



**Test Report:**

2W04669

# Nemko

**Applicant:**

Multitone Electronics PLC  
Multitone House,  
Beggarwood Lane,  
Kempshott Hill,  
Basingstoke,  
Hampshire, England RG23 7LL

**Equipment Under Test:  
(EUT)**

Multitone UHF Radio – RPE673  
447-470MHz

**FCC ID:** E86RPE673

**In Accordance With:** FCC Part 90

**Tested By:**

Nemko Canada Inc.  
3325 River Road, R.R. 5  
Ottawa, Ontario K1V 1H2

**Authorized By:**

J. Harrington, RF Group Manager

**Date:** 28 March 2002

**Total Number of Pages:** 24

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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 90.



New Submission



Production Unit



Class II Permissive Change



Pre-Production Unit



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:** Glen Westwell, Wireless Technologist**DATE:** 28 March 2002

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This report applies only to the items tested.

*EQUIPMENT: RPE673**FCC ID: E86RPE673*

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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	Complies
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: 24°C  
                    Humidity: 44%**Outdoor**      Temperature: 5°C  
                    Humidity: 48%

*EQUIPMENT: RPE673**FCC ID: E86RPE673*

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**Section 2. General Equipment Specification****Manufacturer:** Multitone Electronics PLC**Model No.:** RPE673**Serial No.:** 8551:03**Date Received In Laboratory:** 25 Feb. 2002**Nemko Identification No.:** #1**Transmit Frequency:** 464.6875MHz**RF Power Output:** 2.5W**Emission Designator:** 16K0F1D, F3E

