

MRF300AN 81.36 MHz REFERENCE CIRCUIT

ORDERABLE PART NUMBER: **MRF300AN-81MHZ**



PUBLIC



SECURE CONNECTIONS
FOR A SMARTER WORLD

License

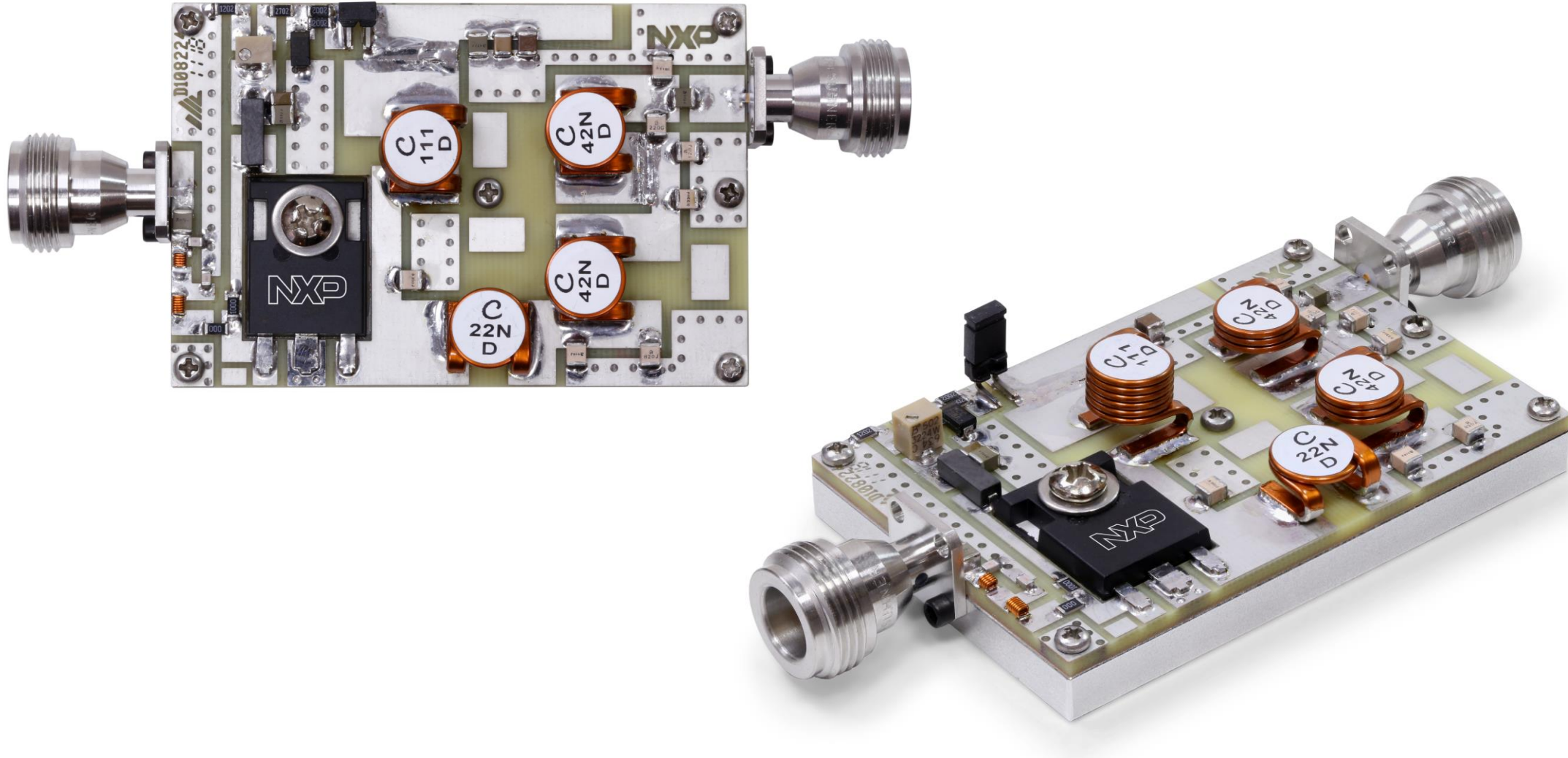
- Open and read the License.pdf included in the same zip file as the document you are currently reading. By using the documentation materials included in this zip file, you indicate that you accept the terms of the agreement.

