

**Nemko Test Report:** 4L0655RUS1rev1

**Applicant:** Enfora, Inc.

**Equipment Under Test:  
(E.U.T.)** DBH0104 Dual Band Phone

**In Accordance With:** **FCC Part 24, Subpart E**  
Broadband PCS Subscriber Station

**Tested By:** Nemko USA Inc.  
802 N. Kealy  
Lewisville, TX  
75057-3136

**Authorized By:**   
Dustin Oaks, Engineer

**Date:** 29 Nov. 2004

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**Section 1. Summary of Test Results**

Manufacturer: Enfora, Inc.

Model No.: DBH0104

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".

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This report applies only to the items tested.

**Summary Of Test Data**

<b>NAME OF TEST</b>	<b>PARA. NO.</b>	<b>RESULT</b>
RF Power Output	24.232	Complies
Occupied Bandwidth	24.238	Complies
Spurious Emissions at Antenna Terminals	24.238(a)	NA
Field Strength of Spurious Emissions	24.238(a)	Complies
Frequency Stability	24.235	Complies

**Footnotes:**

The phone has an integral antenna.

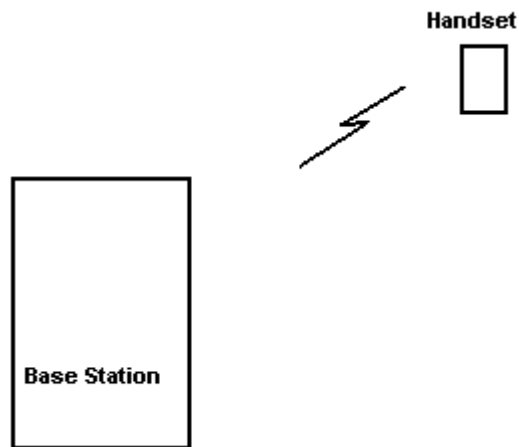
**Section 2. General Equipment Specification**

<b>Supply Voltage Input:</b>	3.6 Vdc Battery		
<b>Frequency Bands:</b>	<input checked="" type="checkbox"/>	Block A :	1850 – 1865 MHz
	<input checked="" type="checkbox"/>	Block B :	1865 – 1870 MHz
	<input checked="" type="checkbox"/>	Block C :	1870 – 1885 MHz
	<input checked="" type="checkbox"/>	Block D :	1885 – 1890 MHz
	<input checked="" type="checkbox"/>	Block E :	1890 – 1895 MHz
	<input checked="" type="checkbox"/>	Block F :	1895 – 1910 MHz
<b>Type of Modulation and Designator:</b>	<b>CDMA (F9W)</b> <input type="checkbox"/>	<b>GSM (GXW)</b> <input checked="" type="checkbox"/>	<b>NADC (DXW)</b> <input type="checkbox"/>
<b>Emission Designator:</b>	300KGXW		
<b>Necessary Bandwidth:</b>	300 kHz		
<b>Output Impedance:</b>	50 ohms		
<b>RF Output (Rated):</b>	0.501 W eirp		

### **System Description**

The phone is a dual band GSM phone operating in the 800 MHz cellular band and 1900 PCS band.

### **System Diagram**



**Section 3. RF Power Output**

NAME OF TEST: RF Power Output	PARA. NO.: 2.1046
TESTED BY: David Light	DATE:

**Test Results:** Complies.

**Measurement Data:**

Frequency (MHz)	Output Power EIRP (Watts)	Output Power EIRP (dBm)
1850.2	0.407	26.1
1880.2	0.537	27.3
1909.8	0.295	24.7

Note: Measurements were done radiated using the signal substitution method of measurement.

**Equipment Used:** 1304-1036-1484-1485

**Measurement Uncertainty:** +/- 1.7 dB

**Temperature:** 19 °C

**Relative Humidity:** 40 %

**Section 4. Occupied Bandwidth**

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 2.1047
TESTED BY:	DATE:

