Nemko Test Report:

1L0388RUS1

MR303 Varia

Applicant:

Allen Telecom 140 Vista Center Drive Forest, VA 24551

Equipment Under Test: (E.U.T.)

In Accordance With:

FCC Part 24, Subpart D Narrowband PCS Subscriber Station

Tested By:

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

Authorized By:

-Jill 10

Tom Tidwell, Wireless/EMC Manager

Date:

10/18/01

43

Total Number of Pages:

EQUIPMENT:

FCC PART 24, SUBPART D NARROWBAND PCS SUBSCRIBER STATION PROJECT NO.: **1L0388RUS1**

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Nemko Dallas			FCC	PART 24, SUBPART D
EQUIPMENT:	MR303 Varia	NARROWBANI PROJE	D PCS SU CT NO.:	1L0388RUS1
Section 1.	Summary of Test	Results		
Manufacturer:	Allen Telecom			
Model No.:	149110			
Serial No.:	1576			
General:	All measurements are	traceable to nation	onal stan	dards.
These tests were conc compliance with FCC	lucted on a sample of the 2 Part 24, Subpart D.	e equipment for the	e purpose	of demonstrating
New S	ubmission	\boxtimes	Produ	ction Unit
Class I	I Permissive Change		Pre-P	roduction Unit
THIS	TEST REPORT RELATE	S ONLY TO THE I	TEM(S) 7	TESTED.
THE FOLLOWING I	DEVIATIONS FROM, AD SPECIFICATION See " Summ	DITIONS TO, OR I S HAVE BEEN MA ary of Test Data".	EXCLUSI ADE.	ONS FROM THE TEST
	R	VLAP		
	NVLAP LAB	CODE: 100426-	0	
TESTED BY:		I	DATE: _	
Nemko Dallas Inc. authorizes t	he above named company to reprod	luce this report provided it	is reproduce	ed in its entirety and for use by the

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.

company's employees only.

EQUIPMENT: MR303 Varia

Summary Of Test Data

NAME OF TEST	PARA.	SPEC.	RESULT
	NO.		
RF Power Output	24.132(a)	<pre>< Rated</pre>	Complies
Occupied Bandwidth (2FSK)	24.133	< Rated	Complies
Occupied Bandwidth (4FSK)	24.133	<u><</u> Rated	Complies
Spurious Emissions at Antenna Terminals	24.133	-13 dBm	Complies
Field Strength of Spurious Emissions	24.133	-13 dBm E.I.R.P.	Complies
Frequency Stability	24.135	± 1 ppm	N/A

Footnotes:

The device has no modulation circuitry, therefore this test was not performed.

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Section 2. General Equipment Specification

Supply Voltage Input:	115 Vac		
Frequency Bands:	Uplink Downlink 2FSK	901-902 MHz 940-941 MHz 4FSK	IDEN (QAM)
Type of Modulation and Designator:	\boxtimes	\boxtimes	\boxtimes
System Gain:	58 dB		
Output Impedance:	50 ohms		
RF Output (Rated): Uplink Downlink	Total Total	24 dBm 8 dBm	
	Uplink Downlink		0.254 W 0.006 W

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System Description

The repeater MR303 Varia is a bi-directional amplifier with adjustable RF-bandwidth. The first and the last channel of the transmission bandwidth can be set manually by means of rotary switches. The repeater has been designed for applications in medium sized rooms such as suites, offices and basements. A quality connection with a mobile phone can usually not be established in these rooms.

The repeater is equipped with a connector for an external receiving/transmitting antenna which provides the RF connection to the mobile. Connection to the BTS can be established via an outdoor antenna. Other components of the D.I.C.E. COAX system can also be connected to the repeater.

The final amplifiers are protected by individual level limiters, which allow the mobile unit to be operated in close proximity to the repeater. Third order intermodulation products are kept below the CEPT limit of -36 dBm constantly, even if the repeater receives the signals of more than one mobile unit.

System Diagram



EQUIPMENT: MR303 Varia

Section 3. RF Power Output

NAME	OF TEST:	RF Power	Output

PARA. NO.: 2.1046

TESTED BY: David Light

DATE: 10/15/2001

Test Results: Complies.

Measurement Data:

Modulation Type	Frequency (MHz)	Output Power (dBm)	Output Power (W)
2FSK	901.025	24.5	0.283
4FSK	901.025	24.5	0.283
2FSK	940.025	7.7	0.006
4FSK	940.025	7.7	0.006

Measurement uncertainty: +/- 0.7 dB

Test Equipment: 1029-1030

EQUIPMENT: MR303 Varia

Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 2.1049
TESTED BY: Lance Walker & David Light	DATE: 10/16/2001

Test Results:	Complies.
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Test Data: See attached plots.

