

NEMKO Test Report: 1L0016RUS1

Applicant: Allen Telecom Systems

Equipment Under Test: MR803P
(E.U.T.)

In Accordance With: FCC Part 22, Subpart H
Cellular Band Repeaters

Tested By: NEMKO Dallas Inc.
802 N. Kealy
Lewisville, TX
75057-3136

Authorized By:



Tom Tidwell, RF Group Manager

Date: 6/8/01

Total Number of Pages: 62

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.....	8
SECTION 5. SPURIOUS EMISSIONS AT ANTENNA TERMINALS	9
SECTION 6. FIELD STRENGTH OF SPURIOUS	26
SECTION 7. FREQUENCY STABILITY	43
SECTION 8. TEST EQUIPMENT LIST	46
ANNEX A - TEST DETAILS	47
ANNEX B - TEST DIAGRAMS.....	56

EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1**

Section 1. Summary of Test ResultsManufacturer: **Allen Telecom System**Model No.: **MR803P**Serial No.: **None**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 22, Subpart H.



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

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.

EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****Summary Of Test Data**

NAME OF TEST	PARA. NO.	SPEC.	MEAS.	RESULT
RF Power Output	22.913(a)	500W ERP	1 W	Complies
Occupied Bandwidth (Voice & SAT)	22.917(c)	Mask	Plots	Complies
Occupies Bandwidth (Wideband Data)	22.917(d)	Mask	Plots	Complies
Occupied Bandwidth (ST)	22.917(d)	Mask	Plots	Complies
Occupied Bandwidth (Digital)	None	None	Plots	Complies
Spurious Emissions at Antenna Terminals	22.917	-13 dBm	> -13 dBm	Complies
Field Strength of Spurious Emissions	22.917	-13 dBm E.I.R.P.	> -13 dBm	Complies
Frequency Stability	22.355	1.5 ppm	N/A	N/A

Footnotes: Since the E.U.T. is not a keyed carrier system, Transient Frequency Behavior was not measured.

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

.

EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****Section 2. General Equipment Specification**

Supply Voltage Input:	120 Vac				
Frequency Range:	Downlink:	869 – 894 MHz			
Frequency Range:	Uplink:	824 – 849 MHz			
Type of Modulation and Designator:	CDMA (F9W) ☒	GSM (GXW) ☐	NADC (DXW) ☒	CDPD (F9W) ☐	AMPS (F8W, F1D) ☒
Output Impedance:	50 ohms				
RF Output (Rated):	Downlink:	Total: 1 W			
	Uplink:	Total: 1 W			
Frequency Translation:	F1-F1 ☒	F1-F2 ☐	N/A ☐		
Band Selection:	Software ☐	Duplexer Change ☐	Fullband Coverage ☒		

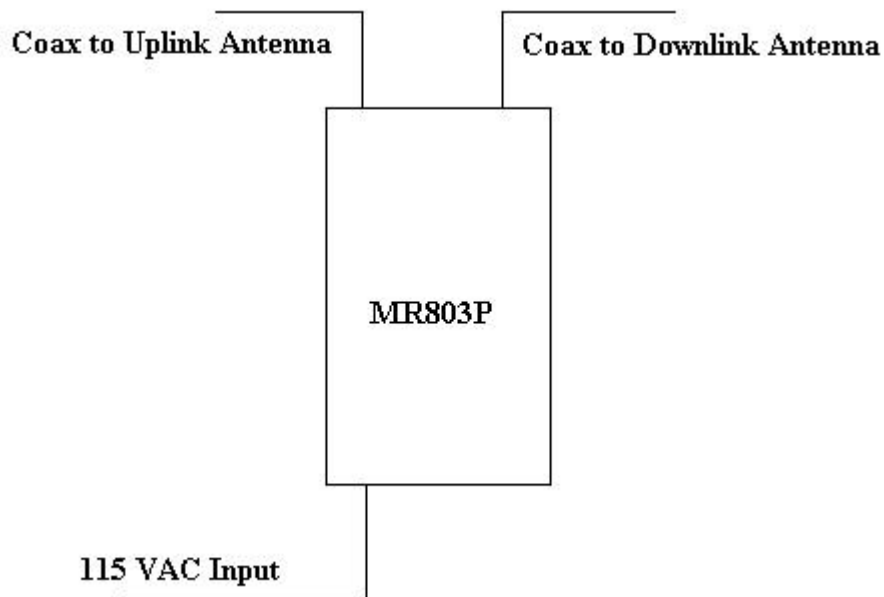
EQUIPMENT: **MR803P**

PROJECT NO.: **1L0016RUS1**

Description of Operation

The device is a variable bandwidth cellular band repeater capable of covering the entire 25 MHz band.

System Diagram



EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1**

Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 2.1046
TESTED BY: Chinda PoyTom Tidwell	DATE: 4/11/01

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

	Modulation Type	Per Channel Power Output (dBm)	Composite Power Output (dBm)
Uplink	AMPS	25.75	28.75
Downlink	AMPS	25.25	28.25
Uplink	CDMA	24.5	27.5
Downlink	CDMA	26.2	29.2
Uplink	NADC	26.5	29.5
Downlink	NADC	27	30

Equipment Used: **1036-1082-1064-1065****Measurement Uncertainty:** +/- 1.6 dB**Temperature:** 22 °C**Relative Humidity:** 50 %

EQUIPMENT: **MR803P**

PROJECT NO.: **1L0016RUS1**

Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth (Digital Mod.)	PARA. NO.: 2.1049
TESTED BY: Chinda PoyTom Tidwell	DATE: 4/10/01

Test Results: **Complies.**

Test Data: **See attached plots**

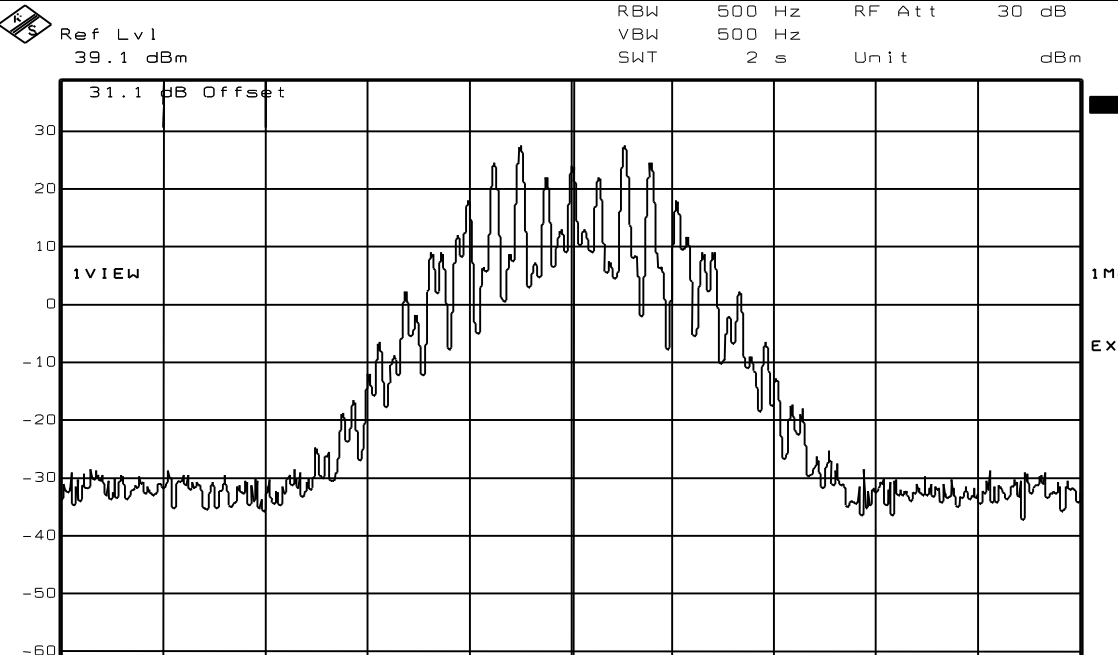
Equipment Used: **1036-1082-1064-1065**

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

Temperature: **22 °C**

Relative Humidity: **50 %**

EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****Test Data – Occupied Bandwidth- Voice**

Data Plot Occupied Bandwidth Analog	
Page <u>1</u> of <u>4</u>	
Job No.: <u>1L0016R</u>	Date: <u>4/10/01</u>
Specification: <u>2.1049</u>	Temperature(°C): <u>22</u>
Tested By: <u>Chinda Poy</u>	Relative Humidity(%) <u>50</u>
E.U.T.: <u>MR803P</u>	
Configuration: <u>Tx Full Power</u>	
Sample Number: <u>S01</u>	
Location: <u>Lab 1</u>	RBW: <u>Refer to plots</u>
Detector Type: <u>Peak</u>	VBW: <u>Refer to plots</u>
Test Equipment Used	
Antenna: _____	Directional Coupler: _____
Pre-Amp: _____	Cable #1: <u>1082</u>
Filter: _____	Cable #2: _____
Receiver: <u>1036</u>	Cable #3: _____
Attenuator #1: <u>1065</u>	Cable #4: _____
Attenuator #2: <u>1064</u>	Mixer: _____
Additional equipment used: _____	
Measurement Uncertainty: <u>+/-3.6 dB</u>	
 Ref Lvl 39.1 dBm RBW 500 Hz RF Att 30 dB VBW 500 Hz SWT 2 s Unit dBm Center 837 MHz 9.777832031 kHz / Span 97.77832031 kHz Date: 10.APR.2001 9:57:37	
Notes: Output Signal Voice and SAT UPLINK	

EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1**

Test Data – Occupied Bandwidth- Voice



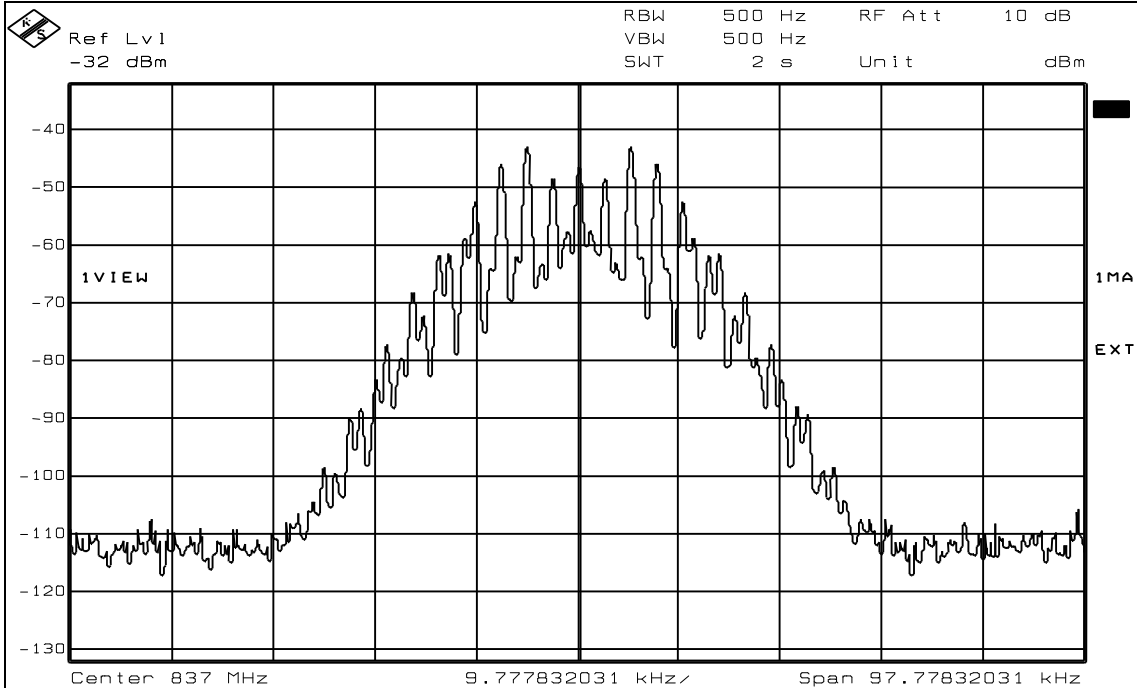
Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.

Data Plot Occupied Bandwidth Analog

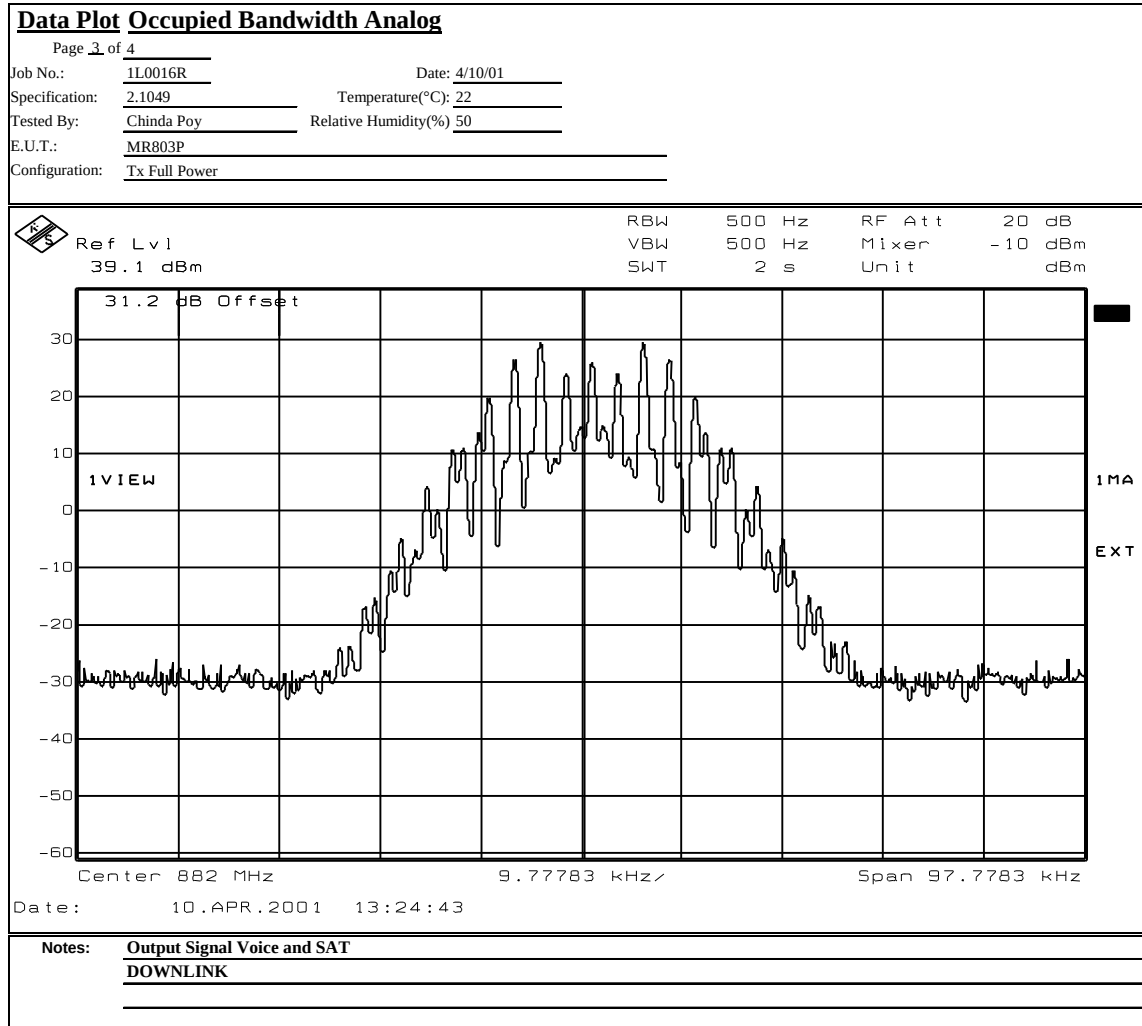
Page 2 of 4

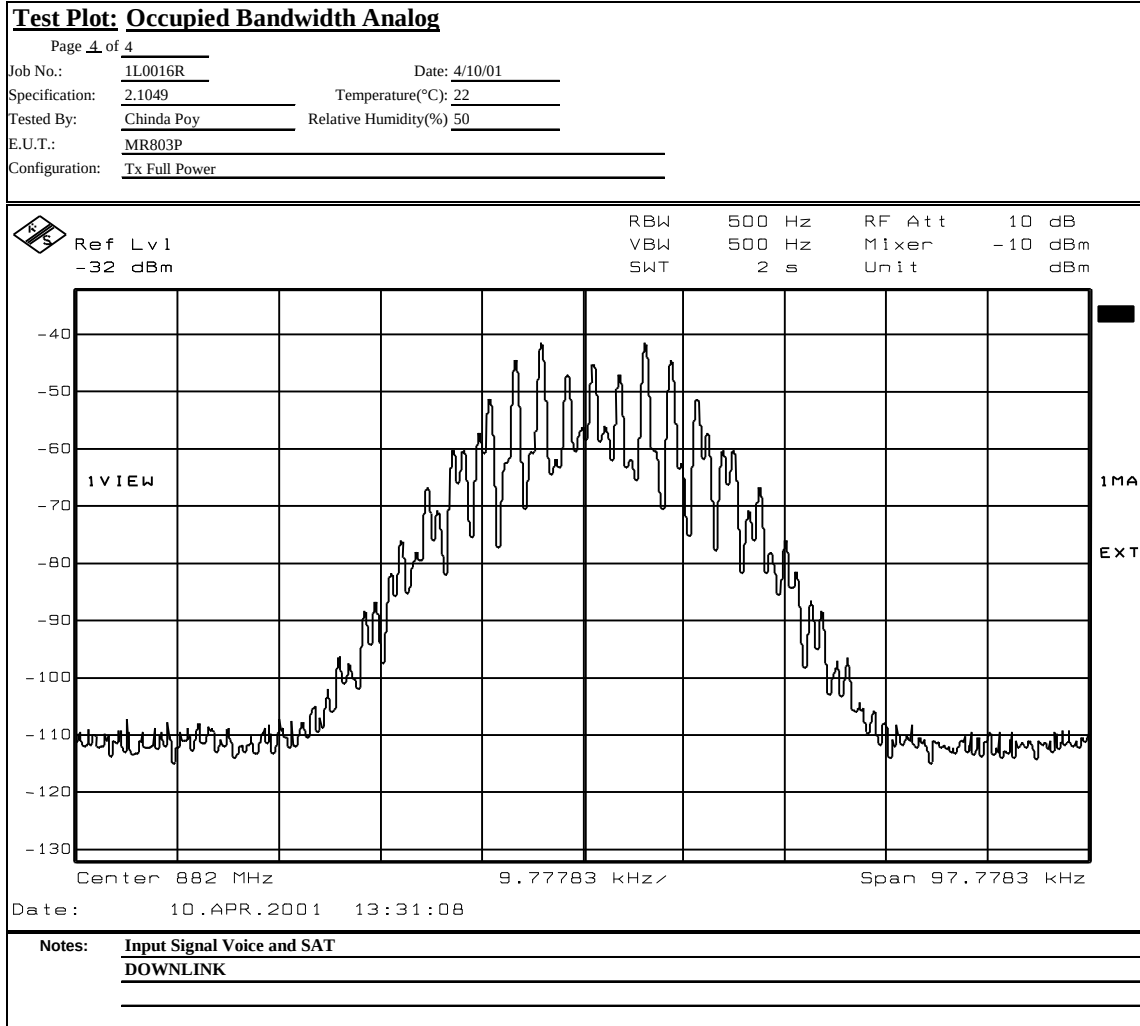
Job No.: 1L0016R Date: 4/10/01
Specification: 2.1 Temperature(°C): 22
Tested By: Chinda Poy Relative Humidity(%) 50
E.U.T.: MR803P
Configuration: Tx Full Power