**Test Results:** Complies.

**Test Data:** See attached plots.

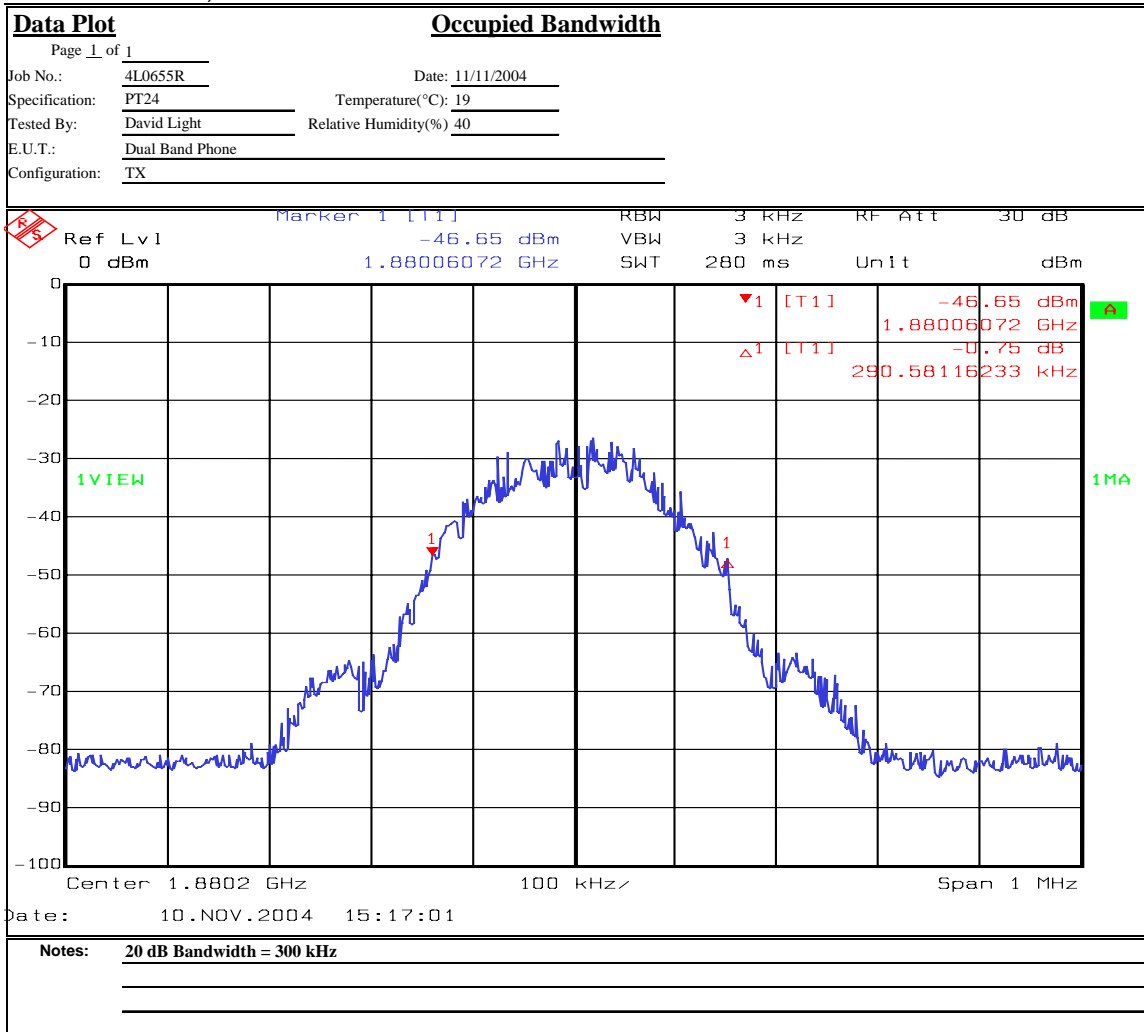


Test Data – Occupied Bandwidth



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Tel: (972) 436-9600  
Fax: (972) 436-2667

Nemko Dallas, Inc.



**Section 5. Field Strength of Spurious**

NAME OF TEST: Field Strength of Spurious	PARA. NO.: 2.1053
TESTED BY: David Light	DATE: 1/11/04

