

MRF101AN 1.8-250 MHz REFERENCE CIRCUIT

ORDERABLE PART NUMBER: **MRF101AN-2MHZ4UP**



PUBLIC



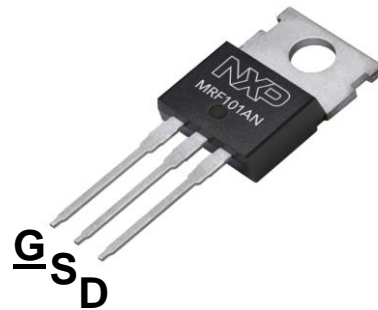
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Introduction

- The NXP MRF101AN and MRF101BN are two 1.8-250 MHz, 100 W CW RF power LDMOS transistors housed in TO-220 over-molded plastic packages. Their unmatched input and output allows wide frequency range utilization. A and B version have a mirrored pin-out in order to easily implement a push-pull design and achieve wideband performance.
 - Further details about the devices, including its data sheets, are available on www.nxp.com/MRF101AN.
- The following pages describe the 1.8-250 MHz 4-up (4 combined transistors) reference circuit. Its typical application is wideband amplifiers.
 - Other reference circuits can be found on www.nxp.com/MRF101CIRCUITS.
- The reference circuit can be ordered through NXP's distribution partners and retailers using part number MRF101AN-2MHZ4UP.

