MRF101AN 87.5-108 MHz COMPACT REFERENCE CIRCUIT

ORDERABLE PART NUMBER: **MRF101AN-88MHZ**

PUBLIC

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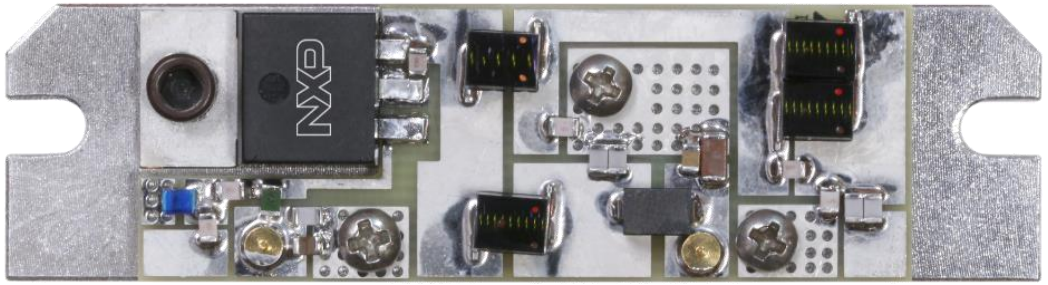
Introduction

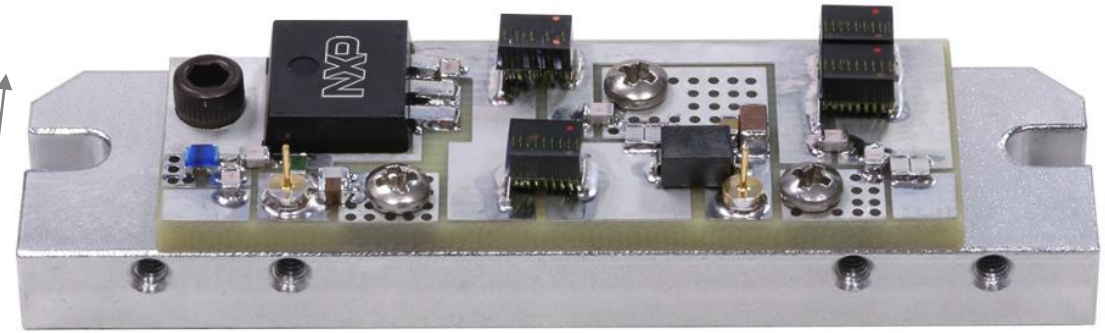
- The NXP MRF101AN is a 1.8-250 MHz, 100 W CW RF power LDMOS transistor housed in a TO-220 over-molded plastic package. Its unmatched input and output allows wide frequency range utilization.
  - Further details about the device, including its data sheet, are available on www.nxp.com/MRF101AN.

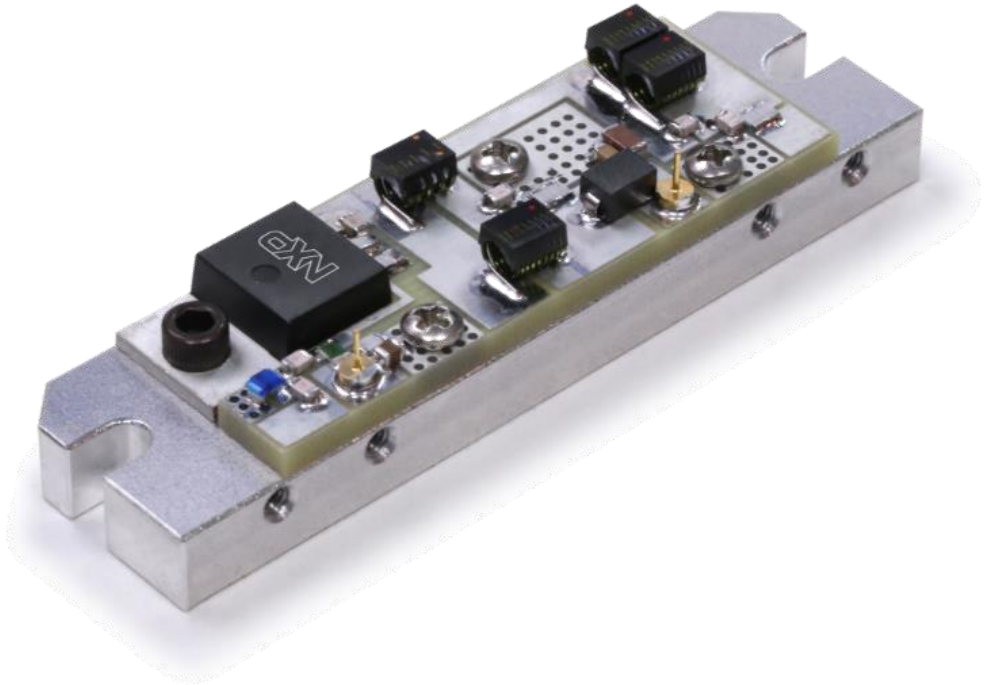
- The following pages describe the 87.5-108 MHz compact reference circuit (evaluation board).
  Its typical application is FM radio broadcast transmitters.
  - Other reference circuits can be found on www.nxp.com/MRF101CIRCUITS.

