Nemko Test Report:	1L0263RUS1
Applicant:	ALLEN TELECOM 140 Vista Center Dr. Forest, Virginia 24551
Equipment Under Test: (E.U.T.)	DUAL BAND BRITECELL FAST SYSTEM
In Accordance With:	**FCC Part 22, Subpart H** Cellular Band Repeaters
Tested By:	Nemko Dallas Inc. 802 N. Kealy Lewisville, TX 75057-3136
Authorized By:	 Tom Tidwell, RF Group Manager
Date:	7/16/01
Total Number of Pages:	52

Table of Contents

Section 1. Summary of Test Results

Manufacturer: ALLEN TELECOM

Model No.: DUAL BAND BRITECELL FAST SYSTEM

Serial No.: NONE

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

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 22, Subpart H.

☒ New Submission ☒ Production Unit

☐ Class II Permissive Change ☐ Pre-Production Unit

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.
See " Summary of Test Data".

NVLAP LAB CODE: 100426-0

Summary Of Test Data

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

Footnotes: E.U.T is an F1 to F1 repeater. Frequency stability was not measured

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

.

Section 2. General Equipment Specification

Supply Voltage Input:		- 48 VDC
Frequency Range:	**Downlink:**	869 – 894 MHz
Frequency Range:	**Uplink:**	824 – 849 MHz

CDMA (F9W)	**GSM (GXW)**	**NADC (DXW)**	**CDPD (F9W)**	**AMPS (F8W, F1D)**
☒	☐	☒	☐	☒

Output Impedance:		50 ohms	
RF Output (Rated):	**Downlink:**	1 Carrier	19 dBm
		2 Carriers	14 dBm
		3 Carriers	12 dBm
		4 Carriers	11 dBm

Frequency Translation:	**F1-F1**	**F1-F2**	**N/A**
	☒	☐	☐

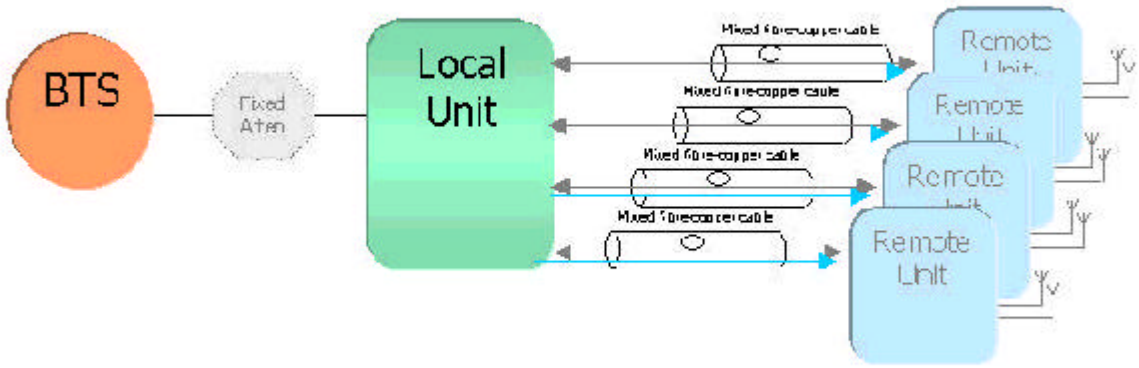
Software	**Duplexer Change**	**Fullband Coverage**
☐	☐	☒

Description of Operation

BRITECELL™ FAST is a plug and play BriteCell kit, offering the most suitable solution for indoor coverage in small areas, thanks to its compactness and absolute easiness to install. The package includes up to four compact RF remote transceivers (TFAF), driven by one local distribution unit (TFLF). It is available in various frequency ranges (from 800MHz up to 2200 MHz), as a single band product. It is aimed to satisfy the requirements of 2 nd and 3 rd generation mobile networks for simple coverage needs.

The TFLF local unit has been properly designed into a stand-alone mechanical case, including all required ancillary and support functions. The kit includes also four standard TFAF Remote units and a compound fiber-copper cable to connect them to local unit. The installed units can be lately kept also in case of system expansion to a fully modular BriteCell configuration, both single band or dual band, with a minimum setting effort. Both TFL and TFA can be optionally hosted into TKA mounting kits, allowing outdoor installation if required.

System Diagram



Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 2.1046
TESTED BY: Chinda Poy	DATE: 6/28/01

Test Results: Complies.

Test Data:

	Modulation Type	Per Channel Power Output (dBm)	Composite Power Output (dBm)
Uplink	AMPS	N/A	N/A
Downlink	AMPS	13.4 dBm	16.4 dBm
Uplink	CDMA	N/A	N/A
Downlink	CDMA	14.76 dBm	17.76 dBm
Uplink	NADC	N/A	N/A
Downlink	NADC	19.8 dBm	22.8 dBm

Equipment Used: 1036-1043-1474

Measurement Uncertainty: +/- 1.7 dB

Temperature: 24 °C

Relative Humidity: 30 %

Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth (Digital Mod.)	PARA. NO.: 2.1049
TESTED BY: Chinda Poy	DATE: 6/28/01

Test Results: Complies.

Test Data: See attached plots

Equipment Used: 1036-1474-1043

Measurement Uncertainty: +/- 1.7 dB

Test Data --- Occupied Bandwidth – Voice

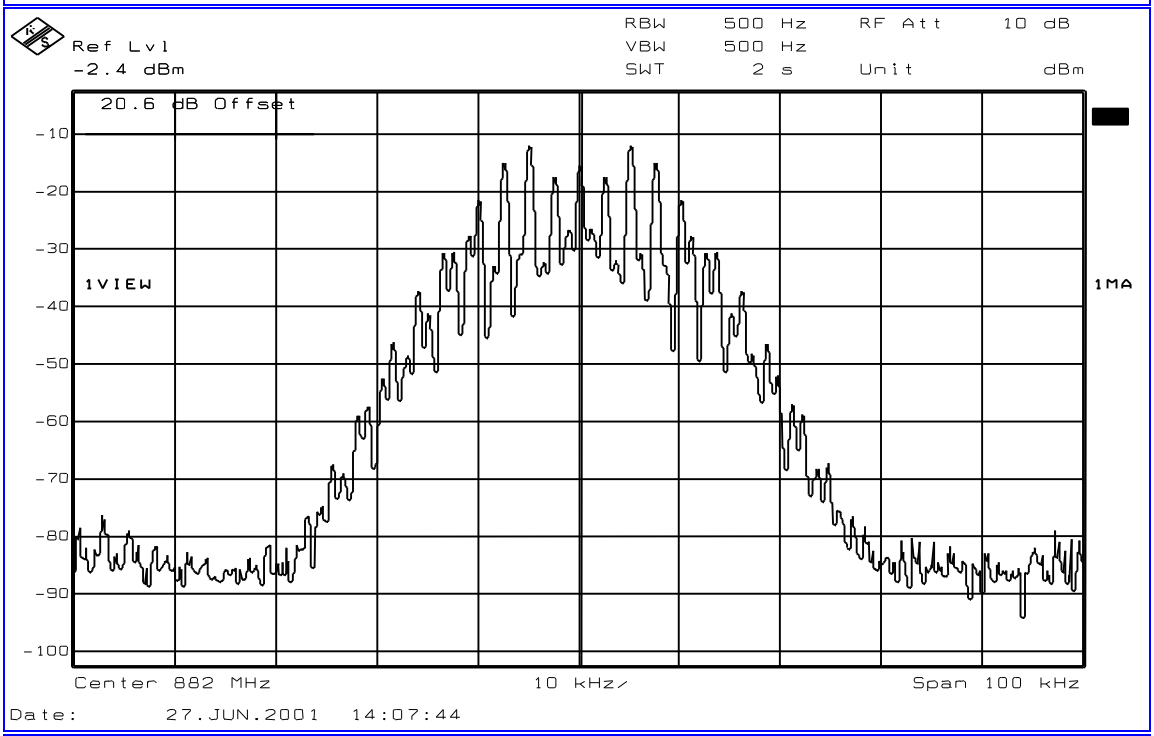
Data Plot **Occupied Bandwidth Analog**

Page 1 of 2 Complete X
Job No.: 1L0263R Date: 6/27/01 Preliminary
Specification: 2.1049 Temperature(°C): 24
Tested By: Chinda Poy Relative Humidity(%) 30
E.U.T.: DUAL BAND BRITCELL FAST SYSTEM
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:	1043
Filter:		Cable #2:	
Receiver:	1036	Cable #3:	
Attenuator #1	1474	Cable #4:	
Attenuator #2:		Mixer:	

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



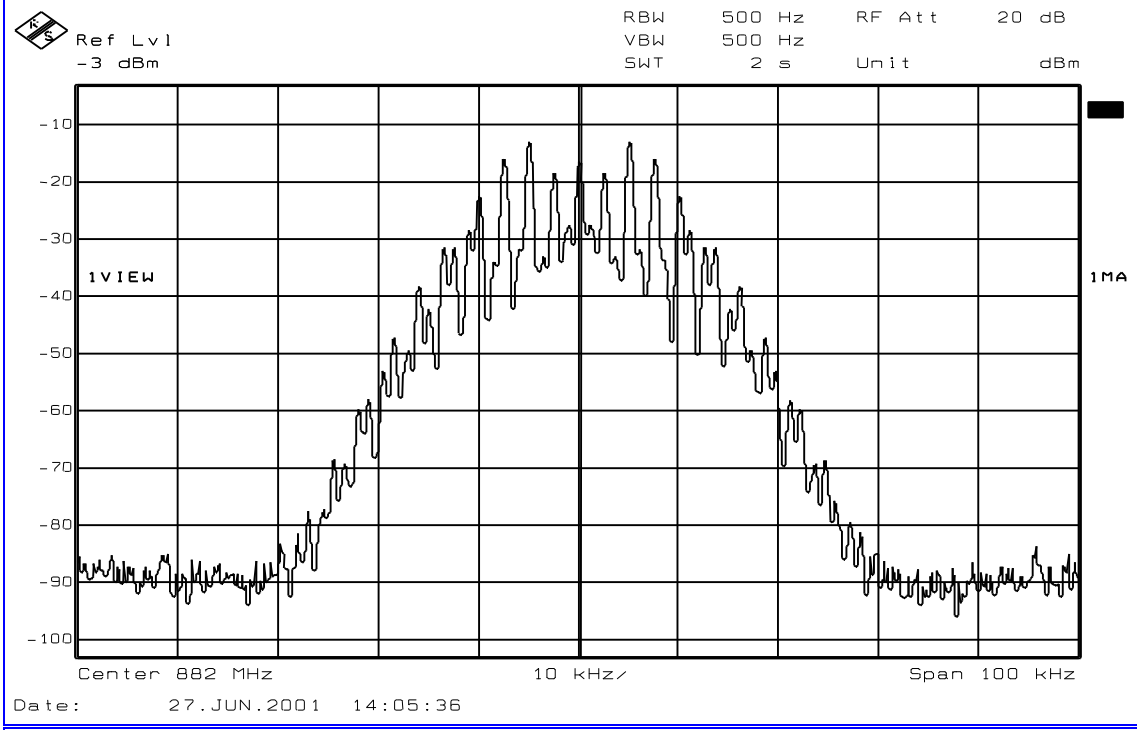
Notes: **Output Signal Voice and SAT**
DOWNLINK

Test Data --- Occupied Bandwidth – Voice

Data Plot **Occupied Bandwidth Analog**

Page 2 of 2

Job No.:	1L0263R	Date:	6/27/01
Specification:	2.1	Temperature(°C):	24
Tested By:	Chinda Poy	Relative Humidity(%)	30
E.U.T.:	DUAL BAND BRITCELL FAST SYSTEM		
Configuration:	Tx Full Power		



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

Test Data --- Occupied Bandwidth – 2FSK

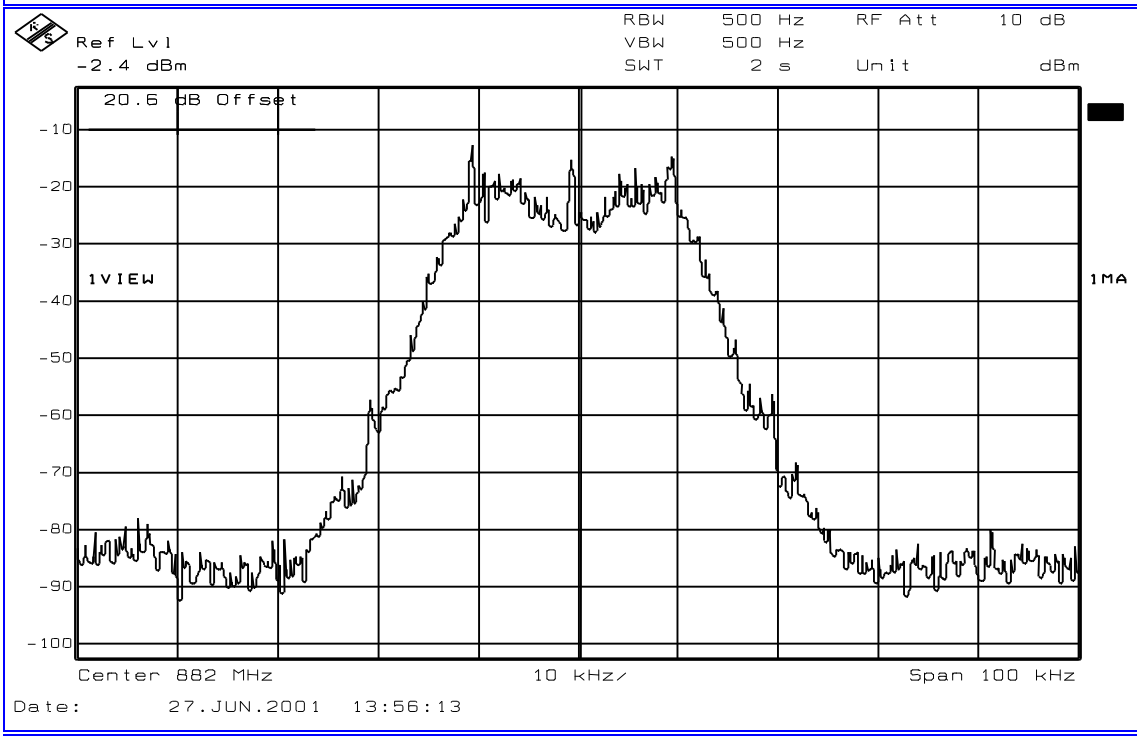
Data Plot **Occupied Bandwidth 2FSK**

Page 1 of 2 Complete X
Job No.: 1L0263R Date: 6/27/01 Preliminary
Specification: Part 22 Temperature(°C): 24
Tested By: Chinda Poy Relative Humidity(%) 38
E.U.T.: Dual Band Britcell Fast System
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:	1043
Filter:		Cable #2:	
Receiver:	1036	Cable #3:	
Attenuator #1	1474	Cable #4:	
Attenuator #2:		Mixer:	

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



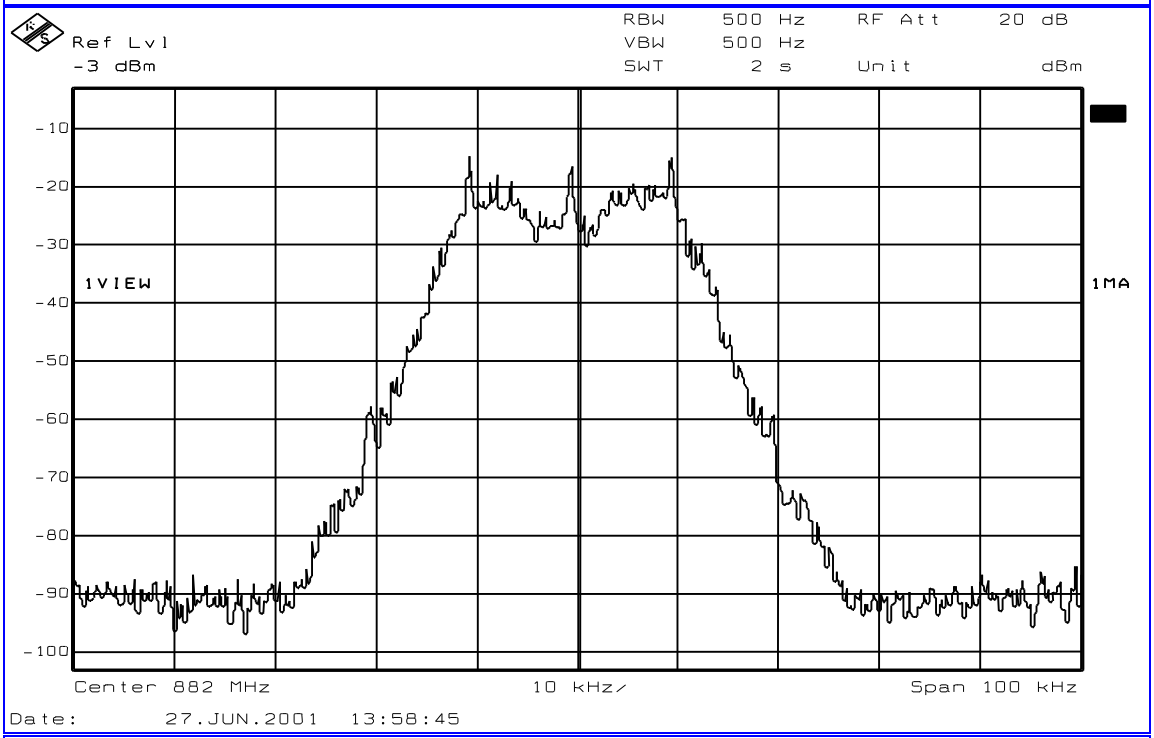
Notes: **Output Signal 2FSK**
DOWNLINK

Test Data --- Occupied Bandwidth – 2FSK

Data Plot Occupied Bandwidth 2FSK

Page 2 of 2

Job No.:	1L0263R	Date:	6/27/01
Specification:	Part 22	Temperature(°C):	24
Tested By:	Chinda Poy	Relative Humidity(%)	38
E.U.T.:	Dual Band Britcell Fast System		
Configuration:	Tx Full Power		



Notes: **Input Signal 2FSK**
DOWNLINK

Test Data --- Occupied Bandwidth – TDMA

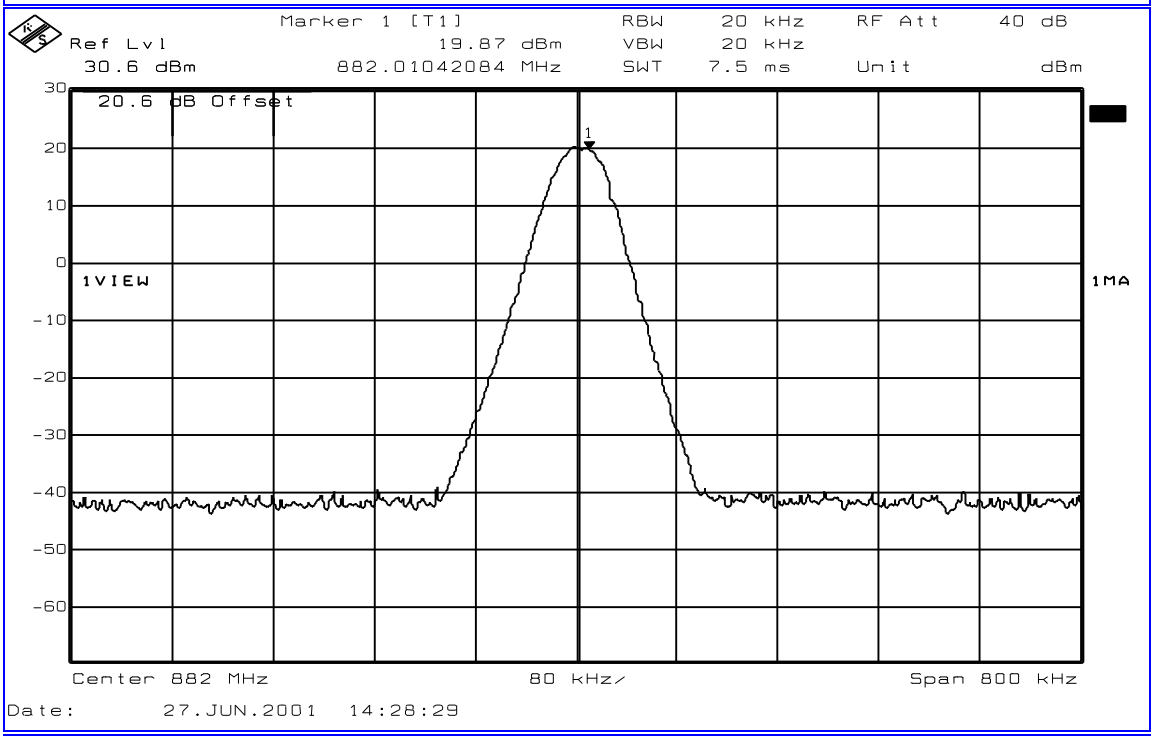
Data Plot **Occupied Bandwidth TDMA**

Page 1 of 2 Complete X
Job No.: 1L0263R Date: 6/27/01 Preliminary
Specification: Part 22 Temperature(°C): 24
Tested By: Chinda Poy Relative Humidity(%) 30
E.U.T.: DUAL BAND BRITCELL FAST SYSTEM
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:	1043
Filter:		Cable #2:	
Receiver:	1036	Cable #3:	
Attenuator #1	1474	Cable #4:	
Attenuator #2:		Mixer:	

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



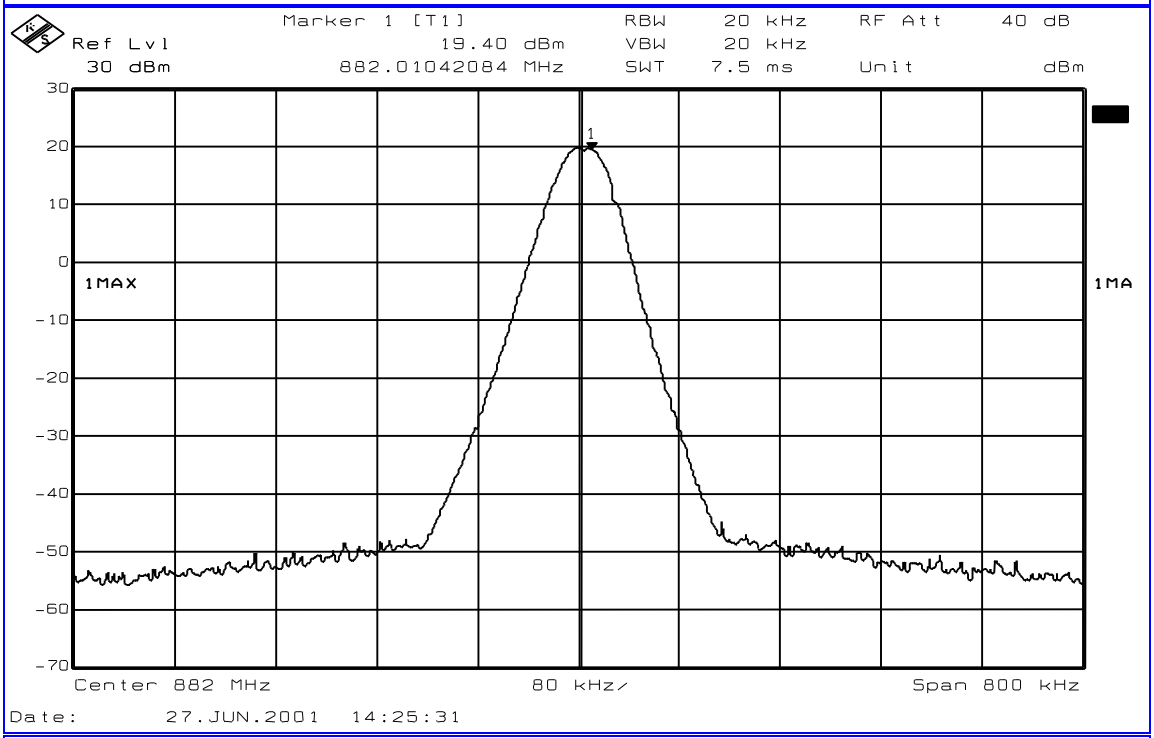
Notes: **Output Signal TDMA**
DOWNLINK

Test Data --- Occupied Bandwidth – TDMA

Data Plot Occupied Bandwidth TDMA

Page 2 of 2

Job No.:	1L0263R	Date:	6/27/01
Specification:	Part 22	Temperature(°C):	24
Tested By:	Chinda Poy	Relative Humidity(%)	30
E.U.T.:	DUAL BAND BRITCELL FAST SYSTEM		
Configuration:	Tx Full Power		