Measurement Uncertainty: +/- 1.7 dB

FCC PART 24, SUBPART D NARROWBAND PCS SUBSCRIBER STATION PROJECT NO.: **1L0388RUS1**

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MR303 Varia



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No.:	1L0388R			Date: 10	0/16/01			Preliminar	у	_	
ification:	FCC Part 24		Temp	perature(°C): 22	2						
ed By:	David Light		Relative H	lumidity(%) 50)						
Г.:	Repeater										
iguration:	Normal										
ole Number	:	1									
tion:	Lab 1				RBW:	Refer to plots		Measuremen	nt		
ctor Type:	Peak				VBW:	Refer to plots		Distanc	e: N/A	m	
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MR303 Varia

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Data Plot	t										
Page <u>2</u> o	of 4										
Job No.:	1L038	8R		Date: 10	/16/01						
Specification:	FCC P	art 24	Temp	erature(°C): 22							
Tested By:	David	Light	Relative H	Humidity(%) 50							
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EQUIPMENT:

FCC PART 24, SUBPART D NARROWBAND PCS SUBSCRIBER STATION PROJECT NO.: **1L0388RUS1**

Dallas Headquarters: 802 N. Kealy Nemko Lewisville, TX 75057 Tel: (972) 436-9600 Fax: (972) 436-2667 Nemko Dallas, Inc. **Data Plot** Page 3 of 4 Job No.: 1L0388R Date: 10/16/01 Specification: FCC Part 24 Temperature(°C): 22 Relative Humidity(%) 50 Tested By: David Light E.U.T.: Repeater Configuration: Normal Ref Lvl КВМ 3U U Δt 30 dB ٧ВЫ 300 Hz 30 dBm SWT 3.9 s Unit dBm 30 20.9 dB Offset 20 Al M М 10 C 1VIEW 1 MA -10 ЕХТ -20 -30 unnul annum unn -40 performent and we have the -50 -60 -70 Center 901.025 MHz 7 kHz/ Span 70 kHz 16.0CT.2001 9:38:22 Date: **OUTPUT SIGNAL - UPLINK** Notes:

EQUIPMENT:



FCC PART 24, SUBPART D NARROWBAND PCS SUBSCRIBER STATION PROJECT NO.: **1L0388RUS1**

EQUIPMENT:

MR303 Varia



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No.:	1L0388R Date: 10/16/01										Pr	elimina	ry			
cification:	FCC Part 24	4		Temperature(°C): 22												
ed By:	David Light	1	Re	Relative Humidity(%) 50												
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MR303 Varia

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Job No.:	1L0388	3R		Date: 10	/16/01						
Specification:	FCC Pa	art 24	Temp	erature(°C): 22							
Tested By:	David	Light	Relative I	Humidity(%) 50)						
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EQUIPMENT:

FCC PART 24, SUBPART D NARROWBAND PCS SUBSCRIBER STATION PROJECT NO.: **1L0388RUS1**

Dallas Headquarters: 802 N. Kealy Nemko Lewisville, TX 75057 Tel: (972) 436-9600 Fax: (972) 436-2667 Nemko Dallas, Inc. **Data Plot** Page 3 of 4 Job No.: 1L0388R Date: 10/16/01 Specification: FCC Part 24 Temperature(°C): 22 Relative Humidity(%) 50 Tested By: David Light E.U.T.: Repeater Configuration: Normal Ref Lvl КВМ 300 Δ· 4U dE νвμ 300 Hz 40 dBm SWT 3.9 s Unit dBm 40 20.9 dB Offset 30 20 10 1VIEW 1 MA Π EXT -10 -20 -30 M White Men Man word white for the -4r Wy June 1 Mm Min -50 -60 Center 901.0260521 MHz 7 kHz/ Span 70 kHz 16.0CT.2001 9:17:54 Date: Notes: **OUTPUT SIGNAL - UPLINK**

EQUIPMENT:



EQUIPMENT:

Section 5. Spurious Emissions at Antenna Terminals

MR303 Varia

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 2.1051
TESTED BY: Lance Walker & David Light	DATE: 10/16/2001

Test Results: Complies.

Test Data: See attached plots

Measurement Uncertainty: +/- 1.7 dB

FCC PART 24, SUBPART D NARROWBAND PCS SUBSCRIBER STATION PROJECT NO.: **1L0388RUS1**

EQUIPMENT:

MR303 Varia

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Nemko Dallas, Inc.

