849 NW State Road 45
Newberry, FL 32669 USA
Phone: 888.472.2424 or 352.472.5500
Fax: 352.472.2030
Email: info@timcoengr.com
Website: www.timcoengr.com

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-355VKX
Model Number	HL-355VKX
Product Description	VHF AMATEUR RADIO AMPLIFIER
Date Sample Received	4/25/2013
Date Tested	4/29/2013
Tested By	Nam Nguyen
Approved By	Mario de Aranzeta
Report Number	698AUT13TestReport.doc
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: Nam Nguyen

Signature:

Function: Testing Tech/Project Manager

Date: May 1, 2013

Authorized by:
Signature:

Mario de Aranzeta C.E.T.
Compliance Engineer/ Lab. Supervisor

Date:

GENERAL INFORMATION

DUT Specification

The test results relate only to the items tested.	
DUT Description	VHF AMATEUR RADIO AMPLIFIER
FCC ID	UB9HL-355VKX
Model Number	HL-355VKX
Serial Number	N/A
Operating Frequency	144 to 148 MHz
Type of Emission	J3E
Modulation	FM, SSB
DUT Power Source	☐ 240 VAC/50– 60Hz; 120 VAC/50-60Hz
	☒ DC Power (13.8 VDC)
	☐ Battery Operated Exclusively
Test Item	☐ Prototype
	☒ Pre-Production
	☐ Production
Type of Equipment	☒ Fixed
	☐ Mobile
	☐ Portable
Antenna Connector	N connector
Supporting Peripheral Equipment	XPR 4550 Mobile Radio FCC ID: ABZ99FT4080 Model: XPR 4550 Manufacture: Motorola

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 26ºC 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 2 meter band (144-148 MHz). The amplifier is NOT capable of operation on any frequency or frequencies between 26 MHz and 28 MHz as marketed.

1. The amplifier requires 50 Watts of drive to obtain full output power. Reduction in RF input power reduces the output power as shown on Page 8.

2. The gain of the amplifier is under 15 dB and under all conditions.

3. 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
3-Meter Semi-Anechoic Chamber	Panashield	N/A	N/A	12/31/11	12/31/13
AC Voltmeter	HP	400FL	2213A14499	6/12/11	6/12/13
Hygro-Thermometer	Extech	445703	0602	6/15/11	6/15/13
Digital Multimeter	Fluke	FLUKE-77	35053830	9/9/11	9/9/13
DC Power Supply	Astron	VS-50M	9001191	01/19/13	01/19/15
Power Meter	Boonton Electronics	4531	11793	1/9/13	1/9/15
Sensor	Boonton	51072A	34647	01/19/13	01/19/15
Signal Generator	HP	8648C	3623A02898	09/09/11	09/09/13
High Power Attenuator	Bird	8329-300	4980	2/26/13	2/26/15
EMI Test Receiver	Rohde & Schwarz	ESIB40	100274	3/16/12	3/16/14
Analyzer Tan Tower Preamplifier	HP	8449B-H02	3008A00372	10/28/11	10/28/13
Analyzer Tan Tower Quasi-Peak Adapter	HP	85650A	3303A01690	10/28/11	10/28/13
Analyzer Tan Tower RF Preselector	HP	85685A	3221A01400	10/28/11	10/28/13
Analyzer Tan Tower Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	10/28/11	10/28/13
Horn Antenna	ETS	3117	35923	12/7/11	12/7/13
Antenna	Electro metrics	LPA-25	1122	5/04/11	5/04/13
Antenna	Electro metrics	BIA-25	1096	5/04/11	5/04/13

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 kW 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 – (13.8Volts)(40Amps) = 552 Watts

