A Broadband 100W Linear RF Power Amplifier for LF, MF and HF Bands

By Mark Mattila, VA7MM and Roger Graves, VE7VV

Revision: January 28, 2021

Introduction

A broadband 100W linear RF power amplifier covering LF, MF and HF radio bands was created by modifying the 1W in, 100W out, 1.8 to 54MHz amplifier designed by Jim Veatch, WA2EUJ, ***Appendix 1***, that utilizes NXP's LDMOS MRF-101A transistor made for RF power applications. The WA2EUJ amplifier was the first place winner of the NXP design challenge in 2019, ***Appendix 2.*** The modified amplifier is built utilizing Jim's circuit board, ***Appendix 3***, with certain components replaced with different values for LF and MF bands and higher performance specification. The output circuit was re-designed by VE7VV for operation down to 136 kHz by using high permeability ferrite material in the output transformer and, since this material must be protected from DC current, separating DC and RF paths by adding an RF choke and DC blocking capacitors.

The new amplifier performs over a wide frequency range from 136kHz to 10.15MHz with 1W of RF drive yielding 100W of RF output. The amplifier was implemented with external low pass filters for the LF and MF radio bands and extensively tested on the bench and on the air, meeting all expectations for performance. Experimental use of the 2200m LF and 630m MF radio bands has been the primary motivation for the project with the amplifier now deployed to provide RF power for weak signal and digital communication experiments.

Design and Assembly

The WA2EUJ circuit board was produced in a type A version dated 7/19 and a type B version dated 9/19. This project utilized the type B version board***, Figure 1***. The WA2EUJ amplifier and board are designed using surface mount components throughout including the output circuit.

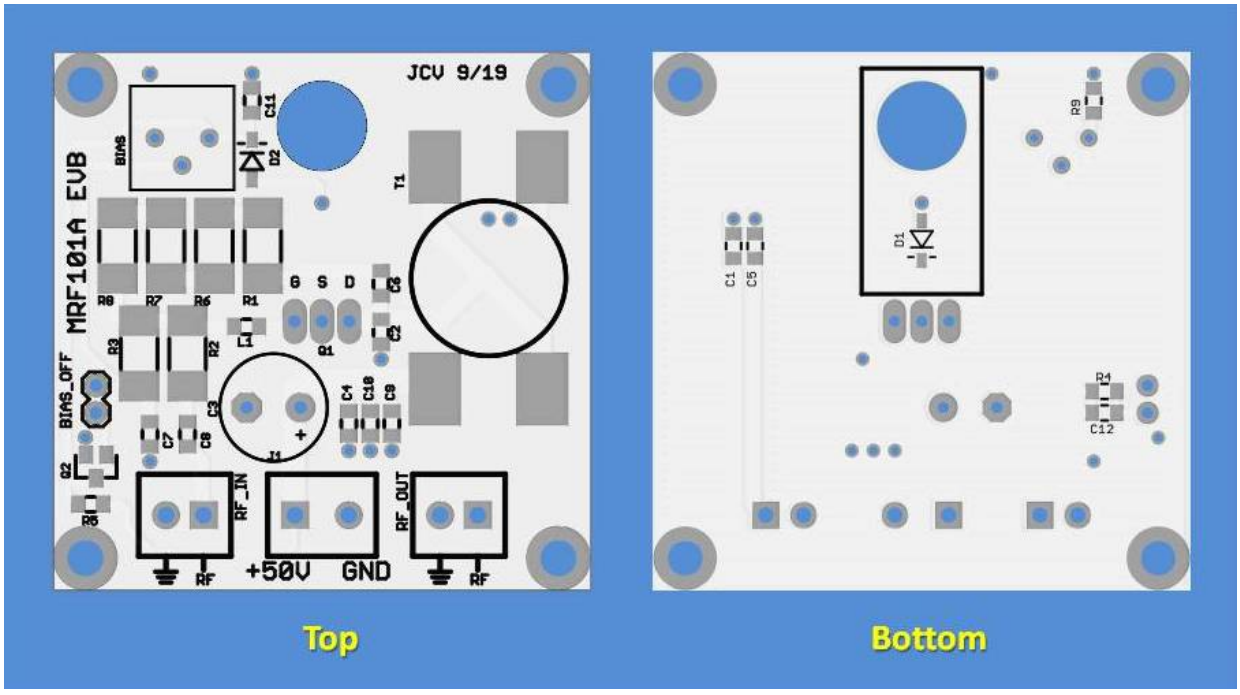


Figure 1: WA2EUJ circuit board version B is a compact 50 x 50 mm SMD design.

Modification of the amplifier to LF and MF bands required component upgrades for which only through hole components were available, ***Figure 2***. Custom RF choke and RF output transformer are external to the board, ***Figure 3***.

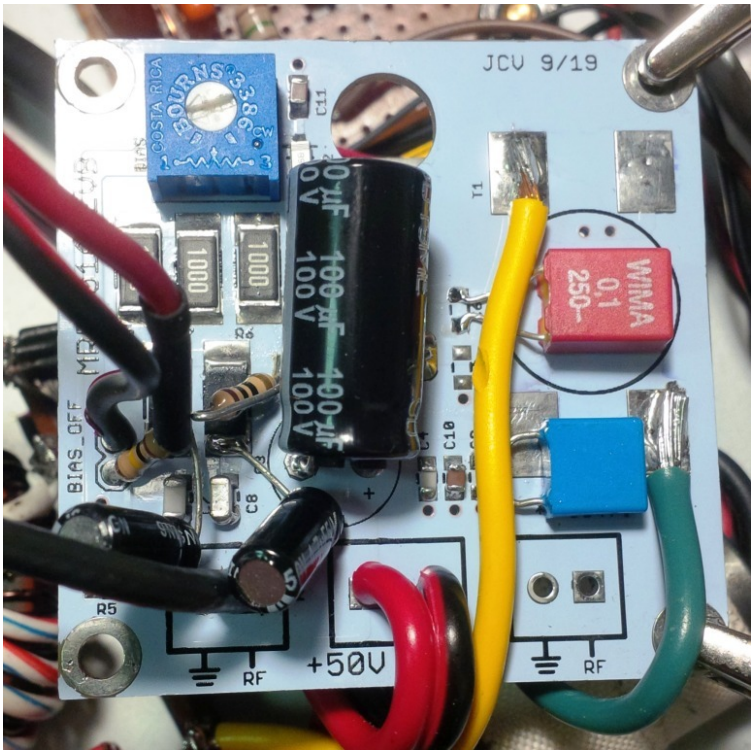


Figure 2: WA2EUJ circuit as modified showing new through-hole components.

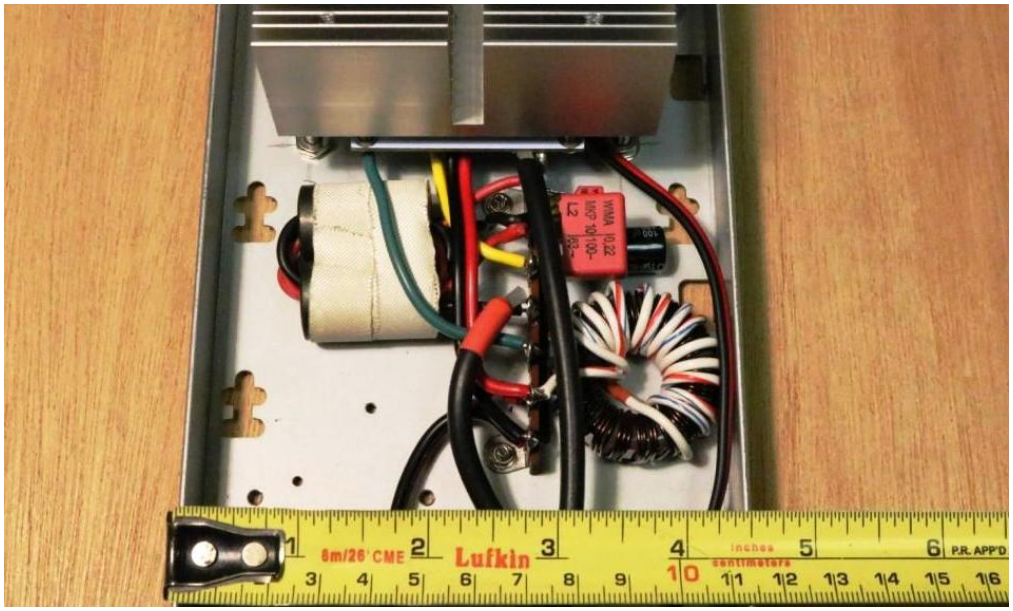


Figure 3: The RF transformer, left, and RF choke, right, are external and adjacent to the board.

The schematic diagram for the modified amplifier and LF and MF low pass filters are presented in ***Appendix 4.*** The schematic identifies components located on and off the circuit board. The parts list,

Appendix 5, identifies which components are part of the original HF amplifier design and which are changed by the modification.

The LF and MF amplifier includes a 5V power supply to provide Q2 gate bias voltage. Q2 controls the bias voltage level to MRF101A MOSFET Q1 with level adjustment made using trim potentiometer R10. The Q1 bias voltage is turned on/off for transmit/receive by Q2 with control through the BIAS_OFF connection on the WA2EUJ board. The switching logic, ***Table 1***, is for implementation of the amplifier with T/R switching provided through the send relay connection on an HF transceiver that drives LF and MF transverters. The modified amplifier additionally includes a built in 12V power supply to provide supply voltage for the cooling fan.

Table 1: Q1 and Q2 Bias Voltage States

Description	**RX**	**TX**
T/R Send Relay	Open	Closed
BIAS_OFF Voltage at Gate of Q2	5V	0V
Voltage at Gate of Q1 with R9 at 0Ω (see note)	0V	5.4V
Voltage at Gate of Q1 with R9 at 10kΩ (see note)	0V	0.9V

Note: R9 is adjusted for a supply current of 100mA so final Q1 gate voltage will lie between table values.