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ecification:	FCC Part 24		Tempe	erature(°C): 22	2								
sted By:	David Light	Re	lative H	umidity(%) 50)								
U.T.:	Repeater												
nfiguration:	Normal												
mple Number:		1											
ocation:	Lab 1				RBW:	Refer to plots		Meas	urement				
etector Type:	Peak				VBW:	Refer to plots		Ľ	Distance: 1	N/A	m		
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EQUIPMENT:

MR303 Varia



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Page 2 o	of <u>4</u>										
Job No.:	1L038	38R		Date: 10	0/16/01						
Specification:	FCC I	Part 24	Tem	perature(°C): 22	2						
Tested By:	David	Light	Relative	Humidity(%) 50)						
E.U.T.:	Repea	ter									
Configuration:	Norm	al									
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EQUIPMENT:

# FCC PART 24, SUBPART D NARROWBAND PCS SUBSCRIBER STATION PROJECT NO.: **1L0388RUS1**

Nate Plot         Page 3 of 4         Date: 10/16/01         cife and Light       Ref 121 IIII         Marker 1 LIII       NUM         Marker 1 LIII       NUM       NUM       NUM         Normal         Normal <th <="" colspan="2" th=""><th>Nemko Dallas, Inc.</th><th>mko</th><th></th><th>Dallas Hea 802 N Lewisville Tel: (972 Fax: (972</th><th>adquarters: I. Kealy , TX 75057 ) 436-9600 ) 436-2667</th><th></th></th>	<th>Nemko Dallas, Inc.</th> <th>mko</th> <th></th> <th>Dallas Hea 802 N Lewisville Tel: (972 Fax: (972</th> <th>adquarters: I. Kealy , TX 75057 ) 436-9600 ) 436-2667</th> <th></th>		Nemko Dallas, Inc.	mko		Dallas Hea 802 N Lewisville Tel: (972 Fax: (972	adquarters: I. Kealy , TX 75057 ) 436-9600 ) 436-2667	
Marker I LTIJ       RBW       IUU RHZ       RF Att       3U dB         30 dBm       900.86172345 MHz       SWT       245 ms       Unit       dBm         30 dBm       900.86172345 MHz       SWT       245 ms       Unit       dBm         30 dBm       900.86172345 MHz       SWT       245 ms       Unit       dBm         30 dBm       900.86172345 MHz       SWT       245 ms       Unit       dBm         20       40       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10	Data Plot           Page 3 of 4           > No.:         1L0388R           ecification:         FCC Part 24           sted By:         David Light           J.T.:         Repeater           nfiguration:         Normal	Date: 10/ Temperature(°C): 22 Relative Humidity(%) 50	16/01					
30       dBm       900.86172345 MHz       SkT       245 ms       Unit       dBm         30       20.9       dB       offset       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1		Marker 1 [11]			RF Att	30 dB		
30       20.9 dB Offset       1         10       1       1         10       1       1         10       1       1         10       1       1         10       1       1         10       1       1         10       1       1         10       1       1         10       1       1         10       1       1         10       1       1         10       1       1         10       1       1         10       1       1         10       1       1         10       1       1         20       1       1         20       1       1         20       1       1         20       1       1         20       1       1         20       1       1         20       1       1         20       1       1         20       1       1         20       1       1         20       1       1         20	30 dBm	24.: 900.861723	45 MHz SW ⁻	n IUU RHZ F 245 ms	Unīt	dBm		
-40 40 50 50 50 50 50 50 50 50 50 50 50 50 50 50 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 70 -	20 10 0 1VIEW -10 -20 -30							
-60 -70 Start 30 MHz 97 MHz/ Stop 1 GHz te: 16.0CT.2001 9:45:21 Notes: DOWNLINK MARKER INDICATES CARRIER	-40	and the man	Markan wanter	whether	with the second s			
-70     Start 30 MHz     97 MHz/     Stop 1 GHz       te:     16.0CT.2001 9:45:21       Notes:     DOWNLINK MARKER INDICATES CARRIER	-60							
te: 16.0CT.2001 9:45:21 Notes: DOWNLINK MARKER INDICATES CARRIER	-70 Start 30 MHz		97 MHz/		St	op 1 GHz		
Notes: DOWNLINK MARKER INDICATES CARRIER	te: 16.0CT.2	2001 9:45:21						
	Notes: DOWNLINK MARKER INDICA	ATES CARRIER						

EQUIPMENT:



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

Nen	nko Dallas, Ir	nc.					. (			
st Plot:										
Page 4 o	f 4									
lo.:	1L0388R		Date: 1	0/16/01						
ification:	FCC Part 24	Te	nperature(°C): 2	2						
d By:	David Light	Relativ	e Humidity(%) 5	0						
Г.:	Repeater									
iguration:	Normal									
>		Marker	<u>    1  [ 1]</u>		КВМ	100 KH	HZ R	.⊢ Att	30 aB	
Ref			-30	.91 dBm	νвμ	100 KH	Ηz			
30	dBm		6.91583	166 GHz	SWT	2.25 :	5 L	Init	dBr	m
20	).9 dB Of	fset								٦.
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50										
50										
70										
Star	rt 1 GHz			900	MHz/			Sto	p 10 GHz	Z
e:	16.OC	T.2001	9:46:40							
Nataa	DOWNI DUZ									
NOTES:	MARKER IN	DICATES UICH	EST EMISSI	ON						
	MAKKEKIN	DICATES HIGH	EST EMISSI							

EQUIPMENT:

#### FCC PART 24, SUBPART D NARROWBAND PCS SUBSCRIBER STATION PROJECT NO.: **1L0388RUS1**

MR303 Varia

Ner	mko Dallas, Inc									
Data Plot				APSE 4	4FSK					
Page 1 o	of 4						Comp	ete X		
Job No.:	1L0388R		Date:	10/16/01			Prelimin	arv	_	
Specification:	FCC Part 24	Те	mperature(°C):	22						
Tested By:	David Light	Relativ	e Humidity(%)	50	-					
E.U.T.:	Repeater		- · · · <u>-</u>		-					
Configuration:	Normal					-				
Sample Number:		1	_							
Location:	Lab 1			RBW:	Refer to plots	_	Measurem	ent		
Detector Type:	Peak			VBW:	Refer to plots	-	Distar	nce: N/A	m	
Test Equipme	nt Used									
Antenna:			Direc	ctional Coupler:		_				
Pre-Amp:				Cable #1:	1082	_				
Filter:				Cable #2:		-				
Receiver:	1036			Cable #3:		_				
Attenuator #1	1477			Cable #4:		_				
Attenuator #2:	1469			Mixer:		-				
Additional equipn	nent used:	10				_				
Measurement Unc	certainty: +/-;	3.6 dB								
R		Marker	1 [ 1]		КВМ	1UU K	HZ RE	- Att	20 de	5
S Ref I	Lv1		8.	23 dBm	VBW	100 k	Hz			
10	dBm	941	.683366	73 MHz	SWT	245 m	s Ur	nit	1 dE	i m
10 10	.9 dB Offe	se t							TŤ	<b></b>
0									+ + -	-
-10		_								_
-20										_
1 V I E	ΞW									1MA
20										
-30										
										EXT
-40										-
-50					-				<u>  lu</u>	-
									()	
-60				INARA LAA		-	All water al	Muplan	upper have	<b>W</b>
MUNIC	white white white	manne	meran	1 Millinger			J 40-0			
- 70										
-18										
-80										-
-90										
Star	t 30 MHz			97 1	1Hz/			Sto	op 1 GH	Z
Date:	16.OCT.	2001 7	:42:10							
Notes:	DOWNLINK									
	MARKER IND	ICATES CAR	RIER							
1										

EQUIPMENT:

MR303 Varia



NGI	nko Dallas, in	IC.								
ata Plot				APSE 4	FSK					
Page 2 of	f 4									
No.:	1L0388R		Date: 10/	16/01						
cification:	FCC Part 24	Temperature(°C): 22								
ed By:	David Light	Relativ	e Humidity(%) 50							
T.:	Repeater					_				
figuration:	Normal					_				
		Maaliaa				1	80.1-		<u> </u>	
	v I	narker		1 dBm	VBU	1	MHZ	RF HI	1 ZU UD	
10 c	⊣vi 1Bm		-42.3	6 GHz	SML	90	ms	Unit	dB	m
10										
10.	.9 ØB Off	set								
n										
0										
10										
20							_			_
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30										
50										
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· • • • • •	where we have a second s			•						
50										
70										
80							-			-
90										
Star	t 1 GHz			900	MHz/			9	Stop 10 GH:	z
e:	16.OCT	.2001 7	43:16							
- N-4	DOUDU DU	,								
NOTES:	DOWNLINK									
	MADIZED 131	DICATED HICE	THE ENGLISH	T						

EQUIPMENT:

to Diot	A D6	EF AFSV			
Page 3 of 4	AIS	<u>5E 4F 5K</u>			
: 1L0388R	Date: 10/16/01				
cation: FCC Part 24	Temperature(°C): 22				
By: David Light	Relative Humidity(%) 50				
Repeater			-		
iration: Normal			-		
	Marker 1 [ 1]	кви	1UU KHZ	RF Att	30 <del>a</del> 8
Ref Lvl	24.51 dl	Bm VBW	100 kHz		
30 dBm	901.02401804 MI	Hz SWT	245 ms	Unit	dBm
20.9 dB Offse	t				1
					I –
17151					1 MA
					1114
					EXT
munnh	when a herrow allowed	all al and	m milder the from the	-Jackagh all bornes	all work
					+1
Start 30 MHz	L. L	17 MHZ/		Sto	op 1 GHz

EQUIPMENT:



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

Nemko Dallas, In	iC.			
Test Plot:	<u>APSE 4</u>	4FSK		
Page <u>4</u> of 4				
Job No.: 1L0388R	Date: 10/16/01			
Specification: FCC Part 24	Temperature(°C): 22	-		
Tested By: David Light	Relative Humidity(%) 50	-		
E.U.T.: Repeater		•		
Configuration: Normal				
<u>B</u>	Marker 1 [11]	КВМ	1UU KHZ RF	Att 30 dB
Ref Lvl	-30.97 dBm	VBW	100 kHz	
30 dBm	6.98797595 GHz	SMT	2.25 s Un	it dBm
20.9 dB Off	set			
20		1 1		
10		_		
17150		1		1 1 1 1
-10		┨───┤		<b>_</b>
				EXT
-20				
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-30			Mint	
ىد ا ا	All as in marken a har a draw of	many	" Unprovending	muchally programment
-40 -40 -40 -40		┨───┤	T	
-50				
-60		1 1		
-70		<u> </u>		
Start 1 GHz	900	MHz/		Stop 10 GHz
Date: 16.0CT	.2001 9:31:48			
Notes: DOWNLINK				
MARKER IN	DICATES HIGHEST EMISSION			