Notes: **Input Signal TDMA**
DOWNLINK

Test Data --- Occupied Bandwidth – CDMA

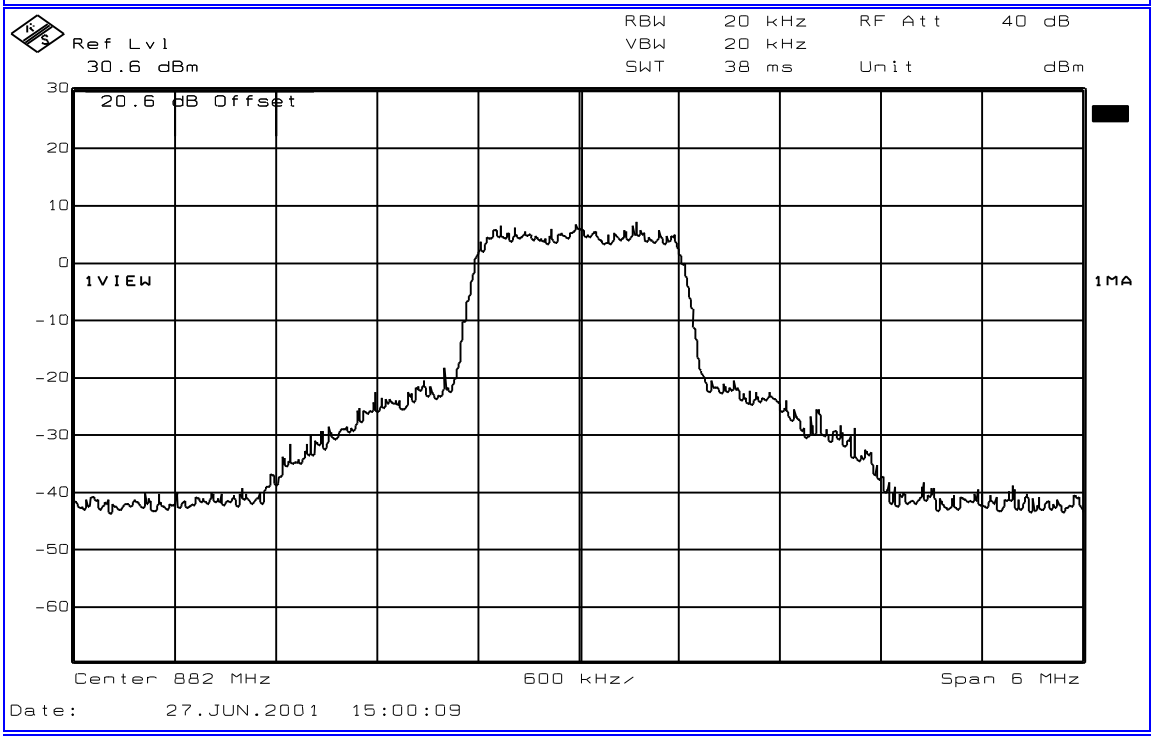
Data Plot **Occupied Bandwidth CDMA**

Page 1 of 2 Complete X
Job No.: 1L0263R Date: 6/27/01 Preliminary
Specification: Part 22 Temperature(°C): 24
Tested By: Chinda Poy Relative Humidity(%) 30
E.U.T.: DUAL BAND BRITCELL FAST SYSTEM
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:	1043
Filter:		Cable #2:	
Receiver:	1036	Cable #3:	
Attenuator #1	1474	Cable #4:	
Attenuator #2:		Mixer:	

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



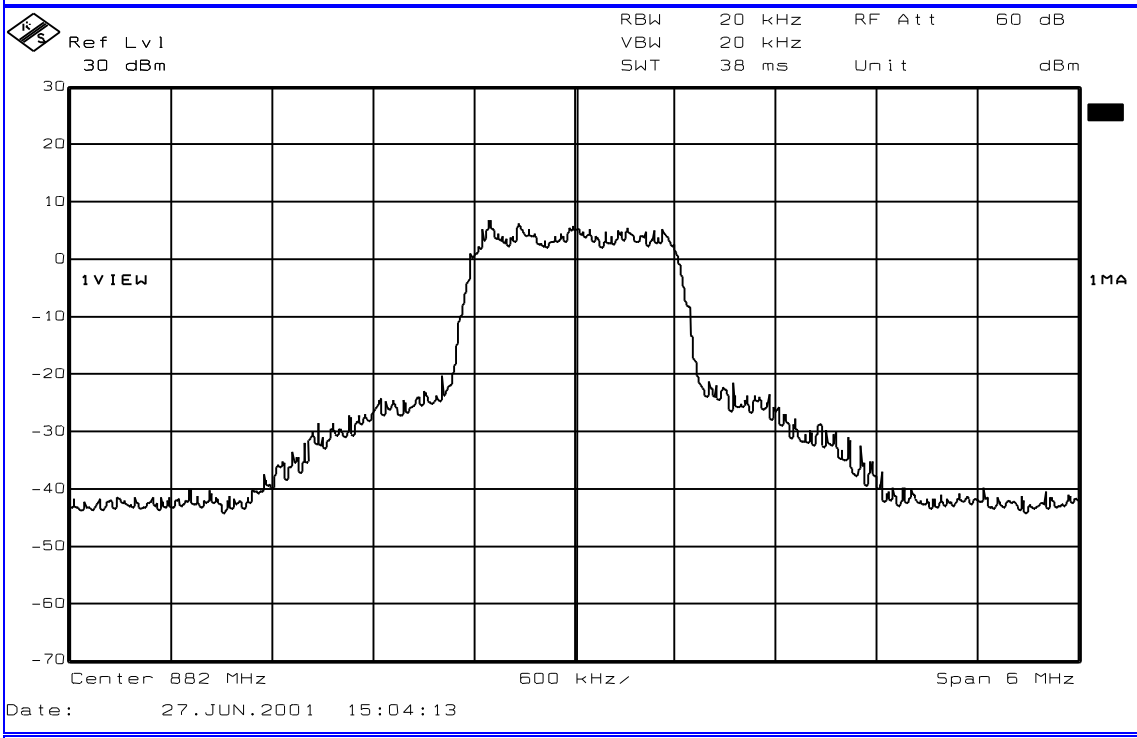
Notes: **Output Signal CDMA**
DOWNLINK

Test Data --- Occupied Bandwidth – CDMA

Data Plot Occupied Bandwidth CDMA

Page 2 of 2

Job No.:	1L0263R	Date:	6/27/01
Specification:	Part 22	Temperature(°C):	24
Tested By:	Chinda Poy	Relative Humidity(%)	30
E.U.T.:	DUAL BAND BRITCELL FAST SYSTEM		
Configuration:	Tx Full Power		



Notes: **Input Signal CDMA**
DOWNLINK

Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 2.1051
TESTED BY: Chinda Poy	DATE: 6/28/01

Test Results: Complies.

Test Data: See attached plots

Equipment Used: 1036-1043-1474

Measurement Uncertainty: +/- 1.6 dB

Test data --- Spurious Emissions at Antenna Terminals

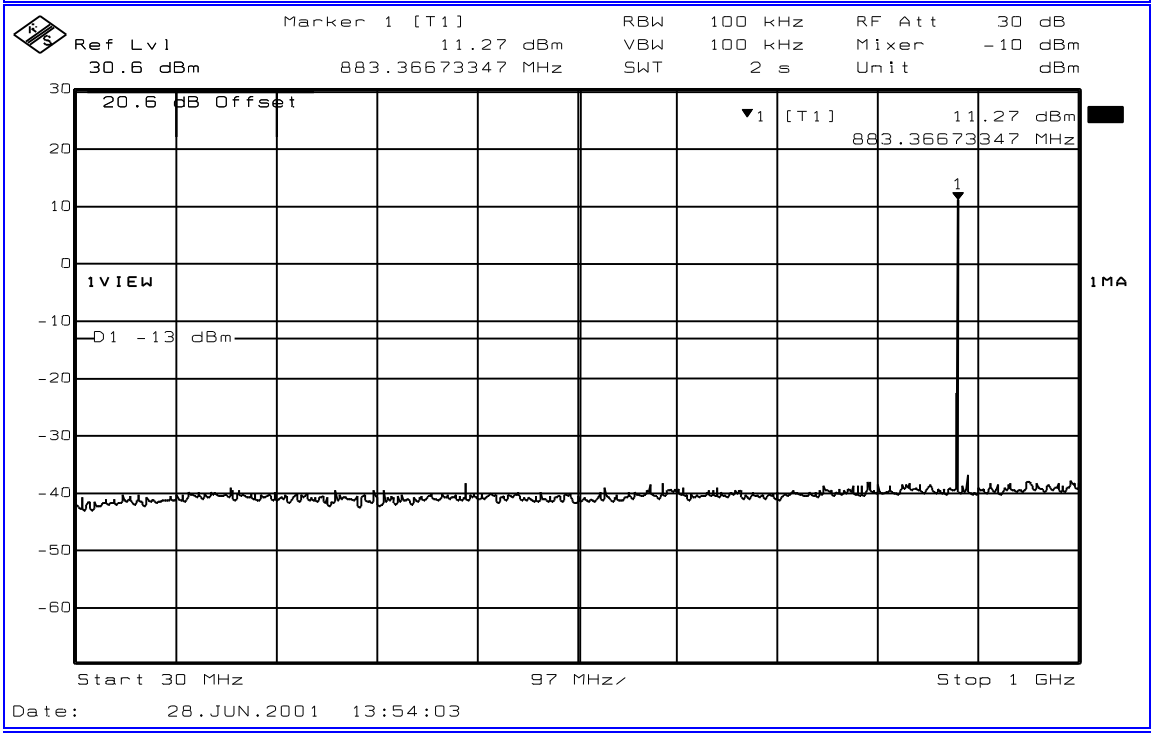
Data Plot **SPURIOUS EMISSIONS AT ANTENNA TERMINALS / ANALOG**

Page 1 of 4 Complete X
Job No.: 1L0263R Date: 6/28/01 Preliminary
Specification: Part 22 Temperature(°C): 22
Tested By: Chinda Poy Relative Humidity(%) 50
E.U.T.: DUAL BAND BRITCELL FAST SYSTEM
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:	1043
Filter:		Cable #2:	
Receiver:	1036	Cable #3:	
Attenuator #1	1474	Cable #4:	
Attenuator #2:		Mixer:	

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



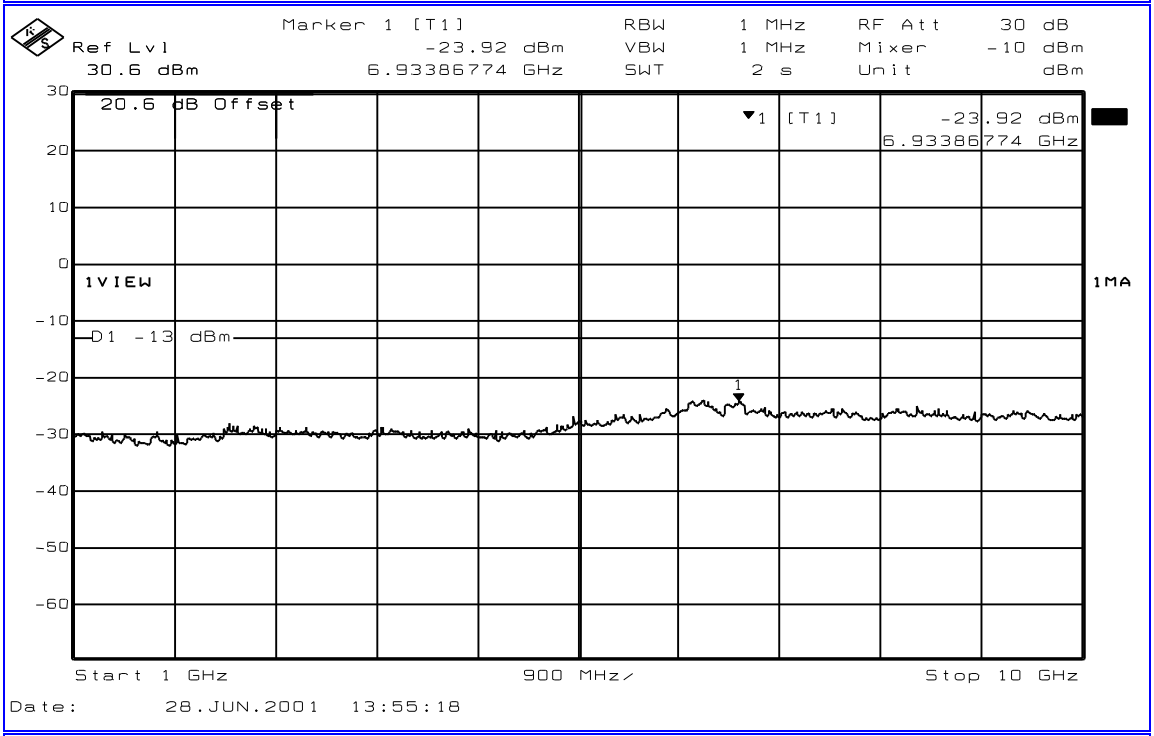
Notes: **30 MHz - 1 GHz**
MARKER INDICATES CARRIER

Test data --- Spurious Emissions at Antenna Terminals

Data Plot **SPURIOUS EMISSIONS AT ANTENNA TERMINALS / ANALOG**

Page 2 of 4

Job No.:	1L0263R	Date:	6/28/01
Specification:	Part 22	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%)	50
E.U.T.:	DUAL BAND BRITCELL FAST SYSTEM		
Configuration:	Tx Full Power		



Notes: **1 GHz - 10 GHz**
MARKER INDICATES HIGHEST EMISSION

Test data --- Spurious Emissions at Antenna Terminals

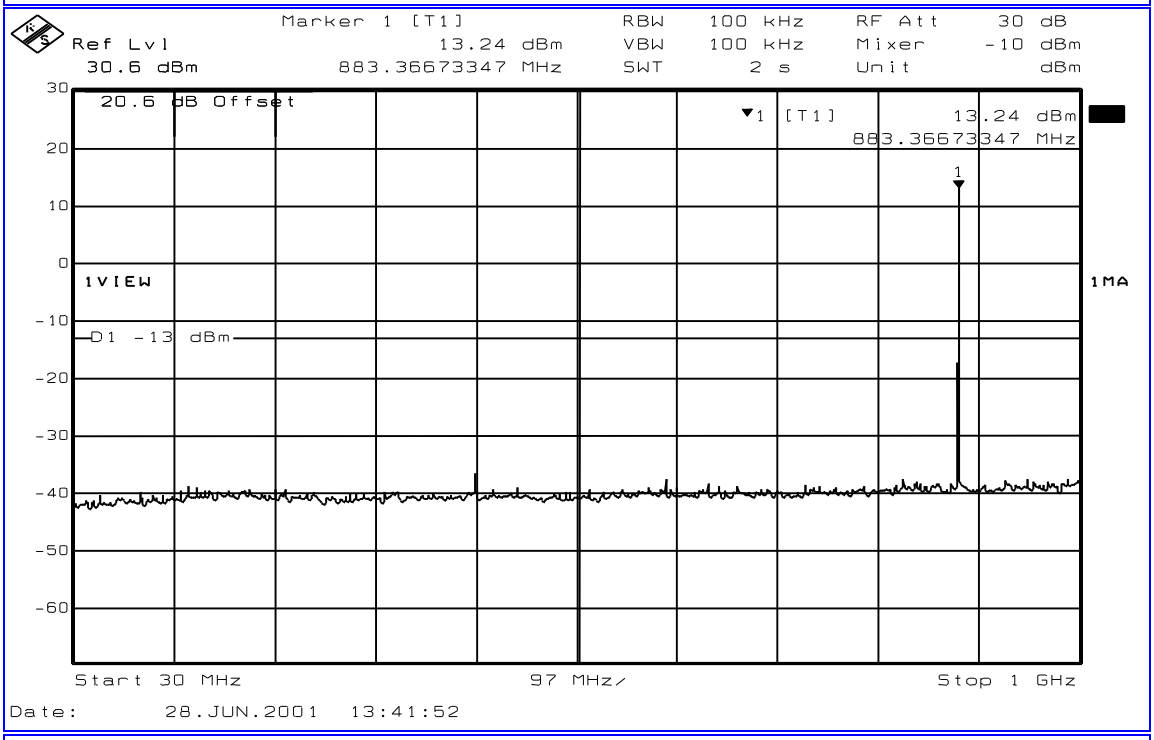
Data Plot **SPURIOUS EMISSIONS AT ANTENNA TERMINALS / TDMA**

Page 1 of 2 Complete X
Job No.: 1L0263R Date: 6/28/01 Preliminary
Specification: Part 22 Temperature(°C): 22
Tested By: Chinda Poy Relative Humidity(%) 50
E.U.T.: DUAL BAND BRITCELL FAST SYSTEM
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:	1043
Filter:		Cable #2:	
Receiver:	1036	Cable #3:	
Attenuator #1	1474	Cable #4:	
Attenuator #2:		Mixer:	

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



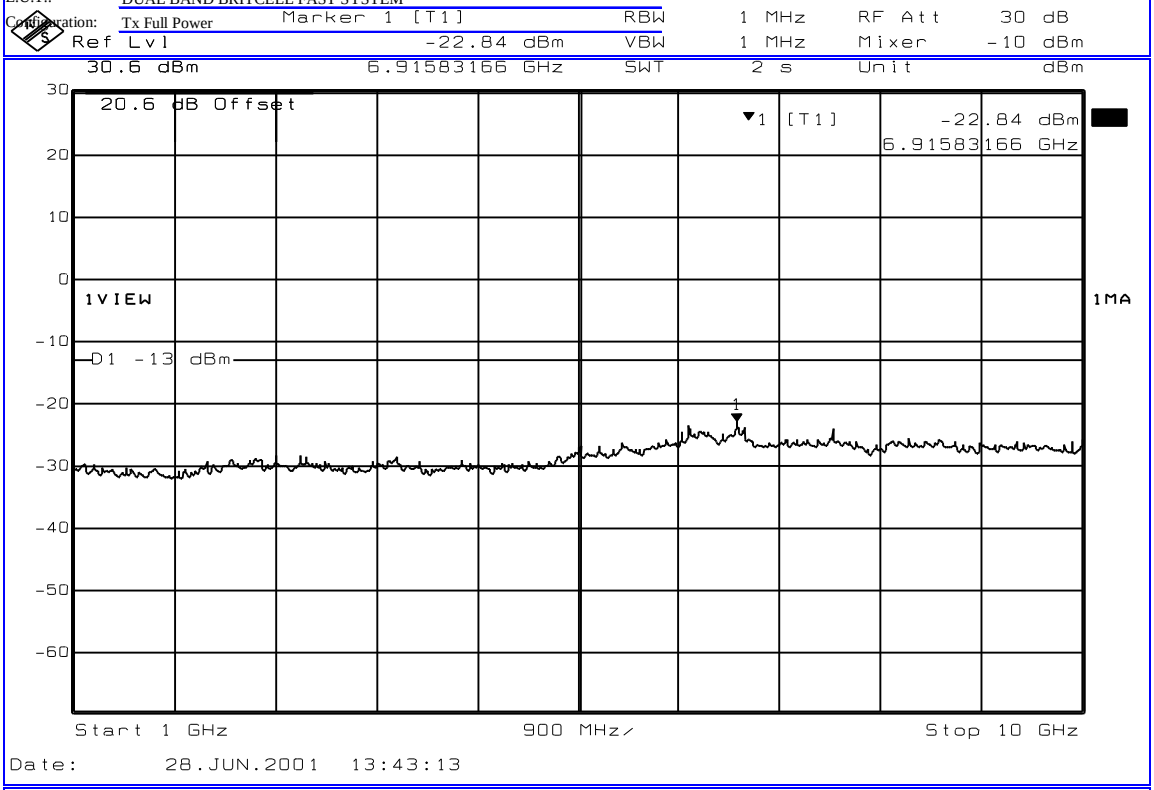
Notes: **30 MHz - 1 GHz**
MARKER INDICATES CARRIER

Test data --- Spurious Emissions at Antenna Terminals

Data Plot **SPURIOUS EMISSIONS AT ANTENNA TERMINALS / TDMA**

Page 2 of 2

Job No.: 1L0263R Date: 6/28/01
Specification: Part 22 Temperature(°C): 22
Tested By: Chinda Poy Relative Humidity(%) 50
E.U.T.: DUAL BAND BRITCELL FAST SYSTEM
Configuration: Tx Full Power



Notes: **1 GHz - 10 GHz**
MARKER INDICATES HIGHEST EMISSION

Test data --- Spurious Emissions at Antenna Terminals

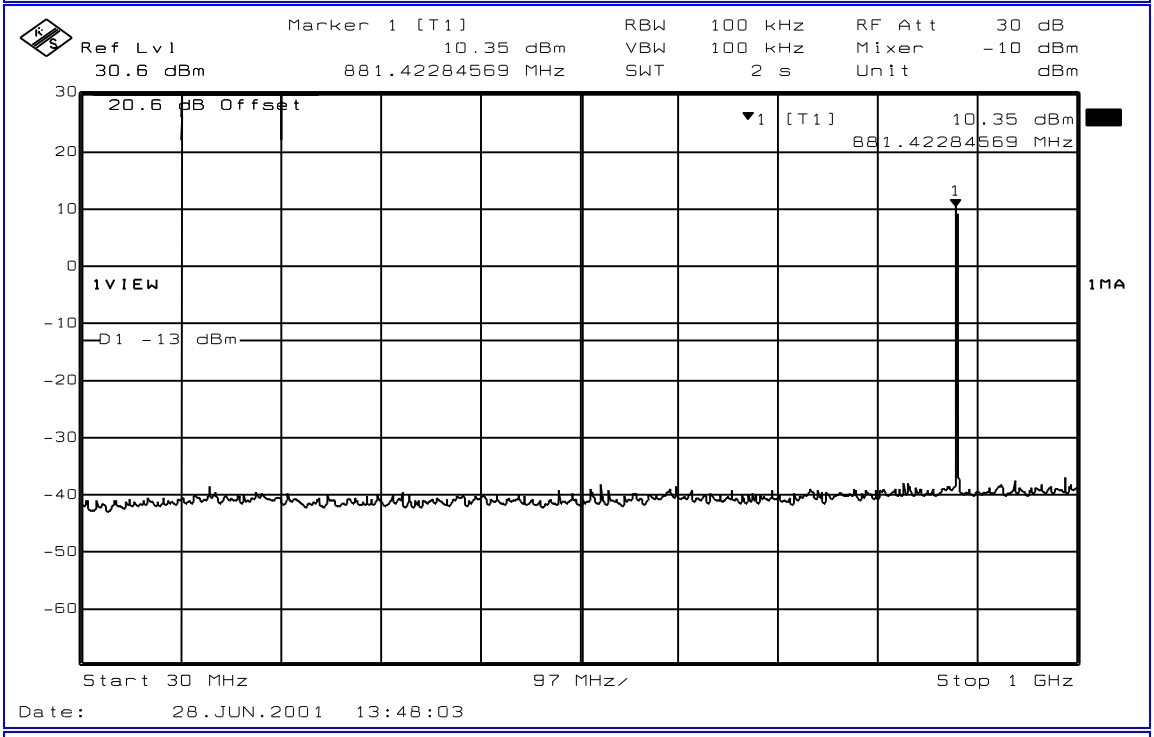
Data Plot **SPURIOUS EMISSIONS AT ANTENNA TERMINALS / CDMA**

Page 1 of 2 Complete X
Job No.: 1L0263R Date: 6/28/01 Preliminary
Specification: Part 22 Temperature(°C): 22
Tested By: Chinda Poy Relative Humidity(%) 50
E.U.T.: DUAL BAND BRITCELL FAST SYSTEM
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:	1043
Filter:		Cable #2:	
Receiver:	1036	Cable #3:	
Attenuator #1	1474	Cable #4:	
Attenuator #2:		Mixer:	

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



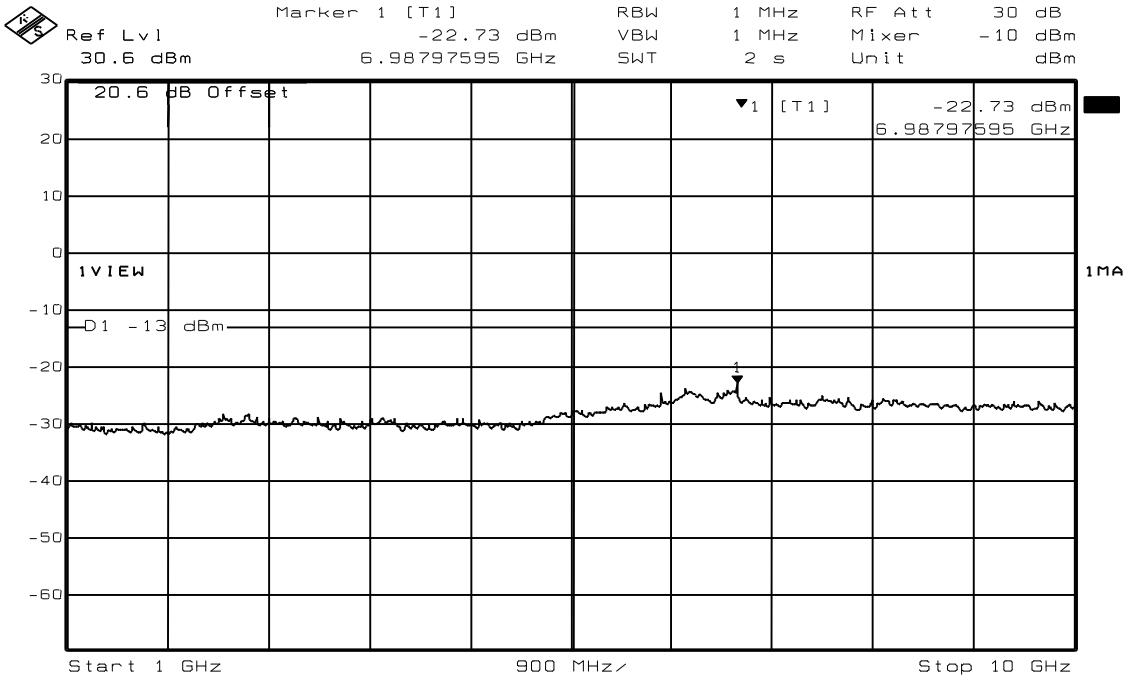
Notes: **30 MHz - 1 GHz**
MARKER INDICATES CARRIER

Test data --- Spurious Emissions at Antenna Terminals

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

Page 2 of 2

Job No.:	1L0263R	Date:	6/28/01
Specification:	Part 22	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%)	50
E.U.T.:	DUAL BAND BRITCELL FAST SYSTEM		
Configuration:	Tx Full Power		



