MRF1K50H 27 MHz REFERENCE CIRCUIT

ORDERABLE PART NUMBER: **MRF1K50H-TF2**

PUBLIC

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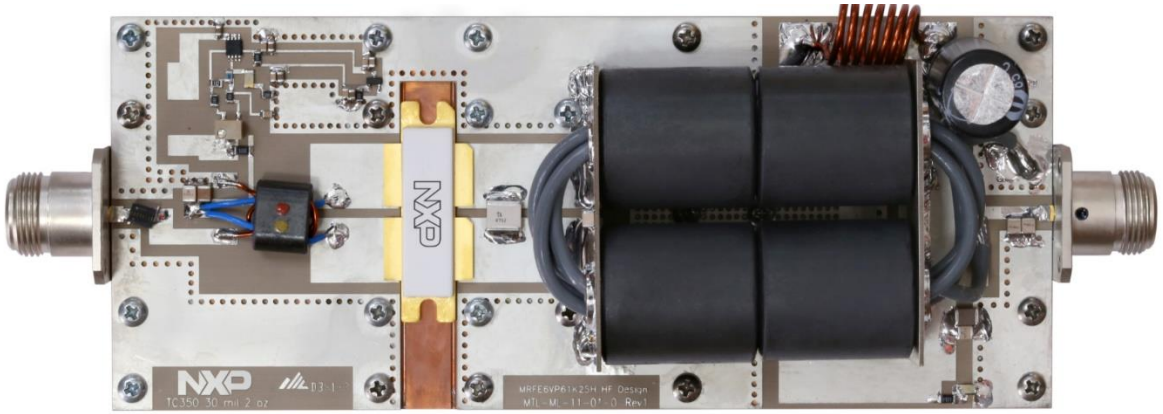
Introduction

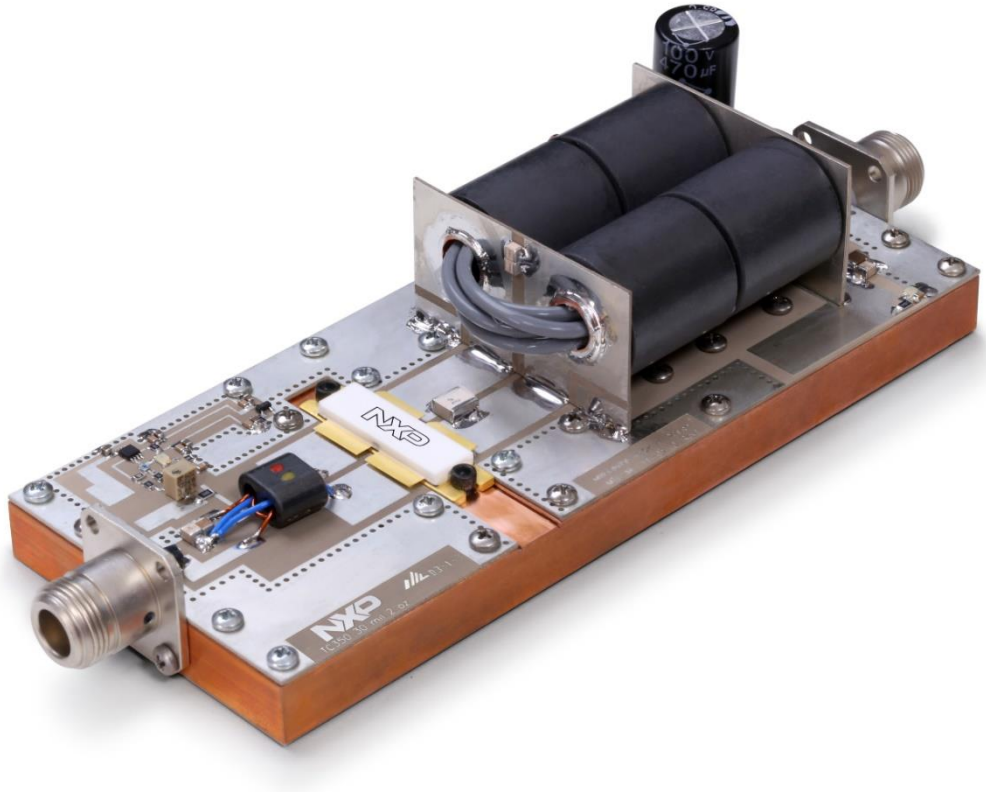
- The NXP MRF1K50H is a 1.8-500 MHz, 1500 W CW RF power LDMOS transistor housed in an NI-1230 air-cavity ceramic package. Its unmatched input and output allows wide frequency range utilization.
  - Further details about the device, including its data sheet, are available here.