Testing and Performance

Initial testing utilized a dual trace oscilloscope and DVM to measure current and 50 V DC supply voltage. Current was measured by running the DC input line through the meter's current jack.

Initial testing set-up procedure:

- Fuse in DC supply line at 4A
- Monitor Q1 drain on oscilloscope channel 1
- Monitor DC supply current
- Connect low pass filter followed by 50Ω load
- Monitor RF output voltage oscilloscope channel 2
- Set trim pot R9 to ground end for maximum resistance
- Connect drive RF source, off initially, minimum drive

While watching the scope drain waveform and being ready to drop the DC if there is any oscillation or if the drain does not go to steady +50V, turn on the 50V supply.

Assuming no oscillation, and no smoke, and with the drain sitting nicely at 50VDC, slowly increase the bias pot to get the 100 mA resting bias while watching the drain voltage on the scope to see if it might start oscillating when the bias reaches the level where the FET begins to conduct.

If any oscillation is seen, drop the DC quickly and re-evaluate.

If no oscillation, then first making sure the exciter is set for minimum drive, turn on the drive while watching the drain waveform, slowly increase the drive. Stop the increase when the drain waveform Vpp stops increasing linearly as indicated by the output waveform which will change shape and show flattening at the top and bottom.

The drain waveform is more sine wave like when the amp is driving a capacitive (Pi form) input LPF than when driving a dummy load with no LPF.

100W output is 70.7 Vrms, 200 Vpp on a 50 Ohm load. Monitoring input and output RF voltage on the scope an increase on the order of ten times should be observable, ***Figure 4.***

If you reach this point, celebrate!

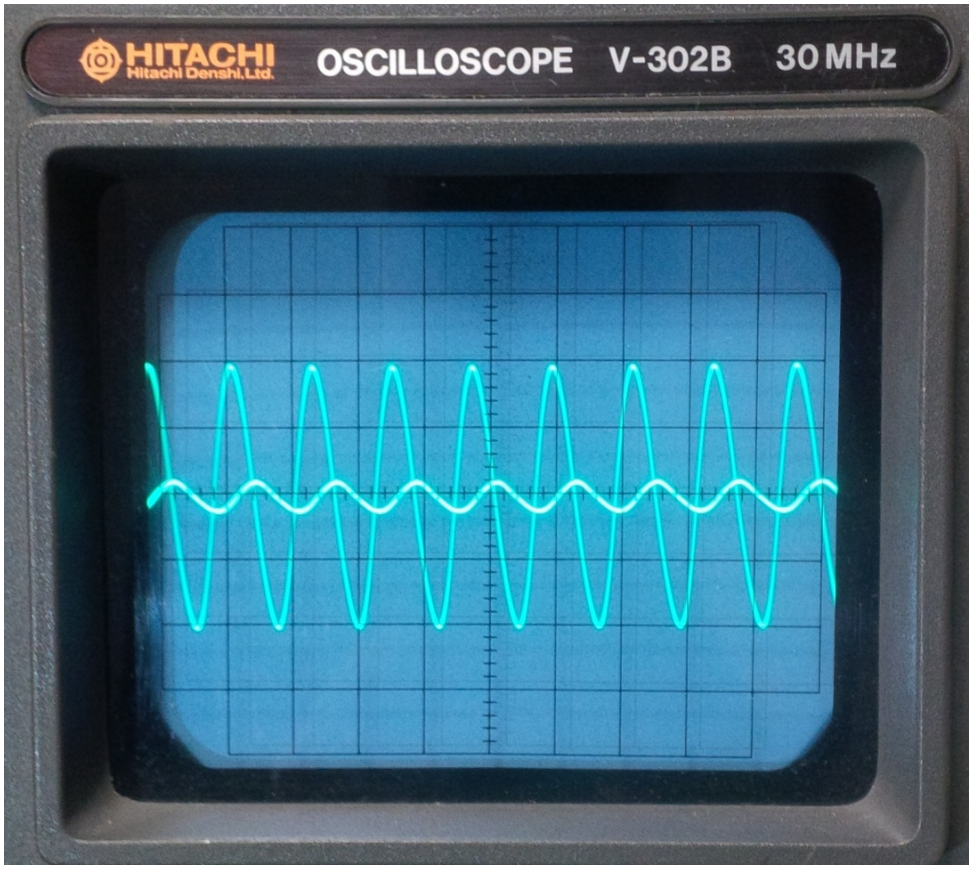


Figure 4: 50V per division scope showing 20Vpp drive and 200Vpp output RF voltages at 137 kHz

Measured supply current at maximum power output is about 3.5 amps at 100W output from the amplifier, ***Figure 5***.

The RF power linearity graph, ***Figure 6***, indicates very linear performance to about 56W. Beyond 56W input/output begins to deviate from linear behaviour. Linear amplifier maximum power output is often specified as the power at which the output drops to 1dB below the linear line, or "1 dB gain compression", since inter-modulation distortion (IMD) increases markedly beyond that point. Our amplifier's 1 dB compression power occurs at 90 Vpeak RF output into 50 Ohms, which equates to about 80W RF power, ***Figure 7***. Interestingly, WA2EUJ chose to report 2-tone IMD spectral analyzer results for his HF version at 80W peak power, which is just the 1dB gain compression point of our version. His plots show the worst products were approximately -40 dB down on the 80m and 20m bands, ***Appendix 6.***