EQUIPMENT: MR303 Varia

**lemko** 

# FCC PART 24, SUBPART D NARROWBAND PCS SUBSCRIBER STATION PROJECT NO.: **1L0388RUS1**

		·			_		_							
<u>ata Plot</u>					Int	term	od							
Page 1 of	f <u>2</u>										Complete	Х		
No.:	1L0388R			Date: 1	0/16/01					Pr	eliminary		-	
cification:	FCC Part 24		Temper	ature(°C): 2	22								-	
ted By:	David Light	R	elative Hu	midity(%) 5	50									
.T.:	Repeater													
figuration:	Normal													
ple Number:	-	1												
ation.	Lab 1				F	BW· R	efer t	to plots		Mea	surement			
ector Type:	Peak				1	/BW· R	efer t	to plots			Distance:	N/A	m	
ietor rype.	- Cuit					<u></u>		to pieto						
t Equipme	ent Used													
enna.	ent oscu			Direc	tional Co	mler.								
Δmn·				Direc	Cab	le #1 ·	1	082						
n.					Cab	ω #2·	1	082						
ivor:	1026				Cab	lo #2.								
ivel.	1477				Cab	le #3.								
uator #2	14//				Cab	(in one								
tional aguin	1409				11	iixei.								
uonai equipi	ment used.	/ 2 ( JD												
surement Un	certainty: +	-3.6 dB												
~								квм	20	кНz	RF	Att	20 di	3
Ref	Lv1							VBW	20	kHz				
10	dBm							SWT	70	ms	Un	ī t	dl	Bm
10 10		fcdt			1									
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908					_ <b>_</b>	1	<b>.</b> МШ-	7.7	1			Stop		4-7
JIAN	. 330 MF	12				1		L/				Jup	340 MF	12
	16.00	F.2001	7:	59:51										
e:														

EQUIPMENT:

MR303 Varia



Data Plot					Int	term	od							
Page <u>2</u> o	f <u>2</u>													
Job No.:	1L038	8R	_	Date: 10	/16/01									
Specification:	FCC P	art 24	Tem	perature(°C): 22										
Tested By:	David	Light	Kelative	Humidity(%) $50$										
E.U.I.: Configuration:	Norma	ler												
Configuration.	Nomia	11						-						
R)							КВГ	1	20	кНz	RI	- Att	4U dB	
Ref	$L \vee 1$						VBL	1	20	кНz				
40	dBm						SMI		70	ms	Ur	пīt	dBr	n
40 20	1.9	dB Offse	e t											1
30								+					_	-
20								_					_	-
10														
10 1 1 1	EΜ													1MA
														-
														EXT
-10								+		_				-
-01	-13	авт——												
-20								_		_			_	_
20														
-30									-					
-40 1 mut	hun	MURMAN	hum	month	h	-\vv.	her Weak	M.L.N	hma	Jun line	W MA	WMAL~	an run m	
~···	, •000	<b>4</b> *** <b>4</b> 4 * 4	··•u·•		••			Υ <b>γ</b> α.	• •	T	<b>V</b> ++ <b>Q</b> ·			
-50								_		_			_	-
-60														
Star	∼t 8	96 MHz				1.1	MHz/					Stop	907 MHz	<u> </u>
Date:	1	6.ОСТ.2	001 9	:13:18										
Notes:	UPLI	NK												
	<u></u>													

EQUIPMENT: MR303 Varia

# Section 6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious	PARA. NO.: 2.1053
TESTED BY: Lance Walker	DATE: 8/31/2001

Test Results: Complies.

