



Nemko Dallas, Inc.
Safety - EMC - Telecom - ISO Guide 25

Nemko Test Report No.:

1L0015RUS1

Applicant:

Allen Telecom Systems
140 Vista center Drive
Forest, VA 24551

Equipment Under Test:

MR703P

FCC ID:

BCR-RPT-MR703P

In Accordance With:

FCC Part 24, Subpart E
Broadband PCS Repeaters

Tested By:

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

A handwritten signature in blue ink, appearing to read 'Tom Tidwell', is written over the printed name.

Authorized By:

Tom Tidwell, EMC/Wireless Group Manager

Date:

February, 2001

Total Number of Pages:

71

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Section 1. Summary of Test Results

Manufacturer: Allen Telecom

Model No.: MR703P

Serial No.: N/A

General: **All measurements are traceable to national standards.**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 24, Subpart E.



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

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Summary Of Test Data

NAME OF TEST	PARA. NO.	SPEC.	MEAS.	RESULT
RF Power Output	24.232	100W		Complies
Occupied Bandwidth (CDMA)	24.238	Input/Output	Plots	Complies
Occupied Bandwidth (GSM)	24.238	Input/Output	Plots	Complies
Occupied Bandwidth (NADC)	24.238	Input/Output	Plots	Complies
Spurious Emissions at Antenna Terminals	24.238(a)	-13 dBm	< -13 dBm	Complies
Field Strength of Spurious Emissions	24.238(a)	-13 dBm E.I.R.P.	< -13 dBm	Complies
Frequency Stability	24.235		N/A	N/A

Footnotes:

(1) Modulation characteristics were not tested since the E.U.T. processes but does not produce a modulated waveform.

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

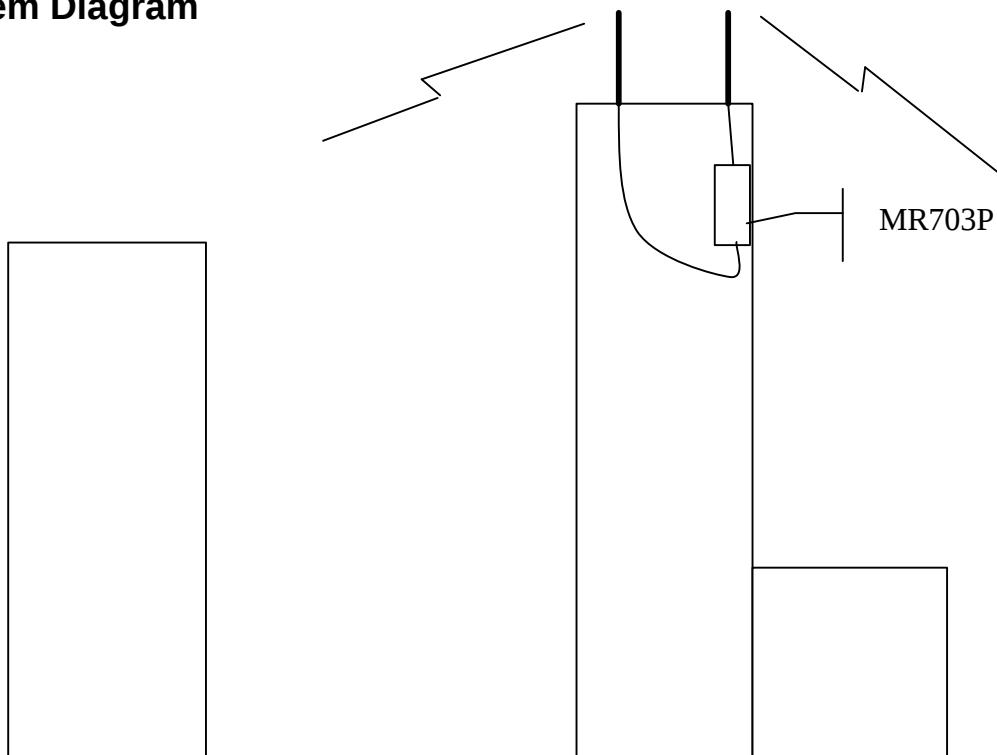
Section 2. General Equipment Specification

Supply Voltage Input:		120 VAC		
Frequency Bands:	Downlink:	☒	Block A :	1930 – 1945 MHz
		☒	Block D :	1945 – 1950 MHz
		☒	Block B :	1950 – 1965 MHz
		☒	Block E :	1965 – 1970 MHz
		☒	Block F :	1970 – 1975 MHz
		☒	Block C :	1975 – 1990 MHz
		Frequency Bands:	Uplink:	☒
☒	Block B :			1865 – 1870 MHz
☒	Block C :			1870 – 1885 MHz
☒	Block D :			1885 – 1890 MHz
☒	Block E :			1890 – 1895 MHz
☒	Block F :			1895 – 1910 MHz
				CDMA (F9W)
		☒	☒	☒
Output Impedance:		50 ohms		
		F9W	1 W	
		GXW	.398 W	
		DXW	.631 W	
		F9W, DXW	1 W	
		GXW	.661 W	
		F1-F1	F1-F2	N/A
		☒	☐	☐
		Software	Duplexer	Fullband
		☐	☒	☐

Description of Operation

The MR703P is a repeater for the PCS services. The system antennas are installed on outside permanent structures. The system is intended to fill in weak coverage areas such as buildings.

System Diagram



Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 2.1046
TESTED BY: David LightTTidwell	DATE: 06 Feb 2001

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

	Modulation Type	Per Channel Output Power (dBm)	Composite Output Power (dBm)
Uplink	CDMA (3 Carriers)	25.1	29.9
Downlink	CDMA (3 Carriers)	25.0	29.8
Uplink	GSM (5 Carriers)	19.0	26.0
Downlink	GSM (5 Carriers)	21.2	28.2
Uplink	NADC (2 Carriers)	25.0	28.0
Downlink	NADC (2 Carriers)	26.8	29.8

Equipment Used: 1081-1036-1604-1605**Measurement Uncertainty:** +/- dB
1.06**Temperature:** 22 °C**Relative Humidity:** 50 %

Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth (CDMA)	PARA. NO.: 2.1049
TESTED BY: David LightTTidwell	DATE:07 Feb 2001

Test Results: Complies.

Test Data: See attached plot(s).

Equipment Used: 1036-1081-1604-1605

Measurement Uncertainty: +/- dB
 1.06

Temperature: 22 °C

Relative 50 %
Humidity:

Test Data - Occupied Bandwidth - CDMA

Data Plot OCCUPIED BANDWIDTH - CDMA

Page 1 of 4

Job No.: 1L0015R Date: 2/7/01 Complete X
Preliminary _____

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

E.U.T.: PMR703

Configuration: TRANSMIT ONE SIGNAL FULL POWER

Sample No.: S01 & S02

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

Test Equipment Used

Antenna: _____ Directional Coupler: _____

Pre-Amp: _____ Cable #1: 1081

Filter: _____ Cable #2: _____

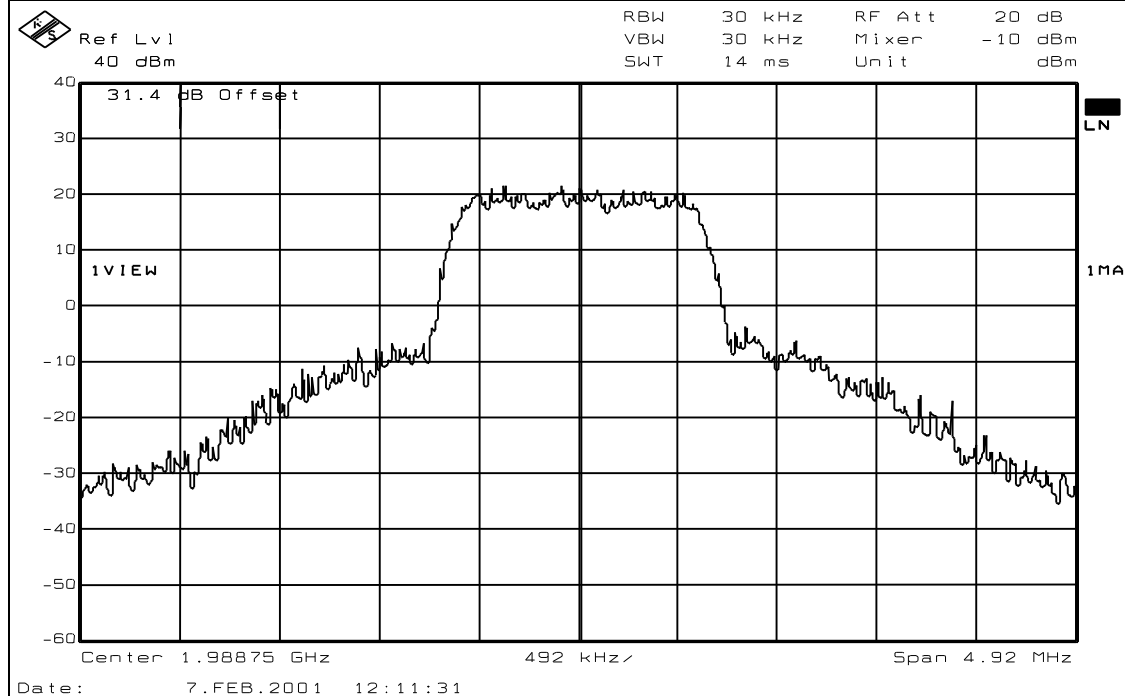
Receiver: 1036 Cable #3: _____

Attenuator #1: 1064 Cable #4: _____

Attenuator #2: 1065 Mixer: _____

Additional equipment used: _____

Measurement Uncertainty: +/-3.6 dB

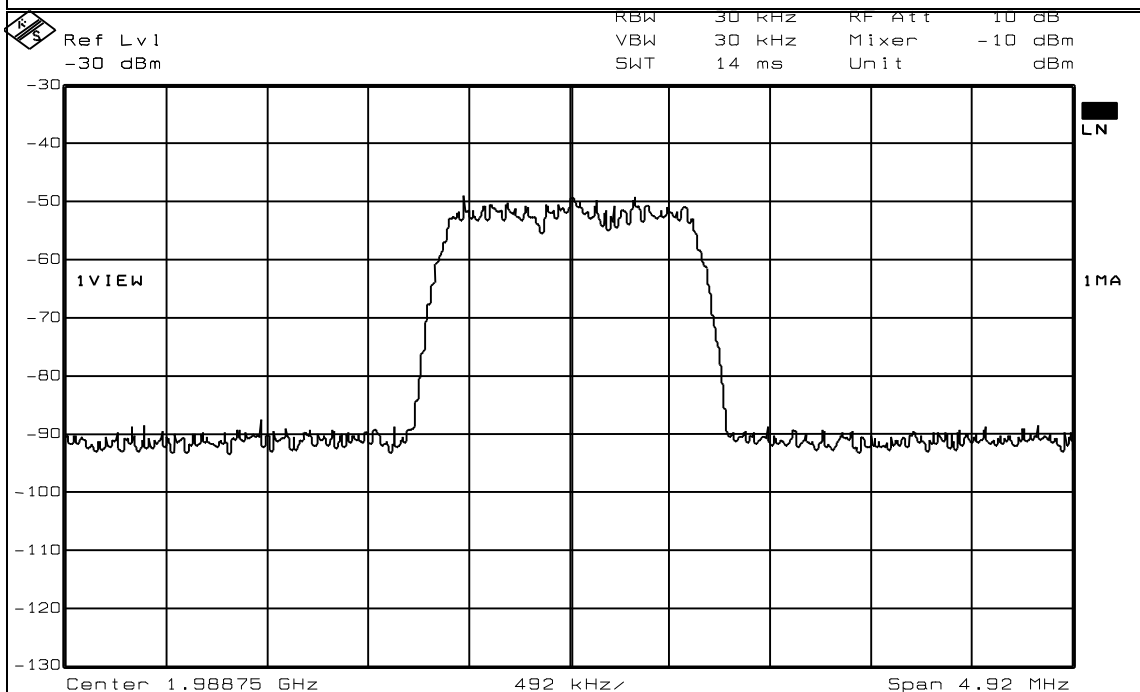


Notes: OUTPUT SIGNAL - DOWNLINK

Test Data - Occupied Bandwidth - CDMA

Data Plot OCCUPIED BANDWIDTH - CDMA

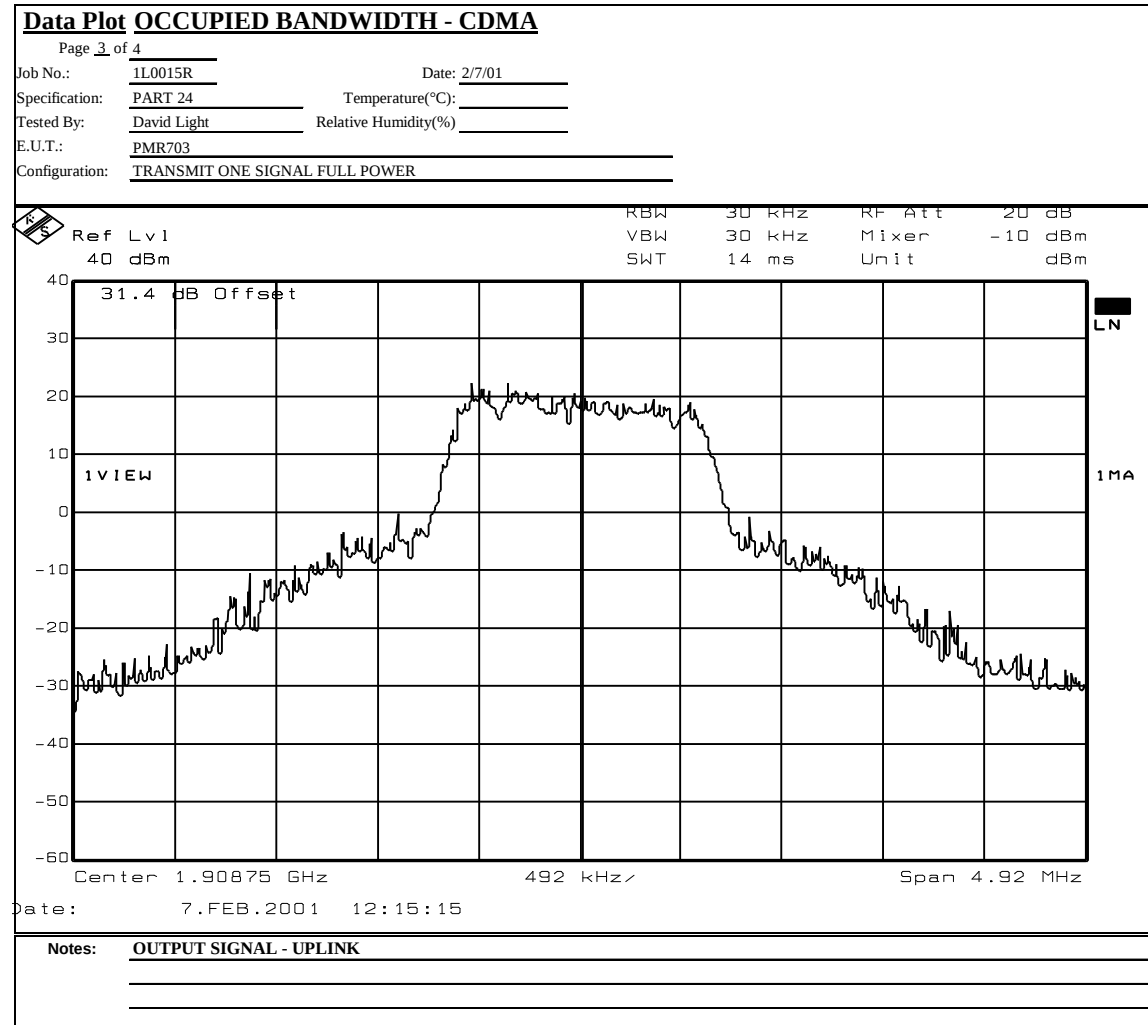
Page 2 of 4
Job No.: 1L0015R Date: 2/7/01
Specification: PART 24 Temperature(°C): 22
Tested By: David Light Relative Humidity(%) 50
E.U.T.: PMR703
Configuration: TRANSMIT ONE SIGNAL FULL POWER



Date: 7.FEB.2001 12:12:55

Notes: INPUT SIGNAL - DOWNLINK

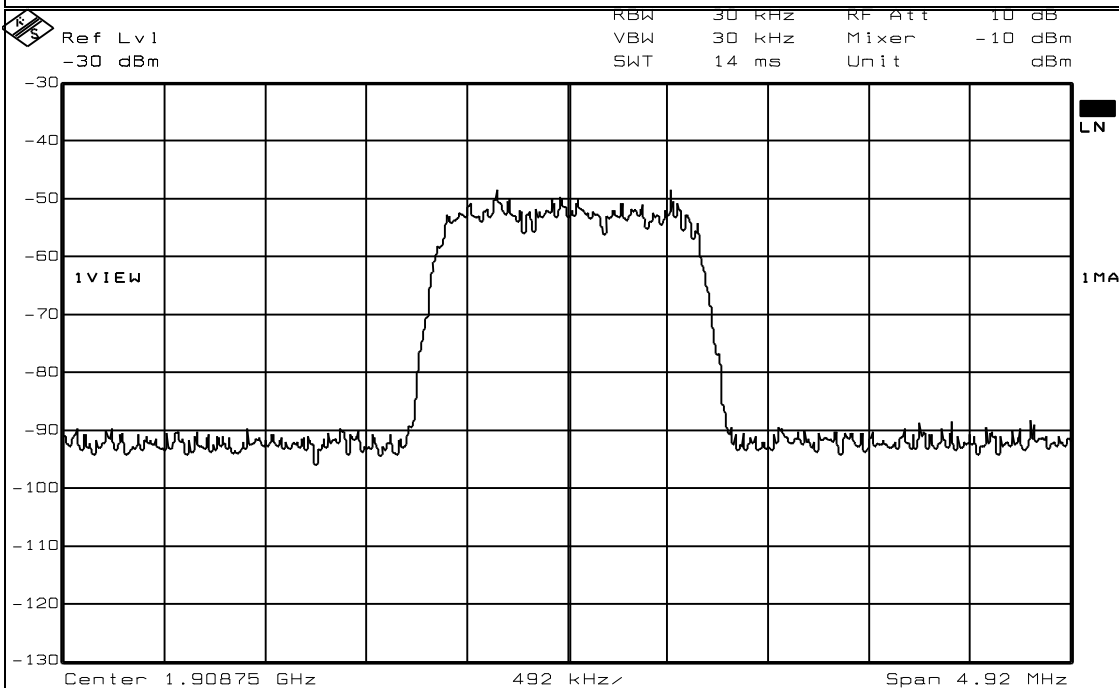
Test Data - Occupied Bandwidth - CDMA



Test Data - Occupied Bandwidth - CDMA

Test Plot: OCCUPIED BANDWIDTH - CDMA

Page 4 of 4
Job No.: 1L0015R Date: 2/7/01
Specification: PART 24 Temperature(°C):
Tested By: David Light Relative Humidity(%):
E.U.T.: PMR703
Configuration: TRANSMIT ONE SIGNAL FULL POWER



Date: 7.FEB.2001 12:13:35

Notes: INPUT SIGNAL - UPLINK

NAME OF TEST: Occupied Bandwidth (GSM)	PARA. NO.: 2.1049
TESTED BY: David LightTTidwell	DATE:07 Feb 2001

Test Results: Complies.

Test Data: See attached plot(s).

Equipment Used: 1036-1064-1065-1081

Measurement Uncertainty: +/- 1.6 dB

Temperature: 22 °C

**Relative
Humidity:** 50 %

Test Data – Occupied Bandwidth – GSM

Data Plot OCCUPIED BANDWIDTH - GSM

Page 1 of 4

Complete X

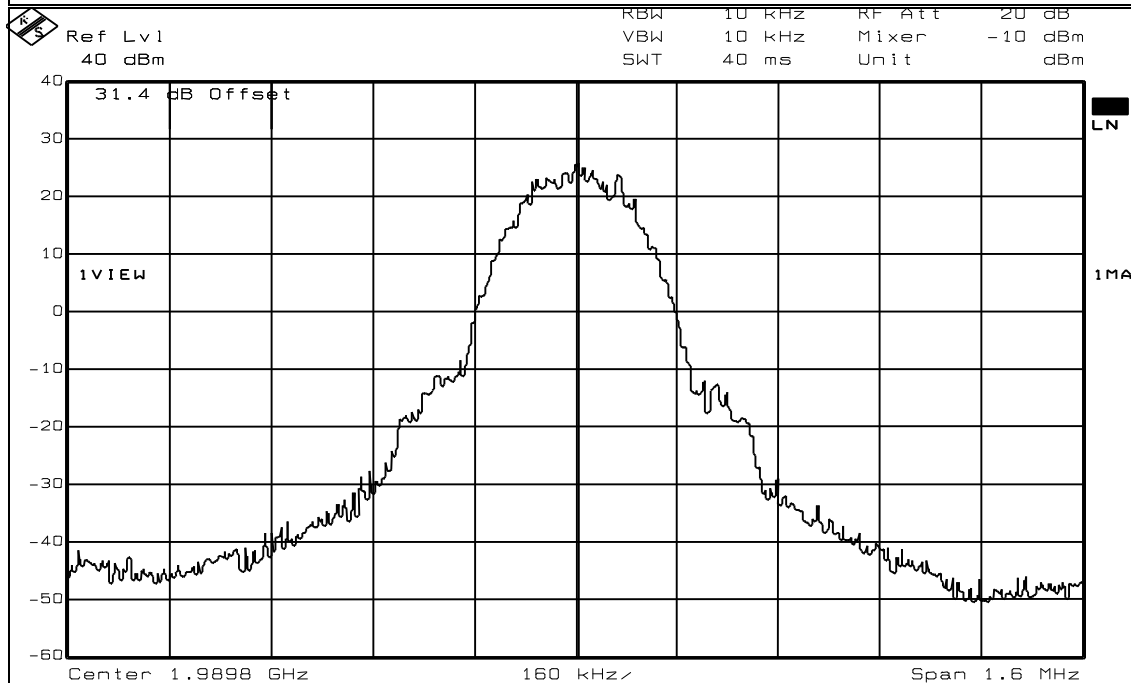
Preliminary _____

Job No.: 1L0015R Date: 2/7/01
Specification: PART 24 Temperature(°C): 22
Tested By: David Light Relative Humidity(%) 50
E.U.T.: PMR703
Configuration: TRANSMIT ONE SIGNAL FULL POWER
Sample No.: S01 & S02
Location: Lab 1 RBW: Refer to plots
Detector Type: Peak VBW: refer to plots

Test Equipment Used

Antenna: _____ Directional Coupler: _____
Pre-Amp: _____ Cable #1: 1081
Filter: _____ Cable #2: _____
Receiver: 1036 Cable #3: _____
Attenuator #1: 1064 Cable #4: _____
Attenuator #2: 1065 Mixer: _____

