| | |
|---|---|
| **Nemko Test Report:** | 1L0269RUS1 |
| **Applicant:** | Grayson Wireless<br>140 Vista Center Drive<br>Forest, Virginia 24551 |
| **Equipment Under Test: (E.U.T.)** | GWMT 0820 |
| **FCC ID:** | |
| **In Accordance With:** | **FCC Part 22, Subpart H**<br>800 MHz Base Stations |
| **Tested By:** | Nemko Dallas Inc.<br>802 N. Kealy<br>Lewisville, TX<br>75057-3136 |
| **Authorized By:** |  <br>Tom Tidwell, RF Group Manager |
| **Date:** | 7/16/01 |
| **Total Number of Pages:** | 33 |

# Table of Contents

## Section 1. Summary of Test Results

Manufacturer: Grayson Wireless

Model No.: GWMT 0820

Serial No.: None

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

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

☒ New Submission ☒ Production Unit

☐ Class II Permissive Change ☐ Pre-Production Unit

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

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

**NVLAP LAB CODE: 100426-0**

TESTED BY: _____ DATE: _____

## Summary Of Test Data

| NAME OF TEST | PARA. NO. | SPEC. | MEAS. | RESULT |
|---|---|---|---|---|
| RF Power Output | 2.1046 | 500 W ERP | < 500 W | Complies |
| Audio Frequency Response | 2.1047 | 6dB/Octave | N/A | N/A |
| Audio Low Pass Filter Response | 2.1047 | Graph | N/A | N/A |
| Modulation Limiting | 2.1047 | Graph | N/A | N/A |
| Occupied Bandwidth (Voice & SAT) | 2.1049 | Mask | N/A | N/A |
| Occupies Bandwidth (WB Data & SAT) | 2.1049 | Mask | N/A | N/A |
| Occupied Bandwidth (ST) | 2.1049 | Mask | N/A | N/A |
| Occupied Bandwidth (SAT) | 2.1049 | Mask | N/A | N/A |
| Occupied Bandwidth (Digital Modulation)) | 2.1049 | Not Specified | N/A | N/A |
| Occupied Bandwidth (CW) | 2.1049 | Not Specified | Plot | Complies |
| Spurious Emissions at Antenna Terminals | 2.1051 | -13 dBm | < -13 dBm | Complies |
| Field Strength of Spurious Emissions | 2.1053 | 82.3 dBµV/m | < -13 dBm | Complies |
| Frequency Stability | 2.1055 | 2.5 ppm | < 2.5 ppm | Complies |

**Footnotes:**

The device transmits CW carriers only.

.

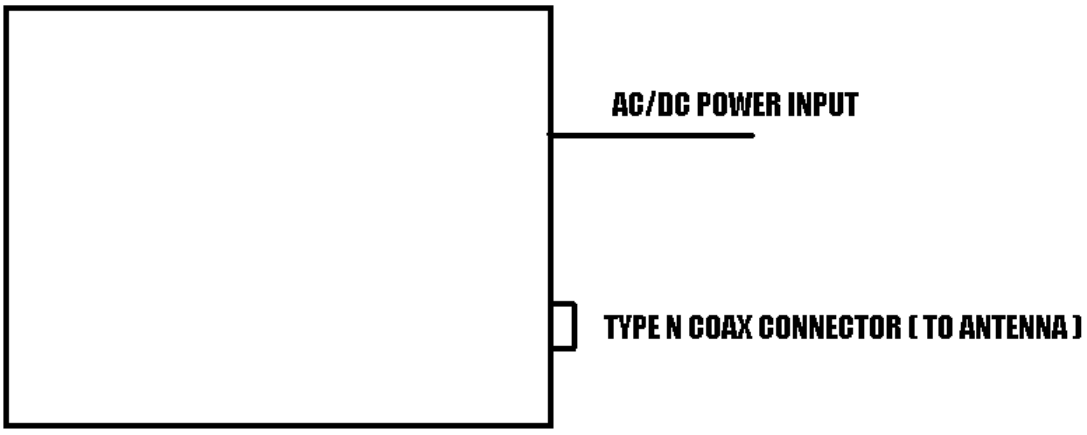
## Section 2. General Equipment Specification

| | |
|---|---|
| **Frequency Range:** | 824.01 – 848.97 MHz<br>869.01 - 893.7 MHz |
| **Tunable Bands:** | 824.01 – 848.97 MHz<br>869.01 - 893.7 MHz |
| **Necessary Bandwidth:** | CW |
| **Type of Modulation and Designator:** | NON |
| **Output Impedance:** | 50 ohms |
| **RF Power Output (rated):** | 20 Watts |
| **Duty Cycle:** | Continuous |
| **Channel Spacing:** | 30 kHz |
| **Operator Selection of Frequency:** | Manually Controlled By Operator<br>**The device operates over the frequency band of 824.01 to 894.98 MHz. SMR band will be approved for Part 90 operation. Manufacturer prohibits use of the unlicensed band from 849 to 851 MHz with firmware.** |
| **Power Output Adjustment Capability:** | Manually Controlled By Operator |

## Operational Description

The GWMT 0820 is a self-contained CW transmitter operating in the cellular band.