**Test Data:** See attached table.

Measurement Uncertainty: +/- 3.6 dB

EQUIPMENT: MR303 Varia

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

Ner	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 <u>1</u> o Job No.: Specification: Tested By:	f 1L0388R Lance Walk	er	Tem	Date: perature(°C): Humidity(%)	8/31/01 22 50			Complete Preliminary	X	
E.U.T.: Configuration:	Repeater Normal Dov	vnlink	-	riumany(70)	50		-			
Sample No:	1			_			-			
Location:	AC 3				RBW:	1 MHz	_	Measurement		
Detector Type:	Peak				VBW:	1 MHz	-	Distance:	3	m
Test Equipm	ent Used			n	irectional Counter:					
Pre-Amp	1016			D	Cable #1:	1043	-			
Filter	1010				Cable #2:	1045	-			
Receiver:	1464	•			Cable #3:	1484	-			
Attenuator #1	1470	•			Cable #4:	1485	-			
Attenuator #2:					Mixer:		-			
Additional equip	ment used:	1053					_			
Measurement U	ncertainty:	+/-3.6 dB	-				_			
Frequency	Meter	Correction		Pre-Amp	Substitution	Limit	ERP	ERP	Polarity	Comments
(MHz)	Reading (dBm)	Factor (dB)		Gain (dB)	Antenna Gain (dBd)	(dBm)	(dBm)	(mW)		
										Tx at 947 5 MHz
1895	-59.5	32.7		33 3	6.4	-13	-53.8	0.000004	Н	Noise floor
2842.5	-60.3	34.6		33.5	8.0	-13	-51.2	0.000008	Н	Noise floor
3790	-61.5	34.3		33.7	8.0	-13	-52.9	0.000005	Н	Noise floor
4737.5	-62.5	35.5		33.7	9.2	-13	-51.5	0.000007	Н	Noise floor
5685	-63.8	36.0		33.3	9.1	-13	-52.0	0.000006	Н	Noise floor
6632.5	-62.3	37.8		33	10.1	-13	-47.3	0.000019	Н	Noise floor
7580	-61.3	39.8		33	9.4	-13	-45.1	0.000031	Н	Noise floor
8527.5	-62.6	41.8		34.3	9.9	-13	-45.1	0.000031	Н	Noise floor
9475	-62.1	41.4		35.7	10.1	-13	-46.4	0.000023	Н	Noise floor
10422.5	-61.8	42.5		35.7	10.5	-13	-44.5	0.000036	Н	Noise floor
1905	50.5	20.0		22.2	6.4	12	56.6	0.000002	V	Noise floor
2042 5	-39.3	29.9		22.5	0.4 8.0	-13	-50.0	0.000002	V	Noise floor
3790	-61.5	40.4		33.7	8.0	-13	-30.3	0.000003	V	Noise floor
4737.5	-62.5	41.2		33.7	9.2	-13	-45.9	0.000021	V	Noise floor
5685	-63.8	38.5		33.3	9.1	-13	-49.5	0.000011	v	Noise floor
6632.5	-62.3	38.3		33	10.1	-13	-46.9	0.000021	v	Noise floor
7580	-61.3	40.4		33	9.4	-13	-44.4	0.000036	V	Noise floor
8527.5	-62.6	40.3		34.3	9.9	-13	-46.7	0.000022	V	Noise floor
9475	-62.1	39.3		35.7	10.1	-13	-48.5	0.000014	V	Noise floor
10422.5	-61.8	41.0		35.7	10.5	-13	-46.0	0.000025	V	Noise floor
1	1		1	1			1	1	1	1

EQUIPMENT:

# FCC PART 24, SUBPART D NARROWBAND PCS SUBSCRIBER STATION PROJECT NO.: **1L0388RUS1**

MR303 Varia

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allac	Inc		

			Field	l Streng	gth of S	Spurious 1	Emissions			
Page 1 of	f							Complete	Х	-
Job No.:	1L0388R	1L0388R Date: 8/31/01						Preliminary		
Specification:			Temperature(	C): 22						
Tested By:	Lance Walk	er	Relative Humidity	(%) 50						
E.U.T.:	Repeater						_			
Configuration:	Normal Upl	ink					_			
Sample No:	1						_			
Location:	AC 3				RBW:	1 MHz		Measurement		
Detector Type:	Peak	•			VBW:	1 MHz	-	Distance:	3	m
Test Equipm	ent Used									
Antenna:	993			Directiona	l Coupler:					
Pre-Amp:	1016	-			Cable #1:	1043	-			
Filter:		-			Cable #2	1484	-			
Receiver:	1464	-			Cable #3:	1082	-			
Attenuator #1		-			Cable #4:	1485	-			
Attenuator #2		-			Miver:	1465	-			
Additional aguin	mont wood	1053			WILKEL.		-			
Additional equip	anteint useu.	1055					-			
Measurement On	certainty.	±/-3.0 dB								
Frequency	Meter	Correction	Pre-An	p Subs	titution	Limit	ERP	ERP	Polarity	Comments
	Reading	Factor	Gain	Anten	na Gain					
	Ŭ									
(MHz)	(dBm)	(dB)	(dB)	(0	Bd)	(dBm)	(dBm)	(mW)		
										Tx at 902.5 MHz
1805	-61.3	29.9	33.3		5.4	-13	-58.4	0.000001	V	Noise floor
2707.5	-60.8	35.6	33.5	:	3.0	-13	-50.8	0.000008	V	Noise floor
3610	-62.6	40.4	33.6	:	3.0	-13	-47.8	0.000017	V	Noise floor
4512.5	-62.3	41.2	33.8		9.2	-13	-45.8	0.000027	V	Noise floor
5415	-63.1	40.6	33.5		9.1	-13	-46.9	0.000020	V	Noise floor
6317.5	-63.8	37.9	32.7		9.5	-13	-49.1	0.000012	V	Noise floor
7220	-63.3	39.4	33	1	0.0	-13	-46.9	0.000020	V	Noise floor
8122.5	-63.3	41.6	33.7		9.7	-13	-45.7	0.000027	V	Noise floor
9025	-62.1	39.3	34.8	1	0.1	-13	-47.6	0.000017	V	Noise floor
9927.5	-61.6	40.4	35.7	1	0.5	-13	-46.4	0.000023	V	Noise floor
						_				
1805	-61.3	32.7	33.3		54	-13	-55.6	0.000003	Н	Noise floor
2707.5	-60.8	34.6	33.5		3.0	-13	-51.7	0.000007	Н	Noise floor
3610	-62.6	34.3	33.6		3.0	-13	-53.9	0.000004	Н	Noise floor
4512.5	-62.3	35.5	33.8		9.2	-13	-51.4	0.000007	Н	Noise floor
5415	-63.1	36.3	33.5		) 1	-13	-51.3	0.000007	Н	Noise floor
6317.5	-63.8	36.6	32.7	-	) 5	-13	-50.4	0.000009	Н	Noise floor
7220	-63.3	38.7	33	1	0.0	-13	-47.6	0.000000	н	Noise floor
8122.5	62.2	42.2	22.7		0.0	-13	45.1	0.000011	н	Noise floor
0025	62.1	42.2	24.8	1	0.1	-13	-45.1	0.000031	н	Noise floor
9025	-02.1	41.4	34.0	1	0.1	-13	-43.3	0.000028		Noise floor
9927.5	-01.0	42.0	35.7		0.3	-13	-44.2	0.000038	п	NOISE 11001
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## FCC PART 24, SUBPART D NARROWBAND PCS SUBSCRIBER STATION PROJECT NO.: **1L0388RUS1**

