| Nemko Test Report No.: | 4L0491RUS2REV2  |
|------------------------|---|
| Applicant:             | Andrew Corporation  |
| Equipment Under Test:  | TFAN 85/19  |
| In Accordance With:    | FCC Part 24, Subpart E Broadband PCS Repeaters                    |
| Tested By:             | Nemko Dallas Inc.<br>802 N. Kealy<br>Lewisville, Texas 75057-3136 |
|                        | Jon- Till   |
| Authorized By:         | Tom Tidwell, Frontline Group Manager                              |
| Date:                  | 18 October, 2004  |
| Total Number of Pages: | 42  |

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FCC PART 24, SUBPART E BROADBAND PCS REPEATERS

EQUIPMENT: TFAN 85/19

TEST REPORT NO. 4L0491RUS2

## Section 1. Summary of Test Results

| Manufacturer: | Andrew Corporation  |          |                         |
|---------------|---|----------|-------------------------|
| Model No.:    | TFAN 85/19  |          |                         |
| Serial No.:   | 042202202   |          |                         |
|               |   |          |                         |
| G 1           |   | 4.       |                         |
| General:      | All measurements are traceable to                                       | nation   | al standards.           |
|               | e conducted on a sample of the equipment f<br>h FCC Part 24, Subpart E. | or the p | urpose of demonstrating |
|               | 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**

|  | PARA.     |                     |          |
|--|-----------|---------------------|----------|
| NAME OF TEST                               | 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<br>Terminals | 24.238(a) | -13 dBm             | Complies |
| Field Strength of Spurious<br>Emissions    | 24.238(a) | -13 dBm<br>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.

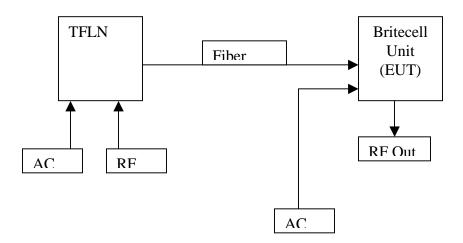
# Section 2. General Equipment Specification

| <b>Supply Voltage Input:</b> |             |                |               |            |          |
|------------------------------|-------------|----------------|---------------|------------|----------|
| Frequency Bands:             | Downlink:   | Block A:       | 1930 – 1945 N | ИНz        |          |
|                              |             | Block D:       | 1945 – 1950 N |            |          |
|                              |             | Block B:       | 1950 – 1965 N | ИНz        |          |
|                              |             | Block E:       | 1965 – 1970 N | МНz        |          |
|                              |             | Block F:       | 1970 – 1975 N | ИHz        |          |
|                              |             | Block C:       | 1975 – 1990 N | MHz        |          |
| Frequency Bands:             | Uplink:     | Block A:       | 1850 – 1865 N | ИНz        |          |
| _ •                          | _           | Block B:       | 1865 – 1870 N |            |          |
|                              |             | Block C:       | 1870 – 1885 N | ИНz        |          |
|                              |             | Block D:       | 1885 – 1890 N | ИHz        |          |
|                              |             | Block E:       | 1890 – 1895 N | ИHz        |          |
|                              |             | Block F:       | 1895 – 1910 N | MHz        |          |
|                              |             | CDMA           | GSM           | NADC       | EDGE     |
| Type of Modulation and       | Designator: | ( <b>F9W</b> ) | (G7W)         | (DXW)      | (GXW)    |
|                              |             |                |               |            |          |
| _                            |             |                |               |            |          |
| Output Impedance:            |             | 50 ohms        |               |            |          |
| Max Input:                   |             | +10 dBm        |               |            |          |
| _                            |             |                |               |            |          |
| RF Output (Rated):           | Uplink      | N/A            |               |            |          |
| _                            |             |                |               |            |          |
| RF Output (Rated):           | Downlink    | 21 dBm max, Si | ngle channel  |            |          |
| -                            |             | D1 D4          | <b>37</b> 14  | E0         | TAT / A  |
| Frequency Translation:       |             | F1-F1          | F1-           | F <i>2</i> | N/A      |
|                              |             |                |               | _          |          |
| Band Selection:              |             | Software       | Dupl          | exer       | Fullband |
|                              |             |                |               |            |          |

