NEMKO Test Report:	**1L0016RUS1**
Applicant:	**Allen Telecom Systems**
Equipment Under Test: (E.U.T.)	**MR803P**
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

Manufacturer: 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

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.

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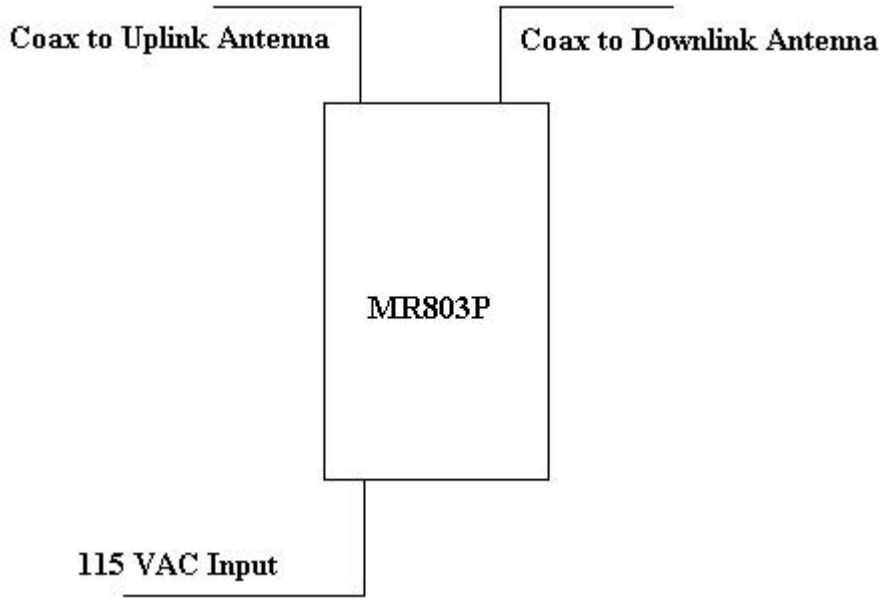
Section 2. General Equipment Specification

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** ☒

Description of Operation

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

System Diagram



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 %

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 %

Test Data – Occupied Bandwidth- Voice

Data Plot Occupied Bandwidth Analog

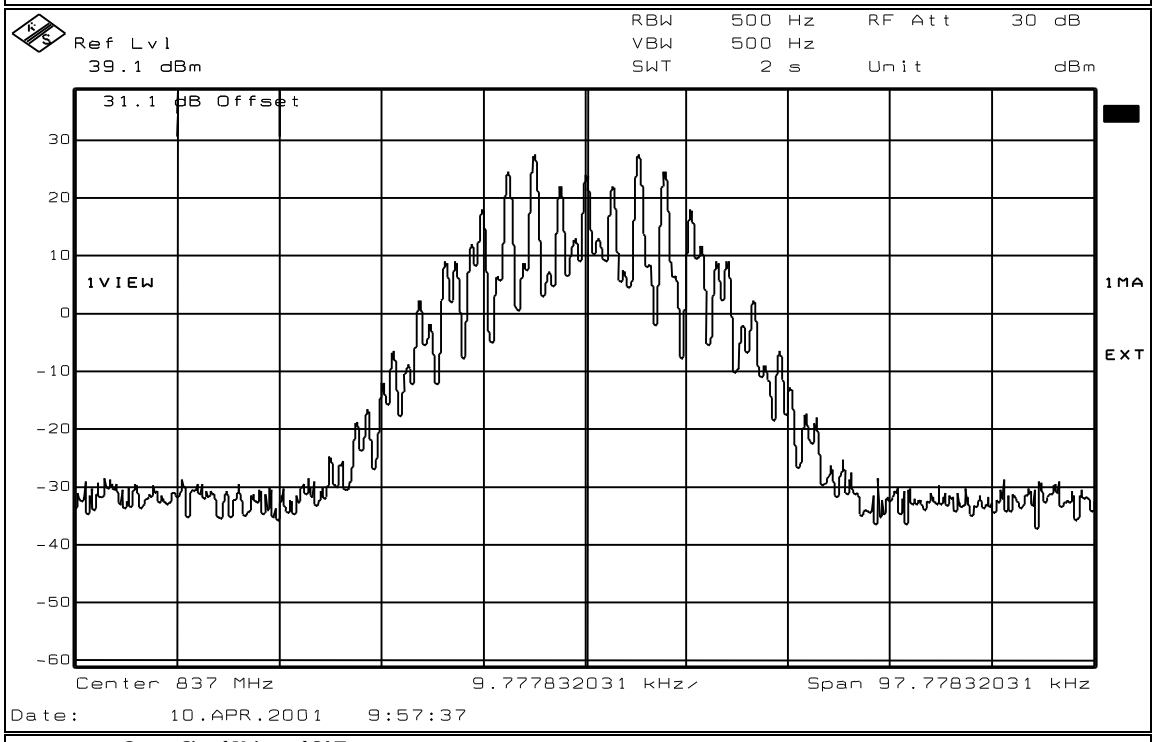
Page 1 of 4

Complete ____
Preliminary X

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



Notes: **Output Signal Voice and SAT**
UPLINK

Test Data – Occupied Bandwidth- Voice

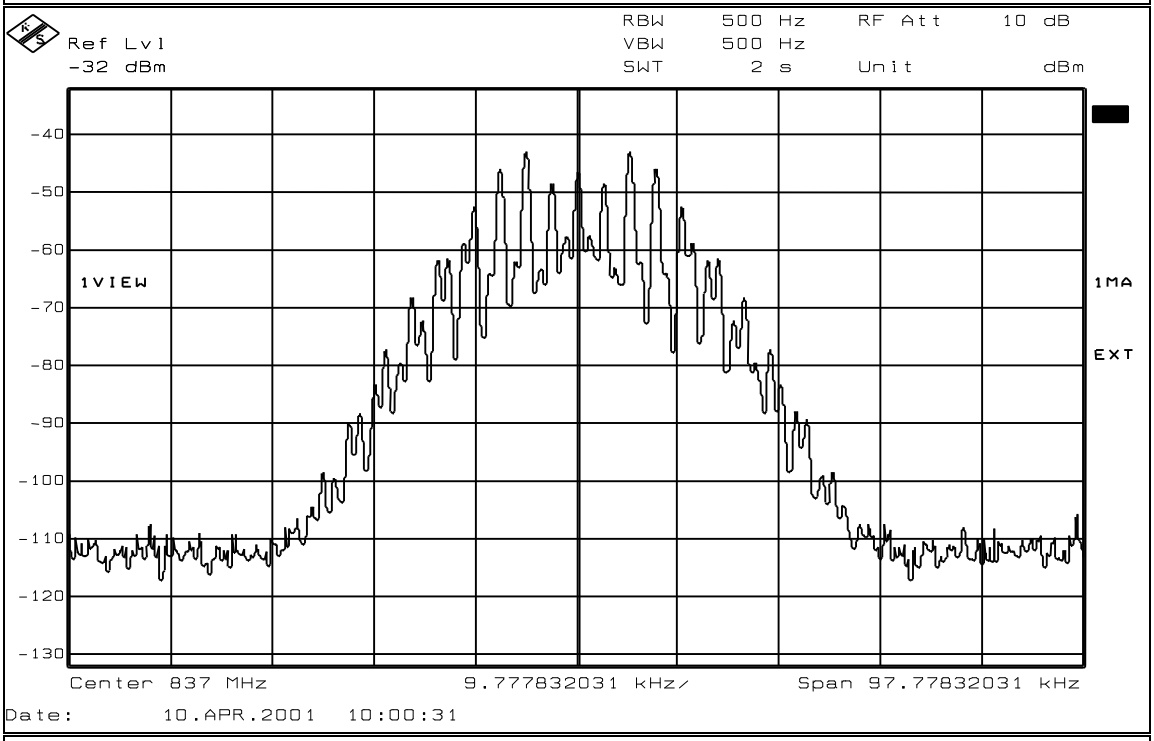
Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

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		



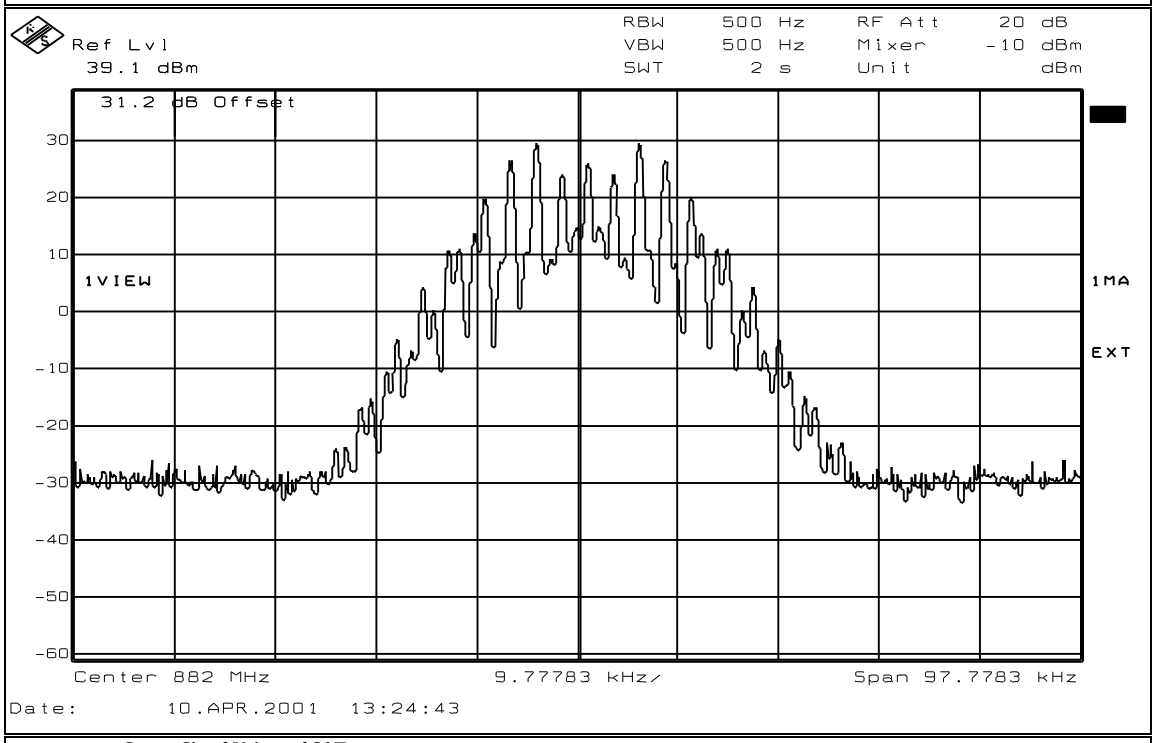
Notes: **Input Signal Voice and SAT**
UPLINK

Test Data – Occupied Bandwidth- Voice

Data Plot Occupied Bandwidth Analog

Page 3 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



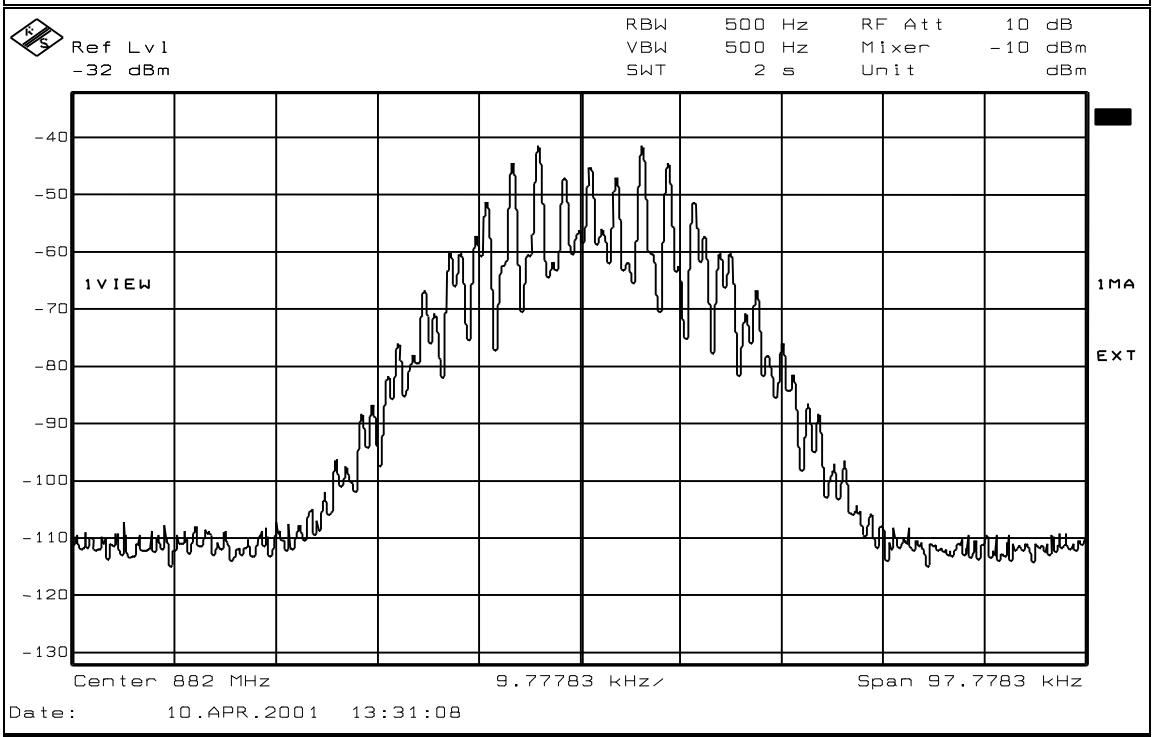
Notes: **Output Signal Voice and SAT**
DOWNLINK

