TIMCO ENGINEERING, Inc.

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Newberry, FL 32669 USA
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FCC PART 97 AMATEUR RADIO TEST REPORT

Applicant	TOKYO HY-POWER LABS, INC.
Address	1-1 HATANAKA 3 CHOME,
	NIIZA SAITAMA 352-0012 JAPAN
FCC ID	UB9HL-15Kfx
Model Number	HL-1.5Kfx
Product Description	LINEAR AMP
Date Sample Received	5/2/2006
Date Tested	6/5/2006
Tested By	RICHARD BLOCK
Approved By	FRANK DENUZZO
Report Number	895UT6 TestReport
Total Pages	25
Test Results	☒ PASS ☐ FAIL

ACCREDITED
Certificate # 0955-01

TABLE OF CONTENT

STATEMENT OF COMPLIANCE

This equipment has been tested in accordance with the standards identified in the referenced test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report and demonstrate that the equipment complies with the appropriate standards. No modifications were made to the equipment during testing in order to demonstrate compliance with these standards.

I attest that the necessary measurements were made by me or under my supervision, at TIMCO ENGINEERING, INC. located at 849 N.W. State Road 45, Newberry, Florida 32669 USA.

Authorized by: Frank DeNuzzo

Signature:

Function: Engineer

Date: June 15, 2006

Tested by: Richard Block

Signature: on file

Date: June 15, 2006

GENERAL INFORMATION

DUT Specification

The test results relate only to the items tested.	
DUT Description	LINEAR AMPLIFIER
FCC ID	UB9HL-15KFX
Model Number	HL-1.5Kfx
Serial Number	N/A
Operating Frequency	1.8-21 MHz (as sold), 1.8-30MHz and 50-54MHz (Amateur Service only)
No. of Channels	Single
Type of Emission	N/A
Modulation	
DUT Power Source	☒ 240 VAC/50– 60Hz; 120 VAC/50-60Hz
	☐ DC Power
	☐ Battery Operated Exclusively
Test Item	☐ Prototype
	☒ Pre-Production
	☐ Production
Type of Equipment	☒ Fixed
	☐ Mobile
	☐ Portable
Antenna	N/A
Antenna Connector	PL 259

Test Facility: The test sites used by Timco Engineering Inc. for radiated and conducted emission data are located at 849 NW State Road 45 Newberry, FL 32669 USA.

Test Condition: The DUT was tested in the laboratory in an environment with normal temperature and humidity. The temperature was 26°C with a relative humidity of 50%.

Modification to the DUT: No modification was made to the DUT during testing.

Test Exercise (e.g software description, test signal, etc.): The DUT was placed in continuous transmit mode of operation.

Applicable Standards: TIA 603 & ANSI C63.4 – 2003
FCC CFR 47 Part 97
FCC CRF 47 Part 15

Other information:

The amplifier is capable of operation in the amateur radio bands below 30 MHz and additionally in the 6 meter amateur band (50-54 MHz). The amplifier is NOT capable of operation on any frequency or frequencies between 24 MHz and 35 MHz as marketed. Instructions for modification to operate in the 12 meter, 10 meter, and 6 meter bands are available only to licensed amateur radio operators upon request from the manufacturer. The amplifier is shipped with 24.5 MHz, 28 MHz, and 50 MHz bands disabled and inoperative.

1. The amplifier is incapable of amplification above 54 MHz.

2. The amplifier requires 80 Watts of drive to obtain full output power. Reduction in RF input power reduces the output power as shown on Page 8.

3. The conducted spurious emissions tables are shown on Pages 17 through 20. The amplifier was modified per manufacturer's instructions to verify spurious RF radiation in the 24 MHz, 28 MHz, and 50 MHz amateur bands. This information is shown separately on Page 20.

4. The gain of the amplifier is under 15 dB on all bands and under all conditions.

5. The amplifier in the off or standby state does not amplify and merely passes through the exciter energy to the antenna port. The spurious emissions of the transceiver were unaffected.

EMC EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
Analyzer Tan Tower Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	CAL 12/7/05	12/7/07
Analyzer Tan Tower RF Preselector	HP	85685A	3221A01400	CAL 12/7/05	12/7/07
Analyzer Tan Tower Quasi-Peak Adapter	HP	85650A	3303A01690	CAL 12/8/05	12/8/07
Analyzer Tan Tower Preamplifier	HP	8449B-H02	3008A00372	CAL 12/8/05	12/8/07
Antenna: Biconnical	Electro-Metrics	BIA-25	1171	CAL 4/29/05	4/29/07
Antenna: Log-Periodic	Electro-Metrics	LPA-25	1122	CAL 8/26/04	8/26/06
Antenna: Double-Ridged Horn	Electro-Metrics	RGA-180	2319	CAL 12/29/04	12/29/06
LISN	Electro-Metrics	ANS-25/2	2604	CAL 8/27/04	8/27/06
Termaline Wattmeter	Bird Electronic Corporation	611	16405	CAL 7/16/04	7/16/06

TEST PROCEDURES:

Radiation Interference: The test procedure used was TIA 603 using a HEWLETT PACKARD spectrum analyzer with a pre-selector. In the frequency range 10 kHz to 30 MHz the RBW was 10 kHz and from 30-1000 MHz the RBW of the spectrum analyzer was 100 kHz with an appropriate sweep speed. The analyzer was calibrated in dB above a micro volt at the output of the antenna. The resolution bandwidth was 100 kHz and the video bandwidth was 300 kHz.

Formula Of Conversion Factors: The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB. The gain of the Pre-selector was accounted for in the Spectrum Analyzer Meter Reading.