## System Diagram



## Section 3. RF Power Output

| | |
|---|---|
| NAME OF TEST: RF Power Output | PARA. NO.: 2.1046 |
| TESTED BY: David Light | DATE: 05/31/2001 |

**Test Results:** Complies.

**Measurement Data:**

| Frequency (MHz) | Supply Voltage | Output Power (dBm) | Rated Power (dBm) | Measured / Rated (dBm) |
|---|---|---|---|---|
| 836.52 | 115 VAC (Nominal) | 42.5 | 43 | 0.99/1 |
| 881.52 | 115 VAC (Nominal) | 42.7 | 43 | 0.99/1 |
| 836.52 | 98 VAC | 42.4 | 43 | 0.99/1 |
| 881.52 | 98VAC | 42.6 | 43 | 0.99/1 |
| 836.52 | 132 VAC | 42.4 | 43 | 0.99/1 |
| 881.52 | 132 VAC | 42.6 | 43 | 0.99/1 |
| 836.52 | 13 VDC | 42.5 | 43 | 0.99/1 |
| 881.52 | 13 VDC | 42.6 | 43 | 0.99/1 |
| 836.52 | 11 VDC | Stopped Operation | 43 | N/A |
| 881.52 | 11 VDC | Stopped Operation | 43 | N/A |
| 836.52 | 15 VDC | 42.5 | 43 | 0.99/1 |
| 881.52 | 15 VDC | 42.6 | 43 | 0.99/1 |

**Equipment Used:** 1604-1065-1046-1036

**Measurement Uncertainty:** 1.7 dB

**Temperature:** 22 °C

**Relative Humidity:** 50 %

| | |
|---|---|
| NAME OF TEST: Occupied Bandwidth (CW) | PARA. NO.: 2.1047 |
| TESTED BY: David Light | DATE: 5/31/2001 |

**Test Results:** Complies.

**Measurement Data:** See attached graph.

**Equipment Used:** 1604-1065-1046-1036

**Measurement Uncertainty:** 1.7 dB

**Temperature:** 22 °C

**Relative Humidity:** 50 %

## Test Plots – Occupied Bandwidth (CW)

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

**Nemko Dallas, Inc.**

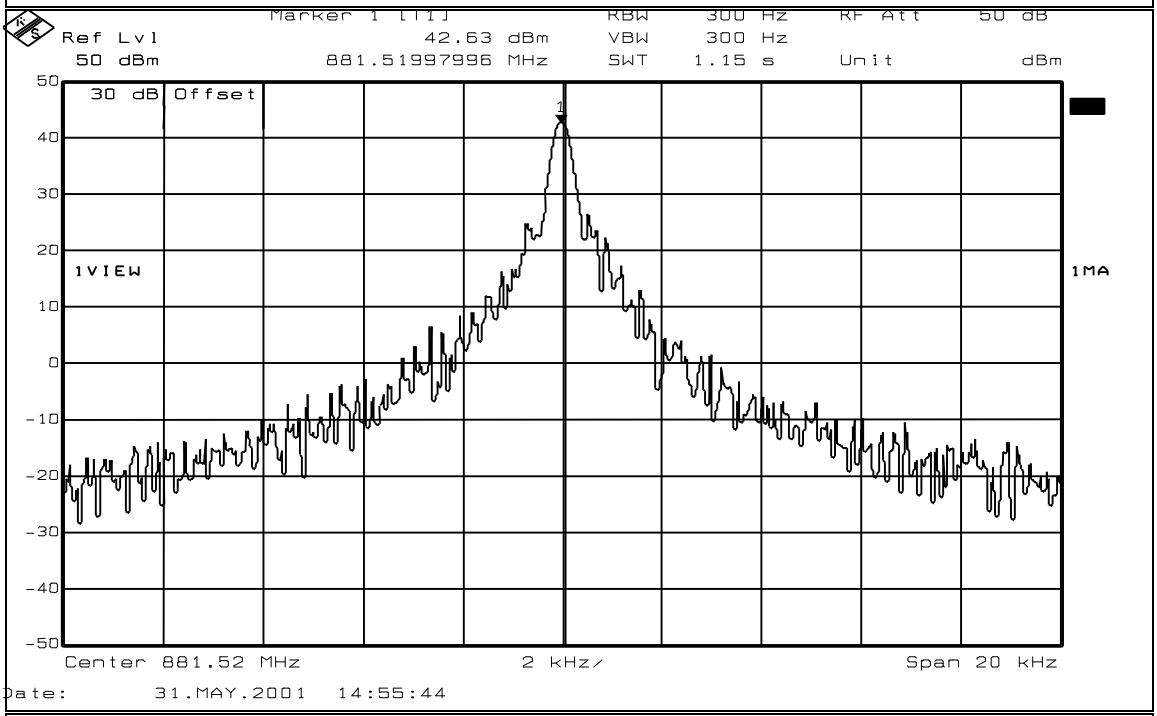
**Data Plot**

Page 1 of 2 — Complete X — Preliminary

| | | | |
|---|---|---|---|
| Job No.: | 1L0269R | Date: 5/31/01 | |
| Specification: | PART 22 | Temperature(°C): 22 | |
| Tested By: | David Light | Relative Humidity(%) 50 | |
| E.U.T.: | GWMT 0802 | | |
| Configuration: | TX FULL POWER | | |
| Sample Number: | | | |
| Location: | Lab 1 | RBW: Refer to plots | Measurement |
| Detector Type: | Peak | VBW: Refer to plots | Distance: N/A m |

**Test Equipment Used**

| | | | |
|---|---|---|---|
| Antenna: | | Directional Coupler: | |
| Pre-Amp: | | Cable #1: | 1046 |
| Filter: | | Cable #2: | |
| Receiver: | 1036 | Cable #3: | |
| Attenuator #1 | 1065 | Cable #4: | |
| Attenuator #2: | 1604 | Mixer: | |
| Additional equipment used: | | | |
| Measurement Uncertainty: | +/-3.6 dB | | |