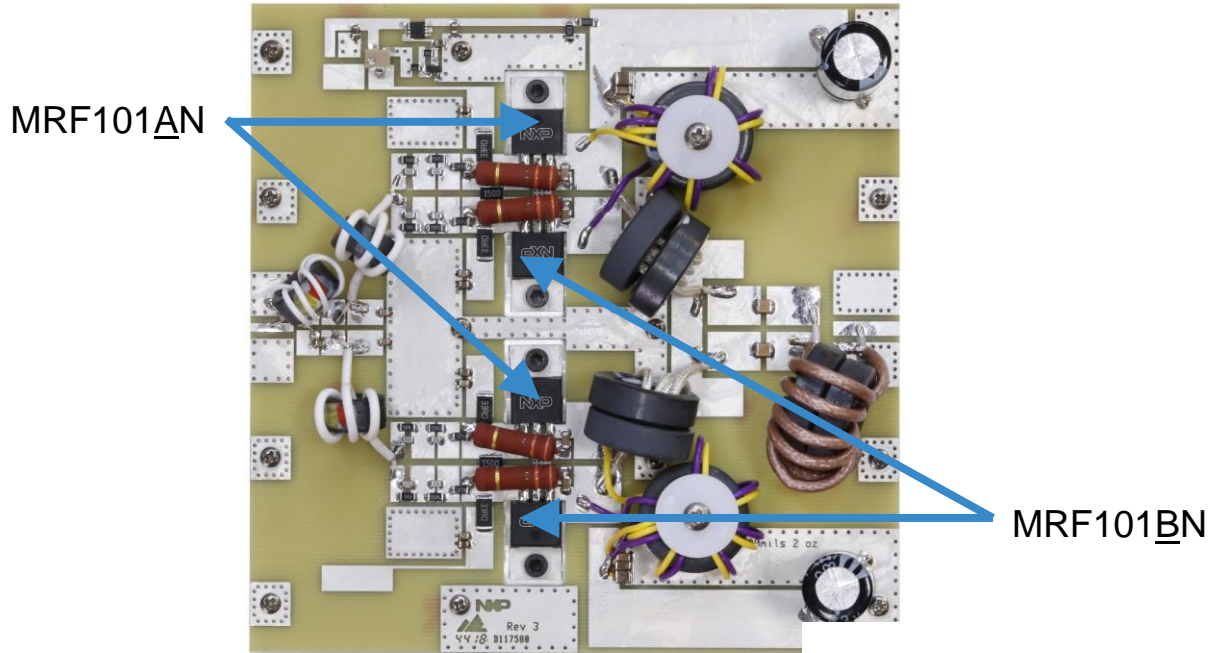


MRF101AN

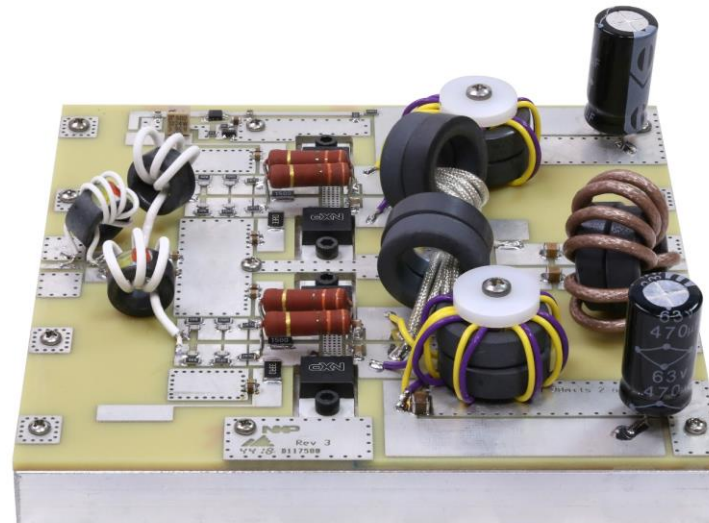


MRF101BN

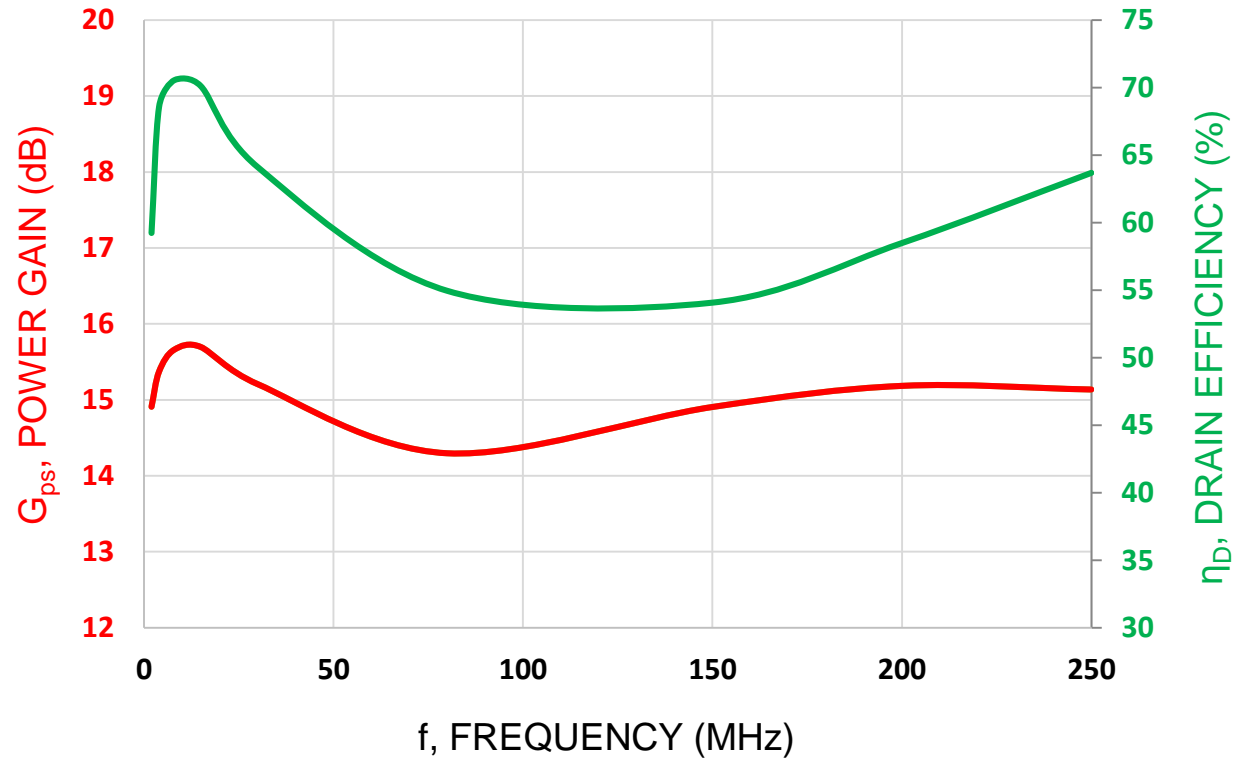
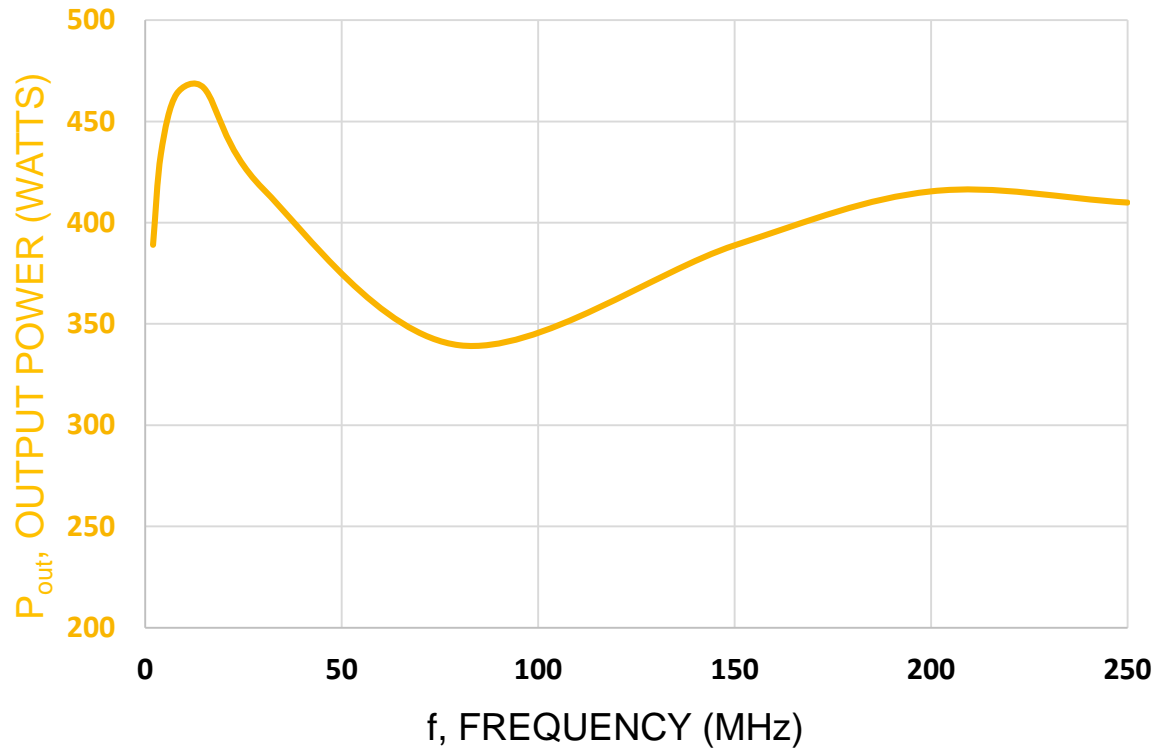
Circuit Overview – 12.7 cm x 12.7 cm (5.0" x 5.0")



The MRF101AN and MRF101BN are used in a push-pull configuration then combined in a second push-pull step.



