NEMKO Test Report No.:	**1L0129RUS1**
Applicant:	**Andrew Corporation**
Equipment Under Test:	**PCS Side-to-Side REPEATER**
FCC ID:	KUWPCS1900
In Accordance With:	**FCC Part 24, Subpart E** Broadband PCS Repeaters
Tested By:	NEMKO Dallas Inc. 802 N. Kealy Lewisville, Texas 75057-3136
Authorized By:	Tom Tidwell, RF Group Manager
Date:	5/6/01
Total Number of Pages:	91

Table of Contents

Section 1. Summary of Test Results

Manufacturer: Andrew Corporation

Model No.: PCS Side-to-Side Repeater

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 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	+20 dBm eirp	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	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

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 A : 1850 – 1865 MHz ☒ 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
Type of Modulation and Designator:		**CDMA (G7W)** ☒ **GSM (GXW)** ☒ **NADC (DXW)** ☒
Output Impedance:		50 ohms
Max Input:		0 dBm
RF Output (Rated):	**Uplink**	Total: +15 dBm
RF Output (Rated):	**Downlink**	Total: +15 dBm
Frequency Translation:		**F1-F1** ☒ **F1-F2** ☐ **N/A** ☐
Band Selection:		**Software** ☐ **Duplexer** ☒ **Fullband** ☐

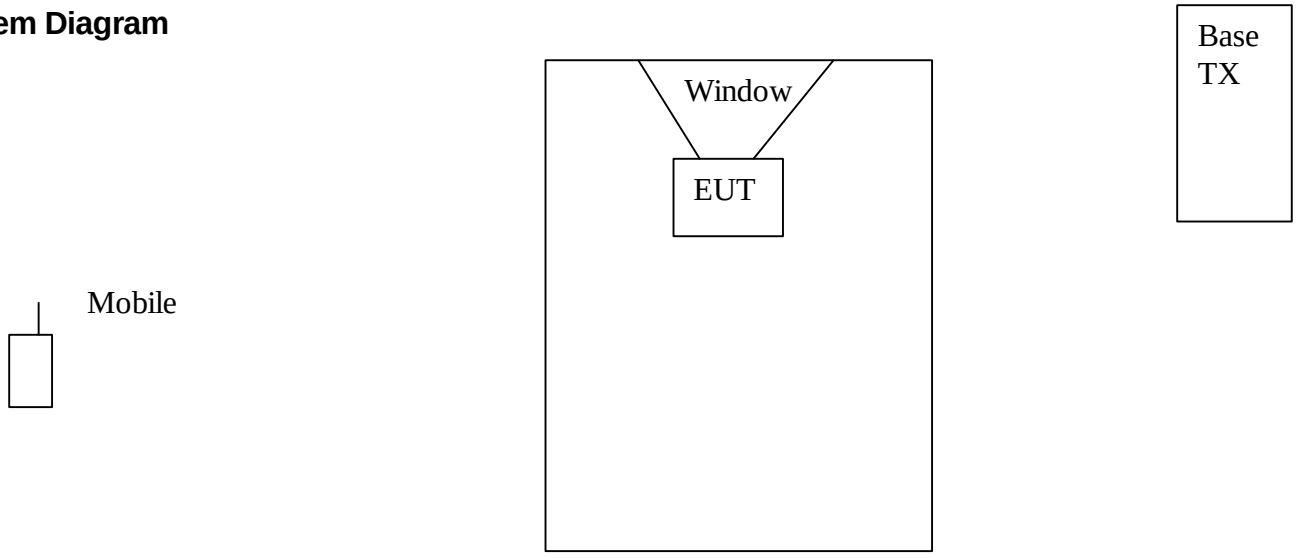
Modifications Made During Testing

There were no modifications made during testing.

Description of Operation

The EUT is a PCS band signal enhancer. The enhancer is essentially an off-air amplifier. The signal that is repeated is repeated on the same signal on which it was received. The function of the EUT is to fill in weak signal areas within a commercial building. The unit is built so that it can be re-located with minimum effort by an installer. The maximum eirp is 100 mW (+20 dBm).

System Diagram



Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 2.1046
TESTED BY: Chinda PoyTTidwell	DATE: 4/25/01

Test Results: Complies.

Measurement Data:

	Modulation Type	Per Channel Output Power (dBm)	Composite Output Power (dBm)
Uplink	CDMA	11.9 dBm	14.9 dBm
Downlink	CDMA	11.7 dBm	14.7 dBm
Uplink	GSM	10.8 dBm	13.8 dBm
Downlink	GSM	10.5 dBm	13.5 dBm
Uplink	NADC	13.7 dBm	16.7 dBm
Downlink	NADC	13.4 dBm	16.4 dBm

Equipment Used: 1036-1477-1082

Measurement Uncertainty: +/- 1.6 dB

Temperature: 22 °C

Relative Humidity: 30 %

Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth (CDMA)	PARA. NO.: 2.1049
TESTED BY: Chinda PoyTTidwell	DATE: 4/25/01

Test Results: Complies.

Test Data: See attached plot(s).

Equipment Used: 1036-1477-1082

Measurement Uncertainty: +/- 1.6 dB

Temperature: 22 °C

Relative Humidity: 30 %

Test Data --- Occupied Bandwidth – CDMA

Data Plot Occupied Bandwidth CDMA

Page 1 of 4

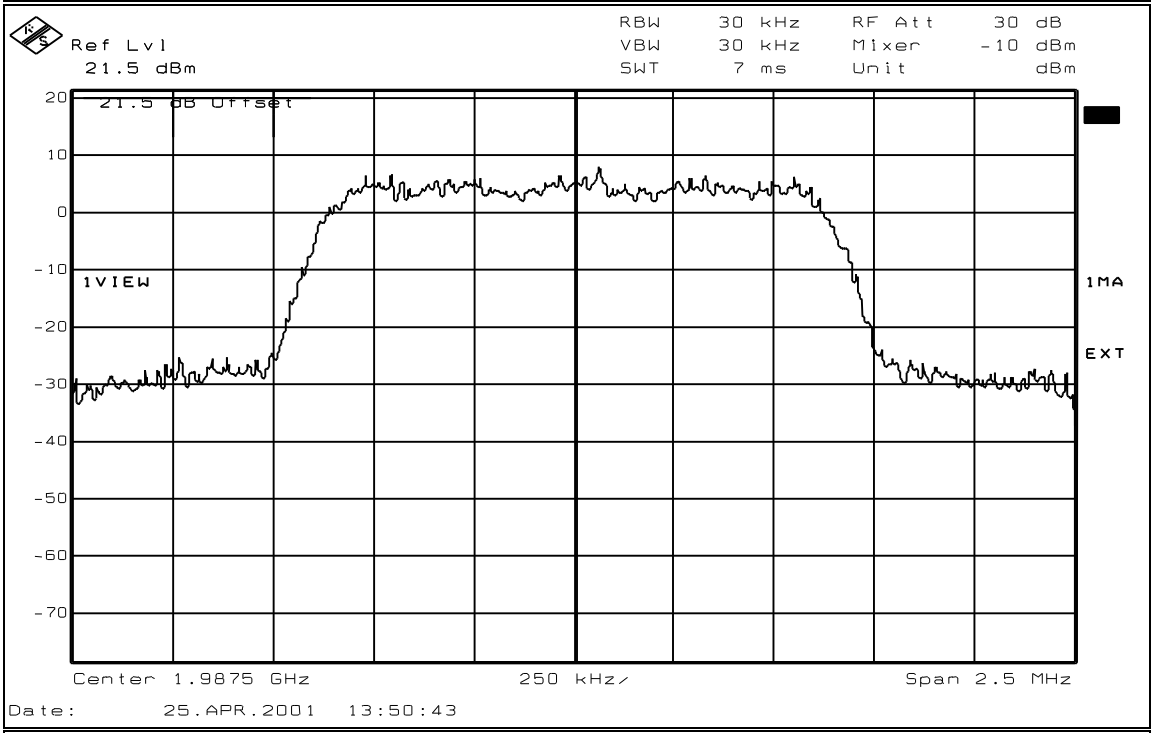
Complete X
Preliminary

Job No.:	1L0129R	Date: 4/25/01	
Specification:	2.1049	Temperature(°C): 22	
Tested By:	Chinda Poy	Relative Humidity(%) 30	
E.U.T.:	PCS Repeater		
Configuration:	TX CDMA SIGNAL		
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	1477	Cable #4:	
Attenuator #2:		Mixer:	

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



Notes: **Output signal CDMA**
DOWNLINK

Test Data --- Occupied Bandwidth – CDMA

Data Plot Occupied Bandwidth CDMA

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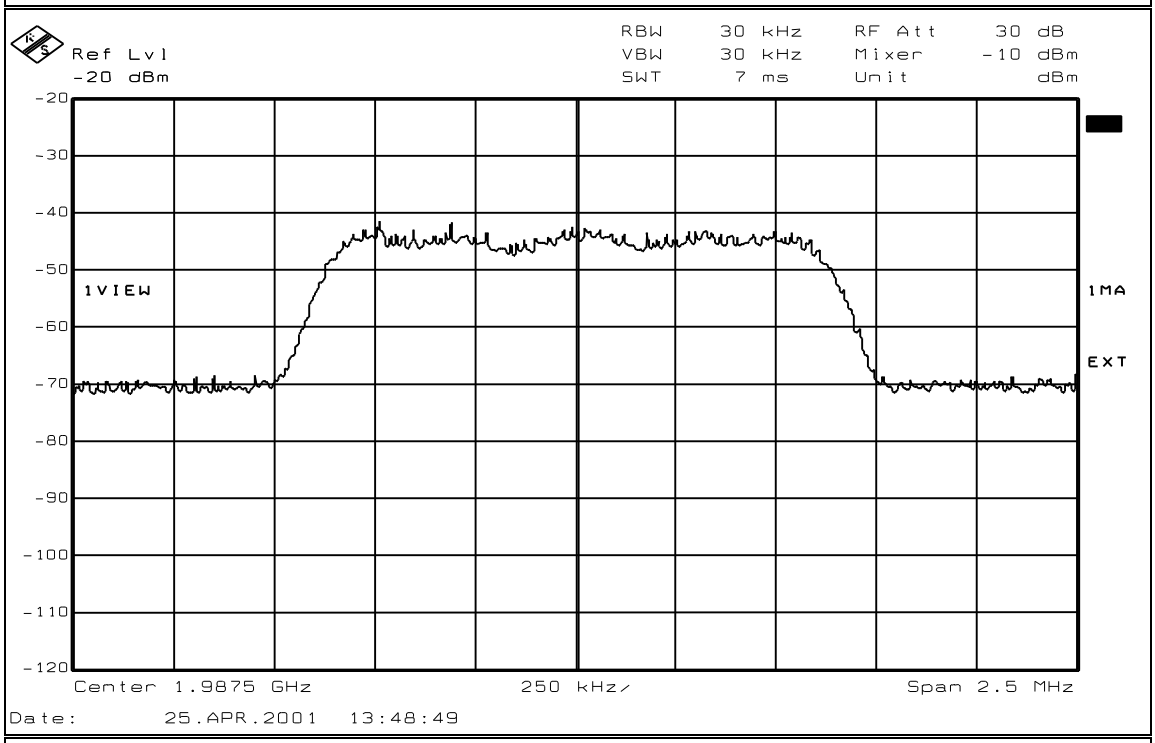
Job No.:	1L0129R	Date:	4/25/01
Specification:	2.1	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%)	30
E.U.T.:	PCS Repeater		
Configuration:	TX CDMA SIGNAL		



Notes: **Input power CDMA**
DOWNLINK

Test Data --- Occupied Bandwidth – CDMA

Data Plot Occupied Bandwidth CDMA

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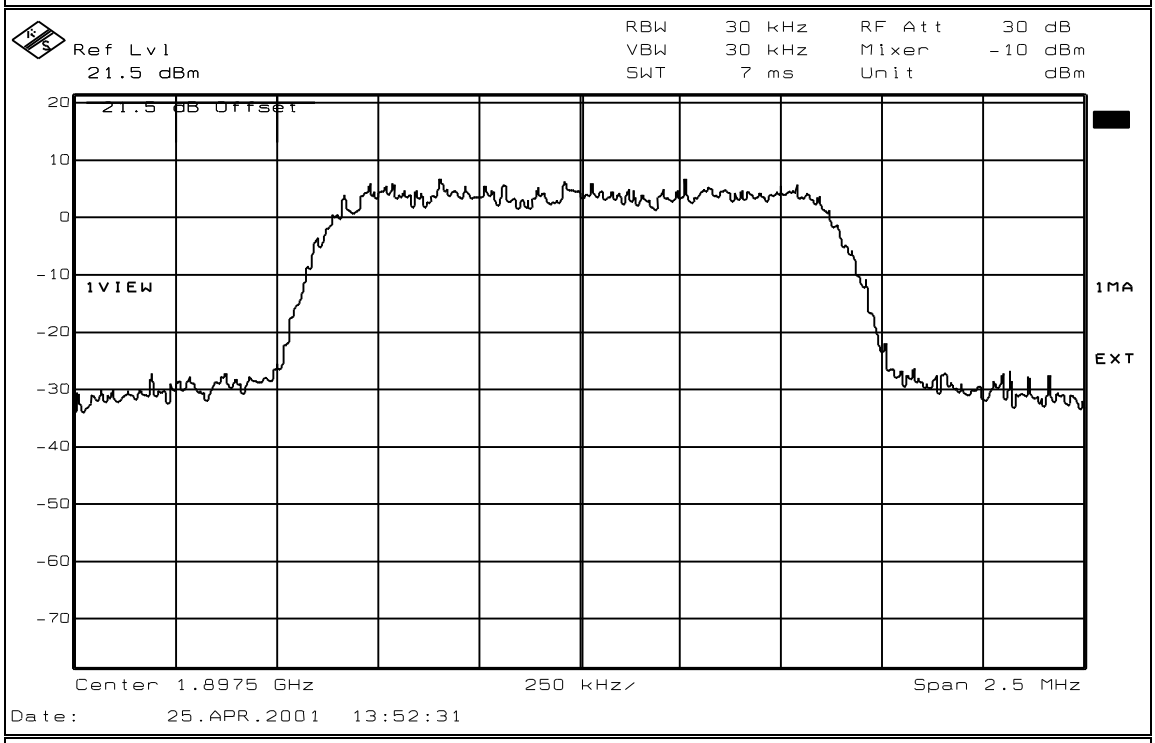
Job No.:	1L0129R	Date:	4/25/01
Specification:	2.1049	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%)	30
E.U.T.:	PCS Repeater		
Configuration:	TX CDMA SIGNAL		



Notes: **Output signal CDMA**
UPLINK

Test Data --- Occupied Bandwidth – CDMA

Test Plot: **Occupied Bandwidth CDMA**

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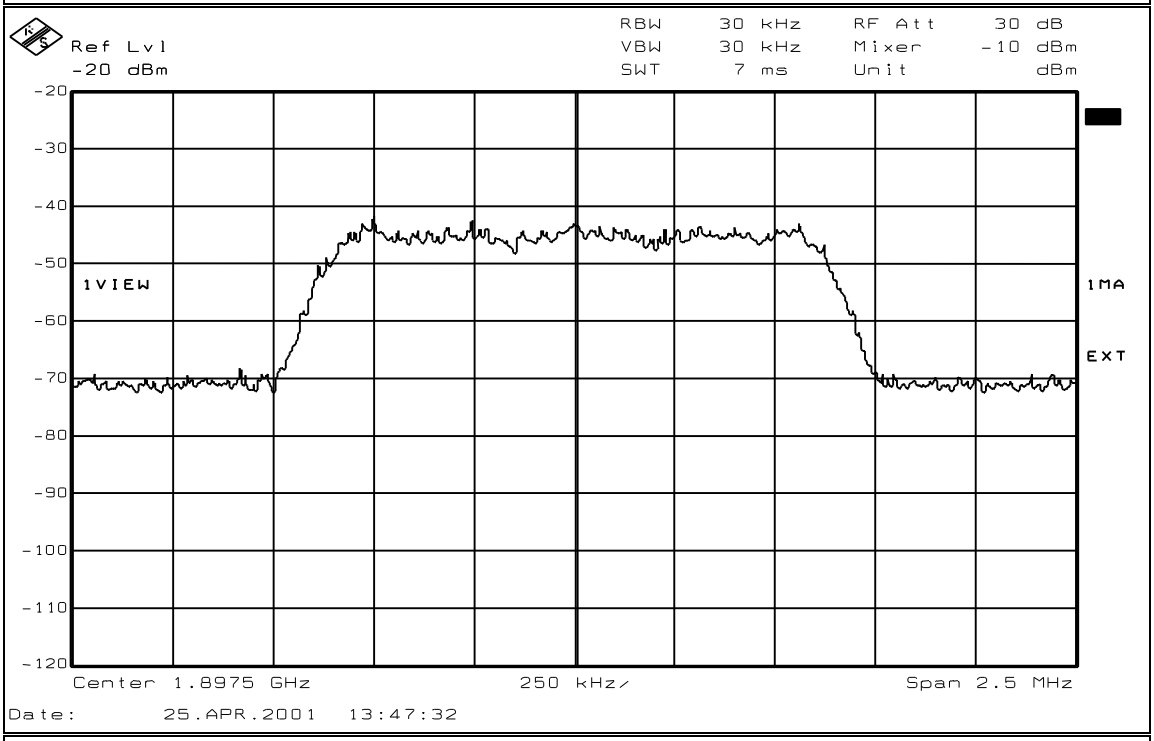
Job No.:	1L0129R	Date:	4/25/01
Specification:	2.1049	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%)	30
E.U.T.:	PCS Repeater		
Configuration:	TX CDMA SIGNAL		



Notes: **Input signal CDMA**
UPLINK

Test Data --- Occupied Bandwidth – CDMA –High Gain

Data Plot **Occupied Bandwidth CDMA**

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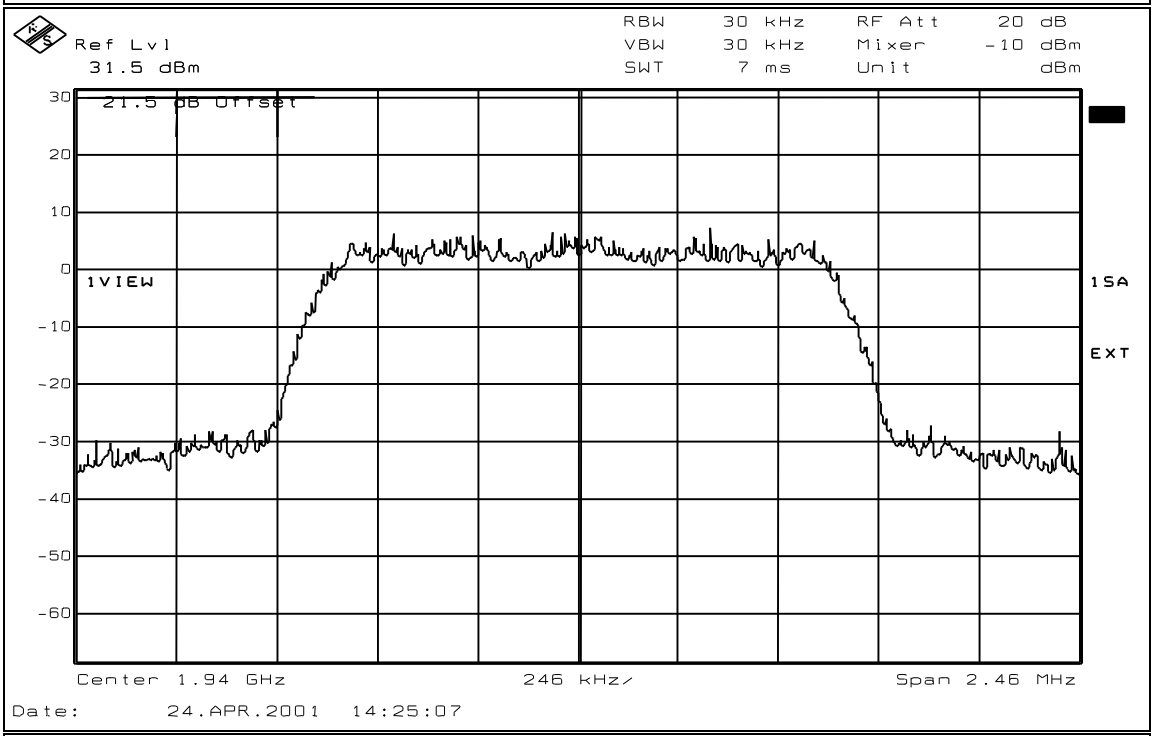
Complete X
Preliminary

Job No.:	1L0129R	Date: 4/24/01	
Specification:	2.1049	Temperature(°C): 24	
Tested By:	Chinda Poy	Relative Humidity(%) 35	
E.U.T.:	PCS Repeater		
Configuration:	TX CDMA SIGNAL		
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	1477	Cable #4:	
Attenuator #2:		Mixer:	

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



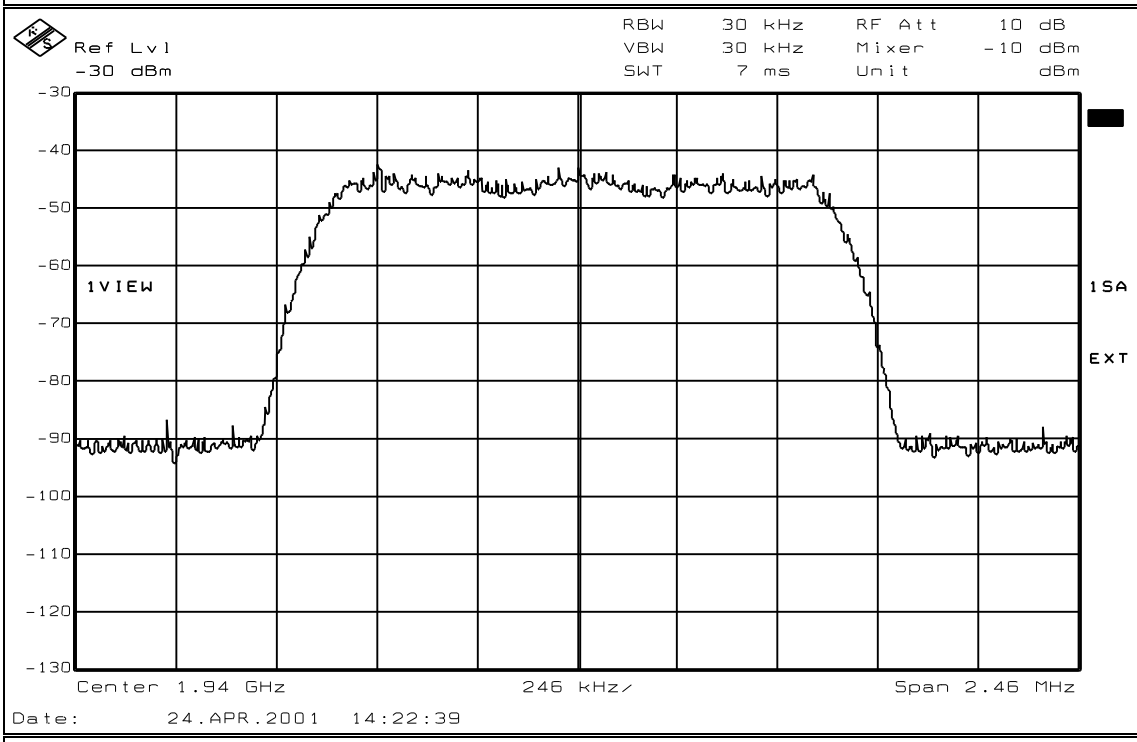
Notes: **Output signal CDMA**
DOWNLINK

Test Data --- Occupied Bandwidth – CDMA –High Gain

Data Plot Occupied Bandwidth CDMA

Page 2 of 4

Job No.:	1L0129R	Date:	4/24/01
Specification:	2.1	Temperature(°C):	24
Tested By:	Chinda Poy	Relative Humidity(%)	35
E.U.T.:	PCS Repeater		
Configuration:	TX CDMA SIGNAL		



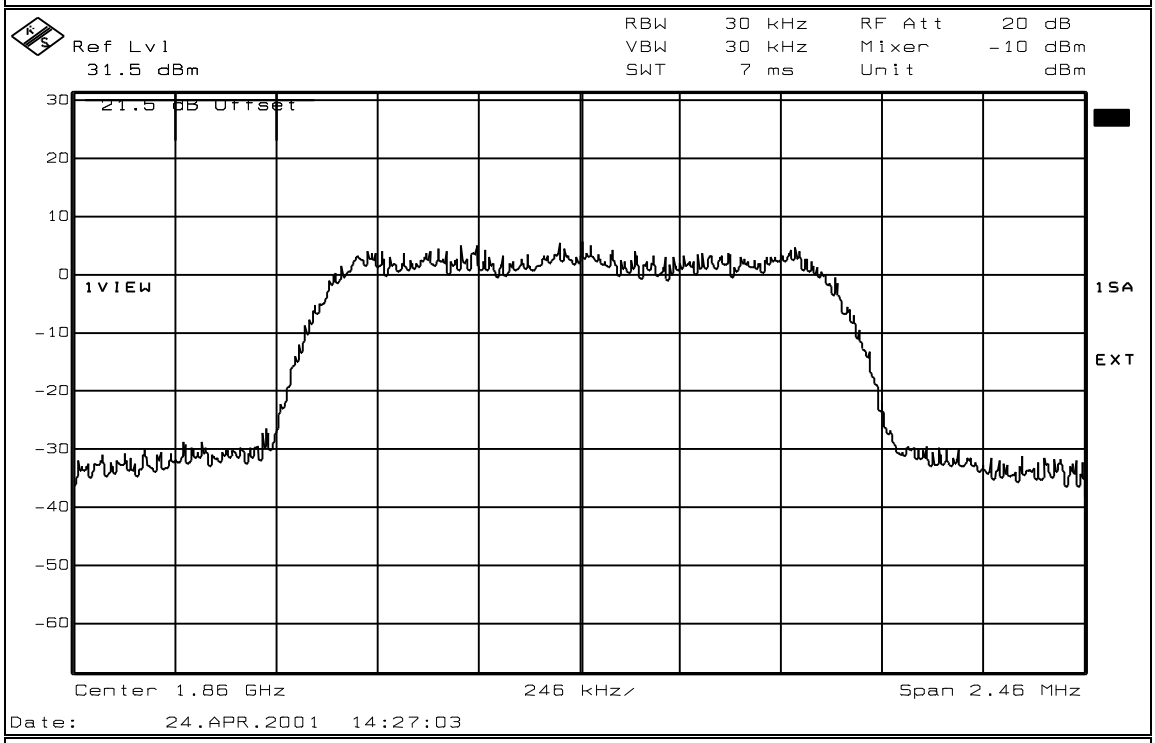
Notes: **Input power CDMA**
DOWNLINK

Test Data --- Occupied Bandwidth – CDMA –High Gain

Data Plot Occupied Bandwidth CDMA

Page 3 of 4

Job No.:	1L0129R	Date:	4/24/01
Specification:	2.1049	Temperature(°C):	24
Tested By:	Chinda Poy	Relative Humidity(%)	35
E.U.T.:	PCS Repeater		
Configuration:	TX CDMA SIGNAL		



Notes: **Output signal CDMA**
UPLINK

Test Data --- Occupied Bandwidth – CDMA –High Gain

Test Plot: **Occupied Bandwidth CDMA**

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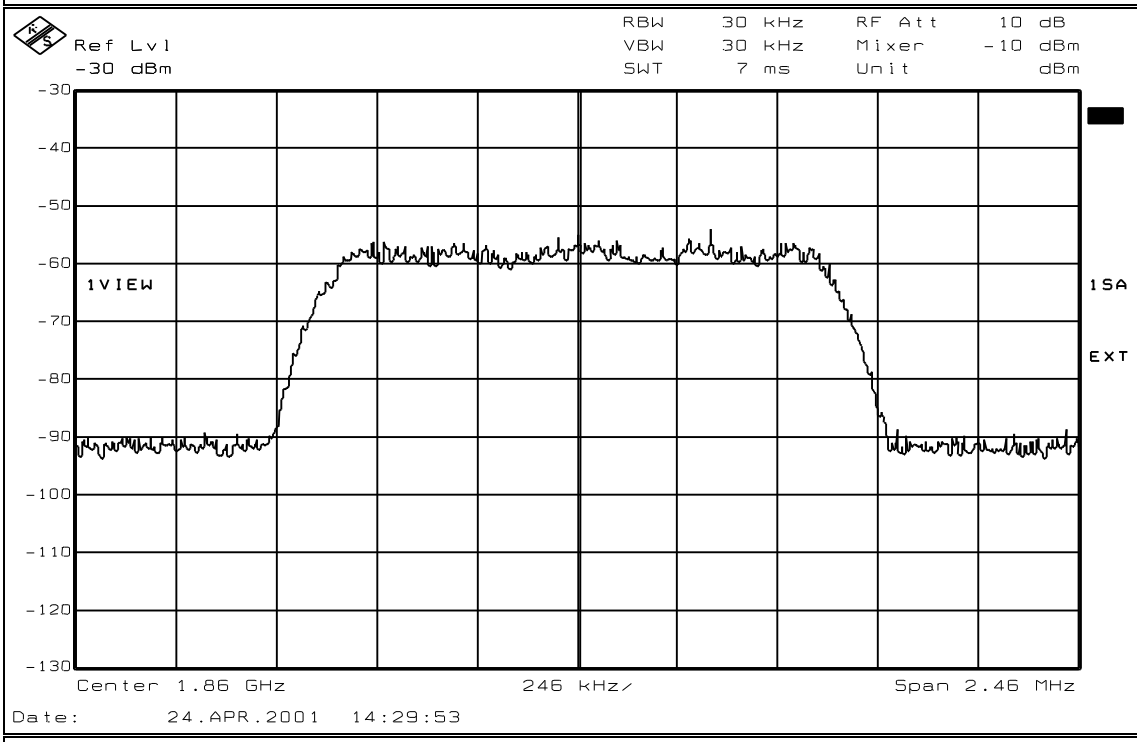
Job No.:	1L0129R	Date:	4/24/01
Specification:	2.1049	Temperature(°C):	24
Tested By:	Chinda Poy	Relative Humidity(%)	35
E.U.T.:	PCS Repeater		
Configuration:	TX CDMA SIGNAL		



Notes: **Input signal CDMA**
UPLINK

NAME OF TEST: Occupied Bandwidth (GSM)	PARA. NO.: 2.1049
TESTED BY: Chinda PoyTTidwell	DATE: 4/25/01

Test Results: Complies.

