

KTL Test Report: 0R02665.2

Applicant: Daniels Electronics Ltd.
43 Erie Street
Victoria, BC
V8V 1P8

**Equipment Under Test:
(E.U.T.)** UHF Transmitter

FCC ID: H4JUT-4-400

In Accordance With: **FCC Part 22**
FCC Part 90

Tested By: KTL Ottawa Inc.
3325 River Road, R.R. 5
Ottawa, Ontario K1V 1H2

Authorized By:

K. Carr, Technologist

Date:

Total Number of Pages: 57

EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400

Table of Contents

Section 1.	Summary of Test Results.....	3
Section 2.	General Equipment Specification	5
Section 3.	RF Power Output	6
Section 4.	Audio Frequency Response	7
Section 5.	Audio Low-Pass Filter Response.....	9
Section 6.	Modulation Limiting.....	11
Section 7.	Occupied Bandwidth.....	14
Section 8.	Spurious Emissions at Antenna Terminals.....	27
Section 9.	Field Strength of Spurious Emissions	43
Section 10.	Frequency Stability	46
Section 11.	Transient Frequency Behaviour	47
Section 12.	Test Equipment List	52
Annex A	Test Diagrams	A1

EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400

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 22, Subpart H and FCC Part 90, Subpart I.

New Submission

Production Unit

Class II Permissive Change

Pre-Production Unit

T	N	B
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Equipment Code

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: 100351-0

TESTED BY: _____ DATE: _____
Russell Grant, Wireless Group Manager

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This report applies only to the items tested.

EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400

Summary Of Test Data

Name Of Test	Para. No.	Result
RF Power Output	2.1046	Complies
Audio Frequency Response	2.1047	Noted
Audio Low-Pass Filter Response	2.1047	Noted
Modulation Limiting	2.1047	Noted
Occupied Bandwidth	2.1049	Complies
Spurious Emissions at Antenna Terminals	2.1051	Complies
Field Strength of Spurious Emissions	2.1053	Complies
Frequency Stability	2.1055	Complies
Transient Frequency Behavior	—	Complies

Footnotes For N/A's:

Indoor Temperature: 22 °C
 Humidity: 50 %

Outdoor Temperature: 26 °C
 Humidity: 65 %

EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400

Section 2. General Equipment Specification

Manufacturer: Daniels Electronics Ltd.

Model No.: P25

Serial No.: None

Date Received In Laboratory: July 17, 2000

KTL Identification No.: Item #6

Tx 406-430 MHz, 450 – 470 MHz 2 Bands

Power: 13.8 VDC

RF Output Power: 2 to 8 W Continuously Variable

Emission Designator: 16K0F3E
11K0F3E
8K10F1E

The P25 transmitter can be configured as either a base or repeater. Both configurations use identical RF and baseband voice/digital processing circuits. In the repeater mode the equipment receives demodulated data from the associated receiver. All tests were conducted in the base configuration.

EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400

Section 3. RF Power Output

Para. No.: 2.1046

Test Performed By: Russell Grant	Date of Test: July 8, 2000
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Minimum Standard: ± 1 dB

Test Results: Complies. The RF power output is within 1 dB of the manufacturer's rating.

Measurement Data:

Measured	Rated
2.0W	2.0W
8.0W	8.0W

EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400

Section 4. Audio Frequency Response

Para. No.: 2.1047

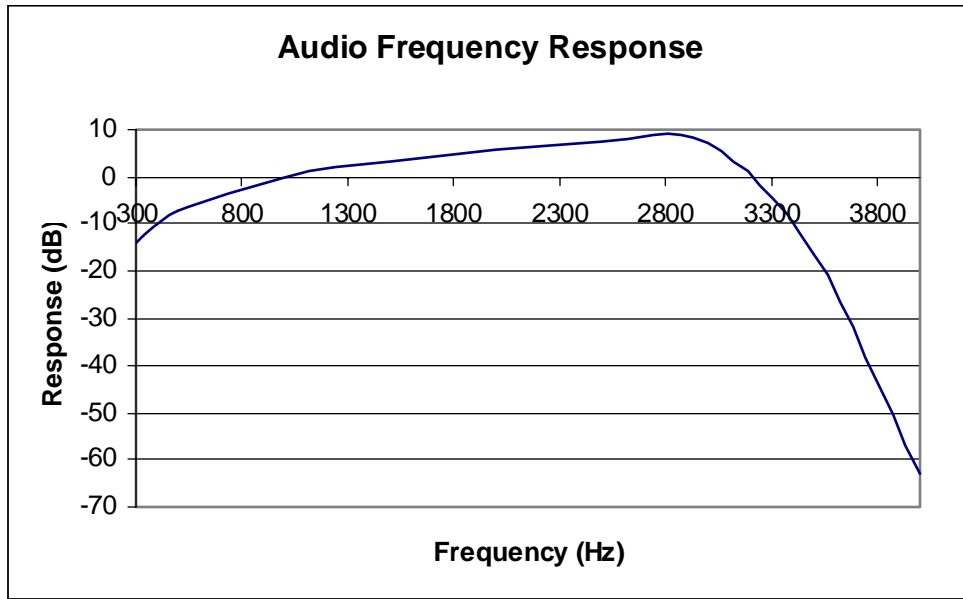
Test Performed By: Russell Grant	Date of Test: July 18, 2000
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Minimum Standard: Not applicable.

Test Results: Complies. The equipment exhibits a 6dB per-emphasis audio frequency characteristic.

Measurement Data: See attached graph.

EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400



EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400

Section 5. Audio Low-Pass Filter Response

Para. No.: 2.1047

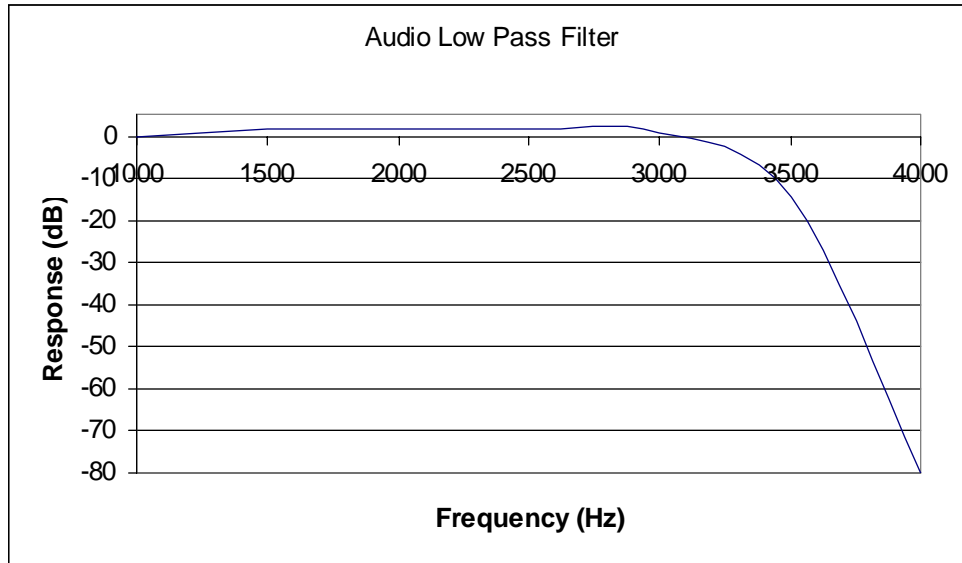
Test Performed By: Russell Grant	Date of Test: July 18, 2000
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Minimum Standard: Not applicable.

Test Results: Complies. The equipment has provision for audio low pass filter.

Measurement Data: See attached graph.

EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400



EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400

Section 6. Modulation Limiting

Para. No.: 2.1047

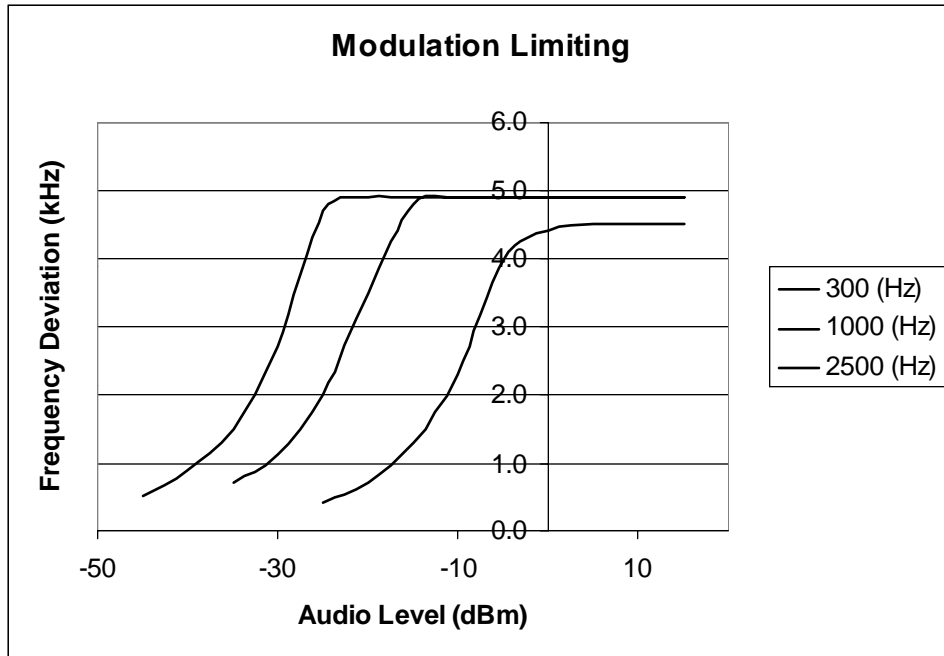
Test Performed By: Russell Grant	Date of Test: July 18, 2000
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Minimum Standard: Not Applicable

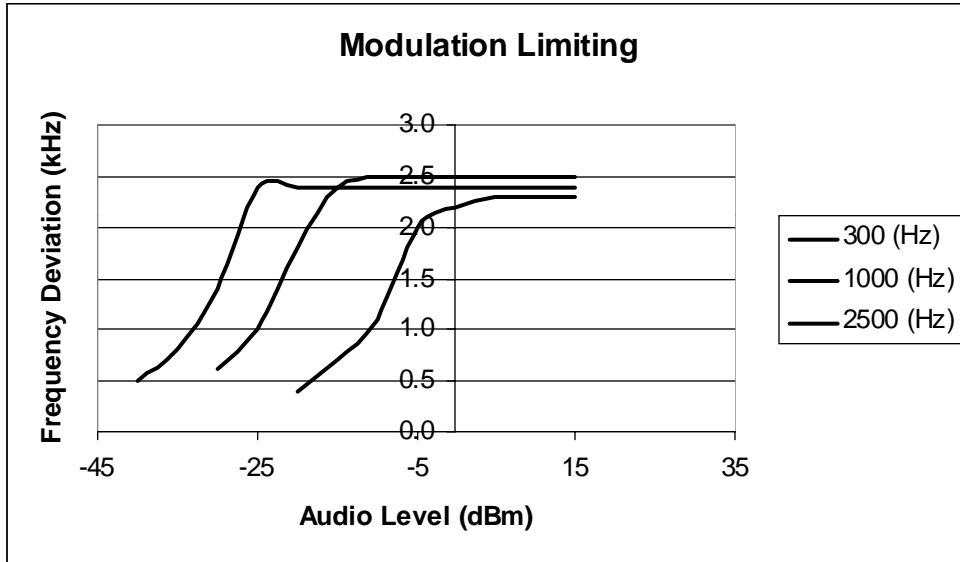
Test Results: Complies. The maximum frequency deviation is less than ± 5 kHz for wideband mode and less than ± 2.5 kHz for narrowband mode.

Measurement Data: See attached graphs.

EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400



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EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400

Section 7. Occupied Bandwidth

Para. No.: 2.1049

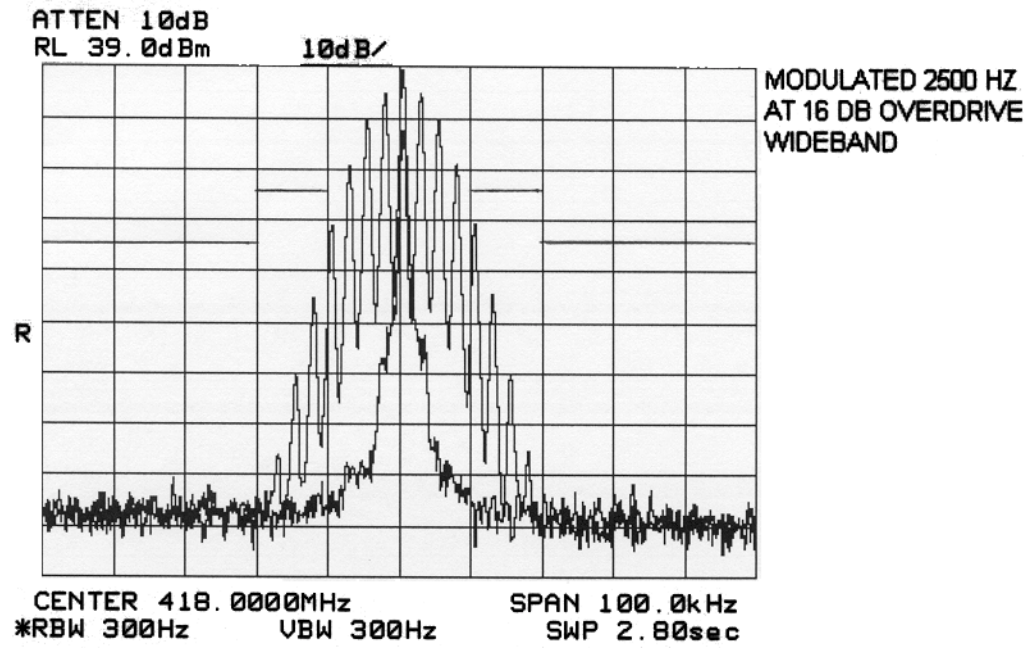
Test Performed By: Russell Grant	Date of Test: July 18, 2000
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Minimum Standard: Para. No.'s 90.210(b)
90.210(d)
22.359(a), (b)(1) & (b)(2)

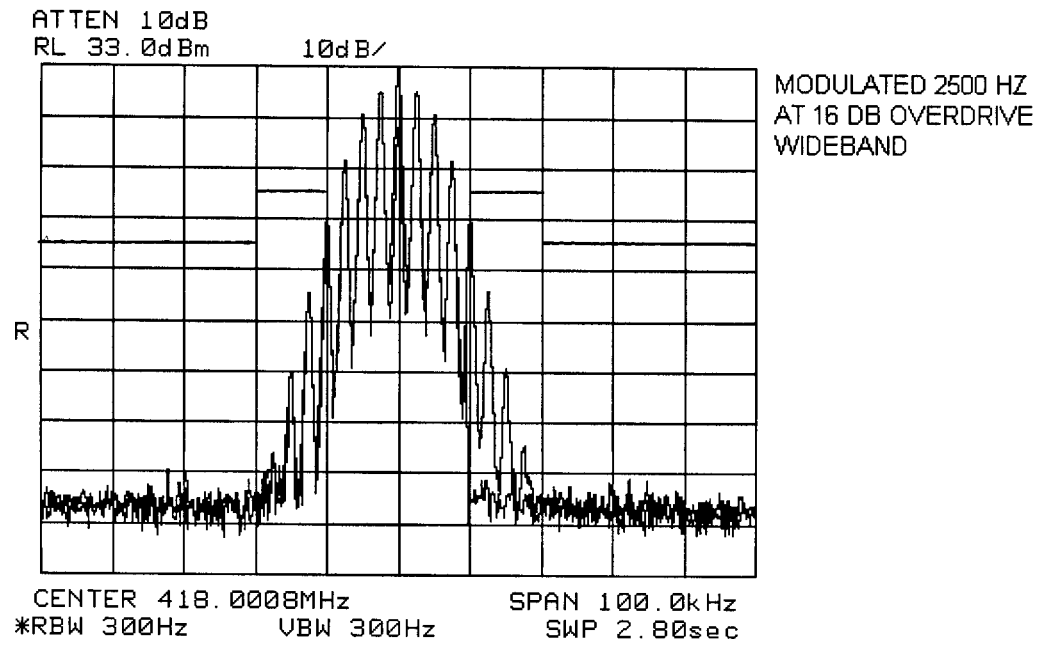
Test Results: Complies.

Measurement Data: See attached graphs.

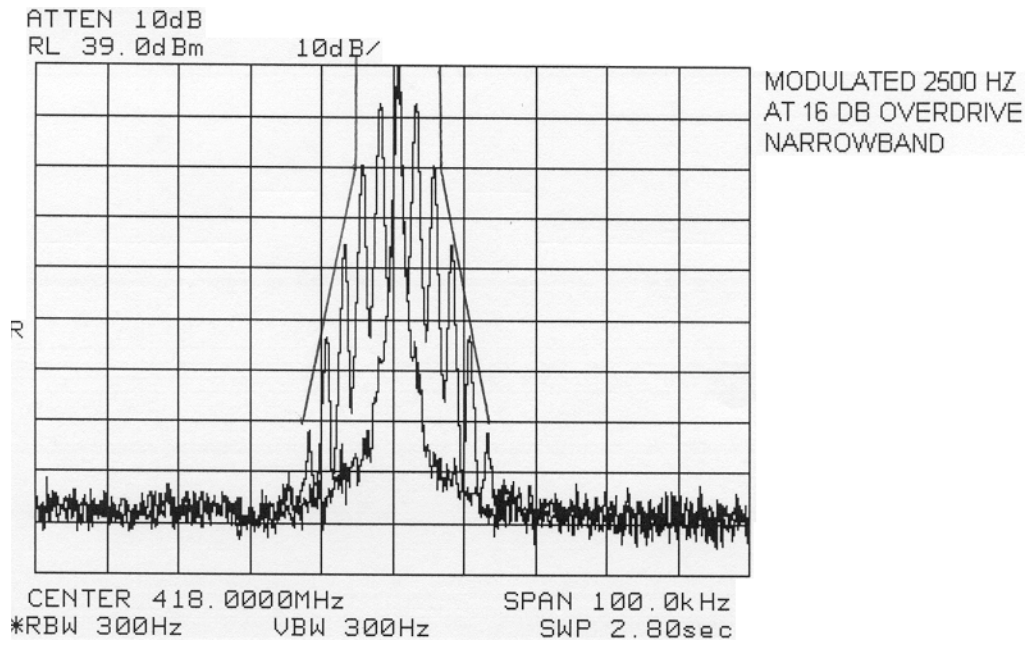
EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400



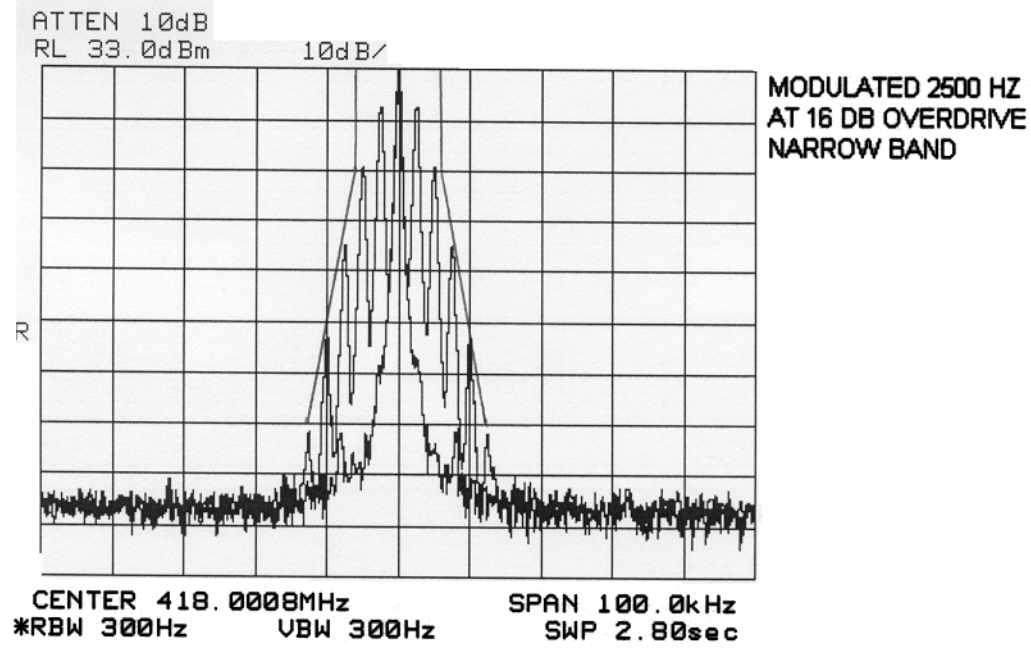
EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400



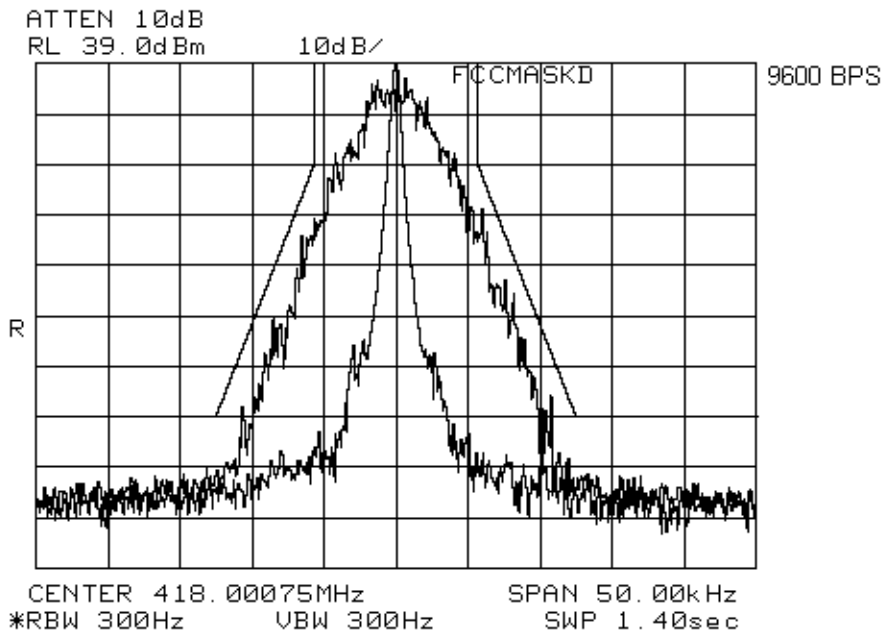
EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400



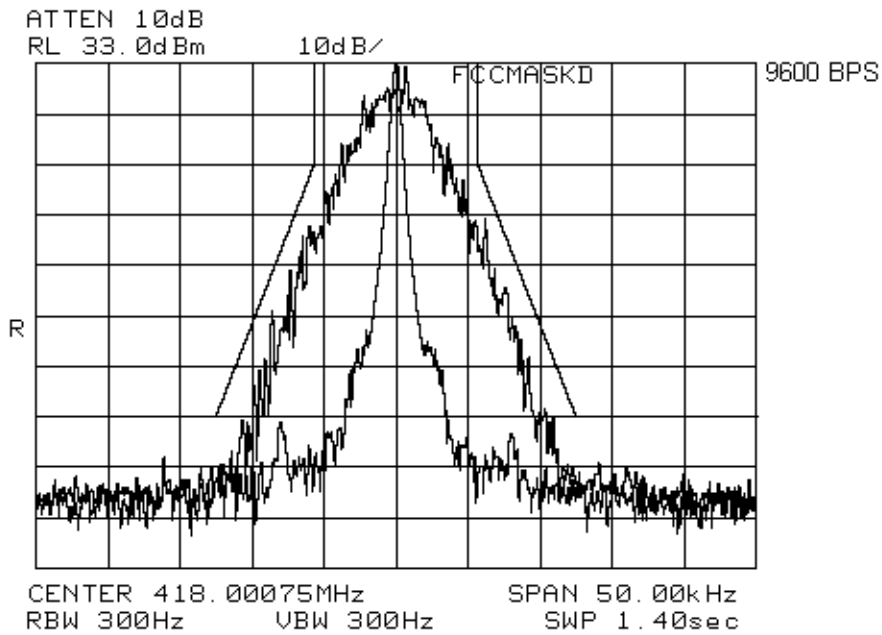
EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400