Test Data – Occupied Bandwidth - Voice

Test Plot: Occupied Bandwidth Analog

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



Notes: **Input Signal Voice and SAT**
DOWNLINK

Test Data – Occupied Bandwidth - 2FSK

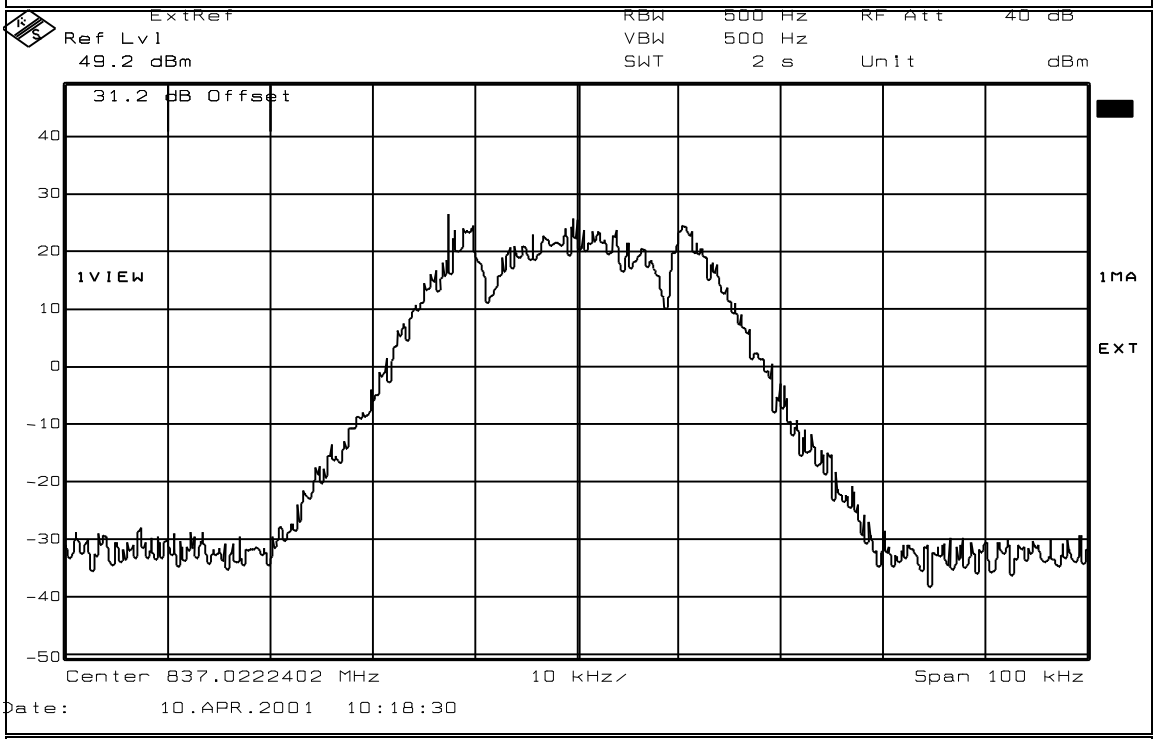
Data Plot Occupied Bandwidth 2FSK

Page 1 of 4 Complete ____
Job No.: 1L0016R Date: 4/10/01 Preliminary X
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