**Test Results:** Complies.

**Test Data:** See attached table.

Test Data - Radiated Emissions



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**EIRP**

Page 1 of 1 Complete X  
Preliminary \_\_\_\_\_

Job No.: 4L0655R Date: 11/11/04

Specification: PT24 Temperature(°C): 19

Tested By: David Light Relative Humidity(%) 40

E.U.T.: DUAL BAND PHONE

Configuration: TX

Sample No: 1

Location: AC 3 RBW: 1 MHz Measurement Distance: 3 m

Detector Type: Peak VBW: 1 MHz

**Test Equipment Used**

Antenna: 1304 Directional Coupler: \_\_\_\_\_

Pre-Amp: 1016 Cable #1: 1484

Filter: 1482 Cable #2: 1485

Receiver: 1036 Cable #3: \_\_\_\_\_

Attenuator #1: \_\_\_\_\_ Cable #4: \_\_\_\_\_

Attenuator #2: \_\_\_\_\_ Mixer: \_\_\_\_\_

Additional equipment used: \_\_\_\_\_

Measurement Uncertainty: +/-1.7 dB

Frequency (MHz)	Meter Reading (dBm)	Correction Factor (dB)		Pre-Amp Gain (dB)	Substitution Antenna Gain (dBi)		EIRP (dBm)	EIRP (mW)	Polarity	Comments
1880.2	-11.1	29.9		0	8.5		27.3	530.88	V	Carrier
1880.2	-22.3	32.7		0	6.4		16.7	47.21	H	Carrier
3760.4	-61.2	34.3		0	8.0		-18.9	0.0130	H	
5640.6	-60.1	36.0		32	9.1		-47.0	0.0000	H	
7520.8	-61.1	39.8		32	9.4		-43.9	0.0000	H	
9401	-52.0	41.4		34	10.1		-34.6	0.0003	H	
11281.2	-53.0	44.4		34.6	11.1		-32.1	0.0006	H	
13161.4	-55.0	47.5		34	11.2		-30.4	0.0009	H	
15041.6	-65.0	47.1		32	11.4		-38.5	0.0001	H	
16921.8	-72.0	46.1		33	13.0		-45.8	0.0000	H	Noise floor
3760.4	-72.2	40.4		0	10.1		-21.7	0.0068	V	
5640.6	-57.0	38.5		32	11.2		-39.3	0.0001	V	
7520.8	-62.0	40.4		32	11.6		-42.0	0.0001	V	
9401	-52.0	39.3		34	12.2		-34.5	0.0004	V	
11281.2	-53.0	42.0		34.6	13.2		-32.4	0.0006	V	
13161.4	-54.0	44.8		34	13.3		-29.9	0.0010	V	
15041.6	-72.0	46.5		32	13.5		-44.0	0.0000	V	Noise floor
16921.8	-72.0	44.3		33	15.2		-45.5	0.0000	V	Noise floor
1850.2	-12.3	29.9		0	8.5		26.1	402.717034	V	Carrier
1850.2	-17.1	32.7		0	6.4		21.9	156.314764	H	Carrier
1909.8	-13.7	29.9		0	8.5		24.7	291.742701	V	Carrier
1909.8	-18.0	32.7		0	6.4		21.0	127.057411	H	Carrier
				0						
				0						

