Nemko Test Report No.:	2L0101RUS1
Applicant:	Communication Components 89 Leuning Street 299 Forest Avenue Hackensack, NJ 07606
Equipment Under Test:	DAB-1819-100
In Accordance With:	FCC Part 24, Subpart E Broadband PCS Repeaters
Tested By:	Nemko Dallas Inc. 802 N. Kealy Lewisville, Texas 75057-3136
Jon- Till	
Authorized By:	Tom Tidwell, RF Group Manager
Date:	3/29/02
Total Number of Pages:	33

# **Table of Contents**

Section 1.	Summary of Test Results	3
Section 2.	General Equipment Specification	5
Section 3.	RF Power Output	7
Section 4.	Occupied Bandwidth	9
Section 5.	Spurious Emissions at Antenna Terminals	12
Section 6.	Field Strength of Spurious	21
Section 7.	Test Equipment List	24
ANNEX A	A - TEST DETAILS	25
ANNEX E	B - TEST DIAGRAMS	31

**EQUIPMENT:** 

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
PROJECT NO.: **2L0101RUS1** 

Section 1. Summary of Test Results

**DAB-1819-100** 

Manufacturer:	er: Communication Components, Inc.								
Model No.:	DAB-1819-100	DAB-1819-100							
Serial No.:	None								
General:	All measurements are traceable to	nation	al standards.						
	re conducted on a sample of the equipment f h FCC Part 24, Subpart E.	for the p	ourpose of demonstrating						
	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 See "Summary of Test Data".

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

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

## **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	N/A
Occupied Bandwidth (GSM)	24.238	Input/Output	Complies
Occupied Bandwidth (NADC)	24.238	Input/Output	N/A
Spurious Emissions at Antenna Terminals	24.238(a)	-13 dBm	Complies
Field Strength of Spurious Emissions	24.238(a)	-13 dBm	Complies
	24.230(a)	E.I.R.P.	Compiles
Frequency Stability	24.235	N/A	N/A

#### **Footnotes:**

- (1) Modulation characteristics were not tested since the E.U.T. processes but does not produce a modulated waveform.
- (2) Since this is an amplifier and does not translate the rf input, frequency stability is not applicable.

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

2L0101RUS1

*EQUIPMENT:* **DAB-1819-100** 

#### **General Equipment Specification** Section 2.

-					
Frequency Bands:	Downlink:	Block A: Block D: Block B: Block E: Block F: Block C:	1945 – 1950 – 1965 – 1970 –	1970 MHz	
Frequency Bands:	Uplink:	Block A: Block B: Block C: Block D: Block E: Block F: CDMA (G7W)	1865 – 1870 – 1885 – 1890 –	1865 MHz 1870 MHz 1885 MHz 1890 MHz 1895 MHz 1910 MHz GSM (GXW)	NADC (DXW)
System Gain:		10 dB			
Output Impedance:		50 ohms			
		Not tested. The coaxial connection			connected with
		Per channel: Total:		W W	
		F1-F1		F1-F2	N/A
		Software		Duplexer	Fullband

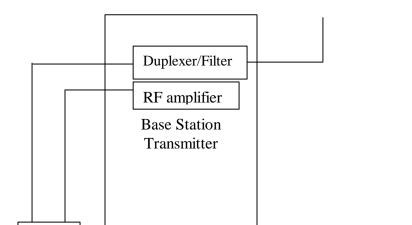
# **Description of Operation**

The EUT is an RF Amplifier to boost either a PCS or Cellular signal. The amplifier would be operated in an equipment rack and the antenna would be mounted on a pole or tower. The forward direction is wireless but the reverse direction is connected directly to a Base Station Transmitter via coaxial cables.

To fixed antenna

## **System Diagram**

**EUT** 



## Section 3. RF Power Output

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

TESTED BY: D. Light DATE:3/14/02

**Test Results:** Complies.

**Measurement Data:** 

Frequency (MHz)	Modulation Type	Per Channel Output Power (dBm)	Composite Output Power (dBm)	Maximum Power Output Delivered to the Antenna (dBm)
1930.2*	GSM	34.7	** N/A	+33.9
1930.3	GSM	50.8	N/A	+50.0
1960	GSM	50.8	N/A	+50.0
1989.7	GSM	50.8	N/A	+50.0
1989.8*	GSM	33.6	N/A	+33.9
Intermodulation (Lower bandedge)	GSM	36.2	***39.2	+38.4
Intermodulation (Upper bandedge)	GSM	40.4	43.4	+42.6

<sup>\*</sup>Power must be reduced at the bandedges to meet emission requirements. Refer to plots in Section 5 of this document.

