

Nemko Test Report No.:

4L0490RUS1REV2

Applicant:

Andrew Corporation

Equipment Under Test:

TFAN 80/19

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, Frontline Group Manager

Date:

18 October, 2004

Total Number of Pages:

42

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Section 1. Summary of Test Results

Manufacturer: Andrew Corporation

Model No.: TFAN 80/19

Serial No.: 042202202

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. NONE**

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Summary Of Test Data

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

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.

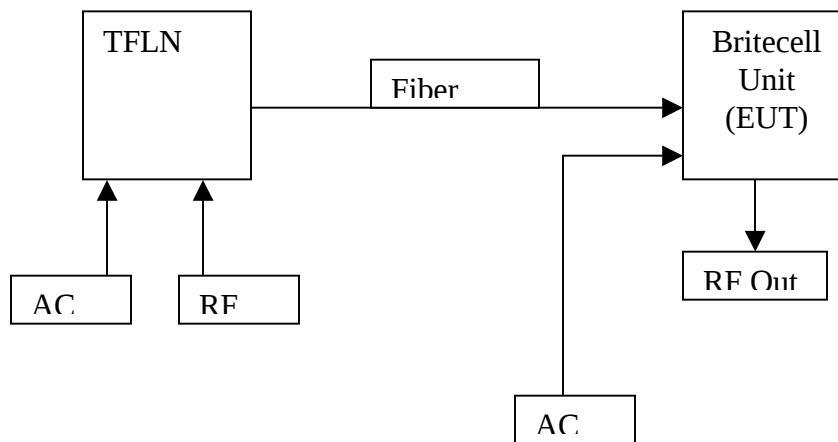
Section 2. General Equipment Specification

Supply Voltage Input:					
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 (F9W)	GSM (G7W)	NADC (DXW)	EDGE (GXW)
		☒	☒	☒	☒
Output Impedance:		50 ohms			
Max Input:		+10 dBm			
RF Output (Rated):	Uplink	N/A			
RF Output (Rated):	Downlink	28.1 mW max			
Frequency Translation:		F1-F1	F1-F2	N/A	
		☒	☐	☐	
Band Selection:		Software	Duplexer	Fullband	
		☐	☐	☒	

Description of Operation

Britecell Plus is a radio over fiber system operation in the 1900 PCS and SMR bands.

System Diagram



Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 2.1046
TESTED BY: Dustin Oaks	DATE:8/13/04

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

	Modulation Type	Per Channel Output Power (mW)	Per Channel Output Power (dBm)
Uplink	NA		
Downlink	CDMA	5.63	15.01
Uplink	NA		
Downlink	GSM	11.50	21.21
Uplink	NA		
Downlink	EDGE	7.60	17.61
Uplink	NA		
Downlink	NADC	8.50	18.59

Equipment Used: 1627-1036-1604**Measurement Uncertainty:** +/- 1.6 dB**Temperature:** 22 °C**Relative Humidity:** 40 %

Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 2.1049
TESTED BY: David Light	DATE:7/28/04

Test Results: Complies.

Test Data: See attached plot(s).

Measurement Uncertainty: +/- 1.6 dB

EQUIPMENT: TFAN 80/19

Test Data – Occupied Bandwidth (Input/Output)



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Data Plot

Page 1 of 8

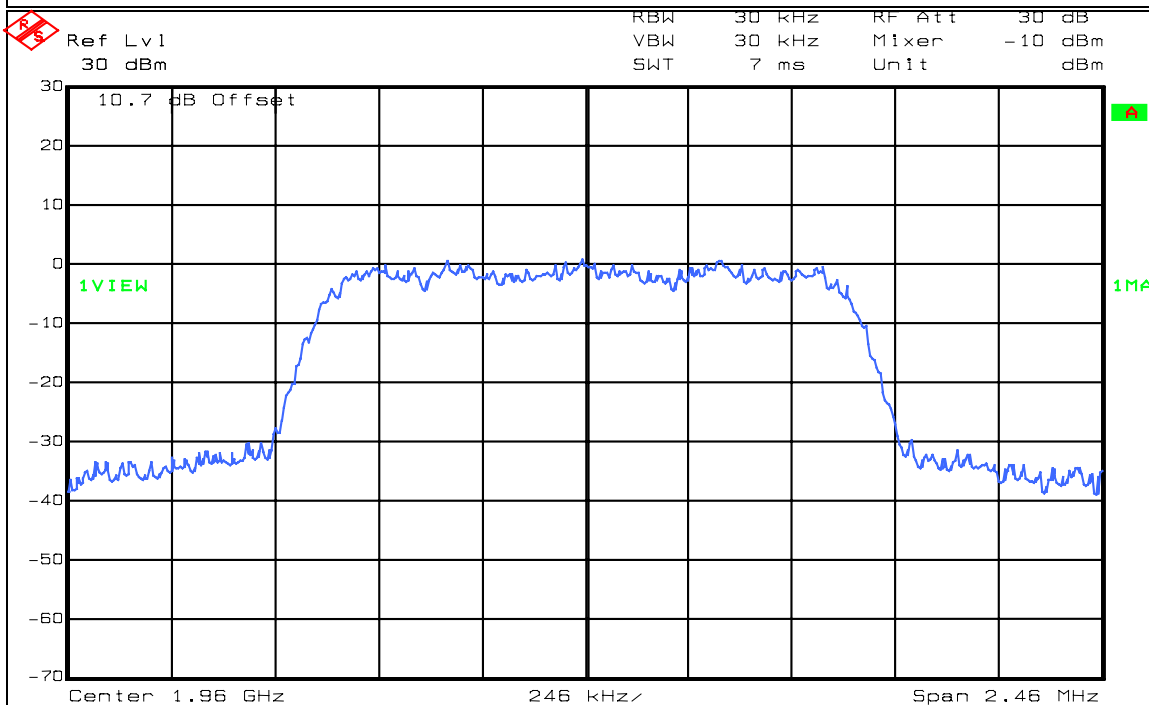
Occupied Bandwidth

Job No.: _____ Date: 7/28/2004
Specification: _____ Temperature(°C): 22
Tested By: David Light _____ Relative Humidity(%): 40
E.U.T.: dual band amp
Configuration: Tx Full power
Sample Number: 1
Location: Lab 1 RBW: Refer to plots
Detector Type: Peak VBW: Refer to plots

Complete: X
Preliminary: _____Measurement
Distance: na m

Test Equipment Used

Antenna: _____ Directional Coupler: _____
Pre-Amp: _____ Cable #1: 1626
Filter: _____ Cable #2: 1627
Receiver: 1036 Cable #3: _____
Attenuator #1: 1471 Cable #4: _____
Attenuator #2: _____ Mixer: _____
Additional equipment used: _____
Measurement Uncertainty: +/-1.7 dB



Date: 28.JUL.2004 08:56:13

Notes: OUTPUT CDMA

EQUIPMENT: TFAN 80/19

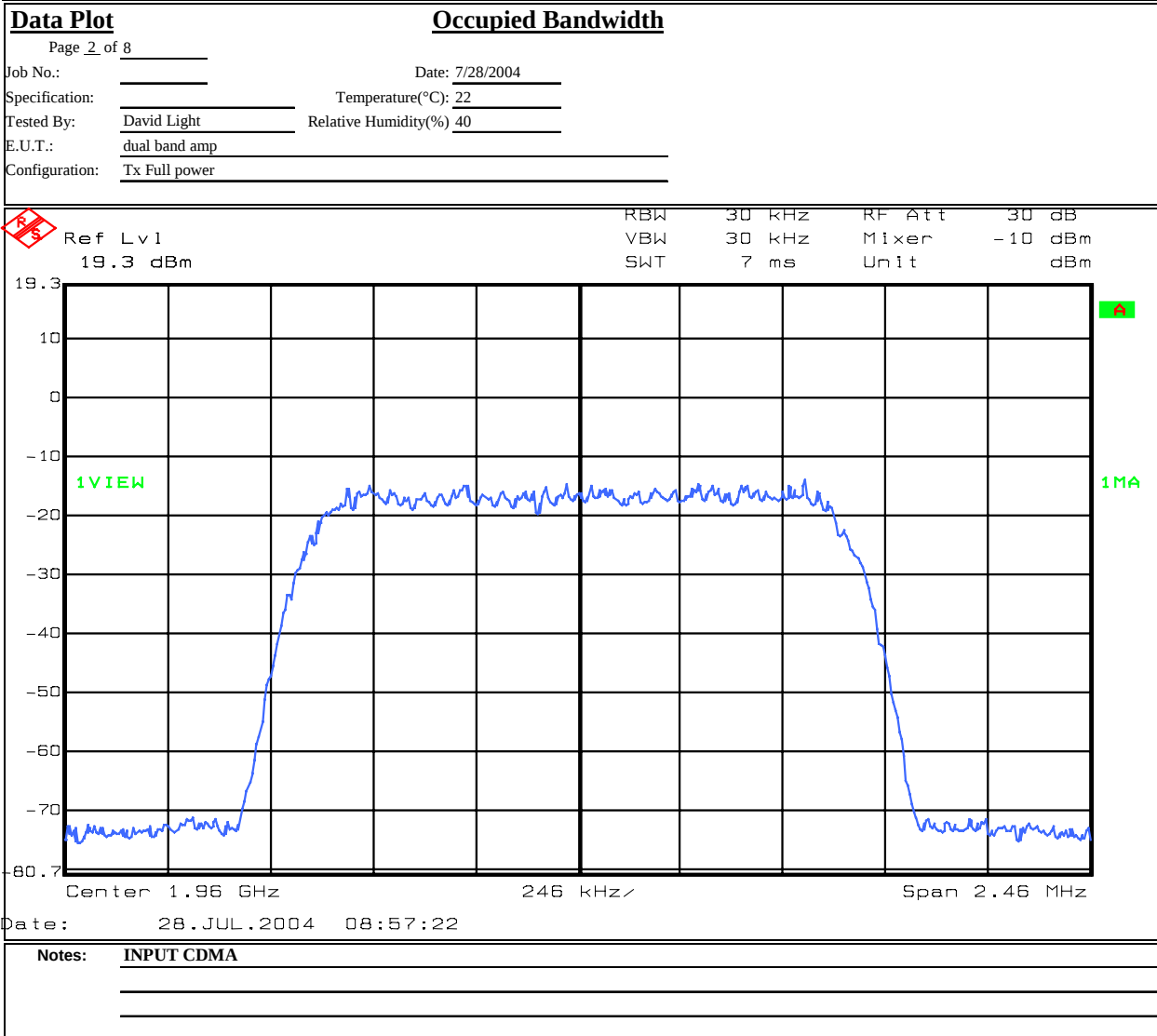
Test Data – Occupied Bandwidth (Input/Output)



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EQUIPMENT: TFAN 80/19

Test Data – Occupied Bandwidth (Input/Output)



