

Nemko Test Report: 1L0388RUS1

Applicant: Allen Telecom
140 Vista Center Drive
Forest, VA 24551

Equipment Under Test: MR303 Varia
(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:



Tom Tidwell, Wireless/EMC Manager

Date: 10/18/01

Total Number of Pages: 43

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EQUIPMENT: MR303 Varia

Section 1. Summary of Test Results

Manufacturer: Allen Telecom

Model No.: 149110

Serial No.: 1576

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 D.



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".



NVLAP LAB CODE: 100426-0

TESTED BY: _____ DATE: _____

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This report applies only to the items tested.

EQUIPMENT: MR303 VariaPROJECT NO.: **1L0388RUS1****Summary Of Test Data**

NAME OF TEST	PARA. NO.	SPEC.	RESULT
RF Power Output	24.132(a)	$\leq$ Rated	Complies
Occupied Bandwidth (2FSK)	24.133	$\leq$ Rated	Complies
Occupied Bandwidth (4FSK)	24.133	$\leq$ 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.

Section 2. General Equipment Specification

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

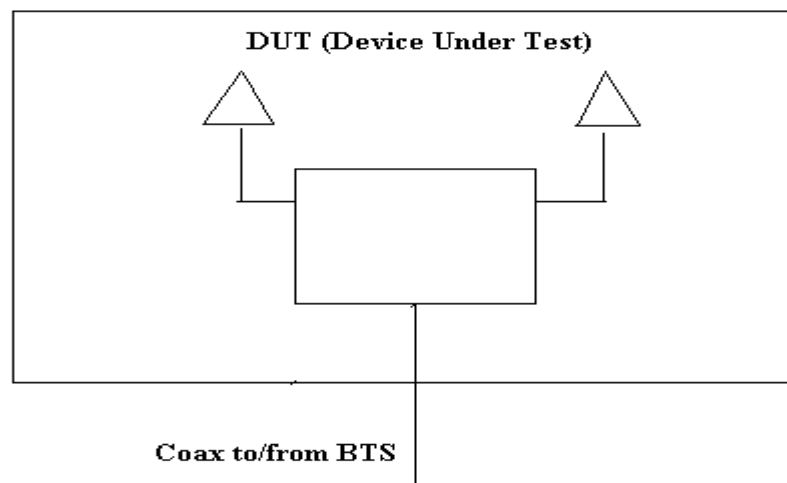
System Description

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 VariaPROJECT NO.: **1L0388RUS1****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

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FCC PART 24, SUBPART D
NARROWBAND PCS SUBSCRIBER STATION

EQUIPMENT: MR303 Varia

PROJECT NO.: **1L0388RUS1**

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.

Test Data: See attached plots.

Measurement Uncertainty: +/- 1.7 dB

EQUIPMENT: MR303 Varia

PROJECT NO.: 1L0388RUS1



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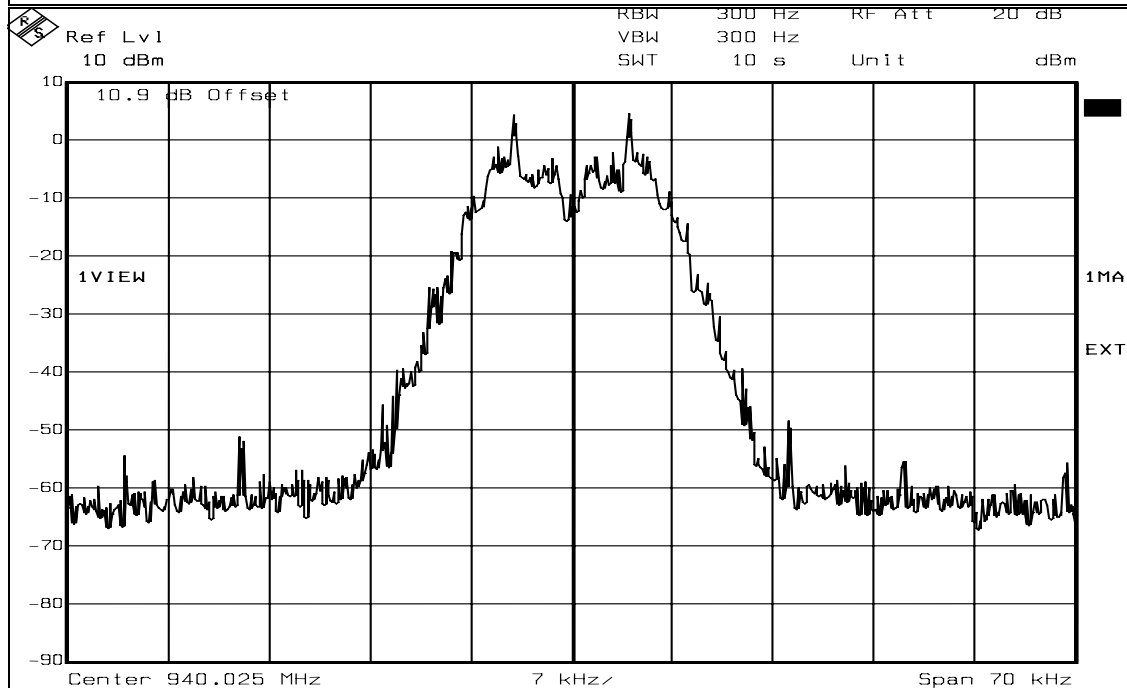
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Data Plot

Page 1 of 4
Job No.: 1L0388R Date: 10/16/01 Complete X
Specification: FCC Part 24 Temperature(°C): 22 Preliminary _____
Tested By: David Light Relative Humidity(%) 50
E.U.T.: Repeater
Configuration: Normal
Sample Number: 1
Location: Lab 1 RBW: Refer to plots Measurement
Detector Type: Peak VBW: Refer to plots Distance: N/A m

Test Equipment Used

Antenna: _____ Directional Coupler: _____
Pre-Amp: _____ Cable #1: 1082
Filter: _____ Cable #2: _____
Receiver: 1036 Cable #3: _____
Attenuator #1: 1477 Cable #4: _____
Attenuator #2: 1469 Mixer: _____
Additional equipment used: _____
Measurement Uncertainty: +/-3.6 dB



Date: 16.OCT.2001 7:15:13

Notes: OUTPUT SIGNAL - DOWNLINK

EQUIPMENT: MR303 Varia

PROJECT NO.: 1L0388RUS1



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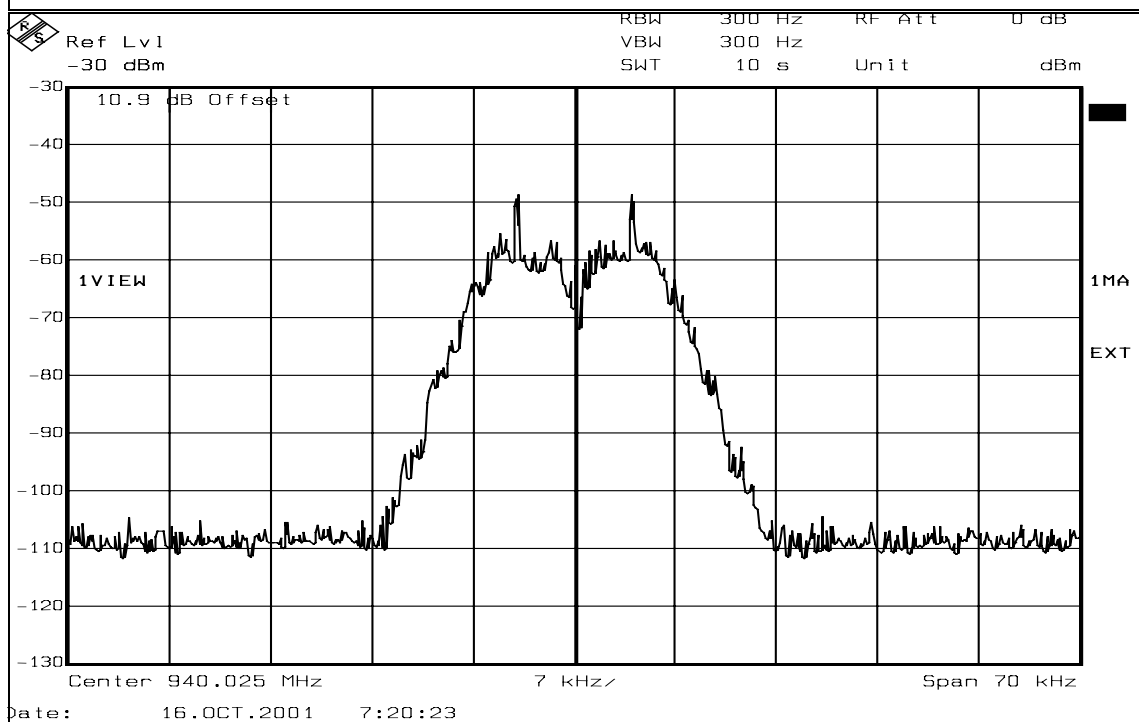
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Page 2 of 4