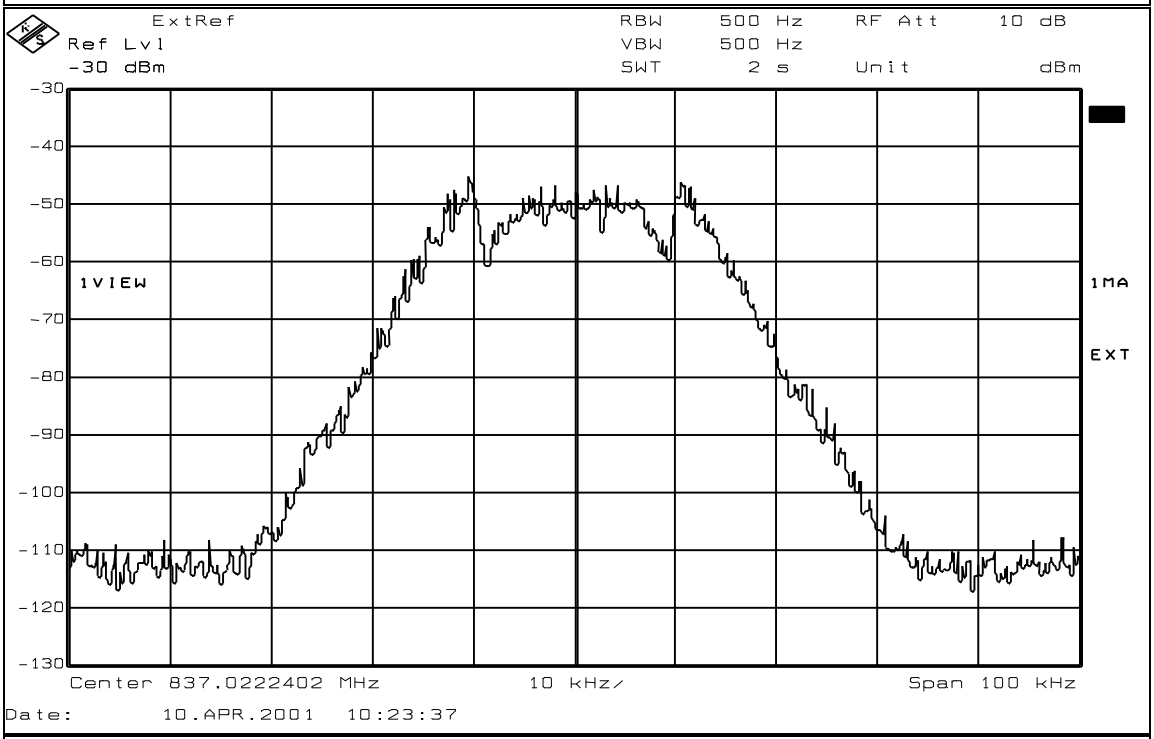
Notes: **Output Signal 2FSK**
UPLINK

Test Data – Occupied Bandwidth- 2FSK

Data Plot Occupied Bandwidth 2FSK

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



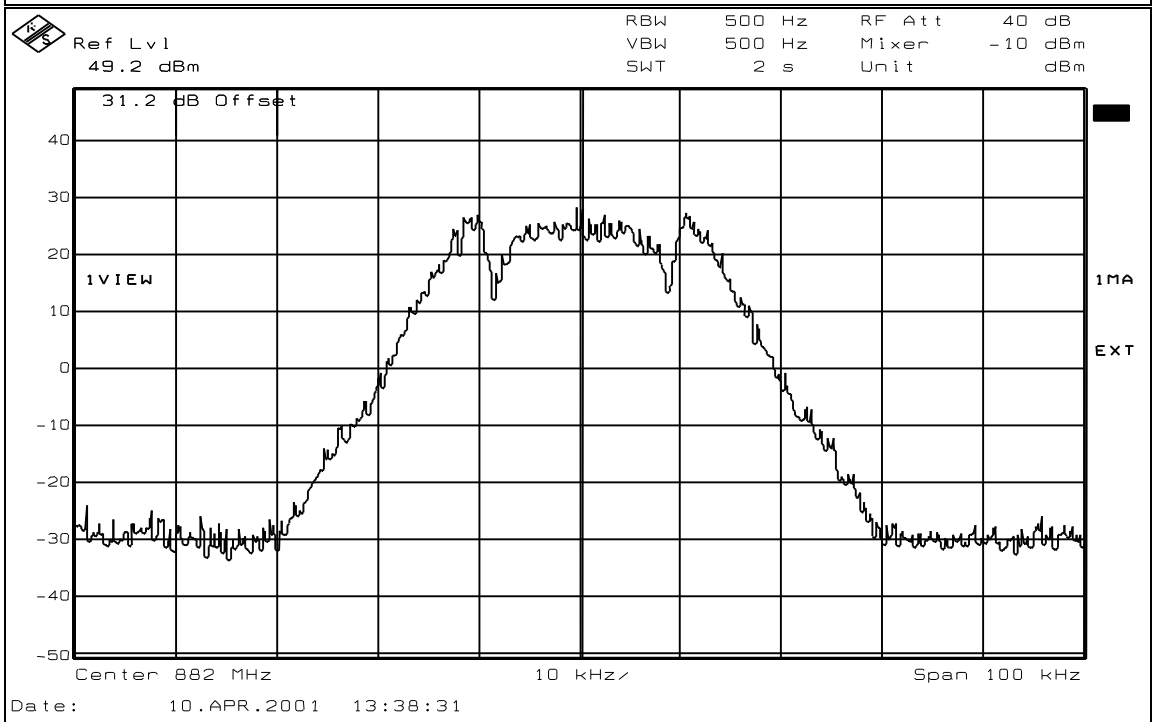
Notes: **Input Signal 2FSK**
UPLINK

Test Data – Occupied Bandwidth- 2FSK

Data Plot Occupied Bandwidth 2FSK

Page 3 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



Notes: **Output Signal 2FSK**
DOWNLINK

Test Data – Occupied Bandwidth- 2FSK

Test Plot: Occupied Bandwidth 2FSK

Page 4 of 4

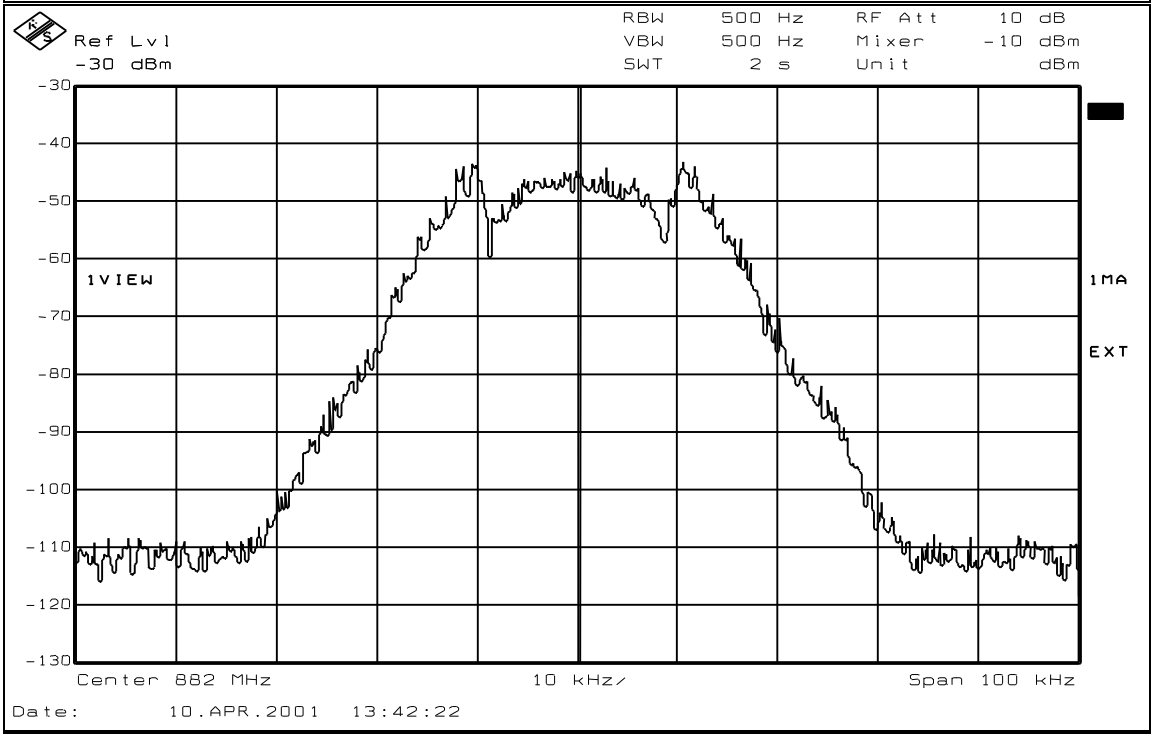
Job No.: 1L0016R Date: 4/10/01

Specification: 2.1049 Temperature(°C): 22

Tested By: Chinda Poy Relative Humidity(%) 50

E.U.T.: MR803P

Configuration: Tx Full Power



Notes: **Input Signal 2FSK**
DOWNLINK

Test Data – Occupied Bandwidth - TDMA

Data Plot Occupied Bandwidth TDMA

Page 1 of 4 Complete X

Job No.: 1L0016R Date: 4/10/01 Preliminary

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

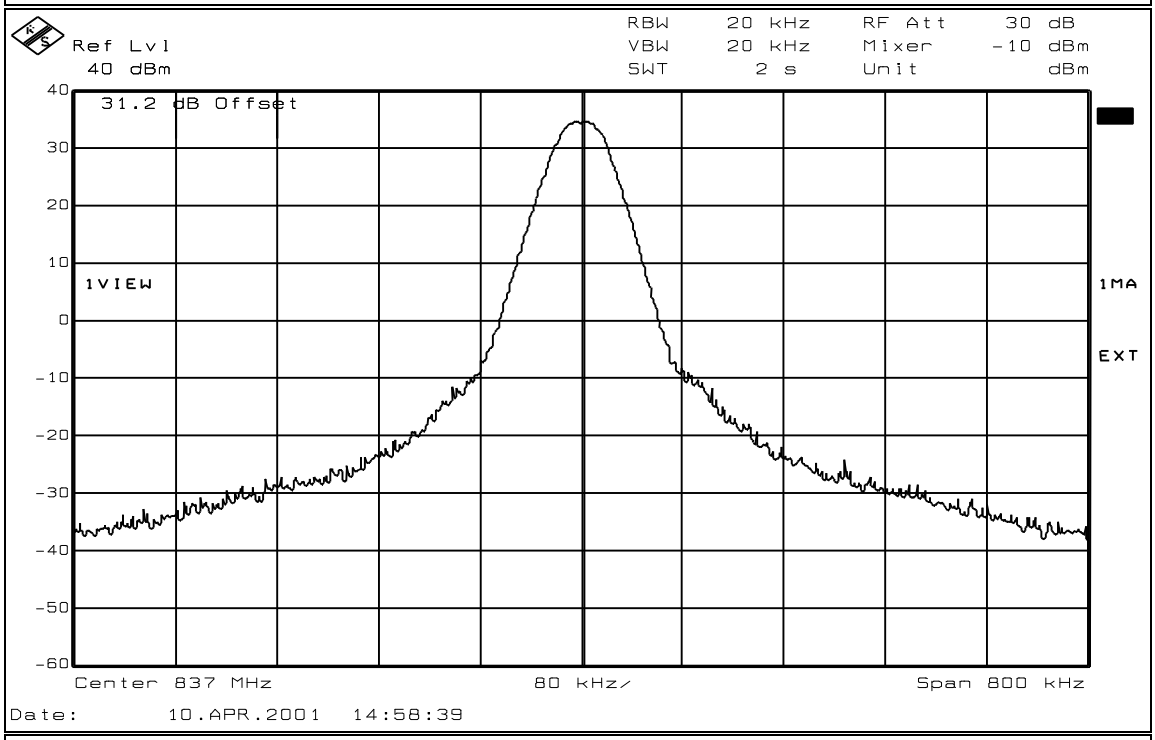
Detector Type: Peak VBW: Refer to plots

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



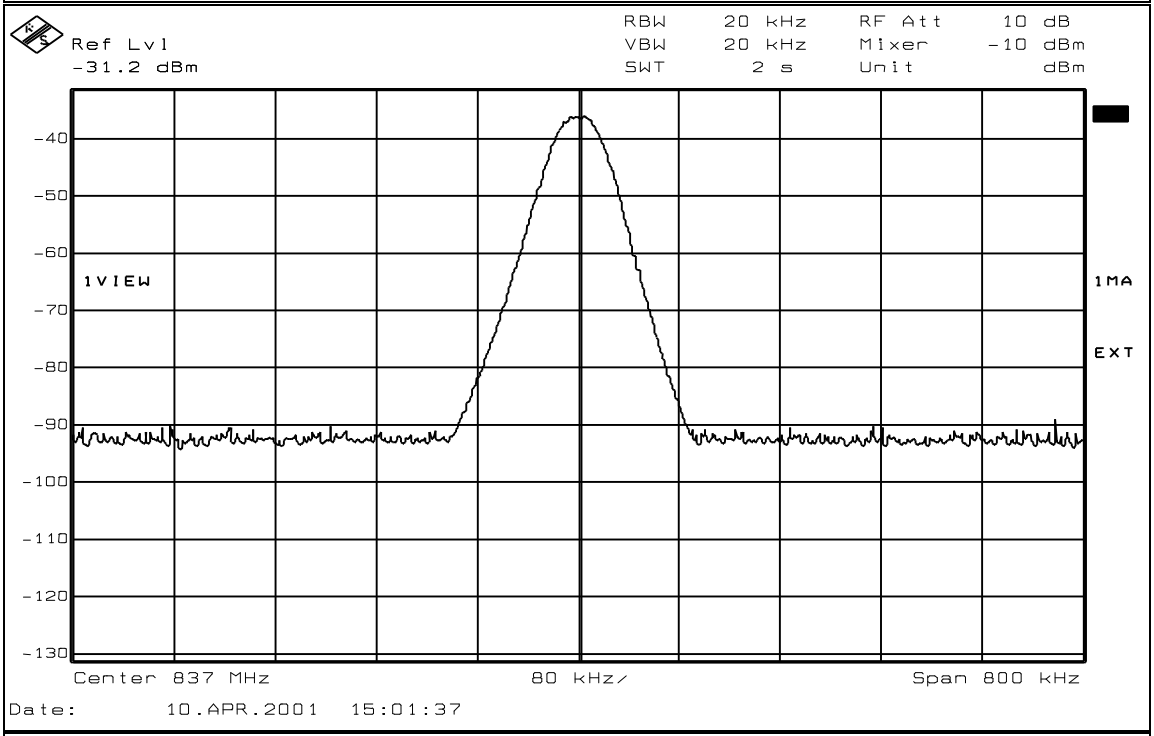
Notes: **Output Signal TDMA**
UPLINK

Test Data – Occupied Bandwidth- TDMA

Data Plot Occupied Bandwidth TDMA

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



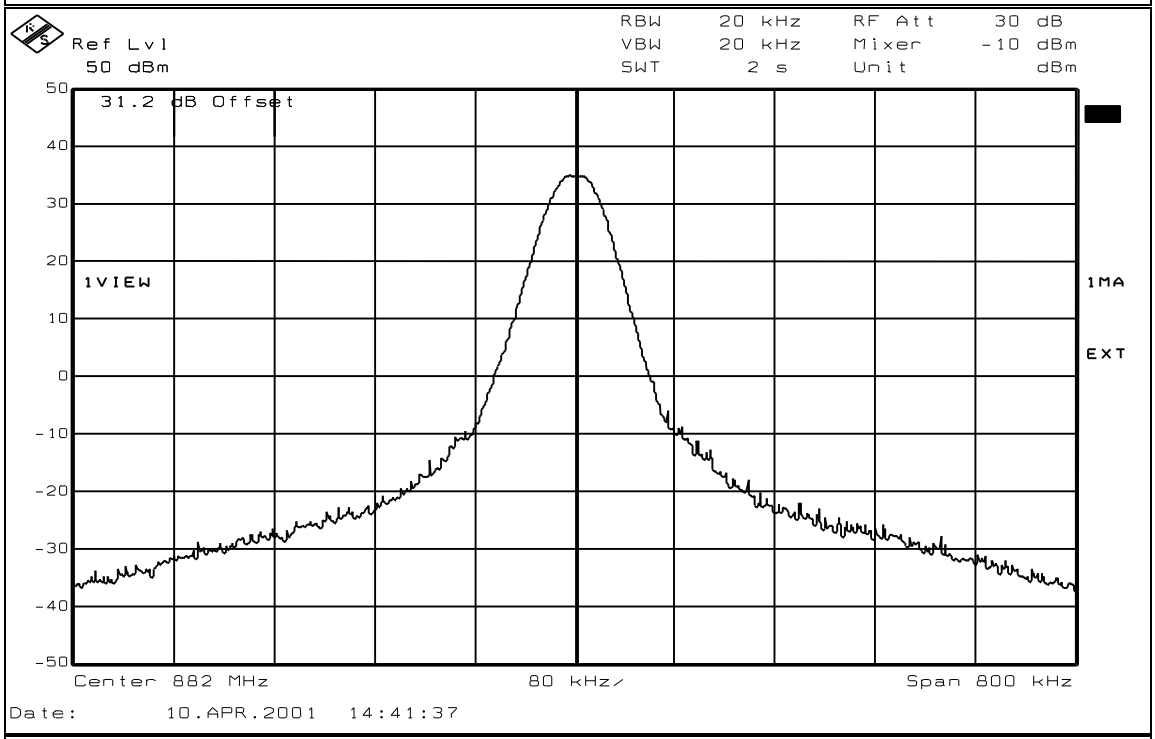
Notes: **Input Signal TDMA**
UPLINK

Test Data – Occupied Bandwidth- TDMA

Data Plot Occupied Bandwidth TDMA

Page 3 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



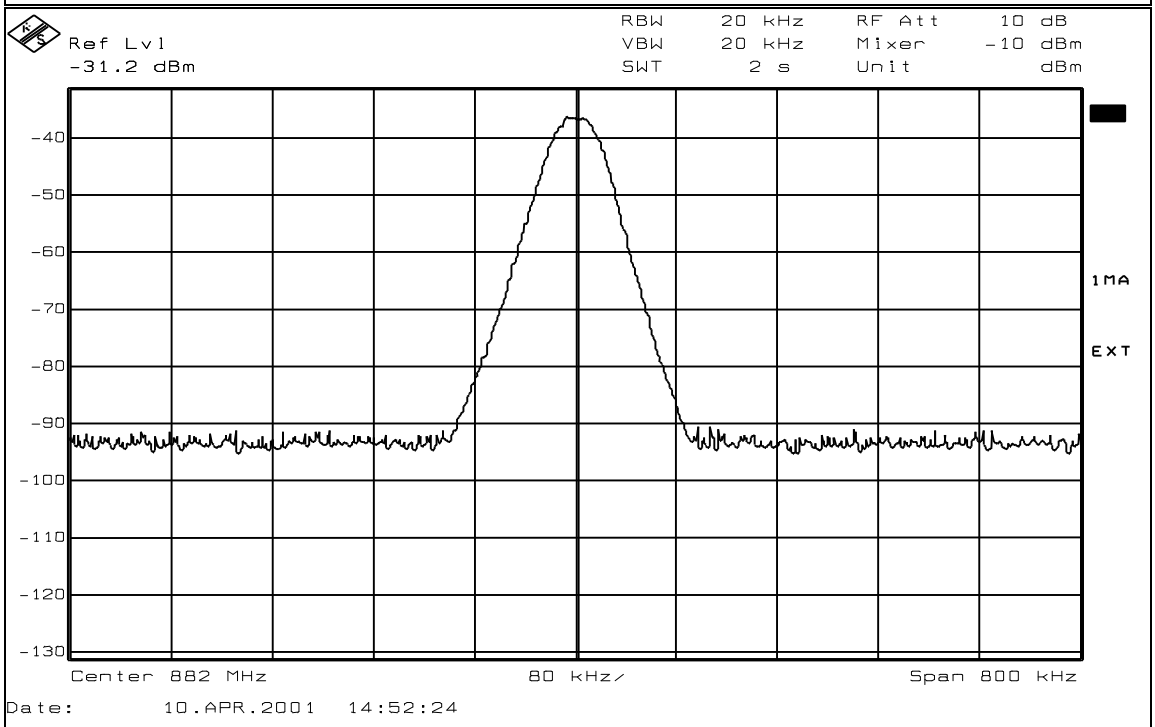
Notes: **Output Signal TDMA**
DOWNLINK

Test Data – Occupied Bandwidth- TDMA

Test Plot: Occupied Bandwidth TDMA

