MRF1K50N 230 MHz
PRODUCTION TEST FIXTURE

ORDERABLE PART NUMBER: **MRF1K50N-TF4**

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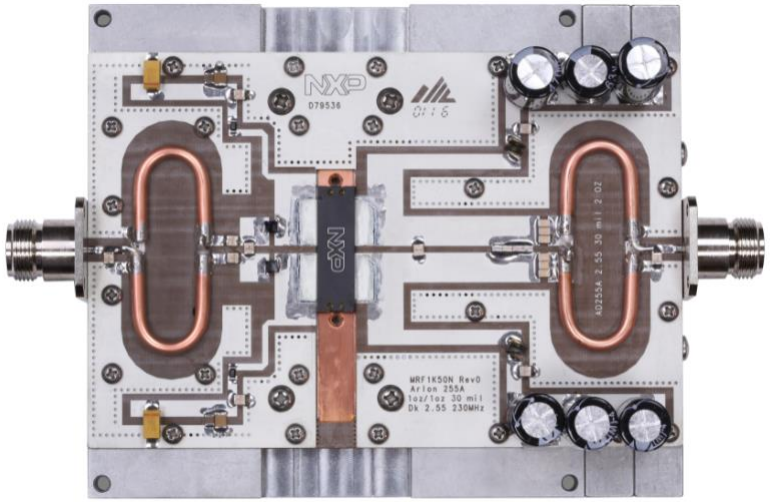
Introduction

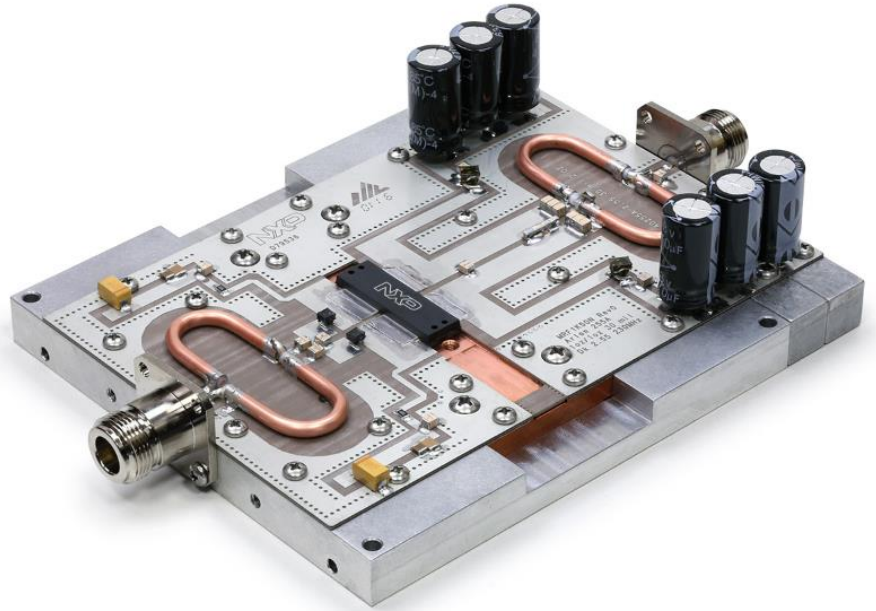
- The NXP MRF1K50N is a 1.8-500 MHz, 1500 W CW RF power LDMOS transistor housed in an OM-1230 over-molded plastic package. Its unmatched input and output allows wide frequency range utilization.
  - Further details about the device, including its data sheet, are available here.

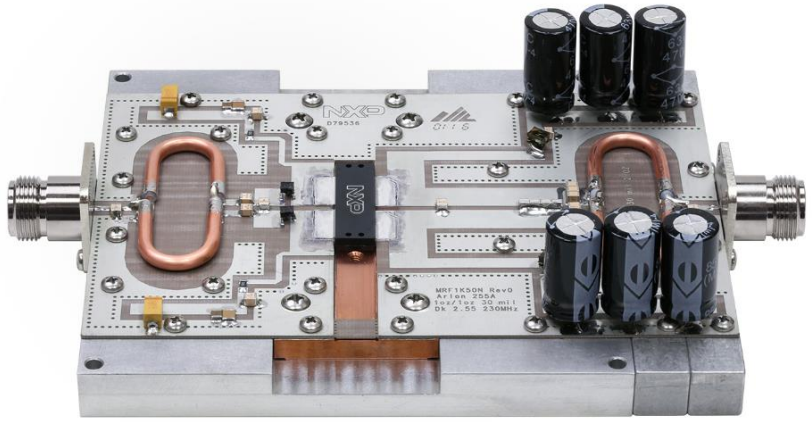
- The following pages describe the 230 MHz pulse test fixture.