Footnote – The amplifier is rated at 100 watts(+50 dBm) but was tested at maximum level(+50.8 dBm) to compensate for any path loss between the amplifier and antenna. There will always be a duplexer and coaxial cable between the output of the EUT and the transmit antenna. The output of the transmitter is set so that a rf output power not exceeding 100 watts is delivered to the transmit antenna.

**Equipment Used:** 1036-1629-1055-1064

**Measurement Uncertainty:** +/- 1.7 dB

<sup>\*\*</sup> This is one carrier only.

<sup>\*\*\*</sup>This reading was measured with two carriers at each bandedge.

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
PROJECT NO.: **2L0101RUS1** 

*EQUIPMENT:* **DAB-1819-100** 

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
PROJECT NO.: **2L0101RUS1** 

# Section 4. Occupied Bandwidth

**EQUIPMENT: DAB-1819-100** 

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

TESTED BY: David Light DATE:3/14/2002

**Test Results:** Complies.

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

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

-30

Center 1.96 GHz

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
PROJECT NO.: **2L0101RUS1** 

# *EQUIPMENT:* **DAB-1819-100**

# Nemko

Test Data - Occupied Bandwidth

#### Dallas Headquarters:

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

ameller of hundred wheel he will be

Span 2 MHz

Nen	nko Da	llas, Inc.						Г	ax. (972) 430-20	507		
Data Plot				OCCU	PIED BA	NDWID1	Г <b>Н</b>					
Page 1 o	f 2			'			<u>.</u>	Comple	te_X			
Job No.:	2L0101	R		Date:	3/14/2002				y:			
Specification:	24.238		Tem	perature(°C):	22							
Γested By:	David L	ight		Humidity(%)	40							
E.U.T.:	_	AND GSM BO										
Configuration:		LL POWER										
Sample Number:												
Location:	Lab	1			RBW: 2	kHz		Measureme	nt			
Detector Type:	Pea	k			VBW: 2	kHz		Distanc	ce: N/A	m		
Test Equipme	ent Use	<u>d</u>										
Antenna:				Directi	onal Coupler:	1055						
Pre-Amp:	-				Cable #1:	1629						
Filter:					Cable #2:							
Receiver:	103				Cable #3:							
Attenuator #1	106	4			Cable #4:							
Attenuator #2:					Mixer:							
Additional equip												
Measurement Un	ncertainty:	+/-1.7	dB_									
<u> </u>			Marker	1 [   1 J		кви	2 ⊦	Hz F	R Att	30	aв	
<b>∜</b> S∕Ref					.32 dBm	VBW	2 ⊦					
	dBm			1.959913	383 GHz	SWT	1.25	s L	J⊓it		dBm	
50 4 1	1.4	B Offs	e t				<b>▼</b> 1	[ T 1 ]	7 3/	. 32	dBm	1
			Ī						1.95991			
40	-				11	<del>lı                                      </del>	<u> </u>	LT1J			aB	
					1 1 W	<b>1</b> 41	4		76.35270	1		
30					\ \mu^*	Yt		•	13.332.13			
30					N/							1
					<i>[</i>	\						
20					<del>  /                                   </del>	\ \						
1 V I	EW				1/							1 MA
10					<del>                                     </del>	$\vdash$				<u> </u>		
					[ر]	<b> </b>	۱,					
0	-			M <sub>A</sub>	Ψ	ι	₩\			<del>                                     </del>		1
				\ \int \( \)			۱ ۳۸					
- 10			+	<del>                                     </del>			<del>  \</del>	<del> </del>	+	1		
				<b>,</b> /"			l <sup>V</sup> I.					
20	- 1		1	I N	1		I V4	1	1	1		I