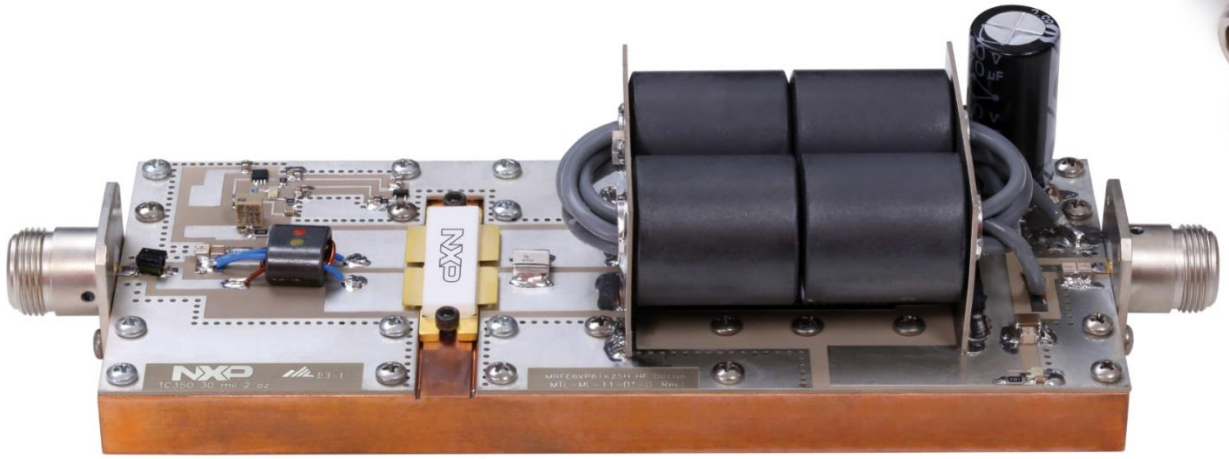
- The following pages describe the 27.12 MHz reference circuit (evaluation board).
  Its typical applications are industrial, scientific, medical (ISM), RF energy and plasma generation.

- The reference circuit can be ordered through NXP's distribution partners and etailers using part number MRF1K50H-TF2.

Circuit Overview – 7.3 cm x 17.5 cm (2.88″ x 6.90″)