- The test fixture can be ordered through NXP's distribution partners and etailers using part number MRF1K50N-TF4.

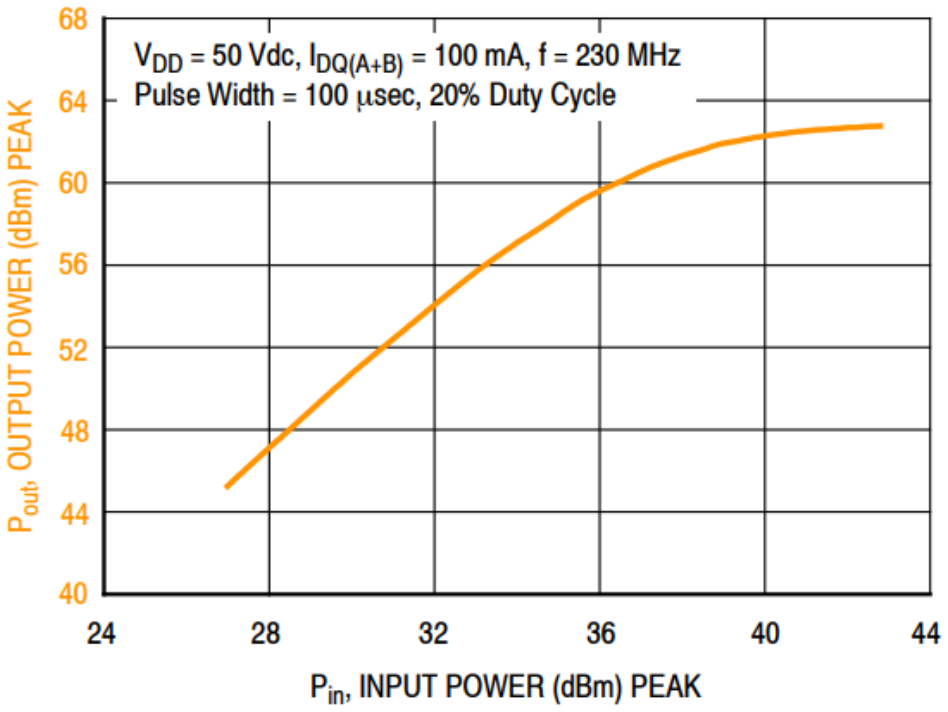
Circuit Overview – PCB 10.16 cm x 15.24 cm (4.0″ × 6.0″)