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



Notes: **Input Signal TDMA**
DOWNLINK

Test Data – Occupied Bandwidth - CDMA

Data Plot Occupied Bandwidth CDMA

Page 1 of 4 Complete X

Job No.: 1L0016R Date: 4/10/01 Preliminary

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

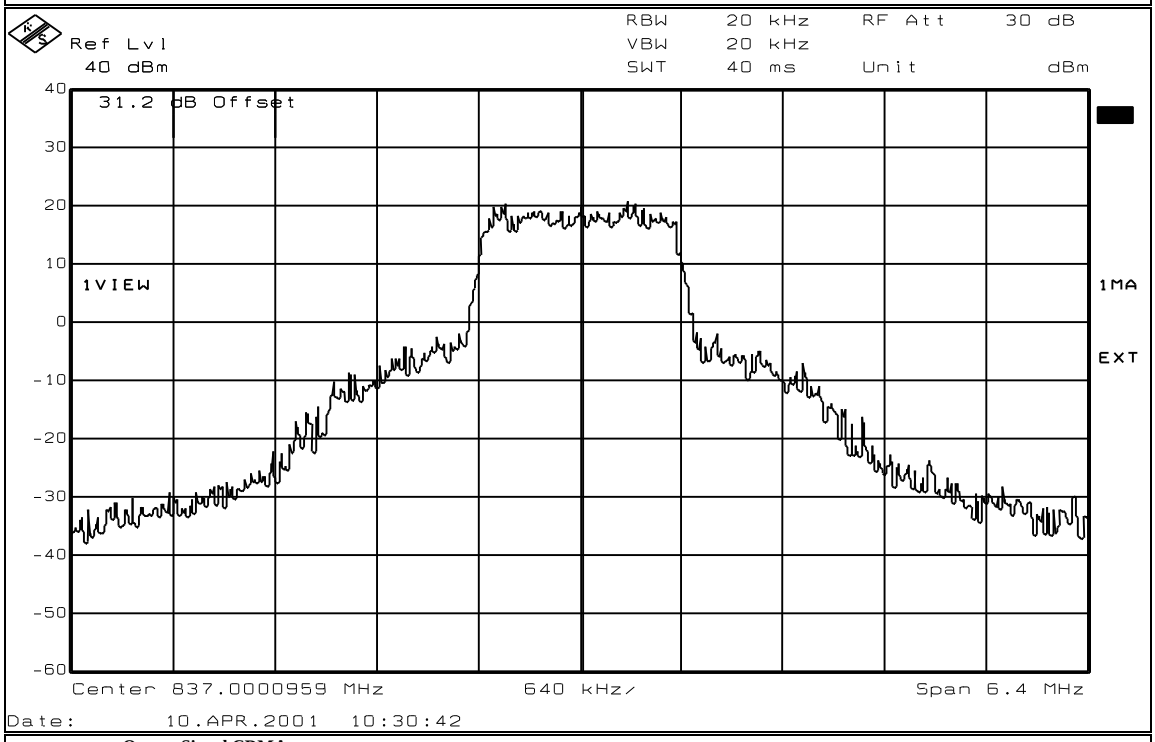
Detector Type: Peak VBW: Refer to plots

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



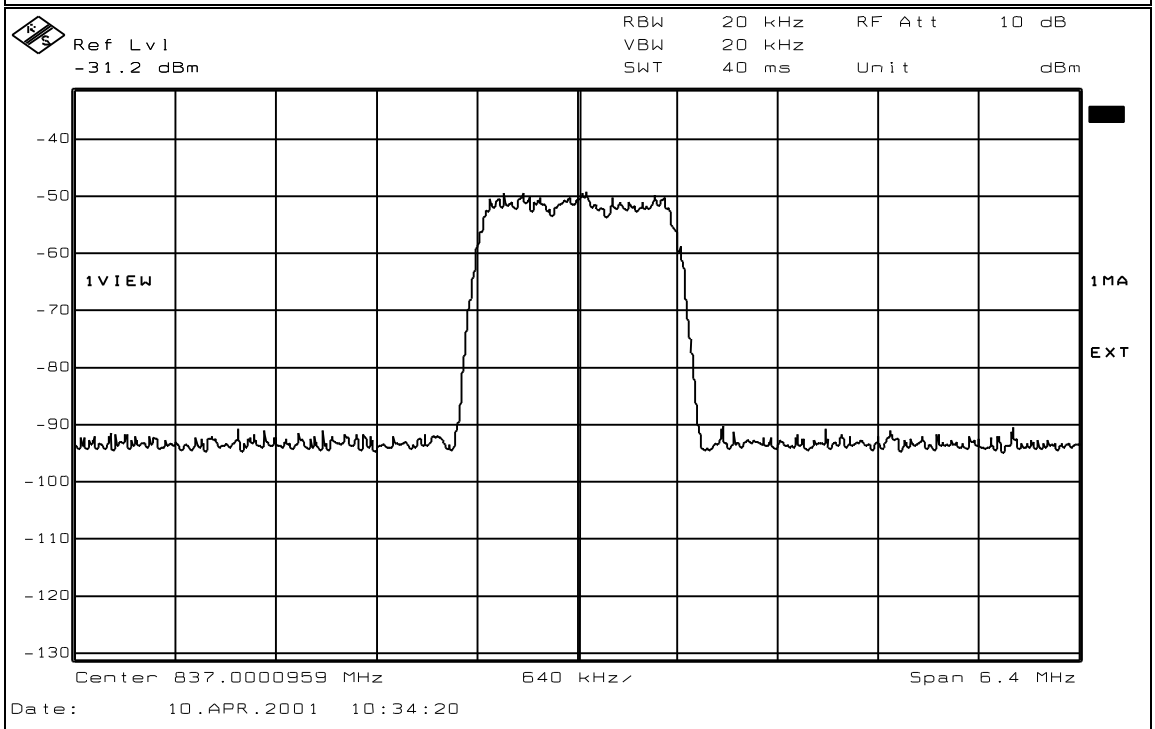
Notes: **Output Signal CDMA**
UPLINK

Test Data – Occupied Bandwidth- CDMA

Data Plot Occupied Bandwidth CDMA

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



Notes: **Input Signal CDMA**
UPLINK

Test Data – Occupied Bandwidth- CDMA

Data Plot Occupied Bandwidth CDMA

Page 3 of 4

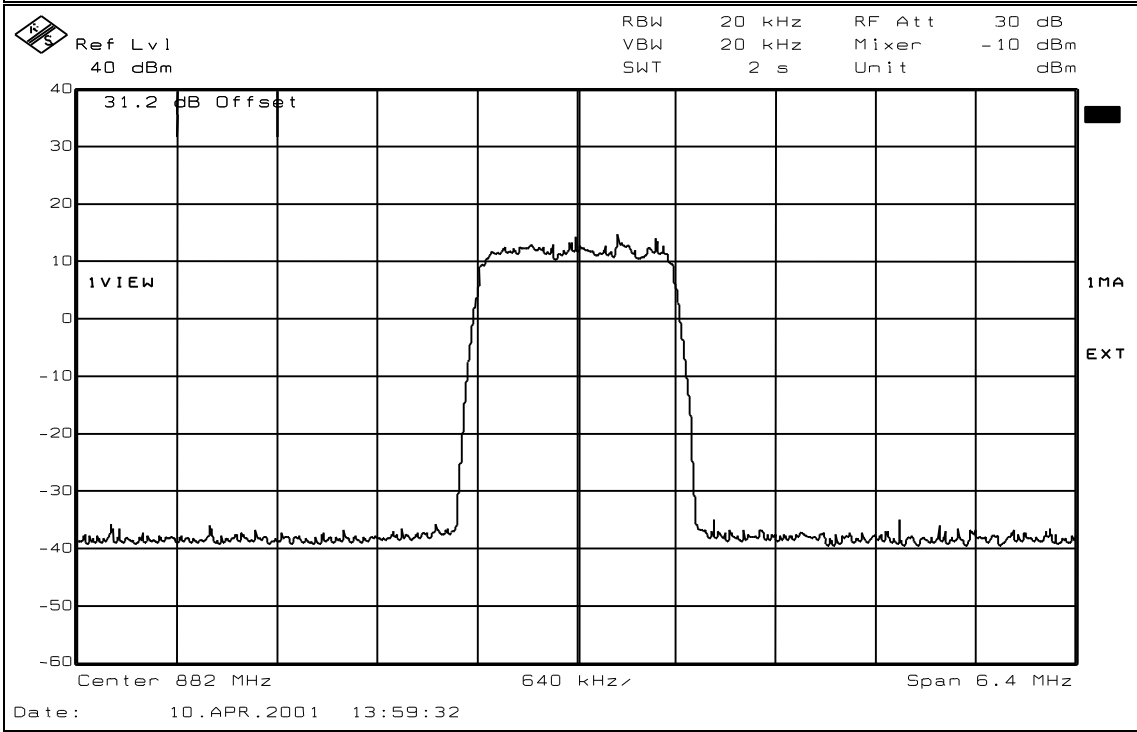
Job No.: 1L0016R Date: 4/10/01

Specification: 2.1049 Temperature(°C): 22

Tested By: Chinda Poy Relative Humidity(%) 50

E.U.T.: MR803P

Configuration: Tx Full Power



Notes: **Output Signal CDMA**
DOWNLINK

Test Data – Occupied Bandwidth- CDMA

Test Plot: Occupied Bandwidth CDMA

Page 4 of 4

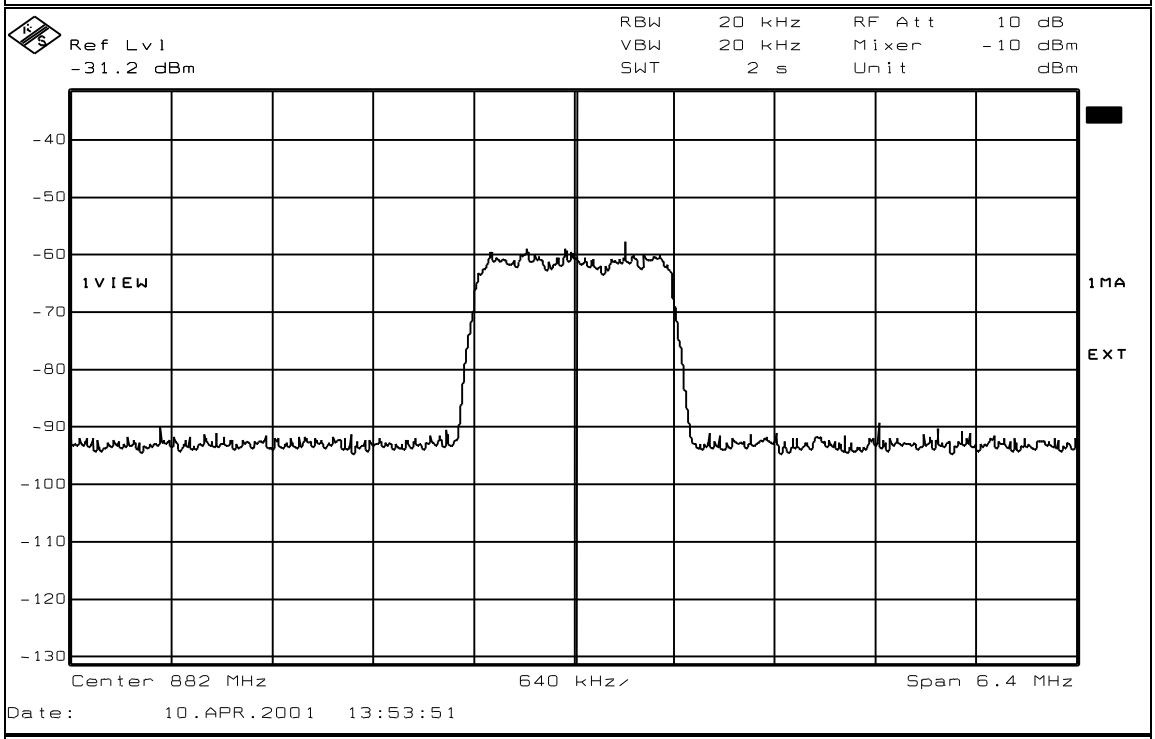
Job No.: 1L0016R Date: 4/10/01

Specification: 2.1049 Temperature(°C): 22

Tested By: Chinda Poy Relative Humidity(%) 50

E.U.T.: MR803P

Configuration: Tx Full Power



Notes: **Input Signal CDMA**
DOWNLINK

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 %

Test Data – Spurious Emissions at Antenna Terminals

Data Plot **SPURIOUS EMISSIONS AT ANTENNA TERMINALS**

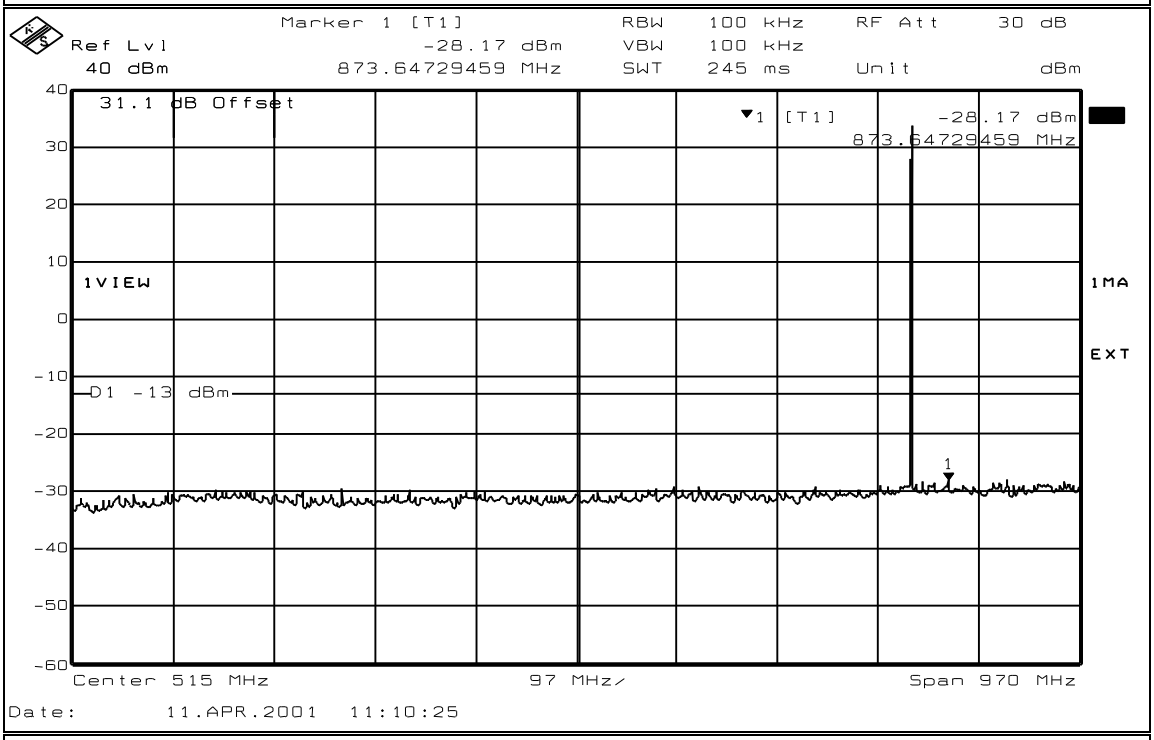
Page 1 of 4

Complete ____
Preliminary X

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: **30 MHz - 1 GHz (UPLINK)**
MARKER INDICATE HIGHEST NOISE FLOOR READING