**Notes:**

## Test Plots – Occupied Bandwidth (CW)

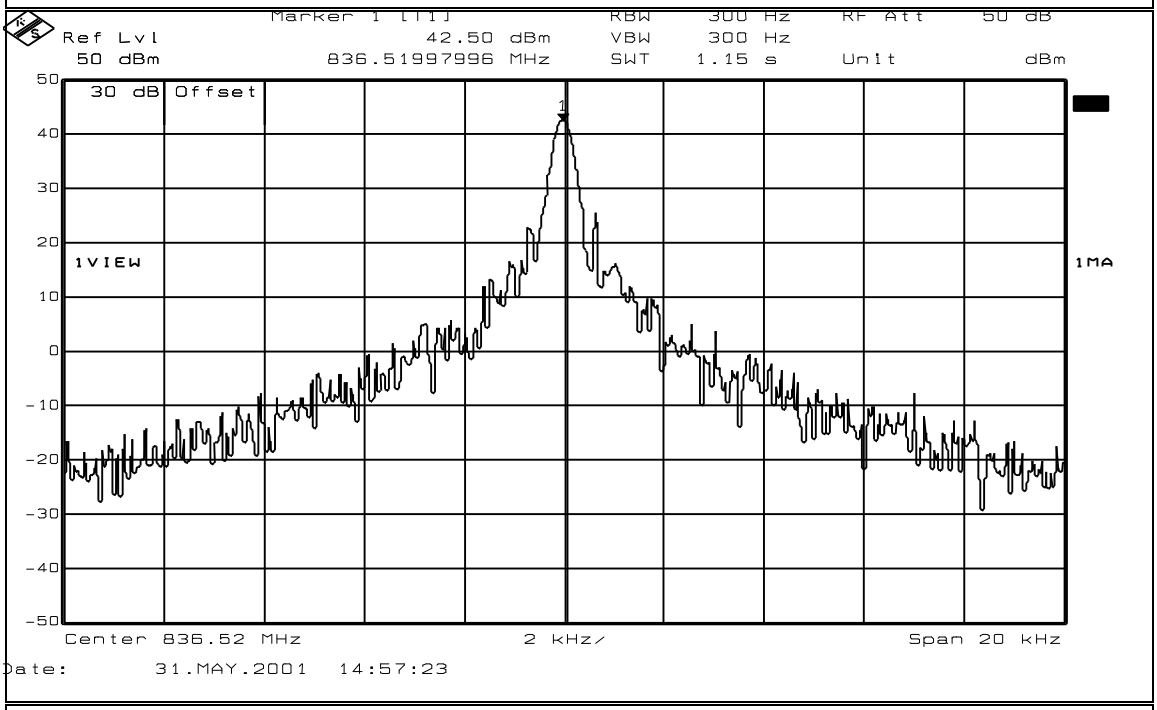
**Dallas Headquarters:**
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

**Nemko Dallas, Inc.**

**Data Plot**

Page 2 of 2

| | | | |
|---|---|---|---|
| Job No.: | 1L0269R | Date: | 5/31/01 |
| Specification: | PART 22 | Temperature(°C): | 22 |
| Tested By: | David Light | Relative Humidity(%) | 50 |
| E.U.T.: | GWMT 0802 | | |
| Configuration: | TX FULL POWER | | |




**Notes:**

## Section 4. Spurious Emissions at Antenna Terminals

| | |
|---|---|
| NAME OF TEST: Spurious Emissions At Antenna Terminals | PARA. NO.: 2.1051 |
| TESTED BY: David Light | DATE:05/31/2001 |

**Test Results:** Complies.

**Measurement Data:** See attached graph.

**Equipment Used:** 1604-1065-1046-1036-1060-1081

**Measurement Uncertainty:** 1.7 dB

**Temperature:** 22 °C

**Relative Humidity:** 50 %

## Test Plots – 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**

Page 1 of 2 — Complete X — Preliminary

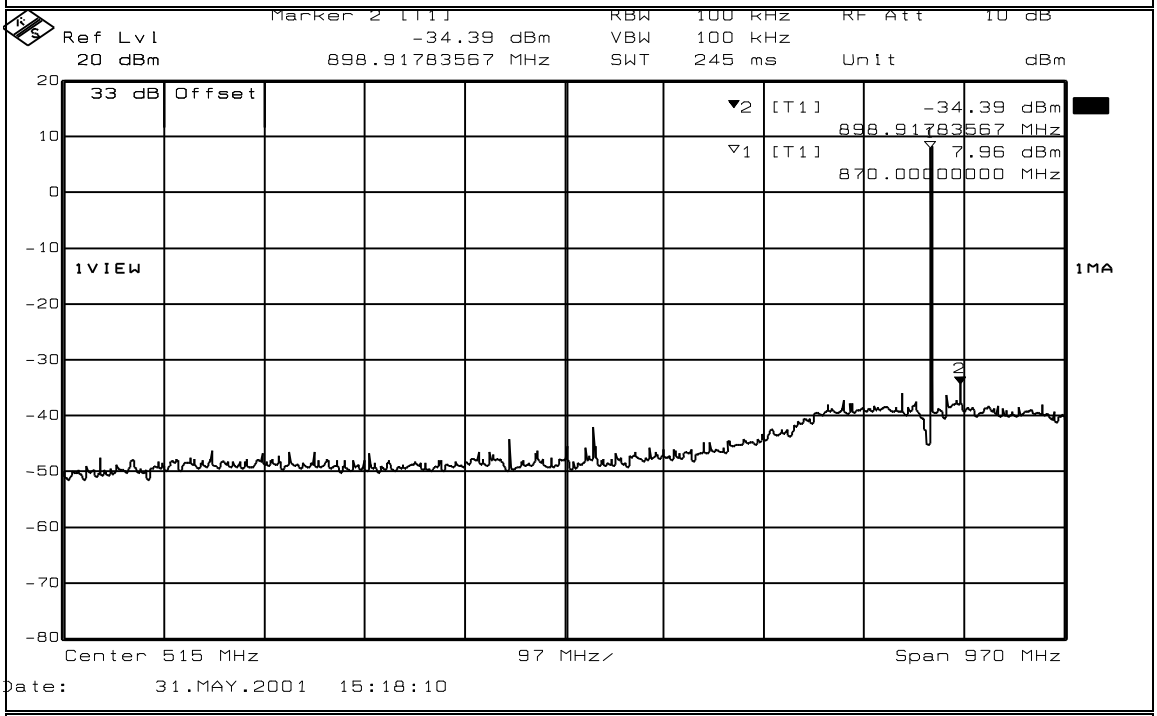
| | | | |
|---|---|---|---|
| Job No.: | 1L0269R | Date: 5/31/01 | |
| Specification: | PART 22 | Temperature(°C): 22 | |
| Tested By: | David Light | Relative Humidity(%) 50 | |
| E.U.T.: | GWMT 0802 | | |
| Configuration: | TX FULL POWER | | |
| Sample Number: | | | |
| Location: | Lab 1 | RBW: Refer to plots | Measurement Distance: N/A m |
| Detector Type: | Peak | VBW: Refer to plots | |