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



Notes: INPUT SIGNAL - DOWNLINK

EQUIPMENT: MR303 Varia

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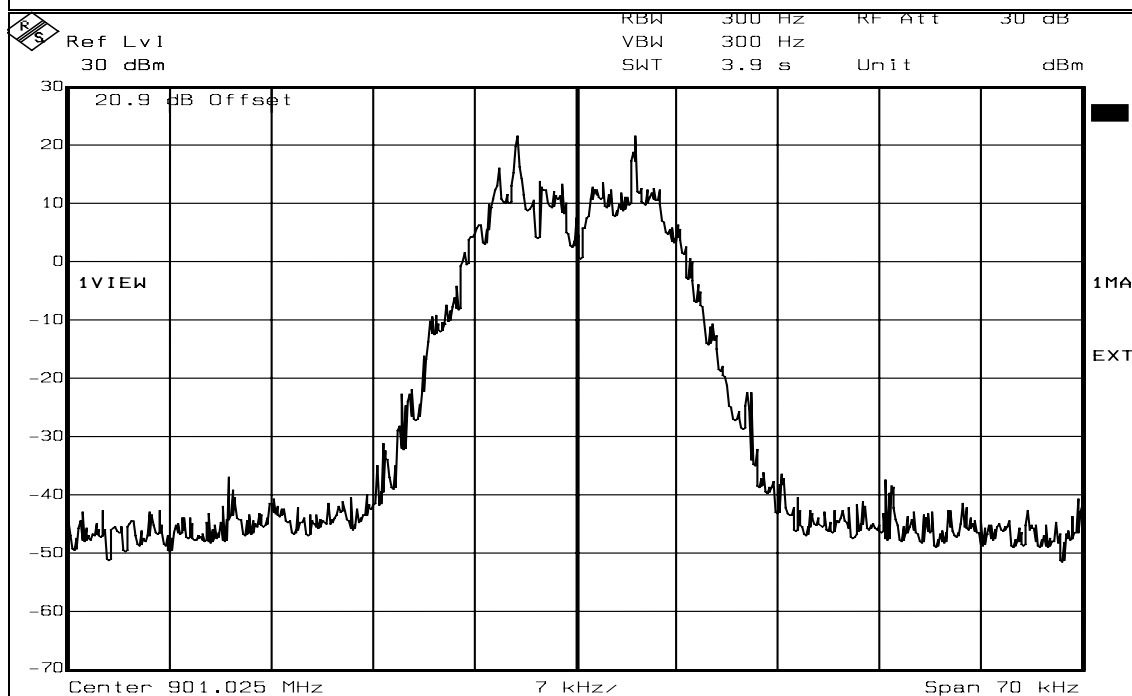
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Page 3 of 4

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



Date: 16.OCT.2001 9:38:22

Notes: OUTPUT SIGNAL - UPLINK

EQUIPMENT: MR303 Varia

PROJECT NO.: 1L0388RUS1



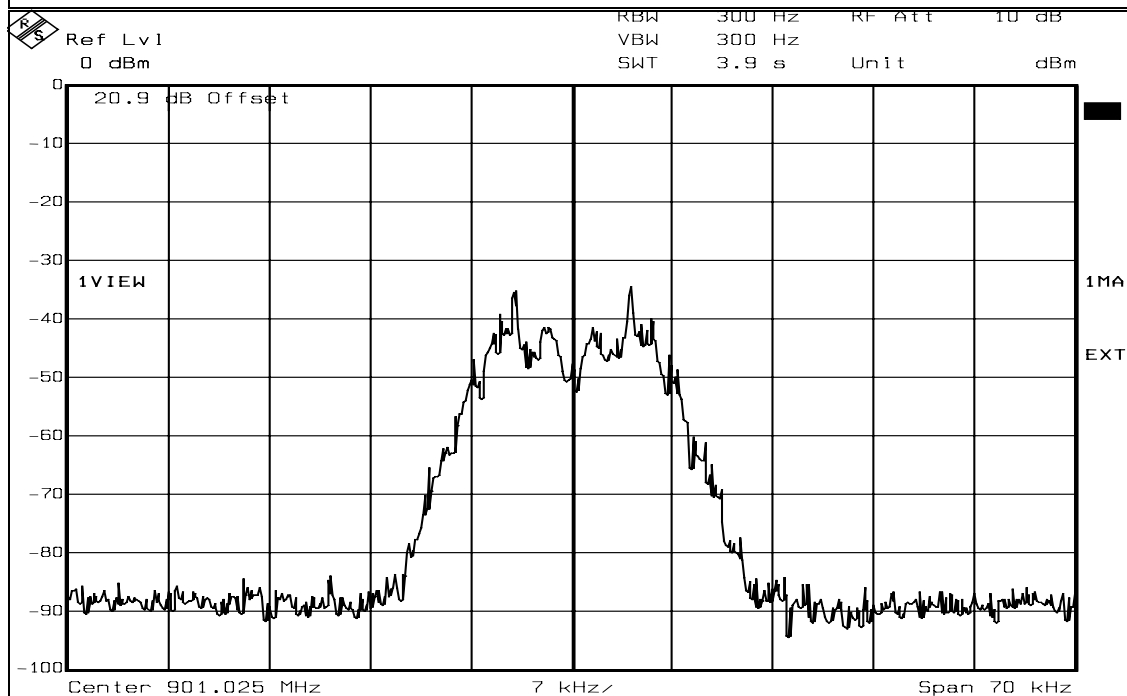
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Test Plot:

Page 4 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



Date: 16.OCT.2001 9:41:50

Notes: INPUT SIGNAL - UPLINK

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Data Plot

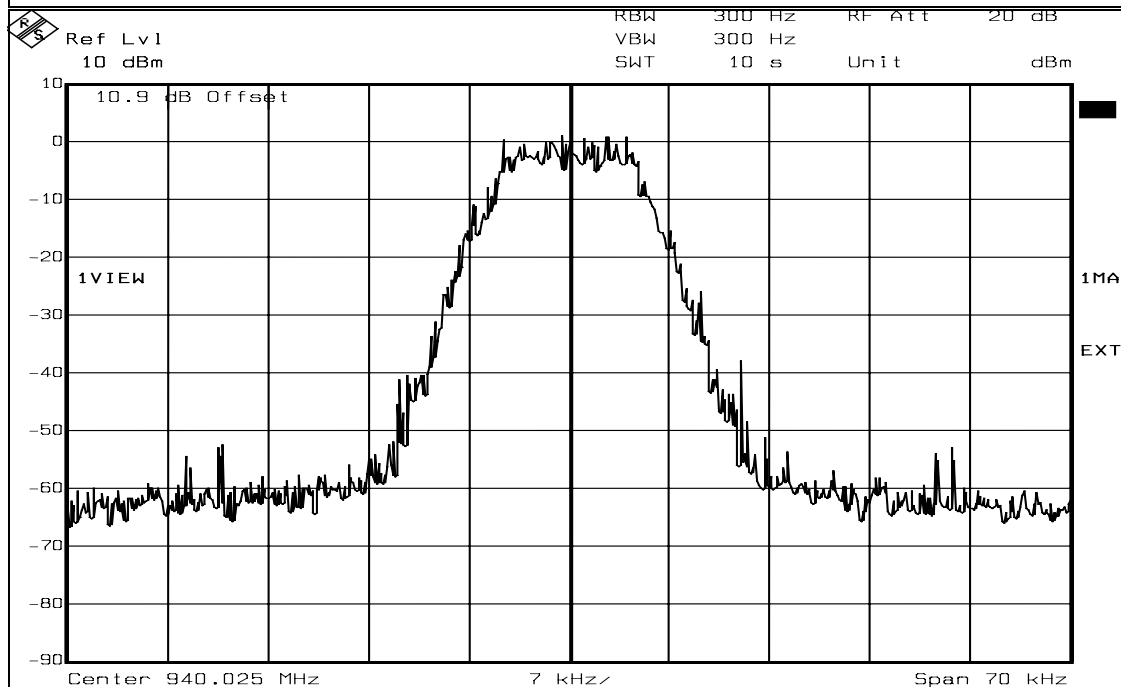
Page 1 of 4

Job No.: 1L0388R Date: 10/16/01 Complete X
Preliminary _____

Specification: FCC Part 24 Temperature(°C): 22
Tested By: David Light Relative Humidity(%) 50
E.U.T.: Repeater
Configuration: Normal
Sample Number: 1
Location: Lab 1 RBW: Refer to plots Measurement
Detector Type: Peak VBW: Refer to plots Distance: N/A m

Test Equipment Used

Antenna: _____ Directional Coupler: _____
Pre-Amp: _____ Cable #1: 1082
Filter: _____ Cable #2: _____
Receiver: 1036 Cable #3: _____
Attenuator #1: 1477 Cable #4: _____
Attenuator #2: 1469 Mixer: _____
Additional equipment used: _____
Measurement Uncertainty: +/-3.6 dB



