Nemko Test Report:	4L0362RUS2
Applicant:	Andrew Corporation 2601 Telecom Parkway Richardson, Texas 75082
Equipment Under Test: (E.U.T.)	E/O Transceiver Amp 400
In Accordance With:	**FCC Part 90, Subpart I** Transmitter
Tested By:	Nemko Dallas Inc. 802 N. Kealy Lewisville, TX 75057-3136
Authorized By:	 Tom Tidwell, Frontline Group Manager
Date:	16_Dec_2004

Table of Contents

Section 1. Summary of Test Results

Manufacturer: Andrew Corporation

Model No.: E/O Transceiver Amp 400

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 90, Subpart I.

☒ 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

Summary Of Test Data

NAME OF TEST	PARA. NO.	SPEC.	MEAS.	RESULT
RF Power Output	90.205			Complies
Audio Frequency Response	TIA EIA-603.3.2.6	N/A	N/A	N/A
Audio Low-Pass Filter Response	TIA EIA-603.3.2.6	N/A	N/A	N/A
Modulation Limiting	TIA EIA-603.3.2.6	N/A	N/A	N/A
Occupied Bandwidth	90.210	Plots	Plots	Complies
Spurious Emissions at Antenna Terminals	90.210	Plots	Plots	Complies
Field Strength of Spurious Emissions	90.210			Complies
Frequency Stability	90.213			Complies
Transient Frequency Behavior	90.214	N/A	N/A	N/A

Footnotes For N/A's:

(1) Since the E.U.T. does not contain modulation circuitry modulation testing was not performed.
(2) Since the E.U.T. is not a keyed carrier system, Transient Frequency Behavior was not performed.

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Section 2. General Equipment Specification

Transmitter

Supply Voltage Input: 120 Vac

Frequency Range: 483.1625 – 483.2375 MHz

Tunable Bands: 483.1625 – 483.2375 MHz

Type(s) of Modulation:

F3E (FM)	F1D	F2D	D7W (QAM)	Other (G9D)
☒	☐	☐	☐	☐

Emission Designator: 14K4F3E

Gain: 48 dB

Output Impedance: 50 Ohms

RF Power Output (rated):

Single: 30 dBm (1 Watt)

Composite:
2 Carriers 24 dBm (250 mW) – 21 dBm per carrier

Channel Spacing(s): 12.5 kHz

Frequency Translation:

F1-F1	F1-F2	N/A
☒	☐	☐

Band Selection:

Software	Duplexer Change	Fullband Coverage
☐	☐	☒

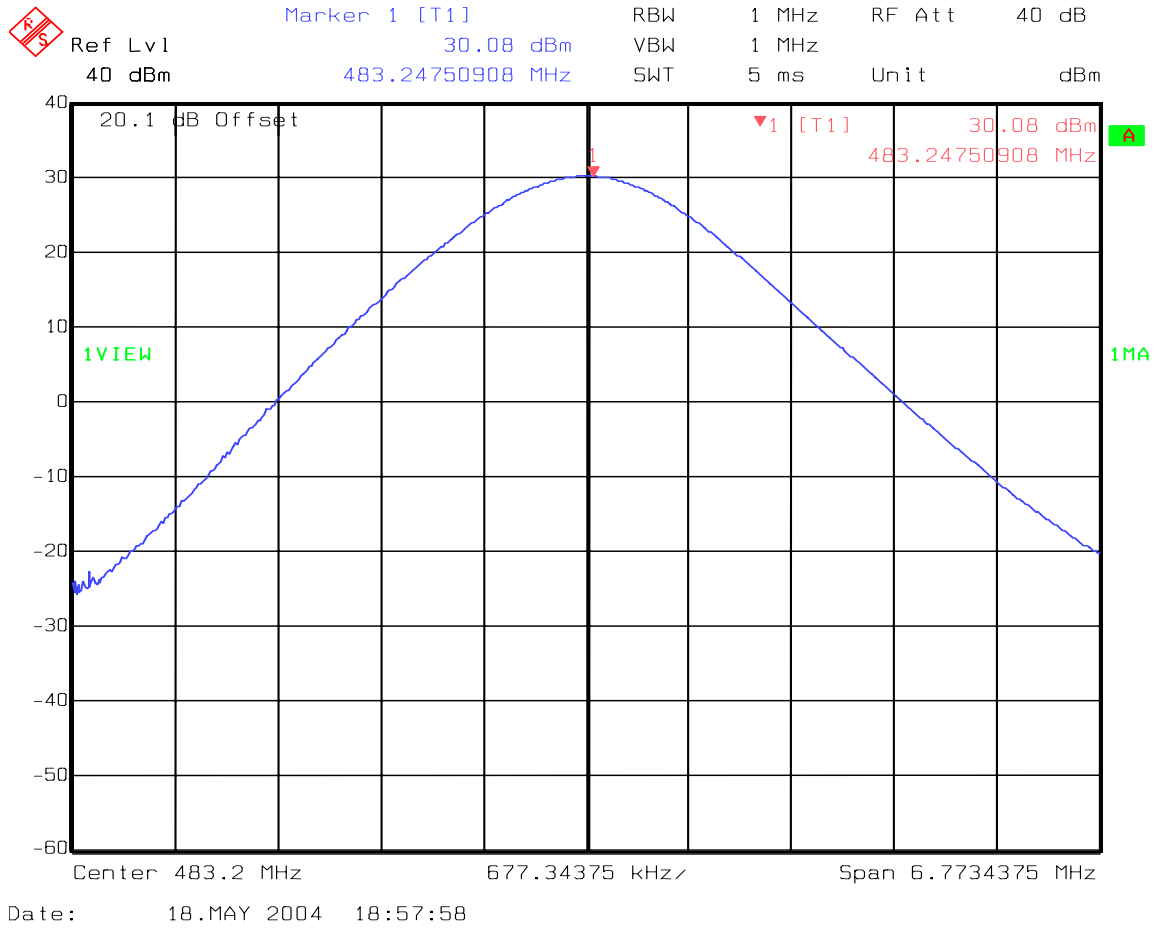
Description of EUT: Fiber based amplifier

Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 2.985
TESTED BY: David Light	DATE: 5/18/04

Test Results: Complies.