Example:

Freq (MHz)	Meter Reading	+ ACF	+ CL	= FS
33	20 dBuV	+ 10.36 dB/m	+0.4 dB	= 30.76 dBuV/m @ 3m

TIA 603 Measurement Procedures: The DUT was placed on a non-conducting table 80 cm above the ground plane with the DUT located in the center of the table. With the antenna vertical a preliminary scan was done at 1 meters distance, the DUT was moved to a 3.0-meter distance and the antenna height varied and also placed in a horizontal position. The frequency was scanned from 9.0 kHz to 1.0 GHz. When an emission was found, the table was rotated to produce the maximum signal strength.

Part 97.313

Power Output Power shall not exceed 1.5 PEP Watts into a 50 ohm resistive load. There are no user power controls.

Part 2.1033(c)(8)

DC Voltages and Current into Final Amplifier:

INPUT POWER – (60Volts)(50Amps) = 3000 Watts

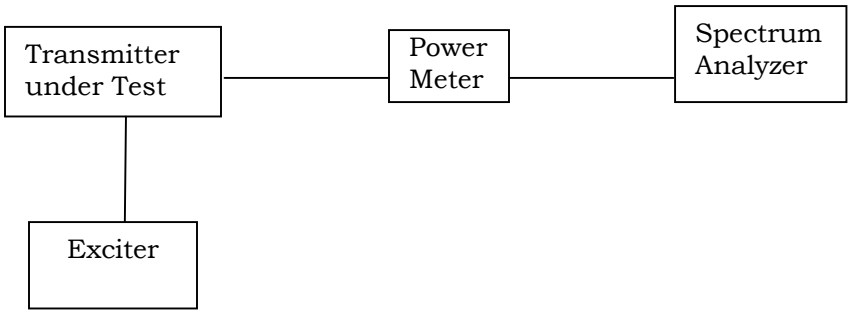
RF POWER OUTPUT

Rule Parts No.: Part 2.1046(a), Part 97.313

Requirements: 97.313

Test Procedure: RF power is measured by connecting a 50-ohm, resistive wattmeter to the RF output connector with a nominal input voltage of 240 AC Volts. The transmitter was properly adjusted and the maximum RF output power was measured at 900 Watts.

Test Setup:



Test Data:

Output Power: With disabling jumper (as sold)
(Input/Output: Not to exceed 15 dB Gain)

Freq (MHz)	Power in (W)	Power out (W)
1.900	80	850
3.750	80	850
7.150	80	900
10.125	80	800
14.150	80	900
18.110	80	900
21.200	80	900

(Input/Output= 0 dB gain)

24.890	>=60	40
28.000	>=60	40
29.700	>=60	40
52.000	>=60	40

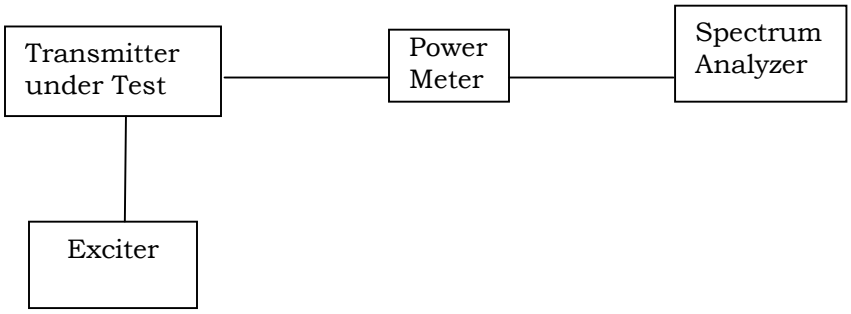
RF POWER OUTPUT (with modification)

Rule Parts No.: Part 2.1046(a), Part 97.313

Requirements: 97.313

Test Procedure: The amplifier was modified per manufacturer's instruction to include the 24, 28, and 50 MHz amateur radio bands and tested. RF power is measured by connecting a 50-ohm, resistive wattmeter to the RF output connector with a nominal input voltage of 240 AC Volts. The transmitter was properly adjusted and the maximum RF output power was measured at 900 Watts.

Test Setup:



Test Data:

Output Power: (Modified for Amateur Service only)

Freq (MHz)	Power in (W)	Power out (W)
1.900	80	850
3.750	80	850
7.150	80	900
10.125	80	800
14.150	80	900
18.110	80	900
21.200	80	900
24.890	80	800
28.000	80	850
29.700	80	800
52.000	80	550

SPURIOUS EMISSIONS – INTER MODULATION DISTORTION

Rule Parts No.: Part 2.1053

Requirements:

Method of Measurement: Exciter operating in SSB (A3E, J3E) mode with two equal-tone audio applied to the microphone input. Amplifier under test driven to 900 W PEP output at the center of the band with typically 80 W input power.