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



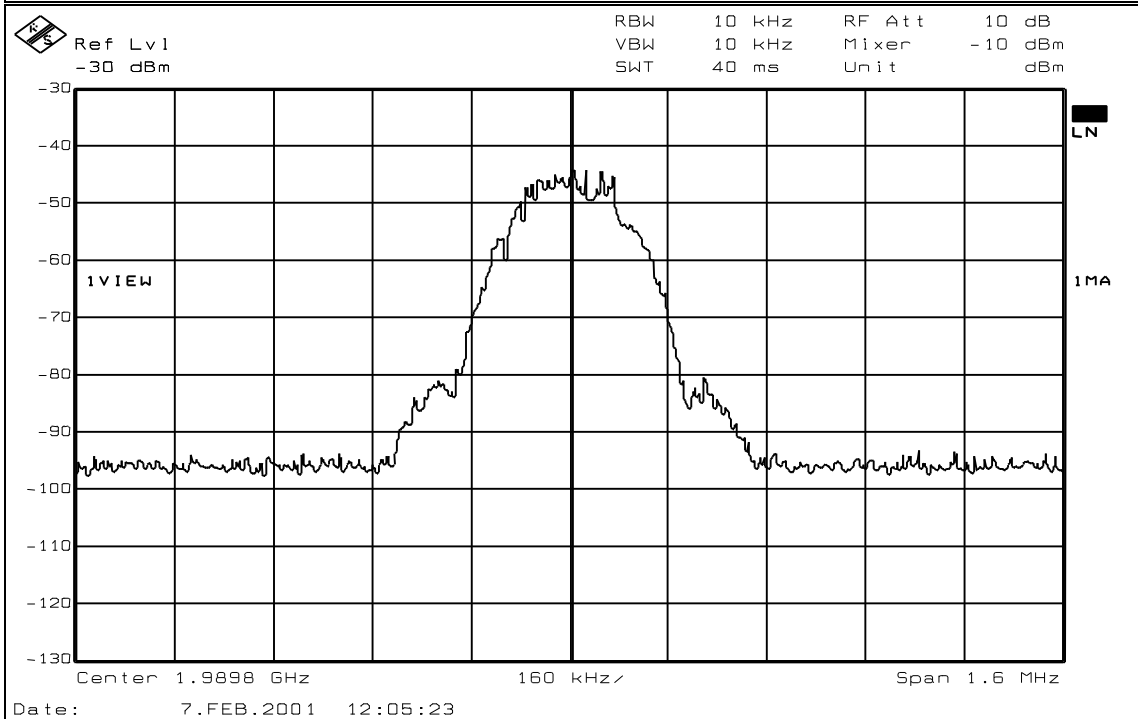
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Notes: OUTPUT SIGNAL - DOWNLINK

Test Data – Occupied Bandwidth – GSM

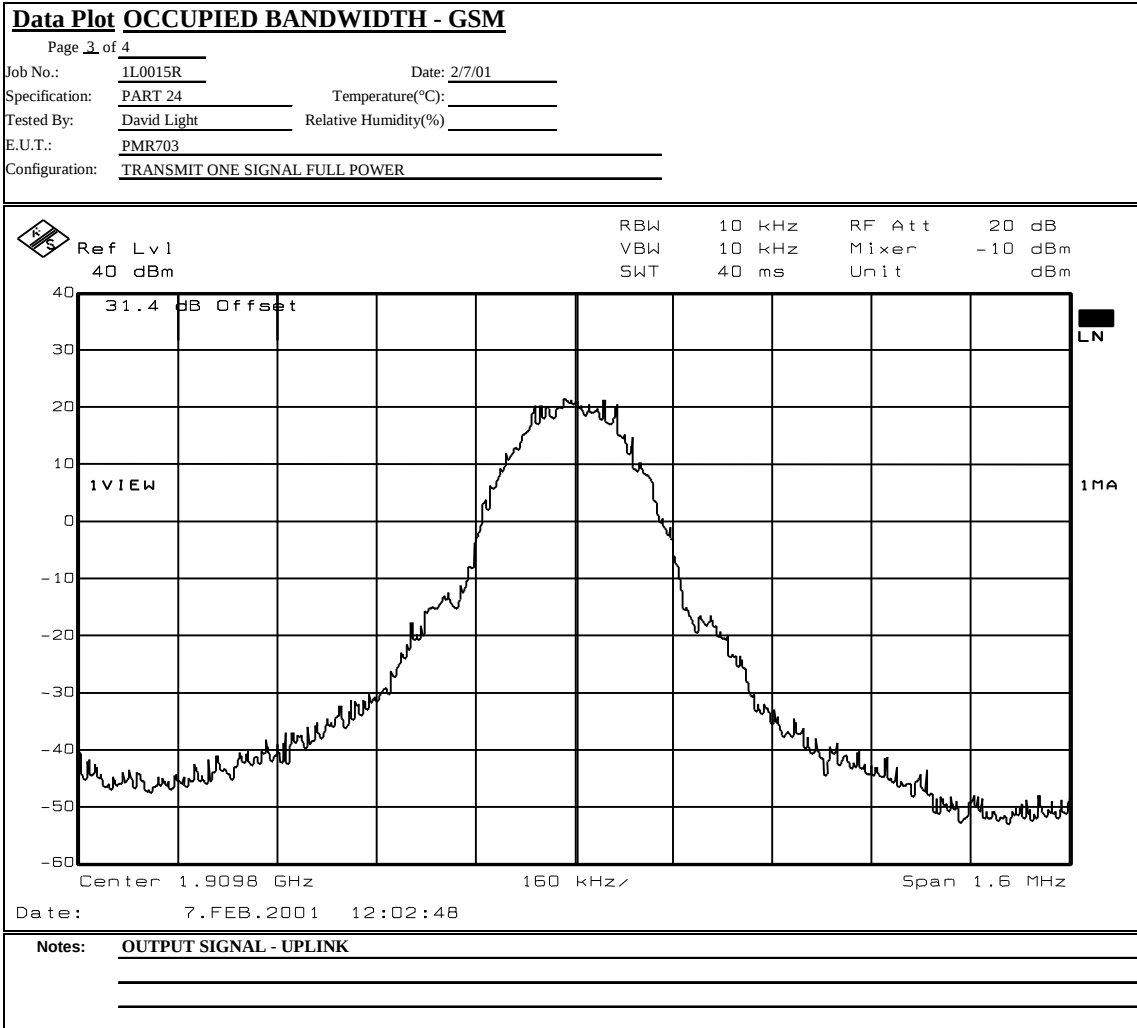
Data Plot OCCUPIED BANDWIDTH - GSM

Page 2 of 4
Job No.: 1L0015R Date: 2/7/01
Specification: PART 24 Temperature(°C): 22
Tested By: David Light Relative Humidity(%) 50
E.U.T.: PMR703
Configuration: TRANSMIT ONE SIGNAL FULL POWER

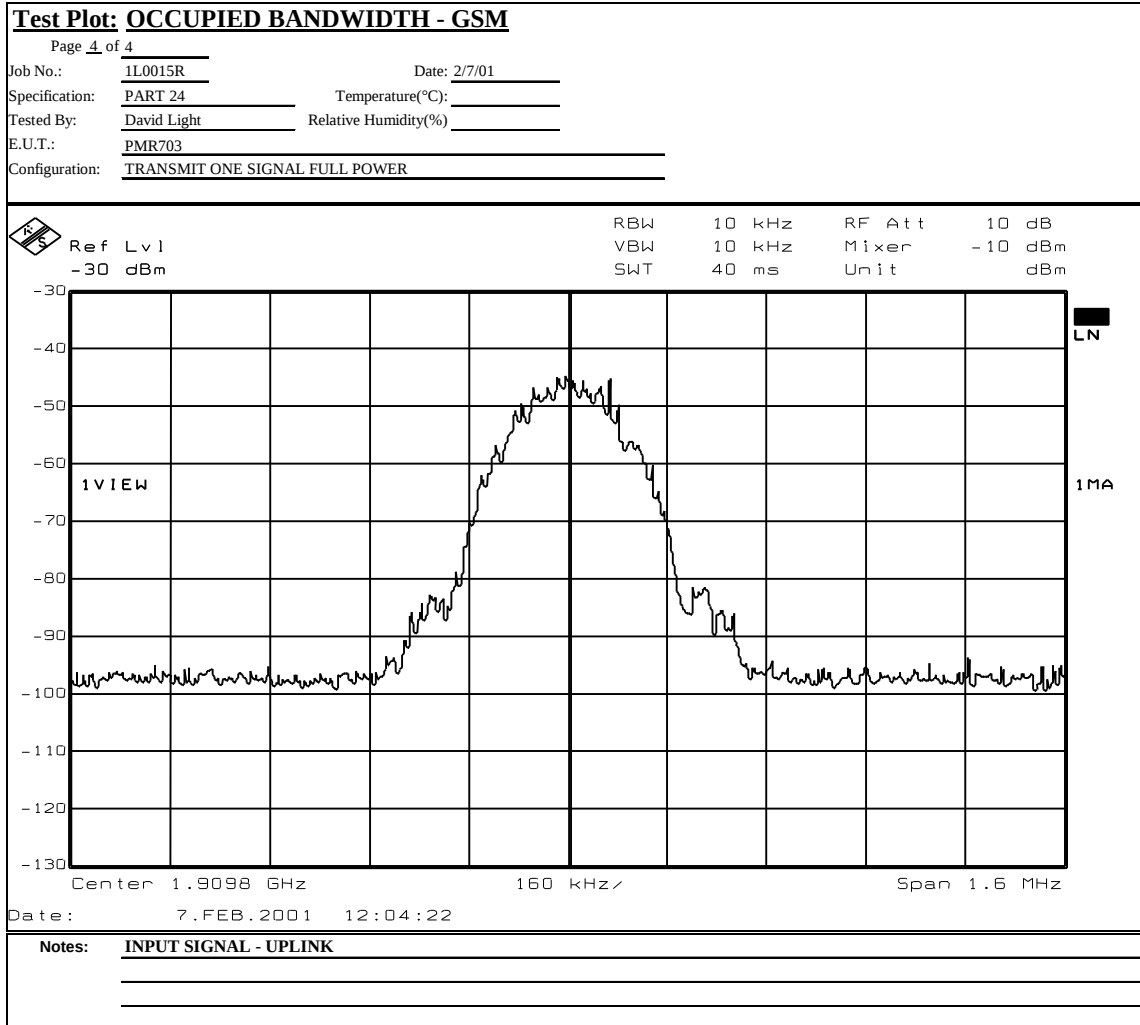


Notes: INPUT SIGNAL - DOWNLINK

Test Data – Occupied Bandwidth – GSM



Test Data – Occupied Bandwidth – GSM



NAME OF TEST: Occupied Bandwidth (NADC)	PARA. NO.: 2.1049
TESTED BY: David LightTTidwell	DATE: 06-FEB 2001

Test Results: Complies.

Test Data: See attached plot(s).

Equipment Used: 1036-1064-1065-1081

Measurement Uncertainty: +/- dB
1.06

Temperature: °C

Relative Humidity: %

Test Data – Occupied Bandwidth - NADC

Data Plot OCCUPIED BANDWIDTH - NADC

Page 1 of 4

Complete X

Preliminary _____

Job No.: 1L0015R

Date: 2/6/01

Specification: PART 24

Temperature(°C): _____

Tested By: David Light

Relative Humidity(%) _____

E.U.T.: PMR703

Configuration: TRANSMIT ONE SIGNAL FULL POWER

Sample No.: S01& S02

Location: Lab 1

RBW: Refer to plots

Detector Type: Peak

VBW: refer to plots

Test Equipment Used

Antenna: _____

Directional Coupler: _____

Pre-Amp: _____

Cable #1: 1081

Filter: _____

Cable #2: _____

Receiver: 1036

Cable #3: _____

Attenuator #1: 1064

Cable #4: _____

Attenuator #2: 1065

Mixer: _____

Additional
equipment used: _____

Measurement

Uncertainty: +/-3.6 dB

Ref Lvl
40 dBm

RBW 1 kHz

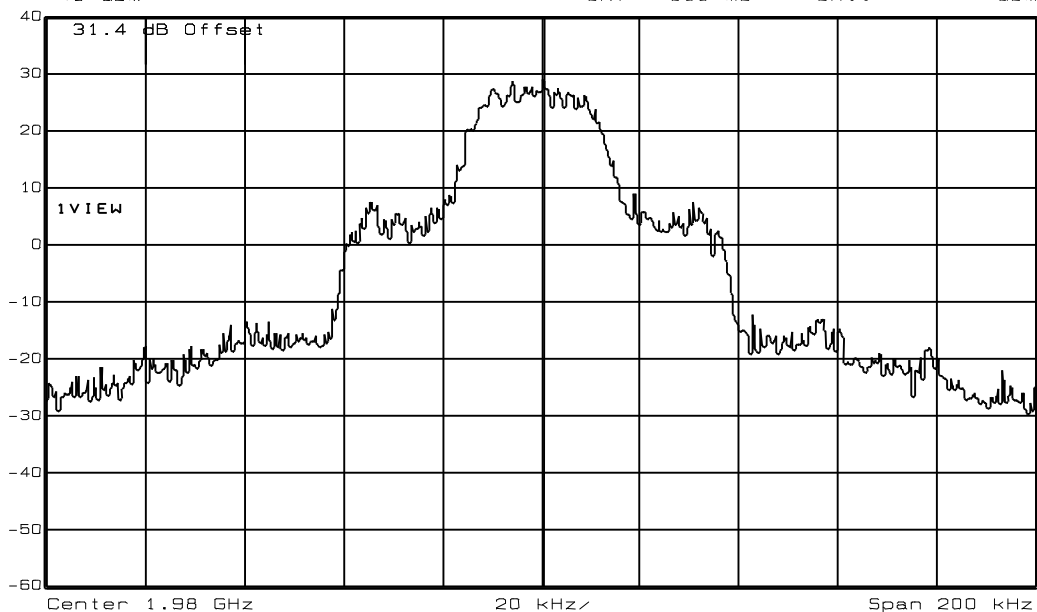
RF Att 20 dB

VBW 1 kHz

Mixer -20 dBm

SWT 500 ms

Unit dBm



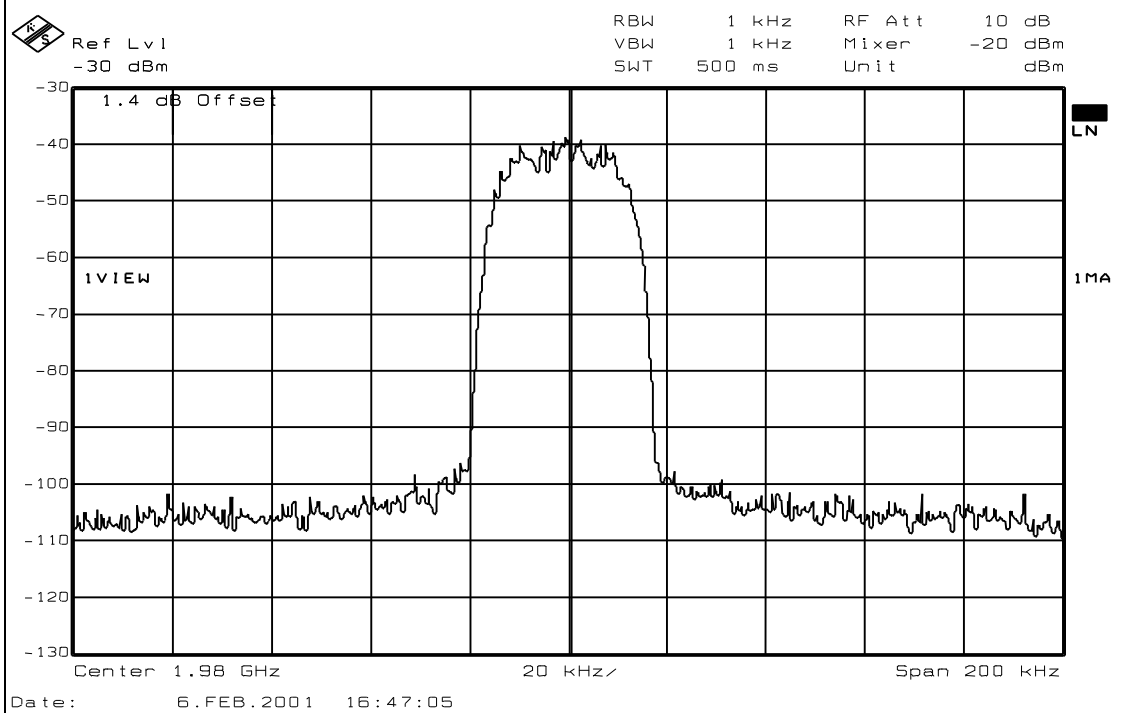
Date: 6.FEB.2001 16:45:21

Notes: OUTPUT SIGNAL - DOWNLINK

Test Data – Occupied Bandwidth - NADC

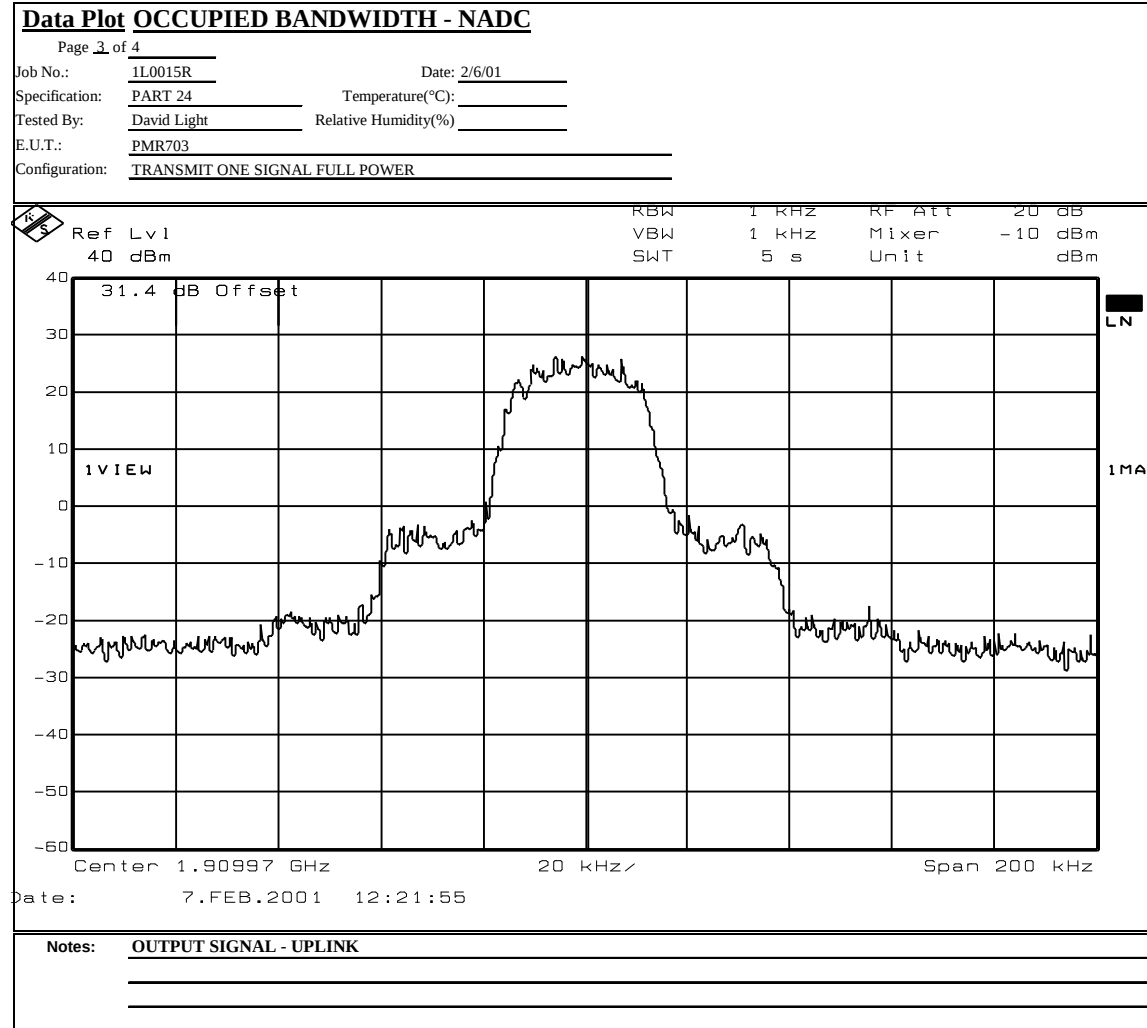
Data Plot OCCUPIED BANDWIDTH - NADC

Page 2 of 4
Job No.: 1L0015R Date: 2/6/01
Specification: PART 24 Temperature(°C):
Tested By: David Light Relative Humidity(%):
E.U.T.: PMR703
Configuration: TRANSMIT ONE SIGNAL FULL POWER



Notes: INPUT SIGNAL - DOWNLINK

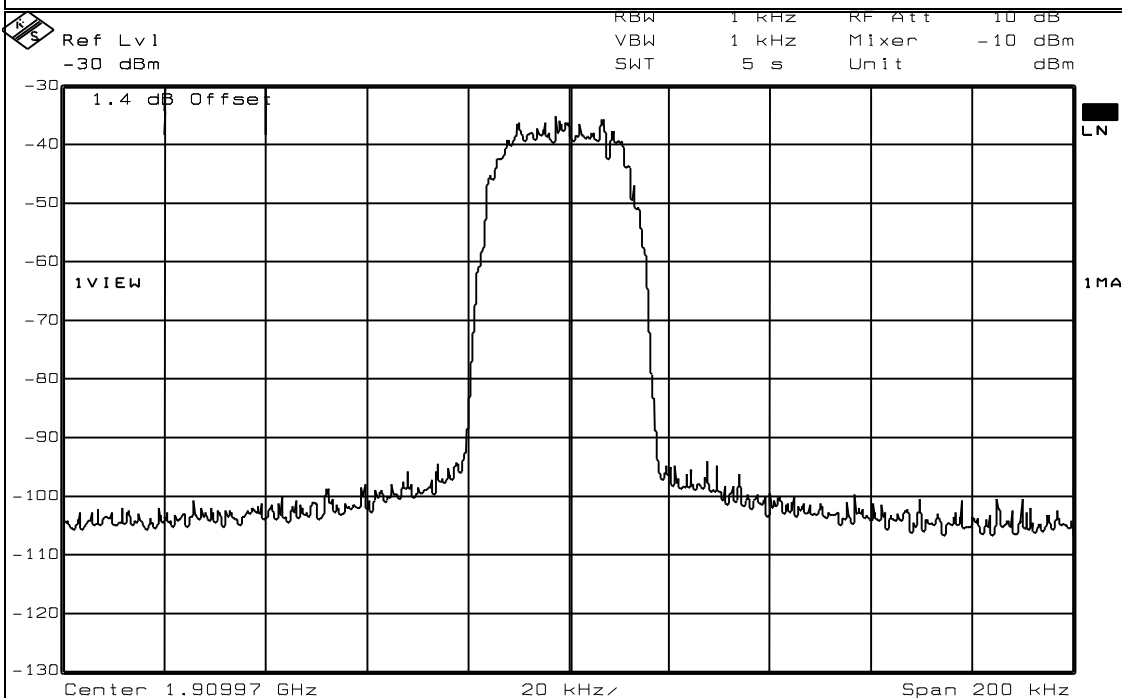
Test Data – Occupied Bandwidth - NADC



Test Data – Occupied Bandwidth - NADC

Test Plot: OCCUPIED BANDWIDTH - NADC

Page 4 of 4
Job No.: 1L0015R Date: 2/6/01
Specification: PART 24 Temperature(°C):
Tested By: David Light Relative Humidity(%):
E.U.T.: PMR703
Configuration: TRANSMIT ONE SIGNAL FULL POWER



Date: 7.FEB.2001 12:24:01

Notes: INPUT SIGNAL - UPLINK

Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 2.1051
TESTED BY: David LightTTidwell	DATE: 07-09 Feb 2001

Test Results: Complies.

Test Data: See attached plot(s).