Test Data – Spurious Emissions at Antenna Terminals

Data Plot **SPURIOUS EMISSIONS AT ANTENNA TERMINALS**

Page 2 of 4

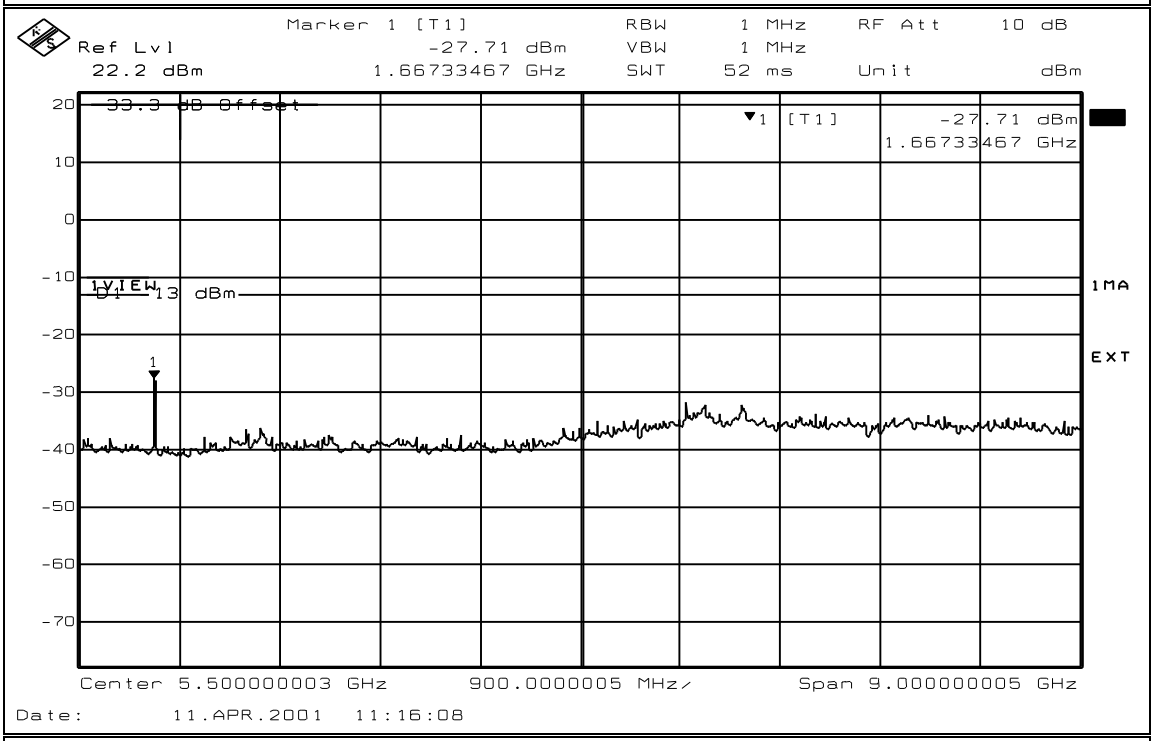
Job No.: 1L0016R Date: 4/11/01

Specification: 2.1 Temperature(°C): 22

Tested By: Chinda Poy Relative Humidity(%) 56

E.U.T.: MR803P

Configuration: Tx Full Power



Notes: **1 GHz - 10 GHz (UPLINK)**

MARKER INDICATES HIGHEST EMISSION

Test Data – Spurious Emissions at Antenna Terminals

Data Plot **SPURIOUS EMISSIONS AT ANTENNA TERMINALS**

Page 3 of 4

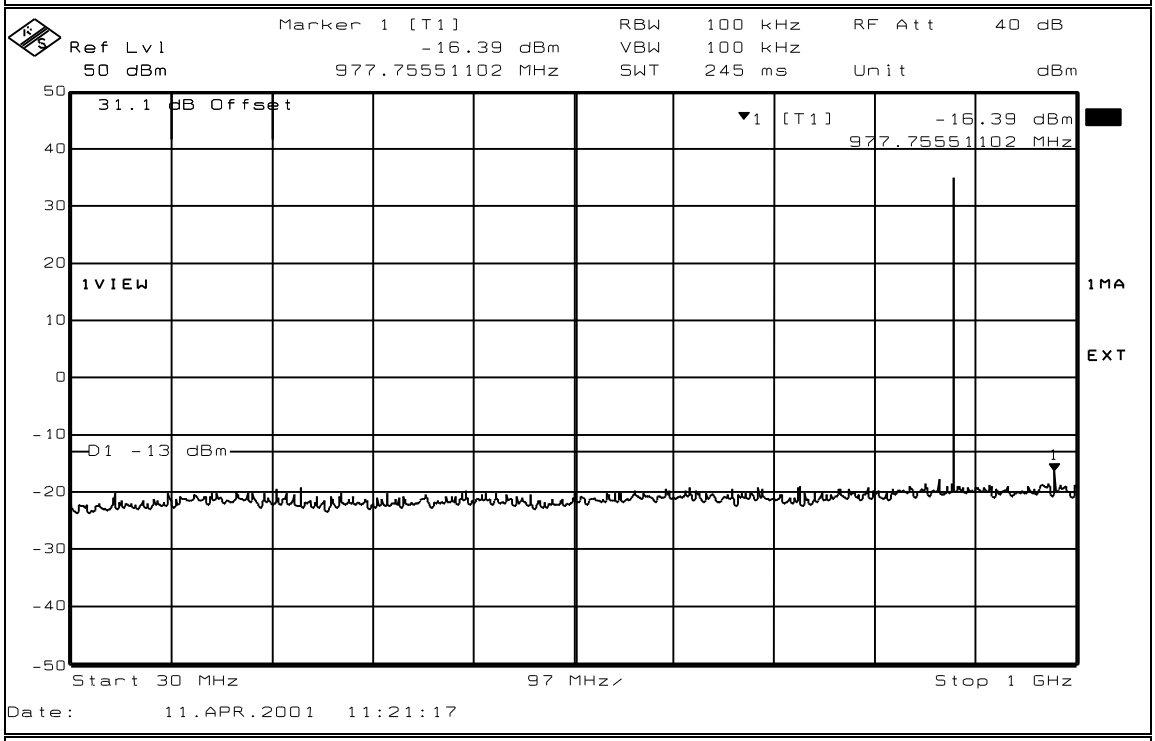
Job No.: 1L0016R Date: 4/11/01

Specification: 2.1049 Temperature(°C): 22

Tested By: Chinda Poy Relative Humidity(%) 56

E.U.T.: MR803P

Configuration: Tx Full Power



Notes: **30 MHz - 1GHz (DOWNLINK)**

MARKER INDICATES HIGHEST EMISSION

Test Data – Spurious Emissions at Antenna Terminals

Test Plot: SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Page 4 of 4

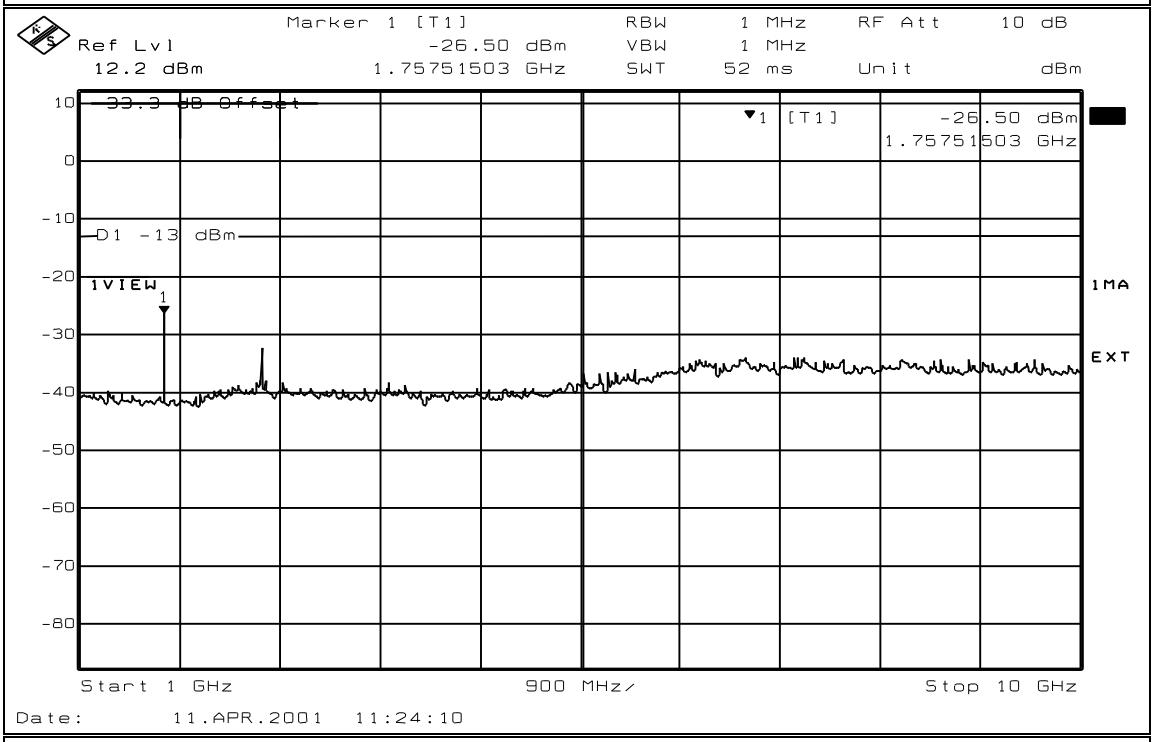
Job No.: 1L0016R Date: 4/11/01

Specification: 2.1049 Temperature(°C): 22

Tested By: Chinda Poy Relative Humidity(%) 56

E.U.T.: MR803P

Configuration: Tx Full Power



Notes: **1 GHz - 10 GHz (DO\WNLINK)**

MARKER INDICATES HIGHEST EMISSION

Test Data – Spurious Emissions at Antenna Terminals

Data Plot Intermodulation Characteristics CDMA

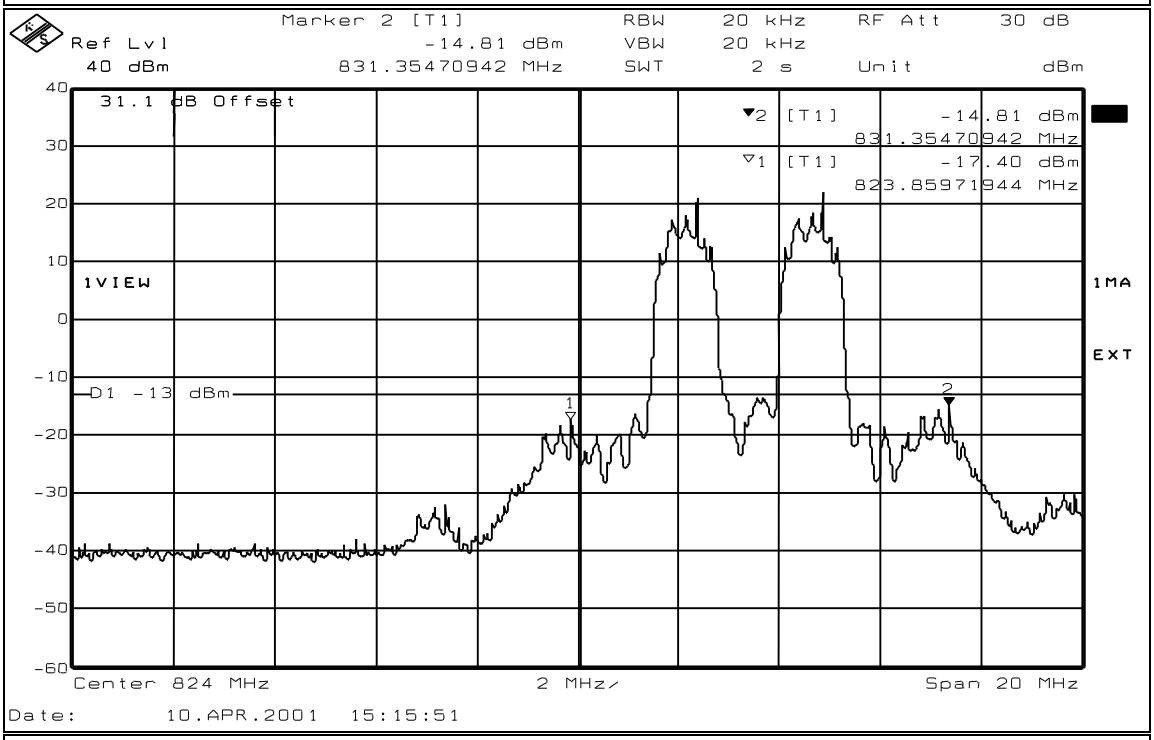
Page 1 of 4

Complete ____
Preliminary X

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



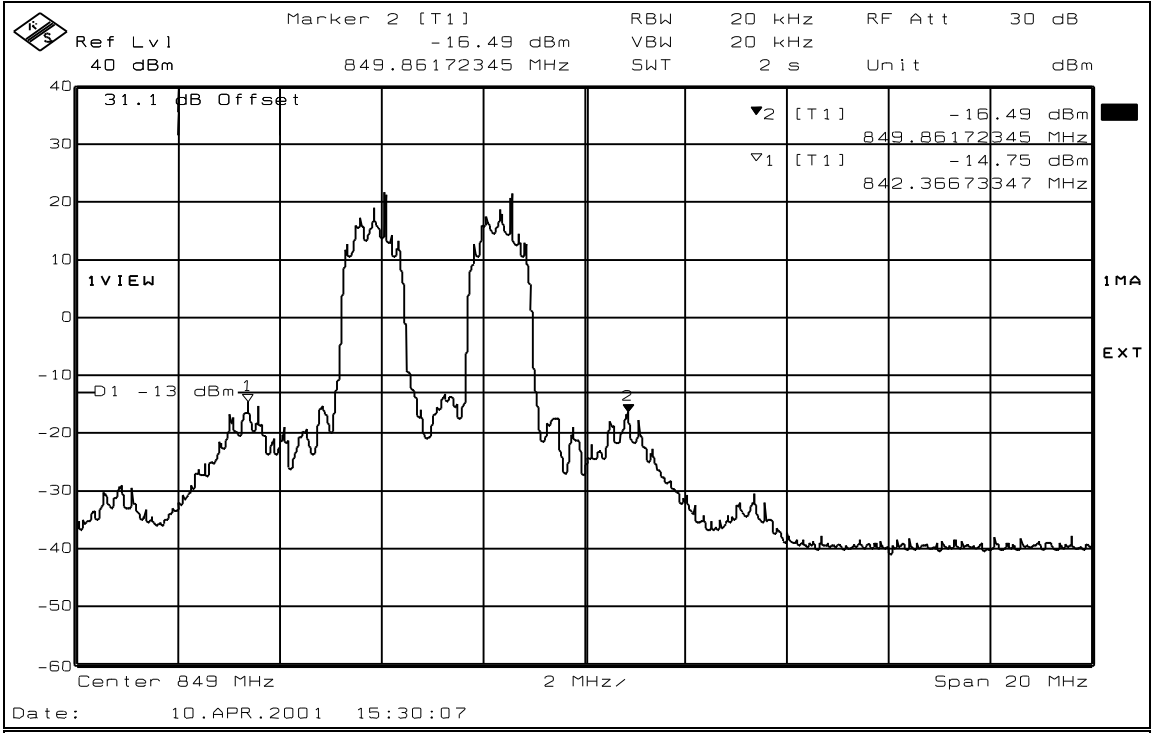
Notes: **CDMA INTERMOD LOWER BANDEDGE (UPLINK)**
Marker 1 indicates highest emission outerband
Marker 2 indicates highest emission inband

Test Data – Spurious Emissions at Antenna Terminals

Data Plot Intermodulation Characteristics CDMA

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



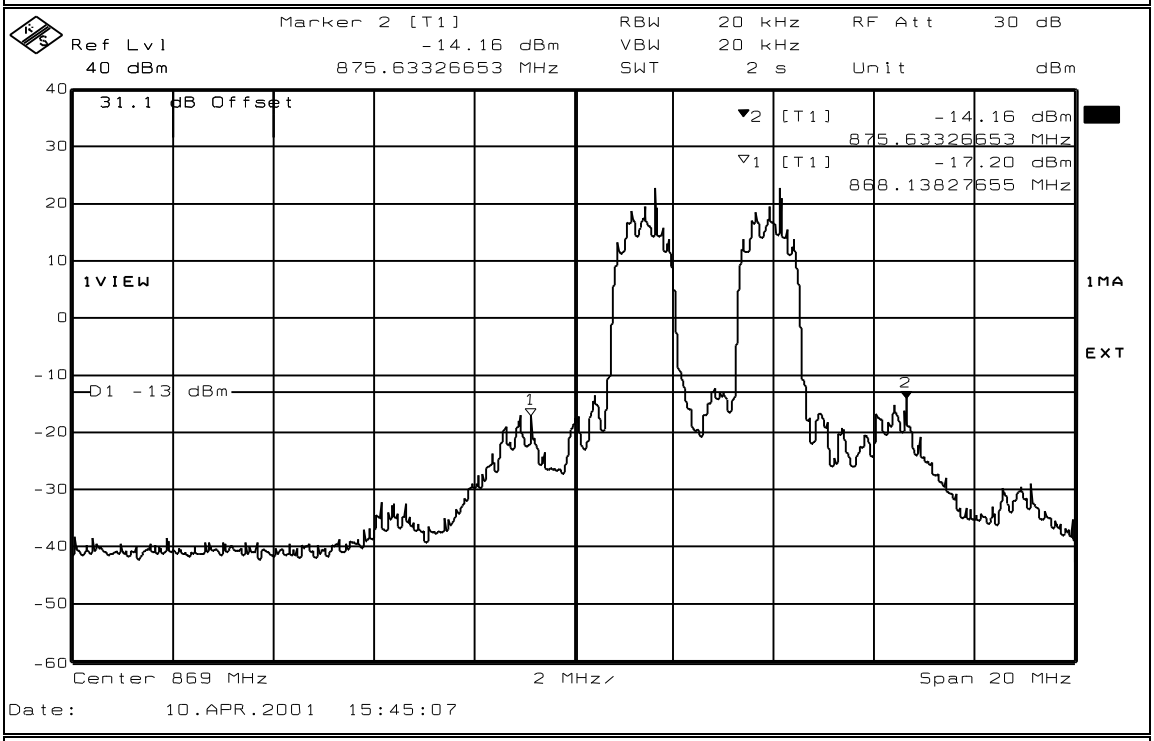
Notes:
CDMA INTERMOD UPPER BANDEDGE (UPLINK)
Marker 2 indicates highest emission outerband
Marker 1 indicates highest emission inband

Test Data – Spurious Emissions at Antenna Terminals

Data Plot Intermodulation Characteristics CDMA

Page 3 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		



Notes:
CDMA INTERMOD LOWER BANDEDGE (DOWNLINK)
Marker 1 indicates highest emission outerband
Marker 2 indicates highest emission inband

Test Data – Spurious Emissions at Antenna Terminals

Test Plot: Intermodulation Characteristics CDMA

Page 4 of 4

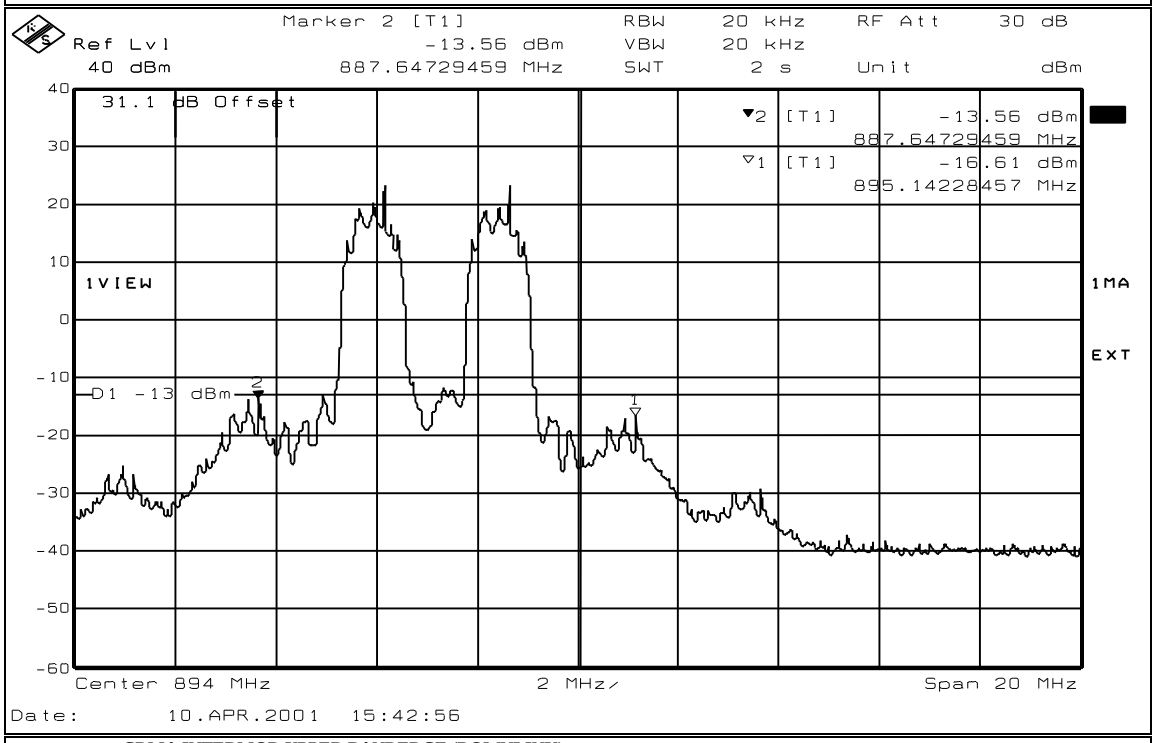
Job No.: 1L0016R Date: 4/10/01

Specification: 2.1049 Temperature(°C): 22

Tested By: Chinda Poy Relative Humidity(%) 50

E.U.T.: MR803P

Configuration: Tx Full Power



Notes:

CDMA INTERMOD UPPER BANDEDGE (DOWNLINK)

