MRF24G300HS 2400-2500 MHz REFERENCE CIRCUIT

ORDERABLE PART NUMBER: **MRF24G300HS-2450**

PUBLIC

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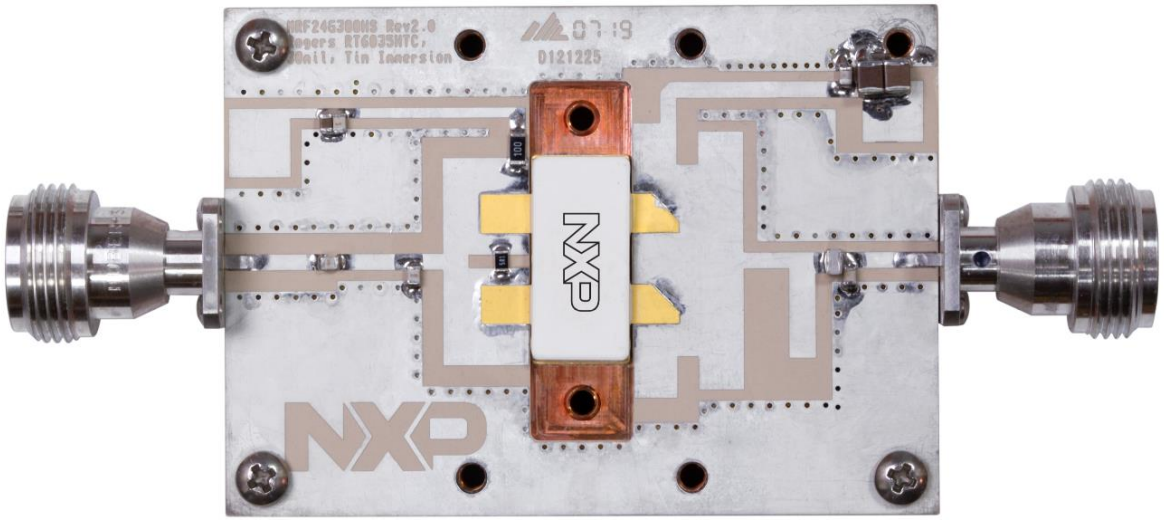
Introduction

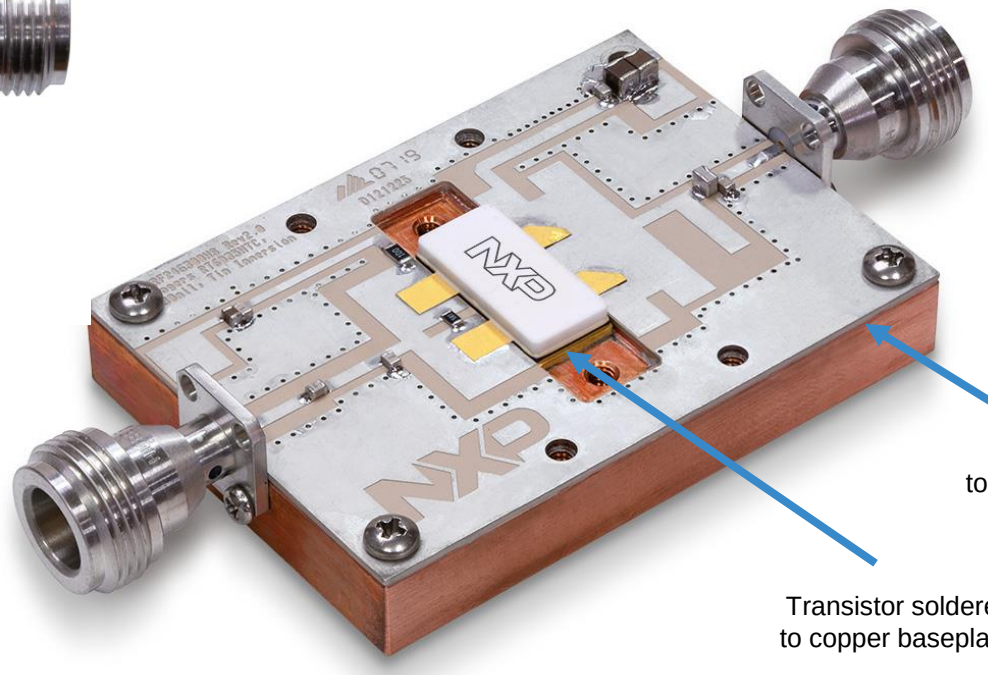
- The NXP MRF24G300HS is a 2400-2500 MHz, 300 W CW RF power GaN transistor housed in an NI-780 air-cavity ceramic package. It has pre-matched input and no output matching.
  - Further details about the device, including its data sheet, are available on www.nxp.com/MRF24G300HS.