Notes: **1 GHz - 10 GHz**
MARKER INDICATES HIGHEST EMISSION

Test data --- Spurious Emissions at Antenna Terminals

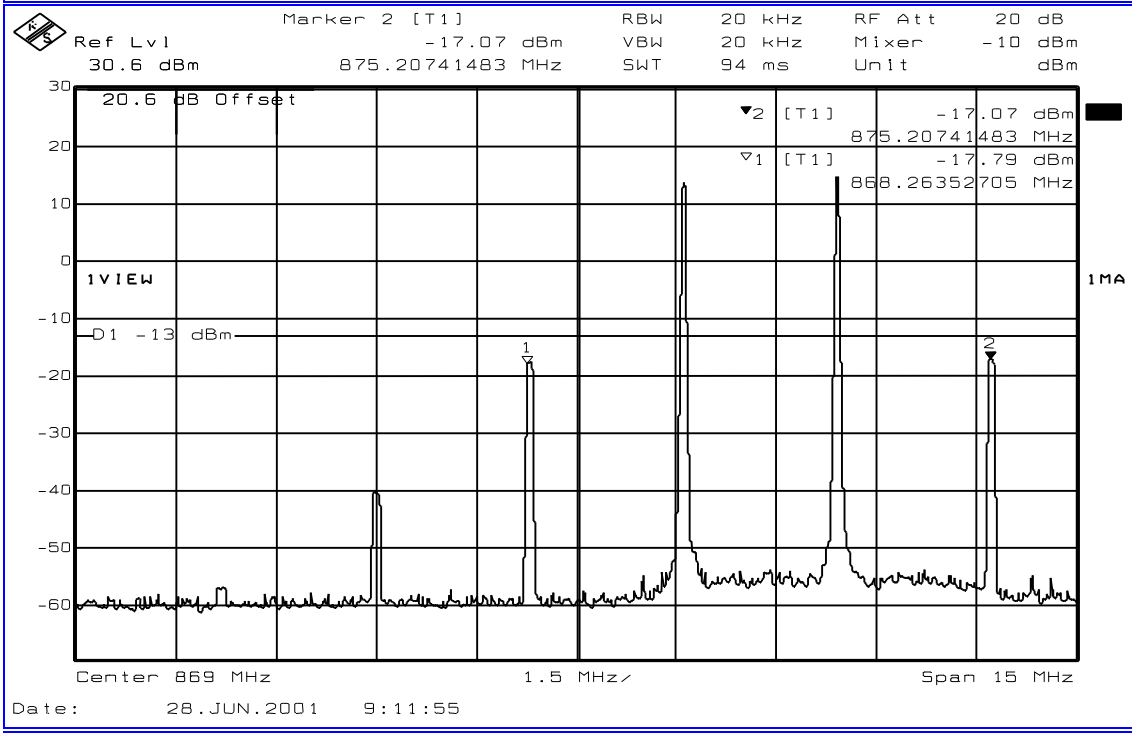
Data Plot **Intermodulation Characteristics Analog**

Page 1 of 2 Complete X
Job No.: 1L0263R Date: 6/28/01 Preliminary
Specification: Part 22 Temperature(°C): 22
Tested By: Chinda Poy Relative Humidity(%) 50
E.U.T.: DUAL BAND BRITCELL FAST SYSTEM
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:	1043
Filter:		Cable #2:	
Receiver:	1036	Cable #3:	
Attenuator #1	1474	Cable #4:	
Attenuator #2:		Mixer:	

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



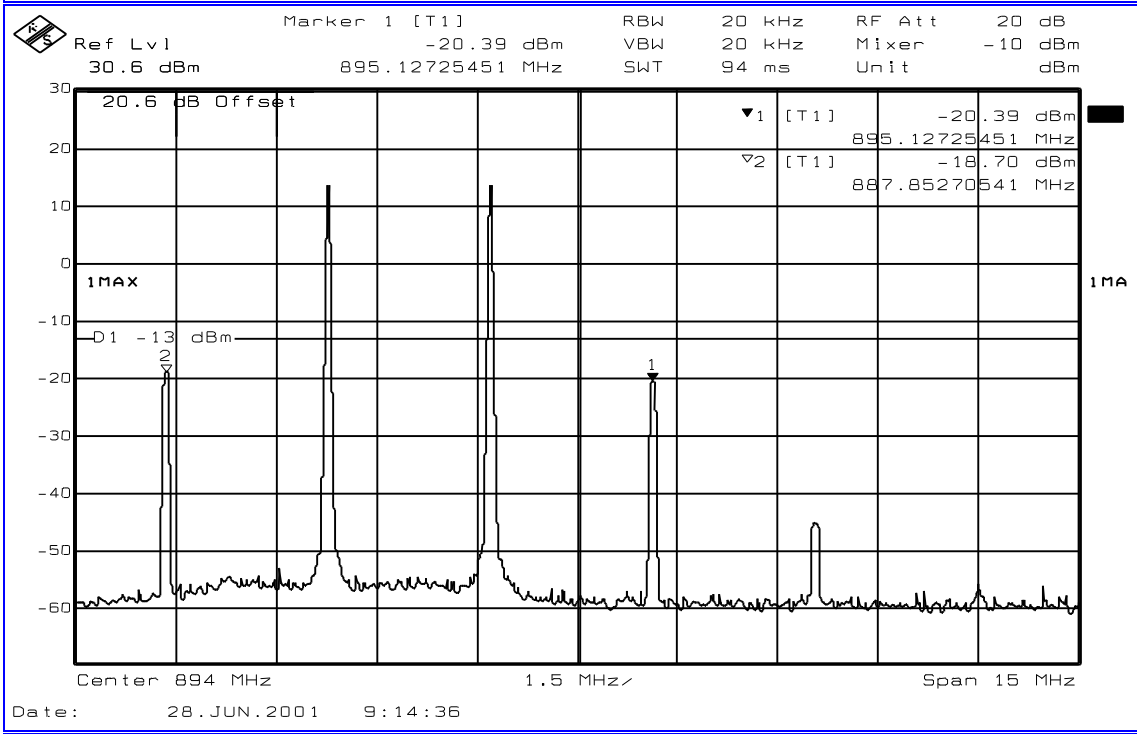
Notes: **ANALOG INTERMOD LOWER BANDEDGE (DOWNLINK)**
Marker 1 indicates highest emission outerband
Marker 2 indicates highest emission inband

Test data --- Spurious Emissions at Antenna Terminals

Data Plot **Intermodulation Characteristics Analog**

Page 2 of 2

Job No.:	1L0263R	Date:	6/28/01
Specification:	Part 22	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%)	50
E.U.T.:	DUAL BAND BRITCELL FAST SYSTEM		
Configuration:	Tx Full Power		



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

Test data --- Spurious Emissions at Antenna Terminals

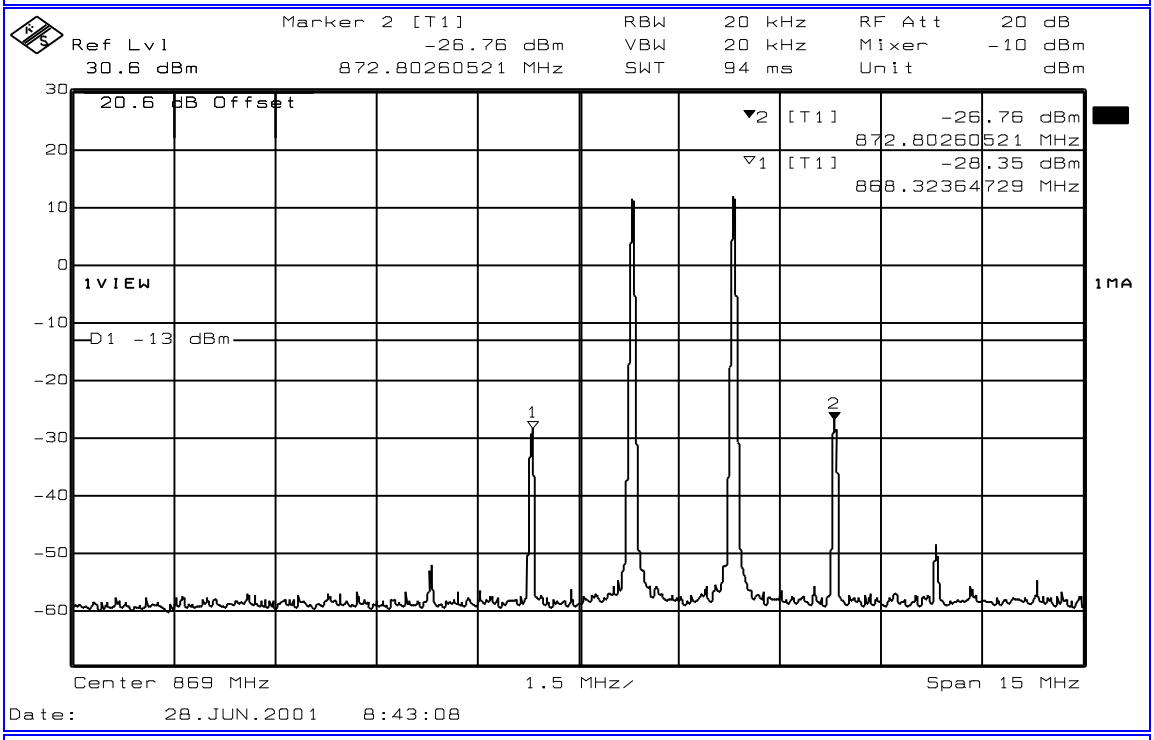
Data Plot **Intermodulation Characteristics TDMA**

Page 1 of 2 Complete X
Job No.: 1L0263R Date: 6/28/01 Preliminary
Specification: Part 22 Temperature(°C): 22
Tested By: Chinda Poy Relative Humidity(%) 50
E.U.T.: DUAL BAND BRITCELL FAST SYATEM
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:	1043
Filter:		Cable #2:	
Receiver:	1036	Cable #3:	
Attenuator #1	1474	Cable #4:	
Attenuator #2:		Mixer:	

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



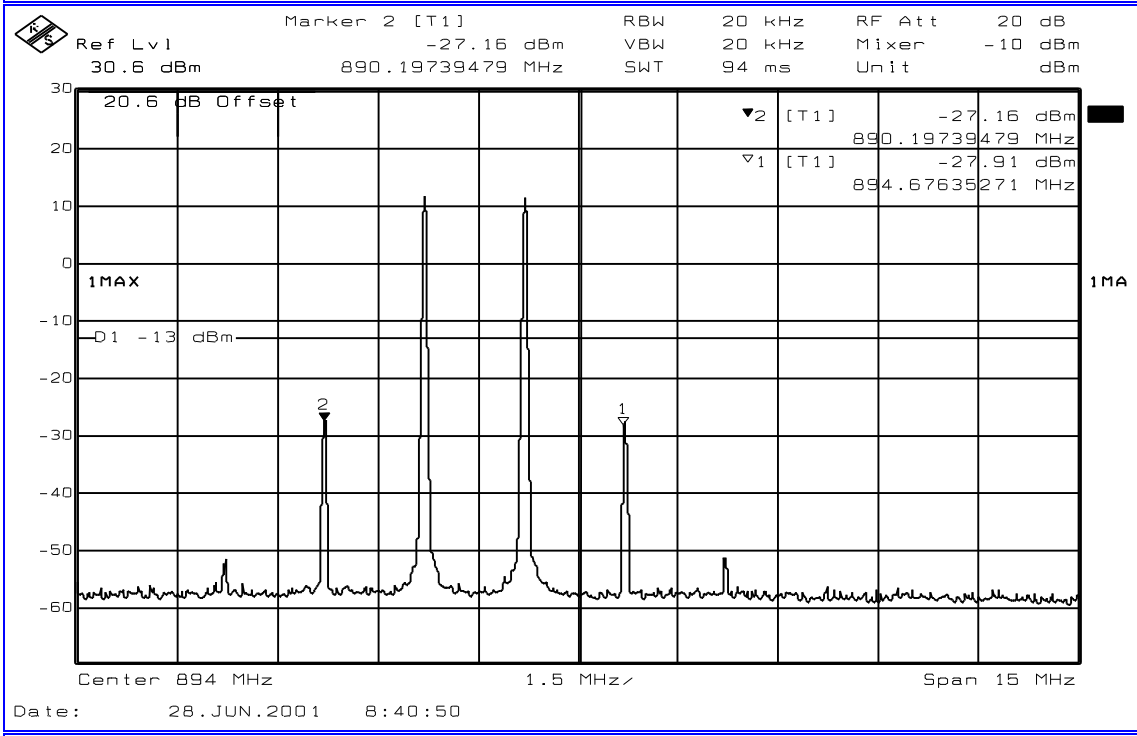
Notes: **TDMA INTERMOD LOWER BANDEDGE (DOWNLINK)**
Marker 1 indicates highest emission outerband
Marker 2 indicates highest emission inband

Test data --- Spurious Emissions at Antenna Terminals

Data Plot Intermodulation Characteristics TDMA

Page 2 of 2

Job No.:	1L0263R	Date:	6/28/01
Specification:	Part 22	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%)	50
E.U.T.:	DUAL BAND BRITCELL FAST SYATEM		
Configuration:	Tx Full Power		



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

Test data --- Spurious Emissions at Antenna Terminals

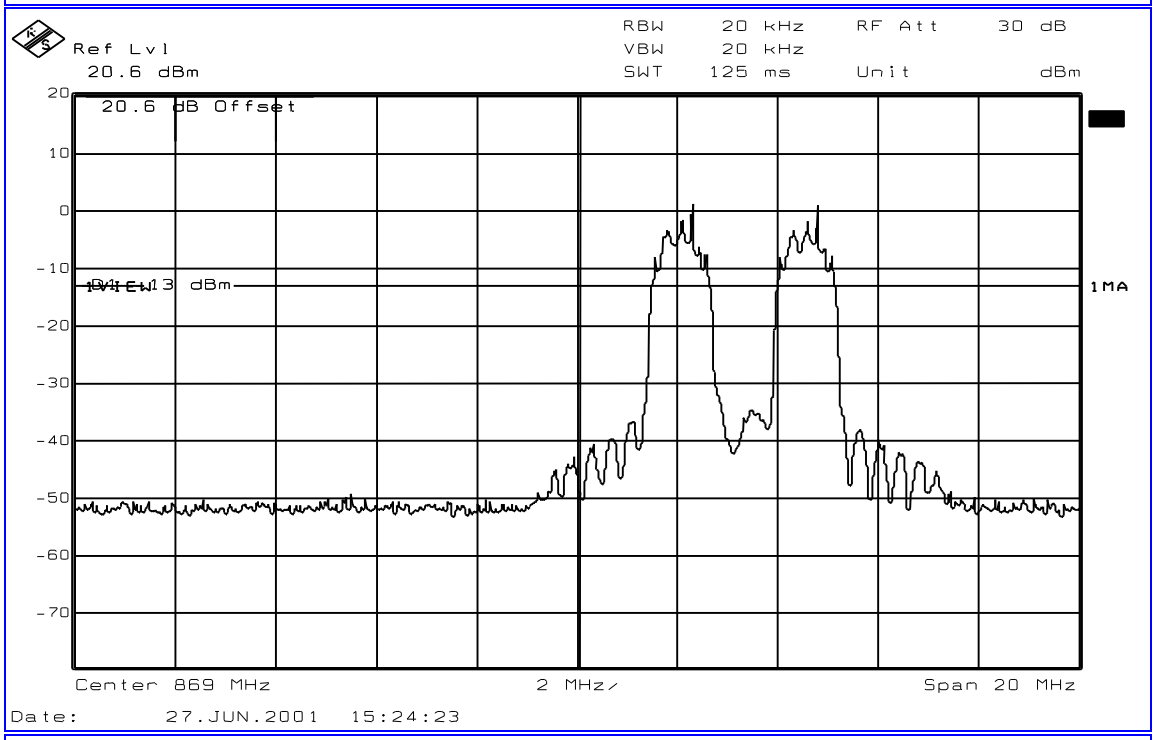
Data Plot **Intermodulation Characteristics CDMA**

Page 1 of 2 Complete X
Job No.: 1L0263R Date: 6/27/01 Preliminary
Specification: Part 22 Temperature(°C): 24
Tested By: Chinda Poy Relative Humidity(%) 30
E.U.T.: DUAL BAND BRITCELL FAST SYSTEM
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:	1043
Filter:		Cable #2:	
Receiver:	1036	Cable #3:	
Attenuator #1	1474	Cable #4:	
Attenuator #2:		Mixer:	

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



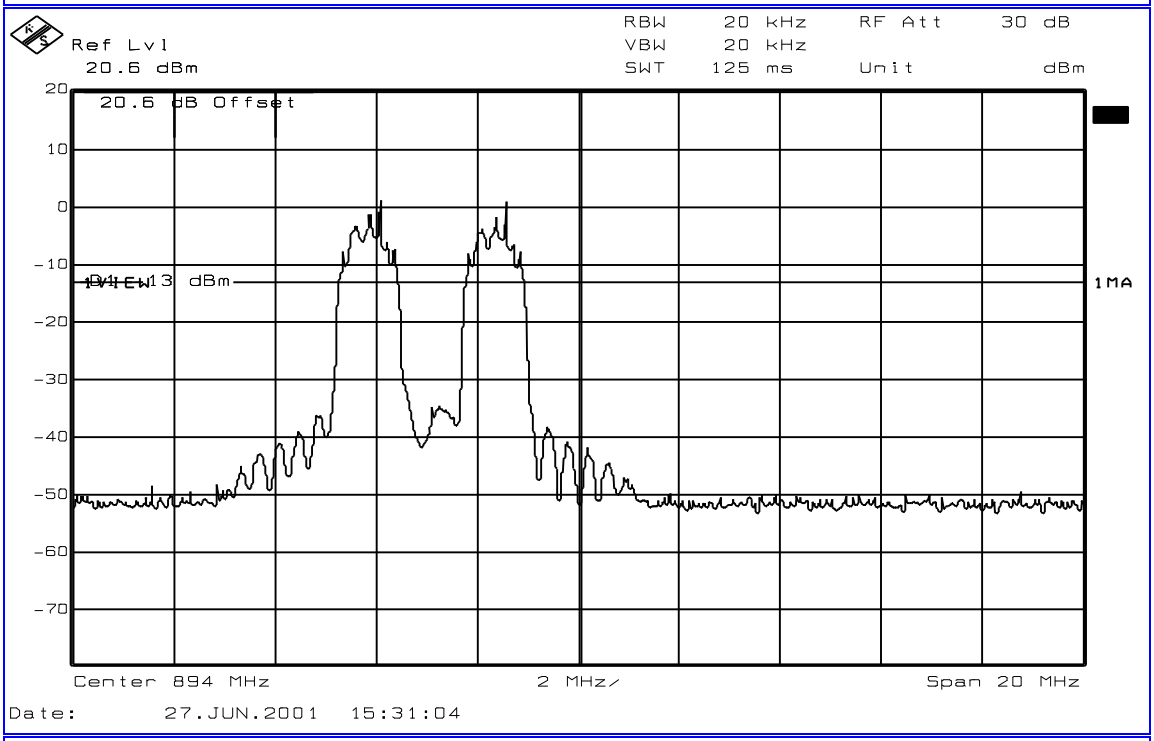
Notes: **CDMA INTERMOD LOWER BANDEDGE (DOWNLINK)**

Test data --- Spurious Emissions at Antenna Terminals

Data Plot **Intermodulation Characteristics CDMA**

Page 2 of 2

Job No.:	1L0263R	Date:	6/27/01
Specification:	Part 22	Temperature(°C):	24
Tested By:	Chinda Poy	Relative Humidity(%)	30
E.U.T.:	DUAL BAND BRITCELL FAST SYSTEM		
Configuration:	Tx Full Power		



Notes: **CDMA INTERMOD UPPER BANDEDGE (DOWNLINK)**

Test data --- Spurious Emissions at Antenna Terminals

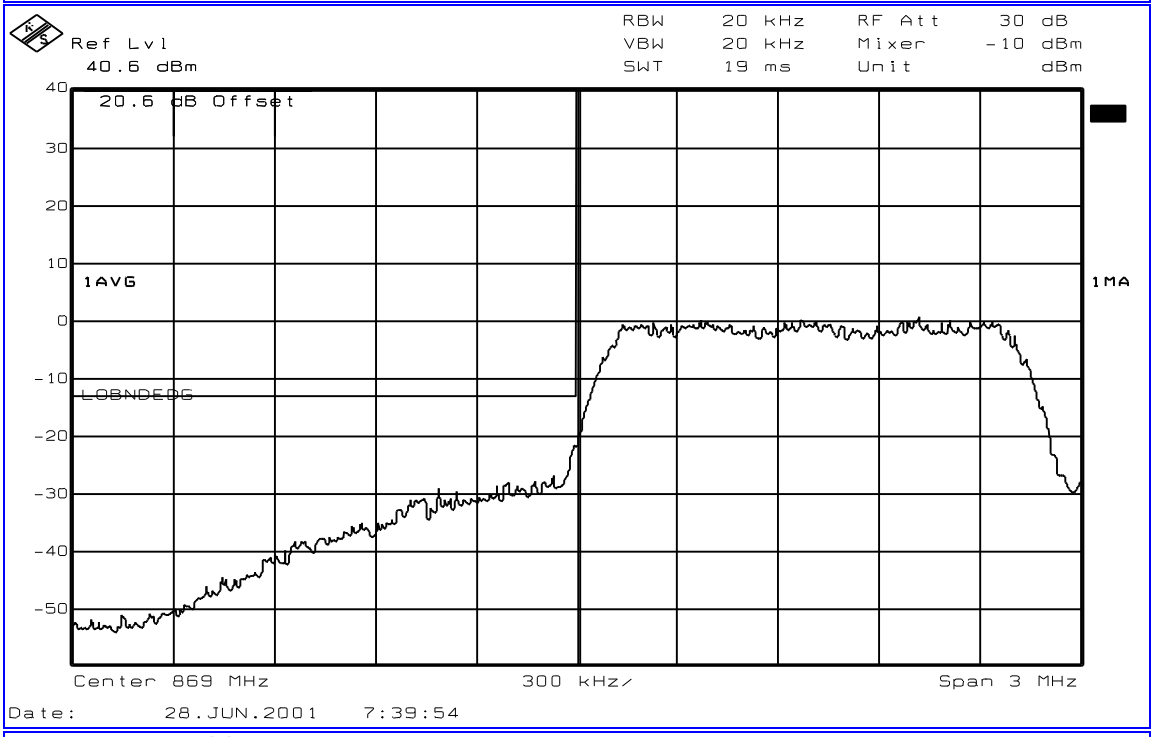
Data Plot **CDMA BANDEDGE**

Page 1 of 2 Complete X
Job No.: 1L0263R Date: 6/28/01 Preliminary
Specification: Part 22 Temperature(°C): 22
Tested By: Chinda Poy Relative Humidity(%) 50
E.U.T.: DUAL BAND BRITCELL FAST SYSTEM
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:	1043
Filter:		Cable #2:	
Receiver:	1036	Cable #3:	
Attenuator #1	1474	Cable #4:	
Attenuator #2:		Mixer:	

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



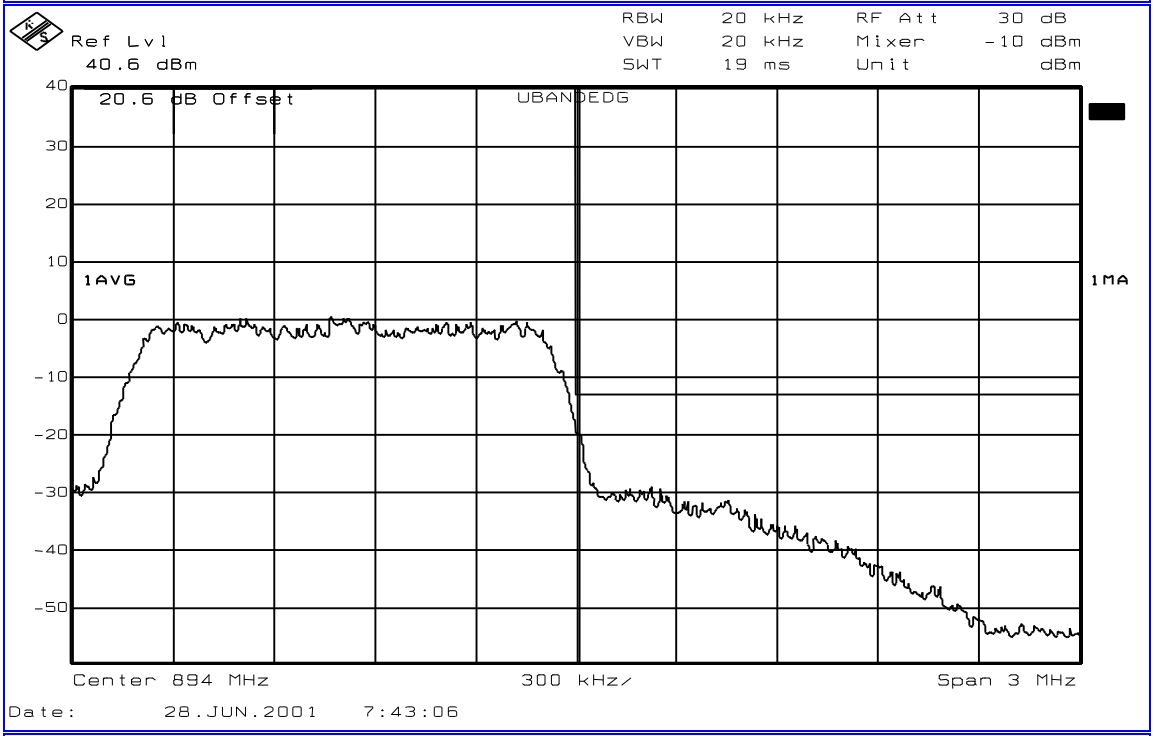
Notes: **Lower Bandedge CDMA**
DOWNLINK

Test data --- Spurious Emissions at Antenna Terminals

Data Plot **CDMA BANDEDGE**

Page 2 of 2

Job No.:	1L0263R	Date:	6/28/01
Specification:	Part 22	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%)	50
E.U.T.:	DUAL BAND BRITCELL FAST SYSTEM		
Configuration:	Tx Full Power		



Notes: **Upper Bandedge CDMA**
DOWNLINK

Section 6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious	PARA. NO.: 2.1053
TESTED BY: Chinda Poy	DATE: 6/28/01

Test Results: Complies.

Test Data: See attached table.

