

Nemko Test Report: 2L0300RUS1

Applicant: Hop-On Wireless, Inc.
12966 Euclid Street
Garden Grove, CA 92840

FCC ID. No. QHOHPN1600

**Equipment Under Test:
(E.U.T.)** Dundee Single Mode Cellular Telephone
HPN1600

In Accordance With: **FCC Part 22, Subpart H**
800 MHz Cellular Subscriber Units

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

Authorized By:



Tom Tidwell, RF Group Manager

Date: 7/16/02

Total Number of Pages: 33

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Section 1. Summary of Test Results

Manufacturer: Holley Communications

Model No.: HPN1600

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

FCC Product Code: TNT

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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Summary Of Test Data

NAME OF TEST	PARA. NO.	RESULT
RF Power Output	2.1046	Complies
Audio Frequency Response	2.1047	N/A
Audio Low Pass Filter Response	2.1047	N/A
Modulation Limiting	2.1047	N/A
Occupied Bandwidth (Voice & SAT)	2.1049	N/A
Occupied Bandwidth (WB Data & SAT)	2.1049	N/A
Occupied Bandwidth (CDMA)	2.1049	Complies
Spurious Emissions at Antenna Terminals	2.1051	Complies
Field Strength of Spurious Emissions	2.1053	Complies
Frequency Stability	2.1055	Complies

Footnotes:

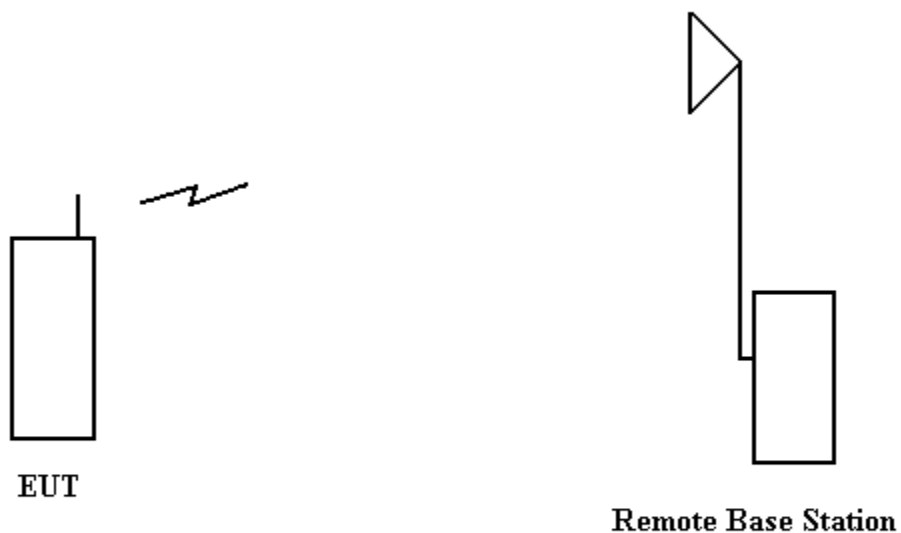
This device does not support analog operation. CDMA modulation only.

Section 2. General Equipment Specification

Frequency Range:	824.7 to 848.31 MHz
Necessary Bandwidth:	1.23 MHz
Type of Modulation and Designator:	CDMA 1M25G7W
Output Impedance:	50 ohms
RF Power Output (rated):	200 mW (23 dBm)
Duty Cycle:	Continuous
Channel Spacing:	30 kHz
Operator Selection of Frequency:	Frequency is controlled in a closed loop system between the BTS and the subscriber.
Power Output Adjustment Capability:	Power is controlled in a closed loop system between the BTS and the subscriber.
Power Supply:	4.2V Lithium-Ion

Operational Description

The device is a CDMA phone operating in the cellular band. The phone is not intended for use against the user's head. There is no microphone or speaker in the device.

System Diagram

Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 2.1046
TESTED BY: David Light	DATE: 6/20/2002

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

Channel	Measured Output Power (dBm)	Measured Output Power (W)	Rated Power (dBm)
1013	23.1	.204	23.0
384	23.0	.200	23.0
777	23.1	.204	23.0

All power measurements were made at the antenna terminal test port. Power output was measured using the FSEK30 spectrum analyzer utilizing the channel power measurement with RMS detector.

ERP

Channel	Measured Effective Radiated Power (dBm)	Measured Effective Radiated Power (W)	Rated ERP (dBm)
383	25.6	.363	25.2

The rated gain of the integral antenna is 0 dBi (2.15 dBd).

Equipment Used: 1036-1629-1478-1471**Measurement Uncertainty:** +/- 1.6 dB**Temperature:** 24 °C**Relative Humidity:** 45 %**Note – This unit was tested with a new battery.**

EQUIPMENT: HPN1600

Data Plot

Page 1 of 3

RF Power Output

Job No.: 2L0300

Date: 6/20/2002

Complete C

Specification: PT 22

Temperature(°C): 24

Preliminary:

Tested By: David Light

Relative Humidity(%): 45

E.U.T.: CDMA CELL PHONE

Configuration: TX CDMA SIGNAL FULL POWER CONTROLLED BY SOFTWARE

Sample Number: 1

Location: Lab 1

RBW: 30 kHz

Measurement

Detector Type: Rms

VBW: 300 kHz

Distance: NA m

Test Equipment Used

Antenna:

Directional Coupler:

Pre-Amp:

Cable #1: 1629

Filter:

Cable #2:

Receiver: 1036

Cable #3:

Attenuator #1: 1478

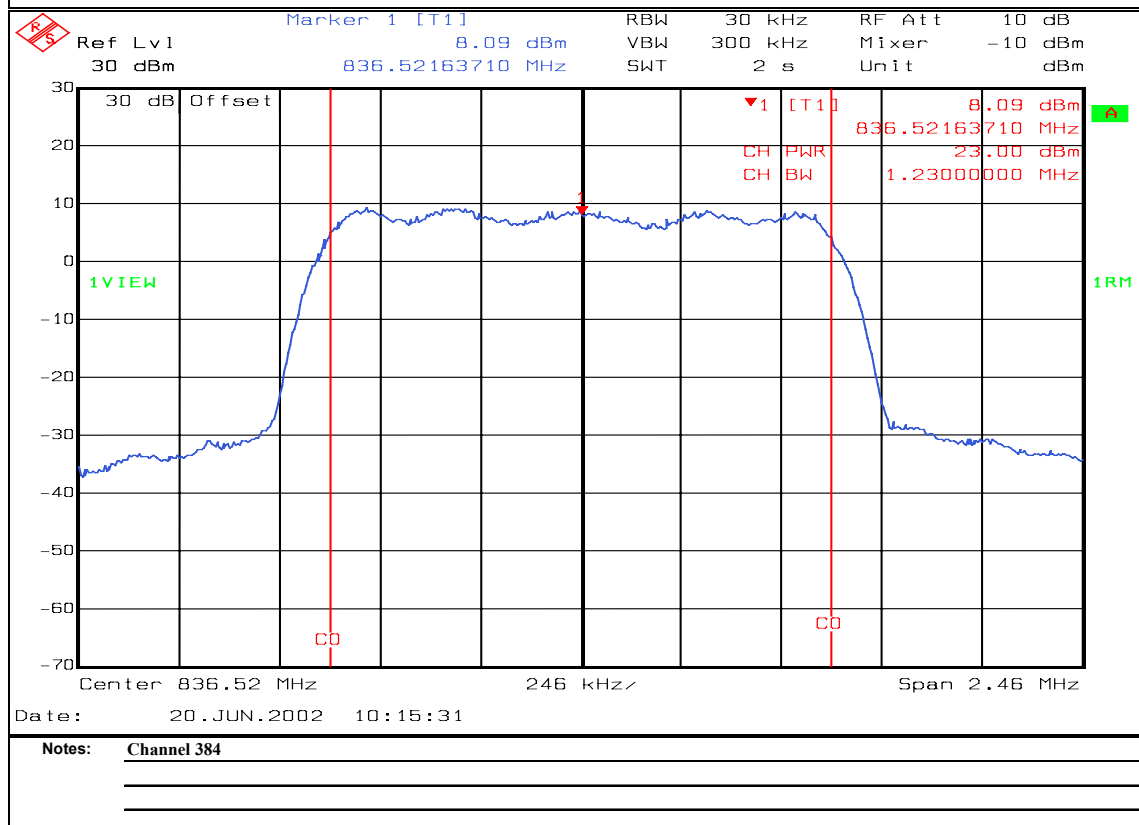
Cable #4:

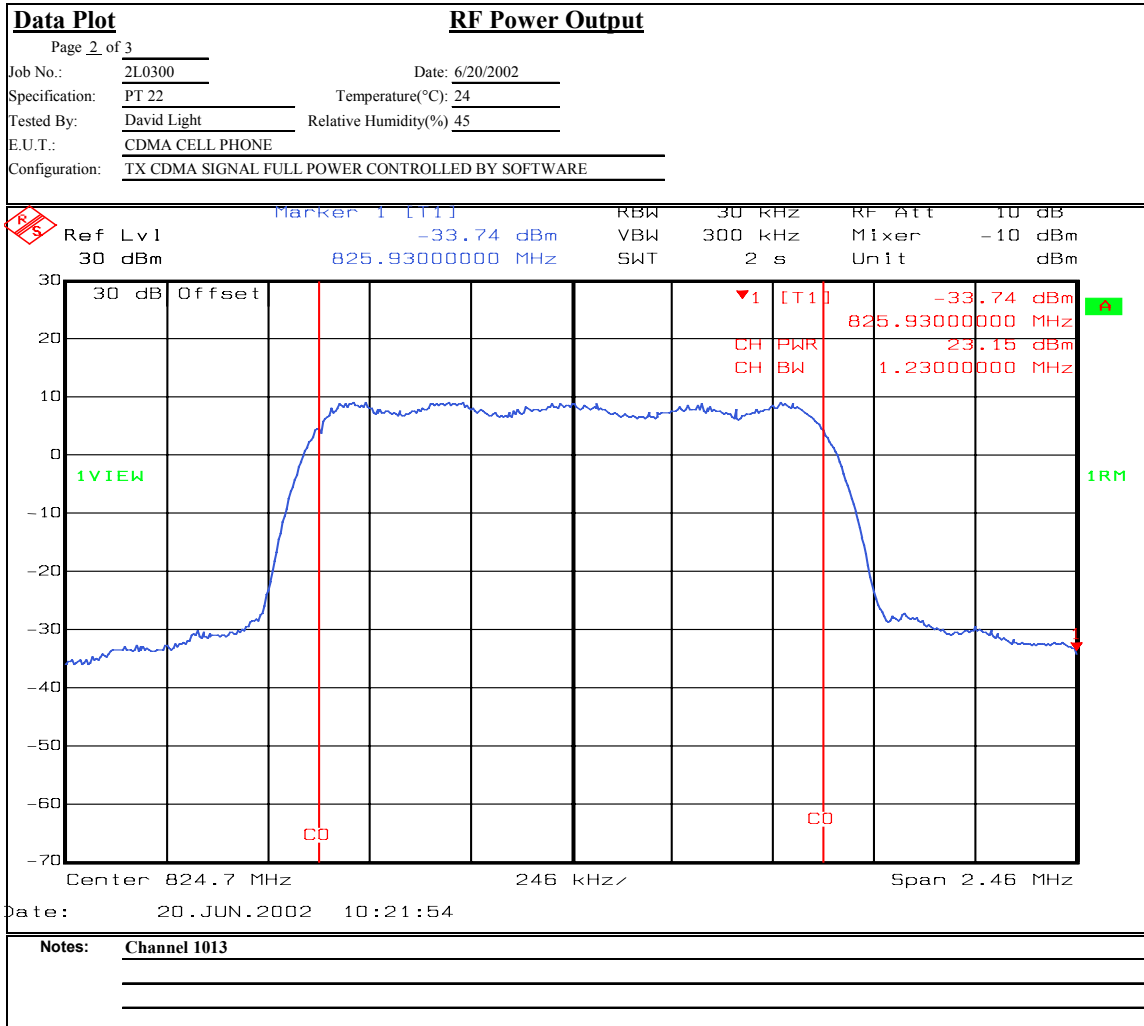
Attenuator #2: 1471

Mixer:

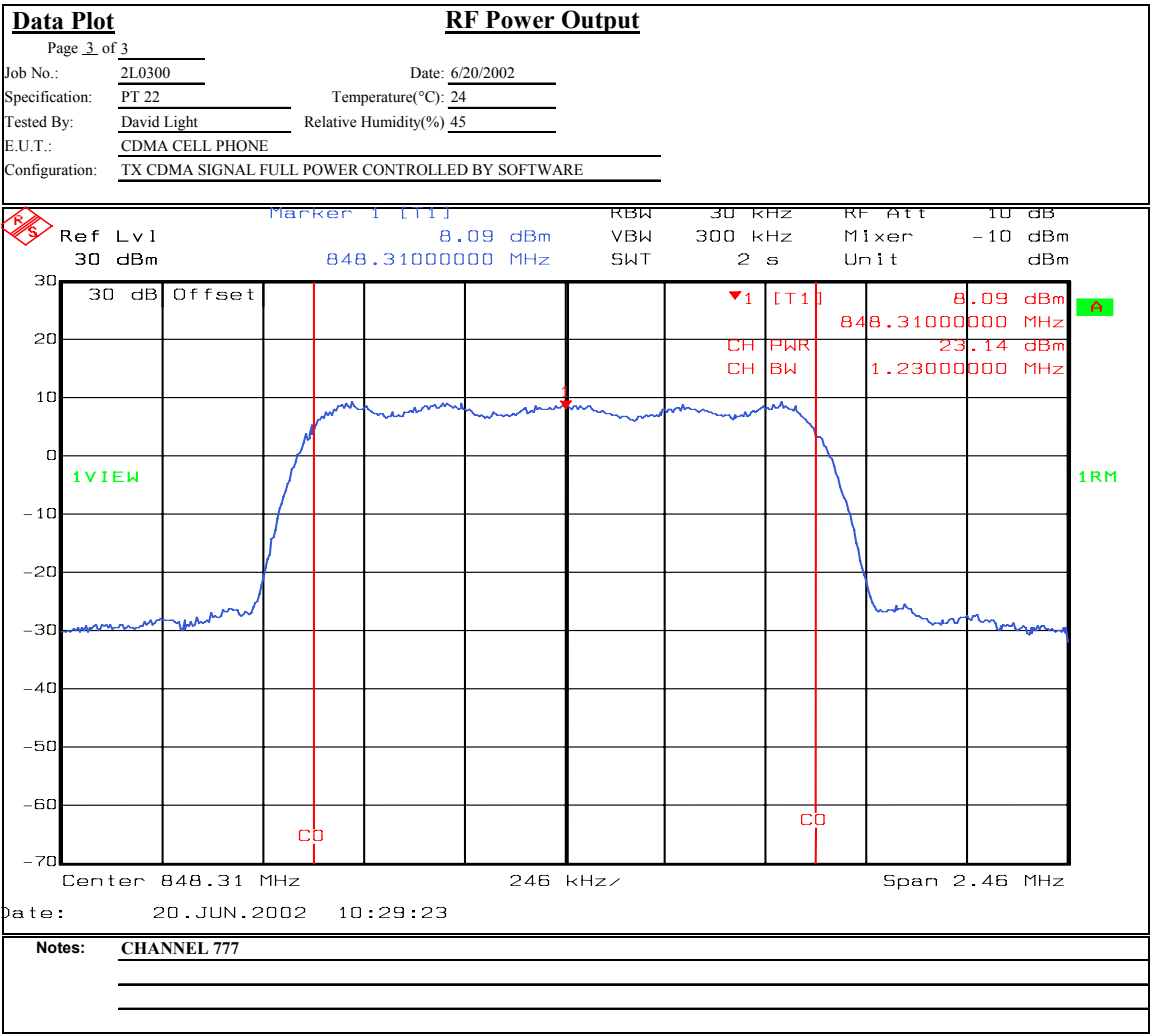
Additional equipment used:

Measurement Uncertainty: +/-1.7 dB



EQUIPMENT: HPN1600

EQUIPMENT: HPN1600



EQUIPMENT: HPN1600**ERP Substitution Method**Page 1 of 1

Job No.: 2L0300

Date: 6/20/2002

Complete X

Preliminary _____

Specification: PT22

Temperature(°C): 22

Tested By: David Light

Relative Humidity(%) 50

E.U.T.: 800 MHz CDMA PHONE

Configuration: TX FULL POWER AT CENTER CHANNEL (384)