## **Description of Operation**

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

## **System Diagram**



TEST REPORT NO. 4L0491RUS2

## 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<br>Type | Per Channel Output Power (mW) | Per Channel Output Power (dBm) |
|----------|--------------------|-------------------------------|--------------------------------|
| Uplink   | NA                 |                               |                                |
| Downlink | CDMA               | 5.7                           | 15.12                          |
| Uplink   | NA                 |                               |                                |
| Downlink | GSM                | 11.3                          | 21.06                          |
| Uplink   | NA                 |                               |                                |
| Downlink | EDGE               | 7.6                           | 17.61                          |
| Uplink   | NA                 |                               |                                |
| Downlink | NADC               | 8.5                           | 18.59                          |

**Equipment Used:** 1627-1036-1604

**Measurement Uncertainty:** +/- 1.6 dB

**Temperature:** 22 °C

**Relative Humidity:** 40 %

EQUIPMENT:

FCC PART 24, SUBPART E BROADBAND PCS REPEATERS

TEST REPORT NO. 4L0491RUS2

# Section 4. Occupied Bandwidth

**TFAN 85/19** 

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

#### Test Data - Occupied Bandwidth (Input/Output)



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

Nemko Dallas, Inc. Data Plot **Occupied Bandwidth** Page  $\underline{1}$  of  $\underline{8}$ Complete \_\_\_\_ X Job No.: Date: 7/28/2004 Preliminary: Specification: Temperature(°C): 22 Tested By: Relative Humidity(%) David Light dual band amp EHT: Configuration: Tx Full power Sample Number: 1 RBW: Refer to plots Location: Lab 1 Measurement VBW: Refer to plots Detector Type: Peak Distance: na m Test Equipment Used Directional Coupler: 1626 Pre-Amp: Cable #1: Filter: Cable #2: 1627 Cable #3: Receiver: 1036 Cable #4: Attenuator #1 Attenuator #2: Mixer: Additional equipment used: +/-1.7 dB Measurement Uncertainty: Ref Lvl VBW 30 kHz -10 dBm Mixer 30 dBm SWT dBm 7 ms Unit 30 18.7 dB Offset Α 20 1Π who way **1VIEW** 1MA - 1C -20 -30 many myen WILLIM MANUA -40 -50 -60 246 kHz/ Span 2.46 MHz Center 1.96 GHz 28.JUL.2004 08:56:13 OUTPUT CDMA

### **EQUIPMENT: TFAN 85/19**

### **Test Data – Occupied Bandwidth (Input/Output)**



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

Nemko Dallas, Inc. **Data Plot Occupied Bandwidth** Page 2 of 8 Job No.: Date: 7/28/2004 Specification: Temperature(°C): 22 David Light Relative Humidity(%) 40 Tested By: E.U.T.: dual band amp Configuration: Tx Full power Ref Lvl VBW 30 kHz Mixer -10 dBm 19.3 dBm SWT 7 ms Unit dBm 19.3 A 10 -10 1VIEW 1 MA -20 -30 -40 -50 -60 Center 1.96 GHz 246 kHz/ Span 2.46 MHz 28.JUL.2004 08:57:22 Date: INPUT CDMA

TEST REPORT NO. 4L0491RUS2

### **Test Data – Occupied Bandwidth (Input/Output)**



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Nemko Dallas, Inc. **Data Plot Occupied Bandwidth** Page 3 of 8 Job No.: Date: 7/28/2004 Specification: Temperature(°C): 22 David Light Relative Humidity(%) 40 Tested By: E.U.T.: dual band amp Configuration: Tx Full power RBL 300 Hz Αtt 30 dB Ref Lvl VBW 300 Hz Mixer -10 dBm 30 dBm SWT 4.2 s Unit dBm 30 10.7 dB Offset Α 20 10 **1VIEW** 1MA -10-20 -30 -40 -50 -60 Center 1.96 GHz 7.5 kHz/ Span 75 kHz 28.JUL.2004 09:02:23 Date: TDMA OUTPUT Notes:

## **Test Data – Occupied Bandwidth (Input/Output)**



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|                   | Nem      | ko Da     | ıllas, Inc. |          |                   |             |              |                    | ,0. | 2) 436-26 |       |         |          |
|-------------------|----------|-----------|-------------|----------|-------------------|-------------|--------------|--------------------|-----|-----------|-------|---------|----------|
| )ata 🛚            |          |           | -           |          | Oce               | cupied Ba   | ndwidth      |                    |     |           |       |         |          |
|                   | ge 4_ of | 8         |             |          |                   |             | <del>_</del> |                    |     |           |       |         |          |
| b No.:            |          |           |             |          | Date: 7/          |             |              |                    |     |           |       |         |          |
| ecificati         |          |           |             |          | nperature(°C): 22 |             |              |                    |     |           |       |         |          |
| ested By<br>U.T.: |          | David l   | nd amp      | Relative | Humidity(%) 40    | )           |              |                    |     |           |       |         |          |
| ∪.1.:<br>onfigura |          | Tx Full   | •           |          |                   |             |              |                    |     |           |       |         |          |
| migura            | uon.     | 1 X T UII | power       |          |                   |             |              |                    |     |           |       |         |          |
| <b>S</b>          |          |           |             |          |                   |             | RBW          | 300                |     | RF        |       | 30 dB   |          |
| 5 F               | Ref      |           | _           |          |                   |             | VBW          | 300                |     |           | ixer  | -10 dB  |          |
| 9.3               | 19.      | 3 dE      | 3m          |          |                   |             | SWT          | 4.2                | S   | Ur        | nit   | dB      | m        |
| 3.3               |          |           |             |          |                   |             |              |                    |     |           |       |         | A        |
| 10                |          |           |             |          |                   |             |              |                    |     |           |       |         |          |
| 10                |          |           |             |          |                   |             |              |                    |     |           |       |         | 1        |
|                   |          |           |             |          |                   |             |              |                    |     |           |       |         |          |
| 0                 |          |           |             |          |                   |             |              |                    |     |           |       |         | 1        |
|                   |          |           |             |          |                   |             |              |                    |     |           |       |         |          |
| -10               |          |           |             |          |                   |             | A .A.J .     |                    |     |           |       |         | 1        |
|                   | 1 / 1    | EW        |             |          | A har             | 1411/14/W/W | M.M.M.       | MyrMy, Wh          |     |           |       |         | 1 M      |
| -20               |          |           |             |          | الدر              | UU U        | •            | " W \ <sub>1</sub> |     |           |       |         | -        |
|                   |          |           |             |          | WIL               |             |              | l Y                |     |           |       |         |          |
| -30               |          |           |             |          |                   |             |              | ,                  | 4   |           |       |         | 4        |
|                   |          |           |             |          |                   |             |              |                    |     |           |       |         |          |
| -40               |          |           |             | 1        |                   |             |              |                    | Щ   |           |       |         | 4        |
|                   |          |           |             |          |                   |             |              |                    | ١ ١ |           |       |         |          |
| -50               |          |           |             |          |                   |             |              |                    |     |           |       |         | _        |
|                   |          |           |             |          |                   |             |              |                    |     |           |       |         |          |
| -60               |          |           |             |          |                   |             |              |                    |     |           |       |         |          |
| -00               |          |           |             |          |                   |             |              |                    |     |           |       |         |          |
|                   |          |           |             |          |                   |             |              |                    |     |           |       |         |          |
| -70               |          | Щ.        | Lak         |          |                   |             |              |                    |     | Mar       | M     |         |          |
|                   | WW       | MAN       | 19 MAN 1991 | A        |                   |             |              |                    |     | 7         | Myluk | 1       | M        |
| .a7 <b>L</b>      |          |           | 1 00 01     | _        |                   | 7 -         | KHz/         |                    |     |           | C     | 75 1.11 | 4        |
|                   | _ent     |           | 1.96 GH:    |          |                   | ۲.5         | KHZ/         |                    |     |           | spar  | 1 75 KH | <b>∠</b> |
| te:               |          |           | 8.JUL.2     | 004 0    | 9:03:40           |             |              |                    |     |           |       |         |          |
| Note              | es:      | TDM       | A INPUT     |          |                   |             |              |                    |     |           |       |         |          |
|                   |          |           |             |          |                   |             |              |                    |     |           |       |         |          |
|                   | •        |           |             |          |                   |             |              |                    |     |           |       |         |          |
|                   |          |           |             |          |                   |             |              |                    |     |           |       |         |          |

### **Test Data – Occupied Bandwidth (Input/Output)**



#### Dallas Headquarters:

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Nemko Dallas, Inc. **Data Plot Occupied Bandwidth** Page 5 of 8 Job No.: Date: 7/28/2004 Specification: Temperature(°C): 22 David Light Relative Humidity(%) 40 Tested By: E.U.T.: dual band amp Configuration: Tx Full power RBW 30 dB Ref Lvl VBW 3 kHz Mixer -10 dBm 30 dBm SWT 280 ms Unit dBm 30 10.7 dB Offset A 20 10 1VIEW 1MA - 1C -20 -30 -40 -50 1.96 GHz 100 kHz/ Span 1 MHz 28.JUL.2004 09:06:42 OUTPUT GSM Notes:

### **Test Data – Occupied Bandwidth (Input/Output)**



#### Dallas Headquarters:

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

Nemko Dallas, Inc. **Data Plot Occupied Bandwidth** Page <u>6</u> of 8 Date: 7/28/2004 Job No.: Specification: Temperature(°C): 22 David Light Relative Humidity(%) 40 Tested By: E.U.T.: dual band amp Configuration: Tx Full power RBW 30 dB Ref Lvl VBW 3 kHz Mixer -10 dBm 19.3 dBm SWT 280 ms Unit dBm 19.3 A 10 -10 1 V I EW 1MA -20 -30 -40 -50 -60 -70 1.96 GHz 100 kHz/ 28.JUL.2004 09:08:43 INPUT GSM Notes:

### **Test Data – Occupied Bandwidth (Input/Output)**



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Nemko Dallas, Inc. **Data Plot Occupied Bandwidth** Page <u>6</u> of 8 Job No.: Date: 7/28/2004 Specification: Temperature(°C): 22 David Light Relative Humidity(%) 40 Tested By: E.U.T.: dual band amp Configuration: Tx Full power RBW Αtt 30 dB Ref Lvl VBW 3 kHz Mixer -10 dBm 30 dBm SWT  $280 \, \text{ms}$ Unit dBm 30 10.7 dB Offset A 20 10 1VIEW 1MA -10 -20 -30 -40 -50 -60 Center 1.96 GHz 100 kHz/ Span 1 MHz 28.JUL.2004 09:10:38 OUTPUT EDGE Notes:

TEST REPORT NO. 4L0491RUS2

### **Test Data – Occupied Bandwidth (Input/Output)**



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Nemko Dallas, Inc. **Data Plot Occupied Bandwidth** Page <u>6</u> of 8 Job No.: Date: 7/28/2004 Temperature(°C): 22 Specification: David Light Relative Humidity(%) 40 Tested By: E.U.T.: dual band amp Configuration: Tx Full power RBW 30 dB Ref Lv1 VBW 3 kHz Mixer -10 dBm 19.3 dBm SWT 280 ms Umit dBm 19.3 A 10 - 10 1VIEW 1MA -20 -30 -40 -50 -60 100 kHz/ Center 1.96 GHz Span 1 MHz bate: 28.JUL.2004 09:11:35 INPUT EDGE Notes:

*EQUIPMENT:* 

FCC PART 24, SUBPART E BROADBAND PCS REPEATERS

TEST REPORT NO. 4L0491RUS2

## 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).

**TFAN 85/19** 

**Measurement Uncertainty:** +/- 1.6 dB

#### **Test Data – Spurious Emissions at Antenna Terminals**

| N | Nem | ko |
|---|-----|----|
|   |     |    |

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Nemko Dallas, Inc. Data Plot **Intermodulation Characteristics** Page <u>1</u> of <u>8</u> Complete X Date: 10/18/2004 Preliminary: Job No.: Specification: PT24 Temperature(°C): 25 Tested By: David Light Relative Humidity(%) PCS REPEATER E.U.T.: Configuration: Sample Number: RBW: Refer to plots Lab 1 VBW: Refer to plots Distance: na Detector Type: Refer to plots Test Equipment Used Antenna: Directional Coupler: Pre-Amp: Cable #1: 1629 Filter: Cable #2: Cable #3: Receiver: Cable #4: Attenuator #1 1064 Mixer Additional equipment used: Measurement Uncertainty: +/-1.7 dB Ref Lvl 3.30 dBm VBW 30 kHz Mixer -10 dBm 10 dBm 1.93125000 GHz SWT 14 ms Unit dBm 10 21.7 dB Offset [T1<sub>1</sub>] 30 dBn A LIMIT CHEC LOBNDE make the way and a second of the second of t -20 **1VIEW** 1 MA -30 -40 -50 1441 WW -60 -70 -80 -90 500 kHz/ Span 5 MHz Center 1.93 GHz 18.OCT.2004 08:13:57 ate: CDMA 11 dBm per carrier - 14 dBm Composite

TEST REPORT NO. 4L0491RUS2

#### Test Data – Spurious Emissions at Antenna Terminals



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Nemko Dallas, Inc. Data Plot **Intermodulation Characteristics** Page 2 of 8 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 кви dВ 1 U Ref Lvl 2.92 dBm VBW 30 kHz Mixer -10 dBm 10 dBm 1.98875000 GHz SWT 14 ms 21.7 ASSED<sup>▼1</sup> 92 dBn Α MIT CHE : P 1.9887 000 GHz **-1**C hellen a line of the house of t -20 1VIEW 1MA -30 -40 -50 -60 -70 -80 -90 Center 1.99 GHz 500 kHz/ Span 5 MHz ate: 18.0CT.2004 08:17:30 CDMA Notes: 11 dBm per carrier - 14 dBm Composite

