MRF101AN 81.36 MHz REFERENCE CIRCUIT

ORDERABLE PART NUMBER: **MRF101AN-81MHZ**

PUBLIC

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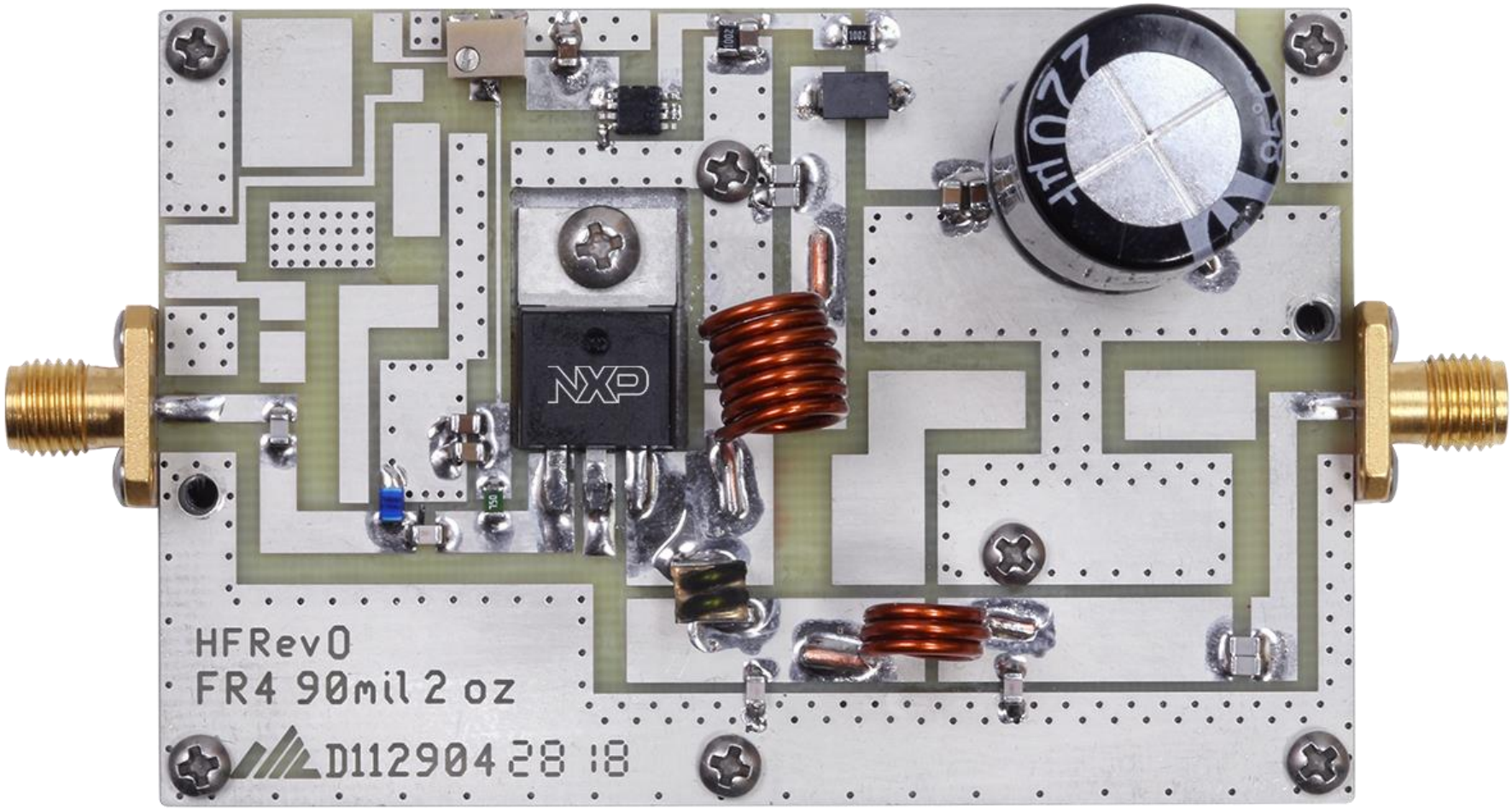
Introduction

- The NXP MRF101AN is a 1.8-250 MHz, 100 W CW RF power LDMOS transistor housed in a TO-220 over-molded plastic package. Its unmatched input and output allows wide frequency range utilization.
  - Further details about the device, including its data sheet, are available on www.nxp.com/MRF101AN.