Sample No: 1

Location: AC 3

RBW: 1 MHz

Measurement

Detector Type: Peak

VBW: 1 MHz

Distance: 3 m

Test Equipment Used

Antenna: 1304

Directional Coupler: _____

Pre-Amp: _____

Cable #1: 1484

Filter: _____

Cable #2: 1485

Receiver: 1464

Cable #3: _____

Attenuator #1: _____

Cable #4: _____

Attenuator #2: _____

Mixer: _____

Additional equipment used: 993, 1053

Measurement Uncertainty: +/-1.7 dB

Frequency (MHz)	Meter Reading (dBm)	Substitution Level (dBm)		Pre-Amp Gain (dB)	Substitution Antenna Gain (dBd)		ERP (dBm)	ERP (mW)	Polarity	Comments
										UPRIGHT
836.52	-11.4	20.8		0	4.9		25.6	364.4741	V	Channel power
836.52	-29.7	0.6		0	4.9		5.5	3.5345	H	Channel power
										LYING FLAT
836.52	-31.7	0.5		0	4.9		5.3	3.4015	V	Channel power
836.52	-13.7	16.6		0	4.9		21.5	140.7127	H	Channel power
										ON SIDE
836.52	-21.6	10.6		0	4.9		15.4	34.8070	V	Channel power
836.52	-13.8	16.5		0	4.9		21.4	137.5097	H	Channel power

Notes: Upright confirmed to be worst case emission**Tested with fresh battery. All measurements were made at center channel 384**

Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 2.1047
TESTED BY: David Light	DATE: 6/20/2002

Test Results: Complies.

Measurement Data: See attached graph.

Measurement Uncertainty: +/-1.6 dB

Test Plot – Occupied Bandwidth (CDMA)



Nemko Dallas, Inc.

Dallas Headquarters:

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

Data Plot

Occupied Bandwidth

Page 1 of 1

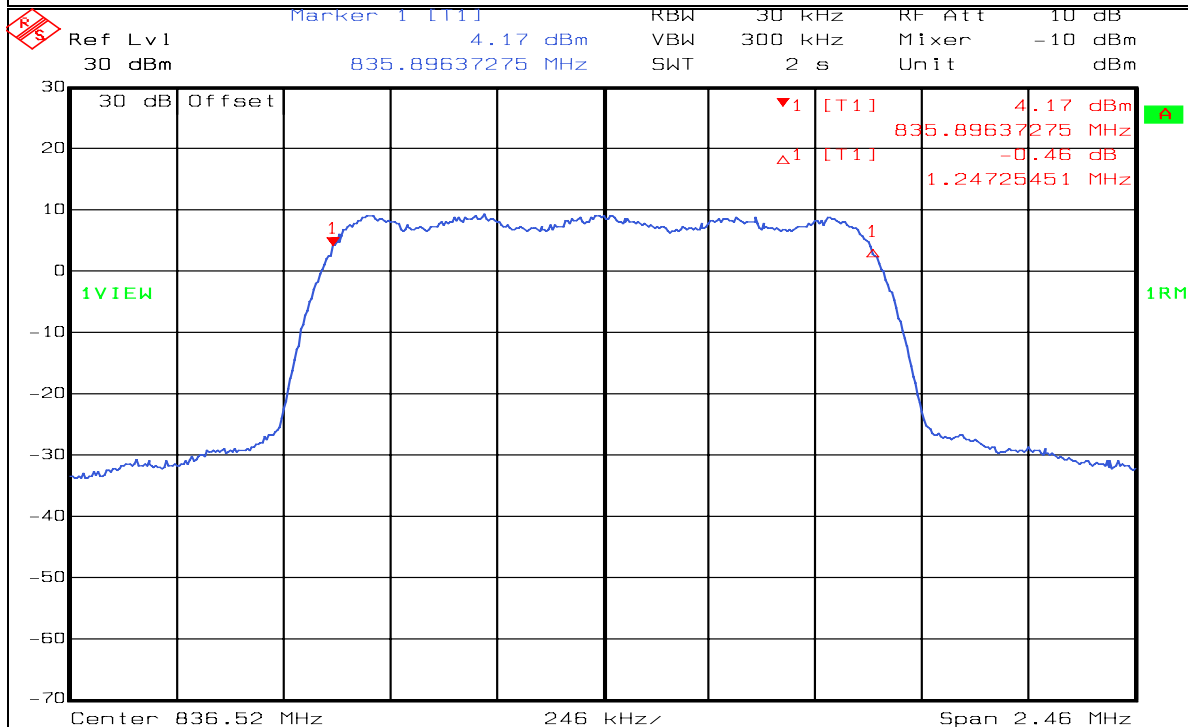
Job No.: 2L0300 Date: 6/20/2002
Specification: PT 22 Temperature(°C): 24
Tested By: David Light Relative Humidity(%): 45
E.U.T.: CDMA CELL PHONE
Configuration: TX CDMA SIGNAL FULL POWER CONTROLLED BY SOFTWARE
Sample Number: 1
Location: Lab 1 RBW: 30 kHz
Detector Type: Rms VBW: 300 kHz

Complete x
Preliminary: _____

Measurement
Distance: NA m

Test Equipment Used

Antenna: _____ Directional Coupler: _____
Pre-Amp: _____ Cable #1: 1629
Filter: _____ Cable #2: _____
Receiver: 1036 Cable #3: _____
Attenuator #1: 1478 Cable #4: _____
Attenuator #2: 1471 Mixer: _____
Additional equipment used: _____
Measurement Uncertainty: +/-1.7 dB



Date: 20 JUN 2002 10:55:10

Notes: Channel 384

Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions At Antenna Terminals	PARA. NO.: 2.1051
TESTED BY: David Light	DATE: 6/20/2002

Test Results: Complies.

Measurement Data: See attached graph.

Measurement Uncertainty: +/-1.6 dB

Test Plot – Spurious Emissions at Antenna Terminals



Nemko Dallas, Inc.