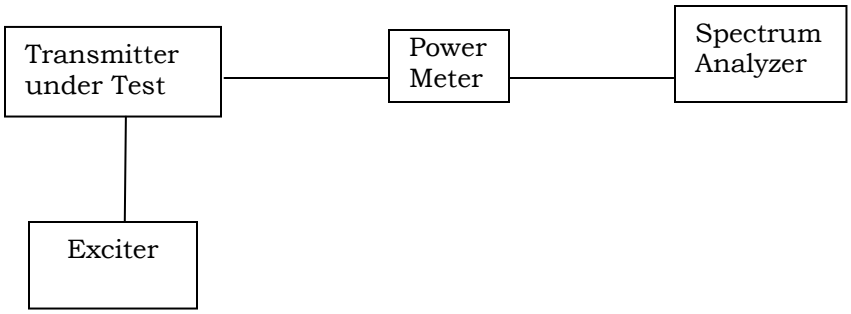
RF POWER OUTPUT

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 13.8 DC Volts. The transmitter was properly adjusted and the maximum RF output power was measured at 300 Watts.

Test Setup:

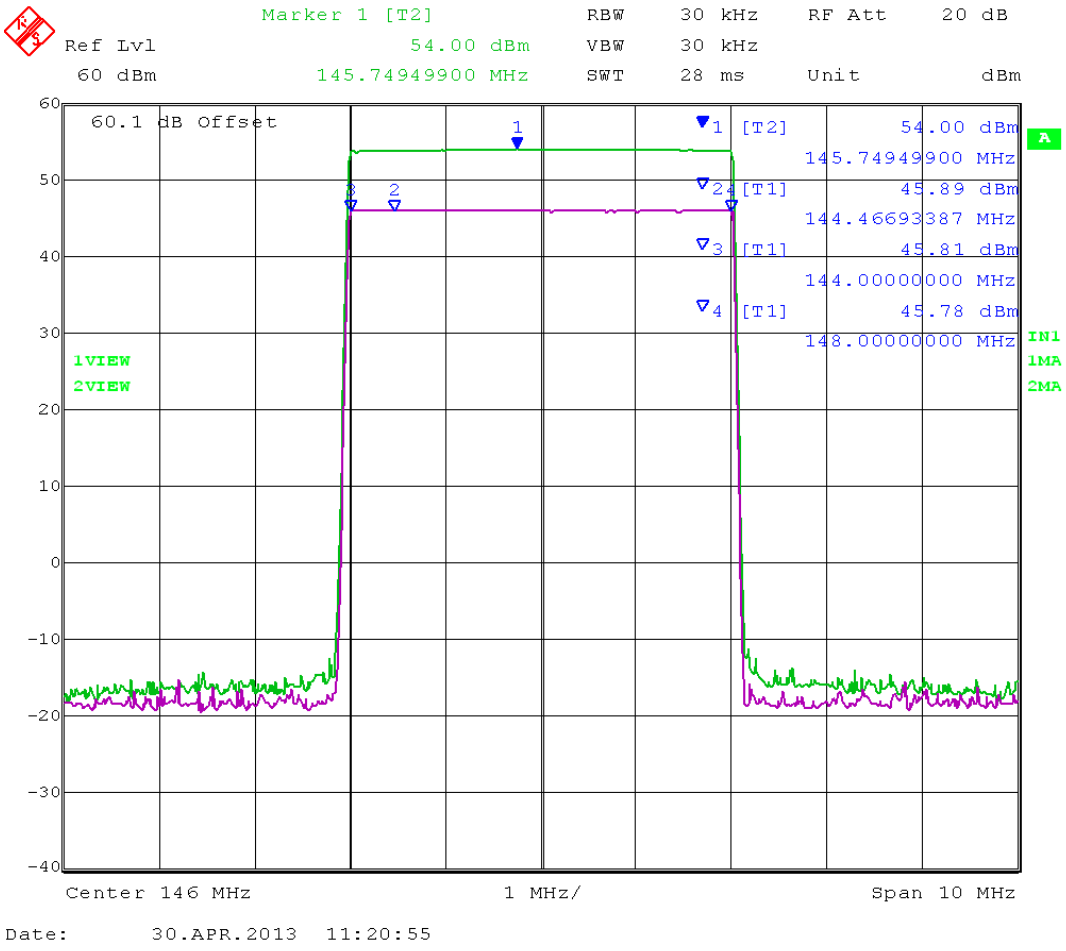


Test Data:

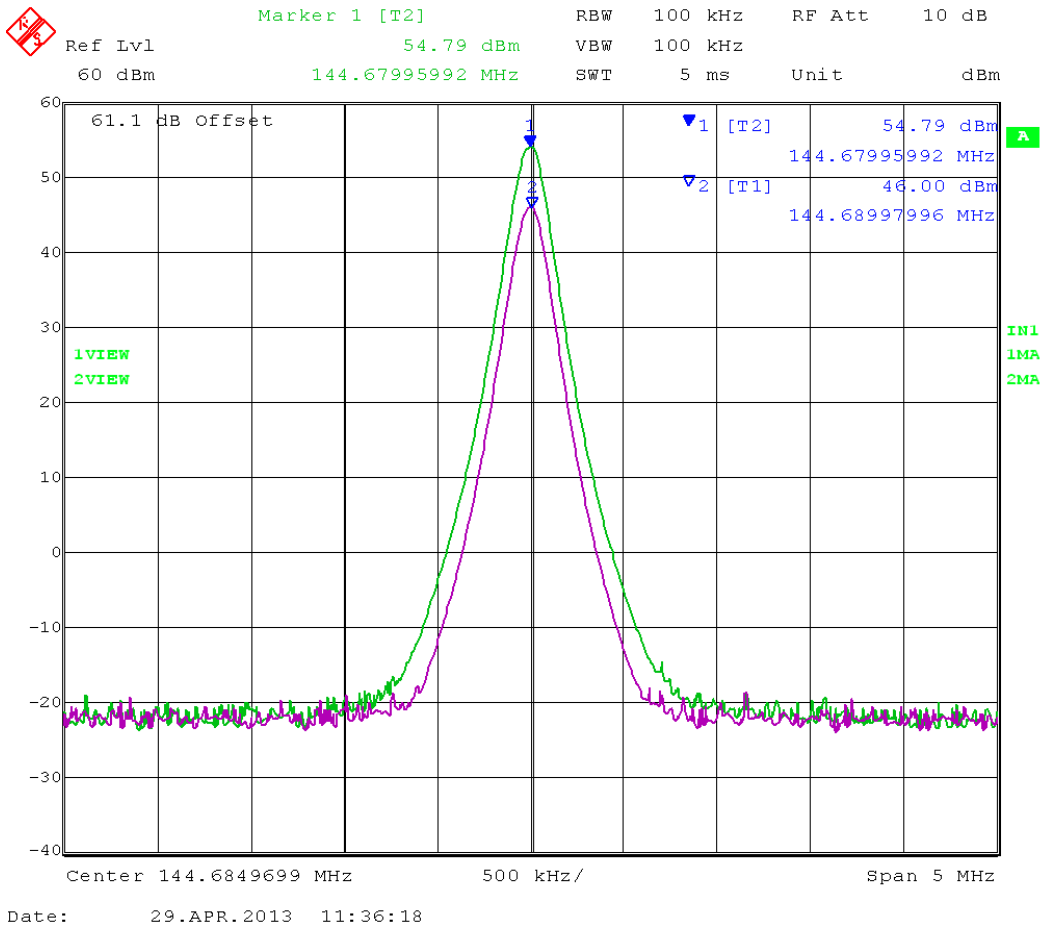
Input Freq (MHz)	Input (W)	Output (W)
144.70	39.8	301.3
146.01	38.8	292.5
147.90	39.4	295.8