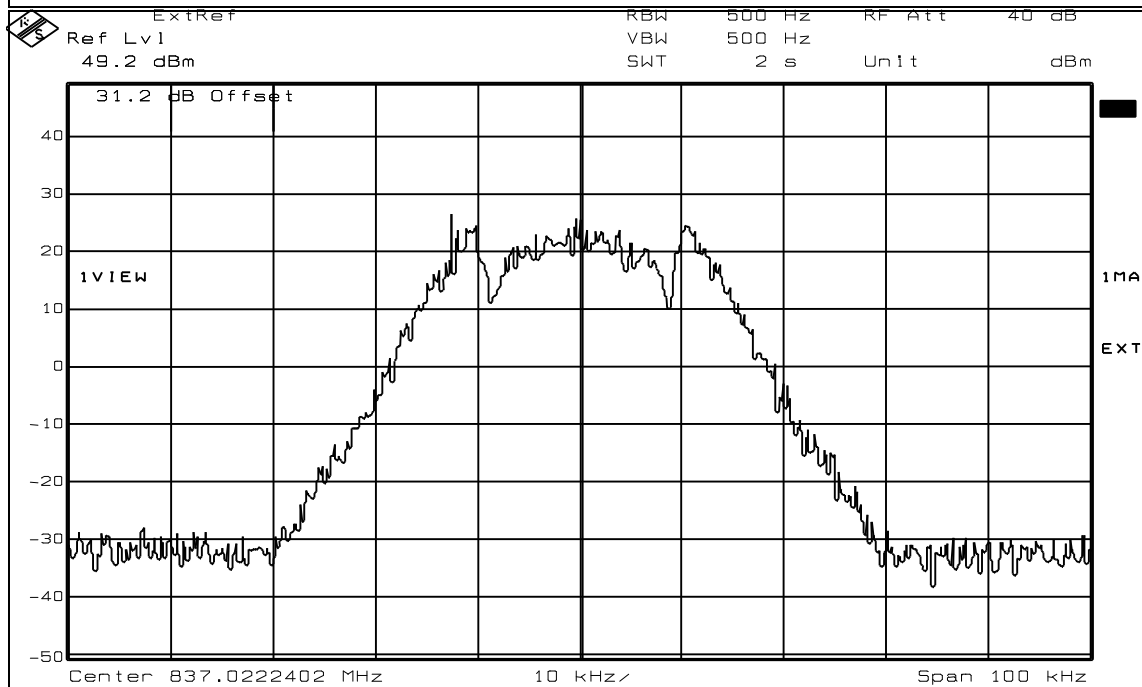
Date: 10.APR.2001 10:00:31

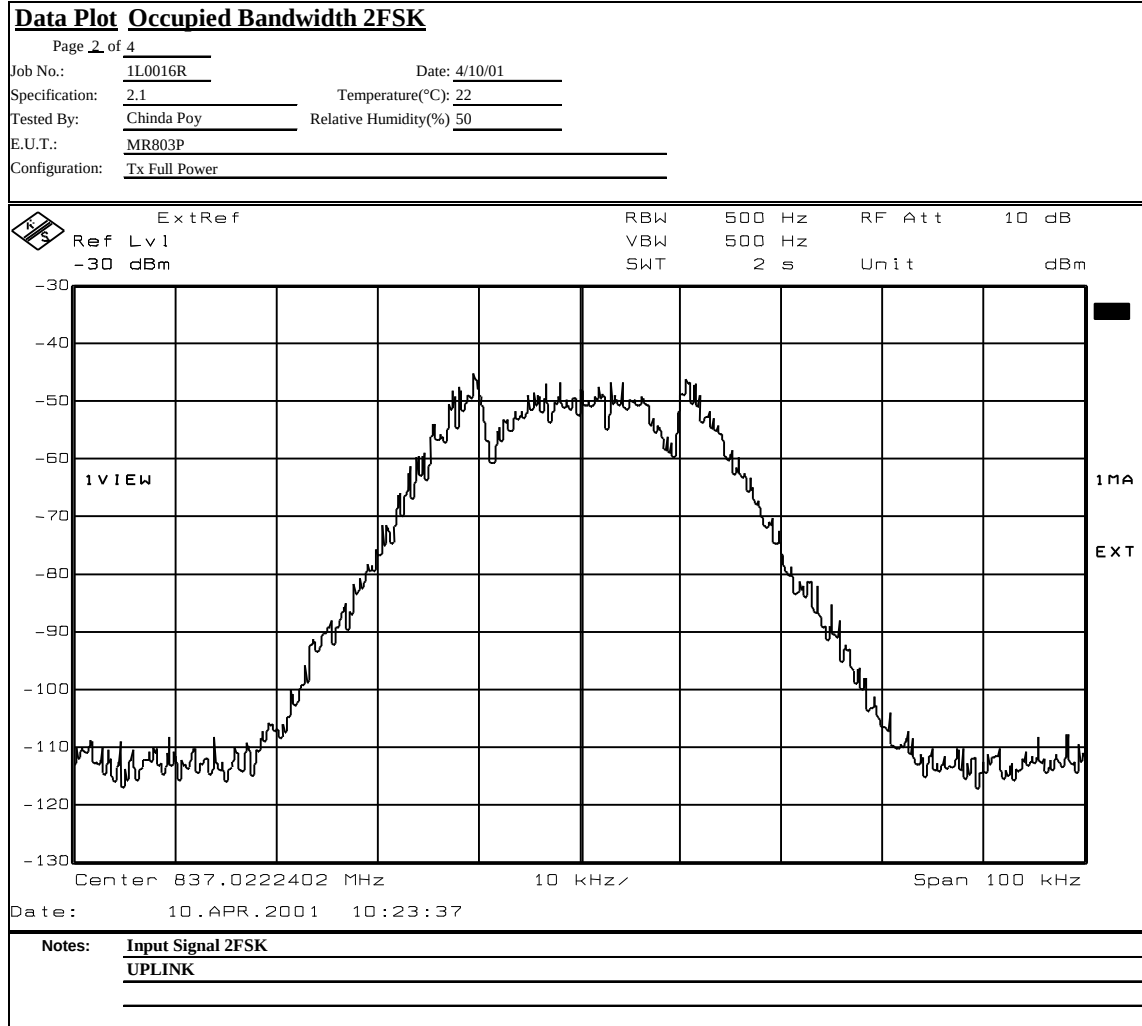
Notes: Input Signal Voice and SAT
UPLINK

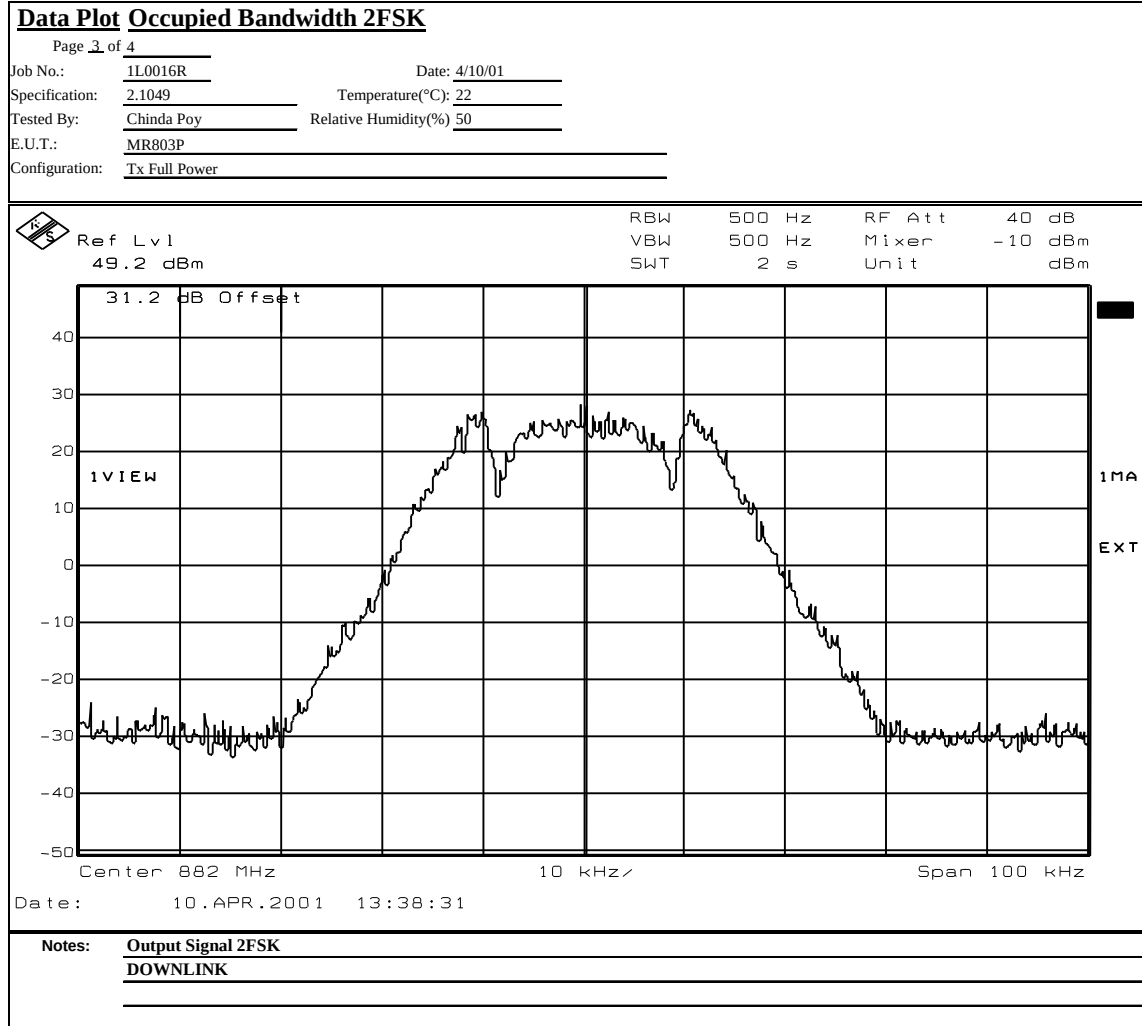
EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****Test Data – Occupied Bandwidth- Voice**

EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****Test Data – Occupied Bandwidth - Voice**

EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****Test Data – Occupied Bandwidth - 2FSK**

Data Plot Occupied Bandwidth 2FSK	
Page 1 of 4	
Job No.: 1L0016R	Date: 4/10/01
Specification: 2.1049	Temperature(°C): 22
Tested By: Chinda Poy	Relative Humidity(%) 50
E.U.T.: MR803P	
Configuration: Tx Full Power	
Sample Number: S01	
Location: Lab 1	RBW: Refer to plots
Detector Type: Peak	VBW: Refer to plots
Test Equipment Used	
Antenna:	Directional Coupler:
Pre-Amp:	Cable #1: 1082
Filter:	Cable #2:
Receiver: 1036	Cable #3:
Attenuator #1: 1065	Cable #4:
Attenuator #2: 1064	Mixer:
Additional equipment used:	
Measurement Uncertainty: +/-3.6 dB	
	
Date: 10.APR.2001 10:18:30	
Notes: Output Signal 2FSK	
UPLINK	

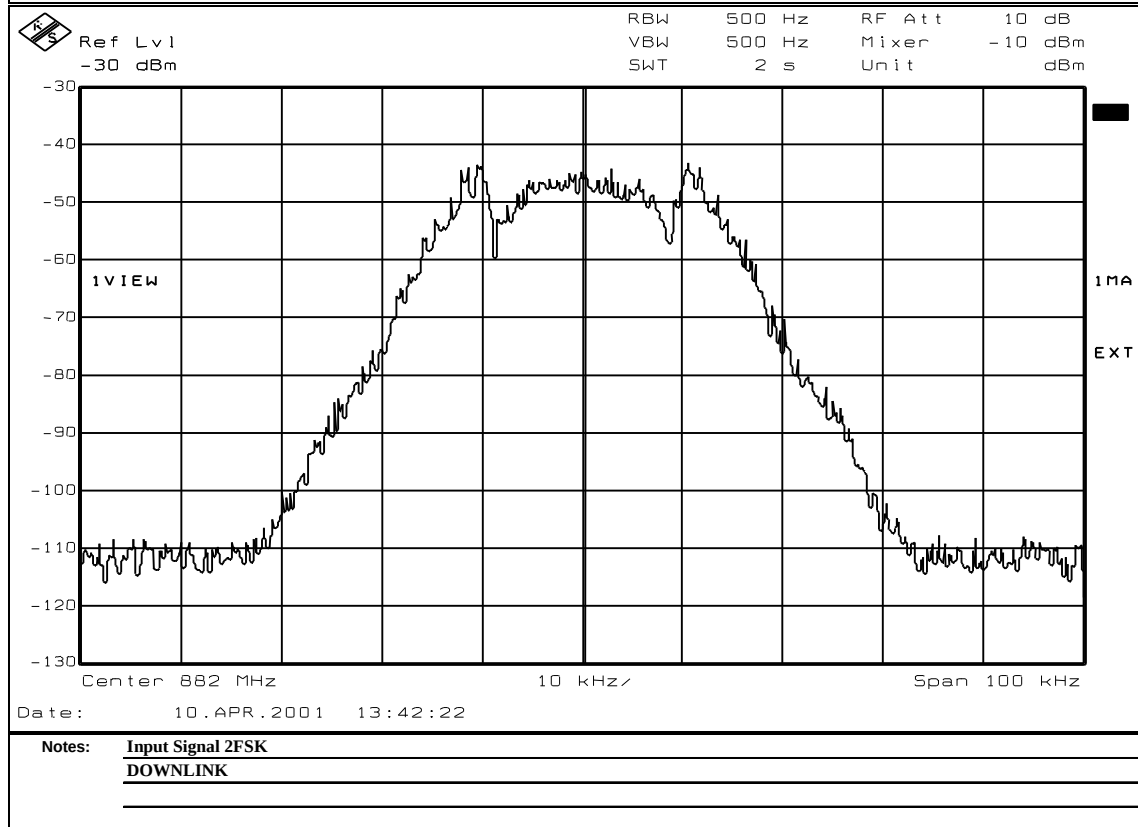
EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****Test Data – Occupied Bandwidth- 2FSK**

EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****Test Data – Occupied Bandwidth- 2FSK**

EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****Test Data – Occupied Bandwidth- 2FSK****Test Plot: Occupied Bandwidth 2FSK**

Page 4 of 4

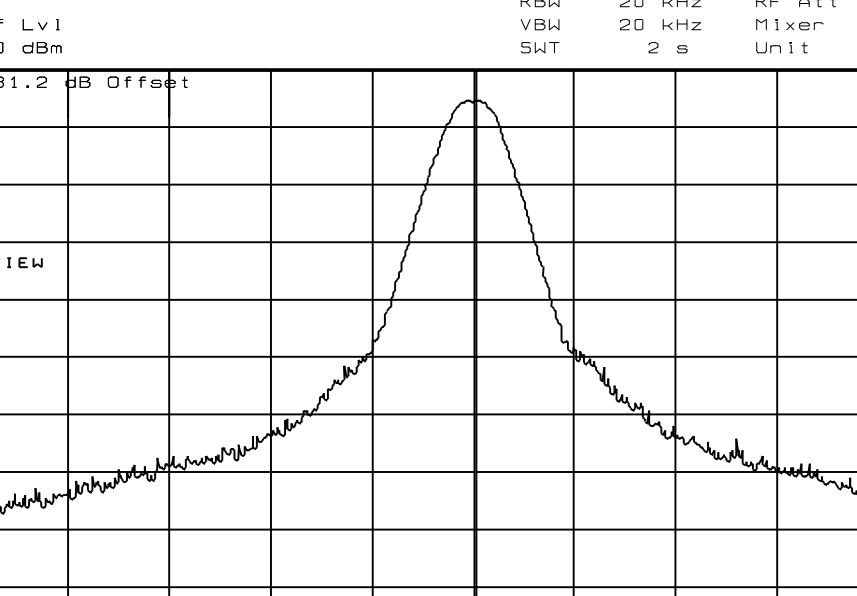
Job No.: 1L0016R Date: 4/10/01
Specification: 2.1049 Temperature(°C): 22
Tested By: Chinda Poy Relative Humidity(%) 50
E.U.T.: MR803P
Configuration: Tx Full Power