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Tel: (972) 436-9600
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Data Plot

Spurious Emissions at Antenna Terminals

Page 1 of 3

Job No.: 2L0300

Date: 6/20/2002

Complete X

Specification: PT22

Temperature(°C): 24

Preliminary: _____

Tested By: David Light

Relative Humidity(%): 45

E.U.T.: CDMA PHONE

Configuration: TX FULL POWER

Sample Number: 1

Location: Lab 1

RBW: 30 kHz

Measurement

Detector Type: Rms

VBW: 300 kHz

Distance: NA m

Test Equipment Used

Antenna: _____

Directional Coupler: _____

Pre-Amp: _____

Cable #1: 1629

Filter: _____

Cable #2: _____

Receiver: 1036

Cable #3: _____

Attenuator #1: 1478

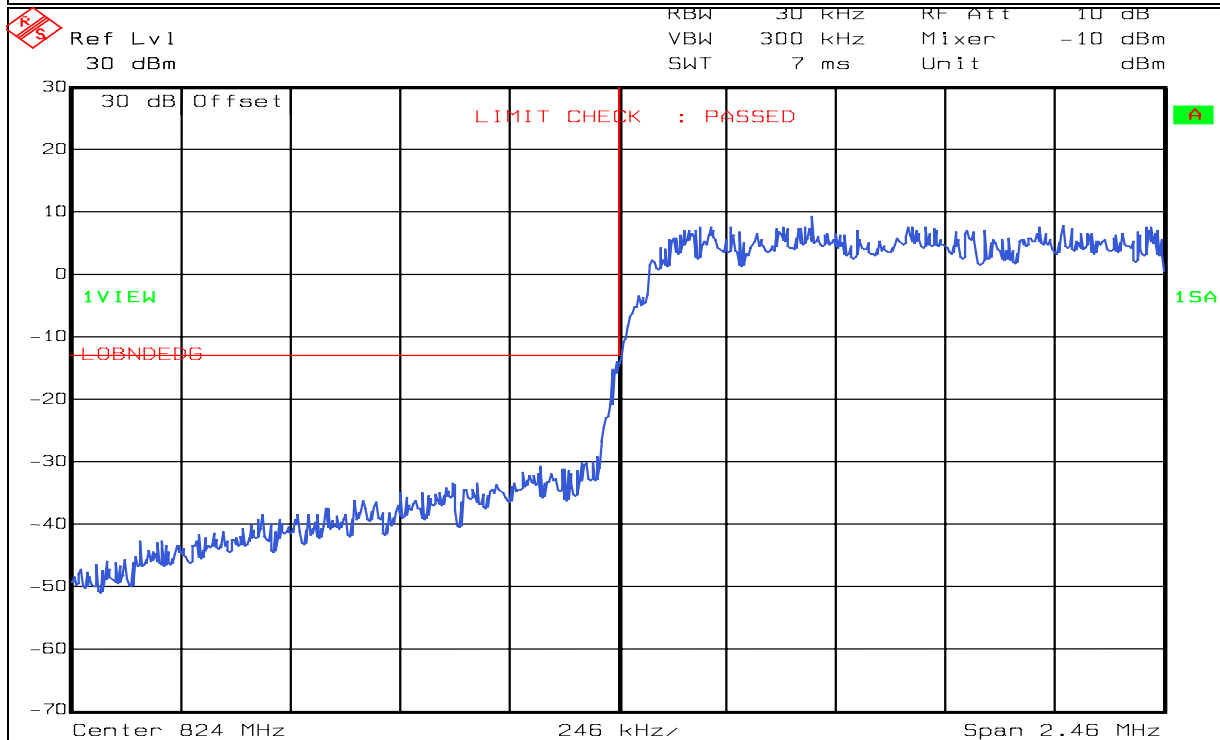
Cable #4: _____

Attenuator #2: 1471

Mixer: _____

Additional equipment used: _____

Measurement Uncertainty: +/-1.7 dB



Date: 20 JUN 2002 10:26:12

Notes:

LOWER BANDEDGE

TRANSMITT FULL POWER AT CHANNEL 1013

Test Plot – Spurious Emissions at Antenna Terminals



Dallas Headquarters:

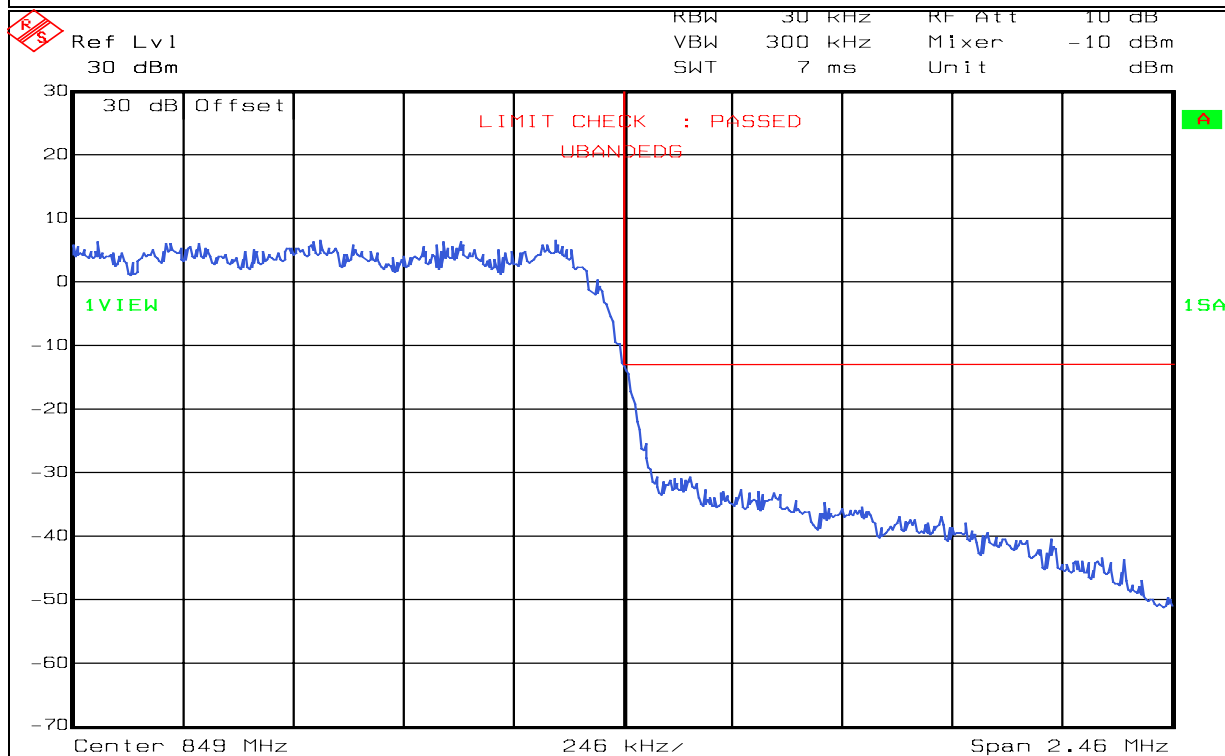
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Nemko Dallas, Inc.

