Nemko Test Report No.:	1L0581RUS1
Applicant:	Communications Components 89 Leuning Street South Hackensack, NJ 07606 Tel: 201-342-3338 Fax: 201-342-3339 Email: sales@cciproducts.com
Equipment Under Test:	GSM Amplifier DAB1819
In Accordance With:	FCC Part 24, Subpart E Broadband PCS Repeaters
Tested By:	Nemko Dallas Inc. 802 N. Kealy Lewisville, Texas 75057-3136
Authorized By:	Tom Tidwell, RF Group Manager
Date:	11/1/01

Total Number of Pages:

37

# **Table of Contents**

Section 1.	Summary of Test Results	3
Section 2.	General Equipment Specification	5
Section 3.	RF Power Output	10
Section 4.	Occupied Bandwidth	11
Section 5.	Spurious Emissions at Antenna Terminals	20
Section 6.	Field Strength of Spurious	23
Section 7.	Frequency Stability	26
Section 8.	Test Equipment List	27
ANNEX A -	TEST DETAILS	28
ANNEX B -	TEST DIAGRAMS	34

EQUIPMENT: DAB 1819

PROJECT NO.: 1L0581RUS1

# Section 1. Summary of Test Results

Manufacturer: Communications Components

Model No.: DAB1819

Serial No.: 160

### 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.

$\square$	New Submission	$\square$	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: DAB 1819

## PROJECT NO.: 1L0581RUS1

## Summary Of Test Data

	PARA.	SPECIFIED	
NAME OF TEST	NO.	LIMT	RESULT
RF Power Output	24.232	100W	Complies
Occupied Bandwidth (GSM)	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

### 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: DAB 1819

PROJECT NO.: 1L0581RUS1

# Section 2. General Equipment Specification

Supply Voltage Input:		28 Vdc 10A		
Frequency Bands:	Downlink:	Block A: $1930 - 19$ Block D: $1945 - 19$ Block B: $1950 - 19$ Block E: $1965 - 19$ Block F: $1970 - 19$ Block C: $1975 - 19$	950 MHz 965 MHz 970 MHz 975 MHz	
Frequency Bands:	Uplink:	Not Applicable. The equip BTS via coaxial cable.	ment is directly co	nnected to the
Output Impedance:		CDMA (G7W)	GSM (GXW)	NADC (DXW)
Max Input:		5 dBm Highest Channel: 5.01 Per channel: 55 Lowest Channel: 5.01 The power output must be channels of each frequency	W W lowered on the firs	t and last
		F1-F1	F1-F2	N/A
		Software	Duplexer	Fullband

## EQUIPMENT: DAB 1819

PROJECT NO.: 1L0581RUS1

**Description of Modifications For Class II Permissive Change** 



EQUIPMENT: DAB 1819

PROJECT NO.: 1L0581RUS1

**Modifications Made During Testing** 



### EQUIPMENT: DAB 1819

PROJECT NO.: 1L0581RUS1

### **Description of Operation**

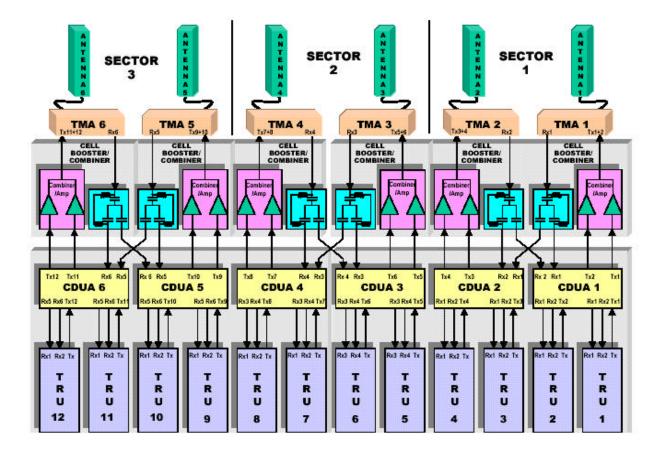
The PCS Cell Booster was specifically designed to integrate with compact GSM base stations without any need for retrofitting the original equipment. The system consists of a 5U 19" rack mount tray that can accommodate up to five individual modules. The modules include a Dual Amplifier-Booster Module, a Dual Amplifier-Combiner Module, a Triple Duplexer Module, and a Power Supply Unit (PSU). The Cell Booster system can be configured with any combination of the above modules in order to achieve the desired performance results.