Measurement Data:



Test Equipment Used: 1036-1604-1629-1627

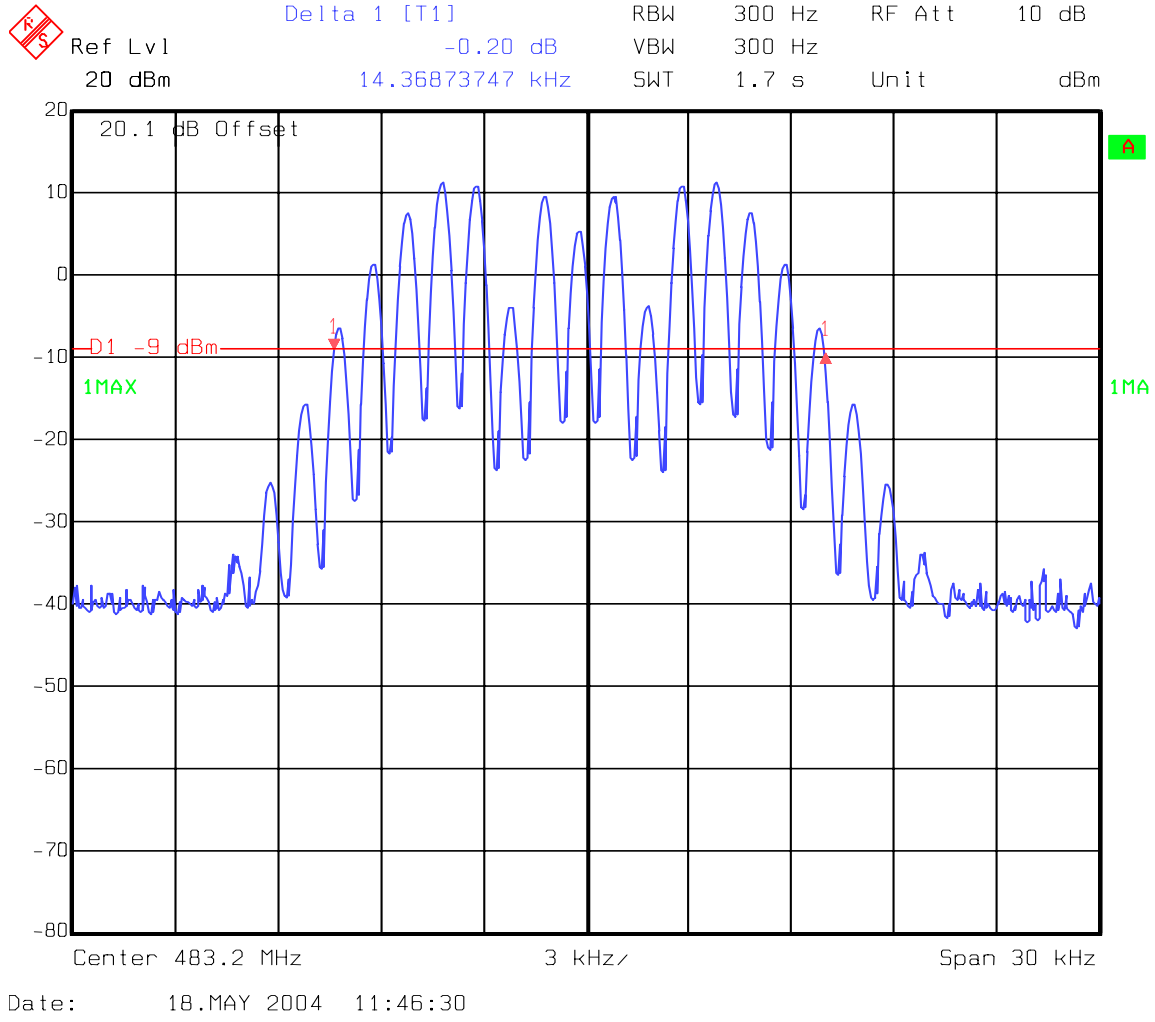
Test Conditions: 22^{O}C / 40% RH

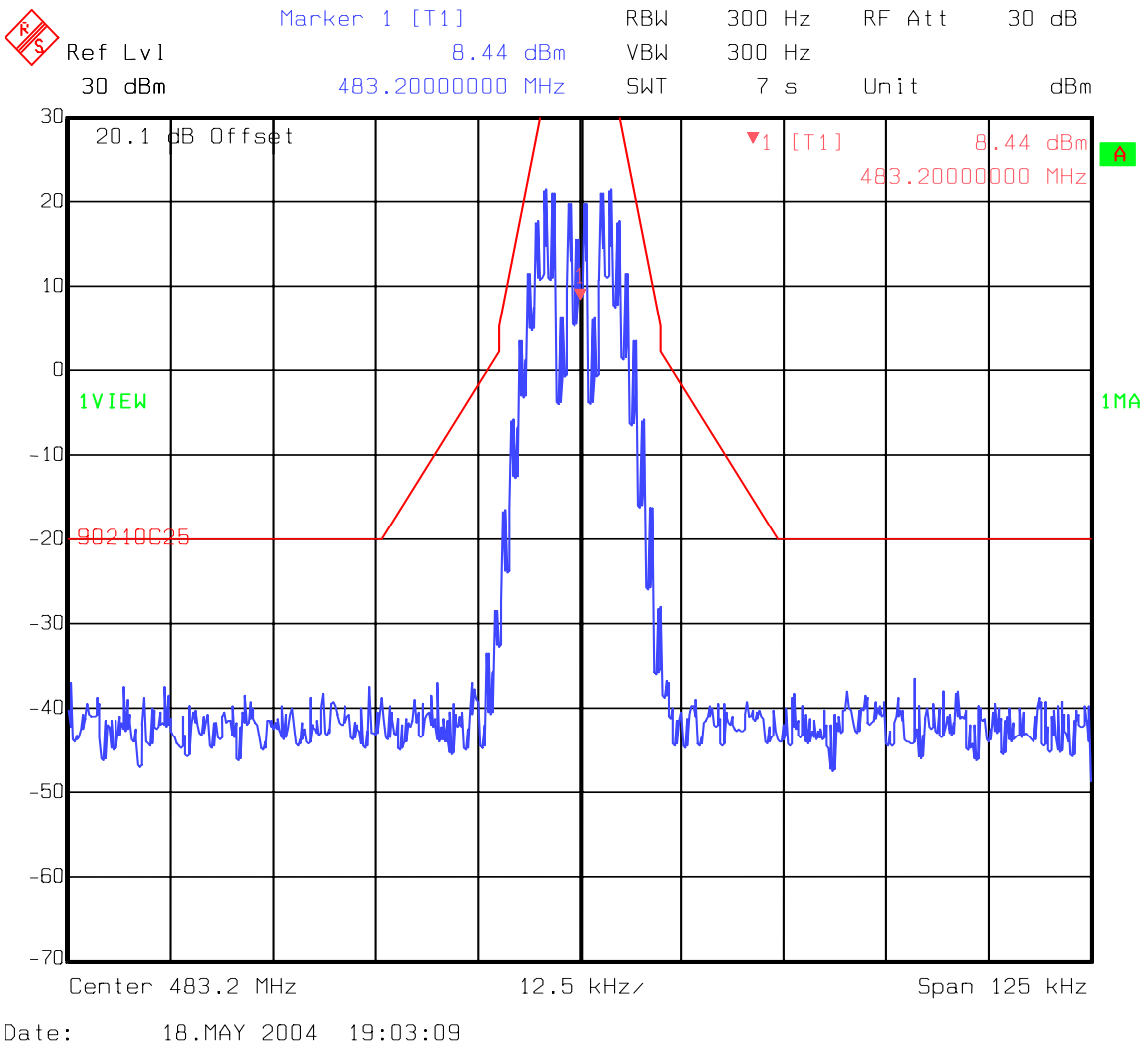
Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 2.989
TESTED BY: David Light	DATE: 5/18/04

Test Results: Complies.