EQUIPMENT: MR303 Varia

Photographs of Test Setup FRONT VIEW



**REAR VIEW** 



#### FCC PART 24, SUBPART D NARROWBAND PCS SUBSCRIBER STATION PROJECT NO.: **1L0388RUS1**

EQUIPMENT: MR303 Varia

# Section 7. Frequency Stability

NAME OF TEST: Fre	equency Stability	PARA. NO.: 24.235
TESTED BY:		Par h C
Test Results:	NOPES. APP	Galoio
Measurement Data:	Standard Test Frequency Standard Test Voltage:	: MHz

EQUIPMENT: MR303 Varia

# Section 8. Test Equipment List

ASSET	Description	Manufacturer Model Number	Serial Number	Cal. Date
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	09/17/01
1477	20db Attenuator DC 18 Ghz	MCL Inc. BW-S20W5	NONE	CBU
1469	10 db Attenuator DC 18 Ghz	MCL Inc. BW-S10W2 10db-2WDC	NONE	CBU
993	Horn antenna	A.H. Systems SAS-200/571	XXX	07/16/99
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	05/30/01
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	01/02/01
1470	10 db Attenuator DC 18 Ghz	MCL Inc. BW-S10W2 10db-2WDC	NONE	CBU
1043	Flexable cable 1m	Astrolab Inc. 32027-2-29094K-1M	0	01/29/01
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
1063	Low Noise Amplifier 20-1000mhz	MiteQ AM-1430	422057	02/27/01
1029	PEAK POWER METER	HP 8900D	3303U0012	03/12/01
1030	PEAK POWER SENSOR	HP 84811A	2539A03573	03/12/01

## FCC PART 24, SUBPART D NARROWBAND PCS SUBSCRIBER STATION PROJECT NO.: **1L0388RUS1**

EQUIPMENT:

MR303 Varia

# **ANNEX A - TEST METHODOLOGIES**

#### FCC PART 24, SUBPART D NARROWBAND PCS SUBSCRIBER STATION PROJECT NO.: **1L0388RUS1**

*EQUIPMENT:* MR303 Varia

#### NAME OF TEST: RF Power Output

#### PARA. NO.: 2.985

Minimum Standard:	<ul><li>Para. No.24.132.</li><li>(a) Stations transmitting in the 901-902 MHz band are limited to 7 watts e.r.p.</li></ul>
	(b) Mobile stations transmitting in the 930-931 MHz and 940-941 MHz bands are limited to 7 watts e.r.p.
	(c) Base stations transmitting in the 930-931 MHz and 940-941 MHz bands are limited to 3500 watts e.r.p. per authorized channel and are unlimited in antenna height except as provided in paragraph (d) of this section.
Method Of Measurement:	CDMA Per ANSI/J-STD-008 TDMA Per ANSI/J-STD-010 PCS 1900 Per ANSI/J-STD-007

#### Detachable Antenna:

The peak power at antenna terminals is measured using an in-line peak power meter or a spectrum analyzer.