Notes: 14 . MAR . 2002 14 : 40 : 13

| Notes: | OUTPUT GSM SIGNAL AT FULL POWER (+50.8 dBm) |

200 kHz/

## Test Data - Occupied Bandwidth

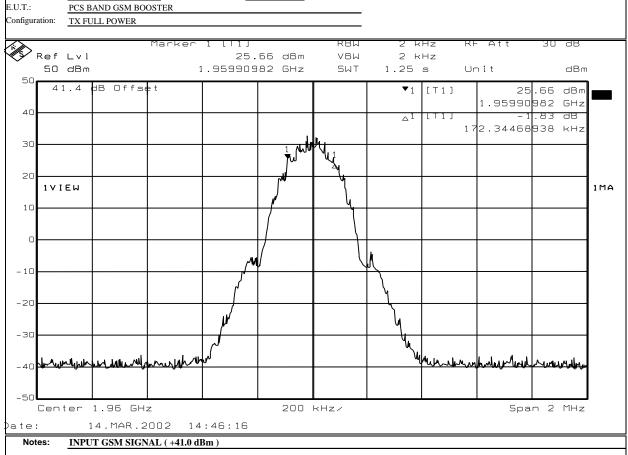


#### Dallas Headquarters:

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

#### Nemko Dallas, Inc. **Data Plot OCCUPIED BANDWIDTH**

Page 2 of 2 2L0101R Date: 3/14/2002 Job No.: Specification: 24.2 Temperature(°C): 22 Tested By: David Light Relative Humidity(%) 40 PCS BAND GSM BOOSTER



FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
PROJECT NO.: **2L0101RUS1** 

# Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals PARA. NO.: 2.1051

TESTED BY: David Light DATE: 2/26/2002

**Test Results:** Complies.

**EQUIPMENT: DAB-1819-100** 

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

**Measurement Uncertainty:** +/- 1.7 dB

Page 12 of33

### Test Data – Spurious Emissions at Antenna Terminals

$\mathbb{N}$	Nem	<b>(O</b>

Nemko Dallas, Inc.

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

BANDEDGE DATA **Data Plot** Page <u>1</u> of <u>6</u> Complete Date: 2/26/2002 Job No.: 2L0101R Preliminary: 24.238 Specification: Temperature(°C): Tested By: David Light Relative Humidity(%) 50 E.U.T.: PCS BAND GSM BOOSTER Configuration: Sample Number: Location: Lab 1 RBW: 2 kHz Measurement Detector Type: VBW: 2 kHz Distance: N/A Peak m Test Equipment Used Antenna: Directional Coupler: Cable #1: Pre-Amp: Filter: Cable #2: 1036 Cable #3: Receiver: Cable #4: Attenuator #2: Mixer: Additional equipment used: +/-1.7 dB Measurement Uncertainty: dE Ref Lvl 2 kHz VBW 60.8 dBm SWT 400 ms Unit dBm dB Offs∉t 50 40 30 1 V I E W 1 MA 20 EXT 10 -20 -30 39.2 Center 1.93 GHz 62.5 kHz/ Span 625 kHz 26.FEB.2002 12:08:09 Date: LOWER BANDEDGE - FREQUENCY 1930.2 MHz Notes: OUTPUT POWER = 34.7 dBm

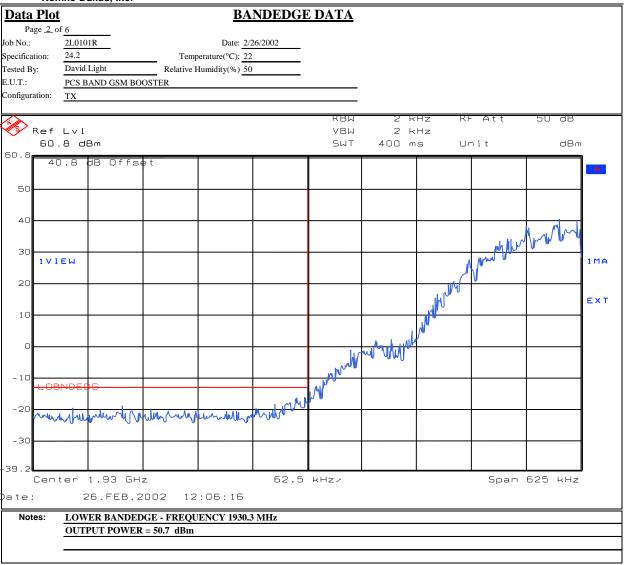
## **Test Data – Spurious Emissions at Antenna Terminals**



#### Dallas Headquarters:

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

Nemko Dallas, Inc.