## TEST REPORT NO. 4L0491RUS2

### **Test Data – Spurious Emissions at Antenna Terminals**



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| Nemko Dallas, Inc.               | ~   |                  |                |           |        |          |     |
|----------------------------------|---|------------------|----------------|-----------|--------|----------|-----|
| ata Plot                         | <b>Spurious Emissions at</b>                      | : Antenna T      | <u>'ermina</u> | <u>ls</u> |        |          |     |
| Page <u>3</u> of <u>5</u>        |   |                  |                |           |        |          |     |
| No.: 4L0490R                     | Date: 7/28/2004                                   | =                |                |           |        |          |     |
| eification: PT24                 | Temperature(°C): 22                               | -                |                |           |        |          |     |
| ed By: David Light               | Relative Humidity(%) 40                           | -                |                |           |        |          |     |
| T.: Dual band amp  Tx Full power |   |                  |                |           |        |          |     |
| figuration: Tx Full power        |   |                  |                |           |        |          |     |
|                                  |   | RBU              | 1              | MHz       | RF Att | 30 dB    |     |
| Ref Lv1                          |   | VBW              | 1              | MHz       | Mixer  | -10 dBm  |     |
| 30 dBm                           |   | SWT              | 200            | ms        | Umit   | dBm      |     |
| 10.7 dB Offset                   |   |                  |                |           |        |          |     |
|                                  |   |                  |                |           |        |          | Α   |
| 20                               | <del>                                      </del> | +                |                |           | -      | +        |     |
|                                  |   | 1                |                |           |        |          |     |
| 10                               |   |                  |                |           |        |          |     |
|                                  |   |                  |                |           |        |          |     |
|                                  |   |                  |                |           |        |          |     |
| 1VIEW                            |   |                  |                |           |        |          | 1 M |
|                                  |   |                  |                |           |        |          |     |
| -10<br>-D1 -13 dBm               |   |                  |                |           |        |          |     |
|                                  |   |                  |                |           |        |          | i   |
| 20                               |   | -                |                |           |        | _        | i   |
|                                  |   |                  |                |           |        |          | i   |
| 30                               |   | _                |                |           |        |          | i   |
|                                  | Alb. A  |                  | As AMAL        | Murun     | uh L.  |          | i   |
| 40                               | man who have maken                                | New March 1 - Co | DAMP.          | W 400     | whome  | hurane   | i   |
| ment of the second               |   |                  |                |           |        |          | i   |
| E0                               |   |                  |                |           |        |          | i   |
| 50                               |   |                  |                |           |        |          | i   |
|                                  |   |                  |                |           |        |          | i   |
| -60                              |   | 1                |                |           |        | _        |     |
|                                  |   |                  |                |           |        |          | i   |
| 70                               |   |                  |                |           |        |          | i   |
| Start 30 MHz                     | 1.95  | 37 GHz/          |                |           | Sto    | p 20 GHz |     |
| te: 28.JUL.200                   | 10:24:46  |                  |                |           |        |          |     |
| Notes: CDMA - SINGLE CAI         | RRIER 14 dBm                                      |                  |                |           |        |          |     |
| TX 1960 MHz                      |   |                  |                |           |        |          |     |
|                                  |   |                  |                |           |        |          |     |

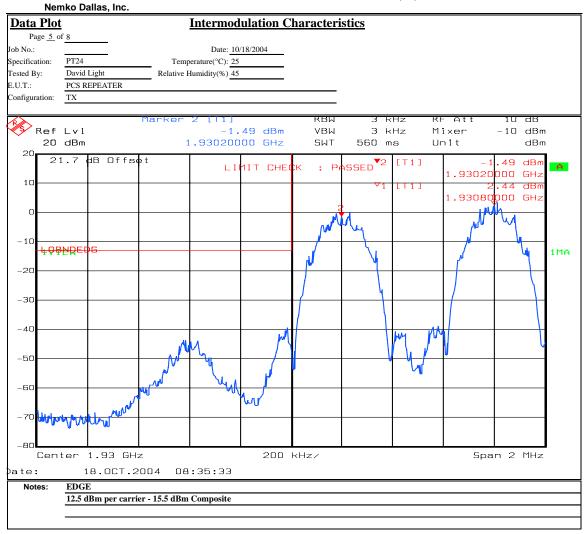
The spectrum was investigated in detail on three channels. The plot shown is indicative of the noise floor readings found for all channels and modulations.