Test Data: See attached plot(s).

Equipment Used: 1036-1477-1082

Measurement Uncertainty: +/- 1.6 dB

Temperature: 22 °C

Relative Humidity: 30 %

Test Data --- Occupied Bandwidth – GSM

Data Plot Occupied Bandwidth GSM

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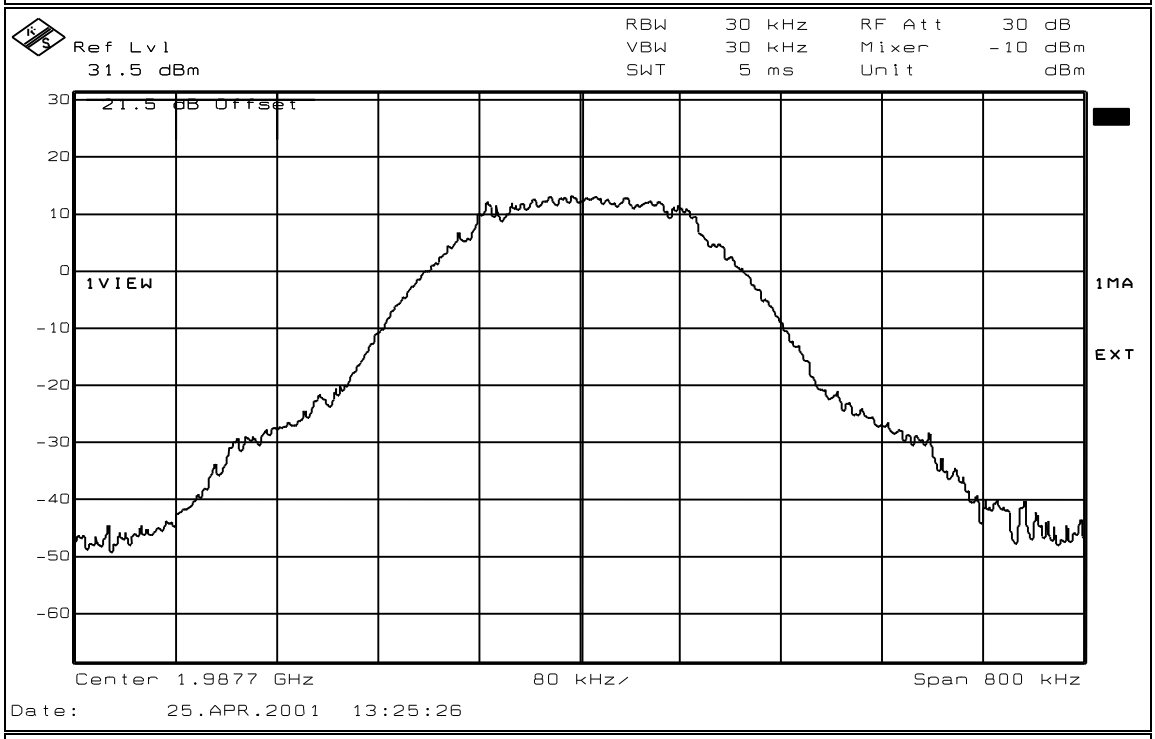
Complete X
Preliminary

Job No.: 1L0129R Date: 4/25/01
Specification: 2.1049 Temperature(°C): 22
Tested By: Chinda Poy Relative Humidity(%) 30
E.U.T.: PCS Repeater
Configuration: TX GSM SIGNAL
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 1477 Cable #4:
Attenuator #2: Mixer:
Additional equipment used:
Measurement Uncertainty: +/-3.6 dB



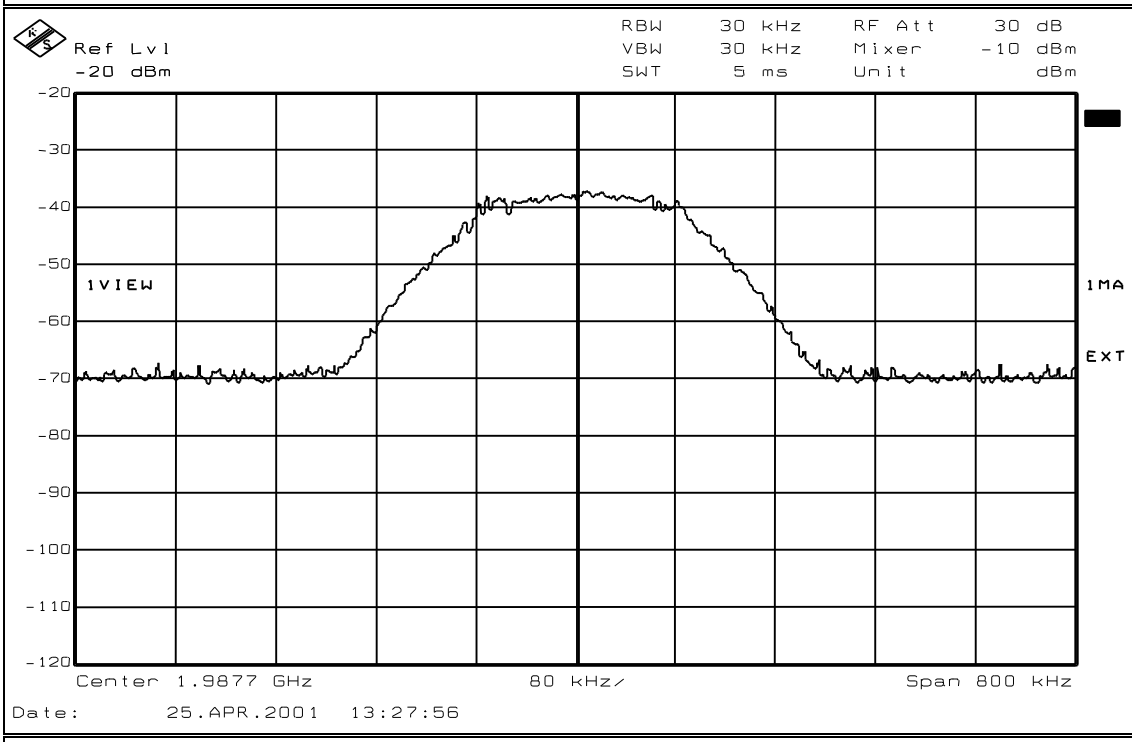
Notes: **Output signal GSM**
DOWNLINK

Test Data --- Occupied Bandwidth – GSM

Data Plot Occupied Bandwidth GSM

Page 2 of 4

Job No.:	1L0129R	Date:	4/25/01
Specification:	2.1	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%)	30
E.U.T.:	PCS Repeater		
Configuration:	TX GSM SIGNAL		



Notes: **Input power GSM**
DOWNLINK

Test Data --- Occupied Bandwidth – GSM

Data Plot Occupied Bandwidth GSM

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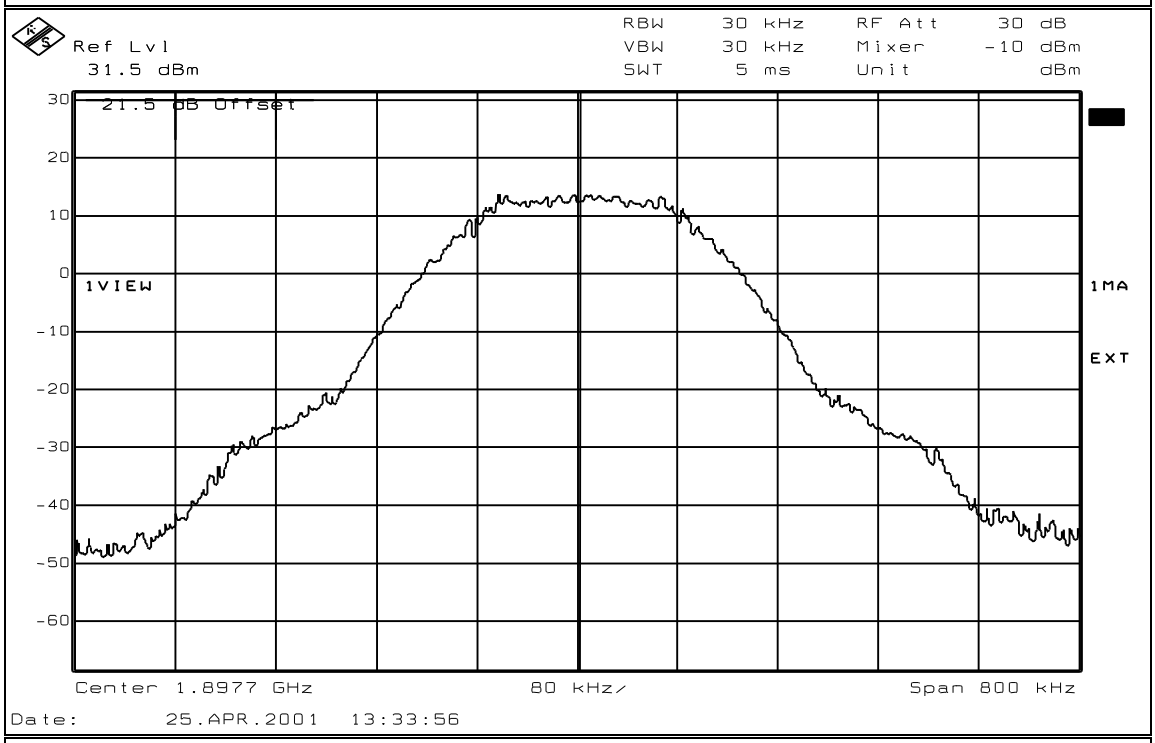
Job No.:	1L0129R	Date:	4/25/01
Specification:	2.1049	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%)	30
E.U.T.:	PCS Repeater		
Configuration:	TX GSM SIGNAL		



Notes: **Output signal GSM**
UPLINK

Test Data --- Occupied Bandwidth – GSM

Test Plot: **Occupied Bandwidth GSM**

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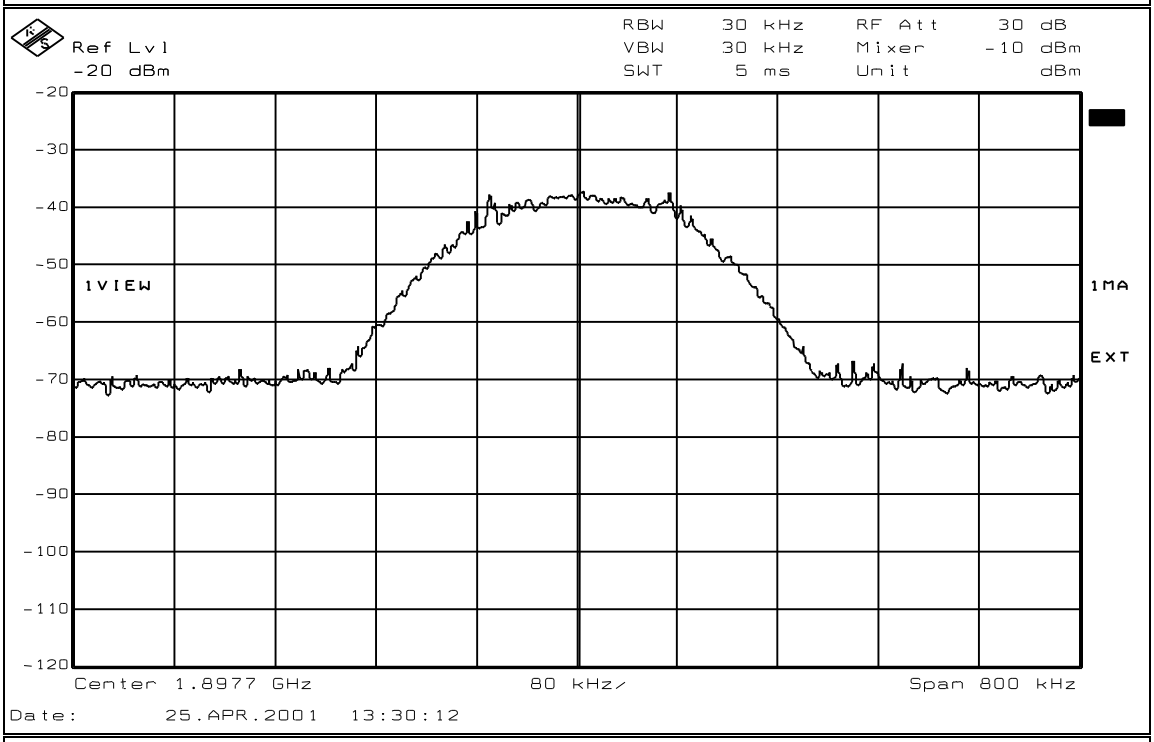
Job No.:	1L0129R	Date:	4/25/01
Specification:	2.1049	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%)	30
E.U.T.:	PCS Repeater		
Configuration:	TX GSM SIGNAL		



Notes: **Input power GSM**
UPLINK

Test Data --- Occupied Bandwidth – GSM – High Gain

Data Plot **Occupied Bandwidth GSM**

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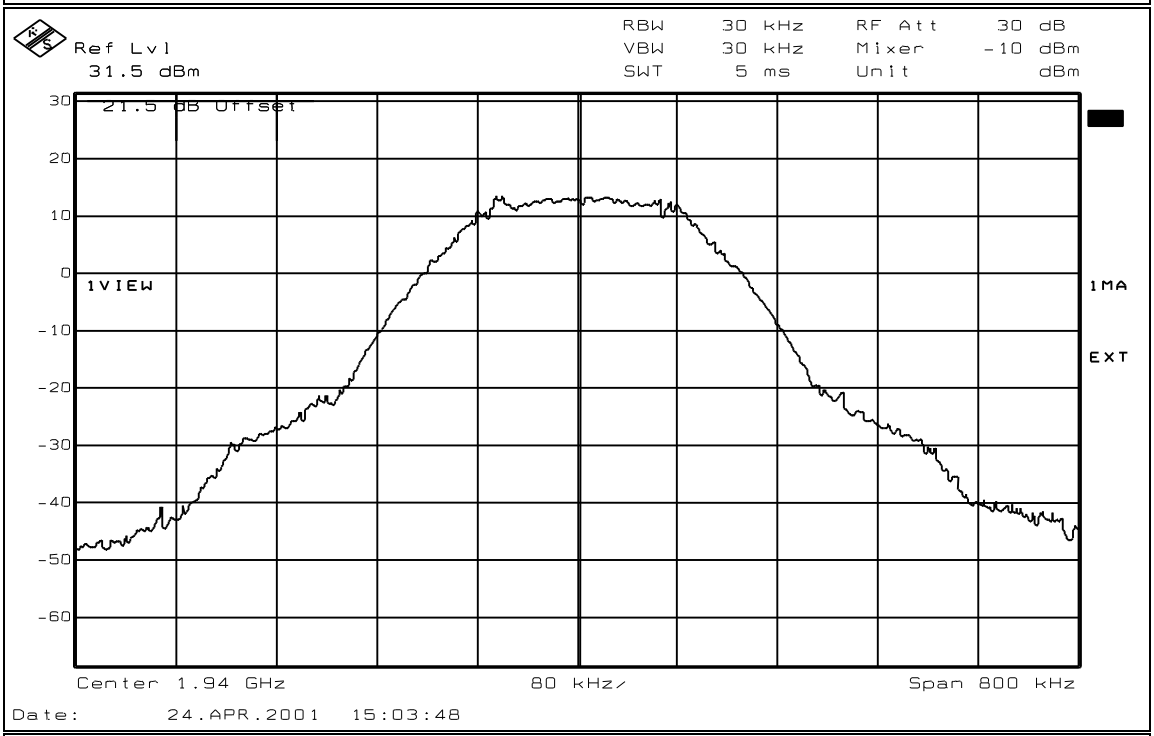
Complete X
Preliminary

Job No.:	1L0129R	Date: 4/24/01	
Specification:	2.1049	Temperature(°C): 24	
Tested By:	Chinda Poy	Relative Humidity(%) 35	
E.U.T.:	PCS Repeater		
Configuration:	TX GSM SIGNAL		
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	1477	Cable #4:	
Attenuator #2:		Mixer:	

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



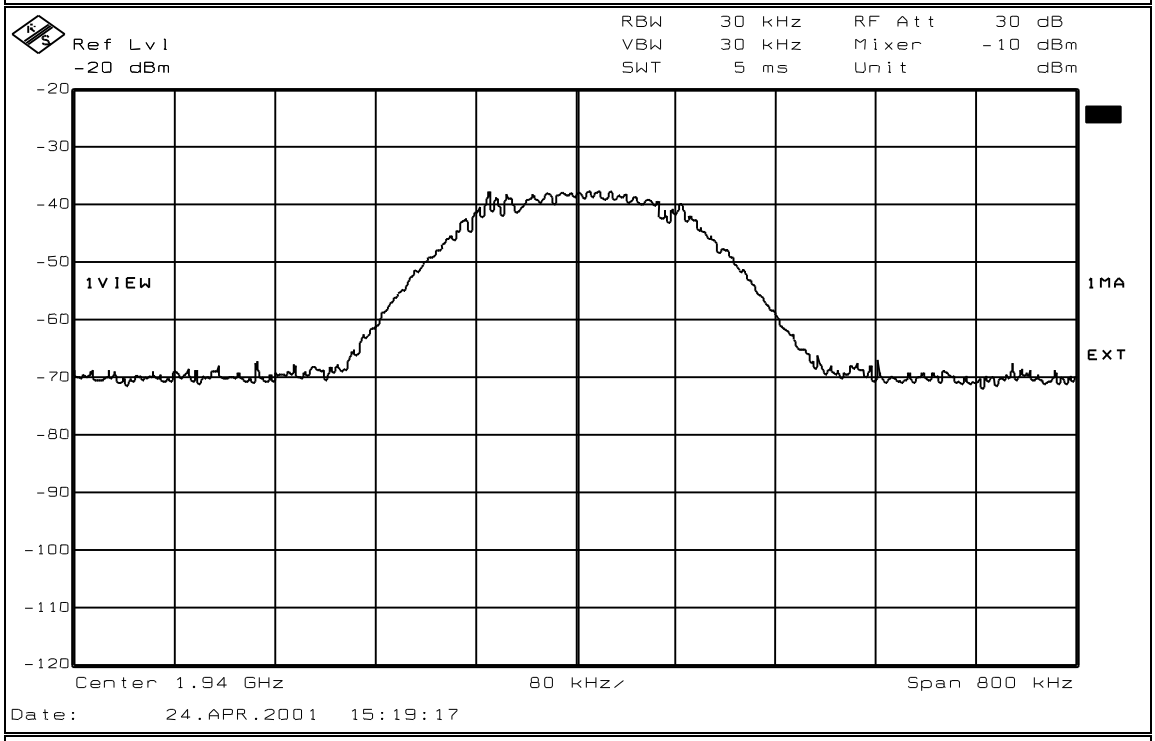
Notes: **Output signal GSM**
DOWNLINK

Test Data --- Occupied Bandwidth – GSM – High Gain

Data Plot Occupied Bandwidth GSM

Page 2 of 4

Job No.:	1L0129R	Date:	4/24/01
Specification:	2.1	Temperature(°C):	24
Tested By:	Chinda Poy	Relative Humidity(%)	35
E.U.T.:	PCS Repeater		
Configuration:	TX GSM SIGNAL		



Notes: **Input power GSM**
DOWNLINK

Test Data --- Occupied Bandwidth – GSM – High Gain

Data Plot Occupied Bandwidth GSM

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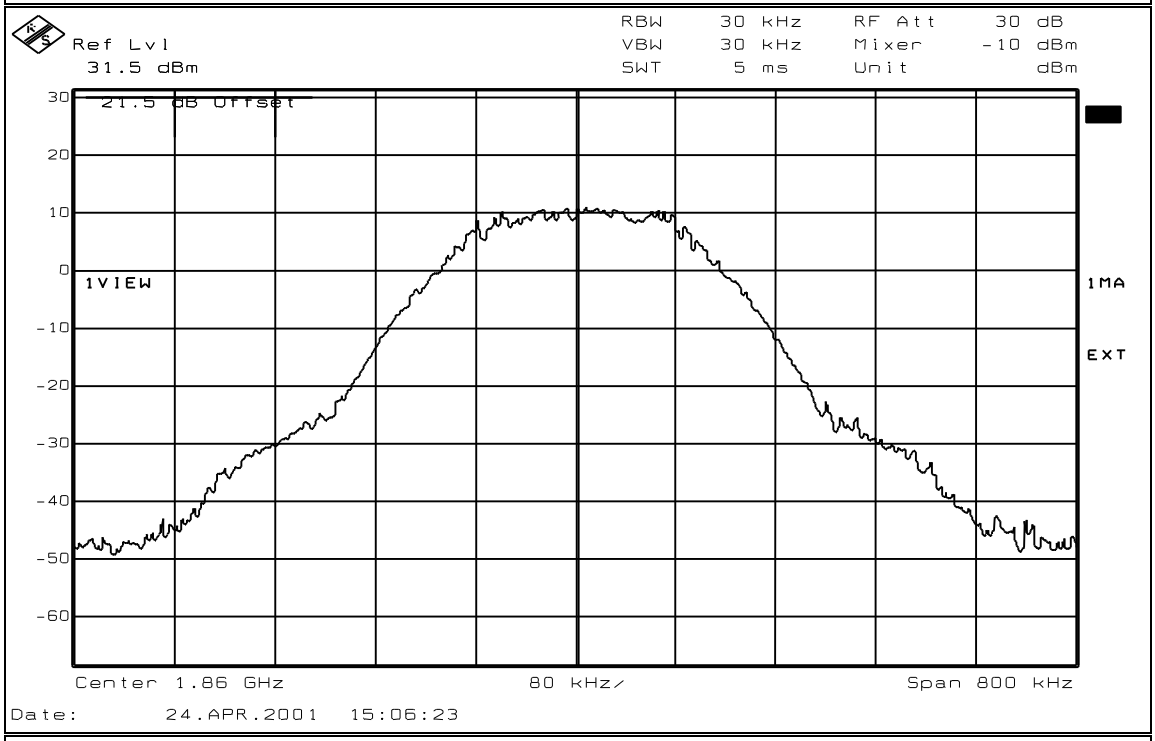
Job No.:	1L0129R	Date:	4/24/01
Specification:	2.1049	Temperature(°C):	24
Tested By:	Chinda Poy	Relative Humidity(%)	35
E.U.T.:	PCS Repeater		
Configuration:	TX GSM SIGNAL		



Notes: **Output signal GSM**
UPLINK

Test Data --- Occupied Bandwidth – GSM – High Gain

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

Nemko Dallas, Inc.

Test Plot: **Occupied Bandwidth GSM**

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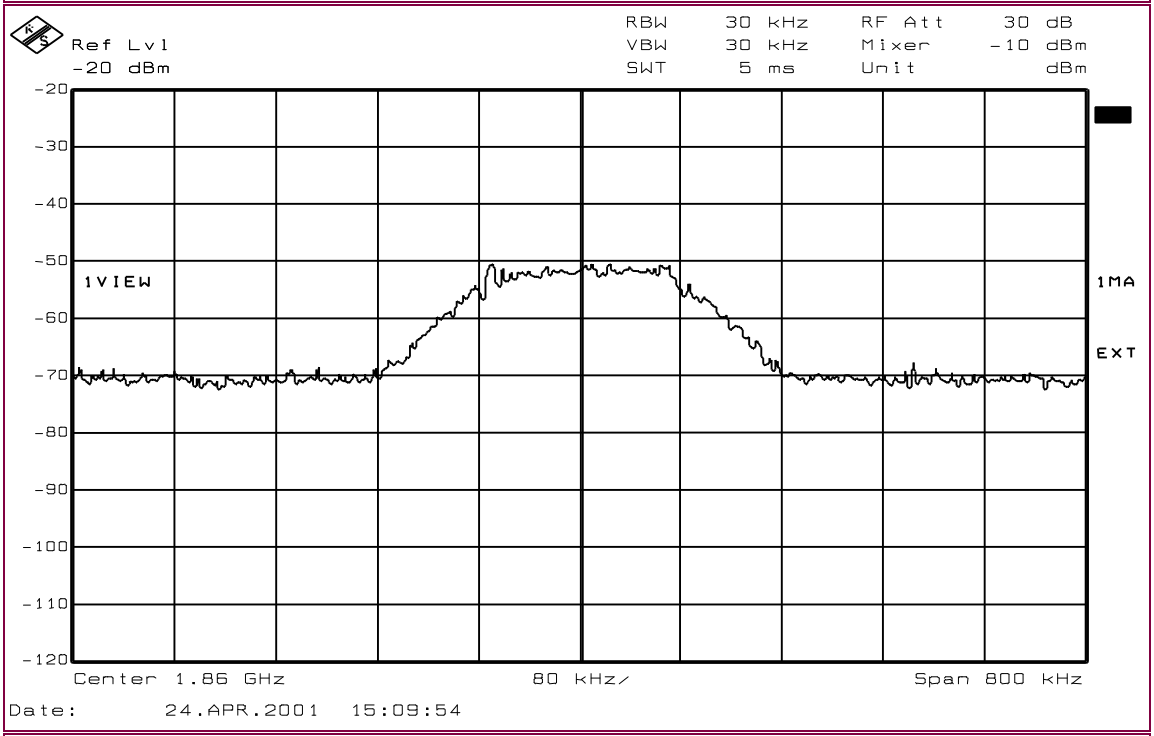
Job No.:	1L0129R	Date:	4/24/01
Specification:	2.1049	Temperature(°C):	24
Tested By:	Chinda Poy	Relative Humidity(%)	35
E.U.T.:	PCS Repeater		
Configuration:	TX GSM SIGNAL		



Notes: **Input power GSM**
UPLINK

NAME OF TEST: Occupied Bandwidth (NADC)	PARA. NO.: 2.1049
TESTED BY: Chinda PoyTTidwell	DATE: 4/25/01

Test Results: Complies.