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Data Plot

Page 3 of 8

Job No.: _____

Date: 7/28/2004

Specification: _____

Temperature(°C): 22

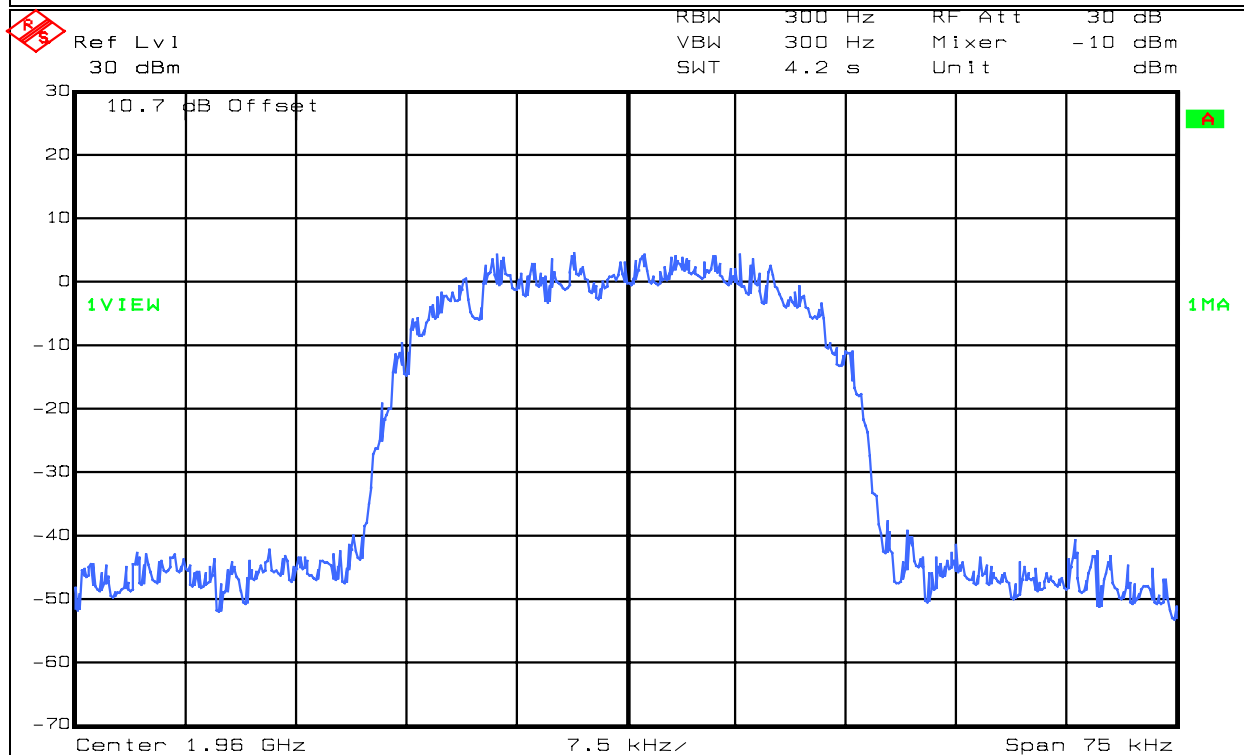
Tested By: David Light

Relative Humidity(%) 40

E.U.T.: dual band amp

Configuration: Tx Full power

Occupied Bandwidth



Date: 28.JUL.2004 09:02:23

Notes: TDMA OUTPUT

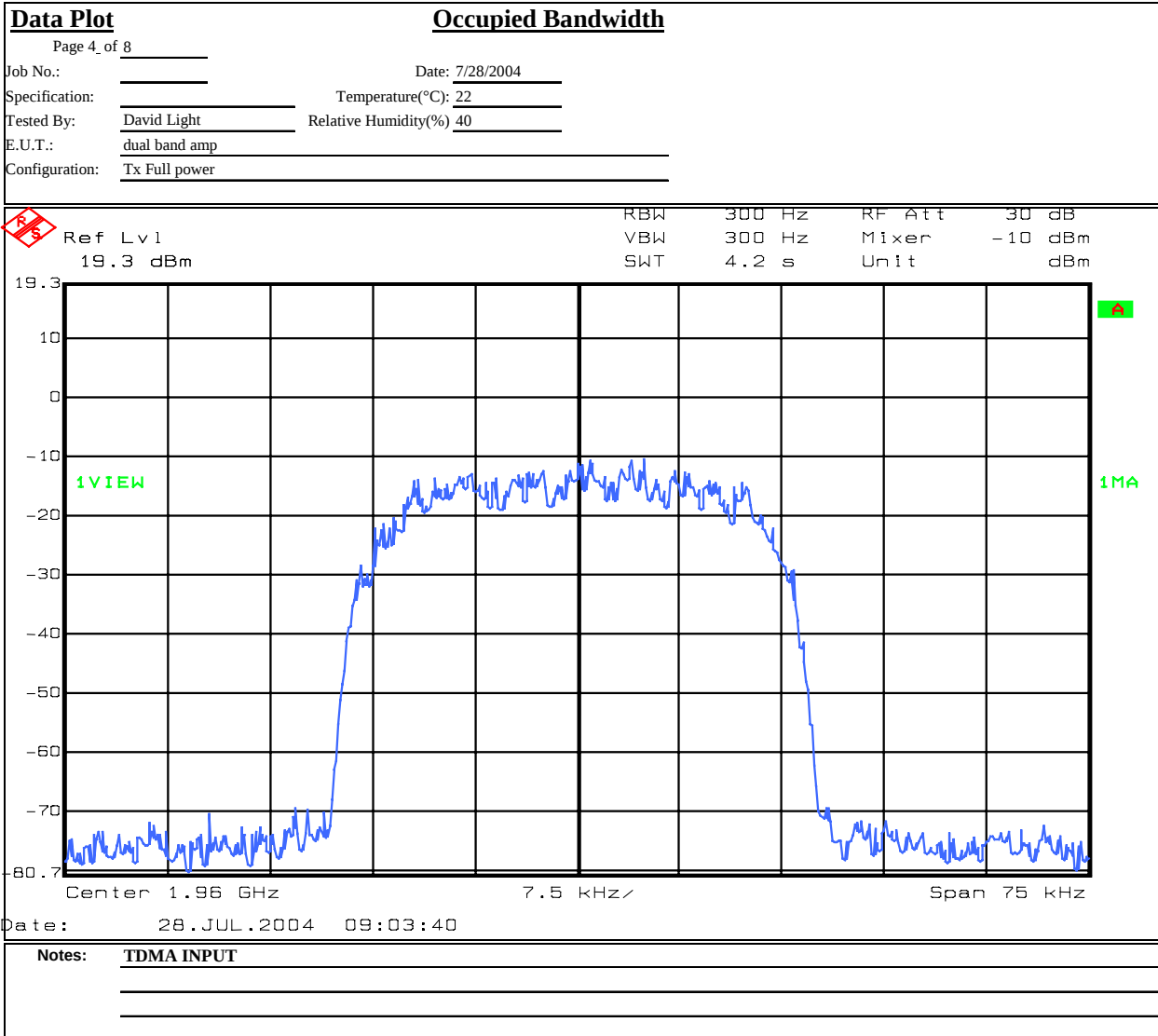
Test Data – Occupied Bandwidth (Input/Output)



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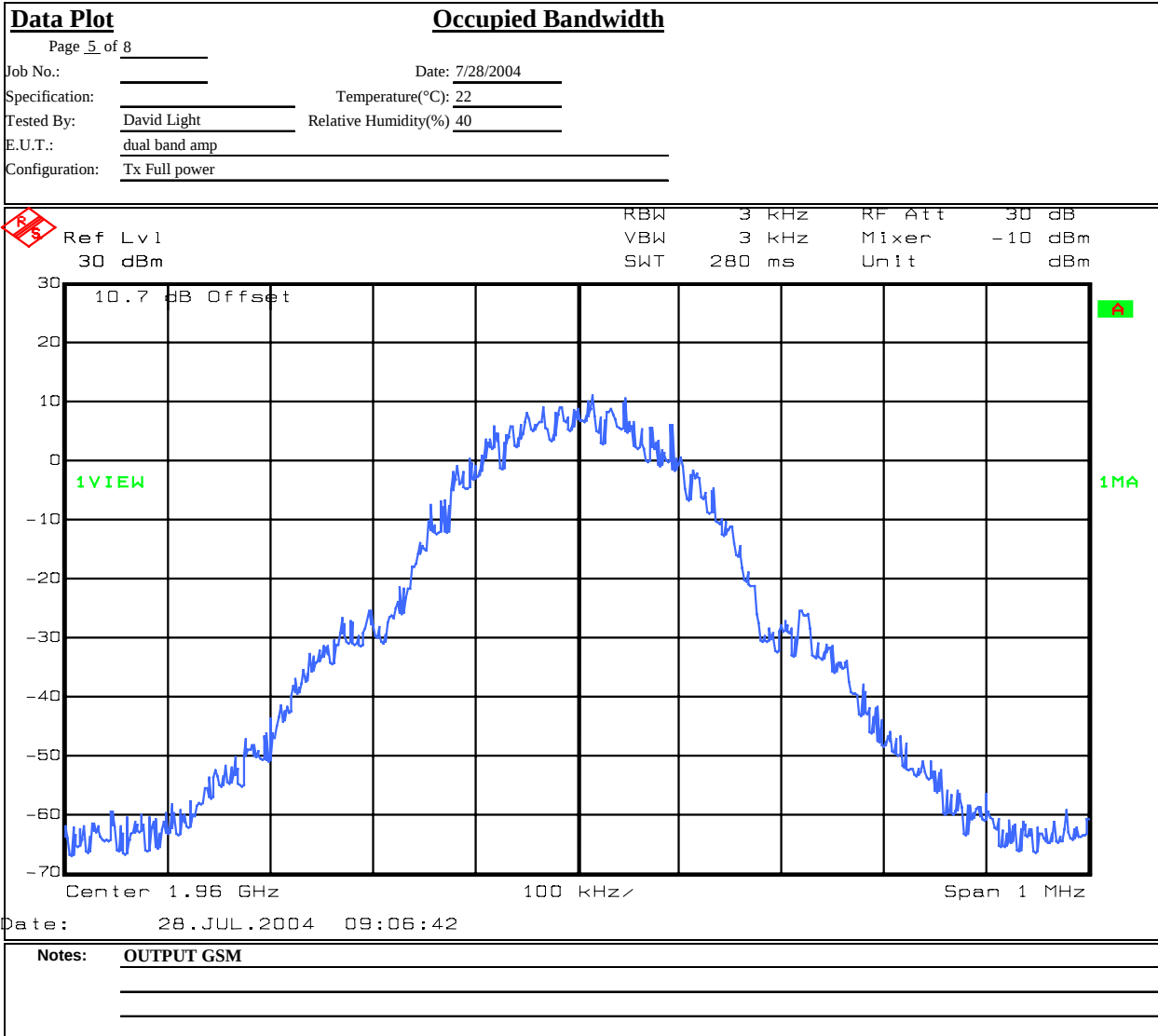
Test Data – Occupied Bandwidth (Input/Output)