- The following pages describe the 81.36 MHz reference circuit (evaluation board).
  Its typical application is laser generation.
  - Other reference circuits can be found on www.nxp.com/MRF101CIRCUITS.

- The reference circuit can be ordered through NXP's distribution partners and etailers using part number MRF101AN-81MHZ.

Circuit Overview – 5.08 cm × 7.62 cm (2.0″ × 3.0″)



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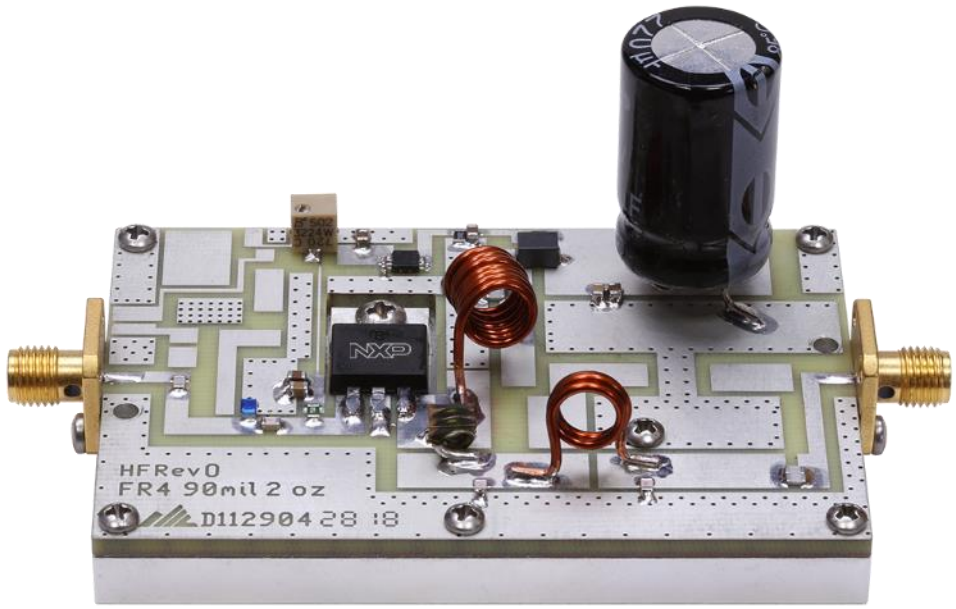
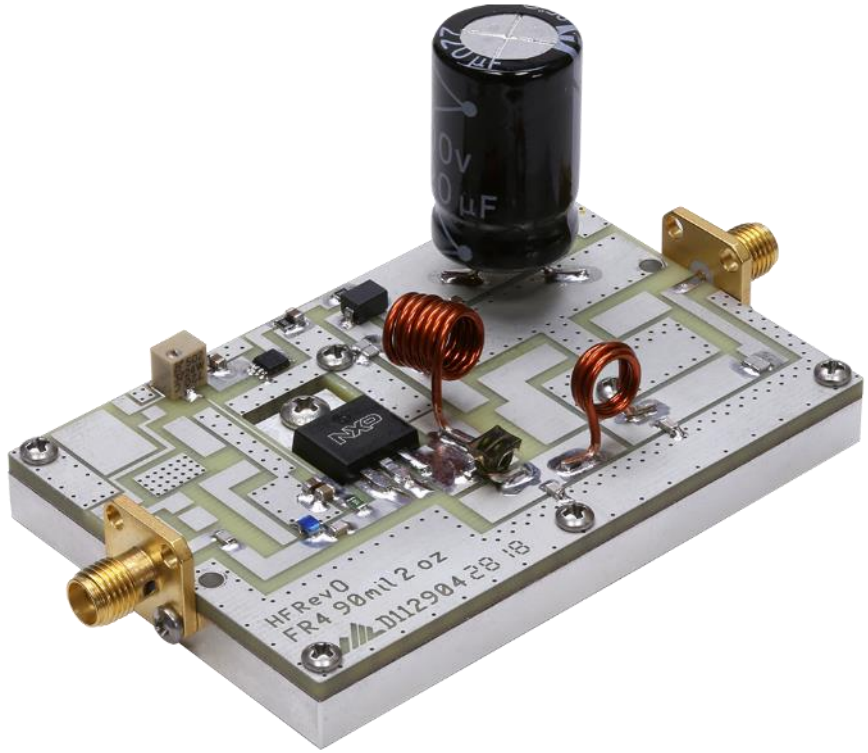
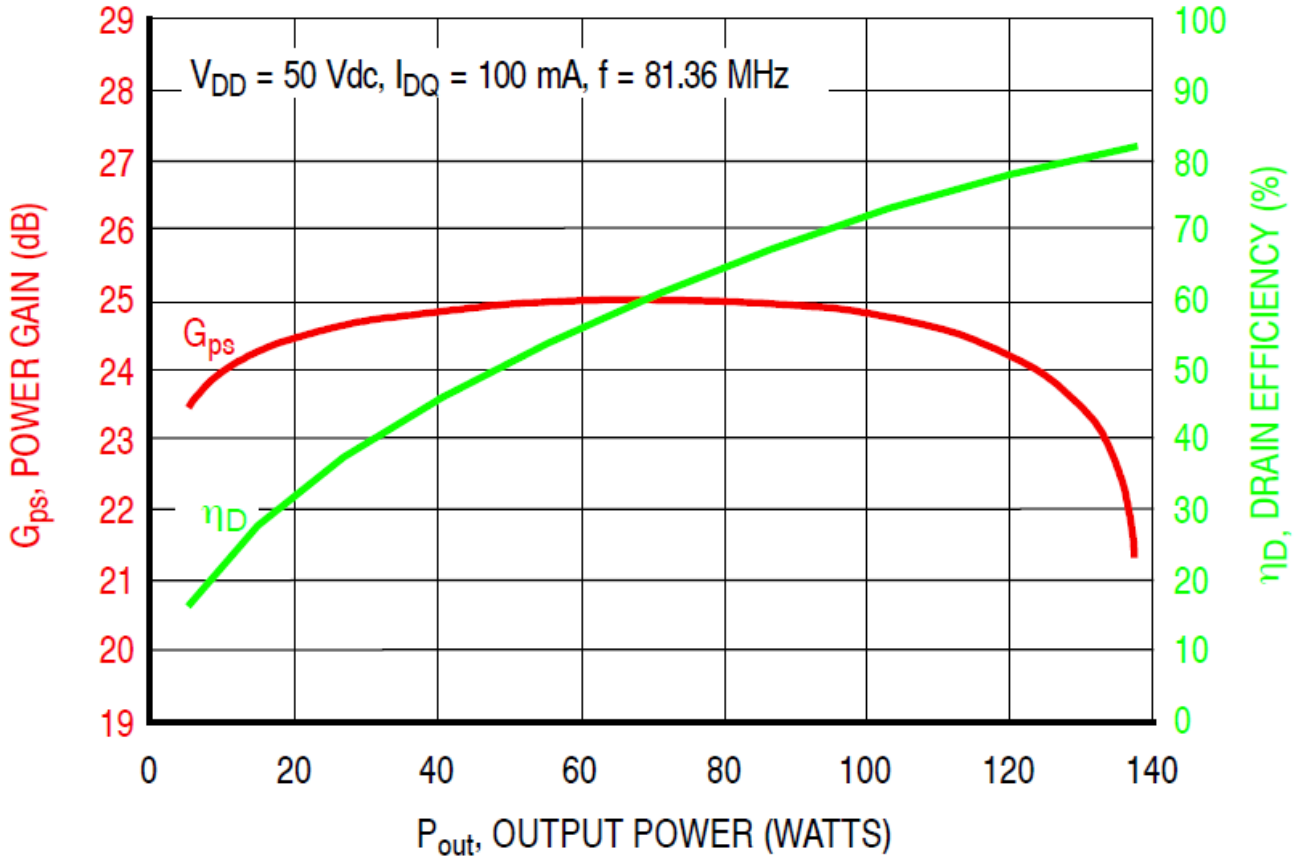