Test Data: See attached plot(s).

Equipment Used: 1036-1477-1082

Measurement Uncertainty: +/- 1.6 dB

Temperature: 22 °C

Relative Humidity: 30 %

Test Data --- Occupied Bandwidth –TDMA

Data Plot Occupied Bandwidth TDMA

Page 1 of 4

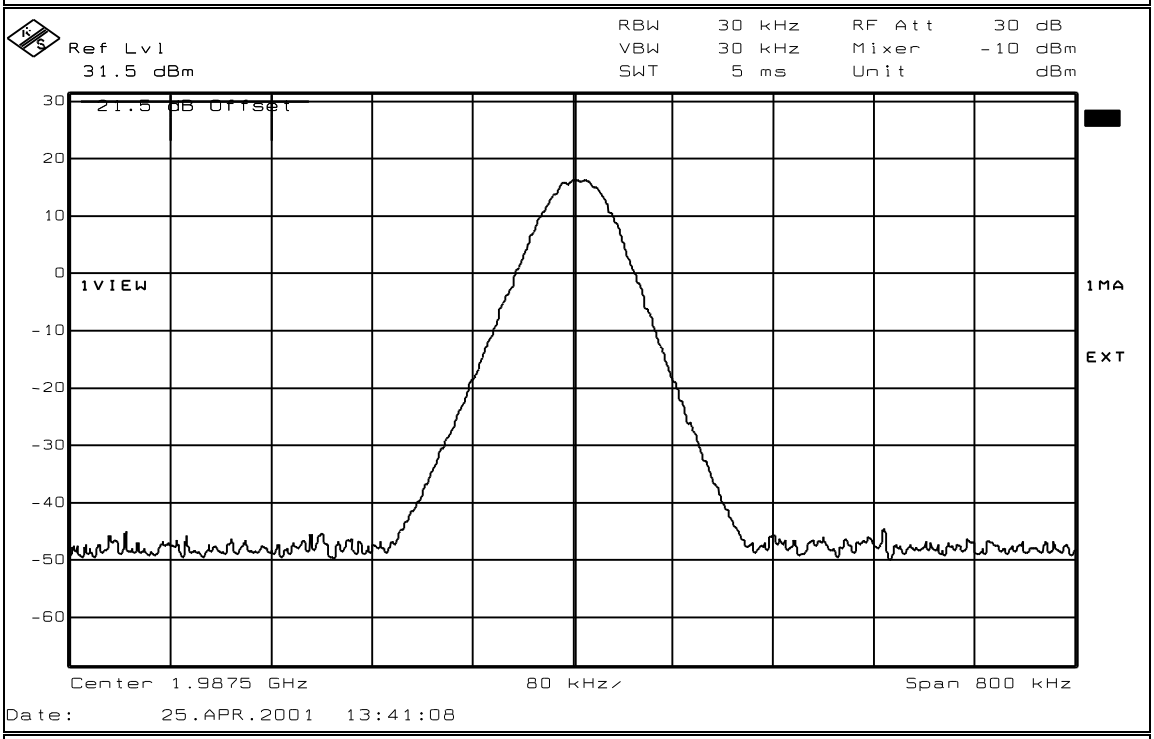
Complete X
Preliminary

Job No.:	1L0129R	Date: 4/25/01	
Specification:	2.1049	Temperature(°C): 22	
Tested By:	Chinda Poy	Relative Humidity(%) 30	
E.U.T.:	PCS Repeater		
Configuration:	TX TDMA SIGNAL		
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	1477	Cable #4:	
Attenuator #2:		Mixer:	

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



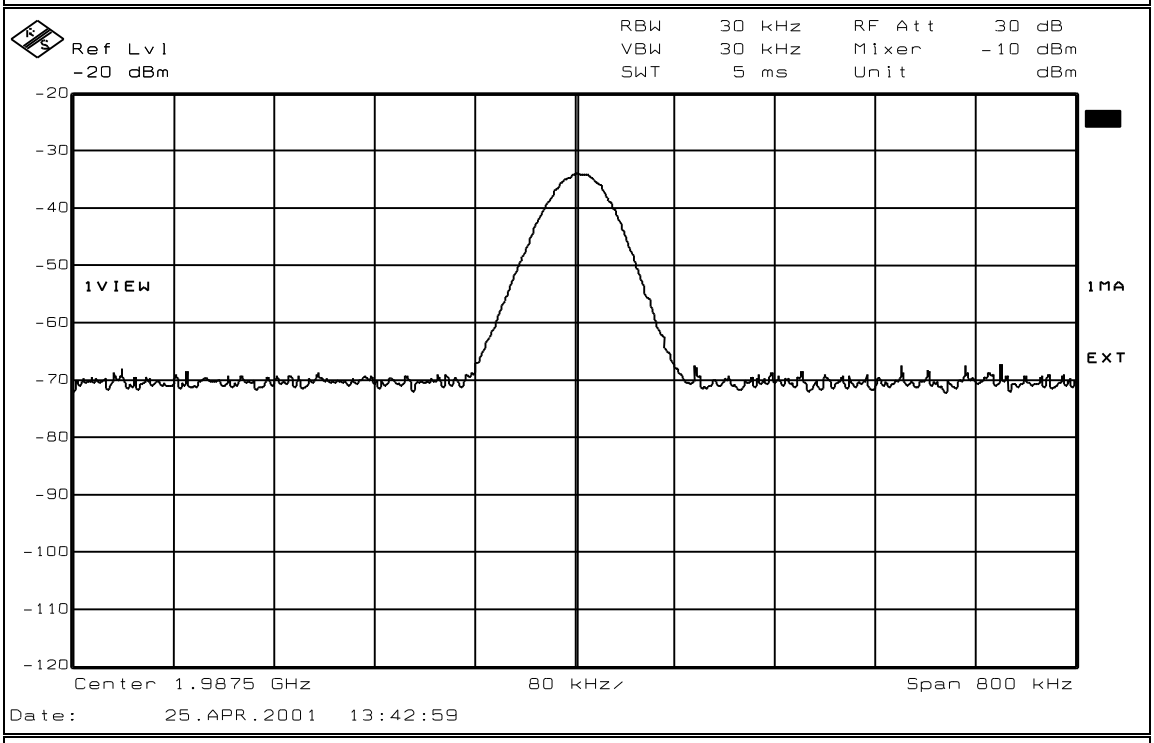
Notes: **Output signal TDMA**
DOWNLINK

Test Data --- Occupied Bandwidth –TDMA

Data Plot Occupied Bandwidth TDMA

Page 2 of 4

Job No.:	1L0129R	Date:	4/25/01
Specification:	2.1	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%)	30
E.U.T.:	PCS Repeater		
Configuration:	TX TDMA SIGNAL		



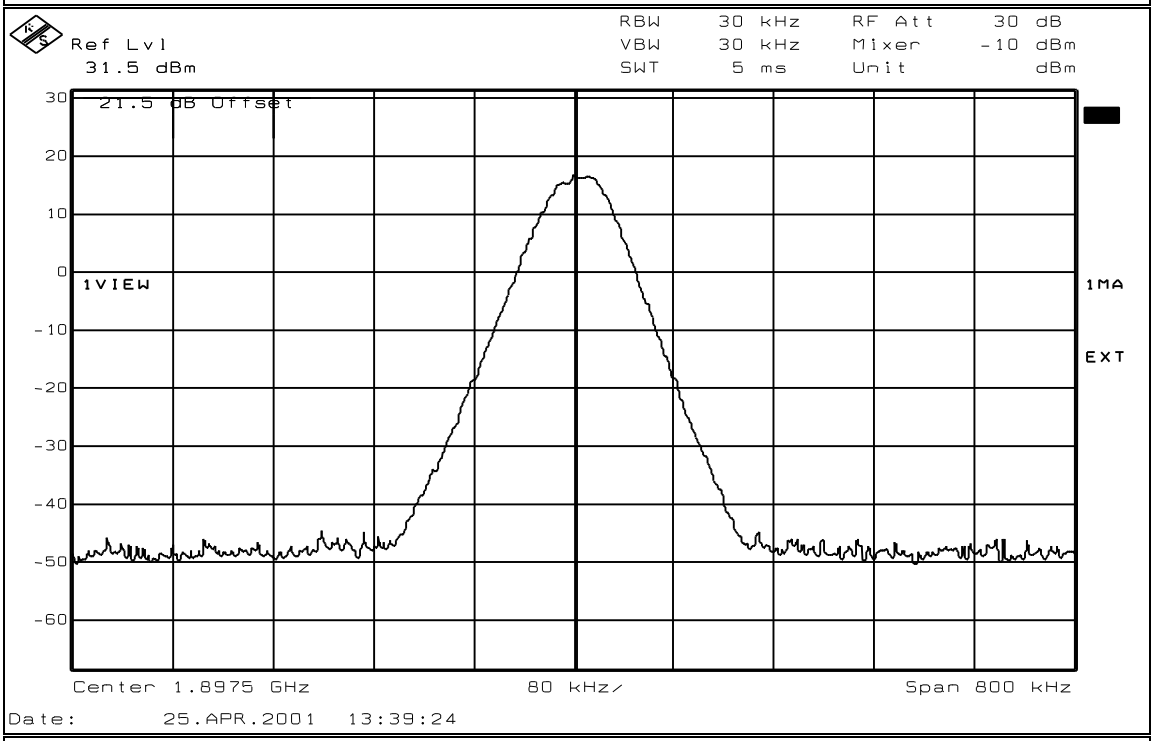
Notes: **Input power TDMA**
DOWNLINK

Test Data --- Occupied Bandwidth –TDMA

Data Plot Occupied Bandwidth TDMA

Page 3 of 4

Job No.:	1L0129R	Date:	4/25/01
Specification:	2.1049	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%)	30
E.U.T.:	PCS Repeater		
Configuration:	TX TDMA SIGNAL		

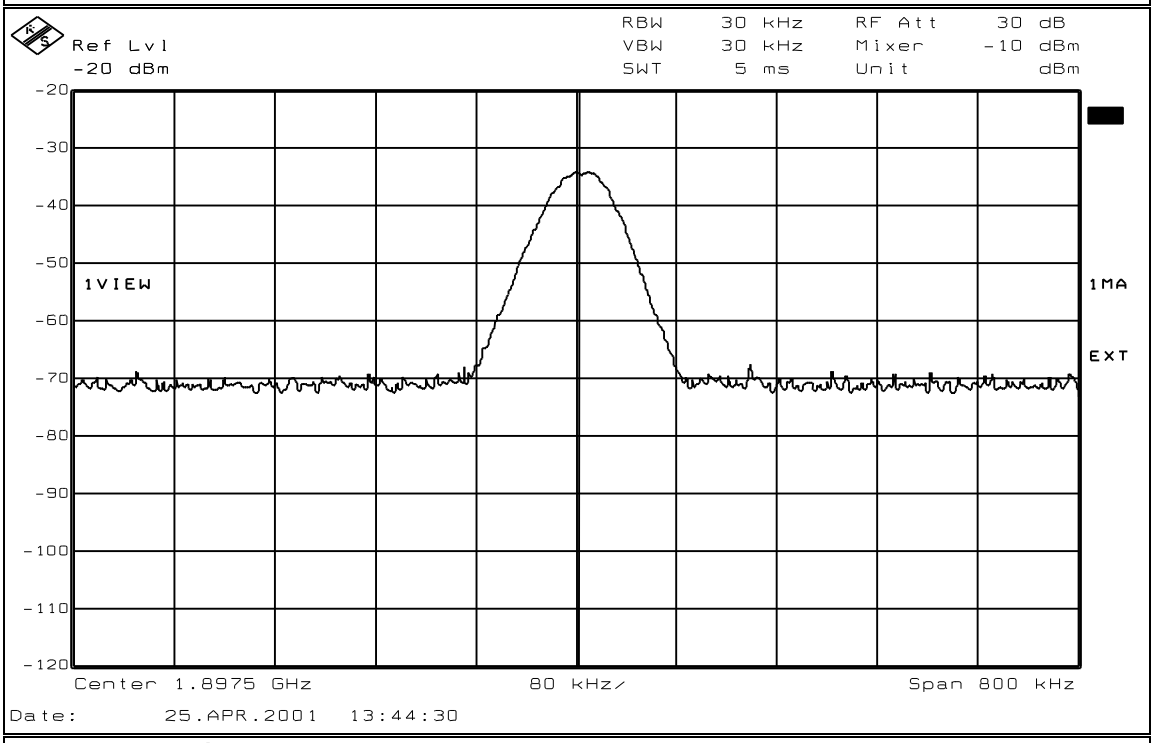


Notes: **Output signal TDMA**
UPLINK

Test Data --- Occupied Bandwidth –TDMA

Test Plot: Occupied Bandwidth TDMA

Page 4 of 4
Job No.: 1L0129R Date: 4/25/01
Specification: 2.1049 Temperature(°C): 22
Tested By: Chinda Poy Relative Humidity(%) 30
E.U.T.: PCS Repeater
Configuration: TX TDMA SIGNAL



Notes: **Input signal TDMA**
UPLINK

Test Data --- Occupied Bandwidth –TDMA –High Gain

Data Plot Occupied Bandwidth TDMA

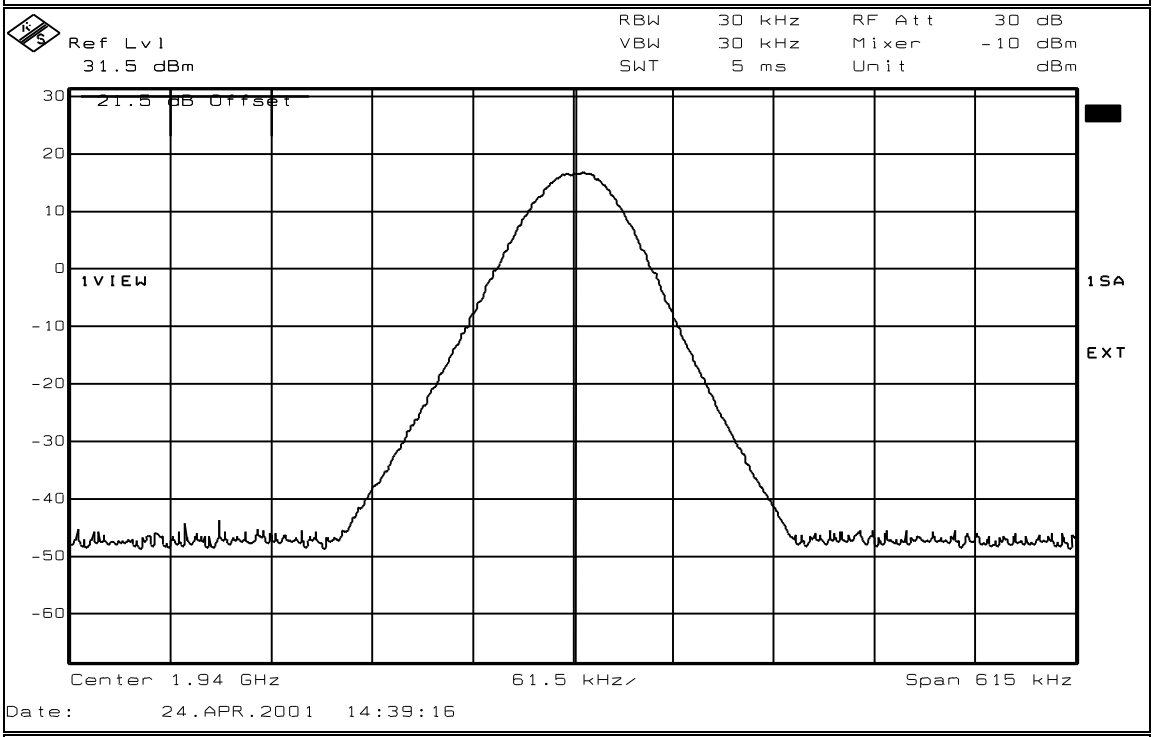
Page 1 of 4

Complete X
Preliminary

Job No.: 1L0129R Date: 4/24/01
Specification: 2.1049 Temperature(°C): 24
Tested By: Chinda Poy Relative Humidity(%) 35
E.U.T.: PCS Repeater
Configuration: TX TDMA SIGNAL
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 1477 Cable #4:
Attenuator #2: Mixer:
Additional equipment used:
Measurement Uncertainty: +/-3.6 dB



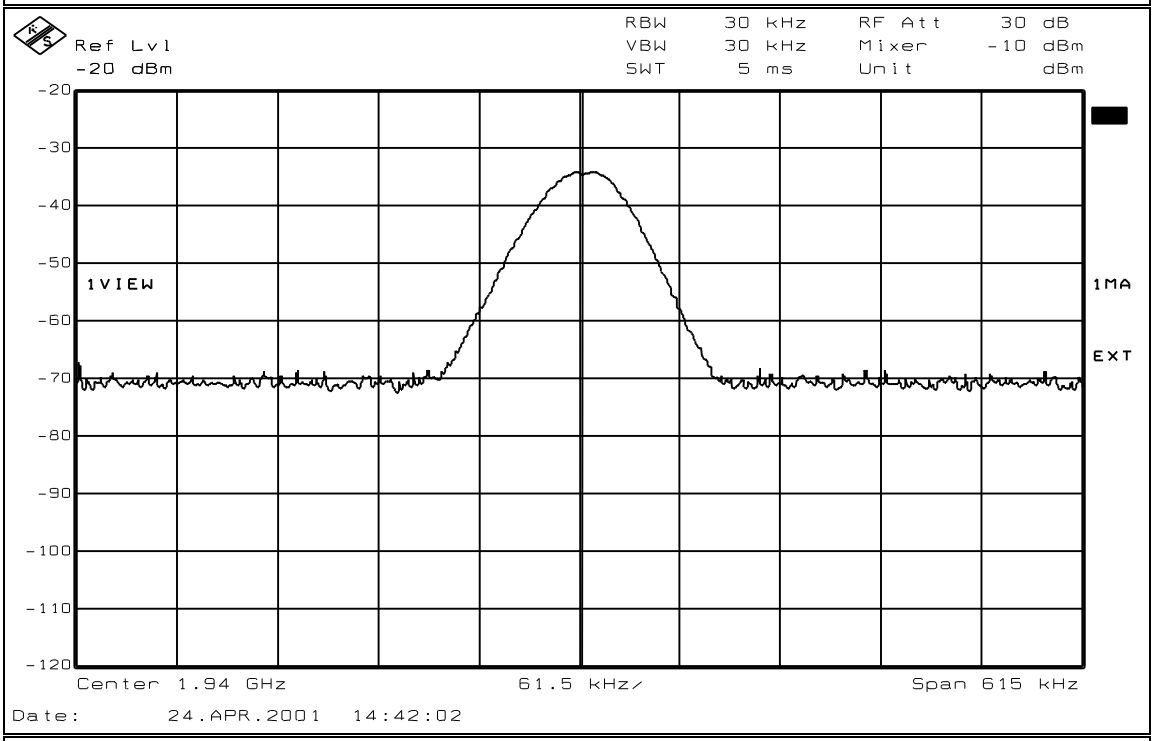
Notes: **Output signal TDMA**
DOWNLINK

Test Data --- Occupied Bandwidth –TDMA –High Gain

Data Plot Occupied Bandwidth TDMA

Page 2 of 4

Job No.: 1L0129R Date: 4/24/01
Specification: 2.1 Temperature(°C): 24
Tested By: Chinda Poy Relative Humidity(%) 35
E.U.T.: PCS Repeater
Configuration: TX TDMA SIGNAL



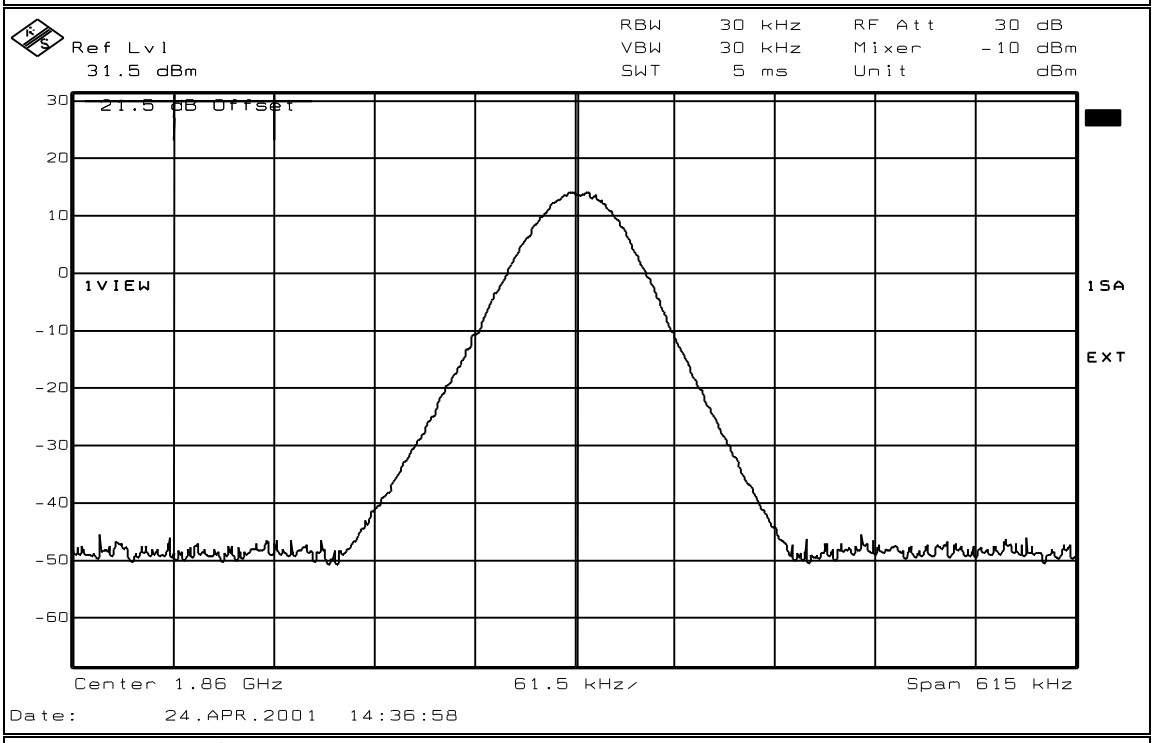
Notes: **Input power TDMA**
DOWNLINK

Test Data --- Occupied Bandwidth –TDMA –High Gain

Data Plot Occupied Bandwidth TDMA

Page 3 of 4

Job No.:	1L0129R	Date:	4/24/01
Specification:	2.1049	Temperature(°C):	24
Tested By:	Chinda Poy	Relative Humidity(%)	35
E.U.T.:	PCS Repeater		
Configuration:	TX TDMA SIGNAL		

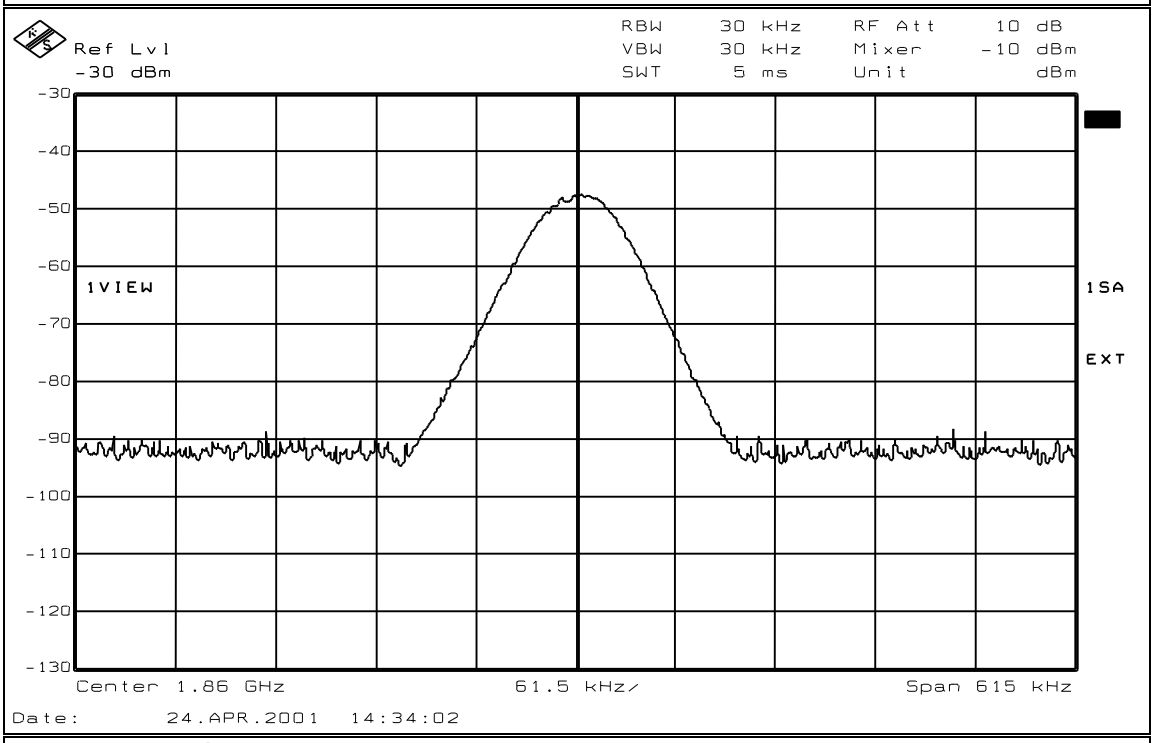


Notes: **Output signal TDMA**
UPLINK

Test Data --- Occupied Bandwidth –TDMA –High Gain

Test Plot: Occupied Bandwidth TDMA

Page 4 of 4
Job No.: 1L0129R Date: 4/24/01
Specification: 2.1049 Temperature(°C): 24
Tested By: Chinda Poy Relative Humidity(%) 35
E.U.T.: PCS Repeater
Configuration: TX TDMA SIGNAL



Notes: **Input signal TDMA**
UPLINK

Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 2.1051
TESTED BY: Chinda PoyTTidwell	DATE: 4/25/01

Test Results: Complies.

Test Data: See attached plot(s).