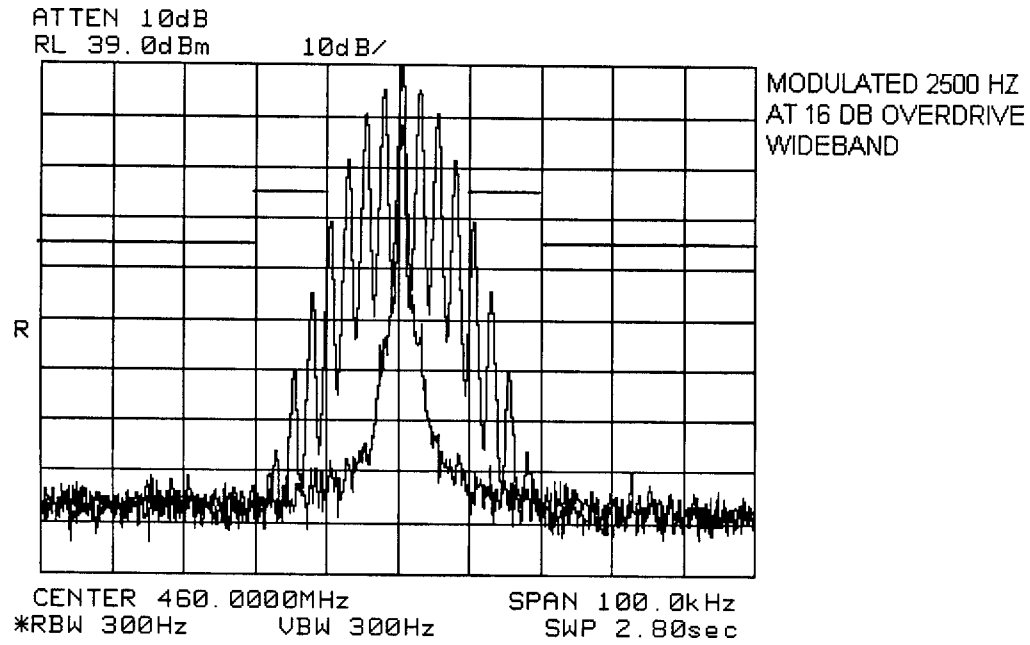
EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400



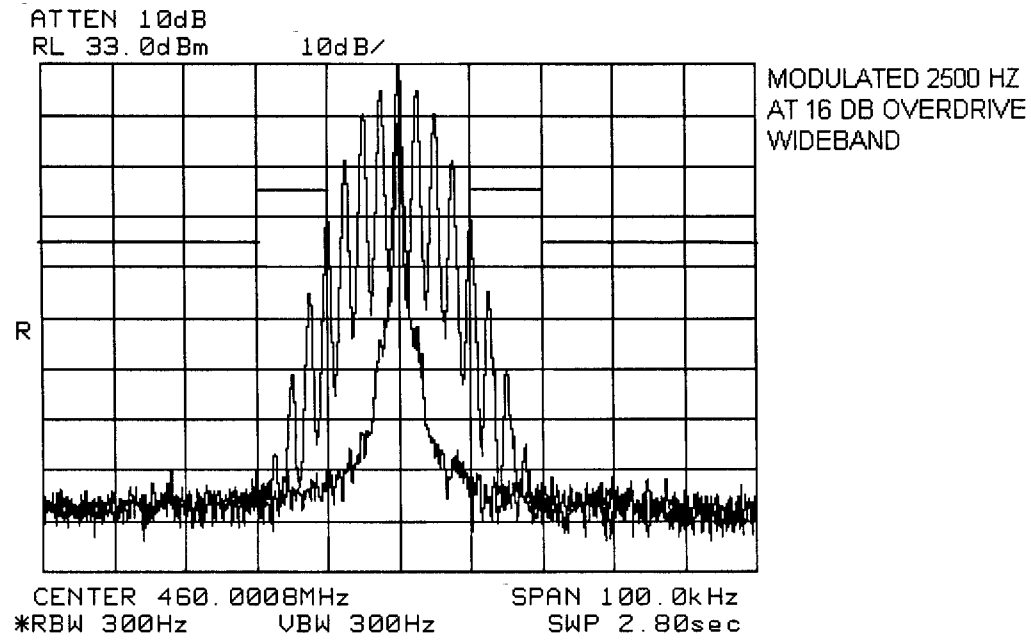
EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400



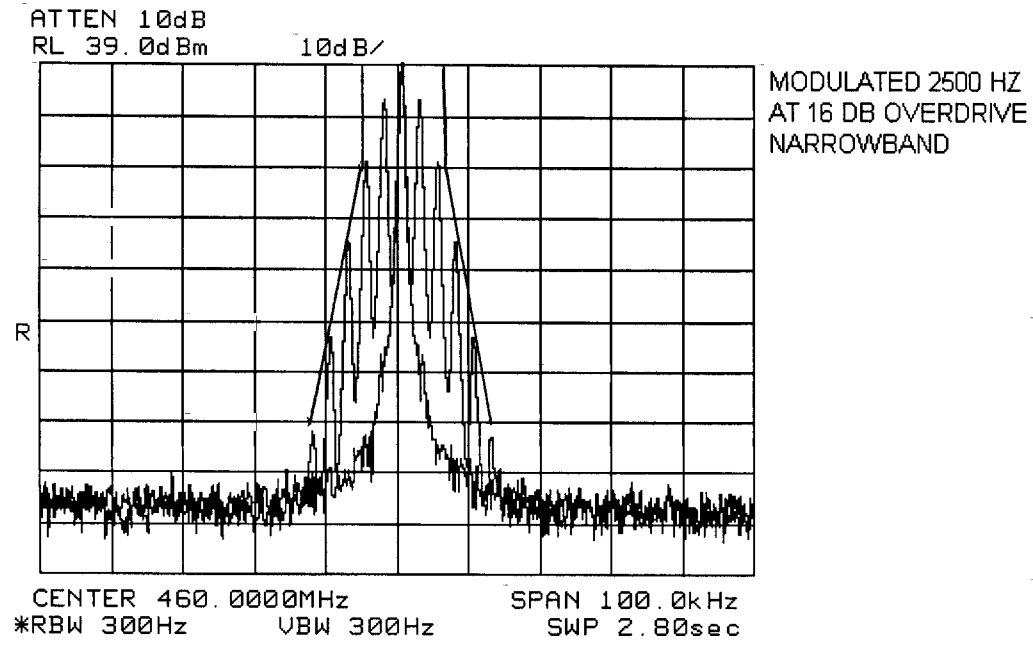
EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400



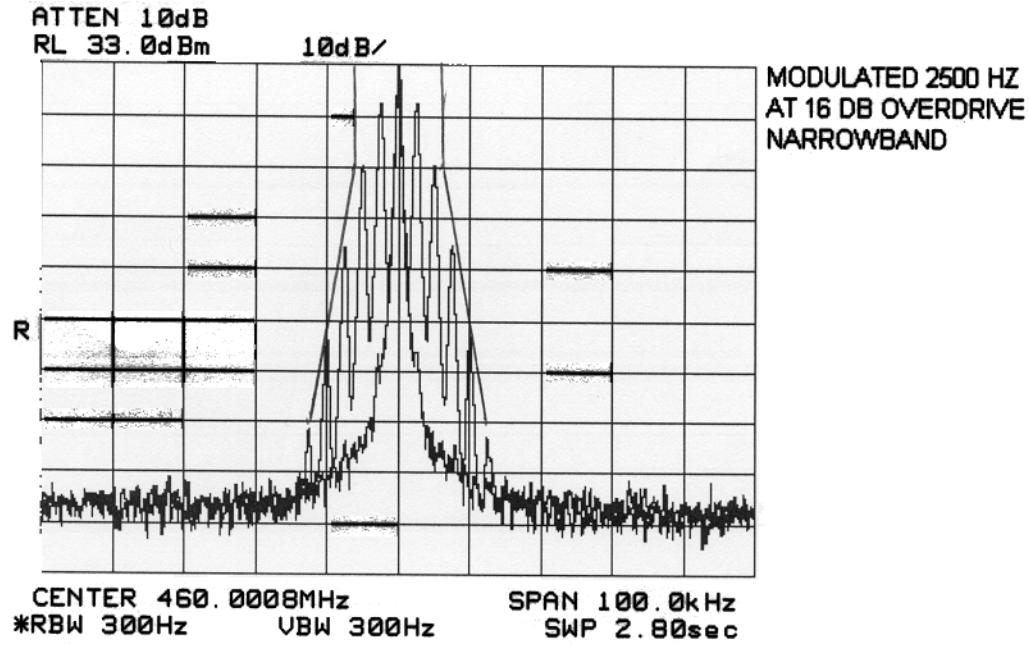
EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400



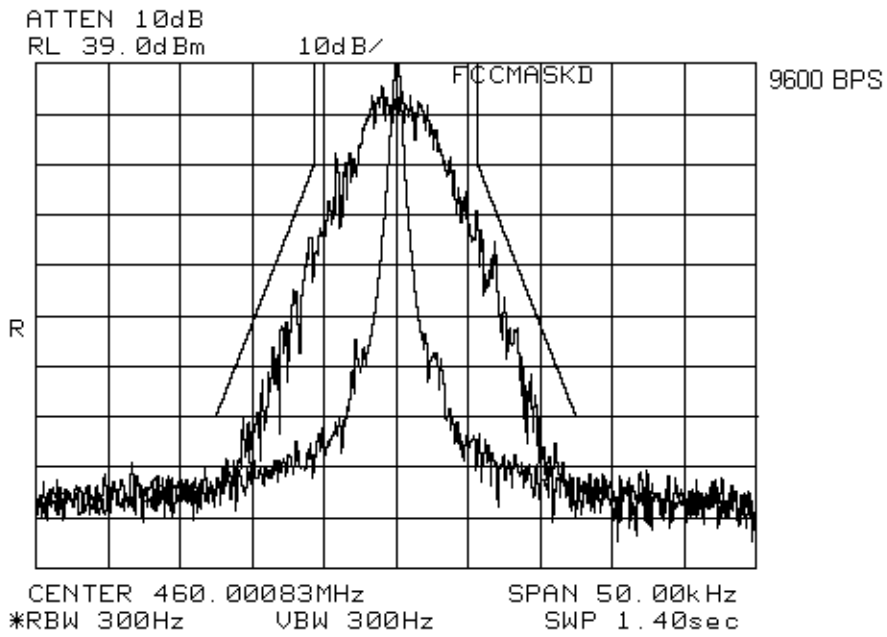
EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400



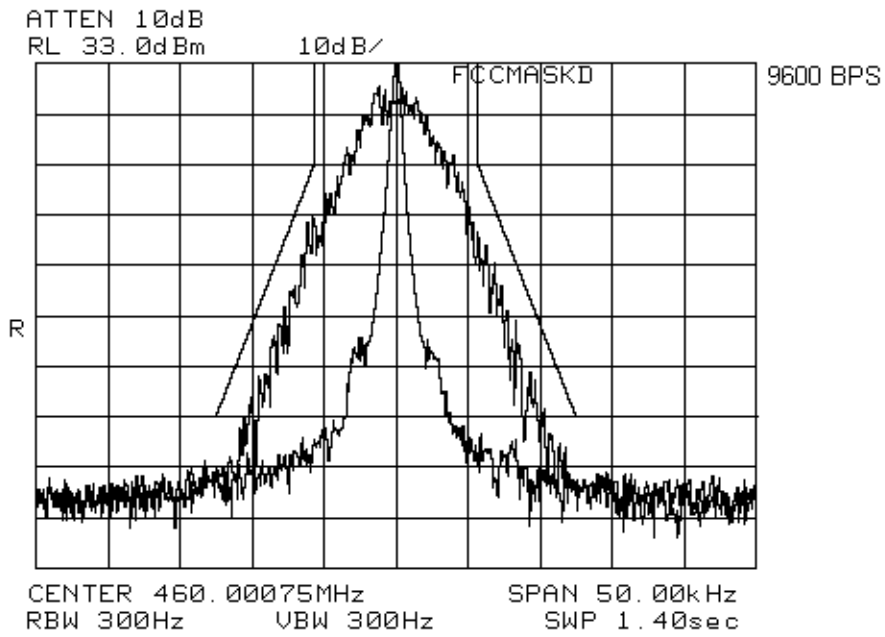
EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400



EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400



EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400



EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400

Section 8. Spurious Emissions at Antenna Terminals

Para. No.: 2.1051

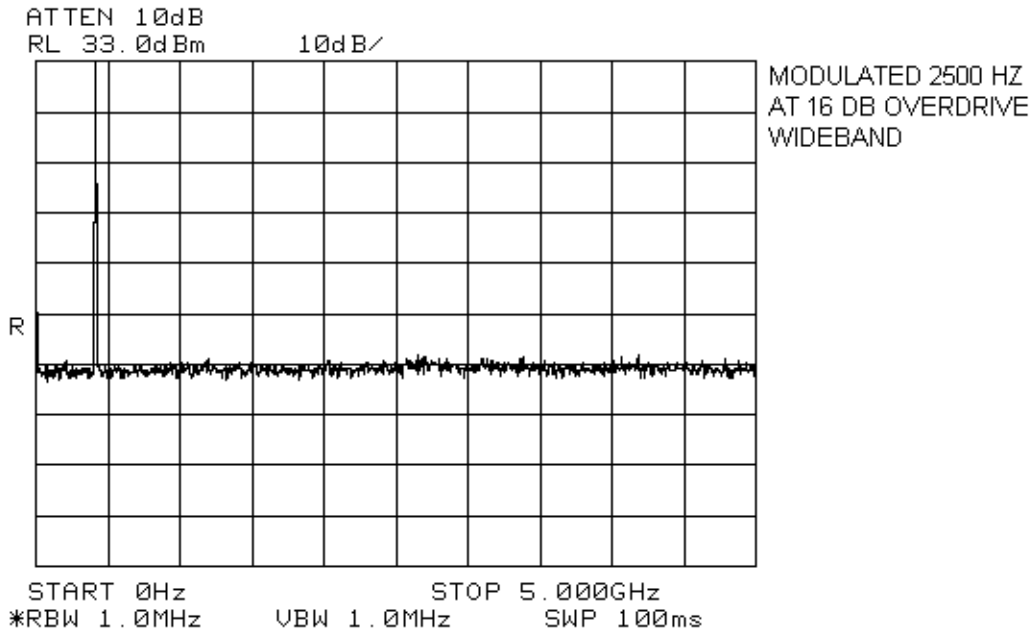
Test Performed By: Russell Grant	Date of Test: July 18, 2000
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Minimum Standard: Para. No.'s 90.210 (b)(d)
22.359(a), (b)(1) & (b)(2)

Test Results: Complies. The worst case emission is -22.2 dBm at 836 MHz.
This is 2.2 dB below the specification limit.

