



**Test Report:**

4W29268  
Issue III

**Applicant:**

Spotwave Wireless Inc.  
1 Hines Rd.  
Ottawa, Ontario  
K2K 3C7

**Equipment Under Test:  
(EUT)**

DU 1900 Full Band

**FCC ID:**

**P3YSPOTCELL0013**

**In Accordance With:**

**FCC Part 24**

**Tested By:**

Nemko Canada Inc.  
303 River Road, R.R. 5  
Ottawa, Ontario K1V 1H2

**Authorized By:**

Kevin Carr, EMC/EMI/Wireless Specialist.

**Date:**

22 October 2004

**Total Number of Pages:**

27

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*EQUIPMENT: DU 1900 Full Band*

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## **Section 1. Summary of Test Results**

### **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.

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.



TESTED BY: \_\_\_\_\_  
Glen Westwell, Wireless Specialist.

DATE: 22 October 2004

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This report applies only to the items tested.

*EQUIPMENT: DU 1900 Full Band*

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**Summary Of Test Data**

| <b>Name Of Test</b>                        | <b>Para. No.</b> | <b>Result</b> |
|--------------------------------------------|------------------|---------------|
| RF Power Output                            | 2.1046           | Complied      |
| Occupied Bandwidth                         | 2.1049           | Complied      |
| Spurious Emissions at Antenna<br>Terminals | 2.1051           | Complied      |
| Field Strength of Spurious Emissions       | 2.1053           | Complied      |
| Out of Band Rejection                      | EAB/RF-2-11-04   | Complied      |
| Frequency Stability                        | 2.1055           | Complied      |

**Indoor**                      Temperature: 25°C  
                                    Humidity:     44%

**Outdoor**                    Temperature: 18°C  
                                    Humidity:     45%

*EQUIPMENT: DU 1900 Full Band*

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## **Section 2.          General Equipment Specification**

|                                                  |                                                         |
|--------------------------------------------------|---------------------------------------------------------|
| <b>Manufacturer:</b>                             | Spotwave Wireless Inc.                                  |
| <b>Model No.:</b>                                | DU 1900 Full Band                                       |
| <b>Serial No.:</b>                               | None.                                                   |
| <b>Date Received In Laboratory:</b>              | 15 Sept 2004                                            |
| <b>Nemko Identification No.:</b>                 | #2                                                      |
| <b>Supply Input Voltage:</b>                     | 10.5Vdc                                                 |
| <b>Frequency Range:</b>                          | Uplink:    1850-1910MHz                                 |
| <b>Rated Output Power (conducted composite):</b> | GSM & CDMA: +18.5dBm, 0.071W<br>WCDMA: +15.5dBm, 0.036W |
| <b>Antenna Gain (maximum):</b>                   | 11.5dBi                                                 |
| <b>Emission Designator</b>                       | GXW (GSM)<br>F9W (CDMA)<br>F9W (WCDMA)                  |

*EQUIPMENT: DU 1900 Full Band***Section 3. RF Power Output**

Para. No.: 2.1046

|                                         |                                    |
|-----------------------------------------|------------------------------------|
| <b>Test Performed By: Glen Westwell</b> | <b>Date of Test: 13 Sept. 2004</b> |
|-----------------------------------------|------------------------------------|

**Minimum Standard:** 24.232**Test Results:** Complied.**Measurement Data:**

The maximum RF output power is within +1dB of the manufacturer's rating. The Composite RF output power is de-rated according to the number of channels via AGC and is equal to  $P_{max} - 10\log N$ .

$P_{max}$  = Maximum Composite RF Output Power

N = Number Of Channels

The power levels were measured at maximum input drive and gain. This device uses AGC to prevent saturation or over-modulation.

**Uplink Maximum Conducted Power**

| <b>Channel Frequency<br/>(MHZ)</b> | <b>Measured Power<br/>(dBm)</b> | <b>Rated Max. Power<br/>(dBm)</b> |
|------------------------------------|---------------------------------|-----------------------------------|
| 1850                               | 12.1                            | 18.5                              |
| 1860                               | 16.2                            | 18.5                              |
| 1870                               | 18.5                            | 18.5                              |
| 1870                               | 18.2                            | 18.5                              |
| 1880                               | 18.0                            | 18.5                              |
| 1890                               | 18.5                            | 18.5                              |
| 1890                               | 18.0                            | 18.5                              |
| 1900                               | 18.5                            | 18.5                              |
| 1910                               | 11.6                            | 18.5                              |

Note:

- (1) Power measurements are shown across all three 20MHz band selections to cover the complete 60MHz uplink. Band edge attenuation due to the filter characteristics can be seen in the table above.

## **Section 4.        Occupied Bandwidth**

**Para. No.: 2.1049**

|                                         |                                   |
|-----------------------------------------|-----------------------------------|
| <b>Test Performed By: Glen Westwell</b> | <b>Date of Test: 15 Sept 2004</b> |
|-----------------------------------------|-----------------------------------|

**Minimum Standard:**        24.238

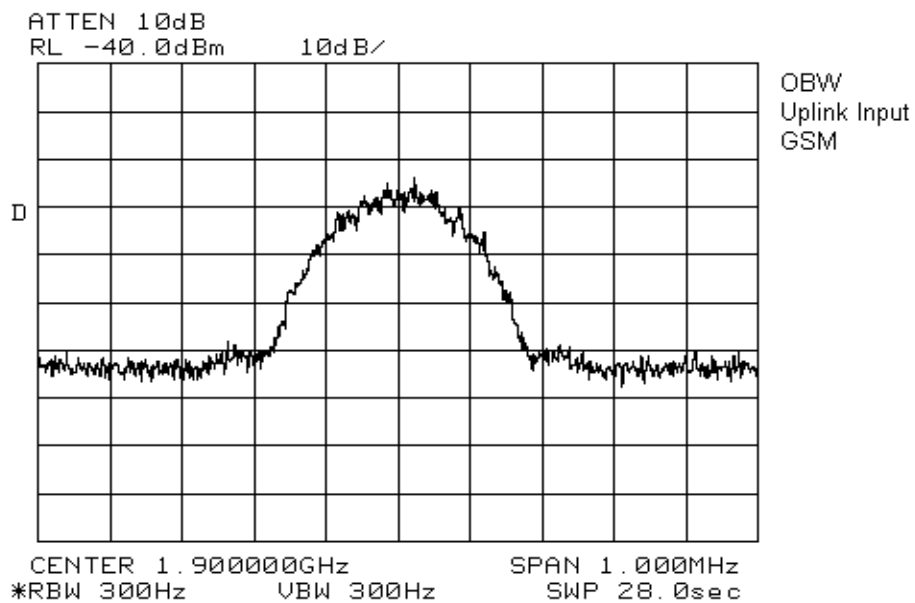
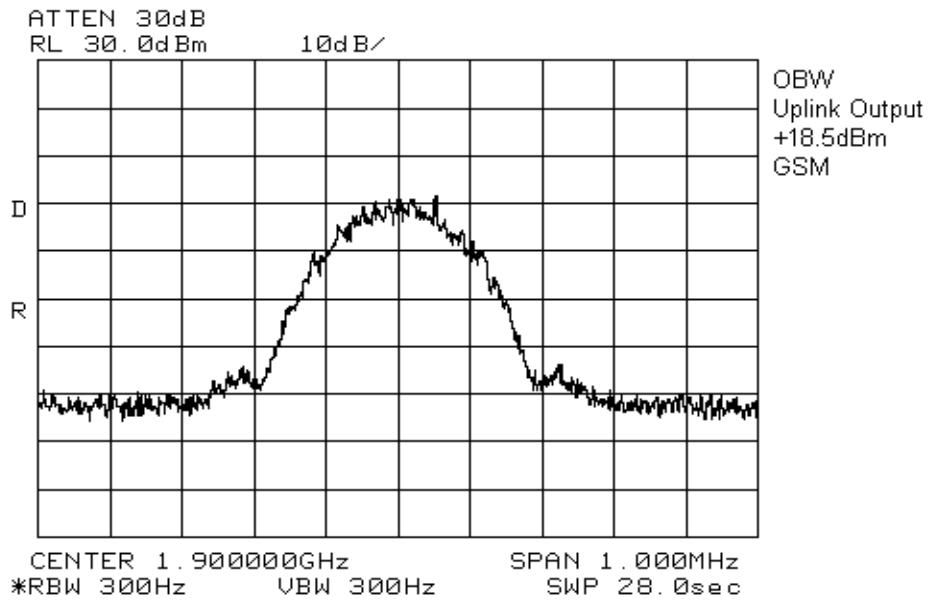
**Test Results:**                Complies.