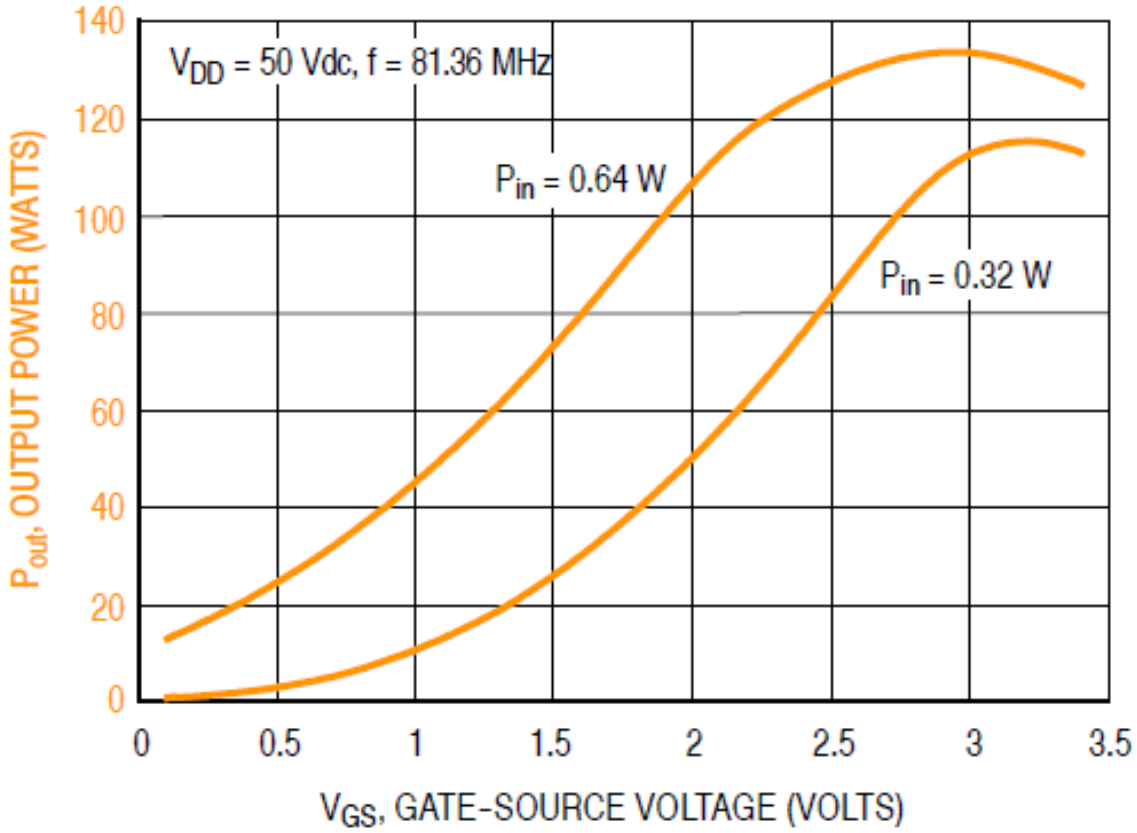
Typical CW Performance

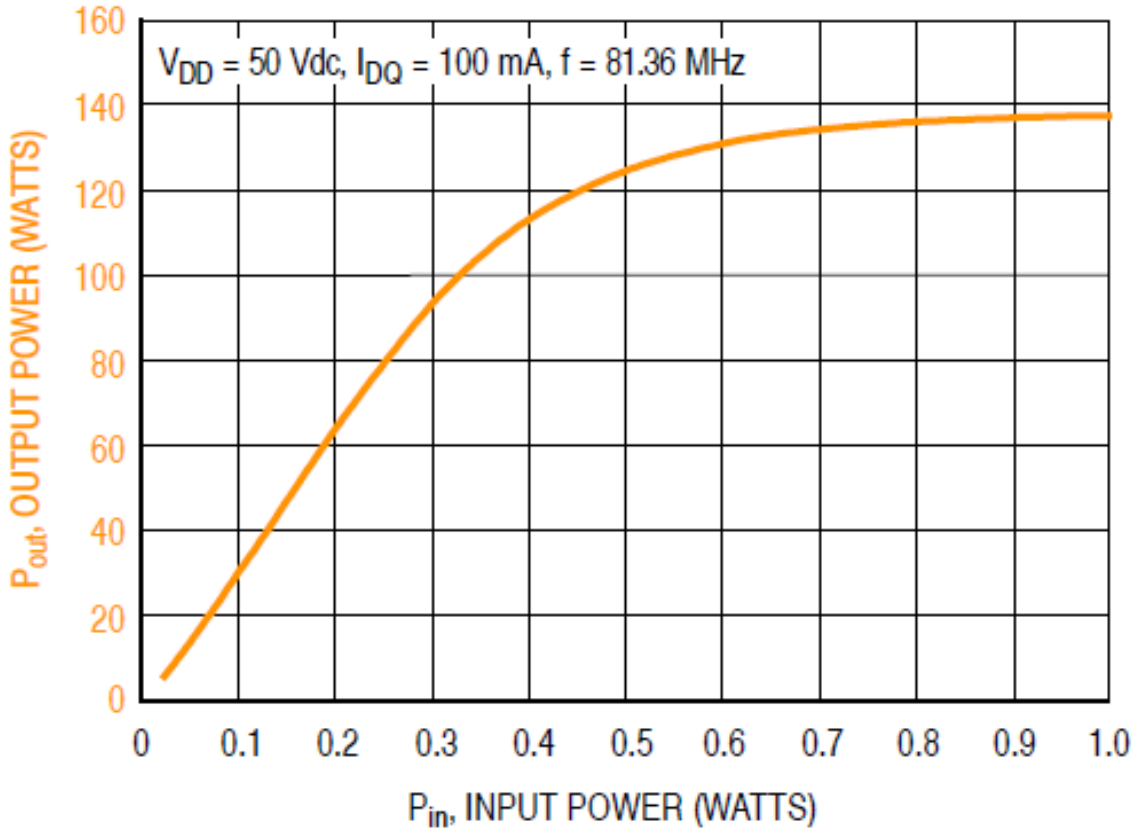


Typical Performance (P3dB):
V_{DD} = 50 Vdc, I_{DQ} = 100 mA, P_{in} = 0.64 W (28 dBm), CW

Frequency (MHz)	Output Power (W)	Power Gain (dB)	Drain Efficiency (%)
81.36	130	23.2	80.8