Test Data: Please see the following plots

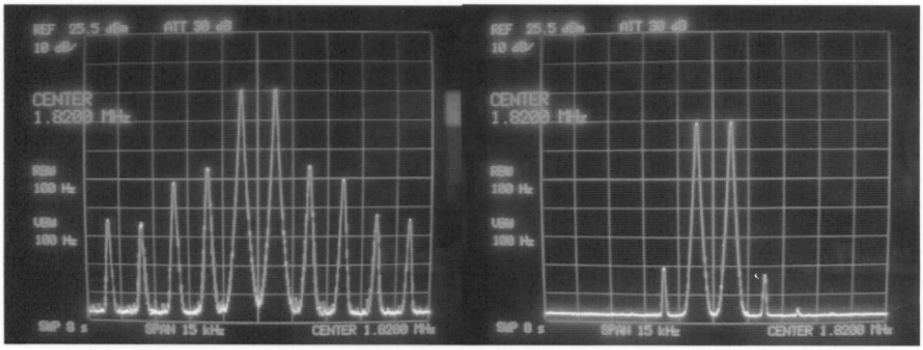
2006/03/10

HL-1.5KFX S/N 0520003

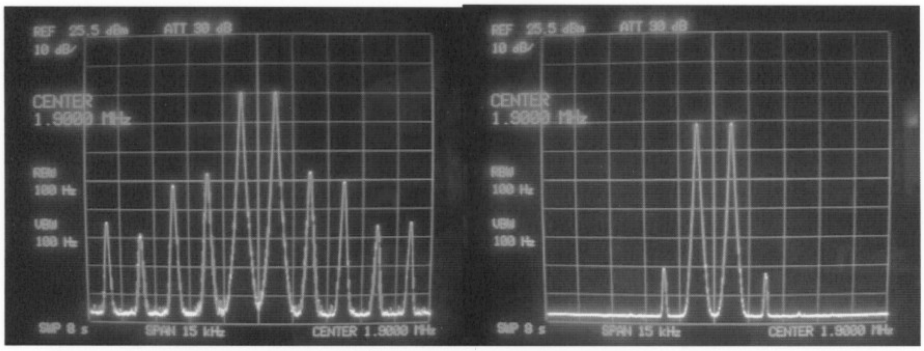
INTER MODULATION DISTORTION

Vertical resolution : 10dB / div.
Horizontal resolution : 1.5 k Hz / div.
Input signal : Two equal RF signals, separated by 1.5 k Hz.

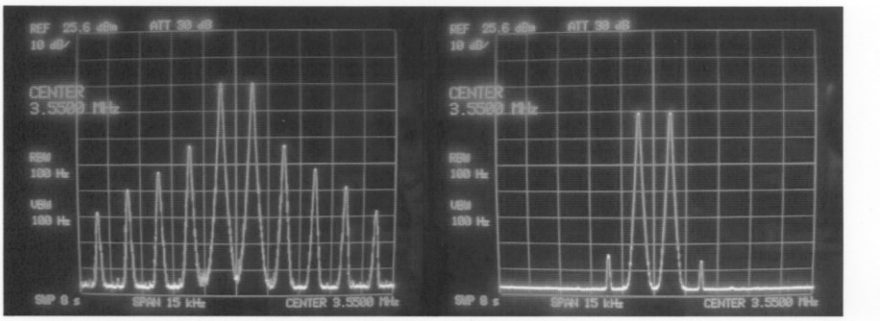
1.82MHz (- 750Hz / +750Hz) 900W PEP Input Signals



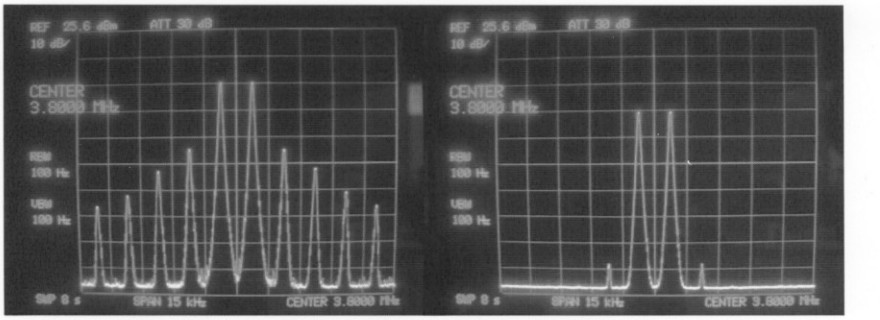
1.9MHz (- 750Hz / +750Hz) 900W PEP Input Signals



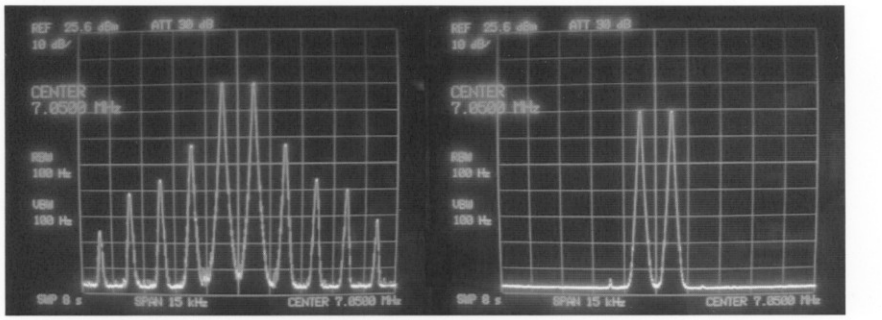
3.55MHz (- 750Hz / +750Hz) 900W PEP Input Signals



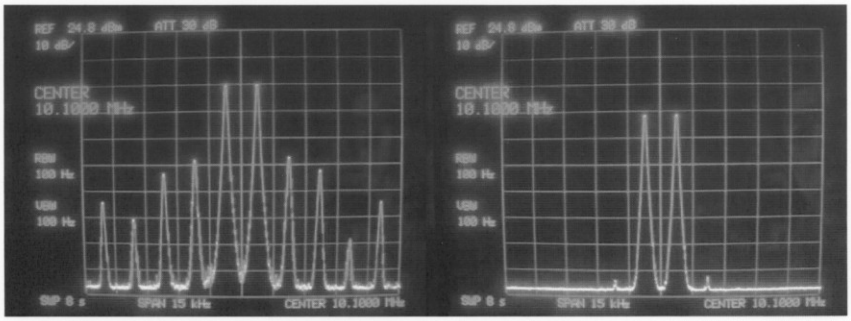
3.8MHz (- 750Hz / +750Hz) 900W PEP Input Signals