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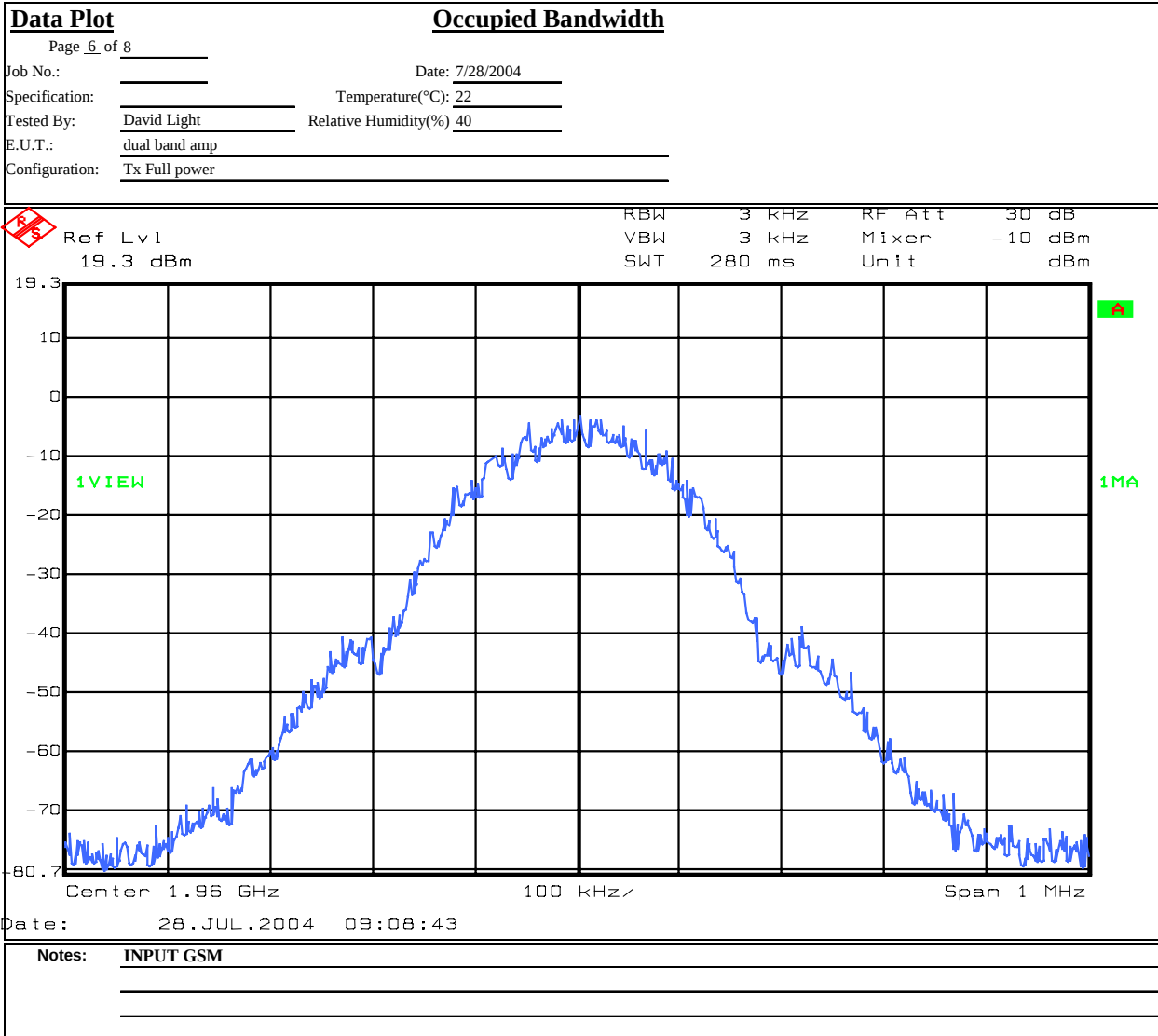
Test Data – Occupied Bandwidth (Input/Output)



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EQUIPMENT: TFAN 80/19

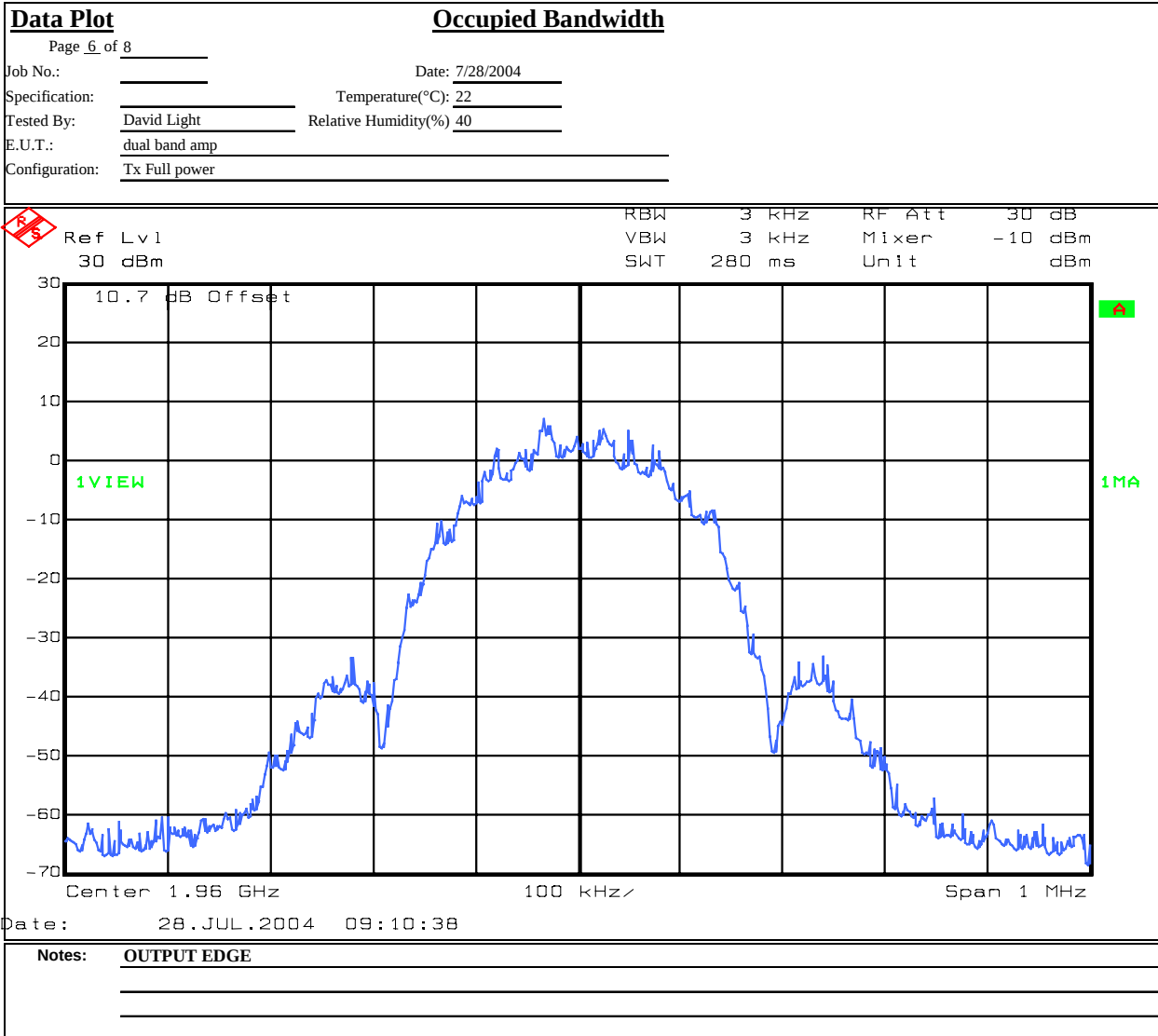
Test Data – Occupied Bandwidth (Input/Output)



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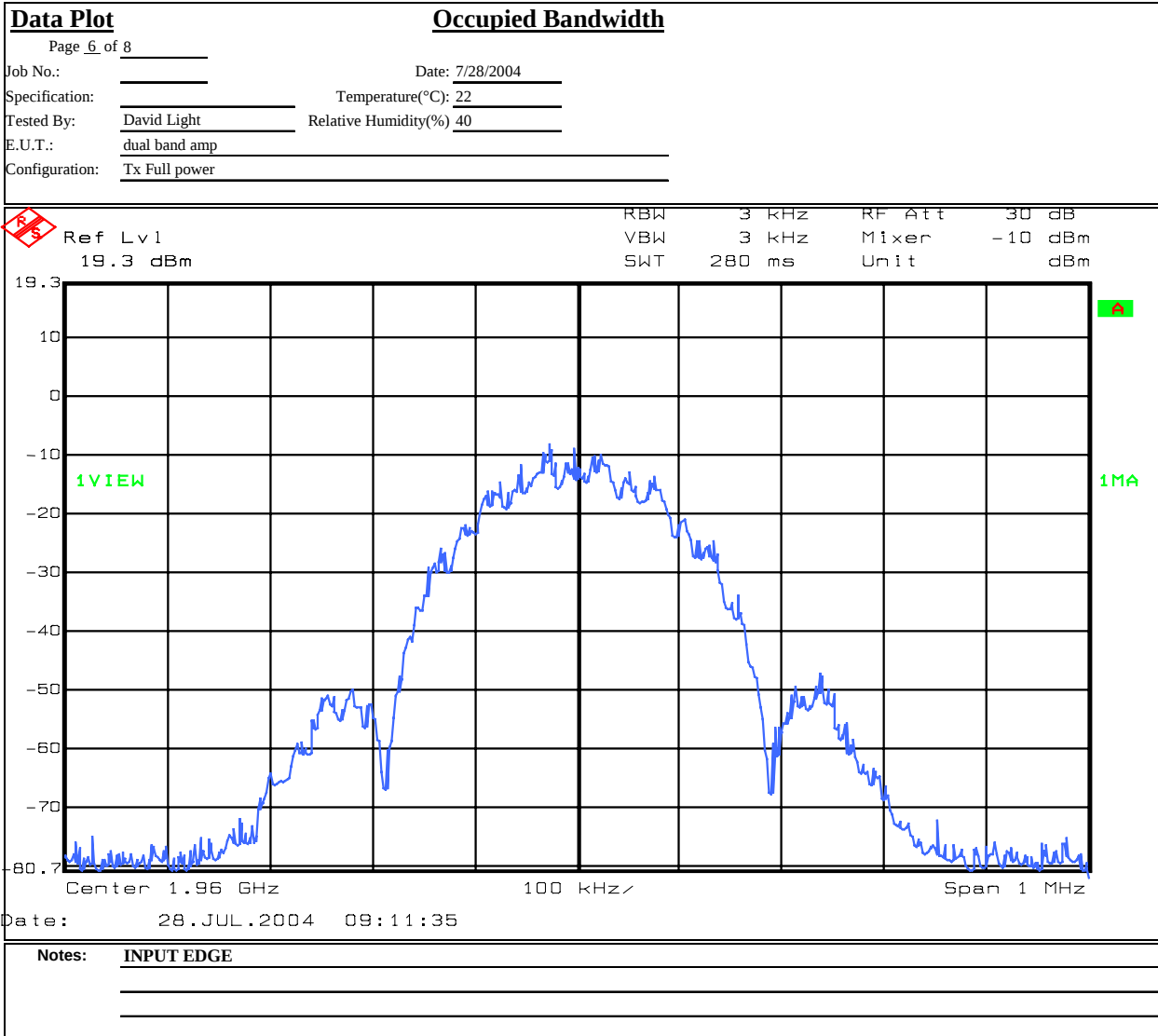
Test Data – Occupied Bandwidth (Input/Output)



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Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 2.1051
TESTED BY: David Light	DATE:7/28/04

Test Results: Complies.

Test Data: See attached plot(s).