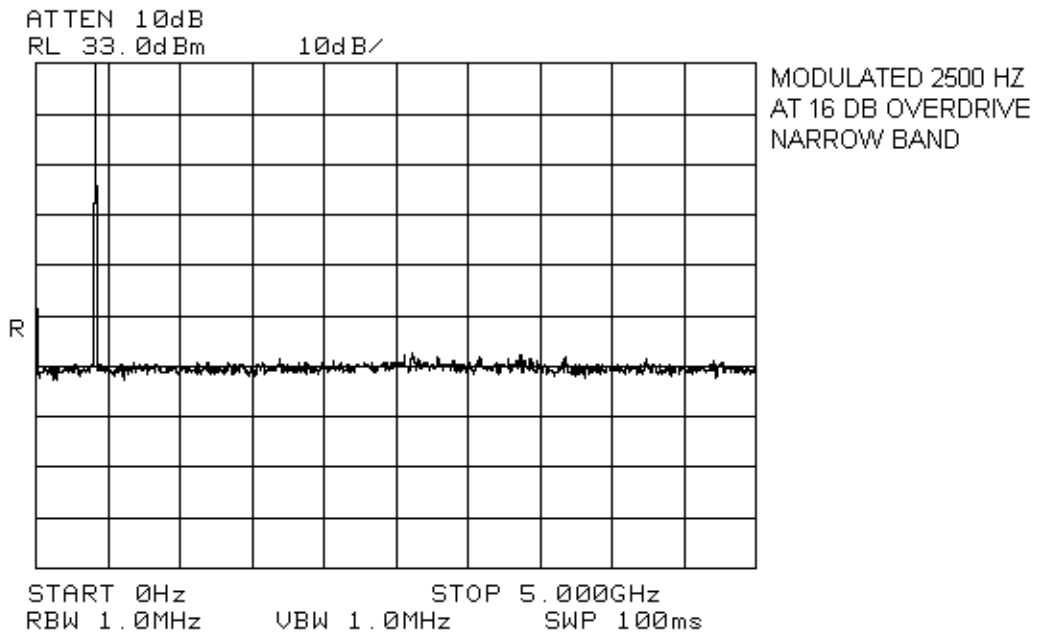
Measurement Data: See attached graphs.

EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400



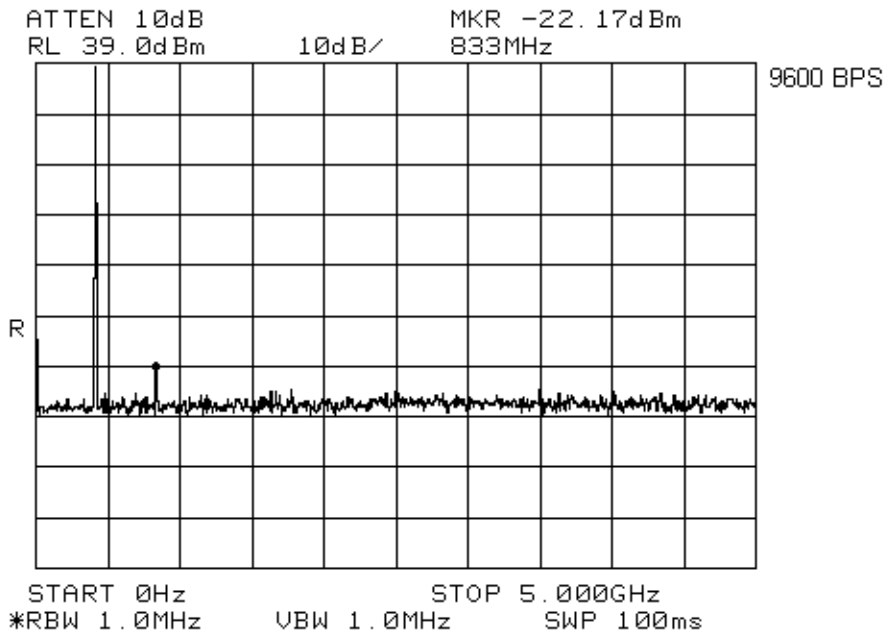
Tx 418 MHz

EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400



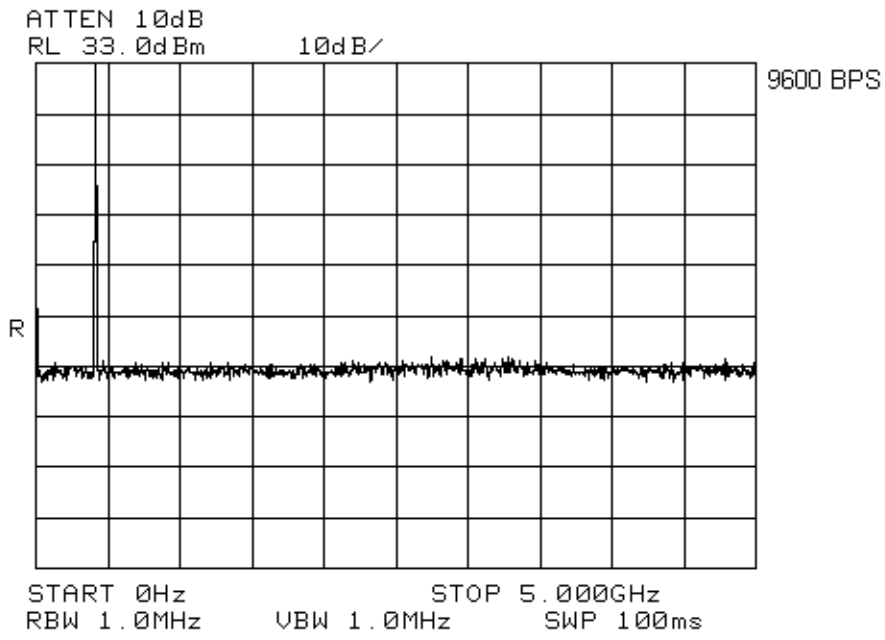
Tx 418 MHz

EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400



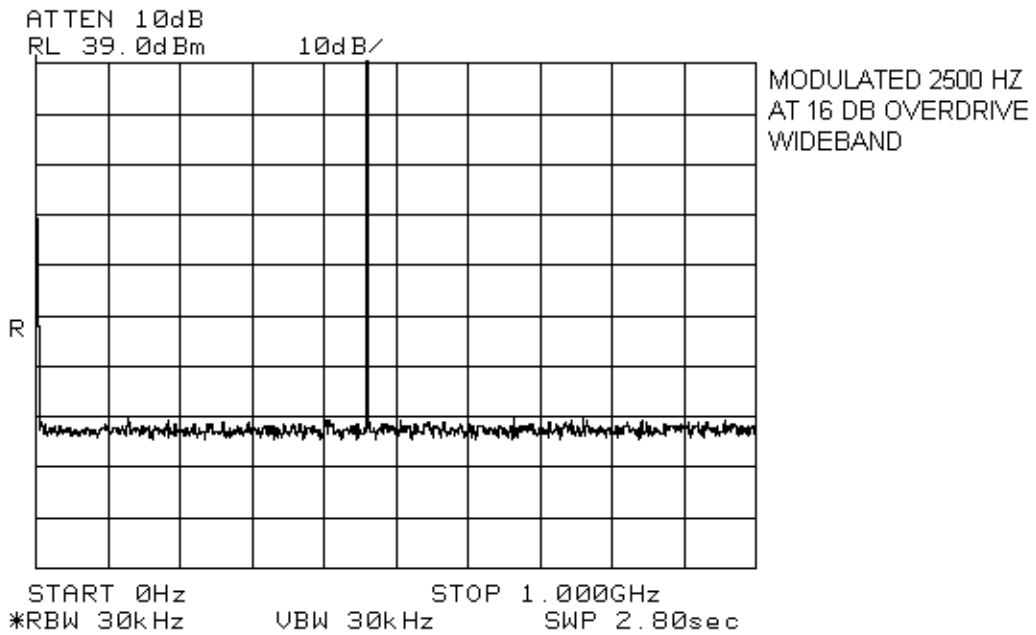
Tx 418 MHz

EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400



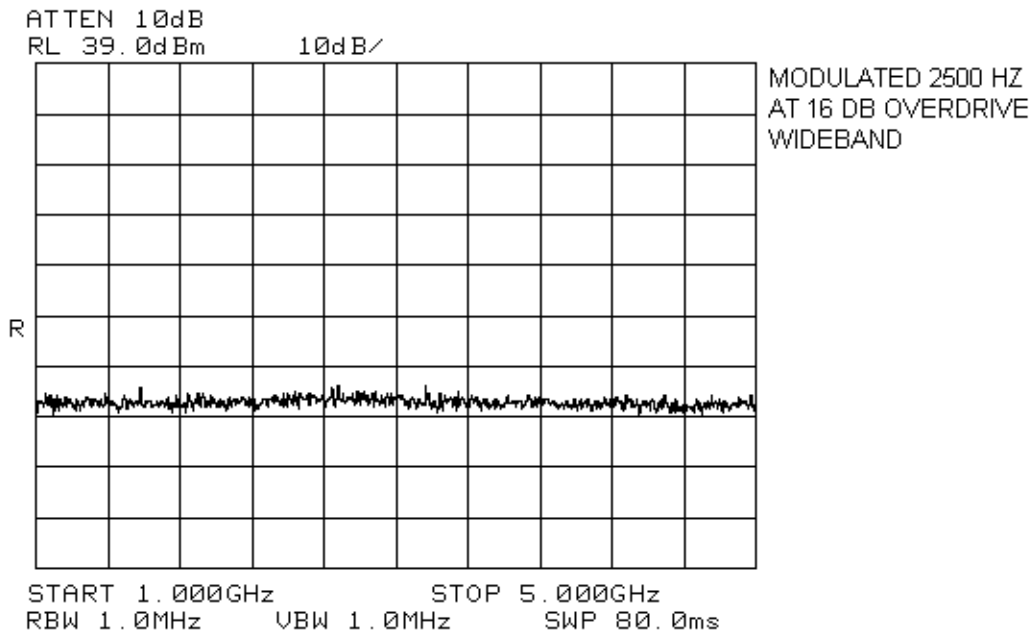
Tx 418 MHz

EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400



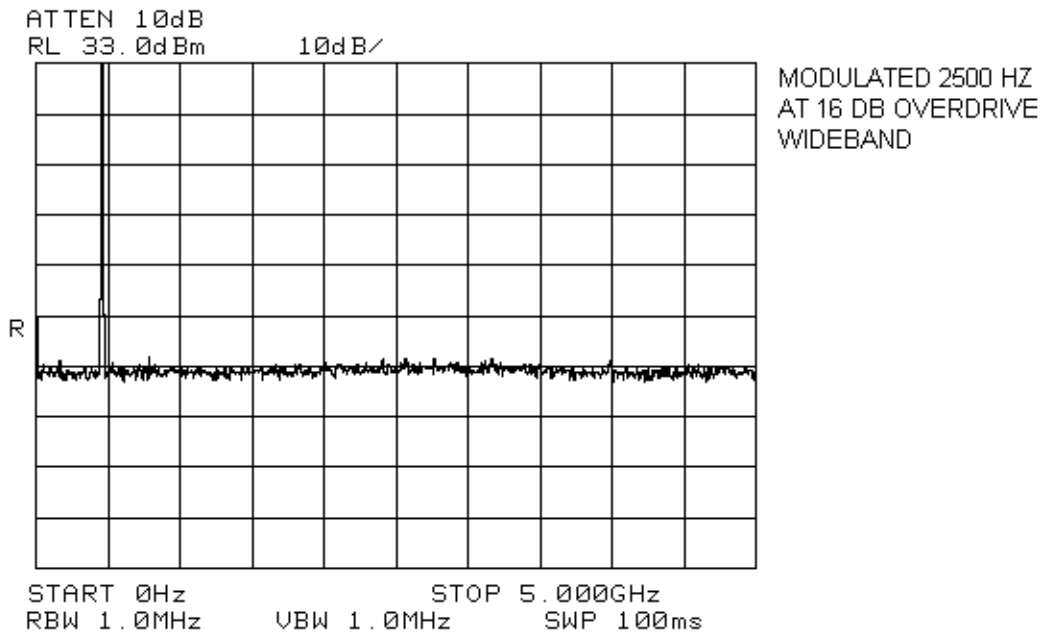
Tx 460 MHz

EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400



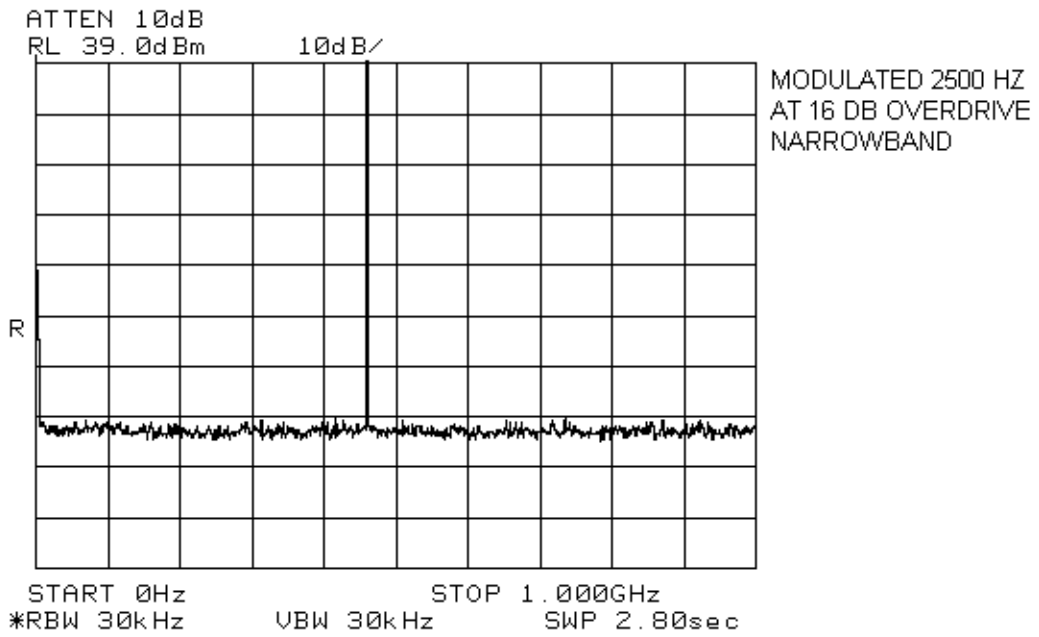
Tx 460 MHz

EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400



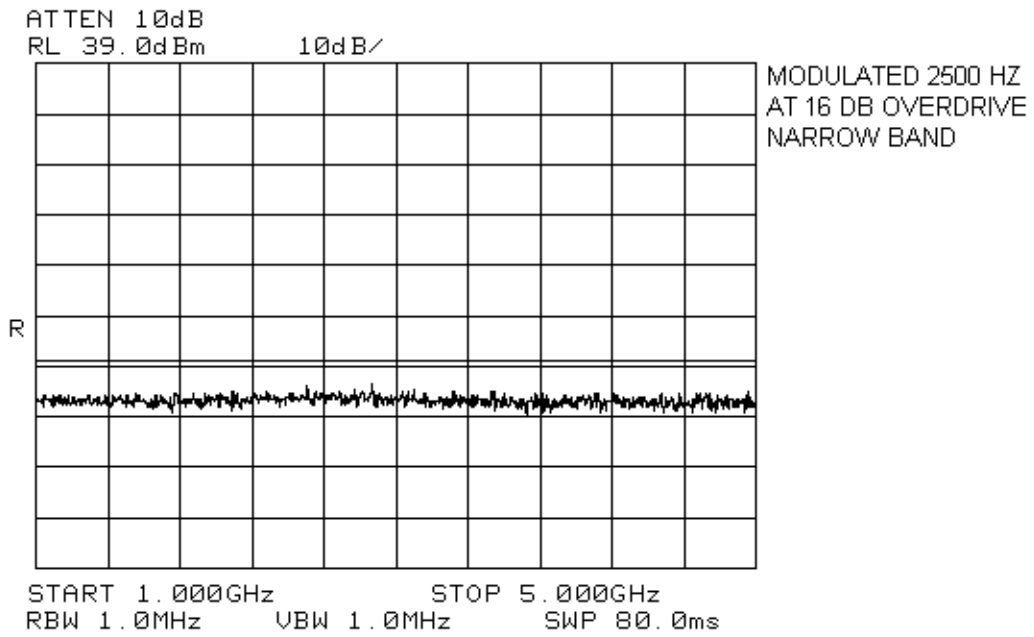
Tx 460 MHz

EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400



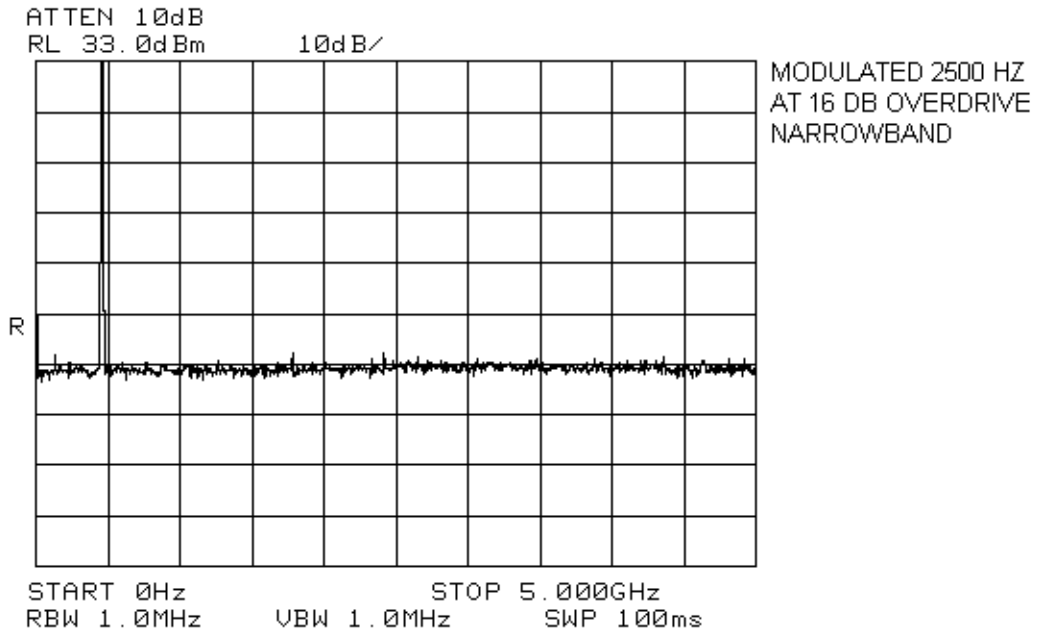
Tx 460 MHz

EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400



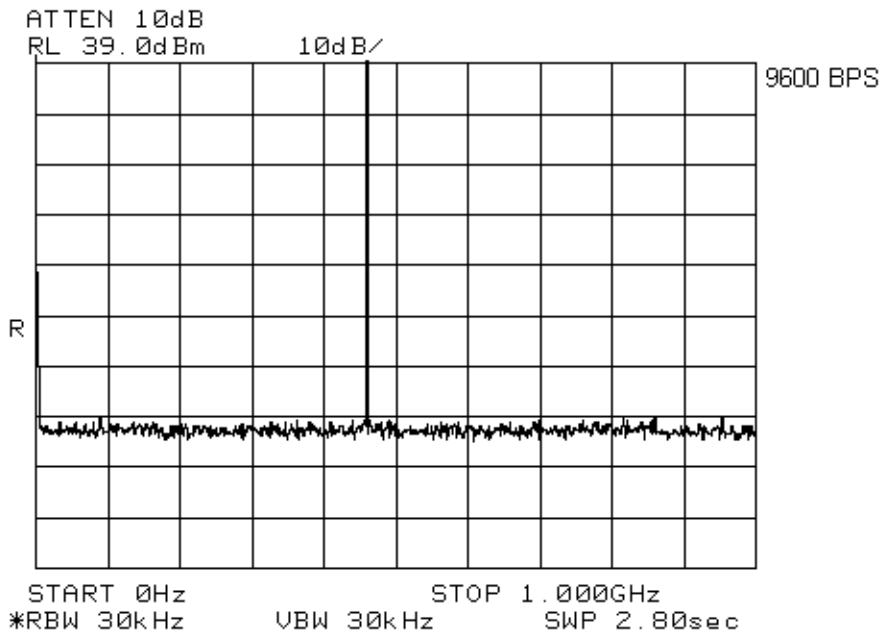
Tx 460 MHz

EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400



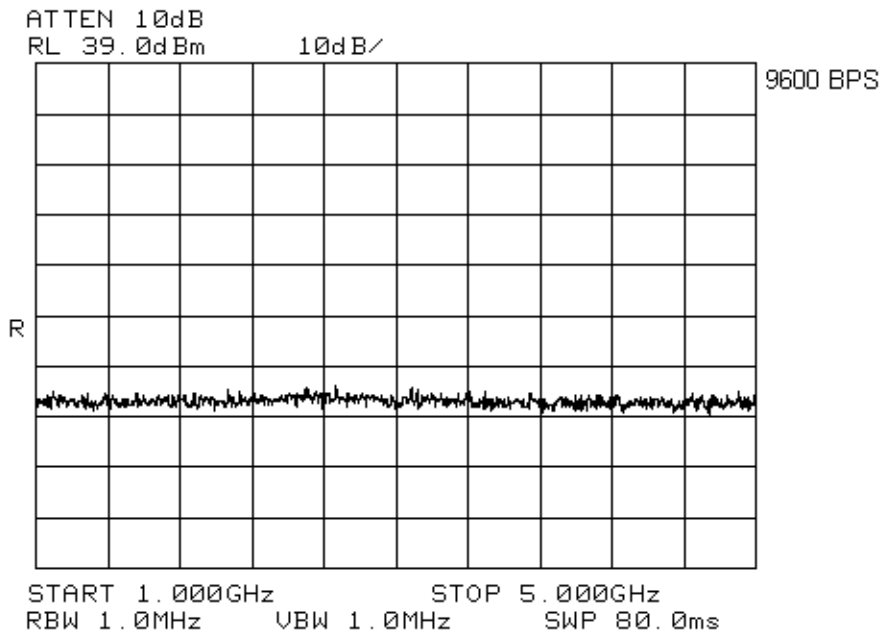
Tx 460 MHz

EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400



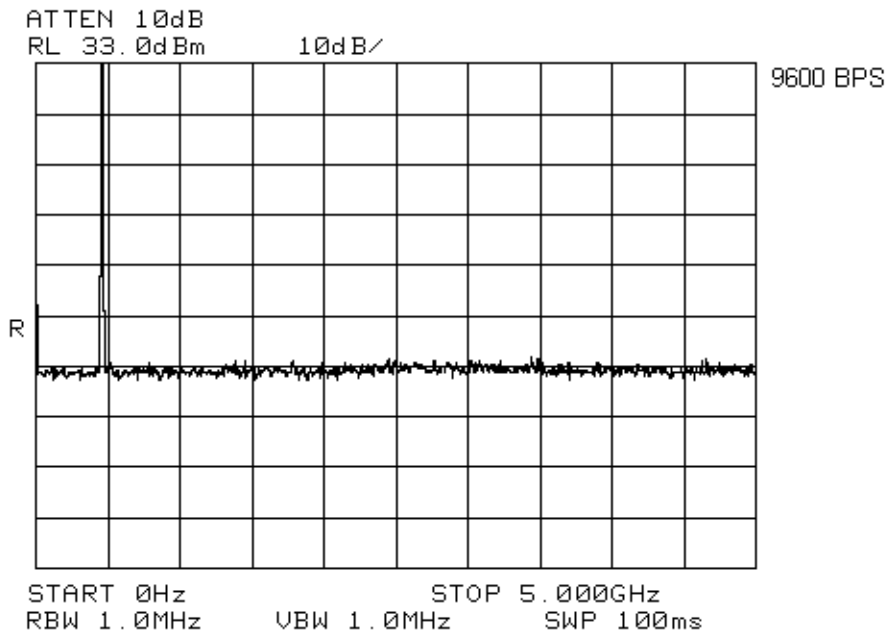
Tx 460 MHz

EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400



Tx 460 MHz

EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400



Tx 460 MHz

EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400

Section 9. Field Strength of Spurious Emissions

Para. No.: 2.1053

Test Performed By: Russell Grant	Date of Test: July 18, 2000
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Minimum Standard: Para. No.'s 90.210 (b), (d)
22.359 (a), (b)(1) & (b)(2)

Test Results: Complies. The worst case emission is 66.7 dB μ V/m @ 3m at 2090 MHz. This is 8.5 dB below the specification limit.