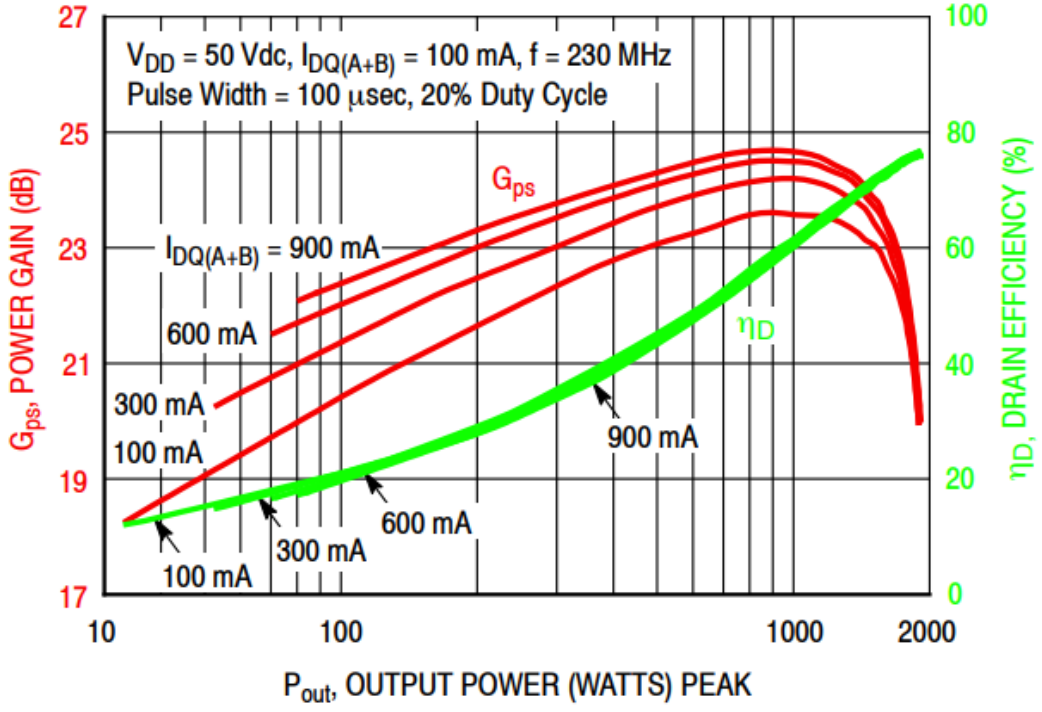






Typical Pulse Performance



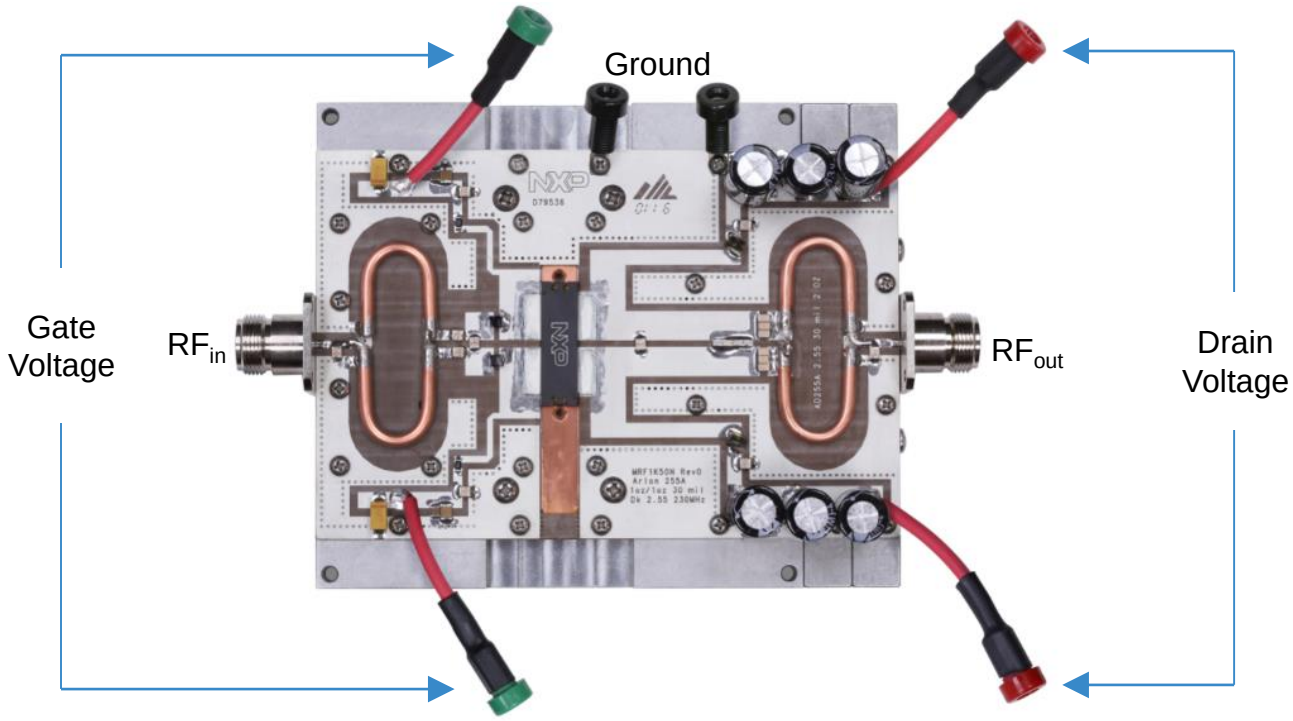


Typical Performance: V_{DD} = 50 Vdc, $I_{DQ(A+B)}$ = 100 mA, P_{in} = 6.9 W (38.4 dBm) Peak, Pulse