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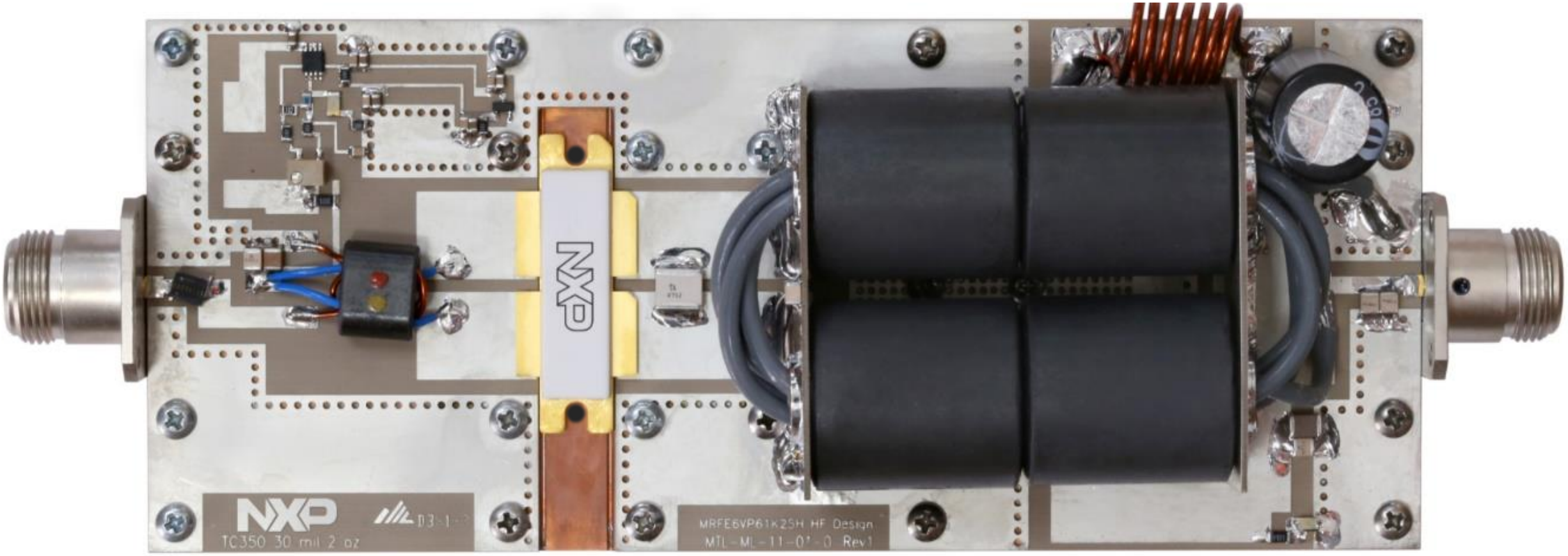
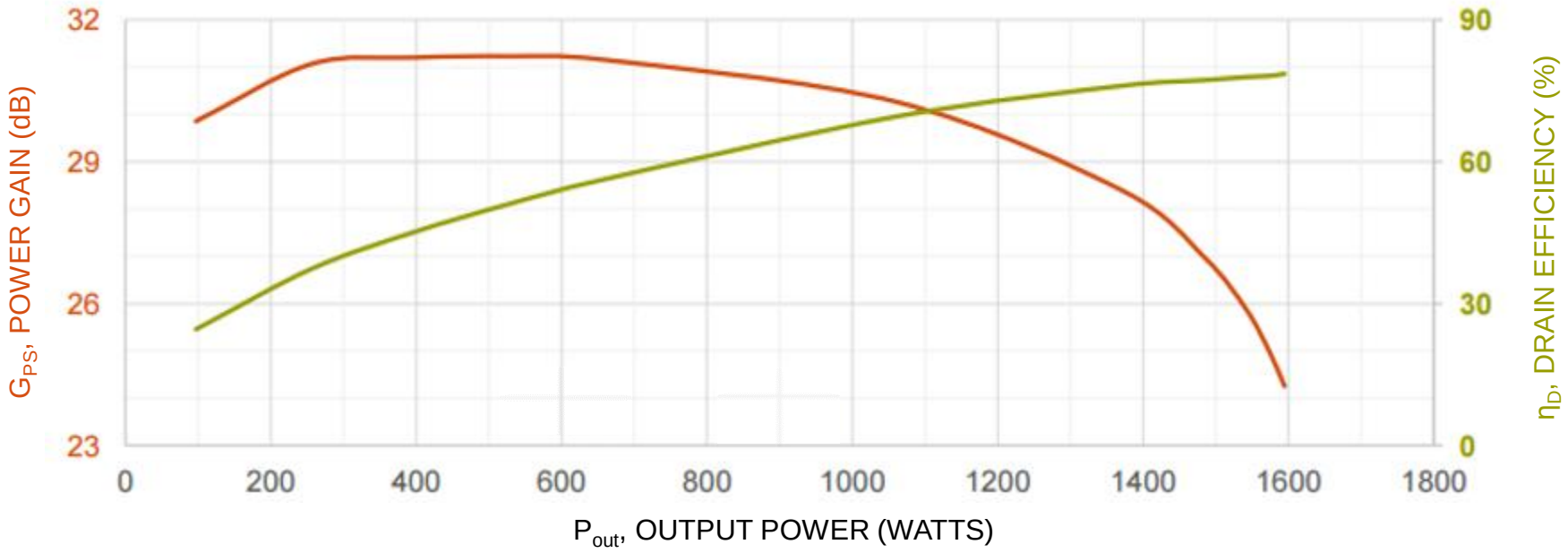


