

MRFX1K80H 81.36 MHz REFERENCE CIRCUIT

ORDERABLE PART NUMBER: **MRFX1K80H-81MHZ**



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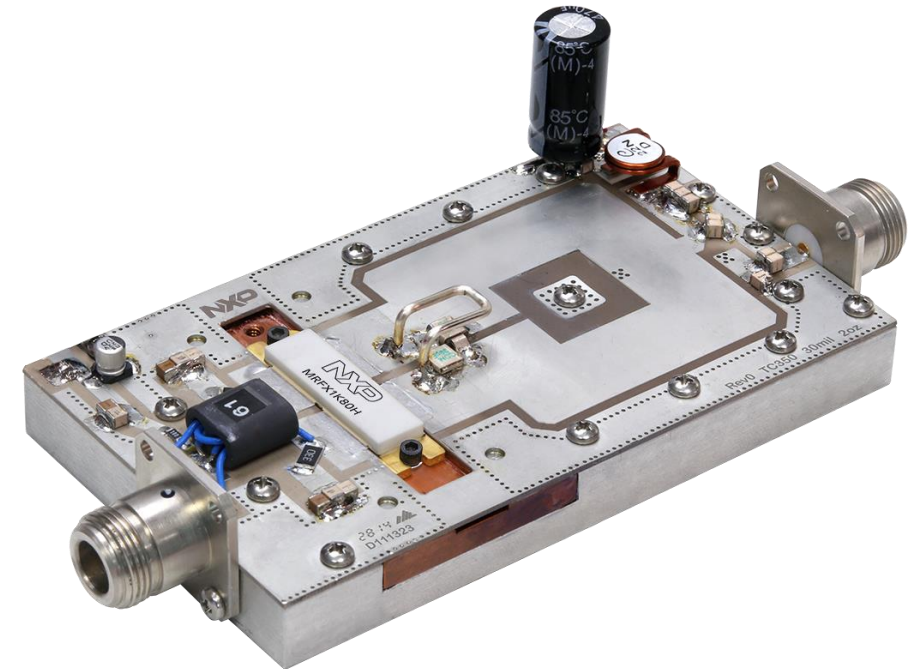
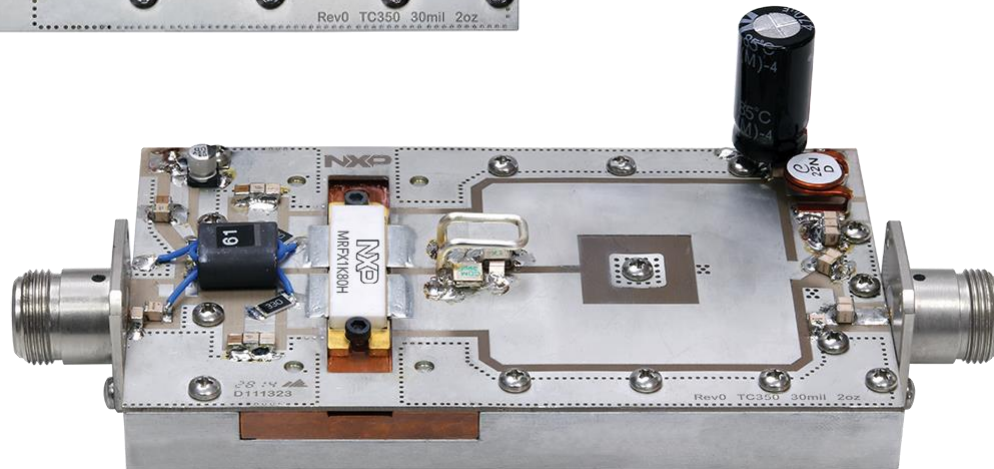
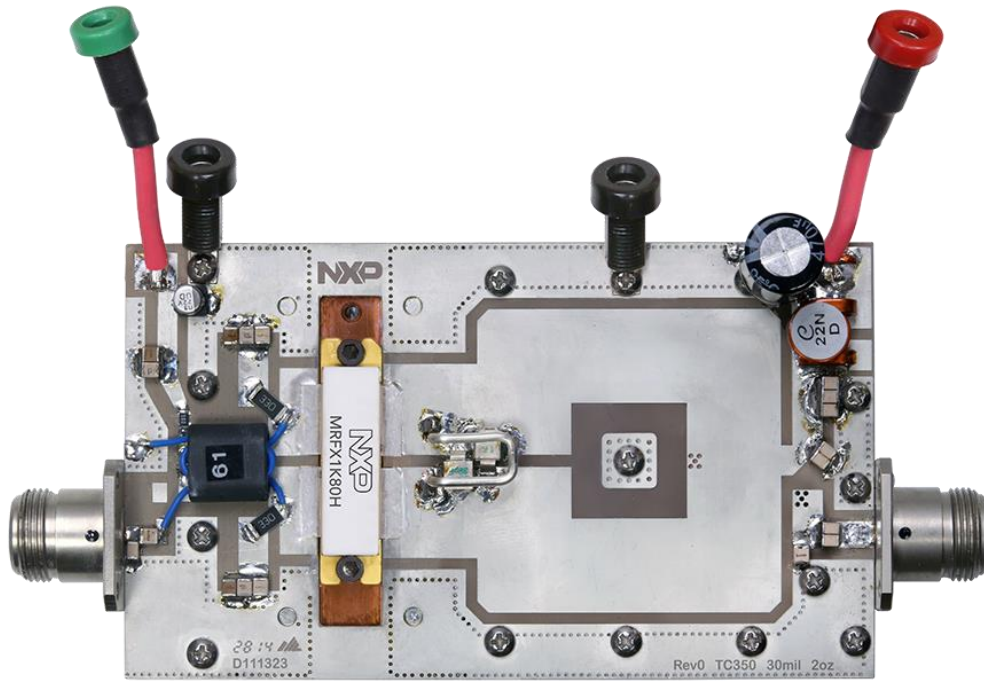
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Introduction