Equipment Used: 1036-1064-1065-1081

Measurement Uncertainty: +/- dB
1.06

Temperature: 22 °C

Relative Humidity: 50 %

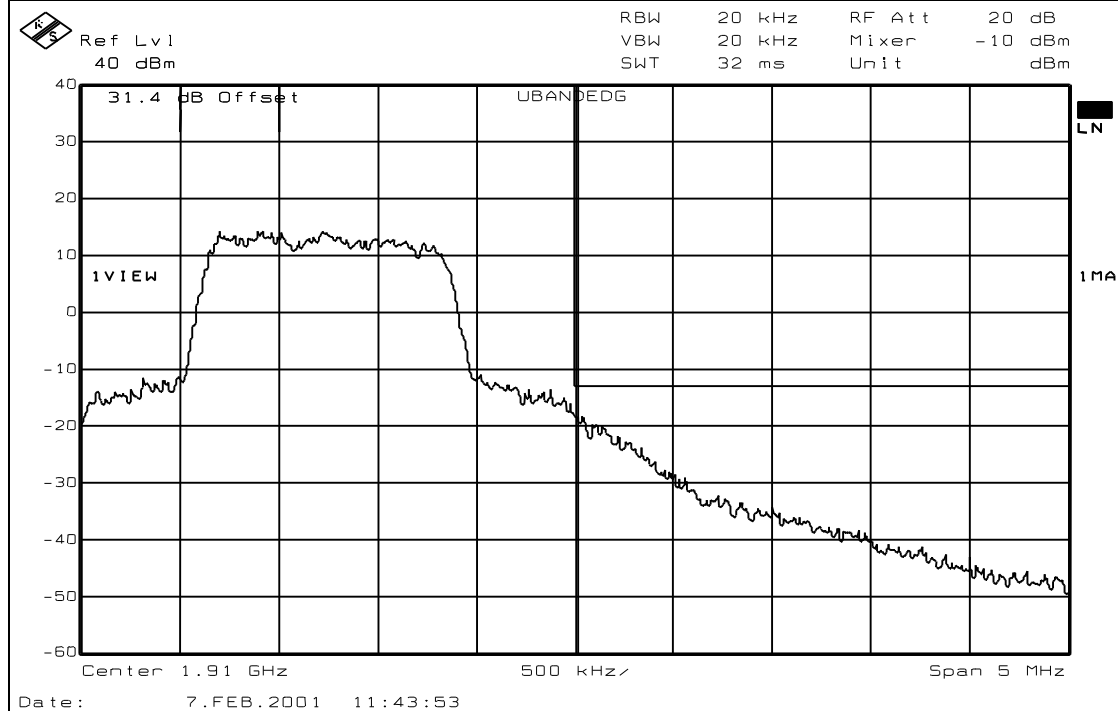
Test Data - Spurious Emissions at Antenna Terminals - CDMA

Data Plot **SPURIOUS EMISSIONS AT ANTENNA TERMINALS - CDMA**

Page 1 of 8 Complete X
Job No.: 1L0015R Date: 2/7/01 Preliminary _____
Specification: PART 24 Temperature(°C): 22
Tested By: David Light Relative Humidity(%): 50
E.U.T.: MR703
Configuration: TX FULL POWER
Sample Number: _____
Location: Lab 1 RBW: REFER TO PLOTS
Detector Type: Peak VBW: REFER TO PLOTS

Test Equipment Used

Antenna: _____ Directional Coupler: _____
Pre-Amp: _____ Cable #1: 1081
Filter: _____ Cable #2: _____
Receiver: 1036 Cable #3: _____
Attenuator #1: 1064 Cable #4: _____
Attenuator #2: 1065 Mixer: _____
Additional equipment used: _____
Measurement Uncertainty: +/-3.6 dB

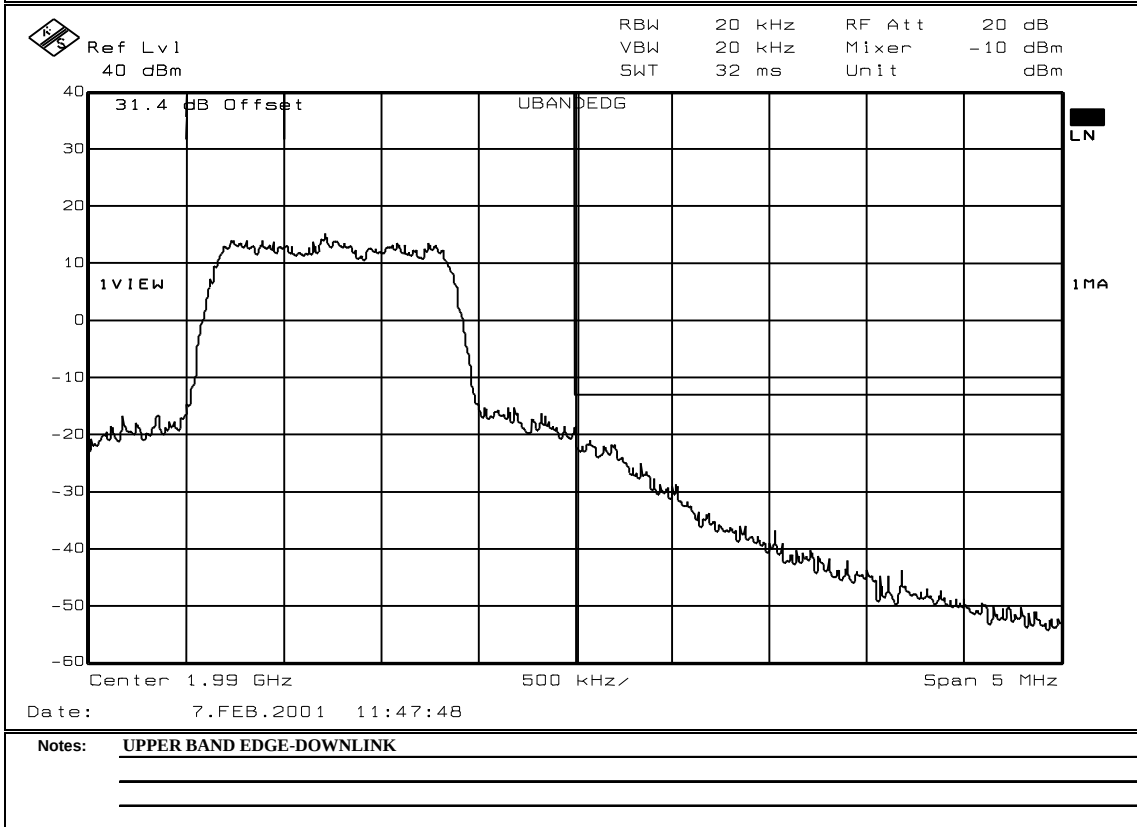
**Notes:** UPPER BAND EDGE - UPLINK

Test Data - Spurious Emissions at Antenna Terminals - CDMA

Data Plot SPURIOUS EMISSIONS AT ANTENNA TERMINALS - CDMA

Page 2 of 8

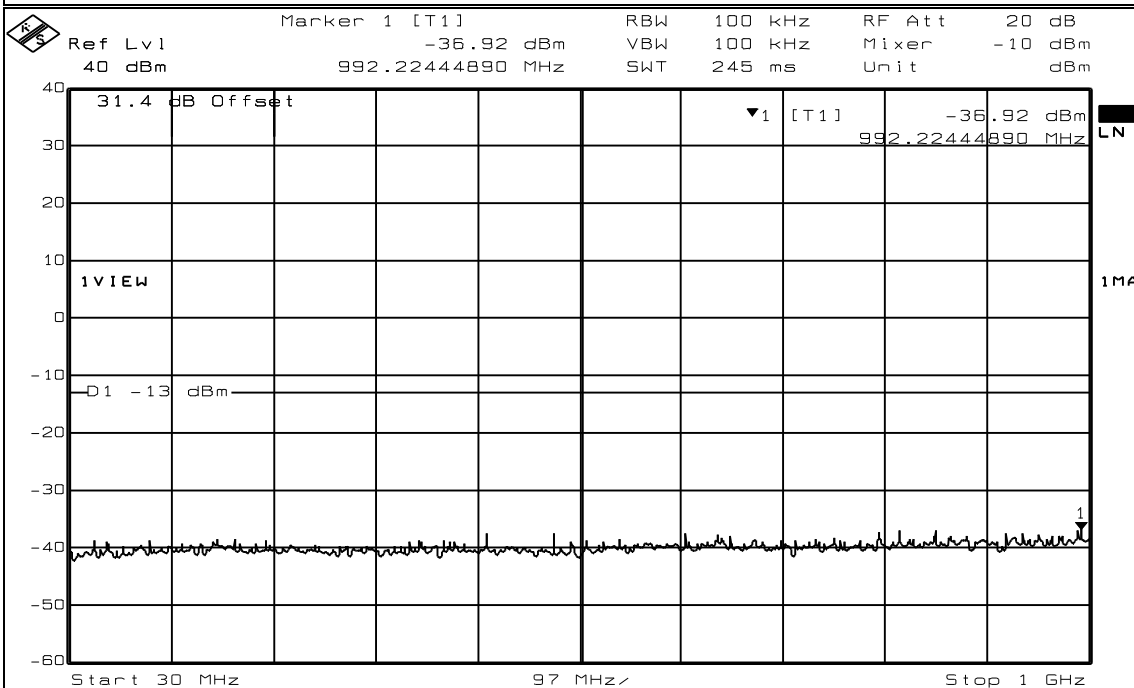
Job No.: 1L0015R Date: 2/7/01
Specification: PART 24 Temperature(°C): 22
Tested By: David Light Relative Humidity(%) 50
E.U.T.: MR703
Configuration: TX FULL POWER



Test Data - Spurious Emissions at Antenna Terminals - CDMA

Data Plot SPURIOUS EMISSIONS AT ANTENNA TERMINALS - CDMA

Page 3 of 8
Job No.: 1L0015R Date: 2/7/01
Specification: PART 24 Temperature(°C): 22
Tested By: David Light Relative Humidity(%) 50
E.U.T.: MR703
Configuration: TX FULL POWER



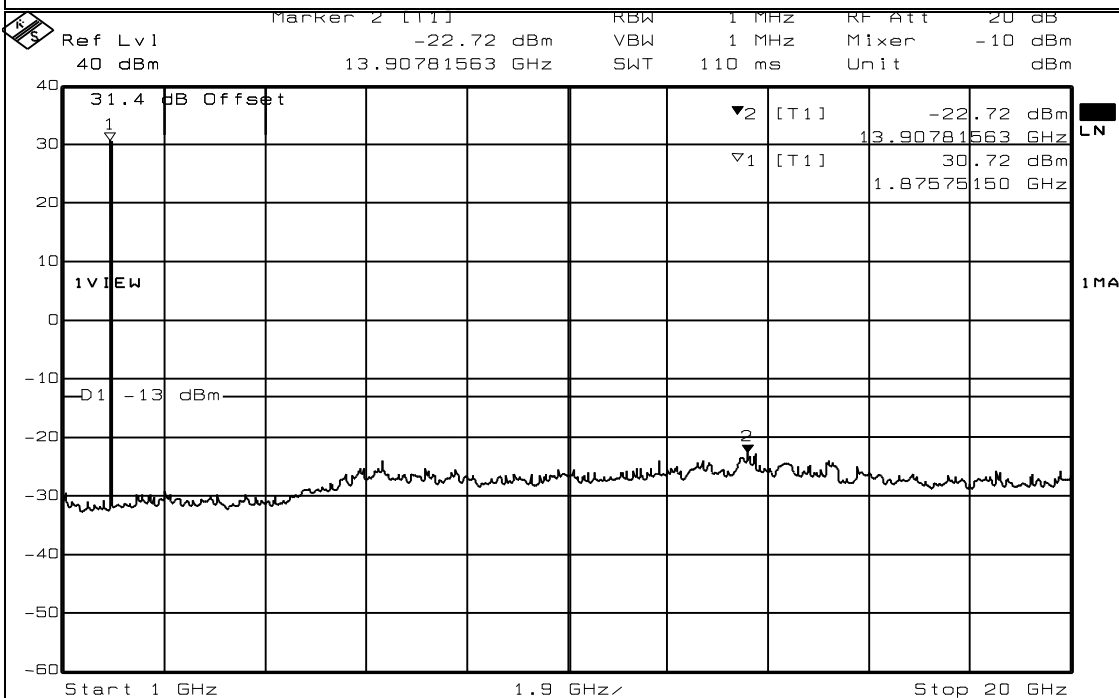
Date: 7.FEB.2001 13:59:37

Notes: UPLINK

Test Data - Spurious Emissions at Antenna Terminals - CDMA

Test Plot: SPURIOUS EMISSIONS AT ANTENNA TERMINALS - CDMA

Page 4 of 8
Job No.: 1L0015R Date: 2/7/01
Specification: PART 24 Temperature(°C): 22
Tested By: David Light Relative Humidity(%) 50
E.U.T.: MR703
Configuration: TX FULL POWER



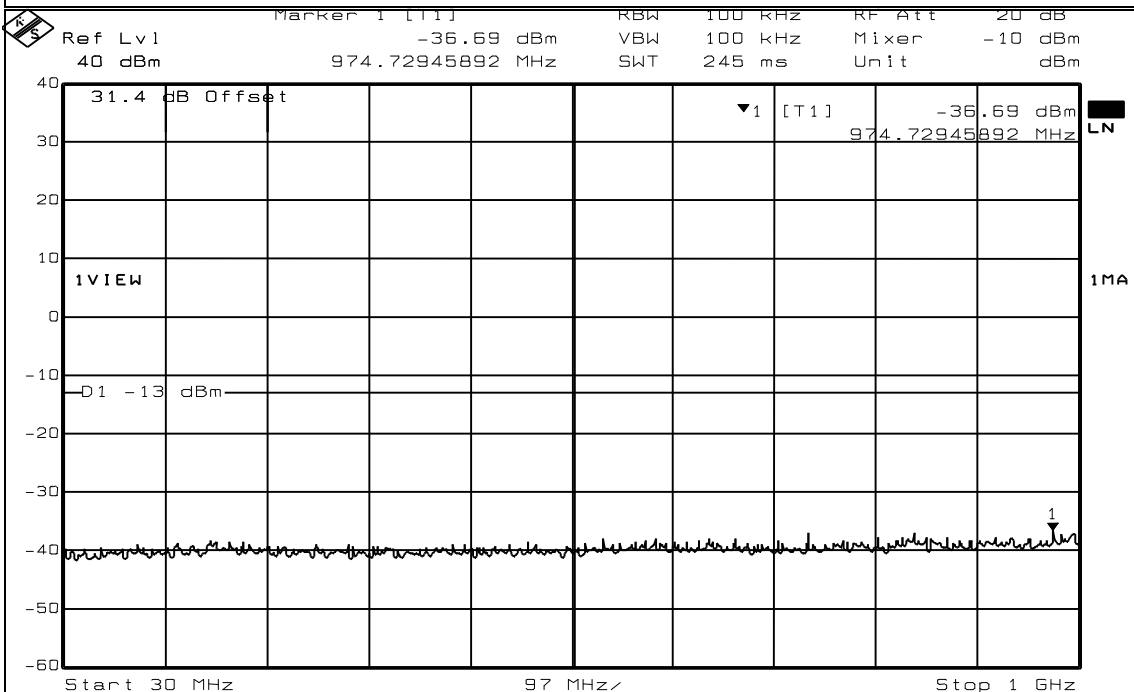
Date: 7.FEB.2001 14:00:35

Notes: UPLINK
MARKER 1 INDICATES CARRIER - MARKER 2 INDICATES EMISSION

Test Data - Spurious Emissions at Antenna Terminals - CDMA

Test Plot: SPURIOUS EMISSIONS AT ANTENNA TERMINALS - CDMA

Page 5 of 8
Job No.: 1L0015R Date: 2/7/01
Specification: PART 24 Temperature(°C): 22
Tested By: David Light Relative Humidity(%) 50
E.U.T.: MR703
Configuration: TX FULL POWER



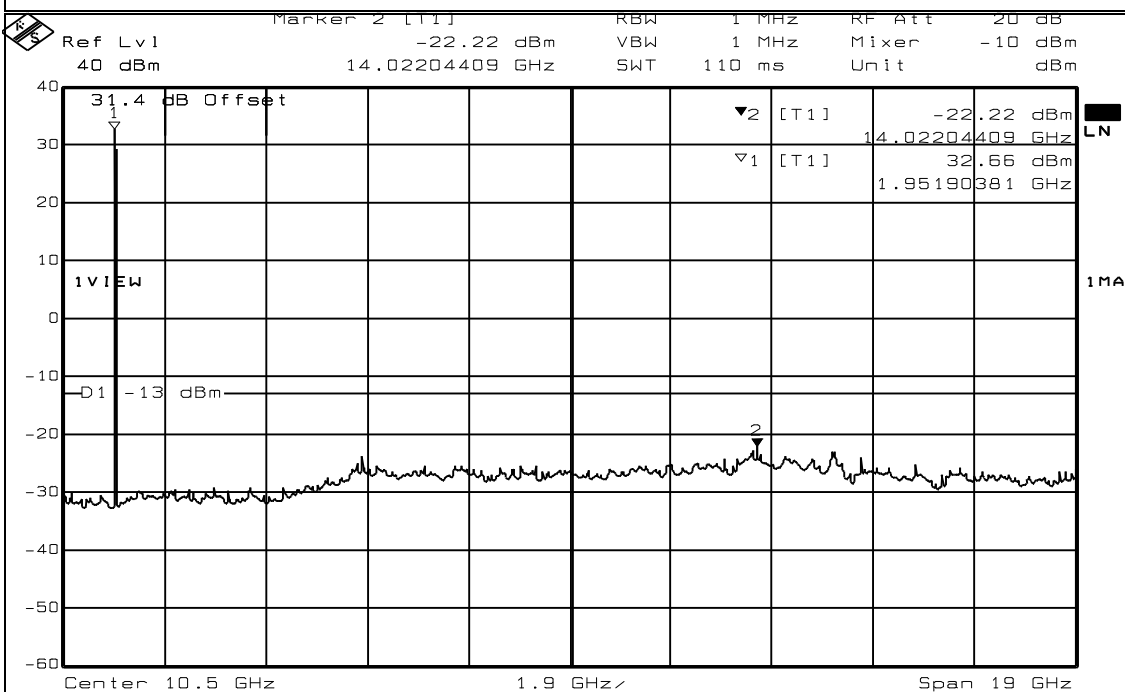
Date: 7.FEB.2001 14:04:19

Notes: DOWNLINK

Test Data - Spurious Emissions at Antenna Terminals - CDMA

Test Plot: SPURIOUS EMISSIONS AT ANTENNA TERMINALS - CDMA

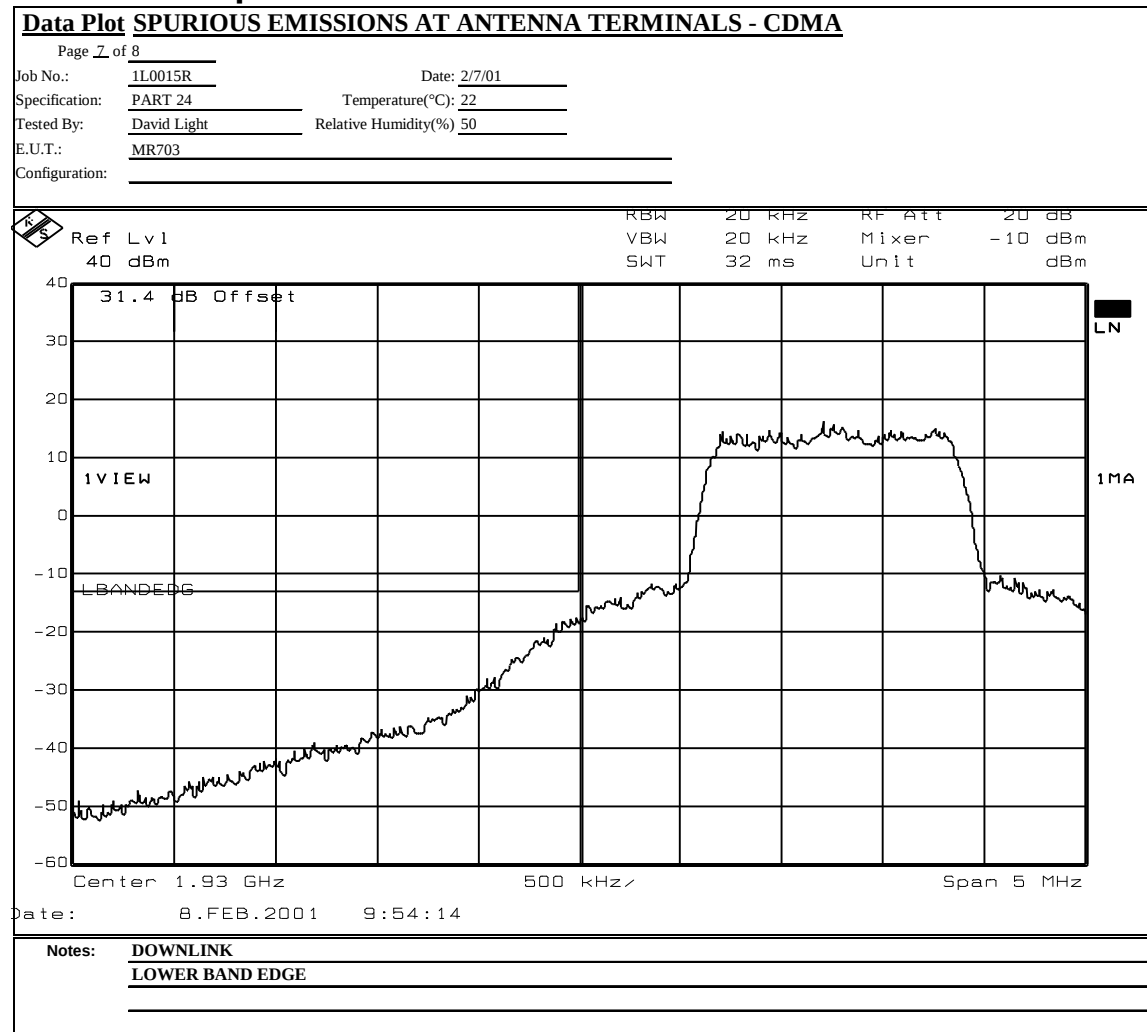
Page 6 of 8
Job No.: 1L0015R Date: 2/7/01
Specification: PART 24 Temperature(°C): 22
Tested By: David Light Relative Humidity(%) 50
E.U.T.: MR703
Configuration: TX FULL POWER