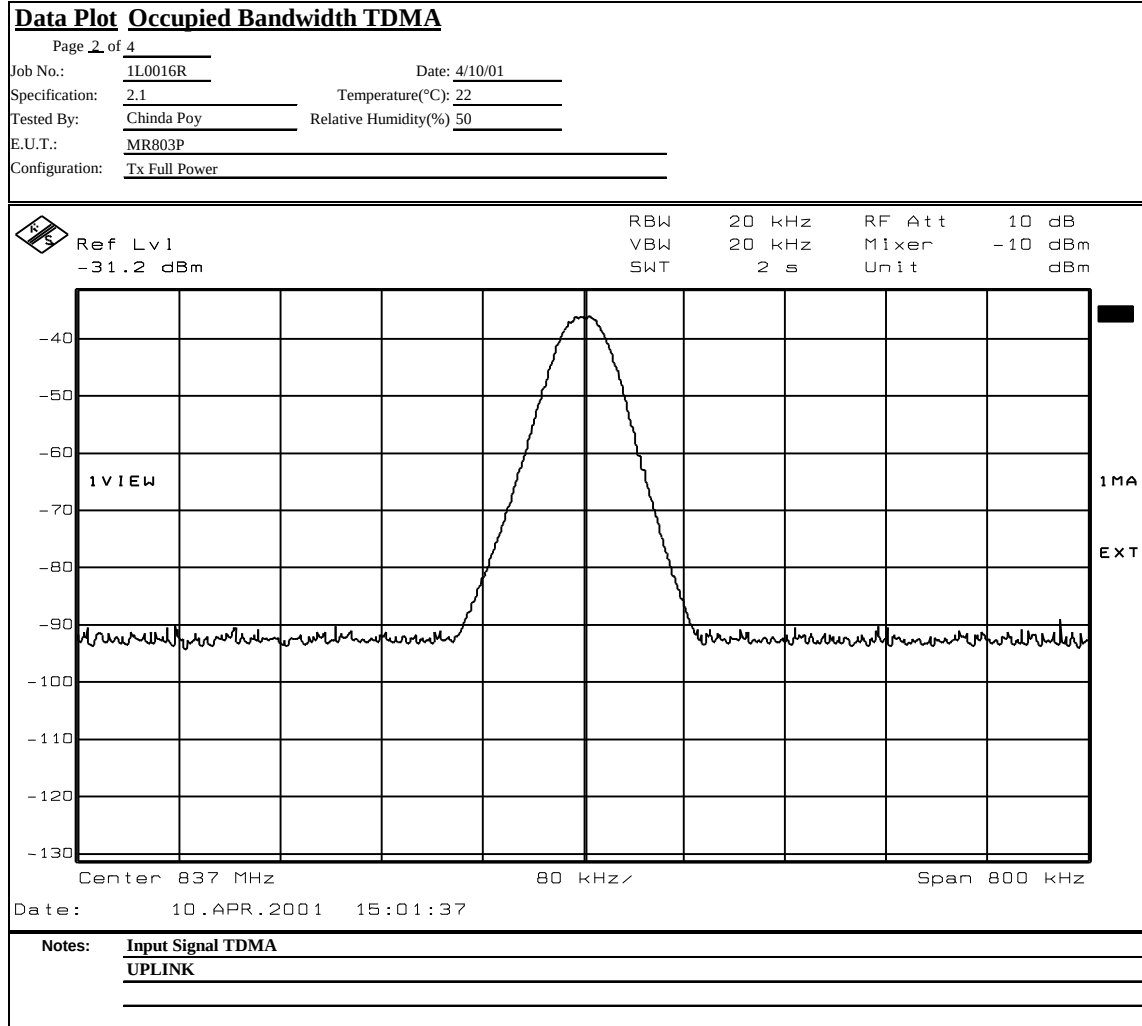


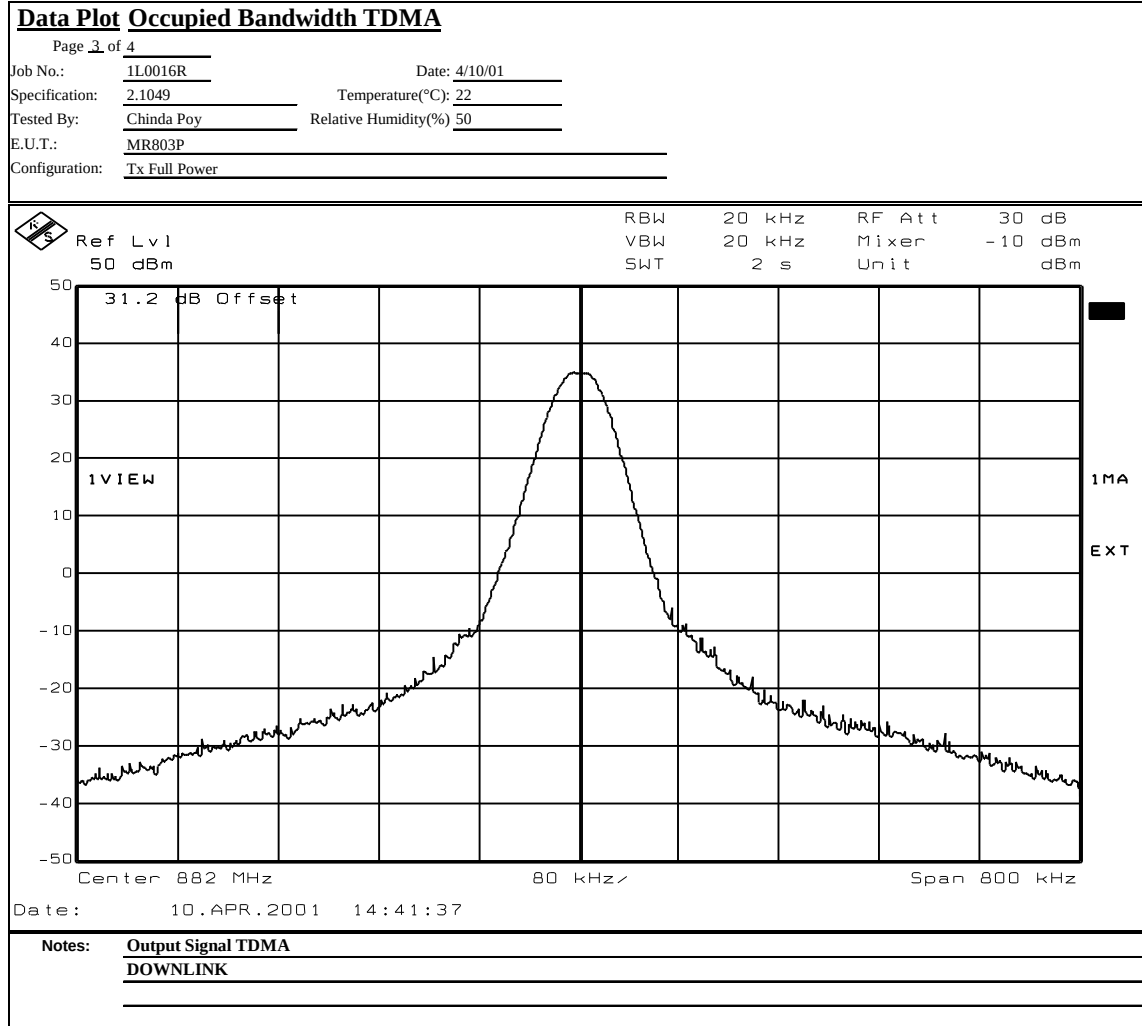
EQUIPMENT: **MR803P**

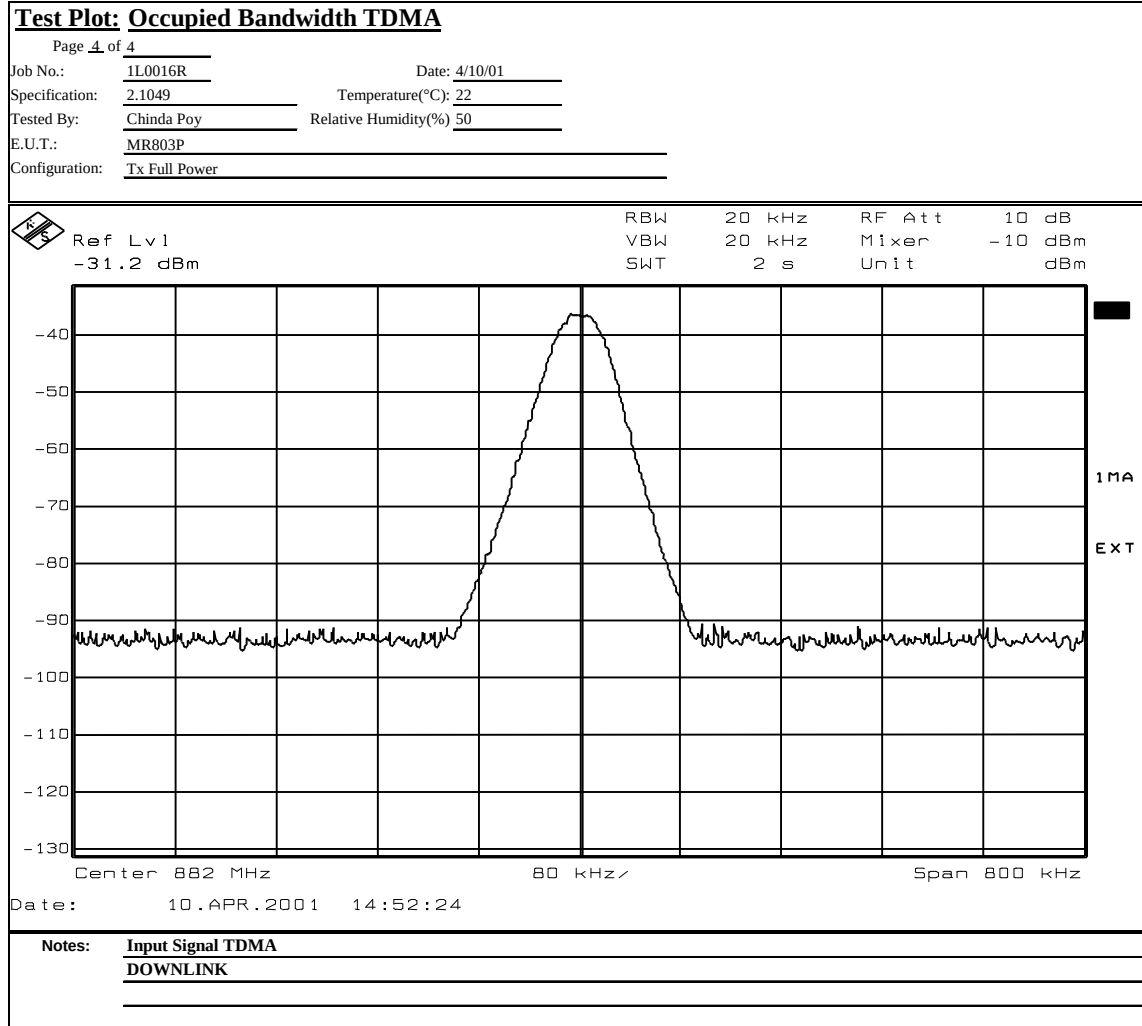
PROJECT NO.: 1L0016RUS1

Test Data – Occupied Bandwidth - TDMA

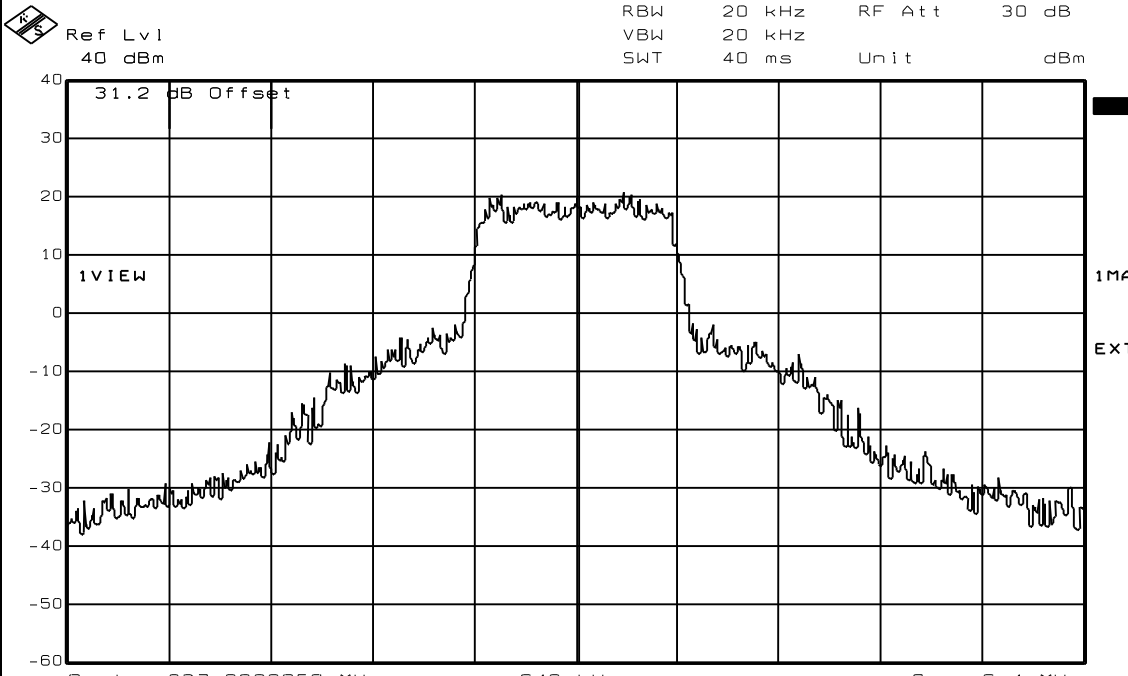
Data Plot Occupied Bandwidth TDMA			
Page <u>1</u> of <u>4</u>		Complete <u>X</u> Preliminary _____	
Job No.: <u>1L0016R</u>	Date: <u>4/10/01</u>		
Specification: <u>2.1049</u>	Temperature(°C): <u>22</u>		
Tested By: <u>Chinda Poy</u>	Relative Humidity(%): <u>50</u>		
E.U.T.: <u>MR803P</u>			
Configuration: <u>Tx Full Power</u>			
Sample Number: <u>S01</u>			
Location: <u>Lab 1</u>	RBW: <u>Refer to plots</u>		
Detector Type: <u>Peak</u>	VBW: <u>Refer to plots</u>		
Test Equipment Used			
Antenna: _____	Directional Coupler: _____		
Pre-Amp: _____	Cable #1: <u>1082</u>		
Filter: _____	Cable #2: _____		
Receiver: <u>1036</u>	Cable #3: _____		
Attenuator #1: <u>1065</u>	Cable #4: _____		
Attenuator #2: <u>1064</u>	Mixer: _____		
Additional equipment used: _____			
Measurement Uncertainty: <u>+/-3.6 dB</u>			
 Ref Lvl 40 dBm RBW 20 kHz RF Att 30 dB VBW 20 kHz Mixer -10 dBm SWT 2 s Unit dBm 31.2 dB Offset 1 VIEW Center 837 MHz 80 kHz Span 800 kHz			
Date: <u>10.APR.2001</u> <u>14:58:39</u>			
Notes: <u>Output Signal TDMA</u> <u>UPLINK</u>			

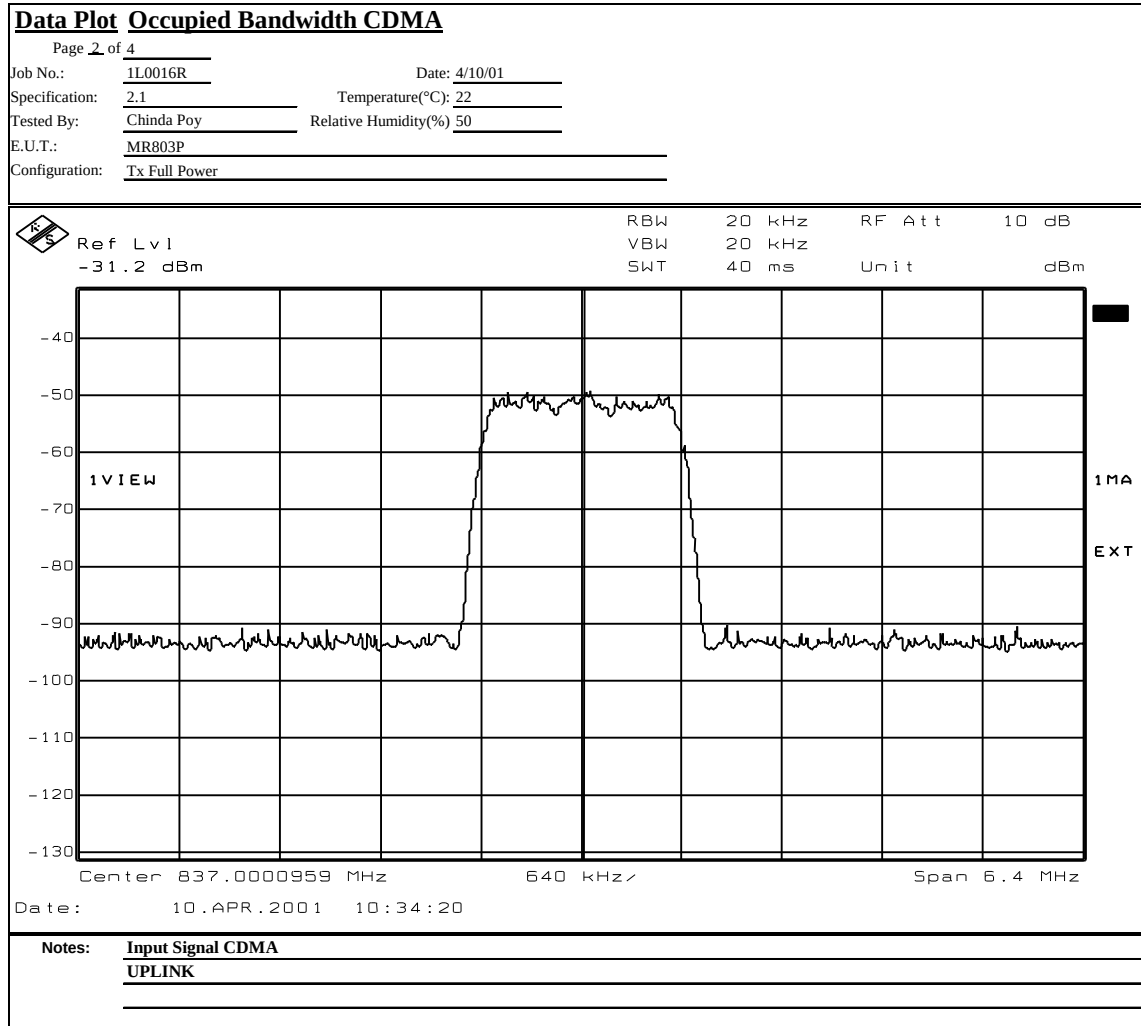
EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****Test Data – Occupied Bandwidth- TDMA**

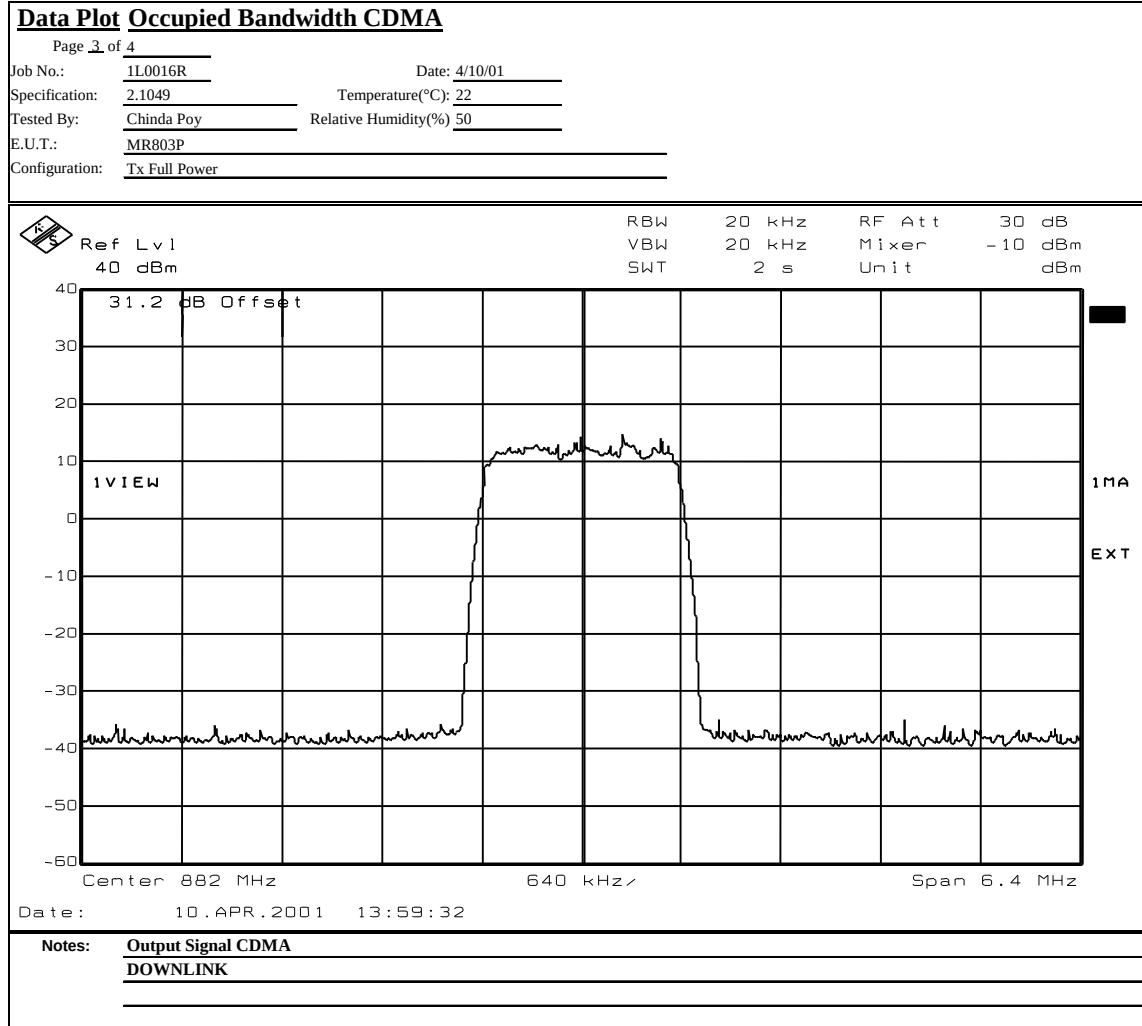
EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****Test Data – Occupied Bandwidth- TDMA**