Equipment Used: 1464-1046-1484-1485

Measurement Uncertainty: +/- 3.6 dB

Test Data -- Field Strength of Spurious Emissions

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

Nemko Dallas, Inc.

Field Strength of Spurious Emissions

Page 1 of 1 Complete X
Job No.: 1L0263R Date: 6/29/01 Preliminary
Specification: PART 22 Temperature(°C): 24
Tested By: Chinda Poy Relative Humidity(%) 48
E.U.T.: DUAL BAND BRITCELL FAST SYSTEM
Configuration: TX FULL POWER
Sample Number:
Location: AC 2 RBW: 1 MHz Measurement Distance 3 m
Detector Type: Peak VBW: 1 MHz

Test Equipment Used

Antenna:	993	Directional Coupler:	#N/A
Pre-Amp:	1016	Cable #1:	1046
Filter:	#N/A	Cable #2:	1484
Receiver:	1036	Cable #3:	1485
Attenuator #1	#N/A	Cable #4:	#N/A
Attenuator #2:	#N/A	Mixer:	#N/A

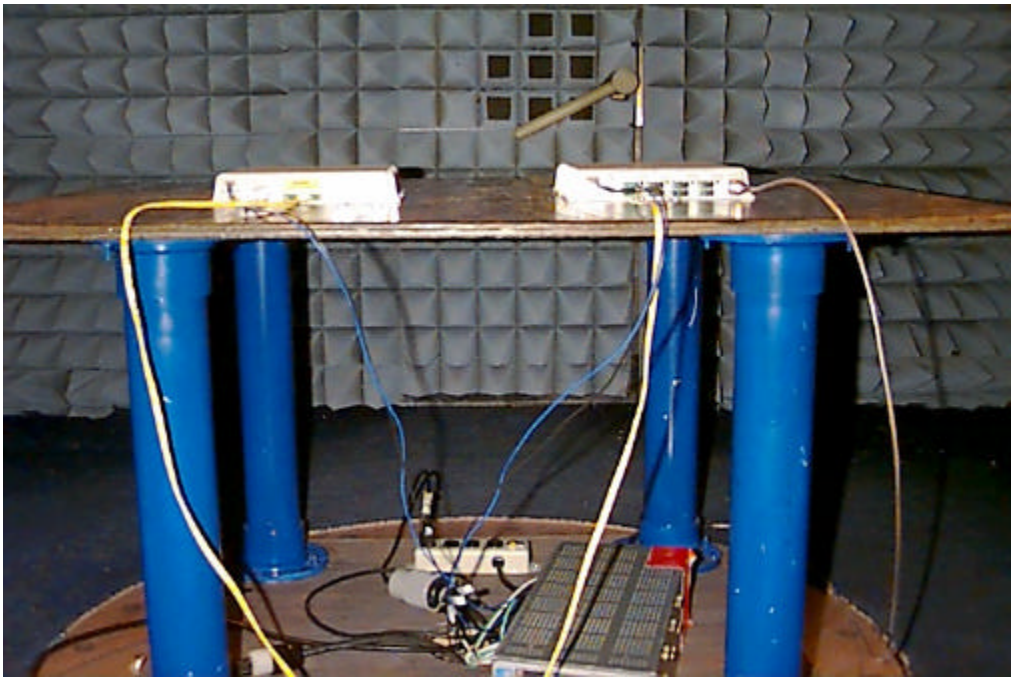
Additional equipment used:
Measurement Uncertainty: +/- .7 dB

Frequency (GHz)	Meter Reading (dBm)	Antenna Factor (dB)	Cable Loss (dB)	Pre-Amp Gain (dB)	Conversion Factor	Corrected Reading (dBuV/m)	ERP (mW)	EIRP (dBm)	Polarity	Comments
1764.00	-60.67	24.3	3	33.3		-67	0.000000	-161.90	H	Noise Floor
2646.00	-59.17	29	3.3	33.8		-61	0.000000	-155.90	H	Noise Floor
3528.00	-61.33	29.9	3.8	33.6		-61	0.000000	-156.46	H	Noise Floor
4410.00	-60.83	32	4.4	33.8		-58	0.000000	-153.46	H	Noise Floor
5292.00	-62.33	33.8	4.7	33.3		-57	0.000000	-152.36	H	Noise Floor
6174.00	-62.67	34.4	5.3	32.7		-56	0.000000	-150.90	H	Noise Floor
7056.00	-62	35.7	5.8	32.8		-53	0.000000	-148.53	H	Noise Floor
7938.00	-61.5	37.8	6.5	33.7		-51	0.000000	-146.13	H	Noise Floor
8820.00	-61	37	6.9	34.3		-51	0.000000	-146.63	H	Noise Floor
1764.00	-60.5	24.3	3	33		-66	0.000000	-161.43	V	Noise Floor
2646.00	-61	29	3.3	33.8		-63	0.000000	-157.73	V	Noise Floor
3528.00	-60.3	29.9	3.8	33.6		-60	0.000000	-155.43	V	Noise Floor
4410.00	-62.5	32	4.4	33.8		-60	0.000000	-155.13	V	Noise Floor
5292.00	-62.67	33.8	4.7	33.3		-57	0.000000	-152.70	V	Noise Floor
6174.00	-63.17	34.4	5.3	32.7		-56	0.000000	-151.40	V	Noise Floor
7056.00	-61.5	35.7	5.8	32.8		-53	0.000000	-148.03	V	Noise Floor
7938.00	-62	37.8	6.5	33.7		-51	0.000000	-146.63	V	Noise Floor
8820.00	-61.67	37	6.9	34.3		-52	0.000000	-147.30	V	Noise Floor

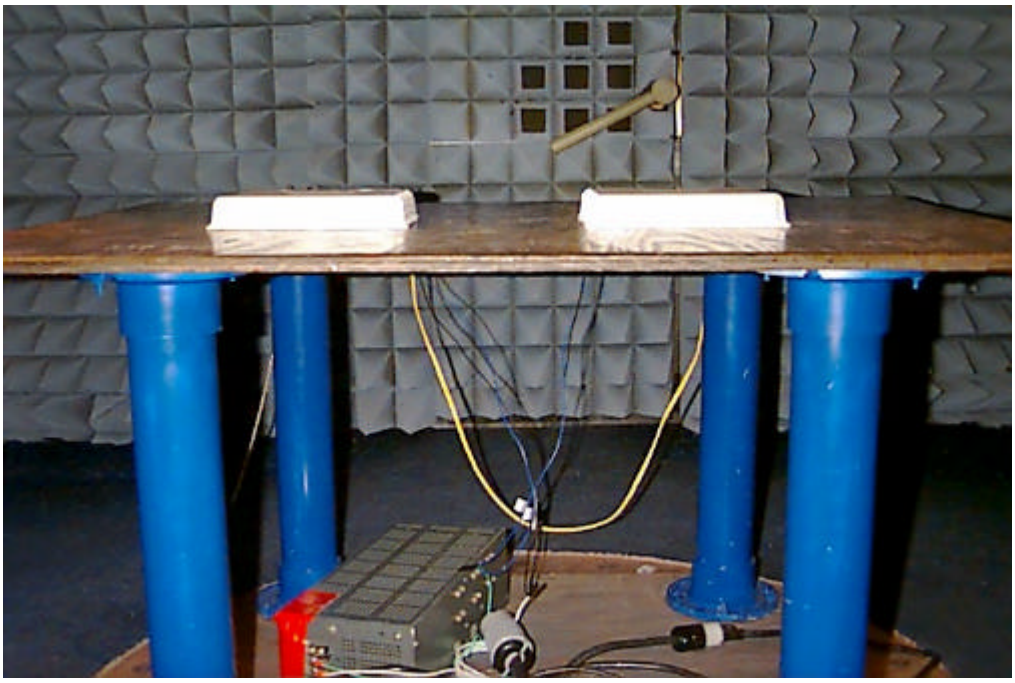
Notes: **882 MHz / SCANNED TO THE 10TH HARMONIC**

Photos – Field Strength of Spurious Emissions

Front



Rear



Section 7. Frequency Stability

NAME OF TEST: Frequency Stability P[illegible]

TESTED BY: D[illegible]

Not Applicable

Test Re[illegible] Complie[illegible]

Test Data: See attached table.
Standard Test Frequency: MHz
Standard Test Voltage:

Equipment Used:

Measurement Uncertainty: +/- 1 x 10^{-7} ppm

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
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	01/02/01	01/02/02
1474	20db Attenuator DC 18 Ghz	MCL Inc. BW-S20W2	NONE	CBU	N/A
1043	Flexable cable 1m	Astrolab Inc. 32027-2-29094K-1M	0	01/29/01	01/29/02
1046	Flex cable 1m	Astrolab Inc. 32022-2-29094K-1M	N/A	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	06/01/01	06/01/02

ANNEX A - TEST DETAILS

NAME OF TEST: RF Power Output	**PARA. NO.: 2.1046**

Minimum Standard: Para. No. 22.913(a). The maximum effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 watts.

Method Of Measurement:

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

Integral Antenna:
If the antenna is not detachable from the circuit then the Peak Power Output is derived from the peak radiated field strength of the fundamental emission by using the plane wave relation $GP/4\pi R^2 = E^2/120\pi$ and proceeding as follows:

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

where,

P = the equivalent isotropic radiated power in watts
E = the maximum measured field strength in V/m
R = the measurement range (3 meters)
G = the numeric gain of the transmit antenna in relation to an isotropic radiator

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

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

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

at least 117 log (f_d/12)

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

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

Method Of Measurement:

Spectrum Analyzer Settings:

RBW: 300 Hz
VBW: ≥ RBW
Span: 100 kHz
Sweep: Auto

Input Signal Characteristics (F3E/F3D):

RF level: Maximum recommended by manufacturer
AF1 frequency: 6 kHz
AF1 level: sufficient to produce 2 kHz deviation
AF2 frequency: 2.5 kHz
AF2 level: sufficient to produce 12 kHz deviation.

NAME OF TEST: Occupied Bandwidth (WB Data)	**PARA. NO.: 2.1049**

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

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

at least 26 dB

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

at least 45 dB

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

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

Method Of Measurement:

Spectrum Analyzer Settings:
RBW: 300 Hz
VBW: ≥ RBW
Span: 200 kHz
Sweep: Auto

Input Signal Characteristics:
RF level: Maximum recommended by manufacturer
AF1 frequency: 10 kHz, random bit sequence
AF1 level: sufficient to produce 8 kHz deviation

NAME OF TEST: Occupied Bandwidth (ST)	**PARA. NO.: 2.1049**

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

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

at least 26 dB

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

at least 45 dB

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

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

Method Of Measurement:

Spectrum Analyzer Settings:
RBW: 300 Hz
VBW: ≥ RBW
Span: 200 kHz
Sweep: Auto

Input Signal Characteristics:
RF level: Maximum recommended by manufacturer
AF1 frequency: 10 kHz tone
AF1 level: sufficient to produce 8 kHz deviation

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

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

Method Of Measurement:

Spectrum Analyzer Settings:
RBW: CDMA (30 kHz), GSM (30 kHz), NADC (1 kHz) and CDPD (1 kHz)
VBW: ≥ RBW
Span: As required
Sweep: Auto

Input Signal Characteristics:
RF level: Maximum recommended by manufacturer

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

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

Method Of Measurement:

Spectrum Analyzer Settings:
RBW: 30 kHz (AMPS). As required for digital modulations.
VBW: ≥ RBW
Start Frequency: 0 MHz
Stop Frequency: 10 GHz
Sweep: Auto

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

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

Calculation Of Field Strength Limit:

An example of attenuation requirement of 43 + 10 Log P is equivalent to -13 dBm (5×10^{-5} Watts) at the antenna terminal. We determine the field strength limit by using the plane wave relation.

$GP/4\pi R^2 = E^2/120\pi$

For emissions ≤ 1 GHz:

G = 1.64 (Dipole Gain)
P = 10^{-5} Watts (Maximum spurious output power)
R = 3m (Measurement Distance)

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

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

For emissions > 1 GHz:

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

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

The spectrum is searched to 10 GHz.

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

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

Table C-1

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

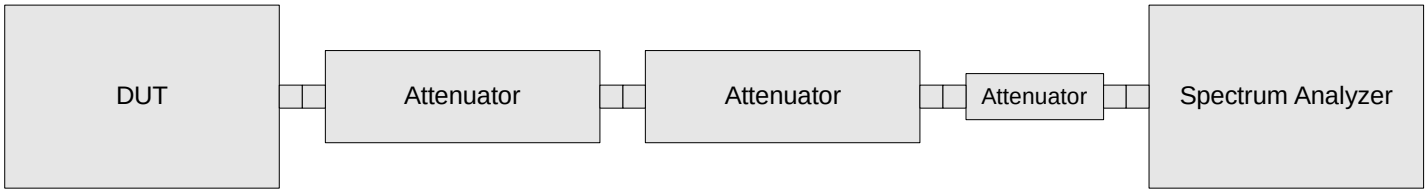
Method Of Measurement:

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

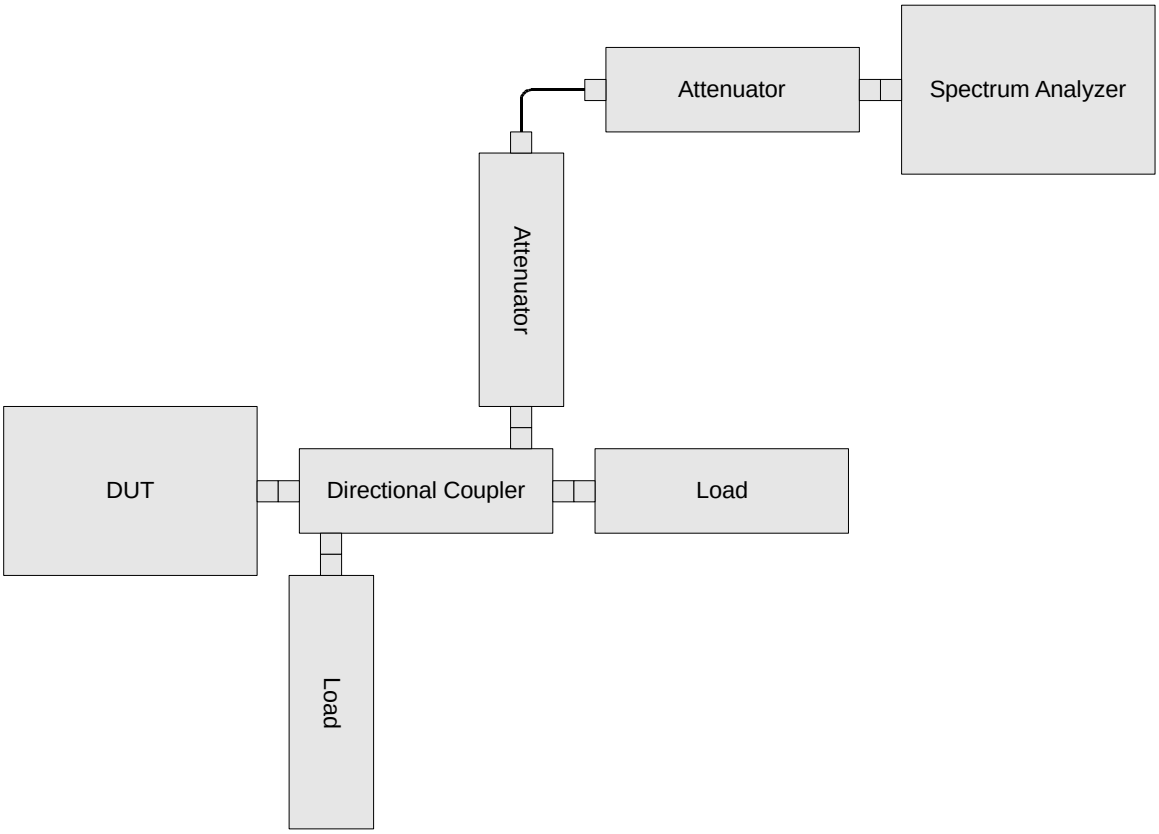
Frequency Stability With Temperature Variation:
The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30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

ANNEX B - TEST DIAGRAMS

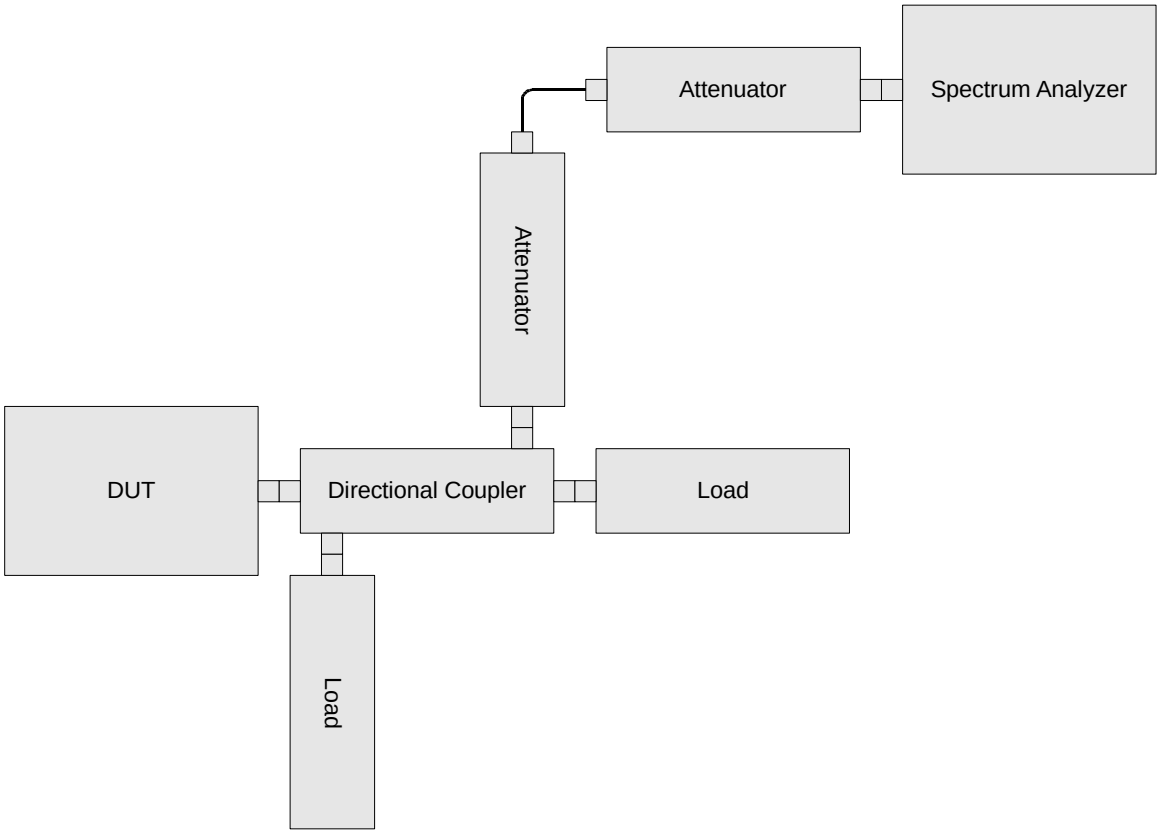
Para. No. 2.1046 - R.F. Power Output

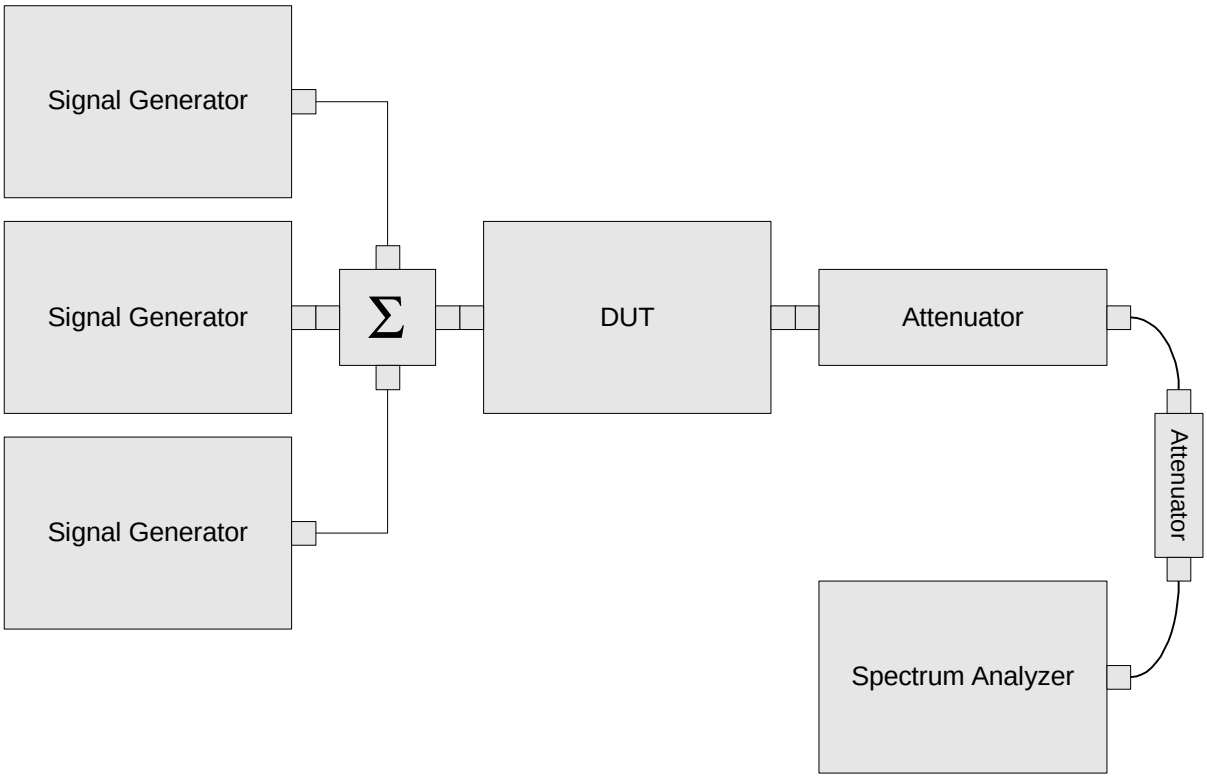


Para. No. 2.1049 - Occupied Bandwidth

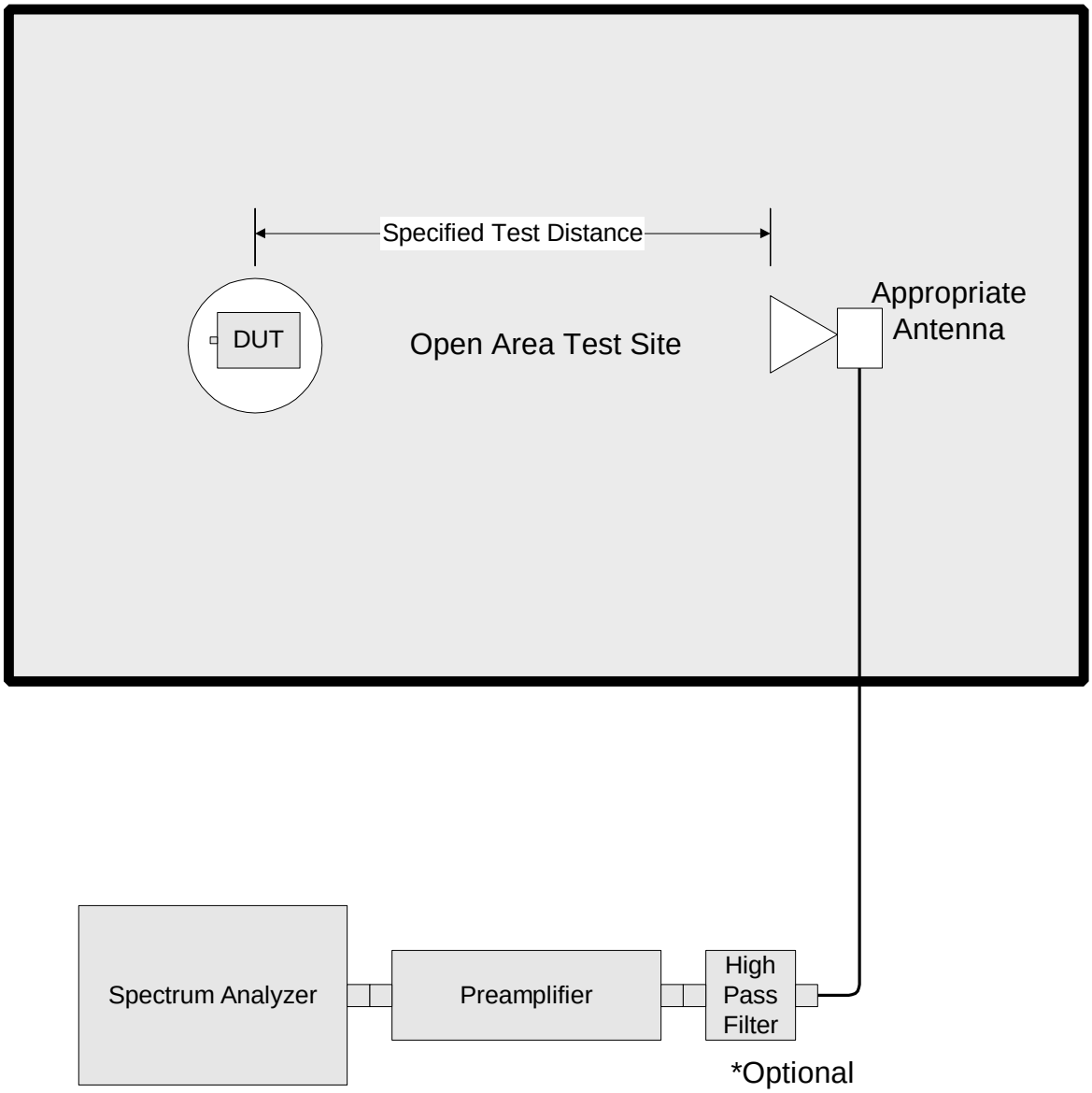


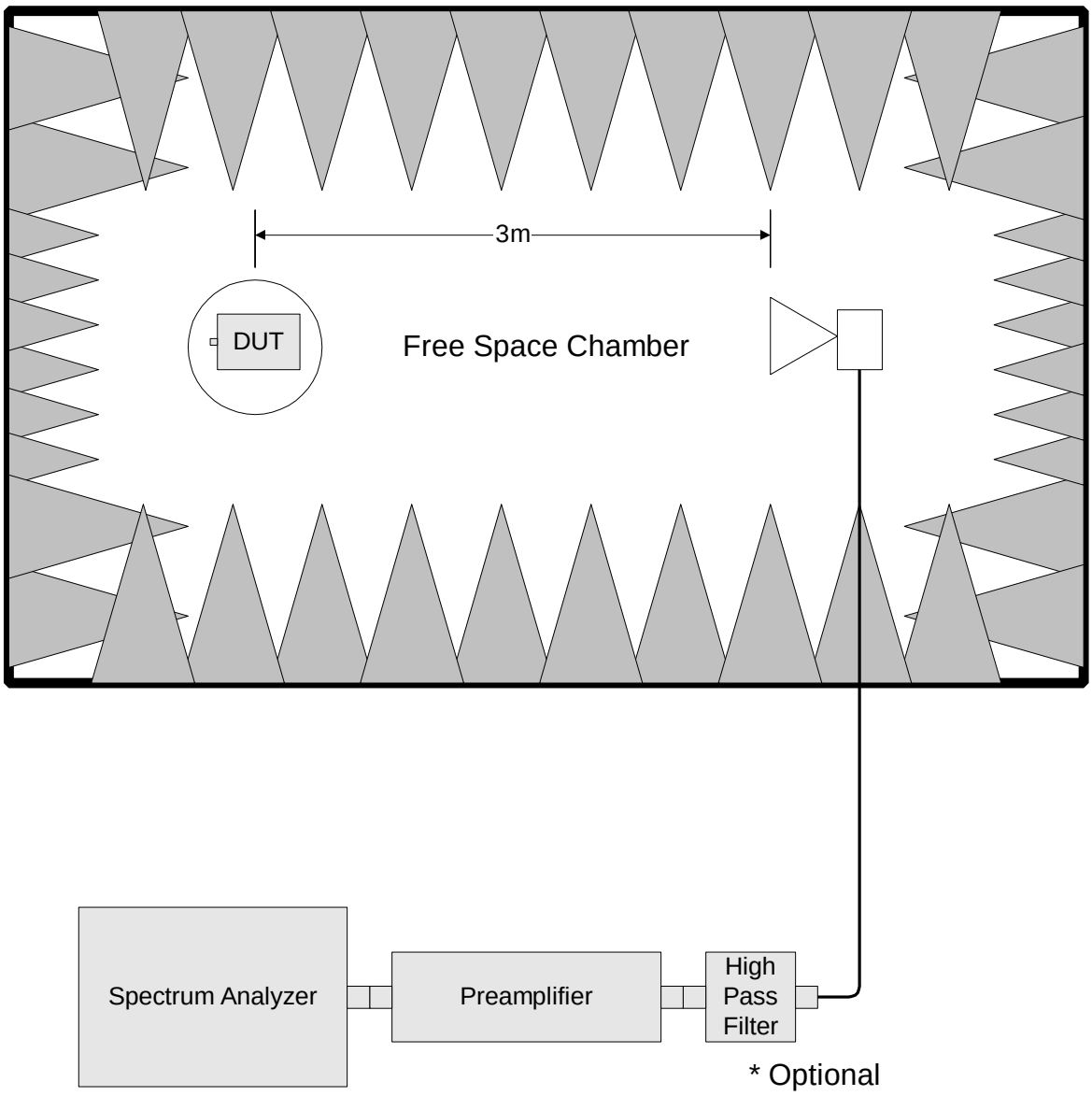
Para. No. 2.1051 Spurious Emissions at Antenna Terminals



