

MRF300AN 27 MHz REFERENCE CIRCUIT

ORDERABLE PART NUMBER: **MRF300A-27MHZ**



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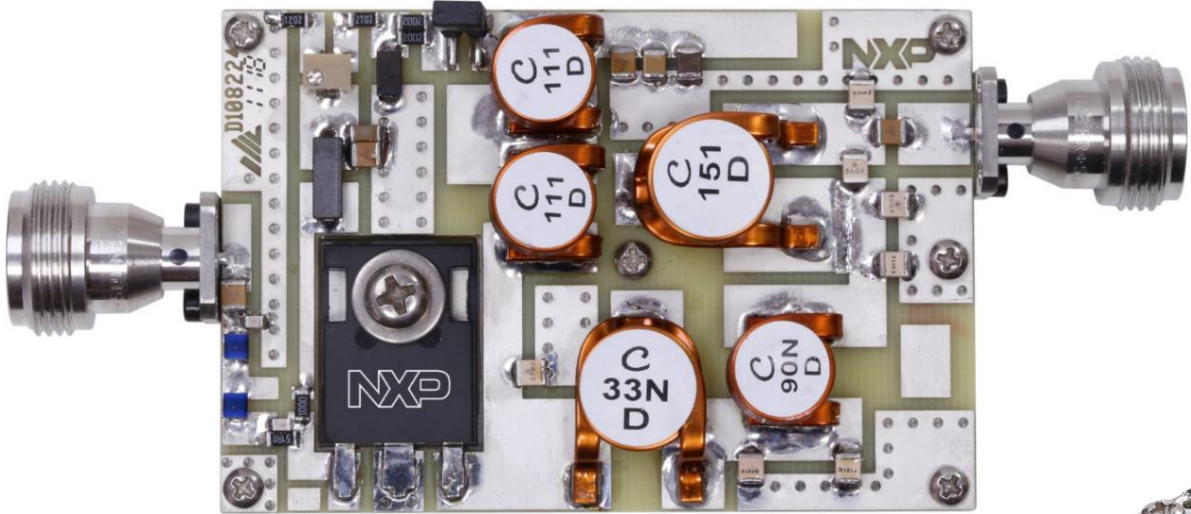
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Introduction

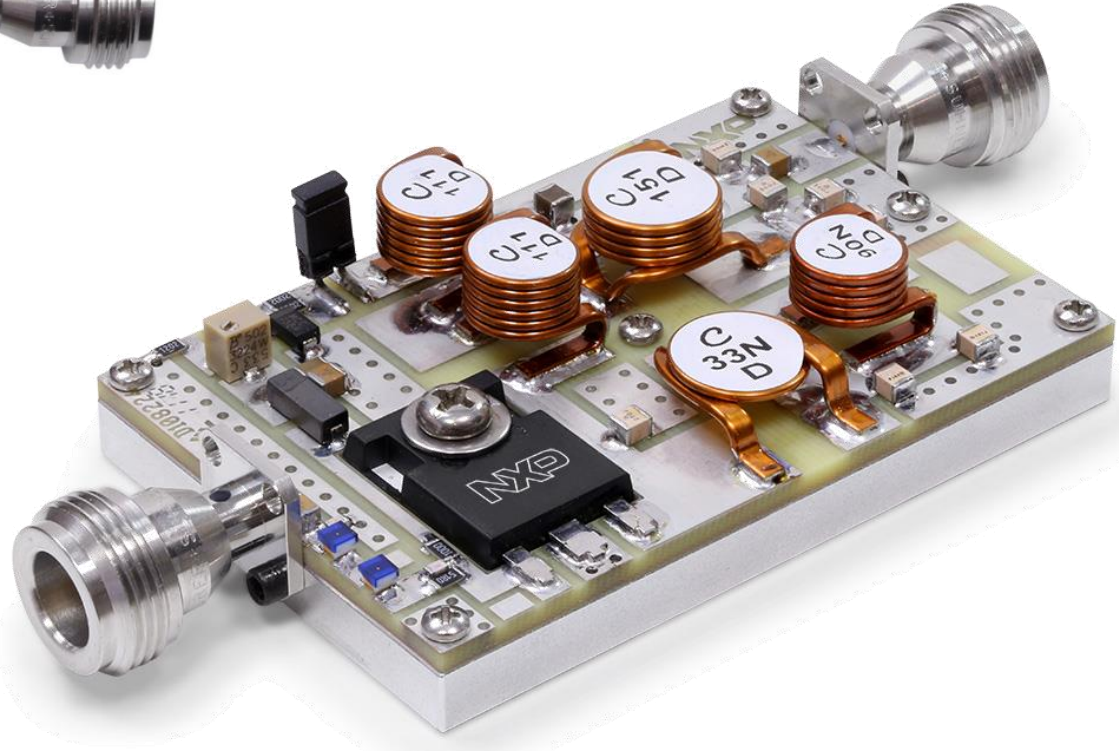
- The NXP MRF300AN is a 1.8-250 MHz, 300 W CW RF power LDMOS housed in a TO-247 over-molded plastic package. Its unmatched input and output allows wide frequency range utilization.
 - Further details about the device, including its data sheet, are available on www.nxp.com/MRF300AN.
- The following pages describe the 27.12 MHz reference circuit (evaluation board). Its typical applications are industrial, scientific, medical (ISM), RF Energy and plasma generation.
- The reference circuit can be ordered through NXP's distribution partners and etailers using part number MRF300A-27MHZ.