Introduction

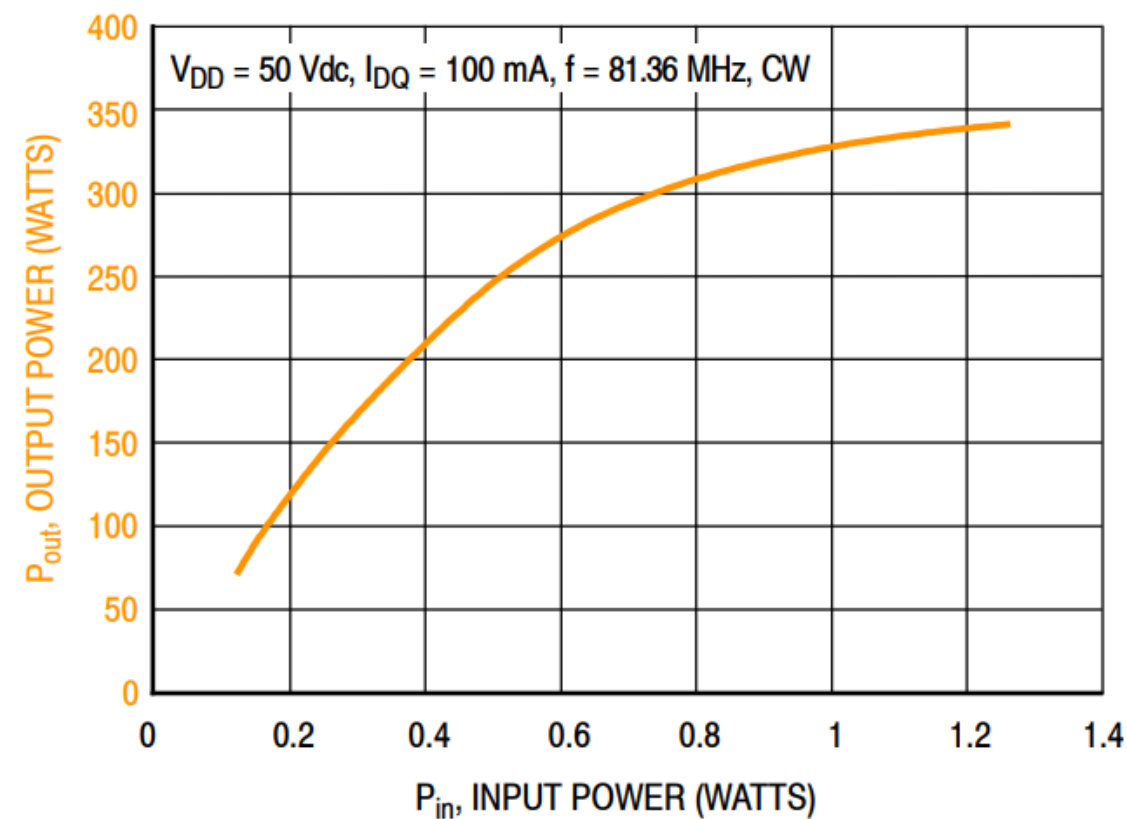
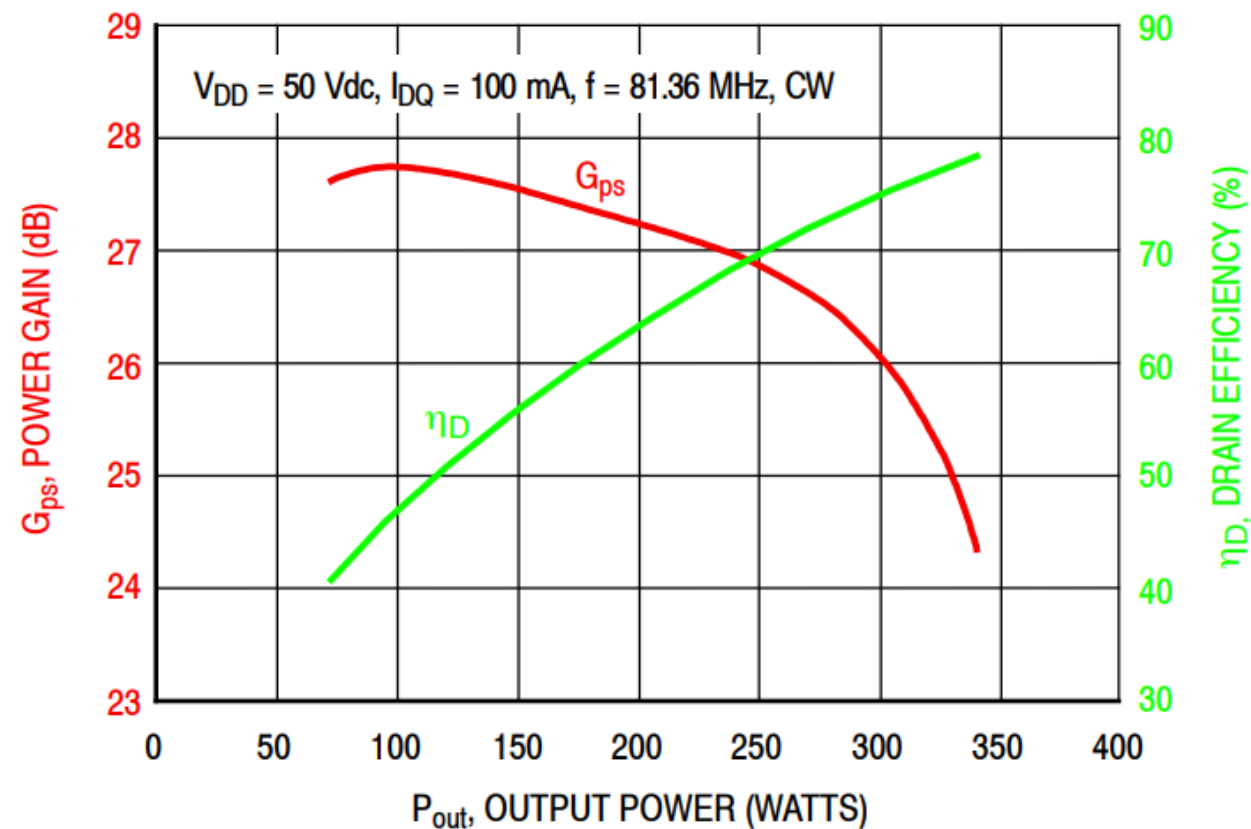
- The NXP MRF300AN is a 1.8-250 MHz, 300 W CW RF power LDMOS housed in a TO-247 over-molded plastic package. Its unmatched input and output allows wide frequency range utilization.
 - Further details about the device, including its data sheet, are available on www.nxp.com/MRF300AN.
- The following pages describe the 81.36 MHz reference circuit (evaluation board). Its typical applications are industrial (ISM) and laser generation.
- The reference circuit can be ordered through NXP's distribution partners and etailers using part number MRF300AN-81MHZ.