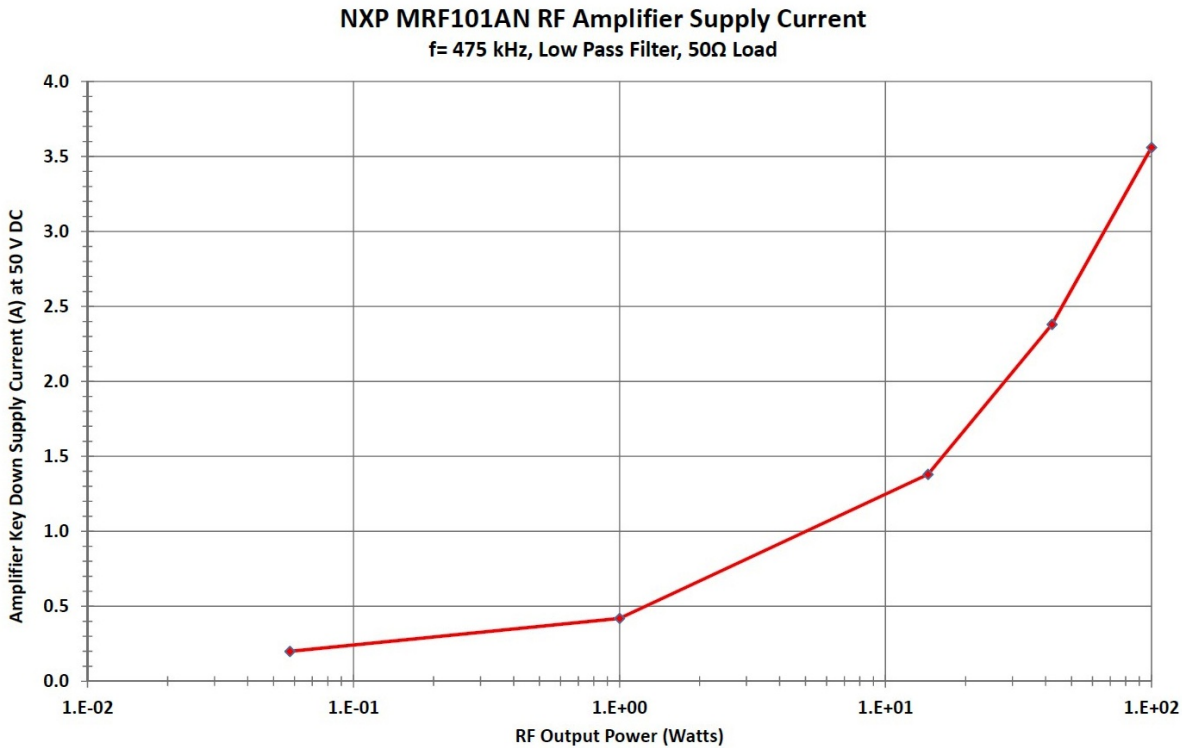


Figure 5: Supply current as a function of power output

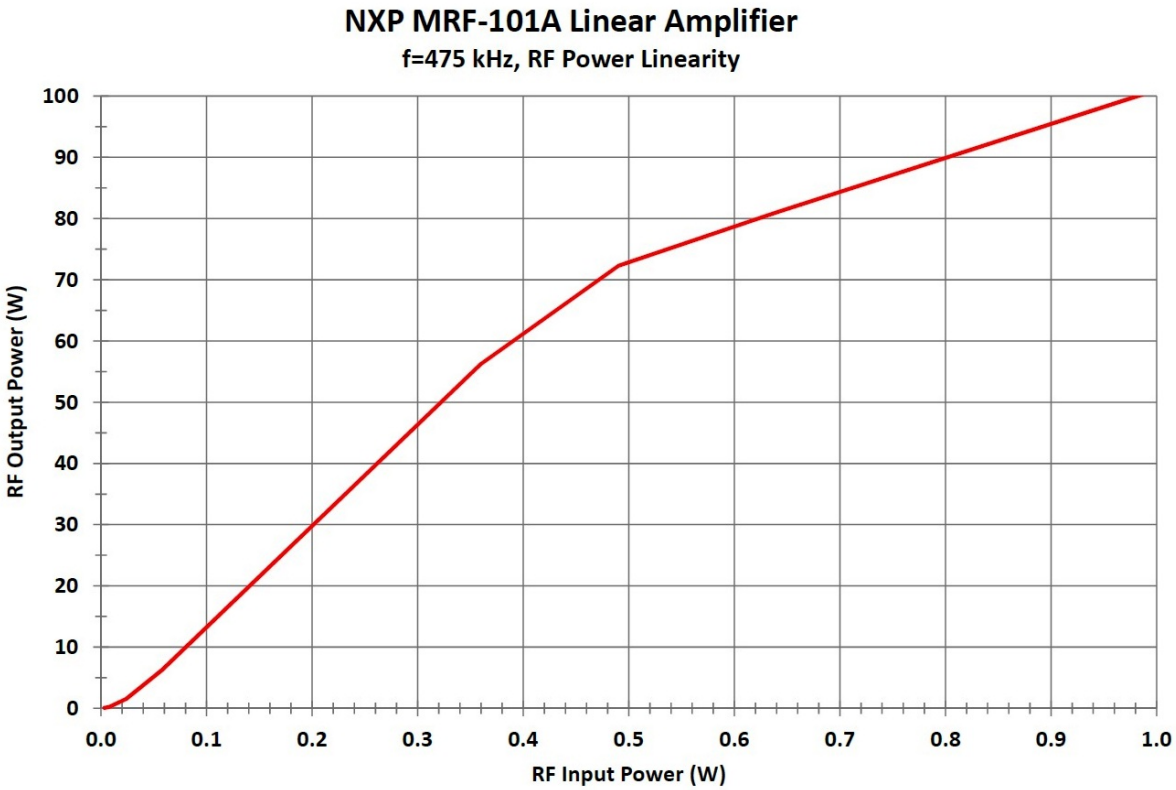


Figure 6: RF power linearity at 475 kHz, 50Ω Load

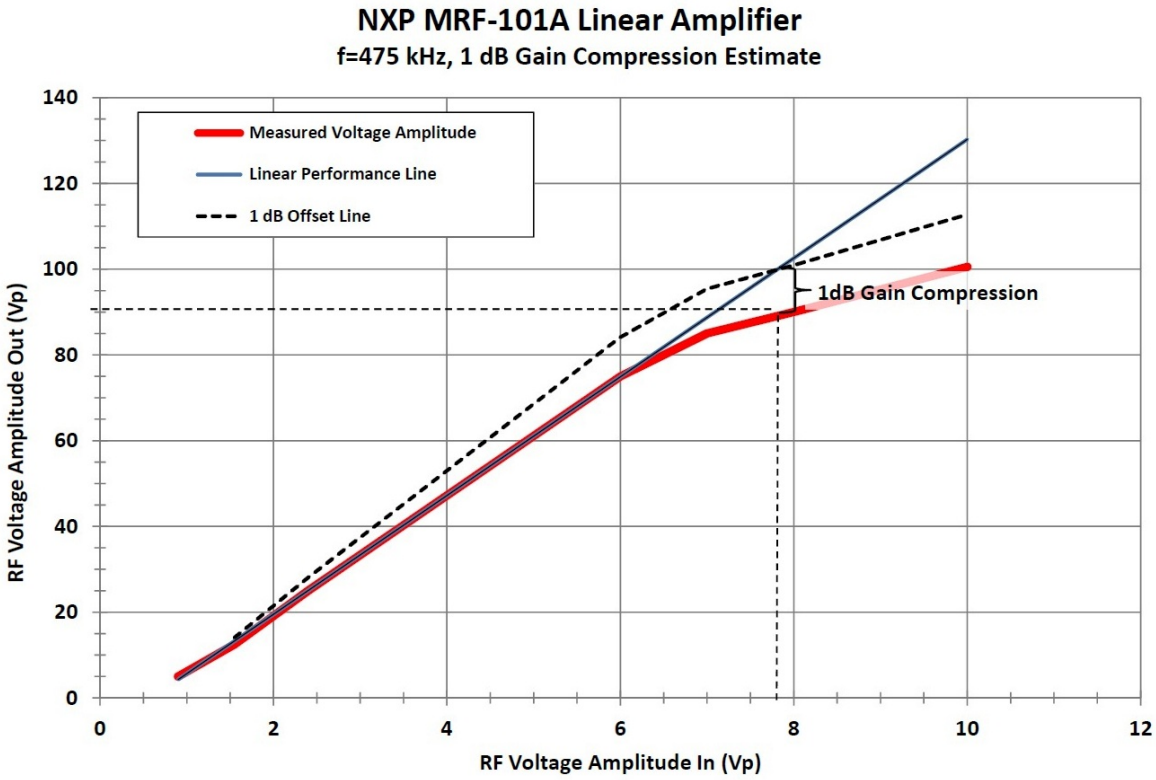


Figure 7: Gain compression at 1 dB occurs at 90 Vpeak which equates to 80W RF power.

Two-tone IMD at -40 dB is considered to be good for an amateur class linear amplifier and significantly exceeds the -30 dB unofficial "standard" used by the ARRL in their test reports. We have not tested 2-tone IMD in our modification, but it could be expected to be similar to what WA2EUJ reported because the active device in both versions is operated with the same negative feedback circuit and at the same 50VDC and 100mA resting bias.

Low Pass Filters

The low pass filters (LPF) shown in the schematic, ***Appendix 4***, are a Pi circuit design by VE7VV that specifies capacitors, toroid types and wire size sufficient to handle RF voltage, current and flux values for power up to 200W. Performance of these filters, indicated by measured insertion loss as a function of frequency, indicates second harmonic suppression about 24dB for 137kHz and 30dB for 475kHz, ***Figures 8 and 9***.

The second harmonic content of this single ended amplifier is relatively high as is generally the case for single-ended amplifiers. When combined with LF and MF antenna tuning systems that are typically very high Q, significant additional suppression of harmonics after the LPF is provided. For example, investigation of the Marconi T antenna system at VA7MM estimated for 475kHz the system Q at 25 and the second harmonic suppression at 56 db, ***Figures 10 and 11***. When the 30dB attenuation of the LPF is included the total suppression at the second harmonic is about 86 dB.

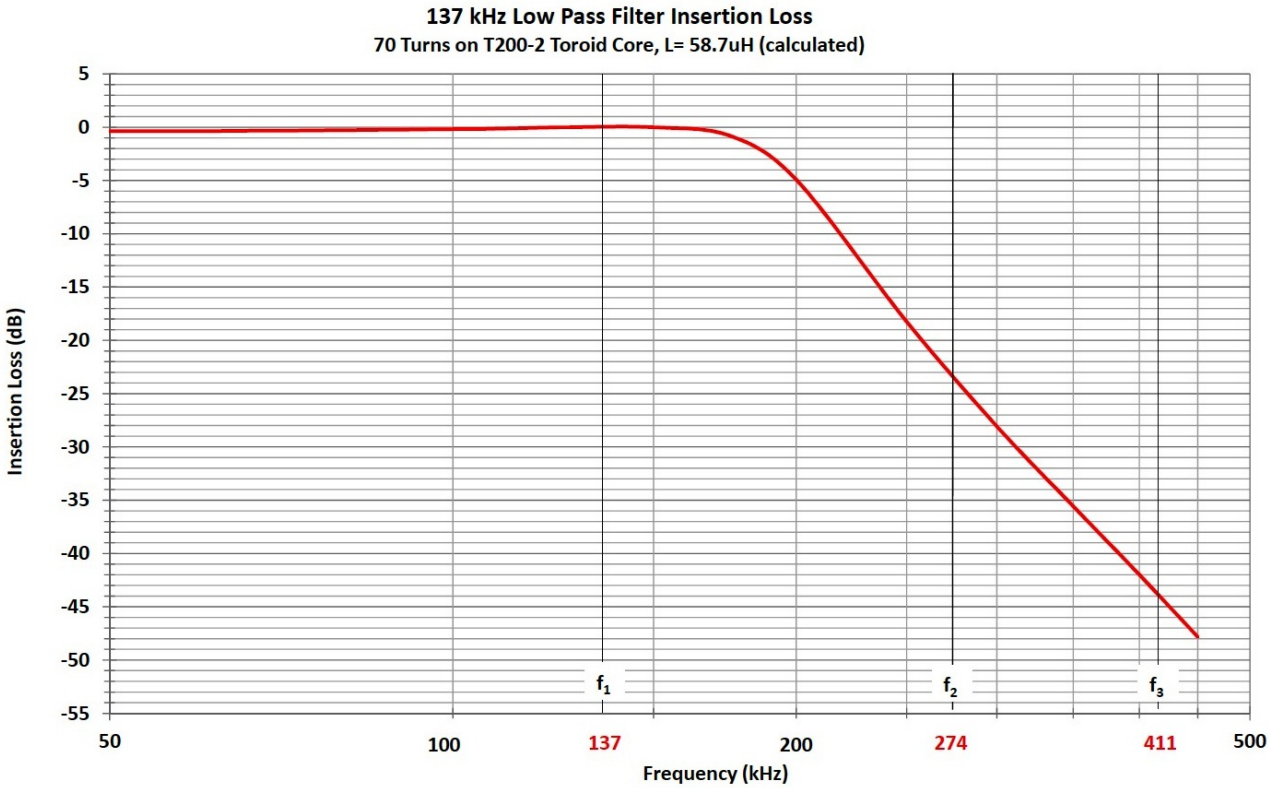


Figure 8: 137 kHz low pass filter measured insertion loss, L= 58.7uH (70 turns on T-200-2)