# Test Data – Spurious Emissions at Antenna Terminals



#### Dallas Headquarters:

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

Nemko Dallas, Inc. **Data Plot BANDEDGE DATA** Page <u>3</u> of <u>6</u> 2L0101R Date: 2/26/2002 Job No.: Specification: 24.238 Temperature(°C): 22 Tested By: David Light Relative Humidity(%) 50 E.U.T.: PCS BAND GSM BOOSTER Configuration: TXRBW 2 kHz RF Att 50 dB Ref Lvl 2 kHz 5.24 dBm VBW 60.8 dBm 1.98968750 GHz SWT 400 ms Unit dBm 60.8 Α 50 40 30 1 V I E W 1 MA 20 EXT - 1 C John Michigan Michigan Carlot Company -20 -30 Center 1.99 GHz 62.5 kHz/ Span 625 kHz ate: 26.FEB.2002 12:12:38 UPPER BANDEDGE - CF = 1989.8 MHz Notes: **OUTPUT POWER = 33.6 dBm** 

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



#### Dallas Headquarters:

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

Nemko Dallas, Inc. **Test Plot: BANDEDGE DATA** Page <u>4</u> of <u>6</u> 2L0101R Date: 2/26/2002 Job No.: Specification: 24.238 Temperature(°C): 22 Tested By: David Light Relative Humidity(%) 50 E.U.T.: PCS BAND GSM BOOSTER Configuration: TX Ref Lvl 2 kHz 35.44 dBm VBW 60.8 dBm 1.98968750 GHz SWT 400 ms Unit dBm 60.8 40.8 Α 50 40 1 MA 20 EXT 1 C - 1C -20 -30 39.2 Center 1.99 GHz 62.5 kHz/ Span 625 kHz 26.FEB.2002 12:16:13 late: UPPER BANDEDGE - CF = 1989.7 MHz Notes: **OUTPUT POWER = 50.8 dBm** 

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



Nemko Dallas, Inc.

#### Dallas Headquarters:

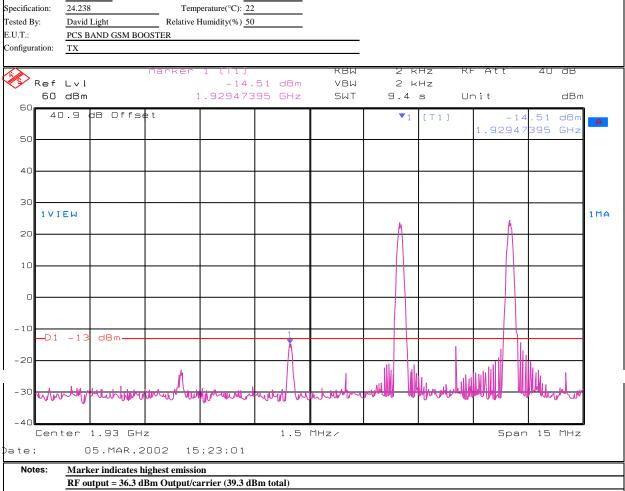
802 N. Kealy Lewisville, TX 75057 Tel: (972) 436-9600 Fax: (972) 436-2667

 Test Plot:
 BANDEDGE DATA

 Page 5 of 6
 Dob No.:
 2L0101R
 Date: 2/26/2002

 Specification:
 24.238
 Temperature(°C): 22

 Tested By:
 David Light
 Relative Humidity(%) 50



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



#### Dallas Headquarters:

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

Nemko Dallas, Inc. **Test Plot: BANDEDGE DATA** Page <u>6</u> of <u>6</u> 2L0101R Date: 2/26/2002 Job No.: Specification: 24.238 Temperature(°C): 22 David Light Tested By: Relative Humidity(%) 50 E.U.T.: PCS BAND GSM BOOSTER Configuration: TX Ref Lvl -15.11 dBm VBW 2 kHz 60 dBm 1.99100701 GHz SWT 9.4 s Unit dBm 40.9 dB Offset .11 dBi .99100701 GHz 40 1 V I E W 1MA dBm Center 1.99 GHz 1.5 MHz/ Span 15 MHz 05.MAR.2002 15:20:42 Notes: Marker indicates highest emission RF output = 40.4 dBm Output/carrier (43.4 dBm total)

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



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

Fax: (972) 436-2667

Nemko Dallas, Inc.