- The following pages describe the 2400-2500 MHz reference circuit (evaluation board).
  Its typical application is RF energy including RF cooking, industrial, scientific and medical (ISM).

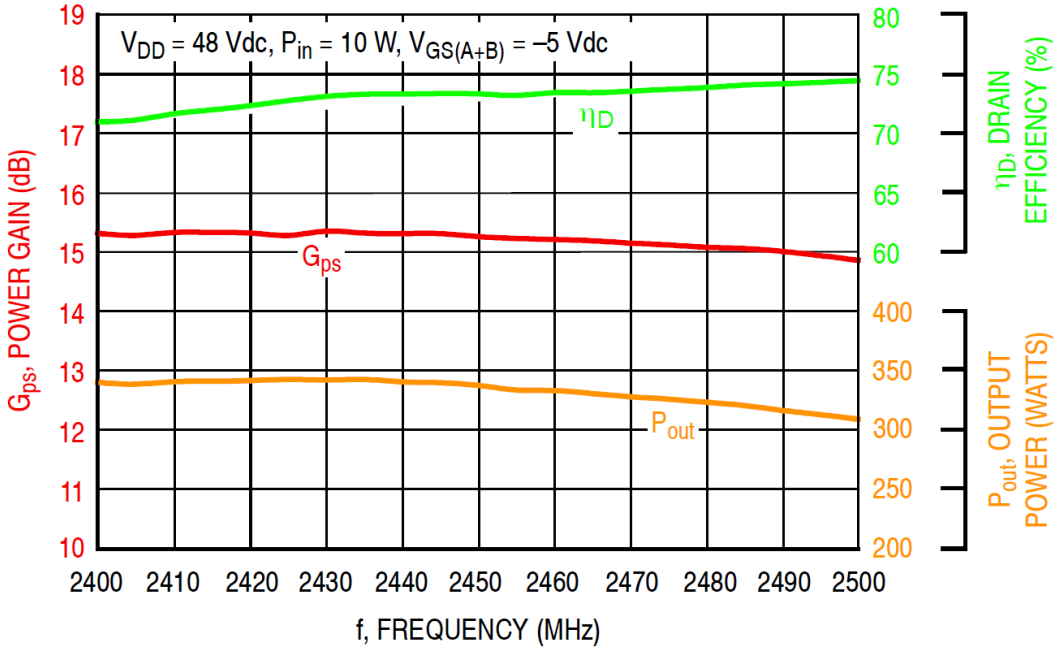
- The reference circuit can be ordered through NXP's distribution partners and etailers under part number MRF24G300HS-2450.

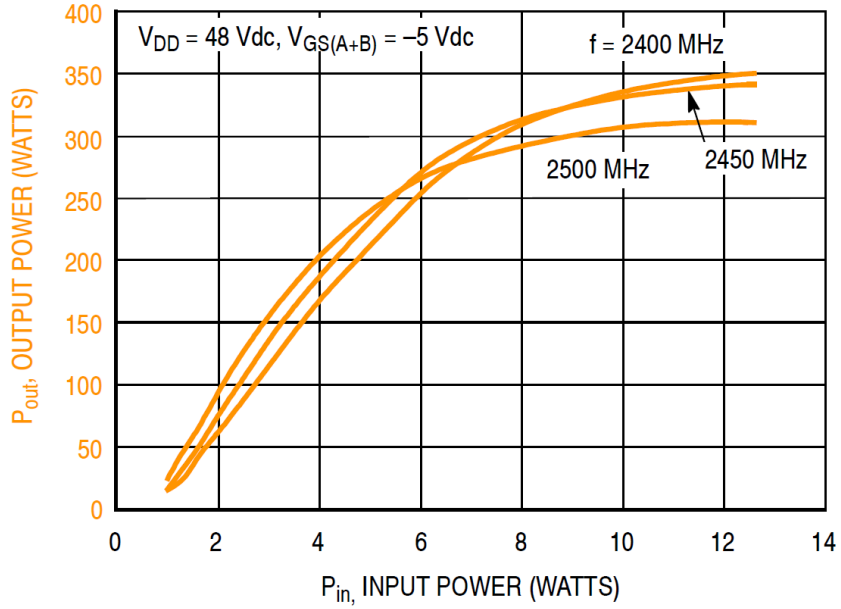
Circuit Overview – 5.0 cm × 7.0 cm (1.97″ × 2.76″)