Typical CW Performance

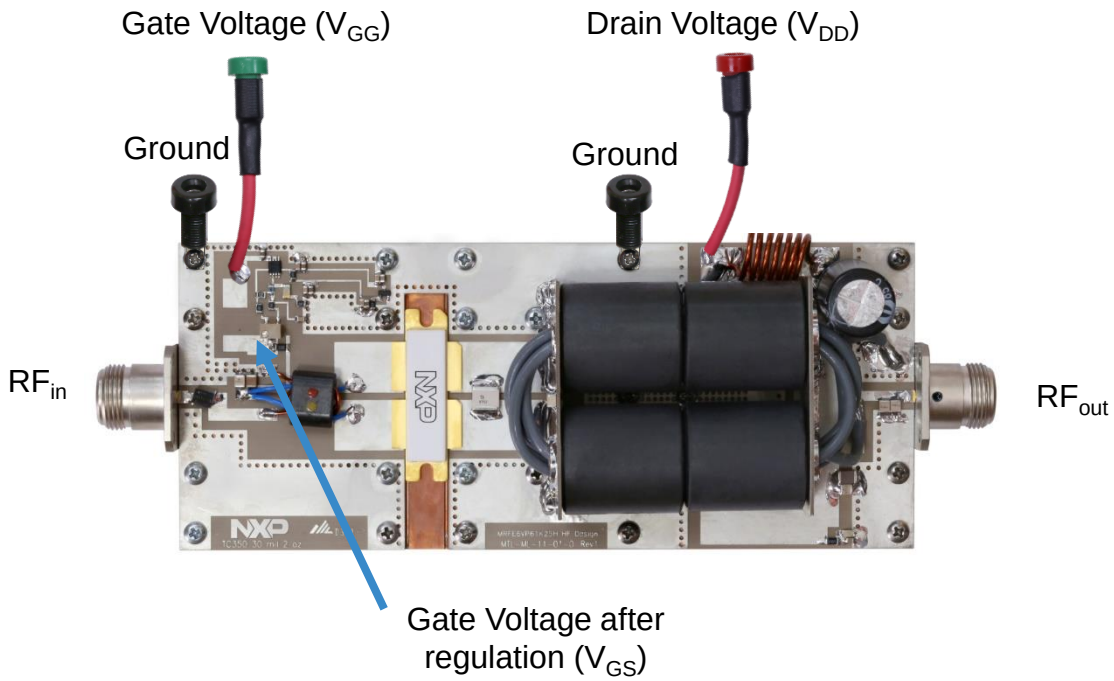


Typical Performance: V_{DD} = 50 Vdc, $I_{DQ(A+B)}$ = 100 mA, P_{in} = 4 W (36.0 dBm), CW