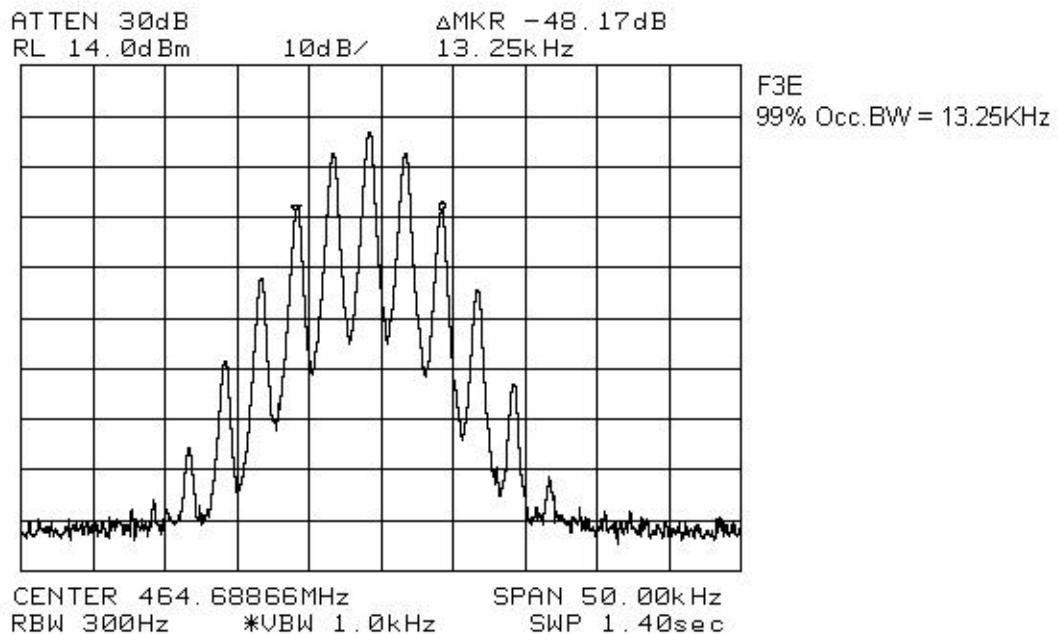
**Nemko Canada Inc.**

FCC PART 90  
PRIVATE LAND MOBILE TRANSMITTER  
PROJECT NO.:2W04669

*EQUIPMENT: RPE673*

*FCC ID: E86RPE673*

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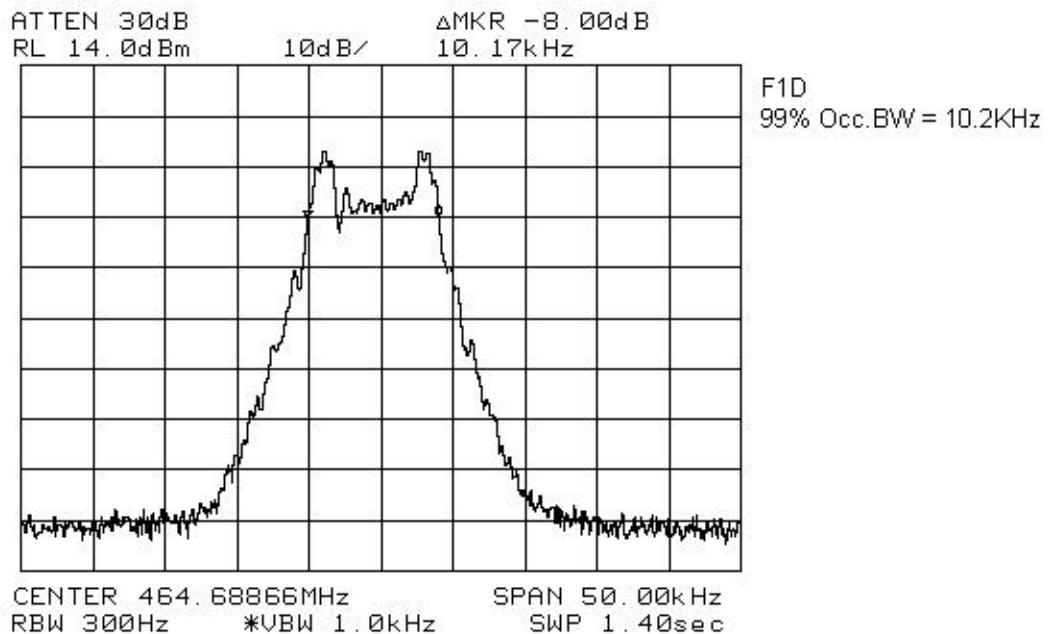
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*EQUIPMENT: RPE673*

*FCC ID: E86RPE673*

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### **Section 3. RF Power Output**

**Para. No.: 2.1046**

<b>Test Performed By: Glen Westwell</b>	<b>Date of Test: 22 March 2002</b>
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**Minimum Standard:** 90.205

**Test Results:** Complies.

The RF power output is 33.8dBm, 2.39W. This is within +/- 1dB of the manufacturers rating.

**Measurement Data:** 2.39W (33.8dBm)

*EQUIPMENT: RPE673**FCC ID: E86RPE673*

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**Section 4.****Occupied Bandwidth****Para. No.: 2.1049**

<b>Test Performed By:</b> Glen Westwell	<b>Date of Test:</b> 23 March 2002
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**Minimum Standard:** 90.210**Test Results:** Complies**Measurement Data:** See Attached Plots.