Marker 1 indicates highest emission outerband

Marker 2 indicates highest emission inband

Test Data – Spurious Emissions at Antenna Terminals

Data Plot Intermodulation Characteristics Analog

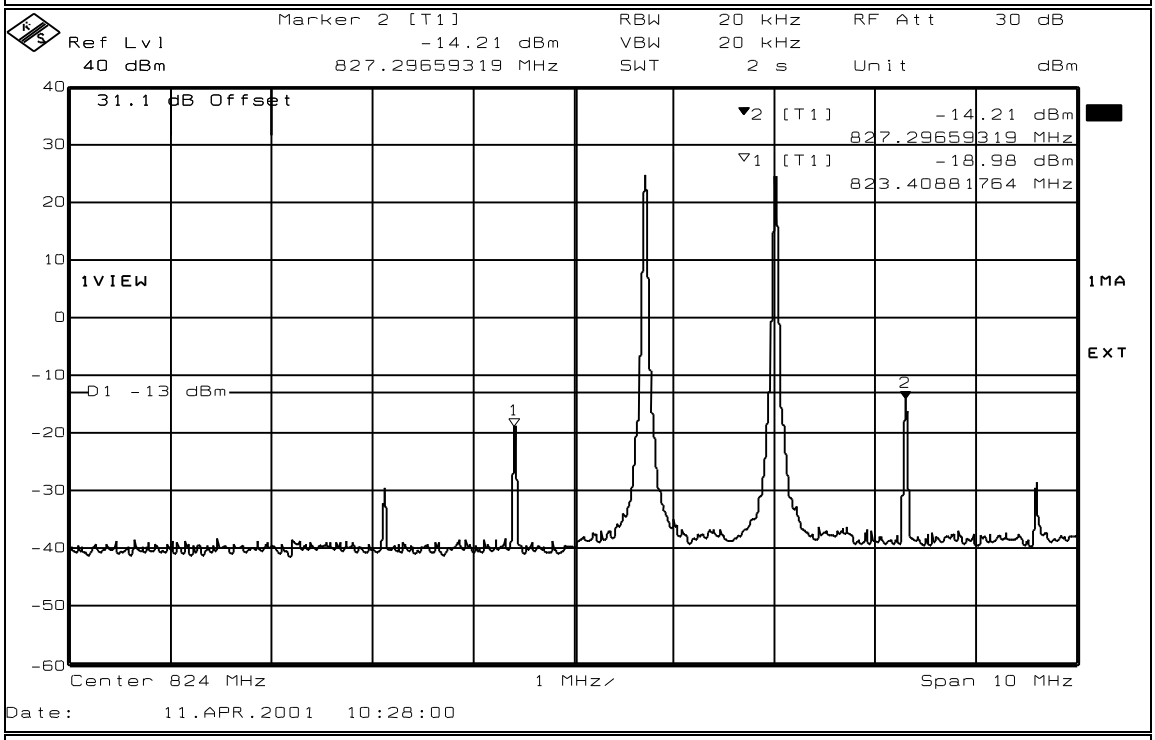
Page 1 of 4

Complete ____
Preliminary X

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: **ANALOG INTERMOD LOWER BANDEDGE (UPLINK)**
Marker 1 indicates highest emission outerband
Marker 2 indicates highest emission inband

Test Data – Spurious Emissions at Antenna Terminals

Data Plot Intermodulation Characteristics Analog

Page 2 of 4

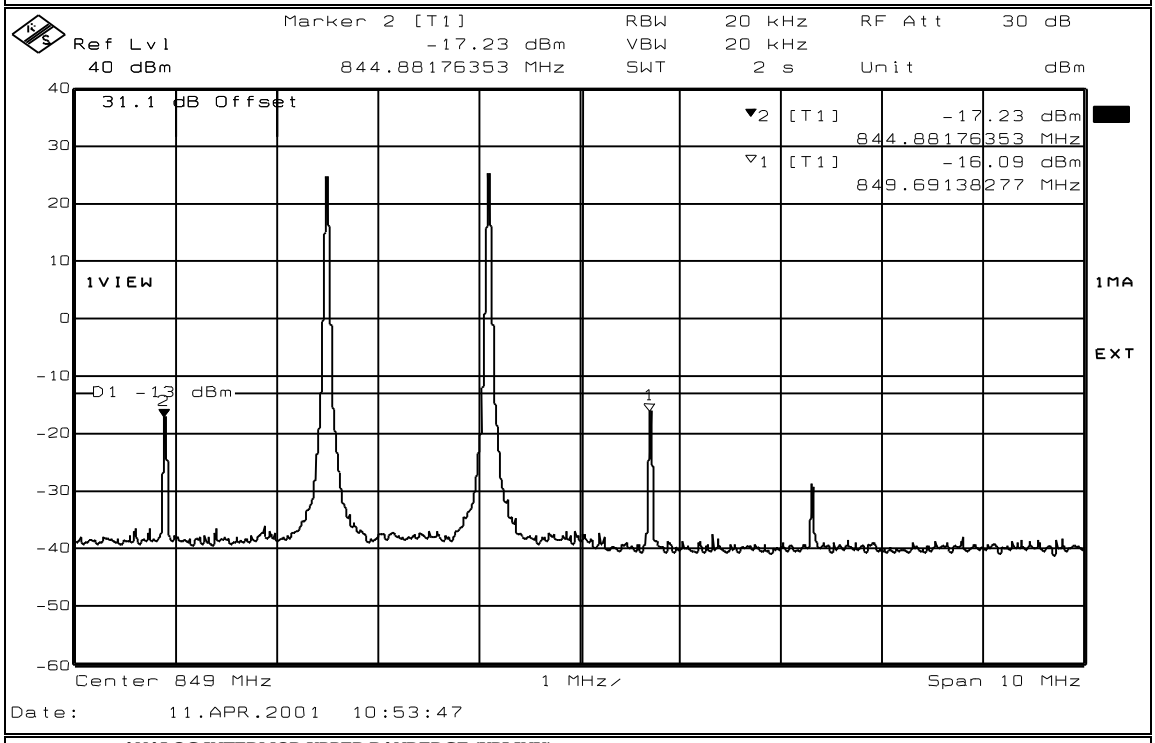
Job No.: 1L0016R Date: 4/11/01

Specification: 2.1 Temperature(°C): 22

Tested By: Chinda Poy Relative Humidity(%) 56

E.U.T.: MR803P

Configuration: Tx Full Power



Notes:

ANALOG INTERMOD UPPER BANDEDGE (UPLINK)

Marker 1 indicates highest emission outerband

Marker 2 indicates highest emission inband

Test Data – Spurious Emissions at Antenna Terminals

Data Plot Intermodulation Characteristics Analog

Page 3 of 4

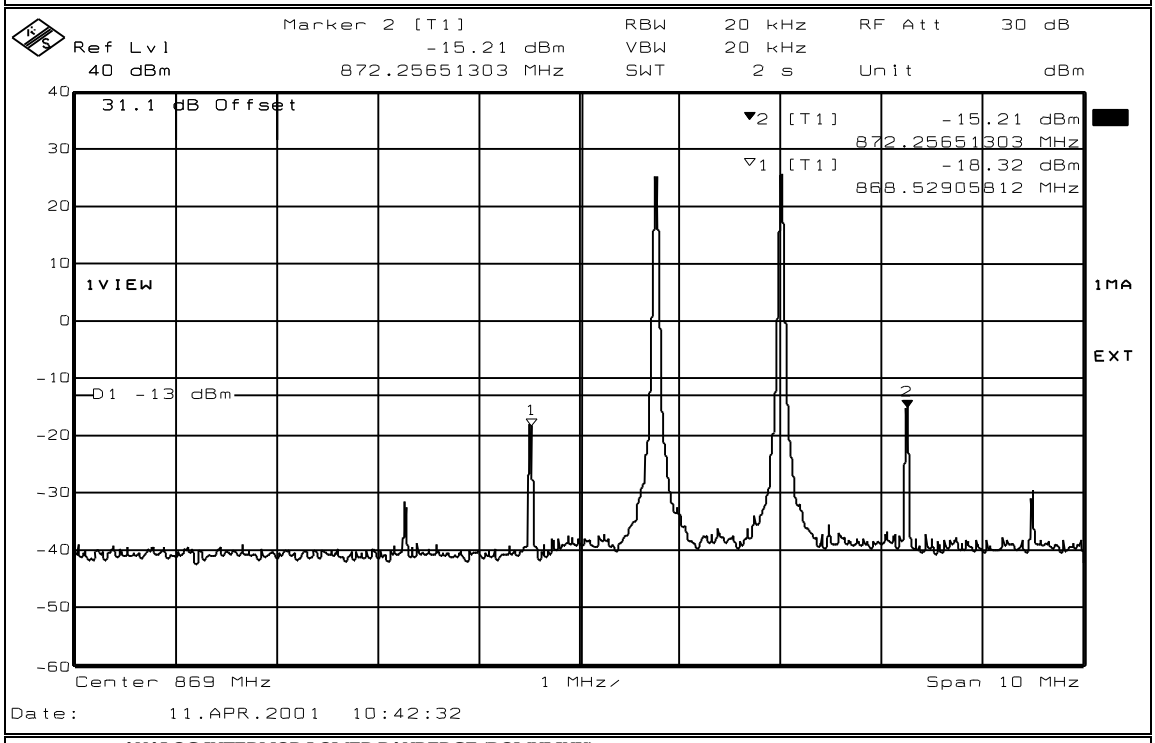
Job No.: 1L0016R Date: 4/11/01

Specification: 2.1049 Temperature(°C): 22

Tested By: Chinda Poy Relative Humidity(%) 56

E.U.T.: MR803P

Configuration: Tx Full Power



Notes:

ANALOG INTERMOD LOWER BANDEDGE (DOWNLINK)

Marker 1 indicates highest emission outerband

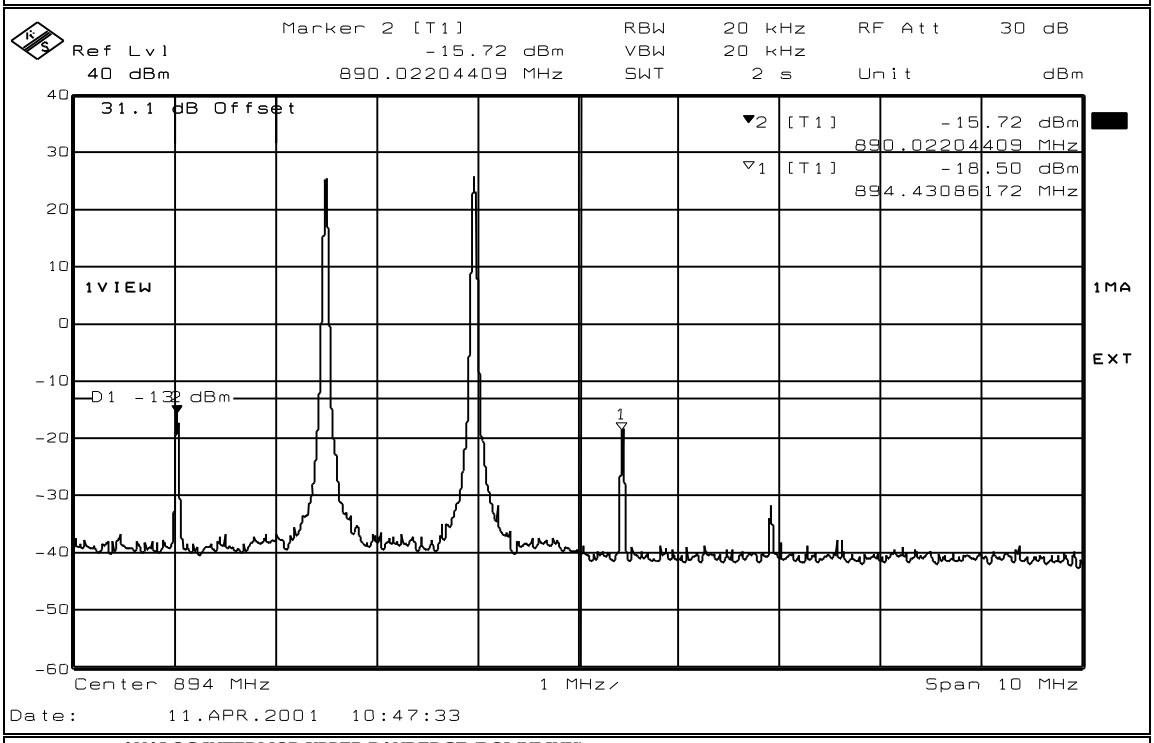
Marker 2 indicates highest emission inband

Test Data – Spurious Emissions at Antenna Terminals

Test Plot: Intermodulation Characteristics Analog

Page 4 of 4

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



Notes:
ANALOG INTERMOD UPPER BANDEDGE (DOWNLINK)
Marker 1 indicates highest emission outerband
Marker 2 indicates highest emission inband