**Measurement Data:**        See attached graphs.

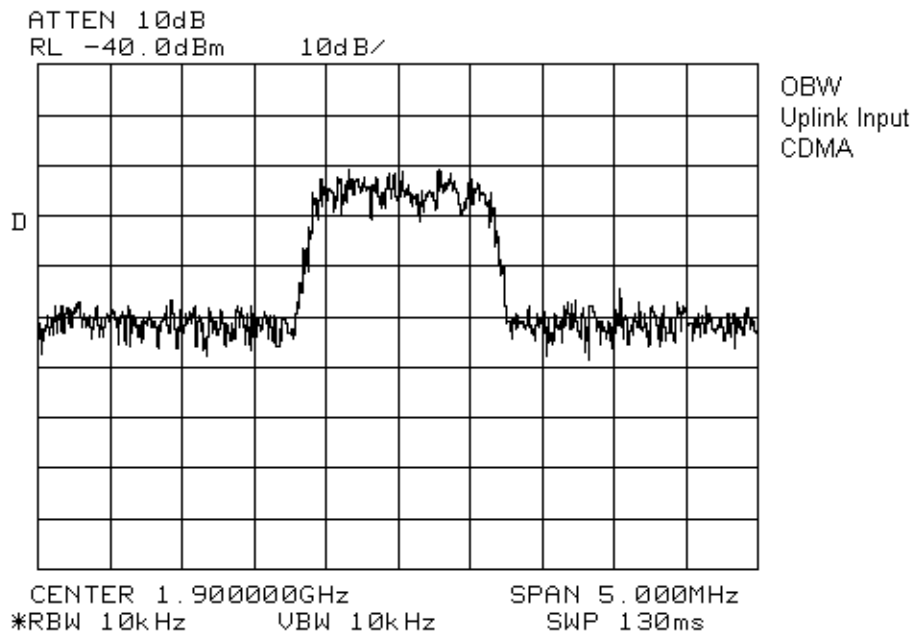
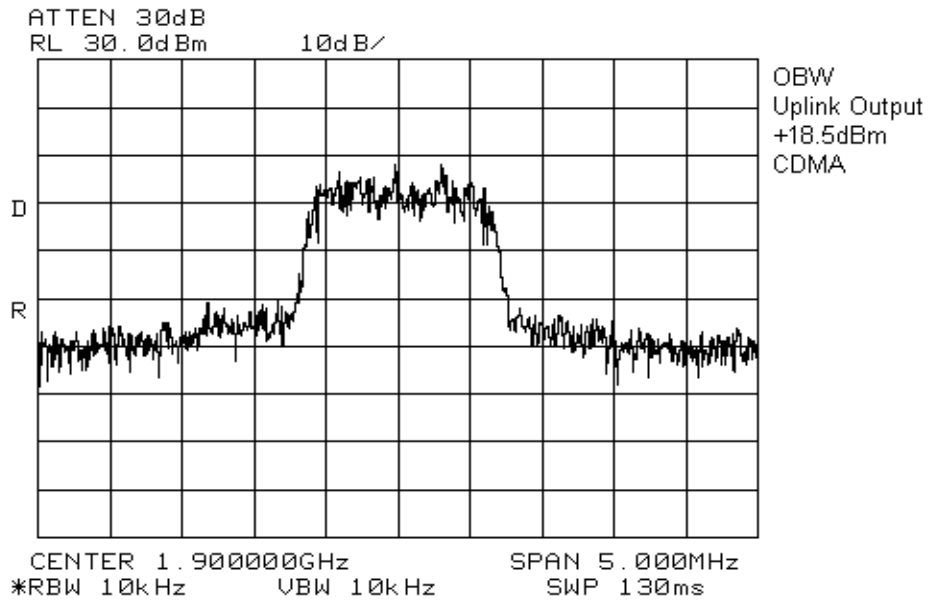
The occupied bandwidth was measured by comparison of input from the signal generator to the output signal from the amplifier. This was done in order to determine if there was any degradation to the output signal due to the amplification and conversion through the repeater.