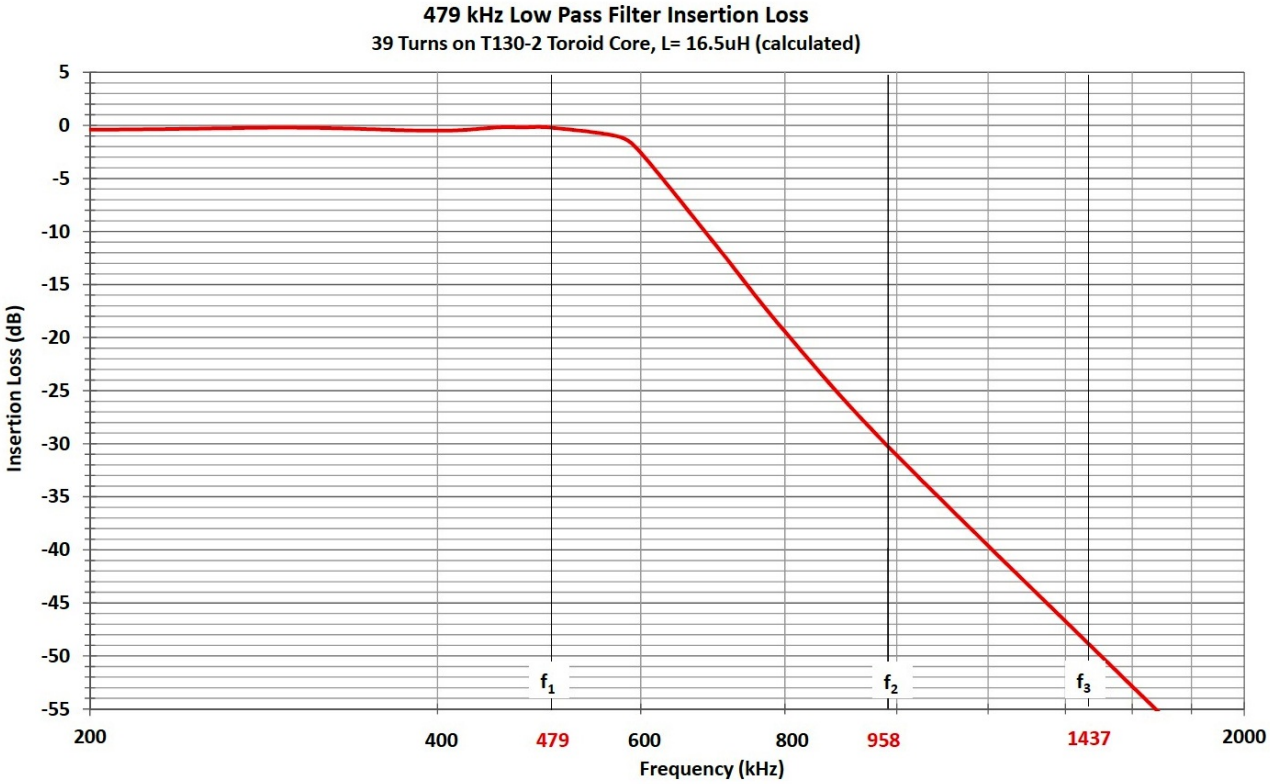


Figure 9: 475 kHz low pass filter measured insertion loss, L= 16.5uH (39 turns on T-130-2)

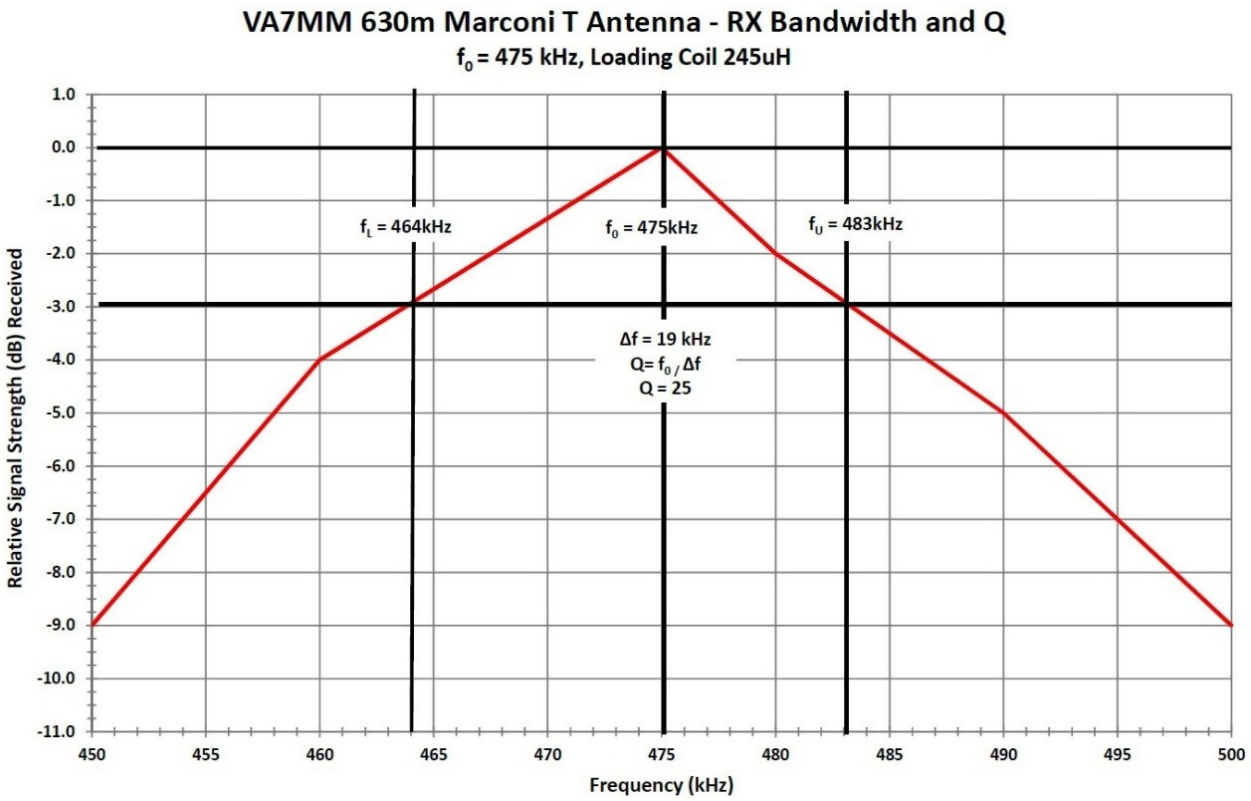


Figure 10: Antenna Q indicated at 25 with 30m high Marconi T antenna and 245uH loading coil.

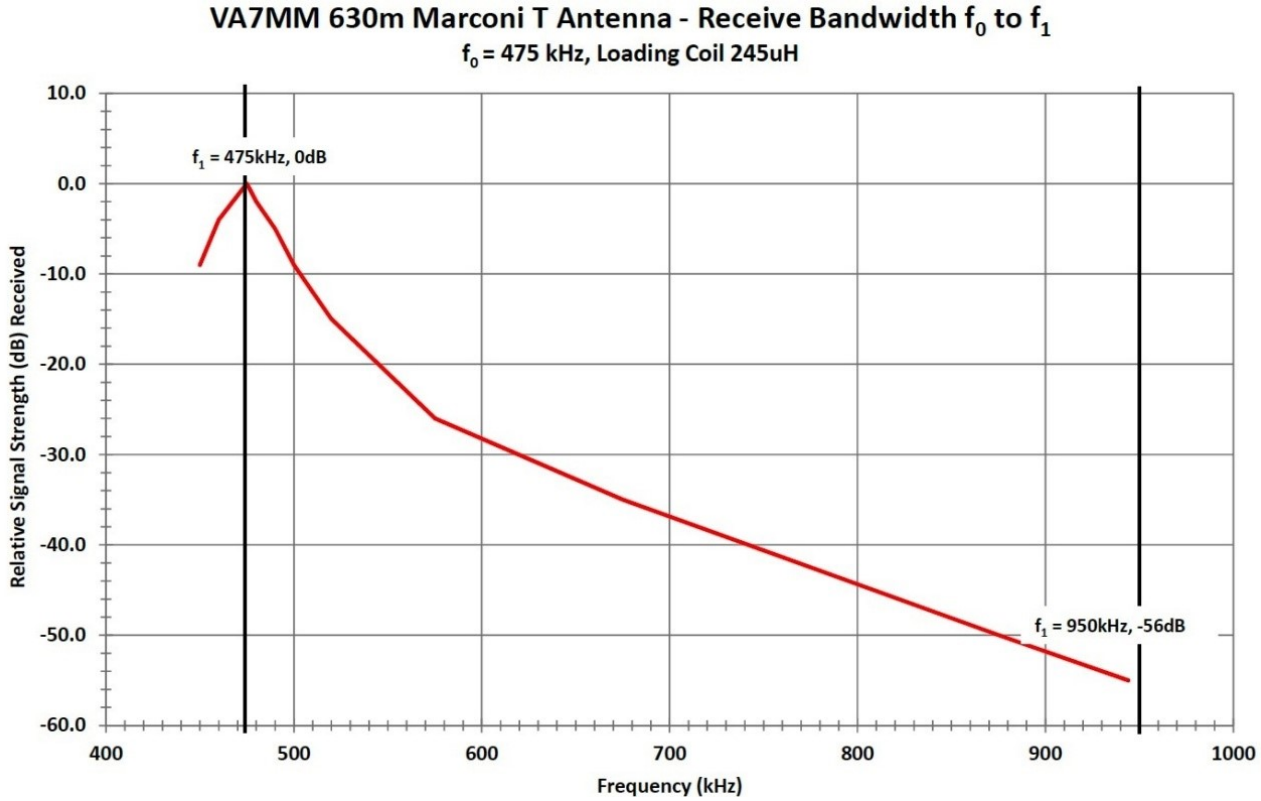


Figure 11: Second harmonic indicated at -56dB with 30m high Marconi T antenna.

It is important to note that if this amplifier is used on HF bands, higher order LPF designs would likely be needed to limit harmonic output to -43 dB below the fundamental frequency level. Elliptical LPFs designed and made available by WA2EUJ are recommended for amplifier use on HF bands, ***Appendix 7.***

Packaging

The packaging and mechanical design by VA7MM utilized a legacy external HDD case enabling a compact assembly. The heat sink projects out of the top of the case which had a rectangular area cut out of the top to enable fit and closure of the case, ***Figures 12 and 13***. The low pass filters are external to the amplifier and packaged in Hammond aluminum enclosures, ***Figure 12***.