Notes: \_\_\_\_\_

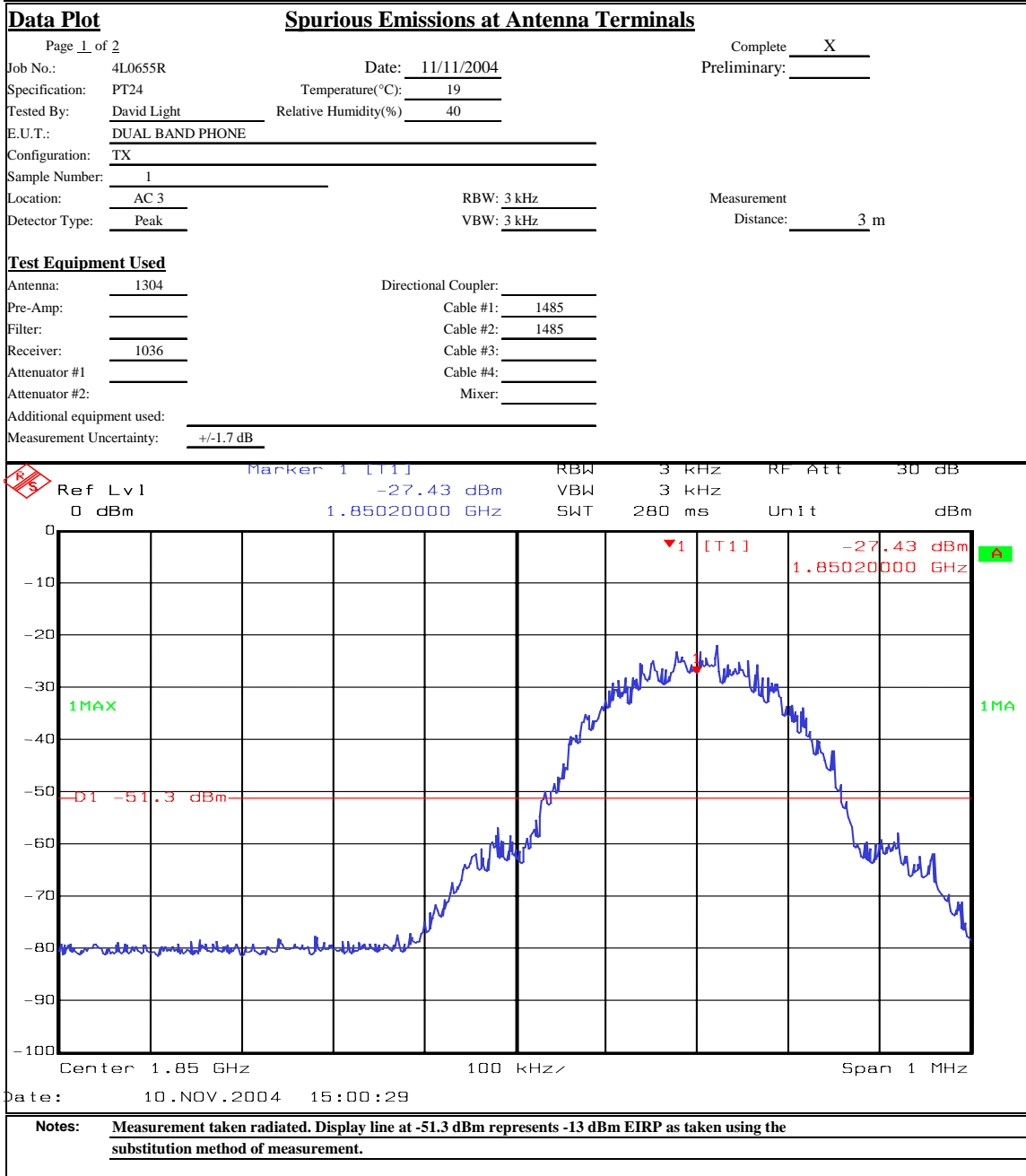
The device was tested on three orthogonal axis' Worse case data is presented.  
The device was tested from 30 MHz to the 10<sup>th</sup> harmonic of the carrier.

Bandedge Plots



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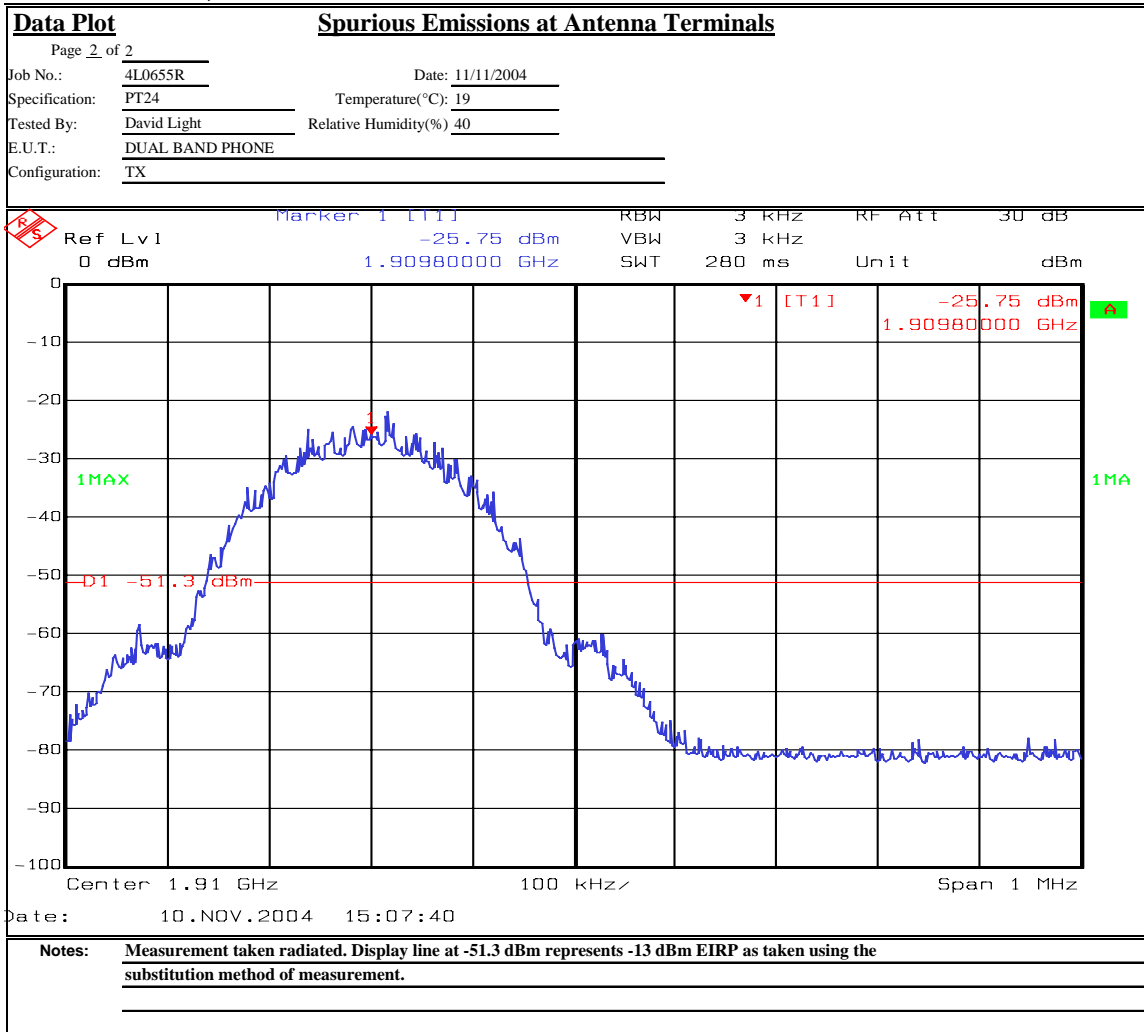