Test Data:





RF Input Level: -19 dBm

Test Equipment Used: 1036-1604-1629-1627

Test Conditions: 22^{O}C / 40% RH

Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 2.991
TESTED BY: David Light	DATE:5/18/14

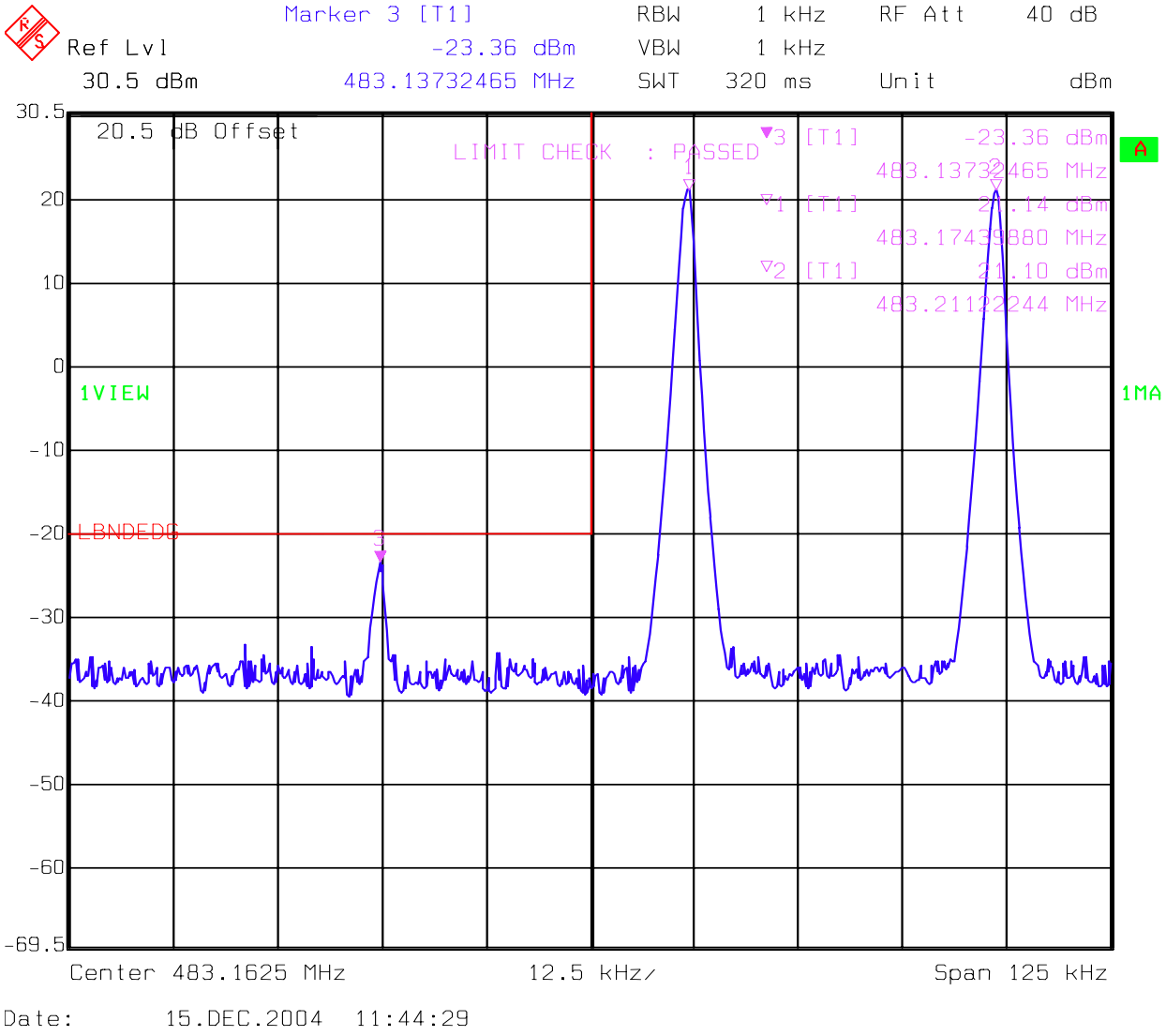
Test Results: Complies.