- The reference circuit can be ordered through NXP's distribution partners and etailers using part number MRF101AN-88MHZ.

Circuit Overview – 1.8 cm × 5.0 cm (0.71″ × 1.96″)





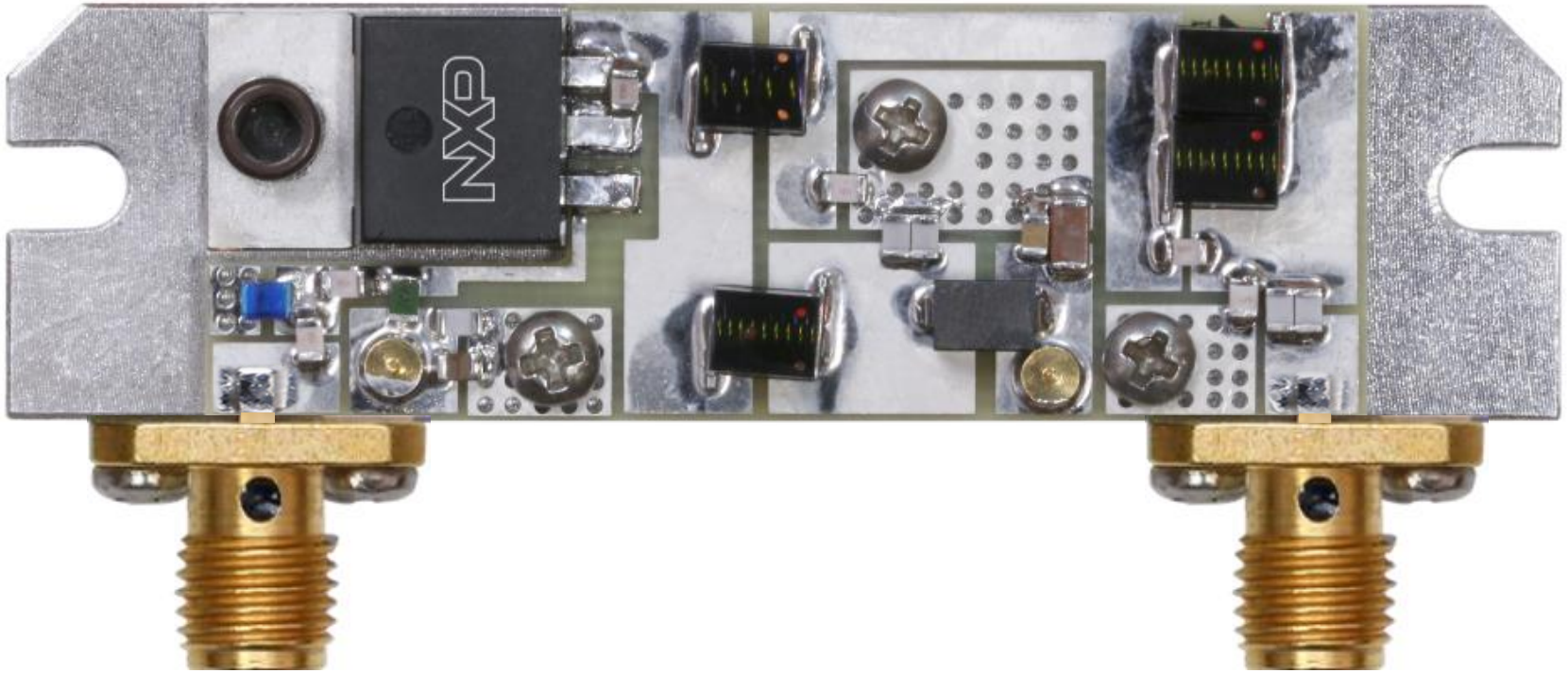


1.8 cm
(0.71″)