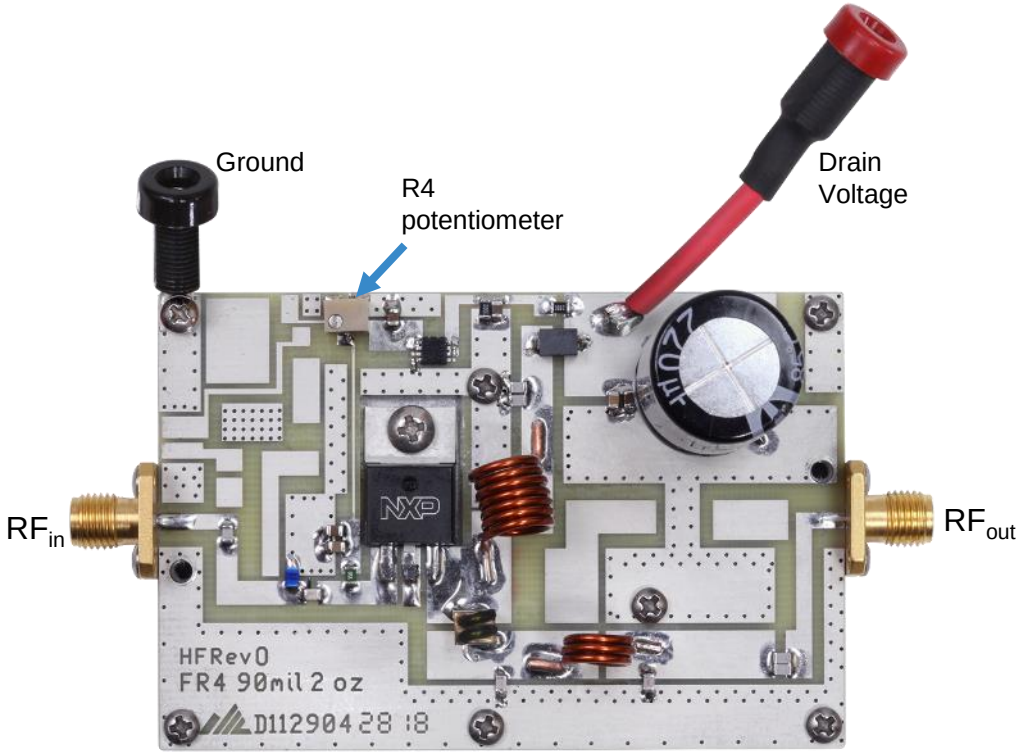
Typical CW Performance



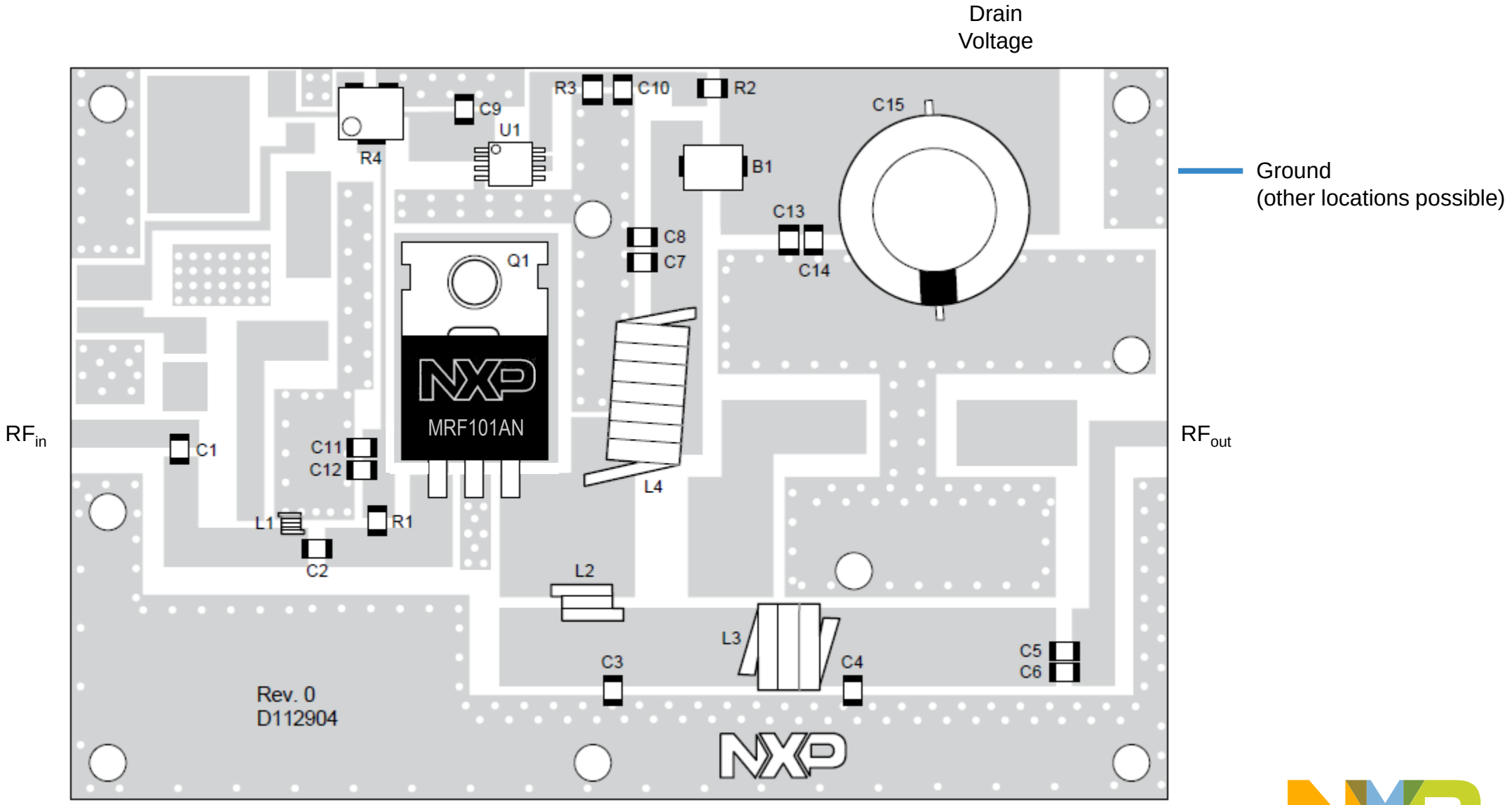


Quick Start

1. Mount the reference circuit onto a heatsink capable of dissipating more than 40 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. Terminate the RF output with a 50 ohm load capable of handling more than 130 W.