Measurement Uncertainty: +/- 1.6 dB

Test Data – Spurious Emissions at Antenna Terminals



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Data Plot		Intermodulation Characteristics	
Page 1 of 8		Complete ☒ Preliminary ☐	
Job No.:	Date: 10/18/2004		
Specification: PT24	Temperature(°C): 25		
Tested By: David Light	Relative Humidity(%): 45		
E.U.T.: PCS REPEATER			
Configuration: TX			
Sample Number: 1			
Location: Lab 1	RBW: Refer to plots	Measurement	
Detector Type: Refer to plots	VBW: Refer to plots	Distance: na m	
Test Equipment Used			
Antenna:	Directional Coupler:		
Pre-Amp:	Cable #1: 1629		
Filter:	Cable #2:		
Receiver: 1036	Cable #3:		
Attenuator #1: 1064	Cable #4:		
Attenuator #2:	Mixer:		
Additional equipment used:			
Measurement Uncertainty: +/-1.7 dB			
Date: 18.OCT.2004 08:13:57			
Notes: CDMA			
11 dBm per carrier - 14 dBm Composite			

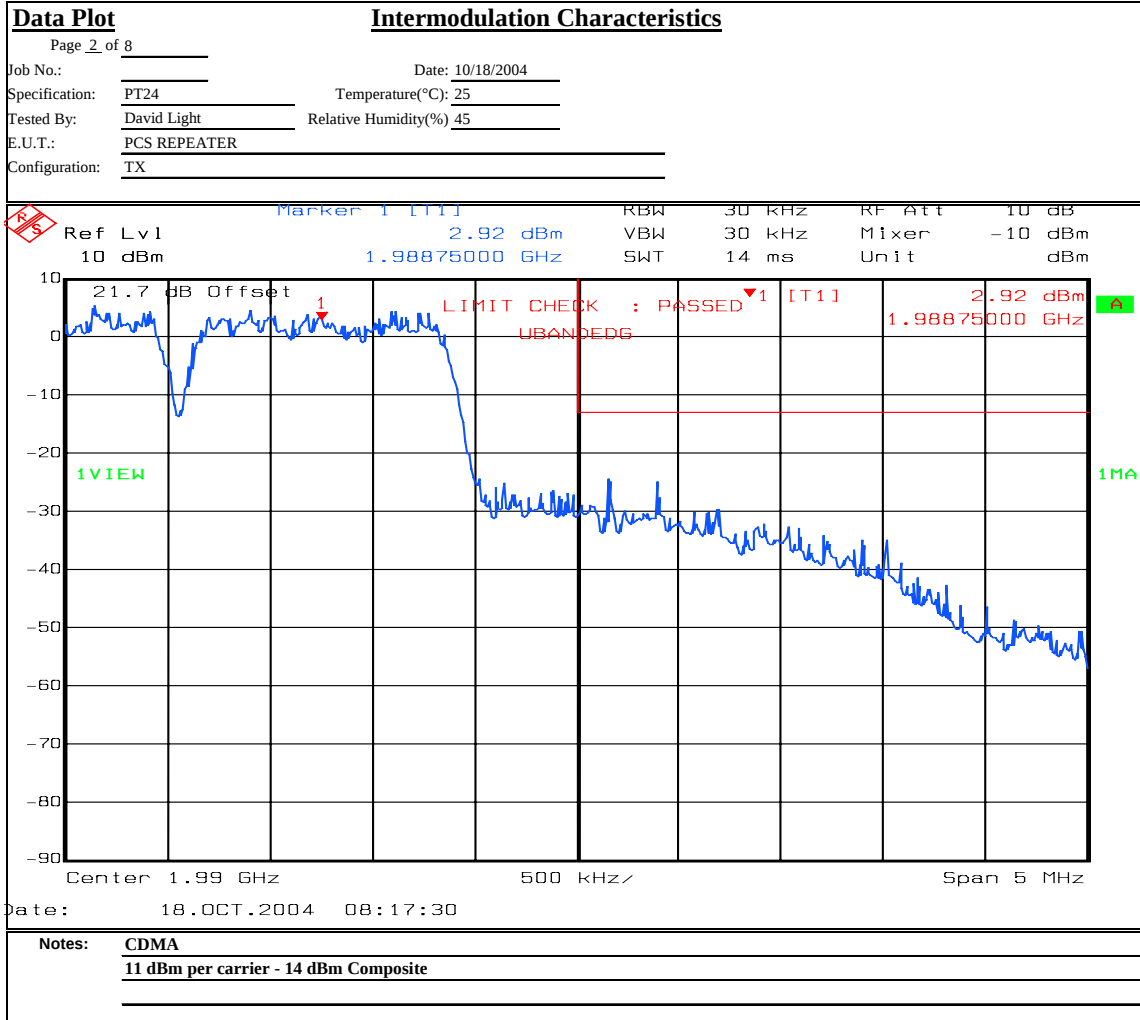
Test Data – Spurious Emissions at Antenna Terminals



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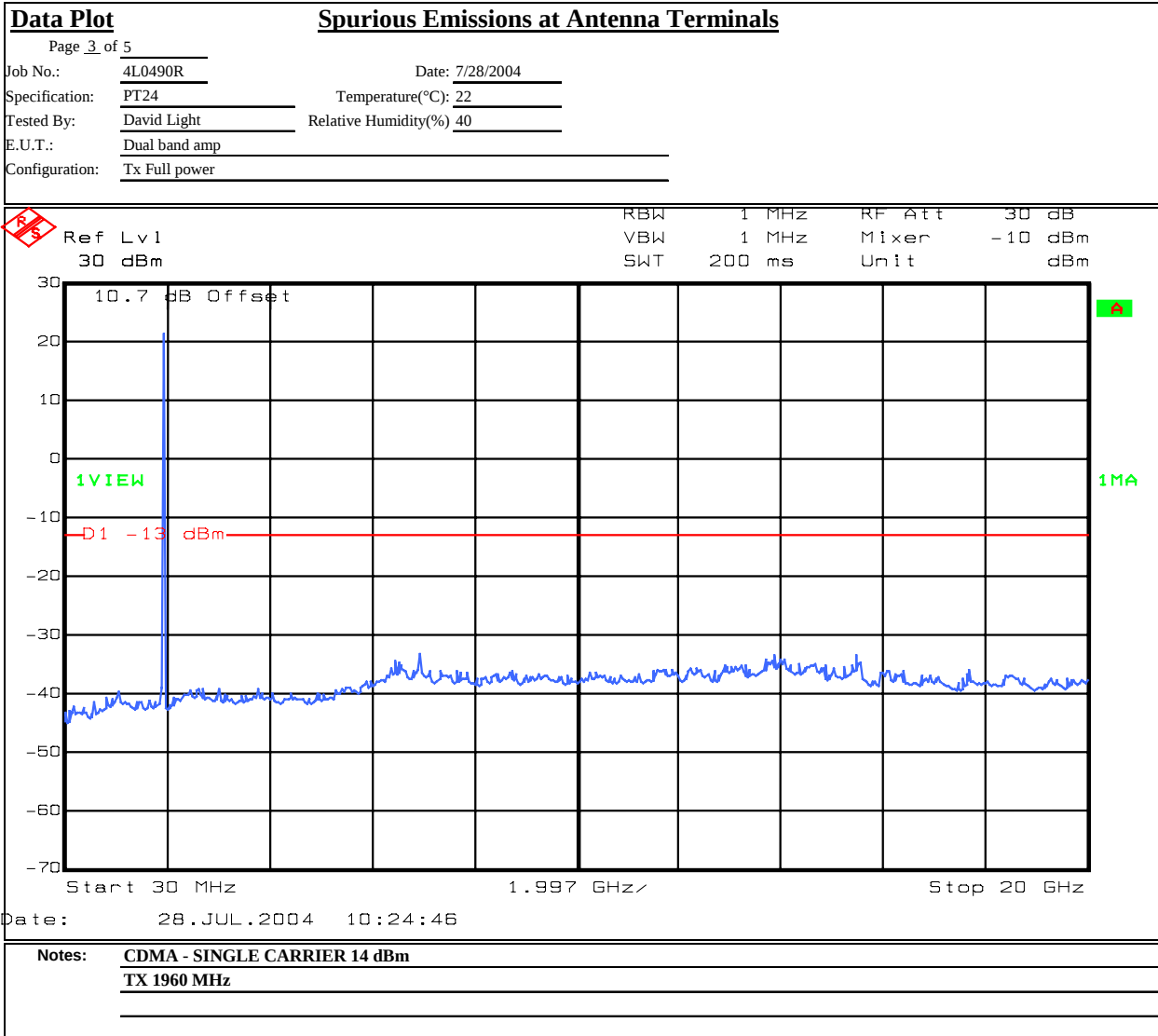
Test Data – Spurious Emissions at Antenna Terminals



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The spectrum was investigated in detail on three channels. The plot shown is indicative of the noise floor readings found for all channels and modulations.

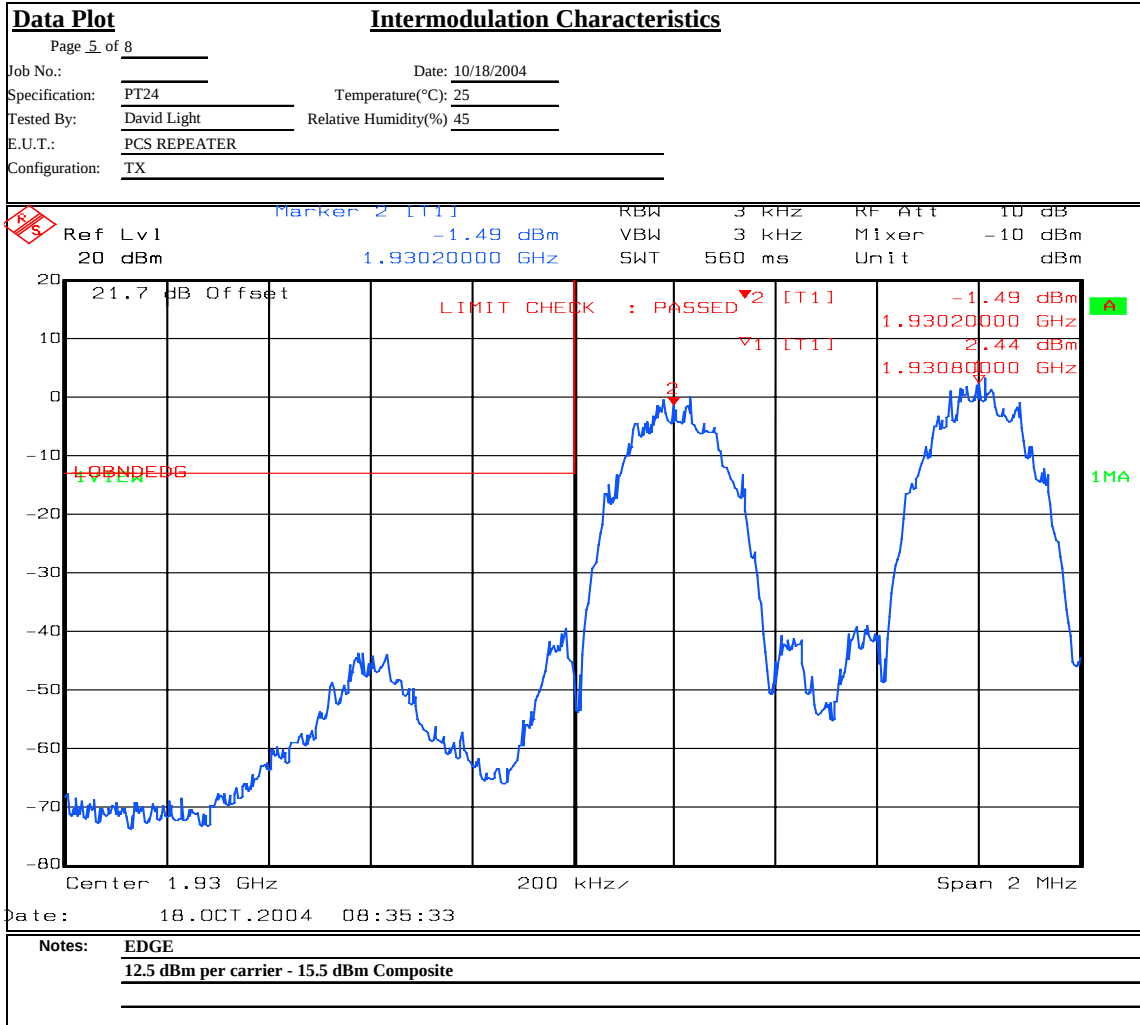
Test Data – Spurious Emissions at Antenna Terminals