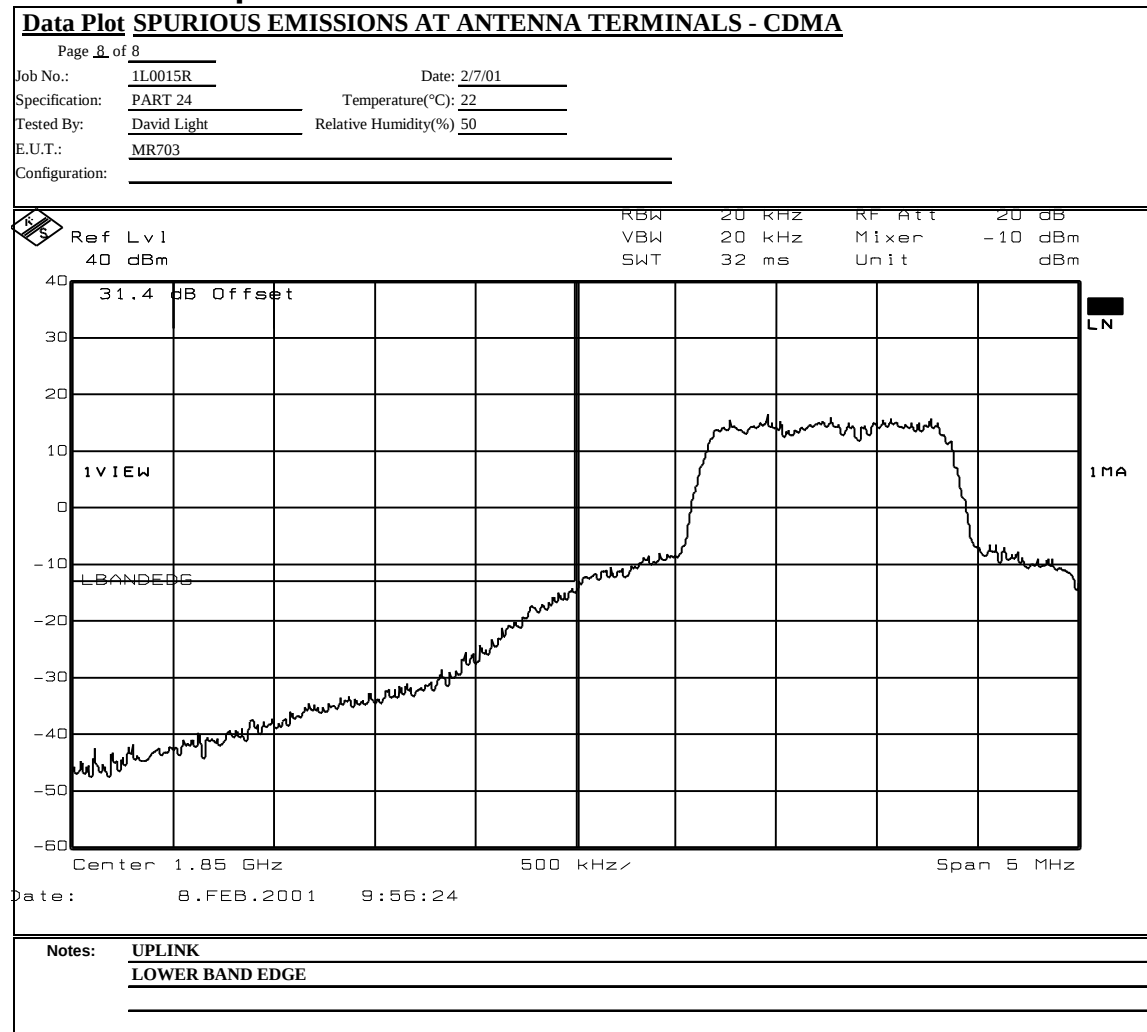
Date: 7.FEB.2001 14:03:23

Notes: DOWNLINK
MARKER 1 INDICATES CARRIER - MARKER 2 INDICATES EMISSION

Test Data - Spurious Emissions at Antenna Terminals - CDMA



Test Data - Spurious Emissions at Antenna Terminals - CDMA



Test Data - Spurious Emissions at Antenna Terminals - CDMA

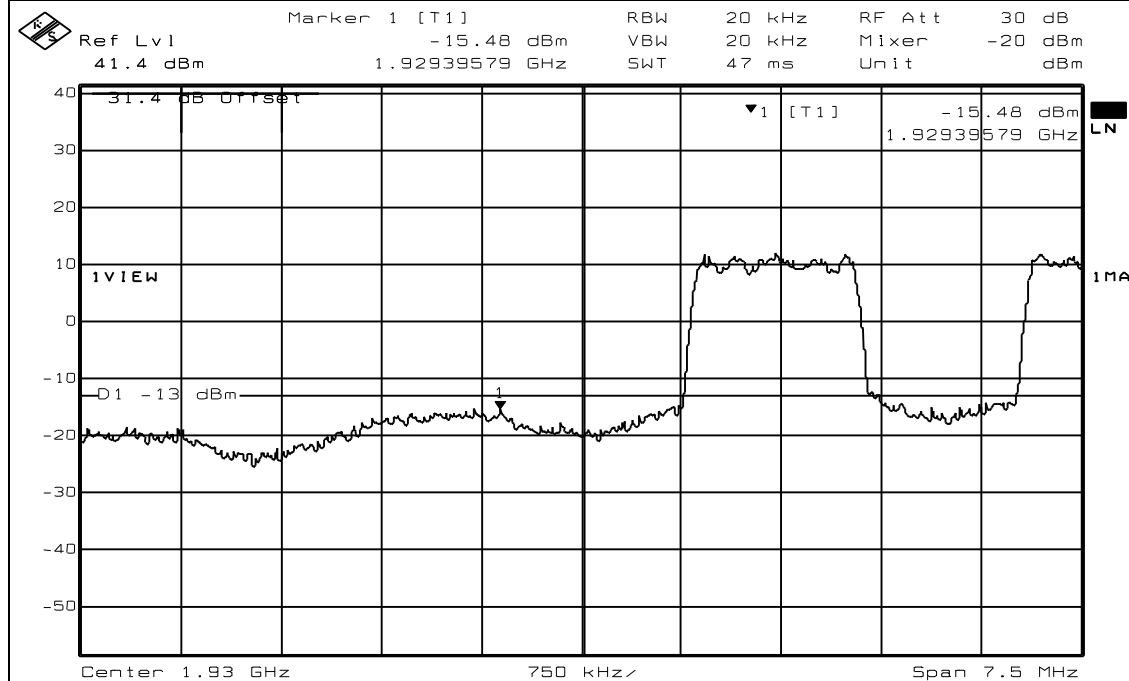
Data Plot INTERMODULATION CHARACTERISTICS - CDMA

Page 1 of 4 Complete X
Preliminary _____

Job No.: 1L0015R Date: 02/06/01
Specification: PART24 Temperature(°C): 22
Tested By: David Light Relative Humidity(%) 50
E.U.T.: MR703
Configuration: Tx 3 CDMA SIGNALS - FULL POWER
Sample Number: _____
Location: Lab 1 RBW: Refer to plots
Detector Type: Peak VBW: Refer to plots

Test Equipment Used

Antenna: _____ Directional Coupler: _____
Pre-Amp: _____ Cable #1: 1081
Filter: _____ Cable #2: _____
Receiver: 1036 Cable #3: _____
Attenuator #1: 1064 Cable #4: _____
Attenuator #2: 1065 Mixer: _____
Additional equipment used: _____
Measurement Uncertainty: +/-3.6 dB



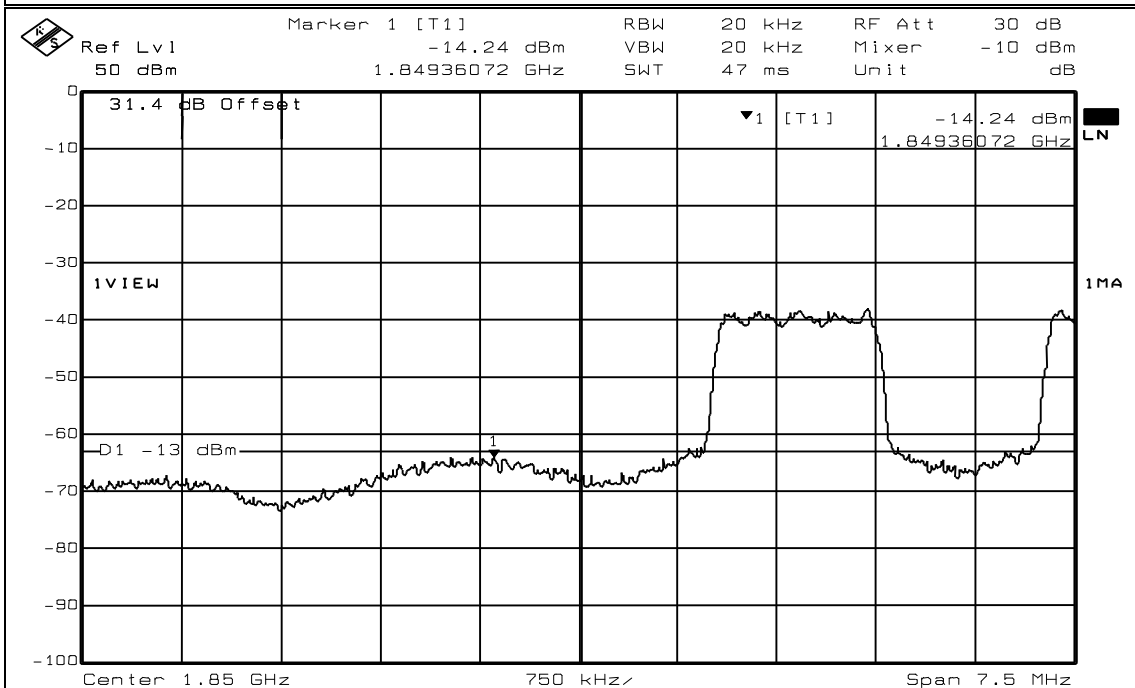
Date: 6.FEB.2001 11:22:44

Notes: DOWNLINK - LOWER BANDEDGE

Test Data - Spurious Emissions at Antenna Terminals - CDMA

Data Plot INTERMODULATION CHARACTERISTICS - CDMA

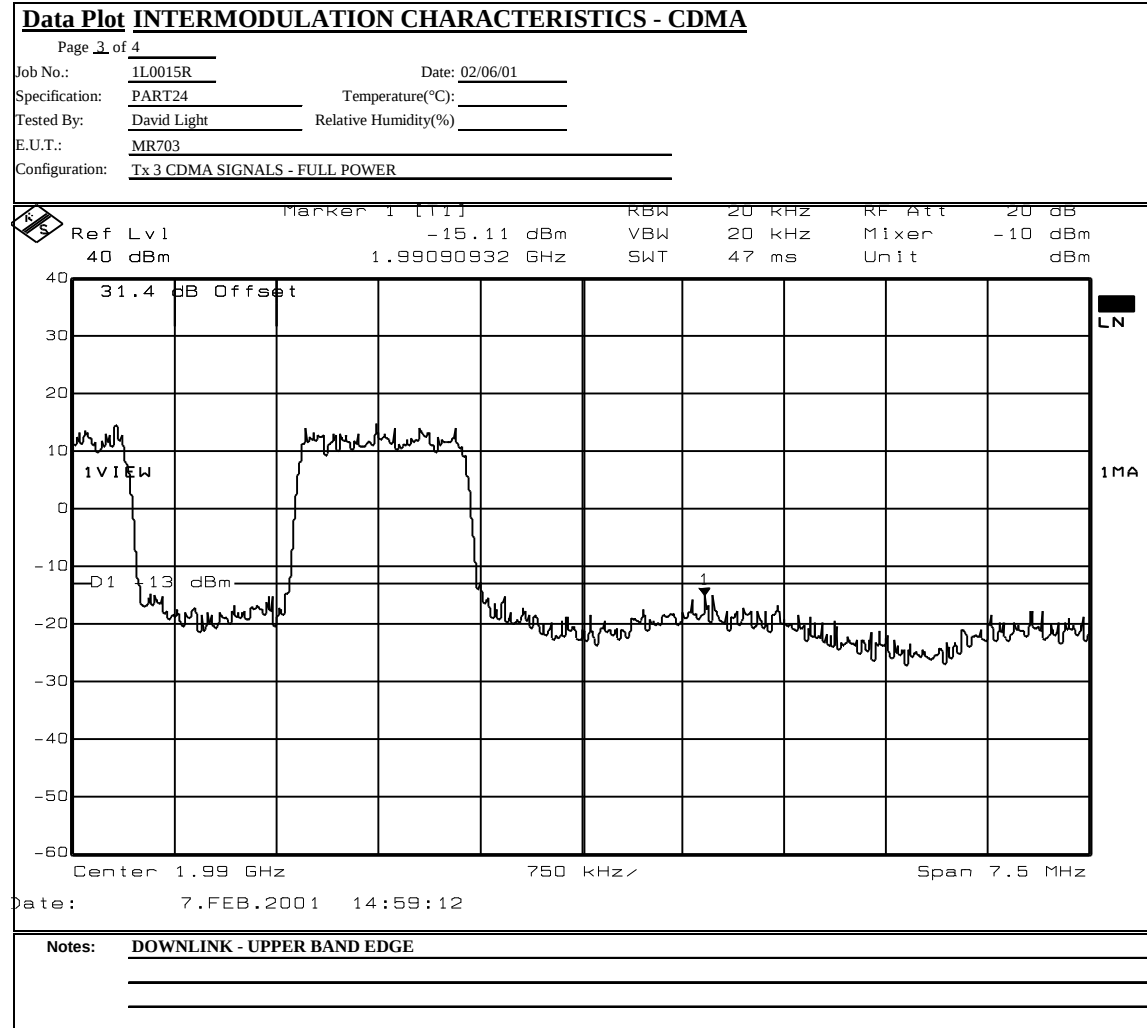
Page 2 of 4
Job No.: 1L0015R Date: 02/06/01
Specification: PART24 Temperature(°C): 22
Tested By: David Light Relative Humidity(%) 50
E.U.T.: MR703
Configuration: Tx 3 CDMA SIGNALS - FULL POWER



Date: 6.FEB.2001 12:00:13

Notes: LOWER BAND EDGE - UPLINK

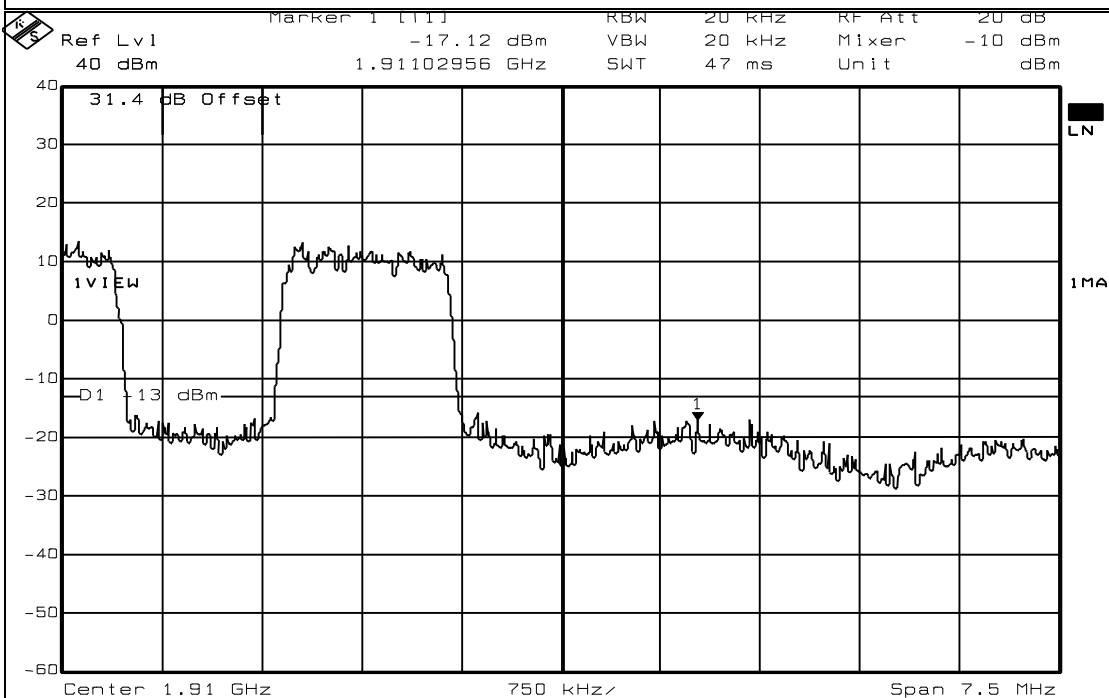
Test Data - Spurious Emissions at Antenna Terminals - CDMA



Test Data - Spurious Emissions at Antenna Terminals - CDMA

Test Plot: INTERMODULATION CHARACTERISTICS - CDMA

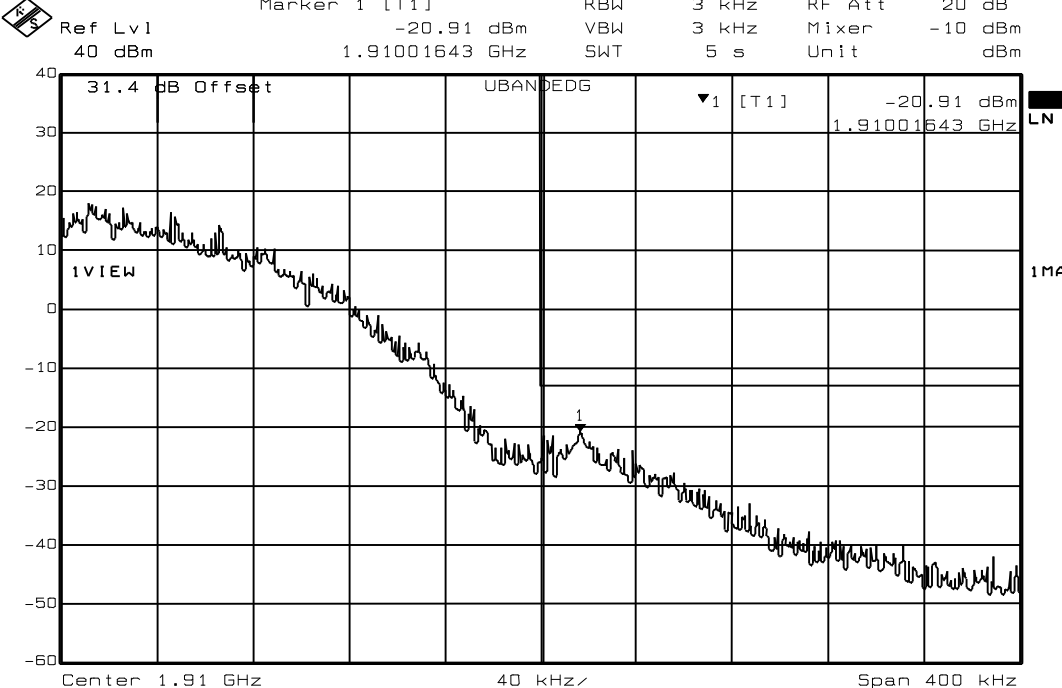
Page 4 of 4
Job No.: 1L0015R Date: 02/06/01
Specification: PART24 Temperature(°C):
Tested By: David Light Relative Humidity(%):
E.U.T.: MR703
Configuration: Tx 3 CDMA SIGNALS - FULL POWER



Date: 7.FEB.2001 14:55:35

Notes: UPLINK - UPPER BAND EDGE

Test Data - Spurious Emissions at Antenna Terminals - GSM

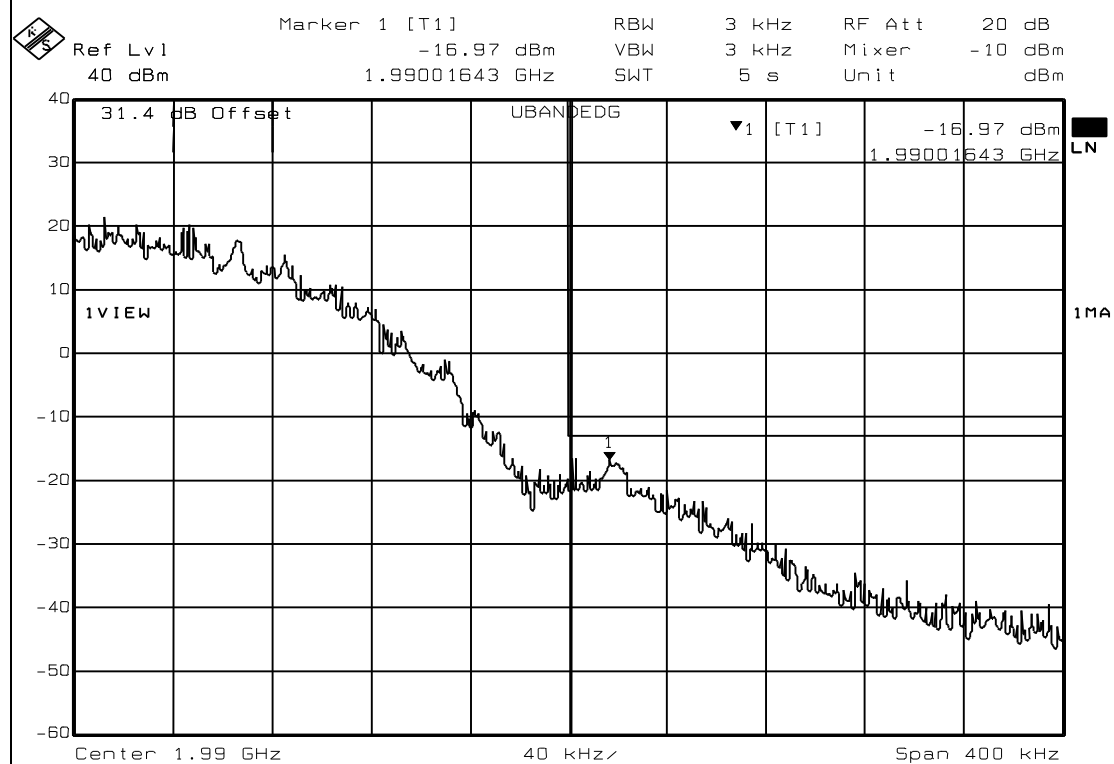
Data Plot: SPURIOUS EMISSIONS AT ANTENNA TERMINALS - GSM			
Page <u>1</u> of <u>6</u>		Complete <u>X</u>	
Job No.: 1L0015R	Date: 2/7/01	Preliminary _____	
Specification: PART 24	Temperature(°C): <u>22</u>		
Tested By: David Light	Relative Humidity(%): <u>50</u>		
E.U.T.: MR703			
Configuration: TX FULL POWER			
Sample Number: S01 & S02			
Location: Lab 1	RBW: REFER TO PLOTS		
Detector Type: Peak	VBW: REFER TO PLOTS		
Test Equipment Used			
Antenna: _____	Directional Coupler: _____		
Pre-Amp: _____	Cable #1: 1081		
Filter: _____	Cable #2: _____		
Receiver: 1036	Cable #3: _____		
Attenuator #1: 1064	Cable #4: _____		
Attenuator #2: 1065	Mixer: _____		
Additional equipment used: _____			
Measurement Uncertainty: +/-3.6 dB			
			
Date: 7.FEB.2001 11:57:55			
Notes: UPPER BAND EDGE - UPLINK			

Test Data - Spurious Emissions at Antenna Terminals - GSM

Data Plot SPURIOUS EMISSIONS AT ANTENNA TERMINALS - GSM

Page 2 of 6

Job No.: 1L0015R Date: 2/7/01
Specification: PART 24 Temperature(°C): 22
Tested By: David Light Relative Humidity(%) 50
E.U.T.: MR703
Configuration: TX FULL POWER



Date: 7.FEB.2001 11:56:10

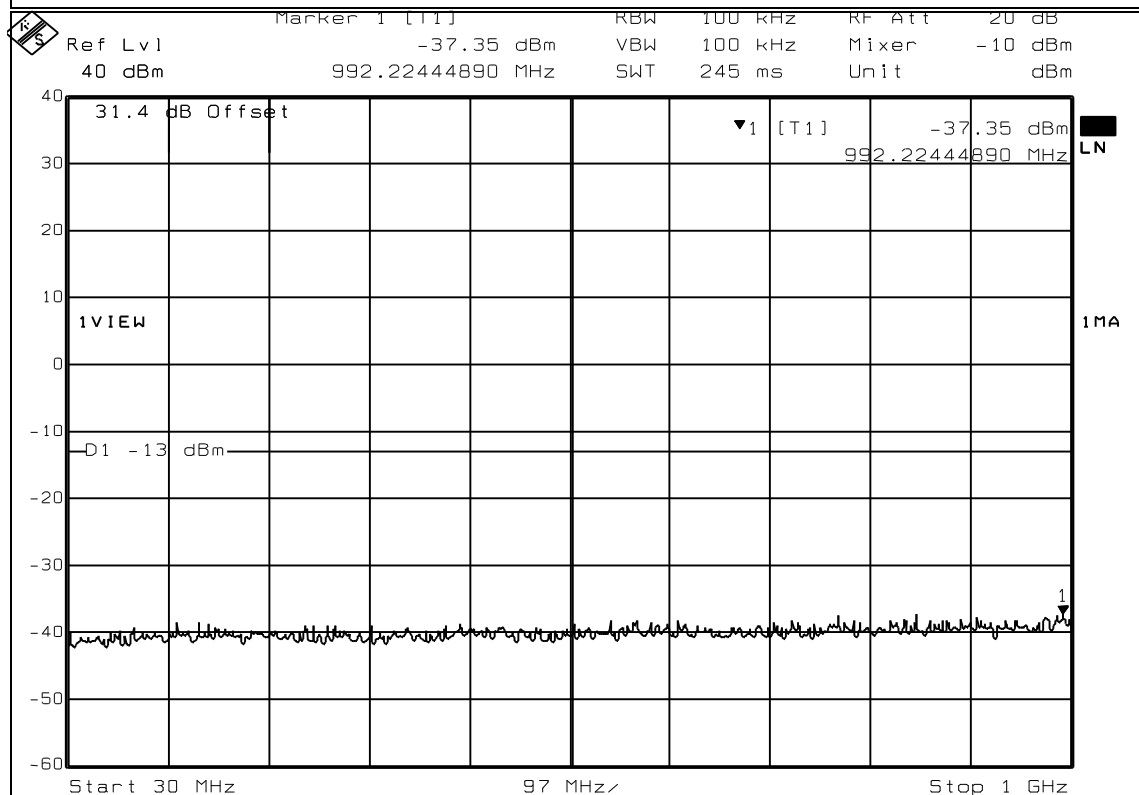
Notes: UPPER BAND EDGE-DOWNLINK

Test Data - Spurious Emissions at Antenna Terminals - GSM

Data Plot SPURIOUS EMISSIONS AT ANTENNA TERMINALS - GSM

Page 3 of 6

Job No.: 1L0015R Date: 2/7/01
Specification: PART 24 Temperature(°C): 22
Tested By: David Light Relative Humidity(%) 50
E.U.T.: MR703
Configuration: TX FULL POWER