Date: 16.OCT.2001 7:27:26

Notes: OUTPUT SIGNAL - DOWNLINK

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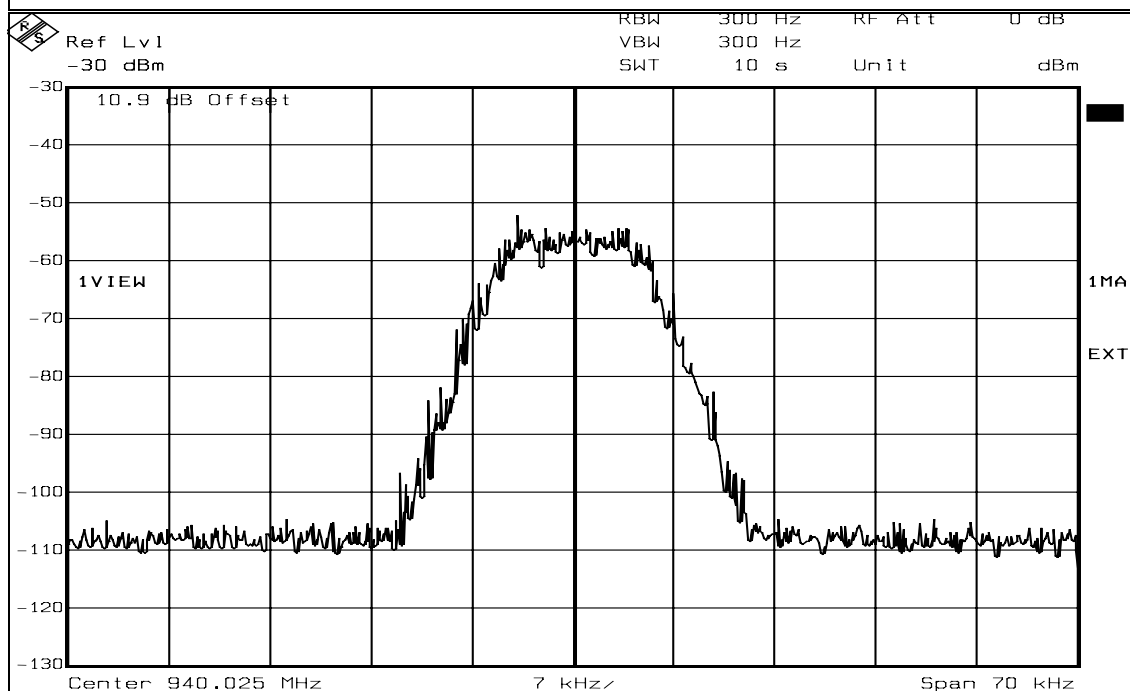
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Data Plot

Page 2 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



Date: 16.OCT.2001 7:24:02

Notes: INPUT SIGNAL - DOWNLINK

EQUIPMENT: MR303 Varia

PROJECT NO.: 1L0388RUS1



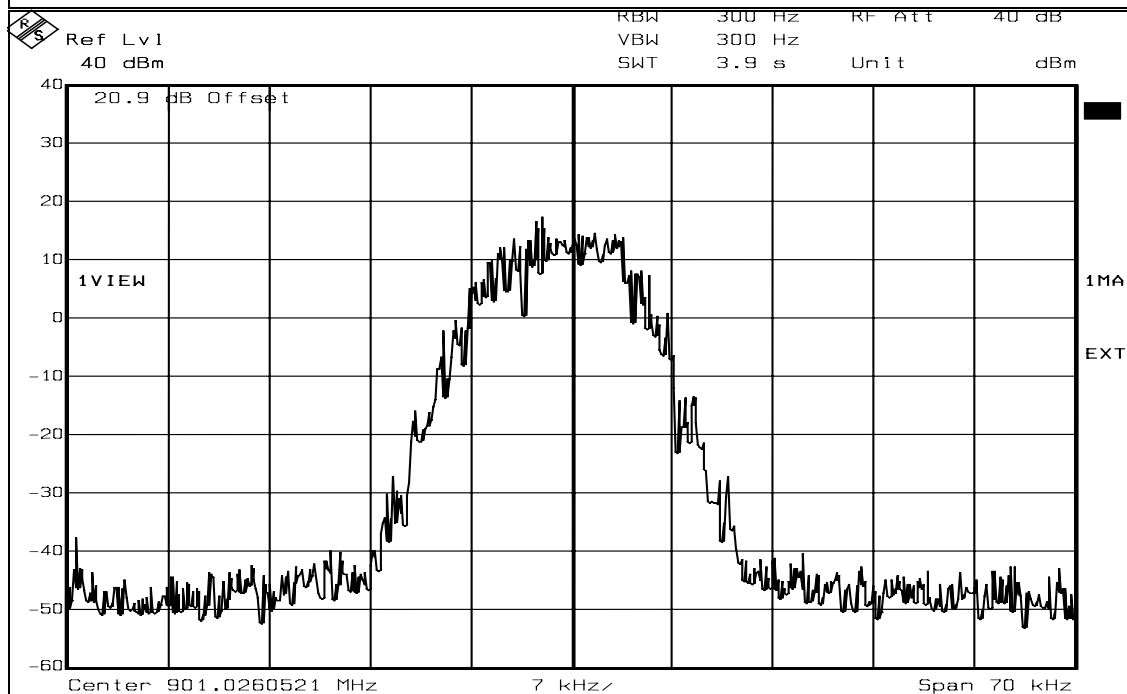
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Data Plot

Page 3 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



Date: 16.OCT.2001 9:17:54

Notes: OUTPUT SIGNAL - UPLINK

EQUIPMENT: MR303 Varia

PROJECT NO.: 1L0388RUS1



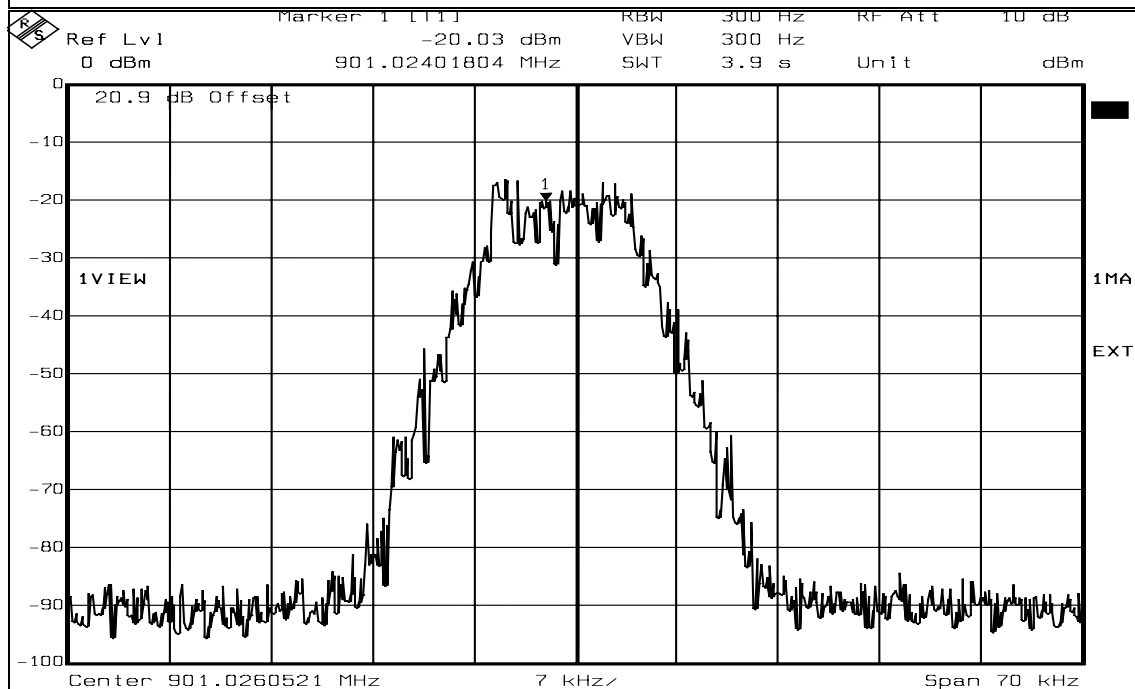
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Test Plot:

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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



Date: 16.OCT.2001 9:21:40

Notes: INPUT SIGNAL - UPLINK

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NARROWBAND PCS SUBSCRIBER STATION

EQUIPMENT: MR303 Varia

PROJECT NO.: **1L0388RUS1**

Section 5. Spurious Emissions at Antenna Terminals

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

EQUIPMENT: MR303 Varia

PROJECT NO.: 1L0388RUS1



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Data Plot

Page 1 of 4

Job No.: 1L0388R Date: 10/16/01 Complete X
Preliminary _____

Specification: FCC Part 24 Temperature(°C): 22
Tested By: David Light Relative Humidity(%) 50