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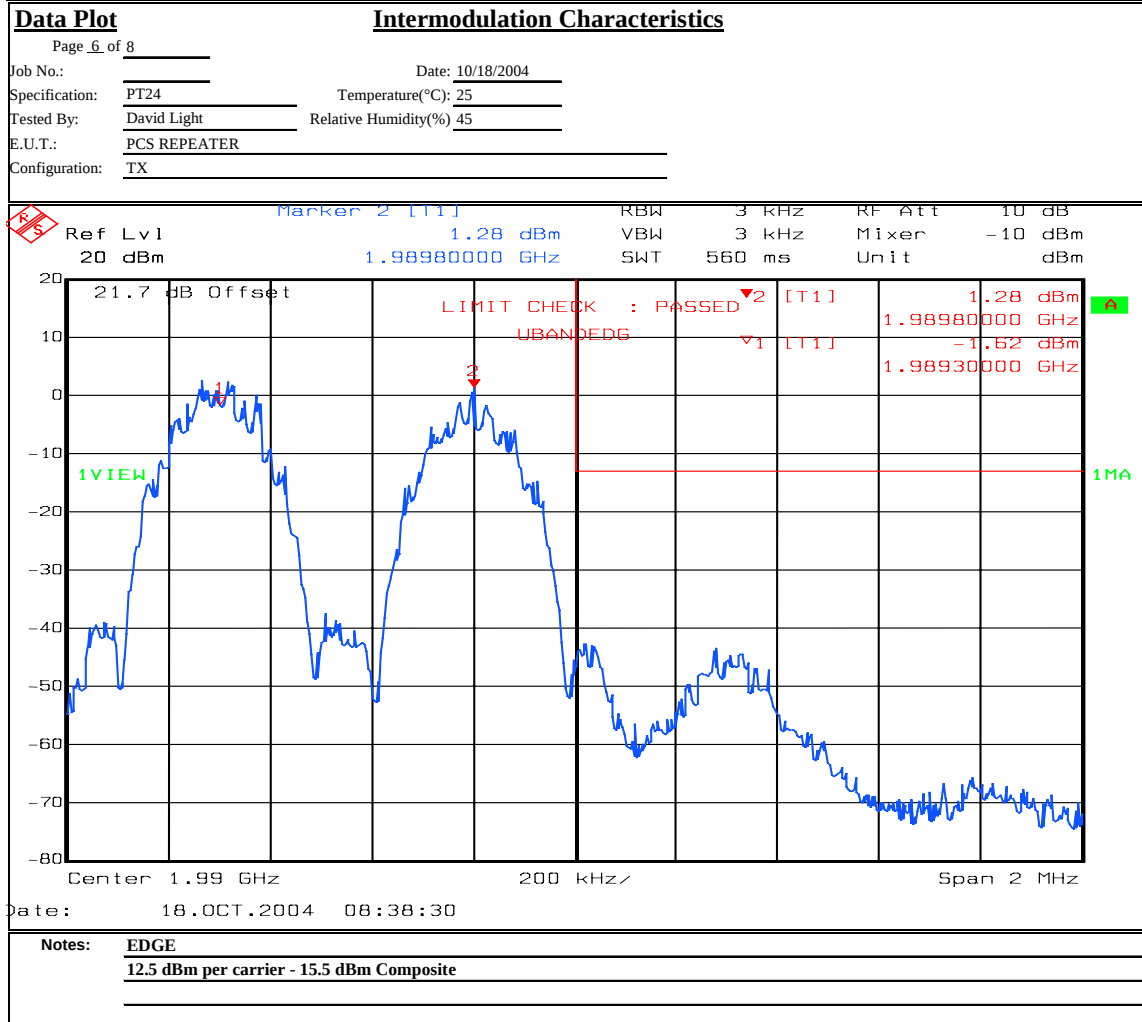
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EQUIPMENT: TFAN 80/19