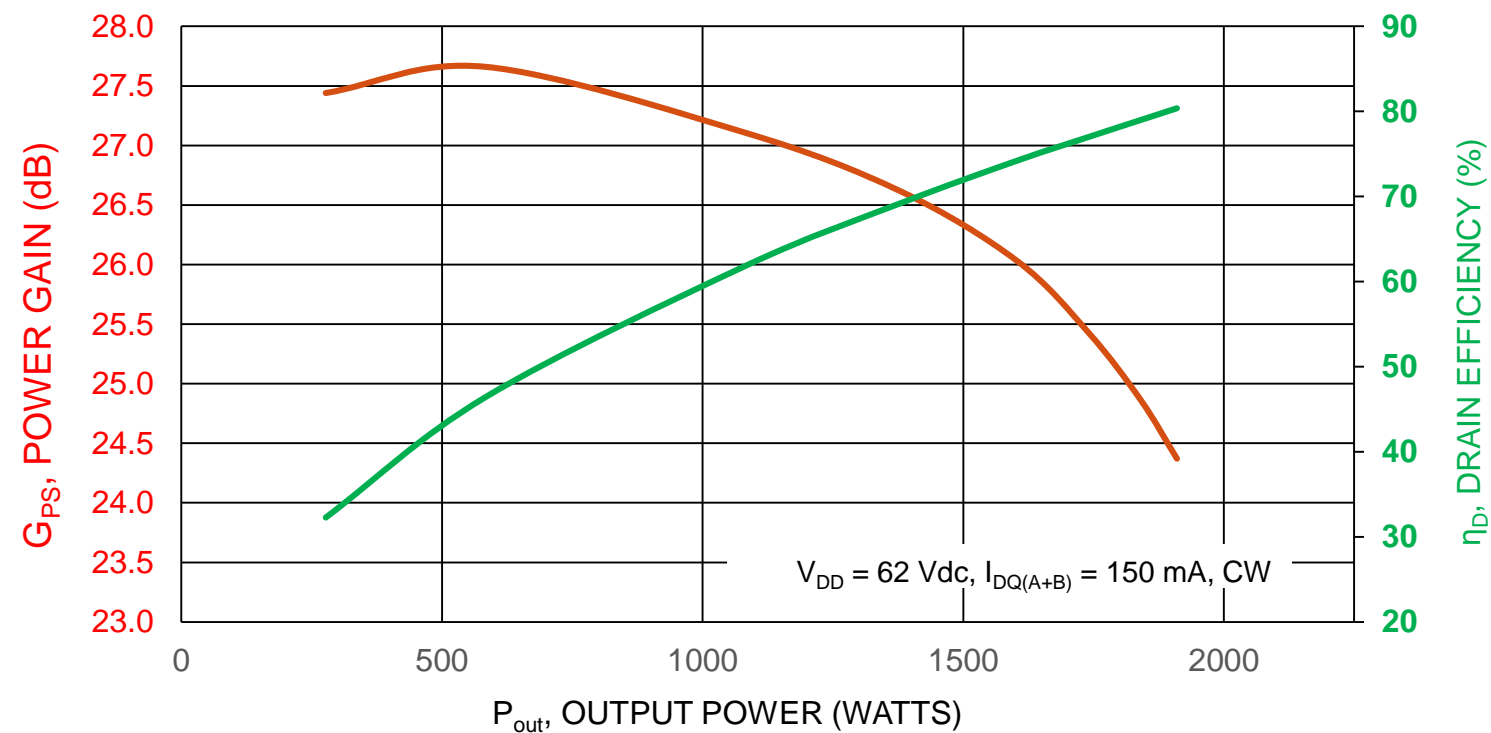
- The NXP MRFX1K80H is a 1.8-400 MHz, 1800 W CW RF power LDMOS transistor housed in an NI-1230 air-cavity ceramic package. Its unmatched input and output allows wide frequency range utilization.
 - Further details about the device, including its data sheet, are available on www.nxp.com/MRFX1K80H.
- The following pages describe the 81.36 MHz reference circuit (evaluation board). Its typical application is laser generation.
- The reference circuit can be ordered through NXP's distribution partners and etailers using part number MRFX1K80H-81MHZ.