EQUIPMENT: DU 1900 Full Band

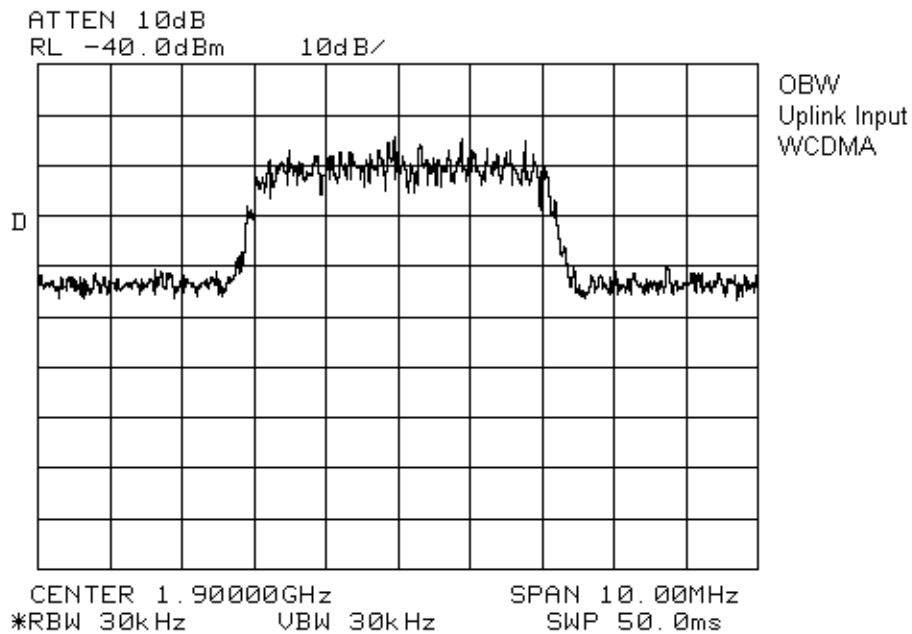
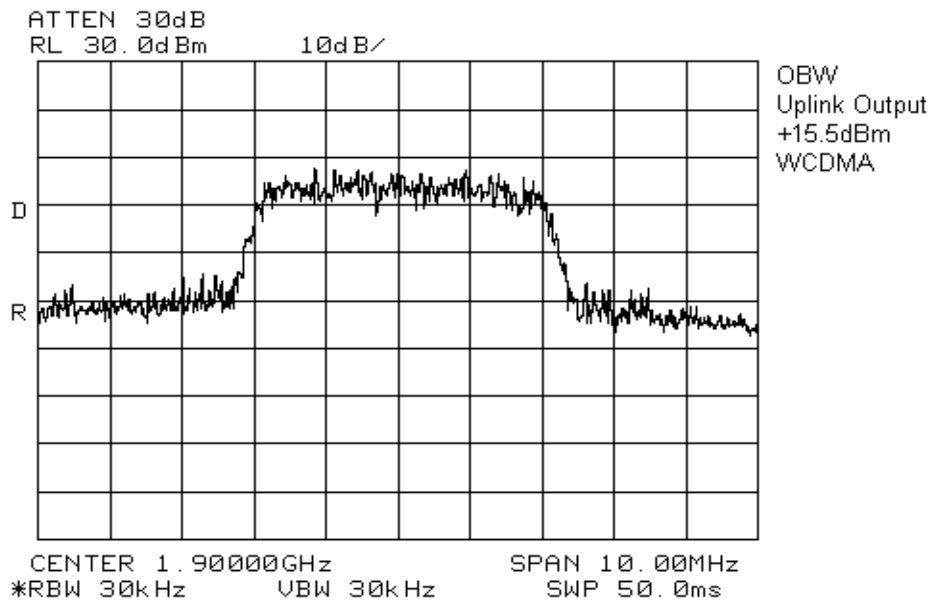
Uplink, Input vs Output  
PCS Band



EQUIPMENT: DU 1900 Full Band



EQUIPMENT: DU 1900 Full Band



*EQUIPMENT: DU 1900 Full Band*

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## **Section 5. Spurious Emissions at Antenna Terminals**

**Para. No.: 2.1051**

|                                         |                                   |
|-----------------------------------------|-----------------------------------|
| <b>Test Performed By: Glen Westwell</b> | <b>Date of Test: 17 Sept 2004</b> |
|-----------------------------------------|-----------------------------------|

**Minimum Standard:** 24.238, -13dBm

**Test Results:** Complies.

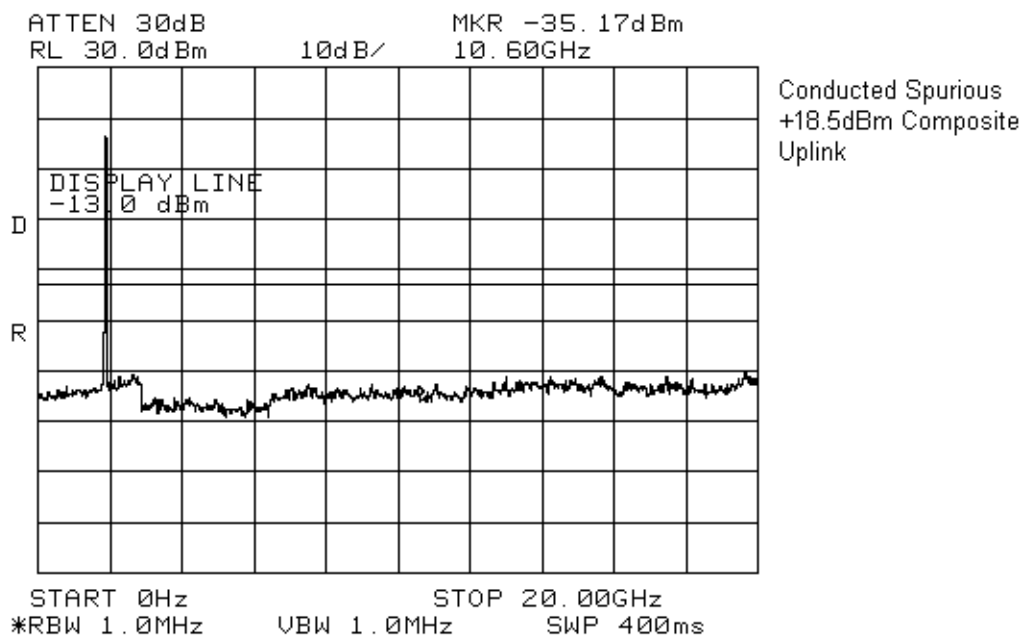
(1) Spurious emissions were searched at low, mid & high ends of the band. Worst case plots have been included.

(2) See section 7, Out-of-Band rejection.

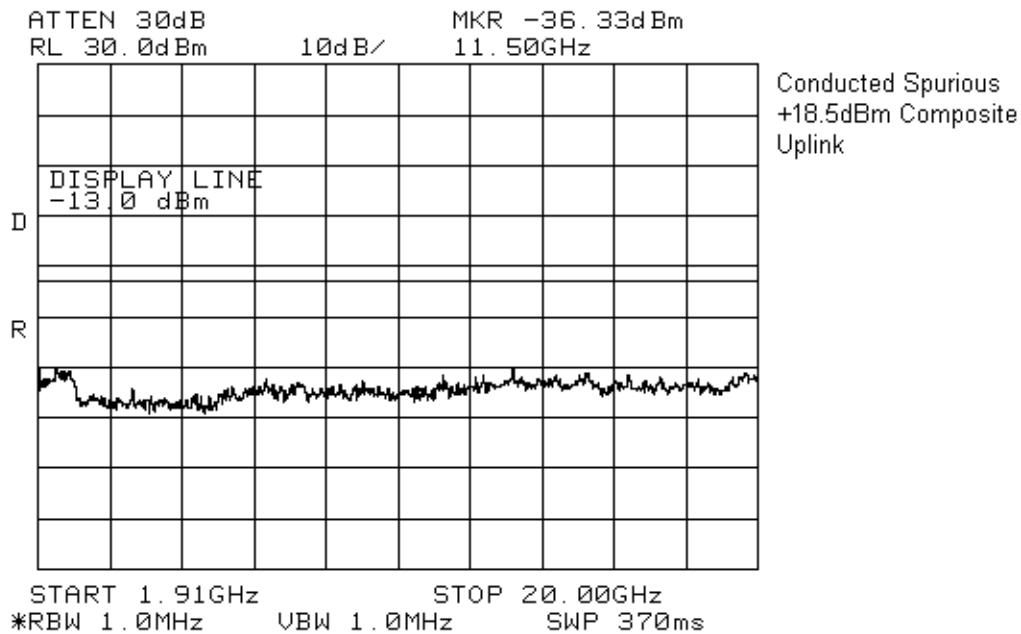
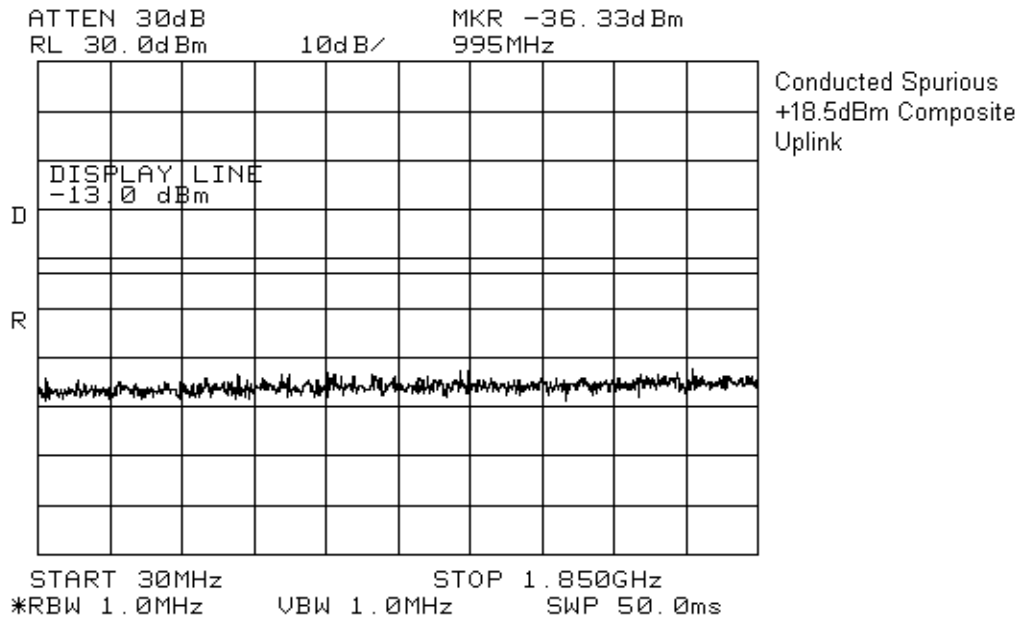
**Measurement Data:** See Attached Graphs.