The Dual Amplifier-Booster Module (DAB) consists of two linear power amplifiers with intermodulation level control circuitry, each capable of generating a 55 Watt GSM signal.

## EQUIPMENT: DAB 1819

# PROJECT NO.: 1L0581RUS1

# System Diagram



EQUIPMENT: DAB 1819

PROJECT NO.: 1L0581RUS1

# Section 3. RF Power Output

NAME OF TEST: RF Power Output

PARA. NO.: 2.1046

DATE: October 22, 2001

TESTED BY: Lance Walker

**Test Results:** 

Complies.

Channel	Per Channel Output Power (dBm)	Composite Output Power (dBm)	Composite Output Power (W)
High (1989.8 MHz)	37	37	5.01
Mid (1960 MHz)	47	47.4	55
Low (1930.2 MHz)	37	37	5.01

It is necessary to lower rf power to 5 watts on the first and last channels of each frequency block in order to satisfy spurious emission limits on the band edges. For the purposes of this testing the first and last channels are considered to be centered at 200 kHz above the block edge and 200 kHz below the upper block edge respectively.

Block	Channel Center	Maximum rf	Maximum rf
	Frequency(MHz)	Input (dBm)	Output (Watts)
A	1930.2	-5.4	5
Α	1930.4 - 1944.6	+5.0	55
A	1944.8	-5.4	5
D	1945.2	-5.4	5
D	1945.4 - 1949.6	+5.0	55
D	1949.8	-5.4	5
В	1950.2	-5.4	5
В	1950.4 - 1964.6	+5.0	55
В	1964.8	-5.4	5
E	1965.2	-5.4	5
E	1965.4 - 1969.6	+5.0	55
E	1969.8	-5.4	5
F	1970.2	-5.4	5
F	1970.4 - 1974.6	+5.0	55
F	1974.8	-5.4	5
С	1975.2	-5.4	5
С	1975.4 - 1989.6	+5.0	55
С	1989.8	-5.4	5

**Equipment Used:** 1036, 1082, 1628, 1604, and 1055

Measurement Uncertainty: +/- 0.6 dB

**Temperature:** 22 °C

**Relative Humidity:** 50 %

EQUIPMENT: DAB 1819

PROJECT NO.: 1L0581RUS1

# Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 2.1049
TESTED BY: Lance Walker	DATE: October 23, 2001

Test Results: Complies.

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

Measurement Uncertainty: +/- 1.7 dB

 Ballas Headquarters:

 802 N. Kealy

 Lewisville, TX 75057

 Tel: (972) 436-9600

 Fax: (972) 436-2667

Complete X Preliminary

Distance: <u>N/A</u> m

Measurement

# EQUIPMENT: DAB 1819

## PROJECT NO.: 1L0581RUS1

	ПЭ	mko	
Nen	nko Dallas, Inc.		
Data Plot		Occupie	ed BW
Page 1 o	f <u>2</u>		
Job No.:	1L0581R	Date: 10/22/2001	
Specification:		Temperature(°C): 22	_
Tested By:	Lance Walker	Relative Humidity(%) 50	
E.U.T.:	Cell Band Repeater		
Configuration:	Normal		
Sample Number:	S01		
Location:	Lab 1	RBW	Refer to plots
Detector Type:	Peak	VBW	Refer to plots
Test Equipm	ent Used		
Antenna:		Directional Coupler	1055
Pre-Amp:		Cable #1	1082
Filter:		Cable #2:	1628
Receiver:	1036	Cable #3:	:
Attenuator #1	1604	Cable #4	:
Attenuator #2:		Mixer	:
Additional equip	ment used:	1048	