Data Plot			SPUF	RIOUS EN	<b>IISSIONS</b>	<u>S</u>				
Page 1 or	f <u>2</u>						Complete	e X		
Job No.:	2L0101R		Date:	2/26/2002			Preliminary	:		_
Specification:	24.238	Temp	erature(°C):	22						
Tested By:	Lance Walker	Relative H	Humidity(%)	50						
E.U.T.:	PCS BAND GS	M BOOSTER								
Configuration:	TX									
Sample Number:	1									
Location:	Lab 1			RBW: R	efer to plots		Measuremen	t		
Detector Type:	Peak				efer to plots		Distance	: N/A	m	
				_						
Test Equipme Antenna:	ent Used		Directi	onal Coupler:	1055					
Pre-Amp:				Cable #1:	1629					
Filter:				Cable #2:	1027					
Receiver:	1036			Cable #3:						
Attenuator #1	1064			Cable #4:						
Attenuator #2:	1004			Mixer:						
				Wilker.						
Additional equip	_	/ 1.7.4D								
Measurement Un	certainty:+	-/-1.7 dB								
<b>1</b>		Marker	1 [ 1 ]		RBM	100	kHz RI	- Att	30 GB	
Ref	∟∨ l		- 18.	.42 dBm	VBW	100	kHz			
40.	8 dBm	922	2.244488	398 MHz	SWT	245	ms U	n i t	dBm	n
40.8	).8 dB 01	fset								a
46	).8 <b> </b> B 01	ı se ı								A
20										
30										
20										
1.5										
1 O 1 V I	FW									1MA
										1
0										
										EXT
4.0										
-10	-13 dBm									1
	13 33								<u>1</u>	
-20	An MALAN	Munimumana 1	4 10 14-14/1-10 24	MIAA E II. I IA N	Jumphon	~~~www.	Mulau Wall	<del>Lamesto</del>	~ <del>\\\\\</del>	1
myny	- William	Two Curry		as ametal.	30.400	0 000 0				
20										
-30										1
-40										-
5.0										
-50										1
-59.2 <b>L</b>									<u> </u>	J
Star	t 30 MH;	Z		97 1	1Hz/			Sto	op 1 GHz	
Date:	26.FE	B.2002 12	:18:52							
Notes:										
Notes.										

# Test Data – Spurious Emissions at Antenna Terminals



#### Dallas Headquarters:

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

Nemko Dallas, Inc. **Data Plot SPURIOUS EMISSIONS** Page 2 of 2 2L0101R Date: 2/26/2002 Job No.: 24.2 Specification: Temperature(°C): 22 Tested By: Lance Walker Relative Humidity(%) 50 E.U.T.: PCS BAND GSM BOOSTER Configuration: 10 dB Ref Lvl -14.09 dBm VBW 1 MHz 13.6 dBm 1.95190381 GHz 20 s SWT Unit dBm 13.E 43.6 dB Offset **V**1 10 381 GHz [T1] .29 dBm 749 GHz - 10 -20 1MA -30 -40 -50 -60 -70 -80 86.4 Start 1 GHz 1.9 GHz/ Stop 20 GHz ate: 05.MAR.2002 14:24:17 Notes: Marker 1 indicates Carrier (notched) Marker 2 indicates highest emission

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
PROJECT NO.: **2L0101RUS1** 

EQUIPMENT: **DAB-1819-100** 

# Section 6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious Emissions PARA. NO.: 2.1051

TESTED BY: David Light DATE: 2/26/2002

**Test Results:** Complies.

**Test Data:** See attached table.

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

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
PROJECT NO.: **2L0101RUS1** 

**EQUIPMENT: DAB-1819-100** 

#### **Test Data - Radiated Emissions - Downlink**



Nemko Dallas, Inc.

Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057

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

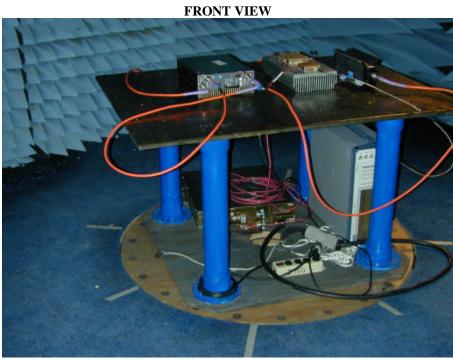
		<u>Field Strength of S</u>	<u>purious E</u>	<u>Emissions</u>
Page 1 c	of <u>1</u>			Complete X
Job No.:	2L0101R	Date: 3/5/2002		Preliminary
Specification:	PT 24	Temperature(°C): 22		
Tested By:	David Light	Relative Humidity(%) 50		
E.U.T.:	120 WATT AMPLIFIER	<u> </u>		
Configuration:	TX FULL POWER INTO D	UMMY LOAD		
Sample No:	1	<u> </u>		
Location:	AC 3	RBW:	1 MHz	Measurement
Detector Type:	Peak	VBW:	1 MHz	Distance: 3 m
Test Equipm	ent Used			
Antenna:	1304	Directional Coupler:		
Pre-Amp:	1016	Cable #1: _	1484	
Filter:		Cable #2:	1485	
Receiver:	1464	Cable #3: _		
Attenuator #1		Cable #4: _		
Attenuator #2:		Mixer:		
Additional equip	oment used:			
Measurement Un	ncertainty: +/-3.6 dB	<u> </u>		
1				

Frequency	Meter	Correction	Pre-Amp	Substitution		ERP	ERP	Polarity	Comments
	Reading	Factor	Gain	Antenna Gain	Limit			·	
(MHz)	(dBm)	(dB)	(dB)	(dBd)	(dBm)	(dBm)	(mW)		
3920	-37.5	35.5	33.3	8.6	-13	-26.8	0.0021	Н	
5880	-37.5	37.8	32.7	9.3	-13	-23.1	0.0049	Н	
7840	-35.0	41.5	33.7	9.2	-13	-18.1	0.0157	Н	
9800	-33.2	43.3	36	10.3	-13	-15.6	0.0274	Н	
11760	-46.5	47.0	35.5	10.5	-13	-24.6	0.0035	Н	
13720	-57.3	47.7	33.3	10.6	-13	-32.4	0.0006	Н	
15680	-57.0	45.5	33.2	12.9	-13	-31.8	0.0007	Н	
3920	-36.7	43.3	33.3	8.6	-13	-18.1	0.0154	V	
5880	-35.3	39.8	32.7	9.3	-13	-18.9	0.0128	V	
7840	-36.0	41.8	33.7	9.2	-13	-18.7	0.0134	V	
9800	-33.2	41.8	36	10.3	-13	-17.1	0.0194	V	
11760	-49.0	42.8	35.5	10.5	-13	-31.2	0.0008	V	

Notes: Scanned to the 10th harmonic

All emissions within 20 dB of the limit were recorded

# **Photographs of Test Setup**



**REAR VIEW** 



# Section 7. Test Equipment List

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	12/18/01
1055	DUAL DIRECTIONAL COUPLER	NARDA 3022	73393	CBU
1629	CABLE, 6 ft	MEGAPHASE 10311 1GVT4	N/A	CBU
1064	ATTENUATOR	NARDA 776B-20	NONE	09/13/01
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
1304	HORN ANTENNA	ELECTRO METRICS RGA-60	6151	07/30/01
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	05/30/01

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
PROJECT NO.: **2L0101RUS1** 

**EQUIPMENT: DAB-1819-100** 

**ANNEX A - TEST DETAILS** 

**2L0101RUS1** 

**EQUIPMENT: DAB-1819-100** 

**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:* **DAB-1819-100** PROJECT NO.: **2L0101RUS1** 

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:**

#### <u>CDMA</u>

Spectrum analyzer settings:

RBW: 30 kHz VBW: ≥ RBW Span: 5 MHz Sweep: Auto

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

#### **GSM**

RBW: 3 kHz VBW: ≥ RBW Span: 2 MHz Sweep: Auto

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

#### NADC

RBW: 1 kHz VBW: ≥ RBW Span: 1 MHz Sweep: Auto

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

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
PROJECT NO.: **2L0101RUS1** 

**EQUIPMENT: DAB-1819-100** 

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

**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:

<u>CDMA</u> <u>GSM</u>

RBW: 1 MHz (> 1 MHz from Band Edge)
RBW: 1 MHz (> 1 MHz from Band Edge)
RBW: 3 kHz (< 1 MHz from Band Edge)
RBW: 3 kHz (< 1 MHz from Band Edge)

 $VBW: \ge RBW$   $VBW: \ge RBW$  Sweep: Auto Sweep: Auto

Video Avg: 6 Sweeps 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.