Equipment Used: 1036-1477-1082

Measurement Uncertainty: +/- 1.6 dB

Temperature: 22 °C

Relative Humidity: 30 %

Test Data --- Spurious Emissions at Antenna Terminals

Data Plot **SPURIOUS EMISSIONS AT ANTENNA TERMINALS**

Page 1 of 4

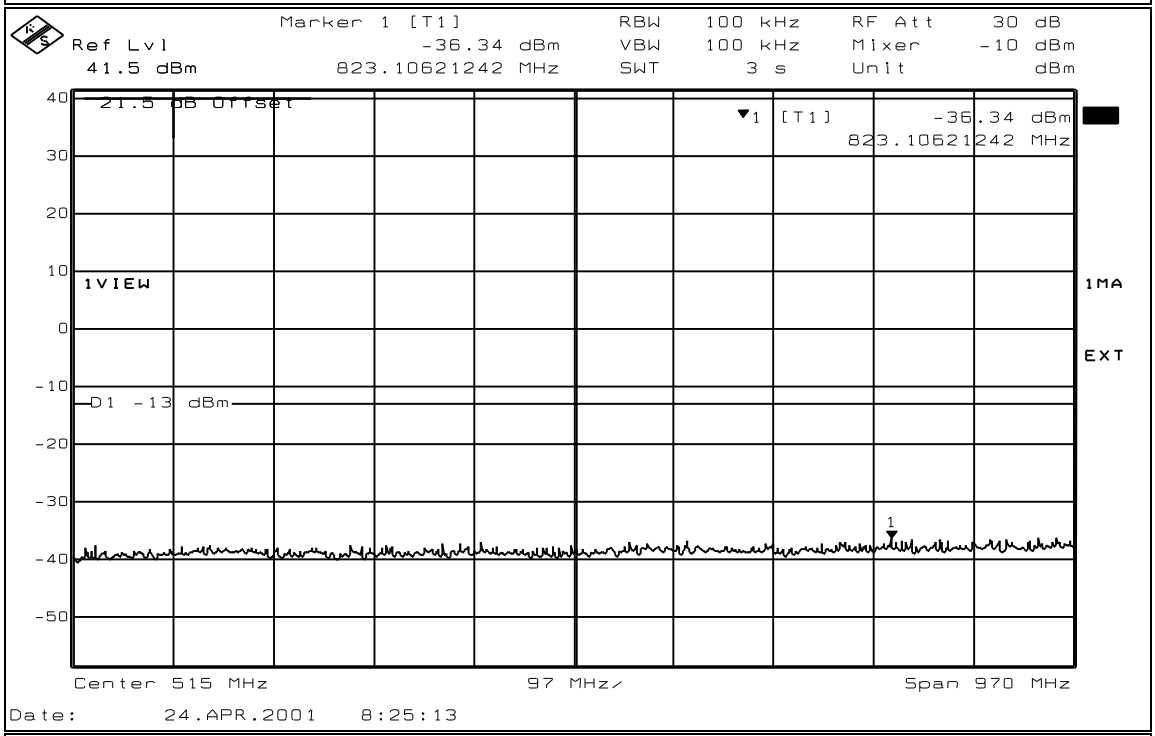
Complete X
Preliminary

Job No.:	1L0129R	Date: 4/24/01	
Specification:	2.1051	Temperature(°C): 21	
Tested By:	Chinda Poy	Relative Humidity(%) 46	
E.U.T.:	PCS Repeater		
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	1477	Cable #4:	
Attenuator #2:		Mixer:	

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



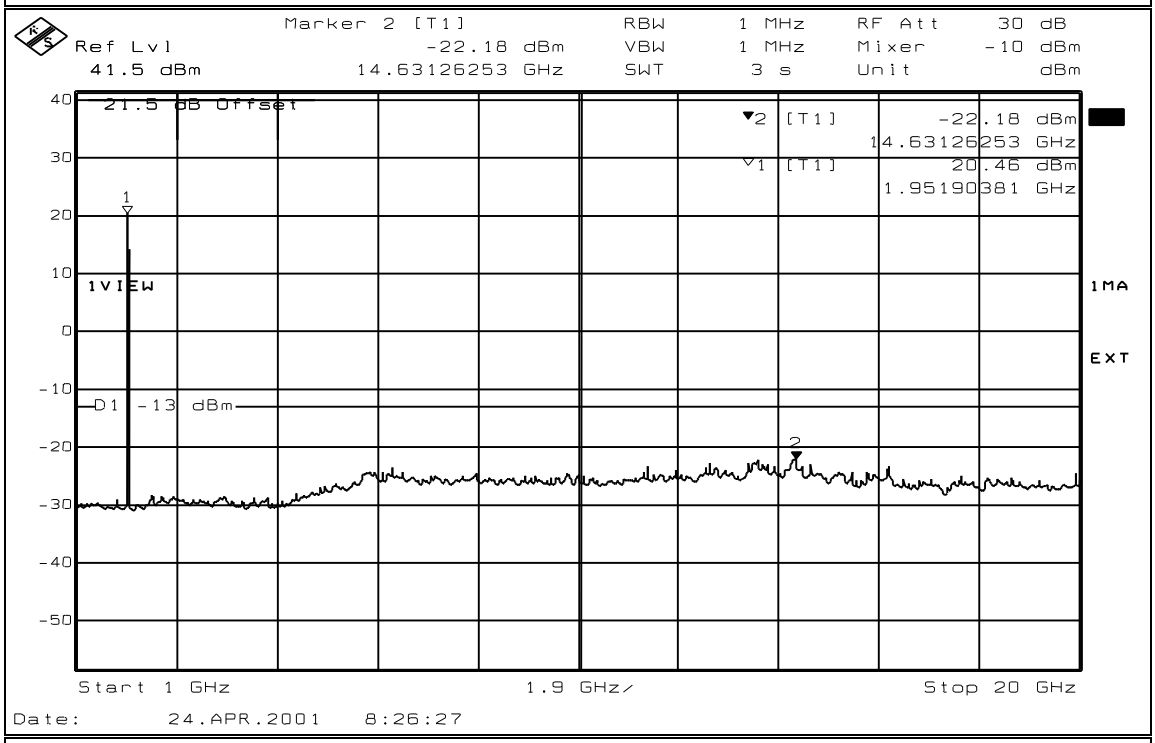
Notes: **30MHz - 1GHz (DOWNLINK)**
Marker indicates highest emission

Test Data --- Spurious Emissions at Antenna Terminals

Data Plot **SPURIOUS EMISSIONS AT ANTENNA TERMINALS**

Page 2 of 4

Job No.:	1L0129R	Date:	4/24/01
Specification:	2.1	Temperature(°C):	21
Tested By:	Chinda Poy	Relative Humidity(%)	46
E.U.T.:	PCS Repeater		
Configuration:	TX FULL POWER		



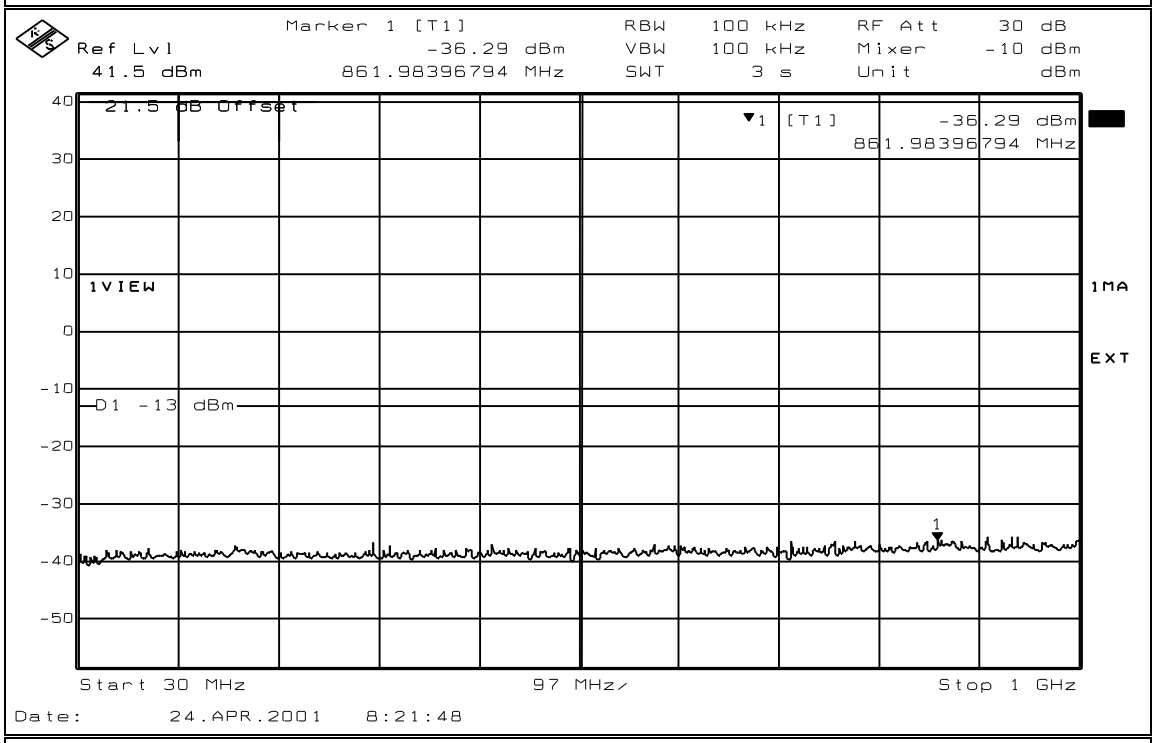
Notes:
1GHz- 20GHz (DOWNLINK)
Marker 1 indicates carrier
Marker 2 indicates highest emission

Test Data --- Spurious Emissions at Antenna Terminals

Data Plot **SPURIOUS EMISSIONS AT ANTENNA TERMINALS**

Page 3 of 4

Job No.:	1L0129R	Date:	4/24/01
Specification:	2.1051	Temperature(°C):	21
Tested By:	Chinda Poy	Relative Humidity(%)	46
E.U.T.:	PCS Repeater		
Configuration:	TX FULL POWER		



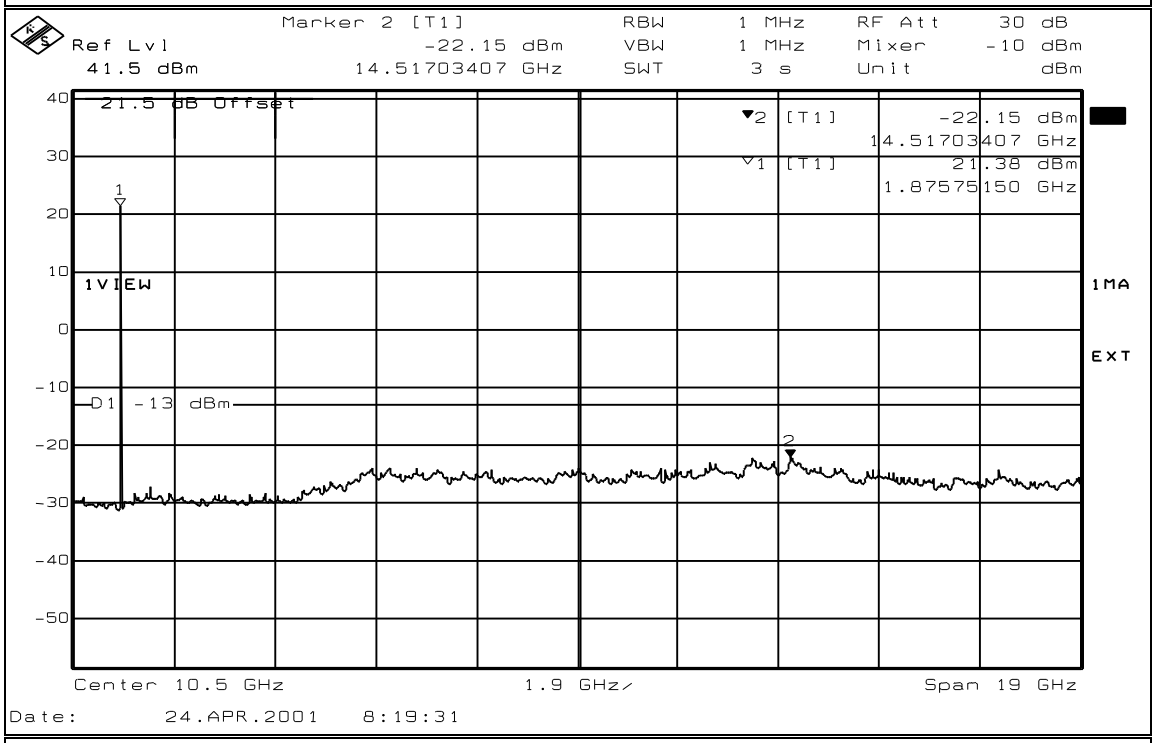
Notes: **30MHz - 1GHz (UPLINK)**
Marker indicates highest emission

Test Data --- Spurious Emissions at Antenna Terminals

Test Plot: **SPURIOUS EMISSIONS AT ANTENNA TERMINALS**

Page 4 of 4

Job No.:	1L0129R	Date:	4/24/01
Specification:	2.1051	Temperature(°C):	21
Tested By:	Chinda Poy	Relative Humidity(%)	46
E.U.T.:	PCS Repeater		
Configuration:	TX FULL POWER		



Notes:
1. **1GHz- 20GHz (UPLINK)**
2. **Marker 1 indicates carrier**
3. **Marker 2 indicates highest emission**

`

Test Data --- Spurious Emissions at Antenna Terminals

Data Plot **INTERMODULATION CHARACTERISTICS CDMA**

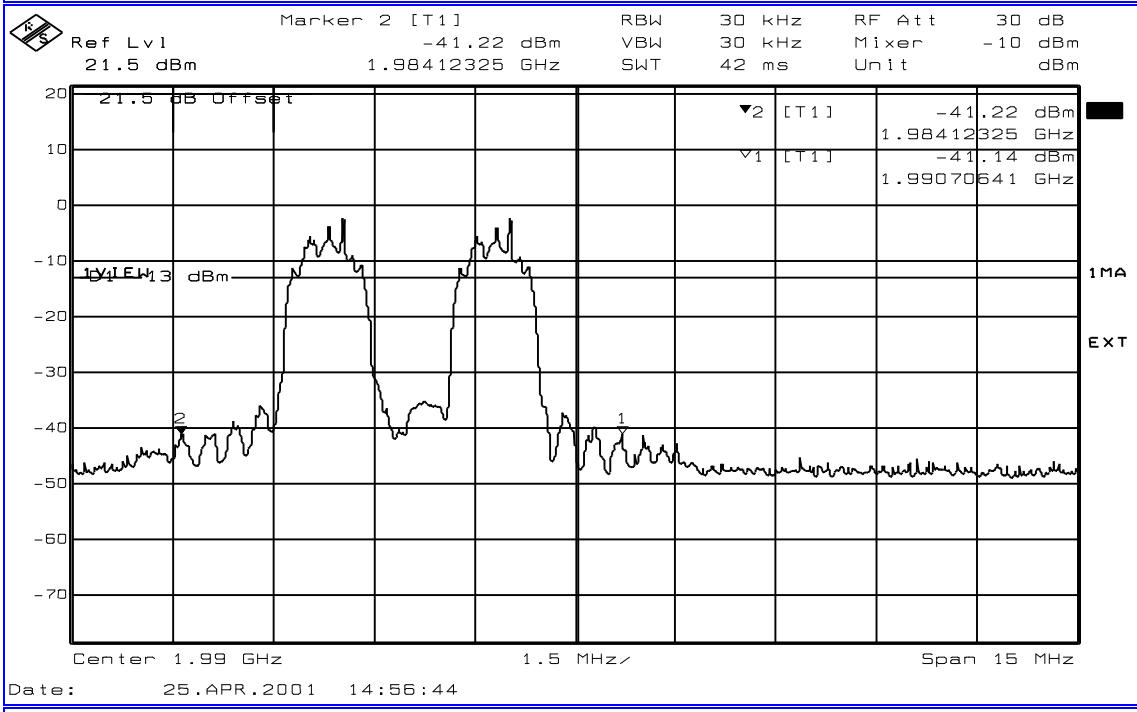
Page 1 of 4 — Complete X — Preliminary

Job No.:	1L0129R	Date:	4/25/01
Specification:	2.1051	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%)	30
E.U.T.:	PCS Repeater		
Configuration:	TX CDMA SIGNAL		
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	1477	Cable #4:	
Attenuator #2:		Mixer:	

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



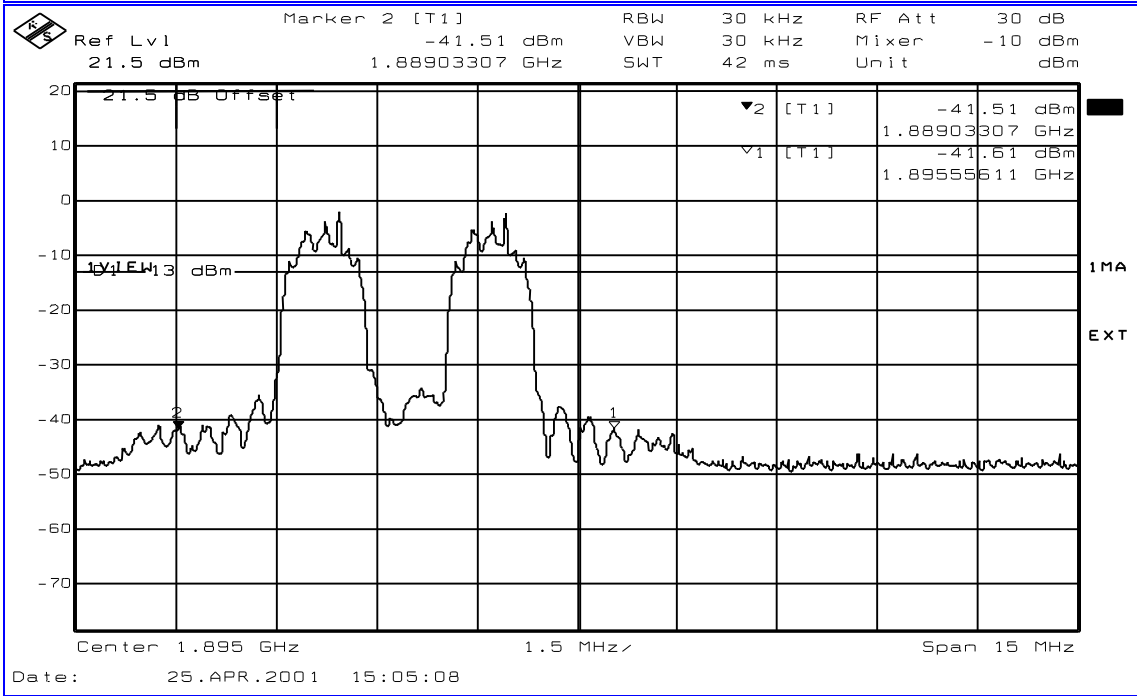
Notes:
CDMA Intermod Upper Bandedge 50dB (DOWNLINK)
Marker 1 indicates highest emission out of band
Marker 2 indicates highest emission inband

Test Data --- Spurious Emissions at Antenna Terminals

Data Plot **INTERMODULATION CHARACTERISTICS CDMA**

Page 2 of 4

Job No.:	1L0129R	Date:	4/25/01
Specification:	2.1	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%)	30
E.U.T.:	PCS Repeater		
Configuration:	TX CDMA SIGNAL		



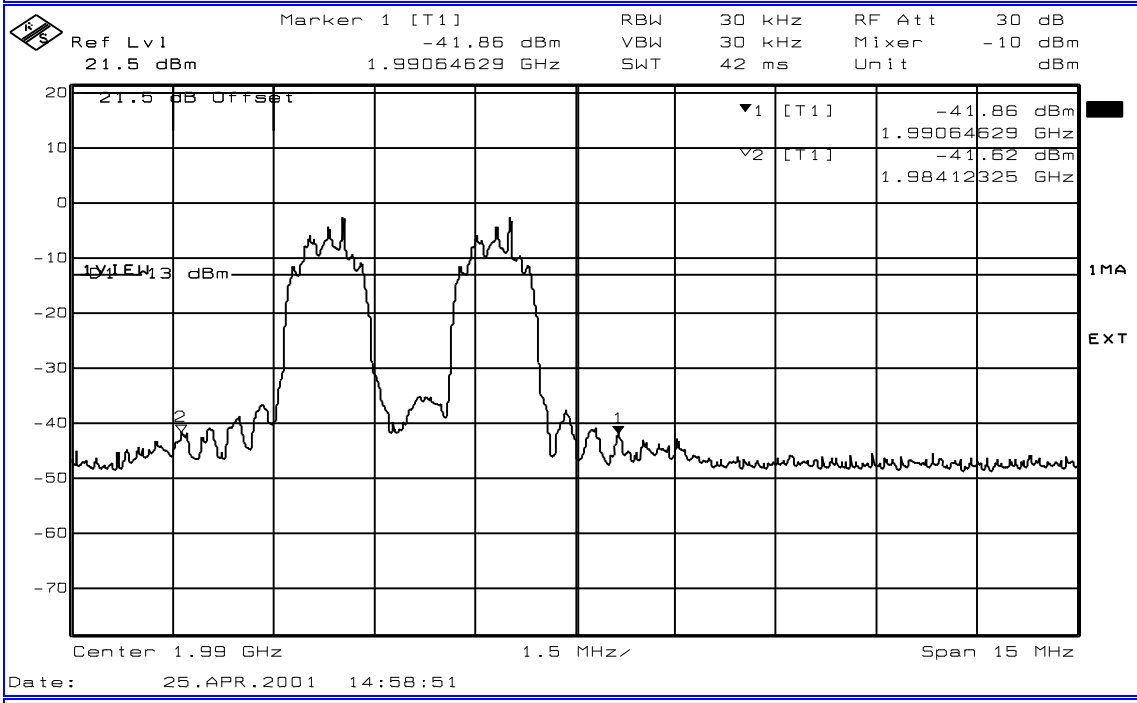
Notes:
CDMA Intermod Upper Bandedge 50dB (UPLINK)
Marker 1 indicates highest emission out of band
Marker 2 indicates highest emission inband

Test Data --- Spurious Emissions at Antenna Terminals

Data Plot INTERMODULATION CHARACTERISTICS CDMA

Page 3 of 4

Job No.:	1L0129R	Date:	4/25/01
Specification:	2.1051	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%)	30
E.U.T.:	PCS Repeater		
Configuration:	TX CDMA SIGNAL		



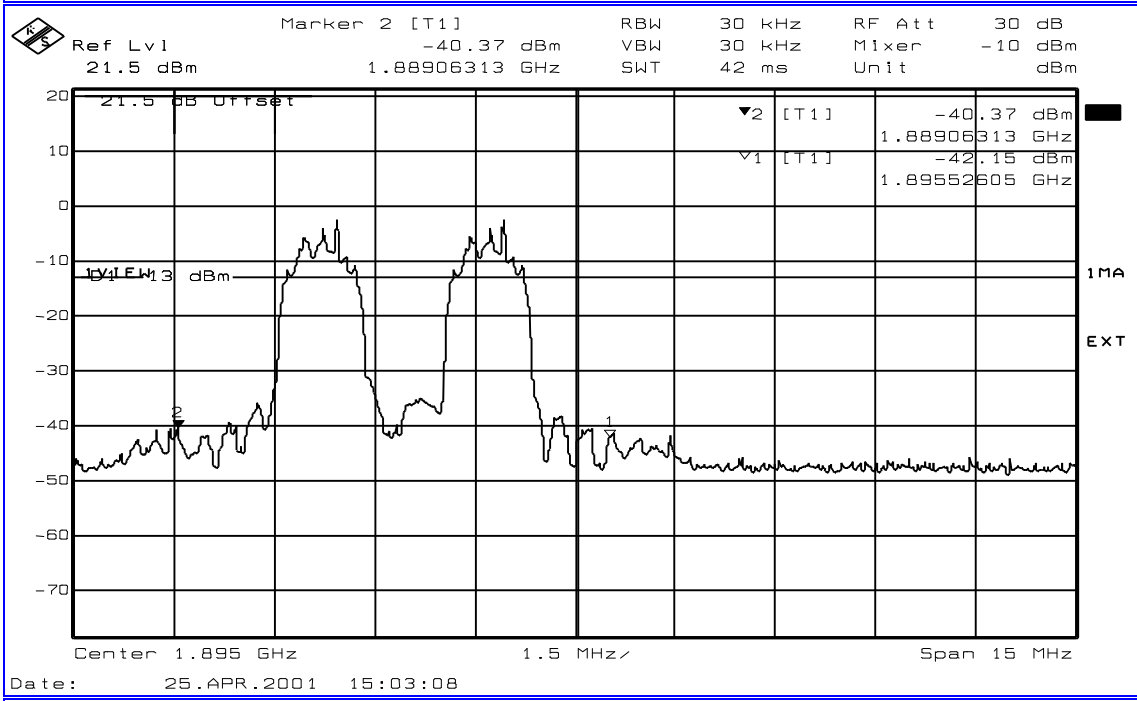
Notes:
CDMA Intermod Upper Bandedge 60dB (DOWNLINK)
Marker 1 indicates highest emission out of band
Marker 2 indicates highest emission inband

Test Data --- Spurious Emissions at Antenna Terminals

Test Plot: INTERMODULATION CHARACTERISTICS CDMA

Page 4 of 4

Job No.:	1L0129R	Date:	4/25/01
Specification:	2.1051	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%)	30
E.U.T.:	PCS Repeater		
Configuration:	TX CDMA SIGNAL		



Notes:
CDMA Intermod Upper Bandedge 60dB (UPLINK)
Marker 1 indicates highest emission out of band
Marker 2 indicates highest emission inband

Test Data --- Spurious Emissions at Antenna Terminals—High Gain

Data Plot **INTERMODULATION CHARACTERISTICS CDMA**

Page 1 of 4

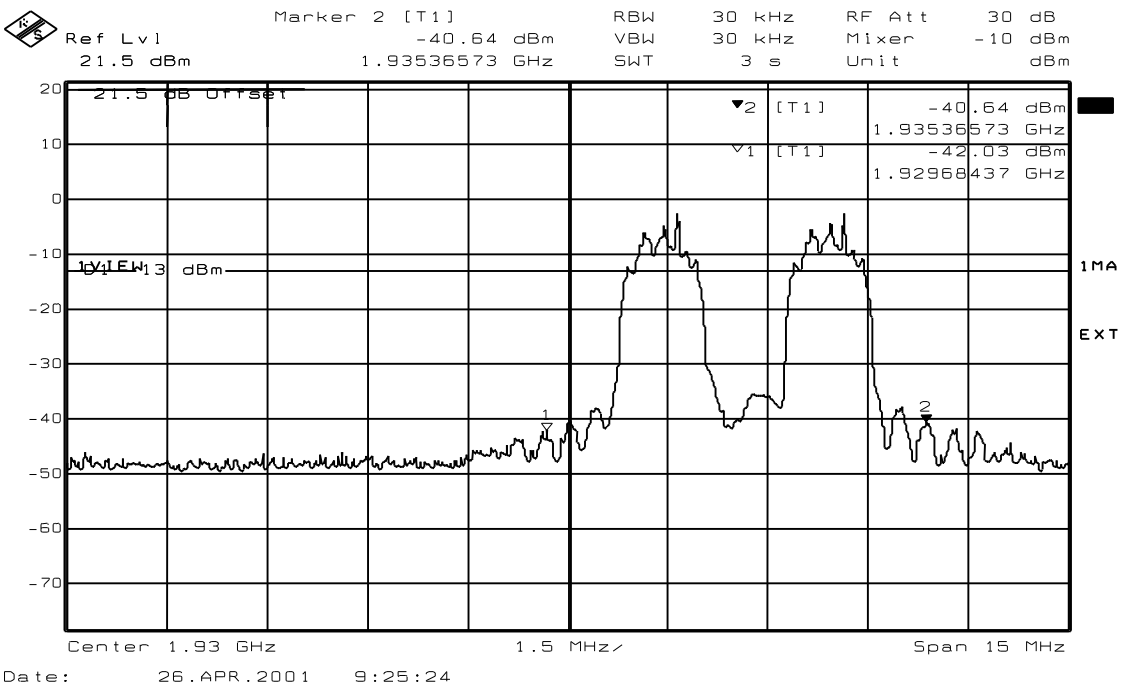
Complete X
Preliminary

Job No.:	1L0129R	Date:	4/26/01
Specification:	2.1051	Temperature(°C):	21
Tested By:	Chinda Poy	Relative Humidity(%)	40
E.U.T.:	PCS Repeater		
Configuration:	TX CDMA SIGNAL		
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	1477	Cable #4:	
Attenuator #2:		Mixer:	