Antenna:			Directi	onal Coupler:	1055					
Pre-Amp:				Cable #1:	1082					
Filter:				Cable #2:	1628					
Receiver:	1036			Cable #3:						
Attenuator #1	1604			Cable #4:						
Attenuator #2:				Mixer:						
Additional equipment		1048								
Measurement Uncert	ainty: +/-1.7	dB								
	1				КВМ		HZ R	F Att	4U dB	
Ref Lv 51.1					VBW SWT	5 k 300 m		nit	dBm	
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	WW AW									
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-48.9 Center	 - 1.96 GH	z		108	kHz/			Span 1	.08 MHz	
Date:	22.OCT.2		:39:36							
Notes: M	id Channel Full	Power Output								

EQUIPMENT: DAB 1819

# PROJECT NO.: 1L0581RUS1



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

Nemko	o Dallas, Inc.									
ta Plot				Occupied	BW					
fication: d By: La	.0581R Ince Walker ell Band Repeater	-	Date: 10 erature(°C): 22 lumidity(%) 50							
	ormal									
> <sub>Ref L</sub> 51.1					RBW VBW SWT		:Hz R :Hz 15 U	F Att	4U dB dBm	<u></u> ו
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9									V	J
Cente e:	r 1.96 GH: 22.0CT.2		:36:38	108	kHz∕			Span î	1.08 MHz	
Notes: M	lid Channel Full P	ower Input								

# EQUIPMENT: DAB 1819

# PROJECT NO.: 1L0581RUS1

	V	mk						802 N. Keal		
		1113	$\cdot$					wisville, TX 7		
$\sim$								el: (972) 436-9 x: (972) 436-2		
Nemko [	Dallas, Inc.						10	IX. (972) 430-2	2007	
a Plot					Banded	<b>G</b> OC				
					Danueu	ges				
Page <u>1</u> of <u>4</u>							Complet	e <u> </u>	-	
	0581R	T		0/21/2001			Preliminar	у	-	
	24 Subpart E e Walker	-	perature(°C): 22							
: Repe		Relative r	Humidity(%) 50	<u>)                                    </u>						
uration: Norm										
e Number:	S01									
	ab 1			RBW:	Refer to plots		Measuremen	nt		
	Peak			-	Refer to plots			e: N/A	m	
									-	
Equipment U	sed									
na:			Direct	ional Coupler:	1055					
np:				Cable #1:	1082					
				Cable #2:	1628					
ver: 1	464			Cable #3:						
ator #1 1	604			Cable #4:						
ator #2:				Mixer:						
onal equipment u										
rement Uncertain	nty: +/- 1.7	dB								
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Ref Lvl	L				VBW	20 K	Hz			
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	1.99 GH							Span	800 KHz	
			:48:25					Span	BOD KHZ	
	1.99 GH 23.0CT.2		:48:25		KHZ/			Span	BOO KHZ	EXT

## EQUIPMENT: DAB 1819

# PROJECT NO.: 1L0581RUS1

Nemko Dallas, Inc.	ko	Dallas Headq 802 N. Ke Lewisville, TX Tel: (972) 43 Fax: (972) 43	ealy ( 75057 )6-9600
Test Plot:	Bandedges		
Page 4 of 4           Job No.:         1L0581R           Specification:         Part 24 Subpart E           Tested By:         Lance Walker         Rel	Date: 10/21/2001 Temperature(°C): 22 ntive Humidity(%) 50		
E.U.T.: <u>Repeater</u> Configuration: Normal			
Ref Lvl 30 dBm	-30.60 dBm V	BW 20 kHz	R⊢Att 1⊔ dB Jnlt dBm
30 41.1 dB Offset			
	dup y wan.		
			IRM
			EXT
-30 <b>m</b>			
-50			
-60			
Center 1.99 GHz Date: 23.0CT.2001	80 kHz/ 10:00:12		Span 800 kHz
Notes: Input Upper Band Edge			