Date: 7.FEB.2001 14:30:18

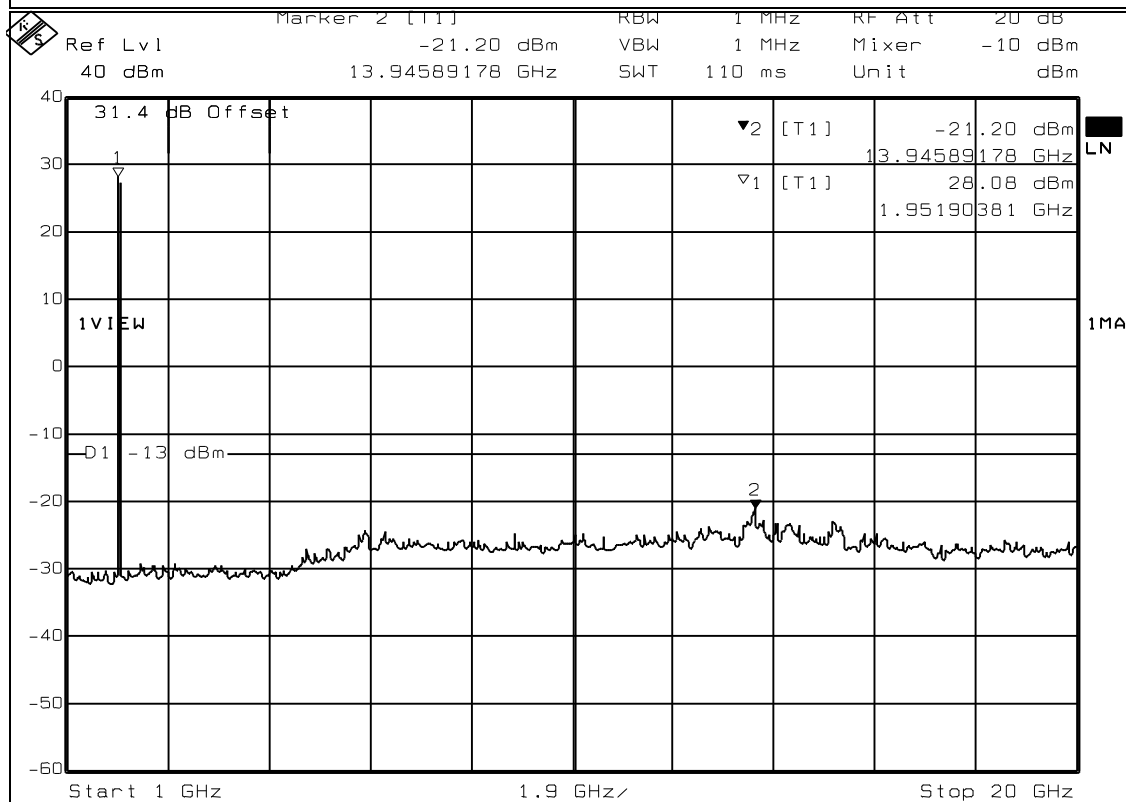
Notes: DOWNLINK

Test Data - Spurious Emissions at Antenna Terminals - GSM

Test Plot: SPURIOUS EMISSIONS AT ANTENNA TERMINALS - GSM

Page 4 of 6

Job No.: 1L0015R Date: 2/7/01
Specification: PART 24 Temperature(°C): 22
Tested By: David Light Relative Humidity(%) 50
E.U.T.: MR703
Configuration: TX FULL POWER



Date: 7.FEB.2001 14:39:51

Notes: DOWNLINK

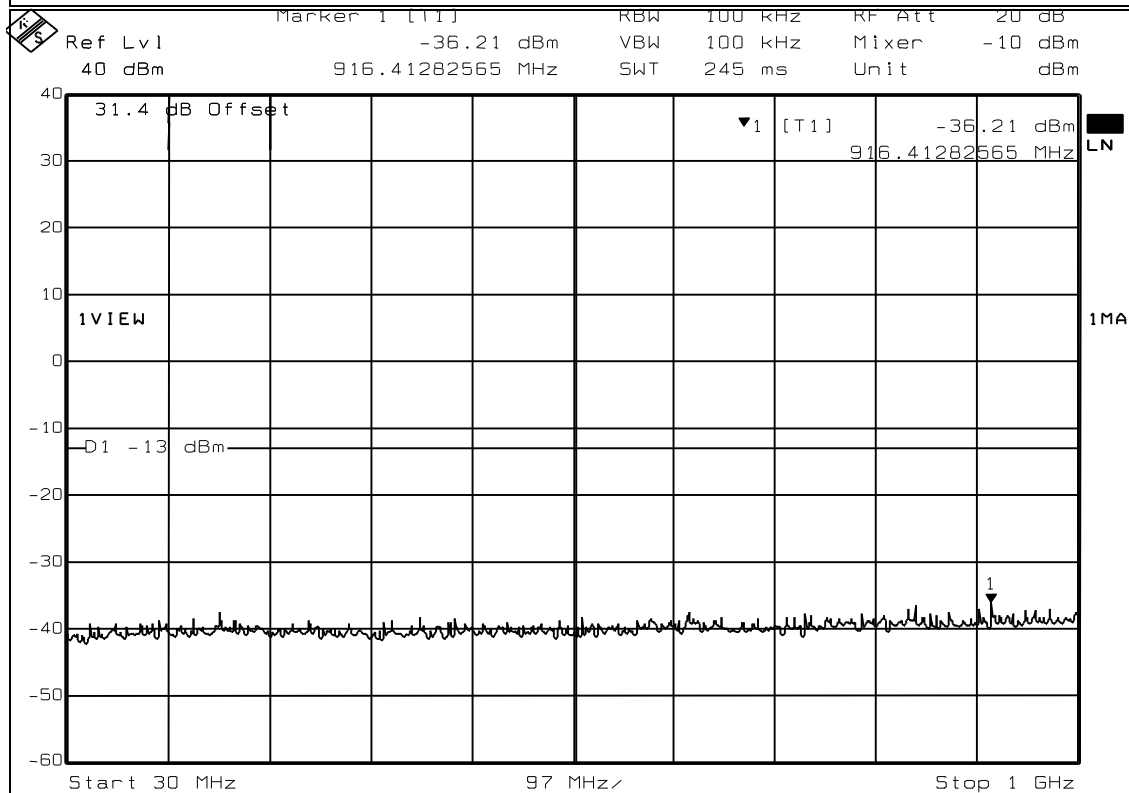
MARKER 1 INDICATES CARRIER - MARKER 2 INDICATES EMISSION

Test Data - Spurious Emissions at Antenna Terminals - GSM

Test Plot: SPURIOUS EMISSIONS AT ANTENNA TERMINALS - GSM

Page 5 of 6

Job No.: 1L0015R Date: 2/7/01
Specification: PART 24 Temperature(°C): 22
Tested By: David Light Relative Humidity(%) 50
E.U.T.: MR703
Configuration: TX FULL POWER



Date: 7.FEB.2001 14:42:04

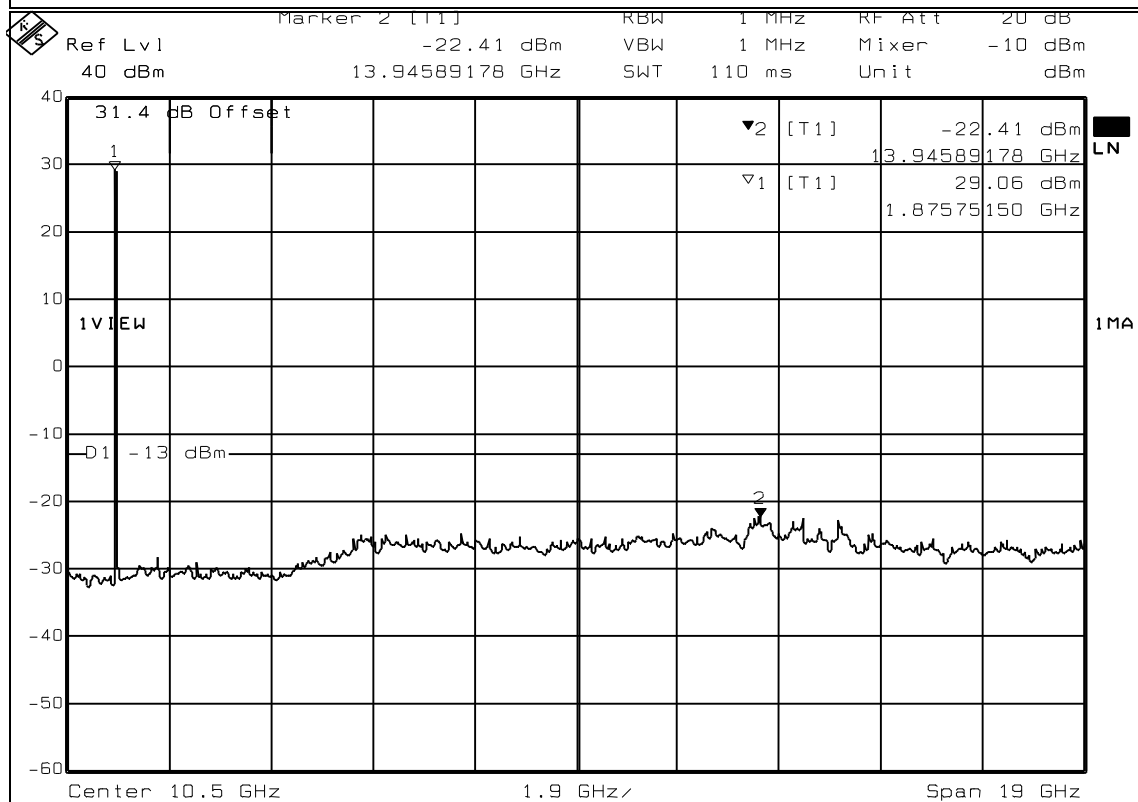
Notes: UPLINK

Test Data - Spurious Emissions at Antenna Terminals - GSM

Test Plot: SPURIOUS EMISSIONS AT ANTENNA TERMINALS - GSM

Page 6 of 6

Job No.: 1L0015R Date: 2/7/01
Specification: PART 24 Temperature(°C): 22
Tested By: David Light Relative Humidity(%) 50
E.U.T.: MR703
Configuration: TX FULL POWER



Date: 7.FEB.2001 14:41:26

Notes: UPLINK

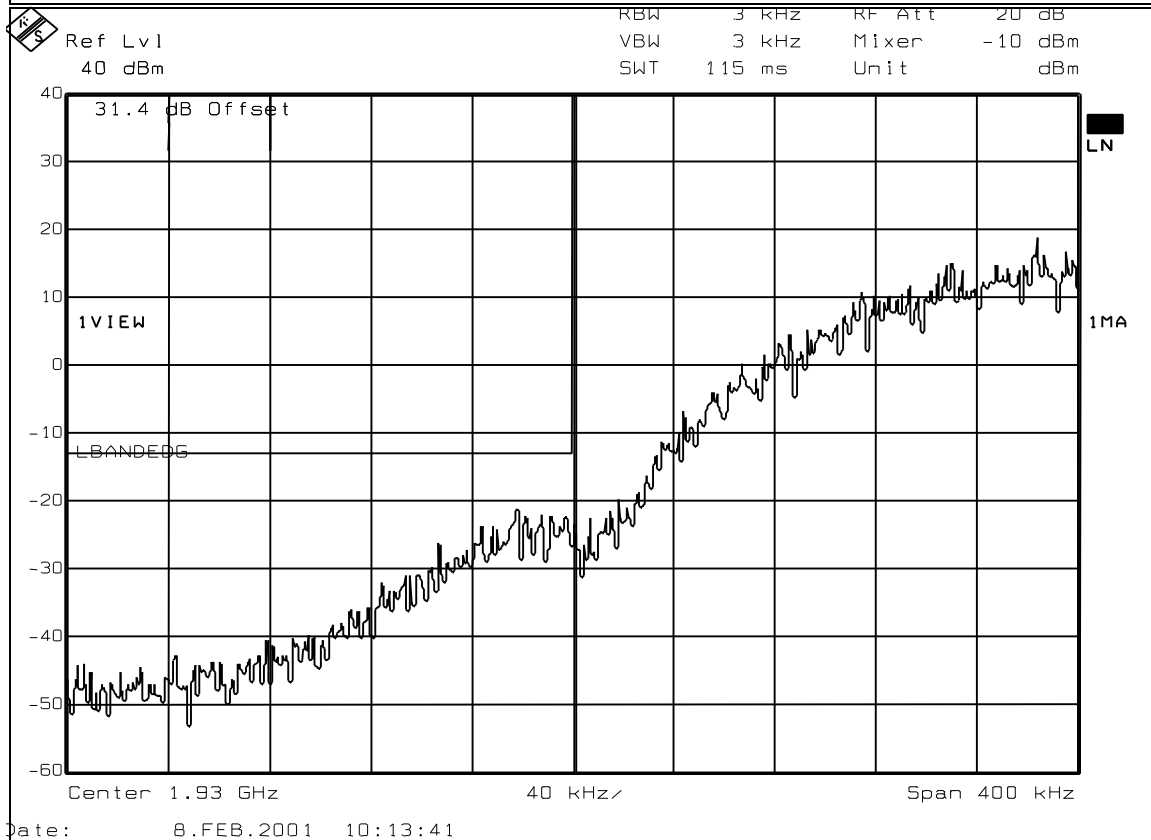
MARKER 1 INDICATES CARRIER - MARKER 2 INDICATES EMISSION

Test Data - Spurious Emissions at Antenna Terminals - GSM

Test Plot: SPURIOUS EMISSIONS AT ANTENNA TERMINALS - GSM

Page 6 of 6

Job No.: 1L0015R Date: 2/7/01
Specification: PART 24 Temperature(°C): 22
Tested By: David Light Relative Humidity(%) 50
E.U.T.: MR703
Configuration: TX FULL POWER



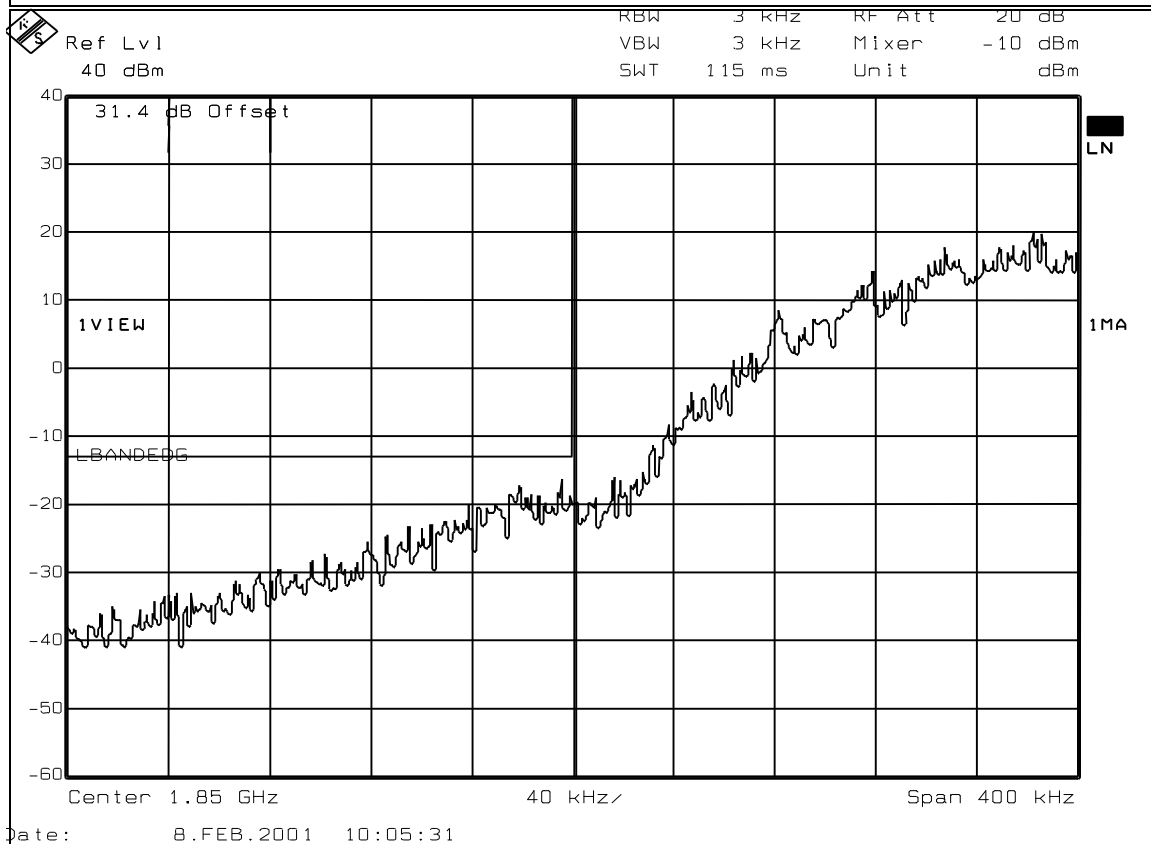
Notes: DOWNLINK
LOWER BAND EDGE

Test Data - Spurious Emissions at Antenna Terminals - GSM

Test Plot: SPURIOUS EMISSIONS AT ANTENNA TERMINALS - GSM

Page 6 of 6

Job No.: 1L0015R Date: 2/7/01
Specification: PART 24 Temperature(°C): 22
Tested By: David Light Relative Humidity(%) 50
E.U.T.: MR703
Configuration: TX FULL POWER



Notes: UPLINK
LOWER BAND EDGE

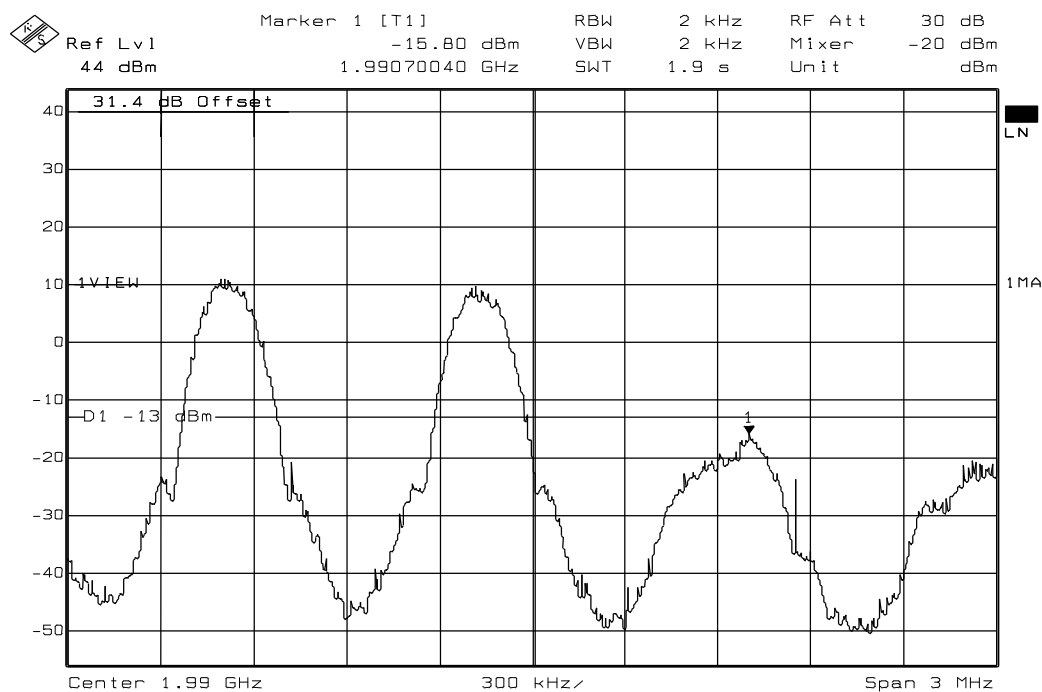
Test Data - Spurious Emissions at Antenna Terminals - GSM

Data Plot INTERMODULATION CHARACTERISTICS - GSM

Page 1 of 4 Complete X
Job No.: 1L0015R Date: 02/06/01 Preliminary _____
Specification: PART24 Temperature(°C): 22
Tested By: David Light Relative Humidity(%) 50
E.U.T.: MR703
Configuration: Tx 5 GSM SIGNALS - FULL POWER
Sample Number: _____
Location: Lab 1 RBW: Refer to plots
Detector Type: Peak VBW: Refer to plots

Test Equipment Used

Antenna: _____ Directional Coupler: _____
Pre-Amp: _____ Cable #1: 1081
Filter: _____ Cable #2: _____
Receiver: 1036 Cable #3: _____
Attenuator #1: 1064 Cable #4: _____
Attenuator #2: 1065 Mixer: _____
Additional equipment used: _____
Measurement _____
Uncertainty: +/-3.6 dB



Date: 6.FEB.2001 15:29:02

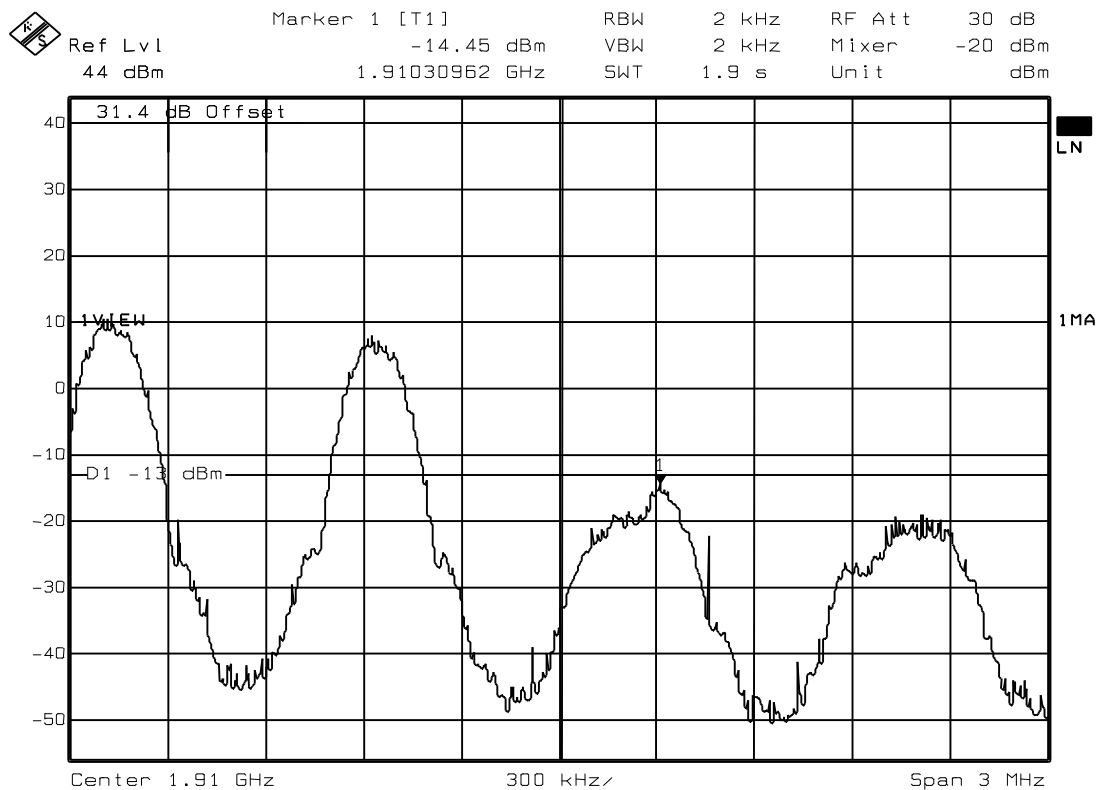
Notes: DOWNLINK - UPPER BANDEDGE

Test Data - Spurious Emissions at Antenna Terminals - GSM

Data Plot INTERMODULATION CHARACTERISTICS - GSM

Page 2 of 4

Job No.: 1L0015R Date: 02/06/01
Specification: PART24 Temperature(°C): 22
Tested By: David Light Relative Humidity(%) 50
E.U.T.: MR703
Configuration: Tx 5 GSM SIGNALS - FULL POWER