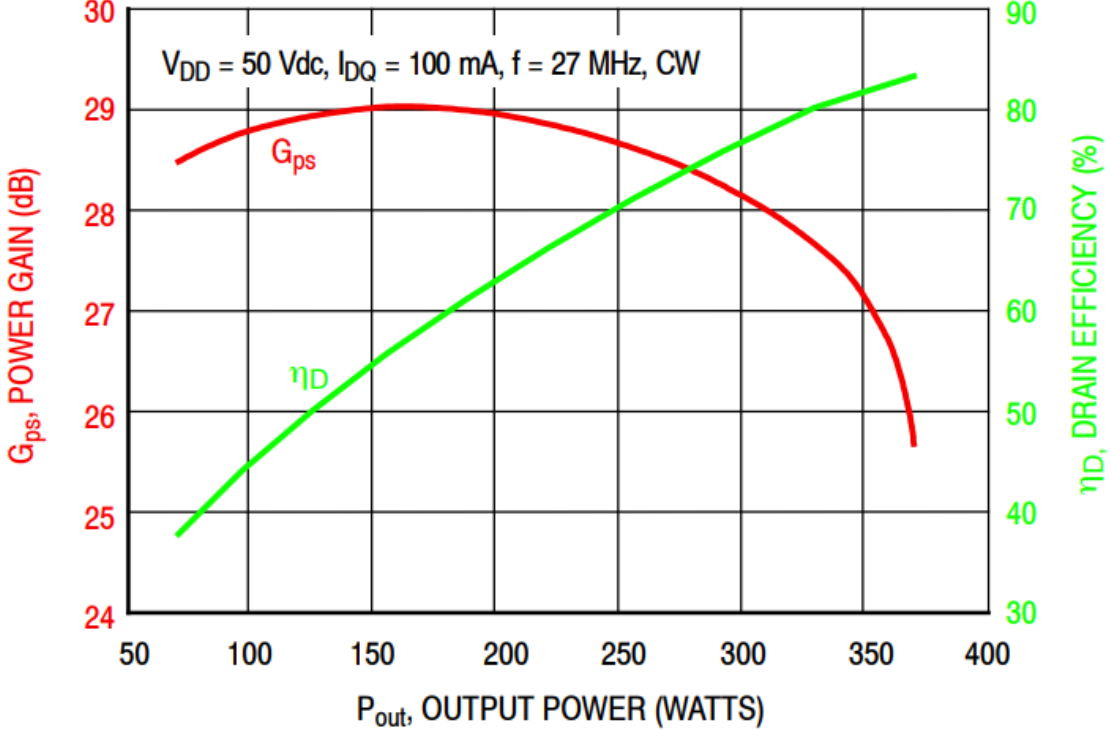
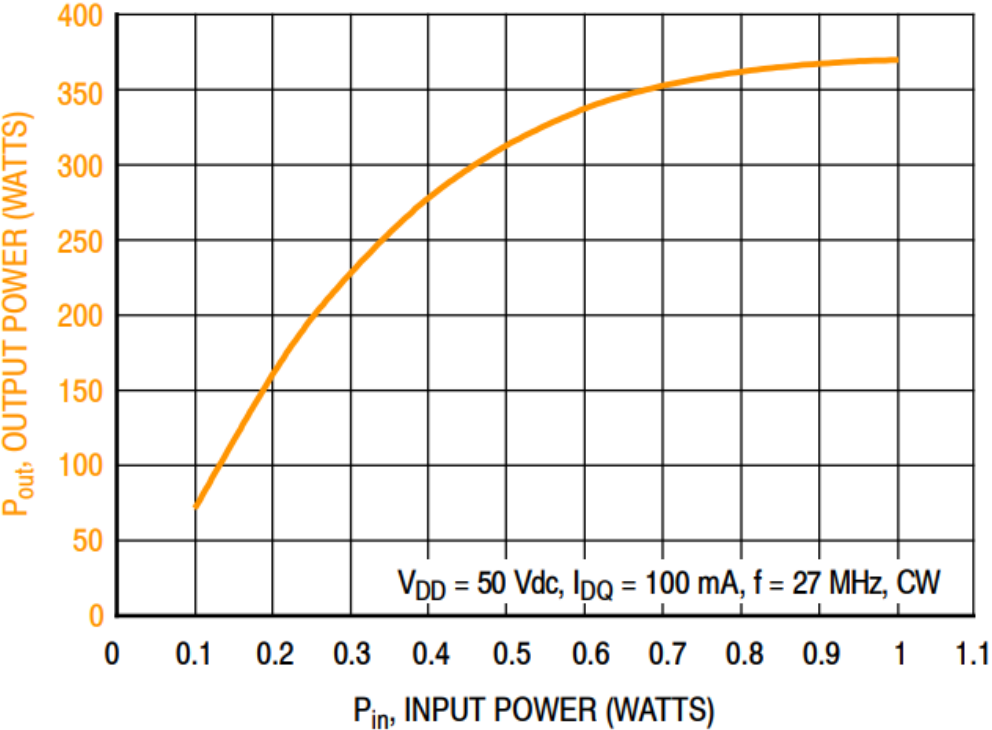
Circuit Overview – 5.08 cm × 7.62 cm (2.0" × 3.0")