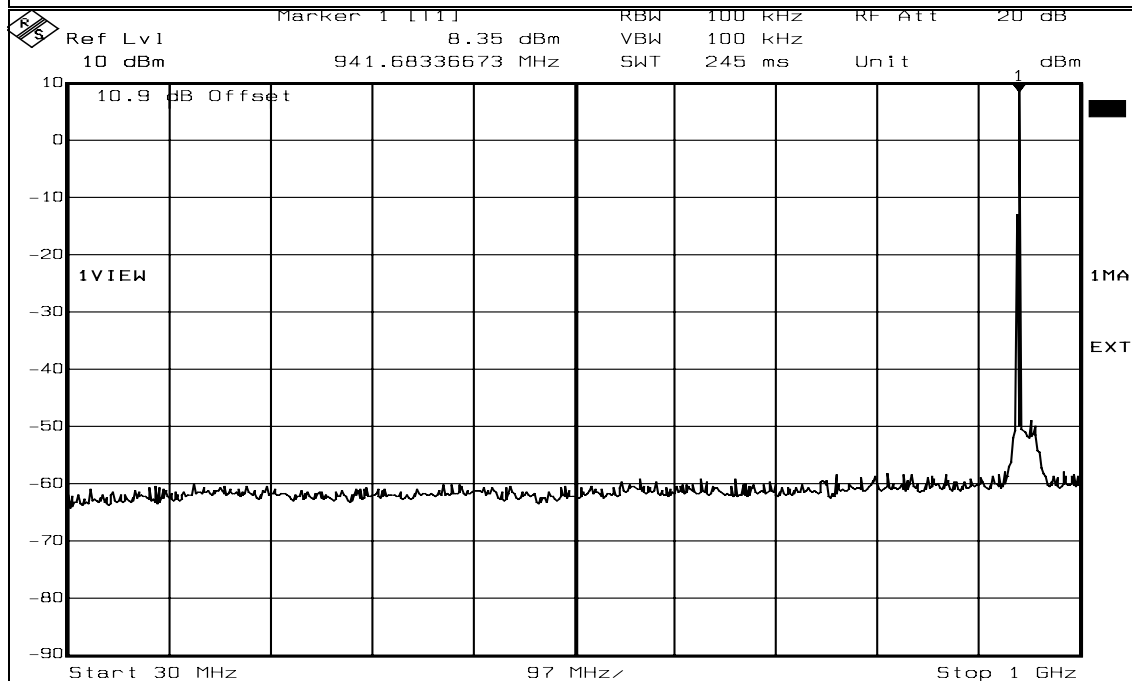
E.U.T.: Repeater
Configuration: Normal

Sample Number: 1

Location: Lab 1 RBW: Refer to plots Measurement
Detector Type: Peak VBW: Refer to plots Distance: N/A m

Test Equipment Used

Antenna: _____ Directional Coupler: _____
Pre-Amp: _____ Cable #1: 1082
Filter: _____ Cable #2: _____
Receiver: 1036 Cable #3: _____
Attenuator #1: 1477 Cable #4: _____
Attenuator #2: 1469 Mixer: _____
Additional equipment used: _____
Measurement Uncertainty: +/-3.6 dB



Date: 16.OCT.2001 7:49:31

Notes: DOWNLINK
MARKER INDICATES CARRIER

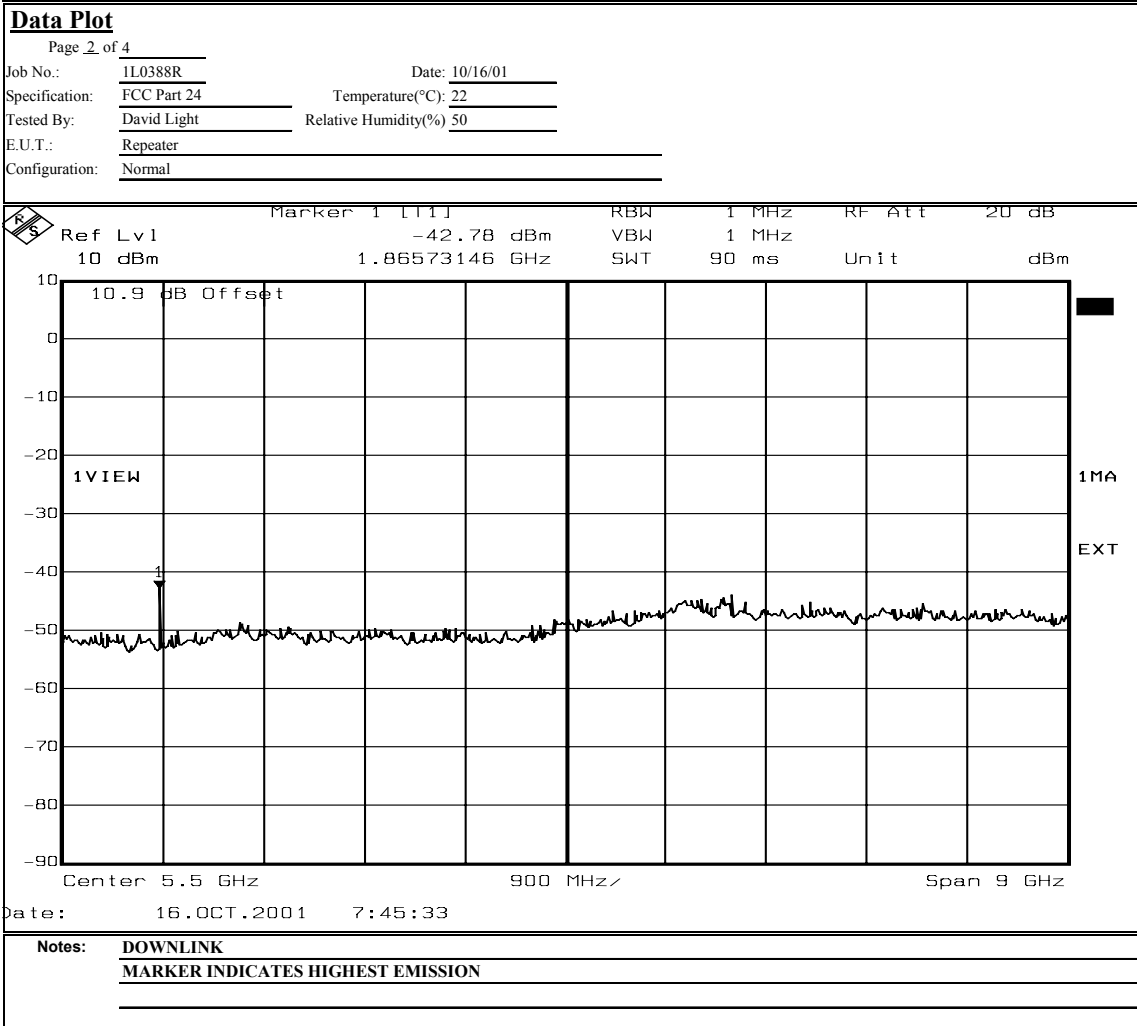
EQUIPMENT: MR303 Varia



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EQUIPMENT: MR303 Varia

PROJECT NO.: 1L0388RUS1



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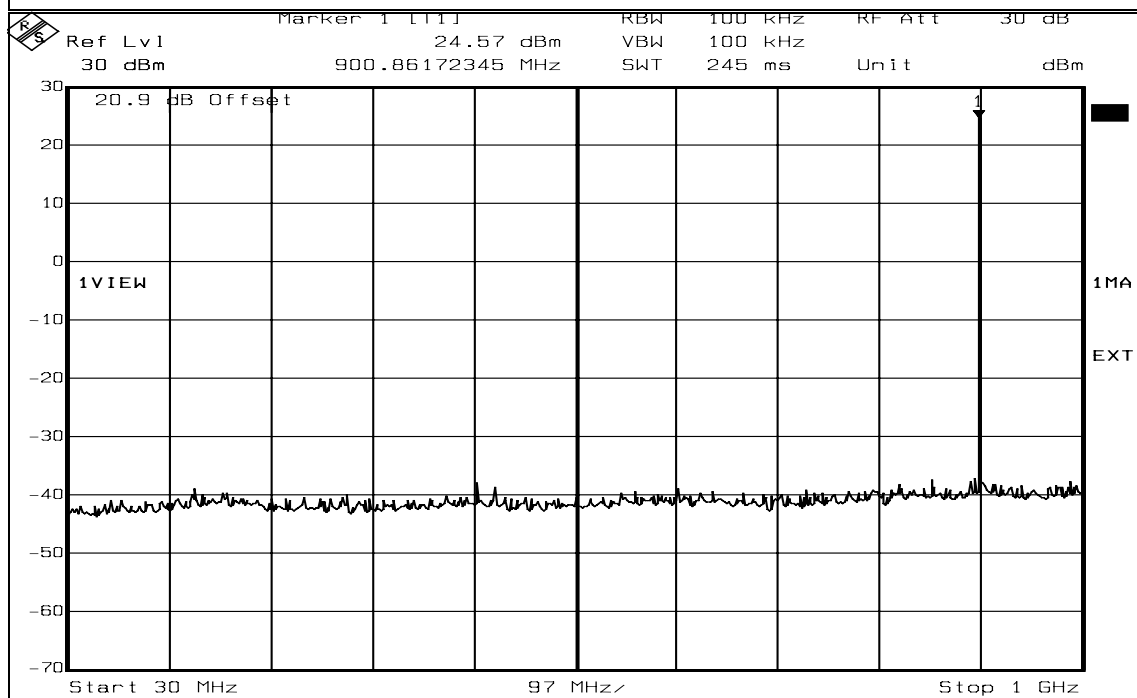
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Data Plot