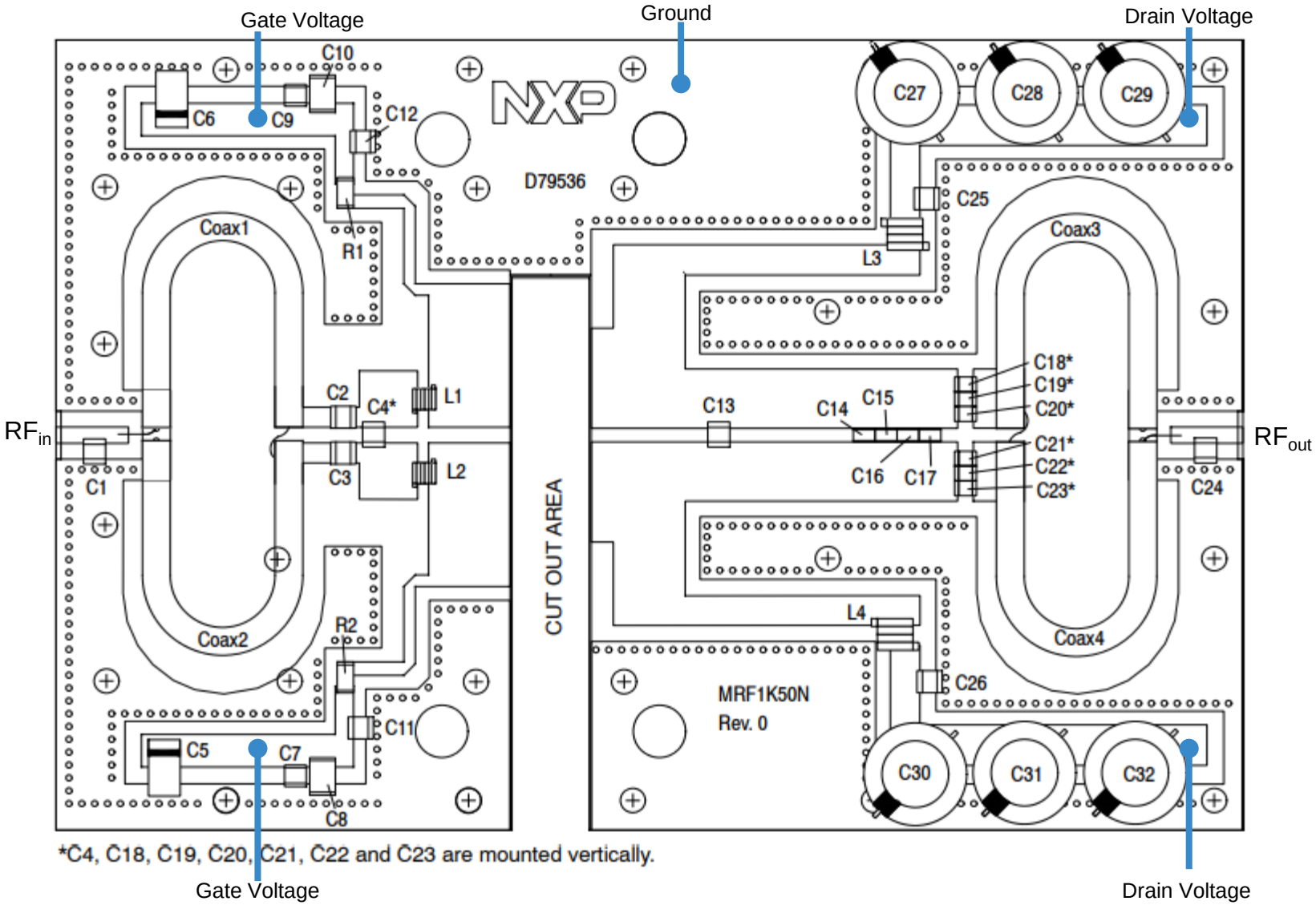
Frequency (MHz)	Signal Type	Output Power (W)	Power Gain (dB)	Drain Efficiency (%)
230	Pulse (100 μs, 20% Duty Cycle)	1500	23.4	75.1