5.0 cm (1.96″)

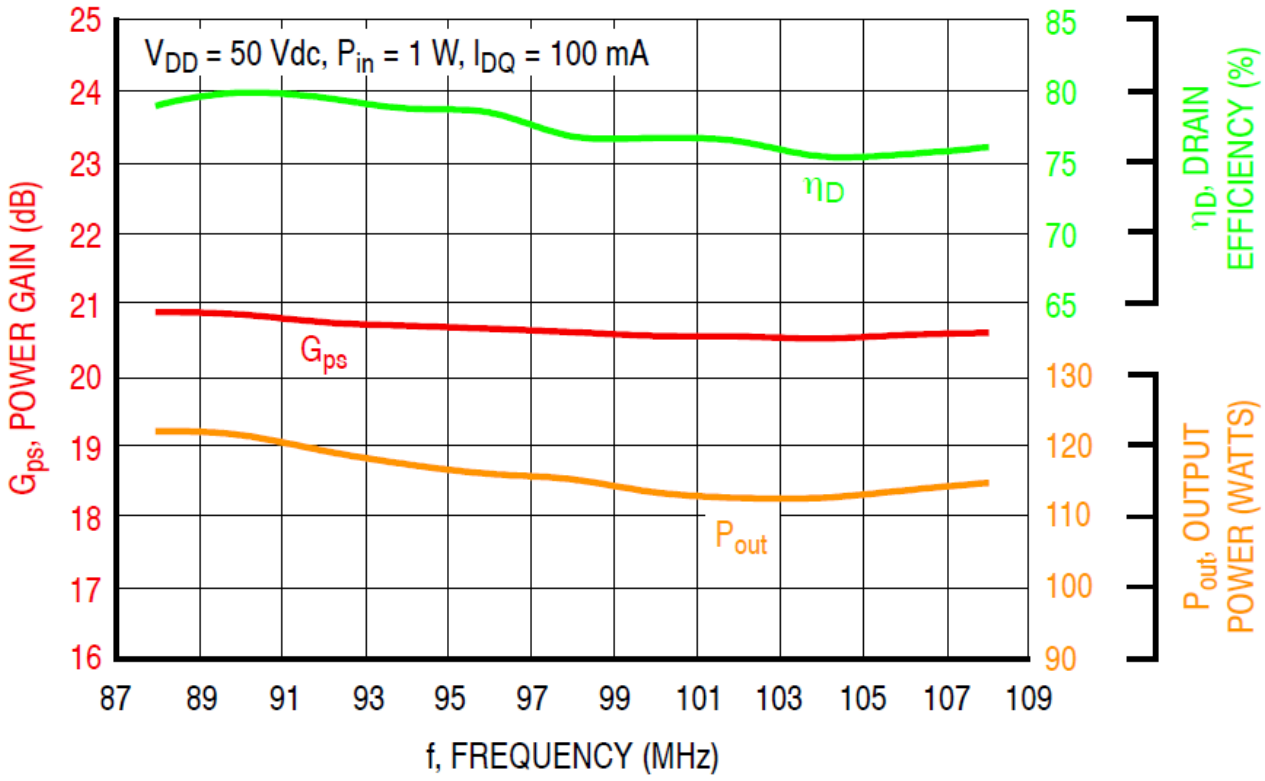
6.7 cm (2.64″)

Circuit Overview – 1.8 cm × 5.0 cm (0.71″ × 1.96″)



Aluminum baseplate: 1.8 cm × 6.7 cm (0.71″ × 2.64″)