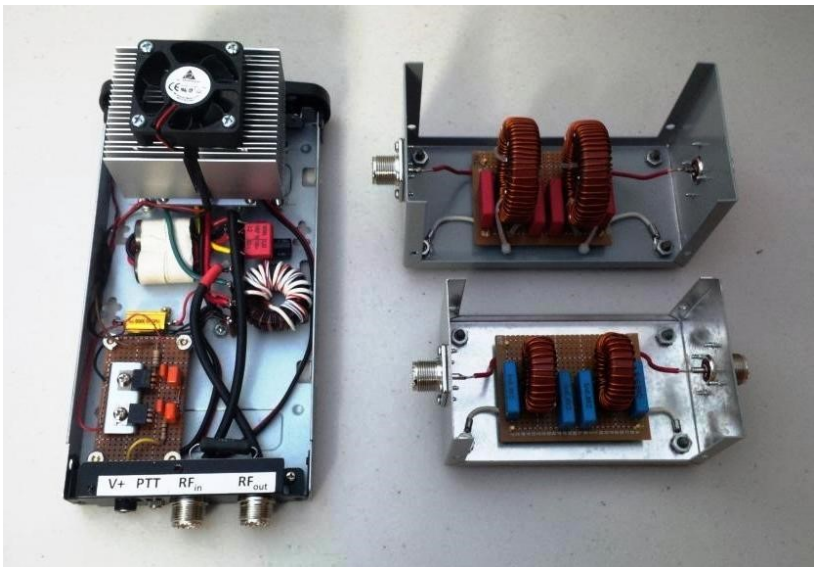


Figure 12: Amplifier and external low pass filters open for inspection.

Figure 13: Completed amplifier with fused DC power cable.

The N-channel MRF-101A MOSFET transistor is constructed with the exposed backside of the TO-220 package also serving as a source terminal for the transistor. Thus the mounting tab is at ground potential enabling grounded heat sinking and avoiding the need for insulation against the heat sink.

Conclusions

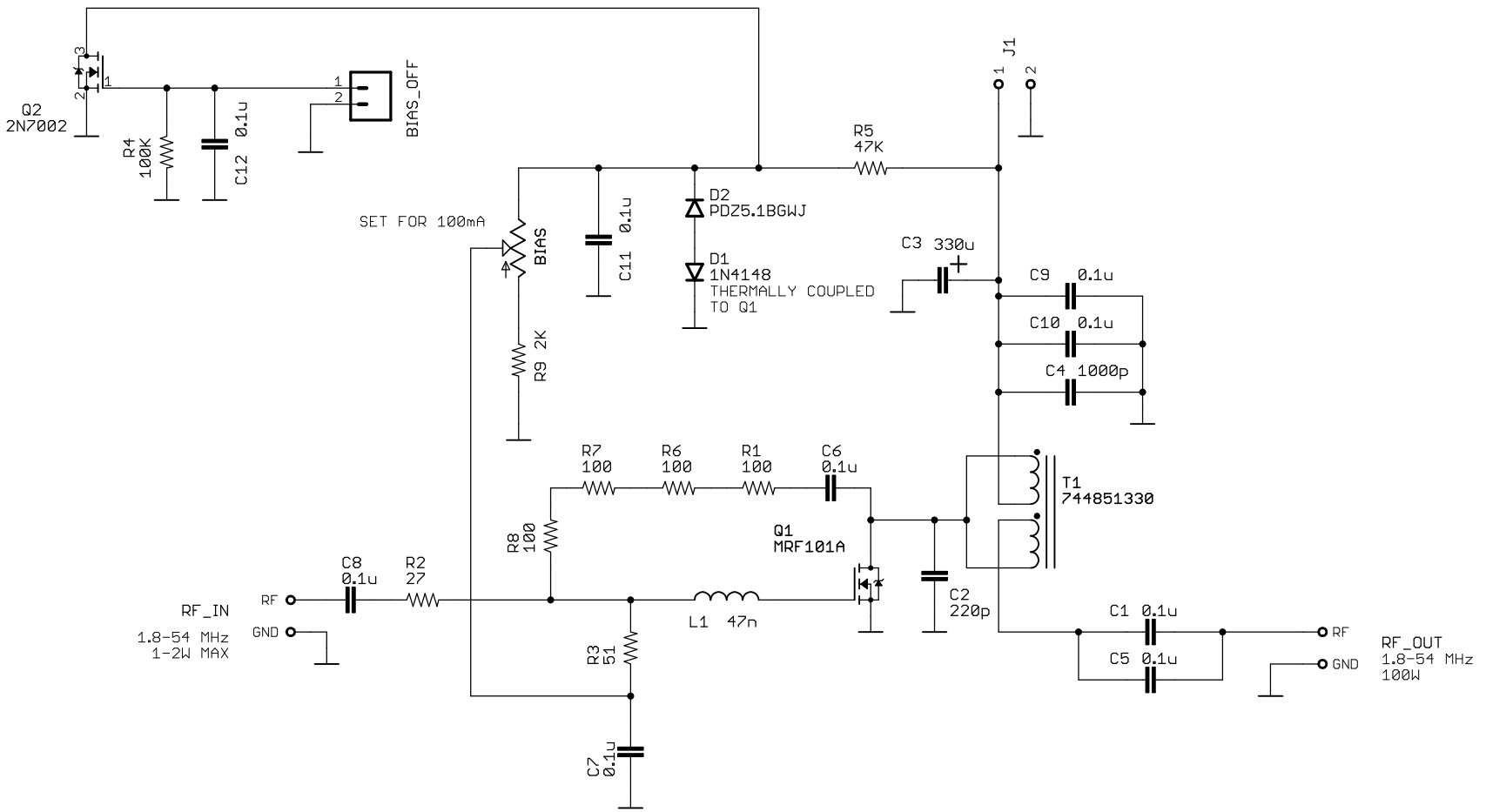
The function of a single MRF-101A MOSFET in a broadband 100W RF power amplifier application has been demonstrated for a frequency range of 136 kHz to 10.15 MHz. Nominal performance specifications for the amplifier are:

- Drive power: 1 W = 30 dBm
- Output Power: 100W = 50 dBm
- DC Power: 50V @ 3.5 A max.
- Gain Linearity: Input/Output power shows very good linearity to 55W RF output level and 1dB gain compression being reached at about 80W.

The Pi network LPFs for 137 and 479 kHz provide about 24 and 30dB of second harmonic suppression respectively. High Q antenna systems used for LF and MF bands when coupled with these filters provide additional suppression. In the case of the Marconi T antenna at VA7MM tested at 475kHz (antenna Q = 25), the combined suppression was found to be 86dB at the second harmonic. This amplifier if used in the HF range will likely require low pass filters that provide higher suppression of the second harmonic than do our LF and MF filters.

The authors found this a satisfying and easy to implement project and would like to acknowledge Jim Veatch, WA2EUJ, for the original HF amplifier concept and design and for his encouragement of our modification.

Appendix 1
WA2EUJ Amplifier Schematic and Parts List



MOUNTING HOLES

MRF-101 100W 1.8-54 MHz		
TITLE: MRF101 EVB Rev B		
Document Number: A100W-JCV		REV: B
Date: 9/11/2019 8:31 AM	Sheet: 1/1	

MRF-101A EVB - REV B
RFPowerTools.com

ITEM	QTY	REFERENCE DESIGNATOR	DESC	MFG	MFG_PN	VND	VND_PN
1	1	BIAS	TRIMMER 10K OHM 0.5W PC PIN TOP	BOURNS	3386P-1-103LF	MOUSER	652-3386P-1-103LF
2	9	C1, C5, C6, C7, C8, C9, C10, C11, C12	CAP CER 0.1UF 100V X7R 0805	TDK	C2012X7R2A104K125AA	MOUSER	810-C2012X7R2A104K
3	1	C2	CAP 220PF 100V C0G/NPO 0805	YAGEO	CC0805JRNPO0BN221	MOUSER	603-CC805JRNPO0BN221
4	1	C3	CAP ALUM 330UF 20% 63V RADIAL	NICHICON	UVR1J331MPD	MOUSER	647-UVR1J331MPD
5	1	C4	CAP 1000PF 100V C0G/NP0 080	MURATA	GRM2165C2A102JA01D	MOUSER	81-GRM2165C2A102JA1D
6	1	D1	DIODE GEN PURP 100V 150MA SOD123	MCC	1N4148W-TP	MOUSER	833-1N4148W-TP
7	1	D2	DIODE ZENER 5.1V 365MW SOD123	NEXPERIA	PDZ5.1BGWJ	MOUSER	771-PDZ5.1BGWJ
8	1	J1	TERM BLK 2POS SIDE ENTRY 5MM PCB	PHOENIX	1935161	MOUSER	651-1935161
9	1	L1	FIXED IND 47NH 500MA 310 MOHM	ABRACON	AISC-0805-R047J-T	MOUSER	815-AISC-0805-R047J
10	1	Q1	RF TRANSISTOR 100W TO-220	NXP	MRF101AN	MOUSER	771-MRF101AN
11	1	Q2	MOSFET N-CH 60V 0.17A SOT23-3	DIODES INC	2N7002H-7	MOUSER	621-2N7002H-7
12	4	R1, R6, R7, R8	RES 100 OHM 1% 2W 2512	BOURNS	CRM2512AFX-1000ELF	MOUSER	652-CRM2512AFX1000LF
13	1	R2	RES 27 OHM 1% 1W 2512	VISHAY	CRCW251227R0FKEG	MOUSER	71-CRCW251227R0FKEG
14	1	R3	RES 51 OHM 1% 1W 2512	VISHAY	CRCW251251R0FKEG	MOUSER	71-CRCW251251R0FKEG
15	1	R4	RES SMD 100K OHM 1% 1/8W 0805	YAGEO	RC0805FR-07100KL	MOUSER	603-RC0805FR-07100KL
16	1	R5	RES 47K OHM 1% 1/8W 0805	YAGEO	RC0805FR-0747KL	MOUSER	603-RC0805FR-0747KL
17	1	R9	RES 2K OHM 1% 1/8W 0805	YAGEO	RC0805FR-072KL	MOUSER	603-RC0805FR-072KL
18	2	RF_IN, RF_OUT	TERM BLOCK PCB 2POS 3.5MM GREEN	PHOENIX	1984617	MOUSER	651-1984617
19	1	T1	INDUCT ARRAY 2 COIL 3.3UH SMD	WURTH	744851330	MOUSER	710-744851330

Appendix 2
NXP Design Challenge

RFPowerTools

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NXP MRF-101

This design won 1st place in the NXP Design Challenge, view the YouTube Video here.