IN BAND GAIN

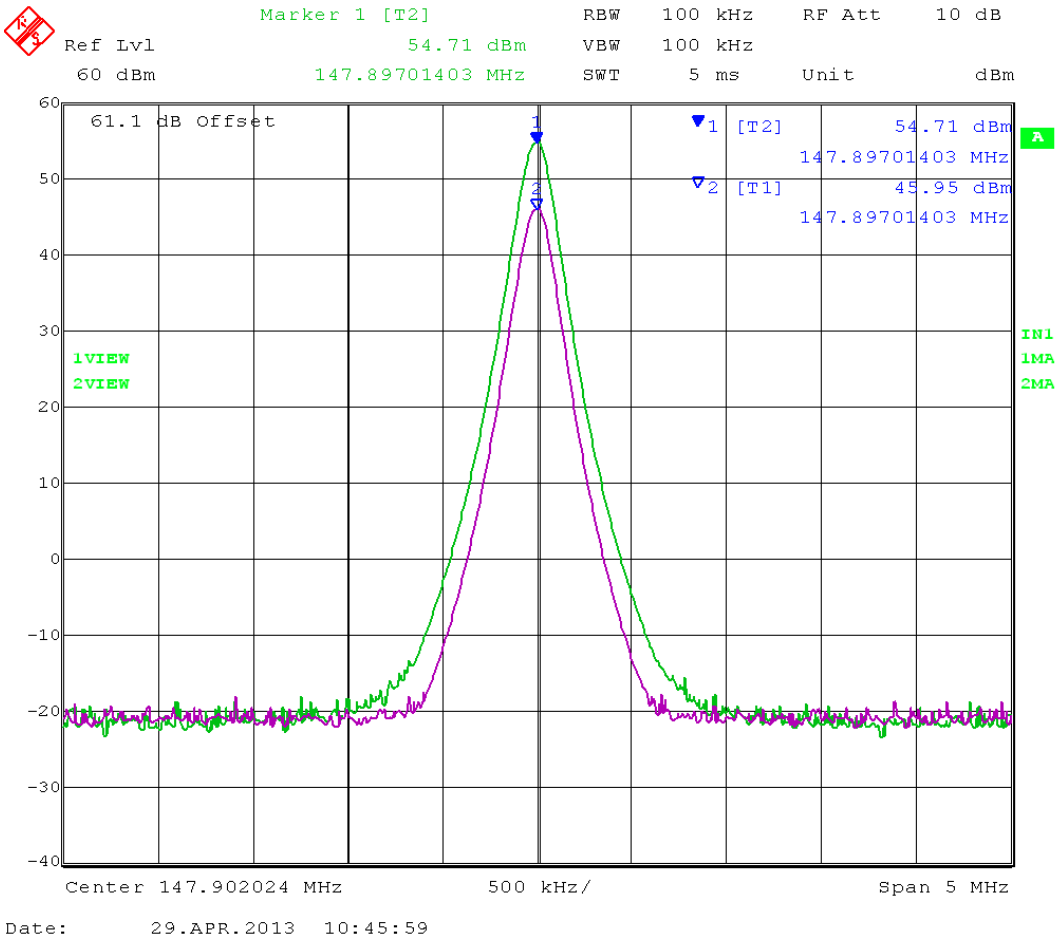
Requirements: 97.317 (a) (2)
The ratio of the input to the output RF power of the amplifier is less than 15 dB.