Typical CW Performance

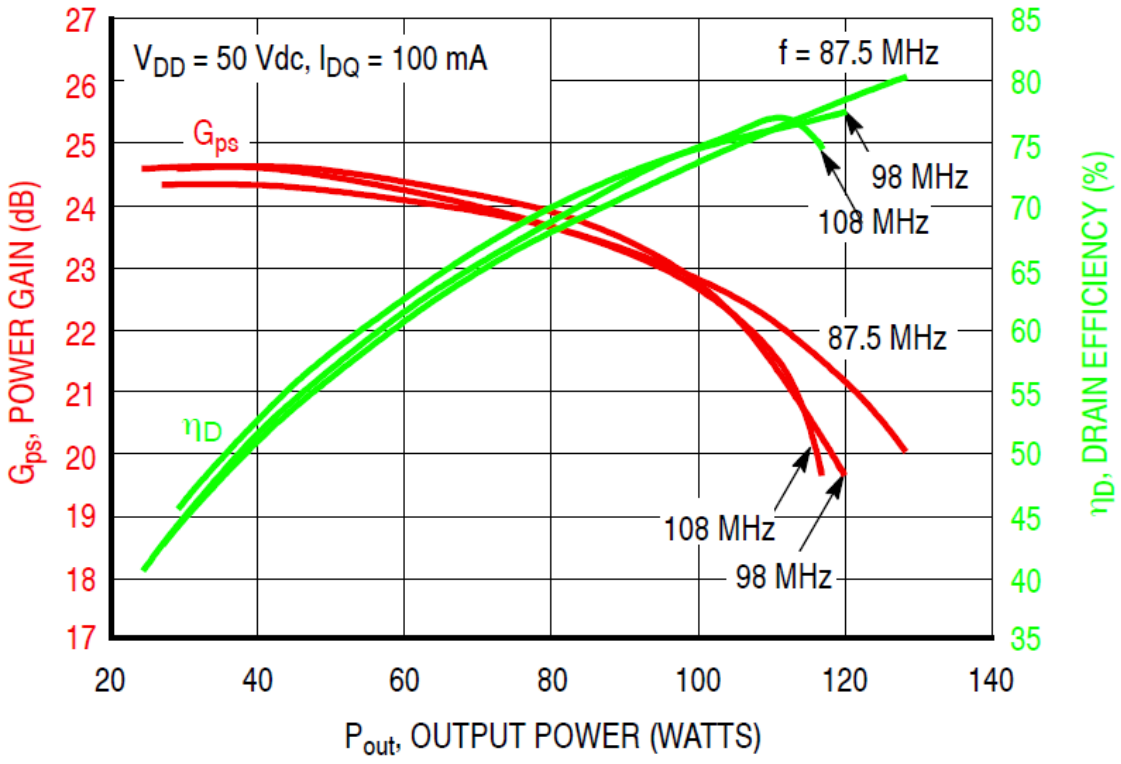


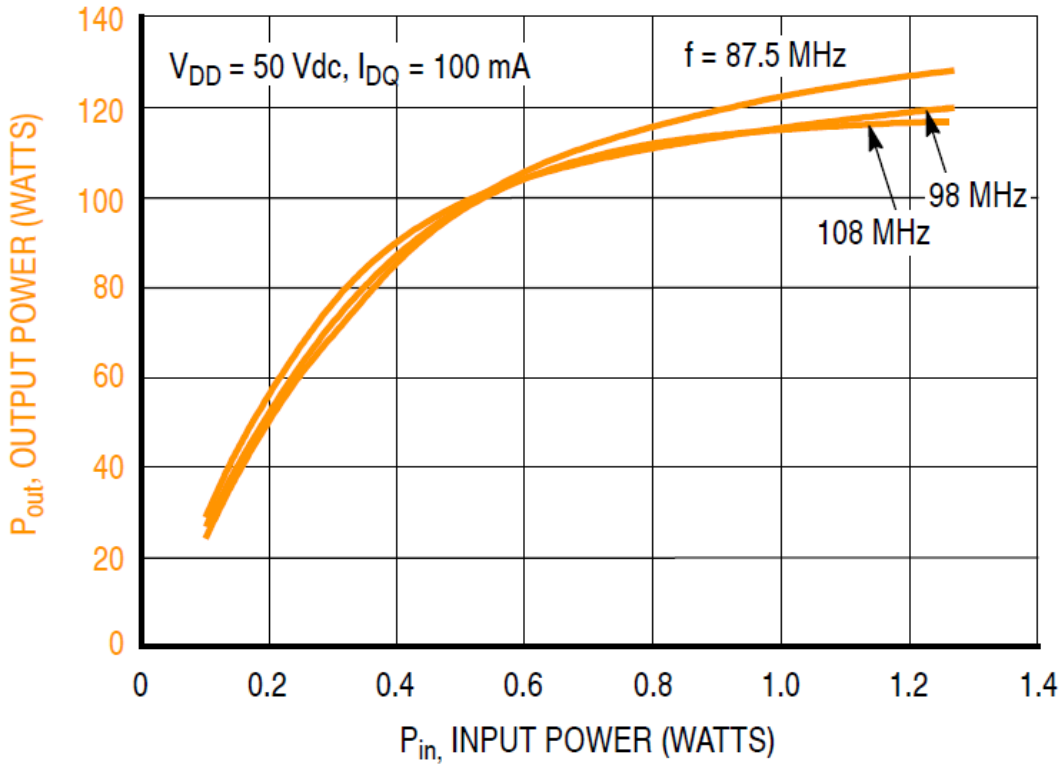
Typical Performance:

V_{DD} = 50 Vdc, I_{DQ} = 100 mA, P_{in} = 1 W, CW

Frequency (MHz)	P_{out} (W)	G_{ps} (dB)	η_D (%)
87.5	122	20.8	79.0
98	115	20.6	76.8
108	115	20.6	76.0

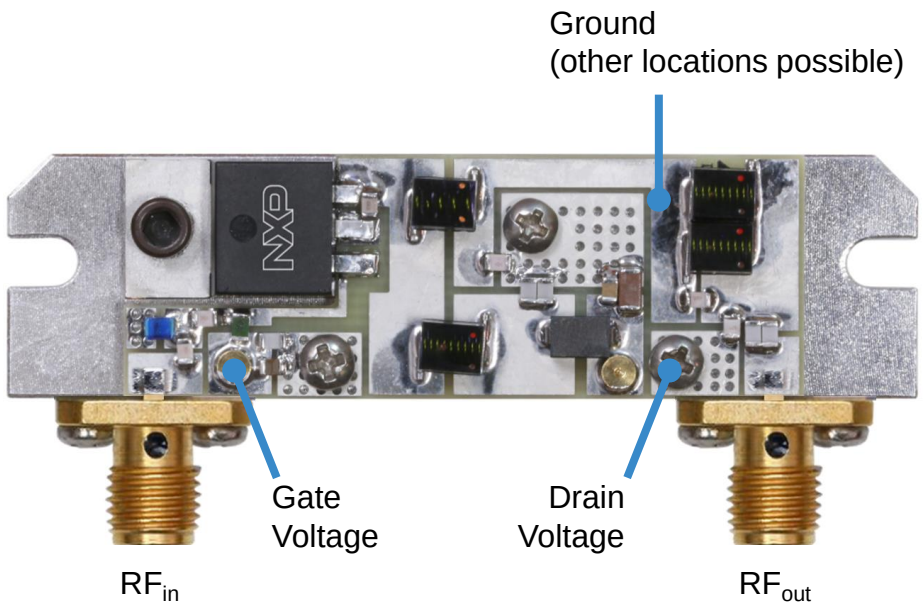
Typical CW Performance





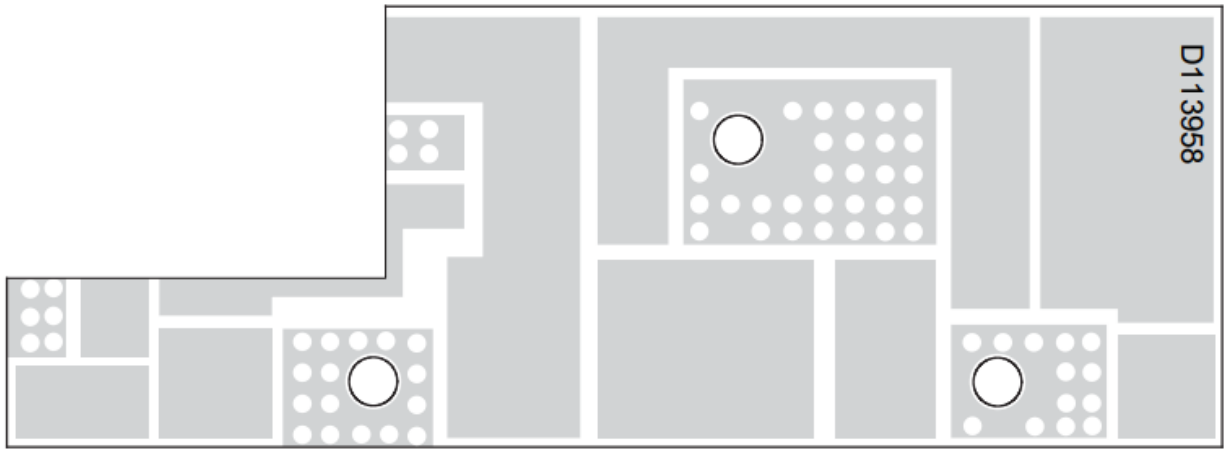
Quick Start

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. Connect the ground.
3. Terminate the RF output with a 50 ohm load capable of handling more than 115 W.
4. Connect the RF input to a 50 ohm source with the RF off.
5. Connect the gate voltage, set to 0 V.
6. Connect the drain voltage (V_{DD}) and raise it slowly to 50 V. Current should be 0 A.
7. Raise the gate voltage slowly until the drain current reaches the desired level (drain quiescent current I_{DQ} = 100 mA typically). The gate voltage should be around 2.5 V.
8. Raise the RF input slowly to 1 W.
9. Check the RF output power (typically 115 W mid-band), the drain current (around 3 A for this power level) and the temperature of the board.