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



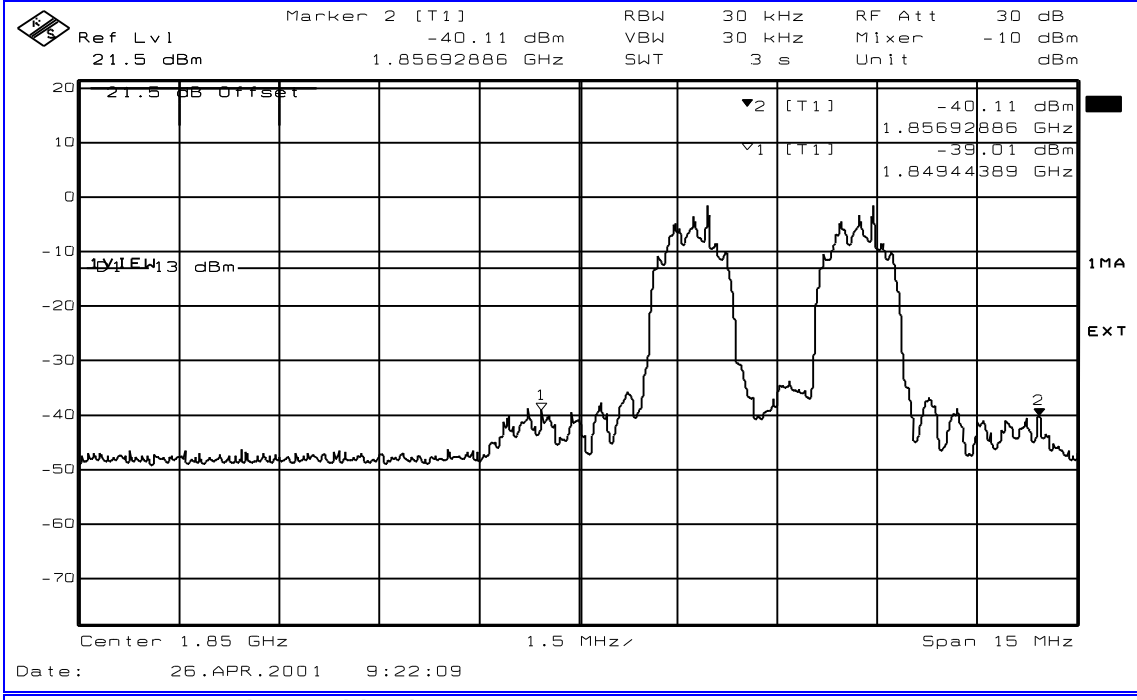
Notes:
CDMA Intermod Upper Bandedge 50dB (DOWNLINK)
Marker 1 indicates highest emission out of band
Marker 2 indicates highest emission inband

Test Data --- Spurious Emissions at Antenna Terminals—High Gain

Data Plot **INTERMODULATION CHARACTERISTICS CDMA**

Page 2 of 4

Job No.:	1L0129R	Date:	4/26/01
Specification:	2.1	Temperature(°C):	21
Tested By:	Chinda Poy	Relative Humidity(%)	40
E.U.T.:	PCS Repeater		
Configuration:	TX CDMA SIGNAL		



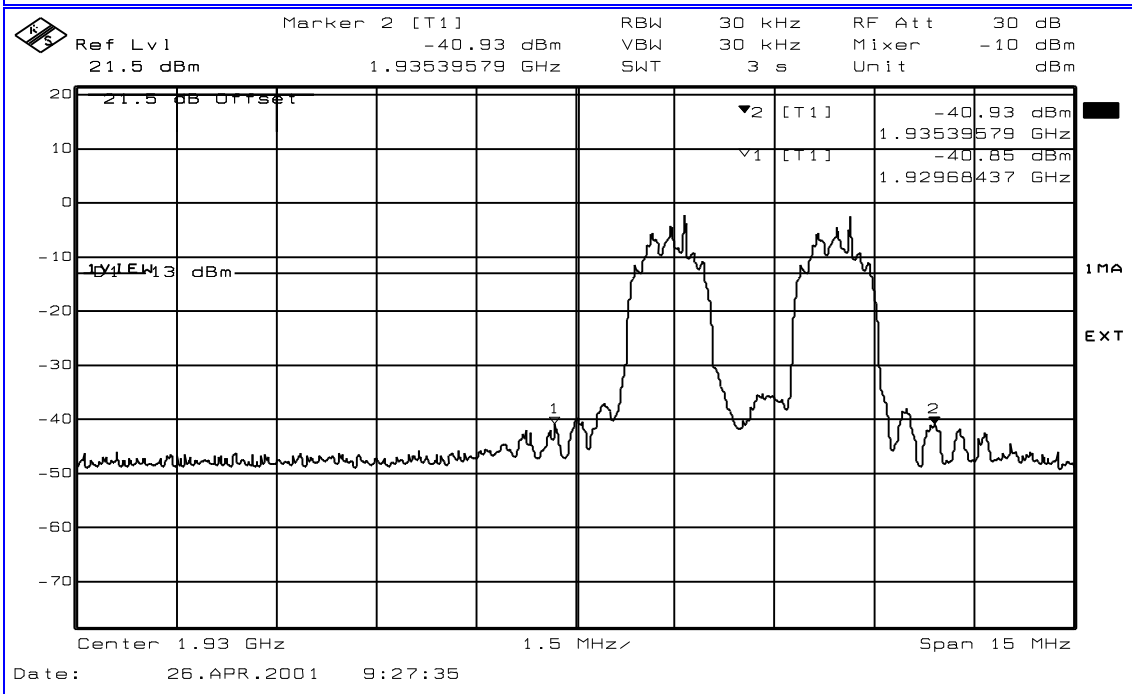
Notes:
CDMA Intermod Upper Bandedge 50dB (UPLINK)
Marker 1 indicates highest emission out of band
Marker 2 indicates highest emission inband

Test Data --- Spurious Emissions at Antenna Terminals—High Gain

Data Plot INTERMODULATION CHARACTERISTICS CDMA

Page 3 of 4

Job No.:	1L0129R	Date:	4/26/01
Specification:	2.1051	Temperature(°C):	21
Tested By:	Chinda Poy	Relative Humidity(%)	40
E.U.T.:	PCS Repeater		
Configuration:	TX CDMA SIGNAL		



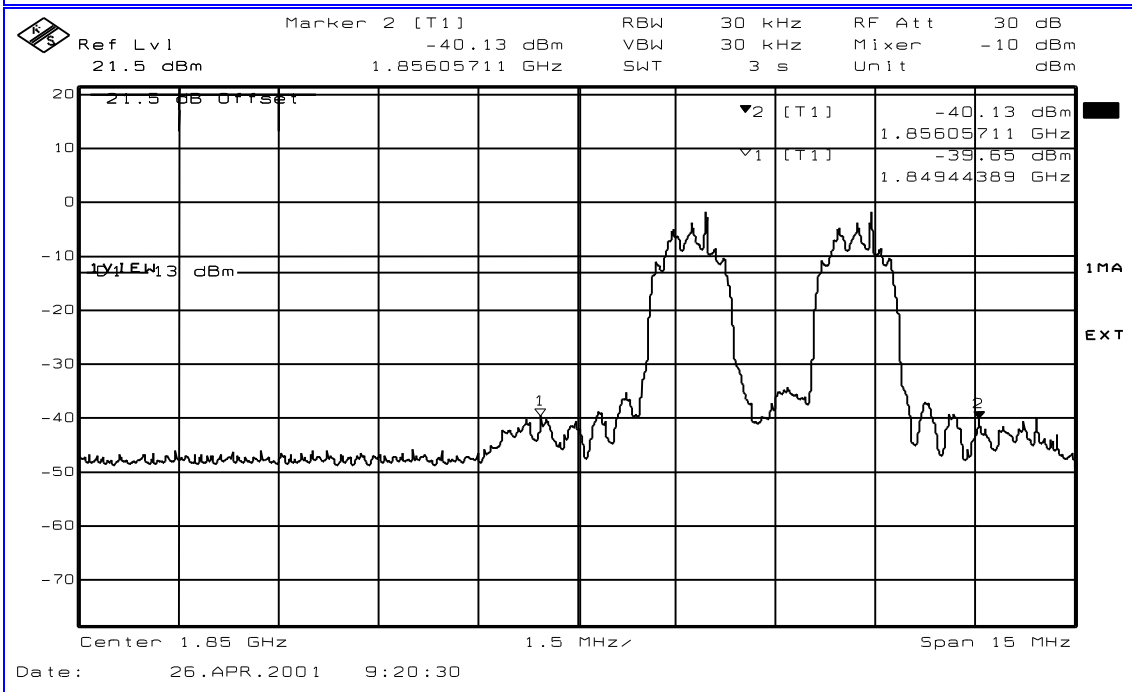
Notes:
CDMA Intermod Upper Bandedge 60dB (DOWNLINK)
Marker 1 indicates highest emission out of band
Marker 2 indicates highest emission inband

Test Data --- Spurious Emissions at Antenna Terminals—High Gain

Test Plot: INTERMODULATION CHARACTERISTICS CDMA

Page 4 of 4

Job No.:	1L0129R	Date:	4/26/01
Specification:	2.1051	Temperature(°C):	21
Tested By:	Chinda Poy	Relative Humidity(%)	40
E.U.T.:	PCS Repeater		
Configuration:	TX CDMA SIGNAL		



Notes:
CDMA Intermod Upper Bandedge 60dB (UPLINK)
Marker 1 indicates highest emission out of band
Marker 2 indicates highest emission inband

Test Data --- Spurious Emissions at Antenna Terminals

Data Plot CDMA BANDEDGE

Page 1 of 2

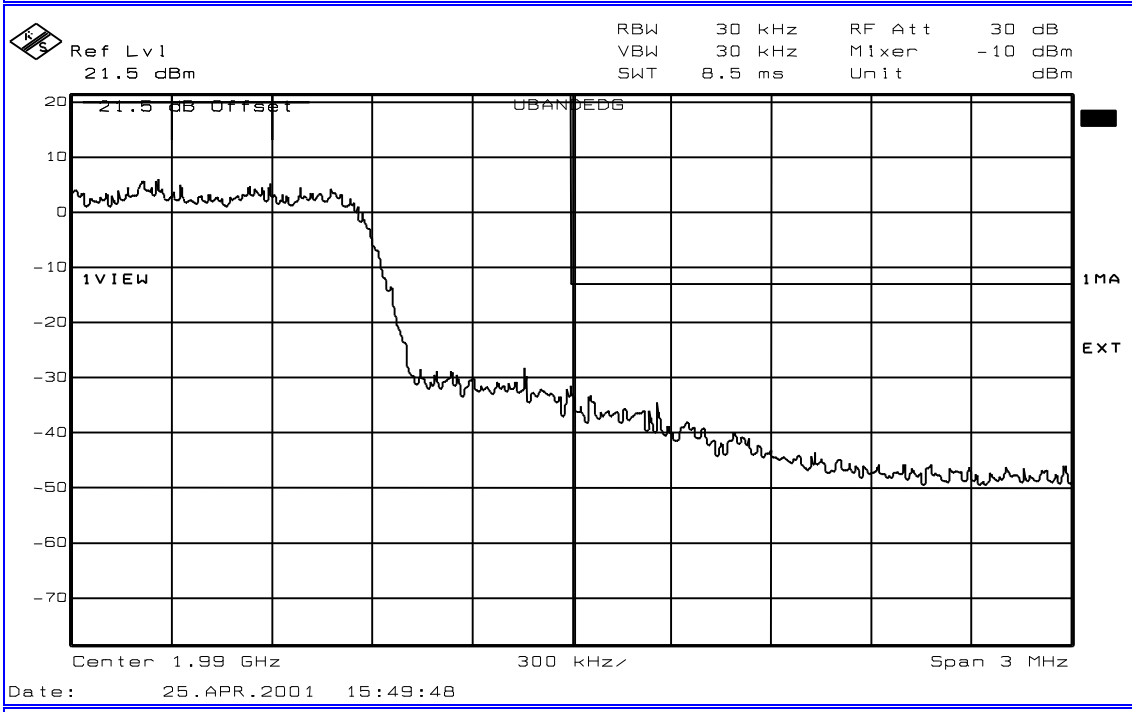
Complete X
Preliminary

Job No.:	1L0129R	Date:	4/25/01
Specification:	2.1051	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%)	30
E.U.T.:	PCS Repeater		
Configuration:	TX CDMA SIGNAL		
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	1477	Cable #4:	
Attenuator #2:		Mixer:	

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



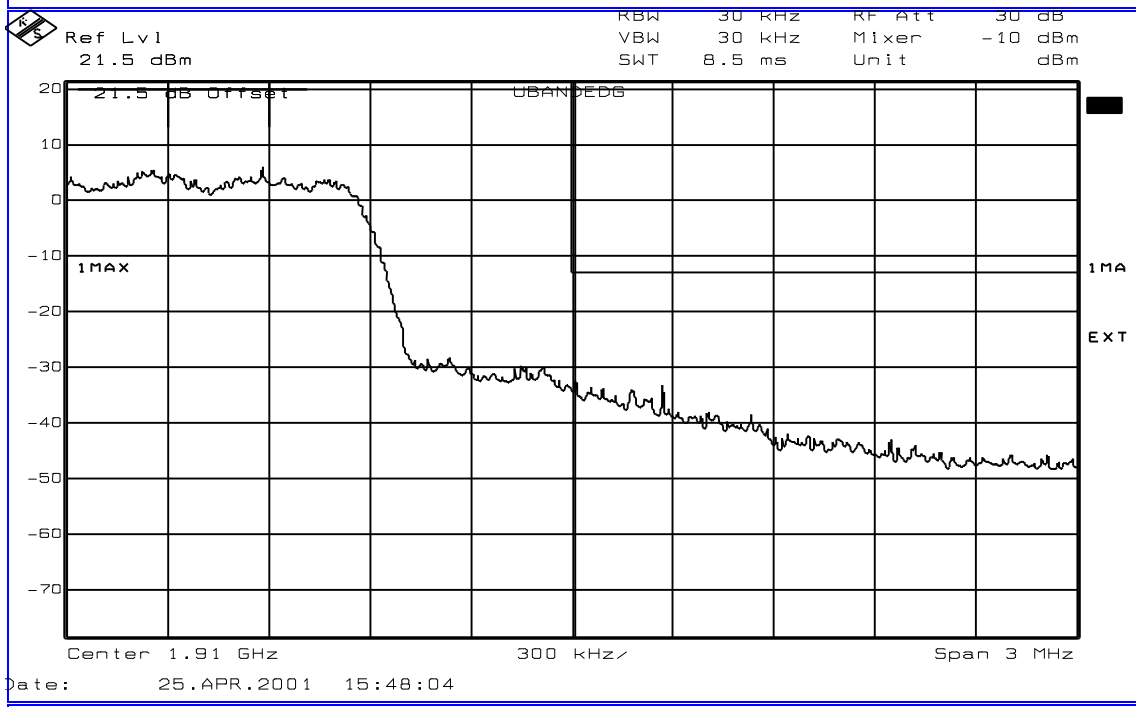
Notes: **CDMA Upper Bandedge (DOWNLINK)**

Test Data --- Spurious Emissions at Antenna Terminals

Data Plot **CDMA BANDEDGE**

Page 2 of 2

Job No.:	1L0129R	Date:	4/25/01
Specification:	2.1	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%)	30
E.U.T.:	PCS Repeater		
Configuration:	TX CDMA SIGNAL		



Notes: **CDMA Upper Bandedge (UPLINK)**

Test Data --- Spurious Emissions at Antenna Terminals –High Gain

Data Plot CDMA_BANDEDGE

Page 1 of 2

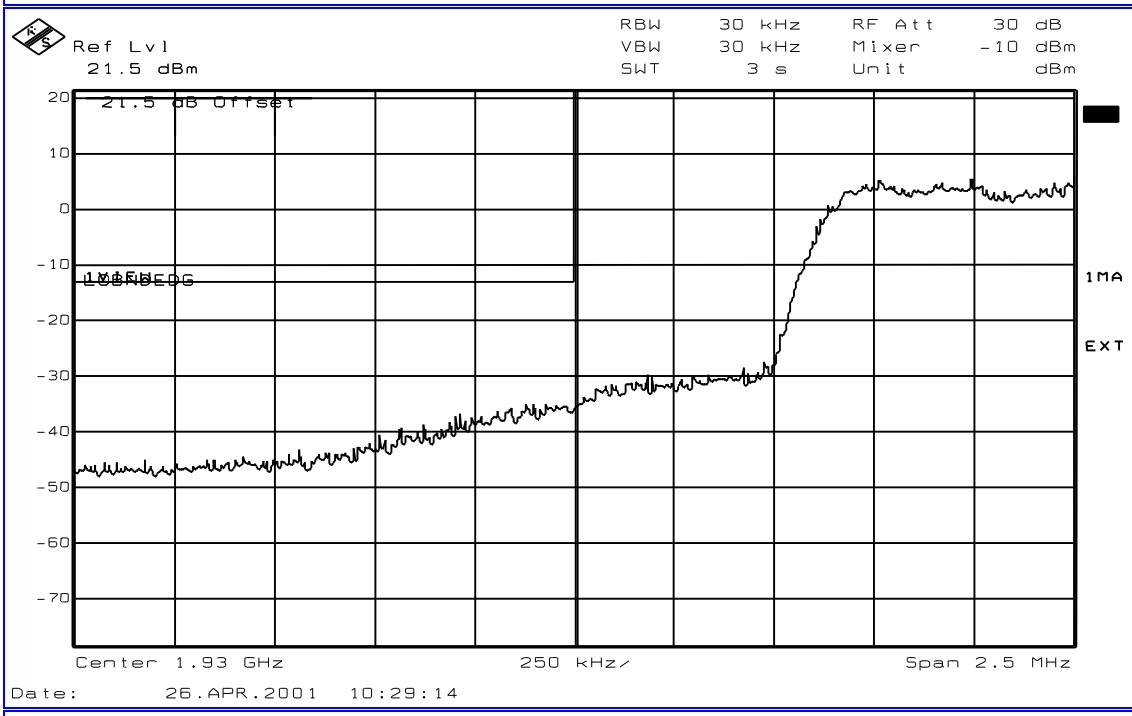
Complete X
Preliminary

Job No.:	1L0129R	Date:	4/26/01
Specification:	2.1051	Temperature(°C):	21
Tested By:	Chinda Poy	Relative Humidity(%)	40
E.U.T.:	PCS Repeater		
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	1477	Cable #4:	
Attenuator #2:		Mixer:	

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



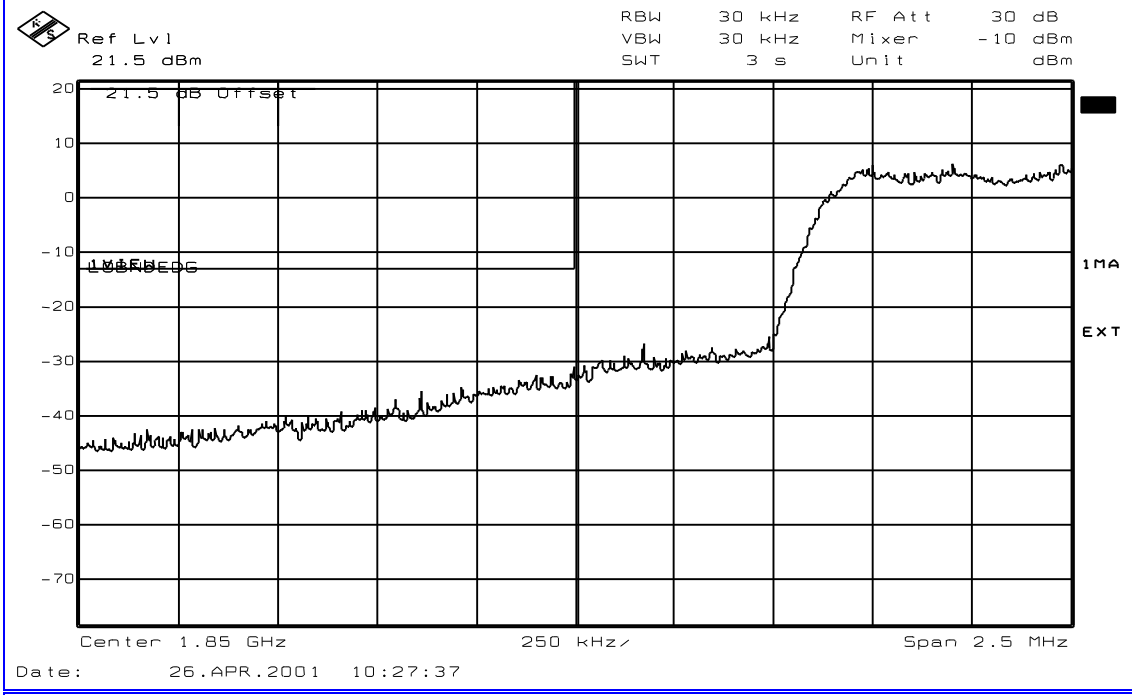
Notes: **CDMA Lower Bandedge (DOWNLINK)**

Test Data --- Spurious Emissions at Antenna Terminals –High Gain

Data Plot CDMA_BANDEDGE

Page 2 of 2

Job No.:	1L0129R	Date:	4/26/01
Specification:	2.1	Temperature(°C):	21
Tested By:	Chinda Poy	Relative Humidity(%)	40
E.U.T.:	PCS Repeater		
Configuration:	TX FULL POWER		



Notes: **CDMA Lower Bandedge (UPLINK)**

Test Data --- Spurious Emissions at Antenna Terminals

Data Plot **INTERMODULATION CHARACTERISTICS GSM**

Page 1 of 4

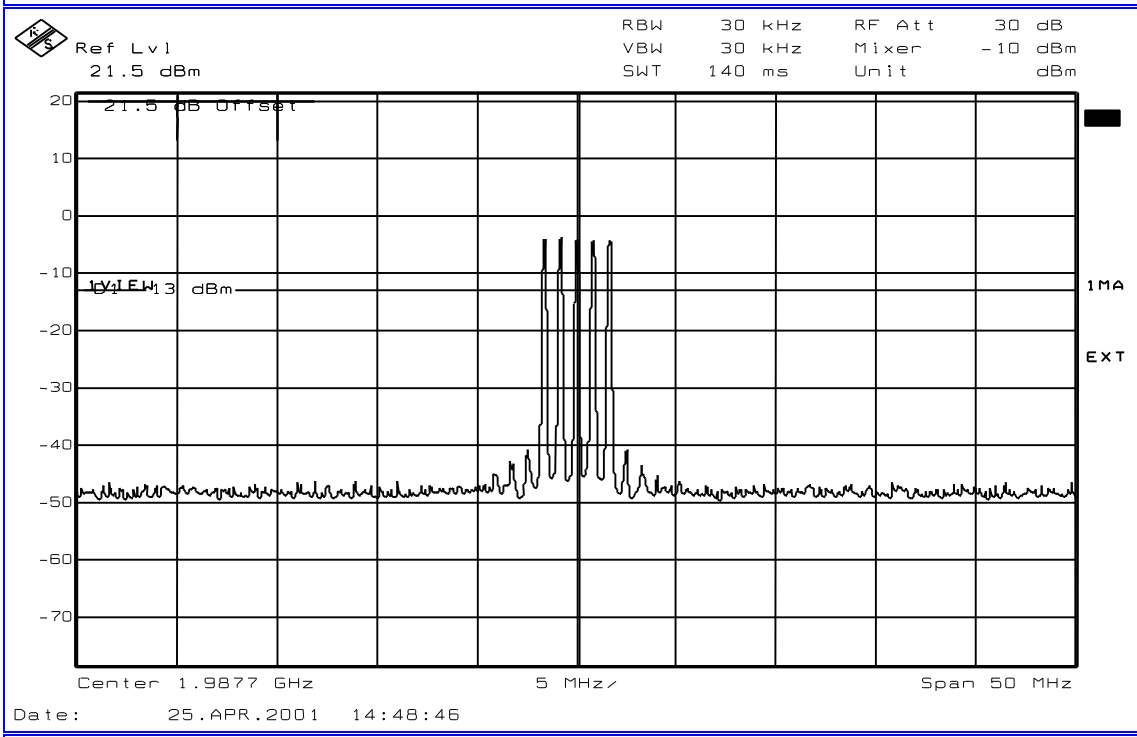
Complete X
Preliminary

Job No.:	1L0129R	Date: 4/25/01	
Specification:	2.1051	Temperature(°C): 22	
Tested By:	Chinda Poy	Relative Humidity(%) 30	
E.U.T.:	PCS Repeater		
Configuration:	TX GSM SIGNAL		
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	1477	Cable #4:	
Attenuator #2:		Mixer:	

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



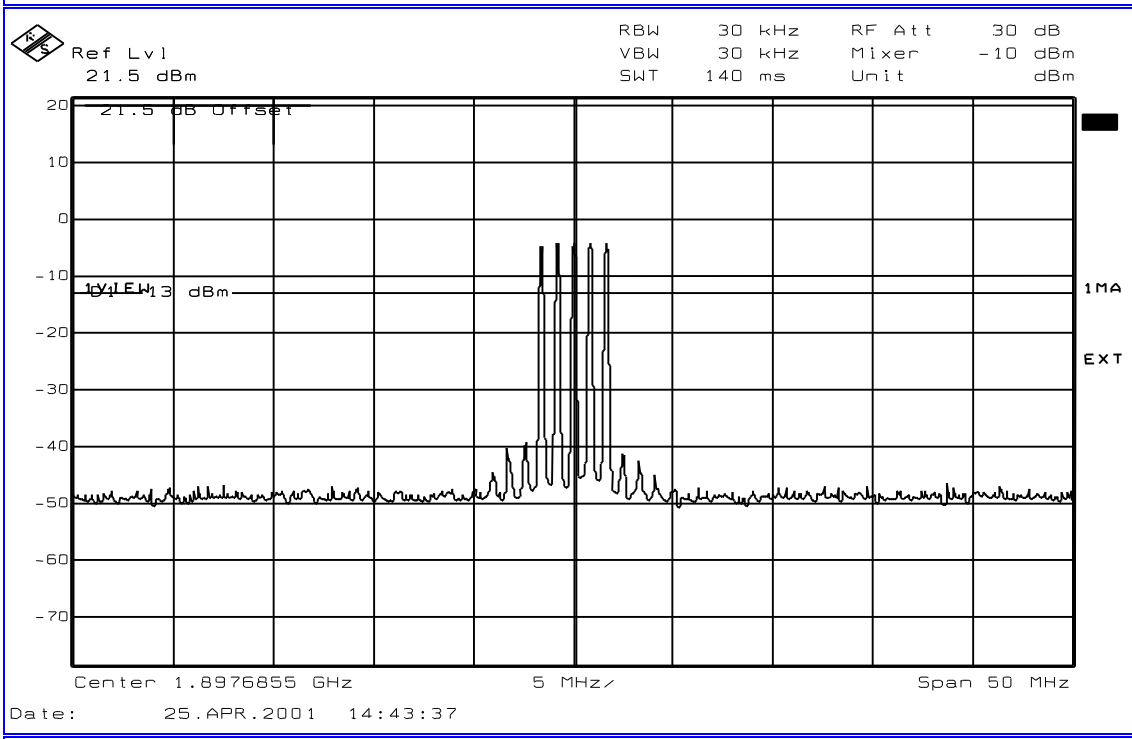
Notes: **GSM Intermod Upper Bandedge 50dB (DOWNLINK)**
5 CARRIERS