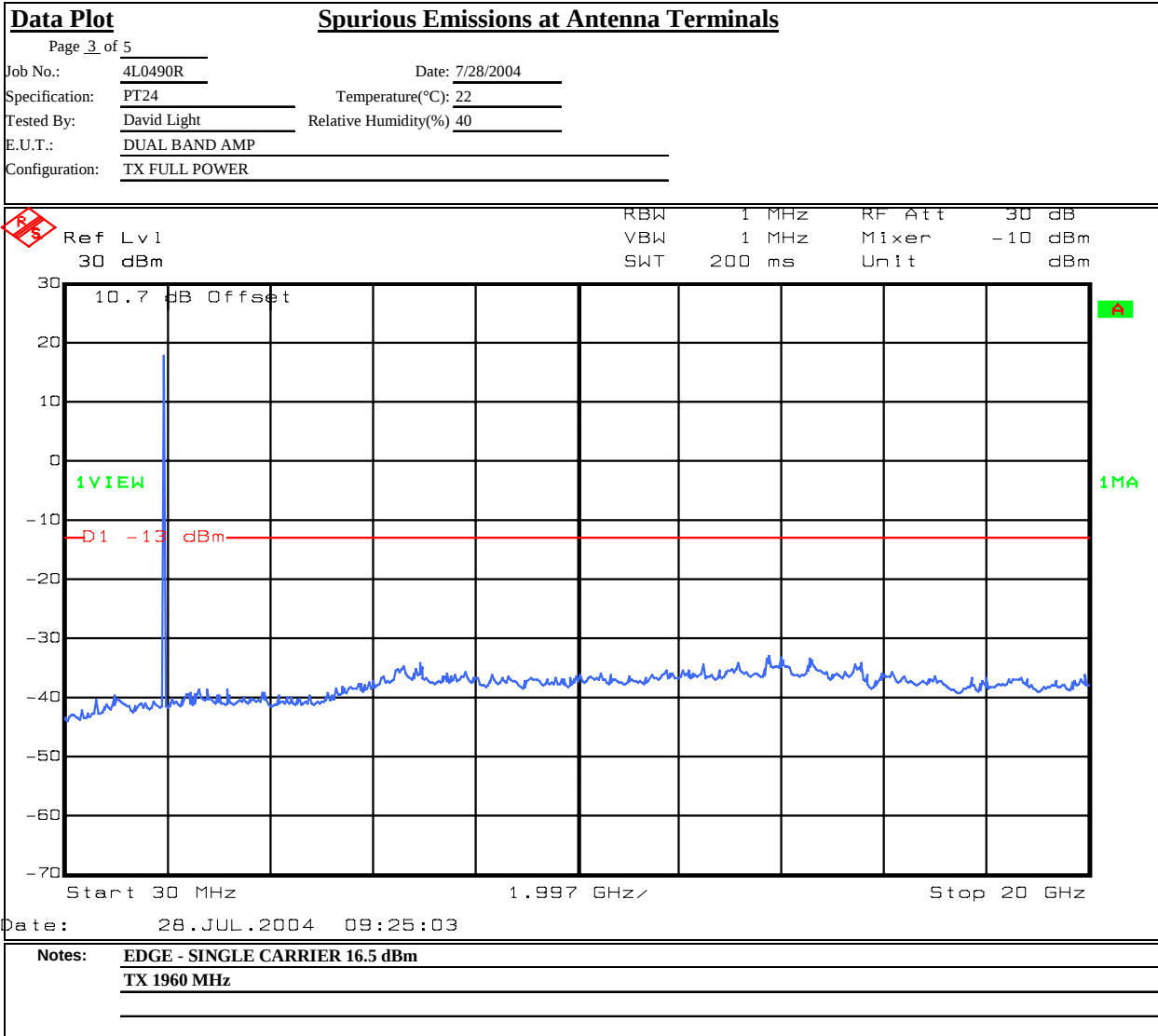
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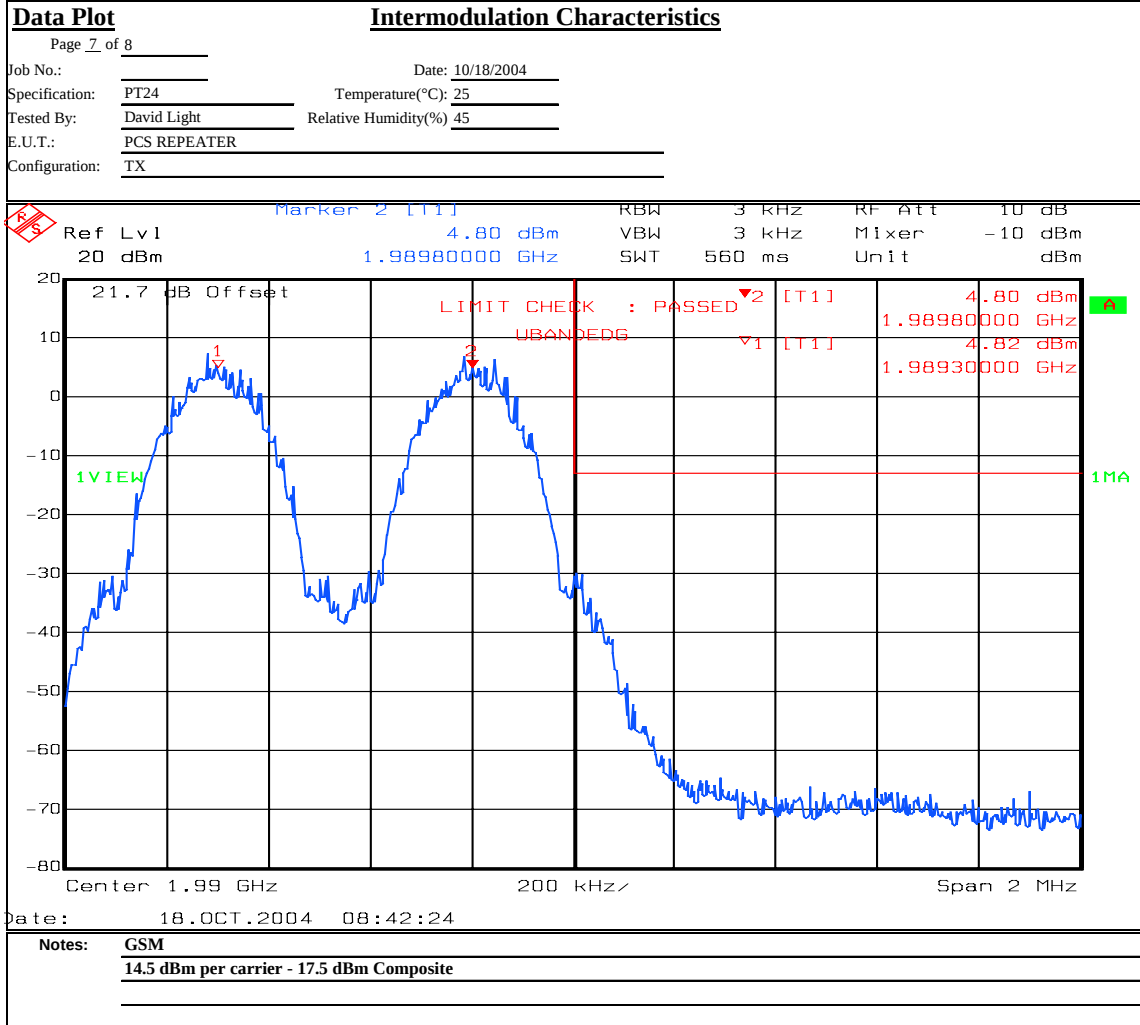
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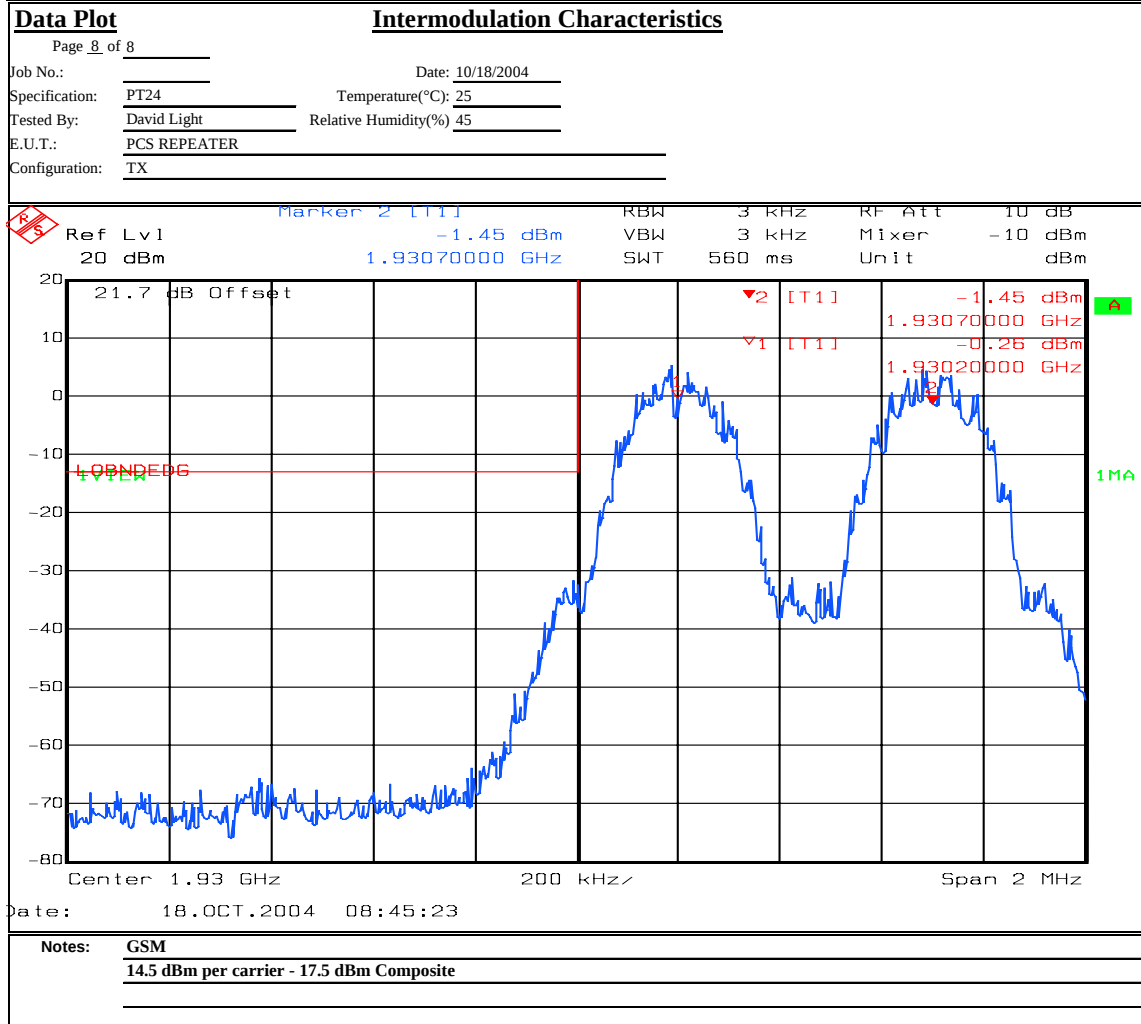
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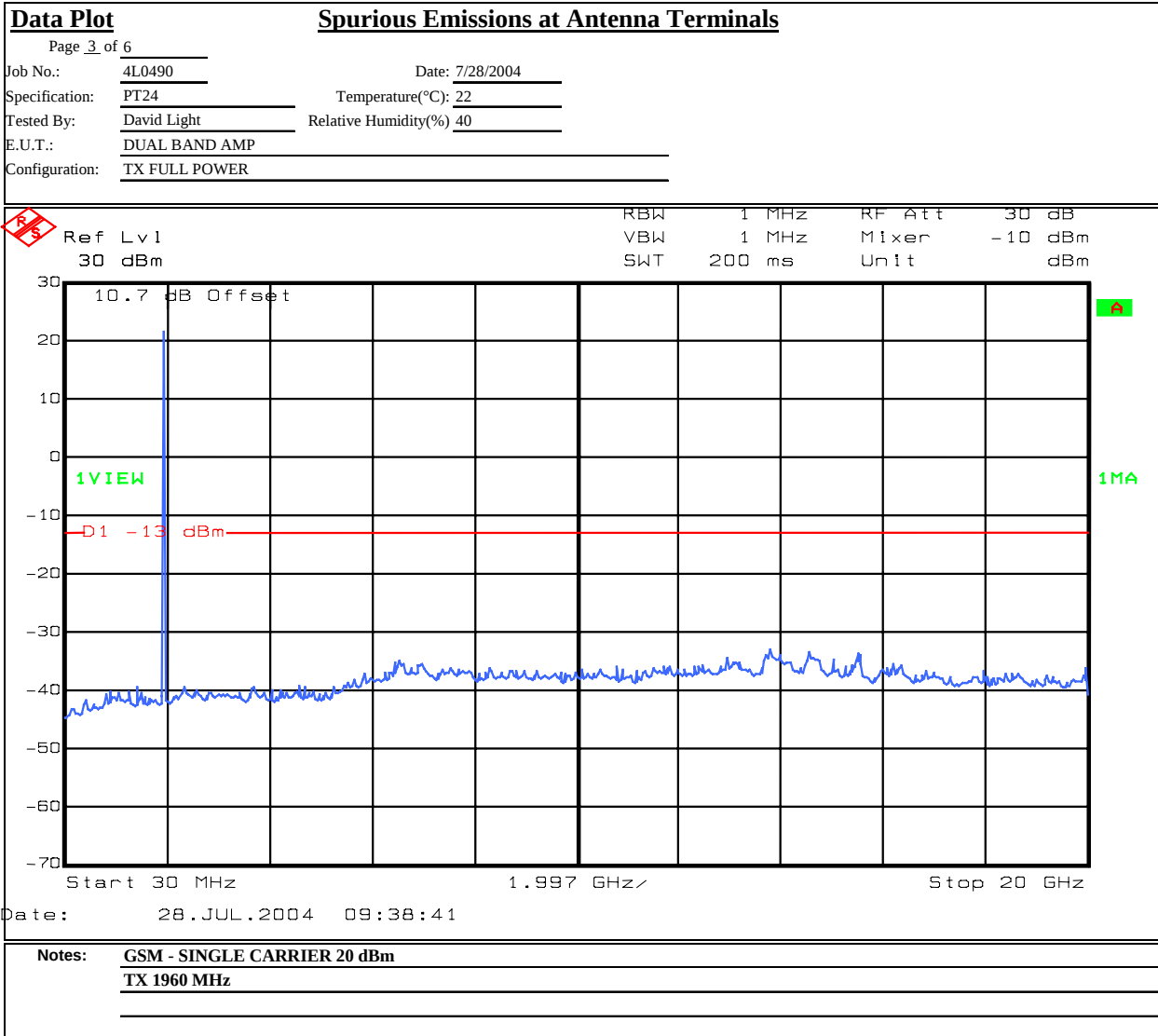
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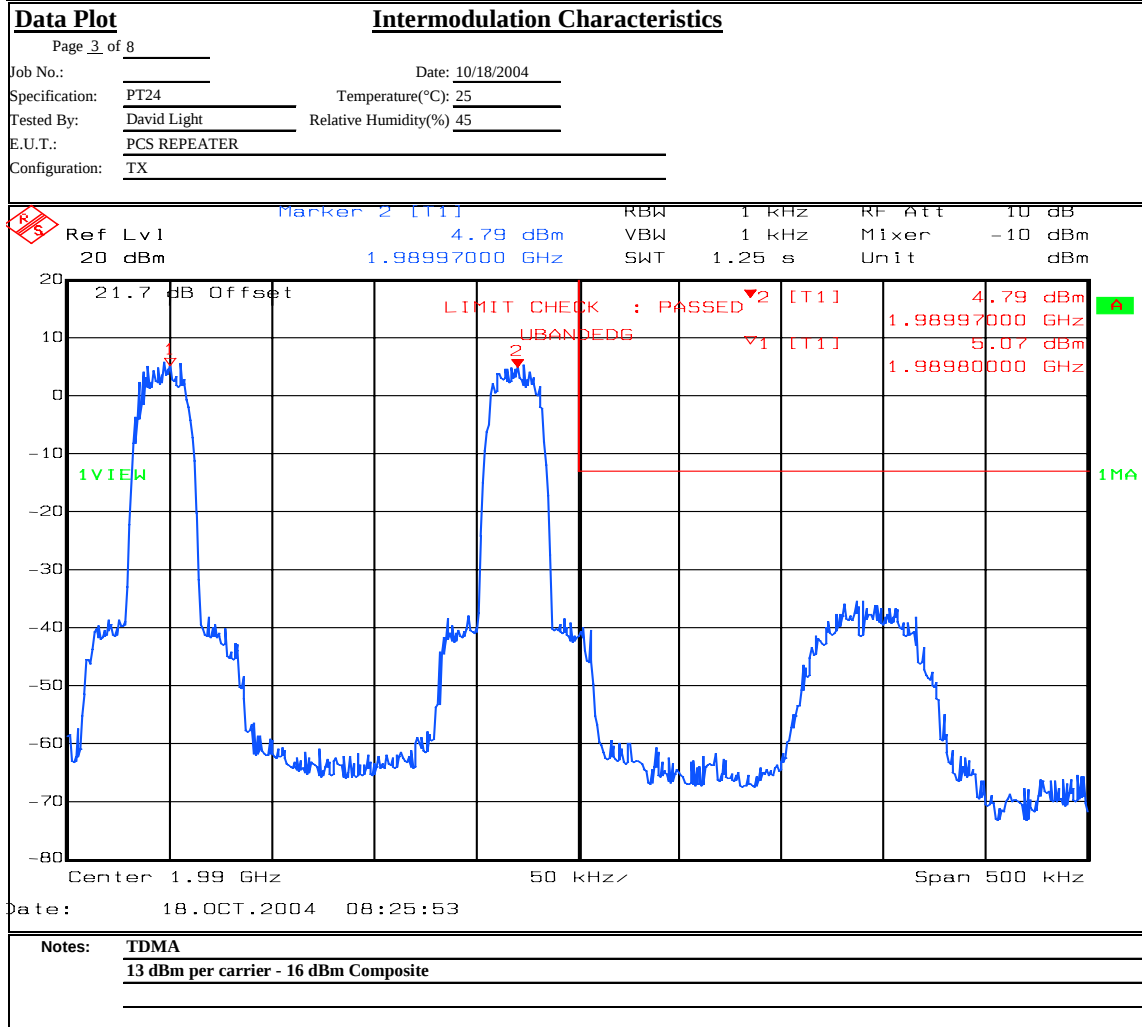
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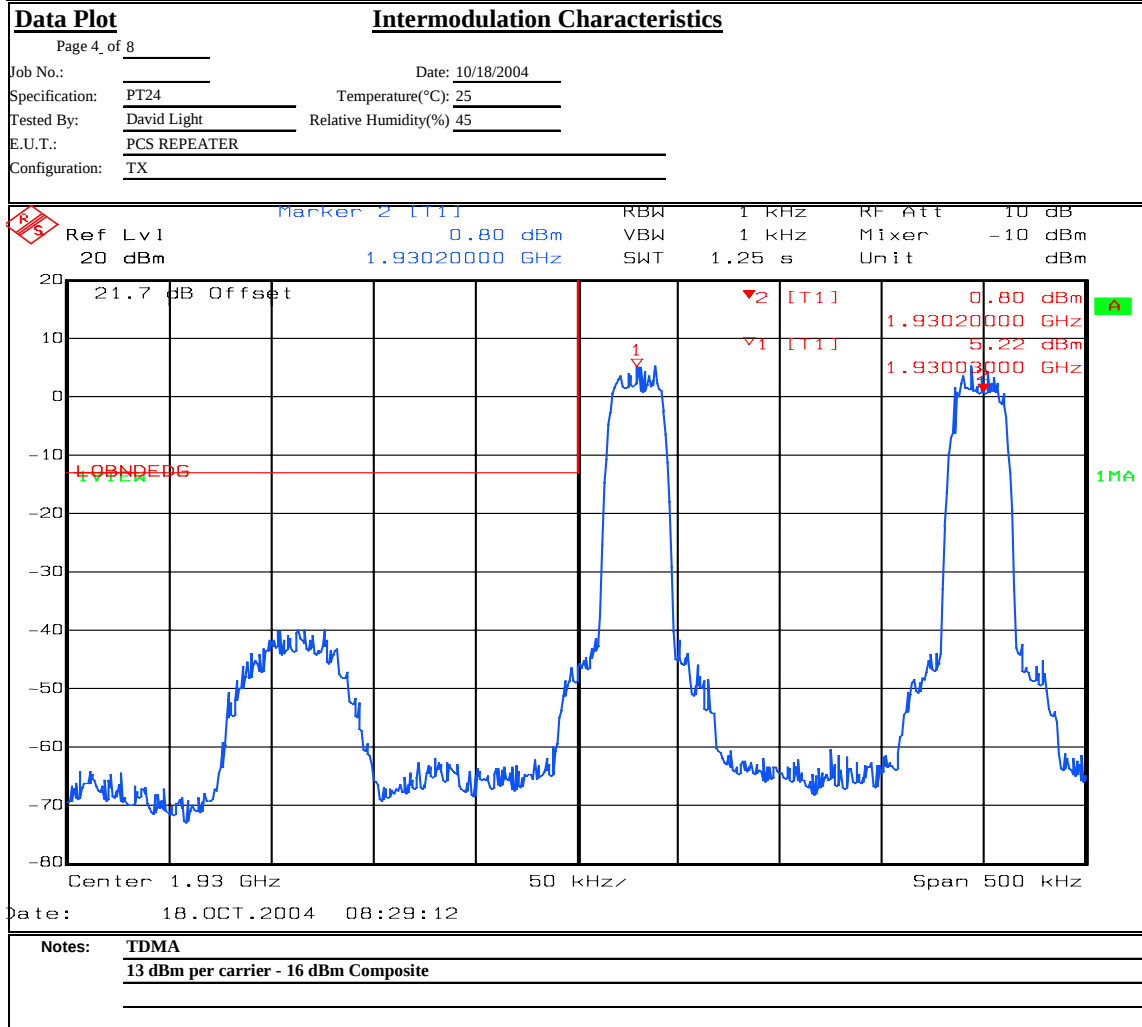
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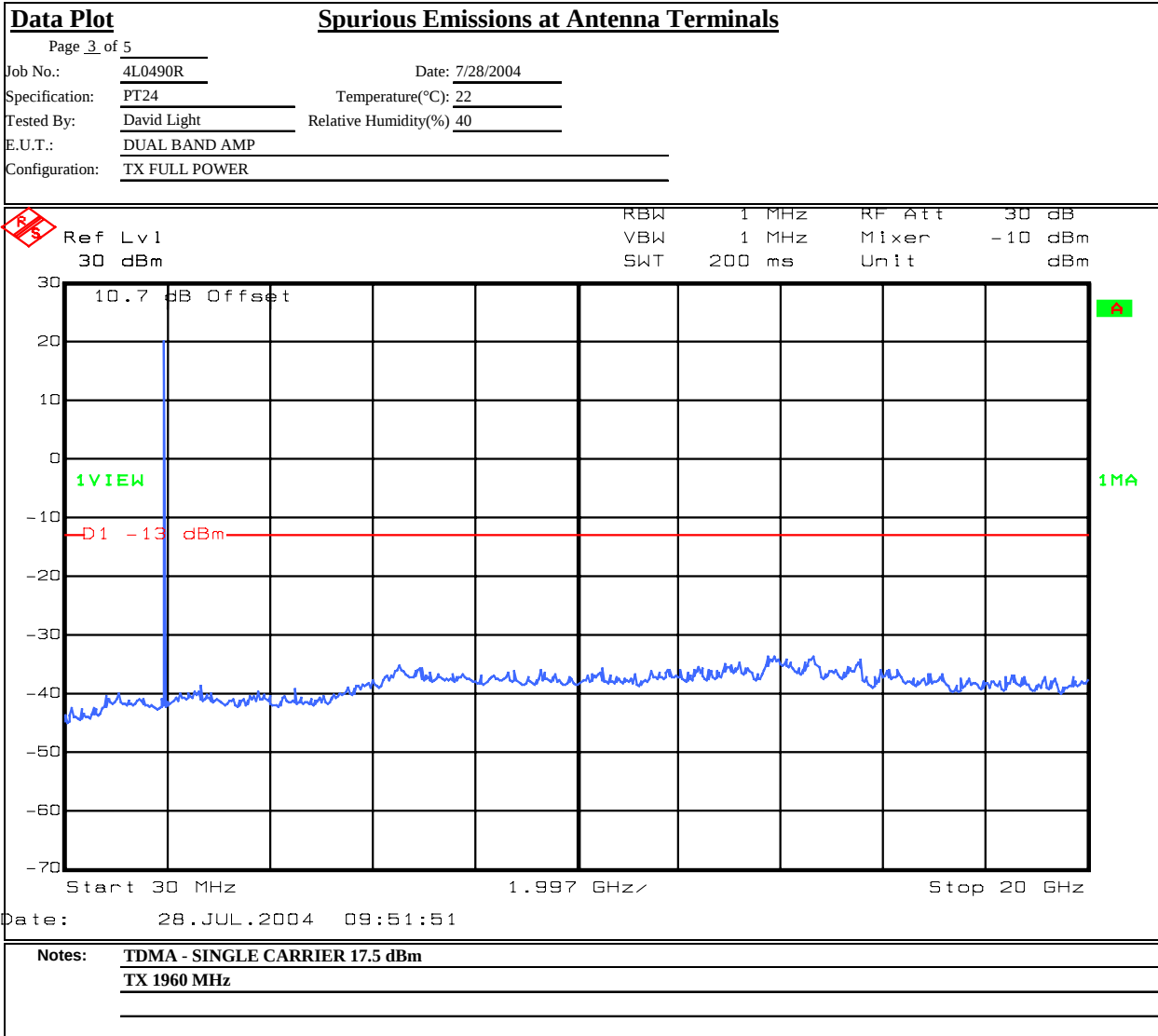
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Section 6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious Emissions	PARA. NO.: 2.1051
TESTED BY: Brian Boyea	DATE: 7/29/04