Transistor bolted to aluminum baseplate
with thermal grease under it.
PCB bolted to aluminum baseplate with
no thermal grease.



Typical Performance



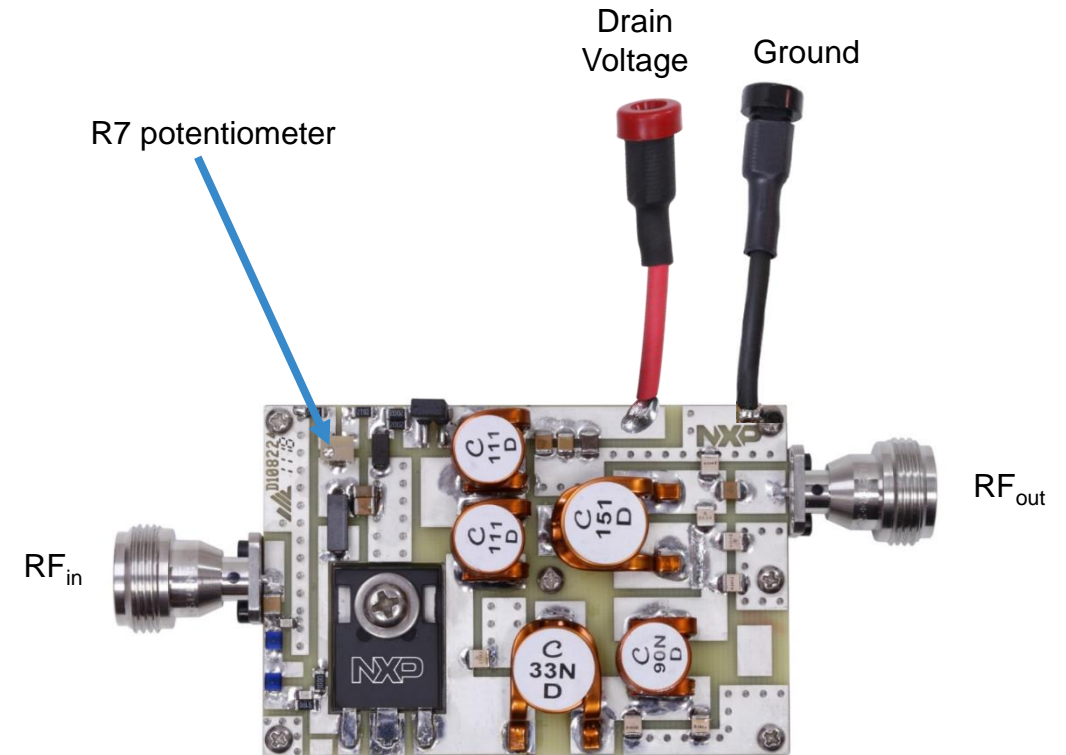
Typical Performance: $V_{DD} = 50\text{ Vdc}$, $I_{DQ} = 100\text{ mA}$, $P_{in} = 0.6\text{ W}$ (28 dBm), CW