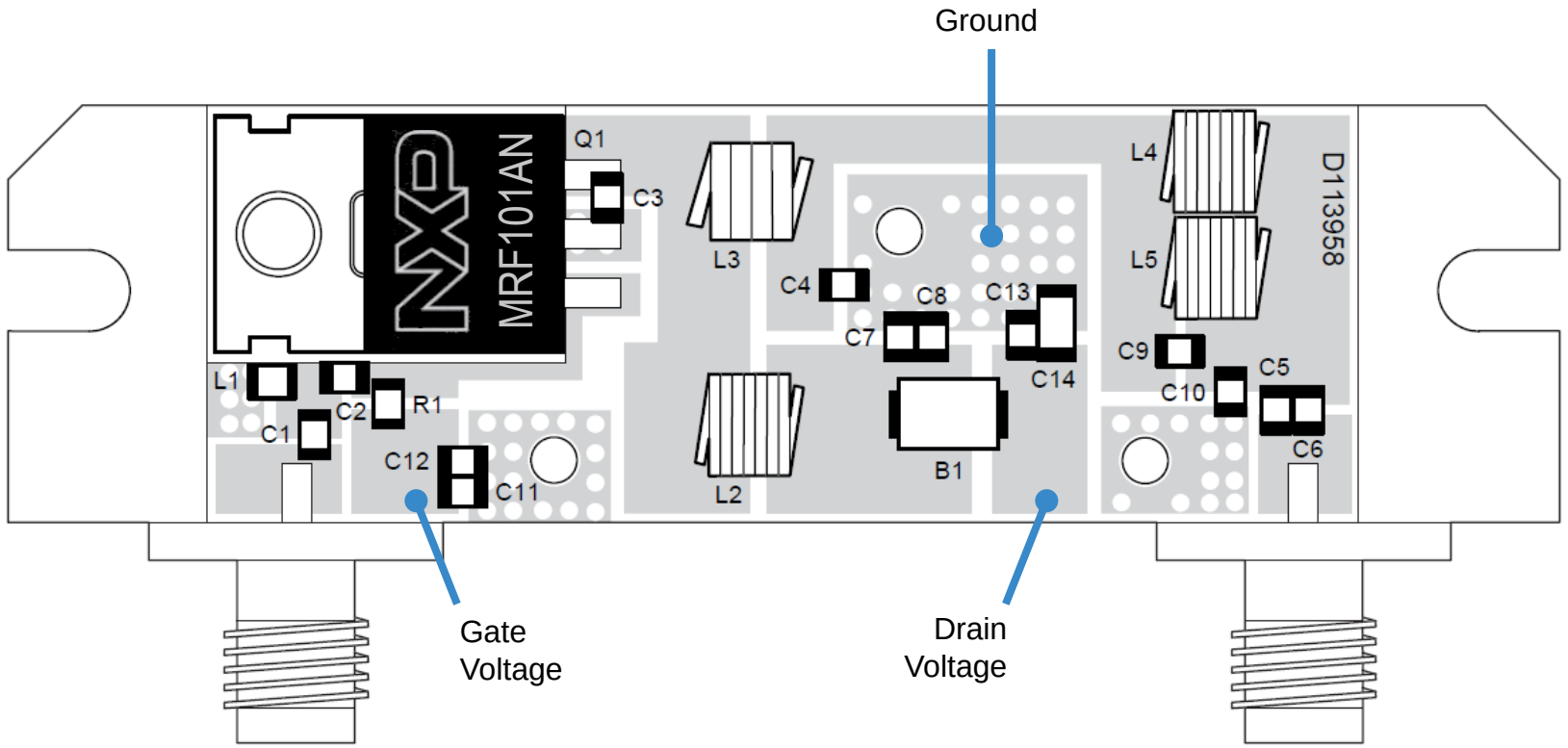


MRF101AN Compact PCB