Test Data: See attached graph(s).

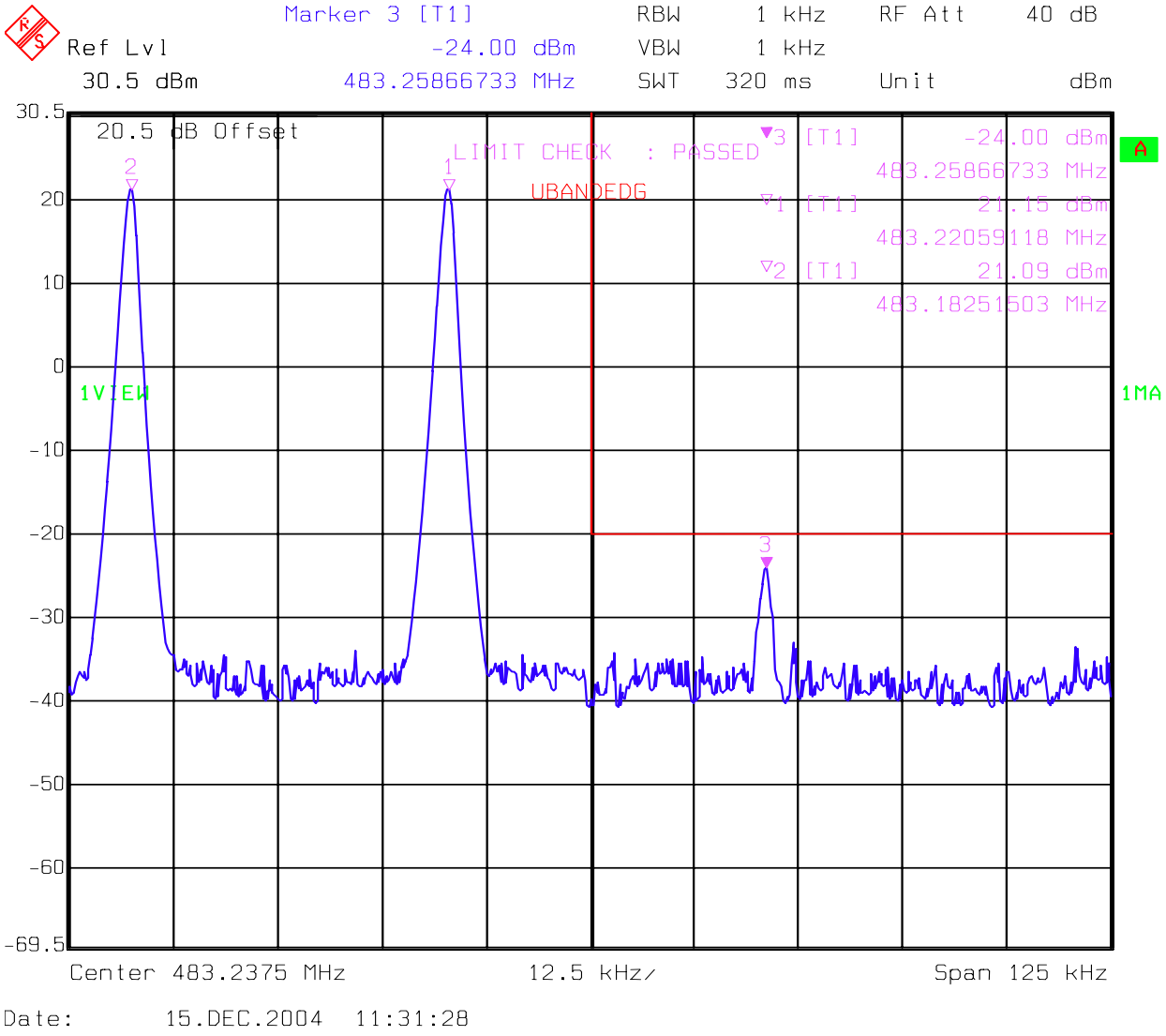
Test Equipment Used: 1036-1604-1629-1627