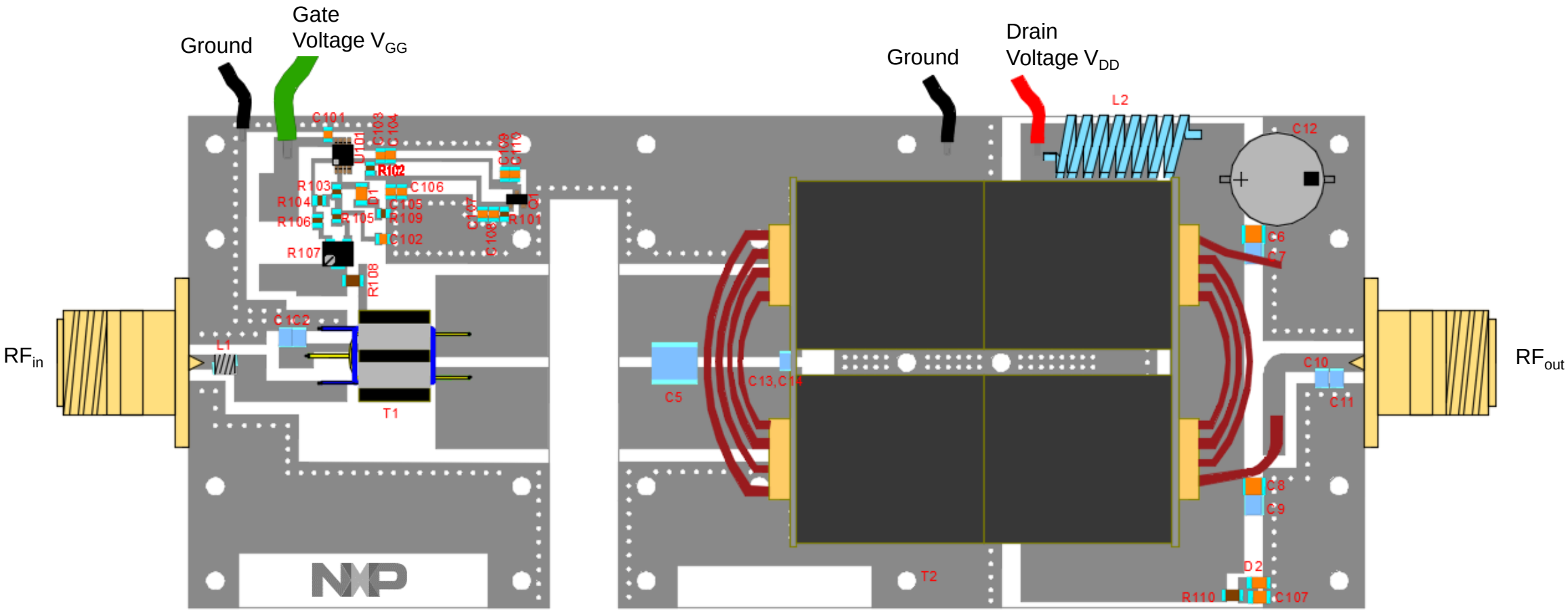
Frequency (MHz)	Output Power (W)	Power Gain (dB)	Drain Efficiency (%)
27	1550	25.9	78.3

Quick Start

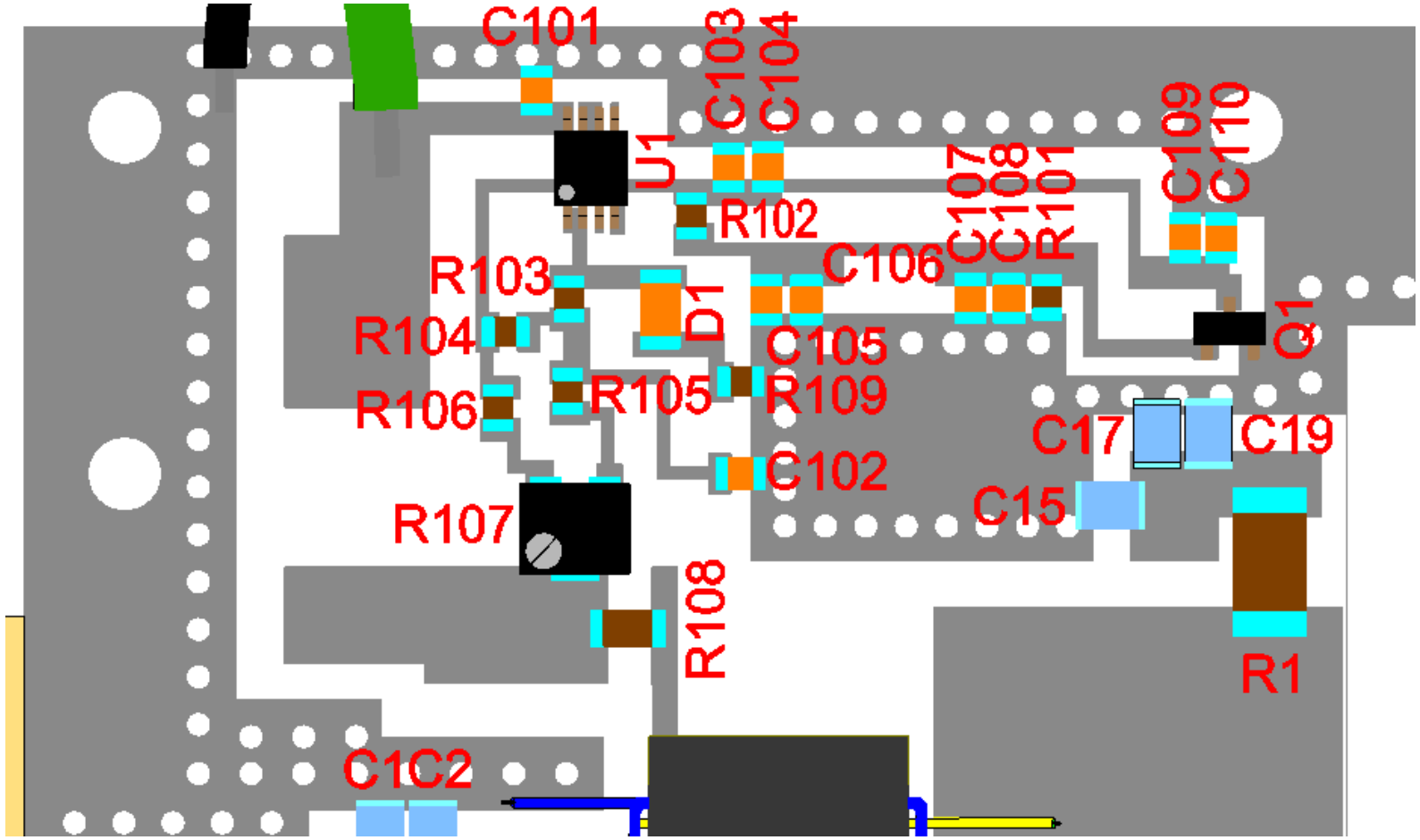
1. Mount the reference circuit onto a heatsink capable of dissipating more than 500 W in order to provide enough thermal dissipation (the baseplate included in this reference circuit is not sufficient to serve as a standalone heatsink).
2. Connect the ground.
3. Terminate the RF output with a 50 ohm load capable of dissipating more than 1600 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 V_{GG} slowly to 12 V ensuring the drain current remains below or equal to typical quiescent current $I_{DQ(A+B)}$ = 100 mA. The gate voltage at the transistor level (V_{GS}) should be around 2.4 V.
8. If needed, adjust the R107 potentiometer to modify the gate voltage of the transistor V_{GS} to adjust the drain quiescent current $I_{DQ(A+B)}$.
9. Raise the RF input slowly to 4 W (36.0 dBm).
10. Check the RF output power (typically 1550 W), the drain DC current (around 40 A for this power level) and the temperature of the board.