Test Data – Spurious Emissions at Antenna Terminals

Data Plot Intermodulation Characteristics TDMA

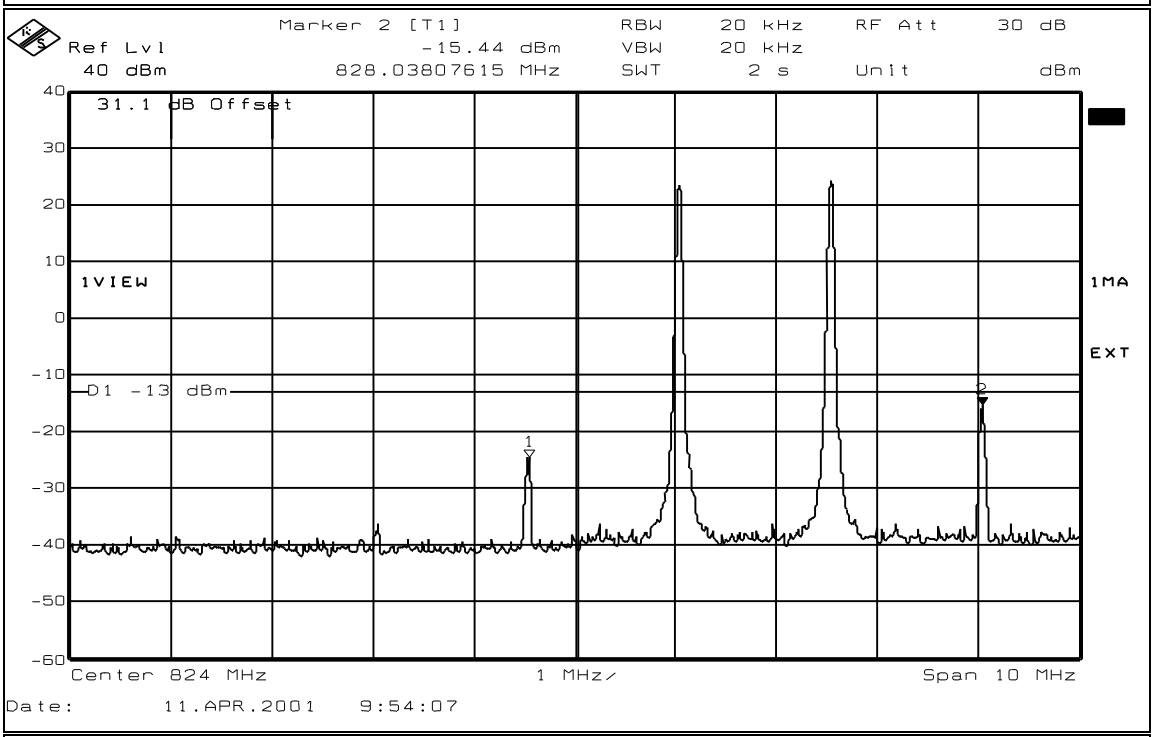
Page 1 of 4

Complete ____
Preliminary X

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



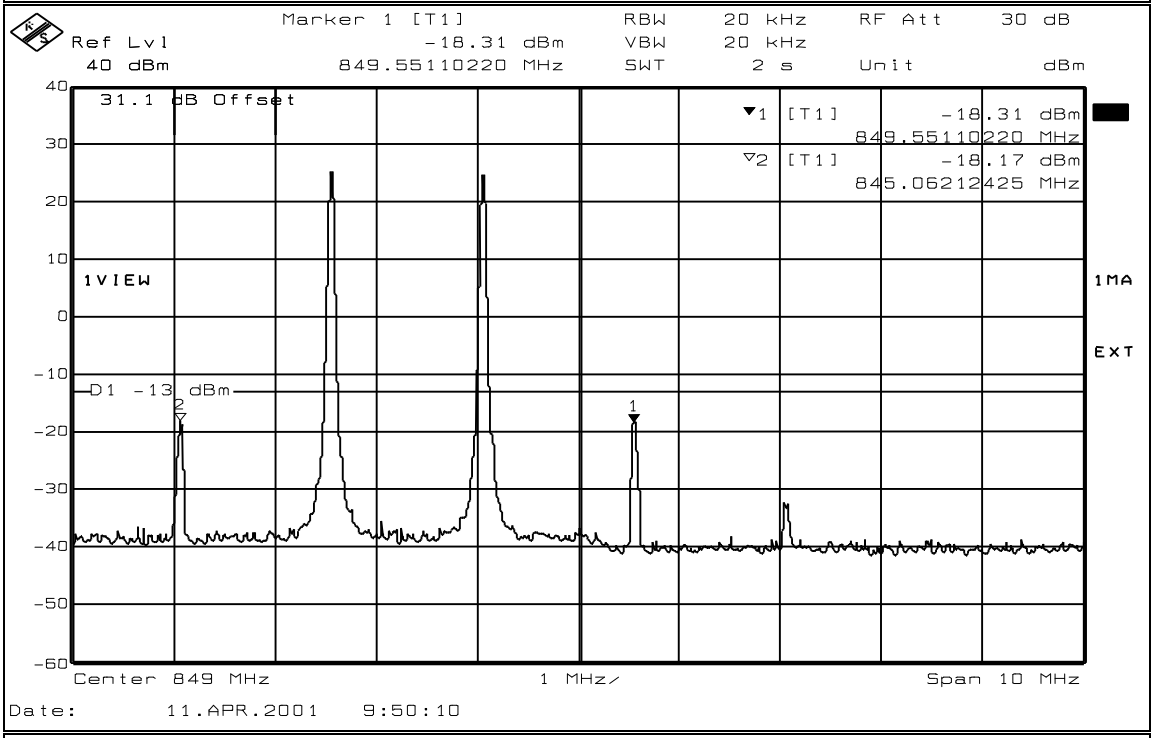
Notes: **TDMA INTERMOD LOWER BANDEDGE (UPLINK)**
Marker 1 indicates highest emission outerband
Marker 2 indicates highest emission inband

Test Data – Spurious Emissions at Antenna Terminals

Data Plot Intermodulation Characteristics TDMA

Page 2 of 4

Job No.: 1L0016R Date: 4/11/01
Specification: 2.1 Temperature(°C): 22
Tested By: Chinda Poy Relative Humidity(%) 56
E.U.T.: MR803P
Configuration: Tx Full Power



Notes:
TDMA INTERMOD UPPER BANDEDGE (UPLINK)
Marker 1 indicates highest emission outerband
Marker 2 indicates highest emission inband

Test Data – Spurious Emissions at Antenna Terminals

Data Plot Intermodulation Characteristics TDMA

Page 3 of 4

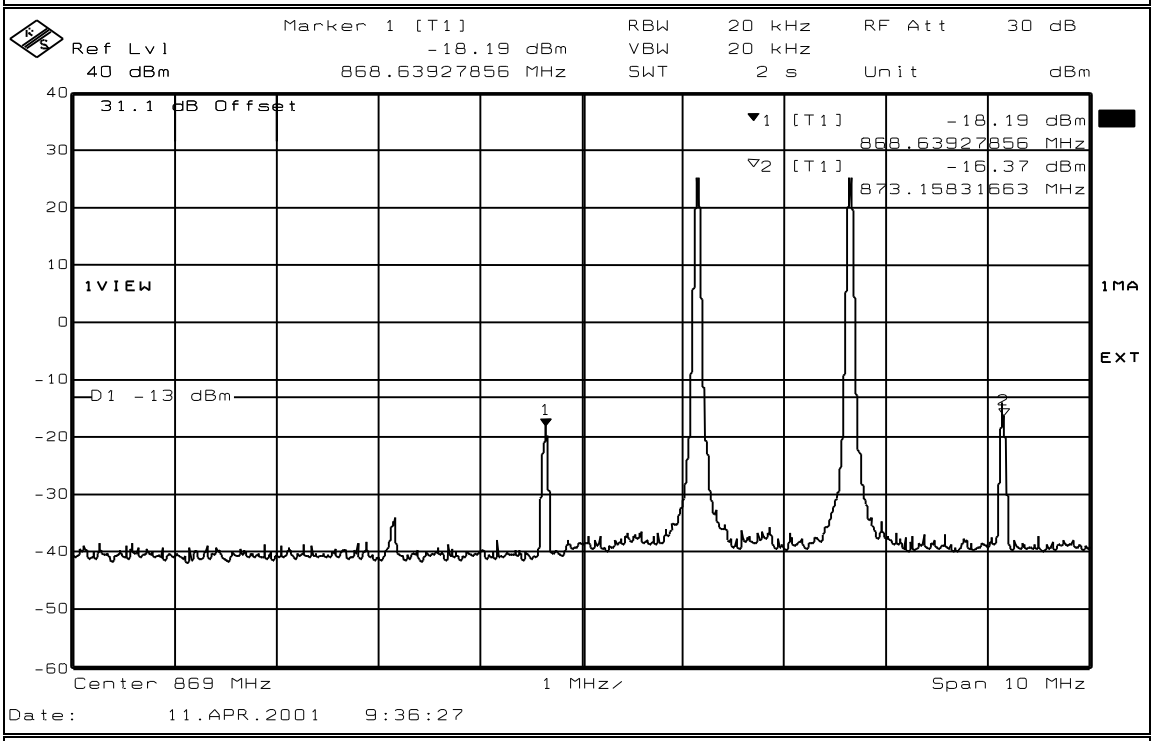
Job No.: 1L0016R Date: 4/11/01

Specification: 2.1049 Temperature(°C): 22

Tested By: Chinda Poy Relative Humidity(%) 56

E.U.T.: MR803P

Configuration: Tx Full Power



Notes:

TDMA INTERMOD LOWER BANDEDGE (DOWNLINK)

Marker 1 indicates highest emission outerband

Marker 2 indicates highest emission inband

Test Data – Spurious Emissions at Antenna Terminals

Test Plot: Intermodulation Characteristics TDMA

Page 4 of 4

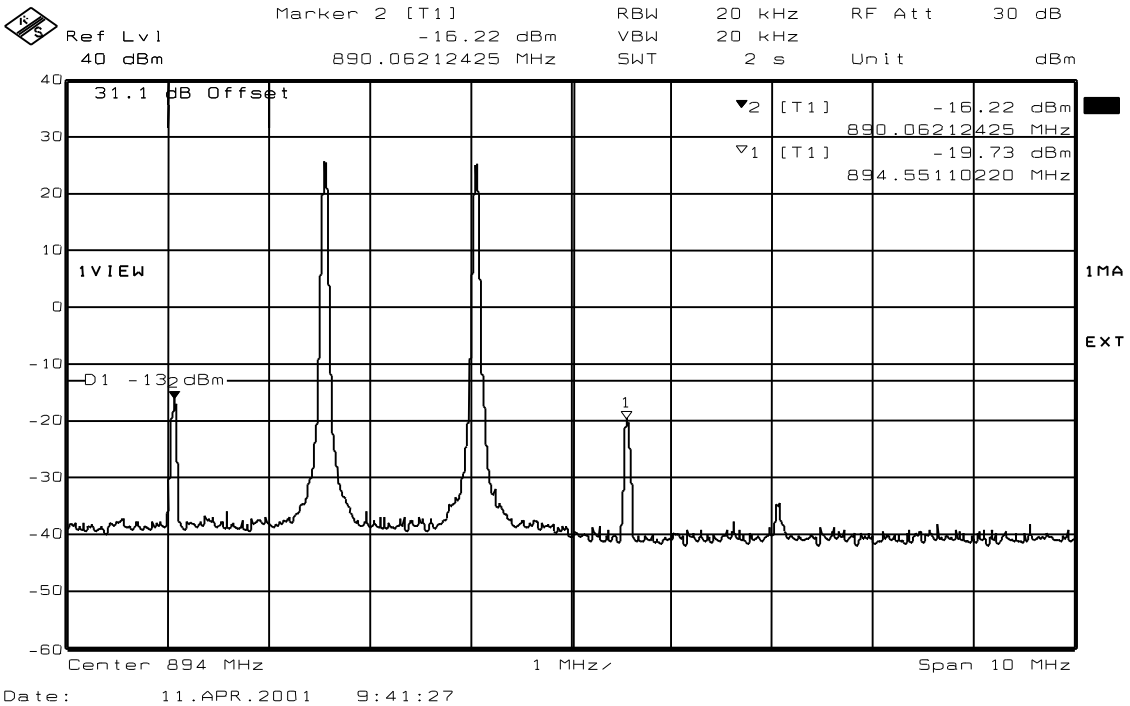
Job No.: 1L0016R Date: 4/11/01

Specification: 2.1049 Temperature(°C): 22

Tested By: Chinda Poy Relative Humidity(%) 56

E.U.T.: MR803P

Configuration: Tx Full Power



Notes:

TDMA INTERMOD UPPER BANDEDGE (DOWNLINK)

Marker 1 indicates highest emission outerband

Marker 2 indicates highest emission inband

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 %

Test Data – Field Strength of Spurious Emissions

Field Strength of Spurious Emissions

Page 1 of 2 Complete ____
Job No.: 1L0016R Date: 4/11/01 Preliminary X
Specification: Part 22 Temperature(°C): 22
Tested By: Chinda Poy Relative Humidity(%) 56
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: 3 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: Downlink 881 MHz

Test Data – Field Strength of Spurious Emissions

Field Strength of Spurious Emissions

Page 2 of 2 Complete
Job No.: 1L0016R Date: 4/11/01 Preliminary X
Specification: Part 22 Temperature(°C): 22
Tested By: Chinda Poy Relative Humidity(%) 56
E.U.T.: MR803P
Configuration: Tx Full Power
Sample No: S01

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: **Scanned spectrum to the 10th harmonic of carrier**

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: MHz
Standard Test Voltage:

Equipment Used:

Measurement Uncertainty: +/- x 10^-7 ppm

Temperature: °C

Relative Humidity: %

Not Applicable

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

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

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: ≥ 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.

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: ≥ 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

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: ≥ 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

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: ≥ RBW
Span: As required
Sweep: Auto

Input Signal Characteristics:
RF level: Maximum recommended by manufacturer

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: ≥ RBW
Start Frequency: 0 MHz
Stop Frequency: 10 GHz
Sweep: Auto

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 = 3m (Measurement Distance)

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

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

For emissions > 1 GHz:

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

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

The spectrum is searched to 10 GHz.

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

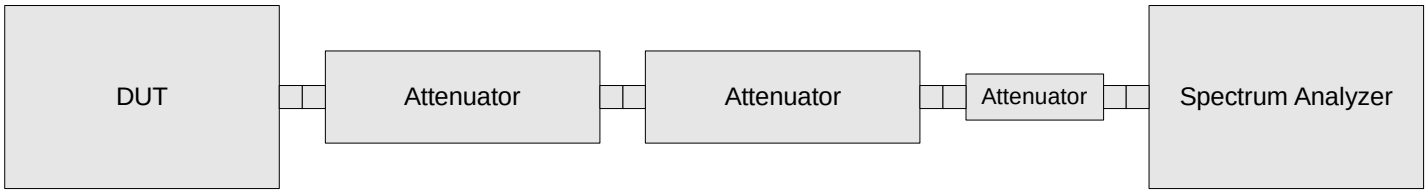
Method Of Measurement:

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.

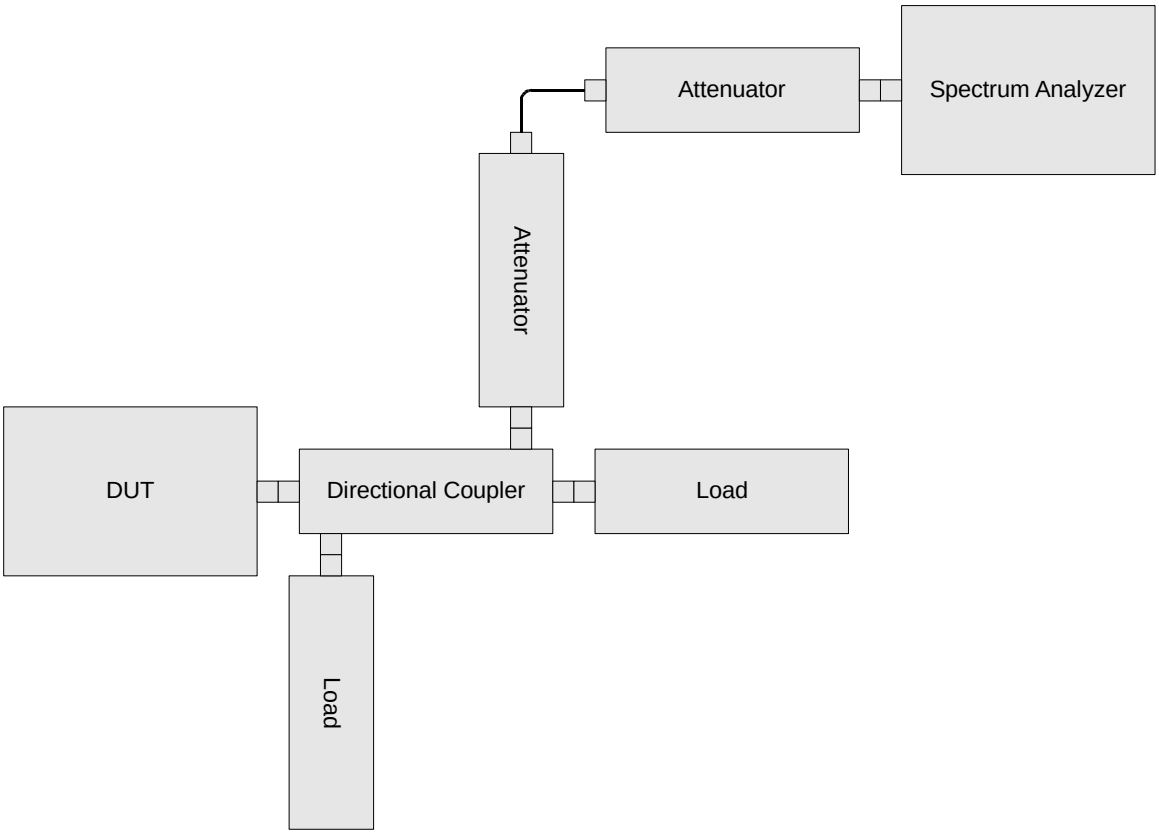
Frequency Stability With Temperature Variation:
The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30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