Measurement Data: See attached tables.

EQUIPMENT: UHF Transmitter
 FCC ID: H4JUT-4-400

Test Data - Radiated Emissions – Tx 418 MHz

Test Distance (meters) : 3		Range: A Tower		Receiver: ESVP		RBW(kHz): 120/1000		Detector: Q-Peak	
Freq. (MHz)	Ant. *	Pol. (V/H)	RCVD Signal (dBµV/m)	Ant. Factor (dB)**	Amp. Gain (dB)***	Dist. Corr. (dB)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
836.0	L/P	V	23.0	28.6			51.6	77.4	25.8
836.0	L/P	H	24.0	28.6			52.6	77.4	24.8
1254.0	Hrn2	V	55.0	30.3	-48.0		37.3	75.2	37.9
1254.0	Hrn2	H	51.5	30.3	-48.0		33.8	75.2	41.4
1672.0	Hrn2	V	67.3	32.1	-48.0		51.4	75.2	23.8
1672.0	Hrn2	H	63.7	32.1	-48.0		47.8	75.2	27.4
2090.0	Hrn2	V	89.3	35.0	-57.6		66.7	75.2	8.5
2090.0	Hrn2	H	81.7	35.0	-57.6		59.1	75.2	16.1
2508.0	Hrn2	V	67.3	37.4	-60.0		44.7	75.2	30.5
2508.0	Hrn2	H	66.7	37.4	-60.0		44.1	75.2	31.1
2926.0	Hrn2	V	51.7	38.6	-59.6		30.7	75.2	44.5
2926.0	Hrn2	H	54.3	38.6	-59.6		33.3	75.2	41.9
3344.0	Hrn2	V	51.8	40.2	-58.5		33.5	75.2	41.7
3344.0	Hrn2	H	51.0	40.2	-58.5		32.7	75.2	42.5
3762.0	Hrn2	V	49.3	41.9	-57.8		33.4	75.2	41.8
3762.0	Hrn2	H	50.8	41.9	-57.8		34.9	75.2	40.3

Notes:
 B/C = Biconical, B/L = Biconilog, L/P = Log-Periodic, H = Horn, D/P = Dipole
 * Re-measured using dipole antenna.
 ** Includes cable loss when amplifier is not used.
 *** Includes cable loss.
 () Denotes failing emission level.
 N.D. = Not Detected

EQUIPMENT: UHF Transmitter
 FCC ID: H4JUT-4-400

Test Data - Radiated Emissions – Tx 460 MHz

Test Distance (meters) : 3		Range: A Tower		Receiver: ESVP		RBW(kHz): 120/1000		Detector: Q-Peak	
Freq. (MHz)	Ant. *	Pol. (V/H)	RCVD Signal (dBµV/m)	Ant. Factor (dB)**	Amp. Gain (dB)***	Dist. Corr. (dB)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
920.0	E/D4		10.0	34.5			44.5	77.4	32.9
920.0	E/D4		11.0	34.5			45.5	77.4	31.9
1380.0	Hrn2		53.5	30.5	-48.0		36.0	75.2	39.2
1380.0	Hrn2		46.2	30.5	-48.0		28.7	75.2	46.5
1840.0	Hrn2		57.8	33.3	-48.1		43.0	75.2	32.2
1840.0	Hrn2		49.3	33.3	-48.1		34.5	75.2	40.7
2300.0	Hrn2		76.5	36.2	-59.2		53.5	75.2	21.7
2300.0	Hrn2		60.2	36.2	-59.2		37.2	75.2	38.0
2760.0	Hrn2		69.3	38.1	-59.9		47.5	75.2	27.7
2760.0	Hrn2		62.2	38.1	-59.9		40.4	75.2	34.8
3220.0	Hrn2		57.0	39.7	-59.4		37.3	75.2	37.9
3220.0	Hrn2		48.5	39.7	-59.4		28.8	75.2	46.4
3680.0	Hrn2		52.8	41.6	-57.6		36.8	75.2	38.4
3680.0	Hrn2		47.0	41.6	-57.6		31.0	75.2	44.2

Notes:
 B/C = Biconical, B/L = Biconilog, L/P = Log-Periodic, H = Horn, D/P = Dipole
 * Re-measured using dipole antenna.
 ** Includes cable loss when amplifier is not used.
 *** Includes cable loss.
 () Denotes failing emission level.
 N.D. = Not Detected

EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400

Section 10. Frequency Stability

Para. No.: 2.1055

Test Performed By: Russell Grant	Date of Test: July 18, 2000
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Minimum Standard: Para. No.'s 22.355
 90.213

Test Results: Complies. The maximum frequency drift is 499 Hz.
 This is 1.08 ppm.

Measurement Data: Standard Test Voltage (STV): 13.8 VDC
 Test Frequency: 460 MHz

Test Condition	Frequency (MHz)	Frequency Drift (Hz)
115% STV	460.000 311	311
STV	460.000 309	309
85% STV	460.000 310	310
-30 °C	460.000 243	243
-20 °C	460.000 141	141
-10 °C	460.000 085	085
0 °C	460.000 128	128
+10 °C	460.000 340	340
+30 °C	460.000 464	464
+40 °C	460.000 499	499
+50 °C	460.000 372	372

EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400

Section 11. Transient Frequency Behaviour

Test Performed By: Russell Grant	Date of Test: July 18, 2000
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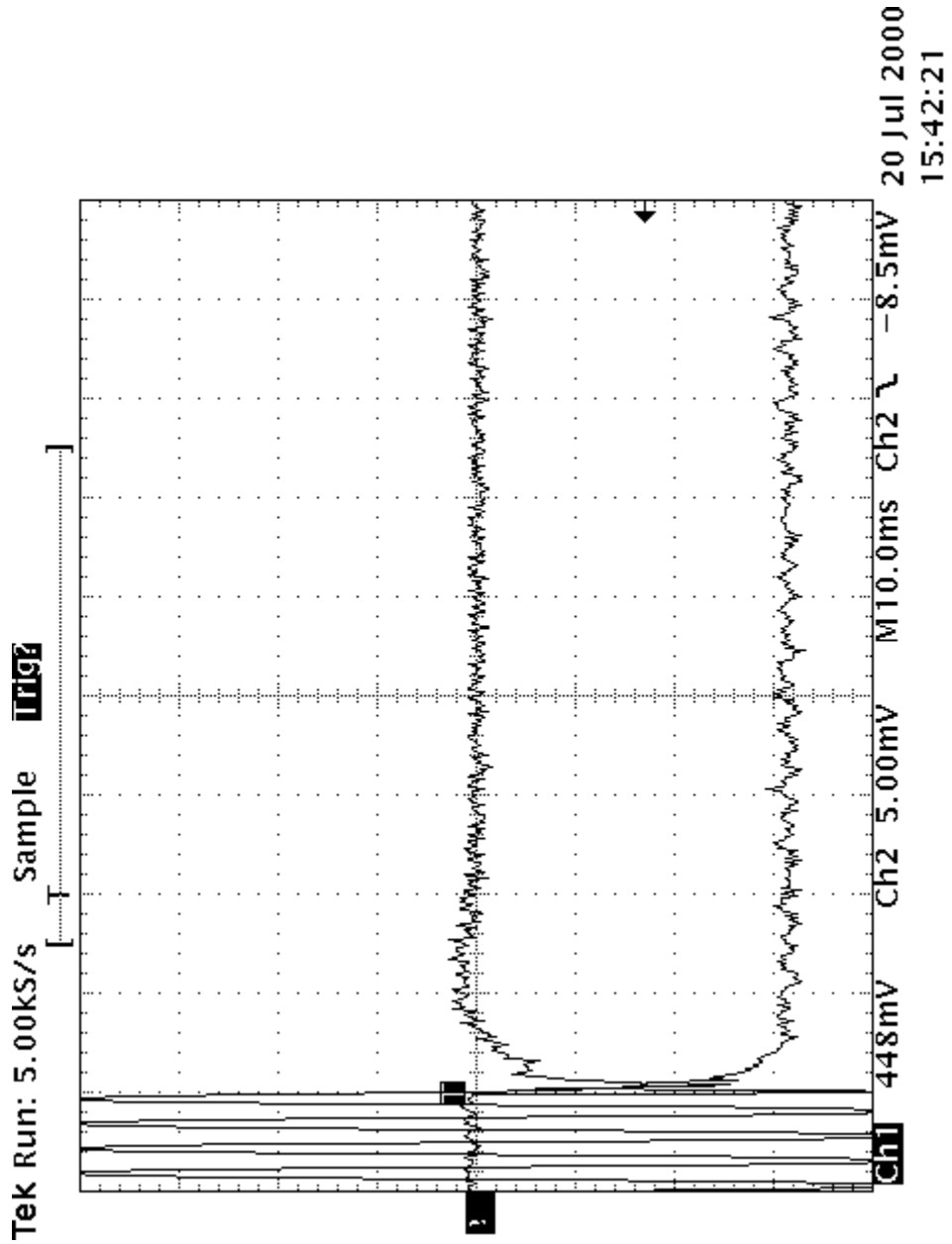
Minimum Standard: Para. No. 90.214

Test Results: Complies.

Measurement Data: See attached graphs.

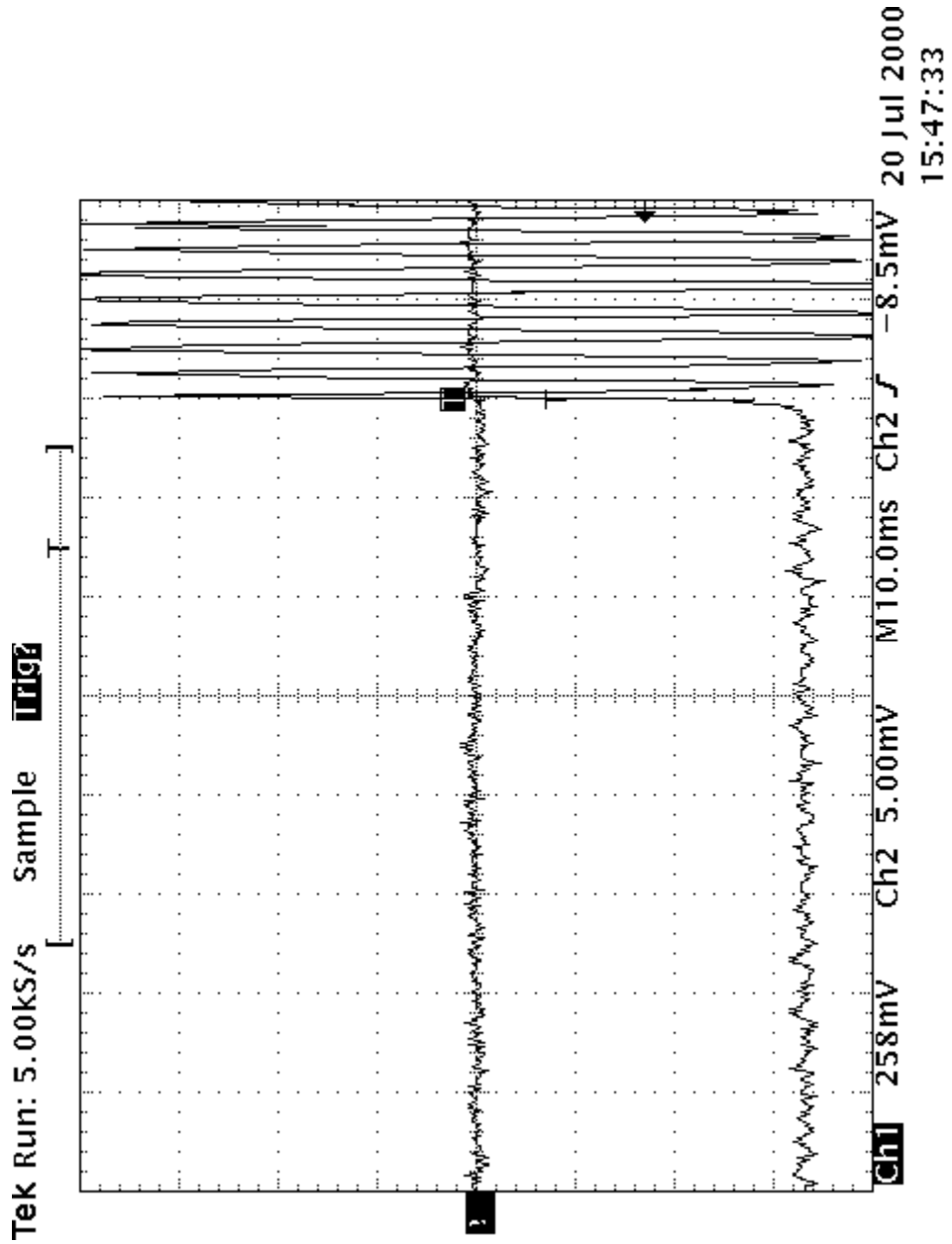
EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400

