464	Spectrum analyzer	Hewlett Packard	8563E	3551A04428	1/2/01	1/3/03
1604	ATTENUATOR	NARDA	776B-20	NONE	9/13/01	9/13/02
1043	Flexible cable 1m	Astrolab Inc.	32027-2-29094K-1M		1/18/02	1/18/03
1046	Flex cable 1m	Astrolab Inc.	32022-2-29094K-1M	N/A	1/18/02	1/18/03
1053	SIGNAL GENERATOR	ROHDE & SCHWARZ	SMIQ 03	DE22081	8/9/01	8/9/02
1052	I/Q MODULATION GENERATOR	Rhode & Schwarz	AMIQ	DE30619	9/25/00	9/27/03
1484	Cable 2.0-18.0 Ghz	Storm	PR90-010-072	N/A	6/1/01	6/1/02
1485	Cable 2.0-18.0 Ghz	Storm	PR90-010-216	N/A	6/1/01	6/1/02

ANNEX A - TEST DETAILS

EQUIPMENT: Compact Bi Directional Amplifier**NAME OF TEST: RF Power Output****PARA. NO.: 2.1046**

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: Compact Bi Directional Amplifier

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.

EQUIPMENT: Compact Bi Directional Amplifier

NAME OF TEST: Spurious Emission at Antenna Terminals	PARA. NO.: 2.1051
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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: $\geq$ RBW

Sweep: Auto

Video Avg: 6 Sweeps

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: Compact Bi Directional Amplifier**NAME OF TEST: Field Strength of Spurious Radiation****PARA. NO.: 2.1053**

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.

Calculation Of Field Strength Limit

An example of attenuation requirement of $43 + 10 \log P$ is equivalent to -13 dBm (5×10^{-5} Watts) at the antenna terminal. We determine the field strength limit by using the plane wave relation.

$$GP/4\pi R^2 = E^2/120\pi$$

For emissions ≤ 1 GHz:

$G = 1.64$ (Dipole Gain)

$P = 10^{-5}$ Watts (Maximum spurious output power)

$R = 3\text{m}$ (Measurement Distance)

$$E = \frac{\sqrt{30GP}}{R}$$

$$E = \frac{\sqrt{30 \times 1.64 \times 5 \times 10^{-5}}}{3} = 0.016533 \text{ V / m} = 84.4 \text{ dB}\mu\text{V / m}$$

For emissions > 1 GHz:

$G = 1$ (Isotropic Gain)

$P = 1 \times 10^{-5}$ Watts (Maximum spurious output power)

$R = 3\text{m}$ (Measurement Distance)

$$E = 84.4 - 20 \log \sqrt{1.64} = 82.3 \text{ dB}\mu\text{V / m} @ 3\text{m}$$

EQUIPMENT: Compact Bi Directional Amplifier

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.

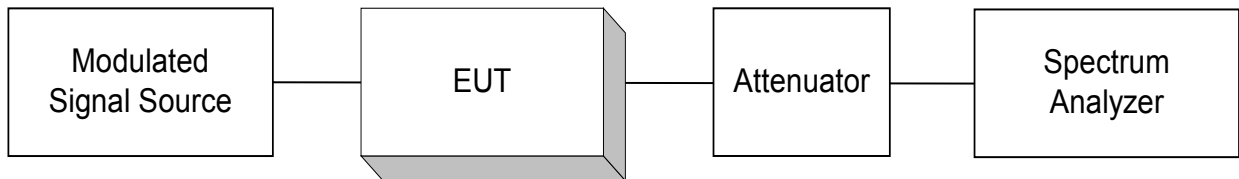
Frequency Stability With Temperature Variation

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.