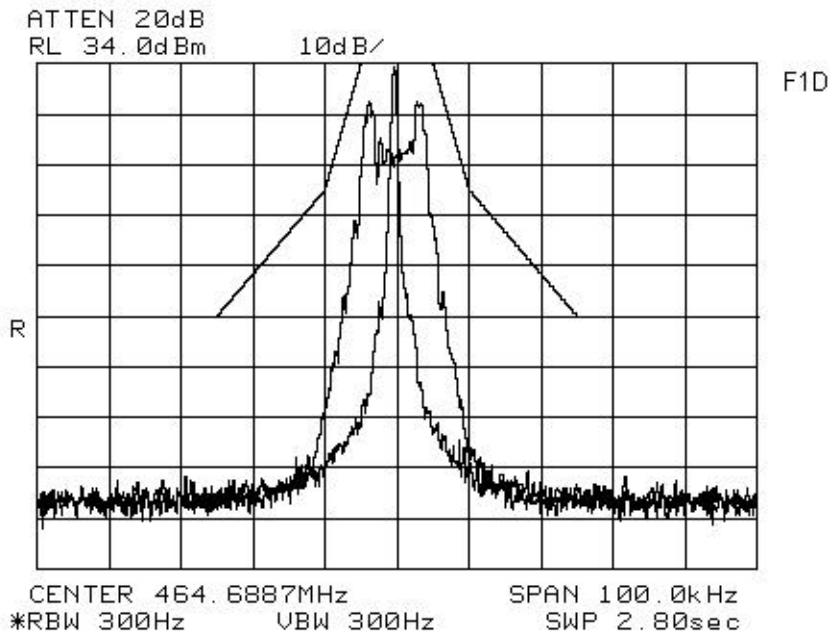
**Nemko Canada Inc.**

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PROJECT NO.:2W04669

*EQUIPMENT: RPE673*

*FCC ID: E86RPE673*

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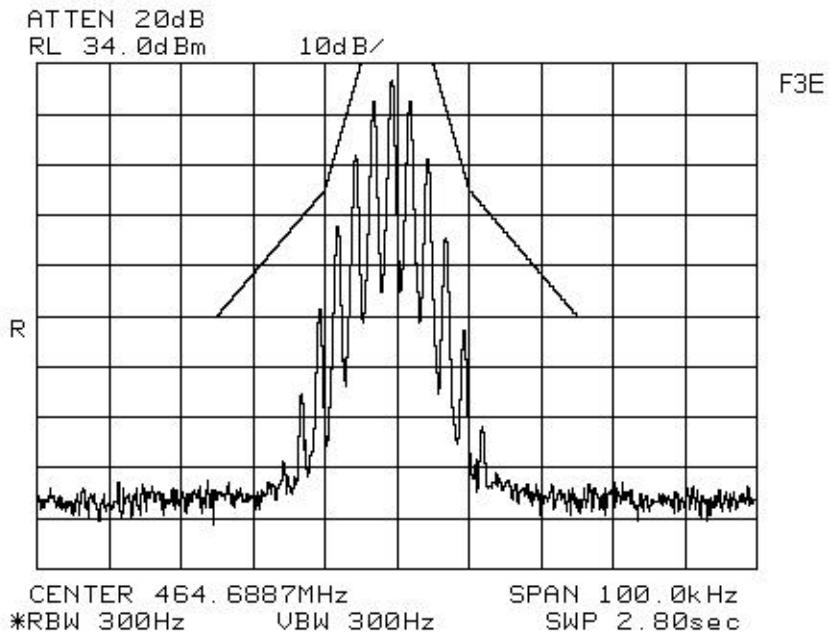
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PROJECT NO.:2W04669

*EQUIPMENT: RPE673*

*FCC ID: E86RPE673*

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*EQUIPMENT: RPE673**FCC ID: E86RPE673*

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**Section 5. Spurious Emissions at Antenna Terminals****Para. No.: 2.1051**

<b>Test Performed By:</b> Glen Westwell	<b>Date of Test:</b> 25 March 2002
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**Minimum Standard:** 90.210, -13dBm**Test Results:** Complies.**Measurement Data:** See Attached Plot.

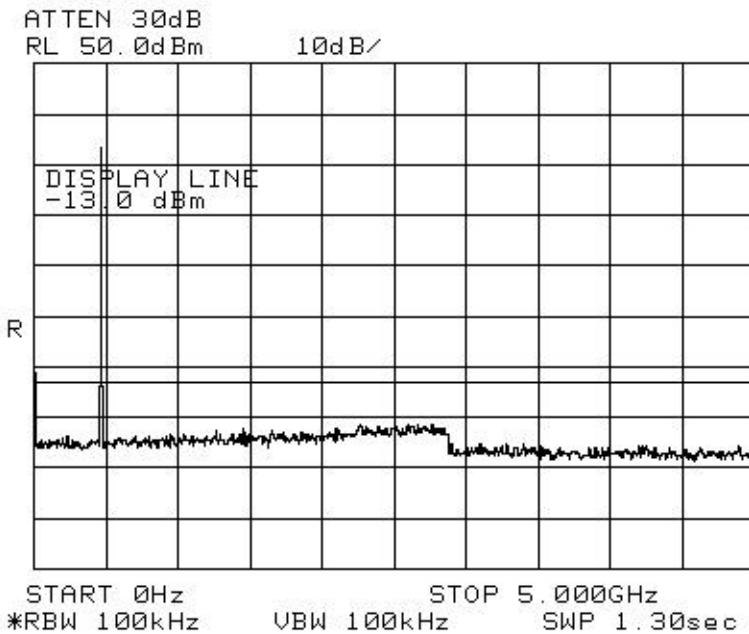
**Nemko Canada Inc.**

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*EQUIPMENT: RPE673*

*FCC ID: E86RPE673*

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Conducted Spurious.