Bandedge Plots



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**Photographs of Test Setup**



**Section 7. Frequency Stability**

NAME OF TEST: Frequency Stability	PARA. NO.: 24.235
TESTED BY: David Light	DATE: 11/12/04

**Test Results:** Complies.

Test Data – Frequency Stability



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<u>Frequency Stability</u>							
Page <u>1</u> of <u>1</u>							
Job No.:	4L0655R	Date:		11/12/2004			
Specification:	PT24	Temperature(°C):		22			
Tested By:	David Light	Relative Humidity(%)		50			
E.U.T.:	DUAL BAND PHONE						
Configuration:	TX						
Sample Number:	1						
<u>Test Equipment Used</u>							
Antenna:	1304	Directional Coupler:					
Pre-Amp:		Cable #1:		1629			
Filter:		Cable #2:					
Receiver:	1026	Thermometer:		619			
Attenuator #1:							
Attenuator #2:							
Measurement Uncertainty:	1x10 <sup>-17</sup> ppm	Standard Test Frequency		1880.267300		MHz	
Temp (°C)	Measured Frequency (MHz)	Rho	Test Voltage	Frequency Error (Hz)	Limit (+/-Hz)	Error (ppm)	Comment
20	1880.267300	NA	3.6	0	4700.7	0	Fully charged battery
20	1880.268120	NA	4.2	820	4700.7	0.4	Connected to charger
20	1880.267750	NA	3.0	450	4700.7	0.2	Battery cutoff
50	1880.266894	NA		-406	4700.7	-0.2	
40	1880.266894	NA		-406	4700.7	-0.2	
30	1880.268419	NA		1119	4700.7	0.6	
10	1880.270808	NA		3508	4700.7	1.9	
0	1880.270500	NA		3200	4700.7	1.7	
-10	1880.269165	NA		1865	4700.7	1.0	
-20	1880.270700	NA		3400	4700.7	1.8	
-30	1880.267600	NA		300	4700.7	0.2	
Notes:							