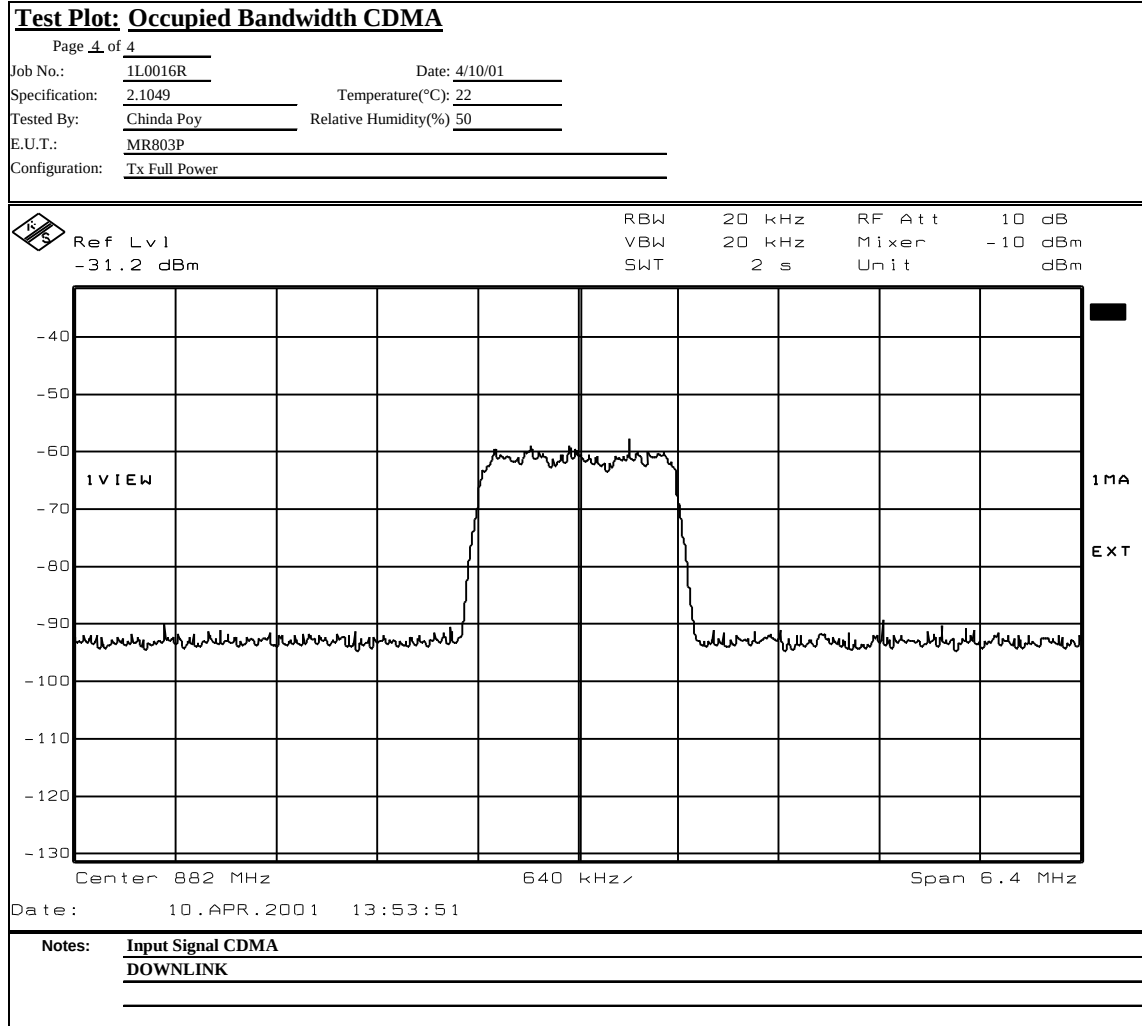
EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****Test Data – Occupied Bandwidth- TDMA**

EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****Test Data – Occupied Bandwidth - CDMA**

Data Plot Occupied Bandwidth CDMA	
Page <u>1</u> of <u>4</u>	
Job No.: <u>1L0016R</u>	Date: <u>4/10/01</u>
Specification: <u>2.1049</u>	Temperature(°C): <u>22</u>
Tested By: <u>Chinda Poy</u>	Relative Humidity(%) <u>50</u>
E.U.T.: <u>MR803P</u>	
Configuration: <u>Tx Full Power</u>	
Sample Number: <u>S01</u>	
Location: <u>Lab 1</u>	RBW: <u>Refer to plots</u>
Detector Type: <u>Peak</u>	VBW: <u>Refer to plots</u>
Test Equipment Used	
Antenna: _____	Directional Coupler: _____
Pre-Amp: _____	Cable #1: <u>1082</u>
Filter: _____	Cable #2: _____
Receiver: <u>1036</u>	Cable #3: _____
Attenuator #1: <u>1065</u>	Cable #4: _____
Attenuator #2: <u>1064</u>	Mixer: _____
Additional equipment used: _____	
Measurement Uncertainty: <u>+/-3.6 dB</u>	
	
Date: <u>10.APR.2001 10:30:42</u>	
Notes: <u>Output Signal CDMA</u>	
<u>UPLINK</u>	

EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****Test Data – Occupied Bandwidth- CDMA**

EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****Test Data – Occupied Bandwidth- CDMA**

EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****Test Data – Occupied Bandwidth- CDMA**

EQUIPMENT: **MR803P**

PROJECT NO.: **1L0016RUS1**

Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 2.1051
TESTED BY: Chinda poyTom Tidwell	DATE: 4/11/01

Test Results: **Complies.**

Test Data: **See attached plots**

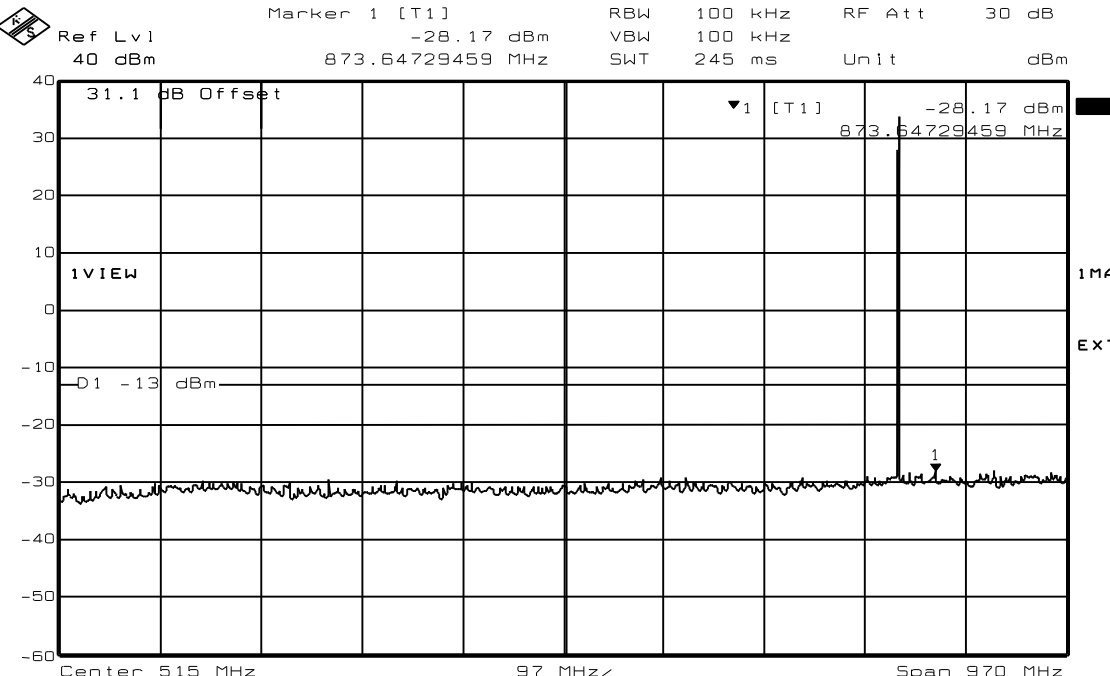
Equipment Used: **1036-1064-1065-1082**

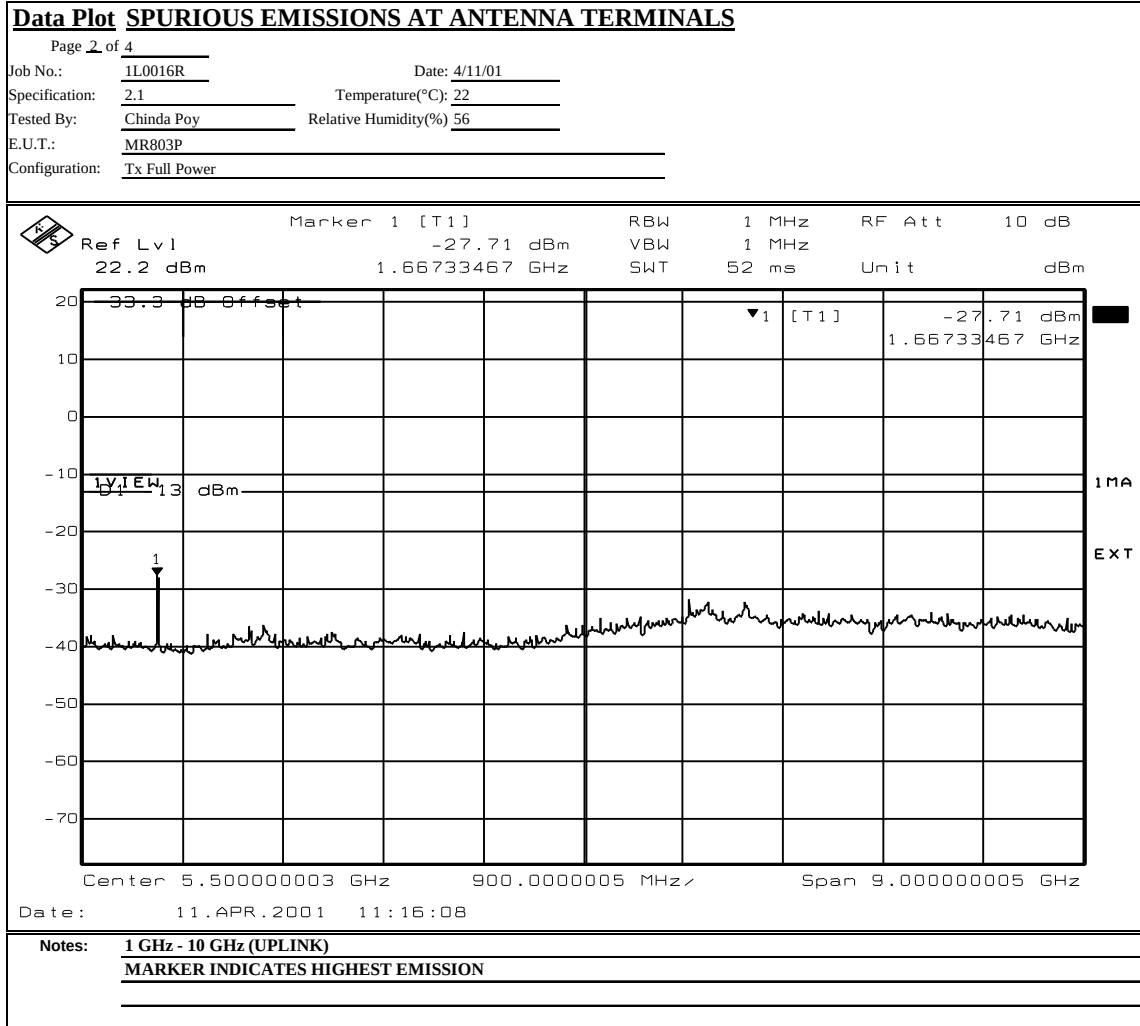
Measurement Uncertainty: **+/- 1.6 dB**

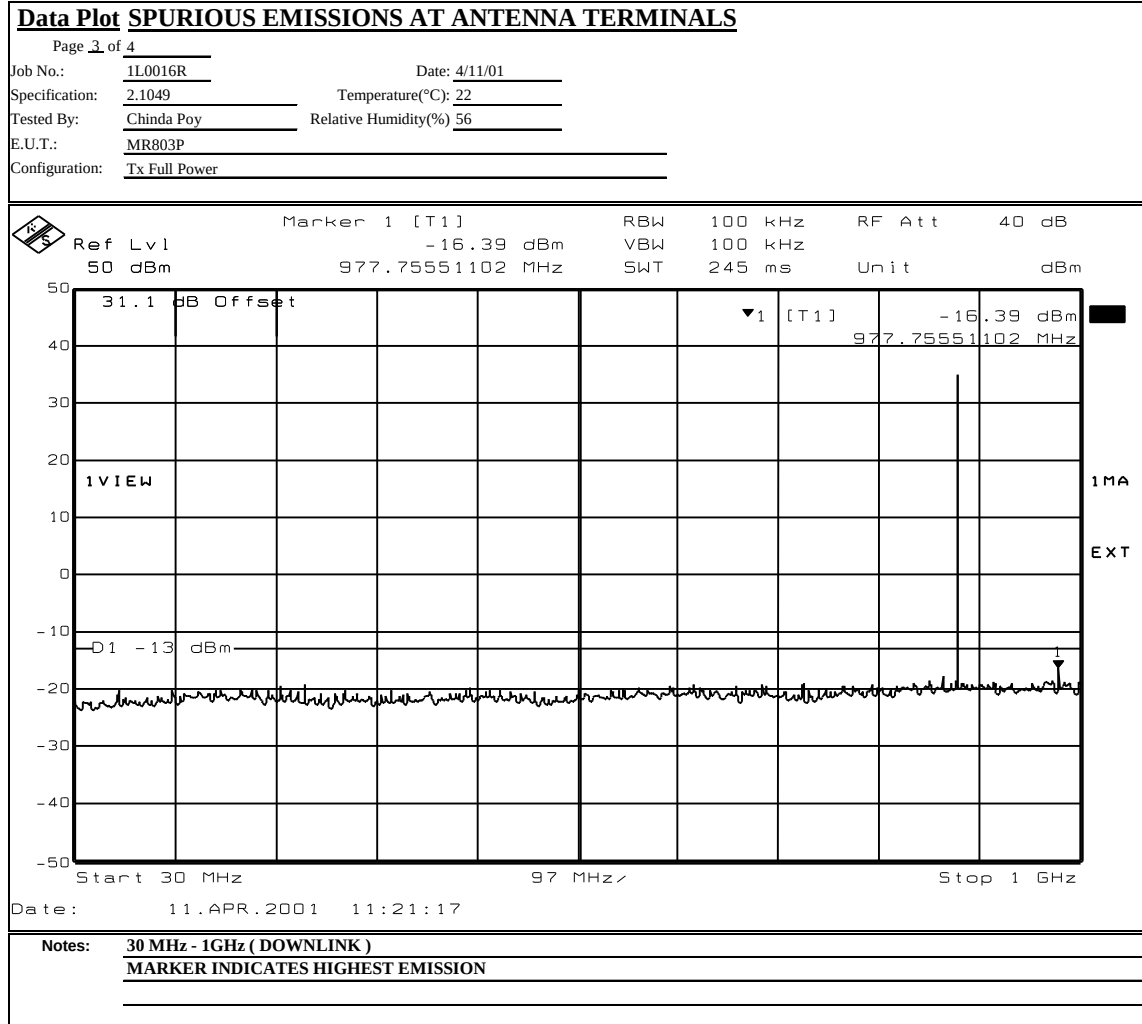
Temperature: **22 °C**

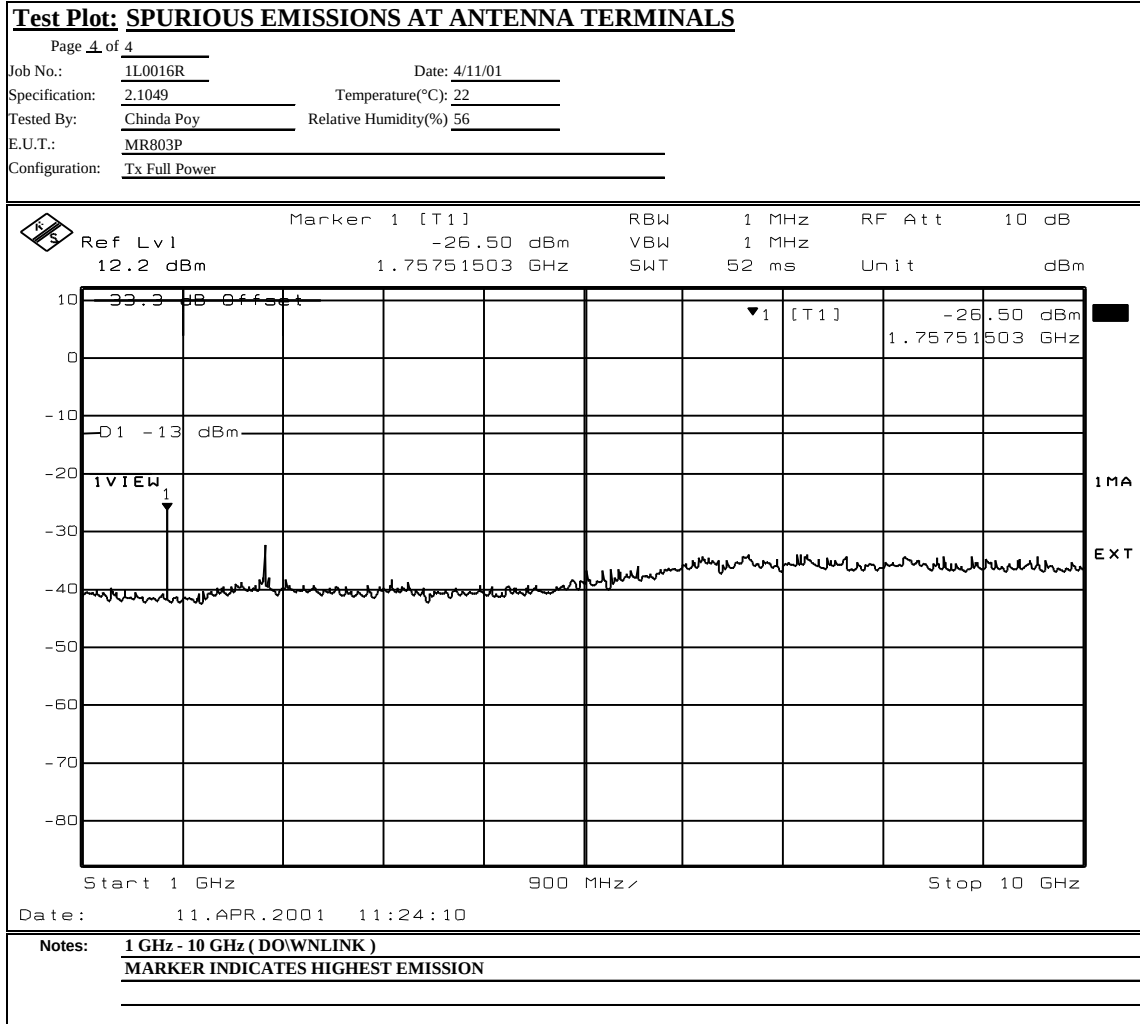
Relative Humidity: **50 %**

EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****Test Data – Spurious Emissions at Antenna Terminals**