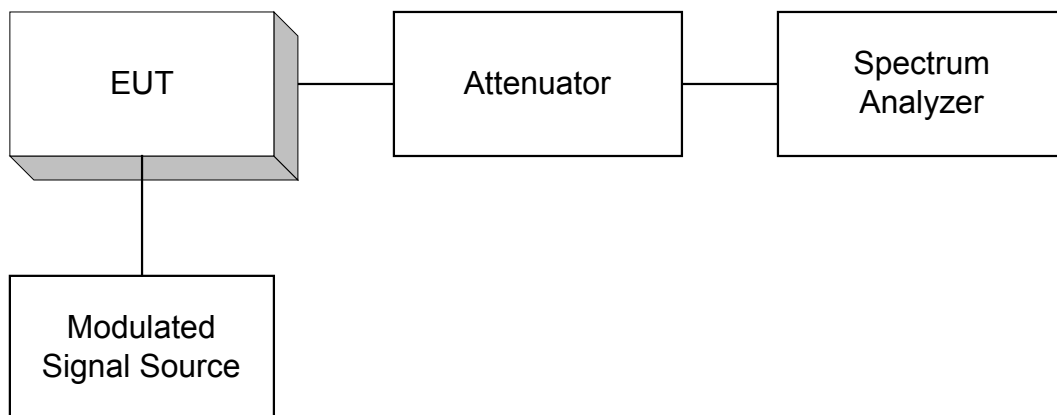
ANNEX B - TEST DIAGRAMS

EQUIPMENT: Compact Bi Directional Amplifier

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

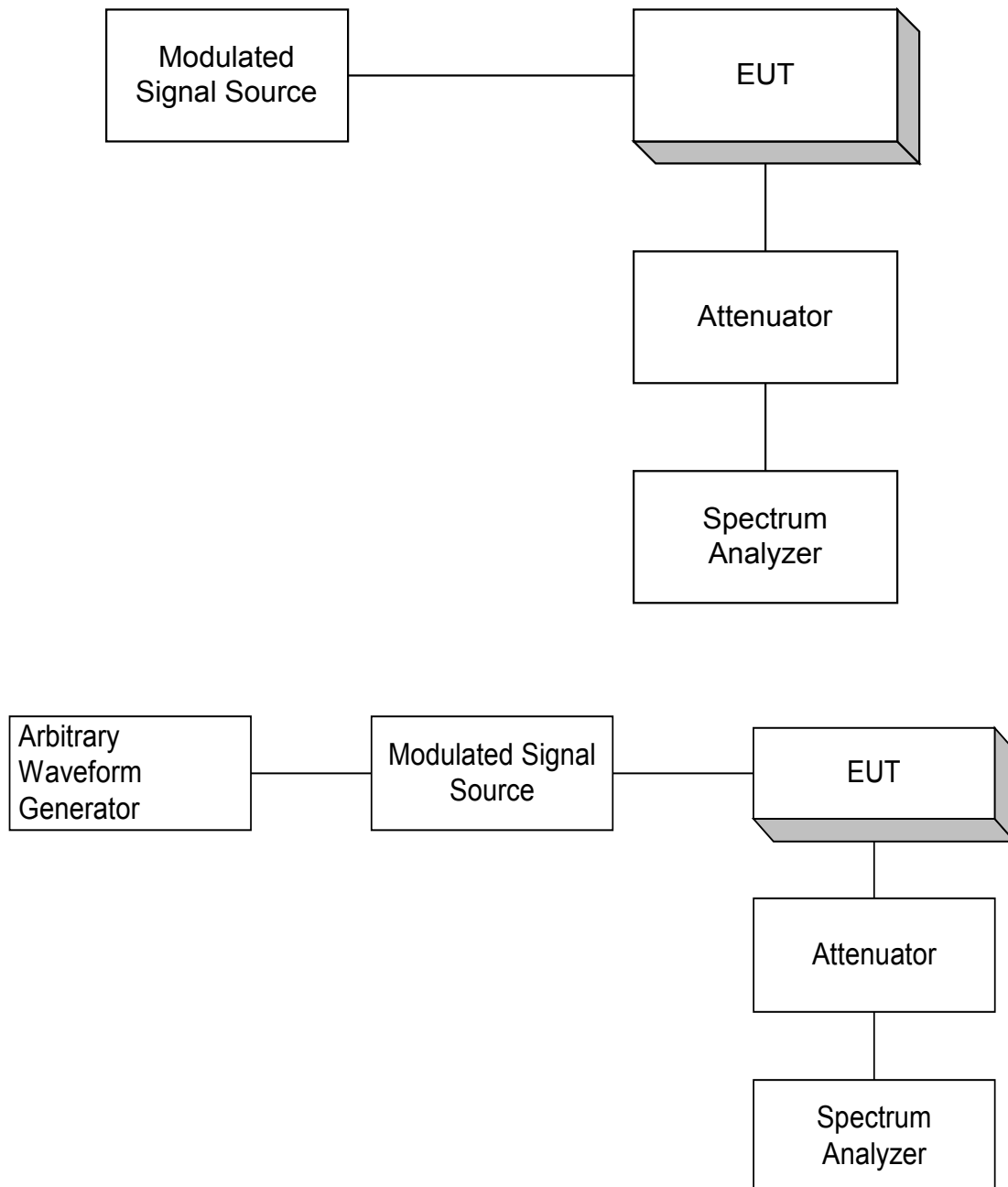


Para. No. 2.989 - Occupied Bandwidth