Page 3 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



Date: 16.OCT.2001 9:45:21

Notes: DOWNLINK
MARKER INDICATES CARRIER

EQUIPMENT: MR303 Varia

PROJECT NO.: 1L0388RUS1



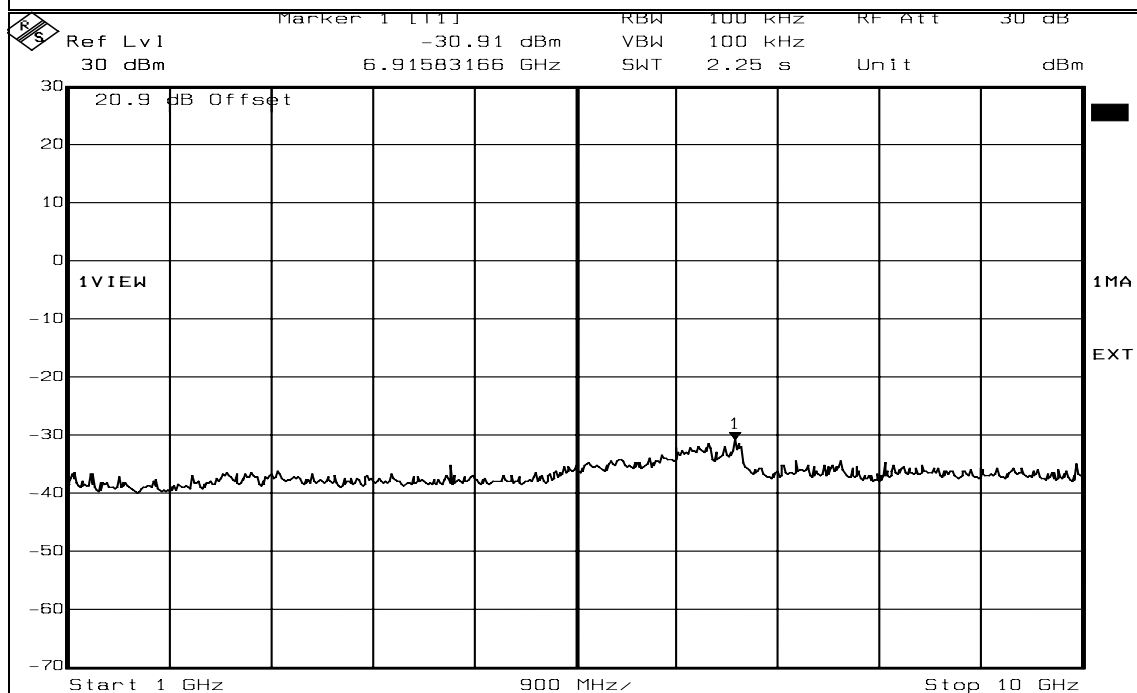
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Test Plot:

Page 4 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



Date: 16.OCT.2001 9:46:40

Notes: DOWNLINK
MARKER INDICATES HIGHEST EMISSION

EQUIPMENT: MR303 Varia

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Data Plot

APSE 4FSK

Page 1 of 4

Complete X

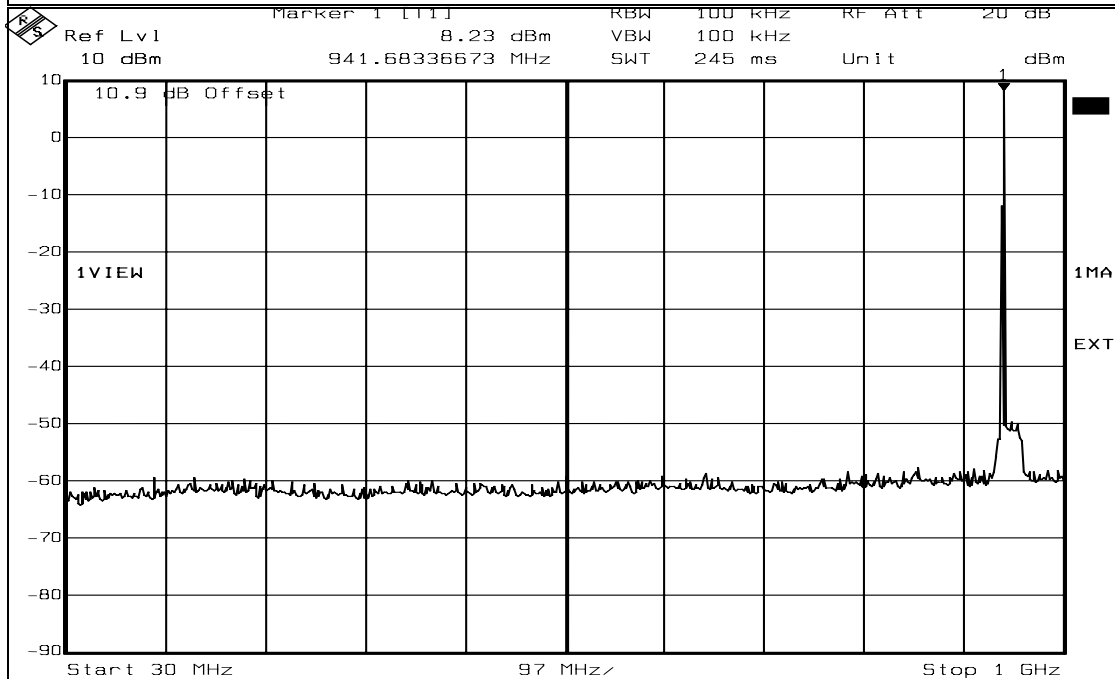
Preliminary _____

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
Sample Number: 1
Location: Lab 1 RBW: Refer to plots
Detector Type: Peak VBW: Refer to plots

Measurement
Distance: N/A m

Test Equipment Used

Antenna: _____ Directional Coupler: _____
Pre-Amp: _____ Cable #1: 1082
Filter: _____ Cable #2: _____
Receiver: 1036 Cable #3: _____
Attenuator #1: 1477 Cable #4: _____
Attenuator #2: 1469 Mixer: _____
Additional equipment used: _____
Measurement Uncertainty: +/-3.6 dB