## PROJECT NO.: 1L0581RUS1



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

Nei	mko Dallas, Inc.						(012) 400 2001	
ata Plo				Banded	lges			
Page <u>2</u> o No.: cification: ced By: .T.:	of 4 <u>1L0581R</u> Part 24 <u>Subpart E</u> <u>Lance Walker</u> Repeater		Date: <u>1</u> nperature(°C): <u>2</u> Humidity(%) <u>5</u>					
figuration:	Normal					•		
30	Lvl dBm	Marker	1 [ 1] -53. 1.929805	52 dBm 521 GHz	RBW VBW SWT	2 kH: 20 kH: 500 ms		1U dB dBm
30 4 20	1.1 dB Offs	e t				Mulu M		
10							¥ W	
	IEW BNDEDG			I. ANDAU				
30					<i>ч</i> ј			
40			M					
50 60								
.70 Cen	ter 1.93 GH 23.0CT.2	z	1:52:54	80 +	<hz <="" td=""><td></td><td>Spar</td><td>800 KHz</td></hz>		Spar	800 KHz
Notes:	Same as upper Ba		ed output					

## EQUIPMENT: DAB 1819

# PROJECT NO.: 1L0581RUS1

Nemko Dallas, Inc.	mko		Lewisvil Tel: (97	N. Kealy le, TX 75057 72) 436-9600 72) 436-2667	
a Plot	Band	edges			
age <u>3</u> of <u>4</u>					
: <u>1L0581R</u> ation: Part 24 Subpart E	Date: 10/21/2001 Temperature(°C): 22	_			
By: Lance Walker	Relative Humidity(%) 50				
Repeater					
ration: Normal					
	Marker 1 [ 1]	КВМ	2 kHz	RF Att	1U dB
Ref Lvl 30 dBm	-70.00 dBm 1.92980521 GHz		20 kHz 500 ms	Unit	dBm
			300 ms		
41.1 dB Offse	e t				
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	.// <b>*/</b> *`				1
	LM				
Center 1.93 GHz	80	kHz/		Span	800 kHz
: 23.OCT.20	001 9:57:00				
otes: Input Lower Bande	edae				
nes. Input Lower bande	uge				

# EQUIPMENT: DAB 1819

## PROJECT NO.: 1L0581RUS1

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Nomko		s Inc			

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Data Plot				Intermo	lulation C	haracter	istics					
Page <u>1</u> o	f								Complete	Х	_	
Job No.:	1L05	81R		Date: 10	)/26/2001				Preliminary		_	
Specification:				erature(°C): 22								
Tested By:	Lance		Relative H	umidity(%) 50	)							
E.U.T.:	-	Repeater										
Configuration:	Norma	1										
Sample Number:												
Location:	Lat					efer to plots		Ν	leasurement			
Detector Type:	Pea	ak			VBW: R	efer to plots			Distance:	N/A	m	
<u>Test Equipm</u>	ent Use	ed										
Antenna:				Direct	ional Coupler:	1055						
Pre-Amp:					Cable #1:	1043						
Filter:					Cable #2:	1626						
Receiver:	103				Cable #3:							
Attenuator #1	106	54			Cable #4:							
Attenuator #2:					Mixer:							
Additional equip												
Measurement Ur	certainty	/: +/-1.7 0	iB									
k De la constante de la consta			Delta 1			КВМ		1 MHz	z RF	• Att	20 dB	
💞 Ref	L∨l			- 0	.48 dB	VBW		1 MHz	z Mi	ixer	-20 dB	m
	9 dB	Зm	- 1 0	.34068	136 MHz	SWT		5 ms	Ur	nit	dB	m
50.9	.9 (	dB Offs	<b>b</b> †		1						-	٦
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-30												-1
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-0												
49.1												
	ter	1.93 GH	 z		12	MHz/		•		Spar	n 120 MHz	<b>_</b> z
)ate:		6.0CT.2		:20:12								
	2		.001 11	.20:12								
Notes:	Mark	er 1 at top of	signal at 1945	5 MHz and	Delta being th	e other innut	signal.	no signific	ant spurio	us emissior	is were found.	
l.					soing th	put	<u>B</u> , ,					