Component Placement Reference



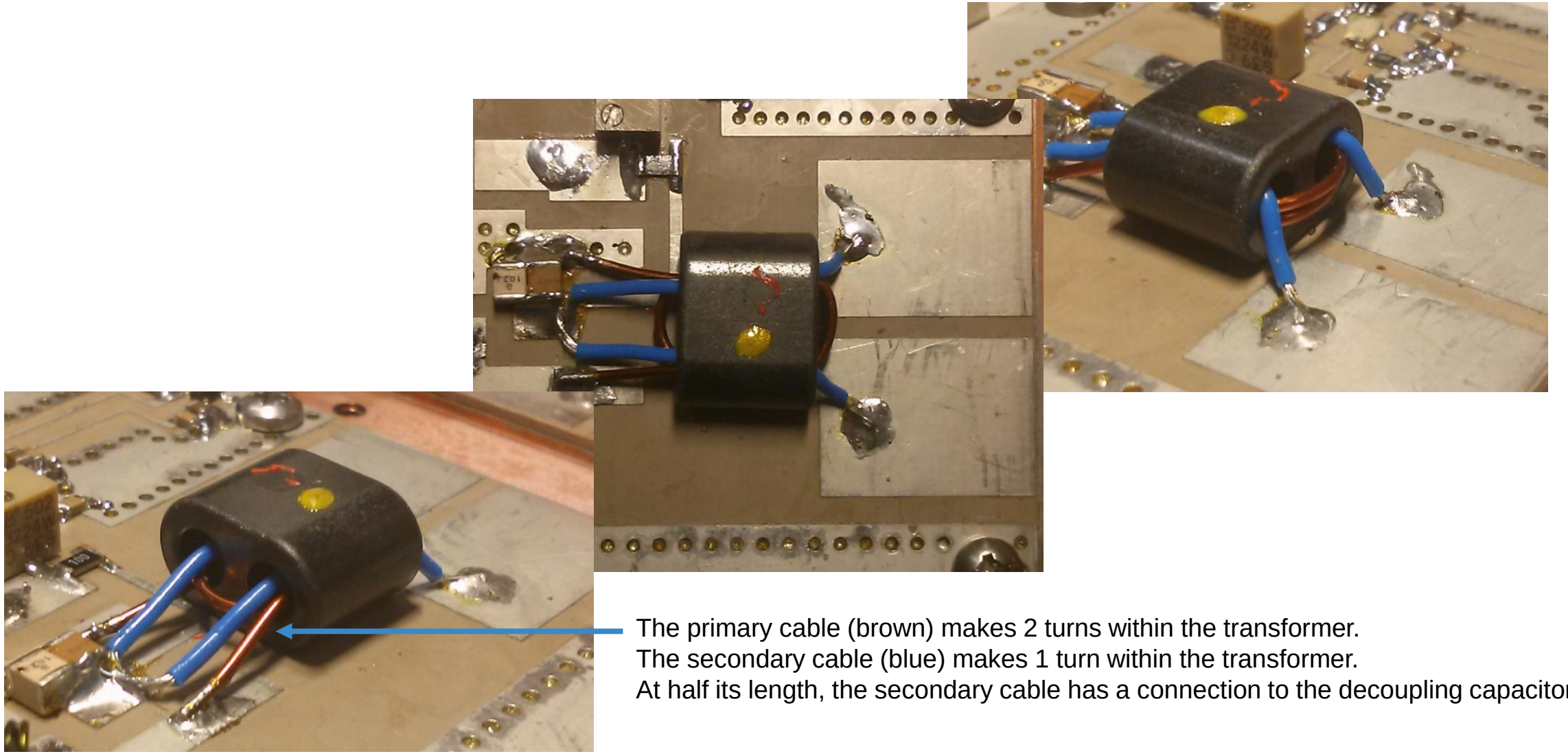
Component Placement Reference (Zoom)