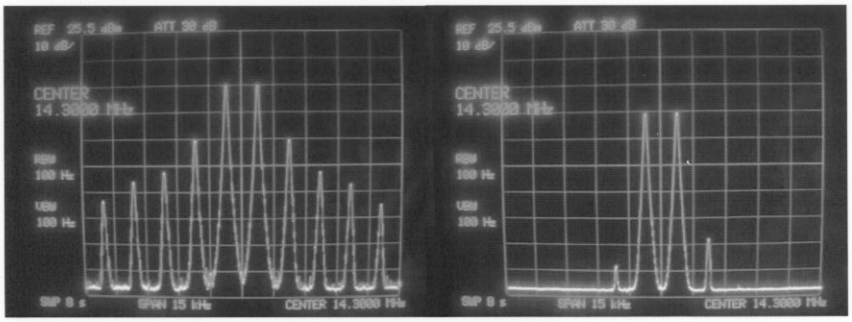
7.05MHz (- 750Hz / +750Hz) 900W PEP Input Signals



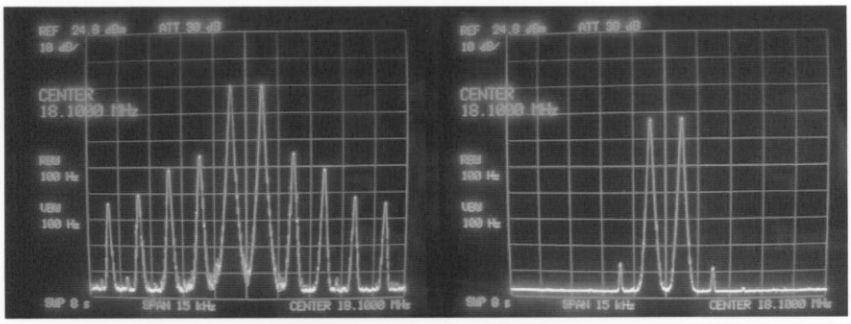
10.1MHz (- 750Hz / +750Hz) 800W PEP Input Signals



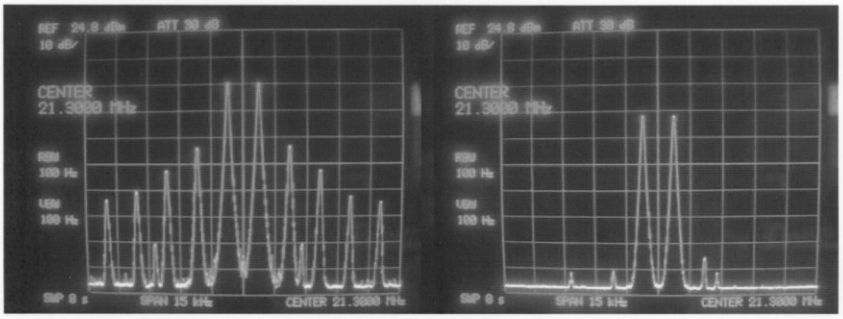
14.3MHz (- 750Hz / +750Hz) 900W PEP Input Signals



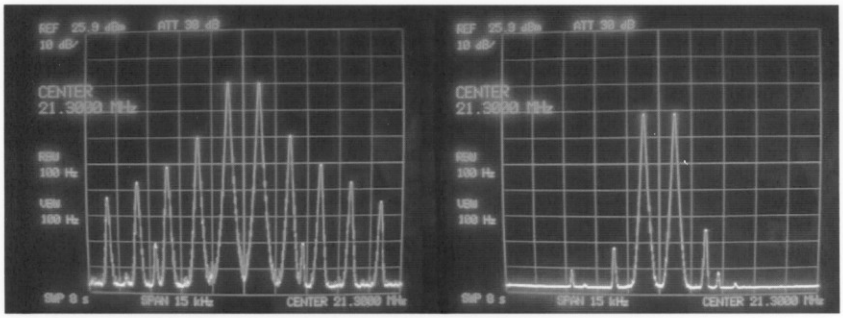
18.1MHz (- 750Hz / +750Hz) 900W PEP Input Signals



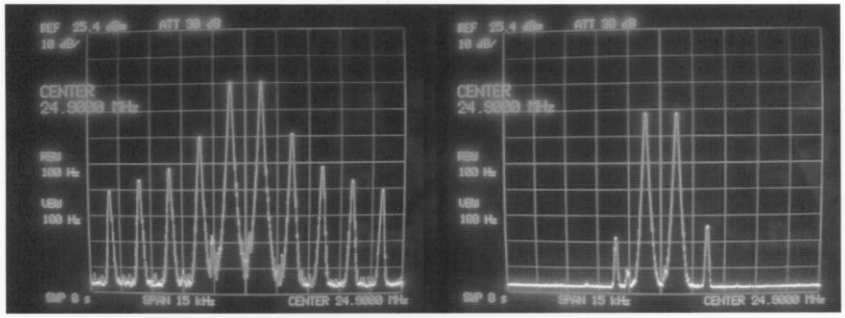
21.3MHz (- 750Hz / +750Hz) 900W PEP Input Signals



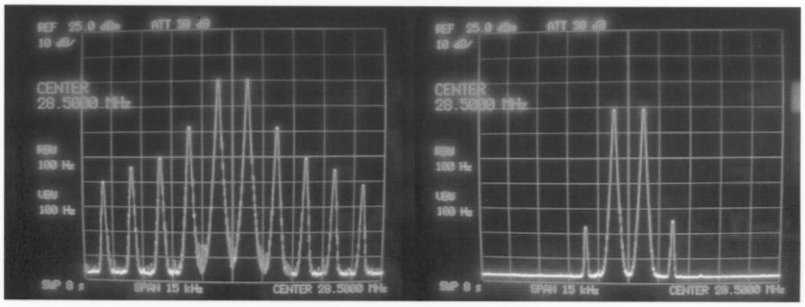
21.3MHz (- 750Hz / +750Hz) 1000W PEP Input Signals