Circuit Overview – 7.3 cm x 12.6 cm (2.88" x 4.95")



Typical CW Performance



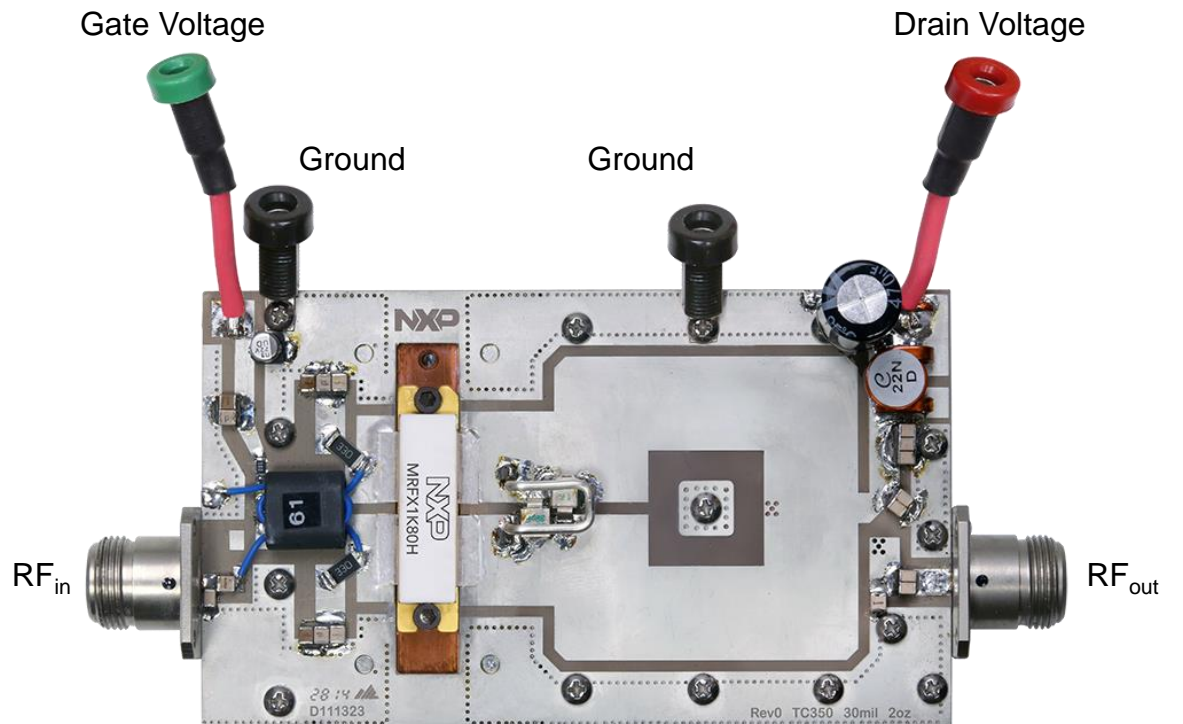
Typical Performance: $V_{DD} = 62 \text{ Vdc}$, $I_{DQ(A+B)} = 150 \text{ mA}$, $P_{in} = 5.6 \text{ W}$ (37.45 dBm), CW

Frequency (MHz)	Output Power (W)	Power Gain (dB)	Drain Efficiency (%)
81.36	1800	25.1	78.7