Quick Start

1. Mount the reference circuit onto a heatsink capable of dissipating more than 140 W in order to provide enough thermal dissipation (the circuit is capable for more but has been measured in pulse conditions).
2. Connect the ground.
3. Terminate the RF output with a 50 ohm load capable of handling more than 1500 W peak power.
4. Connect the RF input to a 50 ohm source with the RF off.
5. Connect both gate voltages, set to 0 V.
6. Connect both drain voltages (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 $I_{DQ(A+B)}$ = 100 mA typically). The gate voltage should be around 2.4 V.
8. Set the RF input to pulse conditions (100 µs pulse width with 20% duty cycle).
9. Raise the RF input slowly to 6.9 W peak (38.4 dBm).
10. Check the RF output power (typically 1500 W peak), the drain current (around 40 A peak for this power level) and the temperature of the board.



Component Placement Reference

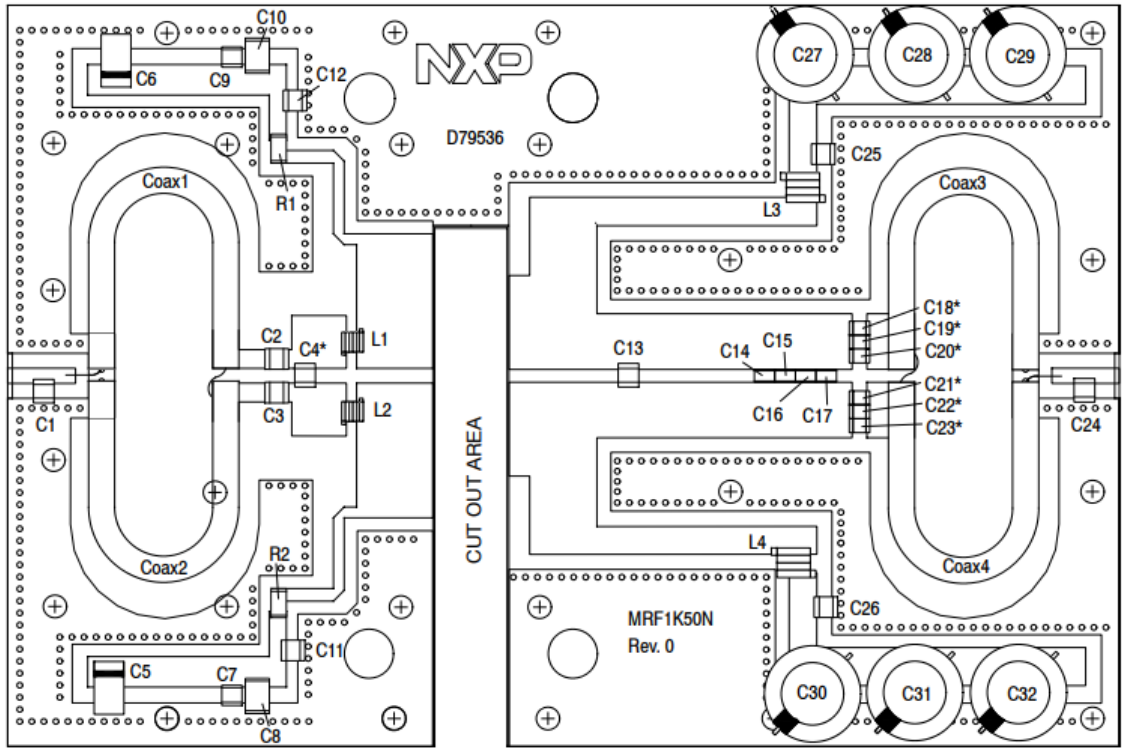


Bill of Materials

Part	Description	Part Number	Manufacturer
C1, C2, C3	22 pF Chip Capacitors	ATC100B220JT500XT	ATC
C4	27 pF Chip Capacitor	ATC100B270JT500XT	ATC
C5, C6	22 μF, 35 V Tantalum Capacitors	T491X226K035AT	Kemet
C7, C9	0.1 μF Chip Capacitors	CDR33BX104AKWS	AVX
C8, C10	220 nF Chip Capacitors	C1812C224K5RACTU	Kemet
C11, C12, C25, C26	1000 pF Chip Capacitors	ATC100B102JT50XT	ATC
C13	51 pF Chip Capacitor	ATC100B510JT500XT	ATC
C14	24 pF Chip Capacitor	ATC800R240JT500XT	ATC
C15, C16, C17	20 pF Chip Capacitors	ATC800R200JT500XT	ATC