Date: 6.FEB.2001 15:32:28

Notes: UPPER BAND EDGE - UPLINK

Test Data - Spurious Emissions at Antenna Terminals - GSM

Data Plot INTERMODULATION CHARACTERISTICS - GSM

Page 3 of 4

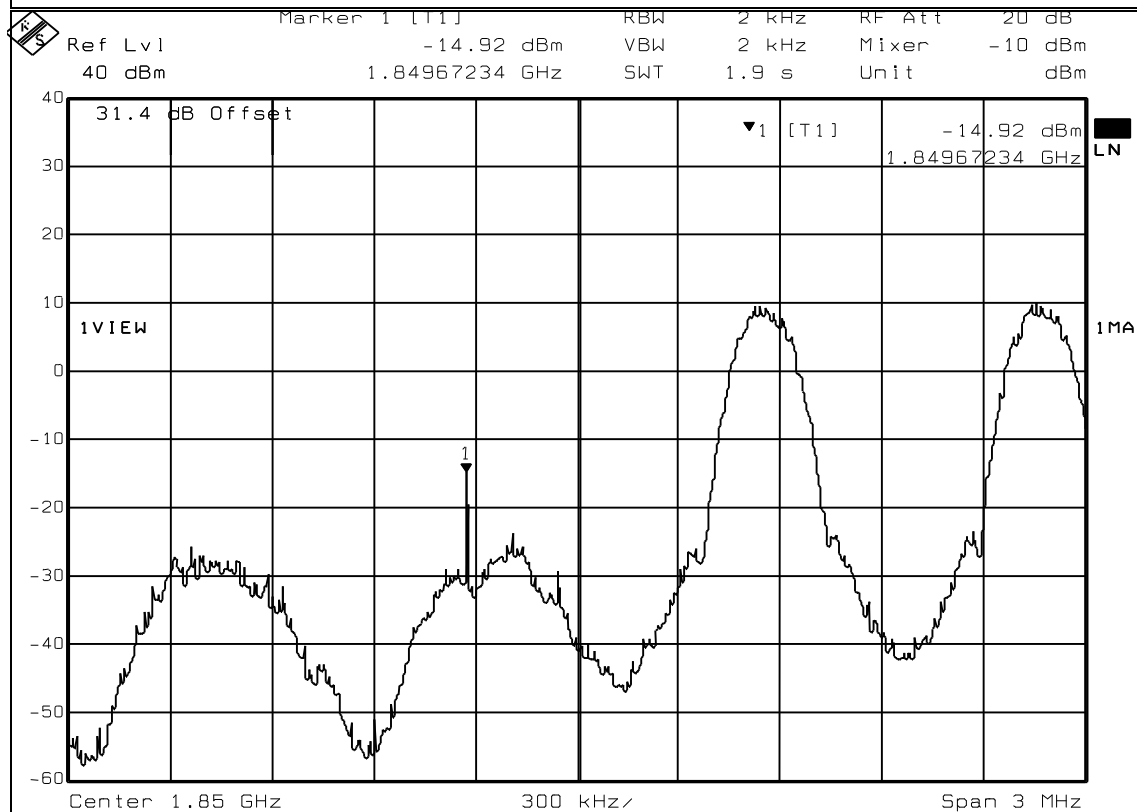
Job No.: 1L0015R Date: 02/06/01

Specification: PART24 Temperature(°C):

Tested By: David Light Relative Humidity(%)

E.U.T.: MR703

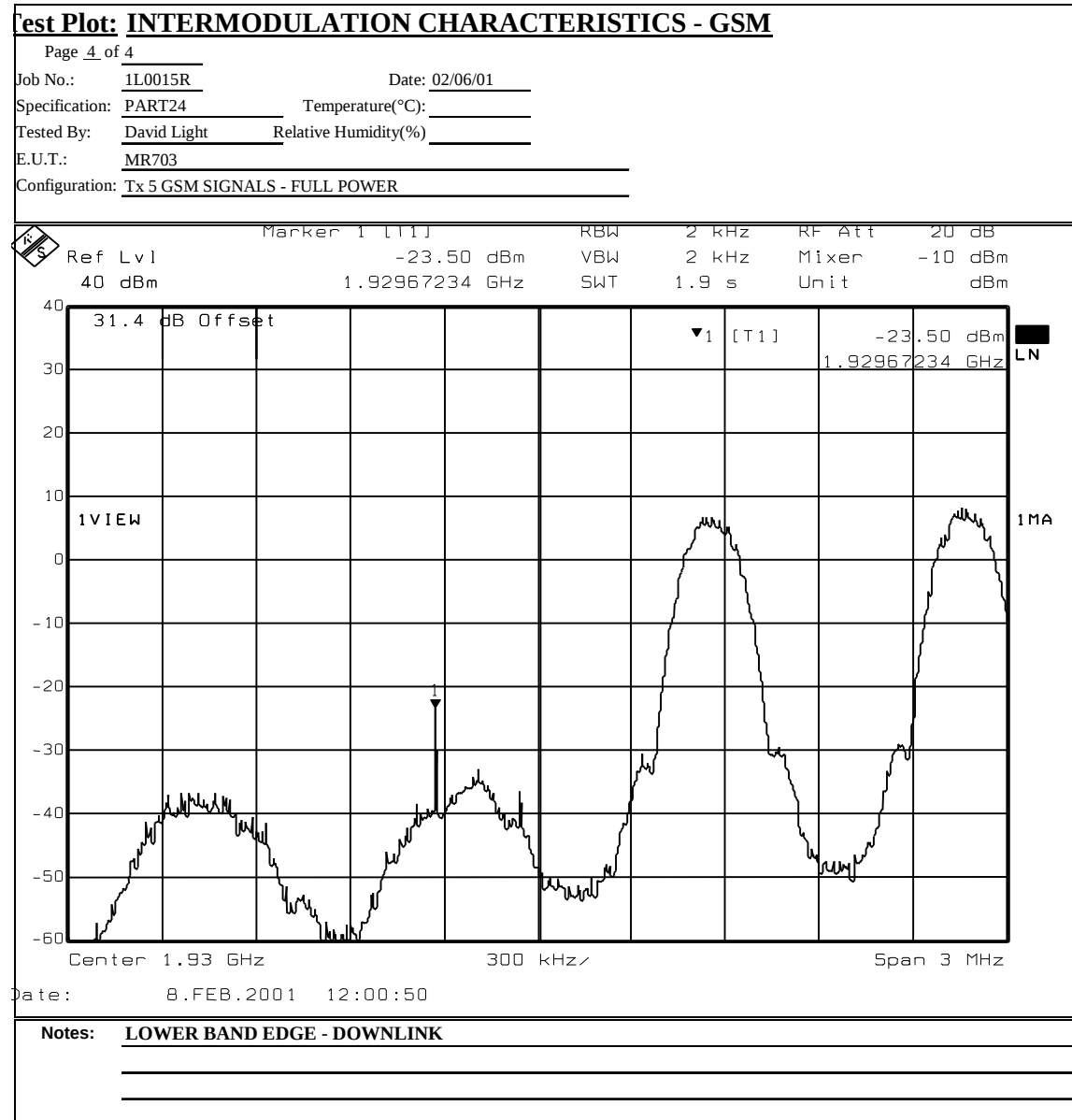
Configuration: Tx 5 GSM SIGNALS - FULL POWER



Date: 8.FEB.2001 11:58:12

Notes: LOWER BAND EDGE - UPLINK

Test Data - Spurious Emissions at Antenna Terminals - GSM



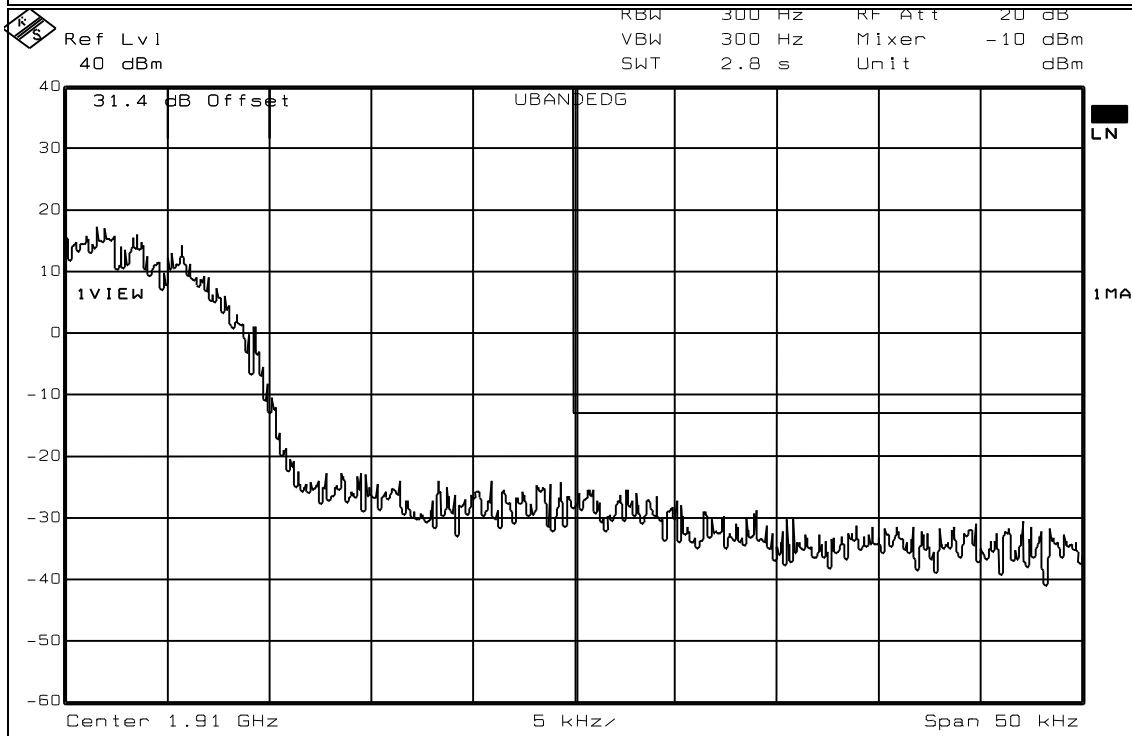
Test Data - Spurious Emissions at Antenna Terminals - NADC

Data Plot 1 SPURIOUS EMISSIONS AT ANTENNA TERMINALS - NADC

Page 1 of 8 Complete X
Job No.: 1L0015R Date: 2/7/01 Preliminary _____
Specification: PART 24 Temperature(°C): 22
Tested By: David Light Relative Humidity(%) 50
E.U.T.: MR703
Configuration: TX FULL POWER
Sample Number: _____
Location: Lab 1 RBW: REFER TO PLOTS
Detector Type: Peak VBW: REFER TO PLOTS

Test Equipment Used

Antenna: _____ Directional Coupler: _____
Pre-Amp: _____ Cable #1: 1081
Filter: _____ Cable #2: _____
Receiver: 1036 Cable #3: _____
Attenuator #1: 1064 Cable #4: _____
Attenuator #2: 1065 Mixer: _____
Additional equipment used: _____
Measurement U +/-3.6 dB



Date: 8.FEB.2001 12:14:40

Notes: UPPER BAND EDGE - UPLINK

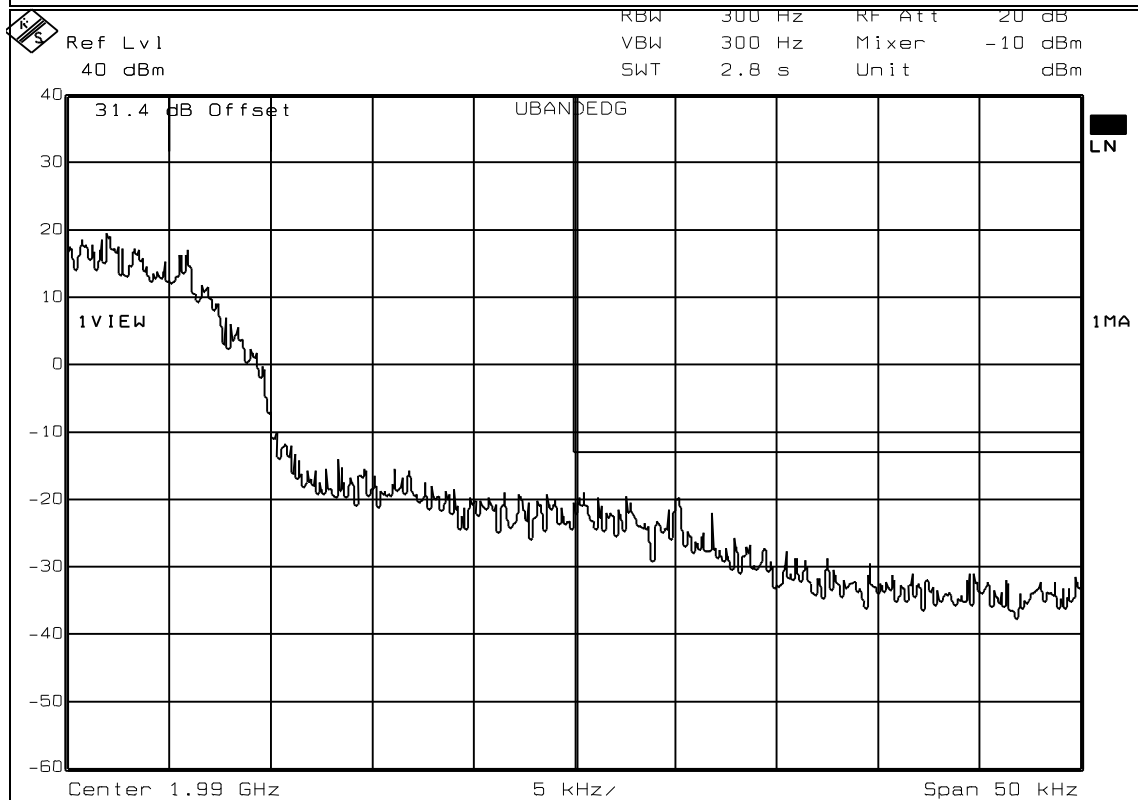
Test Data - Spurious Emissions at Antenna Terminals - NADC

Data Plot

SPURIOUS EMISSIONS AT ANTENNA TERMINALS - NADC

Page 2 of 8

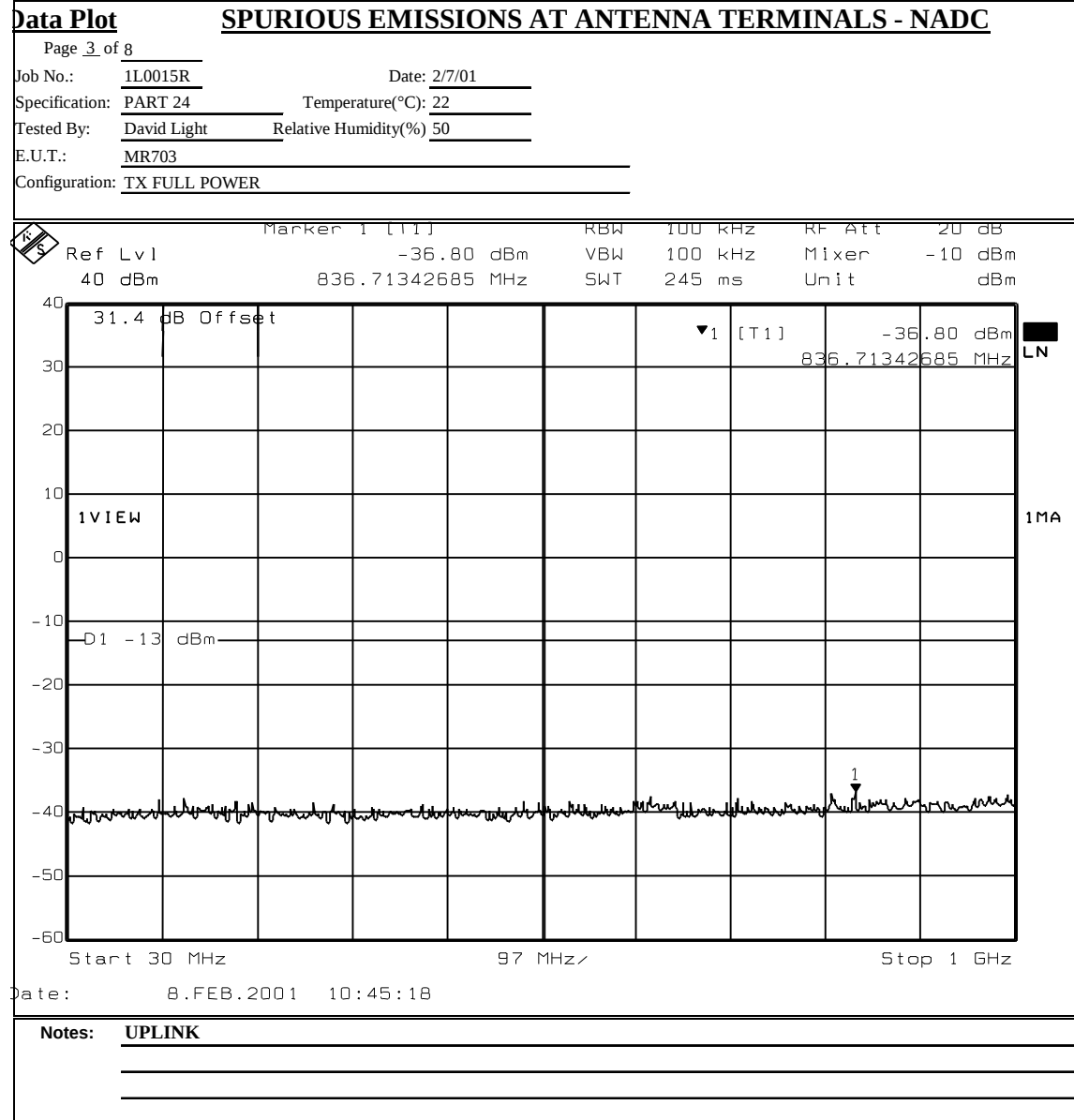
Job No.: 1L0015R Date: 2/7/01
Specification: PART 24 Temperature(°C): 22
Tested By: David Light Relative Humidity(%) 50
E.U.T.: MR703
Configuration: TX FULL POWER



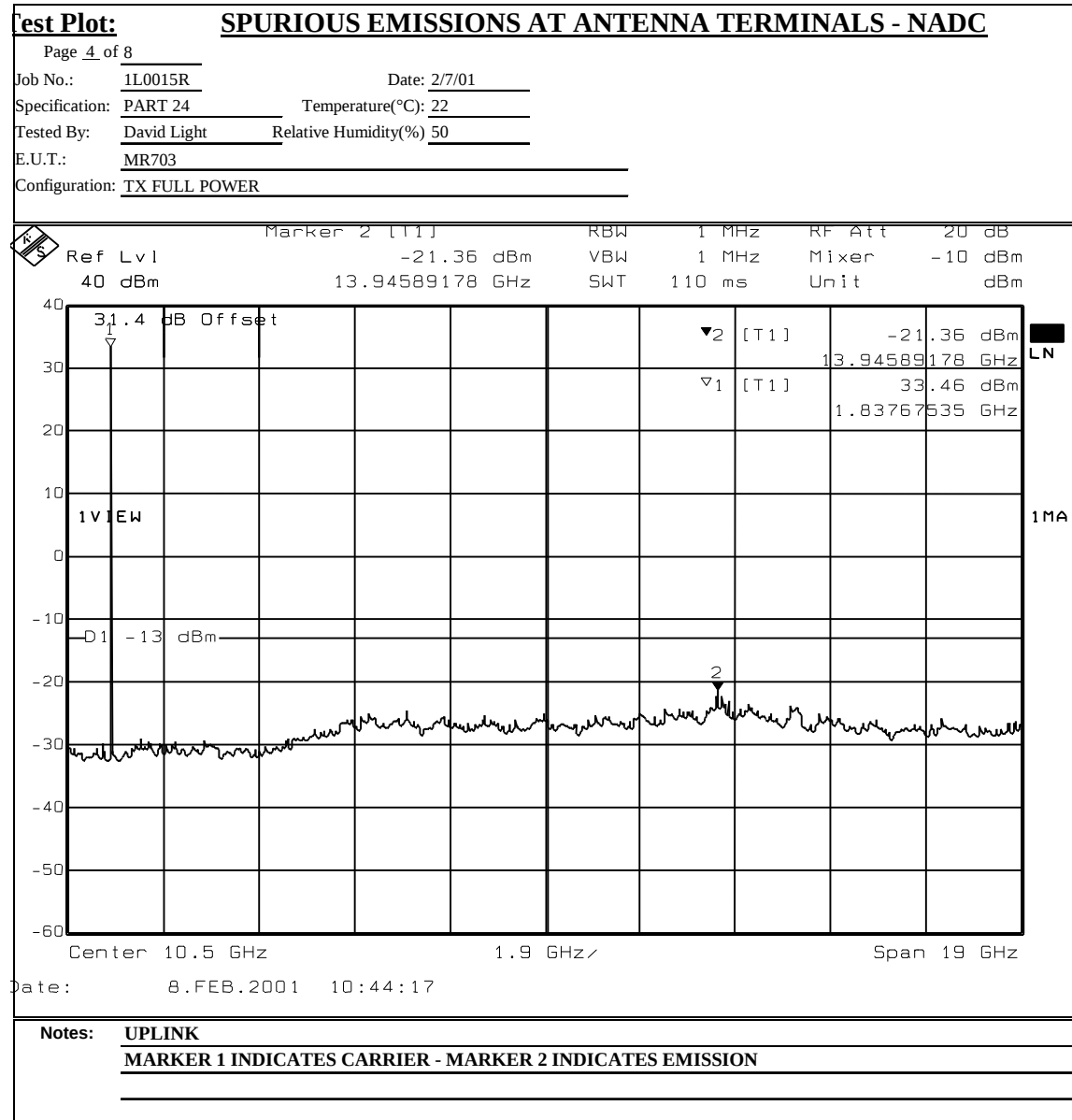
Date: 8.FEB.2001 12:12:36

Notes: UPPER BAND EDGE-DOWNLINK

Test Data - Spurious Emissions at Antenna Terminals - NADC



Test Data - Spurious Emissions at Antenna Terminals - NADC

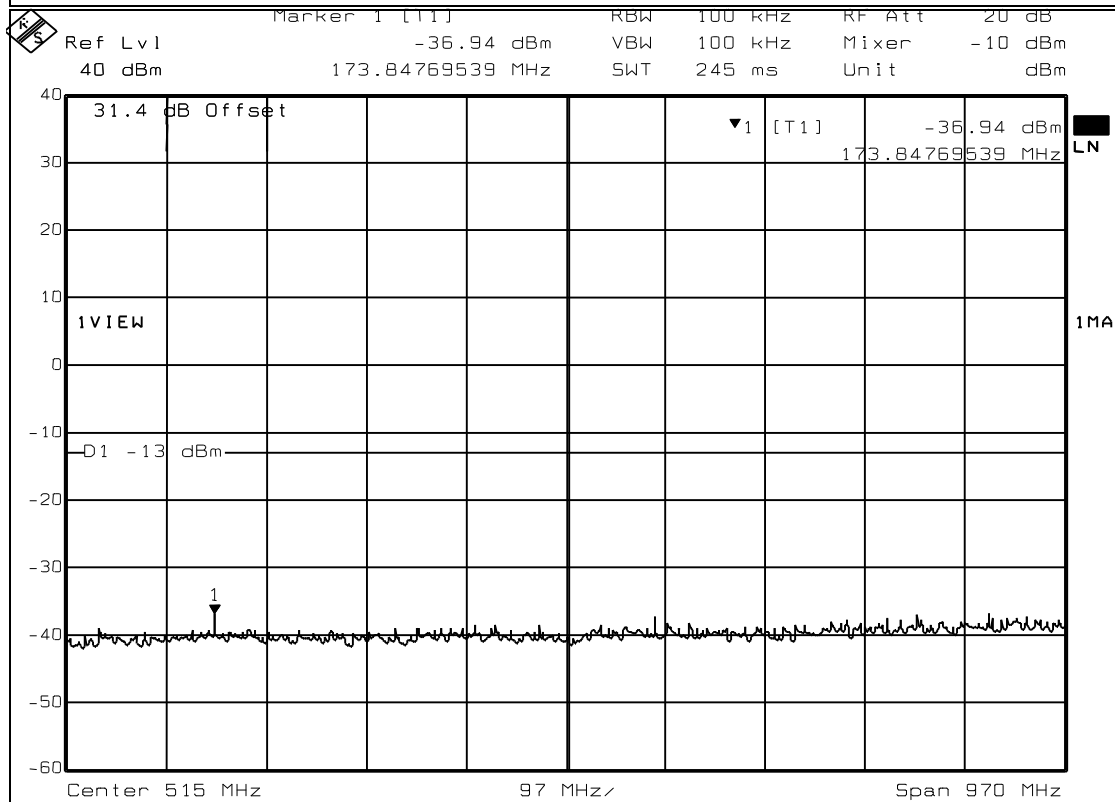


Test Data - Spurious Emissions at Antenna Terminals - NADC

Test Plot: SPURIOUS EMISSIONS AT ANTENNA TERMINALS - NADC

Page 5 of 8

Job No.: 1L0015R Date: 2/7/01
Specification: PART 24 Temperature(°C): 22
Tested By: David Light Relative Humidity(%) 50
E.U.T.: MR703
Configuration: TX FULL POWER