Test Conditions: 22^{O}C / 40% RH

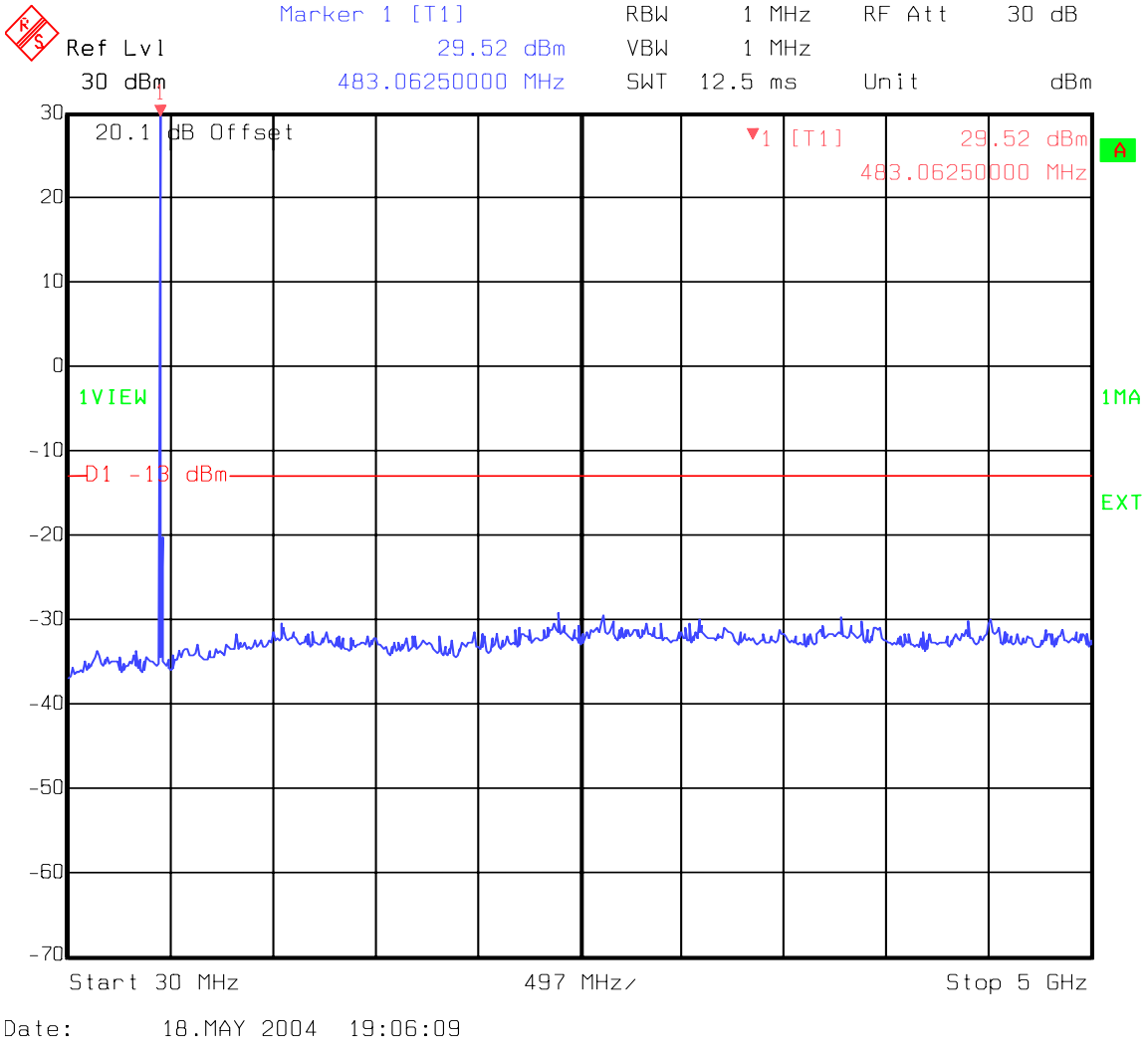
Test Data – Spurious Emissions at Antenna Terminals



Test Data – Spurious Emissions at Antenna Terminals



Test Data – Spurious Emissions at Antenna Terminals



Section 6. Field Strength of Spurious Emissions

NAME OF TEST: Field Strength of Spurious Emissions	PARA. NO.: 2.993
TESTED BY: David Light	DATE: 5/18/04

Test Results: Complies.

Test Data: See attached table.

Note: See page A5 for applicable limit.

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.: 4L0362 — Date: 5/18/04

Specification: PT90 — Temperature(°C): 22

Tested By: David Light — Relative Humidity(%) 45

E.U.T.: 400 MHz Amp

Configuration: TX FULL POWER INTO LOAD

Sample No: 1

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

Detector Type: Peak — VBW: 1 MHz

Test Equipment Used

Antenna: 1304 — Directional Coupler:

Pre-Amp: — Cable #1: 1484

Filter: — Cable #2: 1485

Receiver: 1464 — Cable #3:

Attenuator #1 — Cable #4:

Attenuator #2: — Mixer:

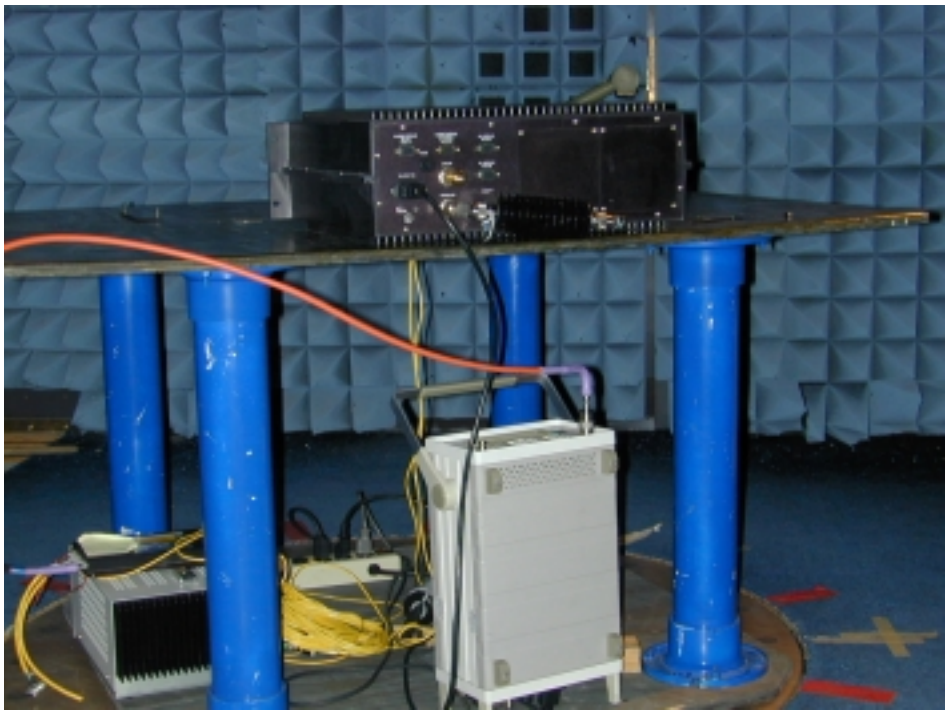
Additional equipment used:

Measurement Uncertainty: +/-1.7 dB

Frequency (MHz)	Meter Reading (dBm)	Correction Factor (dB)		Pre-Amp Gain (dB)	Substitution Antenna Gain (dBd)	Limit (dBm)	ERP (dBm)	ERP (mW)	Polarity	Comments
										Tx @ 483.2 MHz
966.4	-77.1	29.8		0	3.7	-13	-43.6	0.0000	V	Noise floor
1449.6	-77.7	31.5		0	4.8	-13	-41.5	0.0001	V	Noise floor
1932.8	-72.3	29.9		0	6.4	-13	-36.1	0.0002	V	Noise floor
2416	-75.0	34.1		0	6.9	-13	-34.1	0.0004	V	Noise floor
2899.2	-73.6	35.6		0	8.0	-13	-30.1	0.0010	V	Noise floor
3382.4	-77.3	37.1		0	8.1	-13	-32.1	0.0006	V	Noise floor
3865.6	-77.0	40.4		0	8.0	-13	-28.6	0.0014	V	Noise floor
4348.8	-78.0	42.8		0	7.9	-13	-27.3	0.0019	V	Noise floor
4832	-78.0	41.2		0	9.2	-13	-27.7	0.0017	V	Noise floor
966.4	-77.1	30.4		0	3.7	-13	-43.0	0.0001	H	Noise floor
1449.6	-77.7	31.1		0	4.8	-13	-41.9	0.0001	H	Noise floor
1932.8	-72.3	32.7		0	6.4	-13	-33.3	0.0005	H	Noise floor
2416	-75.0	36.7		0	6.9	-13	-31.5	0.0007	H	Noise floor
2899.2	-73.6	34.6		0	8.0	-13	-31.0	0.0008	H	Noise floor
3382.4	-77.3	35.8		0	8.1	-13	-33.4	0.0005	H	Noise floor
3865.6	-77.0	34.3		0	8.0	-13	-34.7	0.0003	H	Noise floor
4348.8	-78.0	35.2		0	7.9	-13	-34.9	0.0003	H	Noise floor
4832	-78.0	35.5		0	9.2	-13	-33.3	0.0005	H	Noise floor

Notes: **No emissions were detected above the noise floor**
Searched spectrum to the 10th harmonic of carrier

Photographs of Test Setup



Section 7. Frequency Stability

NAME OF TEST: Frequency Stability	PARA. NO.: 2.995
TESTED BY: David Light	DATE: 5/19/04

Test Results: Complies.

Measurement Data: See attached tables.

Test Data – Frequency Stability

Nemko Dallas, Inc.

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

Frequency Stability

Page 1 of 1

Job No.: 4L0362 Date: 5/19/2004
Specification: Pt90 Temperature(°C): 24
Tested By: David Light Relative Humidity(%) 45
E.U.T.: 400 MHz Amp
Configuration: Tx CW signal
Sample Number: 1

Test Equipment Used

Antenna: Directional Coupler:
Pre-Amp: Cable #1: 1629
Filter: Cable #2:
Receiver: 1026
Attenuator #1 1478
Attenuator #2:

Measurement Uncertainty: $1x10^{-17}$ppm **Standard Test Frequency 483.200000 MHz**

Temp (°C)	Measured Frequency (MHz)	Rho	Test Voltage	Freqeuncy Error (Hz)	Limit (+/-Hz)	Error (ppm)	Comment
20	483.200000		120	0	1208.0	0.0	
20	483.200000		138	0	1208.0	0.0	
20	483.200000		102	0	1208.0	0.0	
50	483.200000		120	0	1208.0	0.0	
40	483.200000		120	0	1208.0	0.0	
30	483.200000		120	0	1208.0	0.0	
10	483.200000		120	0	1208.0	0.0	
0	483.200000		120	0	1208.0	0.0	
-10	483.200000		120	0	1208.0	0.0	
-20	483.200000		120	0	1208.0	0.0	
-30	483.200000		120	0	1208.0	0.0	
Notes:							

Section 8. Test Equipment List

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	03/29/04	03/29/06
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	02/11/03	02/11/05
1484	Cable 2.0-18.0 Ghz	Storm PR90-010-072	N/A	07/24/03	07/23/04
1485	Cable 2.0-18.0 Ghz	Storm PR90-010-216	N/A	07/24/03	07/23/04
1304	HORN ANTENNA	ELECTRO METRICS RGA-60	6151	09/22/03	09/22/05
1629	CABLE, 6 ft	MEGAPHASE 10311 1GVT4	N/A	CBU	N/A
283	Environmental Chamber with controller # 1189006	ENVIROTRONICS SH27 & 2030-22844	129010083	05/06/04	05/06/05
1478	20db Attenuator DC 18 Ghz	MCL Inc. BW-S20W6	NONE	CBU	N/A
1604	ATTENUATOR	NARDA 776B-20	NONE	N/A	N/A
1627	CABLE, 5 ft	MEGAPHASE 10312 1GVT4	N/A	07/29/03	07/28/04

ANNEX A - TEST METHODOLOGIES

NAME OF TEST: RF Power Output	**PARA. NO.: 2.985**

Minimum Standard: Para. No. 90.205(a). The maximum allowable station ERP is dependent upon the stations HAAT and required service area and will be authorized in accordance with Table 1 of 90.205(d).

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.

Integral Antenna:
If the antenna is not detachable from the circuit then the Peak Power Output is derived from the peak 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 isotropic 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 an isotropic radiator

NAME OF TEST: Spurious Emissions at Antenna Terminals PARA. NO.: 2.991

Test Method:

RBW: 1% of emission bandwidth in the 0 - 1 GHz range.
1 MHz at frequencies above 1 GHz.

VBW: $\Rightarrow$ RBW

The spectrum is searched up to 10 times the fundamental frequency.

NAME OF TEST: Occupied Bandwidth **PARA. NO.: 2.989**

Minimum Standard: Para. No. 90.210, see table 1 below for applicable mask.