EQUIPMENT: DU 1900 Full Band

PCS Band

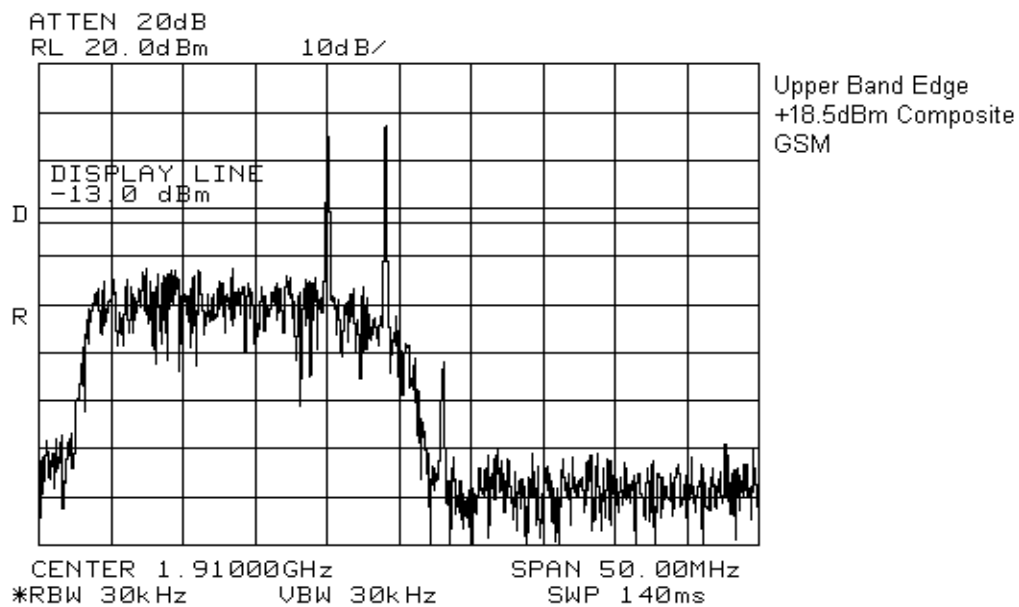
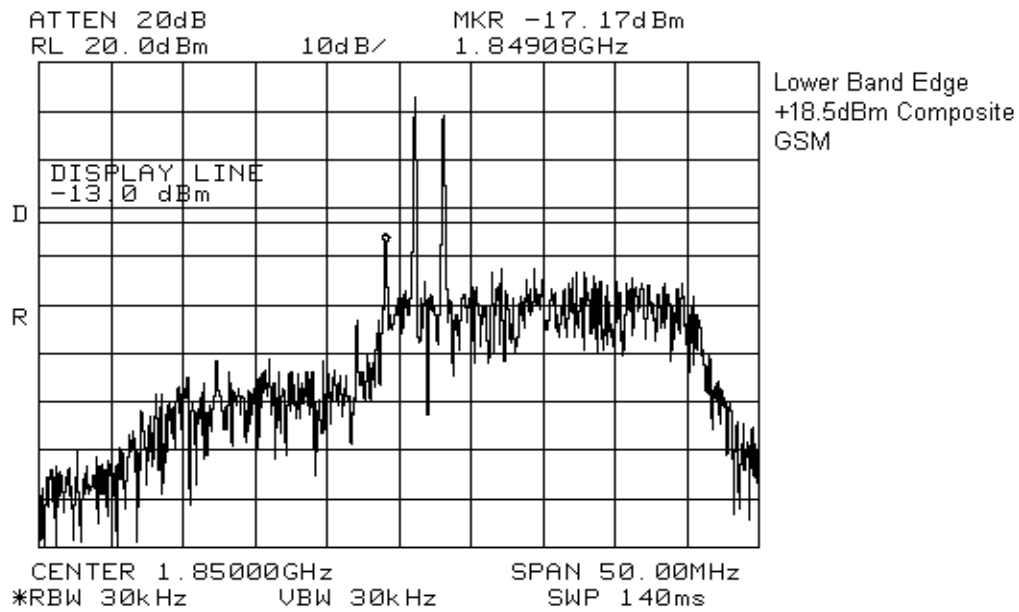