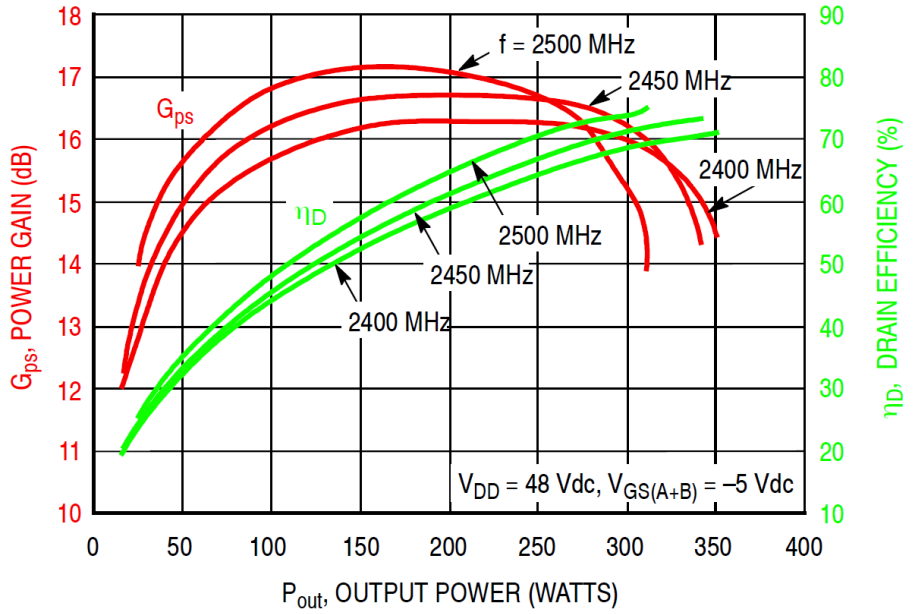




Typical CW Performance





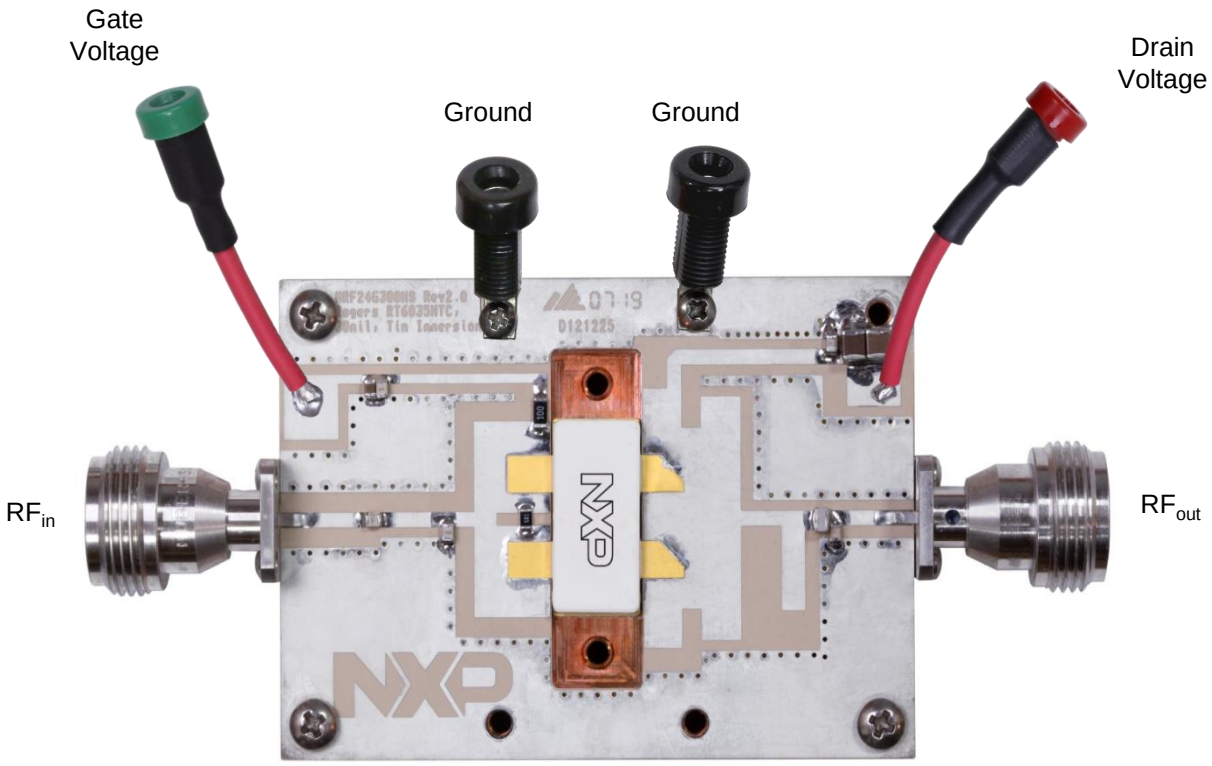


Typical Performance: V_{DD} = 48 Vdc, $V_{GS(A+B)}$ = –5 Vdc, P_{in} = 10 W (40 dBm),CW

Frequency (MHz)	Signal Type	P_{in} (W)	P_{out} (W)	G_{ps} (dB)	η_D (%)
2400	CW	10.0	336	15.3	70.4
2450		10.0	332	15.2	73.0
2500		10.0	307	14.9	74.4