*EQUIPMENT: RPE673**FCC ID: E86RPE673*

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**Section 9. Field Strength of Spurious Emissions****Para. No.: 2.1053**

<b>Test Performed By: Glen Westwell</b>	<b>Date of Test: 26 March 2002</b>
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**Minimum Standard:** 90.210, -13dBm**Test Results:** Complies.**Measurement Data:** See Attached Table.

*EQUIPMENT: RPE673**FCC ID: E86RPE673***Test Data - Radiated Emissions**

Test Distance (meters) : 3		Range: A		Receiver: 8564E	RBW(kHz): 100/1000	Detector: Peak	
Freq. (MHz)	Ant. *	Pol. (V/H)	RCVD Signal (dB $\mu$ V/m)	Conversion Factor (dB)**	Field Strength (dBm)	Limit (dBm)	Margin (dB)
929.4	SSV	V	23.0	-64.2	-41.2	-13.0	28
929.4	SSH	H	25.4	-67.8	-42.4	-13.0	29
1394.06	SSV	V	77.7	-118.2	-40.5	-13.0	27
1394.06	SSH	H	78.1	-118.8	-40.7	-13.0	27
1858.75	SSV	V	69.5	-115.2	-45.7	-13.0	32
1858.75	SSH	H	69.4	-115.6	-46.2	-13.0	33
2323.44	SSV	V	92.2	-124.1	-31.9	-13.0	18
2323.44	SSH	H	92.8	-124.7	-31.9	-13.0	18
2788.13	SSV	V	87.2	-122.6	-35.4	-13.0	22
2788.13	SSH	H	87.7	-124.3	-36.6	-13.0	23
3252.82	SSV	V	78.7	-119.7	-41.0	-13.0	28
3252.82	SSH	H	78.5	-120.0	-41.5	-13.0	28
3717.5	SSV	V	82.7	-118.3	-35.6	-13.0	22
3717.5	SSH	H	83.2	-119.7	-36.5	-13.0	23
4182.19	SSV	V	69.0	-113.4	-44.4	-13.0	31
4182.19	SSH	H	70.0	-113.1	-43.1	-13.0	30
4647.05	SSV	V	79.3	-114.0	-34.7	-13.0	21
4647.05	SSH	H	79.5	-114.3	-34.8	-13.0	21
5111.65	SSV	V	69.5	-111.6	-42.1	-13.0	29
5111.65	SSH	H	69.9	-110.0	-40.1	-13.0	27

**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

**Nemko Canada Inc.**

FCC PART 90  
PRIVATE LAND MOBILE TRANSMITTER  
PROJECT NO.:2W04669

*EQUIPMENT: RPE673*

*FCC ID: E86RPE673*

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RPE673



*EQUIPMENT: RPE673**FCC ID: E86RPE673***Section 10. Frequency Stability****Para. No.: 2.1055**

<b>Test Performed By:</b> Glen Westwell	<b>Date of Test:</b> 25 March 2002
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**Minimum Standard:** 90.213, 2.5ppm.**Test Results:** Complies.

The maximum frequency drift is 783Hz. This is 1.7ppm.

**Standard Test Voltage:** 120Vac.  
**Standard Test freq.:** 464.6875MHz**Measurement Data:**

<b>Test Condition</b>	<b>Frequency Drift (Hz)</b>
STV	748
115% STV	755
85% STV	750
-30°C	51
-20°C	172
-10°C	359
0°C	783
+10°C	758
+30°C	689
+40°C	552
+50°C	489

*EQUIPMENT: RPE673**FCC ID: E86RPE673*

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**Section 11. Transient Frequency Behaviour****Para. No.: N/A**