Frequency (MHz)	P_{out} (W)	G_{ps} (dB)	η_D (%)
27	330	27.4	80.0



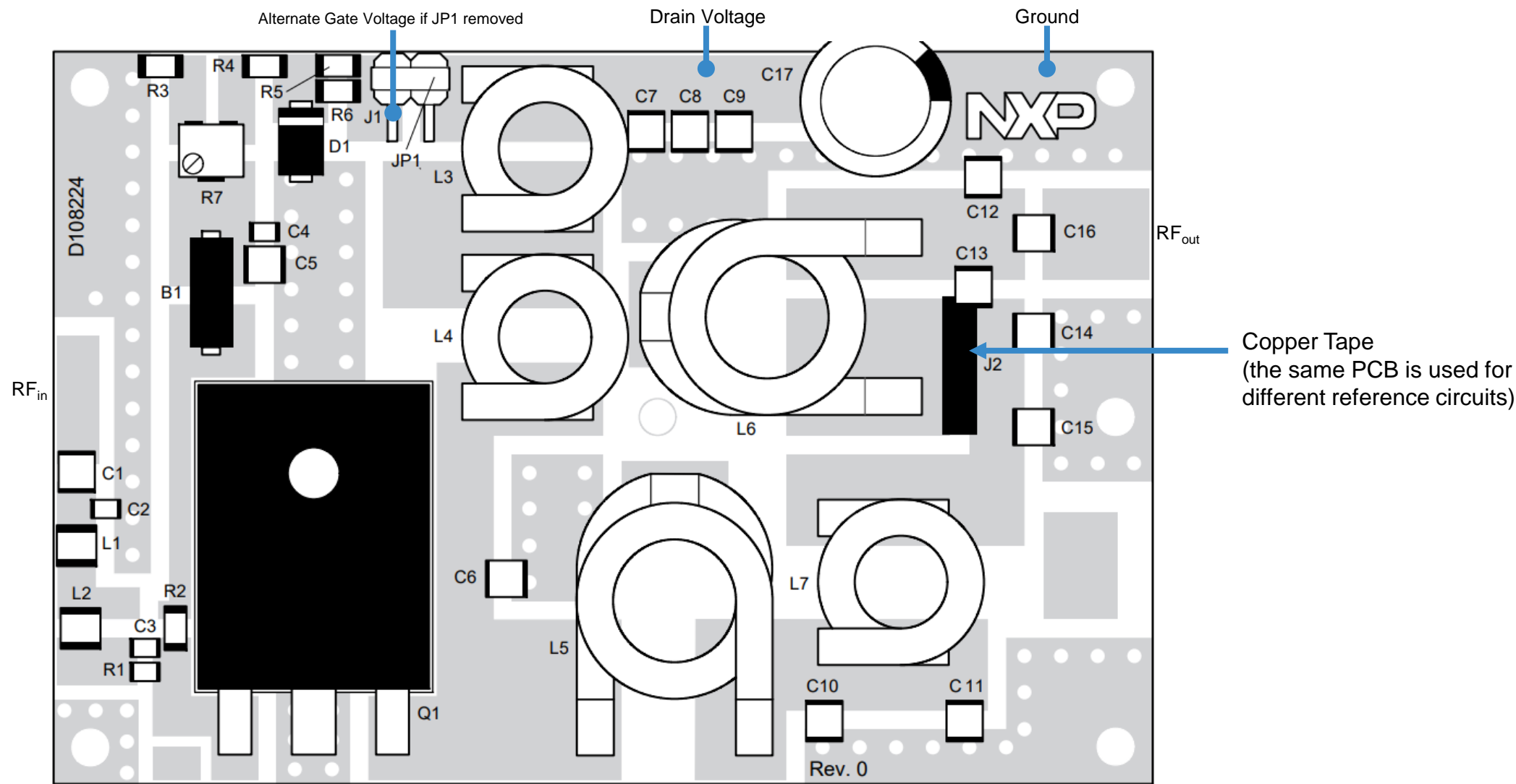
Quick Start

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 340 W.
4. Connect the RF input to a 50 ohm source with the RF off.
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 R7 potentiometer to modify the gate voltage to adjust the drain quiescent current.
7. Raise the RF input slowly to 0.6 W (28 dBm).
8. Check the RF output power (typically 340 W), the drain current (typically 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