Date: 16.OCT.2001 7:42:10

Notes: DOWNLINK
MARKER INDICATES CARRIER

EQUIPMENT: MR303 Varia

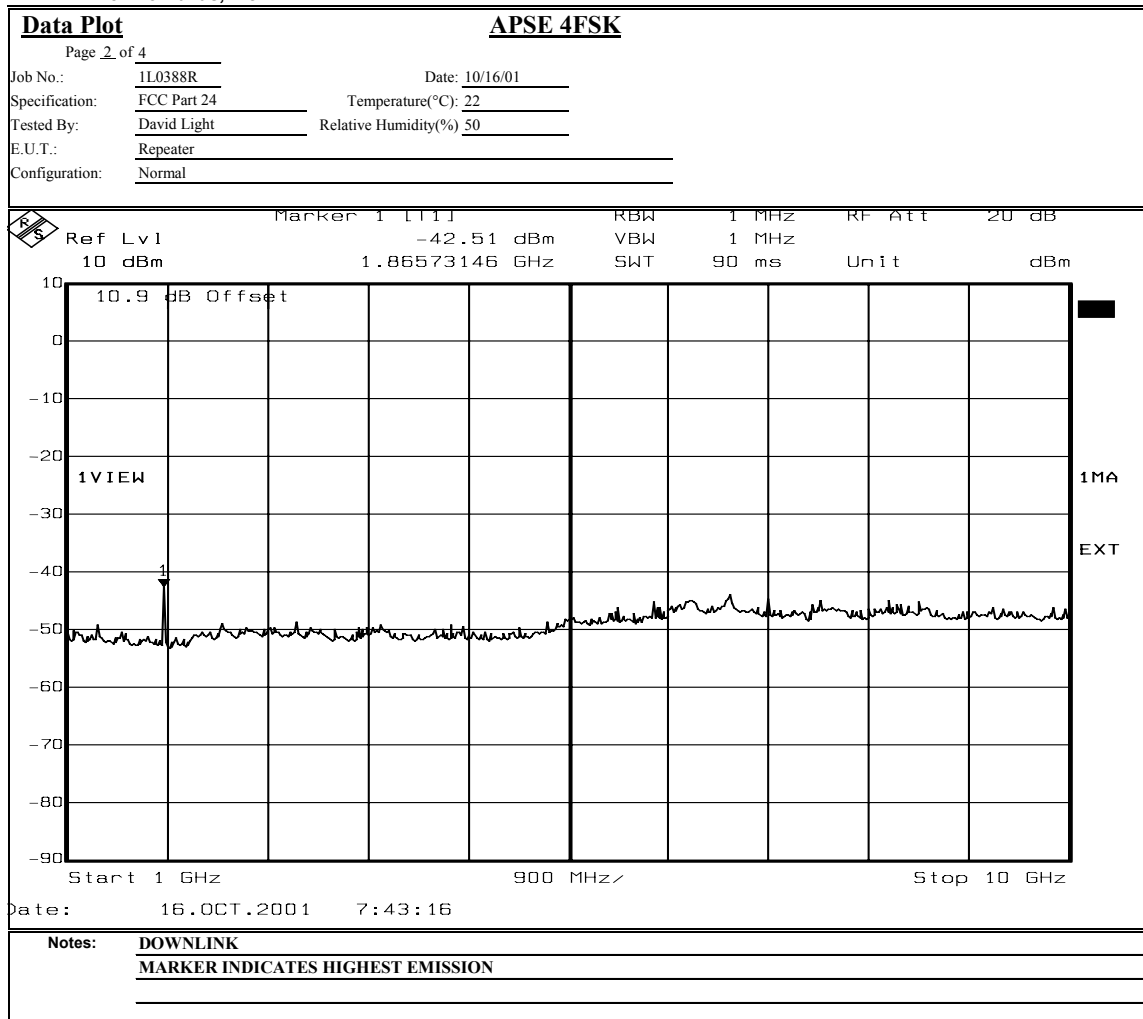
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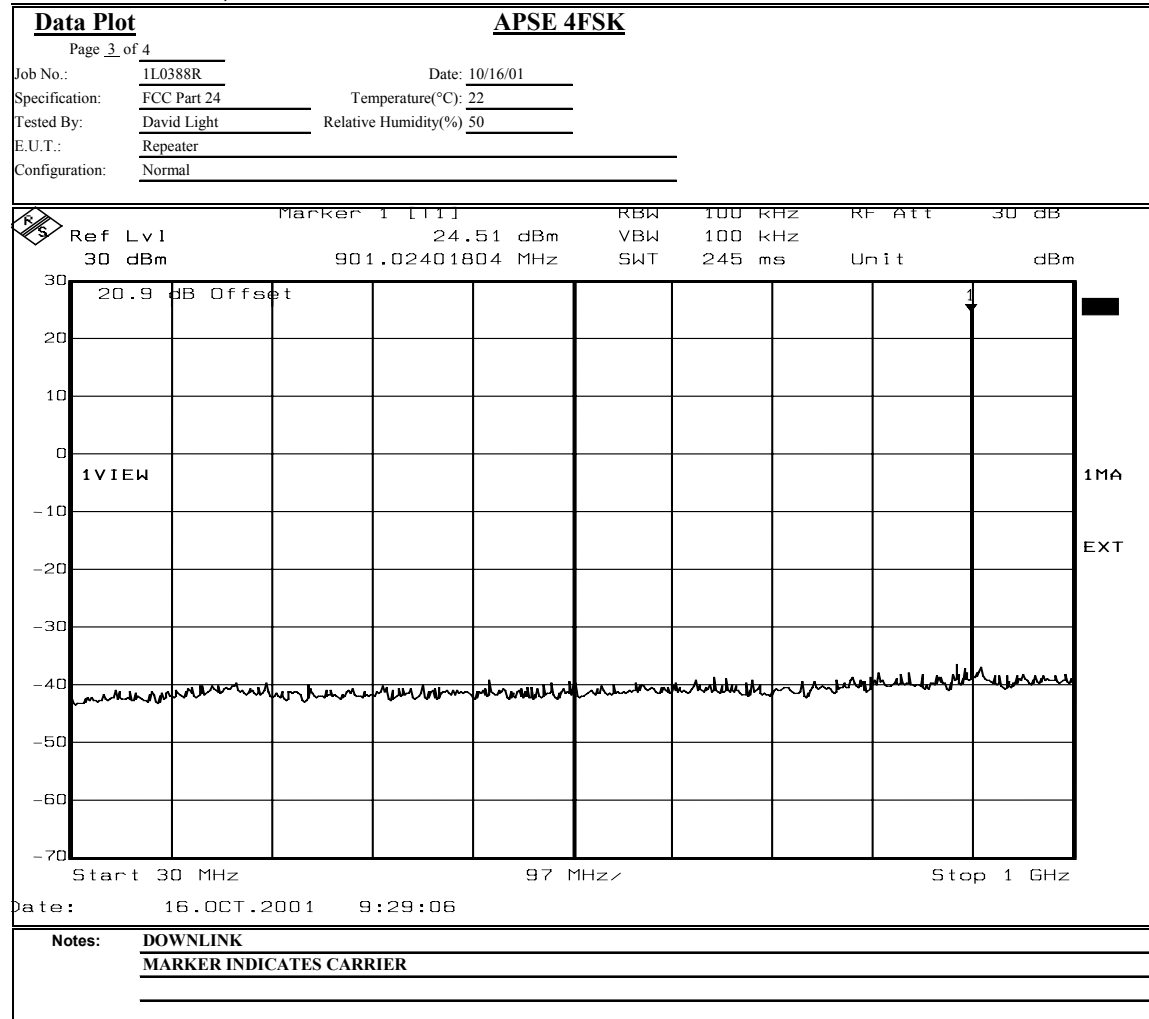
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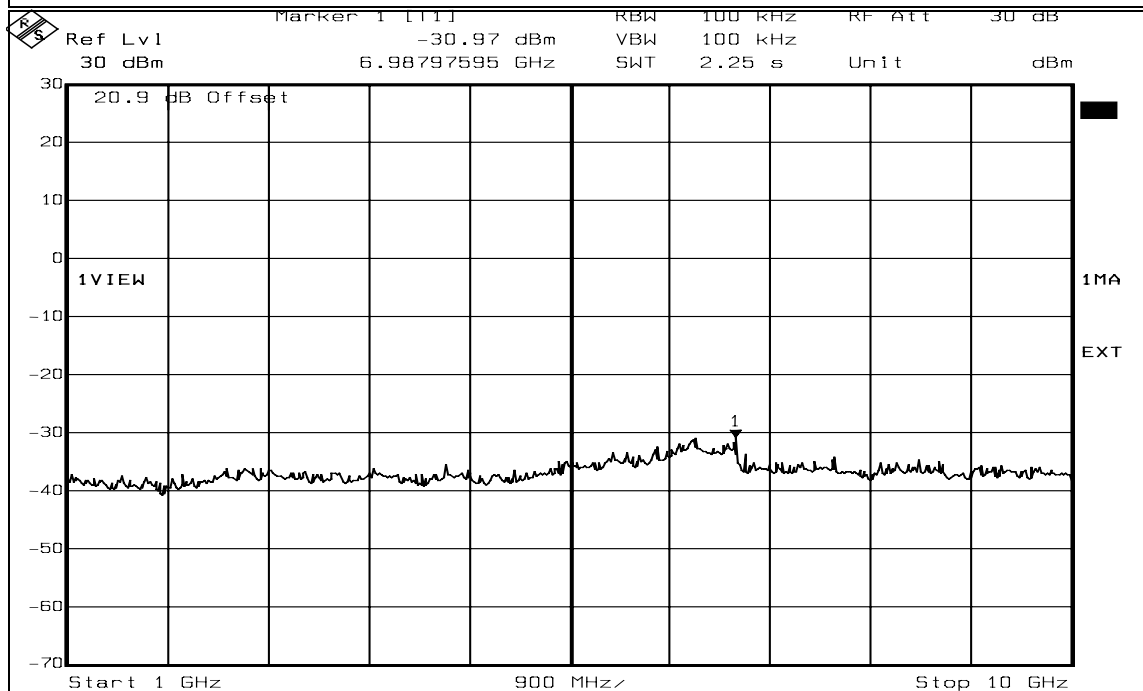
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Test Plot:

APSE 4FSK

Page 4 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



Date: 16.OCT.2001 9:31:48

Notes: DOWNLINK
MARKER INDICATES HIGHEST EMISSION

EQUIPMENT: MR303 Varia

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Data Plot		Intermod	
Page 1 of 2		Complete <u>X</u> Preliminary _____	
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			
Sample Number: 1			
Location: Lab 1	RBW: Refer to plots	Measurement	
Detector Type: Peak	VBW: Refer to plots	Distance: N/A m	
Test Equipment Used			
Antenna: _____	Directional Coupler: _____		
Pre-Amp: _____	Cable #1: 1082		
Filter: _____	Cable #2: _____		
Receiver: 1036	Cable #3: _____		
Attenuator #1: 1477	Cable #4: _____		
Attenuator #2: 1469	Mixer: _____		
Additional equipment used: _____			
Measurement Uncertainty: +/-3.6 dB			
Date: 16.OCT.2001 7:59:51			
Notes: DOWNLINK			