EQUIPMENT: DU 1900 Full Band



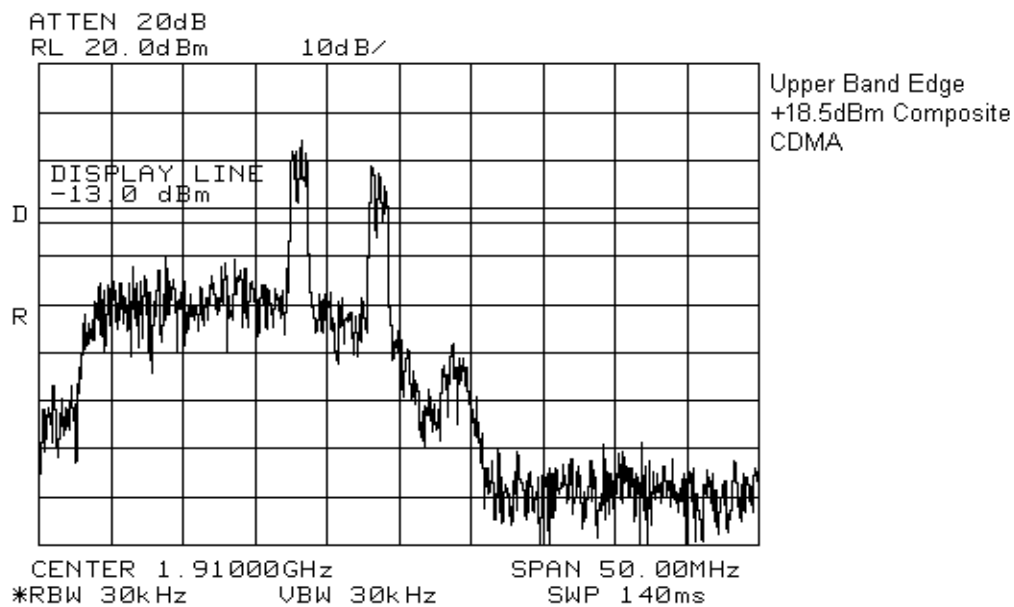
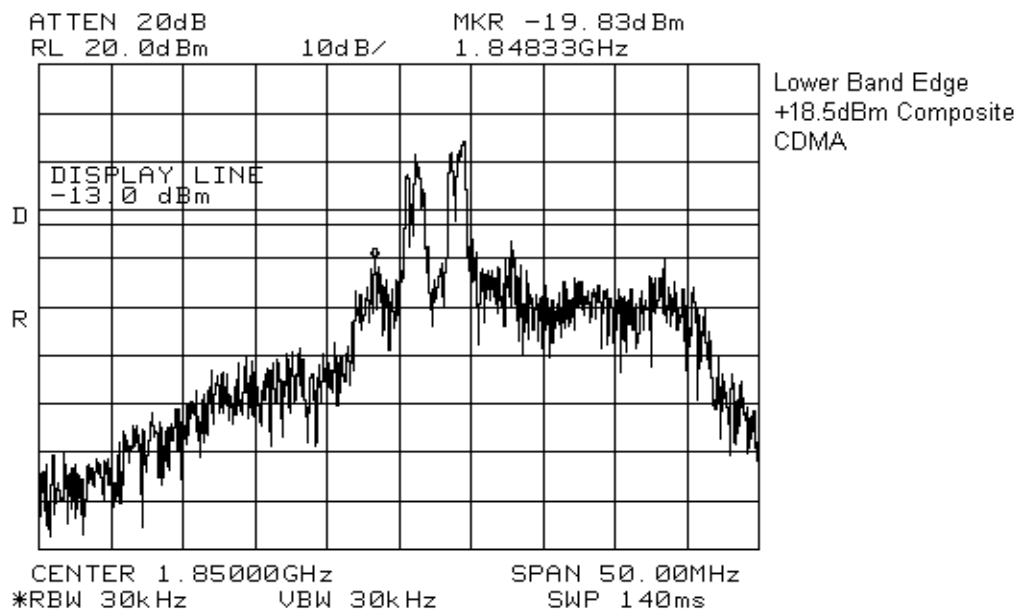
EQUIPMENT: DU 1900 Full Band

GSM



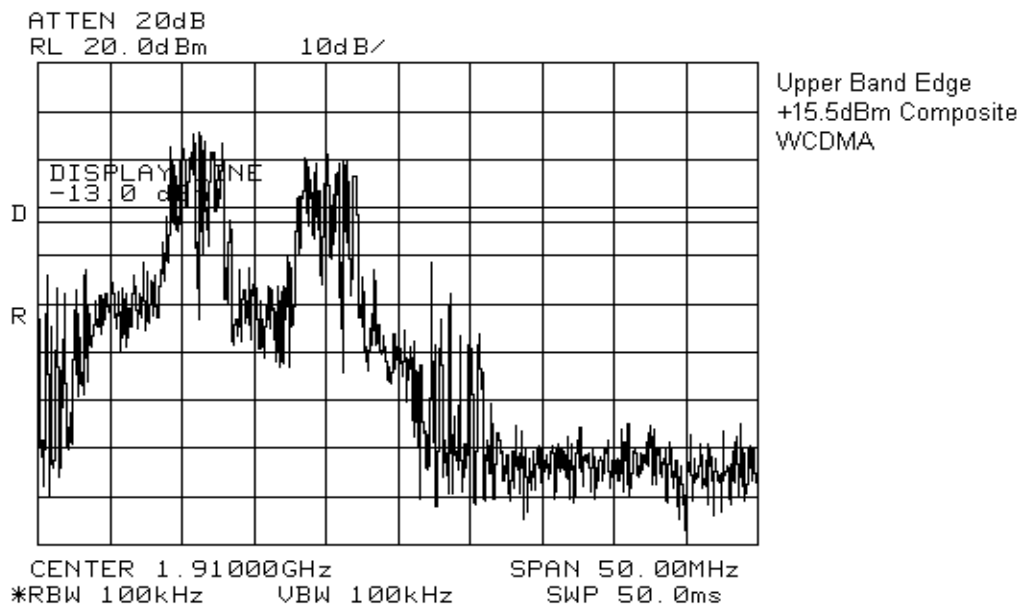
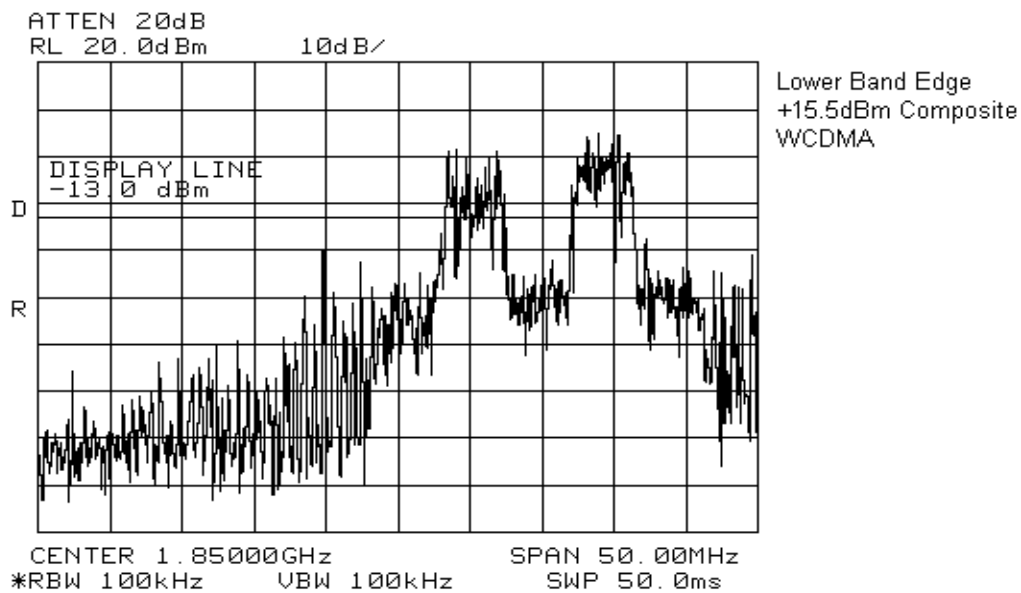
EQUIPMENT: DU 1900 Full Band

CDMA



EQUIPMENT: DU 1900 Full Band

WCDMA



## **Section 6. Field Strength of Spurious Emissions**

**Para. No.: 2.1053**

|                                         |                                    |
|-----------------------------------------|------------------------------------|
| <b>Test Performed By: Glen Westwell</b> | <b>Date of Test: 29 Sept. 2004</b> |
|-----------------------------------------|------------------------------------|

**Minimum Standard:** 24.238, -13dBm

**Test Results:** Complied.

Note: Radiated spurious and harmonic emissions were searched from 30MHz to the 18GHz. One was detected.