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## PROJECT NO.: 1L0581RUS1



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Nei	nko Dallas, Inc.									
Data Plo	t		Intermo	dulation (	Character	ristics				
Page <u>2</u> of Job No.: Specification: Tested By: E.U.T.:	1L0581R Lance Walker GSM Repeater			10/26/2001						
50 9	.9 dBm		- 0	.03 dB 344 MHz	RBW VBW SWT	1 M 5 m		- Att İxer hit	20 dB -20 dBm dBm	
40	).9 dB Offs	e t			DEDG					
20 1 V I 10	EW									1 MA
- 10										
-20 -30	where the second	white			whanna w	w.M.~L.M.	m	nchemenne	phimmethe	
-40 -49.1 Cen	ter 1.99 GH	lz		12	MHz/			Span	120 MHz	
Date: Notes:	25.0CT.2 Marker 1 is set at		: 33 : 27	on the upper e	dge					

EQUIPMENT: DAB 1819

PROJECT NO.: 1L0581RUS1

# Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 2.1051
TESTED BY: Lance Walker	DATE: October 22, 2001

Test Results: Complies.

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

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

# EQUIPMENT: DAB 1819

## PROJECT NO.: 1L0581RUS1

lemko

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	nko Dalla	.,		Antonno	Dort Sr.	rious Ere:	ssions				
<u>ata Plot</u>			;	Amenna	r ort Spu	rious Emi	<u>5510f15</u>				
Page 1 of									te X	-	
No.:	110581r				0/22/2001			Prelimina	у	-	
ecification:	FCC Part 24			perature(°C): 2							
sted By:	David Light	<u>(</u>	Relative	Humidity(%) 5	0						
J.T.:	Repeater										
nfiguration:	Normal										
nple Number:			1								
cation:	Lab 1	-				Refer to plots		Measureme			
ector Type:	Peak	-			VBW:	Refer to plots		Distanc	e: <u>N/A</u>	m	
st Equipm	ent Used										
enna:		_		Direct	tional Coupler:	1055					
Amp:		_			Cable #1:	1082					
er:		_			Cable #2:	1628					
eiver:	1036	_			Cable #3:						
enuator #1	1604	_			Cable #4:						
enuator #2:		-			Mixer:						
ditional equip	ment used:	1059	9								
asurement Un		+/-1.7 dB									
			arker	1 [ ] ]		квм	100	KHZ RI	- Att	30 dB	
Ref	1.9.1		arker		.90 dBm	K B W V B W	100		- нтт	3U GD	
	1 dBm		D 1 -	-17 7.274549		SWT	245 1		- 1 +	dBr	~
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-40											
-50											J
	-t 30 M	1Hz			97	MHz/			Sto	pp 1 GHz	
-50		1Hz 0CT.201	01 15	18:05	97	MHz/			Sto	op 1 GHz	2
-50 -9 Star	22.			18:05	97	MHz/			Sto	op 1 GHz	2

EQUIPMENT: DAB 1819

## PROJECT NO.: 1L0581RUS1



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Nemko Dallas, Inc.											
ita Plot	Antenna Port Spurious Emissions										
Page <u>2</u> of <u>4</u>											
lo.: <u>110581r</u>	/22/2001										
fication: FCC Part 24	Temperature(°C): 22										
d By: David Light	Relative Humidity(%) 50										
Repeater											
guration: Normal											
	Marker 2 [11]		КВМ	1 1~	IHZ RE	- Att	10 ab				
> <sub>Ref Lvl</sub>		90 dBm	VВЫ	1 1	IHz						
21.1 dBm	9.795591	18 GHz	SWT	190 m	ıs Ur	٦īt	dBm	п			
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i0								-			
0											
20								1			
			N 1			C +		1			
Start 1 GHz		1.9 G				stop	20 GHz				
e: 22.OCT.	2001 15:22:38										
lotes: CARRIER NOTO	CHED										

EQUIPMENT: DAB 1819

PROJECT NO.: 1L0581RUS1

# Section 6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious Emissions	PARA. NO.: 2.1051
TESTED BY: Lance Walker	DATE: 10/22/01

Test Results: Complies.