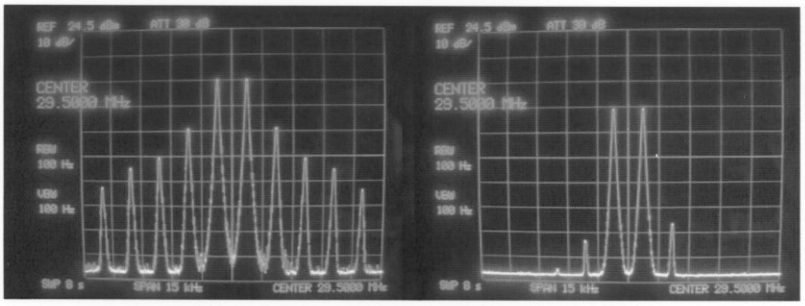
24.9MHz (- 750Hz / +750Hz) 800W PEP Input Signals



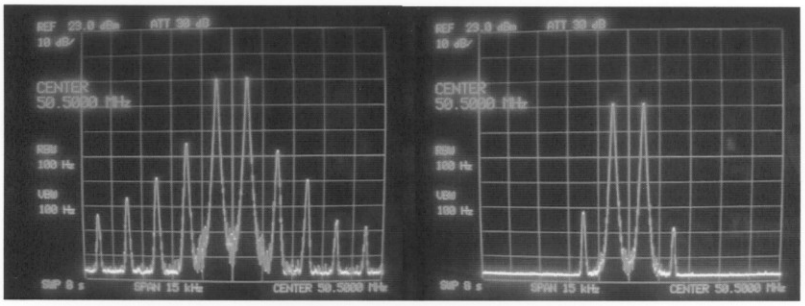
28.5MHz (- 750Hz / +750Hz) 800W PEP Input Signals



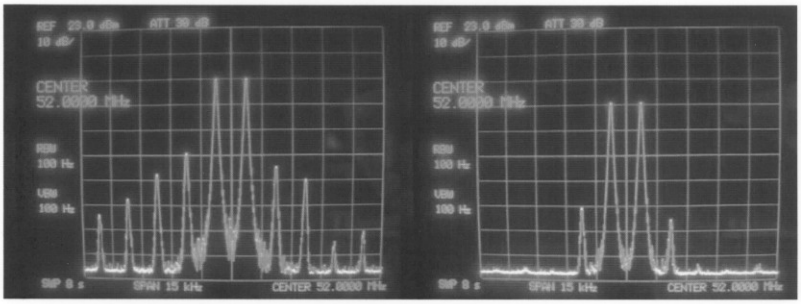
29.5MHz (- 750Hz / +750Hz) 800W PEP Input Signals



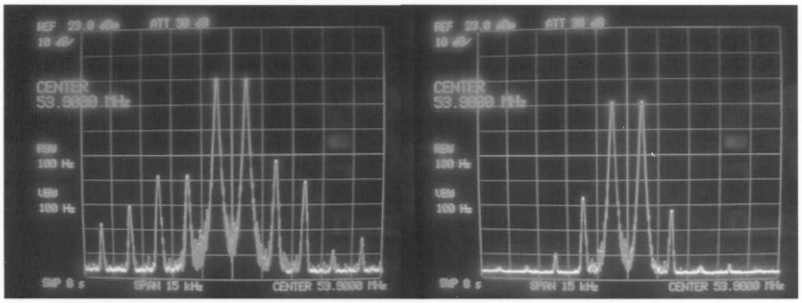
50.5MHz (- 750Hz / +750Hz) 500W PEP Input Signals



52.0MHz (- 750Hz / +750Hz) 500W PEP Input Signals



53.9MHz (- 750Hz / +750Hz) 500W PEP Input Signals

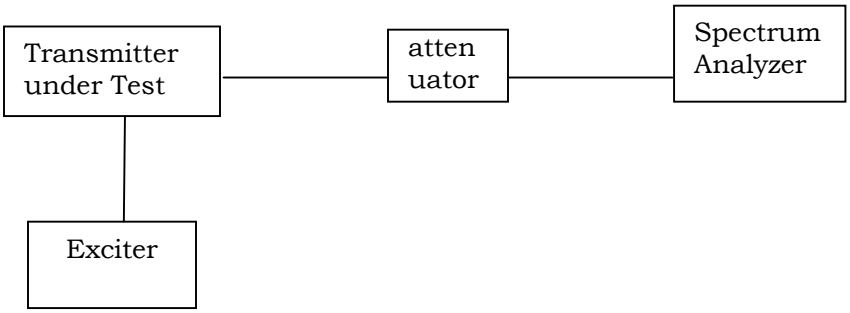


STRENGTH OF SPURIOUS EMISSIONS

Rule Parts No.: Part 2.1053 & Part 97.307 (d) (e)

Requirements: The FCC Limits for spurious emissions of a transmitting operating on a frequency below 30 MHz must be at least 43dB below the mean power. For the transmitter frequency operating at 50 MHz, the RF spurious emissions must be at least 60 dB below the mean power of the fundamental.