Test Results: Complies.

Test Data: There were no emissions detected above the noise floor which was at least 20 dB below the specification limit of -13 dBm EIRP. The spectrum was searched to the 10th harmonic of the carrier and was investigated on 3 channels.

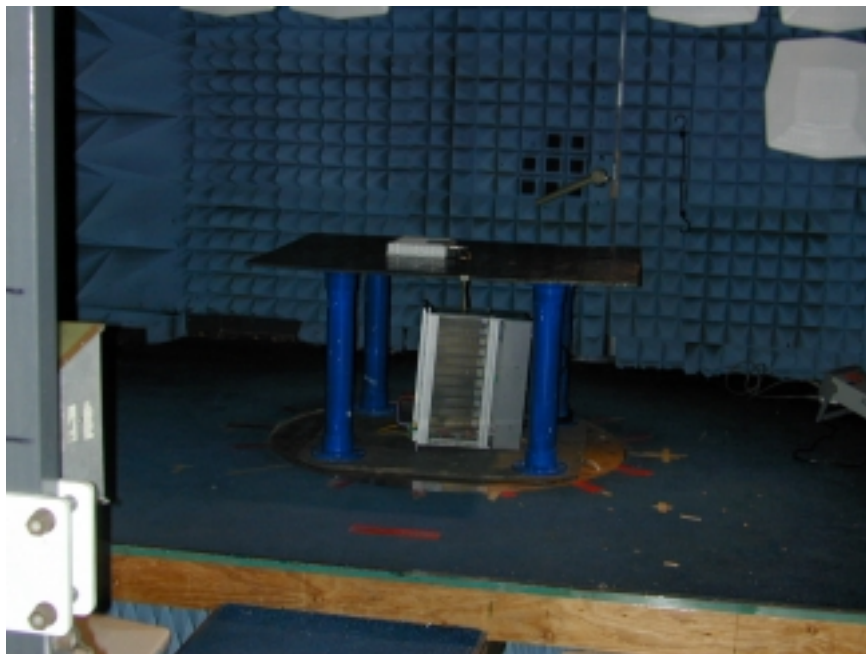
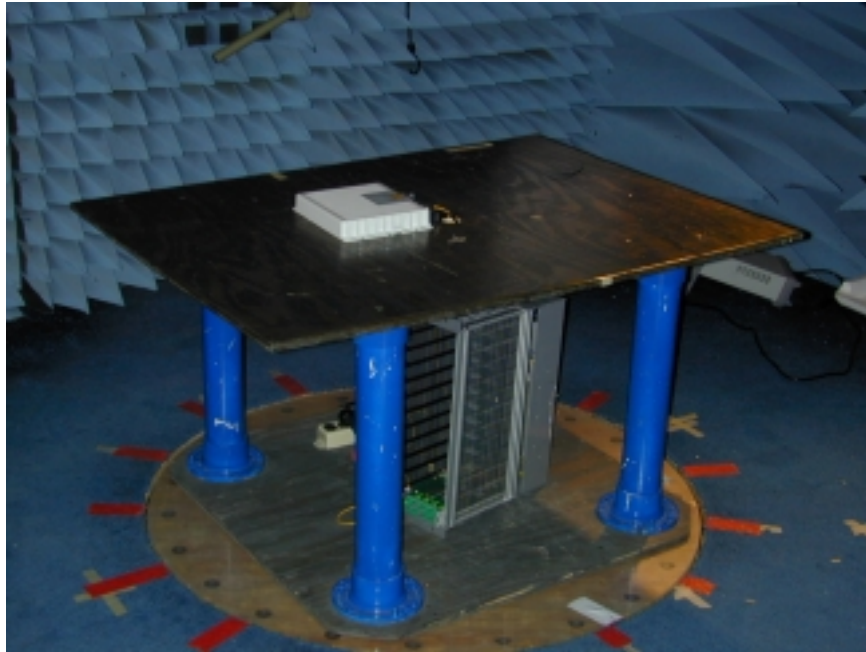
Equipment Used: 1484-1485-1016-1464