Test Data: See attached table.

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

## EQUIPMENT: DAB 1819

# PROJECT NO.: 1L0581RUS1

# **Test Data - Radiated Emissions**

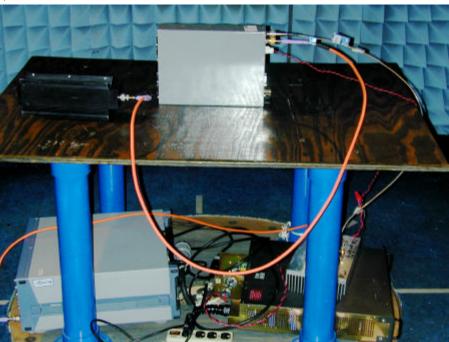
	Dallas Headquarters:         802 N. Kealy         Lewisville, TX 75057         Tel: (972) 436-9600         Fax: (972) 436-2667													
				Field S	strength of S	Spurious 1	Emissions							
Page 1 o	f <u>1</u>							Complete	Х					
Job No.:	1L0581R			Date:	10/22/2001			Preliminary	X	-				
Specification:	Part 24 Subj	part R	Tem	perature(°C):	22									
Tested By:	Lance Walk	er	Relative	Humidity(%)	50									
E.U.T.:	Repeater						_							
Configuration:	Normal						_							
Sample No:	S01			-	DDW	1 1 101								
Location: Detector Turner	AC 3				RBW: VBW:	1 MHz 1 MHz	-	Measurement Distance:		m				
Detector Type:	Peak				VDW:	1 MHZ	-	Distance.		<u> </u>				
Test Equipm	ent Used													
Antenna:	993			D	irectional Coupler:		_							
Pre-Amp:	1016				Cable #1:	1484	_							
Filter:					Cable #2:	1485	_							
Receiver:	1464				Cable #3:	1043	_							
Attenuator #1					Cable #4:		_							
Attenuator #2:					Mixer:		-							
Additional equip Measurement U		+/-1.7 dB					-							
Measurement of	certainty.	17 1.7 db	-											
Frequency	Meter	Correction		Pre-Amp	Substitution	Limit	ERP	ERP	Polarity	Comments				
	Reading	Factor		Gain	Antenna Gain									
(MHz)	(dBm)	(dB)		(dB)	(dBd)	(dBm)	(dBm)	(mW)						
3920	-35.7	34.3		33.3	8.0	-13	-26.7	0.002153	Н	-31.7 without filter				
5880	-37.8	36.0		32.7	9.1	-13	-25.4	0.002858	H					
7840	-40.3 -46.5	39.8 42.6		33.3 36	9.4 10.5	-13	-24.4 -29.4	0.003648	H H					
9800 11760	-40.3	42.0		35.5	11.0	-13	-37.5	0.001153 0.000179	H					
13720	-57.3	50.8		33.3	10.4	-13	-29.4	0.001161	Н					
15680	-67.5	44.0		33.2	13.6	-13	-43.1	0.000049	Н					
17640	-69.0	53.6		34	8.7	-13	-40.7	0.000085	Н	Noise Floor				
3920	-33.5	40.4		33.3	8.0	-13	-18.4	0.014388	V					
5880	-37.2	38.5		32.7	9.1	-13	-22.3	0.005834	V					
7840	-41.3	40.4		33.3	9.4	-13	-24.7	0.003357	V					
9800	-45.4	40.4		36	10.5	-13	-30.5	0.000899	V					
11760	-57.7	49.3		35.5	11.0	-13	-32.9	0.000516	V V					
13720	-59.5	47.6 43.2		33.3 33.2	10.4 13.6	-13 -13	-34.8 -43.9	0.000334	V					
15680 17640	-67.5 -69.0	51.0		33.2	8.7	-13	-43.3	0.000041 0.000047	v	Noise Floor				
17040	07.0	51.0		54	0.7	15	43.5	0.000047		110150 1 1001				
	1													
	1													
	1													