You can buy a bare board to build you own amp in our store.

1W Input, 100W Output 1.8 - 54 MHz Amplifier Deck

Specifications:

- Drive power: 1 - 2W
- Output Power: 100W (50 dBm +/- 1 dB) 1.8-30 MHz, 70W @ 50 MHz
- DC Power: 50V 4A Max.
- Input VSWR: 1.5:1 Max.
- PCB size: 5 X 5 CM (2 X 2 IN)
- Mass: 310g (11 oz.) with heatsink and fan
- Input/Output Connections: 3.5MM Terminal Blocks
- Power Connection: 5.0MM Terminal Block
- Recommended AC supply: Meanwell EPP-200-48

Revisions:

- **Rev A -** Has on board current sense resistor bias control requires high voltage (50V) switching (no longer available for purchase, reference only)
- **Rev B -** No on board current sensing, bias voltage switching at 3.3/5V logic (0V = bias on; > 3V = bias off)

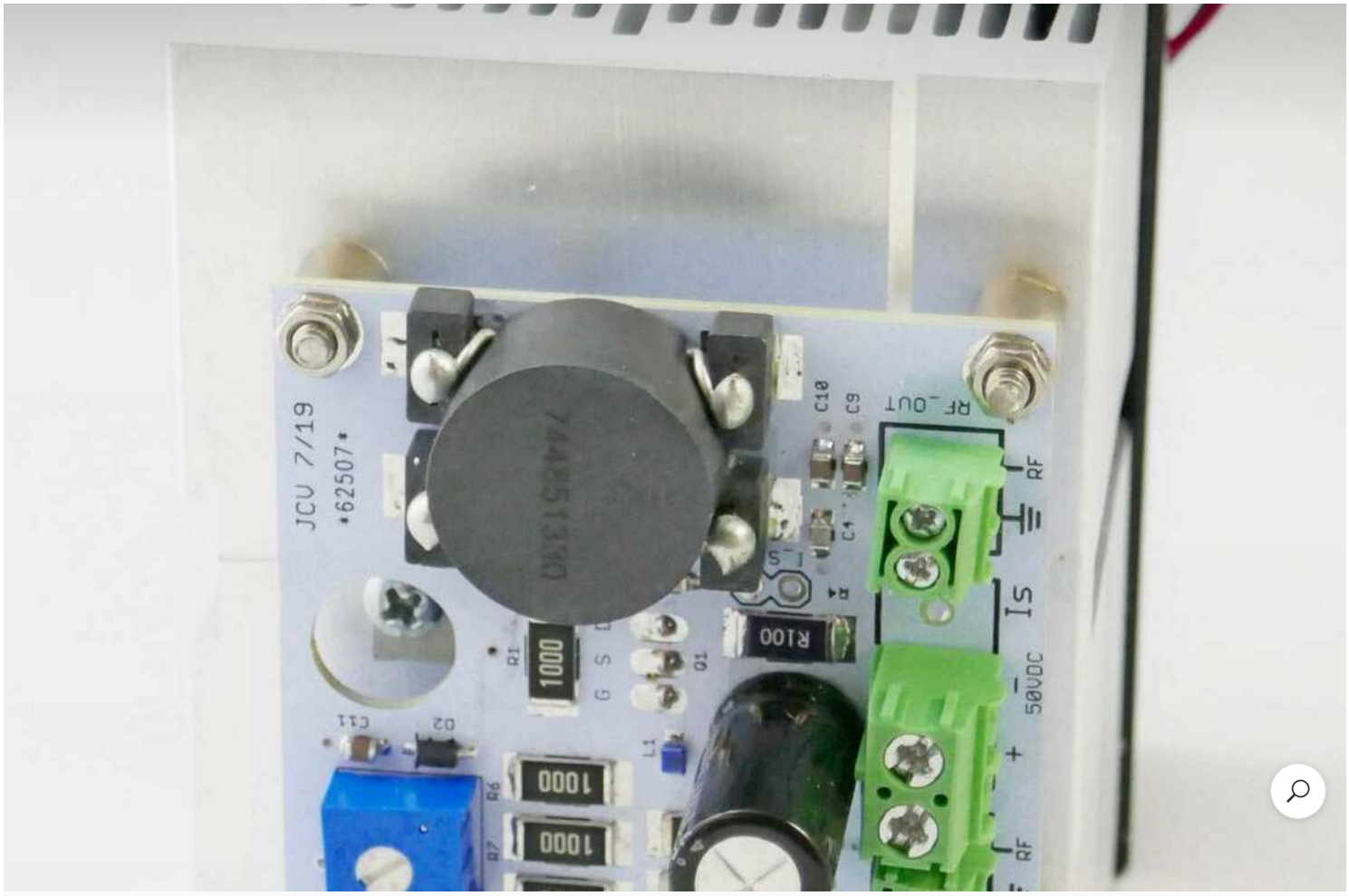
SUBPAGES (1): MRF-101EVB LINEARITY DATA

MRF101 E...	WA2EUJ, ...	V.1	
MRF101 E...	WA2EUJ, ...	V.1	
MRF101_...	WA2EUJ, ...	V.1	
MRF101_...	WA2EUJ, ...	V.1	

Comments

You do not have permission to add comments.

Appendix 3
WA2EUJ Circuit Board



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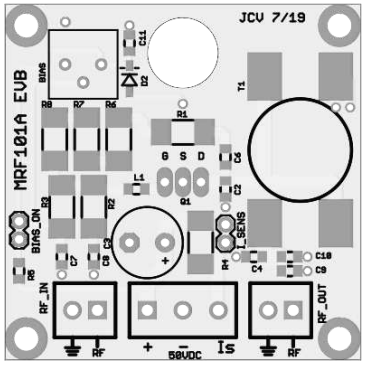

MRF-101A Eval Board

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PCB Options

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Product Details

The MRF-101A eval board is a 1-2W input, 100W output RF power amp module that operates from 1.8 to 54 MHz (reduced output above 30 MHz, typically 75W @ 50 MHz)

Parts to populate the board can be purchased at online retailers. Download the schematic, BOM and technical data at:

https://sites.google.com/site/rfpowertools/home/nx...

Required low-pass filtering for on-the-air operation!!!

Ordering options:

- Bare PCB board - add your own parts and heatsink
- PCB with components - MRF101 and heatsink not included

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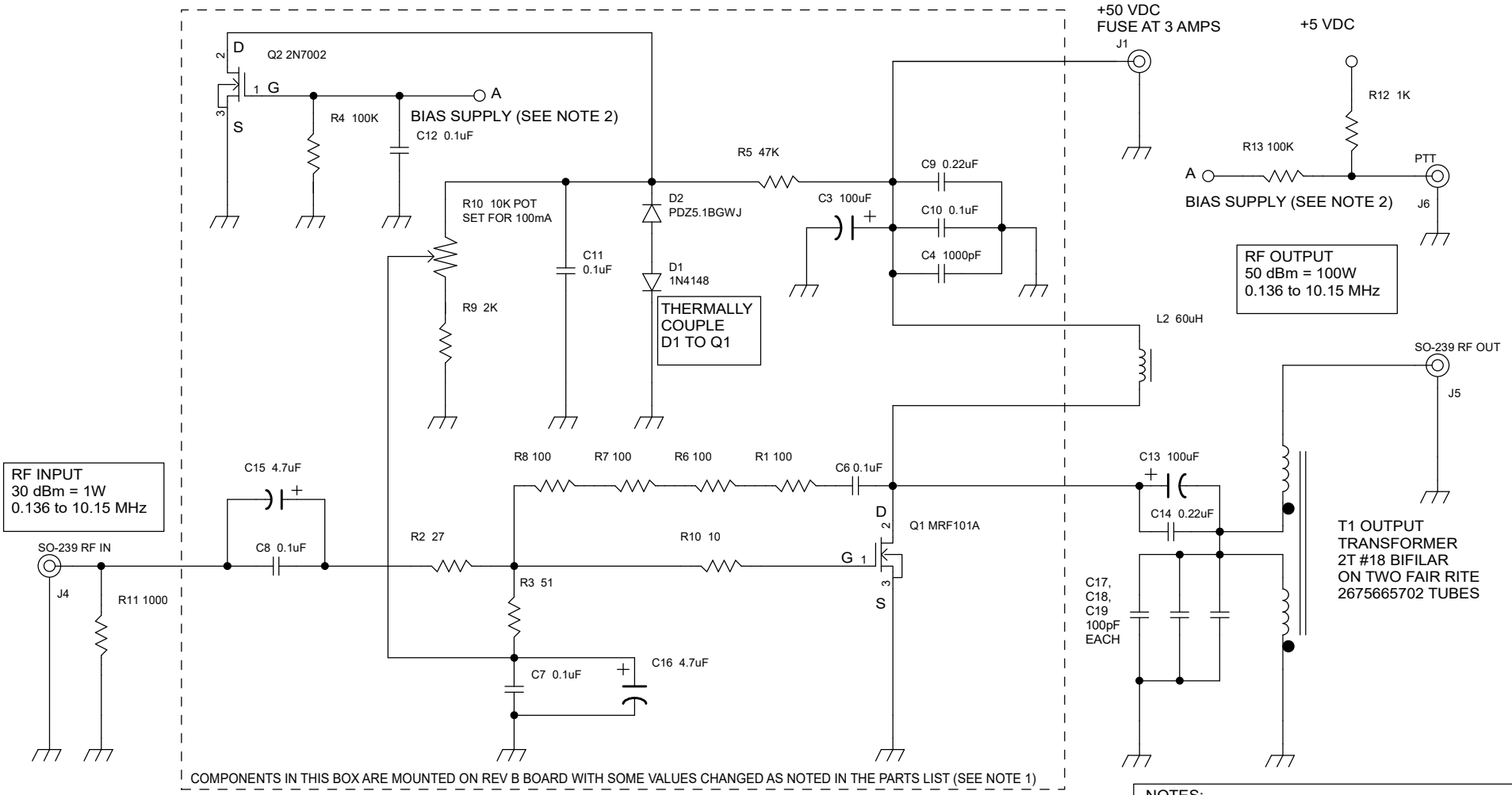
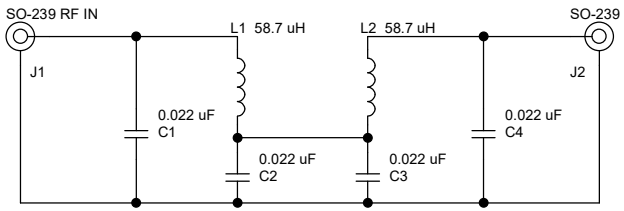
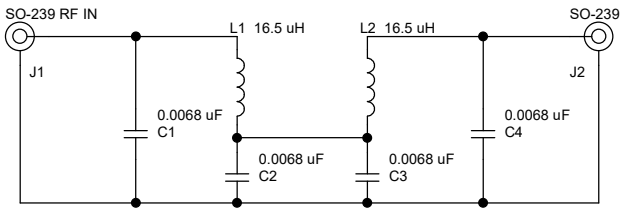
Appendix 4
LF & MF Modified Amplifier and LPFs
Schematic