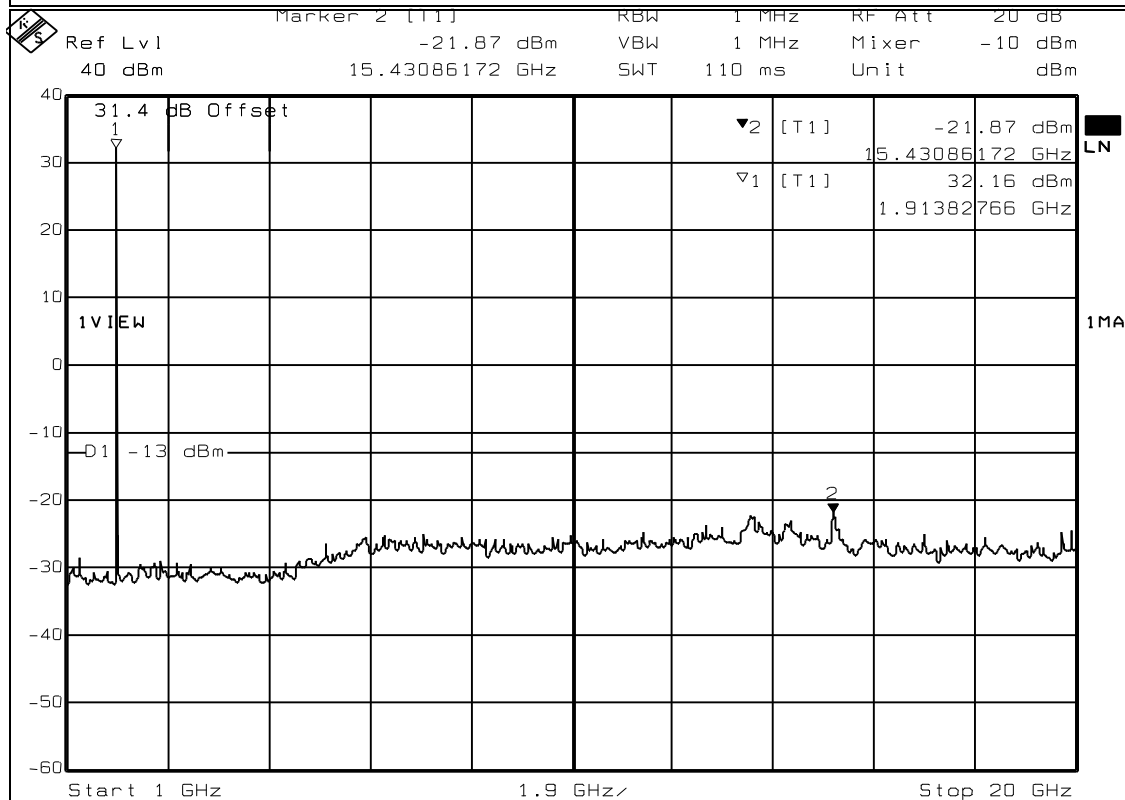
Date: 8.FEB.2001 10:56:25

Notes: DOWNLINK

Test Data - Spurious Emissions at Antenna Terminals - NADC**Test Plot: SPURIOUS EMISSIONS AT ANTENNA TERMINALS - NADC**

Page 6 of 8

Job No.: 1L0015R Date: 2/7/01
Specification: PART 24 Temperature(°C): 22
Tested By: David Light Relative Humidity(%) 50
E.U.T.: MR703
Configuration: TX FULL POWER



Date: 8.FEB.2001 10:57:42

Notes: DOWNLINK

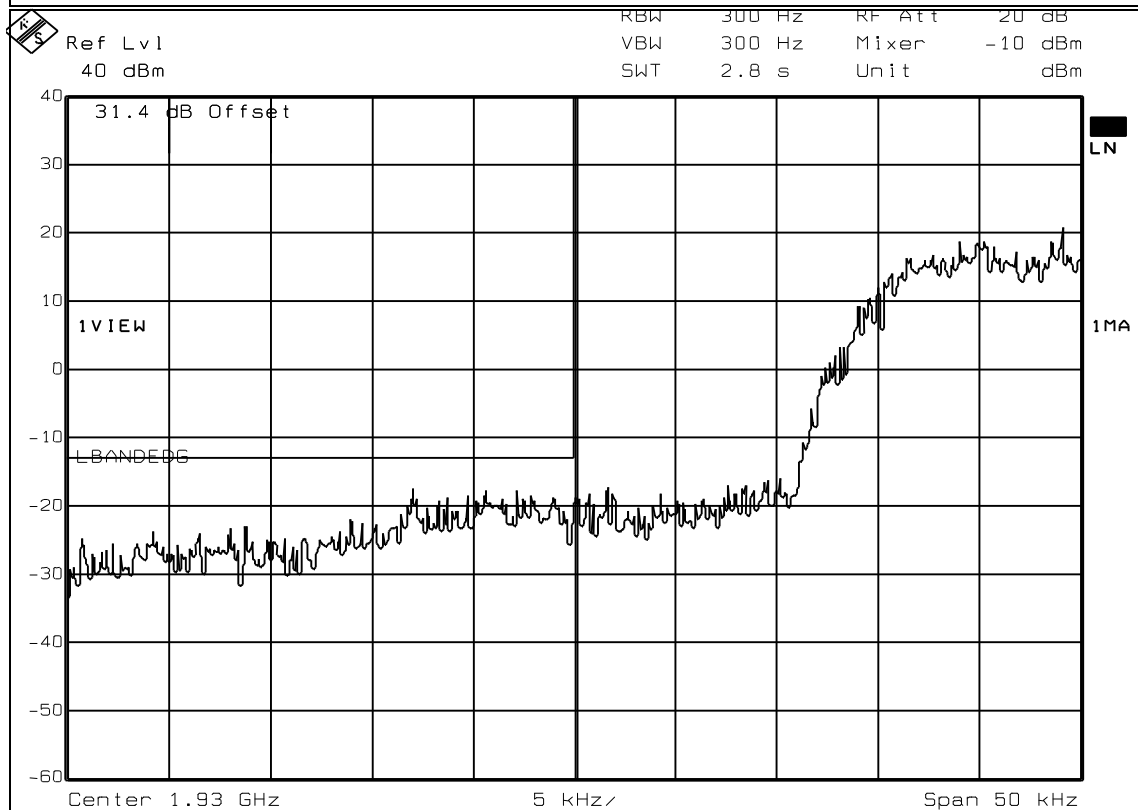
MARKER 1 INDICATES CARRIER - MARKER 2 INDICATES EMISSION

Test Data - Spurious Emissions at Antenna Terminals - NADC

Data Plot SPURIOUS EMISSIONS AT ANTENNA TERMINALS - NADC

Page 7 of 8

Job No.: 1L0015R Date: 2/7/01
Specification: PART 24 Temperature(°C): 22
Tested By: David Light Relative Humidity(%) 50
E.U.T.: MR703
Configuration:



Date: 8.FEB.2001 10:40:15

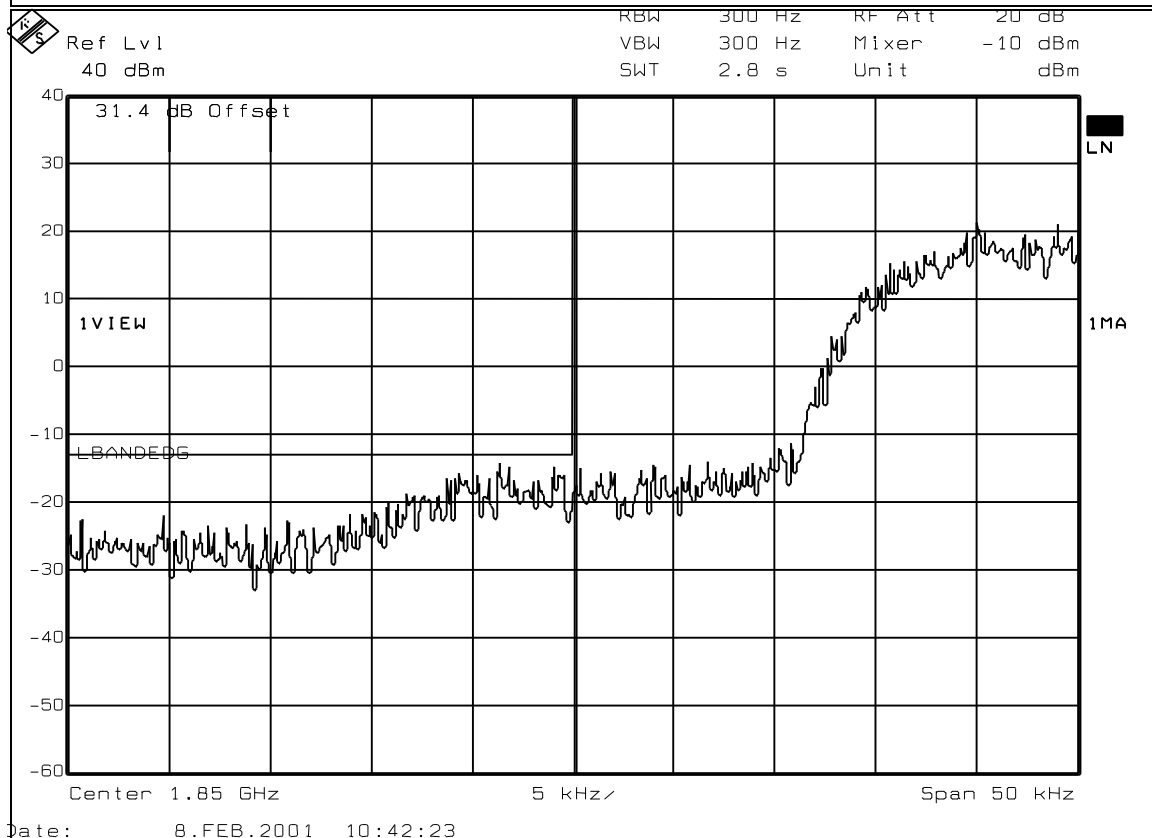
Notes: DOWNLINK
LOWER BAND EDGE

Test Data - Spurious Emissions at Antenna Terminals - NADC

Data Plot SPURIOUS EMISSIONS AT ANTENNA TERMINALS - NADC

Page 8 of 8

Job No.: 1L0015R Date: 2/7/01
Specification: PART 24 Temperature(°C): 22
Tested By: David Light Relative Humidity(%) 50
E.U.T.: MR703
Configuration:



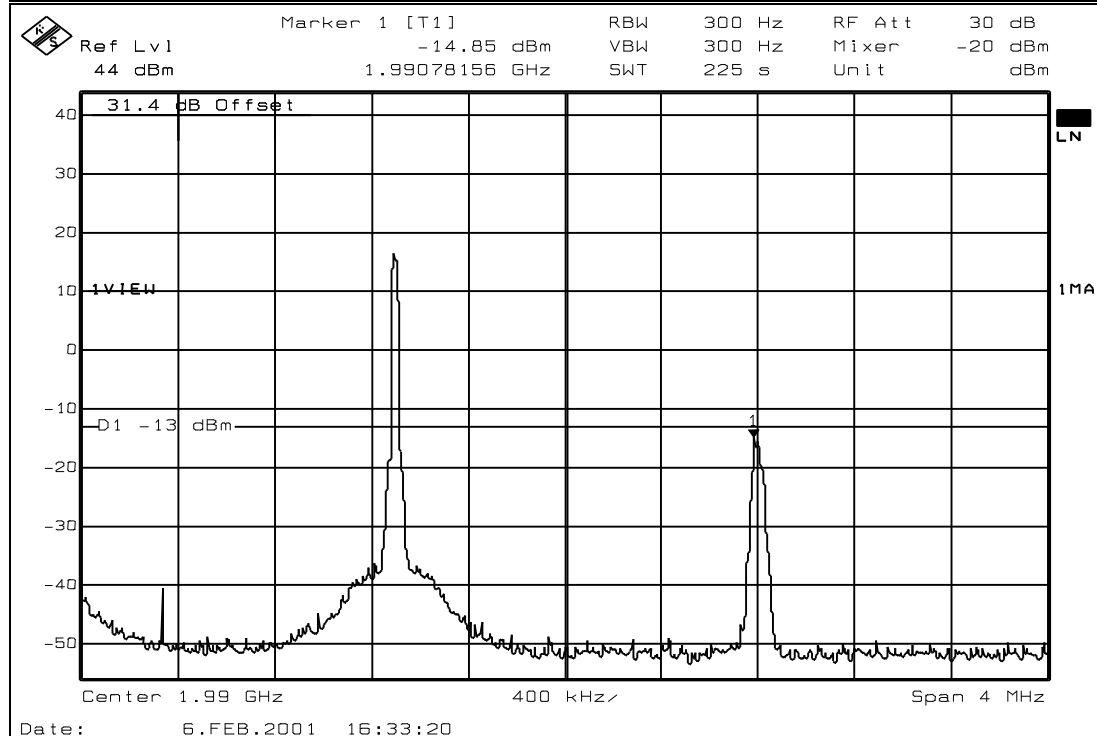
Notes: UPLINK
LOWER BAND EDGE

Test Data - Spurious Emissions at Antenna Terminals - NADC

Data Plot INTERMODULATION CHARACTERISTICS - NADC

Page 1 of 4 Complete X
Job No.: 1L0015R Date: 02/06/01 Preliminary _____
Specification: PART24 Temperature(°C): 22
Tested By: David Light Relative Humidity(%) 50
E.U.T.: MR703
Configuration: Tx 2 NADC SIGNALS - FULL POWER
Sample Number: _____
Location: Lab 1 RBW: Refer to plots
Detector Type: Peak VBW: Refer to plots

Test Equipment Used
Antenna: _____ Directional Coupler: _____
Pre-Amp: _____ Cable #1: 1081
Filter: _____ Cable #2: _____
Receiver: 1036 Cable #3: _____
Attenuator #1: 1064 Cable #4: _____
Attenuator #2: 1065 Mixer: _____
Additional equipment used: _____
Measurement U +/-3.6 dB

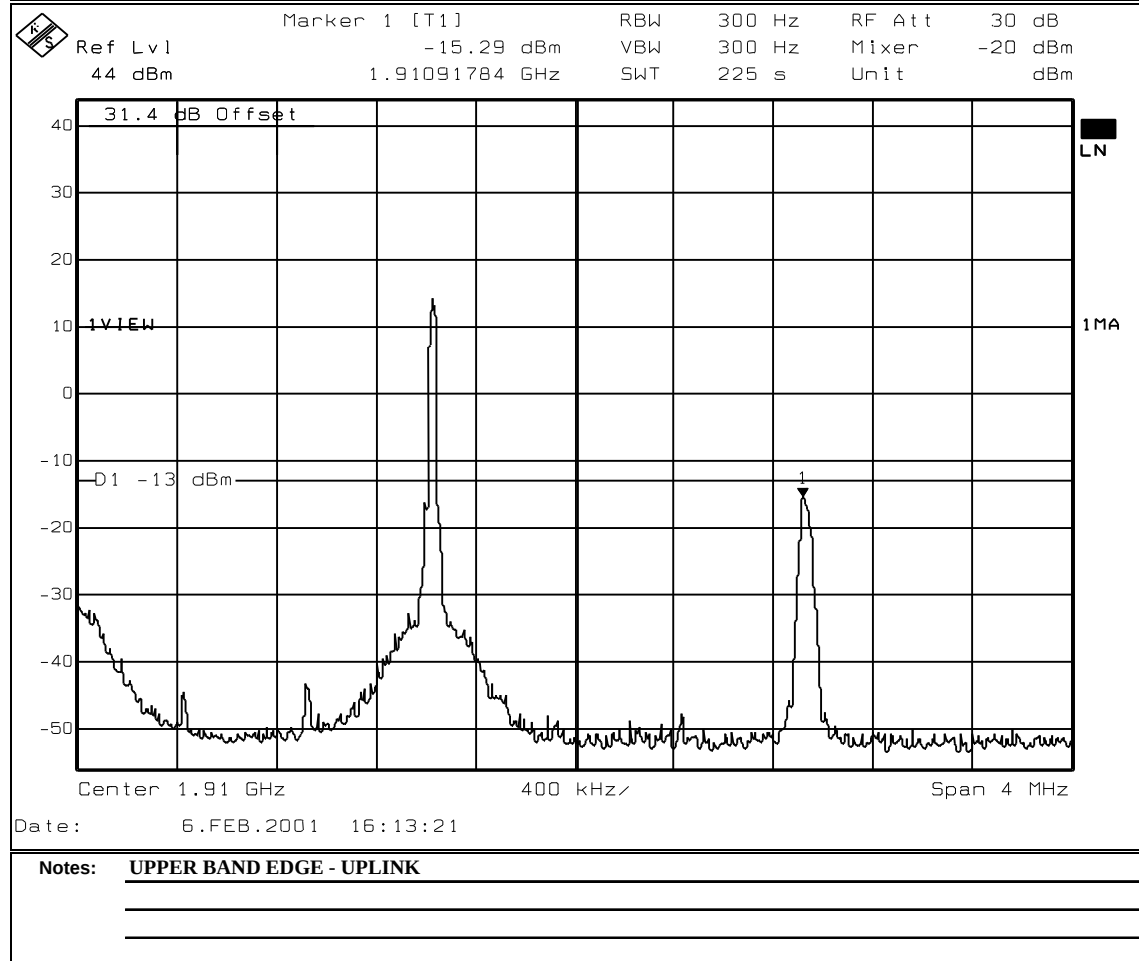
Notes: DOWNLINK - UPPER BANDEDGE

Test Data - Spurious Emissions at Antenna Terminals - NADC

Data Plot INTERMODULATION CHARACTERISTICS - NADC

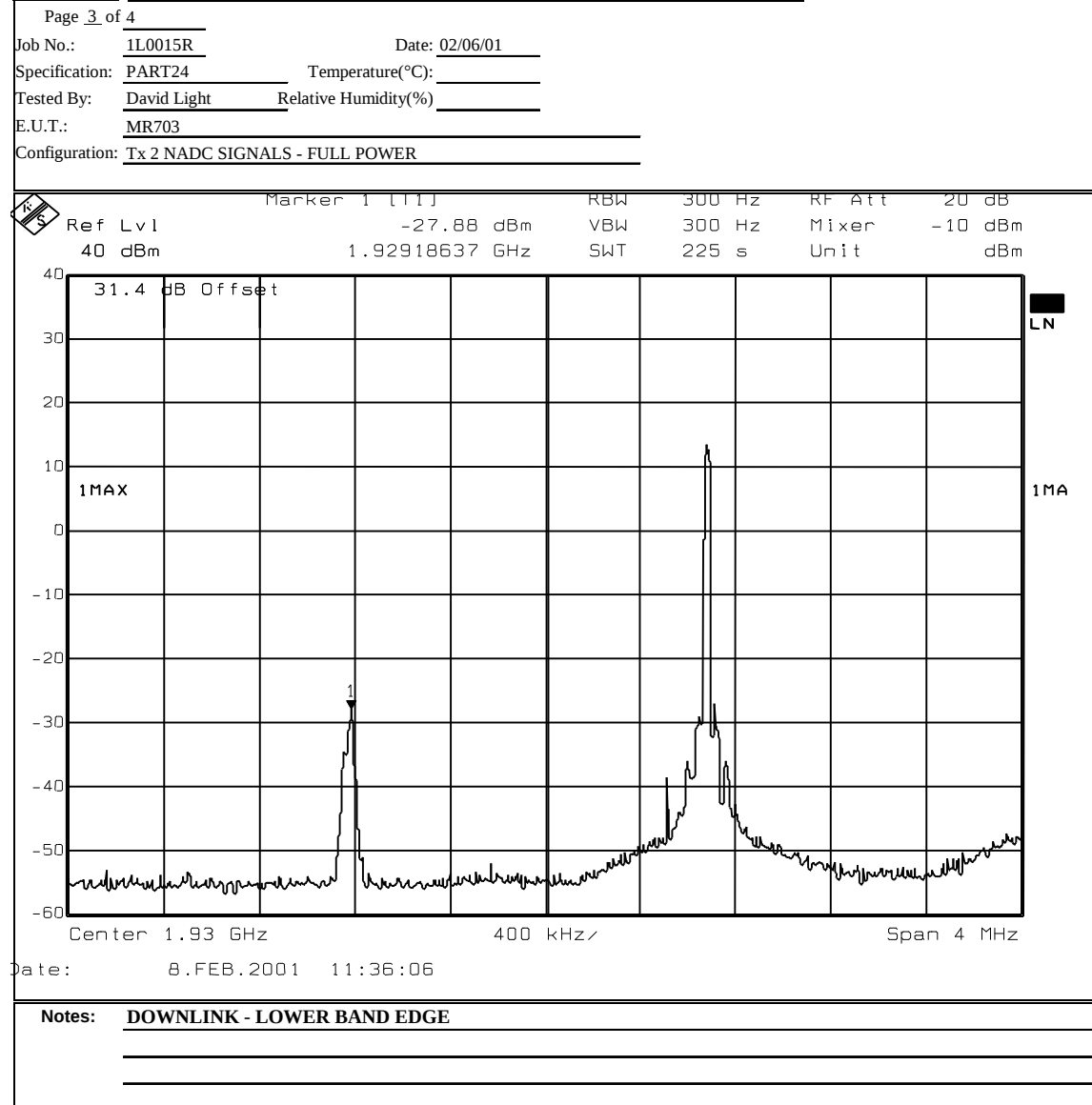
Page 2 of 4

Job No.: 1L0015R Date: 02/06/01
Specification: PART24 Temperature(°C): 22
Tested By: David Light Relative Humidity(%) 50
E.U.T.: MR703
Configuration: Tx 2 NADC SIGNALS - FULL POWER



Test Data - Spurious Emissions at Antenna Terminals - NADC

Data Plot INTERMODULATION CHARACTERISTICS - NADC

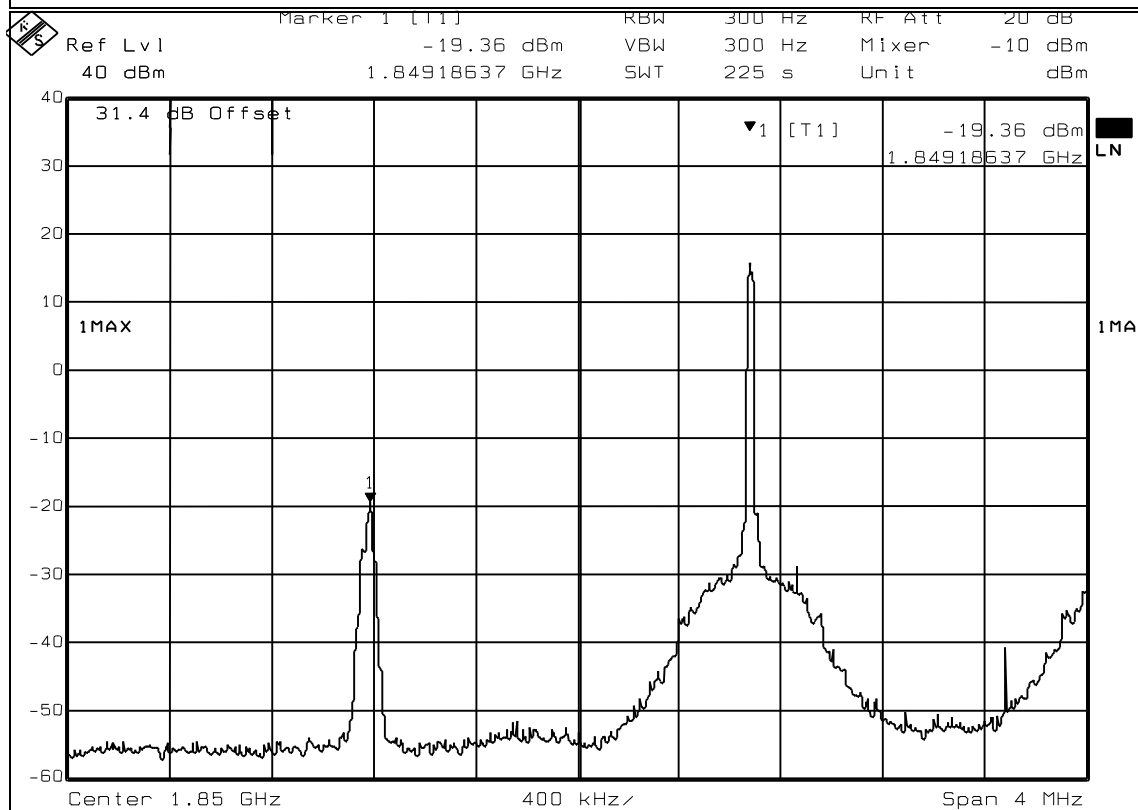


Test Data - Spurious Emissions at Antenna Terminals - NADC

Test Plot: INTERMODULATION CHARACTERISTICS - NADC

Page 4 of 4

Job No.: 1L0015R Date: 02/06/01
Specification: PART24 Temperature(°C):
Tested By: David Light Relative Humidity(%):
E.U.T.: MR703
Configuration: Tx 2 NADC SIGNALS - FULL POWER



Date: 8.FEB.2001 11:53:46

Notes: UPLINK - LOWER BAND EDGE

Section 6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious Emissions	PARA. NO.: 2.1051
TESTED BY: David LightTTidwell	DATE: 12 Feb 2001

Test Results: Complies.