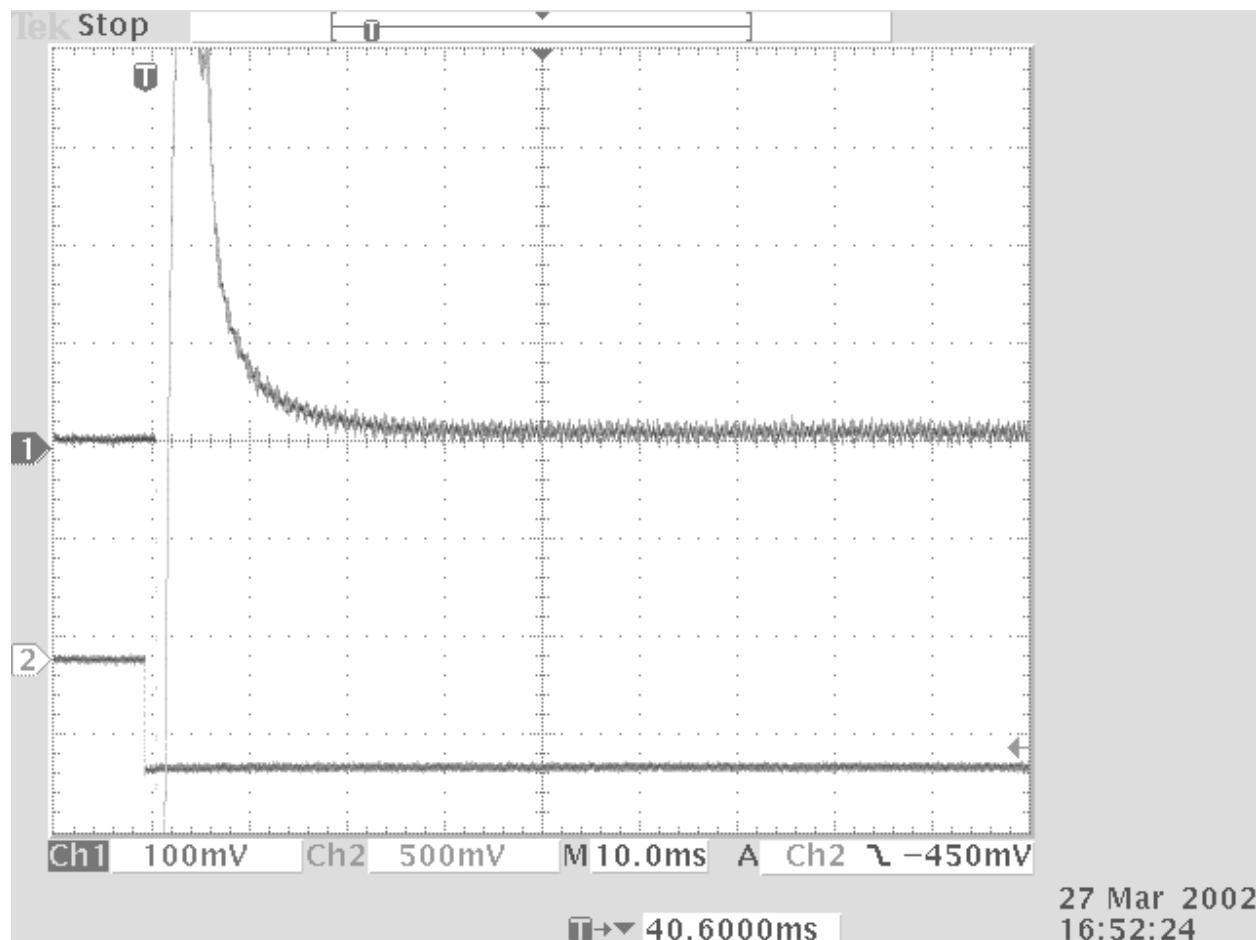
<b>Test Performed By: Glen Westwell</b>	<b>Date of Test: 27 March 2002</b>
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