All emissions within 20dB of the limit were reported.

**Measurement Data:** See table.

*EQUIPMENT: DU 1900 Full Band*

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**Radiated Emissions****Tower: A      Search Distance: 3m****Standard: Signal Substitution, TIA/EIA-603****Receiver: HP8565E**

| <b>Emission Frequency (MHz)</b> | <b>Ant.</b> | <b>Pol.</b> | <b>Maximized Emission (dBuV)</b> | <b>Signal Substitution Level (dBm)</b> | <b>Limit (dBm)</b> | <b>Margin (dB)</b> | <b>Detector</b> | <b>Amp.</b> |
|---------------------------------|-------------|-------------|----------------------------------|----------------------------------------|--------------------|--------------------|-----------------|-------------|
| 3720                            | Hrn1        | V           | 68.2                             | -48.5                                  | -13.0              | 35.5               | Peak            | 2-4GHz      |
| 3720                            | Hrn 1       | H           | 68.5                             | -51.1                                  | -13.0              | 38.1               | Peak            | 2-4GHz      |

*EQUIPMENT: DU 1900 Full Band*

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**Emissions Search Photos**



*EQUIPMENT: DU 1900 Full Band*

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## **Section 7. Out of Band Rejection**

**Para. No.: EAB/RF-2-11-04**

|                                         |                                    |
|-----------------------------------------|------------------------------------|
| <b>Test Performed By: Glen Westwell</b> | <b>Date of Test: 17 Sept. 2004</b> |
|-----------------------------------------|------------------------------------|

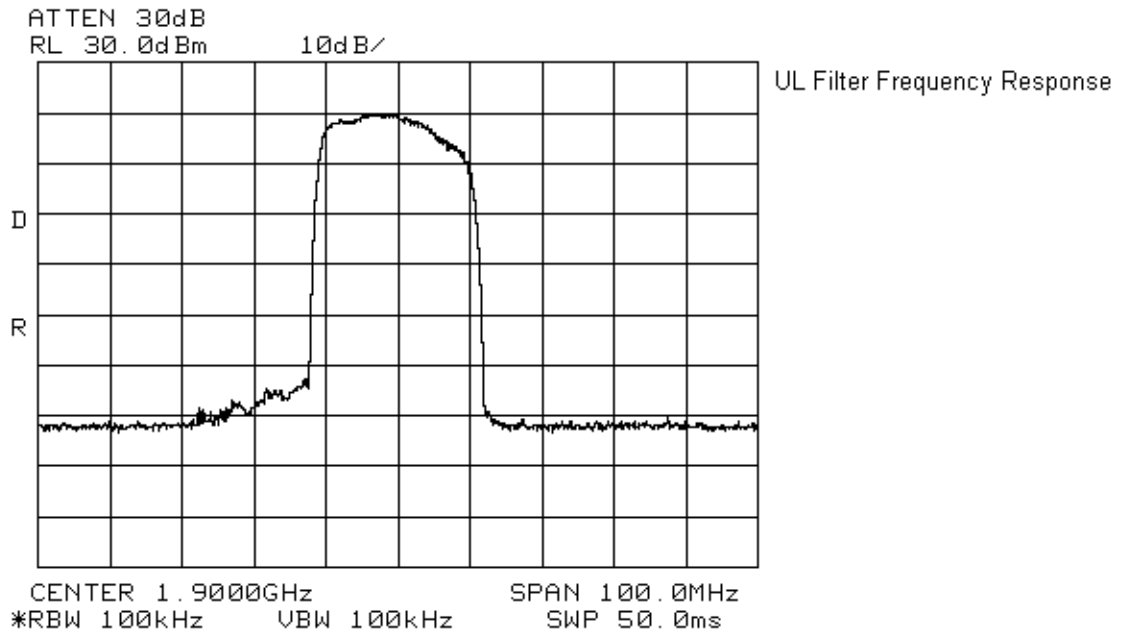
**Limit:** -13dBm

**Test Results:** Complied.

**Measurement Data:** See attached plots.

EQUIPMENT: DU 1900 Full Band

PCS Band



*EQUIPMENT: DU 1900 Full Band*

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## **Section 8. Frequency Stability**

**Para. No.: 2.1055**

|                                         |                                    |
|-----------------------------------------|------------------------------------|
| <b>Test Performed By: Glen Westwell</b> | <b>Date of Test: 29 Sept. 2004</b> |
|-----------------------------------------|------------------------------------|