Test Data: See attached table.

Equipment Used: 1484-1485-1464-1016-993

Measurement Uncertainty: +/- 3.6 dB

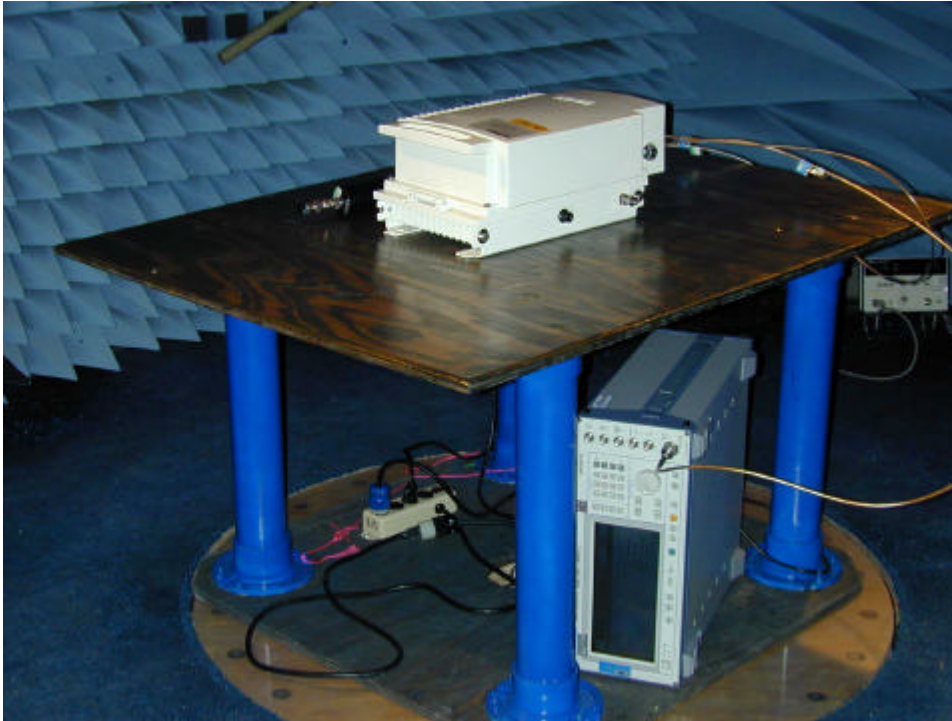
Temperature: 22 °C

**Relative
Humidity:** 50 %

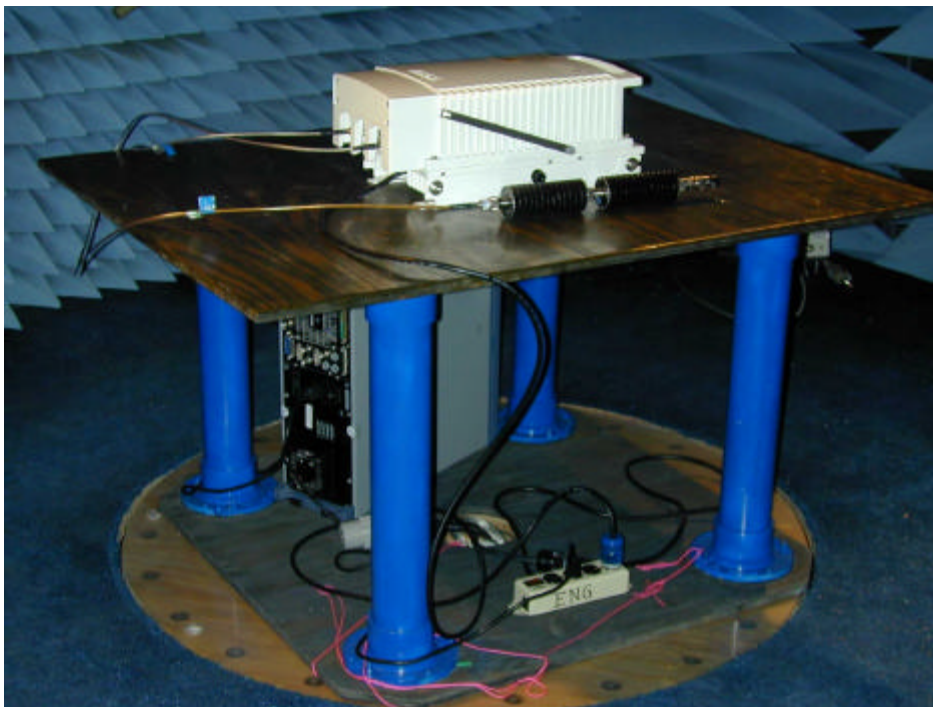
Test Data - Radiated Emissions
Photographs of Test Setup

Field Strength of Spurious Emissions										
Page <u>1</u> of <u>1</u>							Complete <u>X</u>			
Job No.: 1L0015R		Date: 2/12/01		Preliminary _____						
Specification: PART 24		Temperature(°C): <u>22</u>								
Tested By: David Light		Relative Humidity(%): <u>50</u>								
E.U.T.: MR703										
Configuration: TX 1 SIGNAL FULL POWER										
Sample Number: S02										
Location: AC 3		RBW: 1 MHz		Measurement						
Detector Type: Peak		VBW: 1 MHz		Distance: <u>3</u> m						
Test Equipment Used										
Antenna: 993		Directional Coupler: _____								
Pre-Amp: 1016		Cable #1: 1484								
Filter: 1481		Cable #2: 1485								
Receiver: 1464		Cable #3: _____								
Attenuator #1: _____		Cable #4: _____								
Attenuator #2: _____		Mixer: _____								
Additional equipment used: _____										
Measurement U +/-3.6 dB										
Frequency (MHz)	Meter Reading (dBm)	Correction Factor (dB)		Pre-Amp Gain (dB)	Substitution Antenna Gain (dBd)	UL / DL	ERP (dBm)	ERP (mW)	Polarity	Comments
3970	-57.5	40.4		33.4	8.0	DL	-42.5	0.000056	V	
5955	-45.8	38.5		32	9.1	DL	-30.2	0.000946	V	
7940	-60.6	40.4		33.6	9.4	DL	-44.3	0.000037	V	
9925	-60.1	40.4		36.3	10.5	DL	-45.5	0.000028	V	
11910	-80.0	-49.3		36.6	11.0	DL	-154.9	0.000000	V	NOISE FLOOR
13895	-79.3	47.6		34.3	10.4	DL	-55.6	0.000003	V	NOISE FLOOR
15880	-79.0	43.2		34	13.6	DL	-56.2	0.000002	V	NOISE FLOOR
17865	-80.0	51.0		35.3	8.7	DL	-55.6	0.000003	V	NOISE FLOOR
3970	-59.7	34.3		33.4	8.0	DL	-50.8	0.000008	H	
5955	-48.3	36.0		32	9.1	DL	-35.2	0.000299	H	
7940	-65.2	39.8		33.6	9.4	DL	-49.6	0.000011	H	
9925	-62.5	42.6		36.3	10.5	DL	-45.7	0.000027	H	
11910	-80.0	46.0		36.6	11.0	DL	-59.6	0.000001	H	NOISE FLOOR
13895	-79.3	50.8		34.3	10.4	DL	-52.4	0.000006	H	NOISE FLOOR
15880	-79.0	44.0		34	13.6	DL	-55.4	0.000003	H	NOISE FLOOR
17865	-80.0	53.6		35.3	8.7	DL	-53.0	0.000005	H	NOISE FLOOR
3810	-66.1	40.4		33.3	8.0	UL	-51.0	0.000008	V	
5715	-61.6	38.5		32.5	9.1	UL	-46.5	0.000022	V	
7620	-70.0	40.4		33	9.4	UL	-53.1	0.000005	V	
9525	-70.0	40.4		35.9	10.5	UL	-55.0	0.000003	V	
11430	-80.0	42.0		36.1	11.1	UL	-63.1	0.000000	V	NOISE FLOOR
13335	-79.3	44.8		34.2	11.2	UL	-57.5	0.000002	V	NOISE FLOOR
15240	-79.0	46.5		34	11.4	UL	-55.1	0.000003	V	NOISE FLOOR
17145	-80.0	47.0		34.5	11.7	UL	-55.7	0.000003	V	NOISE FLOOR
3810	-67.1	40.4		33.3	8.0	UL	-52.0	0.000006	V	
5715	-55.7	38.5		32.5	9.1	UL	-40.6	0.000086	V	
7620	-70.0	40.4		33	9.4	UL	-53.1	0.000005	V	
9525	-69.5	40.4		35.9	10.5	UL	-54.5	0.000004	V	
11430	-80.0	42.0		36.1	11.1	UL	-63.1	0.000000	V	NOISE FLOOR
13335	-79.3	44.8		34.2	11.2	UL	-57.5	0.000002	V	NOISE FLOOR
15240	-79.0	46.5		34	11.4	UL	-55.1	0.000003	V	NOISE FLOOR
17145	-80.0	47.0		34.5	11.7	UL	-55.7	0.000003	V	NOISE FLOOR
Notes: SEARCHED SPECTRUM TO TENTH HARMONIC OF CARRIER										

FRONT VIEW



REAR VIEW



Section 7. Test Equipment List

Number	Description	Manufacturer	Model Number	Serial Number	Calibrated	Due
993	Horn antenna	A.H. Systems	SAS-200/571	XXX	7/16/99	7/16/01
1016	AMPLIFIER	HEWLETT PACKARD	8449A	2749A00159	5/24/00	5/24/01
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ	FSEK30	830844/006	6/14/99	6/14/01
1065	ATTENUATOR	NARDA	776B-10	NONE	CBU	N/A
1081	CABLE 2m	Astrolab	32027-2-29094-72TC	N/A	5/23/00	5/23/01
1464	Spectrum analyzer	Hewlett Packard	8563E	3551A04428	1/2/01	1/2/02
1484	Cable 2.0-18.0 Ghz	Storm	PR90-010-072	N/A	5/25/00	5/25/01
1485	Cable 2.0-18.0 Ghz	Storm	PR90-010-216	N/A	5/25/00	5/25/01
1604	ATTENUATOR	NARDA	776B-20	NONE	CBU	N/A
1605	LIMITER	FISCHER	FCC-45013-1.2	184	12/16/00	12/16/01

Section 8. Test Details

NAME OF TEST: RF Power Output

PARA. NO.: 2.1046

Minimum Standard: Para. No.24.232. Base stations are limited to 1640 watts peak E.I.R.P. with an antenna height up to 300 meters HAAT. In no case may the peak output power of a base station transmitter exceed 100 watts.

Method Of Measurement:

Detachable Antenna:

The peak power at antenna terminals is measured using an in-line peak power meter. Power output is measured with the maximum rated input level.

Integral Antenna:

If the antenna is not detachable from the circuit then the Peak Power Output is derived from the peak radiated field strength of the fundamental emission by using the plane wave relation $GP/4\pi R^2 = E^2/120\pi$ 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	PARA. NO.: 2.1047
---	--------------------------

Minimum Standard: Para. No. 24.238(b). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB.

Method Of Measurement:

CDMA

Spectrum analyzer settings:

RBW: 30 kHz

VBW: $\geq$ RBW

Span: 5 MHz

Sweep: Auto

Mask: Set markers to -26 dB from peak of CW.

GSM

RBW: 3 kHz

VBW: $\geq$ RBW

Span: 2 MHz

Sweep: Auto

Mask: Set markers to -26 dB from peak of CW.

NADC

RBW: 1 kHz

VBW: $\geq$ RBW

Span: 1 MHz

Sweep: Auto

Mask: Set markers to -26 dB from peak of CW.

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

Minimum Standard: Para. No.24.238(a). On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power by at least $43 + 10 \log (P)$ dB.

Method Of Measurement:

Spectrum analyzer settings:

CDMA

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

GSM

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

NADC

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

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

NAME OF TEST: Field Strength of Spurious Radiation	PARA. NO.: 2.1053
---	--------------------------

Minimum Standard:

Para. No.24.238(a). On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power by at least $43 + 10 \log (P)$ dB.

Test Method:

TIA/EIA-603-1992, Section 2.2.12

The antenna substitution method was used to determine the equivalent radiated power at spurious frequencies. The spurious emissions were measured at a distance of 3 meters. The EUT was then replaced with a reference substitution antenna with a known gain referenced to a dipole. This antenna was fed with a signal at the spurious frequency. The level of the signal was adjusted to repeat the previously measured level. The resulting erp is the signal level fed to the reference antenna corrected for gain referenced to a dipole.

NAME OF TEST: Frequency Stability	PARA. NO.: 2.1055
--	--------------------------

Minimum Standard: Para. No. 24.235. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Method Of Measurement:

Frequency Stability With Voltage Variation

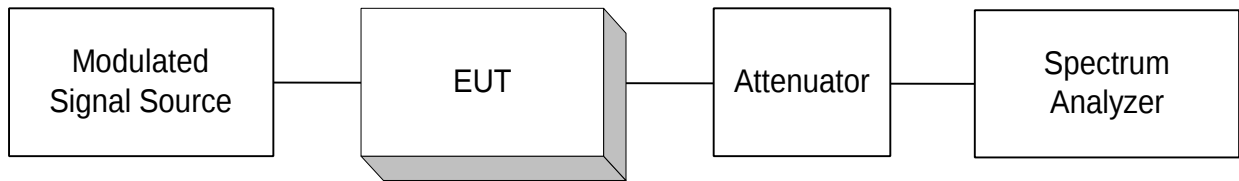
The E.U.T. is placed in an environmental chamber and allowed to stabilize at +20 degrees Celsius for at least 15 minutes. The frequency counter and signal generator are phase locked with the same 10 MHz reference frequency by connecting the 10 MHz ref. out of the counter to the 10 MHz ref, in of the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

Frequency Stability With Temperature Variation

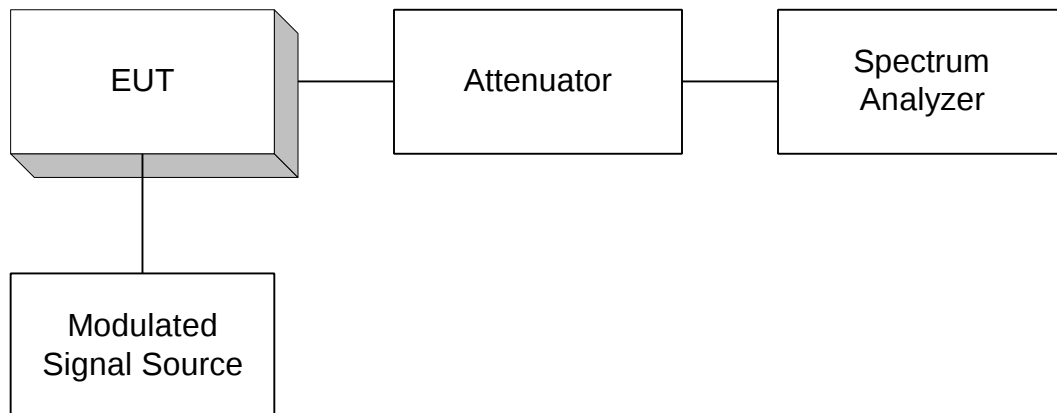
The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30 second intervals for a period of 5 minutes.

Section 9. Test Diagrams

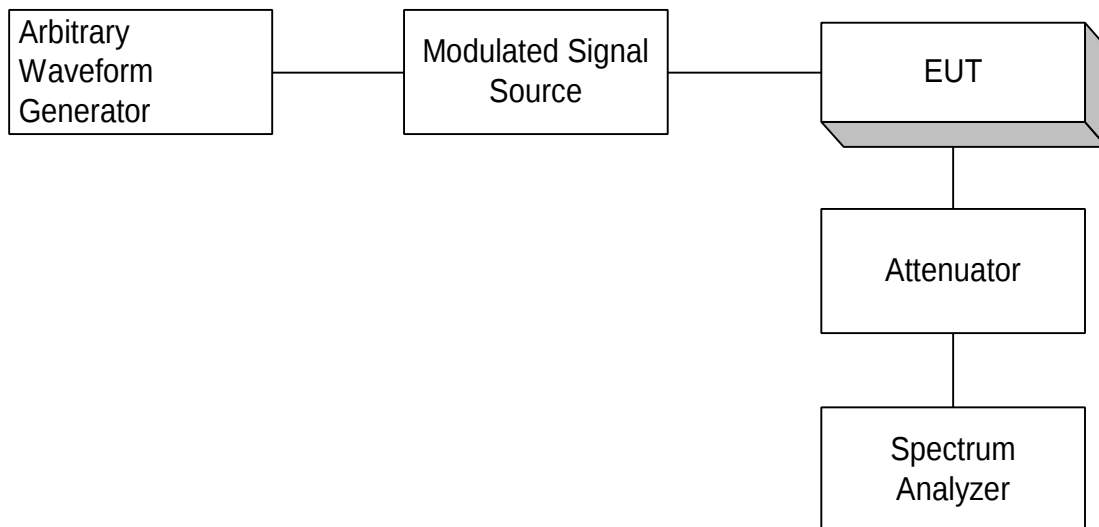
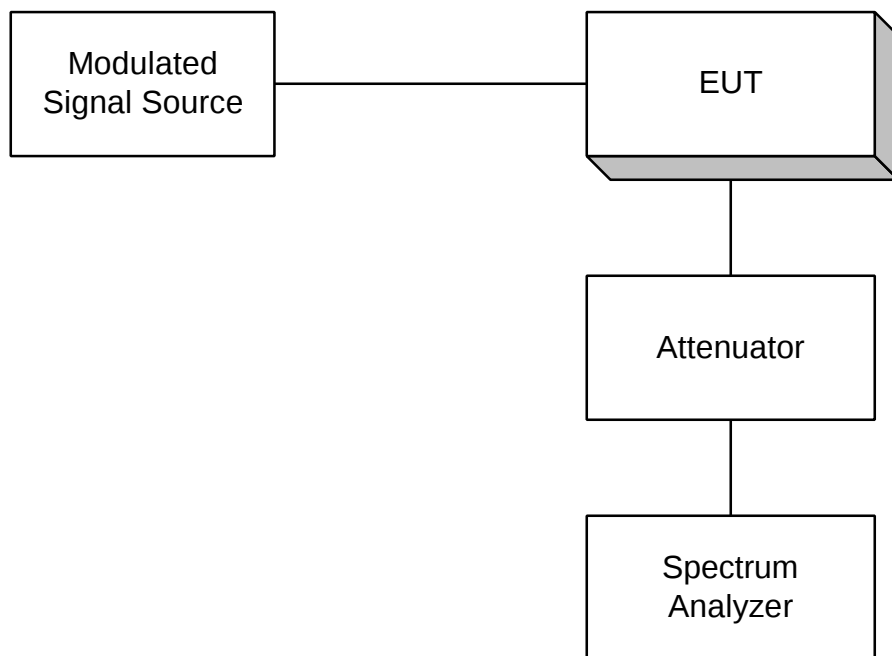
Para. No. 2.985 - R.F. Power Output



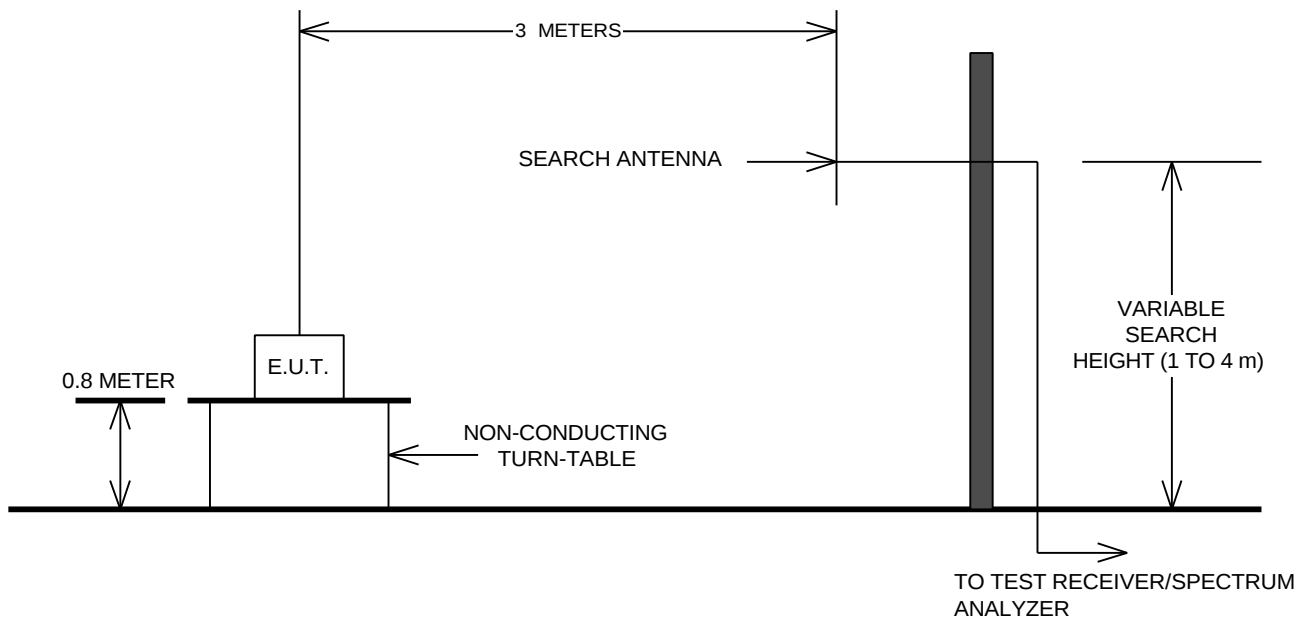
Para. No. 2.989 - Occupied Bandwidth



Para. No. 2.991 Spurious Emissions at Antenna Terminals



Para. No. 2.993 - Field Strength of Spurious Radiation



Para. No. 2.995 - Frequency Stability