# EQUIPMENT: DAB 1819

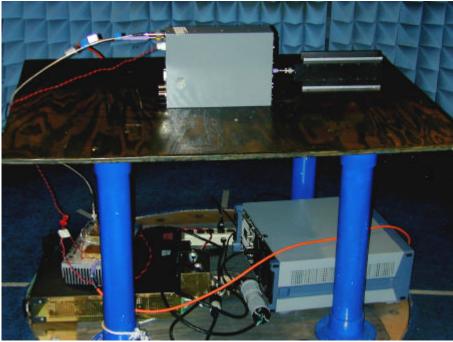
PROJECT NO.: 1L0581RUS1

# Photographs of Test Setup

FRONT VIEW



REAR VIEW



EQUIPMENT: DAB 1819

PROJECT NO.: 1L0581RUS1

# Section 7. Frequency Stability

NAME OF TEST: Frequency Stability		PARA. NO.: 2.1055			
TESTED BY:		DATE			
Test Results: Measurement Da	CompA. <b>ppica</b> See attached table.	ble			
	Standard Test Frequency: Standard Test Voltage:	MHz			
Equipment Used:					
<b>Measurement Uncertainty:</b> +/- 1.6 dB					
Lab Temperature:	С				
Relative % Humidity:	6				

EQUIPMENT: DAB 1819

PROJECT NO.: 1L0581RUS1

# Section 8. Test Equipment List

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	09/17/01
1604	ATTENUATOR	NARDA 776B-20	NONE	09/13/01
1059	TUNABLE NOTCH FILTER	K&L 3TNF-1000/2000-N/N	144	CBU
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	01/02/01
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	05/30/01
993	Horn antenna	A.H. Systems SAS-200/571	XXX	07/16/99
1064	ATTENUATOR	NARDA 776B-20	NONE	09/13/01
1055	DUAL DIRECTIONAL COUPLER	NARDA 3022	73393	Cal Not Req
1082	CABLE 2m	Astrolab 32027-2-29094-72TC	N/A	06/01/01
1628	CABLE, 6 ft	MEGAPHASE TM26 S1S5 72	N/A	CBU
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
1043	Flexable cable 1m	Astrolab Inc. 32027-2-29094K-1M	0	01/29/01
1626	CABLE, 5 ft	MEGAPHASE 10311 1GVT4	N/A	CBU

EQUIPMENT: DAB 1819

PROJECT NO.: 1L0581RUS1

# ANNEX A - TEST DETAILS

### EQUIPMENT: DAB 1819

### PROJECT NO.: 1L0581RUS1

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

Minimum Standard:Para. No.24.232. Base stations are limited to 1640 watts peakE.I.R.P. with an antenna height up to 300 meters HAAT. In no<br/>case may the peak output power of a base station transmitter exceed<br/>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<sup>2</sup> = E<sup>2</sup>/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

### PROJECT NO.: 1L0581RUS1

### 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.

#### <u>GSM</u>

RBW: 3 kHz VBW: ≥ RBW Span: 2 MHz Sweep: Auto Mask: Set markers to -26 dB from peak of CW.

#### <u>NADC</u>

RBW: 1 kHz VBW: ≥ RBW Span: 1 MHz Sweep: Auto Mask: Set markers to -26 dB from peak of CW.

### EQUIPMENT: DAB 1819

### PROJECT NO.: 1L0581RUS1

### 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>

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

## <u>GSM</u>

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

### <u>NADC</u>

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

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

EQUIPMENT: DAB 1819

PROJECT NO.: 1L0581RUS1

## 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<br/>frequency block, the power of any emission shall be attenuated<br/>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.