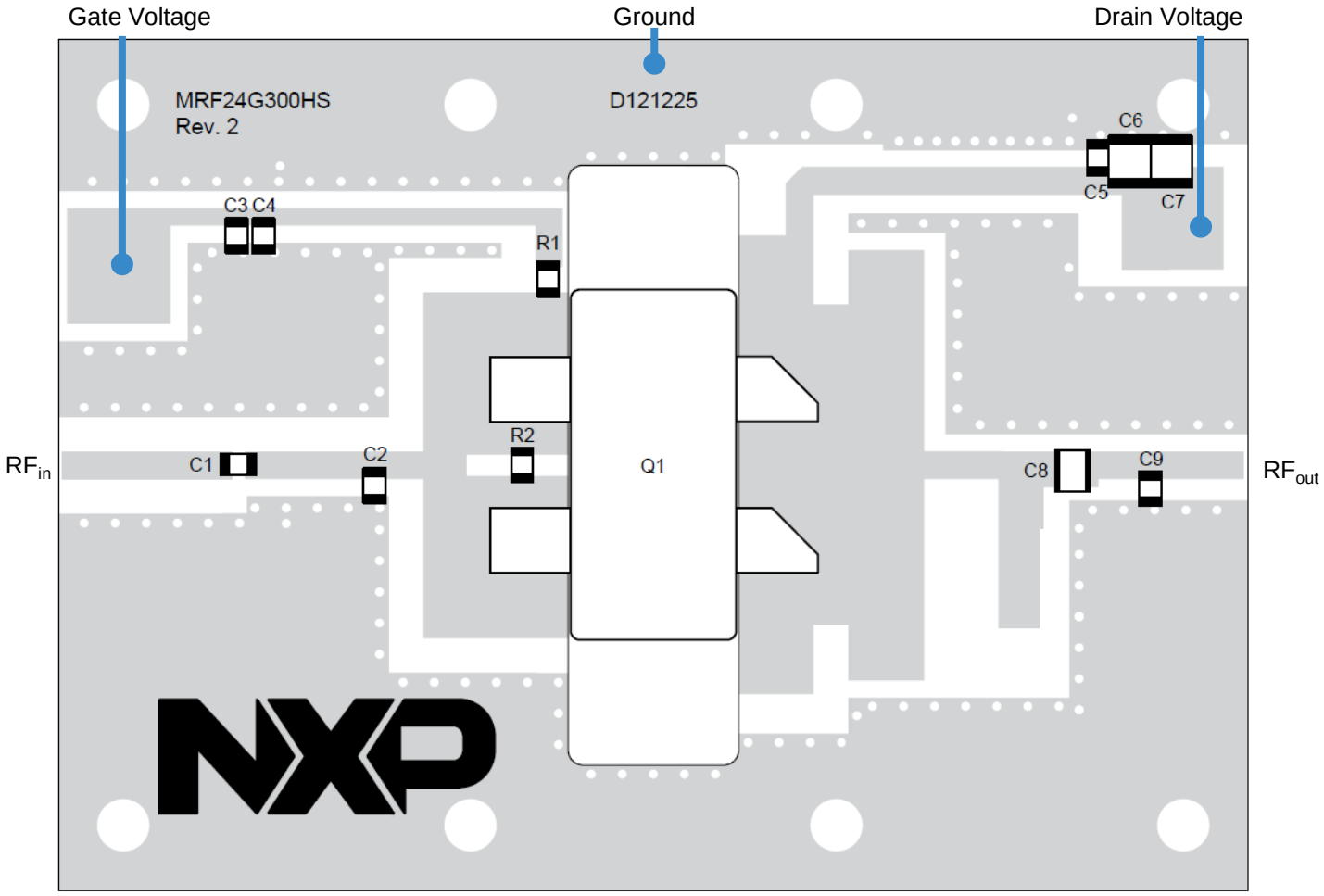
Quick Start

1. Mount the reference circuit onto a heatsink capable of dissipating more than 120 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 dissipating more than 330 W.
4. Connect the RF input to a 50 ohm source with the RF off.
5. Connect the gate voltage ($V_{GS(A+B)}$) and set it to -5 V.
6. Connect the drain voltage (V_{DD}) and raise it slowly to 48 V.
7. Raise the RF input slowly to 10 W (40 dBm).
8. Check the RF output power (typically 330 W CW), the drain current (around 10 A for this power level) and the temperature of the board.



For GaN devices you must always first set the gate voltage before you connect the drain voltage. GaN is a depletion mode device.