**Section 8. Test Equipment List**

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
1629	CABLE, 6 ft	MEGAPHASE 10311 1GVT4	N/A	CBU	N/A
1026	FREQUENCY COUNTER	HEWLETT PACKARD 5350B	8232A01493	01/23/04	01/22/05
283	Environmental Chamber with controller # 1189006	ENVIROTRONICS SH27 & 2030-22844	129010083	04/22/03	04/21/04
619	THERMOMETER	FLUKE 51	4520028	09/16/04	09/16/05
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	03/22/04	03/23/06
1484	Cable 2.0-18.0 Ghz	Storm PR90-010-072	N/A	08/26/04	08/26/05
1485	Cable 2.0-18.0 Ghz	Storm PR90-010-216	N/A	08/02/04	08/02/05
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	11/12/04	11/12/05
1481	Microwave Highpass Filter	K & L 3DH1-2000/T8000-0/0	4	Cal B4 Use	N/A
1482	Band Pass Filter	K & L 11SH10-4000/T12000-0/0	2	Cal B4 Use	N/A
759	ANTENNA, LOG PERIODIC	A.H. SYSTEMS SAS-200/510	556	07/23/04	07/23/05
791	PREAMP, 25dB	ICC LNA25	398	11/12/04	11/12/05
1983	CABLE	KTL Site A OATS	N/A	03/11/04	03/11/05
760	Antenna biconical	Electro Metrics MFC-25	477	06/22/04	06/22/05

## **ANNEX A - TEST METHODOLOGIES**

<b>NAME OF TEST: RF Power Output</b>	<b>PARA. NO.: 2.1046</b>
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**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:** CDMA Per ANSI/J-STD-008  
TDMA Per ANSI/J-STD-010  
PCS 1900 Per ANSI/J-STD-007

Detachable Antenna:

The peak power at antenna terminals is measured using an in-line peak power meter or a spectrum analyzer.

Integral Antenna:

Test Method: TIA/EIA-603-1992, Section 2.2.12

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

**NAME OF TEST: Occupied Bandwidth**

**PARA. NO.: 2.1049**

**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 Per ANSI/J-STD-008

Spectrum analyzer settings:

RBW: 30 kHz

VBW:  $\geq$  RBW

Span: 5 MHz

Sweep: Auto

GSM Per ANSI/J-STD-007

RBW: 3 kHz

VBW:  $\geq$  RBW

Span: 2 MHz

Sweep: Auto

NADC Per IS-136

RBW: 1 kHz

VBW:  $\geq$  RBW

Span: 1 MHz

Sweep: Auto

**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 Per ANSI/J-STD-008

GSM Per ANSI/J-STD-007

RBW: 1 MHz (> 1 MHz from Band Edge)  
RBW: 20 kHz (< 1MHz from Band Edge)  
VBW: ≥ RBW  
Sweep: Auto  
Video Avg: 6 Sweeps

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

NADC Per IS-136

RBW: 1 MHz (> 1 MHz from Band Edge)  
RBW: 1 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.

**Test Method:**

TIA/EIA-603-1992, Section 2.2.12

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

**NAME OF TEST: Frequency Stability**

**PARA. NO.: 2.1055**

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

**Method Of Measurement:** CDMA Per ANSI/J-STD-008  
TDMA Per ANSI/J-STD-007  
NADC Per IS-136

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. 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.

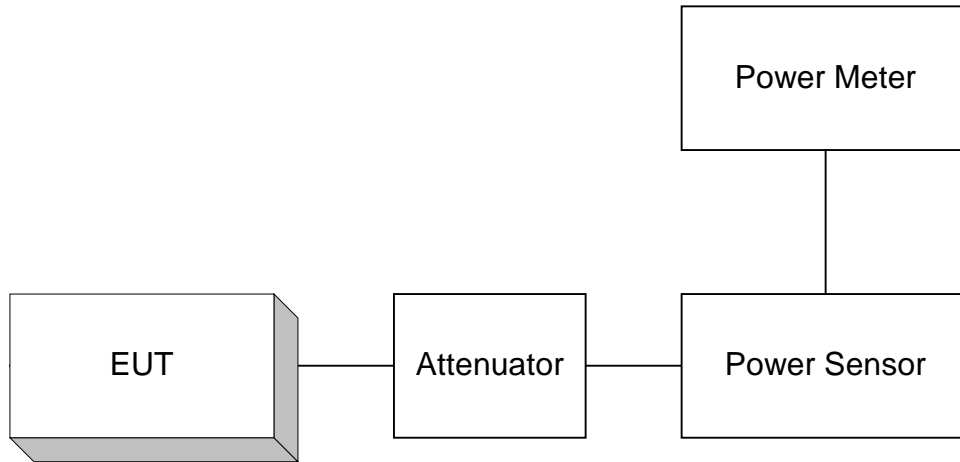
Digitally Modulated Signals

Equipment that produces a digitally modulated carrier is tested using a vector modulation analyzer. Frequency accuracy and rho are measured over the specified environmental extremes.