**Minimum Standard:** 24.235

**Test Results:** Complies. The maximum frequency drift is 0 Hz.

**Measurement Data:** Standard Test Frequency: (-30°C to +50°C)

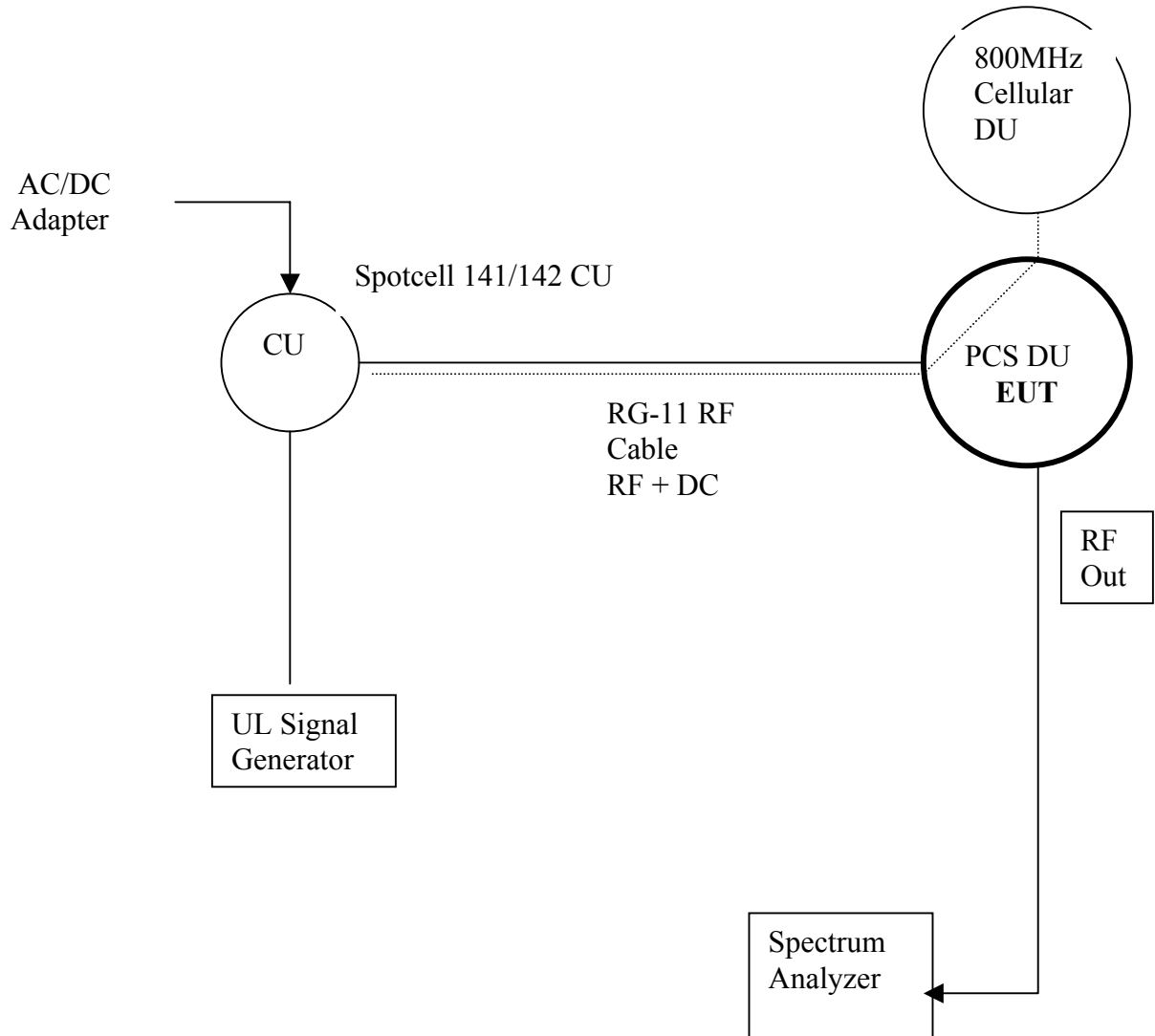
PCS Uplink DU radio: 1860.000 000 MHz

▪Frequency deviation was verified every 10°C from -30°C to +50°C, as well as at voltage variation of +/- 15% of supply voltage.

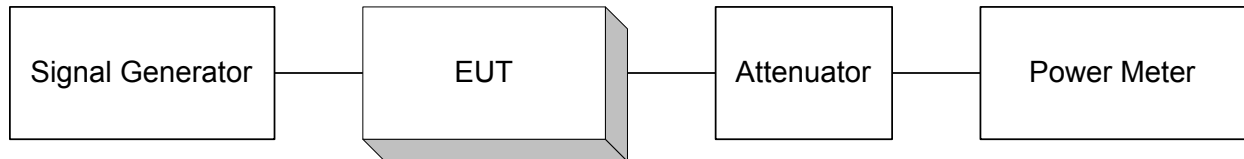
EQUIPMENT: DU 1900 Full Band

## Section 9. Block Diagrams

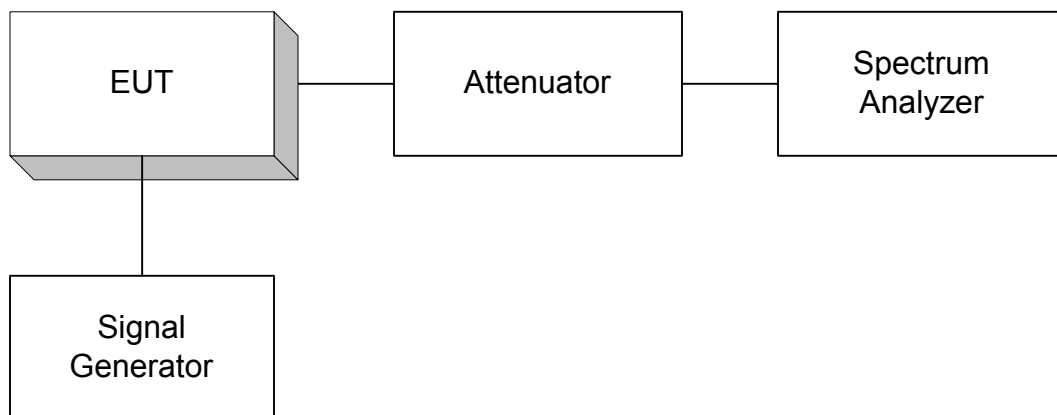
### EUT Test Set Up



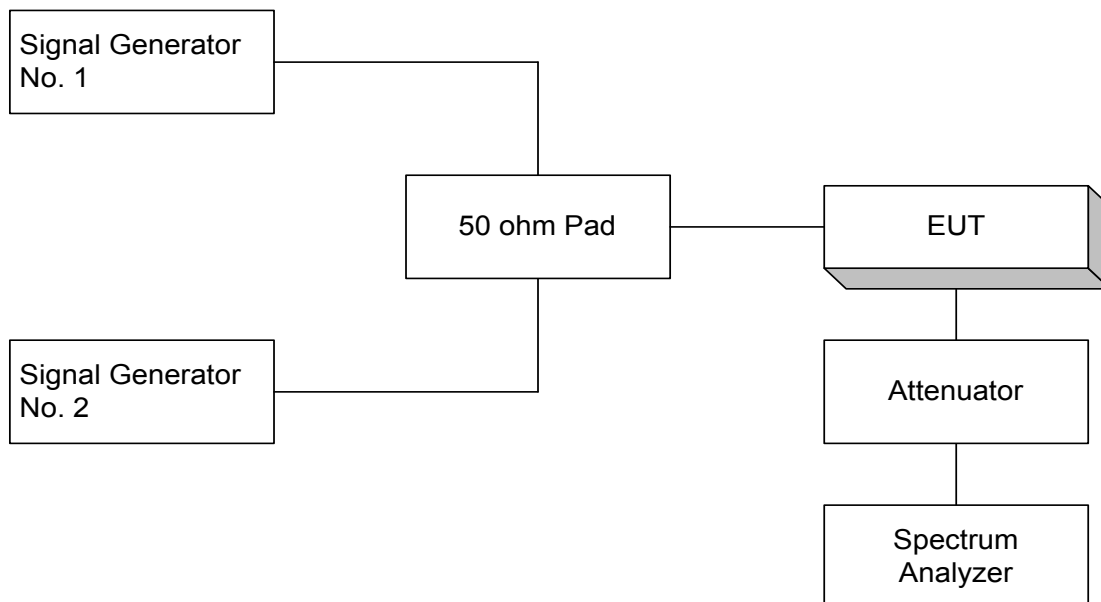
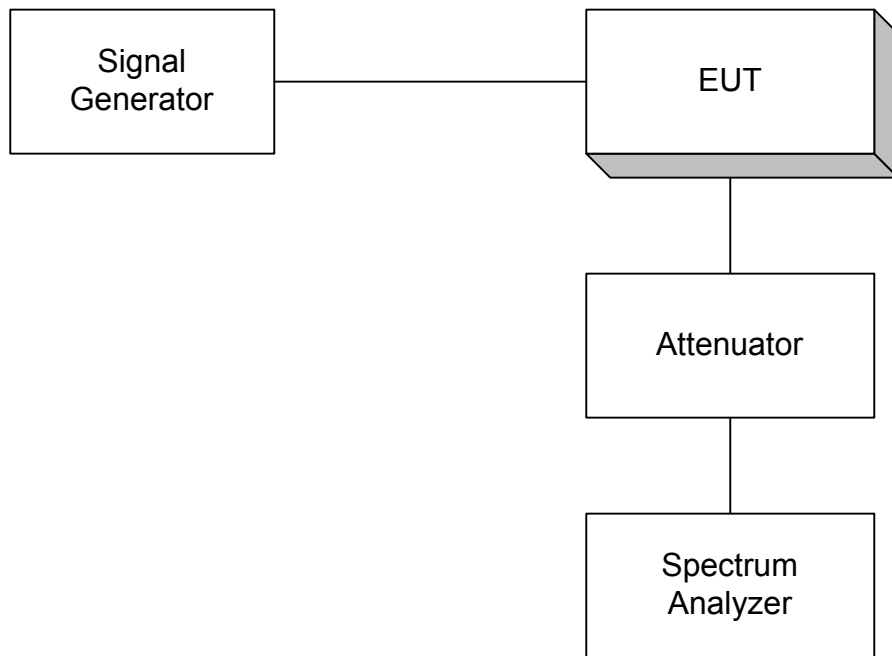
**Para. No. 2.1046 - R.F. Power Output**