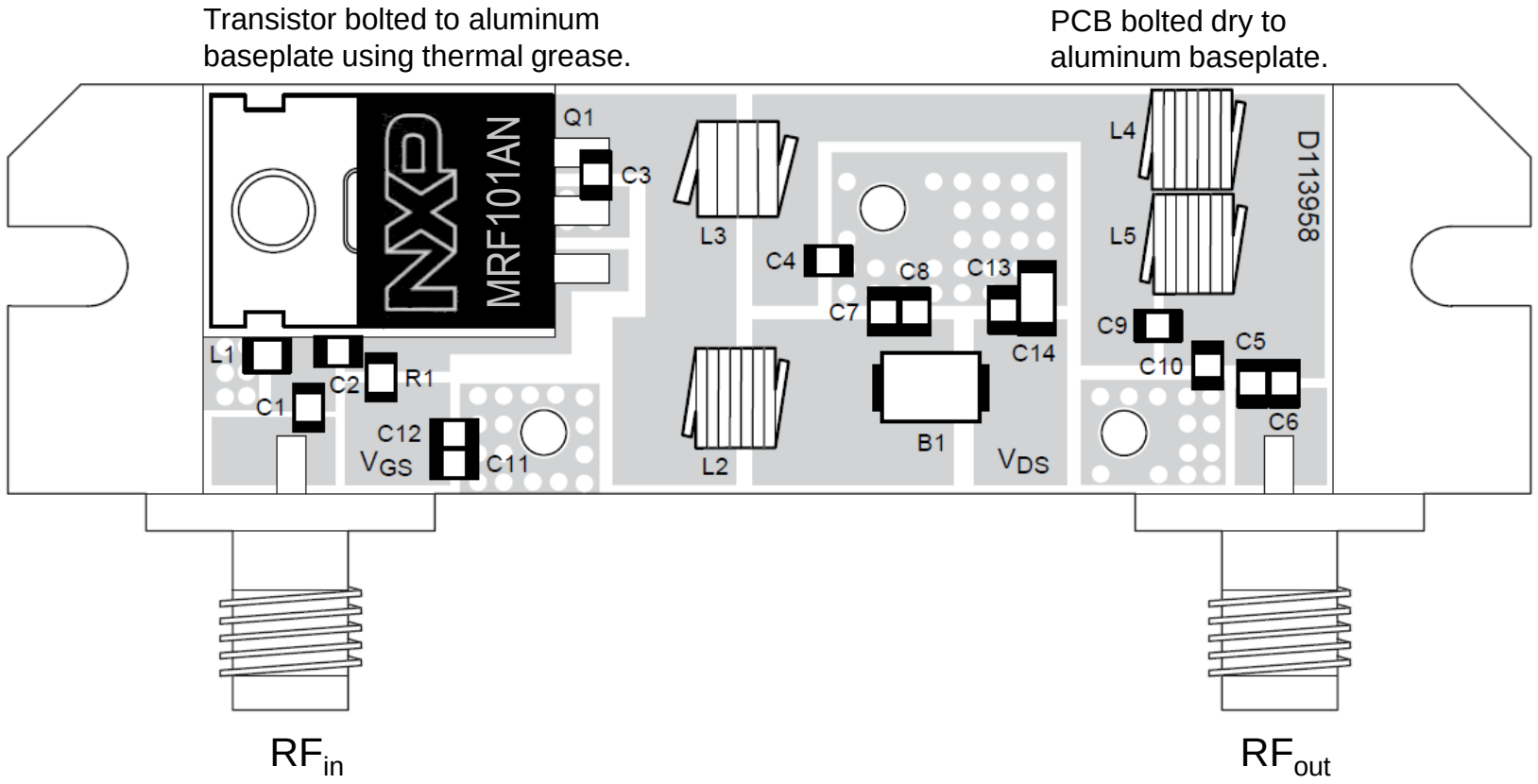
Same PCB for all MRF101AN Compact Reference Circuits