Test Data --- Spurious Emissions at Antenna Terminals

Data Plot **INTERMODULATION CHARACTERISTICS GSM**

Page 2 of 4

Job No.: 1L0129R Date: 4/25/01
Specification: 2.1 Temperature(°C): 22
Tested By: Chinda Poy Relative Humidity(%) 30
E.U.T.: PCS Repeater
Configuration: TX GSM SIGNAL



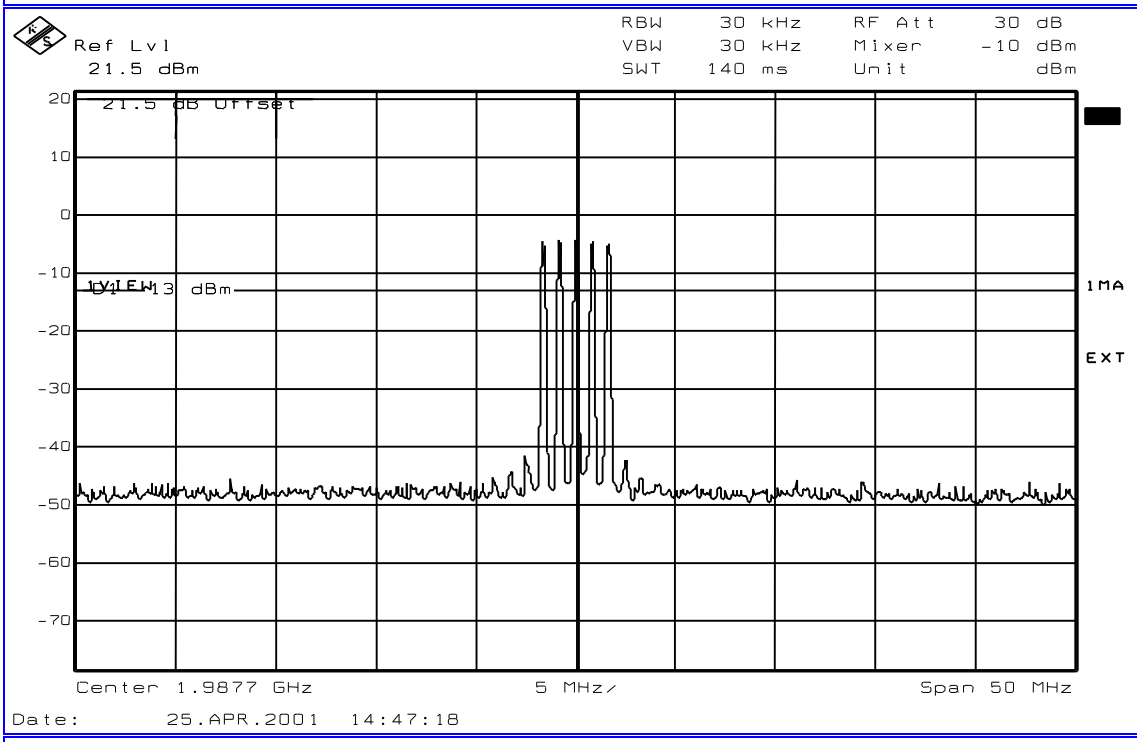
Notes: **GSM Intermod Upper Bandedge 50dB (UPLINK)**
5 CARRIERS

Test Data --- Spurious Emissions at Antenna Terminals

Data Plot **INTERMODULATION CHARACTERISTICS GSM**

Page 3 of 4

Job No.:	1L0129R	Date:	4/25/01
Specification:	2.1051	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%)	30
E.U.T.:	PCS Repeater		
Configuration:	TX GSM SIGNAL		



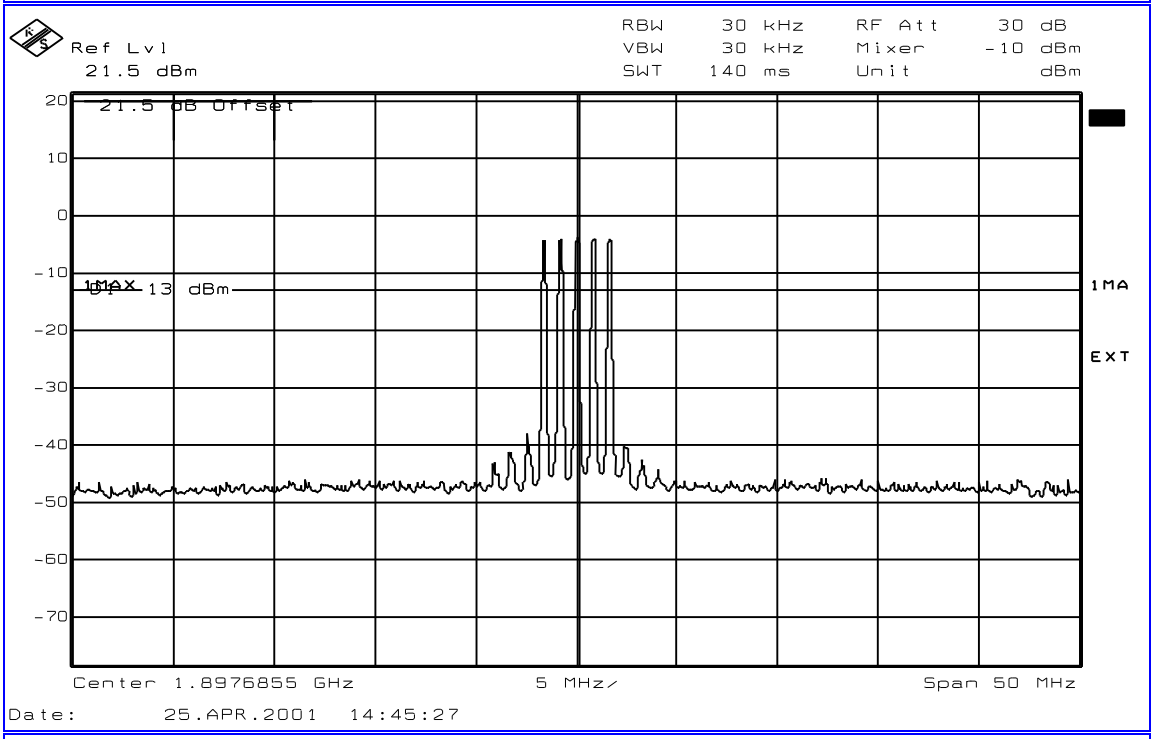
Notes: **GSM Intermod Upper Bandedge 60dB (DOWNLINK)**
5 CARRIERS

Test Data --- Spurious Emissions at Antenna Terminals

Test Plot: **INTERMODULATION CHARACTERISTICS GSM**

Page 4 of 4

Job No.:	1L0129R	Date:	4/25/01
Specification:	2.1051	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%)	30
E.U.T.:	PCS Repeater		
Configuration:	TX GSM SIGNAL		



Notes: **GSM Intermod Upper Bandedge 60dB (UPLINK)**
5 CARRIERS

Test Data --- Spurious Emissions at Antenna Terminals—High Band

Data Plot **INTERMODULATION CHARACTERISTICS GSM**

Page 1 of 4

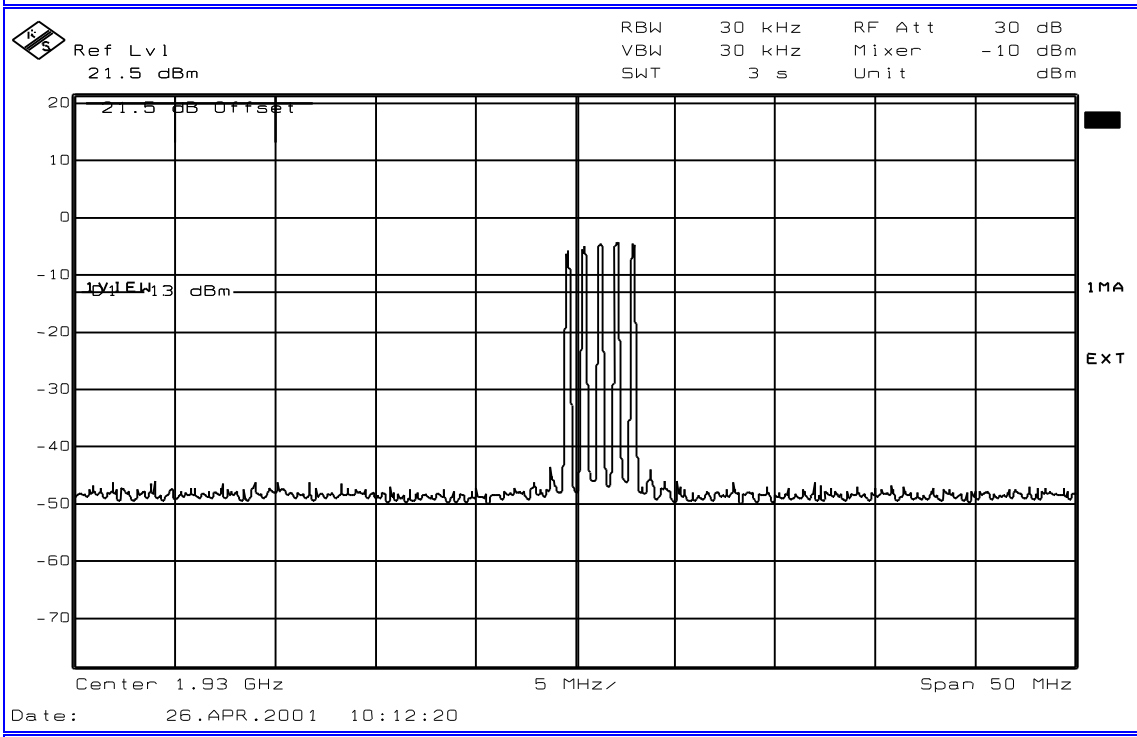
Complete X
Preliminary

Job No.:	1L0129R	Date: 4/25/01	
Specification:	2.1051	Temperature(°C): 21	
Tested By:	Chinda Poy	Relative Humidity(%) 40	
E.U.T.:	PCS Repeater		
Configuration:	TX GSM SIGNAL		
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	1477	Cable #4:	
Attenuator #2:		Mixer:	

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



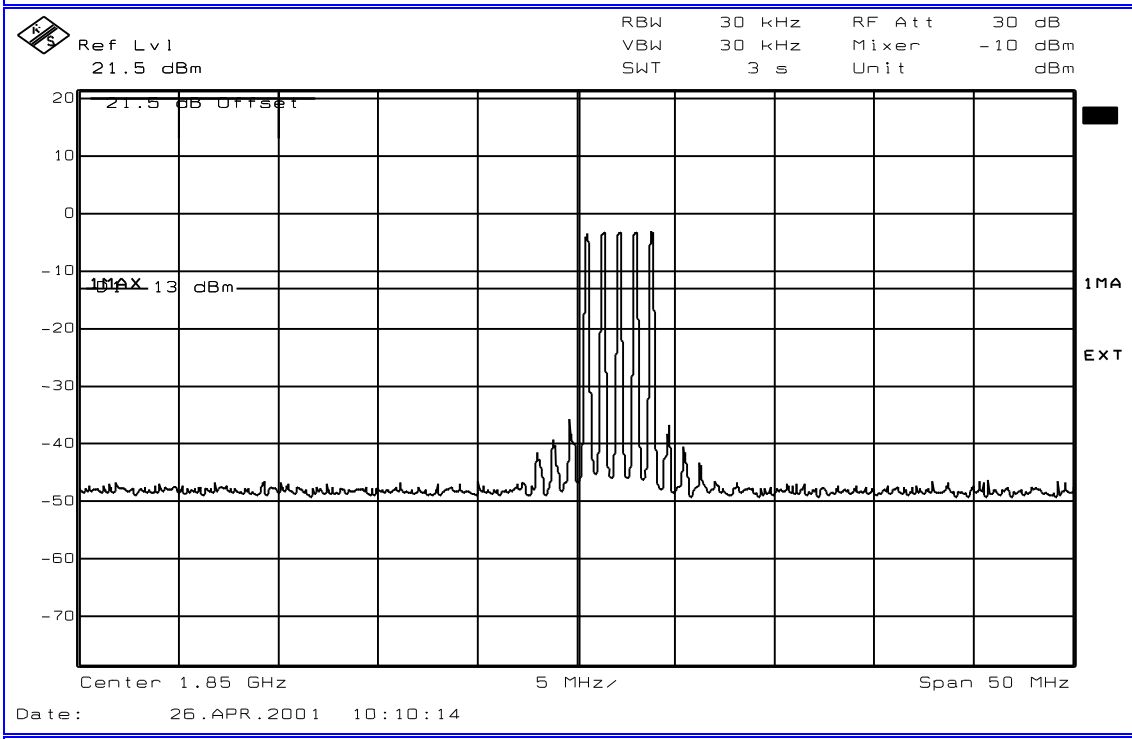
Notes: **GSM Intermod Lower Bandedge 50dB (DOWNLINK)**
5 CARRIERS

Test Data --- Spurious Emissions at Antenna Terminals—High Band

Data Plot **INTERMODULATION CHARACTERISTICS GSM**

Page 2 of 4

Job No.:	1L0129R	Date:	4/25/01
Specification:	2.1	Temperature(°C):	21
Tested By:	Chinda Poy	Relative Humidity(%)	40
E.U.T.:	PCS Repeater		
Configuration:	TX GSM SIGNAL		



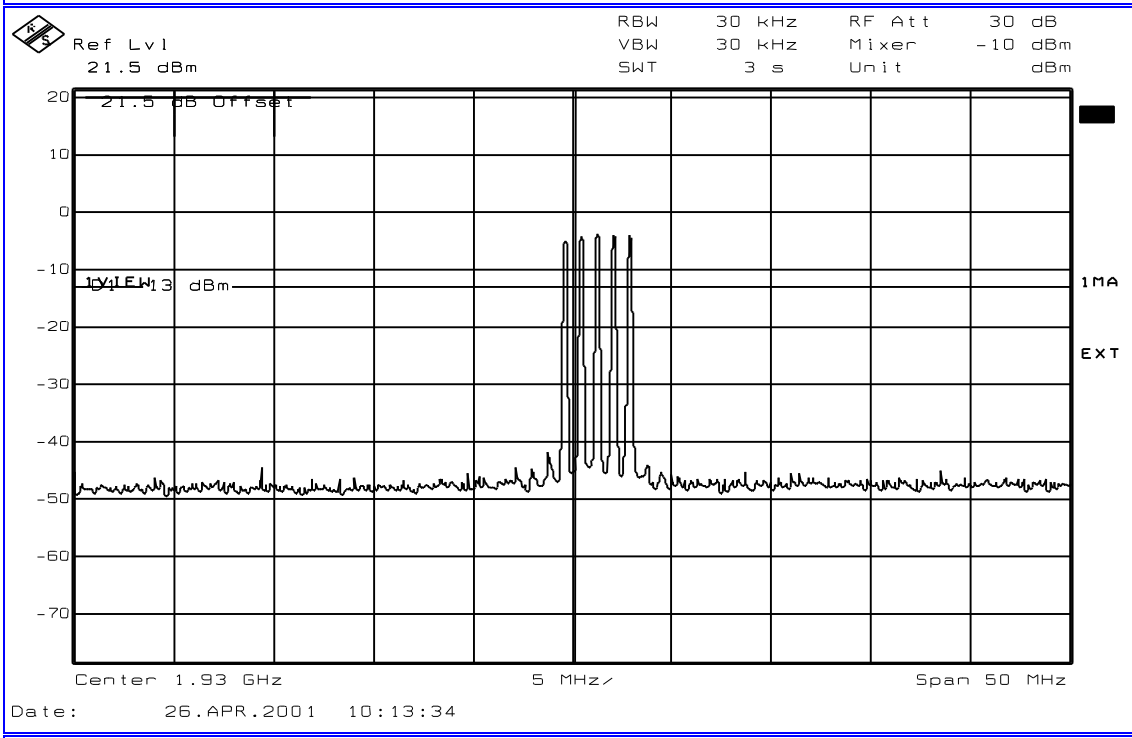
Notes: **GSM Intermod Upper Bandedge 50dB (UPLINK)**
5 CARRIERS

Test Data --- Spurious Emissions at Antenna Terminals—High Band

Data Plot **INTERMODULATION CHARACTERISTICS GSM**

Page 3 of 4

Job No.:	1L0129R	Date:	4/25/01
Specification:	2.1051	Temperature(°C):	21
Tested By:	Chinda Poy	Relative Humidity(%)	40
E.U.T.:	PCS Repeater		
Configuration:	TX GSM SIGNAL		



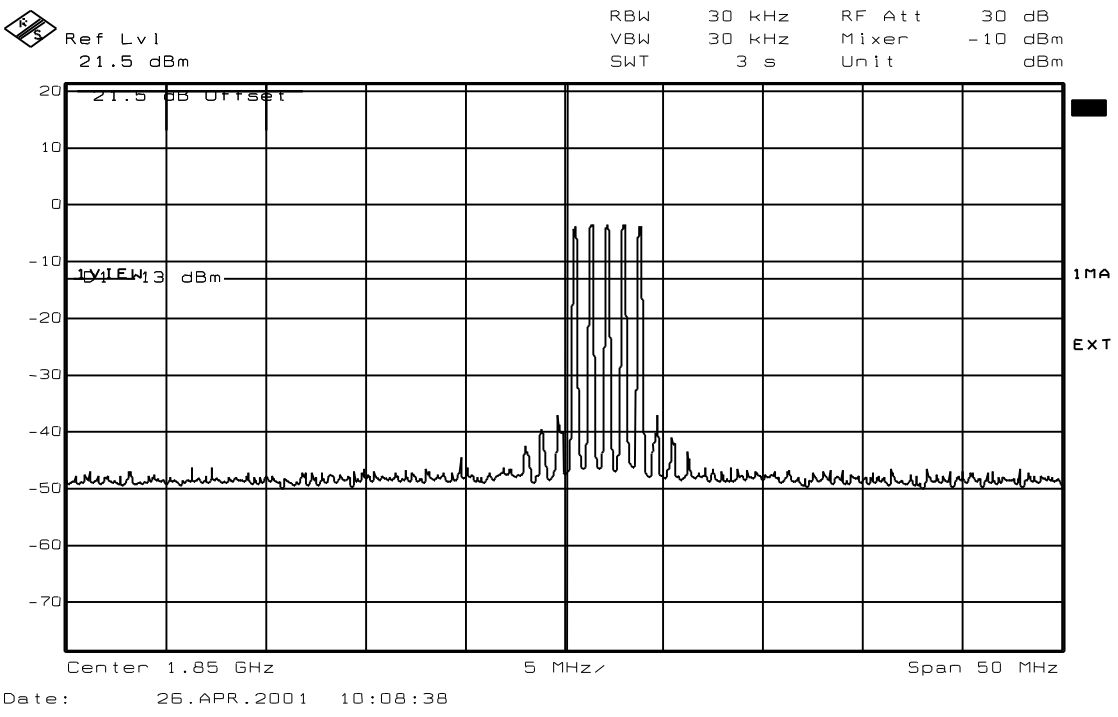
Notes: **GSM Intermod Lower Bandedge 60dB (DOWNLINK)**
5 CARRIERS

Test Data --- Spurious Emissions at Antenna Terminals—High Band

Test Plot: **INTERMODULATION CHARACTERISTICS GSM**

Page 4 of 4

Job No.:	1L0129R	Date:	4/25/01
Specification:	2.1051	Temperature(°C):	21
Tested By:	Chinda Poy	Relative Humidity(%)	40
E.U.T.:	PCS Repeater		
Configuration:	TX GSM SIGNAL		



Notes: **GSM Intermod Upper Bandedge 60dB (UPLINK)**
5 CARRIERS

Test Data --- Spurious Emissions at Antenna Terminals

Data Plot **GSM BANDEDGE**

Page 1 of 2

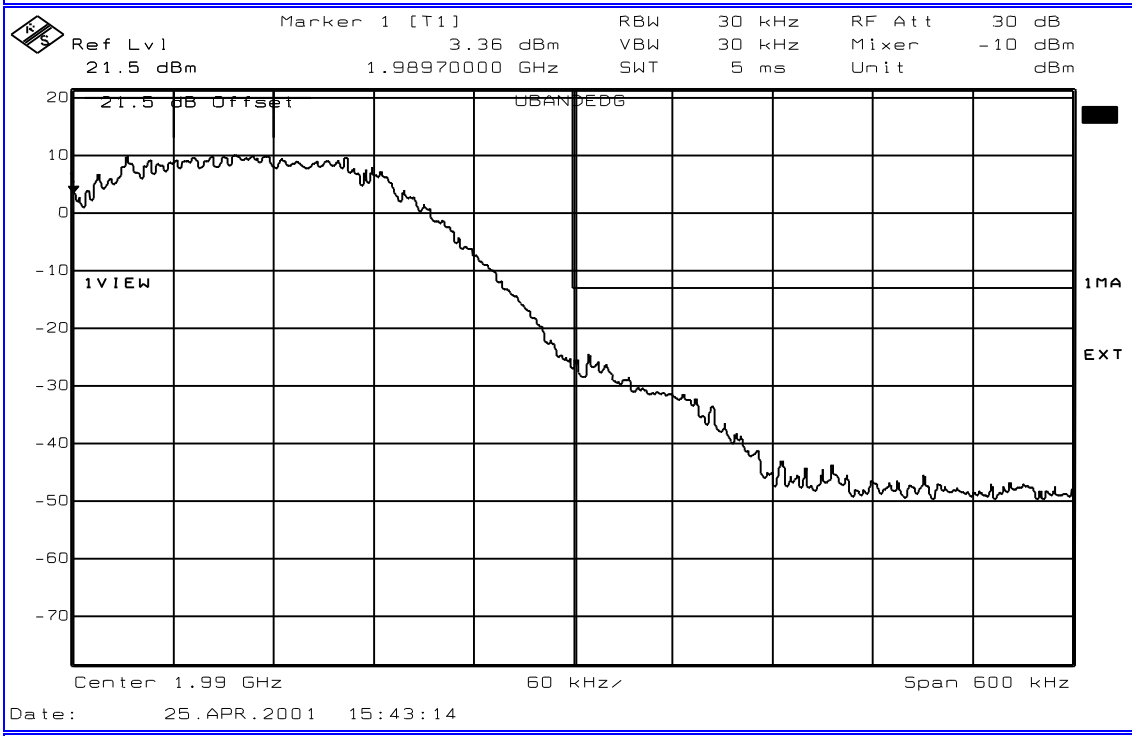
Complete X
Preliminary

Job No.:	1L0129R	Date: 4/25/01	
Specification:	2.1051	Temperature(°C): 22	
Tested By:	Chinda Poy	Relative Humidity(%) 30	
E.U.T.:	PCS Repeater		
Configuration:	TX GSM SIGNAL		
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	1477	Cable #4:	
Attenuator #2:		Mixer:	

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



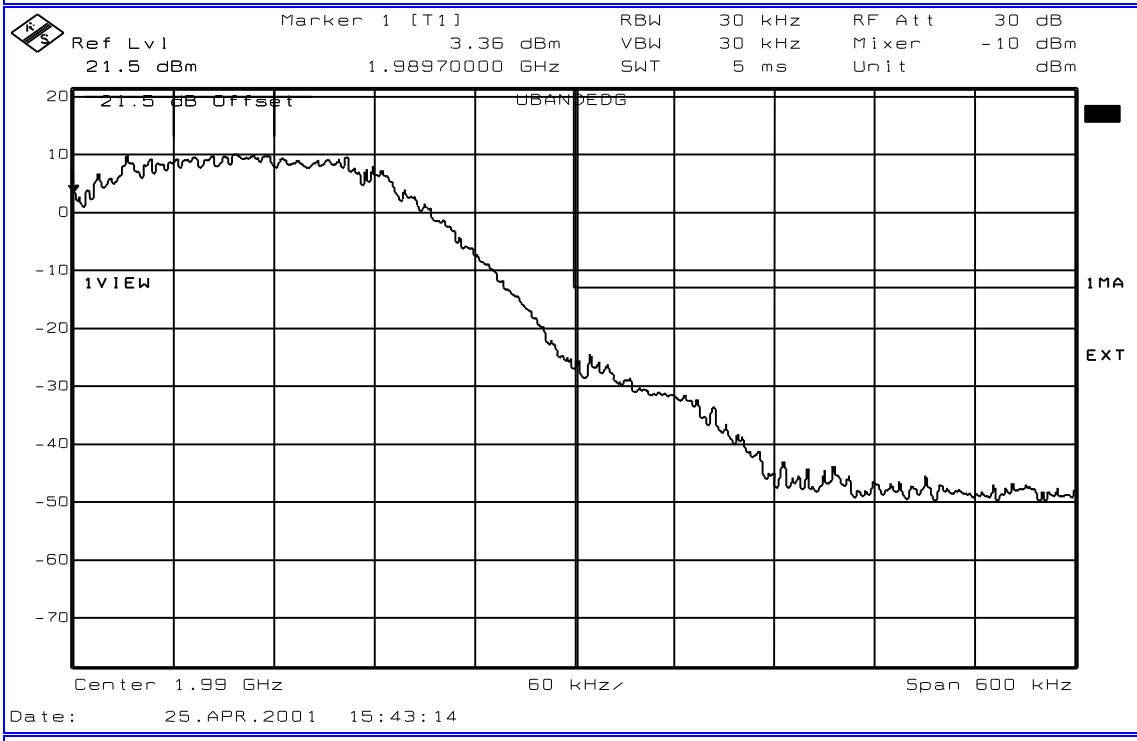
Notes: **GSM Upper Bandedge (DOWNLINK)**

Test Data --- Spurious Emissions at Antenna Terminals

Data Plot GSM BANDEDGE

Page 2 of 2

Job No.:	1L0129R	Date:	4/25/01
Specification:	2.1	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%)	30
E.U.T.:	PCS Repeater		
Configuration:	TX GSM SIGNAL		