#### **Test Data – Spurious Emissions at Antenna Terminals**



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Fax: (972) 436-2667



TEST REPORT NO. 4L0491RUS2

#### **Test Data – Spurious Emissions at Antenna Terminals**

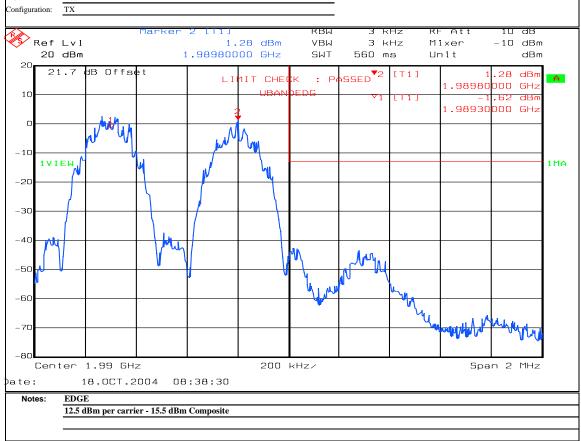


Nemko Dallas, Inc.

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

Fax: (972) 436-2667

**Intermodulation Characteristics Data Plot** Page <u>6</u> of 8 Job No.: Date: 10/18/2004 Temperature(°C): 25 PT24 Specification: Tested By: David Light Relative Humidity(%) 45 вит. PCS REPEATER Configuration: TX VBW



#### **Test Data – Spurious Emissions at Antenna Terminals**



#### Dallas Headquarters:

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

Nemko Dallas, Inc. **Data Plot Spurious Emissions at Antenna Terminals** Page 3 of 5 Job No.: 4L0490R Date: 7/28/2004 PT24 Temperature(°C): 22 Specification: David Light Relative Humidity(%) 40 Tested By: E.U.T.: DUAL BAND AMP Configuration: TX FULL POWER RBW MHz Αtt 30 dB Ref Lvl VBW 1 MHz Mixer -10 dBm 30 dBm SWT 200 ms Unit dBm 30 10.7 dB Offset A 20 10 1VIEW 1MA -10dBm--20 -30 -40 -50 -60 Start 30 MHz 1.997 GHz/ Stop 20 GHz 28.JUL.2004 09:25:03 Date: EDGE - SINGLE CARRIER 16.5 dBm Notes: TX 1960 MHz

#### **Test Data – Spurious Emissions at Antenna Terminals**



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

Fax: (972) 436-2667

Nemko Dallas, Inc. **Intermodulation Characteristics Data Plot** Page <u>7</u> of 8 Job No.: Date: 10/18/2004 Temperature(°C): 25 PT24 Specification: Tested By: David Light Relative Humidity(%) 45 вит. PCS REPEATER Configuration: TX Ref Lvl 4.80 dBm 3 kHz VΒW Mixer -10 dBm 20 dBm 1.98980000 GHz SWT 560 ms Unit dBm 21.7 dB Offset .80 dBr Α SSED 1.98980 000 GHz 10 82 1.98930 000 GHz - 1 C 1VIE 1MA -20 -30 -40 -50 -60 wallhardenfallerender -70 -80 Center 1.99 GHz 200 kHz/ Span 2 MHz 18.OCT.2004 08:42:24 Notes: 14.5 dBm per carrier - 17.5 dBm Composite

TEST REPORT NO. 4L0491RUS2

#### **Test Data – Spurious Emissions at Antenna Terminals**



Dallas Headquarters: 802 N. Kealy Lewisville, TX 75057

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

Nemko Dallas, Inc. **Intermodulation Characteristics Data Plot** Page <u>8</u> of <u>8</u> Job No.: Date: 10/18/2004 Temperature(°C): 25 PT24 Specification: Tested By: David Light Relative Humidity(%) 45 EHT: PCS REPEATER Configuration: TX 10 dB Ref Lvl -1.45 dBm 3 kHz VBW Mixer -10 dBm 1.93070000 GHz 20 dBm SWT 560 ms Un i t dBm 20 21.7 dB Offset [T1] dBr 45 Α 000 GHz 000 GHz -10<del>LOBND</del>ED( 1MA -20 -30 -40 -50 -60 -80 Center 1.93 GHz 200 kHz/ Span 2 MHz 18.OCT.2004 08:45:23 ate: Notes: 14.5 dBm per carrier - 17.5 dBm Composite

EQUIPMENT:

TFAN 85/19 TEST REPORT NO. 4L0491RUS2

### Test Data - Spurious Emissions at Antenna Terminals



#### Dallas Headquarters:

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

Nemko Dallas, Inc. **Data Plot Spurious Emissions at Antenna Terminals** Page <u>3</u> of 6 Job No.: 4L0490 Date: 7/28/2004 PT24 Temperature(°C): 22 Specification: David Light Relative Humidity(%) 40 Tested By: E.U.T.: DUAL BAND AMP Configuration: TX FULL POWER RBU MHz Αtt 30 dB Ref Lvl VBW 1 MHz Mixer -10 dBm 30 dBm SWT 200 ms Unit dBm 10.7 dB Offset A 20 1VIEW 1MA -10 -20 -30 -40 -50 -60 1.997 GHz/ Start 30 MHz Stop 20 GHz 28.JUL.2004 09:38:41 Date: GSM - SINGLE CARRIER 20 dBm Notes: TX 1960 MHz

#### **Test Data – Spurious Emissions at Antenna Terminals**



Dallas Headquarters: 802 N. Kealy Lewisville, TX 75057

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

Nemko Dallas, Inc. **Intermodulation Characteristics Data Plot** Page 3 of 8 Job No.: Date: 10/18/2004 Temperature(°C): 25 PT24 Specification: Tested By: David Light Relative Humidity(%) 45 EHT: PCS REPEATER Configuration: TX 1U dB Ref Lvl 4.79 dBm VBW 1 kHz -10 dBm Mixer 1.98997000 GHz 20 dBm SWT 1.25 s Unit dBm 21.7 dB Offset 79 dBr SSED Α LIMIT CHE 1.9899 000 GHz 000 GHz -101VIEW 1MA -20 -30 -40 -50 -60 Why where "Cally Mary Mary -70 -80 Center 1.99 GHz 50 kHz/ Span 500 kHz 18.OCT.2004 08:25:53 ate: Notes: 13 dBm per carrier - 16 dBm Composite

TEST REPORT NO. 4L0491RUS2

#### Test Data – Spurious Emissions at Antenna Terminals



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

Fax: (972) 436-2667

Nemko Dallas, Inc. **Intermodulation Characteristics Data Plot** Page 4\_ of 8 Job No.: Date: 10/18/2004 Temperature(°C): 25 PT24 Specification: Tested By: David Light Relative Humidity(%) 45 EHT: PCS REPEATER Configuration: TX KHZ 10 dB Ref Lvl 0.80 dBm VBW 1 kHz Mixer -10 dBm 20 dBm 1.93020000 GHz SWT 1.25 sUmit dBm 20 21.7 dB Offset [T1] . 80 dBn Α 1.93020 000 GHz 10 000 GHz NUM – 1 C <del>∔0₽ND</del>E 1 MA -20 -30 HWW/n -4N -50 -60 my Make you was not Monday which which was -80 Center 1.93 GHz 50 kHz/ Span 500 kHz ate: 18.0CT.2004 08:29:12 TDMA Notes: 13 dBm per carrier - 16 dBm Composite

TEST REPORT NO. 4L0491RUS2

#### **Test Data – Spurious Emissions at Antenna Terminals**



Nemko Dallas, Inc.

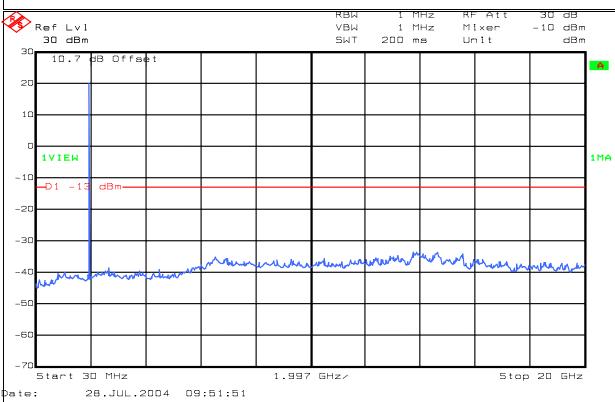
#### Dallas Headquarters:

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

**Data Plot Spurious Emissions at Antenna Terminals** Page 3 of 5 Job No.: 4L0490R Date: 7/28/2004

PT24 Temperature(°C): 22 Specification: David Light Relative Humidity(%) 40 Tested By:

E.U.T.: DUAL BAND AMP Configuration: TX FULL POWER



TDMA - SINGLE CARRIER 17.5 dBm Notes: TX 1960 MHz

## 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 10<sup>th</sup> harmonic of the carrier and was

investigated on 3 channels.