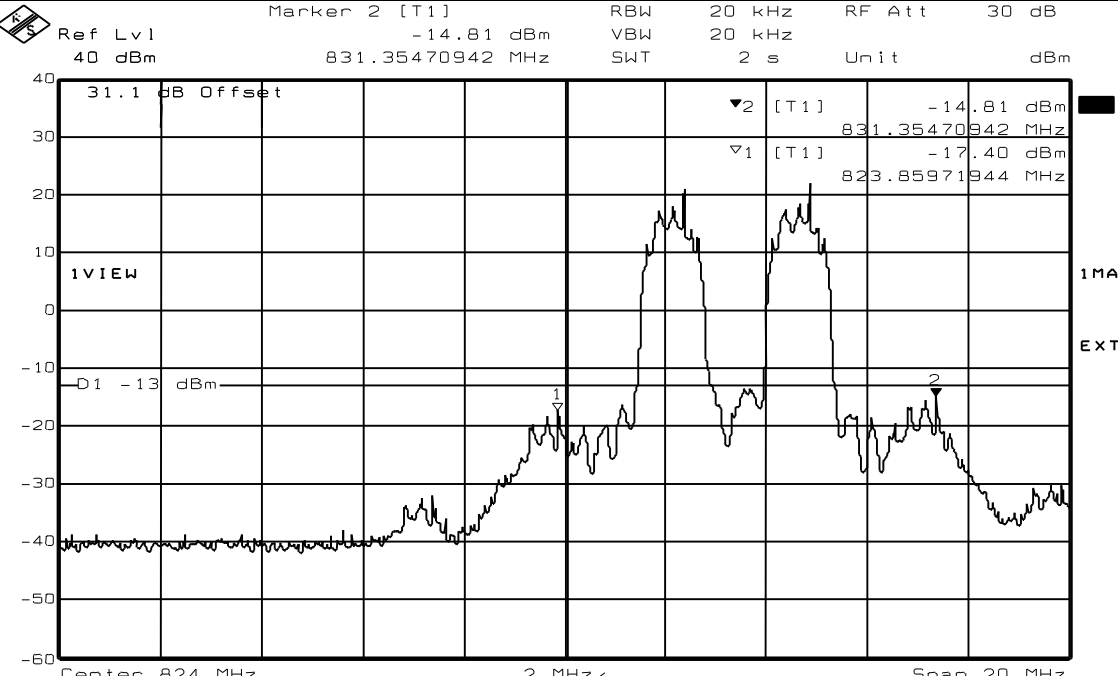
Data Plot SPURIOUS EMISSIONS AT ANTENNA TERMINALS	
Page <u>1</u> of <u>4</u>	
Job No.: <u>1L0016R</u>	Date: <u>4/11/01</u>
Specification: <u>2.1049</u>	Temperature(°C): <u>22</u>
Tested By: <u>Chinda Poy</u>	Relative Humidity(%) <u>56</u>
E.U.T.: <u>MR803P</u>	
Configuration: <u>Tx Full Power</u>	
Sample Number: <u>S01</u>	
Location: <u>Lab 1</u>	RBW: <u>Refer to plots</u>
Detector Type: <u>Peak</u>	VBW: <u>Refer to plots</u>
Test Equipment Used	
Antenna: _____	Directional Coupler: _____
Pre-Amp: _____	Cable #1: <u>1082</u>
Filter: _____	Cable #2: _____
Receiver: <u>1036</u>	Cable #3: _____
Attenuator #1: <u>1065</u>	Cable #4: _____
Attenuator #2: <u>1064</u>	Mixer: _____
Additional equipment used: _____	
Measurement Uncertainty: <u>+/-3.6 dB</u>	
	
Date: <u>11.APR.2001</u> <u>11:10:25</u>	
Notes: <u>30 MHz - 1 GHz (UPLINK)</u>	
<u>MARKER INDICATE HIGHEST NOISE FLOOR READING</u>	

EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****Test Data – Spurious Emissions at Antenna Terminals**

EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****Test Data – Spurious Emissions at Antenna Terminals**

EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****Test Data – Spurious Emissions at Antenna Terminals**

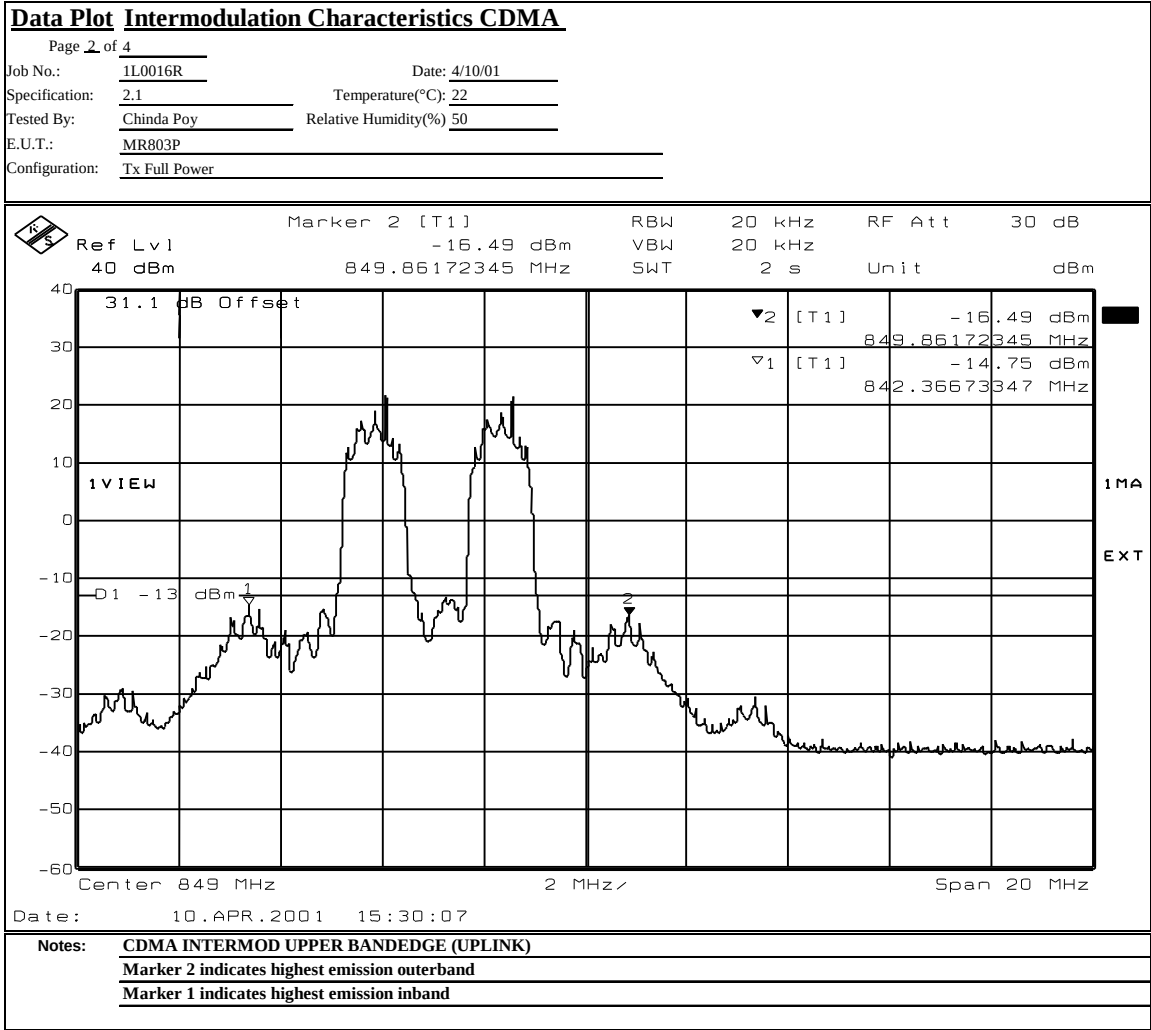
EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****Test Data – Spurious Emissions at Antenna Terminals**

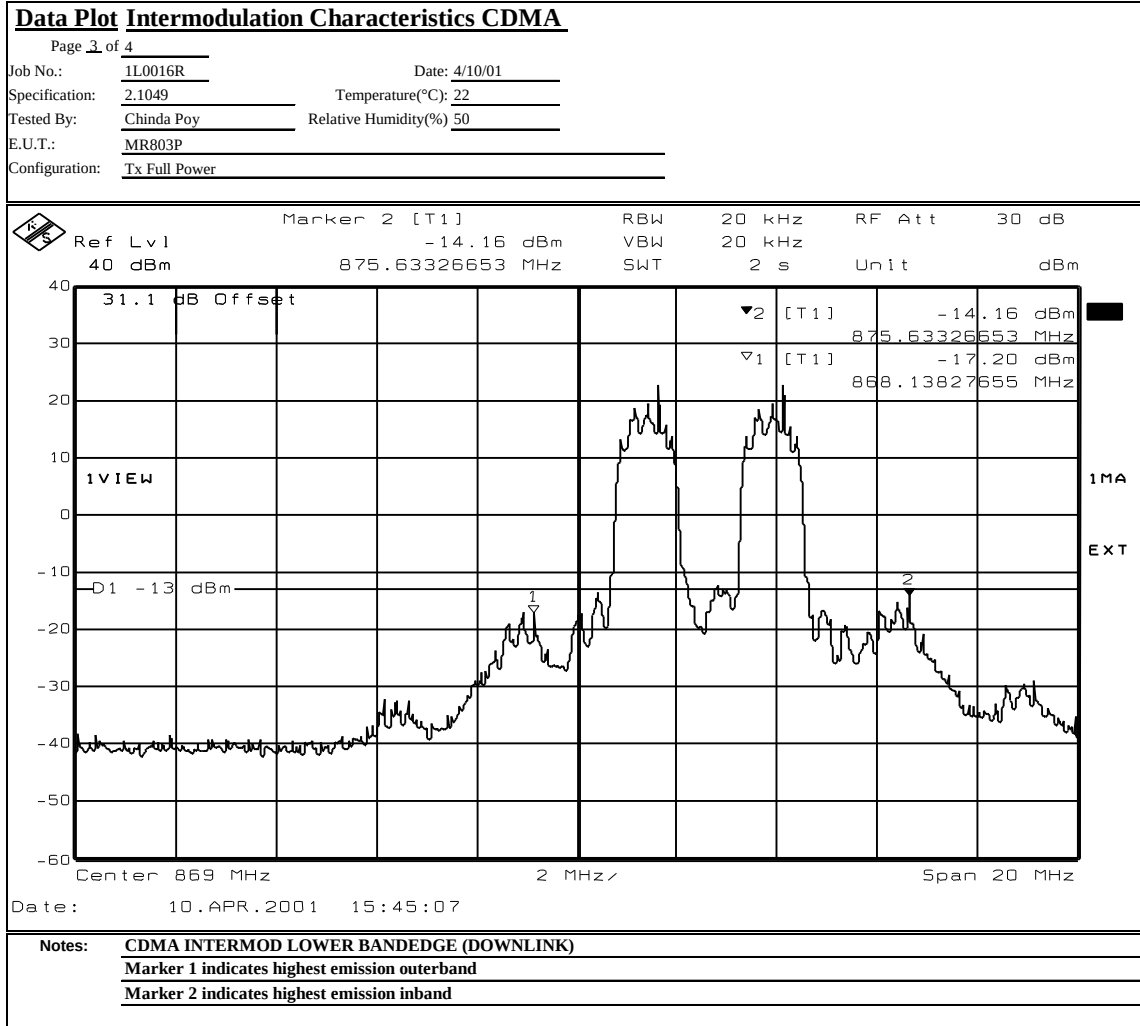
Data Plot		Intermodulation Characteristics CDMA	
Page 1 of 4		Complete _____	
Job No.: 1L0016R	Date: 4/10/01	Preliminary <u>X</u>	
Specification: 2.1049	Temperature(°C): 22		
Tested By: Chinda Poy	Relative Humidity(%): 50		
E.U.T.: MR803P			
Configuration: Tx Full Power			
Sample Number: S01			
Location: Lab 1	RBW: Refer to plots		
Detector Type: Peak	VBW: Refer to plots		
Test Equipment Used			
Antenna: _____	Directional Coupler: _____		
Pre-Amp: _____	Cable #1: 1082		
Filter: _____	Cable #2: _____		
Receiver: 1036	Cable #3: _____		
Attenuator #1: 1065	Cable #4: _____		
Attenuator #2: 1064	Mixer: _____		
Additional equipment used: _____			
Measurement Uncertainty: +/-3.6 dB			
			
Date: 10.APR.2001 15:15:51			
Notes: CDMA INTERMOD LOWER BANDEDGE (UPLINK)			
Marker 1 indicates highest emission outerband			
Marker 2 indicates highest emission inband			

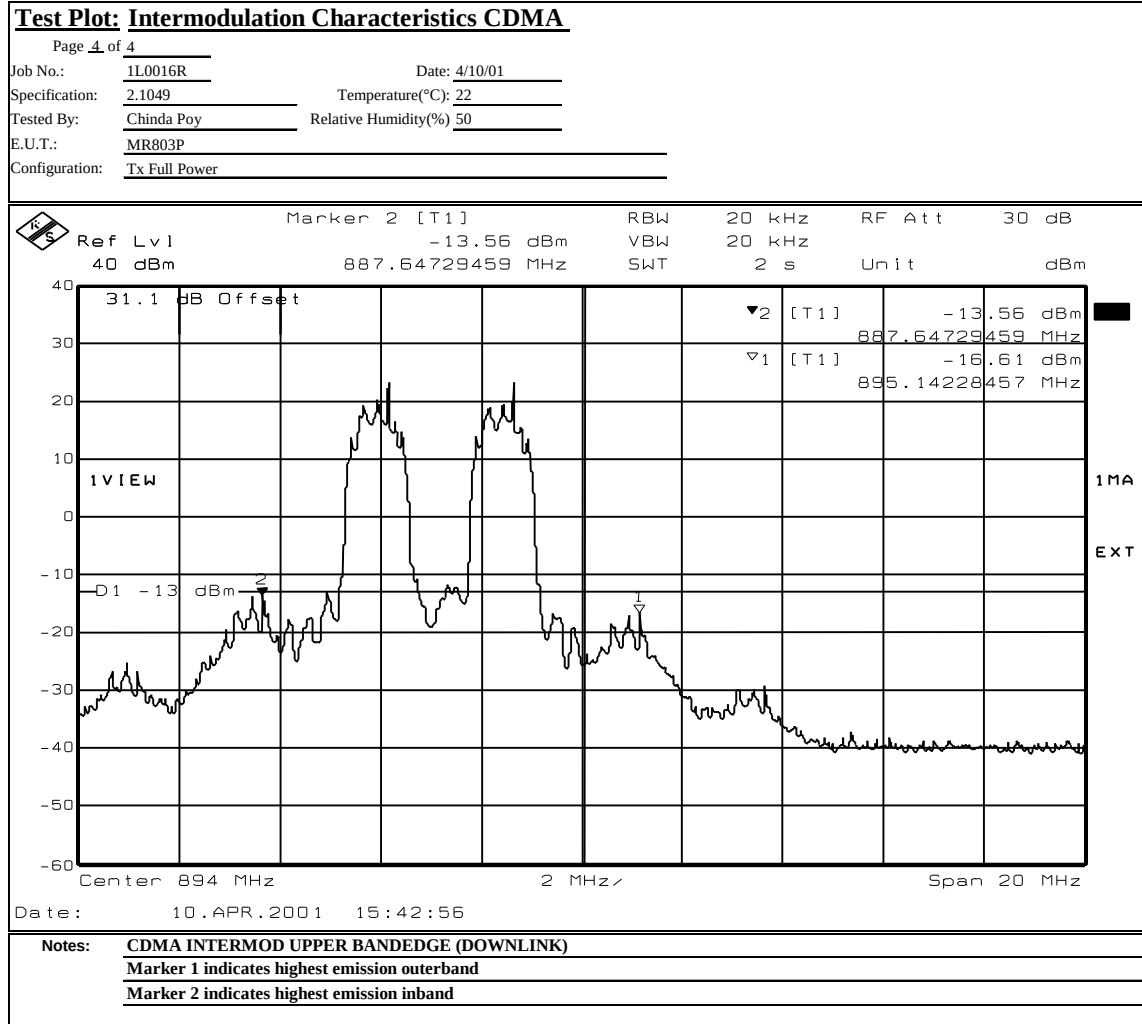
EQUIPMENT: **MR803P**

PROJECT NO.: **1L0016RUS1**

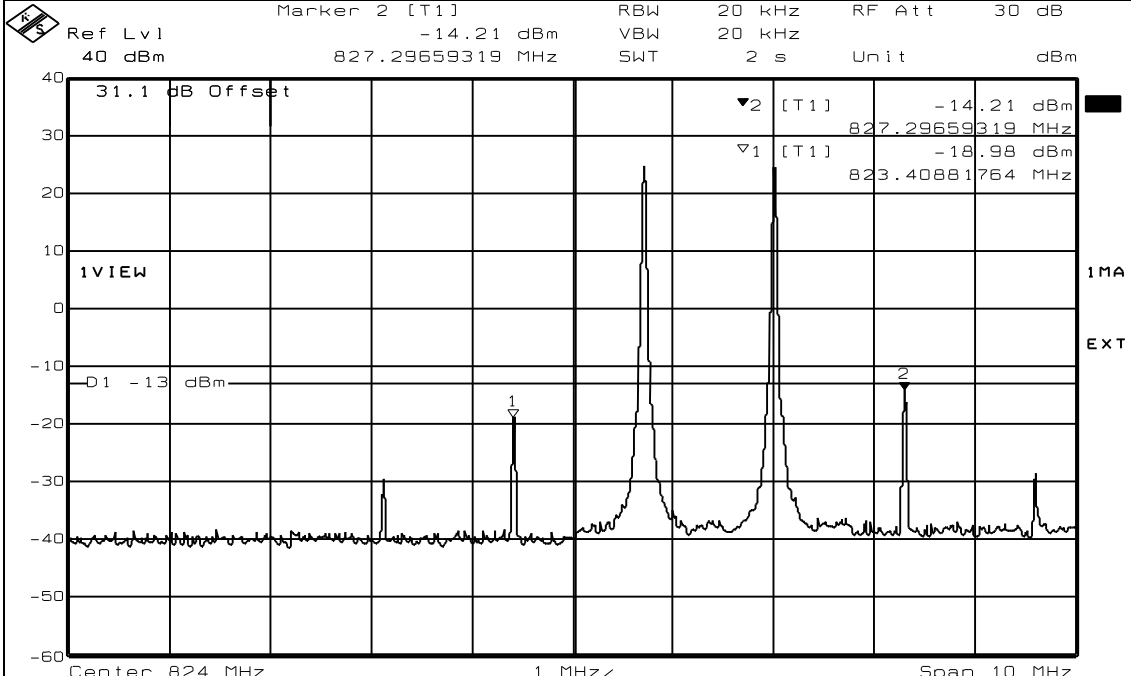
Test Data – Spurious Emissions at Antenna Terminals



EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****Test Data – Spurious Emissions at Antenna Terminals**

EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****Test Data – Spurious Emissions at Antenna Terminals**