Data Plot**Spurious Emissions at Antenna Terminals**

Page 2 of 3

Job No.: 2L0300 Date: 6/20/2002
Specification: PT22 Temperature(°C): 24
Tested By: David Light Relative Humidity(%): 45
E.U.T.: CDMA PHONE
Configuration: TX FULL POWER



Date: 20.JUN.2002 10:38:54

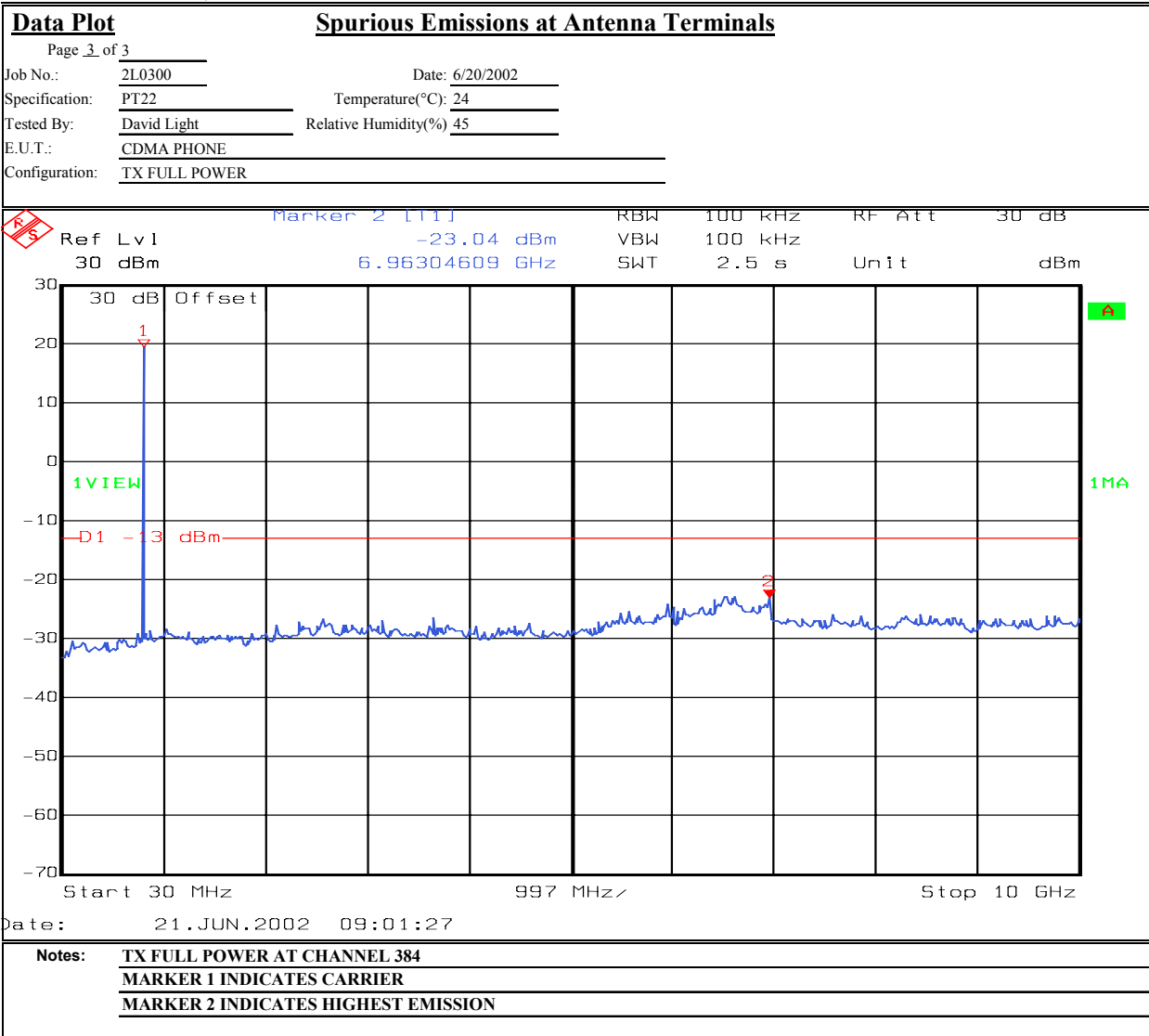
Notes: UPPER BANDEDGE
TRANSMIT FULL POWER AT CHANNEL 777

Test Plot – Spurious Emissions at Antenna Terminals



Nemko Dallas, Inc.

Dallas Headquarters:

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

Section 6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious	PARA. NO.: 2.1053
TESTED BY: David Light	DATE: 6/20/2002

Test Results: Complies.

Measurement Data: See attached table.

Measurement Uncertainty: +/-3.6 dB

Note – This unit was tested on three axis. Upright was deemed to be worst case

Photographs of Test Setup

FRONT VIEW



REAR VIEW



Section 8. Frequency Stability

NAME OF TEST: Frequency Stability	PARA. NO.: 2.1055
TESTED BY: David Light	DATE: 6/21/2002

Test Results: Complies.