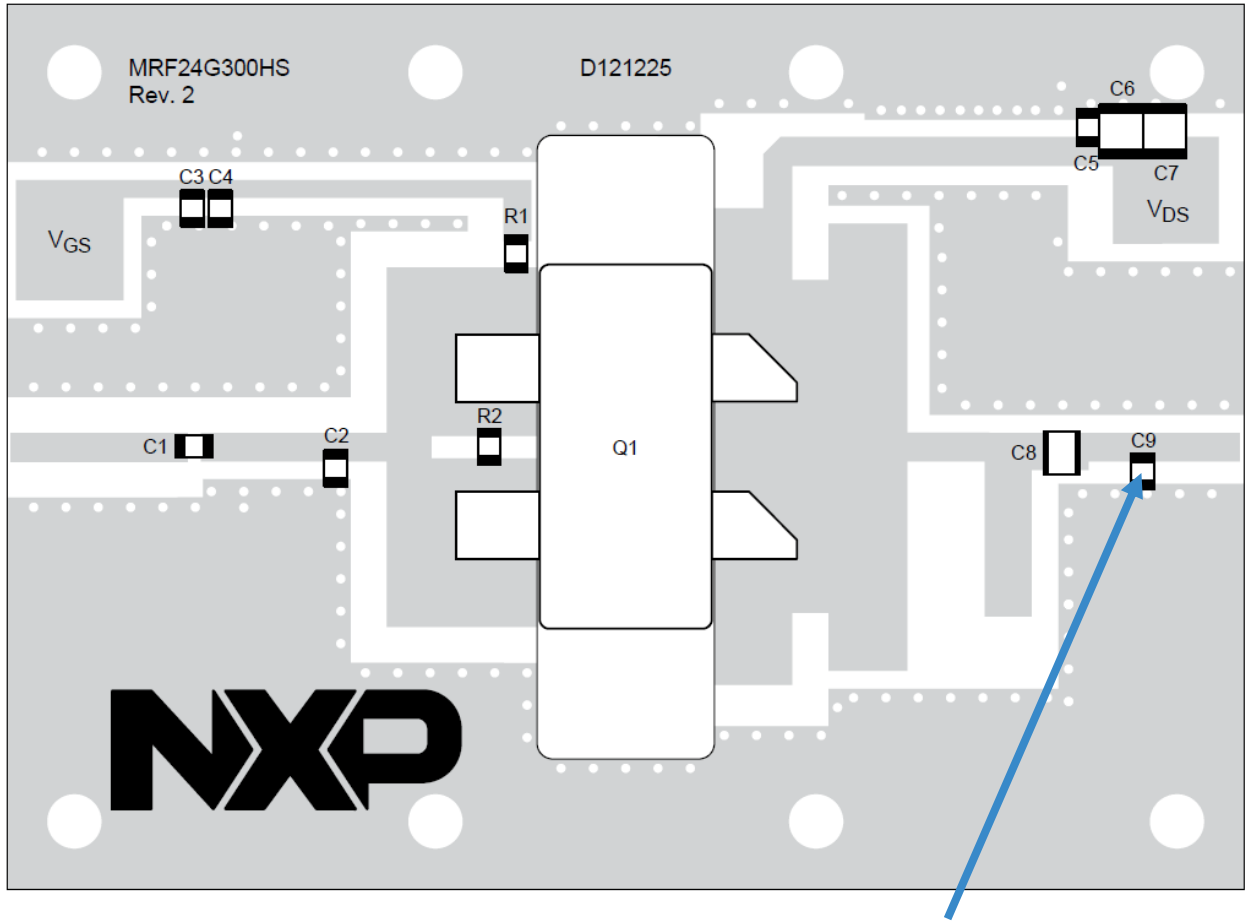
Component Placement Reference



Bill of Materials

Part	Description	Part Number	Manufacturer
C1, C4	20 pF Chip Capacitor	600F200JT250XT	ATC
C2	1.2 pF Chip Capacitor	600F1R2BT250XT	ATC
C3	1.0 μF Chip Capacitor	GCM21BR71H105KA03L	Murata
C5	27 pF Chip Capacitor	600F270JT250XT	ATC
C6, C7	10 μF Chip Capacitor	GRM32EC72A106KE05L	Murata
C8	10 pF Chip Capacitor	800R100JT500XT	ATC
C9	0.1 pF Chip Capacitor	600F0R1BT250XT	ATC
Q1	RF Power LDMOS Transistor	MRF24G300HS	NXP
R1	10 Ω, 1/4 W Chip Resistor	CRCW120610R0JNEA	Vishay
R2	5.1 Ω, 1/8 W Chip Resistor	CRCW08055R10JNEA	Vishay