Notes: **GSM Upper Bandedge (UPLINK)**

Test Data --- Spurious Emissions at Antenna Terminals—High Gain

Data Plot **GSM BANDEDGE**

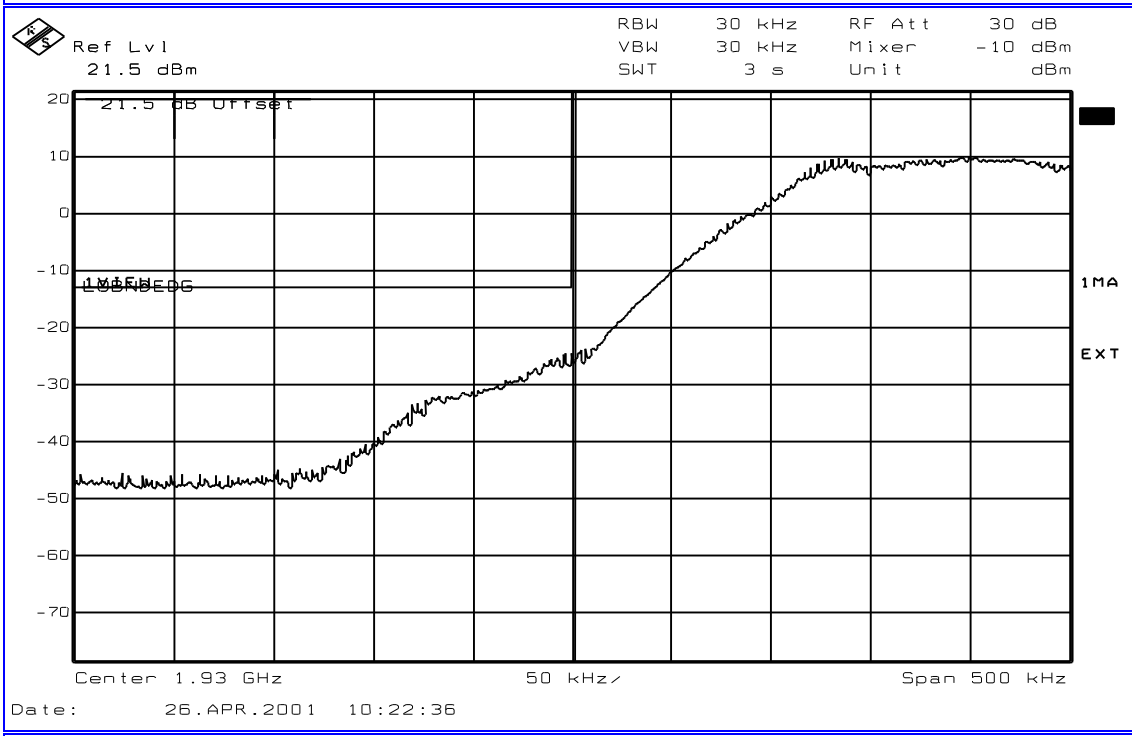
Page 1 of 2

Complete X
Preliminary

Job No.: 1L0129R Date: 4/26/01
Specification: 2.1051 Temperature(°C): 21
Tested By: Chinda Poy Relative Humidity(%) 40
E.U.T.: PCS Repeater
Configuration: TX GSM SIGNAL
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 1477 Cable #4:
Attenuator #2: Mixer:
Additional equipment used:
Measurement Uncertainty: +/-3.6 dB



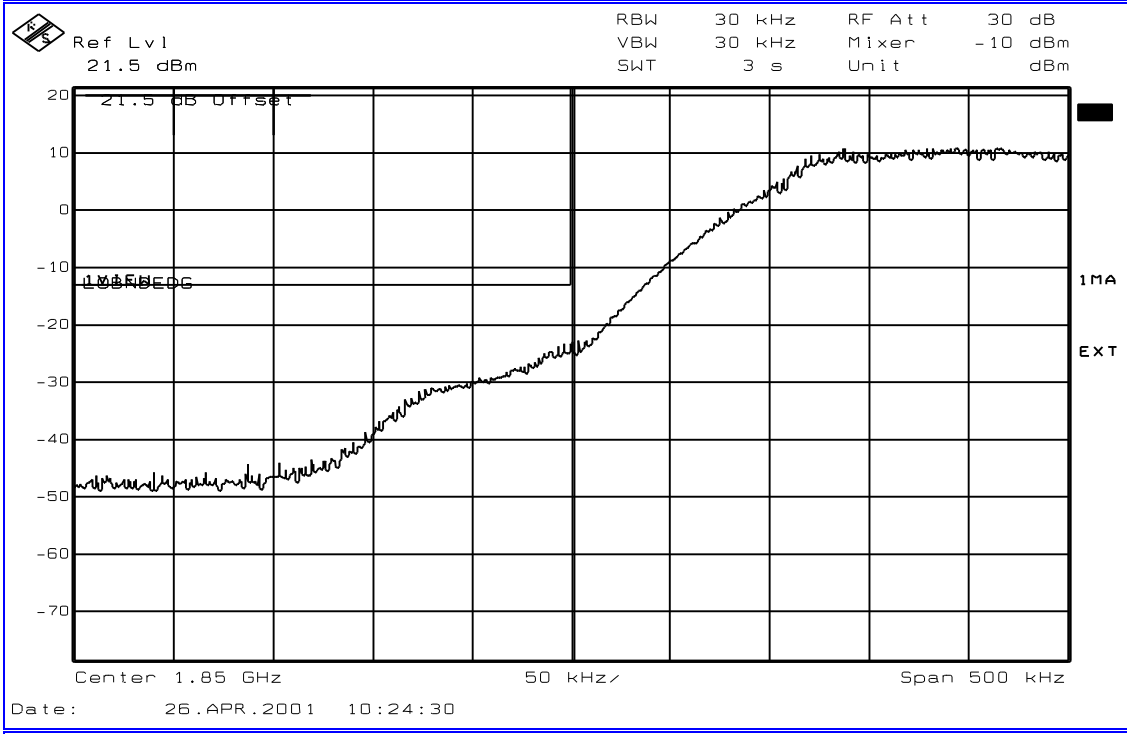
Notes: **GSM Lower Bandedge (DOWNLINK)**

Test Data --- Spurious Emissions at Antenna Terminals—High Gain

Data Plot GSM BANDEDGE

Page 2 of 2

Job No.:	1L0129R	Date:	4/26/01
Specification:	2.1	Temperature(°C):	21
Tested By:	Chinda Poy	Relative Humidity(%)	40
E.U.T.:	PCS Repeater		
Configuration:	TX GSM SIGNAL		



Notes: **GSM Lower Bandedge (UPLINK)**

Test Data --- Spurious Emissions at Antenna Terminals

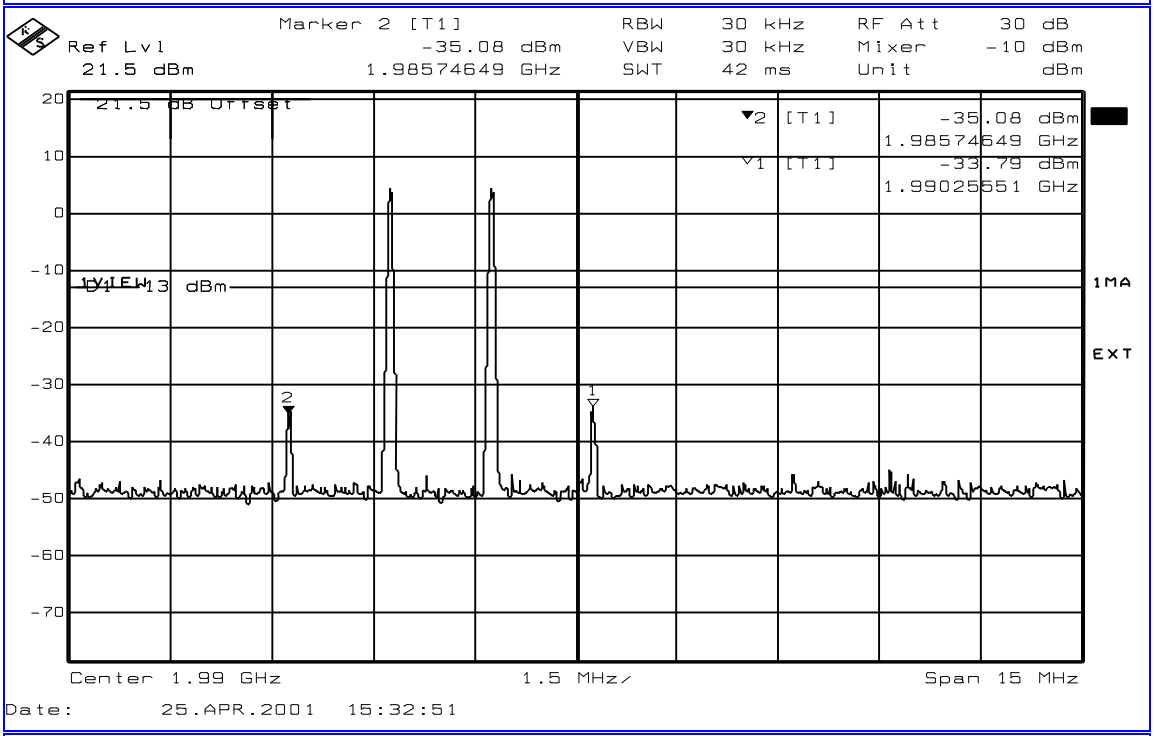
Data Plot **INTERMODULATION CHARACTERISTICS TDMA**

Page 1 of 4 — Complete X — Preliminary

Job No.:	1L0129R	Date: 4/23/01	
Specification:	2.1051	Temperature(°C):	21
Tested By:	Chinda Poy	Relative Humidity(%)	64
E.U.T.:	PCS Repeater		
Configuration:	TX TDMA SIGNAL		
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	1477	Cable #4:	
Attenuator #2:		Mixer:	
Additional equipment used:			
Measurement Uncertainty:	+/-3.6 dB		



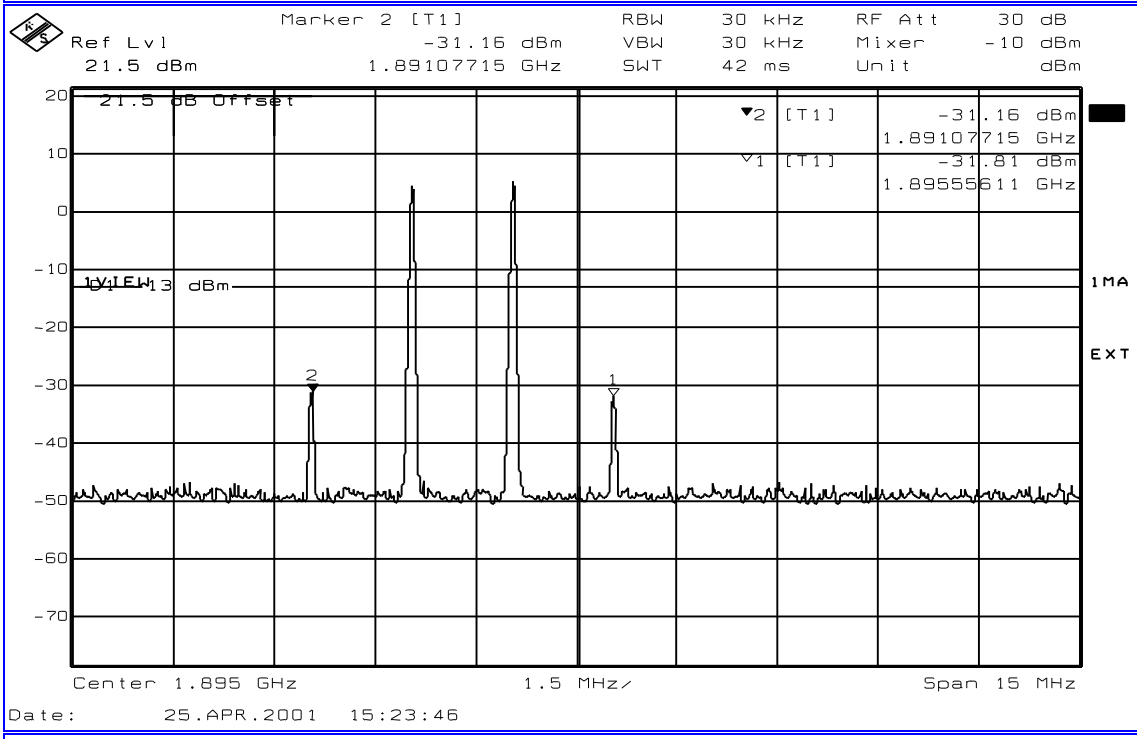
Notes:
TDMA Intermod Upper Bandedge 50dB (DOWNLINK)
Marker 1 indicates highest emission out of band
Marker 2 indicates highest emission inband

Test Data --- Spurious Emissions at Antenna Terminals

Data Plot **INTERMODULATION CHARACTERISTICS TDMA**

Page 2 of 4

Job No.:	1L0129R	Date:	4/23/01
Specification:	2.1	Temperature(°C):	21
Tested By:	Chinda Poy	Relative Humidity(%)	64
E.U.T.:	PCS Repeater		
Configuration:	TX TDMA SIGNAL		



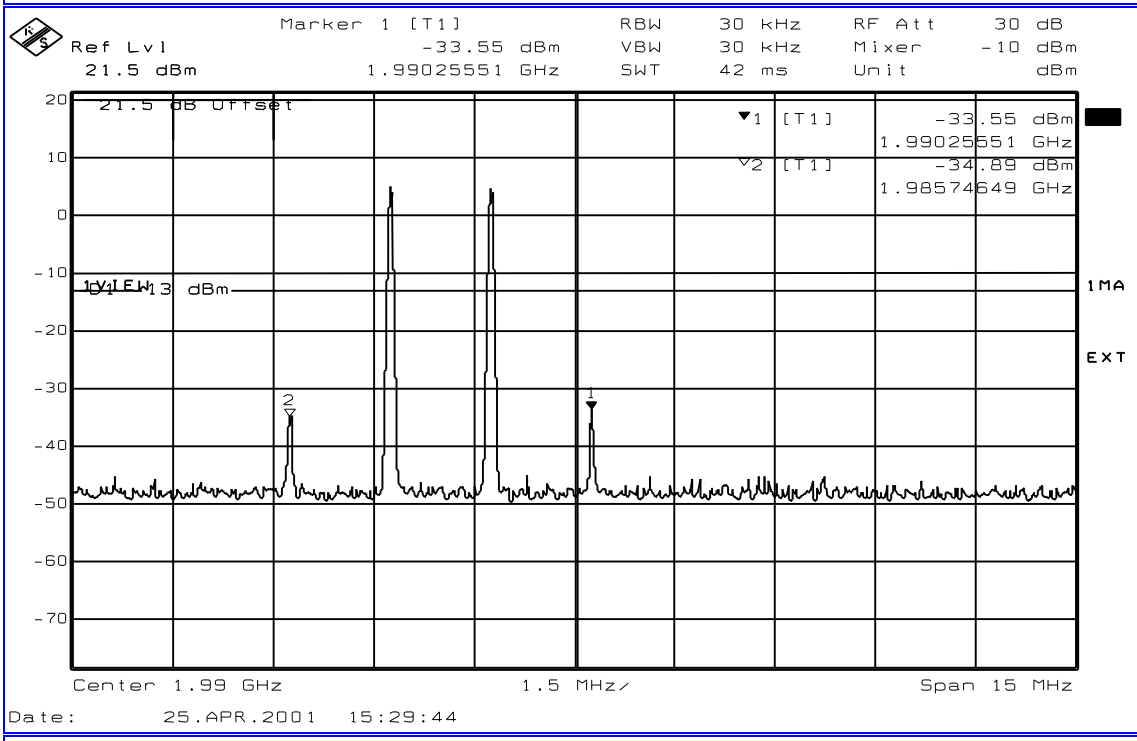
Notes:
TDMA Intermod Upper Bandedge 50dB (UPLINK)
Marker 1 indicates highest emission out of band
Marker 2 indicates highest emission inband

Test Data --- Spurious Emissions at Antenna Terminals

Data Plot **INTERMODULATION CHARACTERISTICS TDMA**

Page 3 of 4

Job No.:	1L0129R	Date:	4/23/01
Specification:	2.1051	Temperature(°C):	21
Tested By:	Chinda Poy	Relative Humidity(%)	64
E.U.T.:	PCS Repeater		
Configuration:	TX TDMA SIGNAL		



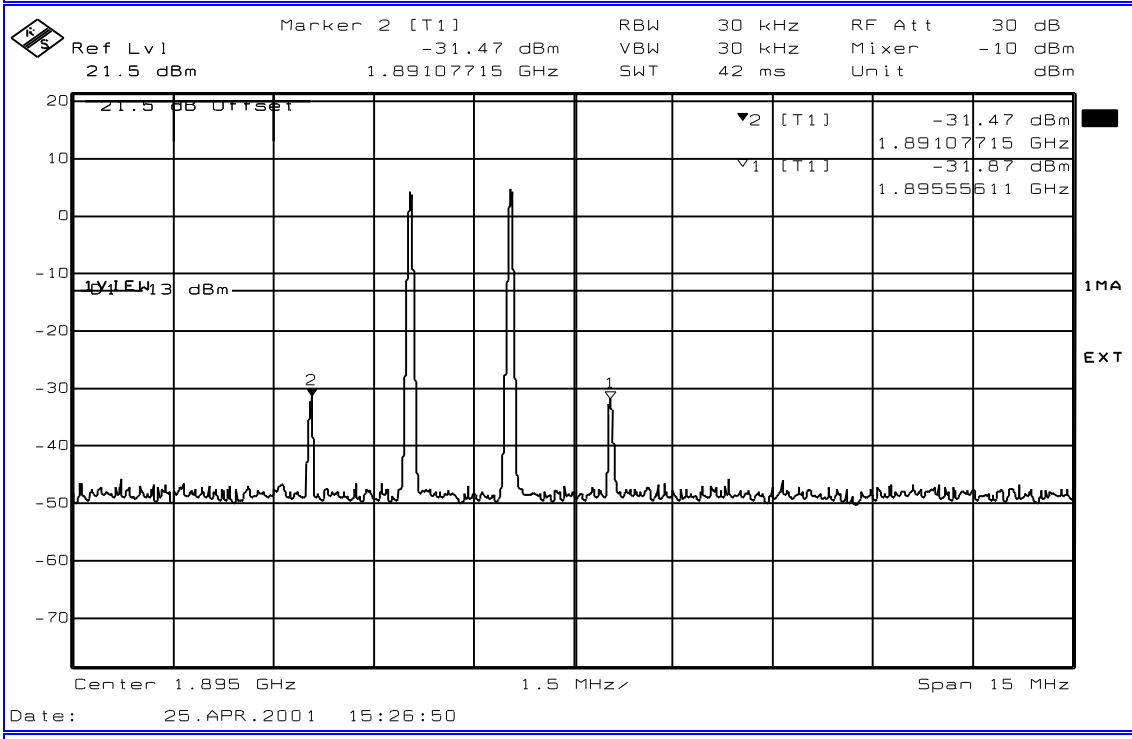
Notes:
TDMA Intermod Upper Bandedge 60dB (DOWNLINK)
Marker 1 indicates highest emission out of band
Marker 2 indicates highest emission inband

Test Data --- Spurious Emissions at Antenna Terminals

Test Plot: INTERMODULATION CHARACTERISTICS TDMA

Page 4 of 4

Job No.:	1L0129R	Date:	4/23/01
Specification:	2.1051	Temperature(°C):	21
Tested By:	Chinda Poy	Relative Humidity(%)	64
E.U.T.:	PCS Repeater		
Configuration:	TX TDMA SIGNAL		



Notes:
TDMA Intermod Upper Bandedge 60dB (UPLINK)
Marker 1 indicates highest emission out of band
Marker 2 indicates highest emission inband

Test Data --- Spurious Emissions at Antenna Terminals—High Gain

Data Plot **INTERMODULATION CHARACTERISTICS TDMA**

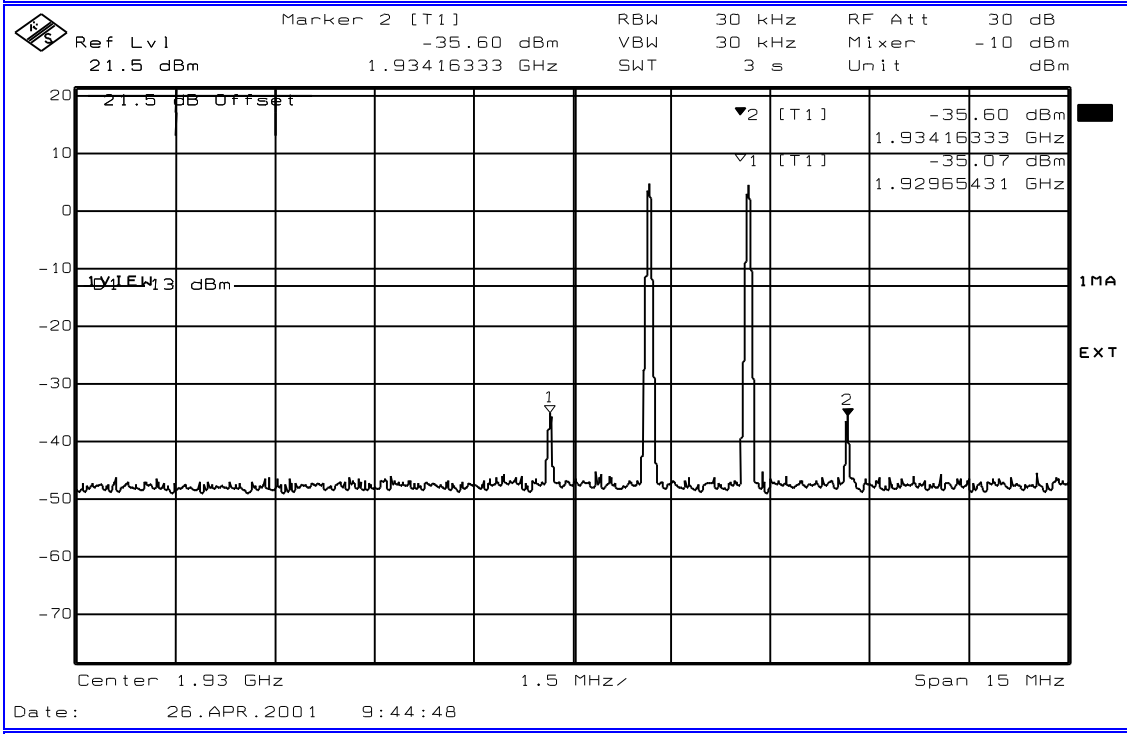
Page 1 of 4

Complete X
Preliminary

Job No.: 1L0129R Date: 4/26/01
Specification: 2.1051 Temperature(°C): 21
Tested By: Chinda Poy Relative Humidity(%) 40
E.U.T.: PCS Repeater
Configuration: TX TDMA SIGNAL
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 1477 Cable #4:
Attenuator #2: Mixer:
Additional equipment used:
Measurement Uncertainty: +/-3.6 dB



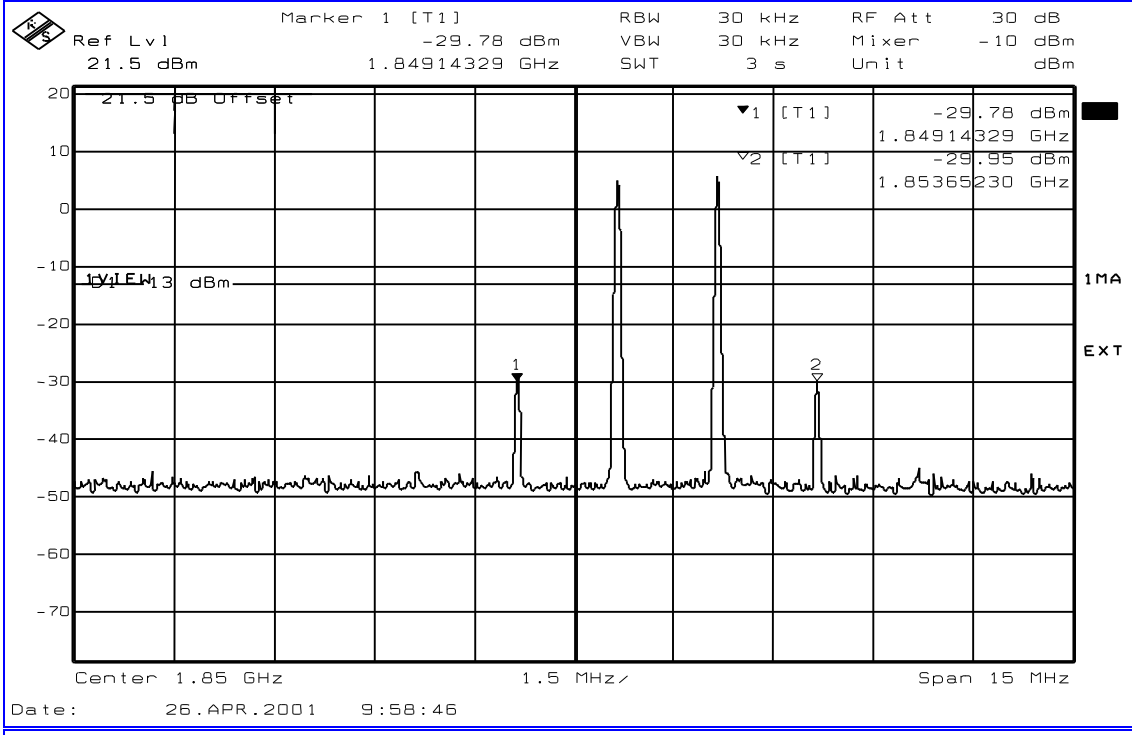
Notes: **TDMA Intermod Lower Bandedge 60dB (DOWNLINK)**
Marker 1 indicates highest emission out of band
Marker 2 indicates highest emission inband

Test Data --- Spurious Emissions at Antenna Terminals—High Gain

Data Plot **INTERMODULATION CHARACTERISTICS TDMA**

Page 2 of 4

Job No.:	1L0129R	Date:	4/26/01
Specification:	2.1	Temperature(°C):	21
Tested By:	Chinda Poy	Relative Humidity(%)	40
E.U.T.:	PCS Repeater		
Configuration:	TX TDMA SIGNAL		



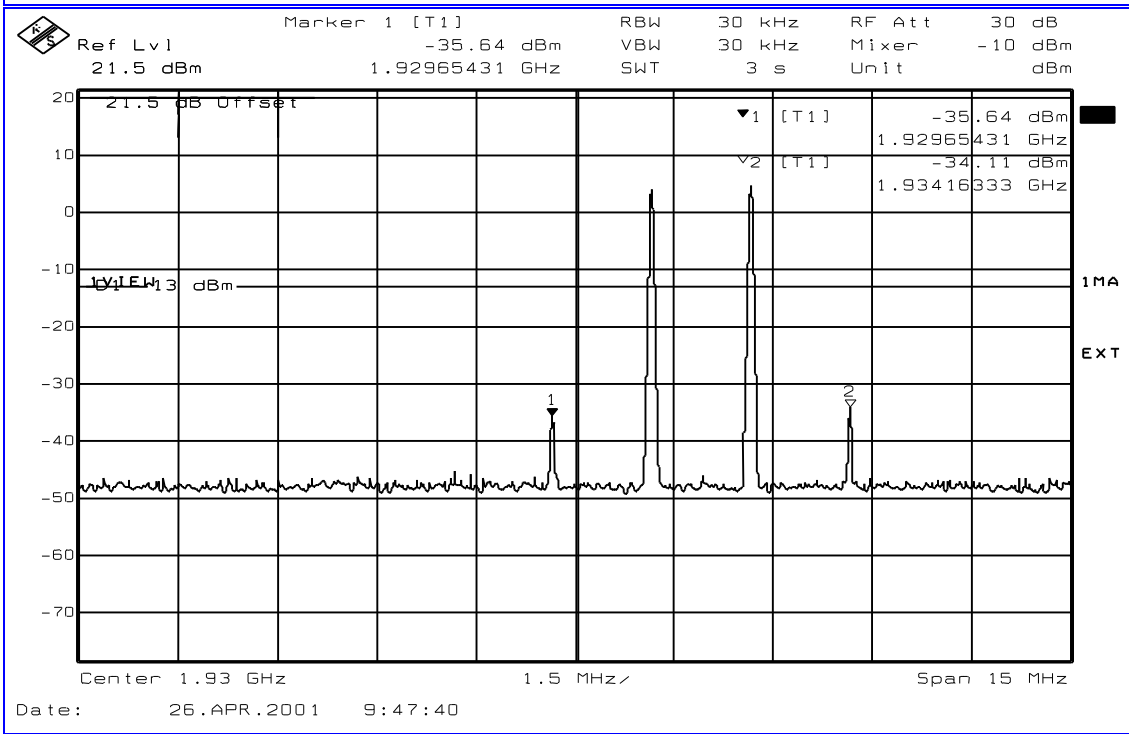
Notes:
TDMA Intermod Lower Bandedge 60dB (UPLINK)
Marker 1 indicates highest emission out of band
Marker 2 indicates highest emission inband