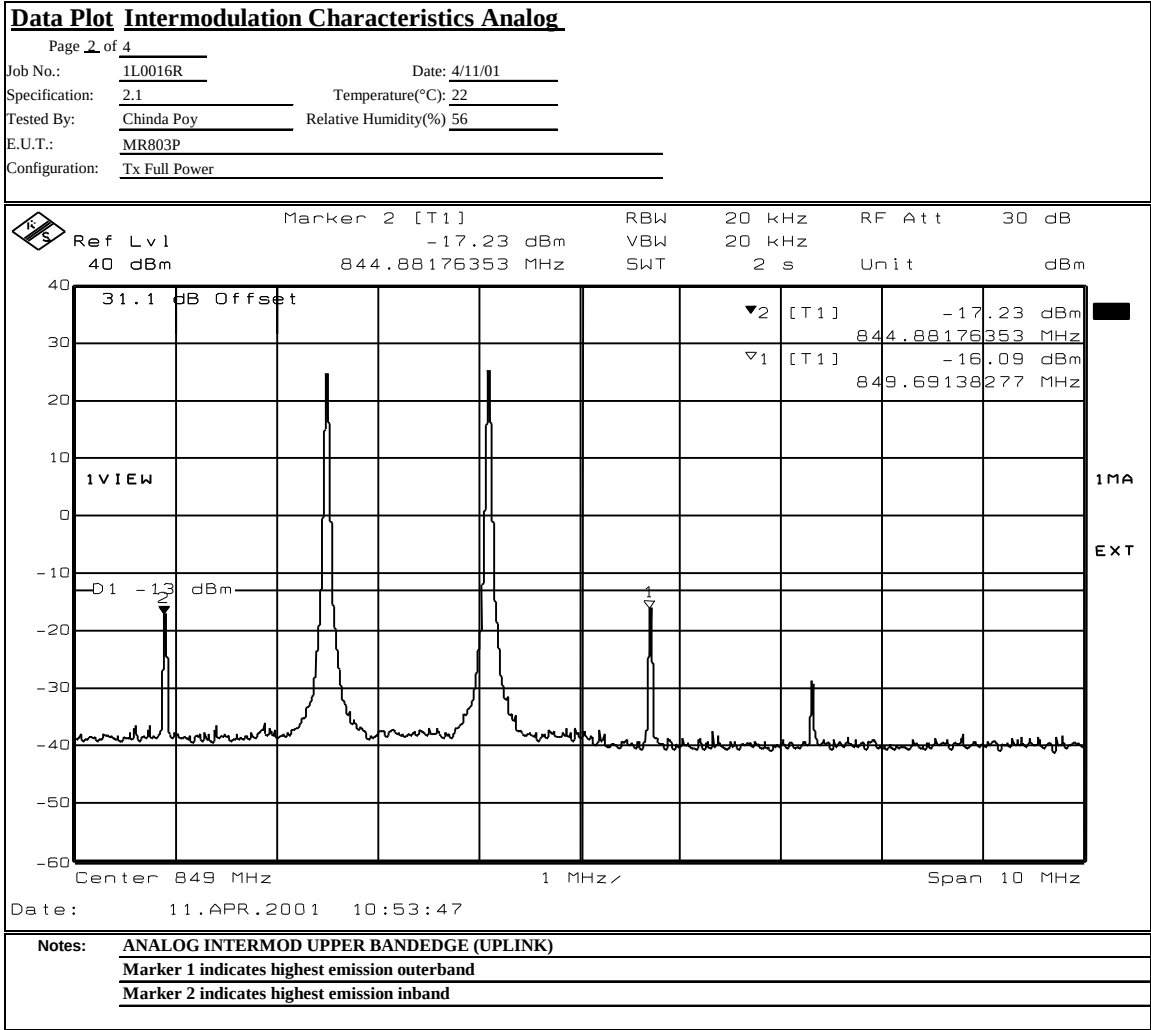
EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****Test Data – Spurious Emissions at Antenna Terminals**

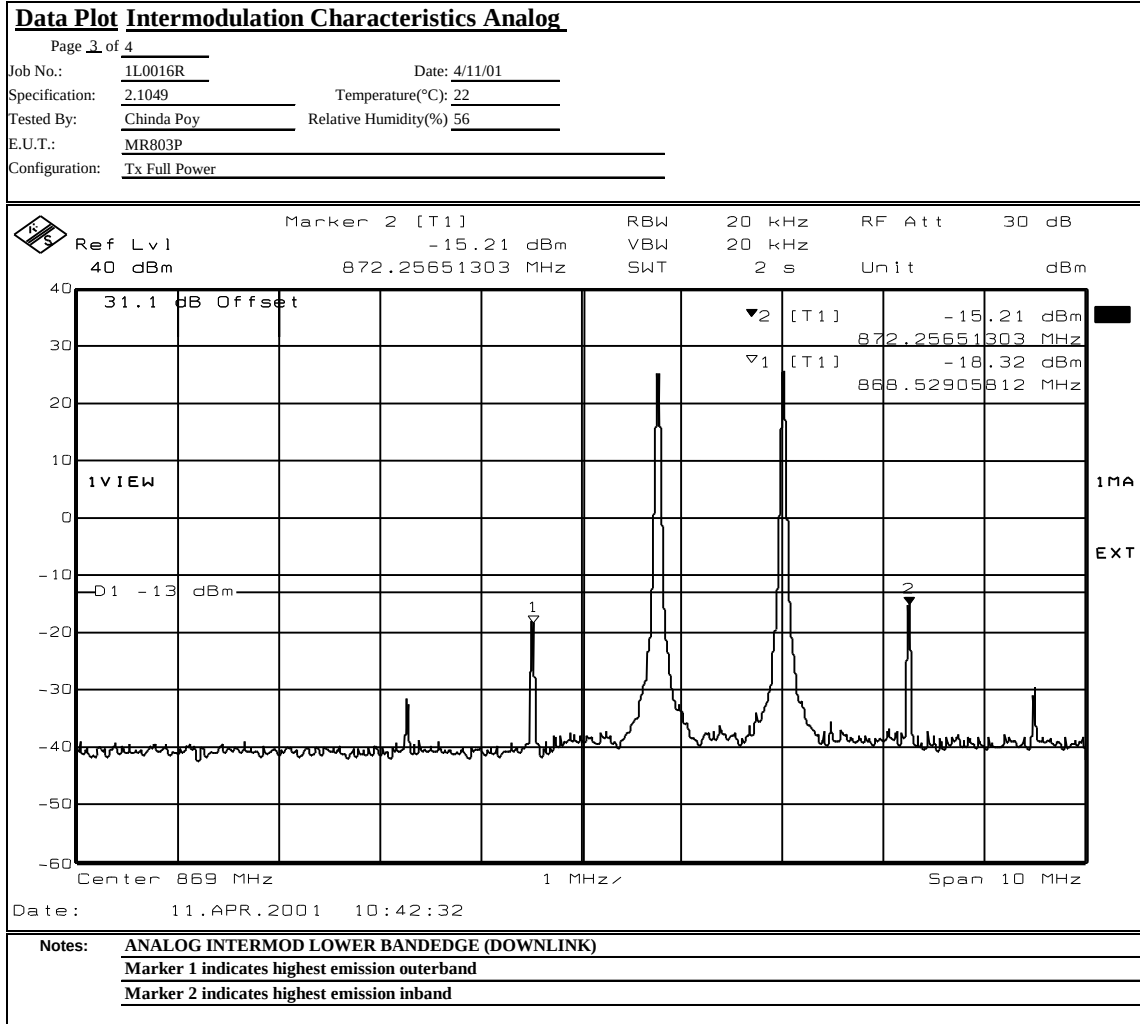
Data Plot		Intermodulation Characteristics Analog	
Page 1 of 4		Complete _____	
Job No.:	1L0016R	Date:	4/11/01
Specification:	2.1049	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%):	56
E.U.T.:	MR803P		
Configuration:	Tx Full Power		
Sample Number:	S01		
Location:	Lab 1	RBW:	Refer to plots
Detector Type:	Peak	VBW:	Refer to plots
Test Equipment Used			
Antenna:		Directional Coupler:	
Pre-Amp:		Cable #1:	1082
Filter:		Cable #2:	
Receiver:	1036	Cable #3:	
Attenuator #1:	1065	Cable #4:	
Attenuator #2:	1064	Mixer:	
Additional equipment used:			
Measurement Uncertainty:	+/-3.6 dB		
			
Date: 11.APR.2001 10:28:00			
Notes: ANALOG INTERMOD LOWER BANDEDGE (UPLINK)			
Marker 1 indicates highest emission outerband			
Marker 2 indicates highest emission inband			

EQUIPMENT: **MR803P**

PROJECT NO.: **1L0016RUS1**

Test Data – Spurious Emissions at Antenna Terminals

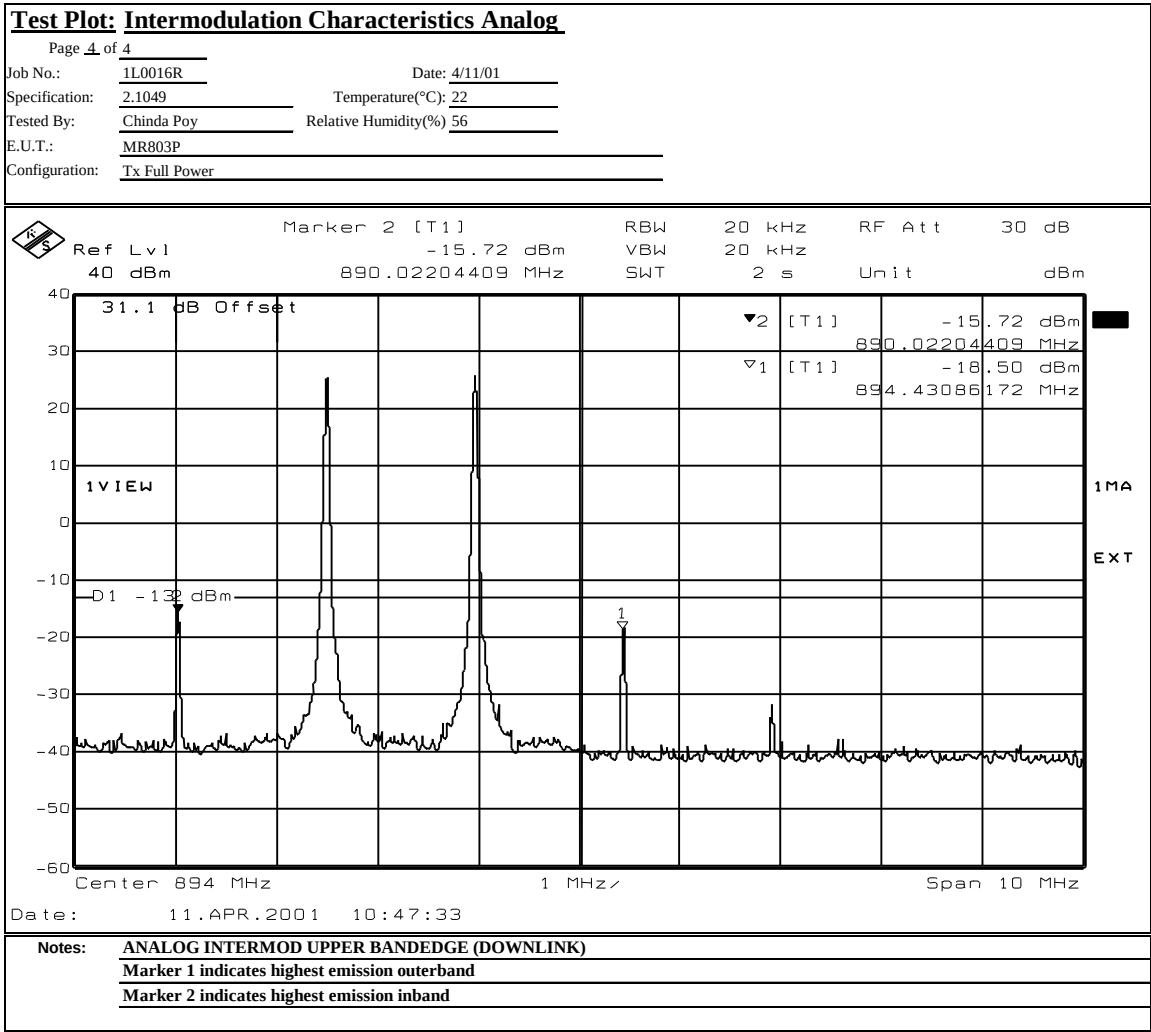


EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****Test Data – Spurious Emissions at Antenna Terminals**

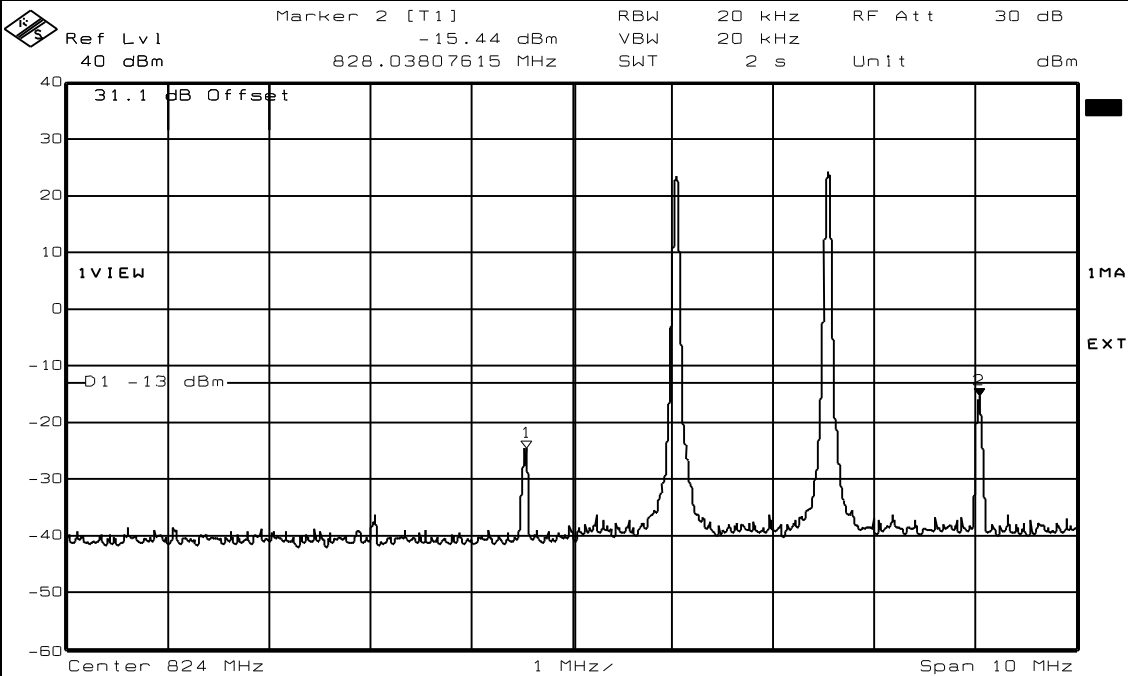
EQUIPMENT: **MR803P**

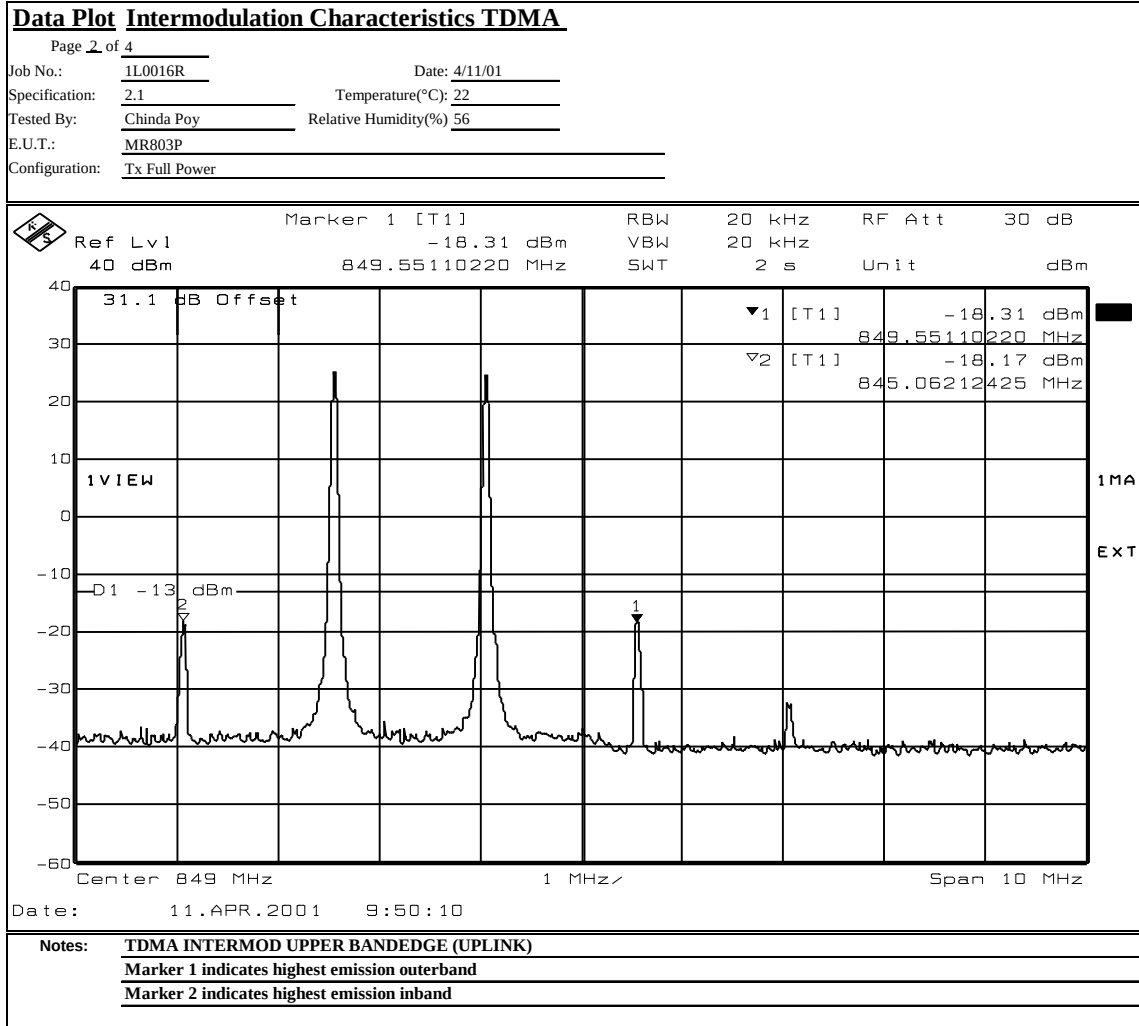
PROJECT NO.: **1L0016RUS1**

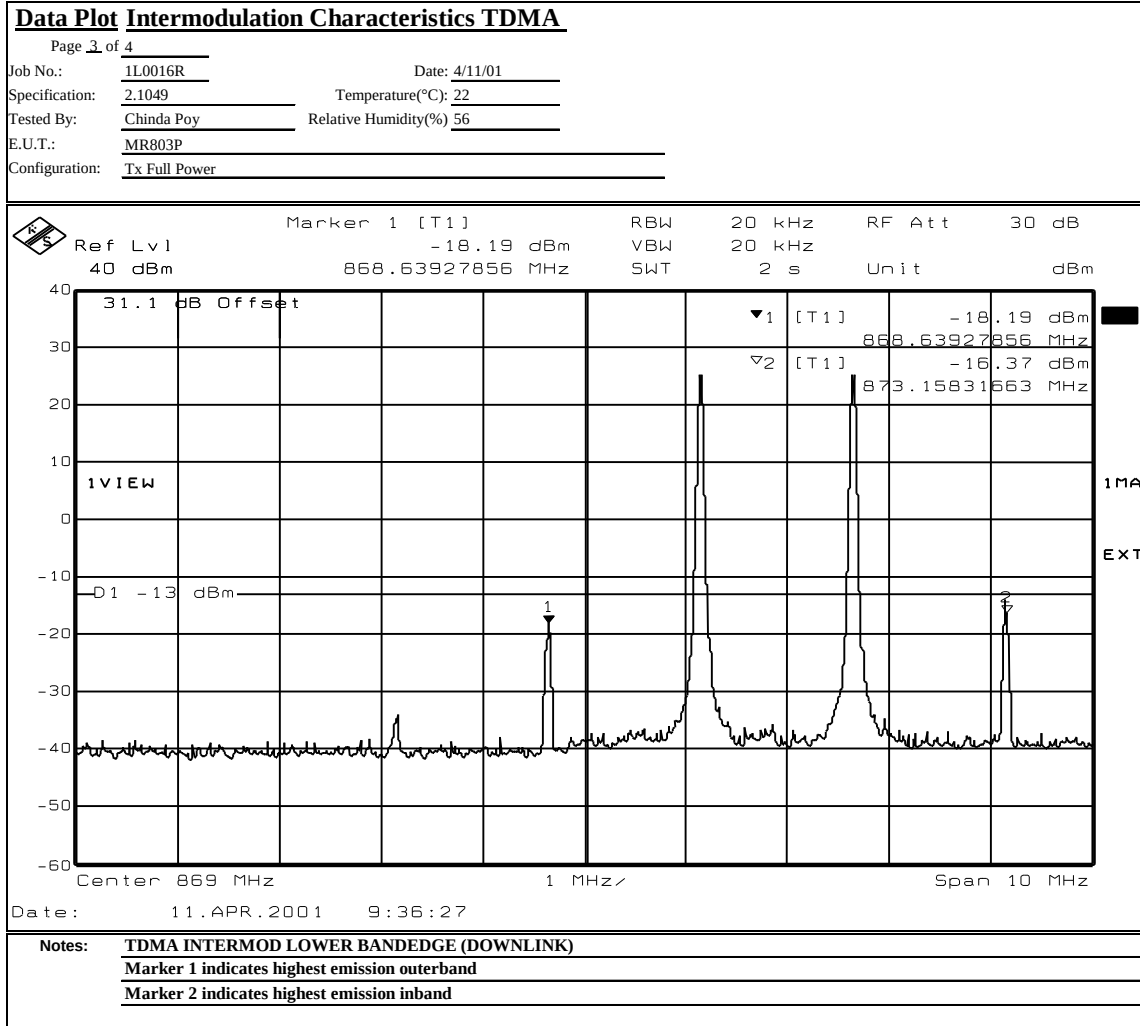
Test Data – Spurious Emissions at Antenna Terminals



EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****Test Data – Spurious Emissions at Antenna Terminals**

Data Plot		Intermodulation Characteristics TDMA	
Page 1 of 4		Complete _____	
Job No.:	1L0016R	Date:	4/11/01
Specification:	2.1049	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%):	56
E.U.T.:	MR803P		
Configuration:	Tx Full Power		
Sample Number:	S01		
Location:	Lab 1	RBW:	Refer to plots
Detector Type:	Peak	VBW:	Refer to plots
Test Equipment Used			
Antenna:		Directional Coupler:	
Pre-Amp:		Cable #1:	1082
Filter:		Cable #2:	
Receiver:	1036	Cable #3:	
Attenuator #1:	1065	Cable #4:	
Attenuator #2:	1064	Mixer:	
Additional equipment used:			
Measurement Uncertainty:	+/-3.6 dB		
			
Notes: TDMA INTERMOD LOWER BANDEDGE (UPLINK)			
Marker 1 indicates highest emission outerband			
Marker 2 indicates highest emission inband			

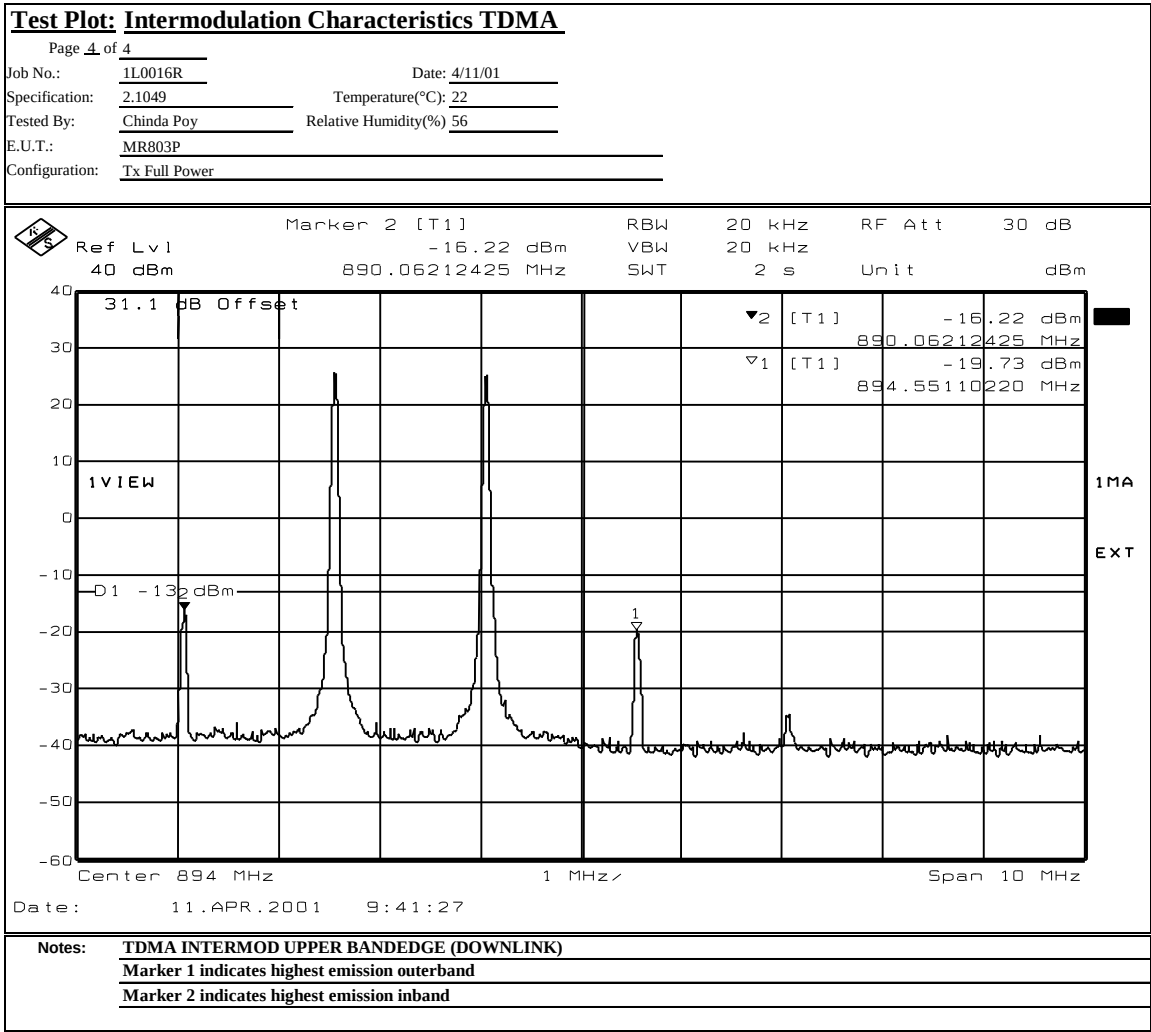
EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****Test Data – Spurious Emissions at Antenna Terminals**

EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****Test Data – Spurious Emissions at Antenna Terminals**

EQUIPMENT: **MR803P**

PROJECT NO.: **1L0016RUS1**

Test Data – Spurious Emissions at Antenna Terminals



EQUIPMENT: **MR803P**

PROJECT NO.: **1L0016RUS1**

Section 6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious	PARA. NO.: 2.1053
TESTED BY: Chinda PoyTom Tidwell	DATE: 4/11/01

Test Results: **Complies.**

Test Data: **See attached table.**

Equipment Used: **1016-1464-1043-1484-1485**

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

Temperature: **22 °C**

Relative Humidity: **50 %**

EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****Test Data – Field Strength of Spurious Emissions**

Field Strength of Spurious Emissions										
Page <u>1</u> of <u>2</u>						Complete _____				
Job No.: 1L0016R		Date: 4/11/01				Preliminary <u>X</u>				
Specification: Part 22		Temperature(°C): <u>22</u>								
Tested By: Chinda Poy		Relative Humidity(%) <u>56</u>								
E.U.T.: MR803P										
Configuration: Tx Full Power										
Sample No: S01										
Location: AC 3		RBW: 1 MHz		Measurement						
Detector Type: Peak		VBW: 1 MHz		Distance: <u>3</u> m						
Test Equipment Used										
Antenna:		Directional Coupler:								
Pre-Amp: 1016		Cable #1: 1043								
Filter:		Cable #2: 1484								
Receiver: 1464		Cable #3: 1485								
Attenuator #1:		Cable #4:								
Attenuator #2:		Mixer:								
Additional equipment used:										
Measurement Uncertainty: +/-3.6 dB										
Frequency (MHz)	Meter Reading (dBm)	Correction Factor (dB)		Pre-Amp Gain (dB)	Substitution Antenna Gain (dBd)		ERP (dBm)	ERP (mW)	Polarity	Comments
1762	-59.2	29.9		32.9	6.4		-55.9	0.000003	V	Downlink / NF
2643	-59.8	35.6		33.3	8.0		-49.6	0.000011	V	Downlink / NF
3524	-60.5	40.4		33.6	8.0		-45.7	0.000027	V	Downlink / NF
4405	-61.7	42.8		33.2	7.9		-44.1	0.000039	V	Downlink / NF
5286	-62.5	40.6		32.8	9.1		-45.6	0.000027	V	Downlink / NF
6167	-62.2	37.9		32	9.5		-46.8	0.000021	V	Downlink / NF
7048	-62.7	39.4		33.2	10.0		-46.5	0.000022	V	Downlink / NF
7929	-62.0	40.4		33.4	9.4		-45.5	0.000028	V	Downlink / NF
8810	-60.8	40.3		34.7	9.9		-45.3	0.000030	V	Downlink / NF
1762	-59.5	32.7		32.9	6.4		-53.4	0.000005	H	Downlink / NF
2643	-58.7	34.6		33.3	8.0		-49.4	0.000011	H	Downlink / NF
3524	-61.0	34.3		33.6	8.0		-52.3	0.000006	H	Downlink / NF
4405	-61.0	35.2		33.2	7.9		-51.1	0.000008	H	Downlink / NF
5286	-62.3	36.3		32.8	9.1		-49.8	0.000011	H	Downlink / NF
6167	-62.2	36.6		32	9.5		-48.1	0.000015	H	Downlink / NF
7048	-61.2	38.7		33.2	10.0		-45.7	0.000027	H	Downlink / NF
7929	-60.8	39.8		33.4	9.4		-45.0	0.000032	H	Downlink / NF
8810	-62.0	41.8		34.7	9.9		-44.9	0.000032	H	Downlink / NF
Notes: <u>Downlink 881 MHz</u>										

EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****Test Data – Field Strength of Spurious Emissions**

Field Strength of Spurious Emissions										
Page <u>2</u> of <u>2</u>								Complete _____		
Job No.: <u>1L0016R</u>				Date: <u>4/11/01</u>				Preliminary <u>X</u>		
Specification: <u>Part 22</u>				Temperature(°C): <u>22</u>						
Tested By: <u>Chinda Poy</u>				Relative Humidity(%) <u>56</u>						
E.U.T.: <u>MR803P</u>										
Configuration: <u>Tx Full Power</u>										
Sample No: <u>S01</u>										
Frequency (MHz)	Meter Reading (dBm)	Correction Factor (dB)		Pre-Amp Gain (dB)	Substitution Antenna Gain (dBd)		ERP (dBm)	ERP (mW)	Polarity	Comments
1674	-60.2	29.9		32.9	6.4		-56.9	0.000002	V	Uplink / NF
2511	-59.5	35.6		33.3	8.0		-49.3	0.000012	V	Uplink / NF
3348	-61.0	37.1		33.6	8.1		-49.4	0.000011	V	Uplink / NF
4185	-60.5	42.8		33.2	7.9		-43.0	0.000050	V	Uplink / NF
5022	-62.7	40.6		32.8	9.1		-45.8	0.000026	V	Uplink / NF
5859	-61.7	38.5		32	9.1		-46.1	0.000024	V	Uplink / NF
6696	-62.0	38.3		33.2	10.1		-46.8	0.000021	V	Uplink / NF
7533	-62.5	40.4		33.4	9.4		-46.0	0.000025	V	Uplink / NF
8370	-61.5	41.6		34.7	9.7		-44.9	0.000033	V	Uplink / NF
1674	-59.7	32.7		32.9	6.4		-53.6	0.000004	H	Uplink / NF
2511	-60.3	34.6		33.3	8.0		-51.0	0.000008	H	Uplink / NF
3348	-61.2	35.8		33.6	8.1		-50.9	0.000008	H	Uplink / NF
4185	-61.5	35.2		33.2	7.9		-51.6	0.000007	H	Uplink / NF
5022	-62.5	36.3		32.8	9.1		-50.0	0.000010	H	Uplink / NF
5859	-62.8	36.0		32	9.1		-49.7	0.000011	H	Uplink / NF
6696	-61.7	37.8		33.2	10.1		-46.9	0.000020	H	Uplink / NF
7533	-62.3	39.8		33.4	9.4		-46.5	0.000022	H	Uplink / NF
8370	-62.0	42.2		34.7	9.7		-44.8	0.000033	H	Uplink / NF
Notes: <u>Scanned spectrum to the 10th harmonic of carrier</u>										

EQUIPMENT: **MR803P**

PROJECT NO.: **1L0016RUS1**

Section 7. Frequency Stability

NAME OF TEST: Frequency Stability	PARA. NO.: 2.1055
TESTED BY: Tom Tidwell	DATE:

Test Results: **Complies.**

Test Data: **See attached table**
Standard Test Frequency: **1900 MHz**
Standard Test Voltage: **10 V**

Equipment Used:

Measurement Uncertainty: **± 1.0 ppm**

Temperature: **23 °C**

Relative Humidity: **50 %**

Not Applicable

EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****Section 8. Test Equipment List**

ASSET	Description	Manufacturer Model Number	Serial Number	Cal. Date	Cal. Due
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	06/14/99	06/14/01
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	01/02/01	01/02/02
1064	ATTENUATOR	NARDA 776B-20	NONE	CBU	N/A
1065	ATTENUATOR	NARDA 776B-10	NONE	CBU	N/A
1082	CABLE 2m	Astrolab 32027-2-29094-72TC	N/A	05/23/00	05/23/01
1016	AMPLIFIER	HEWLETT PACKARD 8449A	2749A00159	05/24/00	05/24/01
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	01/02/01	01/02/02
1484	Cable 2.0-18.0 Ghz	Storm PR90-010-072	N/A	05/25/00	05/25/01
1485	Cable 2.0-18.0 Ghz	Storm PR90-010-216	N/A	05/25/00	05/25/01

ANNEX A - TEST DETAILS

EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****NAME OF TEST: RF Power Output****PARA. NO.: 2.1046**

Minimum Standard: Para. No. 22.913(a). The maximum effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 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: **MR803P**PROJECT NO.: **1L0016RUS1**

NAME OF TEST: Occupied Bandwidth (Voice & SAT)	PARA. NO.: 2.1049
---	--------------------------

Minimum Standard: 22.917(c) The mean power of any emission removed from the carrier frequency by a displacement frequency (f_d in kHz) must be attenuated below the mean power of the unmodulated carrier (P) as follows:

- (i) On any frequency removed from the carrier frequency by more than 12 kHz but not more than 20 kHz:

at least $117 \log(f_d/12)$

- (ii) On any frequency removed from the carrier frequency by more than 20 kHz, up to the first multiple of the carrier frequency:

at least $100 \log(f_d/11)$ dB or $43 + 10 \log(P)$ dB, whichever is the lesser attenuation.

Method Of Measurement:

Spectrum Analyzer Settings:

RBW: 300 Hz

VBW: $\geq$ RBW

Span: 100 kHz

Sweep: Auto

Input Signal Characteristics (F3E/F3D):

RF level: Maximum recommended by manufacturer

AF1 frequency: 6 kHz

AF1 level: sufficient to produce 2 kHz deviation

AF2 frequency: 2.5 kHz

AF2 level: sufficient to produce 12 kHz deviation.

EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****NAME OF TEST: Occupied Bandwidth (WB Data)****PARA. NO.: 2.1049**

Minimum Standard: 22.917(c) The mean power of any emission removed from the carrier frequency by a displacement frequency (f_d in kHz) must be attenuated below the mean power of the unmodulated carrier (P) as follows:

(1) On any frequency removed from the carrier frequency by more than 20 kHz but not more than 45 kHz:

at least 26 dB

(2) On any frequency removed from the carrier frequency by more than 45 kHz but not more than 90 kHz:

at least 45 dB

(3) On any frequency removed from the carrier frequency by more than 90 kHz, up to the first multiple of the carrier frequency:

at least 60 dB or $43 + 10 \log (P)$ dB, whichever is the lesser attenuation.

Method Of Measurement:

Spectrum Analyzer Settings:

RBW: 300 Hz

VBW: $\geq$ RBW

Span: 200 kHz

Sweep: Auto

Input Signal Characteristics:

RF level: Maximum recommended by manufacturer

AF1 frequency: 10 kHz, random bit sequence

AF1 level: sufficient to produce 8 kHz deviation

EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****NAME OF TEST: Occupied Bandwidth (ST)****PARA. NO.: 2.1049**

Minimum Standard: 22.917(c) The mean power of any emission removed from the carrier frequency by a displacement frequency (f_d in kHz) must be attenuated below the mean power of the unmodulated carrier (P) as follows:

(1) On any frequency removed from the carrier frequency by more than 20 kHz but not more than 45 kHz:

at least 26 dB

(2) On any frequency removed from the carrier frequency by more than 45 kHz but not more than 90 kHz:

at least 45 dB

(3) On any frequency removed from the carrier frequency by more than 90 kHz, up to the first multiple of the carrier frequency:

at least 60 dB or $43 + 10 \log (P)$ dB, whichever is the lesser attenuation.

Method Of Measurement:

Spectrum Analyzer Settings:

RBW: 300 Hz

VBW: $\geq$ RBW

Span: 200 kHz

Sweep: Auto

Input Signal Characteristics:

RF level: Maximum recommended by manufacturer

AF1 frequency: 10 kHz tone

AF1 level: sufficient to produce 8 kHz deviation

EQUIPMENT: **MR803P**

PROJECT NO.: **1L0016RUS1**

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

Minimum Standard: Not defined by FCC. Input vs. Output.

Method Of Measurement:

Spectrum Analyzer Settings:

RBW: CDMA (30 kHz), GSM (30 kHz), NADC (1 kHz) and CDPD (1 kHz)

VBW: $\geq$ RBW

Span: As required

Sweep: Auto

Input Signal Characteristics:

RF level: Maximum recommended by manufacturer

EQUIPMENT: **MR803P**

PROJECT NO.: **1L0016RUS1**

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

Minimum Standard:

Para. No. 22.917(e). The mean power of emissions must be attenuated below the mean power of the unmodulated carrier on any frequency twice or more than twice the fundamental emission by at least $43 + 10 \log P$. This is equivalent to -13 dBm absolute power.

Method Of Measurement:

Spectrum Analyzer Settings:

RBW: 30 kHz (AMPS). As required for digital modulations.