### EQUIPMENT: DAB 1819

PROJECT NO.: 1L0581RUS1

### NAME OF TEST: Frequency StabilityPARA. 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.

EQUIPMENT: DAB 1819

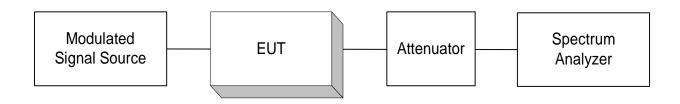
PROJECT NO.: 1L0581RUS1

# ANNEX B - TEST DIAGRAMS

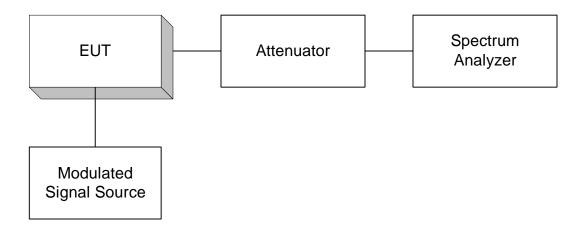
EQUIPMENT: DAB 1819

PROJECT NO.: 1L0581RUS1

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



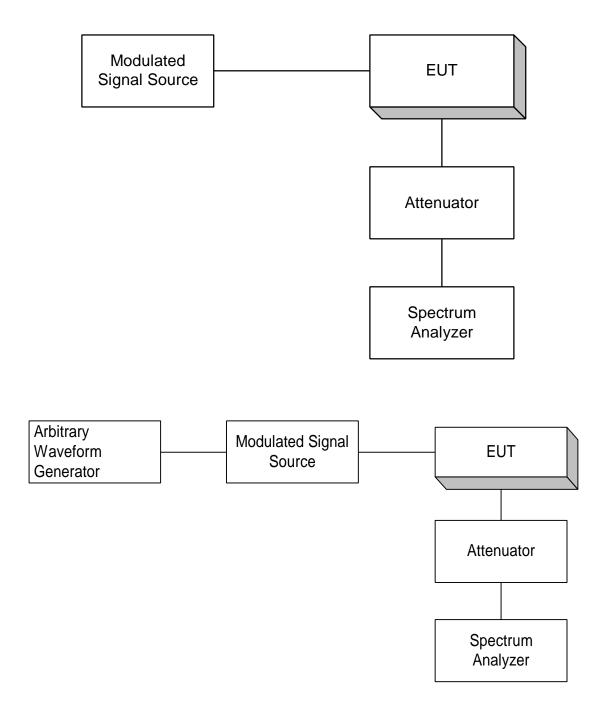
Para. No. 2.989 - Occupied Bandwidth



EQUIPMENT: DAB 1819

PROJECT NO.: 1L0581RUS1

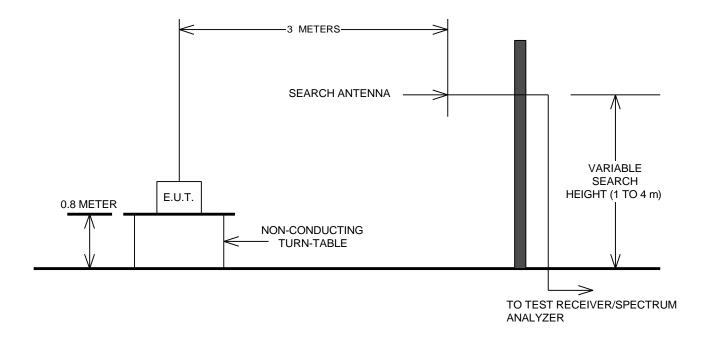
# Para. No. 2.991 Spurious Emissions at Antenna Terminals



EQUIPMENT: DAB 1819

PROJECT NO.: 1L0581RUS1

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



Para. No. 2.995 - Frequency Stability