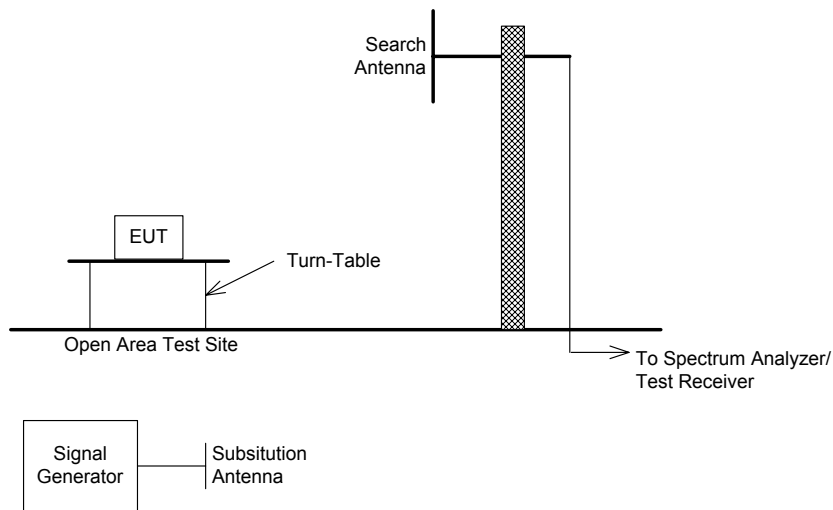
**Para. No. 2.1049 - Occupied Bandwidth**



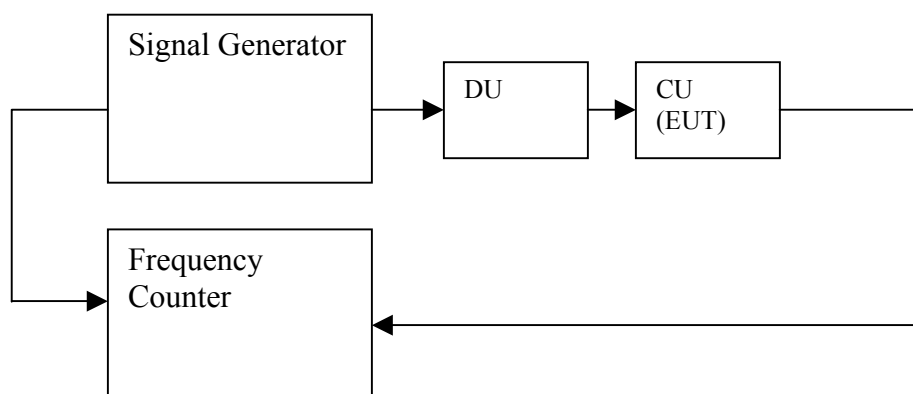
**Para. No. 2.1051 - Spurious Emissions at Antenna Terminals**



**Para. No. 2.1053 - Field Strength of Spurious Radiation**  
**TIA/EIA 603, Signal Substitution Method**



**Para. No. 2.1055 Frequency Stability**



*EQUIPMENT: DU 1900 Full Band***Section 10. Test Equipment List**

| CAL CYCLE | EQUIPMENT                 | MANUFACTURER    | MODEL     | SERIAL   | LAST CAL.  | NEXT CAL.  |
|-----------|---------------------------|-----------------|-----------|----------|------------|------------|
| 1 Year    | Spectrum Analyzer         | Hewlett Packard | 8565E     | FA000981 | 31 May 04  | 31 May 05  |
| 3 Year    | Signal Generator          | Rohde & Schwarz | SM1Q03    | FA001091 | 25 Sep 03  | 25 Sep 06  |
| 1 Year    | Signal Generator          | Rohde & Schwarz | SM1Q06B   | FA001878 | 18 May 04  | 18 May 05  |
| 1 Year    | Power Meter               | Hewlett Packard | E4418B    | FA001413 | 26 May 04  | 26 May 05  |
| 1 Year    | Power Sensor              | Hewlett Packard | 8487A     | FA001741 | 09 Jun 04  | 09 Jun 05  |
| 1 Year    | RF AMP                    | JCA             | 4-8 GHz   | FA001497 | 18 June 04 | 18 June 05 |
| 1 Year    | RF AMP                    | JCA             | 2-4 GHz   | FA001496 | 18 June 04 | 18 June 05 |
| 1 Year    | RF AMP                    | JCA             | 1-2 GHz   | FA001498 | 18 June 04 | 18 June 05 |
| 1 Year    | RF AMP                    | Narda           | 5 - 18GHz | FA001409 | COU        | COU        |
| 1 Year    | Climate Chamber           | Thermotron      | SM-16C    | 15649-S  | COU        | COU        |
| 1 Year    | Frequency Counter         | Hewlett Packard | HP5350A   | FA000086 | 19 Feb 04  | 19 Feb 05  |
| 1 Year    | Spectrum Analyzer         | Hewlett-Packard | 8566B     | FA001309 | May 28/04  | May 28/05  |
| 1 Year    | Spectrum Analyzer Display | Hewlett-Packard | 85662A    | FA001309 | May 28/04  | May 28/05  |
| NCR       | Bilog                     | Schaffner       | CBL6112B  | FA001504 | NCR        | NCR        |
| 1 Year    | Horn Antenna              | EMCO #1         | 3115      | FA000649 | 18 Dec 03  | 18 Dec 04  |
| 1 Year    | Receiver                  | Rohde & Schwarz | ESVP      | FA000871 | Jan. 16/04 | Jan. 16/05 |
| 1 Year    | Log Periodic Antenna #2   | EMCO            | 3148      | FA001355 | May 05/04  | May 05/05  |
| 1 Year    | Biconical (2) Antenna     | EMCO            | 3109      | FA000904 | Aug 3/04   | Aug 3/05   |

NA: Not Applicable  
NCR: No Cal Required  
COU: CAL On Use