**Equipment Used:** 1484-1485-1016-1484

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

**Temperature:** 21 °C

**Relative Humidity:** 42 %

# Photographs of Test Setup





# Section 7. Test Equipment List

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

# **ANNEX A - TEST DETAILS**

FCC PART 24, SUBPART E BROADBAND PCS REPEATERS

EQUIPMENT: TFAN 85/19 TEST REPORT NO. 4L0491RUS2

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.

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.

#### <u>GSM</u>

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.

FCC PART 24, SUBPART E

BROADBAND PCS REPEATERS **TEST REPORT NO. 4L0491RUS2** 

### **EQUIPMENT: TFAN 85/19**

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:

<u>CDMA</u> <u>GSM</u>

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

 $VBW: \ge RBW$   $VBW: \ge RBW$  Sweep: Auto Sweep: Auto

Video Avg: 6 Sweeps 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.

FCC PART 24, SUBPART E

BROADBAND PCS REPEATERS

**EQUIPMENT: TFAN 85/19** 

TEST REPORT NO. 4L0491RUS2

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.

FCC PART 24, SUBPART E BROADBAND PCS REPEATERS

EQUIPMENT: TFAN 85/19 TEST REPORT NO. 4L0491RUS2

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

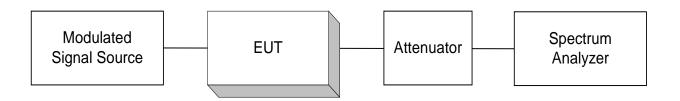
The E.U.T. is placed in an environmental chamber and allowed to stabilize at +20 degrees Celsius for at least 15 minutes. The frequency counter and signal generator are phase locked with the same 10 MHz reference frequency by connecting the 10 MHz ref. out of the counter to the 10 MHz ref, in of the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

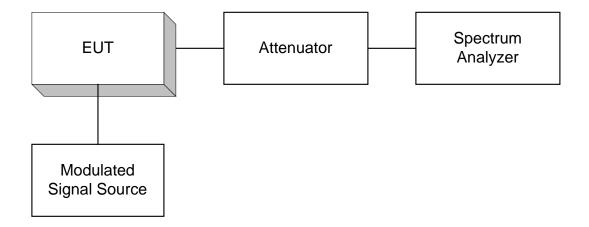
The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30 second intervals for a period of 5 minutes.

## **ANNEX B - TEST DIAGRAMS**

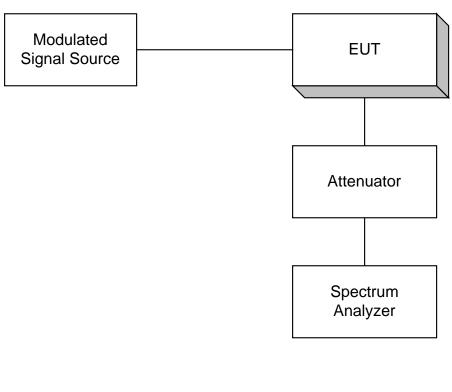
## Para. No. 2.985 - R.F. Power Output

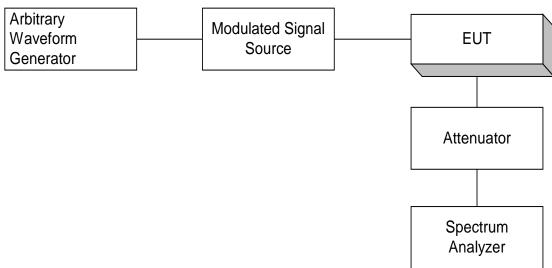


### Para. No. 2.989 - Occupied Bandwidth

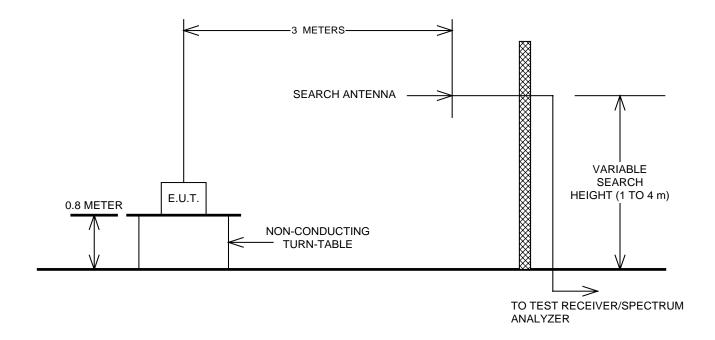


Para. No. 2.991 Spurious Emissions at Antenna Terminals





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



## Para. No. 2.995 - Frequency Stability