C18, C19, C20, C21, C22, C23	240 pF Chip Capacitors	ATC100B241JT200XT	ATC
C24	8.2 pF Chip Capacitor	ATC100B8R2CT500XT	ATC
C27, C28, C29, C30, C31, C32	470 μF, 63 V Electrolytic Capacitors	MCGPR63V477M13X26-RH	Multicomp
Coax1, 2, 3, 4	25 Ω Semi Rigid Coax Cables, 2.2″ Shield Length	UT-141C-25	Micro-Coax
L1, L2	5 nH Inductors	A02TKLC	Coilcraft
L3, L4	6.6 nH Inductors	GA3093-ALC	Coilcraft
R1, R2	10 Ω, 1/4 W Chip Resistors	CRCW120610R0JNEA	Vishay
PCB	Arlon AD255A 0.030″, ε_r = 2.55	D79536	MTL

Tuning Tips

- Moving C4 to the left reduces IRL and increases gain.
- Moving C13 to the right increases efficiency but decreases output power and gain.
- Moving C14-C17 to the right also increases efficiency but decreases output power and gain.
- The distance between C13 and C14-C17 is varied to achieve desired trade-off between output power and efficiency.



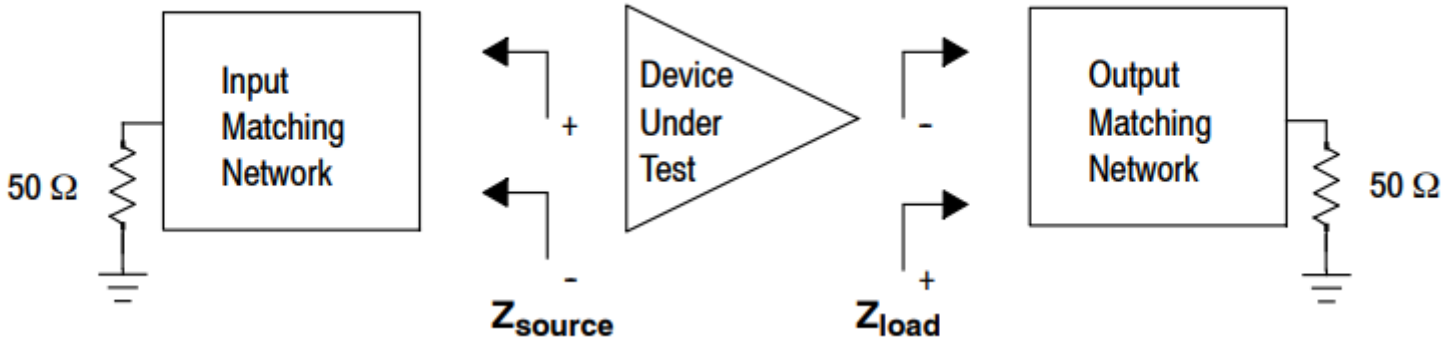
*C4, C18, C19, C20, C21, C22 and C23 are mounted vertically.

Impedances

f MHz	Z_{source} Ω	Z_{load} Ω
230	1.0 + j2.0	1.7 + j0.9

Z_{source} = Test circuit impedance as measured from gate to gate, balanced configuration.

Z_{load} = Test circuit impedance as measured from drain to drain, balanced configuration.



Revision History

- The following table summarizes revisions to the content of the MRF1K50N 230 MHz Test Fixture zip file.

Revision	Date	Description
0	September 2019	• Initial Release

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