Wideband



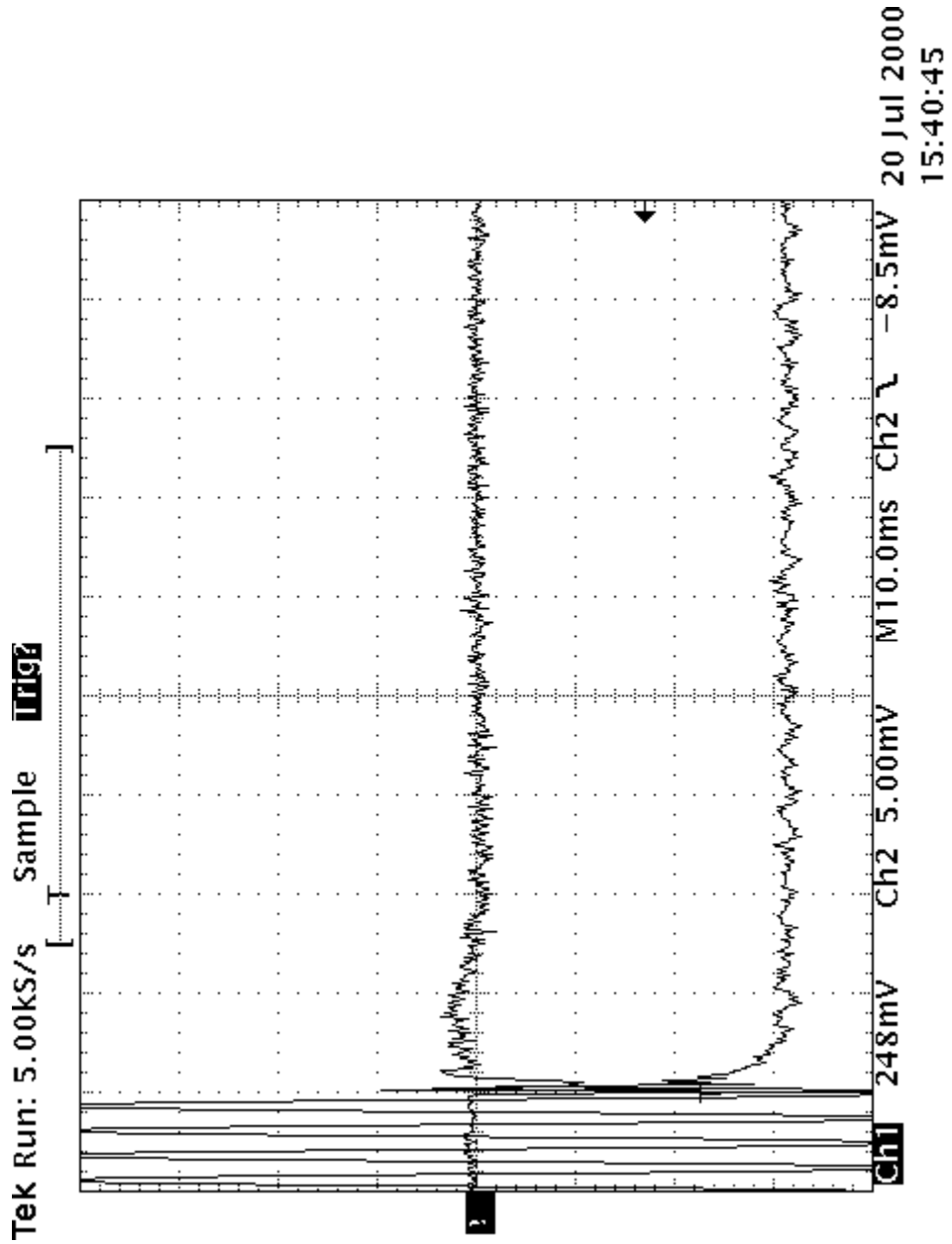
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FCC ID: H4JUT-4-400

Wideband



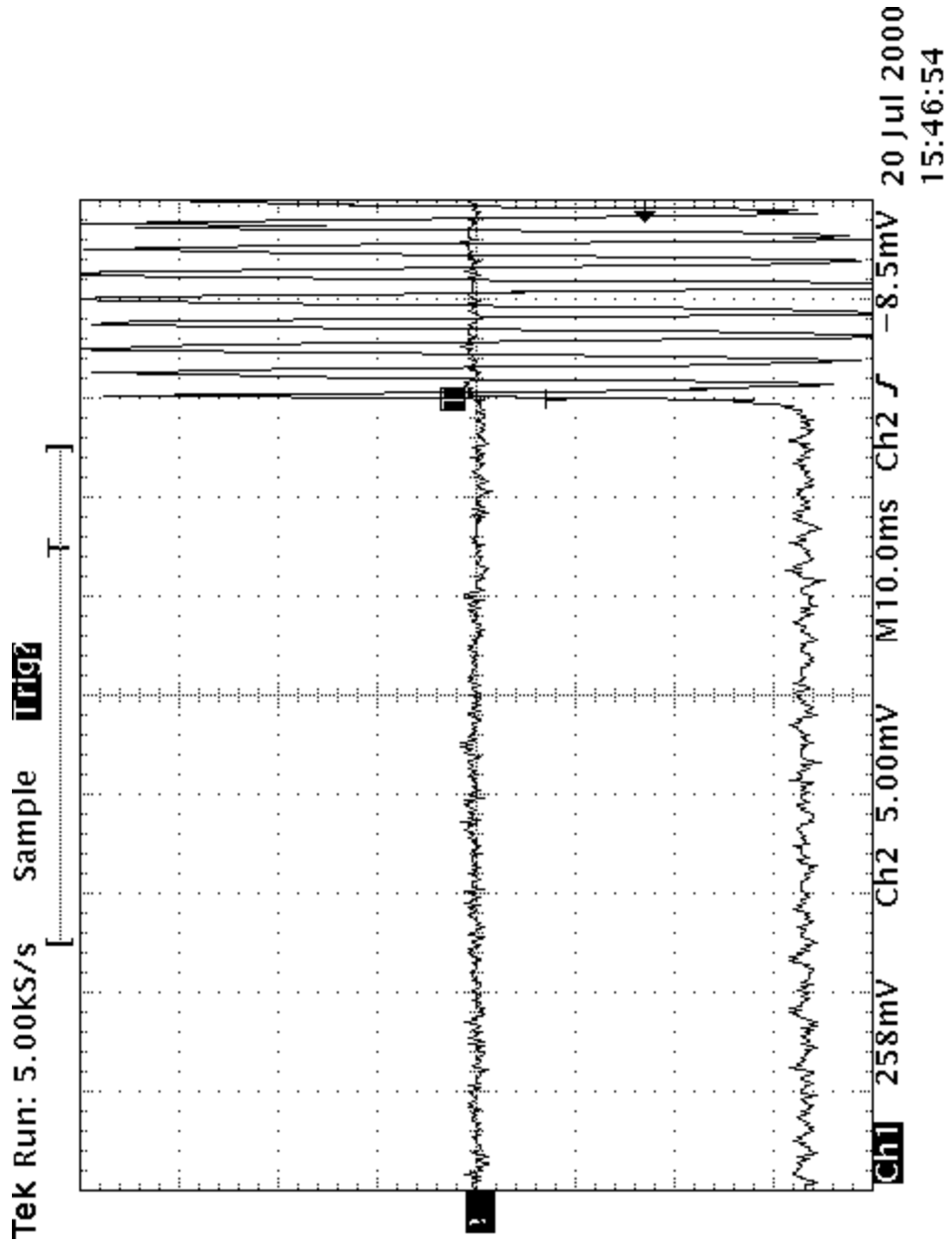
EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400

Narrowband



EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400

Narrowband



EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400

Section 12. Test Equipment List

CAL CYCLE	EQUIPMENT	MANUFACTURER	MODEL	SERIAL	LAST CAL.	NEXT CAL.
1 Year	Spectrum Analyzer	Hewlett Packard	8565E	FA000981	June 16/00	June 16/01
1 Year	Radio Communications	Rohde & Schwarz	CMTA 54	840343/013	Dec. 14/99	Dec. 14/00
1 Year	Climate Chamber	Thermotron	SM-16C	15649-S	COU	COU
	Power Supply	Astron	VS-50M	8405071	NCR	NCR
1 Year	Attenuator	Narda	768-20	9507	Oct. 12/99	Oct. 12/00
1 Year	Attenuator	Narda	768-10	9707	Aug. 23/99	Aug. 23/00
1 Year	Receiver	Rohde & Schwarz	ESVP	892661/014	April 5/00	April 5/01
1 Year	Horn Antenna	EMCO #2	3115	4336	Nov. 11/99	Nov. 11/00
1 Year	Dipole Antenna Set	EMCO #2	3121C	FA001349	June 27/99	June 27/00
1Year	Frequency Counter	Hewlett Packard	HP5350A	2444A00135	May 7/00	Nov. 7/00

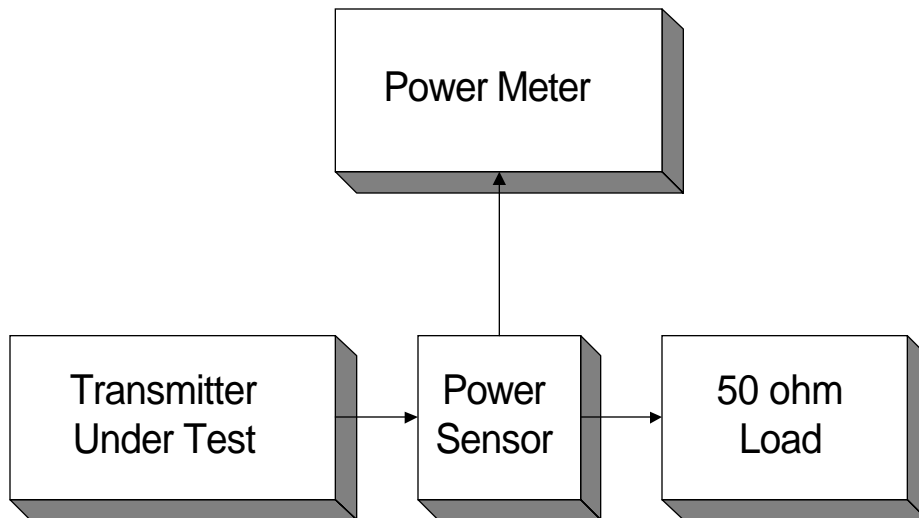
NA: Not Applicable
 NCR: No Cal Required
 COU: CAL On Use

EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400

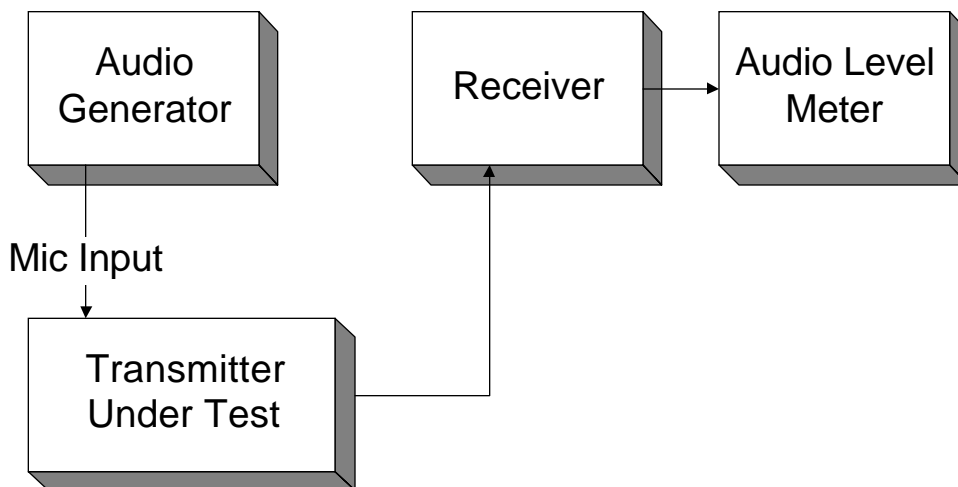
Annex A
Test Diagrams

EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400

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

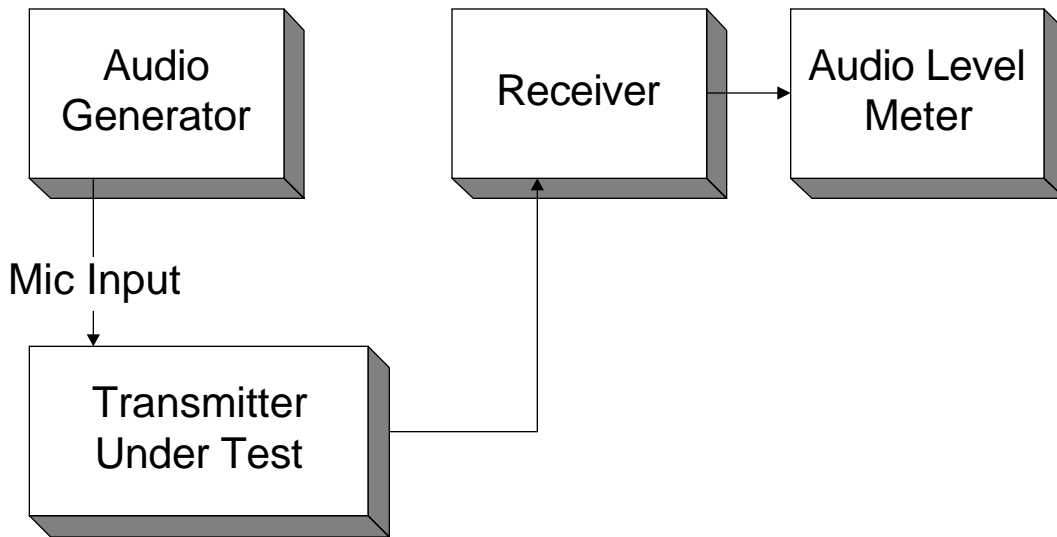


Para. No. 2.1047 - Audio Frequency Response

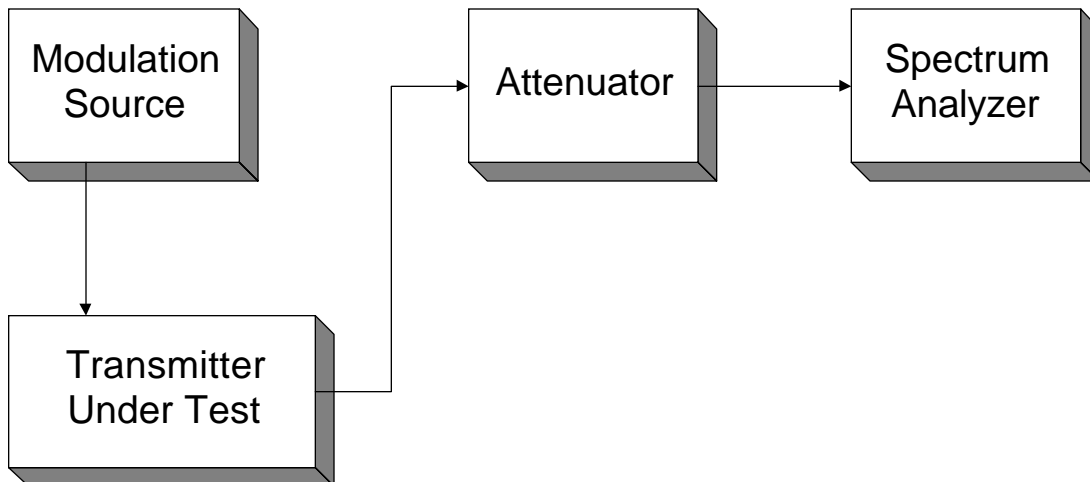


EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400

Para. No. 2.1047 - Modulation Limiting

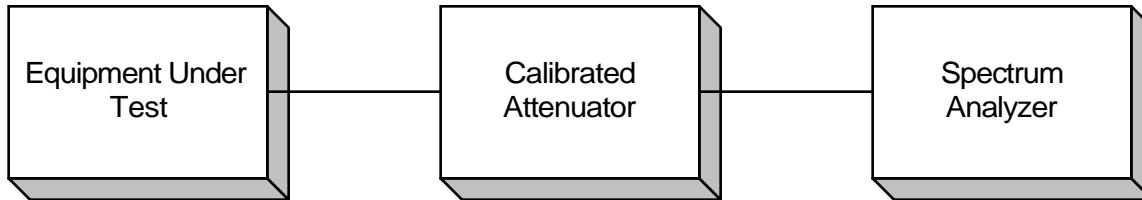


Para. No. 2.1049 - Occupied Bandwidth

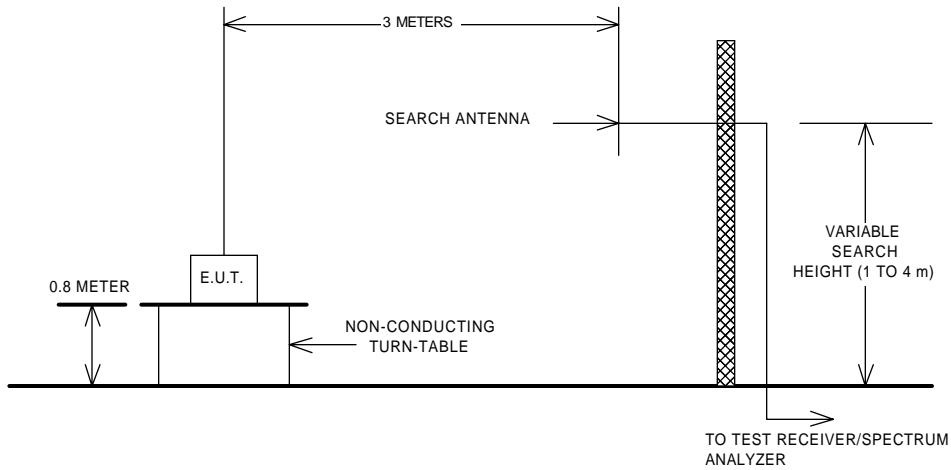


EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400

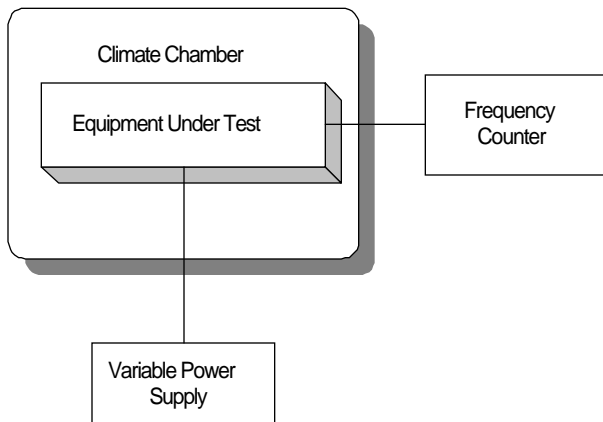
Para. No. 2.1051 - Spurious Emissions at Antenna Terminals



Para. No. 2.1053 - Field Strength of Spurious Radiation

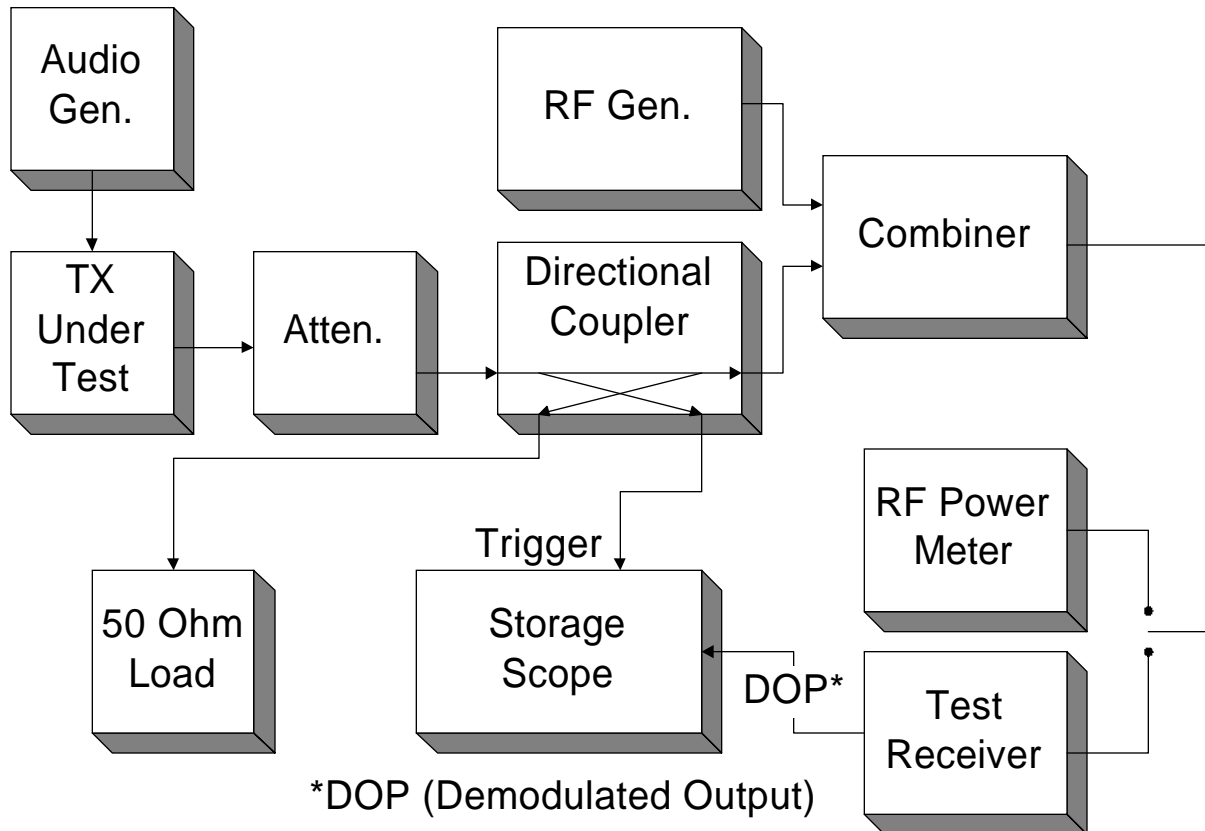


Para. No. 2.1055 - Frequency Stability



EQUIPMENT: UHF Transmitter
FCC ID: H4JUT-4-400

Para. No. 90.214 - Transient Frequency Behaviour



Voice

This measurement was made using measurement procedure TIA/EIA Land Mobile FM or PM Communications Equipment Measurement and Performance Standards TIA/EIA-603 February 1993 Telecommunications Industry Association (American National Standard ANSI/TIA/EIA-603-1992 Approved: October 27, 1992) Para. no. 2.2 Methods of Measurement for Transmitters Para. no. 2.2.19 Transient Frequency Behaviour (page no. 83).

Data

This measurement was made using measurement procedure TIA/EIA Digital C4FM/CQPSK Transceiver Measurement Methods TSB102.CAAA Para. no. 2.2.17 Transient Frequency Behaviour (page no. 74).