EQUIPMENT: MR303 Varia

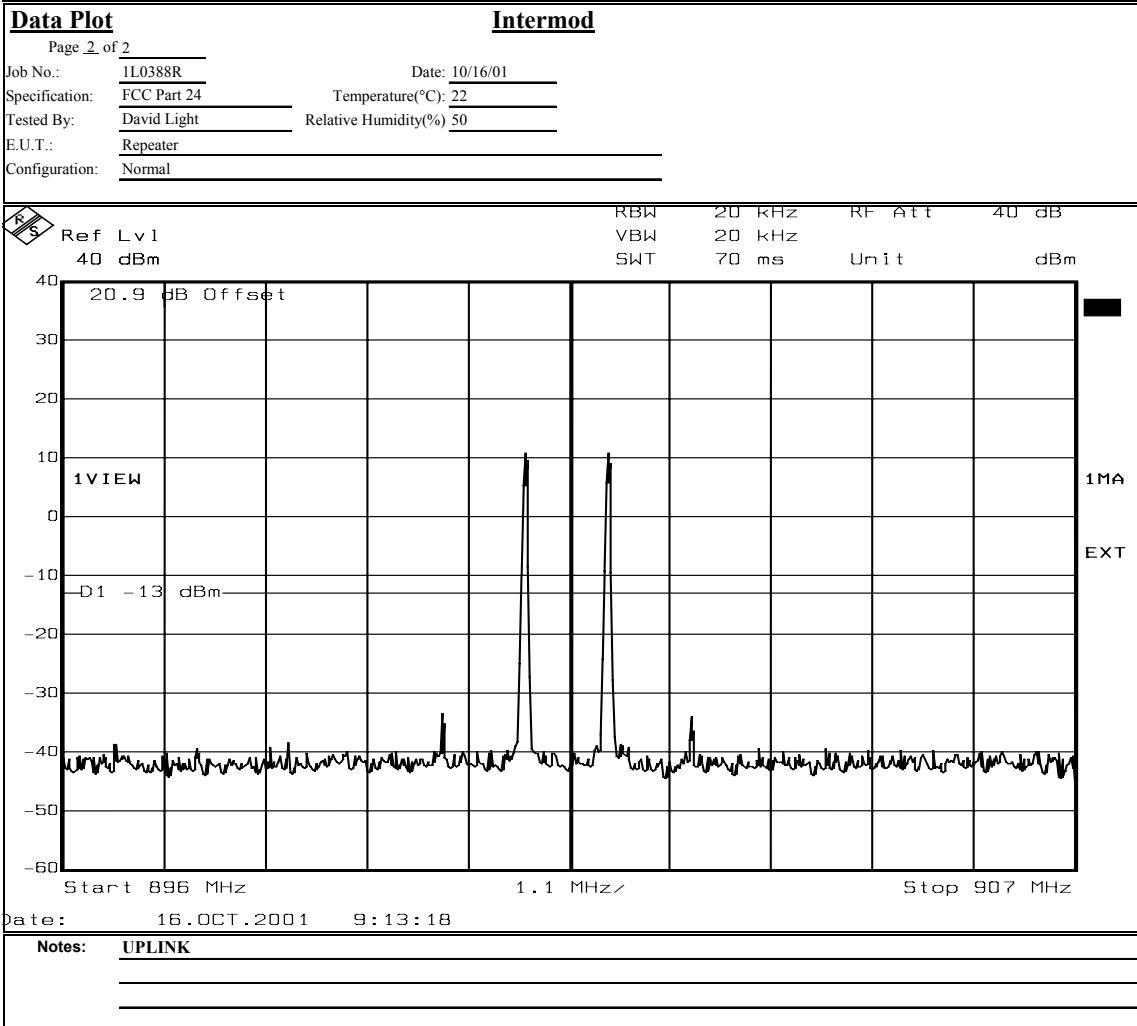
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FCC PART 24, SUBPART D
NARROWBAND PCS SUBSCRIBER STATION

EQUIPMENT: MR303 Varia

PROJECT NO.: **1L0388RUS1**

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



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Field Strength of Spurious Emissions

Page 1 of 1

Job No.: 1L0388R Date: 8/31/01 Complete X
Preliminary

Specification: Temperature(°C): 22
Tested By: Lance Walker Relative Humidity(%) 50

E.U.T.: Repeater
Configuration: Normal Downlink

Sample No: 1
Location: AC 3 RBW: 1 MHz Measurement
Detector Type: Peak VBW: 1 MHz Distance: 3 m

Test Equipment Used

Antenna: 993 Directional Coupler:
Pre-Amp: 1016 Cable #1: 1043
Filter: Cable #2: 1082
Receiver: 1464 Cable #3: 1484
Attenuator #1: 1470 Cable #4: 1485
Attenuator #2: Mixer:

Additional equipment used: 1053
Measurement Uncertainty: +/-3.6 dB

Frequency (MHz)	Meter Reading (dBm)	Correction Factor (dB)		Pre-Amp Gain (dB)	Substitution Antenna Gain (dBd)	Limit (dBm)	ERP (dBm)	ERP (mW)	Polarity	Comments
										Tx at 947.5 MHz
1895	-59.5	32.7		33.3	6.4	-13	-53.8	0.000004	H	Noise floor
2842.5	-60.3	34.6		33.5	8.0	-13	-51.2	0.000008	H	Noise floor
3790	-61.5	34.3		33.7	8.0	-13	-52.9	0.000005	H	Noise floor
4737.5	-62.5	35.5		33.7	9.2	-13	-51.5	0.000007	H	Noise floor
5685	-63.8	36.0		33.3	9.1	-13	-52.0	0.000006	H	Noise floor
6632.5	-62.3	37.8		33	10.1	-13	-47.3	0.000019	H	Noise floor
7580	-61.3	39.8		33	9.4	-13	-45.1	0.000031	H	Noise floor
8527.5	-62.6	41.8		34.3	9.9	-13	-45.1	0.000031	H	Noise floor
9475	-62.1	41.4		35.7	10.1	-13	-46.4	0.000023	H	Noise floor
10422.5	-61.8	42.5		35.7	10.5	-13	-44.5	0.000036	H	Noise floor
1895	-59.5	29.9		33.3	6.4	-13	-56.6	0.000002	V	Noise floor
2842.5	-60.3	35.6		33.5	8.0	-13	-50.3	0.000009	V	Noise floor
3790	-61.5	40.4		33.7	8.0	-13	-46.8	0.000021	V	Noise floor
4737.5	-62.5	41.2		33.7	9.2	-13	-45.9	0.000026	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

EQUIPMENT: MR303 Varia

PROJECT NO.: 1L0388RUS1



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Field Strength of Spurious Emissions

Page 1 of 1

Job No.: 1L0388R Date: 8/31/01 Complete X
Preliminary

Specification: Temperature(°C): 22
Tested By: Lance Walker Relative Humidity(%) 50
E.U.T.: Repeater
Configuration: Normal Uplink
Sample No: 1
Location: AC 3 RBW: 1 MHz Measurement
Detector Type: Peak VBW: 1 MHz Distance: 3 m

Test Equipment Used

Antenna: 993 Directional Coupler:
Pre-Amp: 1016 Cable #1: 1043
Filter: Cable #2: 1484
Receiver: 1464 Cable #3: 1082
Attenuator #1: Cable #4: 1485
Attenuator #2: Mixer:
Additional equipment used: 1053
Measurement Uncertainty: +/-3.6 dB

Frequency (MHz)	Meter Reading (dBm)	Correction Factor (dB)		Pre-Amp Gain (dB)	Substitution Antenna Gain (dBd)	Limit (dBm)	ERP (dBm)	ERP (mW)	Polarity	Comments
										Tx at 902.5 MHz
1805	-61.3	29.9		33.3	6.4	-13	-58.4	0.000001	V	Noise floor
2707.5	-60.8	35.6		33.5	8.0	-13	-50.8	0.000008	V	Noise floor
3610	-62.6	40.4		33.6	8.0	-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	10.0	-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	10.1	-13	-47.6	0.000017	V	Noise floor
9927.5	-61.6	40.4		35.7	10.5	-13	-46.4	0.000023	V	Noise floor
1805	-61.3	32.7		33.3	6.4	-13	-55.6	0.000003	H	Noise floor
2707.5	-60.8	34.6		33.5	8.0	-13	-51.7	0.000007	H	Noise floor
3610	-62.6	34.3		33.6	8.0	-13	-53.9	0.000004	H	Noise floor
4512.5	-62.3	35.5		33.8	9.2	-13	-51.4	0.000007	H	Noise floor
5415	-63.1	36.3		33.5	9.1	-13	-51.3	0.000007	H	Noise floor
6317.5	-63.8	36.6		32.7	9.5	-13	-50.4	0.000009	H	Noise floor
7220	-63.3	38.7		33	10.0	-13	-47.6	0.000017	H	Noise floor
8122.5	-63.3	42.2		33.7	9.7	-13	-45.1	0.000031	H	Noise floor
9025	-62.1	41.4		34.8	10.1	-13	-45.5	0.000028	H	Noise floor
9927.5	-61.6	42.6		35.7	10.5	-13	-44.2	0.000038	H	Noise floor

Photographs of Test Setup

FRONT VIEW



REAR VIEW



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EQUIPMENT: MR303 Varia

PROJECT NO.: **1L0388RUS1**

Section 7. Frequency Stability

NAME OF TEST: Frequency Stability	PARA. NO.: 24.235
TESTED BY:	DATE:

Test Results:

Complies.