Bill Of Materials

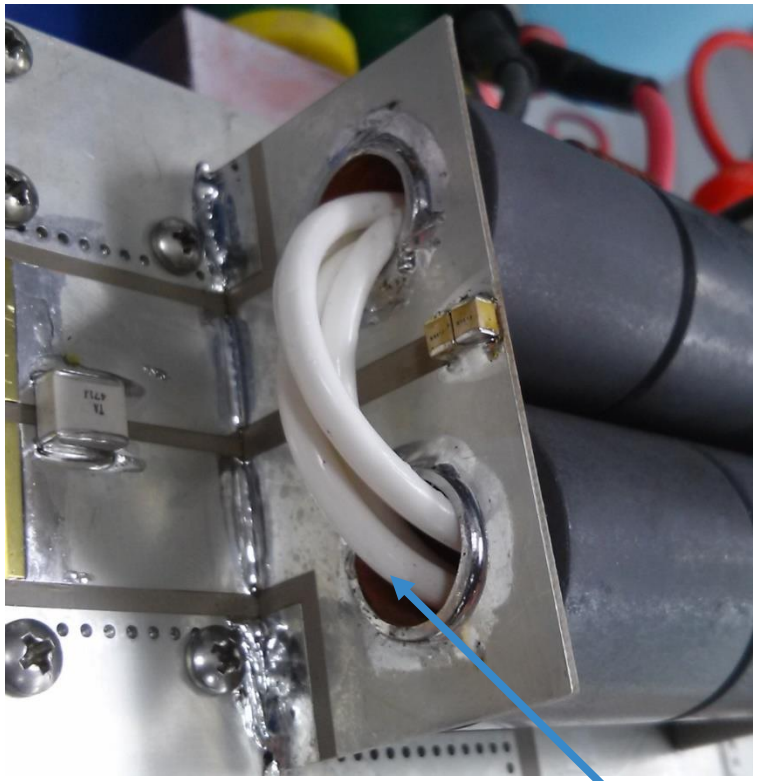
Part	Description	Part Number	Manufacturer
C1,C17,C18	1000 pF chip capacitors	100B102JT50XT	ATC
C2,C15,C16	39,000 pF chip capacitors	200B393KT50XT	ATC
C5	470 pF CLX chip capacitors	152CLX471JCL	TEMEX Ceramics
C6, C8	2.2 µF 100V chip capacitors	HMK432B7225KM-T	Taiyo Yuden
C7, C9	470 pF chip capacitors	100B471JT200XT	ATC
C10, C11	36 pF chip capacitors	100B360JT500XT	ATC
C12	470 µF100V electrolytic capacitor	MCGPR100V477M16X32-RH	Multicomp
C13*,C14*	560 pF chip capacitors	100B561JT200XT	ATC
L1	82 nHinductor	1812SMS-82NJLC	CoilCraft
L2	7 Turn, Inside Diameter 0.394 inch (10mm) #16 AWG Inductor Handwound	8074	Beldon
R1,R2	33Ω 2512chip resistor	1-2176070-3	TE Connectivity
R101	2.2k ohms 0805 chip resistor 1/8W	CRCW08052K20JNEA	Vishay/Dale
R102, R109	1.2k ohms 0805 chip resistors 1/8W	CRCW08051K20FKEA	Vishay/Dale
R103	10 ohms 0805 chip resistor 1/8W	RK73H2ATTD10R0F	KOA Speer
R104	1k ohms 0805 chip resistor 1/8W	RR1220P-102-D	Susumu
R105	3.9k ohms 0805 chip resistor 1/8W	CRCW08053K90JNEA	Vishay/Dale
R106	200 ohms 0805 chip resistor 1/8W	CRCW0805200RJNEA	Vishay/Dale
R107	SMT Trim Pot 5K, (11 turn)	3224W-1-502E	Bourns
R108	10 ohms 1206 chip resistor 1/8W	CRCW120610R0JNEA	Dale/Vishay
R110	9.1k ohms 1206 chip resistor 1/4W	CRCW12069K10FKEA	Dale/Vishay
U101	5V Voltage Regulator Micro8	LP2951ACDMR2G	On-Semi