#### 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 $\pi$  R² = E²/120 $\pi$  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

#### FCC PART 24, SUBPART D NARROWBAND PCS SUBSCRIBER STATION PROJECT NO.: **1L0388RUS1**

EQUIPMENT: MR303 Varia

#### NAME OF TEST: Occupied Bandwidth

#### PARA. NO.: 2.989

Minimum Standard: Para. No. 24.133. 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:**

(a) The power of any emission shall be attenuated below the transmitter power (P), as measured in accordance with \$24.132(f), in accordance with the following schedule:

(1) For transmitters authorized a bandwidth greater than 10 kHz:

(i) On any frequency outside the authorized bandwidth and removed from the edge of the authorized bandwidth by a displacement frequency (fd in kHz) of up to and including 40 kHz: at least 116 Log10 ((fd + 10)/6.1) decibels or 50 plus 10 Log10 (P) decibels or 70 decibels, whichever is the lesser attenuation;

(ii) On any frequency outside the authorized bandwidth and removed from the edge of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 40 kHz: at least 43 + 10 Log10 (P) decibels or 80 decibels, whichever is the lesser attenuation.

(2) For transmitters authorized a bandwidth of 10 kHz:

(i) On any frequency outside the authorized bandwidth and removed from the edge of the authorized bandwidth by a displacement frequency (fd in kHz) of up to and including 20 kHz: at least 116 x Log10 ((fd + 5)/3.05) decibels or  $50 + 10 \times \text{Log10}$  (P) decibels or 70 decibels, whichever is the lesser attenuation;

(ii) On any frequency outside the authorized bandwidth and removed from the edge of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 20 kHz: at least 43 + 10 Log10(P) decibels or 80 decibels, whichever is the lesser attenuation.

(b) The measurements of emission power can be expressed in peak or average values provided they are expressed in the same parameters as the transmitter power.

(c) When an emission outside of the authorized bandwidth causes harmful Interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

(d) A minimum spectrum analyzer resolution bandwidth of 300 Hz shall be used when showing compliance with paragraphs (a)(1)(i) & (ii) and (a)(2)(i) & (ii).

#### FCC PART 24, SUBPART D NARROWBAND PCS SUBSCRIBER STATION PROJECT NO.: **1L0388RUS1**

EQUIPMENT: MR303 Varia

#### NAME OF TEST: Spurious Emission at Antenna Terminals PARA. NO.: 2.991

Minimum Standard:	Para. No.24.133. 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:

30 Mhz to 1000 MHz:	$\begin{array}{l} RBW \geq 100 \ kHz \\ VBW \geq RBW \\ Sweeptime - Auto \\ Video \ Averaging - Off \\ Detector \ type \ - \ Peak \end{array}$
Greater than 1000 MHz	RBW ≥ 1 MHz VBW ≥ RBW Sweeptime – Auto Video Averaging – Off Detector type - Peak

EQUIPMENT: MR303 Varia

#### NAME OF TEST: Field Strength of Spurious Radiation PARA. NO.: 2.993

Minimum Standard:	Para. No.24.133. 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  $-13 \text{ dBm} (5 \times 10^{-5} \text{ Watts})$  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  $\leq 1$  GHz:

G = 1.64 (Dipole Gain)  $P = 10^{-5}$  Watts (Maximum spurious output power) R = 3m (Measurement Distance)

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

For emissions > 1 GHz:

G = 1 (Isotropic Gain)  $P = 1 \times 10^{-5}$  Watts (Maximum spurious output power) R = 3m (Measurement Distance)

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

#### FCC PART 24, SUBPART D NARROWBAND PCS SUBSCRIBER STATION PROJECT NO.: **1L0388RUS1**

EQUIPMENT: MR303 Varia

#### NAME OF TEST: Frequency Stability

#### PARA. NO.: 2.995

Minimum Standard:Para. No. 24.135. The frequency stability shall be ±1%Method Of Measurement:CDMA Per ANSI/J-STD-008<br/>TDMA Per ANSI/J-STD-007<br/>NADC Per IS-136

#### 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. 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.

#### **Digitally Modulated Signals**

Equipment that produces a digitally modulated carrier is tested using a vector modulation analyzer. Frequency accuracy and rho are measured over the specified environmental extremes.

## FCC PART 24, SUBPART D NARROWBAND PCS SUBSCRIBER STATION PROJECT NO.: **1L0388RUS1**

EQUIPMENT:

MR303 Varia

#### **ANNEX B - TEST DIAGRAMS**

EQUIPMENT: MR303 Varia

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



#### Para. No. 2.989 - Occupied Bandwidth



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		NARROWBAND PCS SU	<b>BSCRIBER STATION</b>
EQUIPMENT:	MR303 Varia	PROJECT NO .:	1L0388RUS1

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



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



#### FCC PART 24, SUBPART D NARROWBAND PCS SUBSCRIBER STATION PROJECT NO.: **1L0388RUS1**

EQUIPMENT: MR303 Varia

#### Para. No. 2.995 - Frequency Stability