Typical CW Performance 1/2

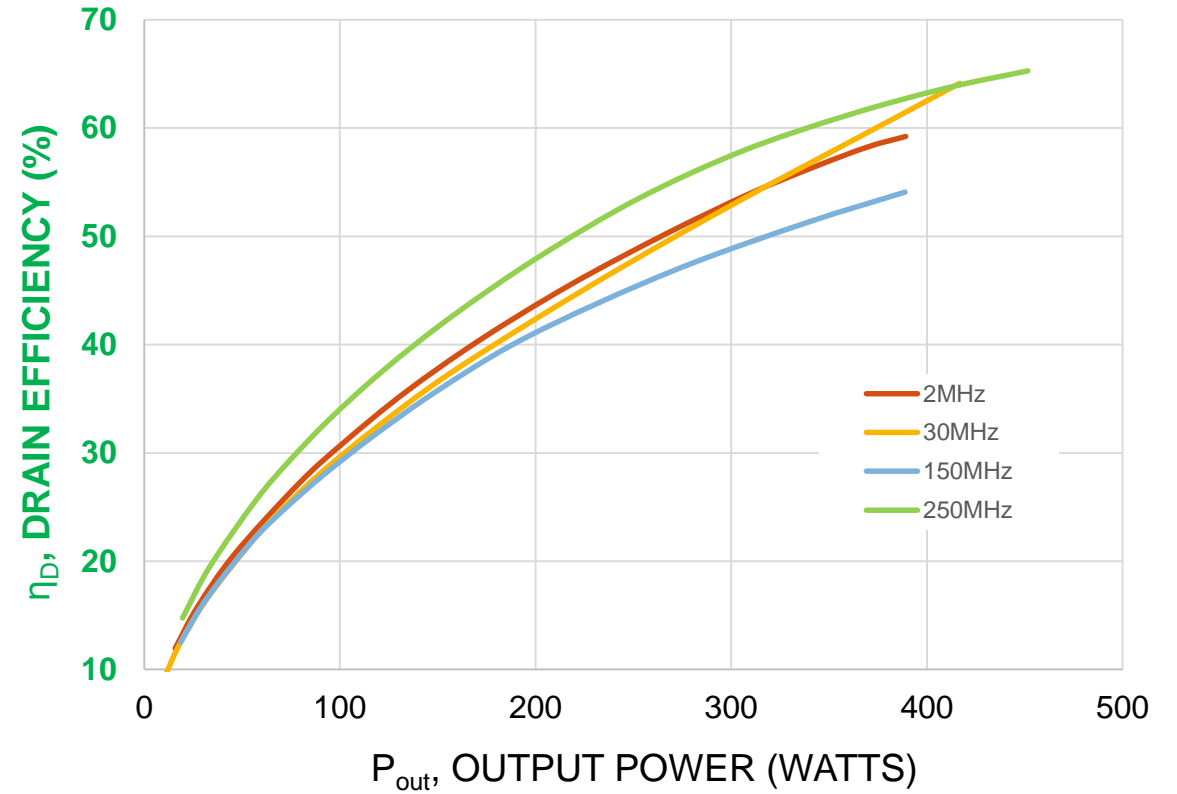
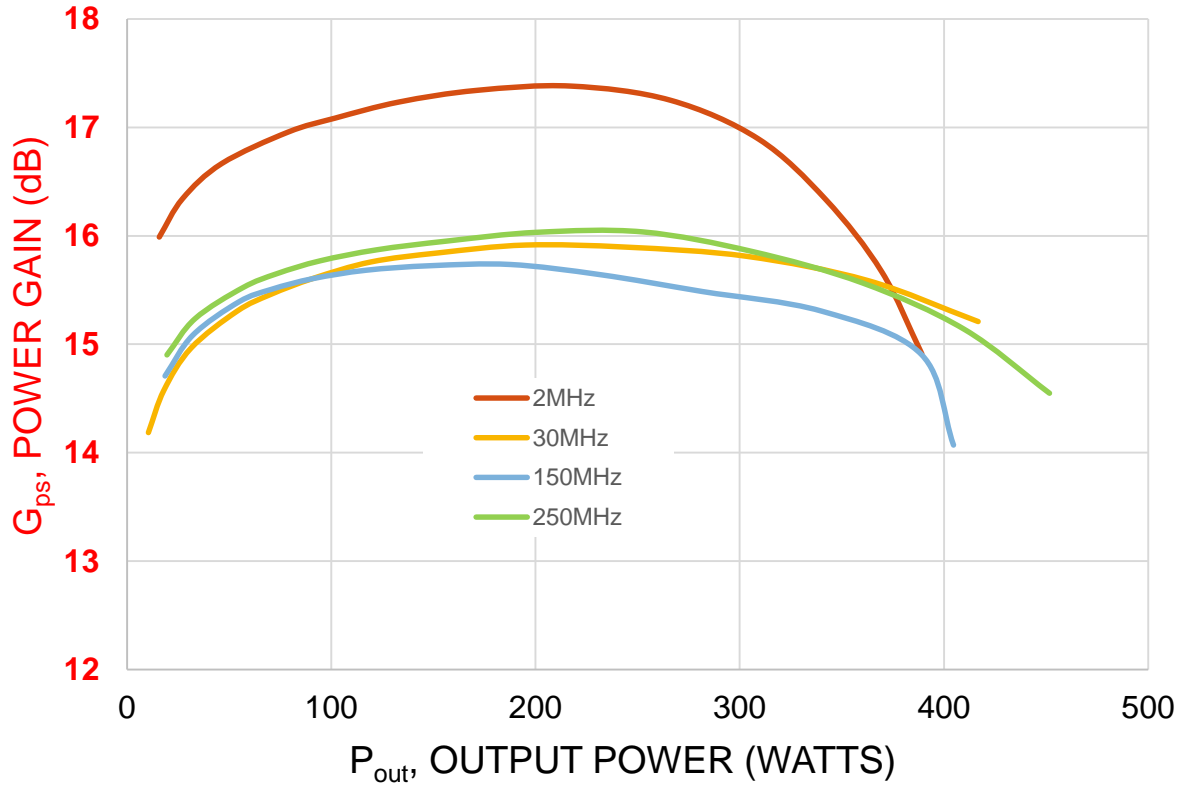