Method Of Measurements:
Test Setup:



Test Data:
(As Sold)

TF (MHz)	EF (MHz)	M reading (dBm)	dB below carrier	43 dB Below Fundamental
1.9	1.90	59.15	0	N/A
1.9	3.80	-21.58	80.73	PASS
1.9	5.70	-3.06	62.21	PASS
1.9	7.60	-26.00	85.15	PASS
1.9	9.50	-26.00	85.15	PASS
1.9	11.40	-26.00	85.15	PASS
1.9	13.30	-24.38	83.53	PASS
1.9	15.20	-26.00	85.15	PASS
1.9	17.10	-26.00	85.15	PASS
1.9	19.00	-26.00	85.15	PASS

Note: -26.0 dBm is noise floor

TF (MHz)	EF (MHz)	M reading (dBm)	dB below carrier	43 dB Below Fundamental
3.75	3.75	59.93	0	N/A
3.75	7.50	-17.65	77.58	PASS
3.75	11.25	-12.46	72.39	PASS
3.75	15.00	-26.00	85.93	PASS
3.75	18.75	-18.80	78.73	PASS
3.75	22.50	-26.00	85.93	PASS
3.75	26.25	-16.39	76.32	PASS
3.75	30.00	-26.00	85.93	PASS
3.75	33.75	-15.15	75.08	PASS
3.75	37.50	-26.00	85.93	PASS

TF (MHz)	EF (MHz)	M reading (dBm)	dB below carrier	43 dB Below Fundamental
7.15	7.15	59.52	0	N/A
7.15	14.30	-7.64	67.16	PASS
7.15	21.45	-14.59	74.11	PASS
7.15	28.60	-26.00	85.52	PASS
7.15	35.75	-19.47	78.99	PASS
7.15	42.90	-26.00	85.52	PASS
7.15	50.05	-26.00	85.52	PASS
7.15	57.20	-26.00	85.52	PASS
7.15	64.35	-17.89	77.41	PASS
7.15	71.50	-26.00	85.52	PASS

TF (MHz)	EF (MHz)	M reading (dBm)	dB below carrier	43 dB Below Fundamental
10.125	10.125	59.14	0	N/A
10.125	20.250	-2.54	61.68	PASS
10.125	30.375	6.15	52.99	PASS
10.125	40.500	-26.00	85.14	PASS
10.125	50.625	-18.22	77.36	PASS
10.125	60.750	-26.00	85.14	PASS
10.125	70.875	-21.67	80.81	PASS
10.125	81.000	-26.00	85.14	PASS
10.125	91.125	-26.00	85.14	PASS
10.125	101.250	-26.00	85.14	PASS

TF (MHz)	EF (MHz)	M reading (dBm)	dB below carrier	43 dB Below Fundamental
14.15	14.150	59.55	0	N/A
14.15	28.300	-0.58	60.13	PASS
14.15	42.450	6.11	53.44	PASS
14.15	56.600	-26.00	85.55	PASS
14.15	70.750	-17.98	77.53	PASS
14.15	84.900	-26.00	85.55	PASS
14.15	99.050	-26.00	85.55	PASS
14.15	113.200	-26.00	85.55	PASS
14.15	127.350	-26.00	85.55	PASS
14.15	141.500	-26.00	85.55	PASS

TF (MHz)	EF (MHz)	M reading (dBm)	dB below carrier	43 dB Below Fundamental
18.11	18.110	59.51	0	N/A
18.11	36.220	-2.24	61.75	PASS
18.11	54.330	2.98	56.53	PASS
18.11	72.440	-26.00	85.51	PASS
18.11	90.550	-26.00	85.51	PASS
18.11	108.660	-26.00	85.51	PASS
18.11	126.770	-26.00	85.51	PASS
18.11	144.880	-26.00	85.51	PASS
18.11	162.990	-26.00	85.51	PASS
18.11	181.100	-26.00	85.51	PASS

TF (MHz)	EF (MHz)	M reading (dBm)	dB below carrier	43 dB Below Fundamental
21.2	21.200	59.51	0	N/A
21.2	42.400	-2.24	61.75	PASS
21.2	63.600	2.98	56.53	PASS
21.2	84.800	-26.00	85.51	PASS
21.2	106.000	-26.00	85.51	PASS
21.2	127.200	-26.00	85.51	PASS
21.2	148.400	-26.00	85.51	PASS
21.2	169.600	-26.00	85.51	PASS
21.2	190.800	-26.00	85.51	PASS
21.2	212.000	-26.00	85.51	PASS

Modified per manufacturer's instructions: For Amateur Service Only

TF (MHz)	EF (MHz)	M reading (dBm)	dB below carrier	43 dB Below Fundamental
24.9	24.900	59.00	0	N/A
24.9	49.800	-1.00	60.00	PASS
24.9	74.700	7.50	51.50	PASS
24.9	99.600	-26.00	85.00	PASS
24.9	124.500	-26.00	85.00	PASS
24.9	149.400	-26.00	85.00	PASS
24.9	174.300	-26.00	85.00	PASS
24.9	199.200	-26.00	85.00	PASS
24.9	224.100	-26.00	85.00	PASS
24.9	249.00	-26.00	85.00	PASS

TF (MHz)	EF (MHz)	M reading (dBm)	dB below carrier	43 dB Below Fundamental
28.0	28.000	59.00	0	N/A
28.0	56.000	-2.75	61.75	PASS
28.0	84.000	-11.00	70.0	PASS
28.0	112.000	-26.00	85.00	PASS
28.0	140.000	-26.00	85.00	PASS
28.0	168.000	-26.00	85.00	PASS
28.0	196.000	-26.00	85.00	PASS
28.0	224.000	-26.00	85.00	PASS
28.0	252.000	-26.00	85.00	PASS
28.0	280.000	-26.00	85.00	PASS

TF (MHz)	EF (MHz)	M reading (dBm)	dB below carrier	60 dB Below Fundamental
52.0	52.000	57.40	0	N/A
52.0	104.00	-10.04	67.44	PASS
52.0	156.00	-26.00	83.40	PASS
52.0	208.00	-26.00	83.40	PASS
52.0	260.00	-26.00	83.40	PASS
52.0	312.00	-26.00	83.40	PASS
52.0	364.00	-26.00	83.40	PASS
52.0	416.00	-26.00	83.40	PASS
52.0	468.00	-26.00	83.40	PASS
52.0	520.00	-26.00	83.40	PASS