Table 1

Frequency Band (MHz)	Mask for equipment with Low Pass Filter	Mask for equipment without Low Pass Filter
Below 25	A or B	A or C
25 - 50	B	C
72 - 76	B	C
150 - 174	B, D or E	C, D or E
150 Paging only	B	C
220 - 222	F	F
421 - 512	B, D or E	C, D or E
450 paging only	B	H
806 - 821/ 851 - 866	B	G
821 - 824/ 866 - 869	B	H
896 - 901/ 935 - 940	I	J
902 - 928	K	K
929 - 930	B	G
Above 940	B	C
All other bands	B	C

NAME OF TEST: Field Strength of Spurious **PARA. NO.: 2.993**

Minimum Standard: Para. No. 90.210, see table 1 for applicable mask.

Test Method: The reference antenna substitution method described in EIA/TIA 603-B was used. The transmitter under test was placed on a turntable. The receive antenna was located at a distance of 3 meters from the transmitter under test. The turntable was rotated 360 degrees until the maximum received level was noted. The transmitter under test was then replaced with a calibrated substitution with known gain. A signal generator was used to feed the substitution antenna and the signal generator output level was adjusted until the maximum level noted above was reached. The erp is the signal fed to the input of the substitution antenna plus any gain the antenna may have with reference to a dipole.

NAME OF TEST: Frequency Stability **PARA. NO.: 2.995**

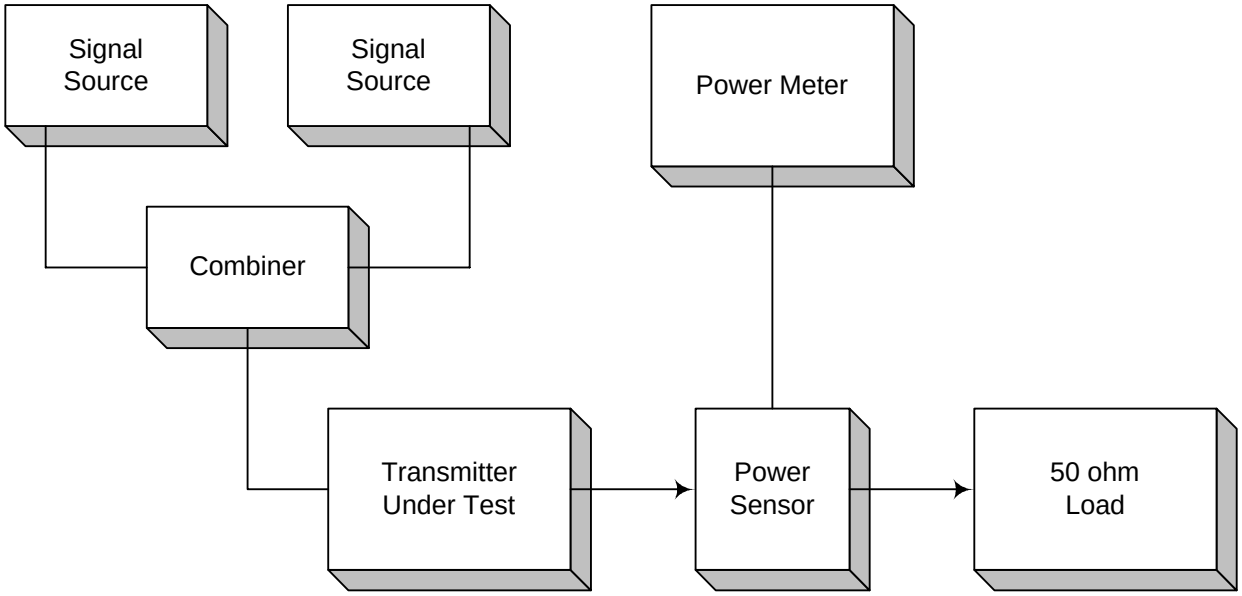
Minimum Standard: Para. No. 990.213. The transmitter carrier frequency shall remain within the assigned frequency below in ppm.

Table 2

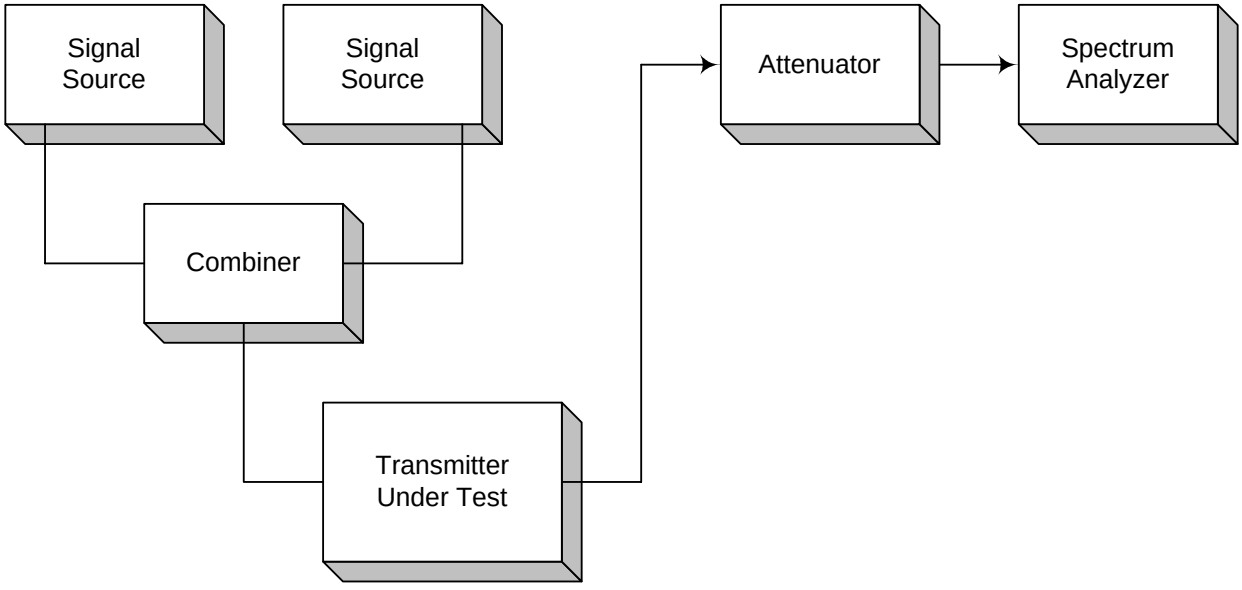
Frequency Band (MHz)	Fixed And Base Stations	Mobile Stations	
		> 2 Watts o/p pwr	< 2 Watts o/p pwr
Below 25	100	100	200
25 - 50	20	20	50
72 - 76	5	-	50
150 - 174	5	5	5
220 - 222	0.1	1.5	1.5
421 - 512	2.5	5	5
806 - 821	1.5	2.5	2.5
821 - 824	1.0	1.5	15
851 - 866	1.5	2.5	2.5
866 - 869	1.0	1.5	1.5
869 - 901	0.1	1.5	1.5
902 - 928	2.5	2.5	2.5
929 - 930	1.5	-	-
935 - 940	0.1	1.5	1.5
1427 - 1435	300	300	300
Above 2450	-	-	-