Typical Performance: $V_{DD} = 50$ Vdc, $I_{DQ} = 480$ mA (120 mA per transistor), $P_{in} = 12.6$ W (41 dBm), CW

Frequency (MHz)	Output Power (W)	Power Gain (dB)	Drain Efficiency (%)
2	389	14.9	59.2
30	417	15.2	64.1
150	389	14.9	54.1
250	410	15.1	63.7



Typical CW Performance 2/2



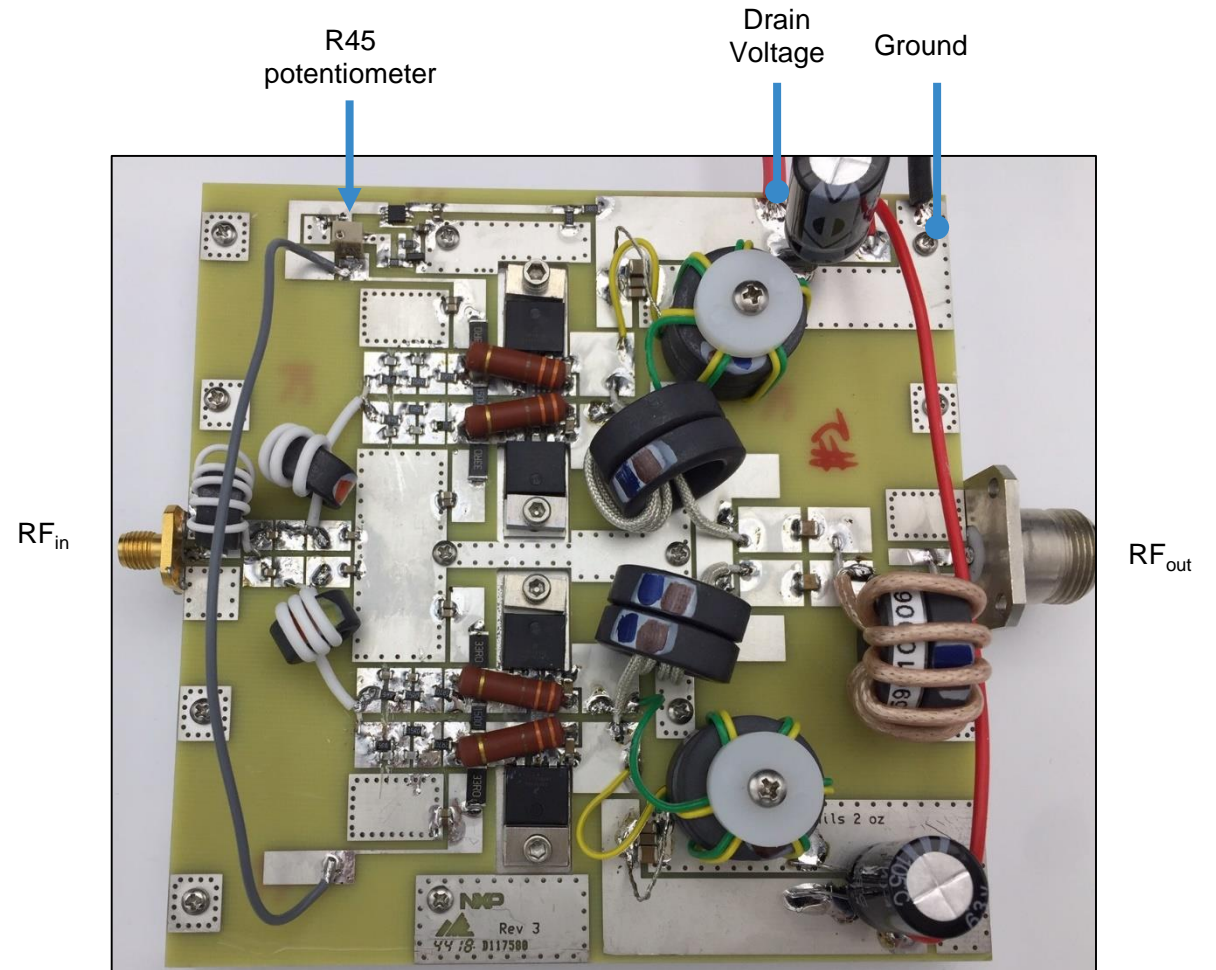