Measurement Data: See attached table.

Standard Test Frequency: 836.52 MHz
Standard Test Voltage: 4.2 Vdc

Device tested with a fresh battery.

Measurement Uncertainty: 1×10^{-7} ppm

EQUIPMENT: HPN1600**Test Data – Frequency Stability****Dallas Headquarters:**

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

Frequency StabilityClient: HOLLEYW.O.# 2L0300EUT: 800 MHz CDMA PhoneS/N: None (prototype)Date: 6/21/2002Tech: LightTest Equipment used: 283

Temperature	Voltage	Frequency Error (Hz)	Rho
20 °C	4.2 Vdc	-25.0	0.978
10 °C	4.2 Vdc	+51.5	0.973
0 °C	4.2 Vdc	-37.1	0.974
-10 °C	4.2 Vdc	-62.9	0.968
-20 °C	4.2 Vdc	-34.8	0.977
-30 °C	4.2 Vdc	-37	0.976
30 °C	4.2 Vdc	-37.2	0.976
40 °C	4.2 Vdc	-30.8	0.976
50 °C	4.2 Vdc	-28.3	0.977
Used Agilent CDMA Mobile Test Set Model E8285A s/n US40332929			
Cal date 12/2/01 Due date 12/2/02			

Note – This unit was tested with a new battery.

Section 9. Test Equipment List

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
1304	HORN ANTENNA	ELECTRO METRICS RGA-60	6151	07/30/01	07/30/03
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	01/02/01	01/03/03
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	12/18/01	12/19/03
1471	10 db Attenuator DC 18 GHz	MCL Inc. BW-S10W2 10db-2WDC	NONE	CBU	N/A
1484	Cable 2.0-18.0 GHz	Storm PR90-010-072	N/A	06/01/02	06/01/03
1485	Cable 2.0-18.0 Ghz	Storm PR90-010-216	N/A	06/01/02	06/01/03
1487	Pre Amp	ICC LN12-18	452	06/06/02	06/06/03
1629	CABLE, 6 ft	MEGAPHASE 10311 1GVT4	N/A	CBU	N/A
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	05/30/02	05/30/03
1481	Microwave Highpass Filter	K & L 3DH1-2000/T8000-0/0	4	Cal B4 Use	N/A
283	Environmental Chamber with controller # 1189006	ENVIROTRONICS SH27 & 2030-22844	129010083	01/10/02	01/10/03
993	Horn antenna	A.H. Systems SAS-200/571	XXX	01/08/02	01/09/04
1053	SIGNAL GENERATOR	ROHDE & SCHWARZ SMIQ 03	DE22081	08/09/01	08/09/02
Holley	CDMA Mobile Test Set	Agilent E8285A	4540332929	12/02/01	12/02/02

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:

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 (CDMA)

PARA. NO.: 2.1049

Minimum Standard: There is no specific requirement within the FCC regulations.

Method Of Measurement:

Spectrum Analyzer Settings:

RBW: 30 kHz

VBW: $\geq$ RBW

Span: 5 MHz

Sweep: Auto

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.

VBW: $\geq$ 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.

Test Method:

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. 22.355. The transmitter carrier frequency shall remain within the tolerances given in Table C-1.

Freq. Range (MHz)	Mobile > 3 W	Mobile $\leq$ 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.

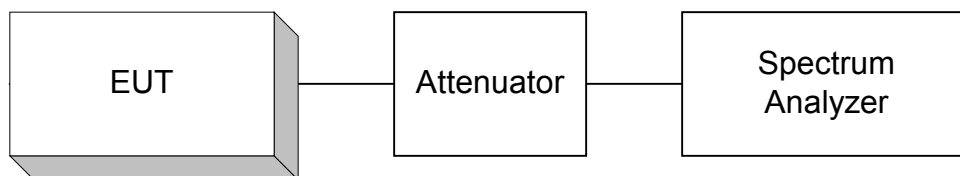
Frequency Stability With Temperature Variation:

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.

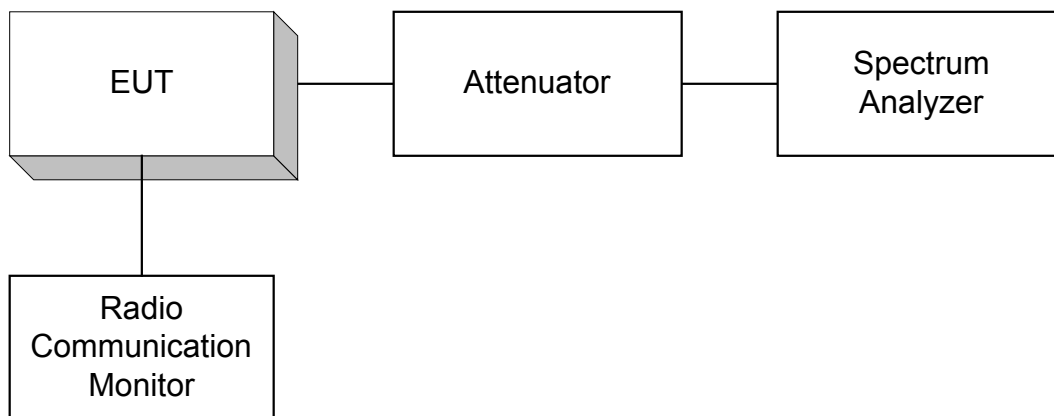
For CDMA radio systems, the frequency stability is measured in a closed-loop system with the phone communicating with a CDMA test set. Modulation quality (rho) and frequency error are measured and reported.