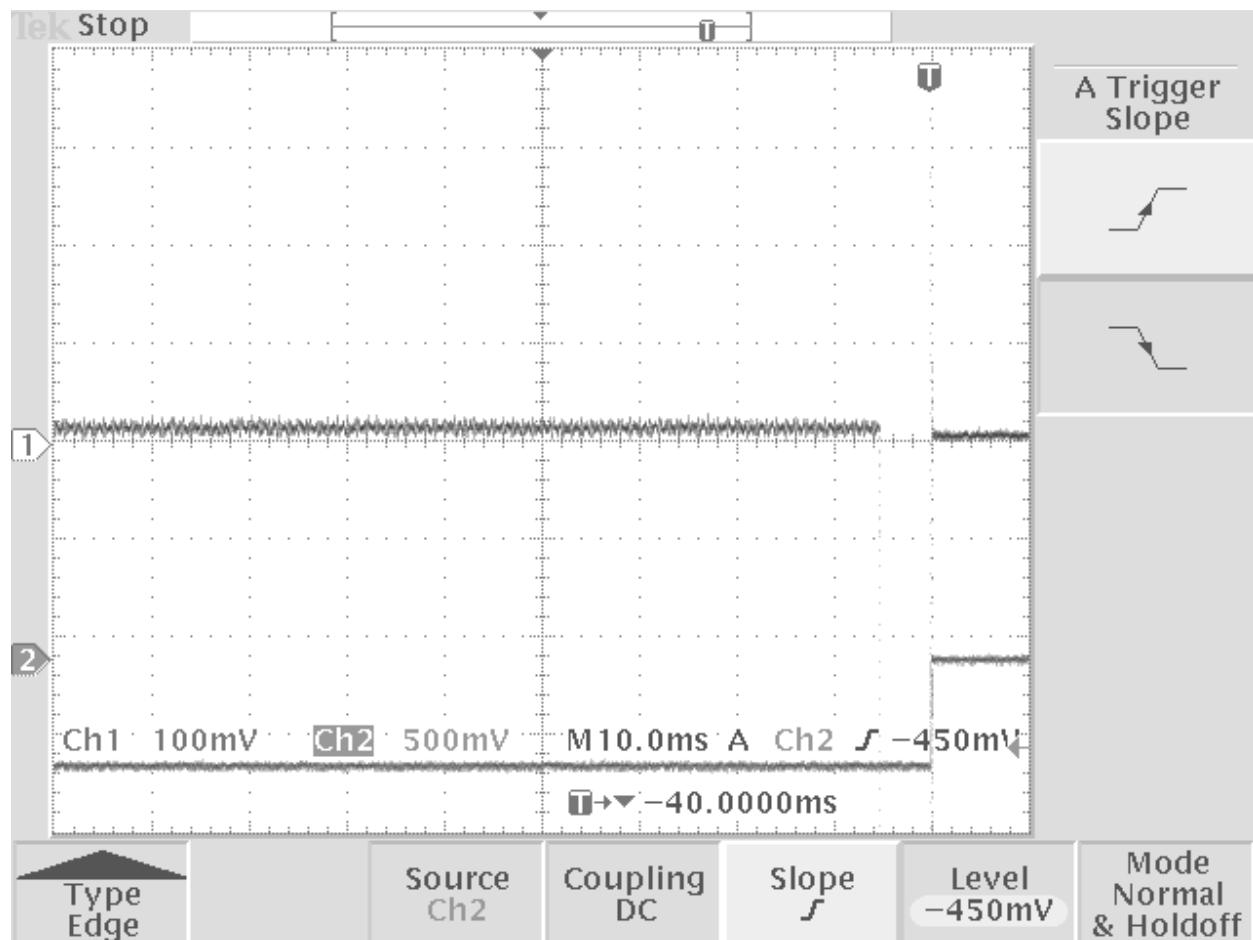
**Minimum Standard:** 90.214**Test Results:** Complies.**Measurement Data:** See Attached plots.