VBW: $\geq$ RBW

Start Frequency: 0 MHz

Stop Frequency: 10 GHz

Sweep: Auto

EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****NAME OF TEST: Field Strength of Spurious Radiation****PARA. NO.: 2.1053****Minimum Standard:**

Para. No. 22.917(e). The mean power of emissions must be attenuated below the mean power of the unmodulated carrier on any frequency twice or more than twice the fundamental emission by at least $43 + 10 \log P$. This is equivalent to -13 dBm absolute power.

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)

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

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

For emissions > 1 GHz:

$G = 1$ (Isotropic Gain)

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

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

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

The spectrum is searched to 10 GHz.

EQUIPMENT: **MR803P**PROJECT NO.: **1L0016RUS1****NAME OF TEST: Frequency Stability****PARA. NO.: 2.1055**

Minimum Standard: Para. No. 22.355. The transmitter carrier frequency shall remain within the tolerances given in Table C-1.

Table C-1

Freq. Range (MHz)	Base, fixed	Mobile > 3 W	Mobile ≤ 3 W
821 to 896	1.5	2.5	2.5

Method Of Measurement:Frequency Stability With Voltage Variation:

The E.U.T. is placed in an environmental chamber and allowed to stabilize at +20 degrees Celsius for at least 15 minutes. The frequency counter and signal generator are phase locked with the same 10 MHz reference frequency by connecting the 10 MHz ref. out of the counter to the 10 MHz ref, in of the signal generator. With the voltage input to the E.U.T. set to 85% S.T.V., the frequency is measured in 30 second intervals for a period of 5 minutes. This procedure is repeated at 100% S.T.V. and 115% S.T.V.

Frequency Stability With Temperature Variation:

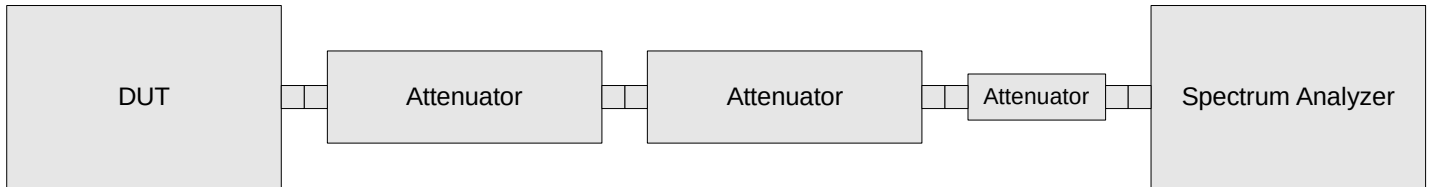
The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30 second intervals for a period of 5 minutes.

ANNEX B - TEST DIAGRAMS

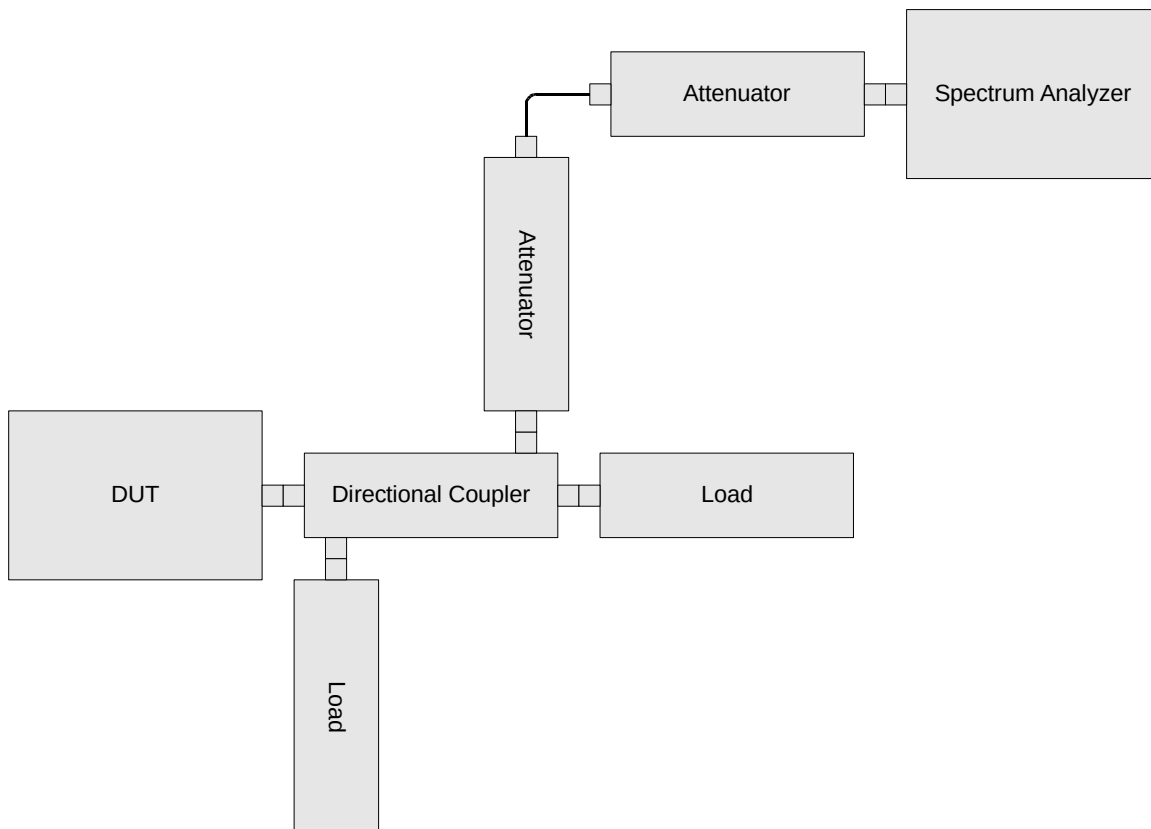
EQUIPMENT: **MR803P**

PROJECT NO.: **1L0016RUS1**

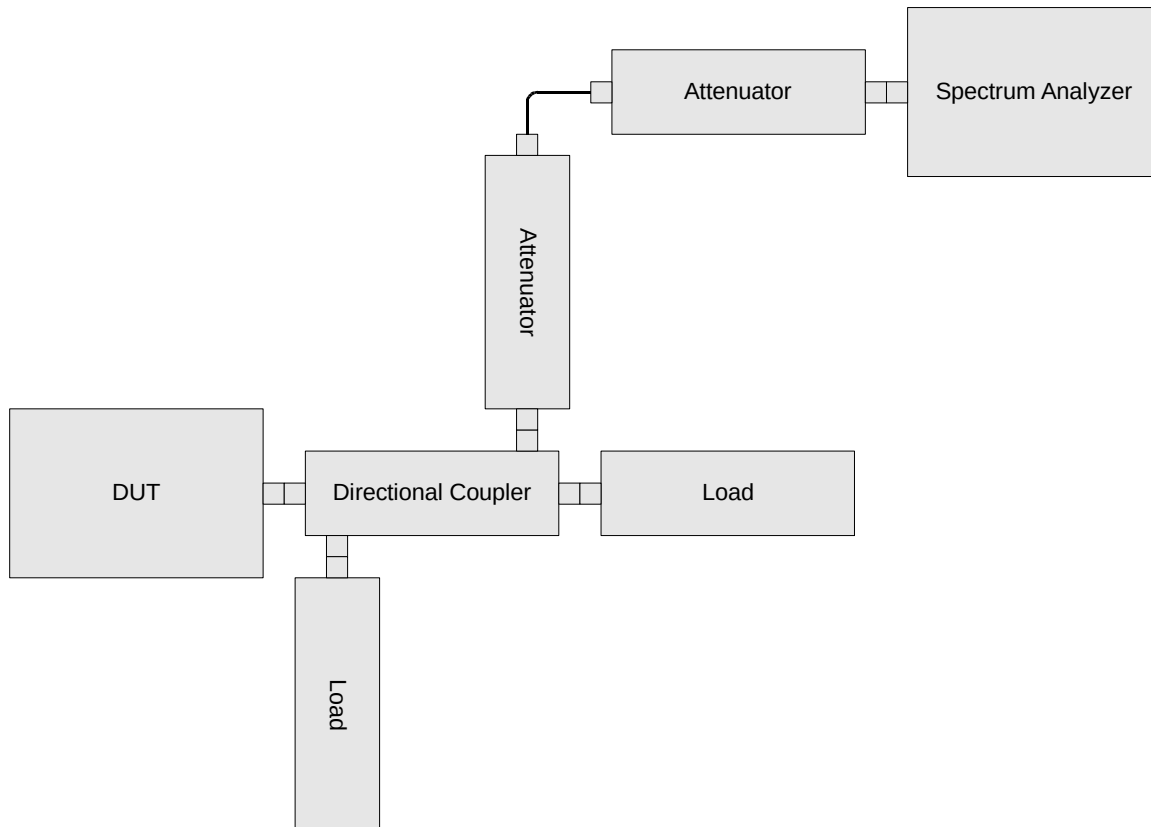
Para. No. 2.1046 - R.F. Power Output

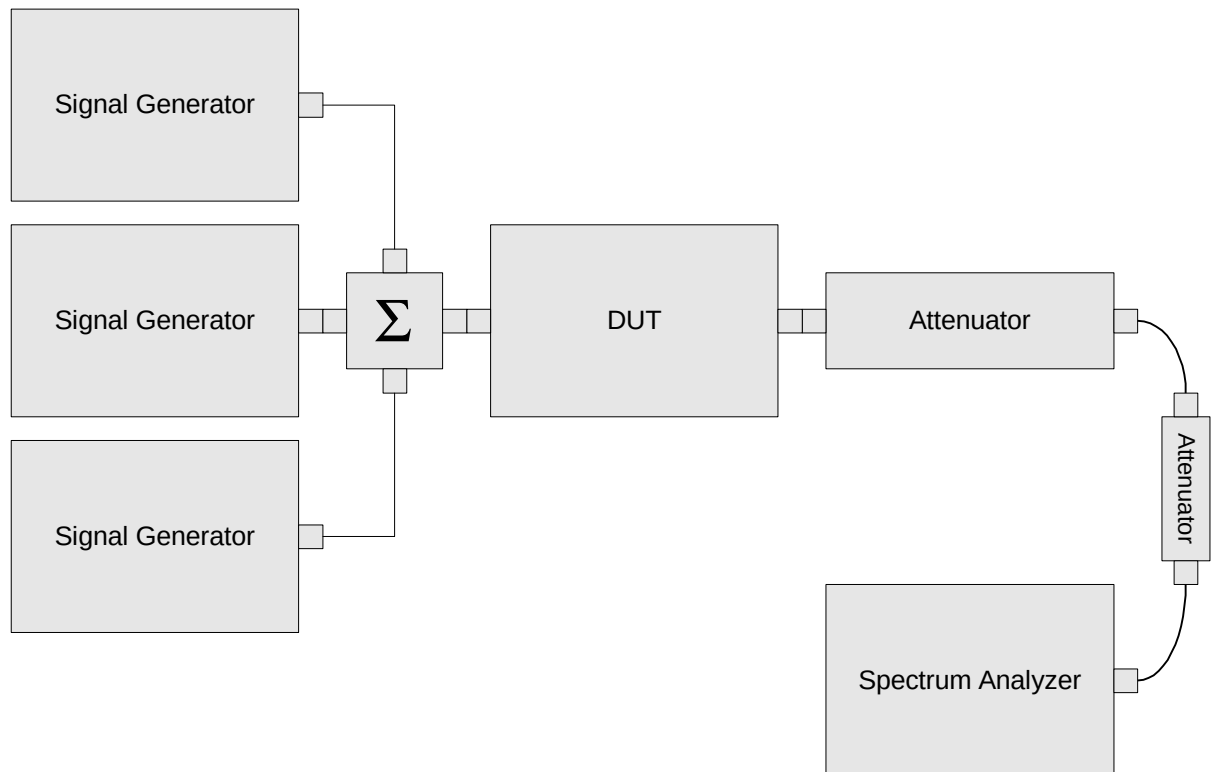


Para. No. 2.1049 - Occupied Bandwidth

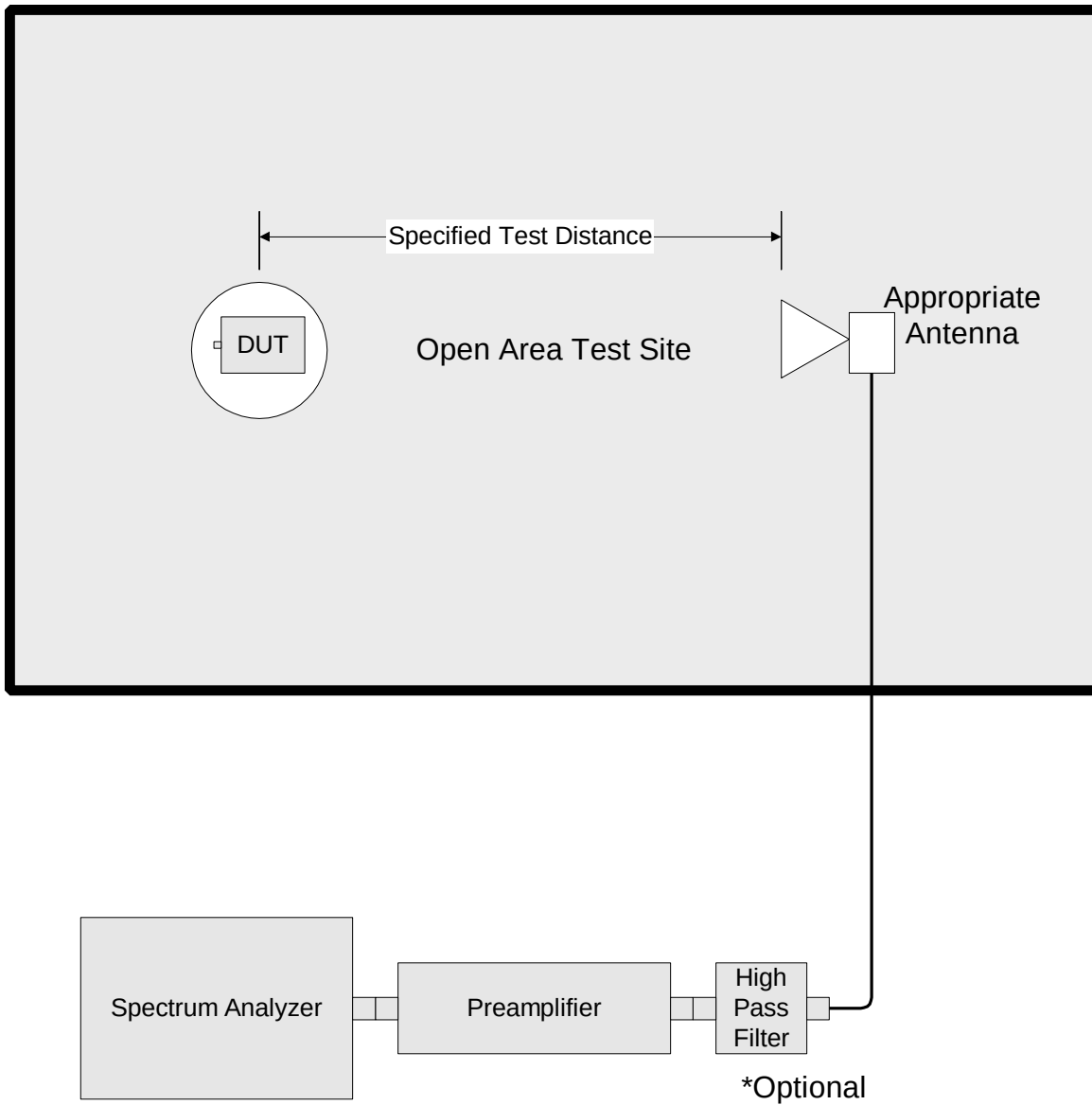


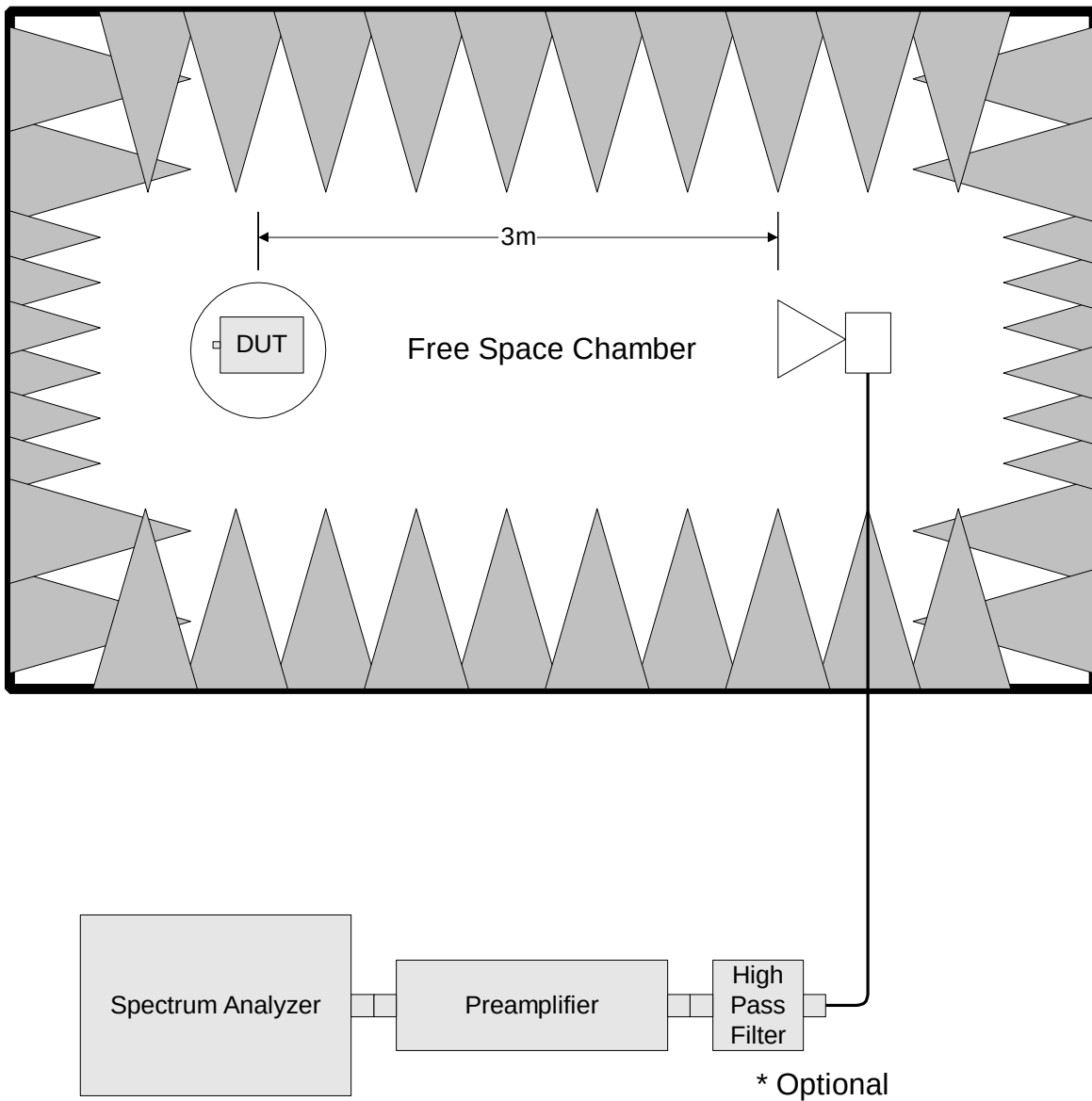
Para. No. 2.1051 Spurious Emissions at Antenna Terminals





Para. No. 2.1053 - Field Strength of Spurious Radiation





Para. No. 2.1055 - Frequency Stability