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



Typical CW Performance

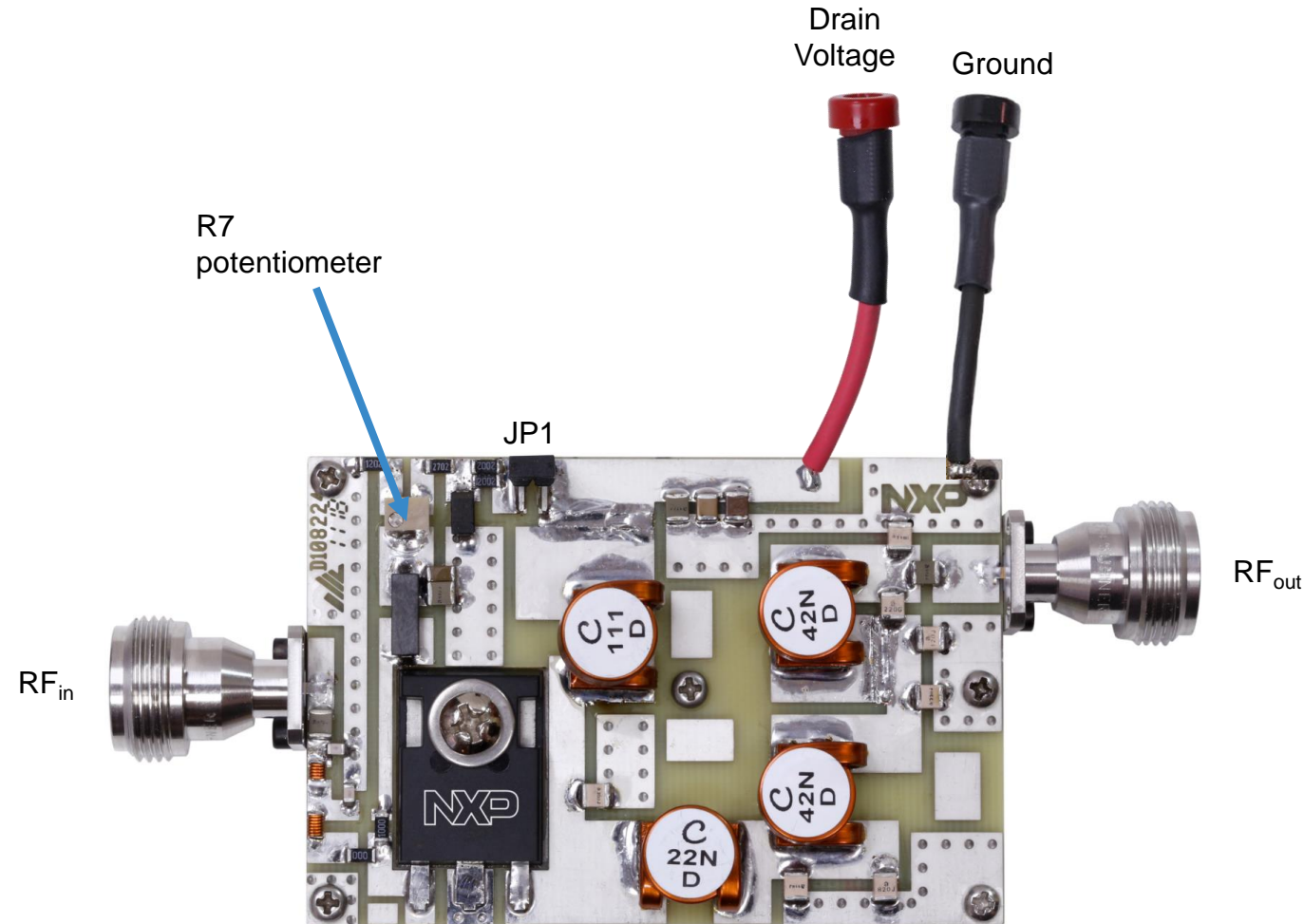


$V_{DD} = 50\text{ Vdc}$, $I_{DQ} = 100\text{ mA}$, $P_{in} = 1\text{ W}$, CW

Frequency (MHz)	P_{out} (W)	G_{ps} (dB)	η_D (%)
81.36	325	25.1	77.5

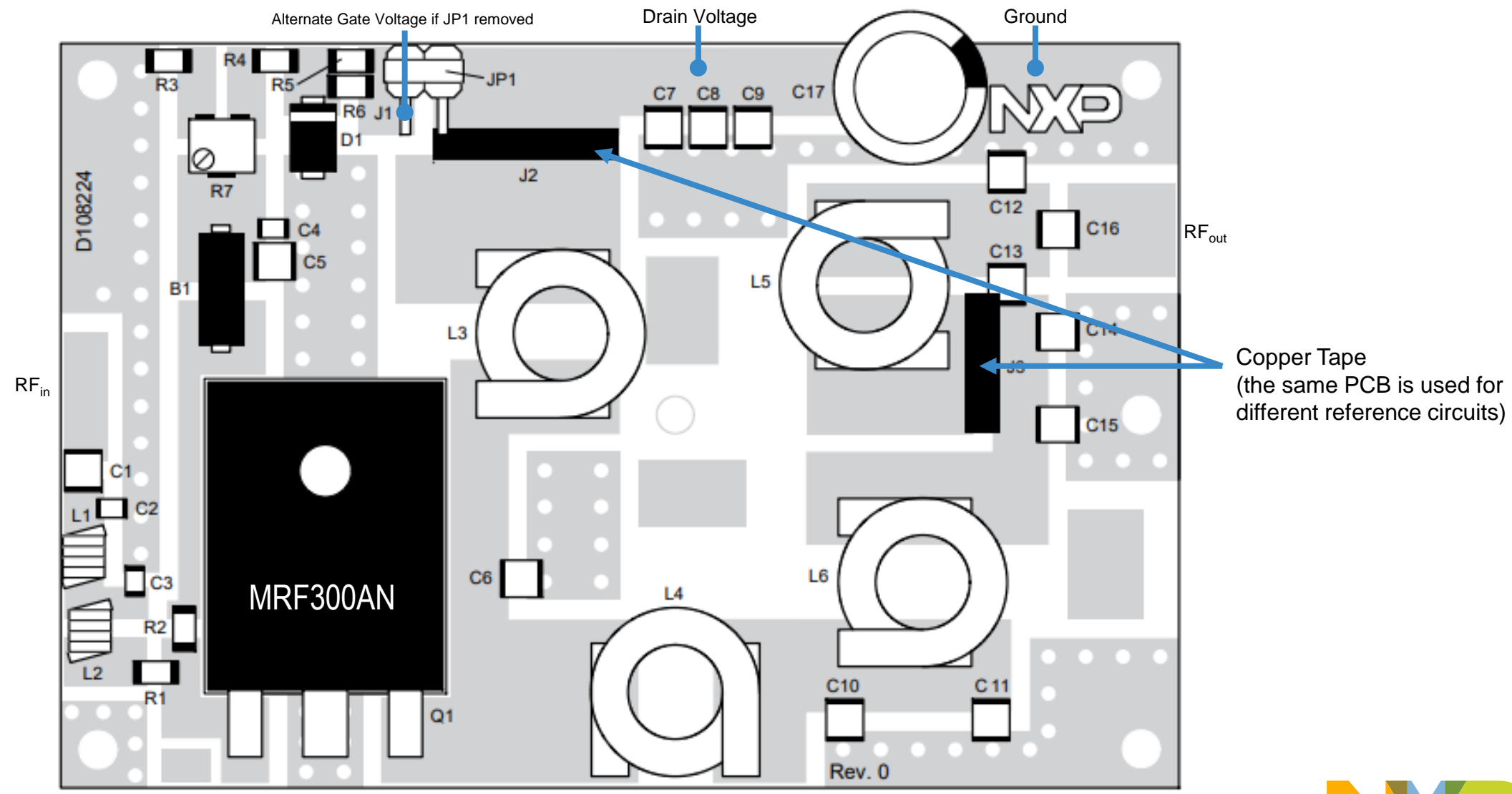
Quick Start

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 handling more than 310 W.
4. 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.
5. If needed, adjust the R7 potentiometer to modify the gate voltage to adjust the drain quiescent current.
6. Raise the RF input slowly to 1 W (30 dBm).
7. Check the RF output power (typically 310 W), the drain current (around 8 A for this power level) and the temperature of the board.



Alternatively, the jumper JP1 can be removed to supply an external gate voltage on J1 connector.