Measurement Data:

Standard Test Frequency: _____ MHz

Standard Test Voltage: _____ Vdc

Not Applicable

EQUIPMENT: MR303 Varia

PROJECT NO.: 1L0388RUS1

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	Flexible 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

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PROJECT NO.: **1L0388RUS1**

EQUIPMENT: MR303 Varia

ANNEX A - TEST METHODOLOGIES

EQUIPMENT: MR303 Varia

NAME OF TEST: RF Power Output	PARA. NO.: 2.985
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Minimum Standard: Para. No.24.132.

(a) Stations transmitting in the 901-902 MHz band are limited to 7 watts e.r.p.

(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-007Detachable 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 $GP/4\pi R^2 = E^2/120\pi$ 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: MR303 Varia

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 2.989
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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 (f_d in kHz) of up to and including 40 kHz: at least $116 \times \text{Log}_{10} ((f_d + 10)/6.1)$ decibels or 50 plus $10 \text{ Log}_{10} (P)$ 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 (f_d in kHz) of more than 40 kHz: at least $43 + 10 \text{ Log}_{10} (P)$ 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 (f_d in kHz) of up to and including 20 kHz: at least $116 \times \text{Log}_{10} ((f_d + 5)/3.05)$ decibels or $50 + 10 \times \text{Log}_{10} (P)$ 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 (f_d in kHz) of more than 20 kHz: at least $43 + 10 \text{ Log}_{10} (P)$ 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).

EQUIPMENT: MR303 Varia

PROJECT NO.: **1L0388RUS1**

NAME OF TEST: Spurious Emission at Antenna Terminals	PARA. NO.: 2.991
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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: RBW $\geq$ 100 kHz
VBW $\geq$ RBW
Sweptime – Auto
Video Averaging – Off
Detector type - Peak

Greater than 1000 MHz RBW $\geq$ 1 MHz
VBW $\geq$ RBW
Sweptime – Auto
Video Averaging – Off
Detector type - Peak

EQUIPMENT: MR303 Varia

NAME OF TEST: Field Strength of Spurious Radiation	PARA. NO.: 2.993
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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 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: MR303 VariaPROJECT NO.: **1L0388RUS1****NAME OF TEST: Frequency Stability****PARA. NO.: 2.995****Minimum Standard:** Para. No. 24.135. The frequency stability shall be $\pm 1\%$ **Method Of Measurement:** CDMA Per ANSI/J-STD-008
TDMA Per ANSI/J-STD-007
NADC Per IS-136Frequency 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.

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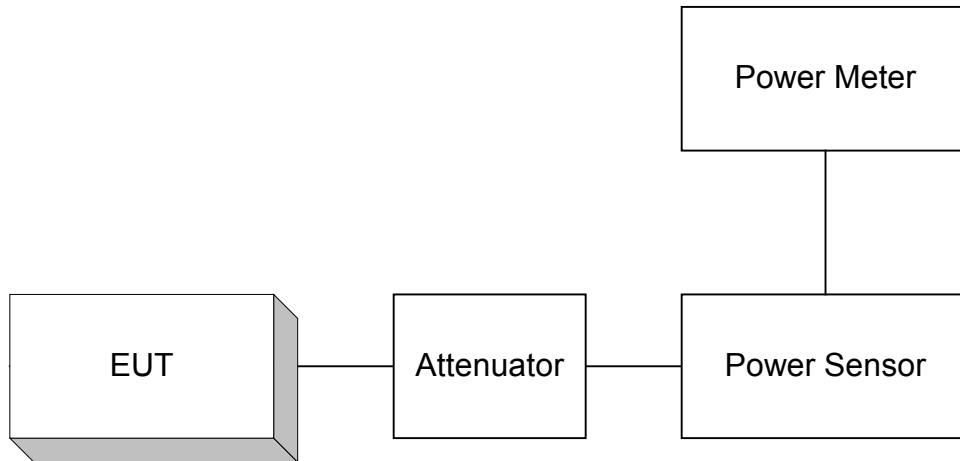
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PROJECT NO.: **1L0388RUS1**

EQUIPMENT: MR303 Varia

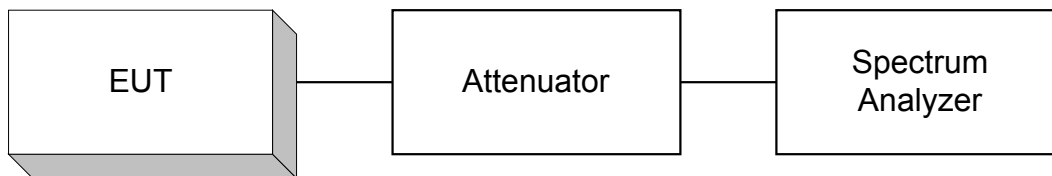
ANNEX B - TEST DIAGRAMS

EQUIPMENT: MR303 Varia

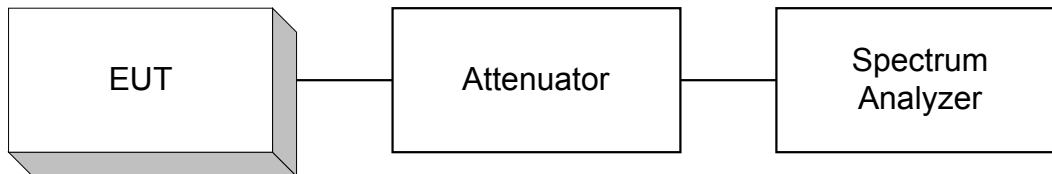
Para. No. 2.985 - R.F. Power Output



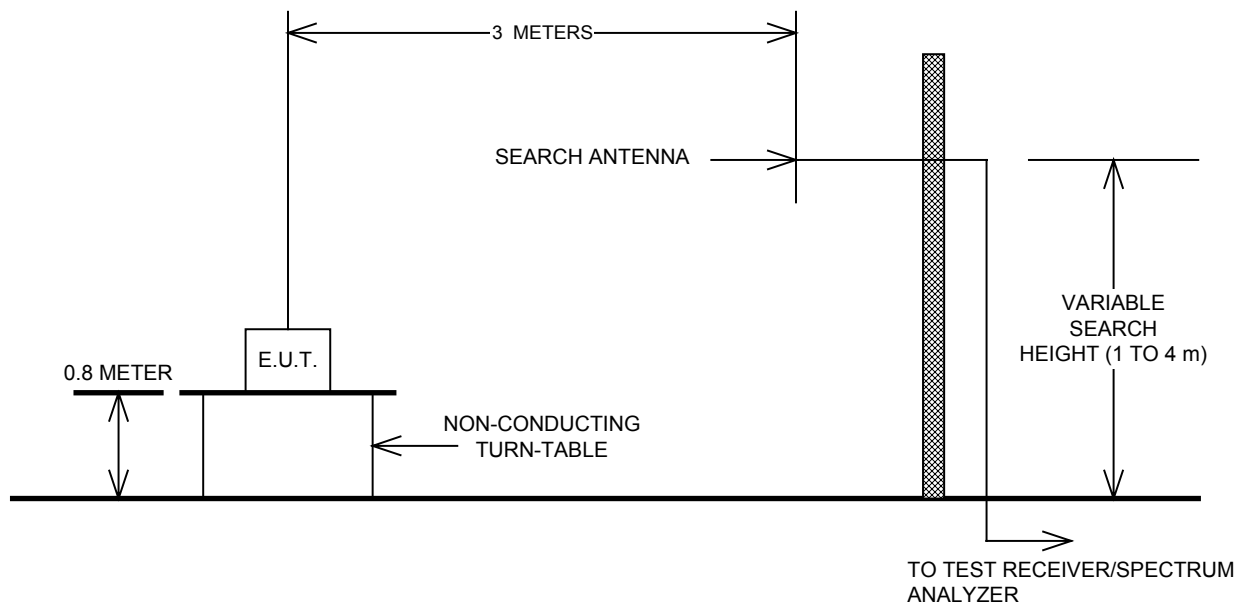
Para. No. 2.989 - Occupied Bandwidth



Para. No. 2.991 Spurious Emissions at Antenna Terminals



Para. No. 2.993 - Field Strength of Spurious Radiation



Para. No. 2.995 - Frequency Stability