**Test Equipment Used**

| | | | |
|---|---|---|---|
| Antenna: | | Directional Coupler: | |
| Pre-Amp: | | Cable #1: | 1046 |
| Filter: | 1060 | Cable #2: | 1081 |
| Receiver: | 1036 | Cable #3: | |
| Attenuator #1 | 1065 | Cable #4: | |
| Attenuator #2: | 1604 | Mixer: | |

Additional equipment used:

Measurement Uncertainty: +/-3.6 dB




**Notes:** **MARKER 1 INDICATES CARRIER - CARRIER HAS BEEN NOTCHED**
**MARKER 2 INDICATES HIGHEST EMISSION**

## Test Plots – Spurious Emissions at Antenna Terminals

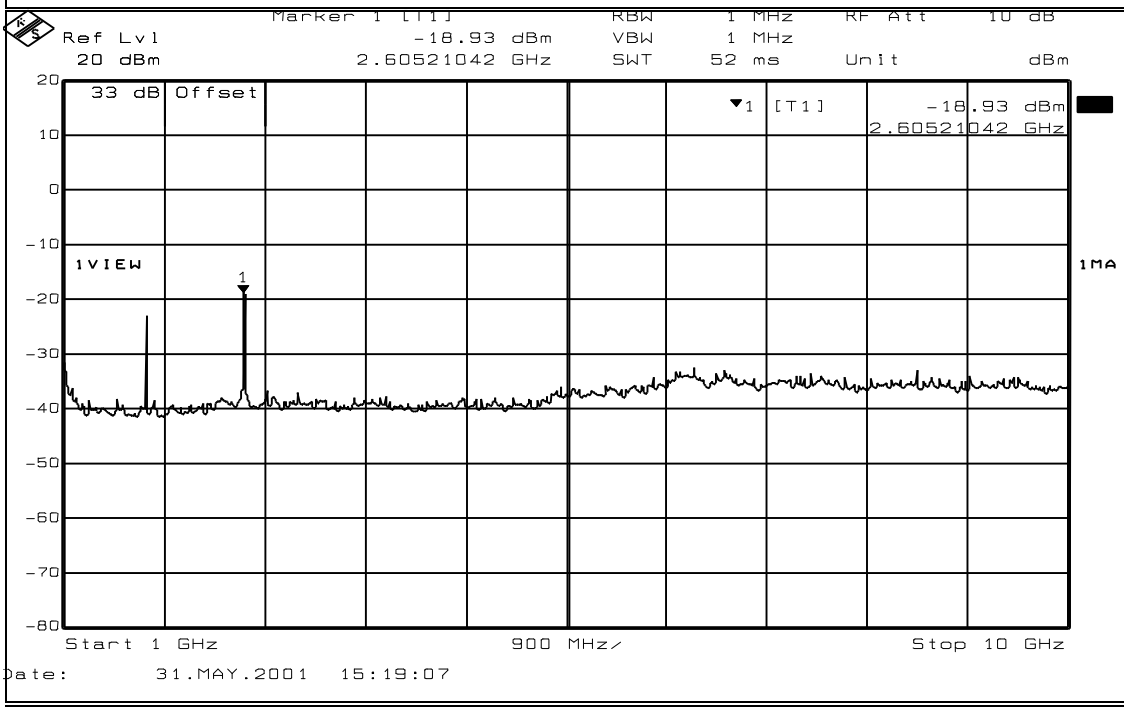
**Dallas Headquarters:**
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

**Nemko Dallas, Inc.**

**Data Plot**

Page 2 of 2

Job No.: 1L0269R Date: 5/31/01
Specification: PART 22 Temperature(°C): 22
Tested By: David Light Relative Humidity(%) 50
E.U.T.: GWMT 0802
Configuration: TX FULL POWER




**Notes:** **MARKER INDICATES HIGHEST EMISSION**

## Section 5. Field Strength of Spurious

| | |
|---|---|
| NAME OF TEST: Field Strength of Spurious | PARA. NO.: 2.1053 |
| TESTED BY: David Light | DATE: 6/12/2001 |

**Test Results:** Complies.

**Measurement Data:** See attached table.

**Equipment Used:** 1464-993-1484-1485-1061

**Measurement Uncertainty:** 1.7 dB

**Temperature:** 22 °C

**Relative Humidity:** 50 %

## Test Data - Radiated Emissions

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

Nemko Dallas, Inc.

### Field Strength of Spurious Emissions

Page 1 of 1 — Complete X — Preliminary

Job No.: 1L0269R — Date: 6/12/01

Specification:

Tested By: Tom Tidwell — Temperature(°C): 22 — Relative Humidity(%) 50

E.U.T.: GWMT 0820

Configuration: TRANSMIT FULL POWER

Sample No: 1

Location: AC 3 — RBW: 300 kHz — Measurement Distance: 3 m

Detector Type: Peak — VBW: 500 kHz

**Test Equipment Used**

Antenna: 993 — Directional Coupler:

Pre-Amp: 1016 — Cable #1: 1484

Filter: — Cable #2: 1485

Receiver: 1464 — Cable #3:

Attenuator #1 — Cable #4:

Attenuator #2: — Mixer:

Additional equipment used:

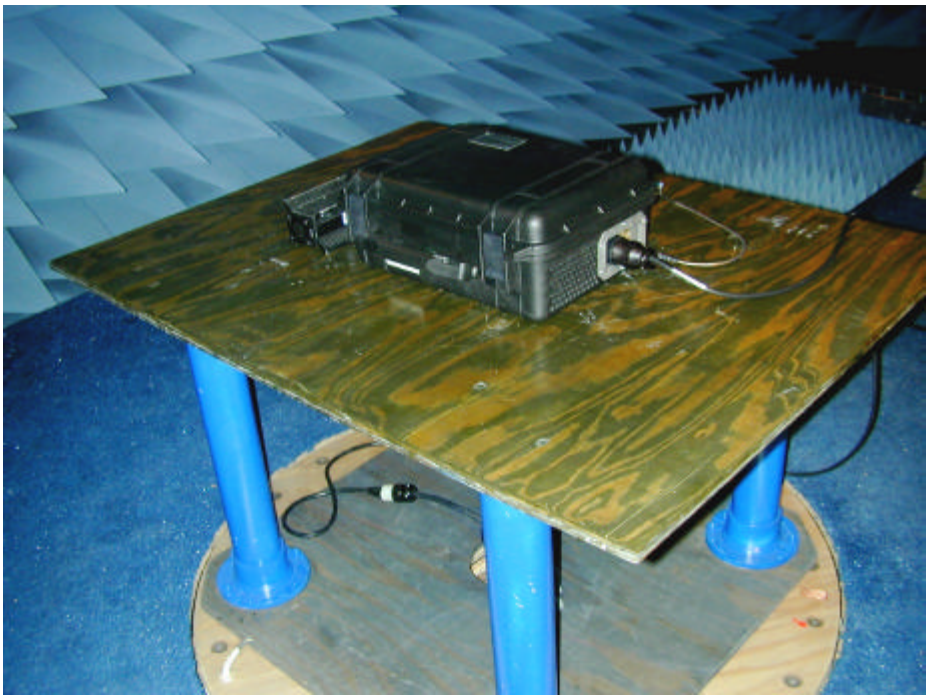
Measurement Uncertainty: +/-3.6 dB

| Frequency (MHz) | Meter Reading (dBm) | Correction Factor (dB) | | Pre-Amp Gain (dB) | Substitution Antenna Gain (dBd) | | ERP (dBm) | ERP (mW) | Polarity | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| 1704 | -55.6 | 29.9 | | 33.3 | 6.4 | | -52.7 | 0.000005 | V | |
| 2556 | -64.5 | 35.6 | | 33.8 | 8.0 | | -54.8 | 0.000003 | V | |
| 3408 | -69.0 | 37.1 | | 33.6 | 8.1 | | -57.4 | 0.000002 | V | Noise floor |
| 4260 | -70.0 | 42.8 | | 33.5 | 7.9 | | -52.8 | 0.000005 | V | Noise floor |
| 8520 | -73.0 | 40.3 | | 34.3 | 9.9 | | -57.1 | 0.000002 | V | Noise floor |
| | | | | | | | | | | |
| 1704 | -57.8 | 32.7 | | 33.3 | 6.4 | | -52.1 | 0.000006 | H | |
| 2556 | -66.0 | 34.6 | | 33.8 | 8.0 | | -57.2 | 0.000002 | H | |
| 3408 | -69.0 | 35.8 | | 33.6 | 8.1 | | -58.7 | 0.000001 | H | Noise floor |
| 4260 | -70.0 | 35.2 | | 33.5 | 7.9 | | -60.4 | 0.000001 | H | Noise floor |
| 8520 | -73.0 | 41.8 | | 34.3 | 9.9 | | -55.5 | 0.000003 | H | Noise floor |
| | | | | | | | | | | |
| | | | | | | | | | | |

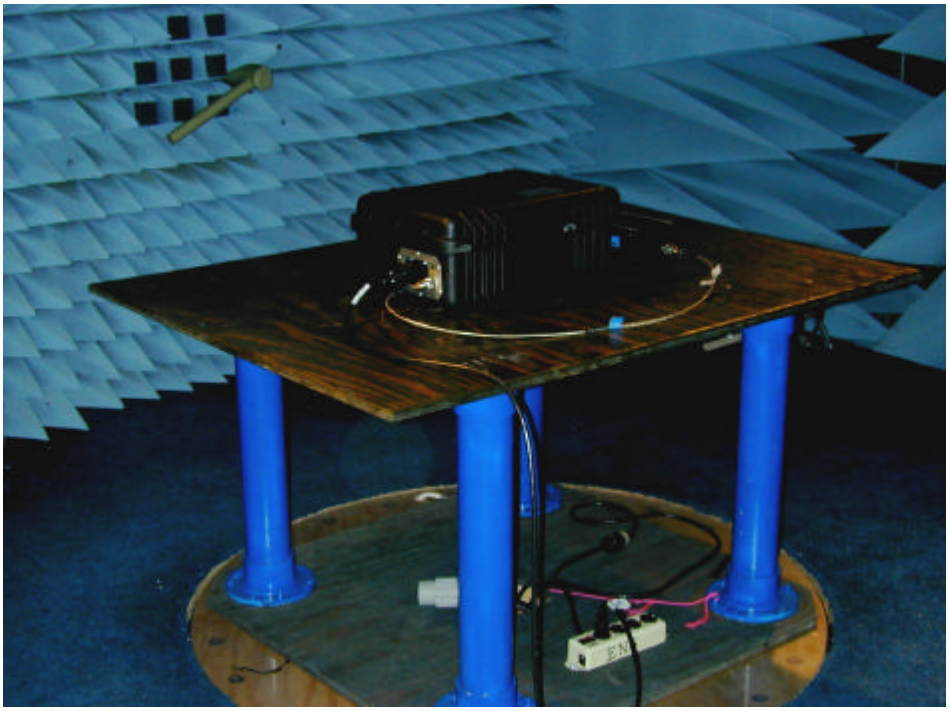
Notes: SCANNED SPECTRUM TO THE 10TH HARMONIC OF CARRIER FREQUENCY

## Photographs of Test Setup

FRONT VIEW



REAR VIEW



## Section 6. Frequency Stability

| | |
|---|---|
| NAME OF TEST: Frequency Stability | PARA. NO.: 2.1055 |
| TESTED BY: David Light | DATE: 06/01/2001 |

**Test Results:** Complies.

**Measurement Data:** See attached table.

| | | |
|---|---|---|
| Standard Test Frequency: | 881.52 | MHz |
| Standard Test Voltage | 115 | VAC |
| Standard Test Voltage: | 13 | VDC |