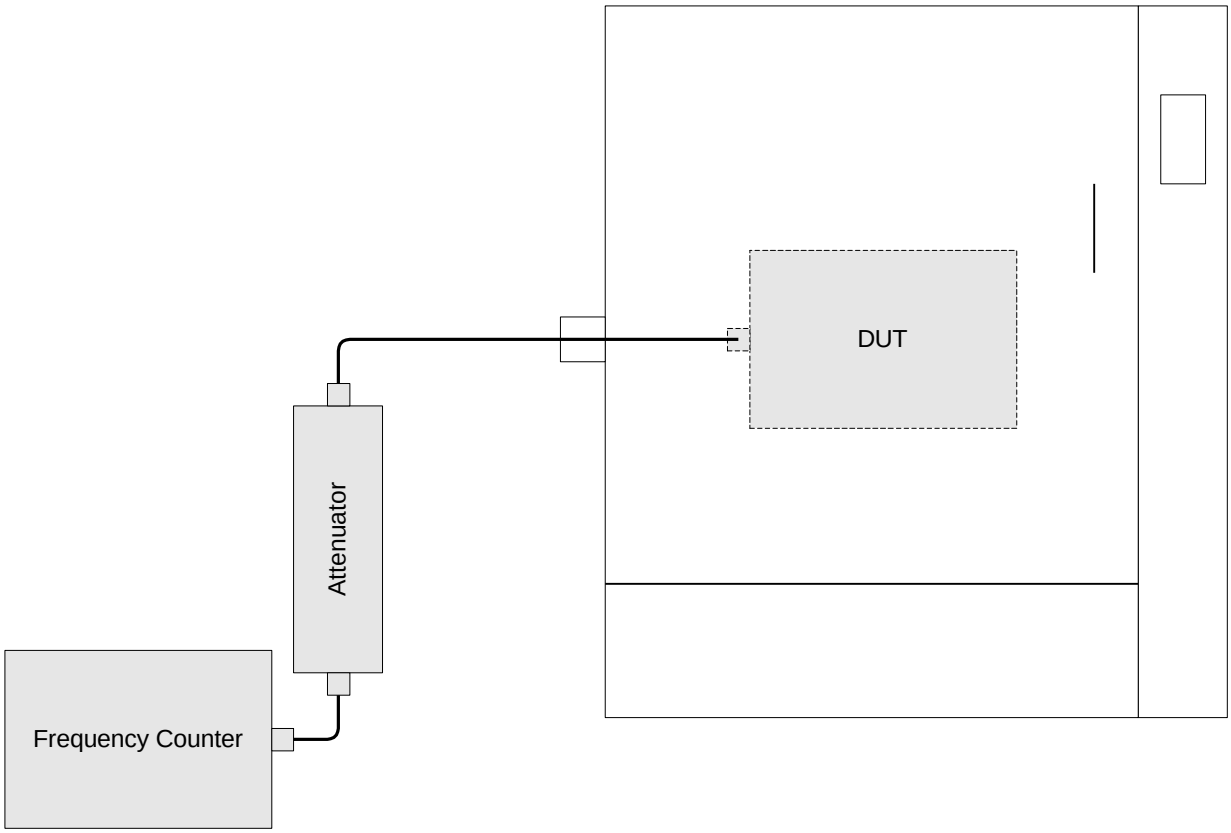

Signal Generator
Signal Generator
Signal Generator
Σ
DUT
Attenuator
Attenuator
Spectrum Analyzer

Para. No. 2.1053 - Field Strength of Spurious Radiation




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

Para. No. 2.1055 - Frequency Stability



Nemko Test Report No.:	1L0263RUS2
Applicant:	ALLEN TELECOM 140 Vista Center Drive Forest, Virginia 24551
Equipment Under Test:	DUAL BAND BRITECELL FAST SYSTEM
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:	7/16/01
Total Number of Pages:	50

Table of Contents

Section 1. Summary of Test Results

Manufacturer: ALLEN TELECOM

Model No.: DUAL BAND BRITECELL FAST SYSTEM

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

Summary Of Test Data

NAME OF TEST	PARA. NO.	SPEC.	MEAS.	RESULT
RF Power Output	24.232	100W	< 100W	Complies
Occupied Bandwidth (CDMA)	24.238	Input/Output	Plot	Complies
Occupied Bandwidth (GSM)	24.238	Input/Output	Plot	Complies
Occupied Bandwidth (NADC)	24.238	Input/Output	Plot	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:		-48 VDC
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
		CDMA (G7W) ☒ **GSM (GXW)** ☒ **NADC (DXW)** ☒
System Gain:		0 dB
Output Impedance:		50 ohms
		1 Carrier 14.5 dBm 2 Carrier 10.0 dBm 3 Carrier 5.0 dBm 4 Carrier 3.5 dBm
		F1-F1 ☒ **F1-F2** ☐ **N/A** ☐
		Software ☐ **Duplexer** ☐ **Fullband** ☒

Description of Modifications For Class II Permissive Change

Not Applicable

Modifications Made During Testing

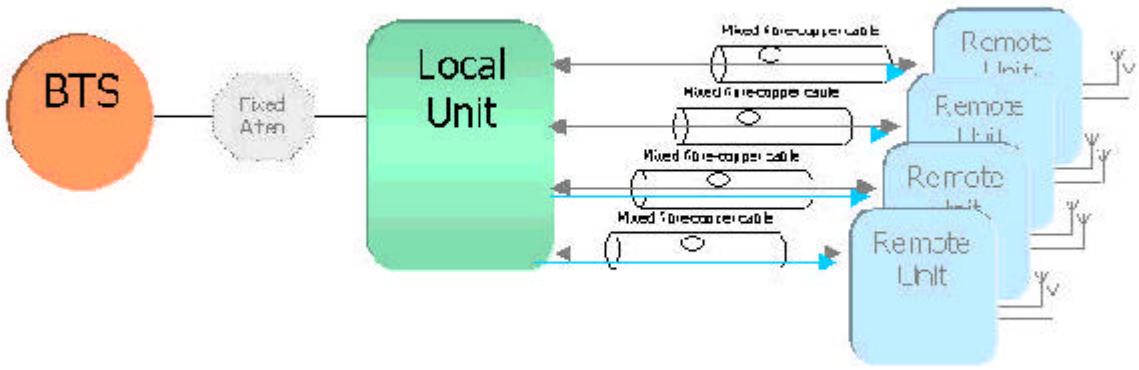
Not Applicable

Description of Operation

BRITECELL™ FAST is a plug and play BriteCell kit, offering the most suitable solution for indoor coverage in small areas, thanks to its compactness and absolute easiness to install. The package includes up to four compact RF remote transceivers (TFAF), driven by one local distribution unit (TFLF). It is available in various frequency ranges (from 800MHz up to 2200 MHz), as a single band product. It is aimed to satisfy the requirements of 2 nd and 3 rd generation mobile networks for simple coverage needs.

The TFLF local unit has been properly designed into a stand-alone mechanical case, including all required ancillary and support functions. The kit includes also four standard TFAF Remote units and a compound fiber-copper cable to connect them to local unit. The installed units can be lately kept also in case of system expansion to a fully modular BriteCell configuration, both single band or dual band, with a minimum setting effort. Both TFL and TFA can be optionally hosted into TKA mounting kits, allowing outdoor installation if required.

System Diagram



Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 2.1046
TESTED BY: Chinda Poy	DATE: 6/28/01

Test Results: Complies.

Measurement Data:

	Modulation Type	Per Channel Output Power (dBm)	Composite Output Power (dBm)
Uplink	CDMA	N/A	N/A
Downlink	CDMA	14.8 dBm	17.8 dBm
Uplink	GSM	N/A	N/A
Downlink	GSM	18.6 dBm	21.6 dBm
Uplink	NADC	N/A	N/A
Downlink	NADC	17.8 dBm	20.8 dBm

Equipment Used: 1036-1043-1474

Measurement Uncertainty: +/- 1.7 dB

Temperature: 24 °C

Relative Humidity: 35 %

Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth (CDMA)	PARA. NO.: 2.1049
TESTED BY: Chinda Poy	DATE: 6/28/01

Test Results: Complies.

Test Data: See attached plot(s).

Equipment Used: 1036-1043-1474

Measurement Uncertainty: +/- 1.7 dB

Test Data – Occupied Bandwidth -- CDMA

Data Plot Occupied Bandwidth CDMA

Page 1 of 2 Complete X

Job No.: 1L0263R Date: 6/28/01 Preliminary

Specification: Part 24 Temperature(°C): 22

Tested By: Chinda Poy Relative Humidity(%) 50

E.U.T.: DUAL BAND BRITCELL FAST SYSTEM

Configuration: Tx Full Power

Sample Number:

Location: Lab 1 RBW: Refer to plots

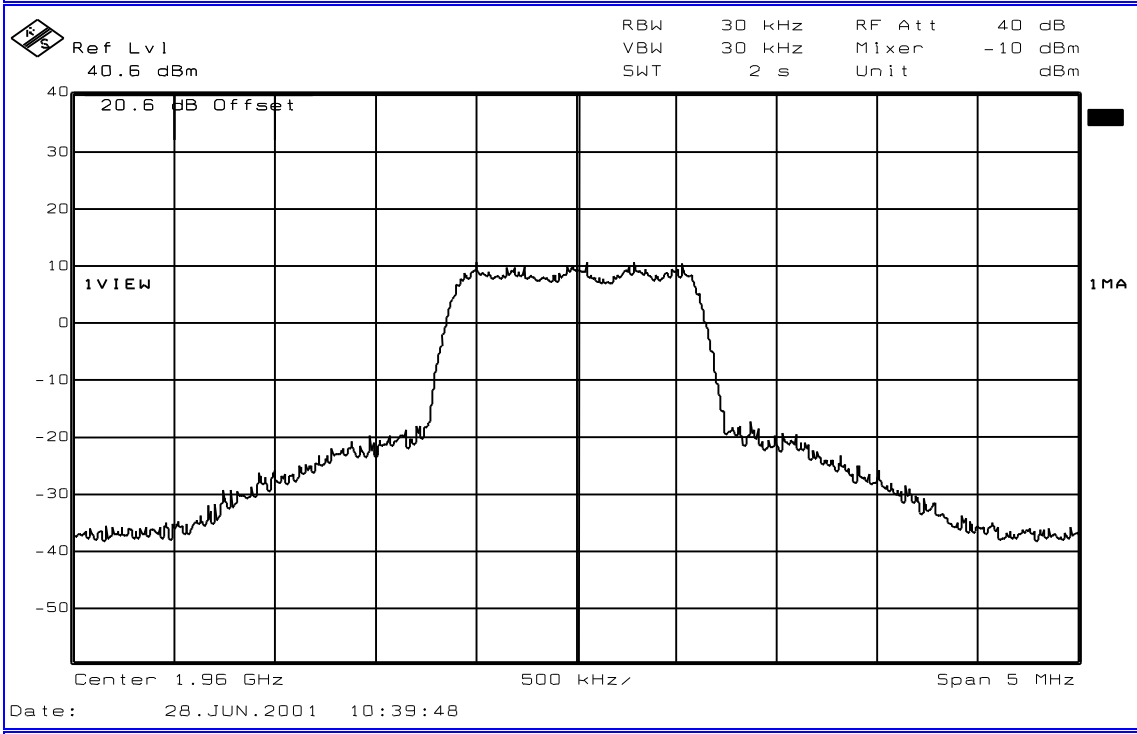
Detector Type: Peak VBW: Refer to plots

Test Equipment Used

Antenna:		Directional Coupler:	
Pre-Amp:		Cable #1:	1043
Filter:		Cable #2:	
Receiver:	1036	Cable #3:	
Attenuator #1	1474	Cable #4:	
Attenuator #2:		Mixer:	

Additional equipment used:

Measurement Uncertainty: +/-3.6 dB



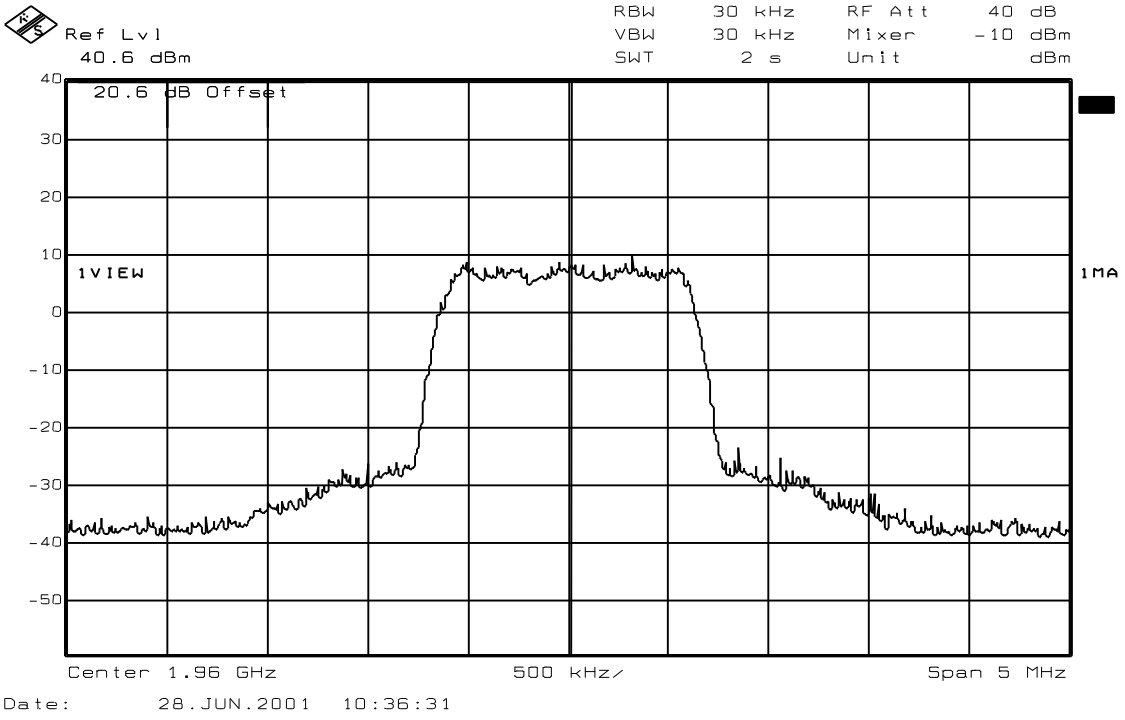
Notes: **OUTPUT SIGNAL CDMA**
DOWNLINK

Test Data – Occupied Bandwidth -- CDMA

Data Plot Occupied Bandwidth CDMA

Page 2 of 2

Job No.:	1L0263R	Date:	6/28/01
Specification:	Part 24	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%)	50
E.U.T.:	DUAL BAND BRITCELL FAST SYSTEM		
Configuration:	Tx Full Power		



Notes: **INPUT SIGNAL CDMA**
DOWNLINK

NAME OF TEST: Occupied Bandwidth (GSM)	PARA. NO.: 2.1049
TESTED BY: Chinda Poy	DATE: 6/28/01

Test Results: Complies.

Test Data: See attached plot(s).

Equipment Used: 1036-1043-1474

Measurement Uncertainty: +/- 1.7 dB

Test Data – Occupied Bandwidth – GSM

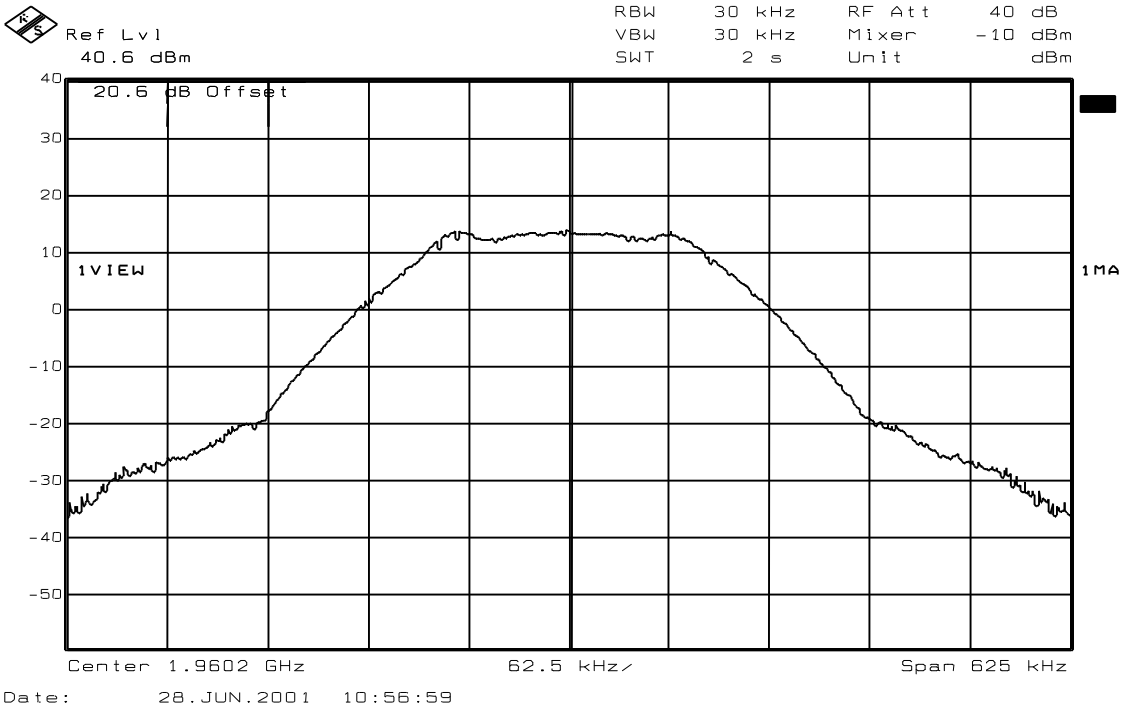
Data Plot Occupied Bandwidth GSM

Page 1 of 2 — Complete X — Preliminary

Job No.: 1L0263R — Date: 6/28/01
Specification: Part 24 — Temperature(°C): 22
Tested By: Chinda Poy — Relative Humidity(%) 50
E.U.T.: DUAL BAND BRITCELL FAST SYSTEM
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: 1043
Filter: — Cable #2:
Receiver: 1036 — Cable #3:
Attenuator #1 1474 — Cable #4:
Attenuator #2: — Mixer:
Additional equipment used:
Measurement Uncertainty: +/-3.6 dB



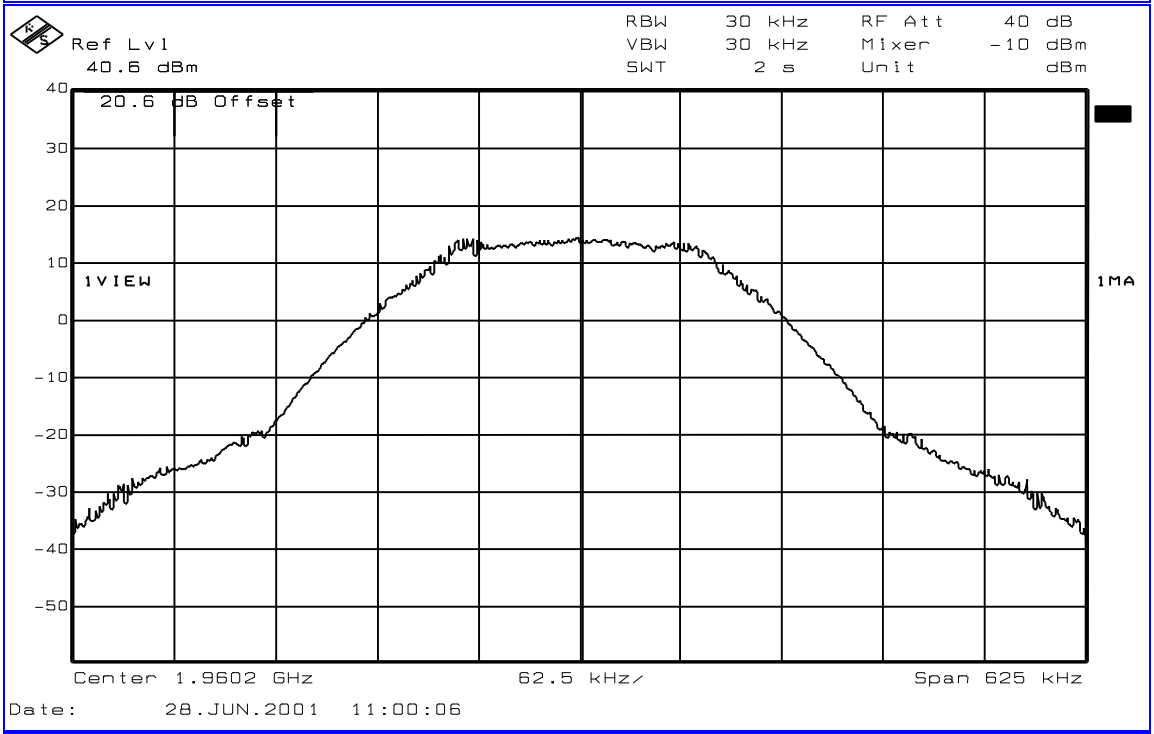
Notes: **OUTPUT SIGNAL GSM**
DOWNLINK

Test Data – Occupied Bandwidth – GSM

Data Plot Occupied Bandwidth GSM

Page 2 of 2

Job No.:	1L0263R	Date:	6/28/01
Specification:	Part 24	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%)	50
E.U.T.:	DUAL BAND BRITCELL FAST SYSTEM		
Configuration:	Tx Full Power		



Notes: **INPUT SIGNAL GSM**
DOWNLINK

NAME OF TEST: Occupied Bandwidth (NADC)	PARA. NO.: 2.1049
TESTED BY: Chinda Poy	DATE: 6/28/01

Test Results: Complies.

Test Data: See attached plot(s).