POWER LINE CONDUCTED INTERFERENCE

Rules Part No.: Part 15.207

Requirements:

Frequency (MHz)	Quasi Peak Limits (dBuV)	Average Limits (dBuV)
0.15 – 0.5	66 – 56	56 – 46
0.5 – 5.0	56	46
5.0 – 30	60	50

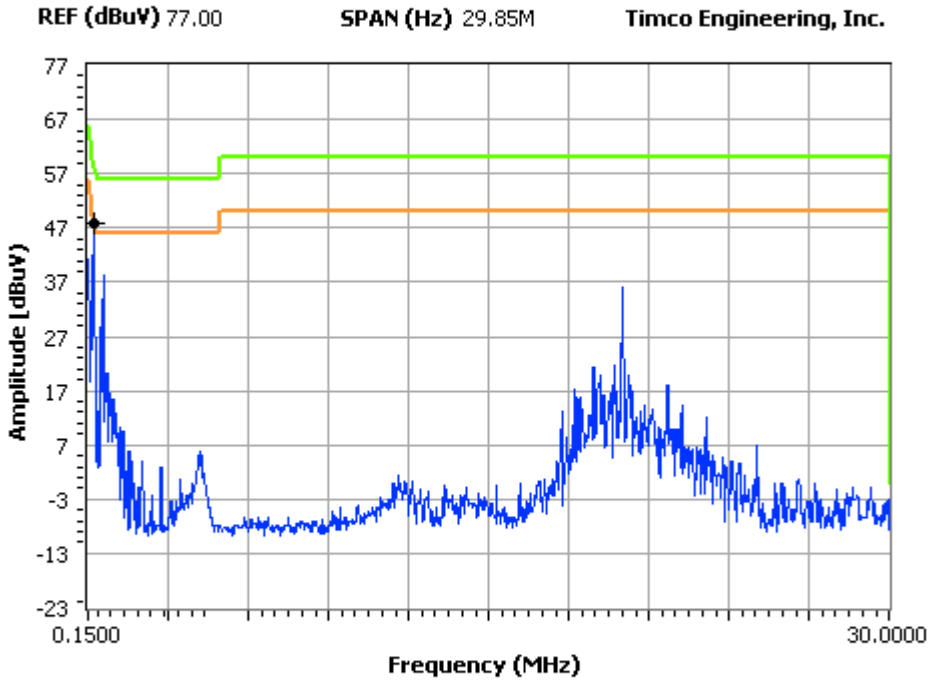
Test Procedure: ANSI Standard C63.4-2003. The spectrum was scanned from 0.15 to 30 MHz.

Test Data: The attached graphs represent the emissions read for power line conducted for this device. Both lines were observed.