**Equipment Used:** 283-1036

**Measurement Uncertainty:** $1x10^{-11}$ ppm

**Temperature:** 22 °C

**Relative Humidity:** 50 %

## Test Data – Frequency Stability

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

### Frequency Stability

Client: GRAYSON WIRELESS W.O.# 1L0269R

EUT: GMWT 0802 S/N: NONE

Date: 6/1/01 Tech: LIGHT

Test Equipment used: 283-1026

| Temperature | Voltage | Frequency Error (Hz) |
|---|---|---|
| 20 °C | 115 VAC | -86.000000 |
| 20 °C | 92 VAC | -90 |
| 20 °C | 132 VAC | -75 |
| 20 °C | 13 VDC | +24 |
| 20 °C | 11 VDC | Stopped Operation |
| 20 °C | 15 VDC | -13 |
| | | |
| 10 °C | 115 VAC | -223 |
| 0 °C | 115 VAC | -232 |
| -10 °C | 115 VAC | -78 |
| -20 °C | 115 VAC | +168 |
| -30 °C | 115 VAC | +256 |
| | | |
| 30 °C | 115 VAC | -165 |
| 40 °C | 115 VAC | -380 |
| 50 °C | 115 VAC | -510 |
| | | |

# Section 7. Test Equipment List

| ASSET | Description | Manufacturer<br>Model Number | Serial Number | Cal.<br>Date | Cal.<br>Due |
|---|---|---|---|---|---|
| 1036 | SPECTRUM ANALYZER | ROHDE & SCHWARZ<br>FSEK30 | 830844/006 | 06/14/99 | 06/14/01 |
| 1065 | ATTENUATOR | NARDA<br>776B-10 | NONE | CBU | N/A |
| 1604 | ATTENUATOR | NARDA<br>776B-20 | NONE | CBU | N/A |
| 1046 | Flex cable 1m | Astrolab Inc.<br>32022-2-29094K-1M | N/A | 01/29/01 | 01/29/02 |
| 1060 | TUNABLE NOTCH FILTER | K&L<br>3TNF-500/1000-N/N | 162 | CBU | N/A |
| 1081 | CABLE 2m | Astrolab<br>32027-2-29094-72TC | N/A | 06/04/01 | 06/04/02 |
| 993 | Horn antenna | A.H. Systems<br>SAS-200/571 | XXX | 07/16/99 | 07/16/01 |
| 1016 | Pre-Amp | HEWLETT PACKARD<br>8449A | 2749A00159 | 05/30/01 | 05/30/02 |
| 1464 | Spectrum analyzer | Hewlett Packard<br>8563E | 3551A04428 | 01/02/01 | 01/02/02 |
| 1484 | Cable 2.0-18.0 Ghz | Storm<br>PR90-010-072 | N/A | 05/25/00 | 05/25/01 |
| 1485 | Cable 2.0-18.0 Ghz | Storm<br>PR90-010-216 | N/A | 06/01/01 | 06/01/02 |
| 283 | ENVIROMENTAL CHAMBER | ENVIROTRONICS<br>SH27 | 129010083 | 05/02/01 | 05/02/02 |
| 1026 | FREQUENCY COUNTER | HEWLETT PACKARD<br>5350B | 8232A01493 | 08/17/00 | 08/17/01 |

# ANNEX A - TEST DETAILS

**NAME OF TEST: RF Power Output** **PARA. NO.: 1.1046**

**Minimum Standard:** Para. No. 22.913(a). The E.R.P. of mobile transmitter and auxiliary test transmitter must not exceed 7 watts.

EIA is 19B Para. No. 3.2.1.3. The transmitter shall be compiled of 8 distinct power levels.

The output power shown above shall be maintained within the range of +2 dB, -4 dB of nominal dBW value

| PL | I | II | III |
|---|---|---|---|
| 0 | +6 | +2 | -2 |
| 1 | +2 | +2 | -2 |
| 2 | -2 | -2 | -2 |
| 3 | -6 | -6 | -6 |
| 4 | -10 | -10 | -10 |
| 5 | -14 | -14 | -14 |
| 6 | -18 | -18 | -18 |
| 7 | -22 | -22 | -22 |

**Method Of Measurement:**

Detachable Antenna:
The power at antenna terminals is measured using an in-line power meter.

Integral Antenna:
If the antenna is not detachable from the circuit then the Power Output is derived from the 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 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 a halfwave dipole antenna

**NAME OF TEST: Audio Frequency Response** **PARA. NO.: 2.1047**

**Minimum Standard:** Para. No. 15-19-B. From 300 to 3000 Hz the audio frequency response shall not vary more than +1 to –3 dB from a true 6dB octave pre-emphasis characteristic as referred to 1000 Hz level (with the exception of a permissible 6dB per octave roll-off from 2500 to 3000 Hz).

**Method Of Measurement:**

Operate the transmitter with the compressor disabled, and monitor the output with a frequency deviation meter or standard test receiver without standard 750-microsecond de-emphasis, with expander disabled, and without C-message weighted filter (see 6.6.2). Apply a sine wave audio input to the transmitter external audio input port, vary the modulating frequency from 300 to 3000 Hz and observe the input levels necessary to maintain a constant ±2.9 kHz system deviation.

**NAME OF TEST: Audio Low Pass Filter Response PARA. NO.: 2.1047**

**Minimum Standard:** Para. No. 22.915 (d). For mobile stations, signals must be attenuated as a function of frequency as follows:

i. In the frequency ranges 3.0 to 5.9 Hz and 6.1 to 15 kHz, 40 log (f/3) dB.
ii. In the frequency range 5.9 to 6.1 kHz, 35 dB
iii. In the frequency range above 15 kHz, 28 dB.

**Method Of Measurement:**

Adjust the audio input frequency to 1000 Hz and adjust the input level to 20 dB greater than that required to produce ±8 kHz deviation. Note the output level on the frequency deviation meter or standard test receiver. Using the output level as reference (0dB), vary the modulating frequency from 3000 Hz to 30,000 Hz and observe the change in output while maintaining a constant audio input level.