Equipment Used: 1036-1043-1474

Measurement Uncertainty: +/- 1.7 dB

Test Data – Occupied Bandwidth – NADC

Data Plot Occupied Bandwidth TDMA

Page 1 of 2 Complete X

Job No.: 1L0263R Date: 6/28/01 Preliminary

Specification: Part 24 Temperature(°C): 22

Tested By: Chinda Poy Relative Humidity(%) 50

E.U.T.: Cell Extender

Configuration: Tx Full Power

Sample Number:

Location: Lab 1 RBW: Refer to plots

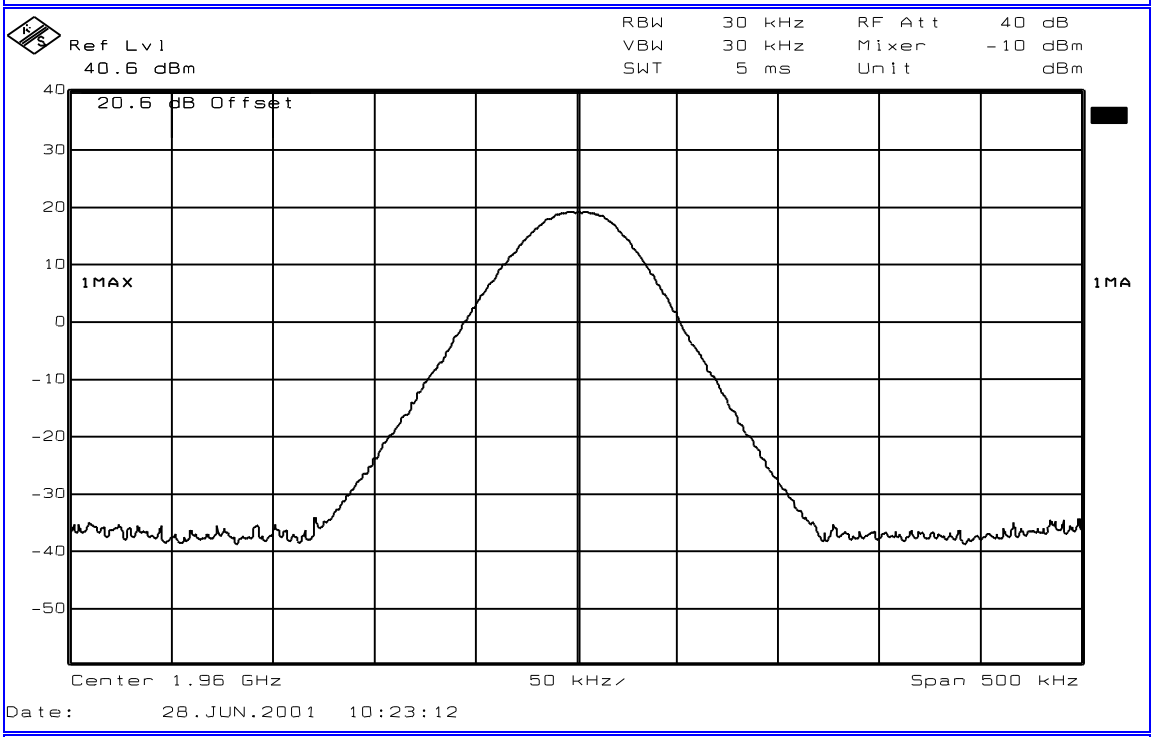
Detector Type: Peak VBW: Refer to plots

Test Equipment Used

Antenna:		Directional Coupler:	
Pre-Amp:		Cable #1:	1043
Filter:		Cable #2:	
Receiver:	1036	Cable #3:	
Attenuator #1	1474	Cable #4:	
Attenuator #2:		Mixer:	

Additional equipment used:

Measurement Uncertainty: +/-3.6 dB



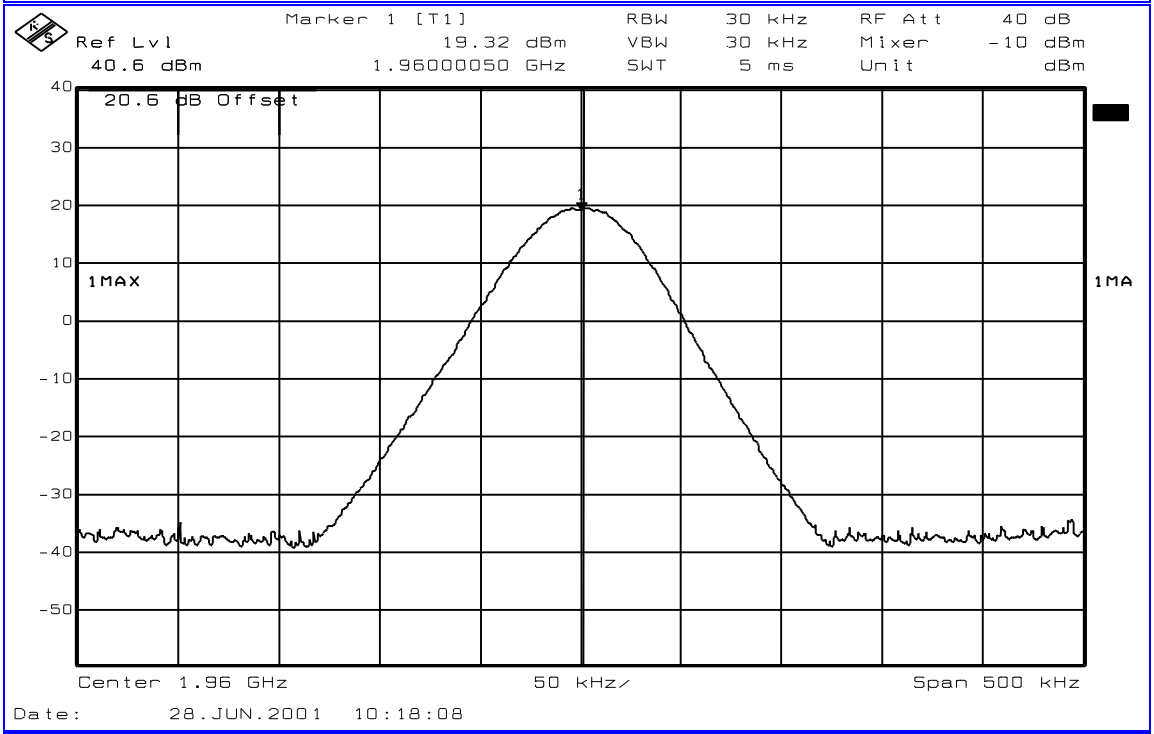
Notes: **OUTPUT SIGNAL TDMA**
DOWNLINK

Test Data – Occupied Bandwidth – NADC

Data Plot **Occupied Bandwidth TDMA**

Page 2 of 2

Job No.:	1L0263R	Date:	6/28/01
Specification:	Part 24	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%)	50
E.U.T.:	Cell Extender		
Configuration:	Tx Full Power		



Notes: **INPUT SIGNAL TDMA**
DOWNLINK

Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 2.1051
TESTED BY: Chinda Poy	DATE: 6/2/8/01

Test Results: Complies.

Test Data: See attached plot(s).

Equipment Used: 1036-1043-1474

Measurement Uncertainty: +/- 1.7 dB

Test Data – Spurious Emission at Antenna Terminals

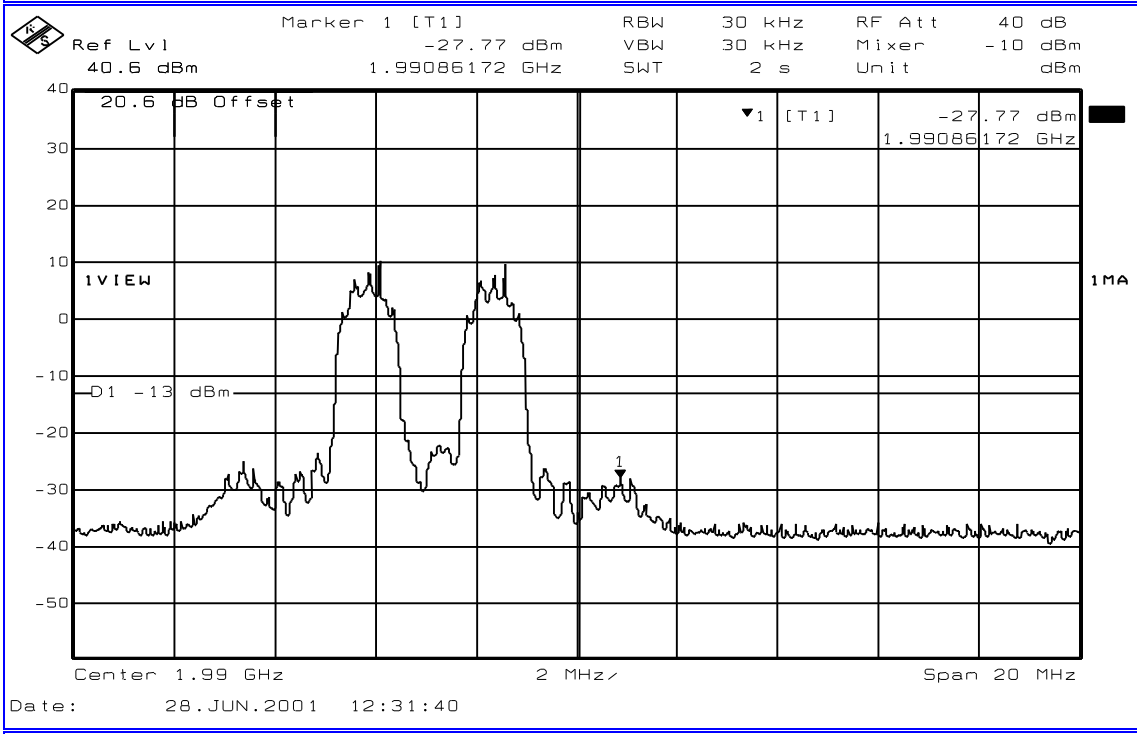
Data Plot **INTERMODULATION CHARACTERISTICS CDMA**

Page 1 of 2 — Complete X — Preliminary

Job No.: 1L0263R — Date: 6/28/01
Specification: Part 24 — Temperature(°C): 22
Tested By: Chinda Poy — Relative Humidity(%) 50
E.U.T.: DUAL BAND BRITCELL FAST SYSTEM
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: 1043
Filter: — Cable #2:
Receiver: 1036 — Cable #3:
Attenuator #1 1474 — Cable #4:
Attenuator #2: — Mixer:
Additional equipment used:
Measurement Uncertainty: +/-3.6 dB



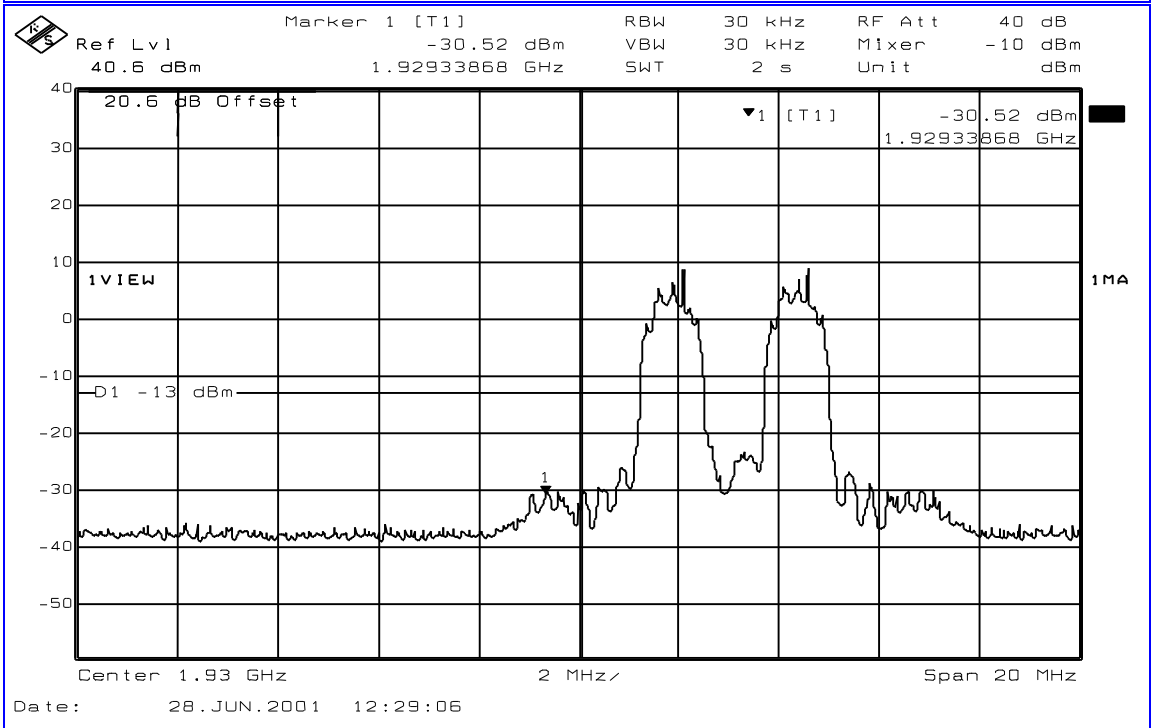
Notes: **CDMA UPPER BAND (OUT OF BAND)**
DOWNLINK

Test Data – Spurious Emission at Antenna Terminals

Data Plot **INTERMODULATION CHARACTERISTICS CDMA**

Page 2 of 2

Job No.:	1L0263R	Date:	6/28/01
Specification:	Part 24	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%)	50
E.U.T.:	DUAL BAND BRITCELL FAST SYSTEM		
Configuration:	Tx Full Power		



Notes:
CDMA LOWER BAND (OUT OF BAND)
DOWNLINK
MARKER 1 INDICATES HIGHEST EMISSION OUT OF BAND

Test Data – Spurious Emission at Antenna Terminals

Data Plot **SPURIOUS EMISSION AT ANTENNA TERMINALS / CDMA**

Page 1 of 2 — Complete X

Job No.: 1L0263R — Date: 6/28/01 — Preliminary

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

Tested By: Chinda Poy — Relative Humidity(%) 50

E.U.T.: DUAL BAND BRITCELL FAST SYSTEM

Configuration: Tx Full Power

Sample Number:

Location: Lab 1 — RBW: Refer to plots

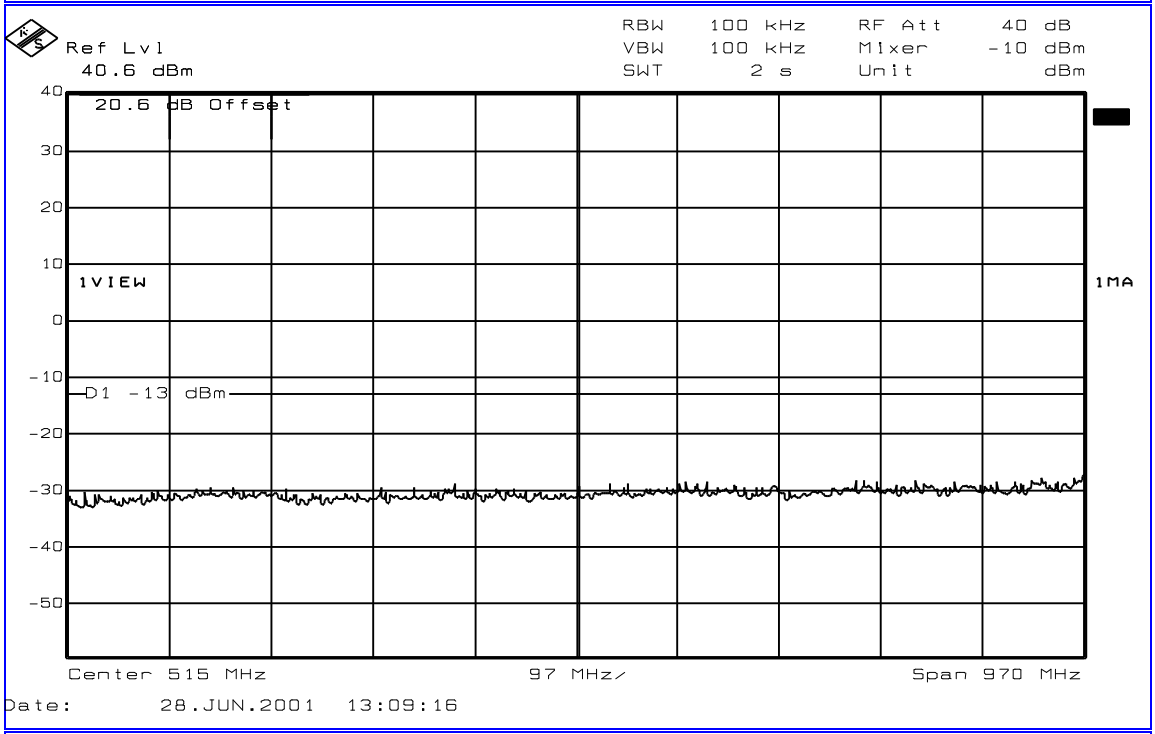
Detector Type: Peak — VBW: Refer to plots

Test Equipment Used

Antenna:		Directional Coupler:	
Pre-Amp:		Cable #1:	1043
Filter:		Cable #2:	
Receiver:	1036	Cable #3:	
Attenuator #1	1474	Cable #4:	
Attenuator #2:		Mixer:	

Additional equipment used:

Measurement Uncertainty: +/-3.6 dB



Notes: **30 MHz - 1 GHz**

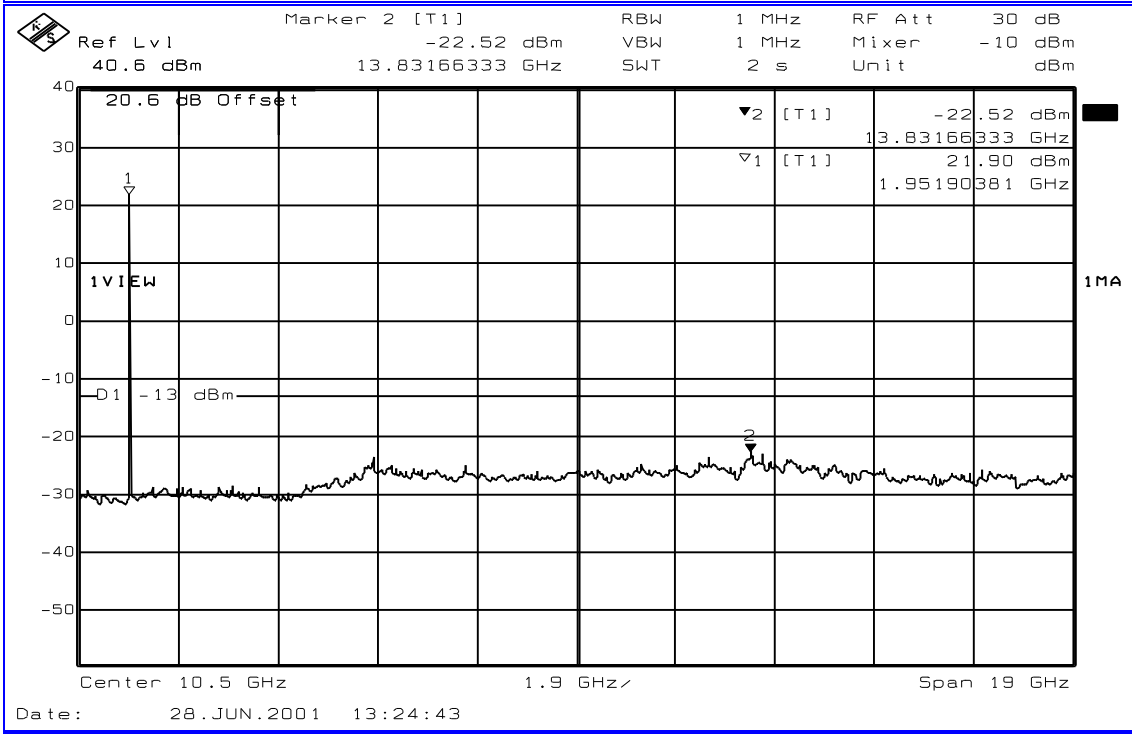
NO EMISSIONS INDICATED

Test Data – Spurious Emission at Antenna Terminals

Data Plot **SPURIOUS EMISSION AT ANTENNA TERMINALS / CDMA**

Page 2 of 2

Job No.:	1L0263R	Date:	6/28/01
Specification:	Part 24	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%)	50
E.U.T.:	DUAL BAND BRITCELL FAST SYSTEM		
Configuration:	Tx Full Power		



Notes:
1 GHz - 20 GHz
MARKER 1 INDICATES CARRIER
MARKER 2 INDICATES HIGHEST EMISSION

Test Data – Spurious Emission at Antenna Terminals

Data Plot BANDEDGE CDMA

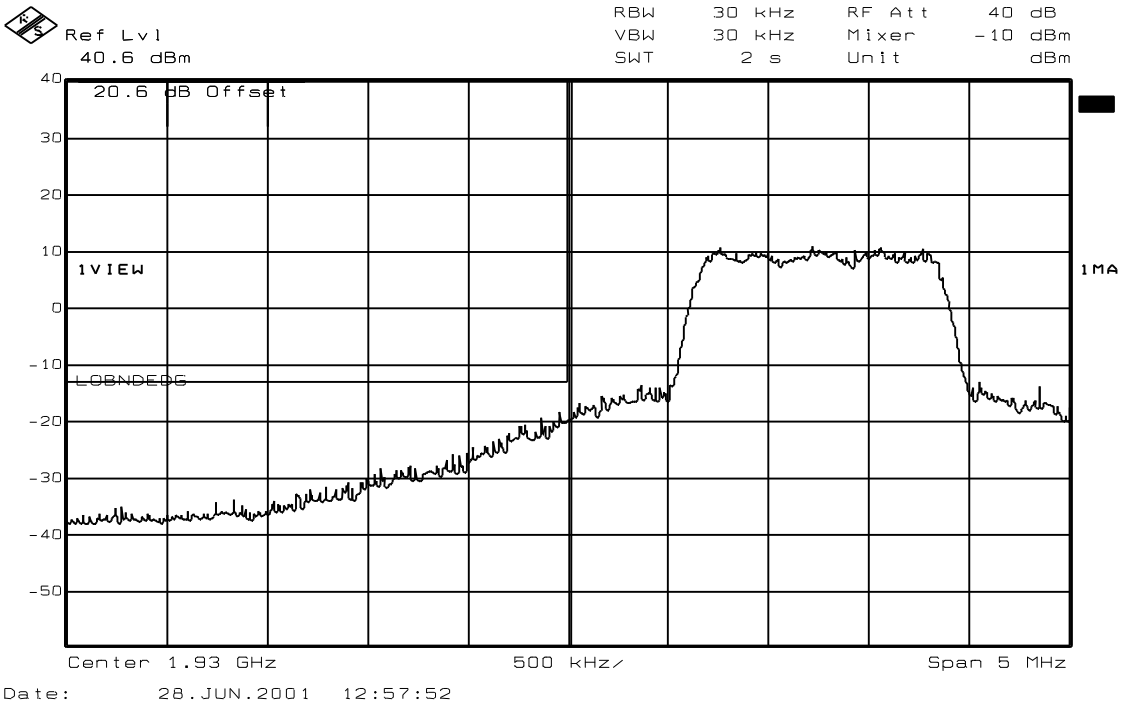
Page 1 of 2 — Complete X — Preliminary

Job No.: 1L0263R — Date: 6/28/01
Specification: Part 24 — Temperature(°C): 22
Tested By: Chinda Poy — Relative Humidity(%) 50
E.U.T.: DUAL BAND BRITCELL FAST SYSTEM
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:	1043
Filter:		Cable #2:	
Receiver:	1036	Cable #3:	
Attenuator #1	1474	Cable #4:	
Attenuator #2:		Mixer:	

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



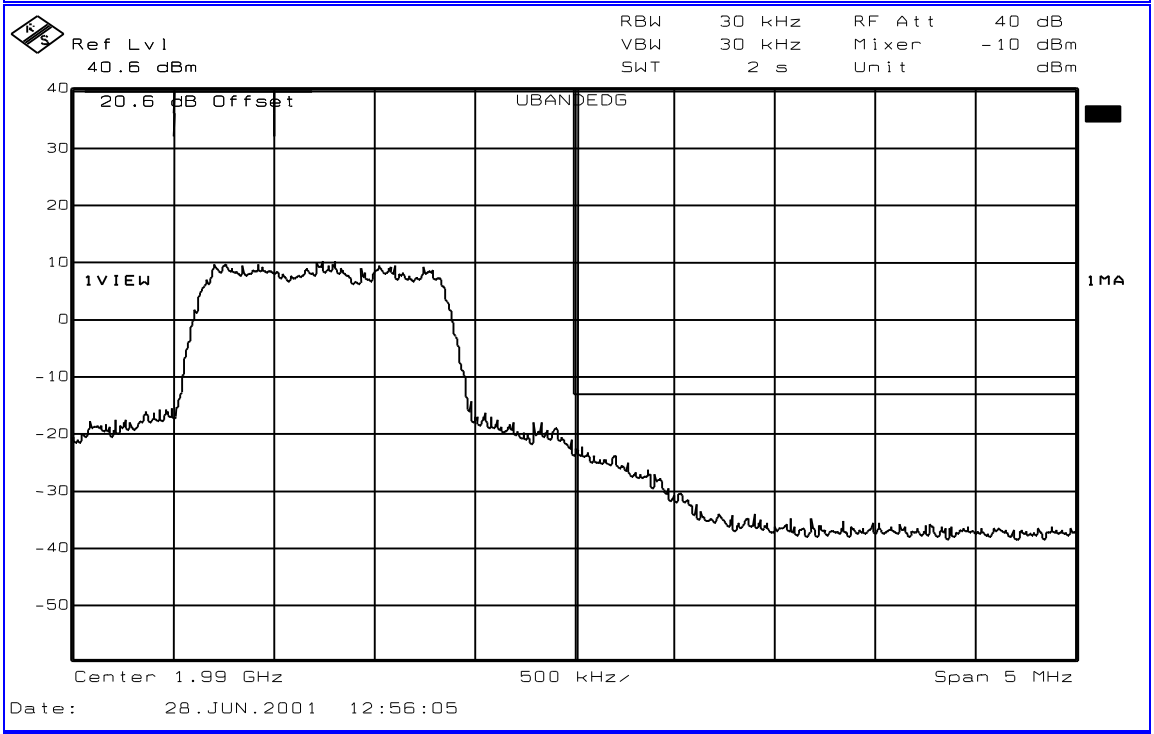
Notes: **CDMA LOWER BANDEDGE**
DOWNLINK

Test Data – Spurious Emission at Antenna Terminals

Data Plot BANDEDGE CDMA

Page 2 of 2

Job No.:	1L0263R	Date:	6/28/01
Specification:	Part 24	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%)	50
E.U.T.:	DUAL BAND BRITCELL FAST SYSTEM		
Configuration:	Tx Full Power		