ANNEX B - TEST DIAGRAMS

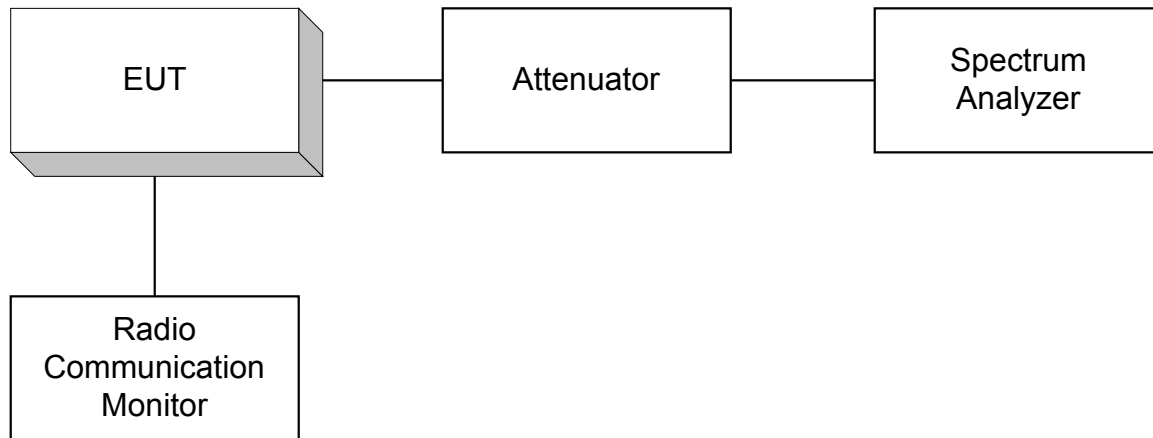
Para. No. 2.1046 - R.F. Power Output



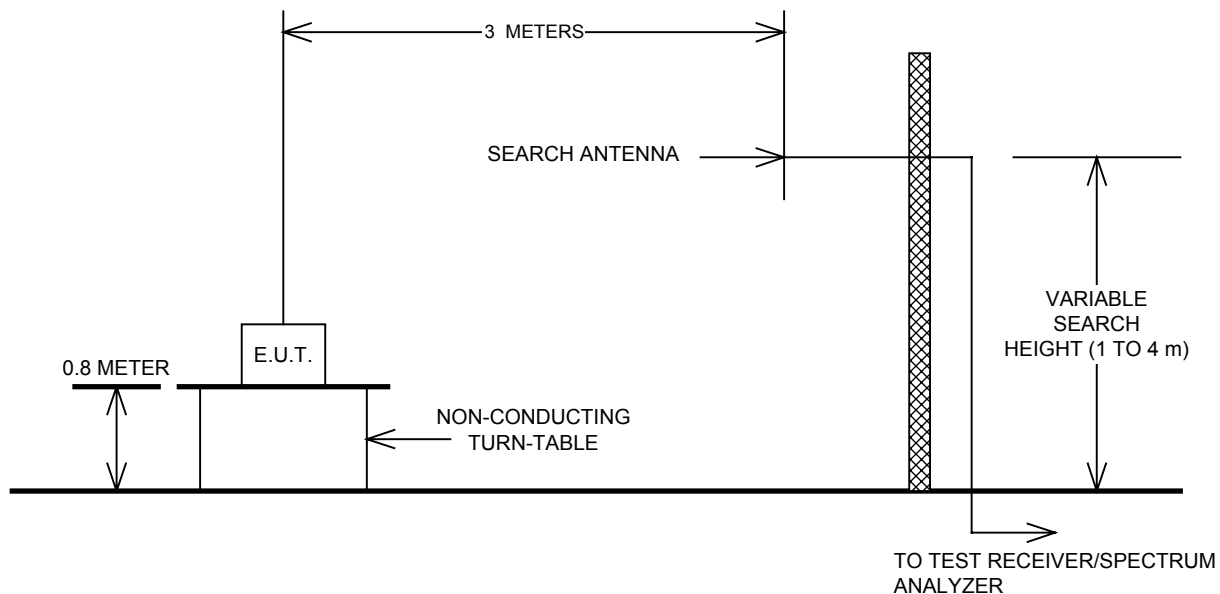
Para. No. 2.1049 - Occupied Bandwidth



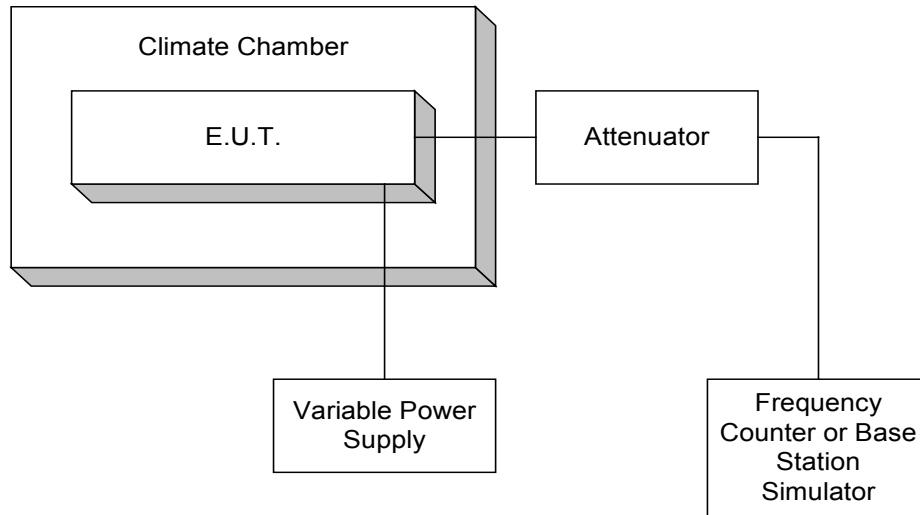
The Radio Communication Monitor is used only to provide modulation input for external modulation.

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