ANNEX B - TEST DIAGRAMS

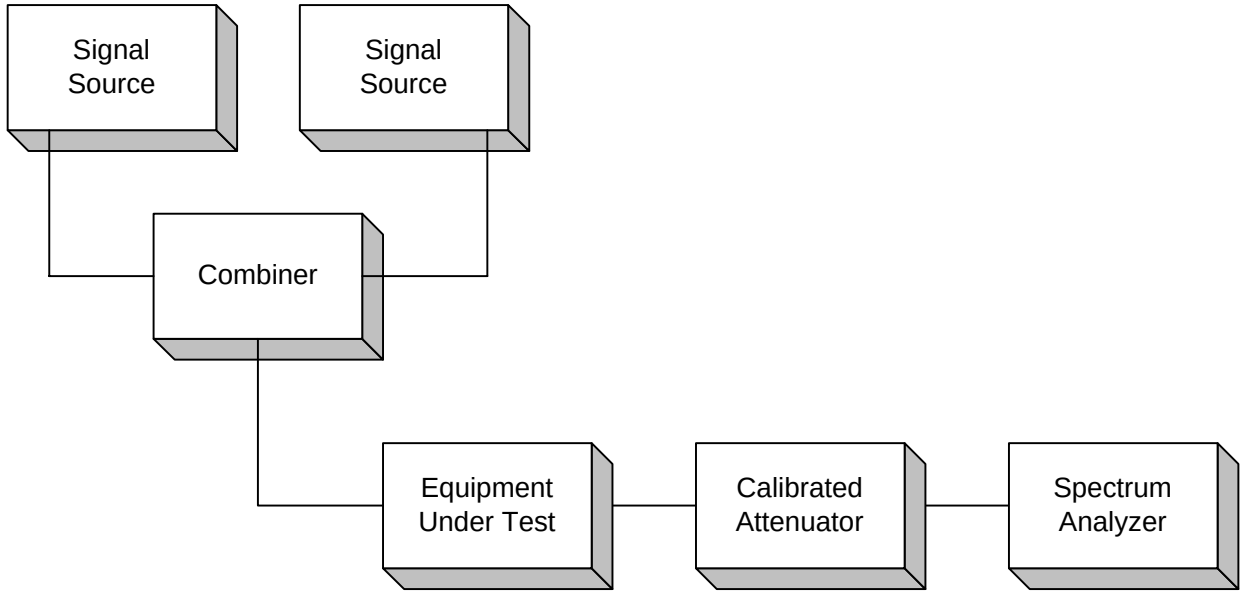
Para. No. 2.985 - R.F. Power Output



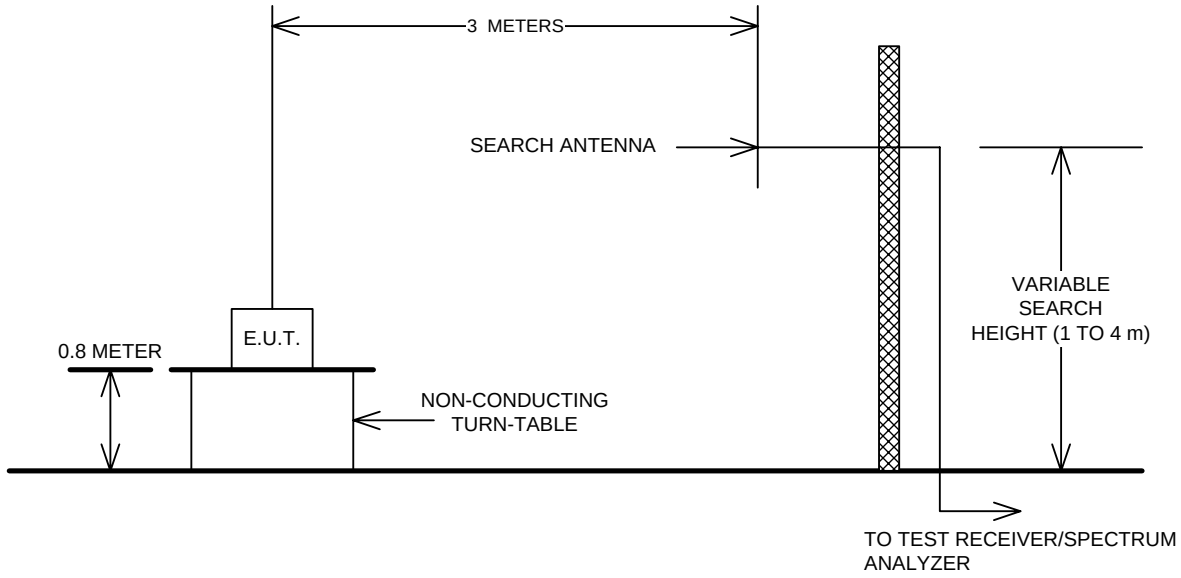
Para. No. 2.989 - Occupied Bandwidth



Para. No. 2.991 - Spurious Emissions at Antenna Terminals



Para. No. 2.993 - Field Strength of Spurious Radiation



Para. No. 2.995 - Frequency Stability