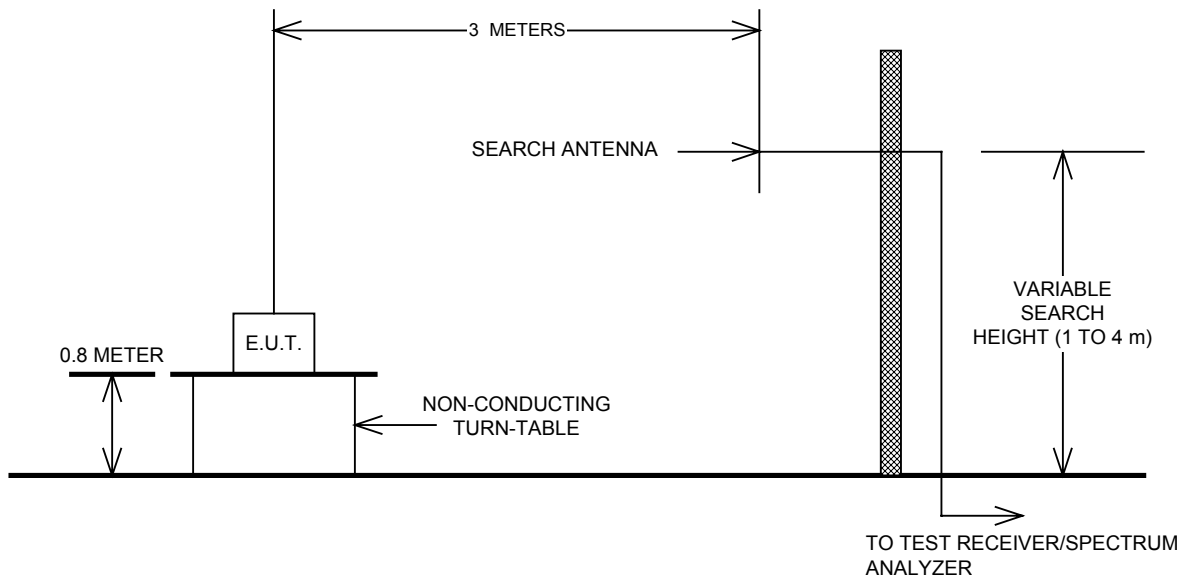
EQUIPMENT: Compact Bi Directional Amplifier

Para. No. 2.991 Spurious Emissions at Antenna Terminals



EQUIPMENT: Compact Bi Directional Amplifier

Para. No. 2.993 - Field Strength of Spurious Radiation



Para. No. 2.995 - Frequency Stability