3. Connect the RF input to a 50 ohm source with the RF off.
4. Connect the ground.
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} = 100 mA.
6. If needed, adjust the R4 potentiometer to modify the gate voltage to adjust the drain quiescent current.
7. Raise the RF input slowly to 0.64 W (28 dBm).
8. Check the RF output power (typically 130 W), the drain current (typically around 3 A for this power level) and the temperature of the board.



Component Placement Reference

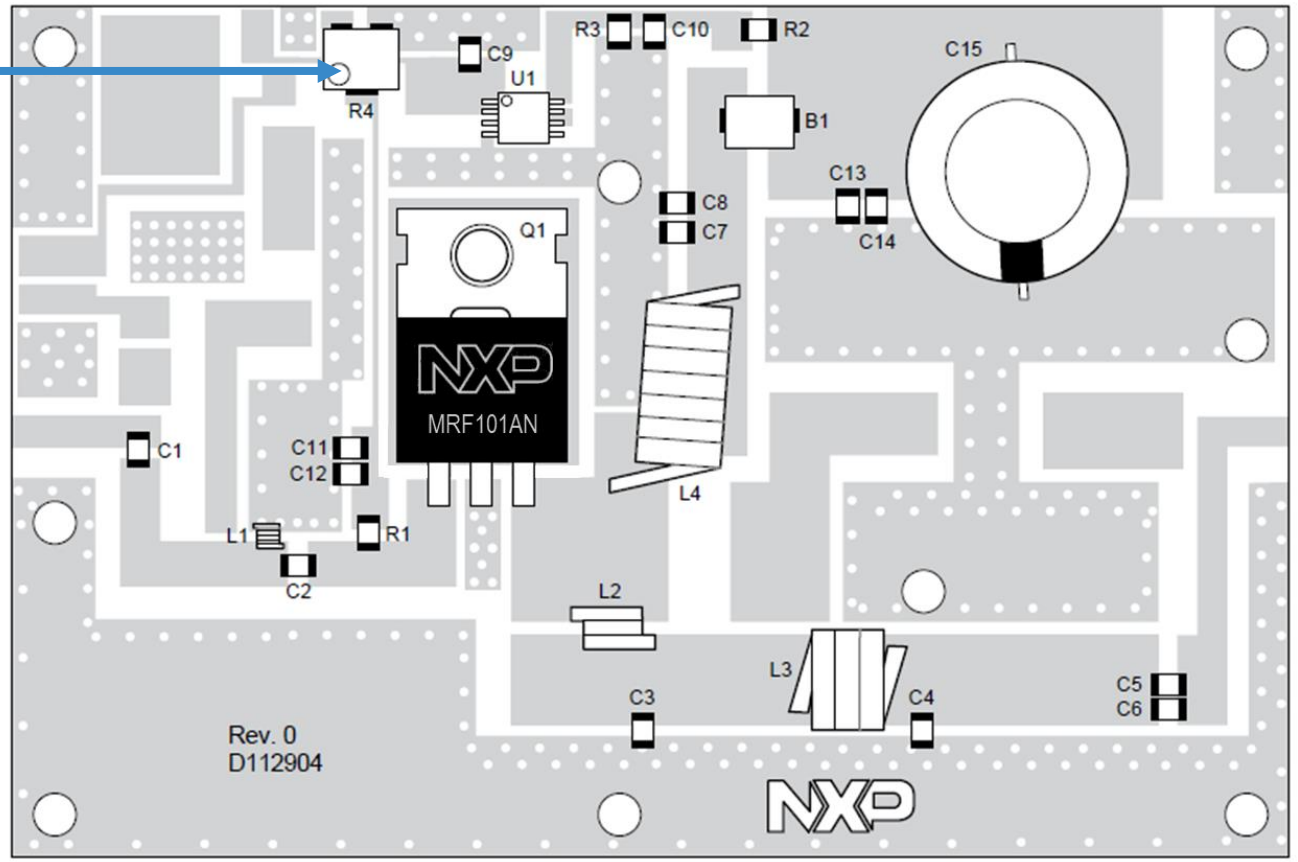


Assembly Details

Transistor bolted to aluminum baseplate using thermal grease.