Test Data --- Spurious Emissions at Antenna Terminals—High Gain

Data Plot **INTERMODULATION CHARACTERISTICS TDMA**

Page 3 of 4

Job No.:	1L0129R	Date:	4/26/01
Specification:	2.1051	Temperature(°C):	21
Tested By:	Chinda Poy	Relative Humidity(%)	40
E.U.T.:	PCS Repeater		
Configuration:	TX TDMA SIGNAL		



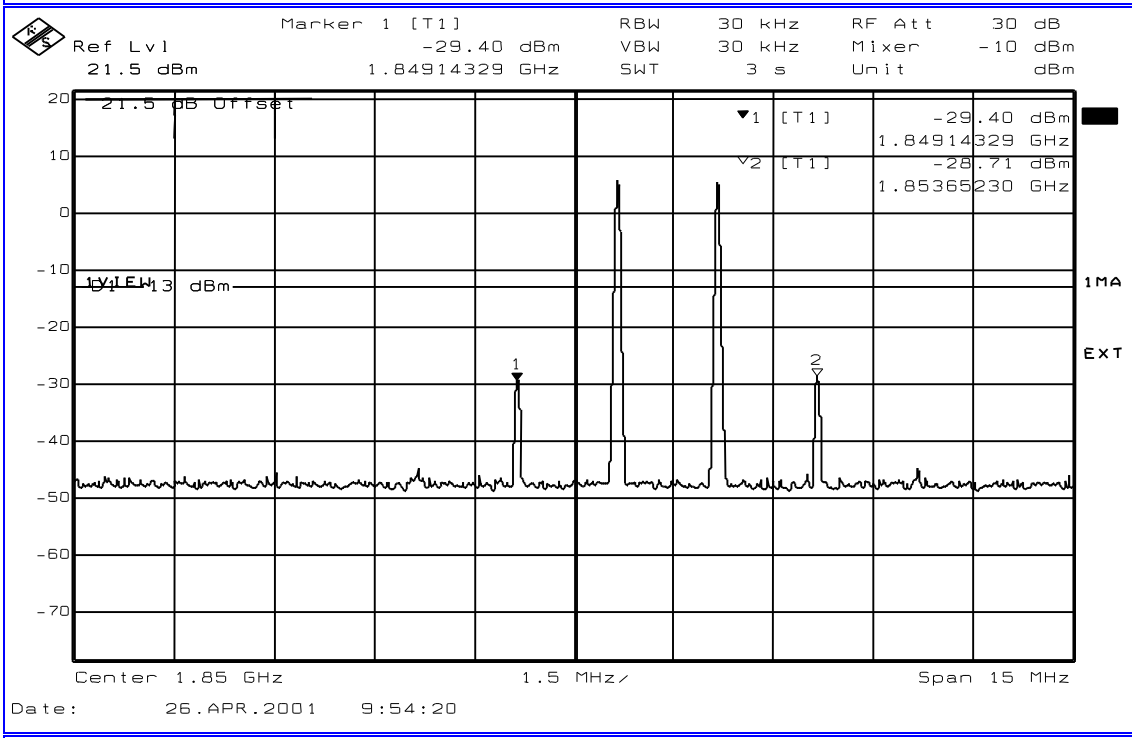
Notes:
TDMA Intermod Lower Bandedge 50dB (DOWNLINK)
Marker 1 indicates highest emission out of band
Marker 2 indicates highest emission inband

Test Data --- Spurious Emissions at Antenna Terminals—High Gain

Test Plot: **INTERMODULATION CHARACTERISTICS TDMA**

Page 4 of 4

Job No.:	1L0129R	Date:	4/26/01
Specification:	2.1051	Temperature(°C):	21
Tested By:	Chinda Poy	Relative Humidity(%)	40
E.U.T.:	PCS Repeater		
Configuration:	TX TDMA SIGNAL		



Notes:
TDMA Intermod Lower Bandedge 50dB (UPLINK)
Marker 1 indicates highest emission out of band
Marker 2 indicates highest emission inband

Section 6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious Emissions	PARA. NO.: 2.1051
TESTED BY: Chinda PoyTTidwell	DATE: 4/20/01

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: 46 %

Test Data – Field Strength of Spurious

Field Strength of Spurious Emissions

Page 1 of 2 — Complete X — Preliminary

Job No.: 1L0129R — Date: 4/20/01
Specification: Part 24 — Temperature(°C): 22
Tested By: Chinda Poy — Relative Humidity(%) 46
E.U.T.: PCS Repeater
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
3960	-59.2	40.4		33.3	8.0		-44.1	0.000039	V	Downlink
5940	-62.8	38.5		32.8	9.1		-48.0	0.000016	V	Downlink / NF
7920	-61.2	40.4		33.4	9.4		-44.7	0.000034	V	Downlink / NF
9900	-60.5	40.4		36.1	10.5		-45.7	0.000027	V	Downlink / NF
11880	-61.5	-49.3		36.6	11.0		-136.4	0.000000	V	Downlink / NF
13860	-61.2	47.6		34.2	10.4		-37.4	0.000184	V	Downlink / NF
15840	-60.8	43.2		34.7	13.6		-38.7	0.000135	V	Downlink / NF
17820	-61.7	51.0		35.1	8.7		-37.1	0.000195	V	Downlink / NF
19800	-61.0	53.1		34.2	6.4		-35.8	0.000266	V	Downlink / NF
3960	-53.2	34.3		33.3	8.0		-44.2	0.000038	H	Downlink
5940	-62.2	36.0		32.8	9.1		-49.9	0.000010	H	Downlink / NF
7920	-57.3	39.8		33.4	9.4		-41.5	0.000071	H	Downlink / NF
9900	-60.0	42.6		36.1	10.5		-43.0	0.000050	H	Downlink / NF
11880	-61.0	46.0		36.6	11.0		-40.6	0.000088	H	Downlink
13860	-60.3	50.8		34.2	10.4		-33.3	0.000473	H	Downlink / NF
15840	-60.5	44.0		34.7	13.6		-37.6	0.000173	H	Downlink / NF
17820	-59.8	53.6		35.1	8.7		-32.6	0.000550	H	Downlink / NF
19800	-61.3	54.6		34.2	6.4		-34.5	0.000358	H	Downlink / NF

Notes: 50 dB / Downlink 1980 MHz / Scanned to the 10th harmonic

Test Data – Field Strength of Spurious

Field Strength of Spurious Emissions

Page 2 of 2 — Complete X — Preliminary

Job No.: 1L0129R — Date: 4/20/01
Specification: Part 24 — Temperature(°C): 22
Tested By: Chinda Poy — Relative Humidity(%) 46
E.U.T.: PCS Repeater
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
3800	-61.7	40.4		33.3	8.0		-46.6	0.000022	V	Uplink / NF
5700	-62.5	38.5		32.5	9.1		-47.4	0.000018	V	Uplink / NF
7600	-61.5	40.4		33	9.4		-44.6	0.000034	V	Uplink / NF
9500	-61.8	40.4		35.9	10.5		-46.8	0.000021	V	Uplink / NF
11400	-60.3	42.0		36.5	11.1		-43.8	0.000042	V	Uplink / NF
13300	-60.8	44.8		34.8	11.2		-39.6	0.000109	V	Uplink / NF
15200	-61.3	46.5		33.8	11.4		-37.2	0.000190	V	Uplink / NF
17100	-61.0	47.0		34.5	11.7		-36.7	0.000212	V	Uplink / NF
19000	-60.8	53.1		34.3	6.4		-35.7	0.000272	V	Uplink / NF
3800	-55.3	34.3		33.3	8.0		-46.3	0.000024	H	Uplink
5700	-62.7	36.0		32.5	9.1		-50.1	0.000010	H	Uplink / NF
7600	-60.5	39.8		33	9.4		-44.3	0.000037	H	Uplink / NF
9500	-61.3	42.6		35.9	10.5		-44.1	0.000039	H	Uplink / NF
11400	-57.7	44.4		36.5	11.1		-38.7	0.000134	H	Uplink
13300	-60.5	47.5		34.8	11.2		-36.7	0.000214	H	Uplink / NF
15200	-61.7	47.1		33.8	11.4		-37.0	0.000198	H	Uplink / NF
17100	-60.7	50.5		34.5	11.7		-33.0	0.000505	H	Uplink / NF
19000	-61.5	54.6		34.3	6.4		-34.8	0.000334	H	Uplink / NF

Notes: **50 dB / Uplink 1900 MHz / Scanned to the 10th Harmonic**

Test Data – Field Strength of Spurious—High Gain

Field Strength of Spurious Emissions

Page 1 of 2 | Complete X | Preliminary

Job No.: 1L0129R | Date: 4/20/01
Specification: Part 24 | Temperature(°C): 22
Tested By: Chinda Poy | Relative Humidity(%) 46
E.U.T.: PCS Repeater
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
3960	-58.7	40.4		33.3	8.0		-43.6	0.000043	V	Downlink
5940	-63.0	38.5		32.8	9.1		-48.2	0.000015	V	Downlink / NF
7920	-61.0	40.4		33.4	9.4		-44.5	0.000035	V	Downlink / NF
9900	-60.2	40.4		36.1	10.5		-45.4	0.000029	V	Downlink / NF
11880	-61.0	-49.3		36.6	11.0		-135.9	0.000000	V	Downlink / NF
13860	-60.3	47.6		34.2	10.4		-36.5	0.000226	V	Downlink / NF
15840	-60.3	43.2		34.7	13.6		-38.2	0.000152	V	Downlink / NF
17820	-60.8	51.0		35.1	8.7		-36.2	0.000240	V	Downlink / NF
19800	-61.2	53.1		34.2	6.4		-36.0	0.000254	V	Downlink / NF
3960	-51.5	34.3		33.3	8.0		-42.5	0.000057	H	Downlink
5940	-62.2	36.0		32.8	9.1		-49.9	0.000010	H	Downlink / NF
7920	-60.0	39.8		33.4	9.4		-44.2	0.000038	H	Downlink / NF
9900	-60.0	42.6		36.1	10.5		-43.0	0.000050	H	Downlink / NF
11880	-56.0	46.0		36.6	11.0		-35.6	0.000278	H	Downlink
13860	-60.0	50.8		34.2	10.4		-33.0	0.000507	H	Downlink / NF
15840	-59.2	44.0		34.7	13.6		-36.3	0.000234	H	Downlink / NF
17820	-60.0	53.6		35.1	8.7		-32.8	0.000525	H	Downlink / NF
19800	-61.5	54.6		34.2	6.4		-34.7	0.000342	H	Downlink / NF

Notes: 60 dB / Downlink 1980 MHz / Scanned to the 10th harmonic

Test Data – Field Strength of Spurious—High Gain

Field Strength of Spurious Emissions

Page 2 of 2 — Complete X

Job No.: 1L0129R — Date: 4/20/01 — Preliminary

Specification: Part 24 — Temperature(°C): 22

Tested By: Chinda Poy — Relative Humidity(%) 46

E.U.T.: PCS Repeater

Configuration: TX Full Power

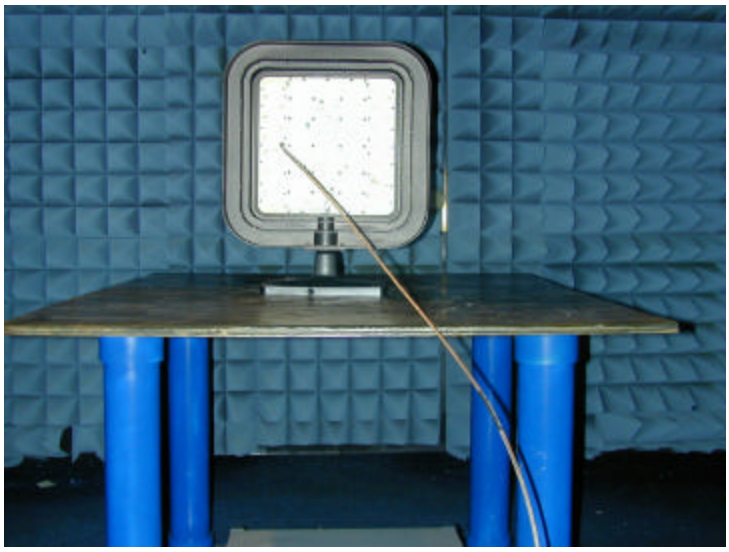
Sample No: S01

Frequency (MHz)	Meter Reading (dBm)	Correction Factor (dB)		Pre-Amp Gain (dB)	Substitution Antenna Gain (dBd)		ERP (dBm)	ERP (mW)	Polarity	Comments
3800	-60.2	40.4		33.3	8.0		-45.1	0.000031	V	Uplink / NF
5700	-62.8	38.5		32.5	9.1		-47.7	0.000017	V	Uplink / NF
7600	-61.8	40.4		33	9.4		-44.9	0.000032	V	Uplink / NF
9500	-61.8	40.4		35.9	10.5		-46.8	0.000021	V	Uplink / NF
11400	-61.5	42.0		36.5	11.1		-45.0	0.000032	V	Uplink / NF
13300	-60.5	44.8		34.8	11.2		-39.3	0.000117	V	Uplink / NF
15200	-61.2	46.5		33.8	11.4		-37.1	0.000194	V	Uplink / NF
17100	-61.2	47.0		34.5	11.7		-36.9	0.000202	V	Uplink / NF
19000	-61.8	53.1		34.3	6.4		-36.7	0.000216	V	Uplink / NF
3800	-54.8	34.3		33.3	8.0		-45.8	0.000026	H	Uplink
5700	-62.2	36.0		32.5	9.1		-49.6	0.000011	H	Uplink / NF
7600	-60.5	39.8		33	9.4		-44.3	0.000037	H	Uplink / NF
9500	-61.2	42.6		35.9	10.5		-44.0	0.000040	H	Uplink / NF
11400	-58.0	44.4		36.5	11.1		-39.0	0.000125	H	Uplink
13300	-60.8	47.5		34.8	11.2		-37.0	0.000200	H	Uplink / NF
15200	-61.3	47.1		33.8	11.4		-36.6	0.000217	H	Uplink / NF
17100	-61.3	50.5		34.5	11.7		-33.6	0.000440	H	Uplink / NF
19000	-61.0	54.6		34.3	6.4		-34.3	0.000375	H	Uplink / NF

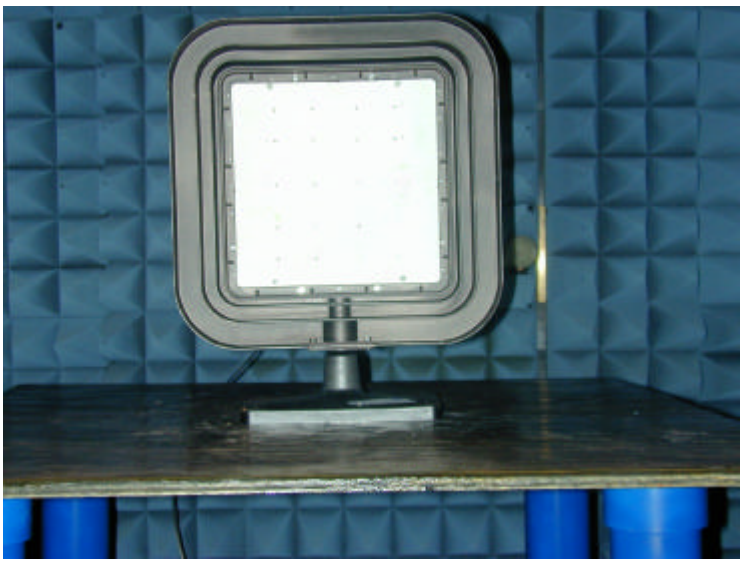
Notes: **60 dB / Uplink 1900 MHz / Scanned to the 10th Harmonic**

Photographs of Test Setup

FRONT VIEW



REAR VIEW



Section 7. Frequency Stability

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

Not Applicable

Test Results: Comments.

Measurement Data: See attached table.

Standard Test Frequency: MHz
Standard Test Voltage:

Equipment Used:

Measurement Uncertainty: +/- 1.6 dB

Lab Temperature: °C

Relative Humidity: %

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
1477	20db Attenuator DC 18 Ghz	MCL Inc. BW-S20W5	NONE	CBU	N/A
1082	CABLE 2m	Astrolab 32027-2-29094-72TC	N/A	05/23/00	05/23/01
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	01/02/01	01/02/02
1016	AMPLIFIER	HEWLETT PACKARD 8449A	2749A00159	05/24/00	05/24/01
1043	Flexable cable 1m	Astrolab Inc. 32027-2-29094K-1M	0	01/29/01	01/29/02
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.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:

$$P = \frac{E^2R^2}{30G} = \frac{E^2 3^2}{30G}$$

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: ≥ RBW
Span: 5 MHz
Sweep: Auto
Mask: Set markers to -26 dB from peak of CW.

GSM

RBW: 3 kHz
VBW: ≥ RBW
Span: 2 MHz
Sweep: Auto
Mask: Set markers to -26 dB from peak of CW.

NADC

RBW: 1 kHz
VBW: ≥ 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: ≥ 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: ≥ RBW
Sweep: Auto
Video Avg: Disabled

NADC

RBW: 1 MHz (> 1 MHz from Band Edge)
RBW: 3 kHz (< 1 MHz from Band Edge)
VBW: ≥ 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.

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)

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

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

For emissions > 1 GHz:

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

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

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

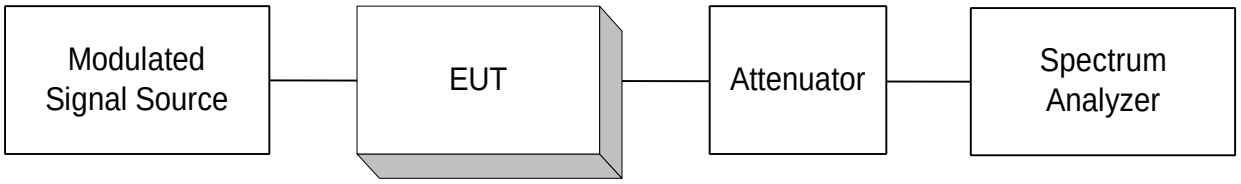
The E.U.T. is placed in an environmental chamber and allowed to stabilize at +20 degrees Celsius for at least 15 minutes. The frequency counter and signal generator are phase locked with the same 10 MHz reference frequency by connecting the 10 MHz ref. out of the counter to the 10 MHz ref, in of the 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

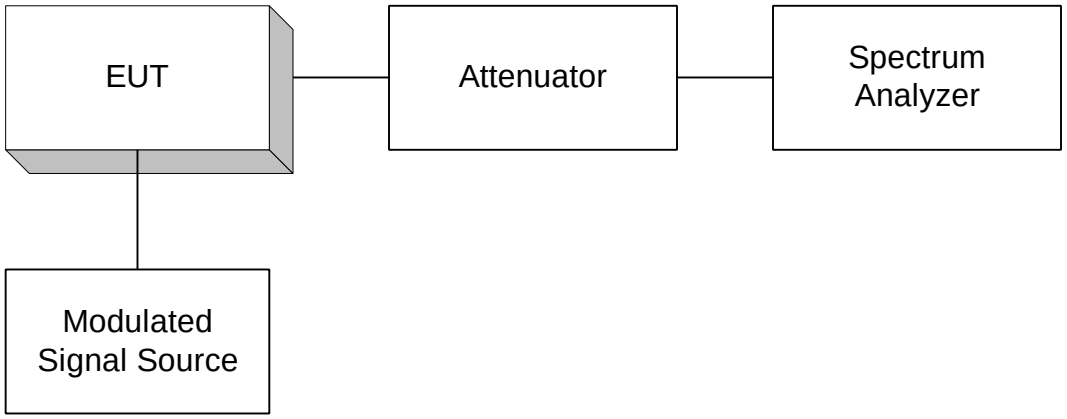
The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30 second intervals for a period of 5 minutes.

ANNEX B - TEST DIAGRAMS

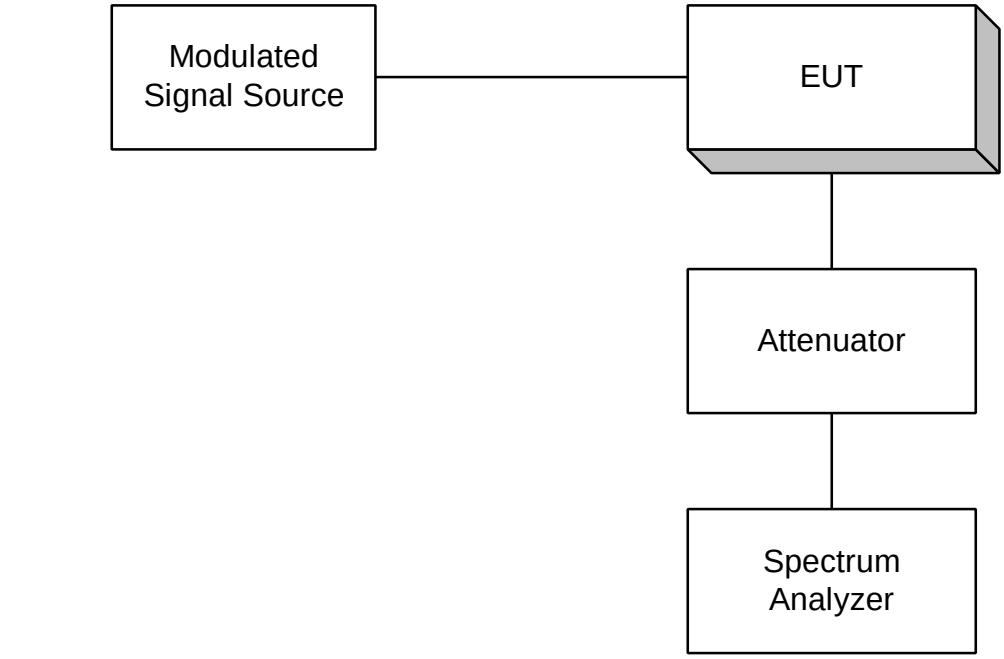
Para. No. 2.985 - R.F. Power Output

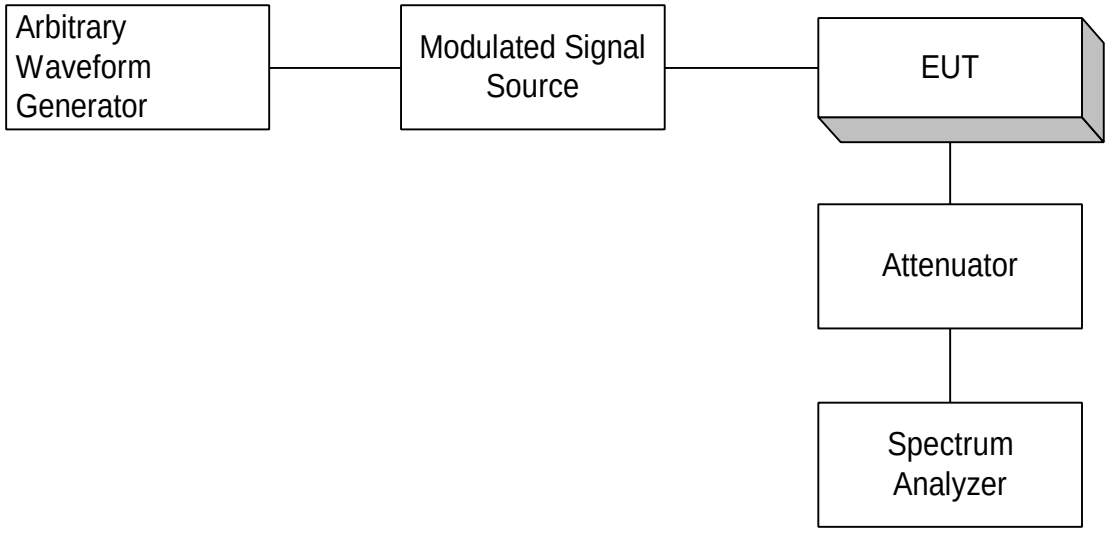


Para. No. 2.989 - Occupied Bandwidth

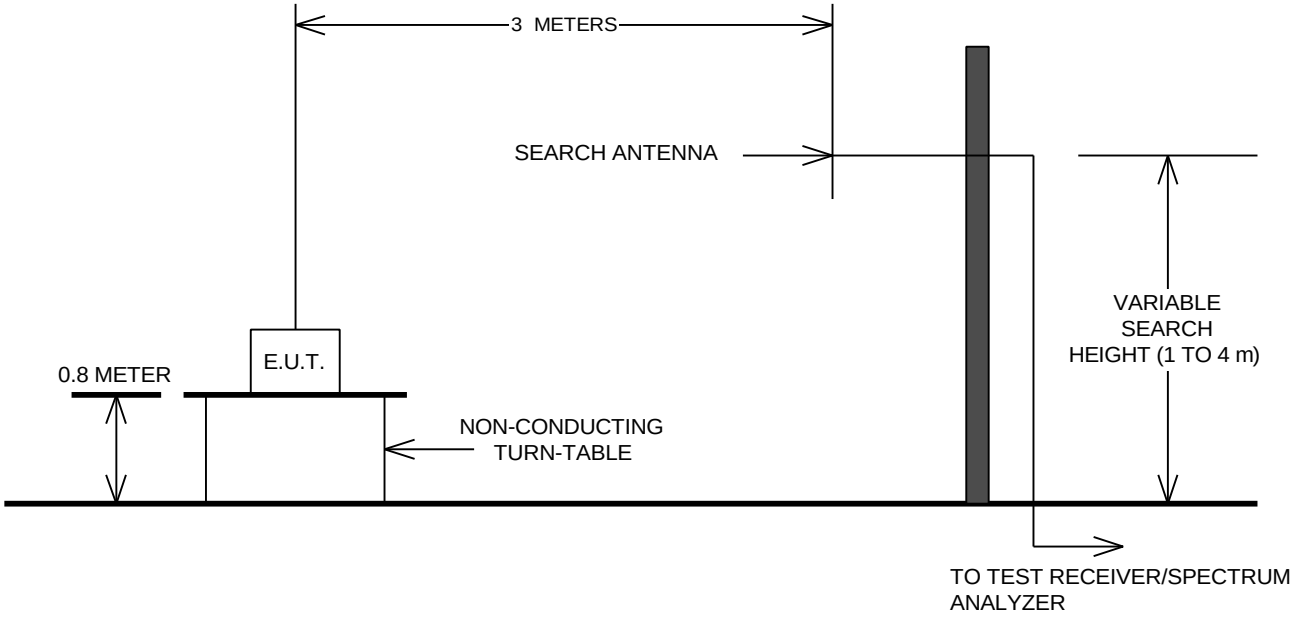


Para. No. 2.991 Spurious Emissions at Antenna Terminals





Para. No. 2.993 - Field Strength of Spurious Radiation



Para. No. 2.995 - Frequency Stability