Measurement Uncertainty: +/- 1.7 dB

Temperature: 21 °C

Relative Humidity: 42 %

Photographs of Test Setup



Section 7. Test Equipment List

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	03/22/04	03/23/06
1471	10 db Attenuator DC 18 Ghz	MCL Inc. BW-S10W2 10db-2WDC	NONE	CBU	N/A
1626	CABLE, 5 ft	MEGAPHASE 10311 1GVT4	N/A	CBU	N/A
1627	CABLE, 5 ft	MEGAPHASE 10312 1GVT4	N/A	CBU	N/A
1304	HORN ANTENNA	ELECTRO METRICS RGA-60	6151	09/22/03	09/22/05
1484	Cable 2.0-18.0 Ghz	Storm PR90-010-072	N/A	07/30/04	07/30/05
1485	Cable 2.0-18.0 Ghz	Storm PR90-010-216	N/A	07/30/04	07/30/05
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	10/27/03	10/26/04
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	02/11/03	02/11/05

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:

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

where,

P = the equivalent isotropic radiated power in watts

E = the maximum measured field strength in V/m

R = the measurement range (3 meters)

G = the numeric gain of the transmit antenna in relation to an isotropic radiator

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 2.1047
---	--------------------------

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

Method Of Measurement:

CDMA

Spectrum analyzer settings:

RBW: 30 kHz

VBW: $\geq$ RBW

Span: 5 MHz

Sweep: Auto

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

GSM

RBW: 3 kHz

VBW: $\geq$ RBW

Span: 2 MHz

Sweep: Auto

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

NADC

RBW: 1 kHz

VBW: $\geq$ RBW

Span: 1 MHz

Sweep: Auto

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

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

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

Method Of Measurement:

Spectrum analyzer settings:

CDMA

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

GSM

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

NADC

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

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

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

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

Test Method:

The substitution antenna method was used to measure eirp of spurious emissions. This method is described in EIA/TIA 603. The field strength of the emission is measured and recorded. The EUT is then replaced with a substitution antenna of known gain against an isotropic radiator. The substitution antenna is fed with a calibrated signal which is adjusted until the previously recorded value is repeated. The eirp of the spurious signal is the level required to repeat the previously measured level.

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

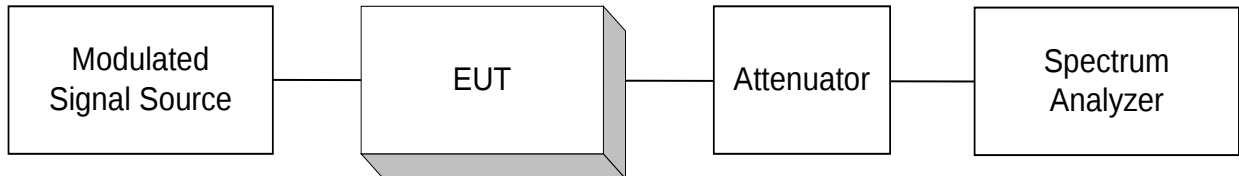
The E.U.T. is placed in an environmental chamber and allowed to stabilize at +20 degrees Celsius for at least 15 minutes. The frequency counter and signal generator are phase locked with the same 10 MHz reference frequency by connecting the 10 MHz ref. out of the counter to the 10 MHz ref, in of the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

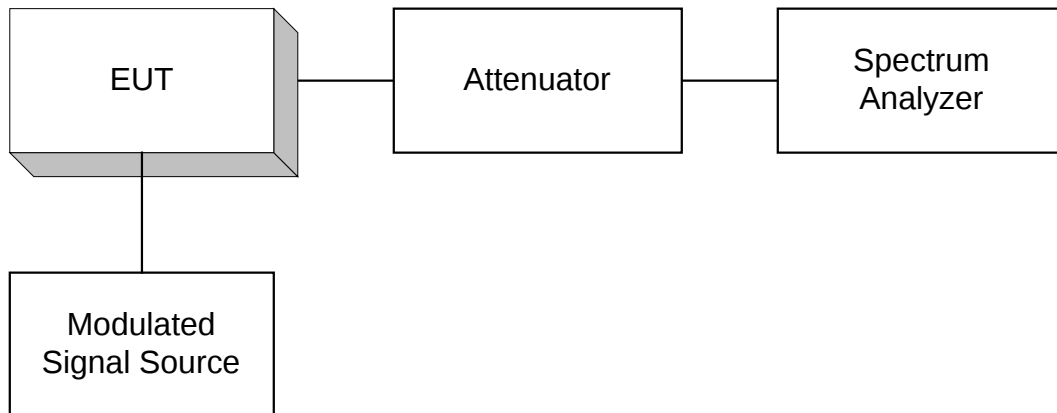
The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30 second intervals for a period of 5 minutes.

ANNEX B - TEST DIAGRAMS

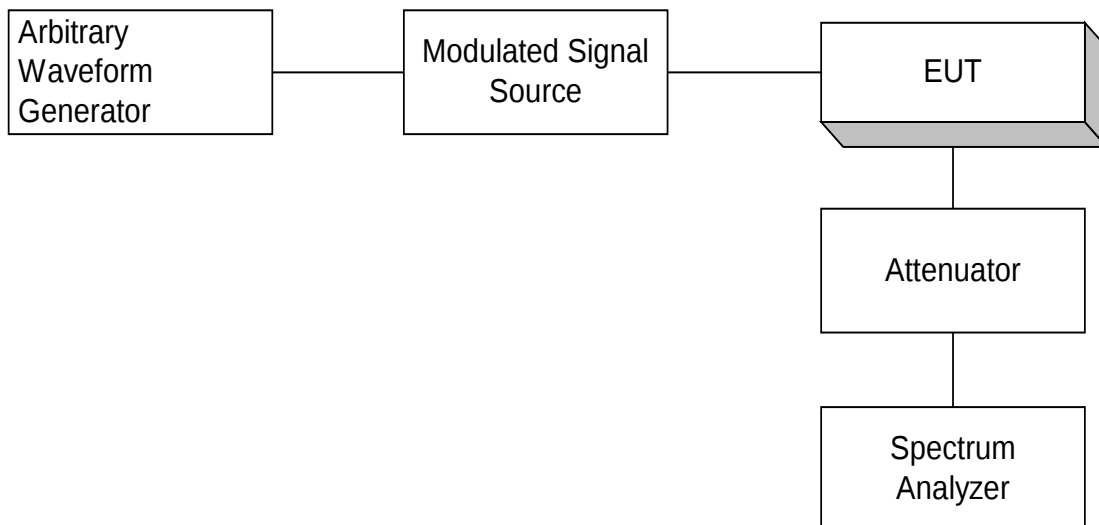
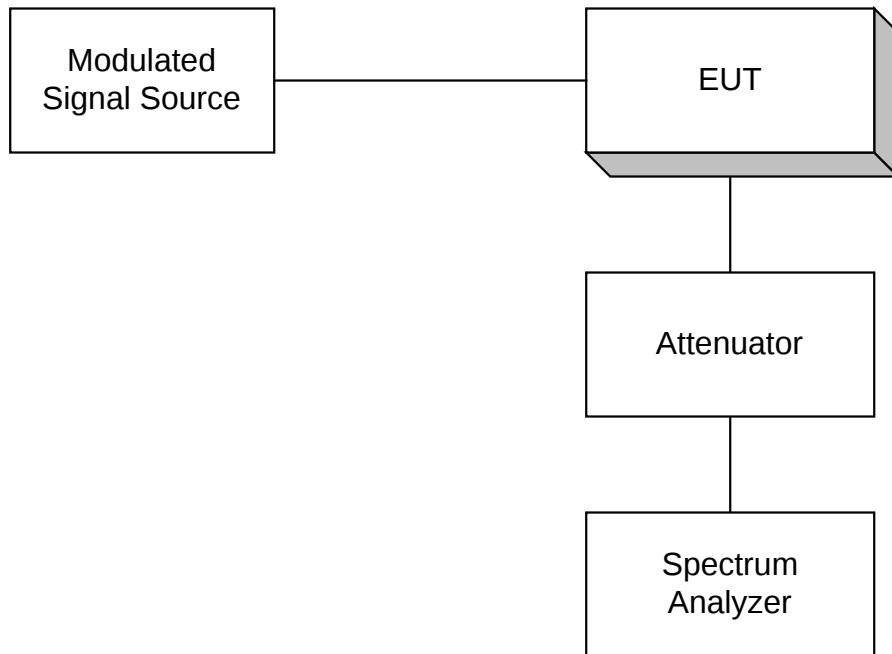
Para. No. 2.985 - R.F. Power Output



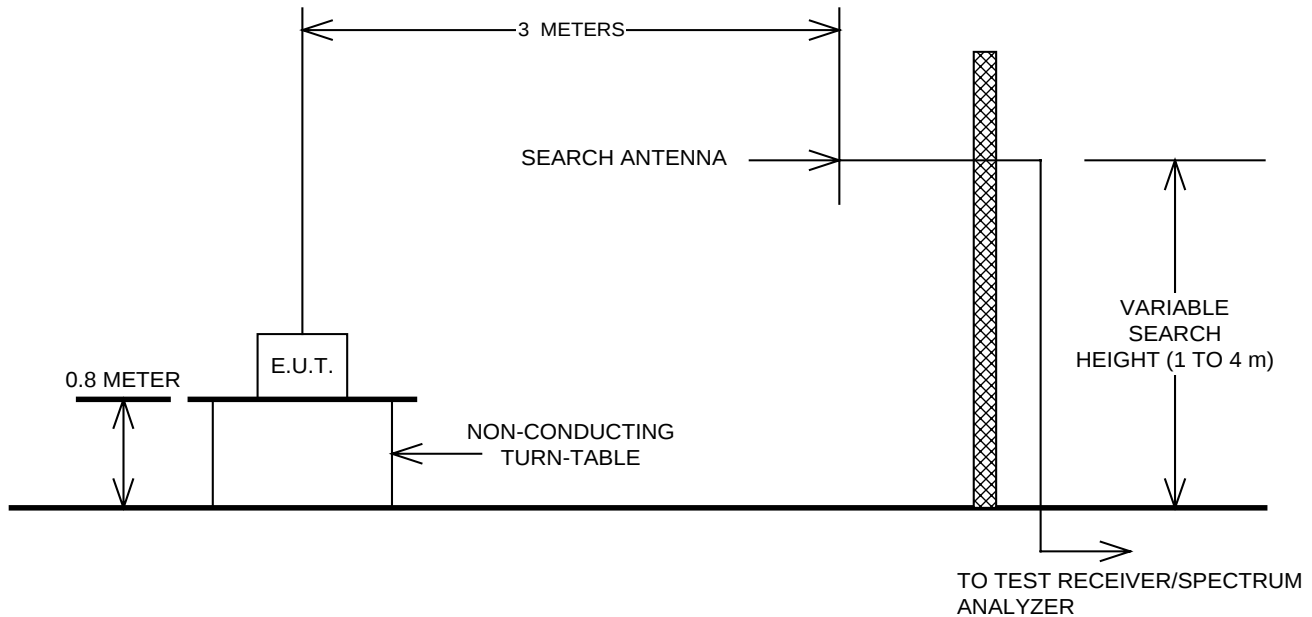
Para. No. 2.989 - Occupied Bandwidth



Para. No. 2.991 Spurious Emissions at Antenna Terminals



Para. No. 2.993 - Field Strength of Spurious Radiation



Para. No. 2.995 - Frequency Stability