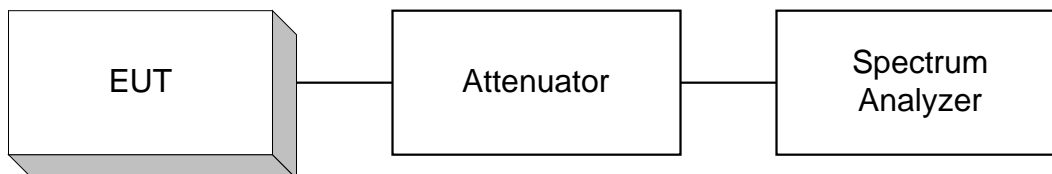
## **ANNEX B - TEST DIAGRAMS**



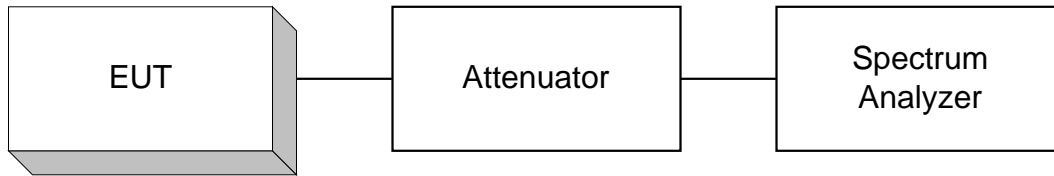
**Para. No. 2.985 - R.F. Power Output**



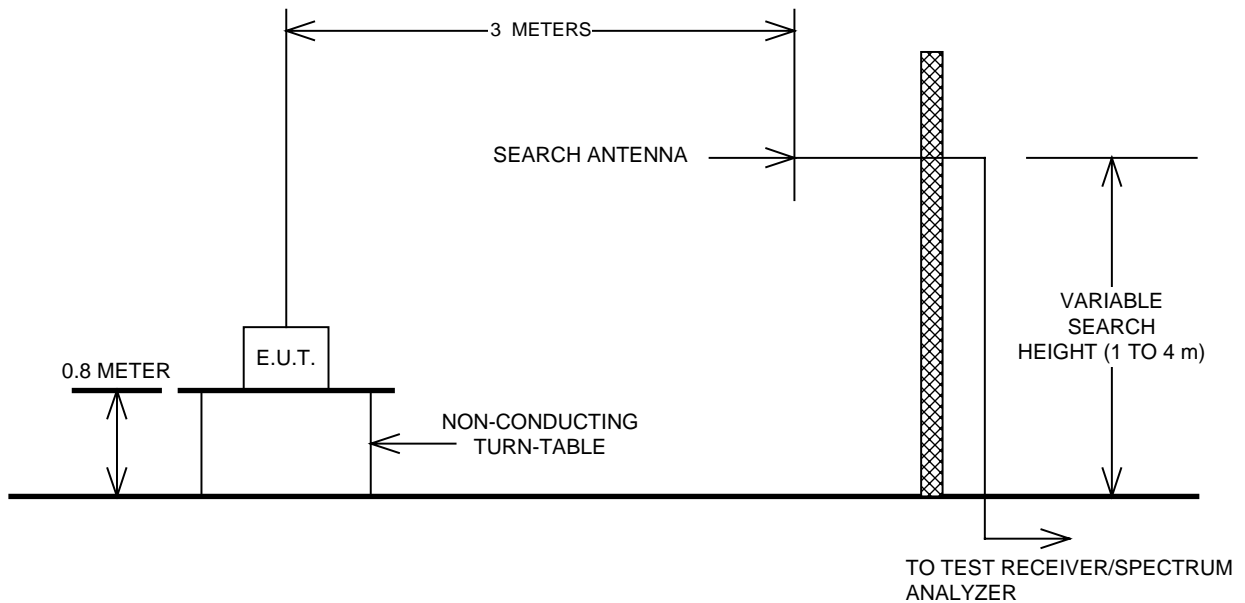
**Para. No. 2.989 - Occupied Bandwidth**



**Para. No. 2.991 Spurious Emissions at Antenna Terminals**



**Para. No. 2.993 - Field Strength of Spurious Radiation**



**Para. No. 2.995 - Frequency Stability**