Component Placement Reference



Assembly Details



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

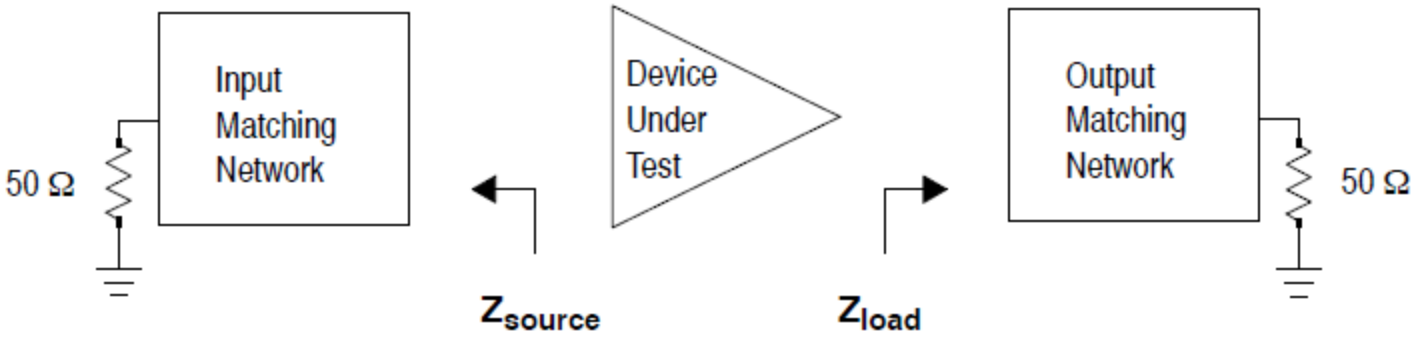
Part	Description	Part Number	Manufacturer
B1	Short RF Bead	2743019447	Fair-Rite
C1, C2	200 pF Chip Capacitor	GQM2195C2A201GB12D	Murata
C3	22 pF Chip Capacitor	GQM2195C2E220GB12D	Murata
C4	100 pF Chip Capacitor	GQM2195C2E101GB12D	Murata
C5, C6, C7, C8, C12	510 pF Chip Capacitor	GRM2165C2A511JA01D	Murata
C9	2.7 pF Chip Capacitor	GQM2195C2E2R7BB12D	Murata
C10	36 pF Chip Capacitor	600F360JT250XT	ATC
C11	1 μF Chip Capacitor	GJ821BR71H105KA12L	Murata
C13	0.01 μF Chip Capacitor	GRM21BR72A103KA01B	Murata
C14	1 μF Chip Capacitor	C3216X7R2A105K160AA	TDK
L1	36 nH Chip Inductor	0805WL360JT	ATC
L2, L4, L5	120 nH Chip Inductor	1812SMS-120NJLC	Coilcraft
L3	33 nH Chip Inductor	1812SMS-33NJLC	Coilcraft
Q1	RF Power LDMOS Transistor	MRF101AN	NXP
R1	75 Ω, 1/4 W Chip Resistor	SG73P2ATTD75R0F	KOA Speer
PCB	FR4 0.09″, ε_r = 4.8, 2 oz. Copper	D113958	MTL

Impedances

f (MHz)	Z_{source} (Ω)	Z_{load} (Ω)
87.5	8.52 + j12.46	13.15 + j5.48
98	10.59 + j14.03	13.12 + j5.21
108	12.21 + j15.02	10.74 + j5.52

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 87.5-108 MHz Reference Circuit zip file.

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

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