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
PROJECT NO.: **2L0101RUS1** 

*EQUIPMENT:* **DAB-1819-100** 

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  $43 + 10 \log (P) dB$ .

**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.

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
PROJECT NO.: **2L0101RUS1** 

**EQUIPMENT: DAB-1819-100** 

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

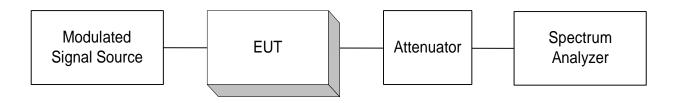
The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30 second intervals for a period of 5 minutes.

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS
PROJECT NO.: **2L0101RUS1** 

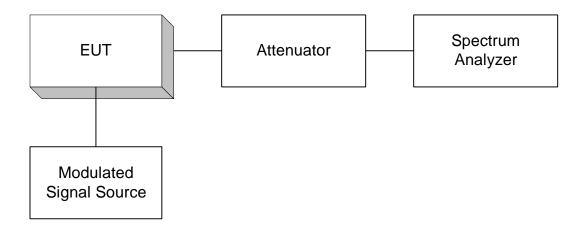
**EQUIPMENT: DAB-1819-100** 

**ANNEX B - TEST DIAGRAMS** 

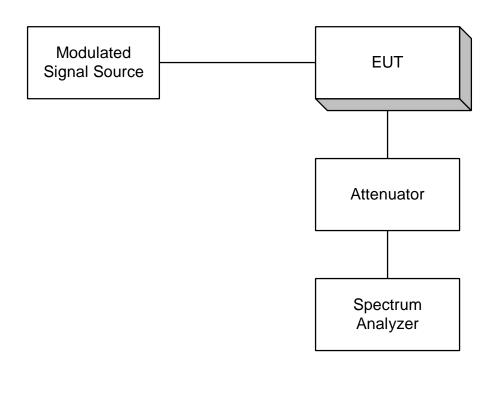
## Para. No. 2.985 - R.F. Power Output

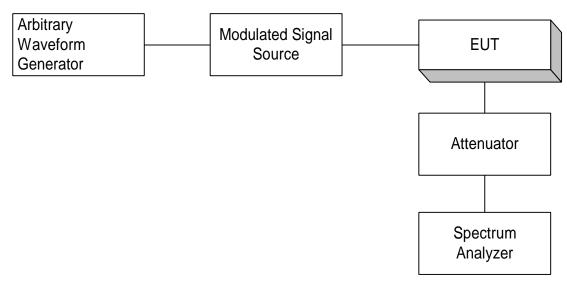


## Para. No. 2.989 - Occupied Bandwidth



# Para. No. 2.991 Spurious Emissions at Antenna Terminals

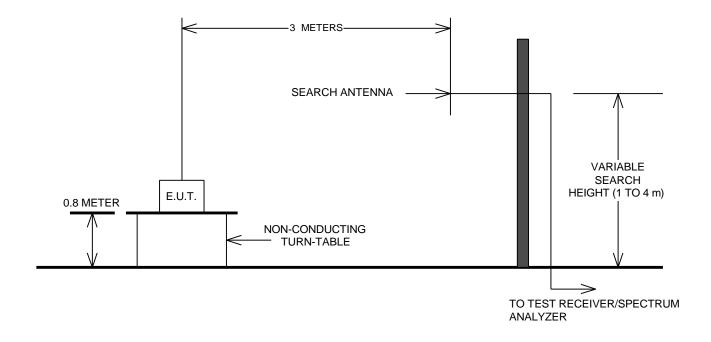




BROADBAND PCS REPEATERS

B-1819-100 PROJECT NO.: 2L0101RUS1

Para. No. 2.993 - Field Strength of Spurious Radiation



Para. No. 2.995 - Frequency Stability