Component Placement Reference



Bill of Materials

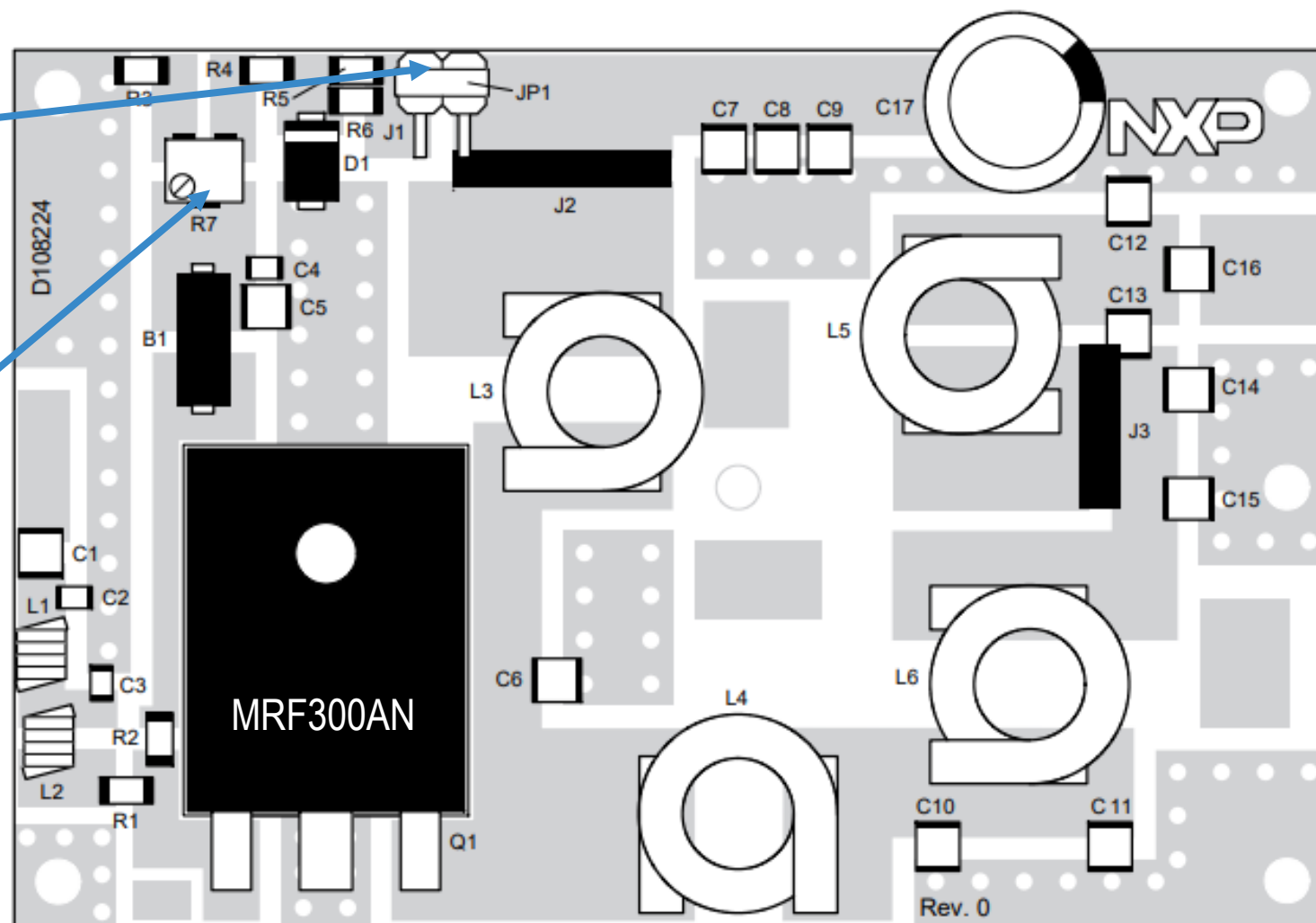
Part	Description	Part Number	Manufacturer
B1	Long Ferrite Bead	2743021447	Fair-Rite
C1, C5, C7, C16	4,700 pF Chip Capacitor	700B472KT50XT	ATC
C2	120 pF Chip Capacitor	GQM2195C2E121GB12D	Murata
C3	47 pF Chip Capacitor	GQM2195C2E470GB12D	Murata
C4	1 μ F Chip Capacitor	GRM31CR72A105KA01L	Murata
C6	30 pF Chip Capacitor	100B300JT500XT	ATC
C8	0.1 μ F Chip Capacitor	GRM32NR72A104KA01B	Murata
C9	10 μ F Chip Capacitor	GRM32ER61H106KA12L	Murata
C10	91 pF Chip Capacitor	100B910JT500XT	ATC
C11	82 pF Chip Capacitor	100B820JT500XT	ATC
C12	51 pF Chip Capacitor	100B510GT500XT	ATC
C13	22 pF Chip Capacitor	100B220JT500XT	ATC
C14	12 pF Chip Capacitor	100B120JT500XT	ATC
C15	33 pF Chip Capacitor	100B330JT500XT	ATC
C17	220 μ F, 63 V Electrolytic Capacitor	EEU-FC1J221	Panasonic
D1	8.2 V Zener Diode	SMAJ4738A-TP	Micro Commercial Components
J1	Right Angle Breakaway Headers (2 Pins)	9-146305-0	TE Connectivity
J2, J3	Jumper	Copper Foil	
JP1	Shunt (J1)	382811-8	TE Connectivity
L1	12.3 nH Square Air Core Inductor	0806SQ-12NJL	Coilcraft
L2	19 nH Square Air Core Inductor	0806SQ-19NJL	Coilcraft
L3	117 nH Air Core Inductor	1212VS-111MEB	Coilcraft
L4	22 nH Air Core Inductor	1212VS-22NMEB	Coilcraft
L5, L6	42 nH Air Core Inductor	1212VS-42NMEB	Coilcraft
Q1	RF Power LDMOS Transistor	MRF300AN	NXP
R1	0 Ω , 1/4 W Chip Resistor	CRCW12060000Z0EA	Vishay
R2	100 Ω , 1/4 W Chip Resistor	CRCW1206100RFKEA	Vishay
R3	12 k Ω , 1/4 W Chip Resistor	CRCW120612K0JNEA	Vishay
R4	27 k Ω , 1/4 W Chip Resistor	CRCW120627K0FKEA	Vishay
R5, R6	20 k Ω , 1/4 W Chip Resistor	CRCW120620K0FKEA	Vishay
R7	5.0 k Ω Multi-turn Cermet Trimmer Potentiometer	3224W-1-502E	Bourns
PCB	FR4 0.087", ϵ_r = 4.8, 2 oz. Copper	D108224	MTL