EQUIPMENT: RPE673

FCC ID: E86RPE673

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**EQUIPMENT: RPE673****FCC ID: E86RPE673**

*EQUIPMENT: RPE673**FCC ID: E86RPE673***Section 12.****Test Equipment List**

<b>CAL CYCLE</b>	<b>EQUIPMENT</b>	<b>MANUFACTURER</b>	<b>MODEL</b>	<b>SERIAL</b>	<b>LAST CAL.</b>	<b>NEXT CAL.</b>
1 Year	Spectrum Analyzer	Hewlett Packard	8564E	3846A01407	Jun. 8/01	Jun. 8/02
1 Year	Spectrum Analyzer-1	Hewlett Packard	8566B	2311A02238	Nov. 27/01	Nov. 27/02
1 Year	Spectrum Analyzer Display-1	Hewlett Packard	8566B	2314A04759	Nov. 27/01	Nov. 27/02
1 Year	Quasi-peak adapter-1	Hewlett-Packard	85650A	2043A00302	Mar. 21/01	Mar. 21/02
1 Year	Radio Communications	Rohde & Schwarz	CMTA 54	840343/013	Mar. 23/01	Mar. 23/03
1 Year	Climate Chamber	Thermotron	SM-16C	15649-S	COU	COU
1 Year	Attenuator	Narda	768-10	9709	COU	COU
1 Year	Attenuator	Narda	769-20	4153	COU	COU
1 Year	Attenuator	Narda	776B-20	FA001400	June 10/01	June 10/02
3 Year	RF Millivoltmeter	Rohde & Schwarz	URV5	FA001570	July 3/00	July 3/03
1 Year	Biconical (1) Antenna	EMCO	3109	9204-2708	Aug. 22/01	Aug. 22/02
3 Year	Signal Generator	Rhode & Schwarz	SM1Q03E	FA001269	Oct. 4/99	Oct. 4/02
1 Year	RF Pick Up	Tegam	95241-1	11175	COU	COU
1 Year	Frequency Counter	Hewlett Packard	HP5350A	2444A00135	May 7/00	Feb. 4/02
1 Year	Plotter	Hewlett Packard	7550A	FA001129	NCR	NCR
1 Year	oscilloscope	Tektronix	TDS3012	FA001560	29 Jun. 01	29 Jun. 02
1 Year	Hrn. Antenna	EMCO	3115	FA000825	01 Dec. 01	01 Dec. 02