POWERLINE CONDUCTED PLOT – LINE 1 – 115V

NOTES:
POWER LINE CONDUCTED -- LINE 1
TOKYO HY-POWER LABS, INC.
FCC ID: XXX HL-1.5KFx

FCC 15.107 Mask Class B



RBW	VBW	ST (sec)
10 kHz	30 kHz	2

Center Frequency (Hz) 15.075M

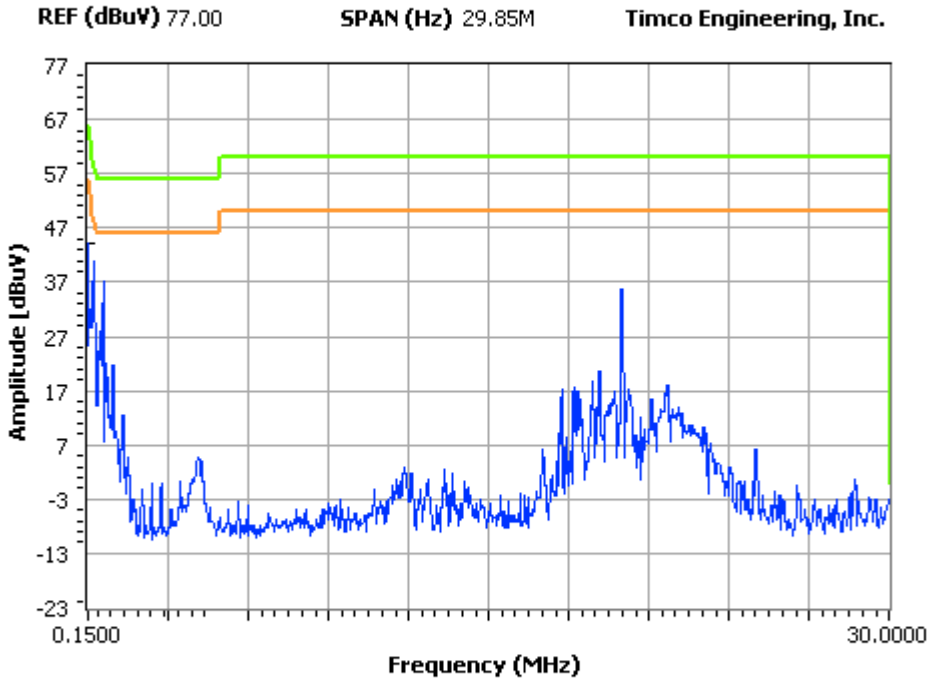
Marker Delta (Hz) 0.00

Peak	0.389	47.90
MKR2	12.239	0.20
MKR3	0.150	40.10
HWMK	23.076	6.27

POWERLINE CONDUCTED PLOT – LINE 2 – 115V

NOTES:
POWER LINE CONDUCTED -- LINE 2
TOKYO HY-POWER LABS, INC.
FCC ID: XXX HL-1.5Kfx

FCC 15.107 Mask Class B



RBW	VBW	ST (sec)
10 kHz	30 kHz	2

Center Frequency (Hz) 15.075M

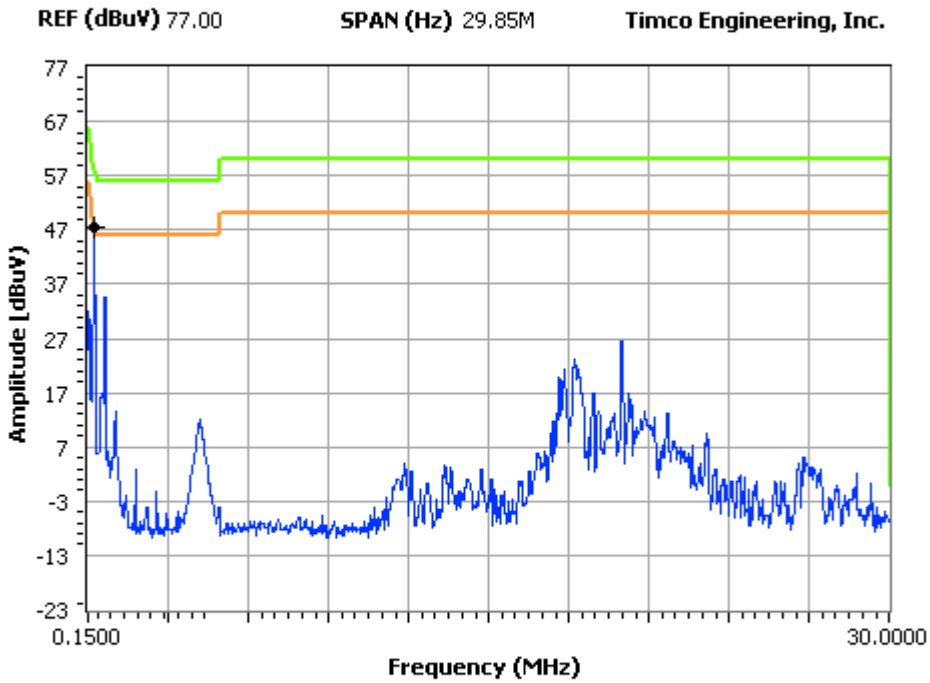
Marker Delta (Hz) 0.00

Peak	0.000	44.10
MKR2	12.239	0.20
MKR3	0.150	40.10
HWMK	23.076	6.27

POWERLINE CONDUCTED PLOT – LINE 1 – 230V

NOTES:
POWER LINE CONDUCTED -- LINE 1
TOKYO HY-POWER LABS, INC.
FCC ID: XXX HL-1.5Kfx

FCC 15.107 Mask Class B



RBW	VBW	ST (sec)
10 kHz	30 kHz	2

Center Frequency (Hz) 15.075M

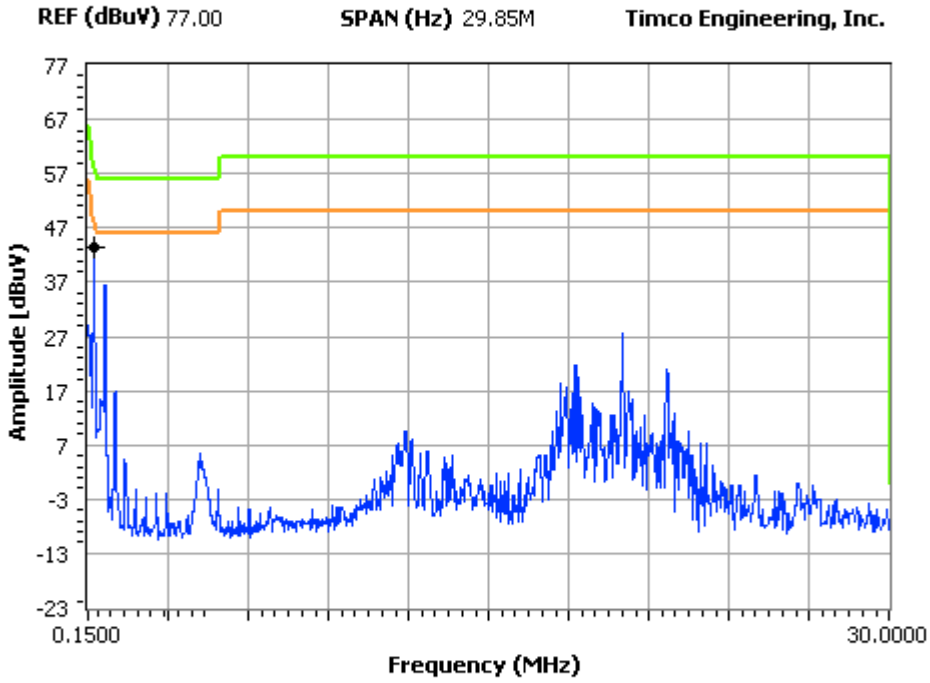
Marker Delta (Hz) 0.00

Peak	0.389	47.30
MKR2	12.239	1.80
MKR3	0.150	24.80
HWMK	23.076	6.27

POWERLINE CONDUCTED PLOT – LINE 2 – 230V

NOTES:
POWER LINE CONDUCTED -- LINE 2
TOKYO HY-POWER LABS, INC.
FCC ID: XXX HL-1.5KFx

FCC 15.107 Mask Class B



RBW	VBW	ST (sec)
10 kHz	30 kHz	2

Center Frequency (Hz) 15.075M

Marker Delta (Hz) 0.00

Peak	0.389	43.40
MKR2	12.239	1.80
MKR3	0.150	24.80
HWMK	23.076	6.27