Tuning Tips

Remove JP1 to disable
gate bias

Turn R7 to adjust I_{DQ} ,
clockwise to decrease

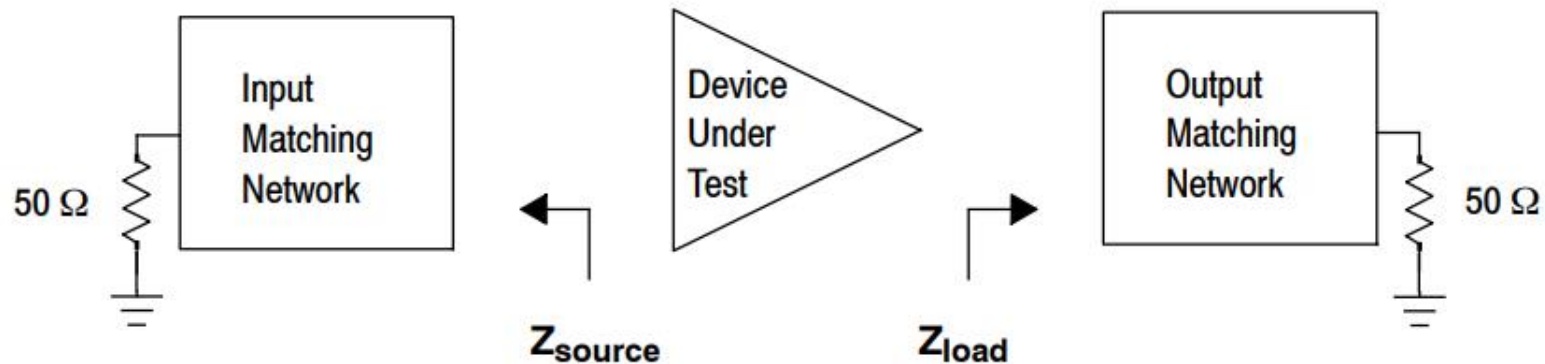


Impedances

f (MHz)	Z_{source} (Ω)	Z_{load} (Ω)
81.36	$3.86 + j7.90$	$4.45 + j3.53$

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 MRF300AN 81.36 MHz Reference Circuit zip file.

Revision	Date	Description
0	September 2019	• Initial Release



SECURE CONNECTIONS
FOR A SMARTER WORLD