Input/Output= 8.1 dB gain



Input/Output= 8.8 dB gain



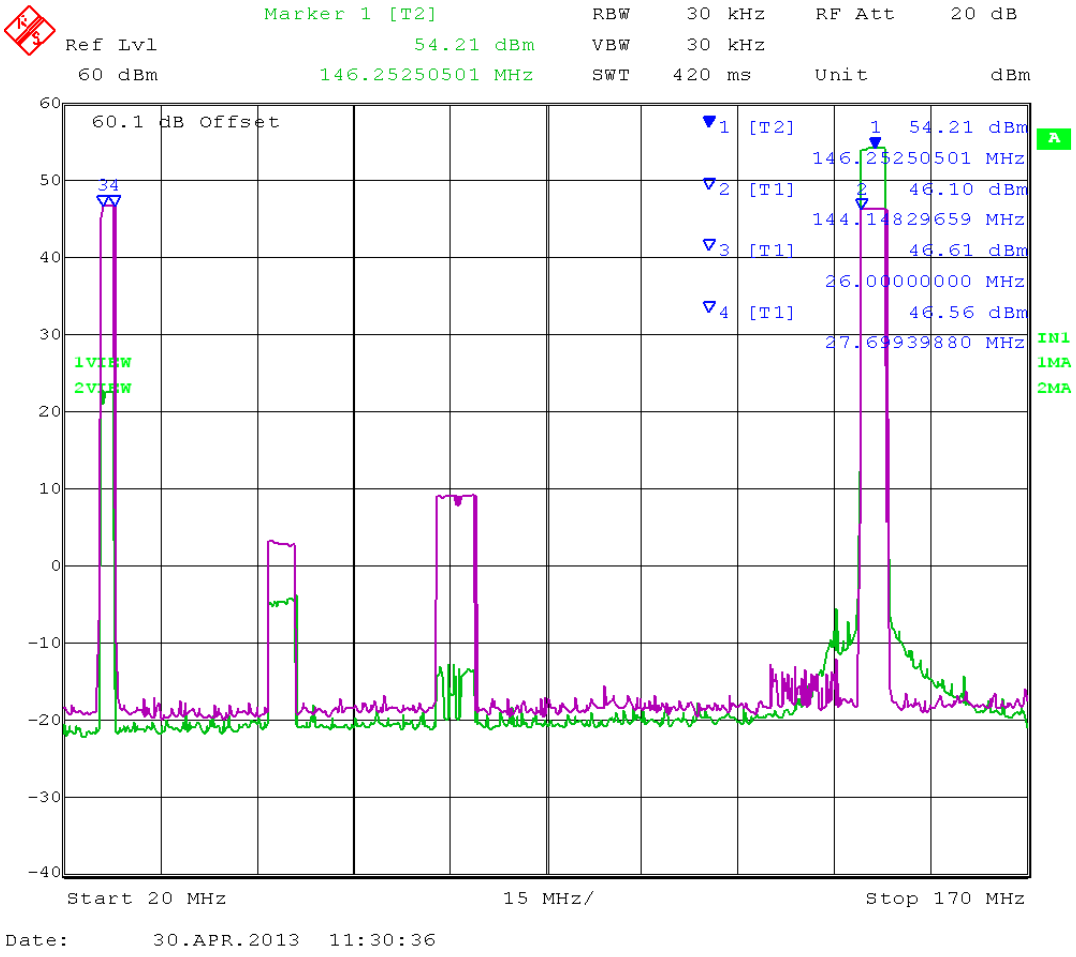
Input/Output= 8.8 dB gain

OUT OF BAND GAIN

DURING THE BAND FROM 26 TO 28 MHz

Requirements: 97.317 (a) (3)
The power amplifier shall exhibit no more than 0dB gain from 26 MHz to 28 MHz.

Test Procedure: The amplifier was set to its operation mode, and the gain was adjusted to maximum at the frequency band 50 – 54 MHz. An input signal was provided in the 26 – 28 MHz band.