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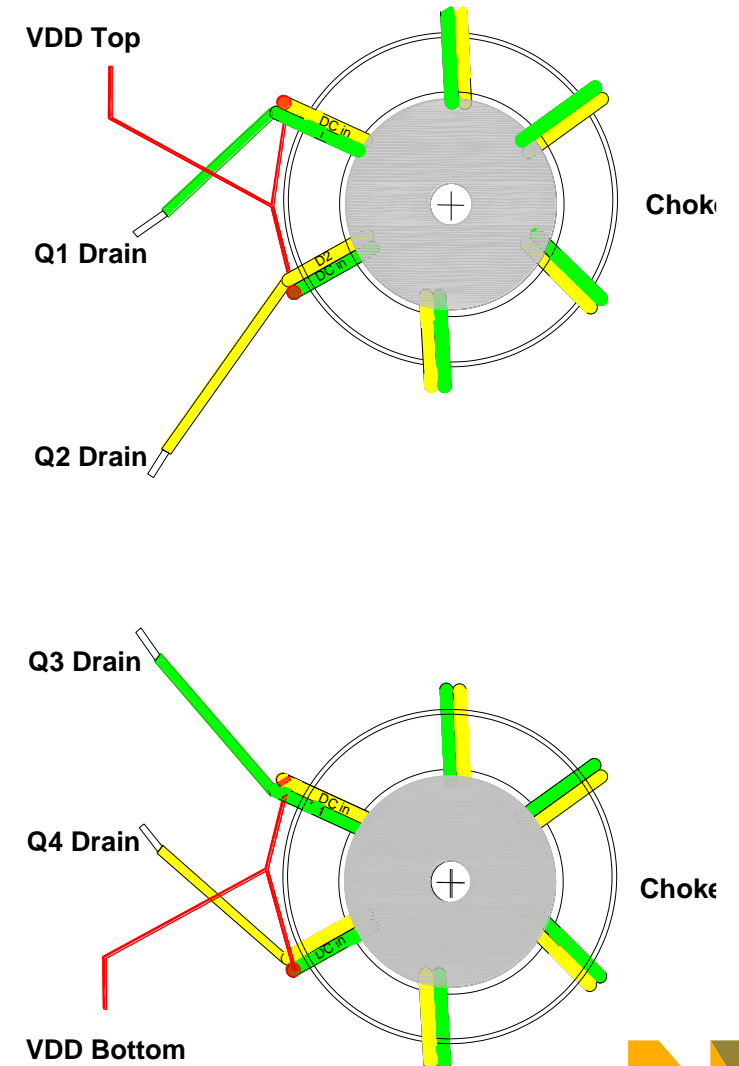
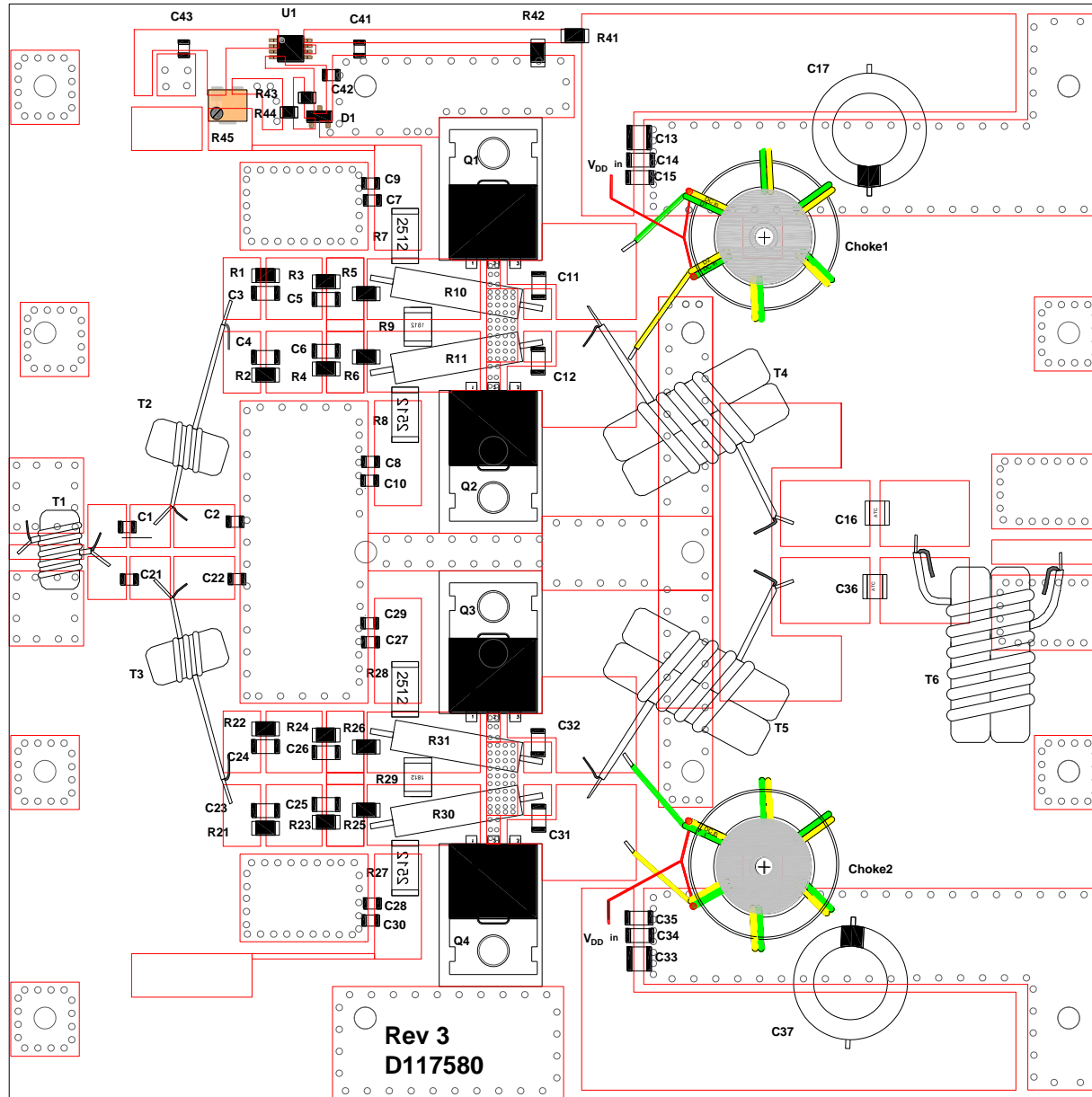