ANNEX B - TEST DIAGRAMS

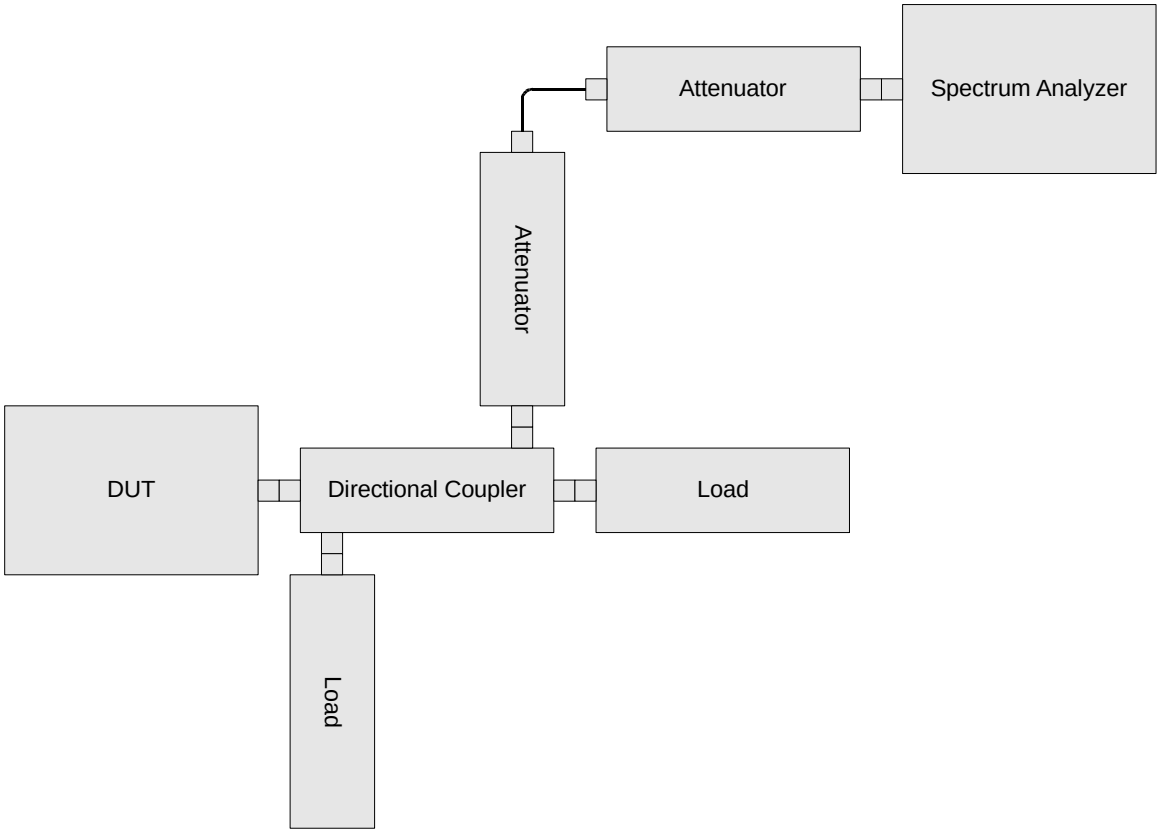
Para. No. 2.1046 - R.F. Power Output

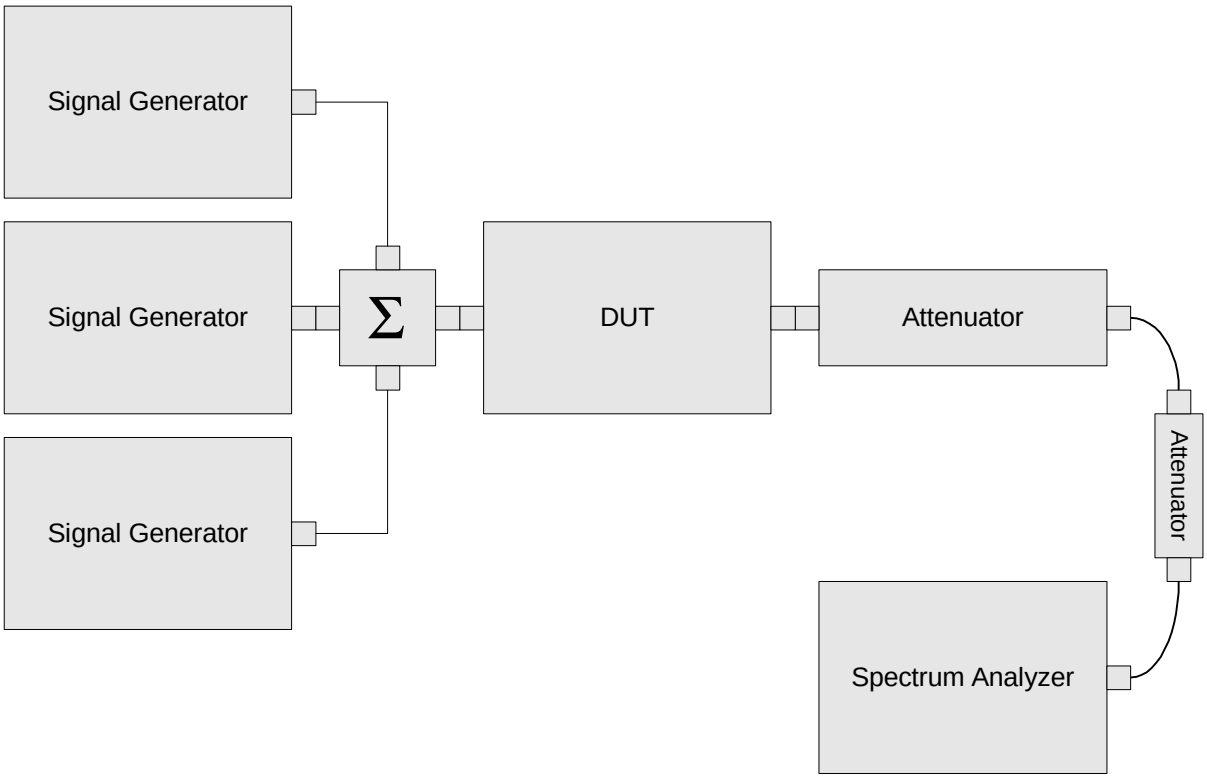


Para. No. 2.1049 - Occupied Bandwidth

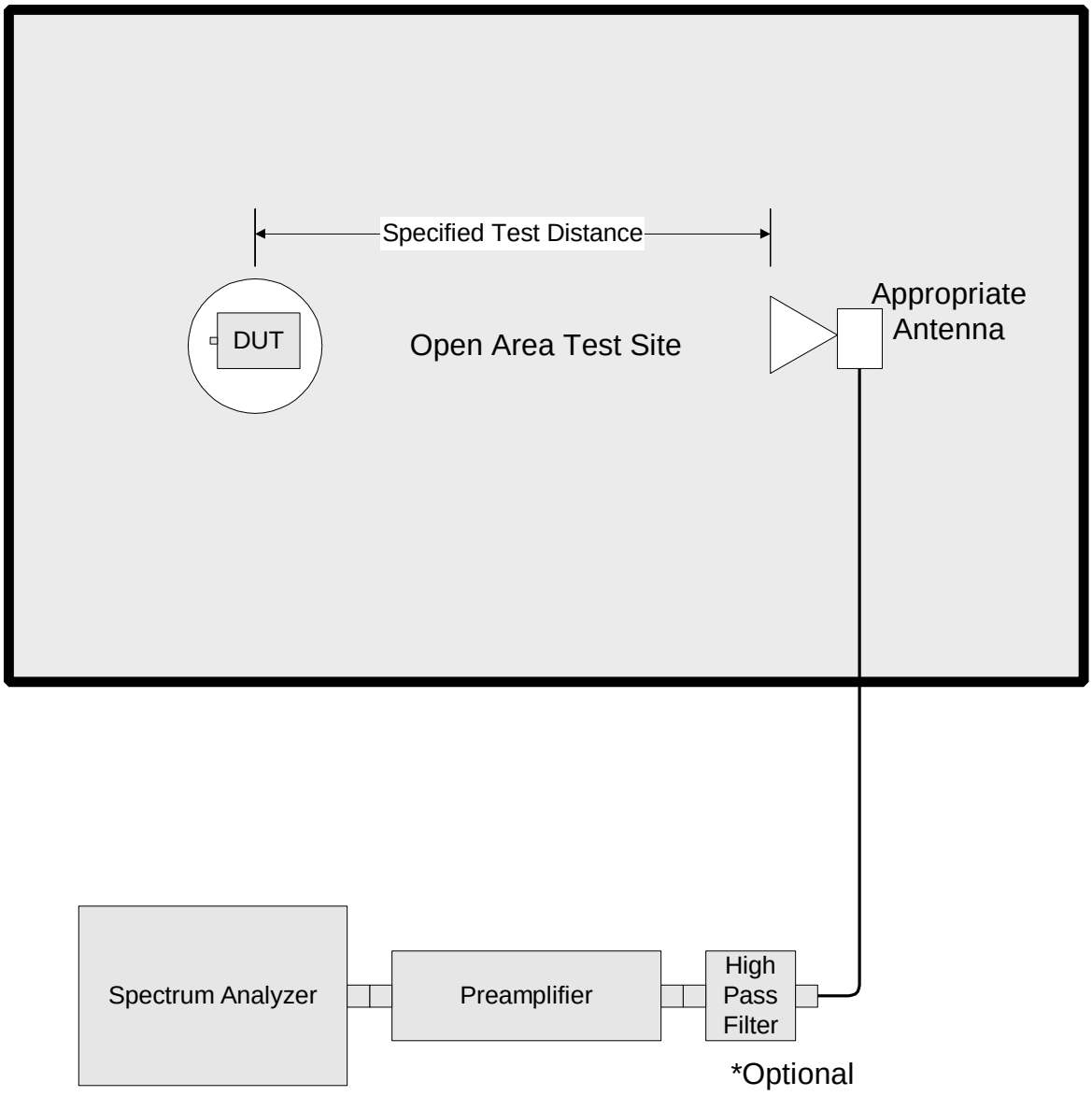


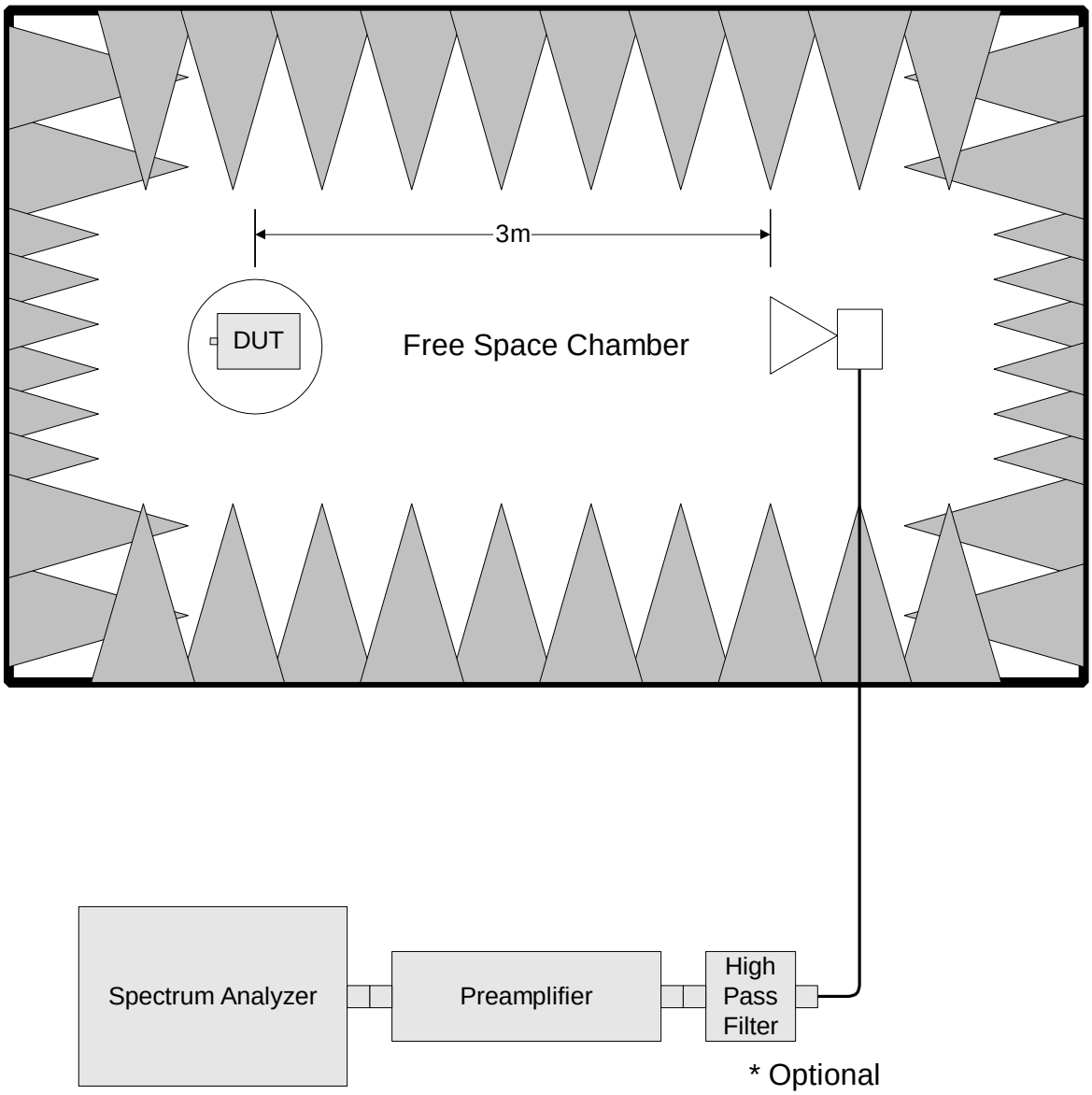
Para. No. 2.1051 Spurious Emissions at Antenna Terminals




Signal Generator
Signal Generator
Signal Generator
Σ
DUT
Attenuator
Attenuator
Spectrum Analyzer

Para. No. 2.1053 - Field Strength of Spurious Radiation




3m
DUT
Free Space Chamber
Spectrum Analyzer
Preamplifier
High Pass Filter
* Optional

Para. No. 2.1055 - Frequency Stability