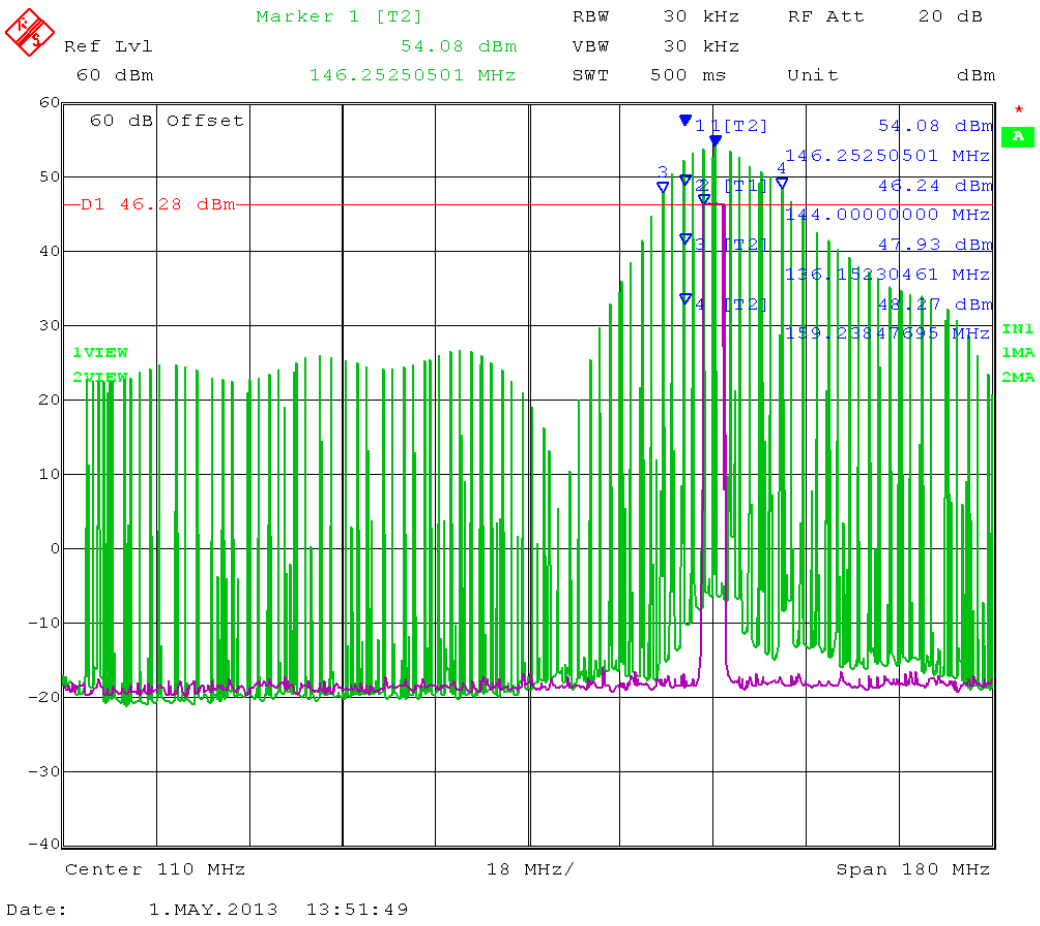


Input(red) vs Output (green)

DURING THE BAND FROM 20 TO 200 MHz

Requirements: 97.317 (b) (1)
The Certification shall be denied when the Commission determines the amplifier can be used in services other than the Amateur Radio Service.

Test result: The following plot showing that the EUT passed the test.



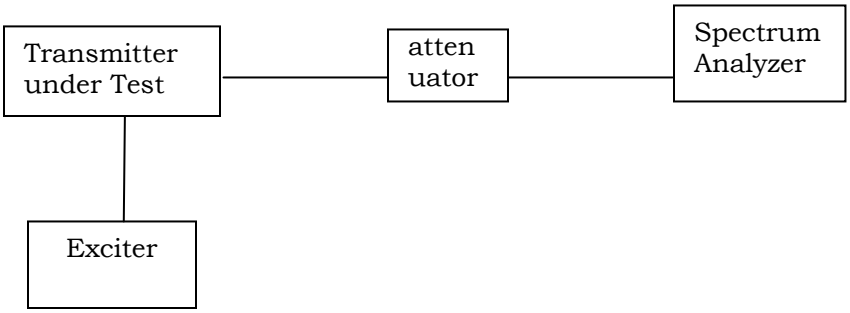
The output of the amplifier (green) has been plot from 20 to 200 MHz with the input level was steady at 46.28 dBm.

FIELD 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 between 30-225MHz, the mean power of any spurious emissions must be at least 60 dB below the mean power of the fundamental.

Method Of Measurements:
Test Setup:



Test Data:

TF	EF	dB Below Carrier
144.70	289.40	75.3
	434.10	74.7
	578.80	76.1
	723.50	75.3
	868.20	74.1
	1012.90	81.9
	1157.60	72.2
	1302.30	80.9
	1447.00	79.8

TF	EF	dB Below Carrier
147.90	295.80	69.5
	443.70	71.2
	591.60	80.0
	739.50	76.2
	887.40	79.3
	1035.30	69.6
	1183.20	71.1
	1331.10	75.5
	1479.00	72.4

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.

Not applicable – 12Vdc operated device

FCC EXPOSURE INFORMATION

The FCC requires users to check their installations for compliance with published values for allowable exposure to RF fields. This information is in the ARRL publications, FCC printed rules, and on the web.