PCB	Rogers RT6035HTC 0.030″, ε_r = 3.5, 2 oz. Copper	D121225	MTL

Tuning Tips



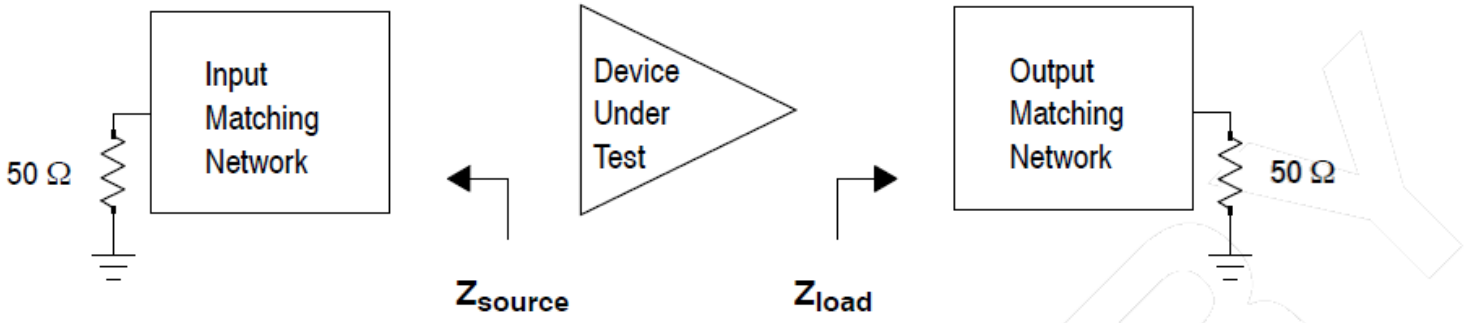
Move C9 left or right to achieve the preferred balance of power and efficiency at either end of the frequency band.

Impedances

f (MHz)	Z_{source} (Ω)	Z_{load} (Ω)
2400	2.55 – j2.96	2.41 – j3.12
2450	2.55 – j2.72	2.13 – j2.98
2500	2.56 – j2.49	1.88 – j2.80

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 MRF24G300HS 2400-2500 MHz Reference Circuit zip file.

Revision	Date	Description
0	September 2019	• Initial Release

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