Quick Start

1. Mount the reference circuit onto a heatsink capable of dissipating more than 350 W in order to provide enough thermal dissipation (the baseplate included in this reference circuit is not sufficient to serve as a standalone heatsink).
2. Connect the ground.
3. Terminate the RF output with a 50 ohm load capable of handling more than 450 W.
4. Connect the RF input to a 50 ohm source with the RF off.
5. Connect the drain voltage (V_{DD}) and raise it slowly to 50 V while ensuring that the drain current remains below or equal to the typical drain quiescent current of $I_{DQ} = 480$ mA (120 mA per transistor).
6. If needed, adjust the R45 potentiometer to modify the gate voltage to adjust the drain quiescent current.
7. Raise the RF input slowly to 12.6 W (41 dBm) typically.
8. Check the RF output power (typically 450 W CW), the drain current (around 13 A for this power level) and the temperature of the board.



Component Placement Reference



Bill of Materials

Designator	Description	Part Number	Manufacturer
C1, C2, C7, C8, C21, C22, C27, C28	0.01 μ F Chip Capacitor	GRM21BR72A103KA01B	Murata
C3, C4, C5, C6, C23,C24,C25,C26	220 pF 100V 0805	GRM2165C2A221JA01D	Murata
C9, C10, C29, C30, C41, C42, C43	1 μ F 50V 0805	GJ821BR71H105KA12L	Murata
C11, C12, C15, C31, C32, C35	22 nF 100V 1206	GRM31MR72A223KA01L	Murata
C13, C33	10 μ F 100V 1210	GRM32EC72A106KE05L	Murata
C14, C34	1 μ F 100V 1206 Chip Capacitor	GRM31CR72A105KA01L	Murata
C16, C36	39K pF 50V Ceramic Capacitor	200B393KT50XT	ATC
C17, C37	220 μ f 100 V Electrolytic capacitors	MCGPR100V227M16X26	Multicomp
Choke1, Choke2 Core	#61 toroid, Bifilar	5961000601	Fair-Rite
Choke1, Choke2 Wire	22 AWG Wire, Use 2 different Colors, Bifilar	5855/7 VI005, 5855/7 YL005	Alpha Wire
Choke1, Choke2, Washer	Nylon Washer .625 x .187 x.125	59553	Hillman
D1	Discrete Transistors, NPN	BC847ALT1G	On-Semi
R1, R2, R21, R22	5.6 Ω 1206 Chip Resistor	CRCW12065R60JNEA	Vishay
R3, R4, R23, R24	15 Ω 1206 Chip Resistor	CRCW120615R0FKEA	Vishay
R5, R6, R25, R26	2.7 Ω 1206 Chip Resistor	CRCW12062R70FKEA	Vishay
R7, R8, R27, R28	33 Ω 2512 Chip Resistor	352133RFT	TE Connectivity
R9, R29	150 Ω 1812 Chip Resistor	RCL1218150RFKEK	Vishay
R10, R11, R30, R31	330 Ω 3W lead metal film Resistor	PR03000203300JAC00	Vishay
R41,	6.8 K Ω 1206 Chip Resistor	CRCW12066K80FKEA	Vishay
R42	10 K Ω 1206 Chip Resistor	CRCW120610K0JNEA	Vishay
R43	1.2 K Ω 0805 Chip Resistor	CRCW08051K20FKEA	Vishay
R44	2.2 K Ω 0805 Chip Resistor	CRCW08052K20JNEA	Vishay
R45	SMT Trim Pot 5K, (12 turn)	3224W-1-502E	Bourns
T1, T2, T3 Core	#43 toroid	5943001101	Fair-Rite
T1 Wire	50 Ω , 5 Turns, 5.6"	9432 WH033	Alpha Wire
T2, T3 Wire	25 Ω 3 Turns, 4.2"	D260-4118-0000	RF Power System
T4, T5, T6 Core	#61 toroid X2	5961000601	Fair-Rite
T4, T5 Wire	12.5 Ω , 4 Turns, 6.3"	SFF-12.5-1	Suzhou Xiangcheng
T6 Wire	50 Ω , 6 Turns, 12.3"	RG316	Beldon
U1	IC 5v regulator (micro8)	LP2951ACDMR2G	On-Semi
Q1, Q3	RF Power LDMOS	MRF101AN	NXP
Q2, Q4	RF Power LDMOS	MRF101BN	NXP
PCB	FR4 ϵ_r = 4.8, 90 mil, 2 oz copper	D117580	MTL

Revision History

- The following table summarizes revisions to the content of the MRF101AN 1.8-250 MHz 4-Up Reference Circuit zip file.

Revision	Date	Description
0	September 2019	• Initial Release



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