NXP MRF101A 100W BROADBAND 136 kHz to 10.15 MHz LINEAR AMPLIFIER



137 kHz LOW PASS FILTER
L1, L2: 58.7 uH, 70 turns on T200-2
18 AWG Enameled Wire
C1, C2, C3, C4: WIMA MKP10 0.022uF 2kV DC



479 kHz LOW PASS FILTER
L1, L2: 16.5 uH, 39 turns on T130-2
18 AWG Enameled Wire
C1, C2, C3, C4: WIMA MKP10 0.0068uF 2kV DC

NOTES:

1. RF POWER TOOLS MRF101A TYPE B EVALUATION BOARD BY JIM VEATCH, WA2EUJ, IS USED WITH MODIFICATIONS FOR THIS AMPLIFIER. SEE THE PARTS LIST FOR DETAILS.
2. BIAS SUPPLY VOLTAGES:
   RX: PTT RELAY OPEN = >3V = BIAS ON
   TX: PTT RELAY CLOSED = 0V = BIAS OFF

Title: 136 kHz to 10.15 MHz Amplifier & Low Pass Filters		
Author: ROGER GRAVES, VE7VV & MARK MATTILA, VA7MM		
File: H:\136kHz-10.15MHz_Amp+LPFs-R10.dsn		Document
Revision: 10.0	Date: 26-Jan-2021	Sheets: 1 of 1

Appendix 5
LF & MF Modified Amplifier
Parts List

MRF-101A 100W BROADBAND 136 kHz to 10.15 MHz LINEAR AMPLIFIER
LIST OF MODIFICATIONS AND PARTS

ORIGINAL PARTS FOR MRF101A REV B EVALUATION BOARD:

ITEM	QTY	PART DESIGNATOR	DESCRIPTION	MFG	MFG_PN	REMARKS	DESIGN
1	1	BIAS= R10	TRIMMER 10K OHM 0.5W PC PIN TOP	BOURNS	3386P-1-103LF	USED AS SPECIFIED	WA2EUJ
2	0	C1, C5	CAP CER 0.1UF 100V X7R 0805	TDK	C2012X7R2A104K125AA	OMITTED, NOT USED	
3	0	C6, C7, C8	CAP CER 0.1UF 100V X7R 0805	TDK	C2012X7R2A104K125AA	REPLACED, SEE C6, C7, C8 BELOW	
4	0	C9	CAP CER 0.1UF 100V X7R 0805	TDK	C2012X7R2A104K125AA	REPLACED, SEE C9 BELOW	
5	3	C10, C11, C12	CAP CER 0.1UF 100V X7R 0805	TDK	C2012X7R2A104K125AA	USED AS SPECIFIED	WA2EUJ
6	0	C2	CAP 220PF 100V C0G/NPO 0805	YAGEO	CC0805JRNPO0BN221	OMITTED, NOT USED	
7	0	C3	CAP ALUM 330UF 20% 63V RADIAL	NICHICON	UVR1J331MPD	REPLACED, SEE C3 BELOW	
8	1	C4	CAP 1000PF 100V C0G/NP0 080	MURATA	GRM2165C2A102JA01D	USED AS SPECIFIED	WA2EUJ
9	1	D1	DIODE GEN PURP 100V 150MA SOD123	MCC	1N4148W-TP	USED AS SPECIFIED	WA2EUJ
10	1	D2	DIODE ZENER 5.1V 365MW SOD123	NEXPERIA	PDZ5.1BGWJ	USED AS SPECIFIED	WA2EUJ
11	0	J1	TERM BLK 2POS SIDE ENTRY 5MM PCB	PHOENIX	1935161	OMITTED, DIRECT CONNECTION TO BOARD	
12	0	L1	FIXED IND 47NH 500MA 310 MOHM	ABRACON	AISC-0805-R047J-T	REPLACED, SEE R11 BELOW	
13	1	Q1	RF TRANSISTOR 100W TO-220	NXP	MRF101AN	USED AS SPECIFIED	WA2EUJ
14	1	Q2	MOSFET N-CH 60V 0.17A SOT23-3	DIODES INC	2N7002H-7	USED AS SPECIFIED	WA2EUJ
15	4	R1, R6, R7, R8	RES 100 OHM 1% 2W 2512	BOURNS	CRM2512AFX-1000ELF	USED AS SPECIFIED	WA2EUJ
16	1	R2	RES 27 OHM 1% 1W 2512	VISHAY	CRCW251227R0FKEG	USED AS SPECIFIED	WA2EUJ
17	1	R3	RES 51 OHM 1% 1W 2512	VISHAY	CRCW251251R0FKEG	USED AS SPECIFIED	WA2EUJ
18	1	R4	RES SMD 100K OHM 1% 1/8W 0805	YAGEO	RC0805FR-07100KL	USED AS SPECIFIED	WA2EUJ
19	1	R5	RES 47K OHM 1% 1/8W 0805	YAGEO	RC0805FR-0747KL	USED AS SPECIFIED	WA2EUJ
20	1	R9	RES 2K OHM 1% 1/8W 0805	YAGEO	RC0805FR-072KL	USED AS SPECIFIED	WA2EUJ
21	0	RF_IN= J2, RF_OUT= J3	TERM BLOCK PCB 2POS 3.5MM GREEN	PHOENIX	1984617	OMITTED, DIRECT CONNECTION TO BOARD	
22	0	T1	INDUCT ARRAY 2 COIL 3.3UH SMD	WURTH	744851330	REPLACED, SEE T1 BELOW	

NEW OR REPLACED PARTS FOR MODIFIED AMPLIFIER:

ITEM	QTY	PART DESIGNATOR	DESCRIPTION	MFG	MFG_PN	REMARKS	DESIGN
1	3	C6, C7, C8	CAP C0G/NP0 SMT TYPE 0.1 uF	MURATA	GRM31C5C2A104JA01L	REPLACEMENT FOR MODIFICATION	VE7VV
2	1	C9	CAP FILM TYPE 100V 0.22 uF	WIMA	MKP1D032204D00JB00	REPLACEMENT FOR MODIFICATION	VE7VV
3	2	C3	CAP 100 uF 100V PANASONIC LOW ESR	PANASONIC	EEU-FR2A101B	REPLACEMENT FOR MODIFICATION	VE7VV
4	1	R10	RES 10 OHM 1% 1/4 W			NEW FOR MODIFICATION, HIGH FREQUENCY OSCILLATION STOPPER RESISTOR	VE7VV
5	1	C13	CAP 100 uF 100V PANASONIC LOW ESR	PANASONIC	EEU-FR2A101B	NEW FOR MODIFICATION, DC BLOCK	VE7VV
6	1	C14	CAP FILM TYPE 100V 0.22 uF	WIMA	MKP1D032204D00JB00	NEW FOR MODIFICATION, DC BLOCK	VE7VV
7	2	C15, C16	CAP 4.7 uF 100V PANASONIC LOW ESR	PANASONIC	EEU-FR1H4R7	NEW FOR MODIFICATION	VE7VV
8	3	C17, C18, C19	CAP 100 pF POLYPROPYLENE	WIMA	FKP2J001001D00KSSD	NEW FOR MODIFICATION, TRANSFORMER COMPENSATION CAPACITORS	VE7VV
9	2	T1	2T #18 BIFILAR ON TWO FAIR RITE 26775 665702 CABLE CORES	FAIR-RITE		NEW FOR MODIFICATION, CUSTOM BUILD OUTPUT TRANSFORMER	VE7VV
10	1	L2	60 uH RFC 74T #18 on T130-2 TOROID			NEW FOR MODIFICATION, CUSTOM BUILD RF CHOKE ACCOMPANYING DC BLOCK	VE7VV
11	1	R11	RES 1K OHM 1% 2 W			NEW FOR MODIFICATION, TO ENSURE DC GROUND POTENTIAL FOR C15	VE7VV
12	1	R12	RES 1K OHM 1% 1/4 W			NEW FOR MODIFICATION, ENABLE USE OF TRANSCEIVER SEND RELAY	VA7MM
13	1	R13	RES 100K OHM 1% 1/4 W			NEW FOR MODIFICATION, ENABLE USE OF TRANSCEIVER SEND RELAY	VA7MM