**NAME OF TEST: Modulation Limiting** **PARA. NO.: 2.1047**

**Minimum Standard:** Para. No. 22.915(b)

The levels of the modulating signals must be set to the values specified below and must be maintained within ±10% of these values.

Voice: ±12 kHz
SAT: ±2 kHz
Wideband Data: ±8 kHz
ST: ± 8 kHz

**Method Of Measurement:**

Voice: A 1 kHz audio tone is injected at levels between -45 and +20 dBVrms. The peak deviation is noted. This is repeated with a 300 Hz tone and a 3 kHz tone.

SAT: A SAT tone is generated by the mobile station and the peak deviation is measured.

Wideband Data: Wideband data is generated by the mobile station and the peak deviation is measured.

ST: ST data is generated by the mobile station and the peak deviation is measured.

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

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

(i) On any frequency removed from the carrier frequency by more than 20 kHz but not more than 45 kHz: at least 26 dB

(ii) On any frequency removed from the carrier frequency by more than 45 kHz, up to the first multiple of the carrier frequency:

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

**Method Of Measurement:**

Spectrum Analyzer Settings:

RBW: 300 Hz
VBW: ≥ RBW
Span: 100 kHz
Sweep: Auto
Mask: CELLF3E

Input Signal Characteristics (F3E/F3D):

AF1 frequency: 2.5 kHz
AF1 level: 16 dB above the level sufficient to produce ±6 kHz deviation with a 1 kHz tone.
SAT: 6000 Hz SAT
SAT level: sufficient to produce ±2 kHz deviation.

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

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

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

at least 26 dB

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

at least 45 dB

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

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

**Method Of Measurement:**

Spectrum Analyzer Settings:
RBW: 300 Hz
VBW: ≥ RBW
Span: 200 kHz
Sweep: Auto
Mask: CELLF1D

Input Signal Characteristics:
RF level: Maximum recommended by manufacturer
10 kbps WBD + DAT
ST

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

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

**Method Of Measurement:**

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

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

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

**Calculation Of Field Strength Limit:**
An example of attenuation requirement of 43 + 10 Log P is equivalent to -13 dBm (5 x $10^{-5}$ Watts) at the antenna terminal. We determine the field strength limit by using the plane wave relation.

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

For emissions ≤ 1 GHz:

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

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

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

For emissions > 1 GHz:

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

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

***The spectrum is searched to 10 GHz.***

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

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

| Freq. Range (MHz) | Mobile > 3 W | Mobile £ 3 W |
|---|---|---|
| 821 to 896 | 2.5 | 2.5 |

Table C-1

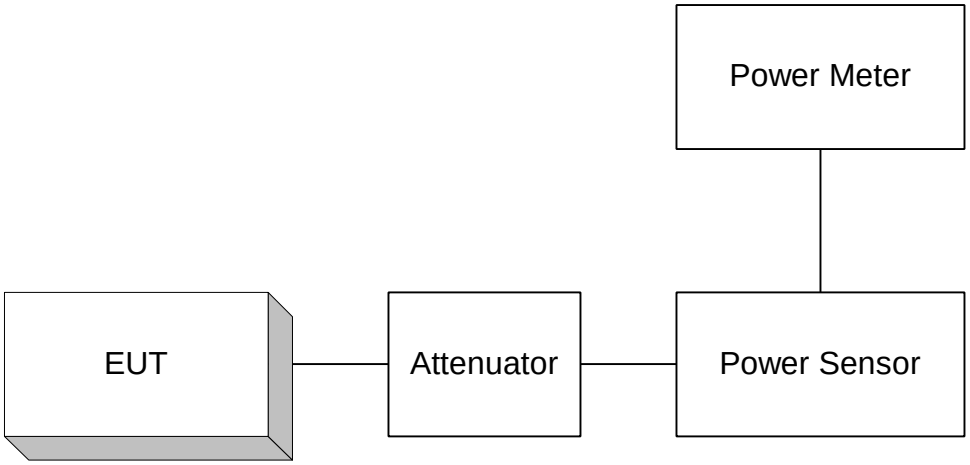
**Method Of Measurement:**

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

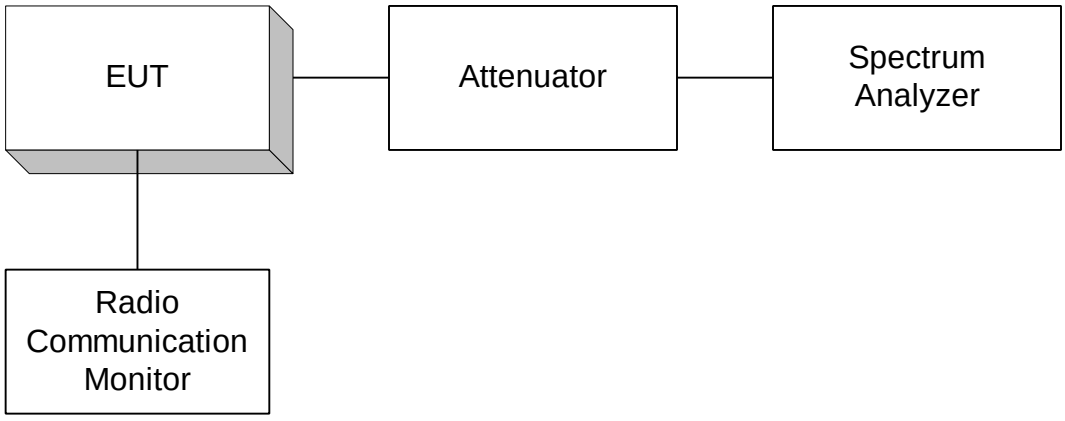
Frequency Stability With Temperature Variation:
The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30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