Notes: **CDMA UPPER BANDEDGE**
DOWNLINK

Test Data – Spurious Emission at Antenna Terminals

Data Plot **INTERMODULATION CHARACTERISTICS GSM**

Page 1 of 2 — Complete X

Job No.: 1L0263R — Date: 6/28/01 — Preliminary

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

Tested By: Chinda Poy — Relative Humidity(%) 50

E.U.T.: DUAL BAND BRITCELL FAST SYSTEM

Configuration: Tx Full Power

Sample Number:

Location: Lab 1 — RBW: Refer to plots

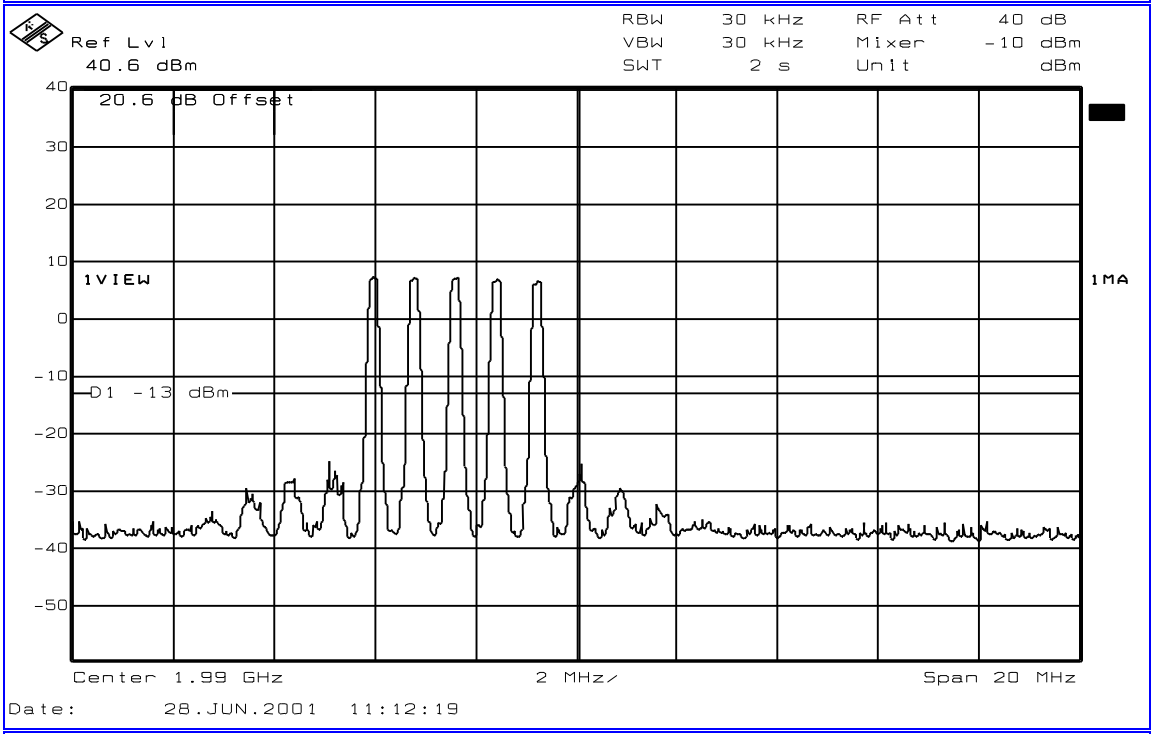
Detector Type: Peak — VBW: Refer to plots

Test Equipment Used

Antenna:		Directional Coupler:	
Pre-Amp:		Cable #1:	1043
Filter:		Cable #2:	
Receiver:	1036	Cable #3:	
Attenuator #1	1474	Cable #4:	
Attenuator #2:		Mixer:	

Additional equipment used:

Measurement Uncertainty: +/-3.6 dB



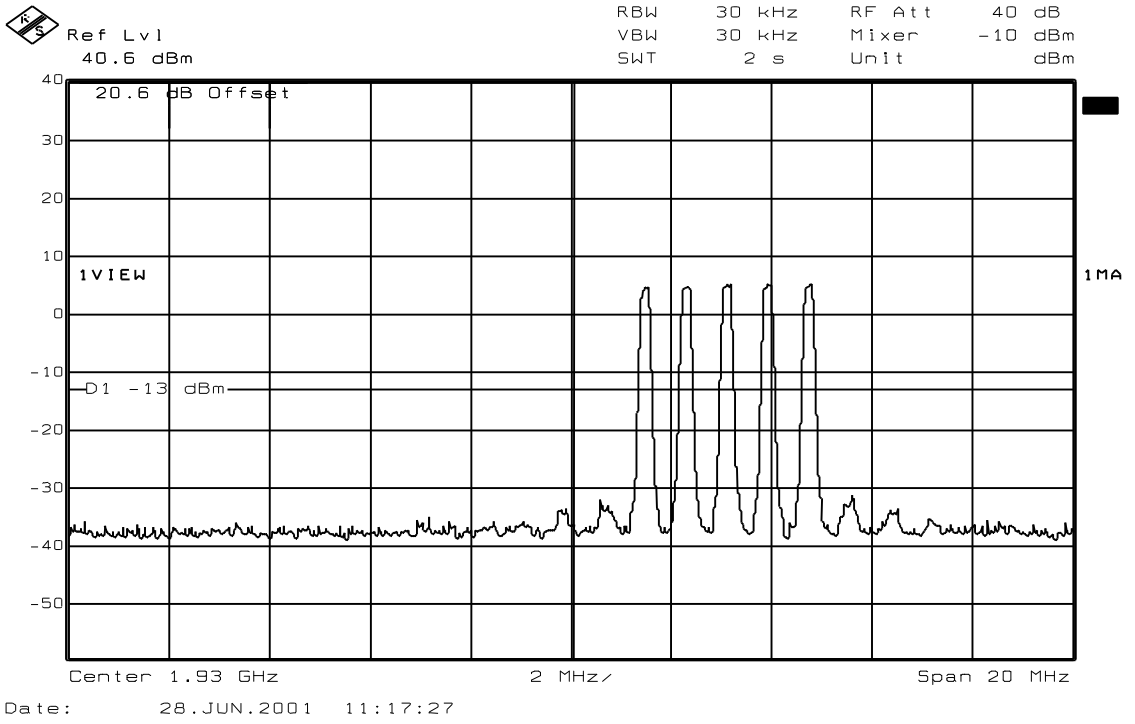
Notes: **GSM UPPER BAND (OUT OF BAND)**
DOWNLINK

Test Data – Spurious Emission at Antenna Terminals

Data Plot **INTERMODULATION CHARACTERISTICS GSM**

Page 2 of 2

Job No.:	1L0263R	Date:	6/28/01
Specification:	Part 24	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%)	50
E.U.T.:	DUAL BAND BRITCELL FAST SYSTEM		
Configuration:	Tx Full Power		



Notes: **GSM LOWER BAND (OUT OF BAND)**
DOWNLINK

Test Data – Spurious Emission at Antenna Terminals

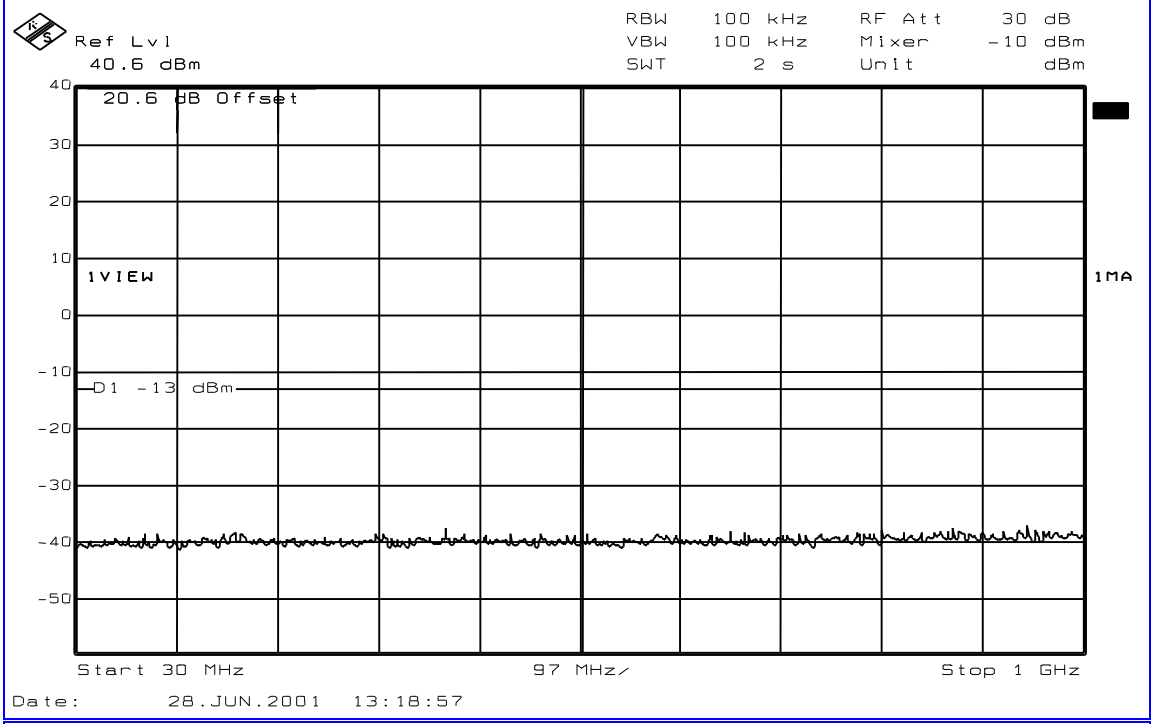
Data Plot **SPURIOUS EMISSION AT ANTENNA TERMINALS / GSM**

Page 1 of 2 — Complete X — Preliminary

Job No.: 1L0263R — Date: 6/28/01
Specification: Part 24 — Temperature(°C): 22
Tested By: Chinda Poy — Relative Humidity(%) 50
E.U.T.: DUAL BAND BRITCELL FAST SYSTEM
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: 1043
Filter: — Cable #2:
Receiver: 1036 — Cable #3:
Attenuator #1 1474 — Cable #4:
Attenuator #2: — Mixer:
Additional equipment used:
Measurement Uncertainty: +/-3.6 dB



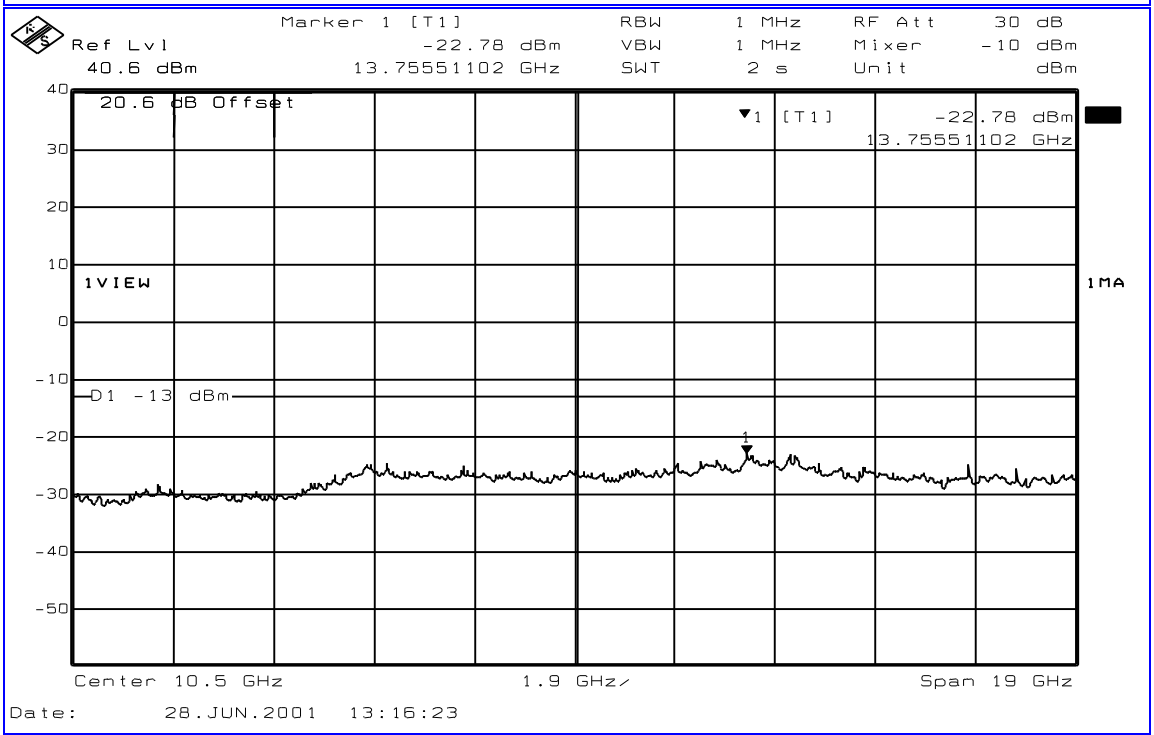
Notes: **30 MHz - 1 GHz**
NO EMISSIONS INDICATED

Test Data – Spurious Emission at Antenna Terminals

Data Plot **SPURIOUS EMISSION AT ANTENNA TERMINALS / GSM**

Page 2 of 2

Job No.:	1L0263R	Date:	6/28/01
Specification:	Part 24	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%)	50
E.U.T.:	DUAL BAND BRITCELL FAST SYSTEM		
Configuration:	Tx Full Power		



Notes: **1 GHz - 20 GHz**
MARKER 1 INDICATES HIGHEST EMISSION

Test Data – Spurious Emission at Antenna Terminals

Data Plot BANDEDGE GSM

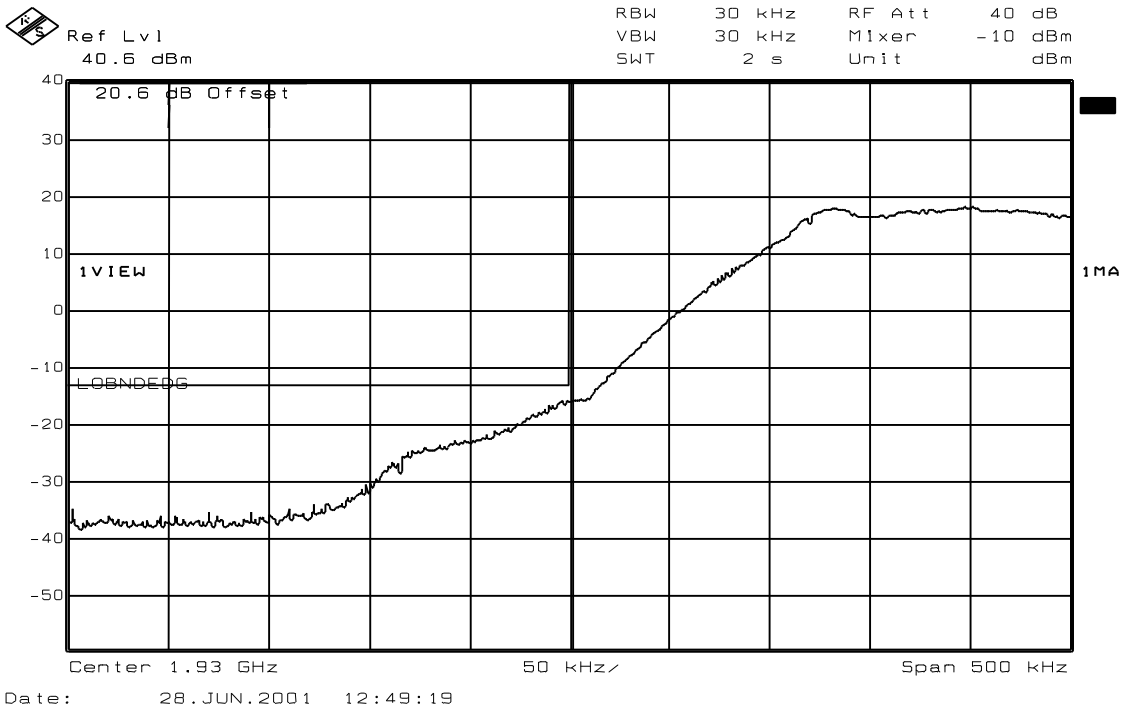
Page 1 of 2

Complete X
Preliminary

Job No.: 1L0263R Date: 6/28/01
Specification: Part 24 Temperature(°C): 22
Tested By: Chinda Poy Relative Humidity(%) 50
E.U.T.: DUAL BAND BRITCELL FAST SYSTEM
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: 1043
Filter: Cable #2:
Receiver: 1036 Cable #3:
Attenuator #1 1474 Cable #4:
Attenuator #2: Mixer:
Additional equipment used:
Measurement Uncertainty: +/-3.6 dB



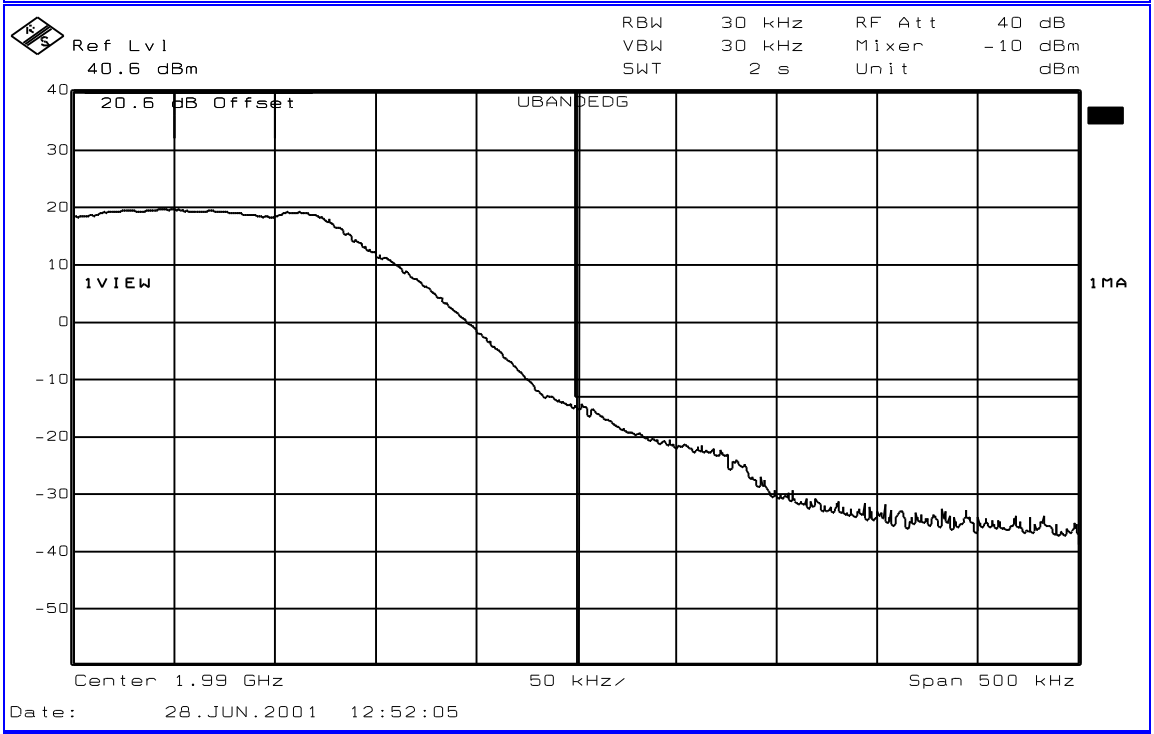
Notes: **GSM LOWER BANDEDGE**
DOWNLINK

Test Data – Spurious Emission at Antenna Terminals

Data Plot BANDEDGE GSM

Page 2 of 2

Job No.:	1L0263R	Date:	6/28/01
Specification:	Part 24	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%)	50
E.U.T.:	DUAL BAND BRITCELL FAST SYSTEM		
Configuration:	Tx Full Power		



Notes: **GSM UPPER BANDEDGE**
DOWNLINK

Test Data – Spurious Emission at Antenna Terminals

Data Plot **INTERMODULATION CHARACTERISTICS TDMA**

Page 1 of 2 — Complete X — Preliminary

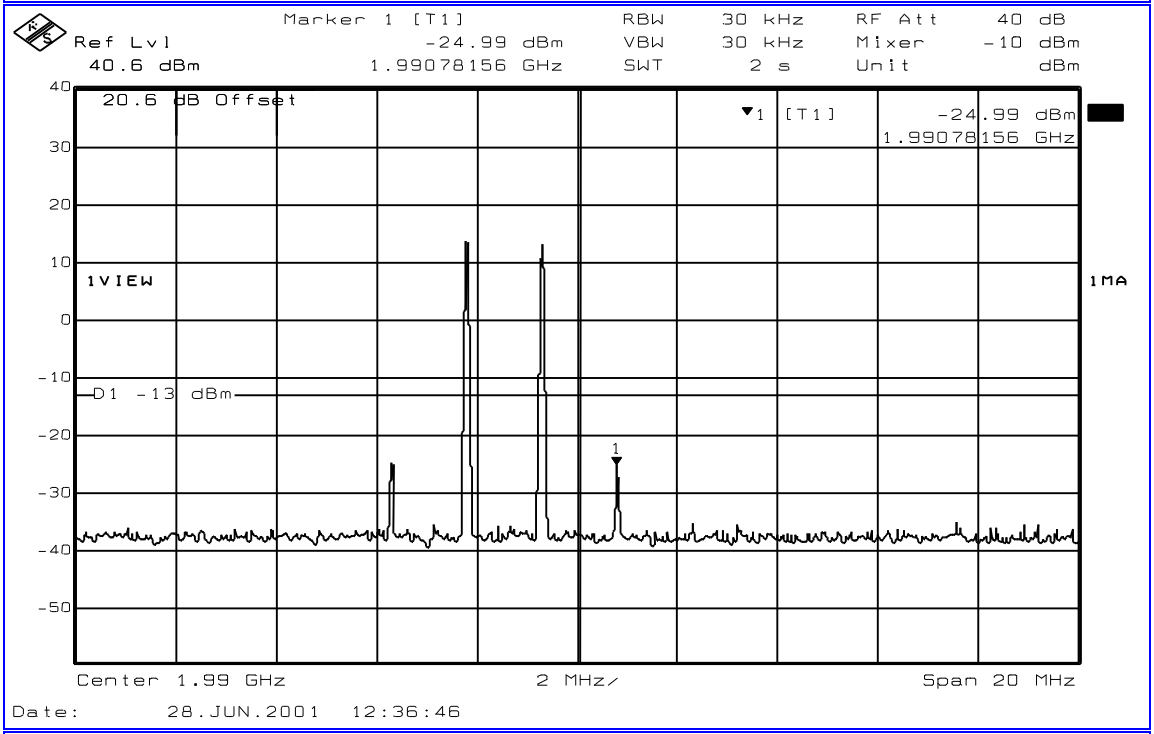
Job No.:	1L0263R	Date: 6/28/01	
Specification:	Part 24	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%)	50
E.U.T.:	DUAL BAND BRITCELL FAST SYSTEM		
Configuration:	Tx Full Power		
Sample Number:			
Location:	Lab 1	RBW:	Refer to plots
Detector Type:	Peak	VBW:	Refer to plots

Test Equipment Used

Antenna:		Directional Coupler:	
Pre-Amp:		Cable #1:	1043
Filter:		Cable #2:	
Receiver:	1036	Cable #3:	
Attenuator #1	1474	Cable #4:	
Attenuator #2:		Mixer:	

Additional equipment used:

Measurement Uncertainty: +/-3.6 dB



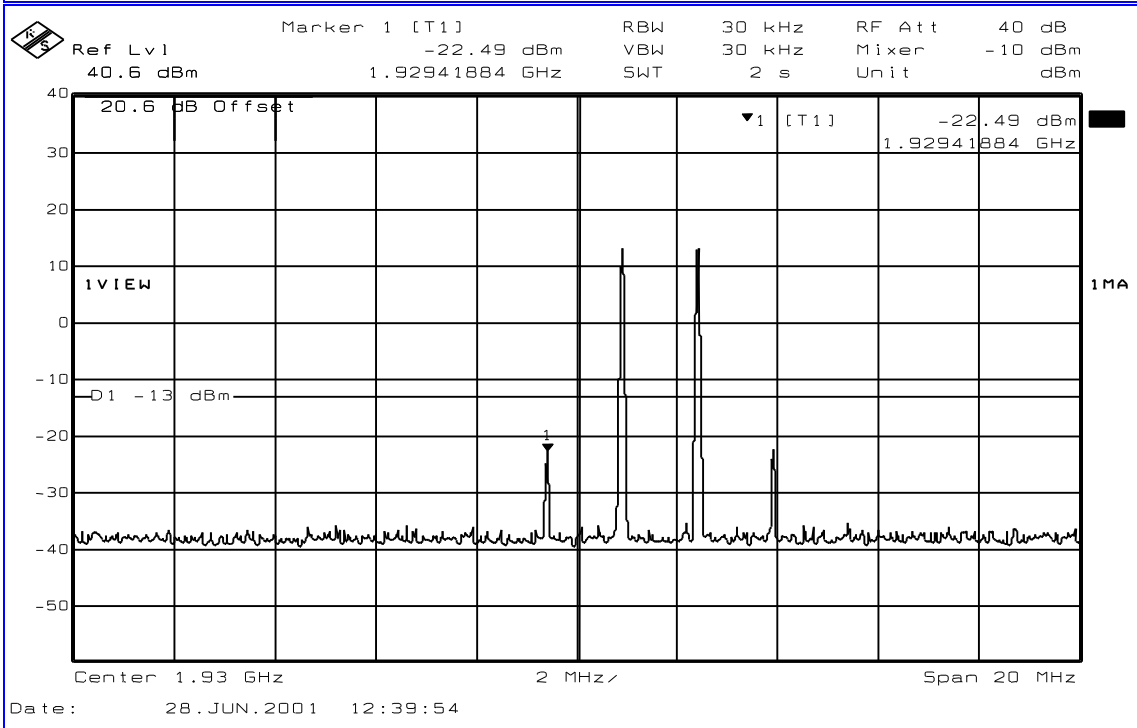
Notes:
TDMA UPPER BAND (OUT OF BAND)
DOWNLINK
MARKER 1 INDICATES HIGHEST EMISSION OUT OF BAND