Appendix 6
WA2EUJ Amplifier
Test Data

RFPowerTools

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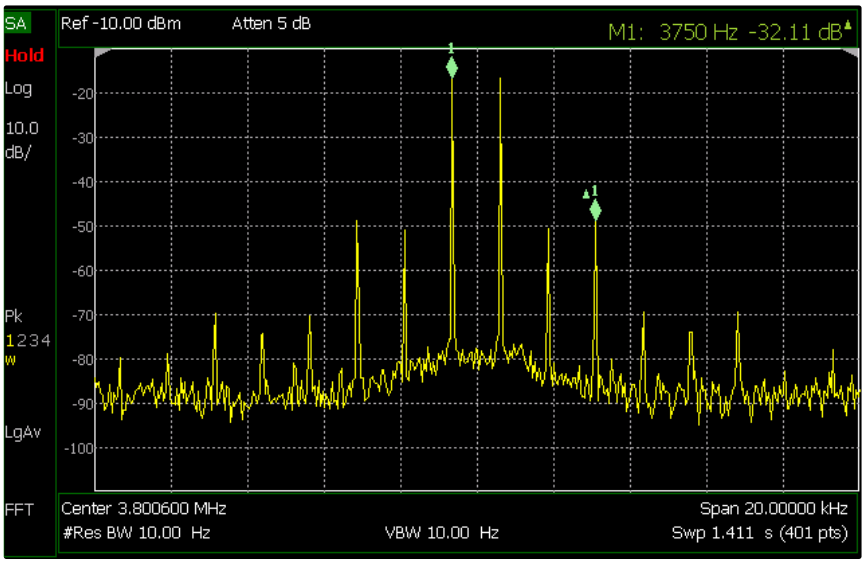
MRF-101EVB Linearity Data

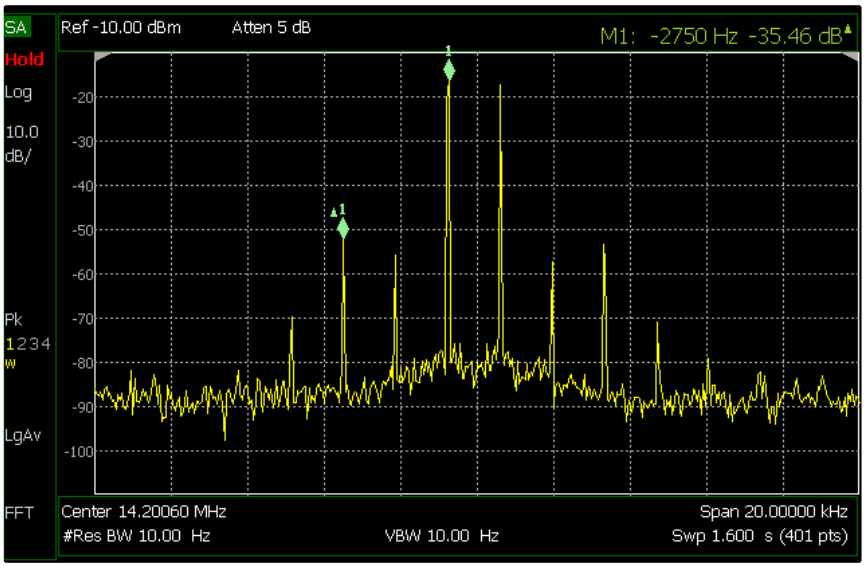
Two-tone test data, tones spaced 1200Hz, 60 dB attenuation between EVB and spectrum analyzer. The top of the screen is equivalent to +50 dBm (100W) at the output of the amplifier.

80M two 20W carriers 80W PEP:



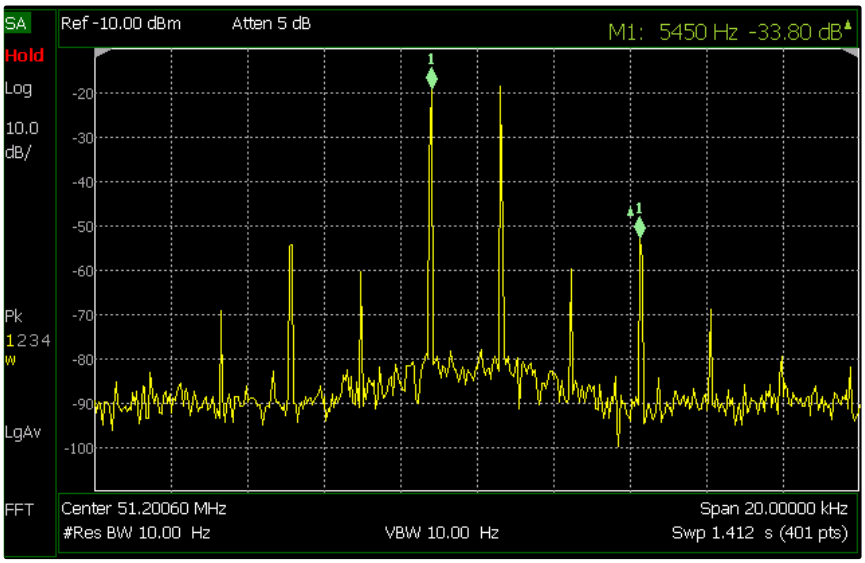
Worst case 5th order products 38 dB below PEP

20M two 20W carriers 80W PEP:



Worst case 5th order products 41 dB Below PEP

6M two 12.5W carriers 50W PEP:



Worst case 5th order products 39 dB Below PEP

Comments

You do not have permission to add comments.

Appendix 7
WA2EUJ Amplifier
Elliptical Filters

RFPowerTools

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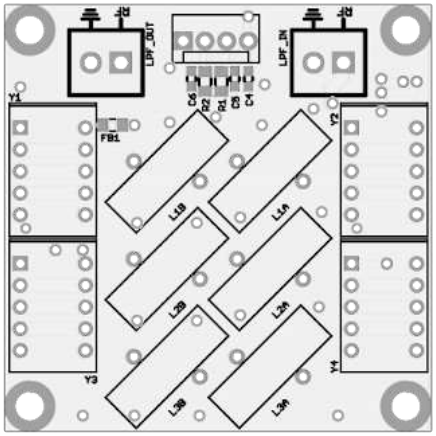
Low Pass Filters

Unfiltered amplifiers are illegal for on-the-air use!
The low-pass filters designs on this page clean up the output of amplifiers up to 100W.
When used with the MRF-101 eval board produce a signal that meets or exceeds FCC requirements.

RF Power Tools currently has two low-pass filter board options for the 100W amplifier deck. A three band version and a seven band version.

3 Band LPF Design:



The 3 band LPF is in a 5 X 5 cm (~2" X 2") which is designed to stack with the 100W MFR-101 eval board and the 100W T/R switch boards to make a compact, complete 100W amplifier.

Builders must select 3 of the available filter designs to complete the filter board. Avaiable designs are:
- 6M
- 10/12/15M
- 17/20M
- 30/40M
- 60M
- 80M
- 160M

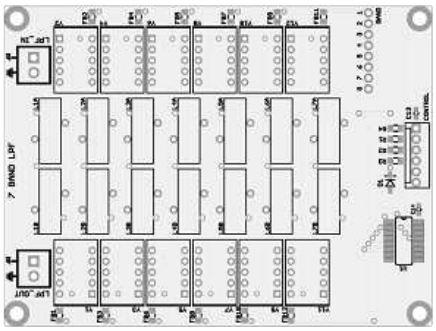
When fitted with the 3 band LPF, the amplifier can be used on the bands covered by the selected filters.

7 Band LPF Design:

The 7 band LPF is in a 10 X 7.5 cm (~4" X 3") which is designed to be used with the 100W MFR-101 eval board and the 100W T/R switch boards to make a compact, complete 100W amplifier.

When fitted with the 7 band LPF, the amplifier can be used on all Amatuer bands from 1.8 to 54 MHz

Header Pinout:
Pin 1: 11-15VDC 13.8V Nominal, 100 mA max.
Pin 2: Band select Bit 0 (LSB) High = 2.4 - 5.0V; Low 0 - 0.5V; Pulled to 5V with a 10K
Pin 3: Band select Bit 1



Pin 4: Band select Bit 2 (MSB)
PIN 5: N/C
Pin 6: Ground
Band Select:

BAND	Bit 2	Bit 1	Bit 0	Filter Position
160M	High	High	High	7
80M	Low	Low	Low	6
60M	Low	Low	High	5
40M	Low	High	Low	4
30M	Low	High	Low	4
20M	Low	High	High	3
17M	Low	High	High	3
15M	High	Low	Low	2
12M	High	Low	Low	2
10M	High	Low	Low	2
6M	High	Low	High	1

SUBPAGES (1): TEST DATA

FILTER LIST.XLSX (12K)	WA2EUJ, OCT 2, 2019, 9:23 AM	V.1	
SEVEN_BAND_LPF_REVA_SCHEMATIC.P...	WA2EUJ, OCT 2, 2019, 9:21 AM	V.1	
SEVEN_BND_LPF_REVA_BOM.XLS (24K)	WA2EUJ, DEC 14, 2019, 6:16 PM	V.1	
THREE_BAND_LPF_REVA_SCHEMATIC.P...	WA2EUJ, OCT 2, 2019, 9:31 AM	V.1	
THREE_BND_LPF_REVA_BOM.XLS (24K)	WA2EUJ, OCT 2, 2019, 9:31 AM	V.1	

Comments

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