PCB bolted dry to aluminum baseplate.

Adjust R4 to set the quiescent current I_{DQ}, turn clockwise to increase



The PCB is screwed to the baseplate with #2-56 screws.
The MRF101AN is screwed to the baseplate with a #4-40 hex screw, a flat washer, a lock washer and thermal grease beneath the transistor.

Bill of Materials

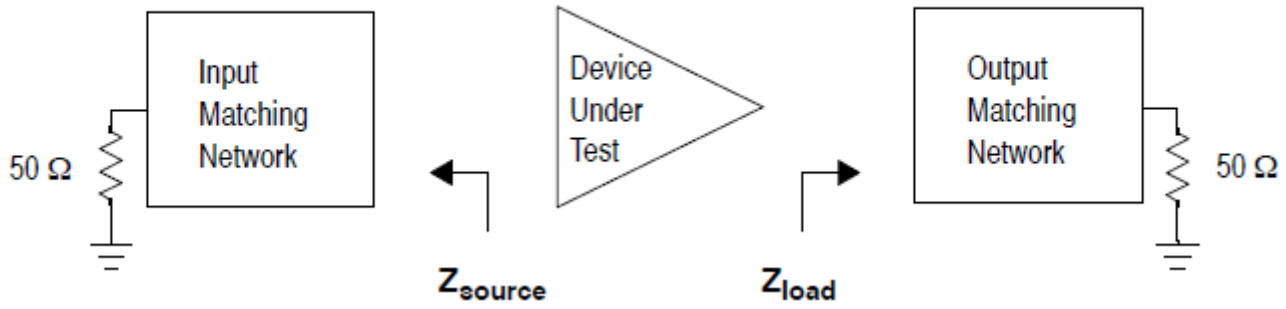
Part	Description	Part Number	Manufacturer
B1	Short RF Bead	2743019447	Fair-Rite
C1, C5, C6, C7, C8	1000 pF Chip Capacitor	GRM2165C2A102JA01D	Murata
C2	200 pF Chip Capacitor	GQM2195C2A201GB12D	Murata
C3	100 pF Chip Capacitor	GQM2195C2E101GB12D	Murata
C4	68 pF Chip Capacitor	GQM2195C2E680GB12D	Murata
C9, C10, C11, C14	1 μF Chip Capacitor	GRM21BR71H105KA12L	Murata
C12, C13	0.01 μF Chip Capacitor	GRM21BR72A103KA01B	Murata
C15	220 μF, 100 V Electrolytic Capacitor	MCGPR100V227M16X26	Multicomp
L1	56 nH Chip Inductor	0805WL560JT	ATC
L2	6.6 nH Air Coil Inductor	GA3093-ALC	Coilcraft
L3	3 Turn, #18 AWG, ID = 0.225″ Inductor	Handwound	NXP
L4	7 Turn, #18 AWG, ID = 0.225″ Inductor	Handwound	NXP
Q1	RF Power LDMOS Transistor	MRF101AN	NXP
R1	75 Ω, 1/4 W Chip Resistor	SG73P2ATTD75R0F	KOA Speer
R2, R3	10 kΩ, 1/8 W Chip Resistor	CRCW080510K0FKEA	Vishay
R4	5 kΩ Multi-turn Cermet Trimming Potentiometer, 12 Turns	3224W-1-502E	Bourns
U1	Voltage Regulator 5 V, Micro8	LP2951ACDMR2G	ON Semiconductor
PCB	FR4 0.09″, ε_r = 4.8, 2 oz. Copper	D112904	MTL

Impedances

f (MHz)	Z_{source} (Ω)	Z_{load} (Ω)
81.36	12.0 + j11.0	11.5 + j3.0

Z_{source} = Test circuit impedance as measured from gate to ground.

Z_{load} = Test circuit impedance as measured from drain to ground.



Revision History

- The following table summarizes revisions to the content of the MRF101AN 81.36 MHz Reference Circuit zip file:

Revision	Date	Description
0	May 2019	• Initial release
1	September 2019	• Added license statement, general updates to align copy to current standard

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