# ANNEX B - TEST DIAGRAMS

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

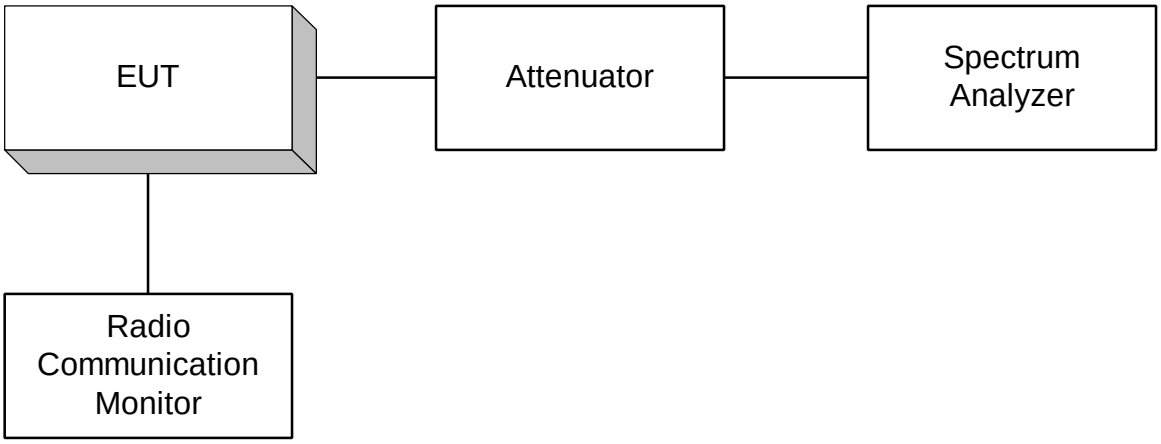



**Para. No. 2.1049 - Occupied Bandwidth**



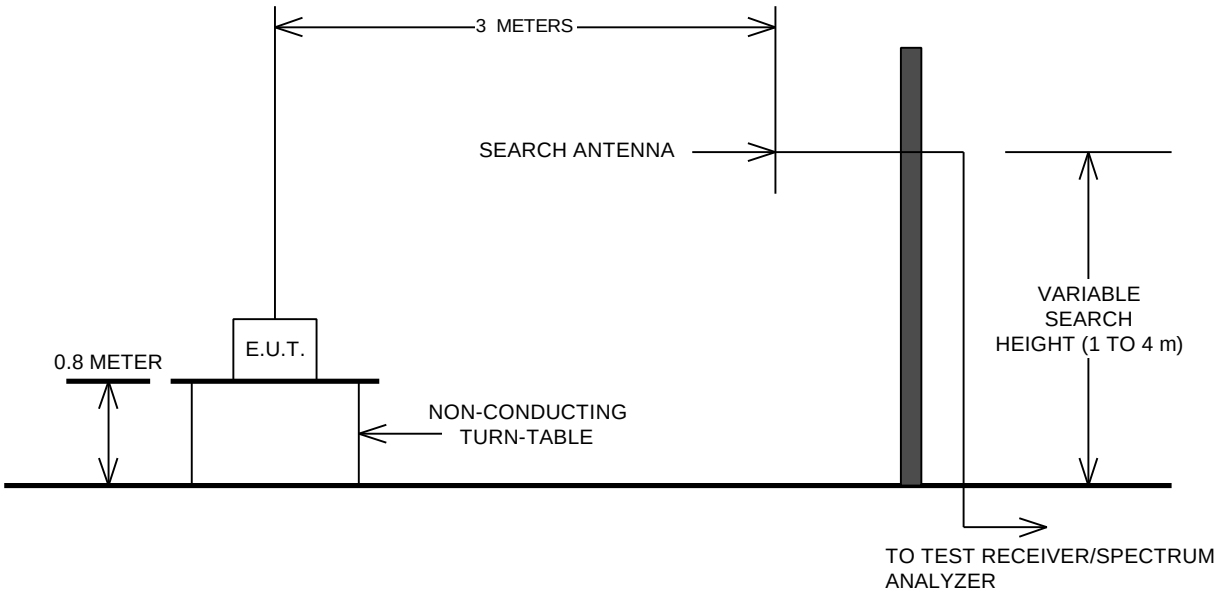

*The Radio Communication Monitor is used only to provide modulation input for external modulation.*

## Para. No. 2.1051 Spurious Emissions at Antenna Terminals

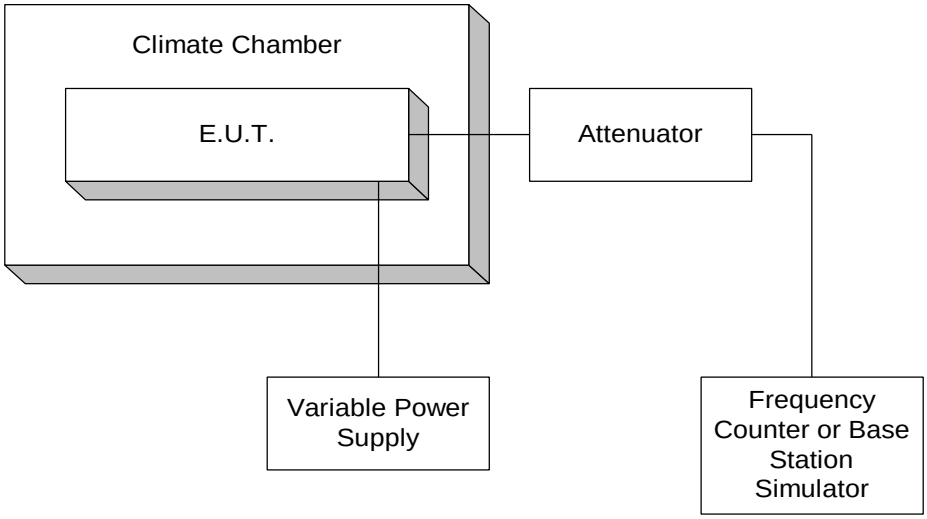



*The Radio Communication Monitor is used only to provide modulation input for external modulation.*

## Para. No. 2.1053 - Field Strength of Spurious Radiation



## Para. No. 2.1055 - Frequency Stability




## Para. No. 2.1045 – Audio Frequency Response, Audio Low Pass Filter Response And Modulation Limiting