Test Data – Spurious Emission at Antenna Terminals

Data Plot **INTERMODULATION CHARACTERISTICS TDMA**

Page 2 of 2

Job No.:	1L0263R	Date:	6/28/01
Specification:	Part 24	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%)	50
E.U.T.:	DUAL BAND BRITCELL FAST SYSTEM		
Configuration:	Tx Full Power		



Notes: **TDMA LOWER BAND (OUT OF BAND)**
DOWNLINK
MARKER 1 INDICATES HIGHEST EMISSION OUT OF BAND

Test Data – Spurious Emission at Antenna Terminals

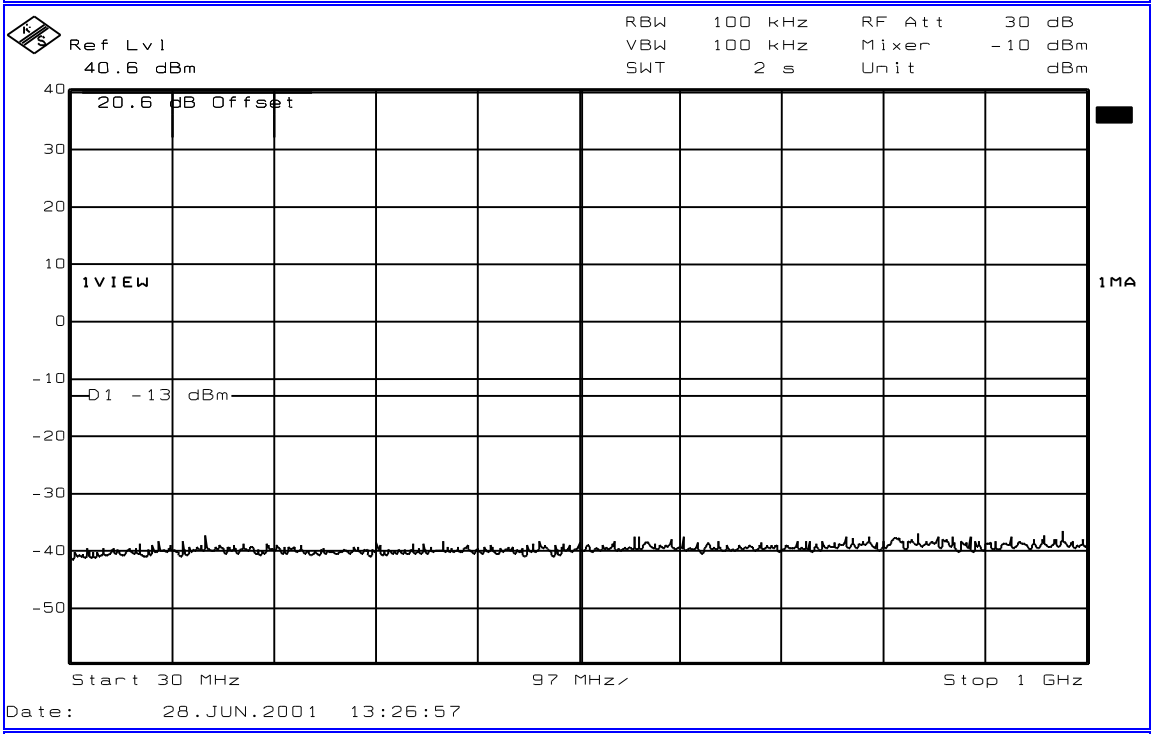
Data Plot **SPURIOUS EMISSION AT ANTENNA TERMINALS / TDMA**

Page 1 of 2 — Complete X — Preliminary

Job No.: 1L0263R — Date: 6/28/01
Specification: Part 24 — Temperature(°C): 22
Tested By: Chinda Poy — Relative Humidity(%) 50
E.U.T.: DUAL BAND BRITCELL FAST SYSTEM
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: 1043
Filter: — Cable #2:
Receiver: 1036 — Cable #3:
Attenuator #1 1474 — Cable #4:
Attenuator #2: — Mixer:
Additional equipment used:
Measurement Uncertainty: +/-3.6 dB



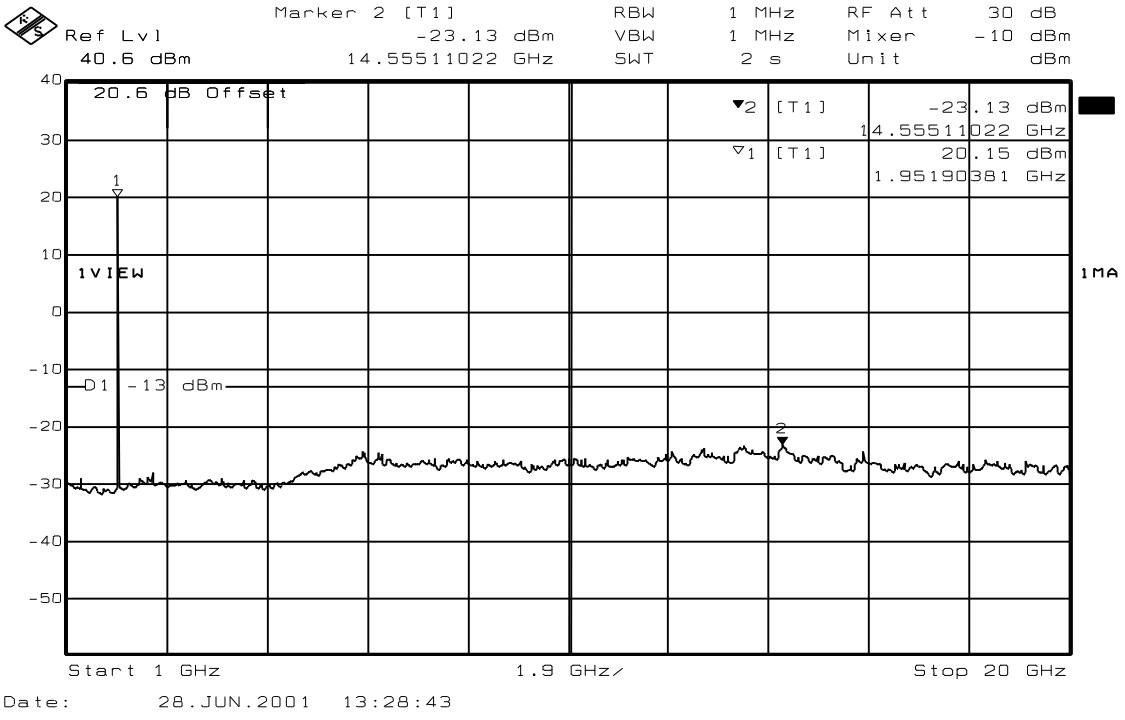
Notes: **30 MHz - 1 GHz**
NO EMISSIONS INDICATED

Test Data – Spurious Emission at Antenna Terminals

Data Plot **SPURIOUS EMISSION AT ANTENNA TERMINALS / TDMA**

Page 2 of 2

Job No.:	1L0263R	Date:	6/28/01
Specification:	Part 24	Temperature(°C):	22
Tested By:	Chinda Poy	Relative Humidity(%)	50
E.U.T.:	DUAL BAND BRITCELL FAST SYSTEM		
Configuration:	Tx Full Power		



Notes:
1 GHz - 20 GHz
MARKER 1 INDICATES CARRIER
MARKER 2 INDICATES HIGHEST EMISSION

Section 6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious Emissions	PARA. NO.: 2.1051
TESTED BY: Chinda Poy	DATE: 6/28/01

Test Results: Complies.

Test Data: See attached table.

Equipment Used: 1464-1016-1484-1485-1046

Measurement Uncertainty: +/- 1.7 dB

Test Data - Radiated Emissions - Downlink

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

Nemko Dallas, Inc.

Field Strength of Spurious Emissions

Page 1 of 1 — Complete: X — Preliminary:

Job No.: 1L0263R — Date: 6/29/01
Specification: PART 24 — Temperature(°C): 24
Tested By: Chinda Poy — Relative Humidity(%): 48
E.U.T.: DUAL BAND BRITCELL FAST SYSTEM
Configuration: TX FULL POWER
Sample Number:
Location: AC 2 — RBW: 1 MHz — Measurement Distance: 3 m
Detector Type: Peak — VBW: 1 MHz

Test Equipment Used

Antenna:	993	Directional Coupler:	#N/A
Pre-Amp:	1016	Cable #1:	1046
Filter:	#N/A	Cable #2:	1484
Receiver:	1036	Cable #3:	1485
Attenuator #1	#N/A	Cable #4:	#N/A
Attenuator #2:	#N/A	Mixer:	#N/A

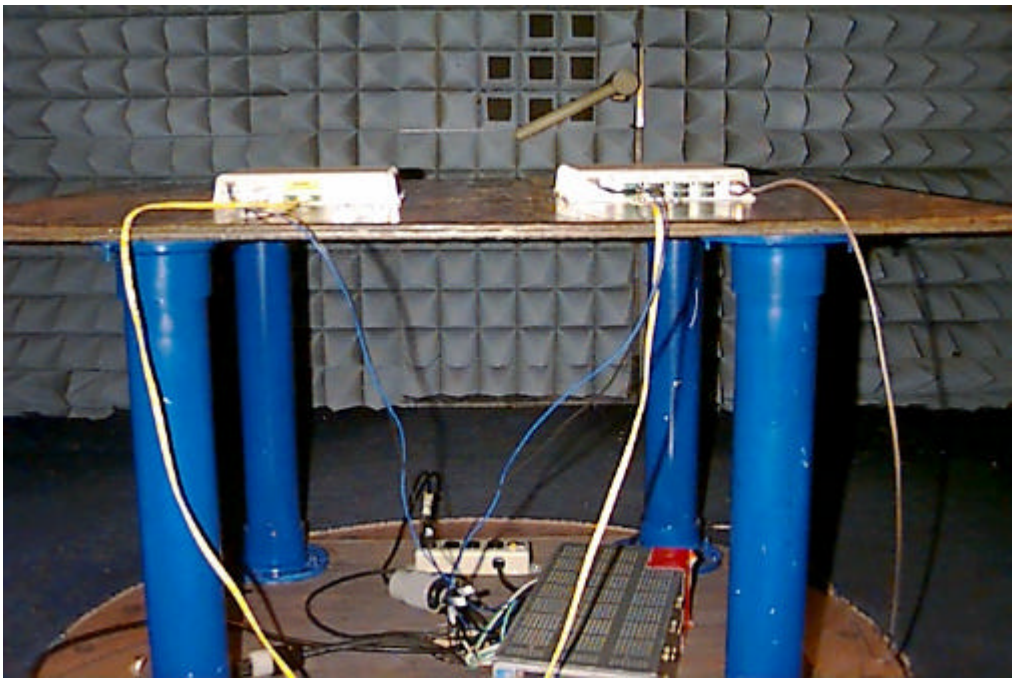
Additional equipment used:
Measurement Uncertainty: +/- .7 dB

Frequency (GHz)	Meter Reading (dBm)	Antenna Factor (dB)	Cable Loss (dB)	Pre-Amp Gain (dB)	Conversion Factor	Corrected Reading (dBuV/m)	ERP (mW)	EIRP (dBm)	Polarity	Comments
3920.00	-61	31.6	4.2	33.3		-59	0.000000	-153.73	V	Noise Floor
5880.00	-62.67	34.4	5.1	33.3		-56	0.000000	-151.70	V	Noise Floor
7840.00	-61.83	37.8	5.5	33.3		-52	0.000000	-147.06	V	Noise Floor
9800.00	-61.17	37.2	7.2	36		-53	0.000000	-148.00	V	Noise Floor
11760.00	-60.17	38.7	8.7	35.5		-48	0.000000	-143.50	V	Noise Floor
13720.00	-61.5	43	8.2	33.3		-44	0.000000	-138.83	V	Noise Floor
15680.00	-61	39.5	4	33.2		-51	0.000000	-145.93	V	Noise Floor
17640.00	-61.67	43	10	33.5		-42	0.000000	-137.40	V	Noise Floor
3920.00	-61.83	31.6	4.2	33.3		-59	0.000000	-154.56	H	Noise Floor
5880.00	-63.17	34.4	5.1	33.3		-57	0.000000	-152.20	H	Noise Floor
7840.00	-62	37.8	5.5	33.3		-52	0.000000	-147.23	H	Noise Floor
9800.00	-61	37.2	7.2	36		-53	0.000000	-147.83	H	Noise Floor
11760.00	-60.17	38.7	8.7	35.5		-48	0.000000	-143.50	H	Noise Floor
13720.00	-60.67	43	8.2	33.3		-43	0.000000	-138.00	H	Noise Floor
15680.00	-60.5	39.5	4	33.2		-50	0.000000	-145.43	H	Noise Floor
17640.00	-61.17	43	10	33.5		-42	0.000000	-136.90	H	Noise Floor

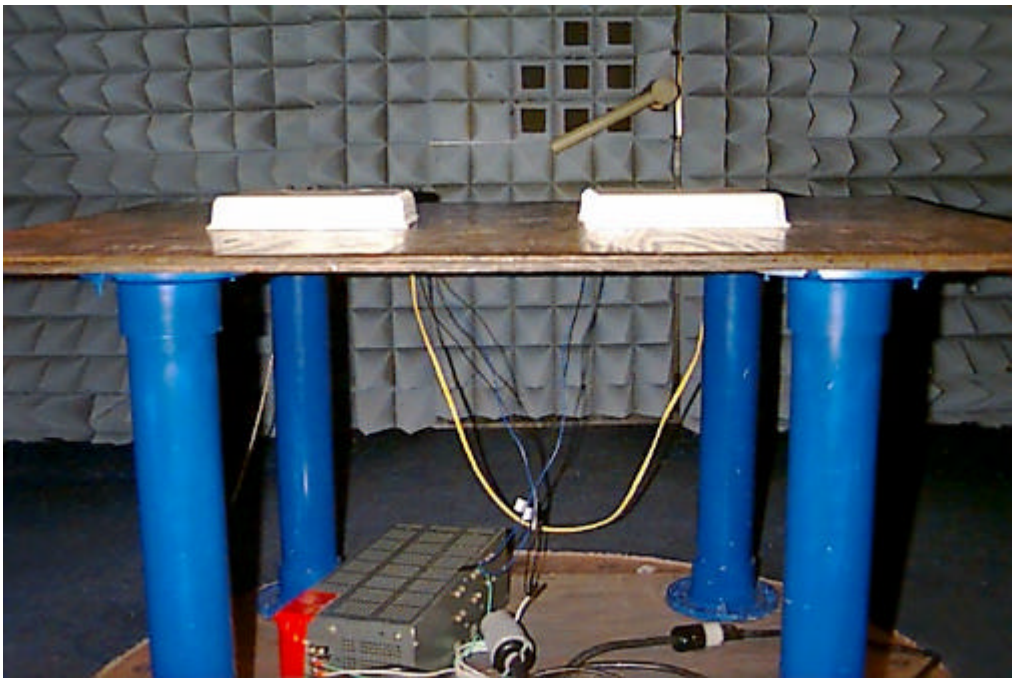
Notes: **1960 MHz / SACNNED TO THE 10TH HARMONIC**

Photographs of Test Setup

FRONT VIEW



REAR VIEW



Section 7. Frequency Stability

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

Not Applicable

Test Results: Complies

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
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	01/02/01	01/02/02
1474	20db Attenuator DC 18 Ghz	MCL Inc. BW-S20W2	NONE	CBU	N/A
1043	Flexable cable 1m	Astrolab Inc. 32027-2-29094K-1M	0	01/29/01	01/29/02
1045	CABLE 2m	Astrolab Inc. 32027-2-29094-72TC	N/A	06/01/01	06/01/02
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	06/01/01	06/01/02

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)

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

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

For emissions > 1 GHz:

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

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

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

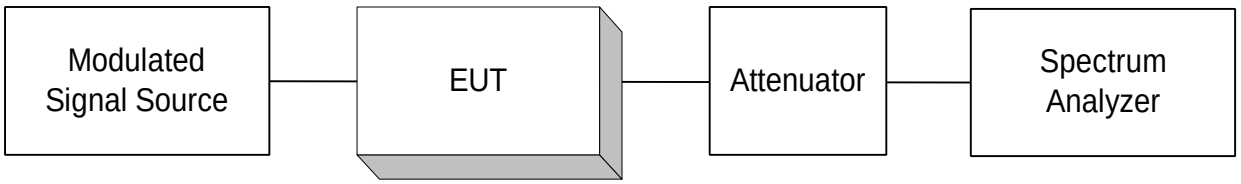
The E.U.T. is placed in an environmental chamber and allowed to stabilize at +20 degrees Celsius for at least 15 minutes. The frequency counter and signal generator are phase locked with the same 10 MHz reference frequency by connecting the 10 MHz ref. out of the counter to the 10 MHz ref, in of the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

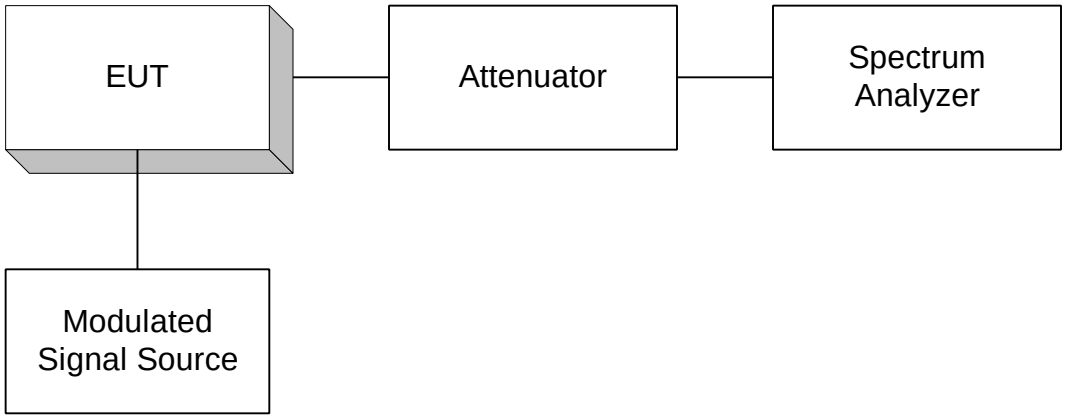
The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30 second intervals for a period of 5 minutes.

ANNEX B - TEST DIAGRAMS

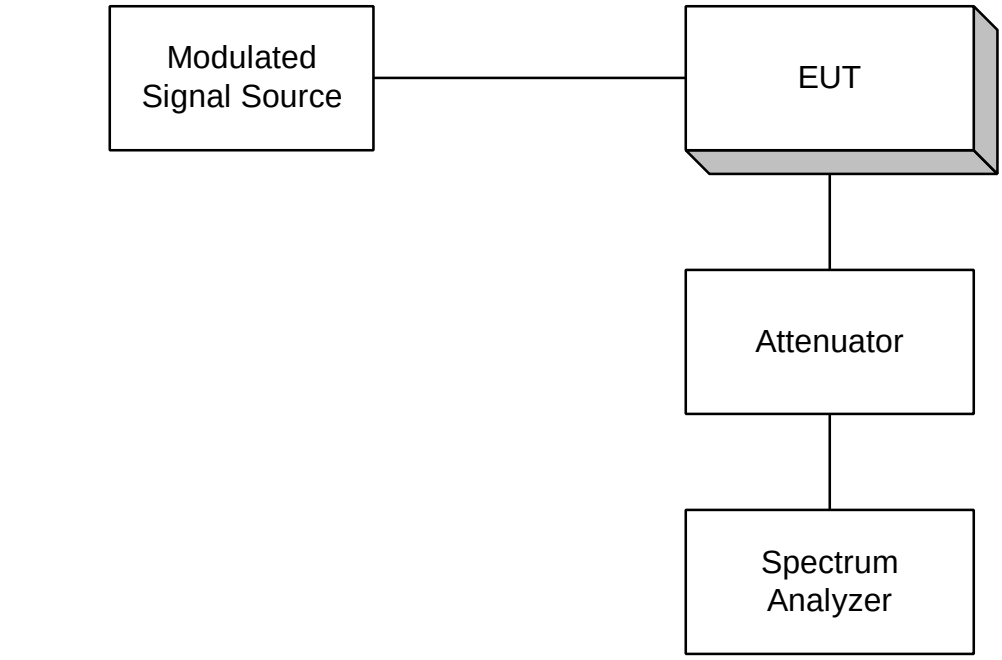
Para. No. 2.985 - R.F. Power Output

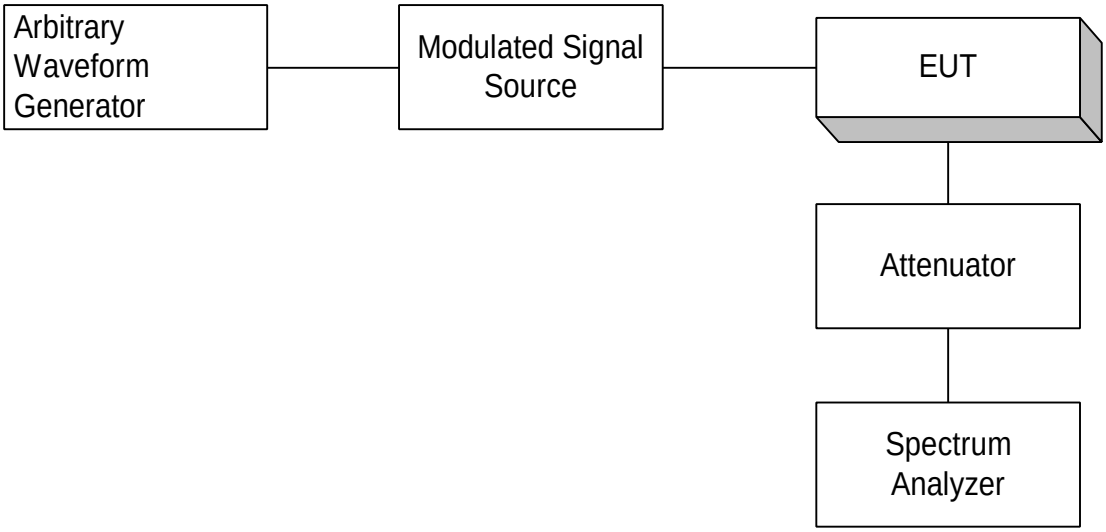


Para. No. 2.989 - Occupied Bandwidth

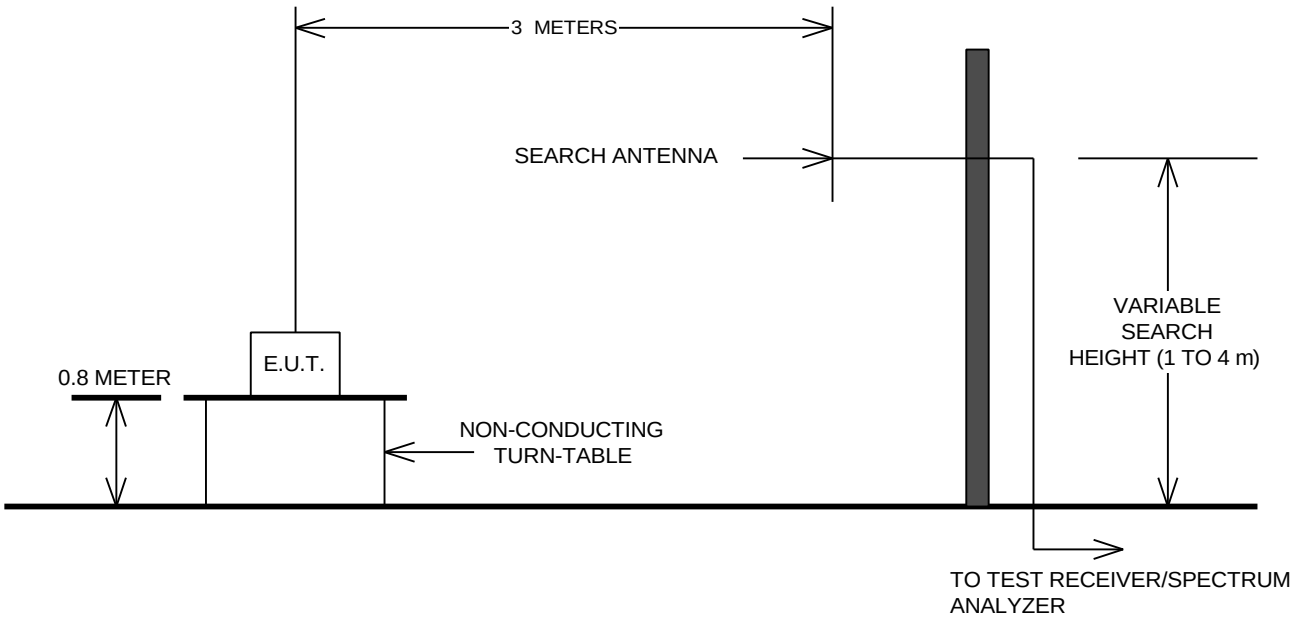


Para. No. 2.991 Spurious Emissions at Antenna Terminals





Para. No. 2.993 - Field Strength of Spurious Radiation



Para. No. 2.995 - Frequency Stability