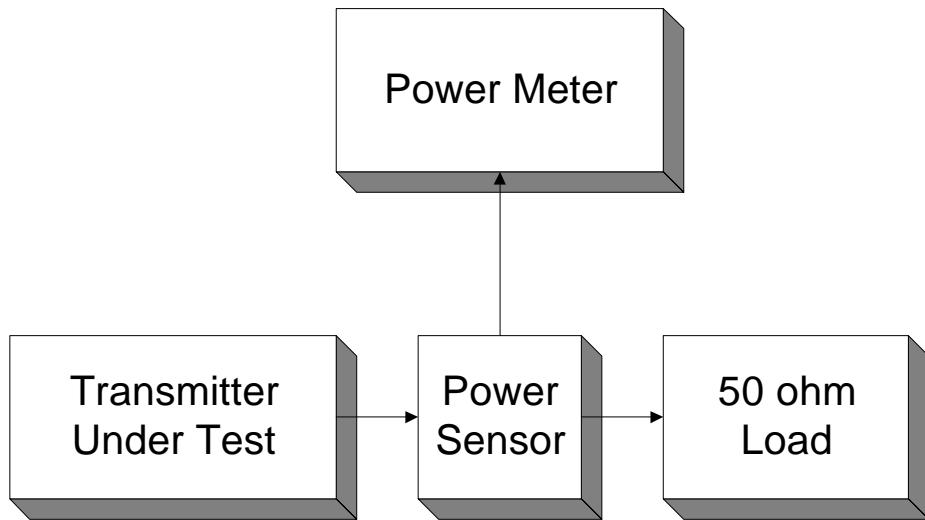
NA: Not Applicable

NCR: No Cal Required

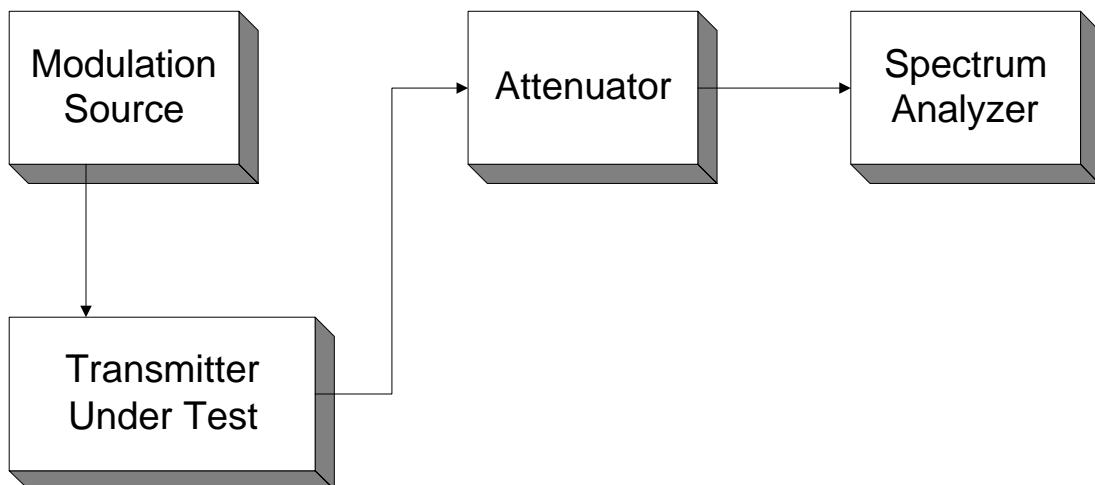
COU: CAL On Use

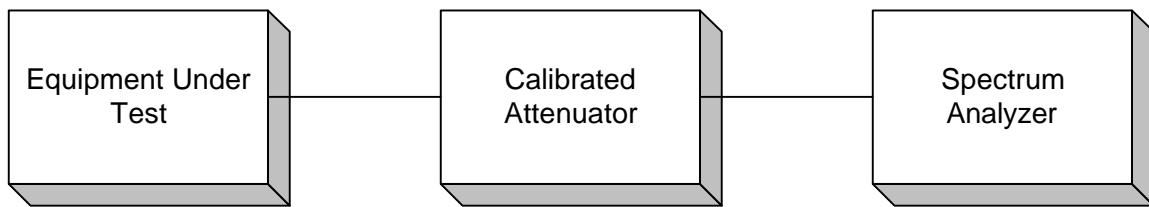
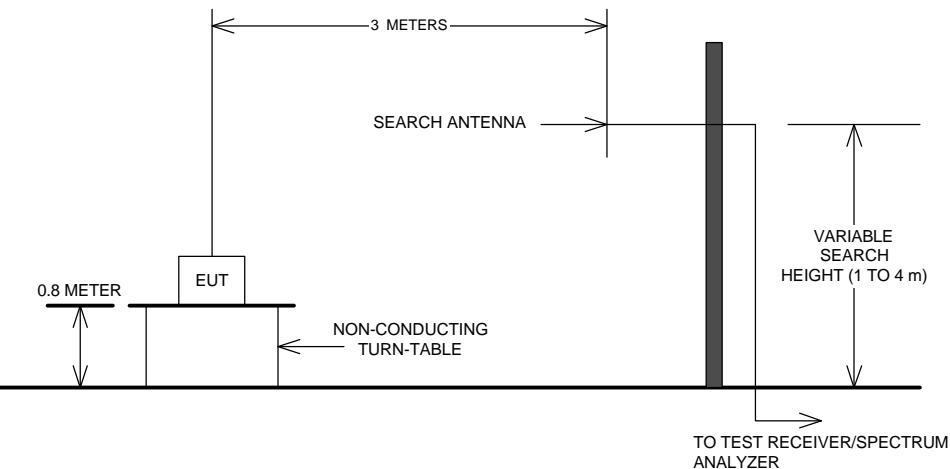
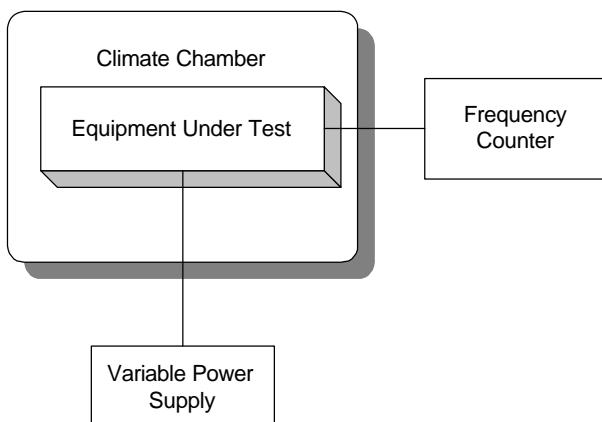
## Section 13. Test Diagrams

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



### Para. No. 2.1049 - Occupied Bandwidth



**EQUIPMENT: RPE673****FCC ID: E86RPE673****Para. No. 2.1051 - Spurious Emissions at Antenna Terminals****Para. No. 2.1053 - Field Strength of Spurious Radiation****Para. No. 2.1055 - Frequency Stability**

**Transient Frequency Behaviour:**