Quick Start

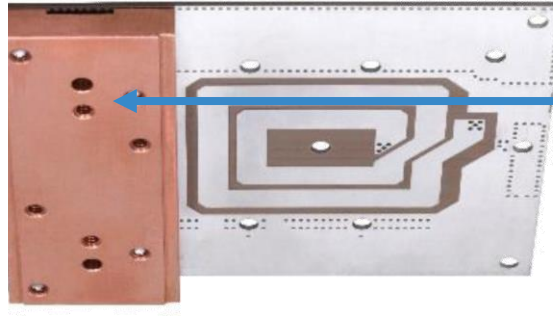
1. Mount the reference circuit onto a heatsink capable of dissipating more than 600 W in order to provide enough thermal dissipation (the baseplate included in this reference circuit is not sufficient to serve as a standalone heatsink).
2. Connect the ground.
3. Terminate the RF output with a 50 ohm load capable of handling more than 1800 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 62 V. Current should be 0 A.
7. Raise the gate voltage slowly until the drain current reaches the desired level (drain quiescent current $I_{DQ(A+B)} = 150 \text{ mA}$ typically). The gate voltage should be around 2.8 V.
8. Raise the RF input slowly to 5.6 W peak (37.5 dBm).
9. Check the RF output power (typically 1800 W peak), the drain current (around 37 A peak for this power level) and the temperature of the board.



Assembly Details

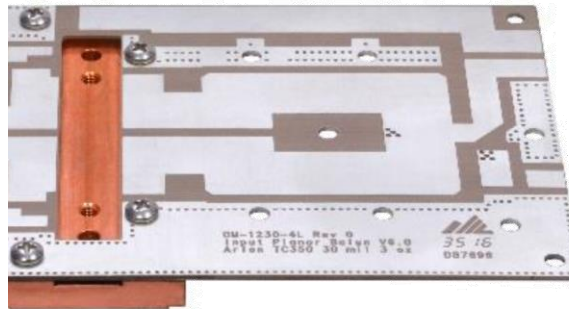
(picture from another reference circuit with different size but with similar concept)

- Back side view of the PCB:

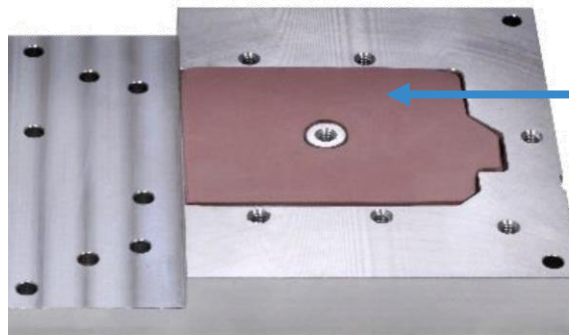


Copper insert soldered to the PCB

- Top side view of the PCB:

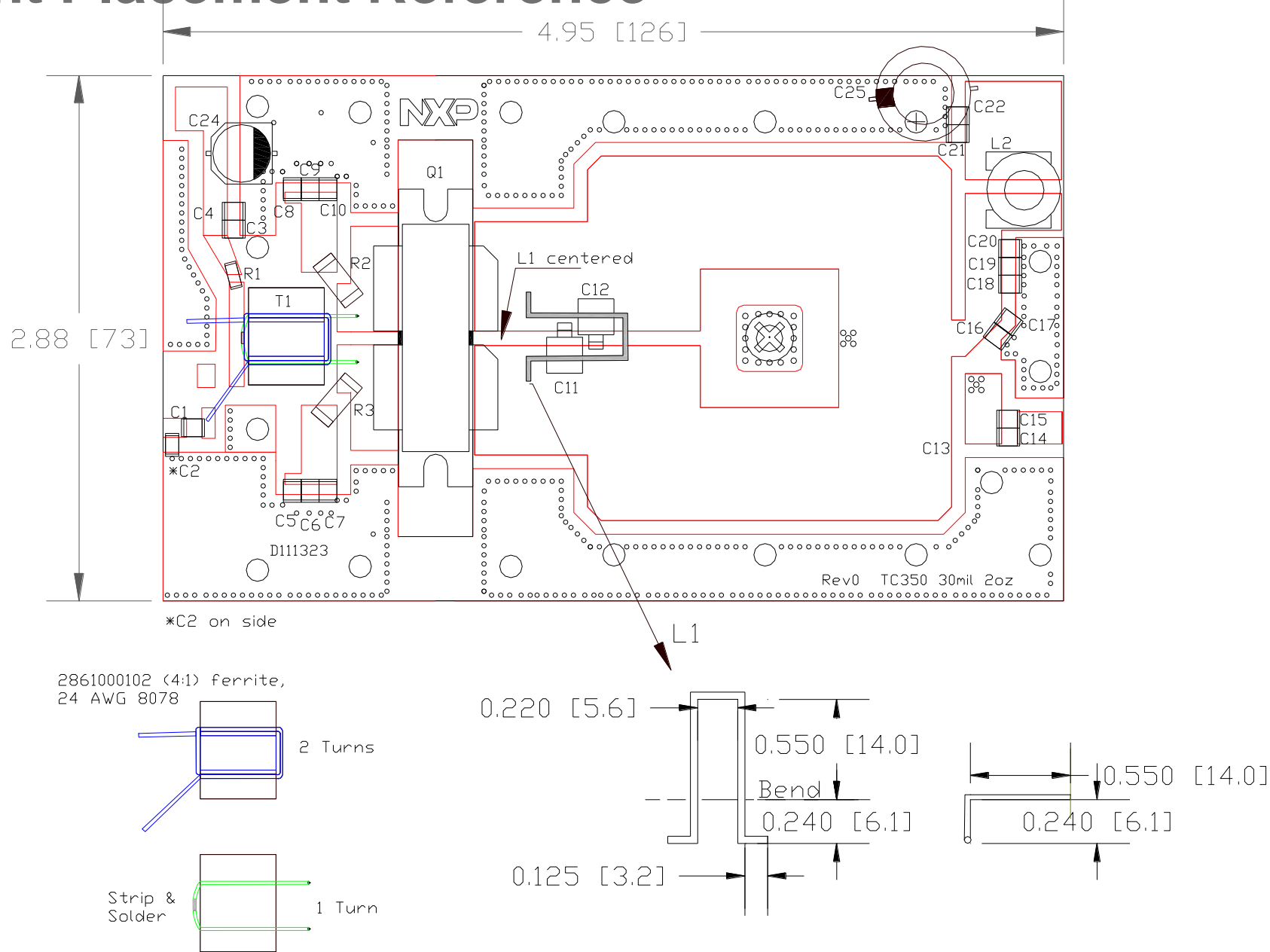


- Aluminum baseplate:



Thermal pad for heat dissipation
on the drain side

Component Placement Reference



Bill of Materials

Designator	Description	Part Number	Manufacturer
C1, C2*	68 pF Chip Capacitor	100B680JT50XT	ATC
C3,C6,C9,C18,C19,C20,C21	1000 pF Chip Capacitor	100B102JT50XT	ATC
C4,C5,C8,C22	10K pF Chip Capacitor	200B103KT50XT	ATC
C7,C10,C14,C15,C16,C17	470 pF Chip Capacitor	100B471JT200XT	ATC
C11	39 pF 300 V Mica	MIN02-002DC390J-F	CDE
C12	91 pF 300 V Mica	MIN02-002EC910J-F	CDE
C13	6.8 pF Chip Capacitor	100B6R8CT500XT	ATC
C24	22 μ F 35 V	UUD1V220MCL1GS	Nichicon
C25	470 μ F 63 V Electrolytic Capacitor	MCGPR63V477M13X26-RH	Multicomp
T1	4/1 Transformer #24 Teflon wire 8078 (see drawing)	2861000102	Fair-Rite
L1	Silver Plated Copper Wire NON TARN 1.5mm 2.05"(49.5 mm)	SP1500NT-001	Scientific Wire Company
L2	22 nH Inductor	1212VS-22NMEB	COILCRAFT
Q1	RF Power LDMOS transistor	MRFX1K80H	NXP
R1	10 Ω 1206	CRCW120610R0JNEA	Vishay Dale
R2,R3	33 Ω 2W 1% 2512	352133RFT	TE CONNECTIVITY
Thermal Pad	TG6050 Series Soft Thermal Conductive Pad	TG6050-150-150-5.0-0	t-Global Technology
Insert	Aluminum C150X288T235D40	C150X288T235D40	Machine Shop
Bedstead	Copper 2.88" x 4.95" A149X345T490BS	A149X345T490BS	Machine Shop
PCB	Rogers TC350 0.030" 2 oz, $\epsilon_r = 3.5$	D111323	MTL

*C2 mount vertically

Revision History

- The following table summarizes revisions to the content of the MRFX1K80H 81.36 MHz Reference Circuit zip file.

Revision	Date	Description
0	September 2019	• Initial Release





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