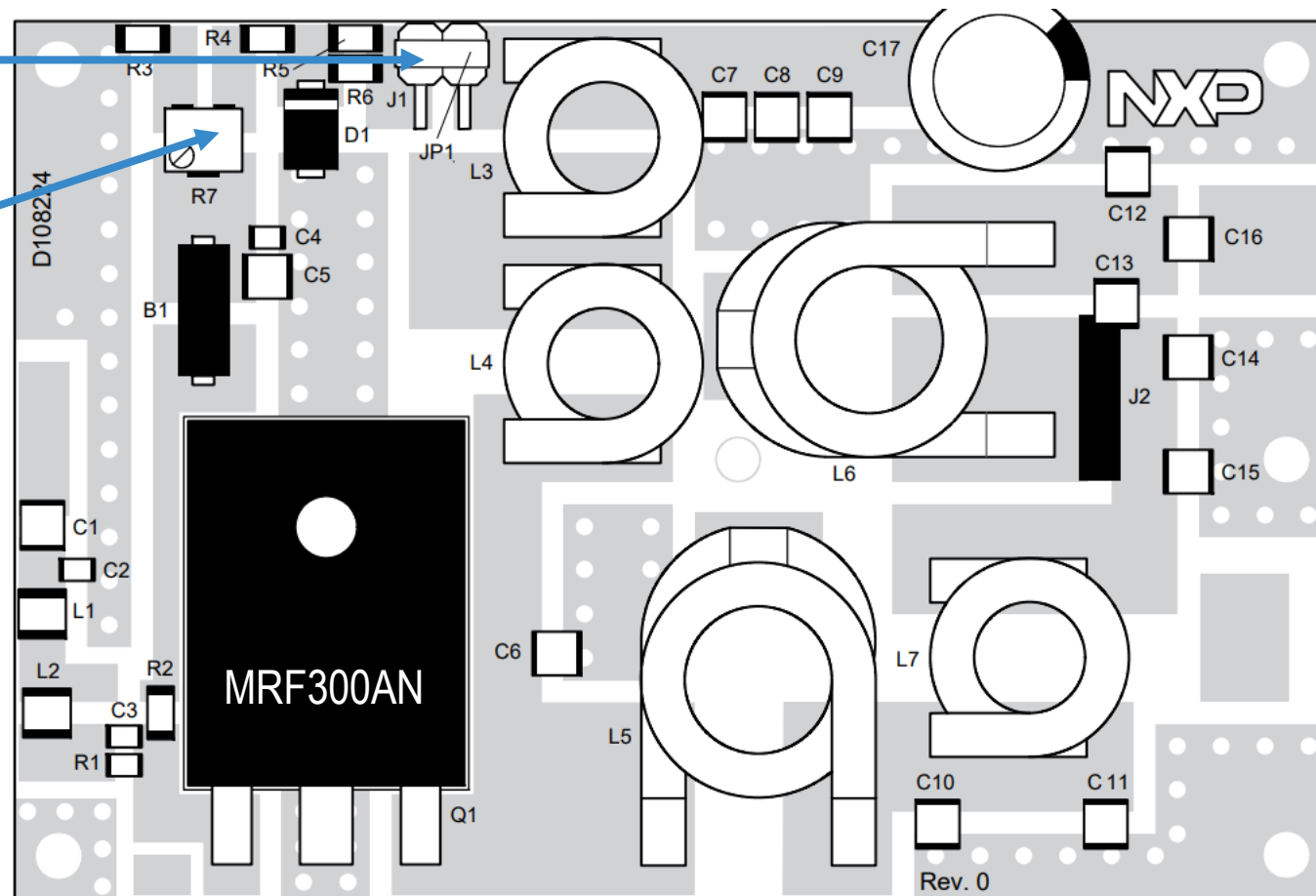
Part	Description	Part Number	Manufacturer
B1	Long Ferrite Bead	2743021447	Fair-Rite
C1, C5, C7, C16	39,000 pF Chip Capacitor	200B393KT50XT	ATC
C2	120 pF Chip Capacitor	GQM2195C2E121GB12D	Murata
C3	200 pF Chip Capacitor	GQM2195C2A201GB12D	Murata
C4	1 μ F Chip Capacitor	GRM31CR72A105KA01L	Murata
C6	27 pF Chip Capacitor	100B270JT500XT	ATC
C8	0.1 μ F Chip Capacitor	GRM32NR72A104KA01B	Murata
C9	10 μ F Chip Capacitor	GRM32ER61H106KA12L	Murata
C10	220 pF Chip Capacitor	100B221JT200XT	ATC
C11	120 pF Chip Capacitor	100B121JT300XT	ATC
C12	30 pF Chip Capacitor	100B300JT500XT	ATC
C13, C14	56 pF Chip Capacitor	100B560CT500XT	ATC
C15	200 pF Chip Capacitor	100B201JT300XT	ATC
C17	220 μ F, 63 V Electrolytic Capacitor	EEU-FC1J221	Panasonic-ECG
D1	8.2 V Zener Diode	SMAJ4738A-TP	Micro Commercial Components
J1	Right Angle Breakaway Headers (2 Pins)	9-146305-0	TE Connectivity
J2	Jumper	Copper Foil	
JP1	Shunt (J1)	382811-8	TE Connectivity
L1, L2	180 nH Chip Inductor	1008CS-181XJLB	Coilcraft
L3, L4	110 nH Air Core Inductor	1212VS-111MEB	Coilcraft
L5	33 nH Air Core Inductor	2014VS-33NMEB	Coilcraft
L6	155 nH Air Core Inductor	2014VS-151MEB	Coilcraft
L7	90 nH Air Core Inductor	1212VS-90NME	Coilcraft
Q1	RF Power LDMOS Transistor	MRF300AN	NXP
R1	51 Ω , 1/4 W Chip Resistor	CRCW120651R0FKEA	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", $\epsilon_r = 4.8$, 2 oz. Copper	D108224	MTL



Tuning Tips

Remove JP1 to disable
gate bias

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



Revision History

- The following table summarizes revisions to the content of the MRF300AN 27 MHz Reference Circuit zip file.

Revision	Date	Description
0	September 2019	• Initial Release



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