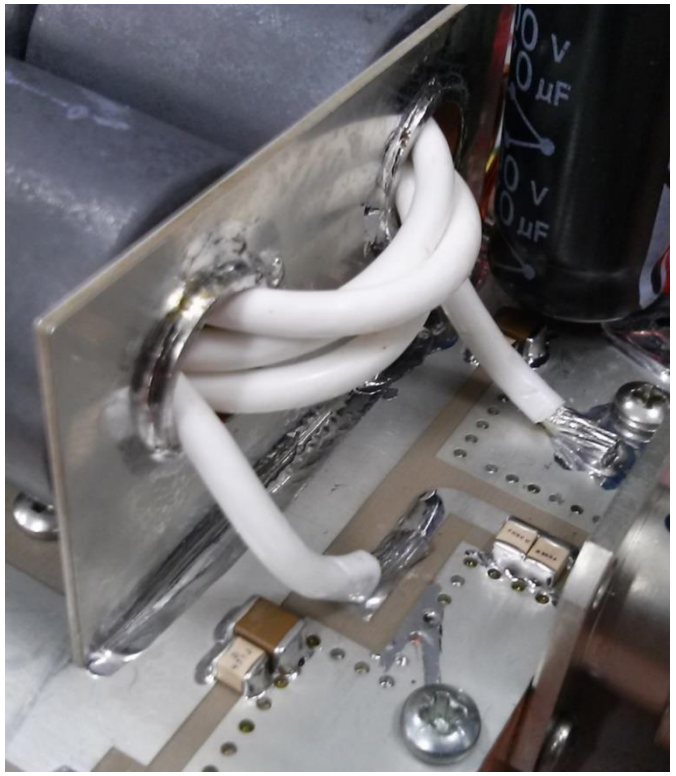
T1 Input – Balun Details



The primary cable (brown) makes 2 turns within the transformer.
The secondary cable (blue) makes 1 turn within the transformer.
At half its length, the secondary cable has a connection to the decoupling capacitors.

T2 Output – Balun Details





The wire makes 3 turns within the transformer.

The vertical PCBs for the T2 output transformer
are cut from the D50876 board (MRF1K50H 27 MHz Balun.dxf)

Revision History

- The following table summarizes revisions to the content of the MRF1K50H 27 MHz Reference Circuit zip file.

Revision	Date	Description
0	September 2019	• Initial Release

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