# MRFX600H 230 MHz
# TEST FIXTURE

ORDERABLE PART NUMBER: **MRFX1K600H-230MHZ**

PUBLIC

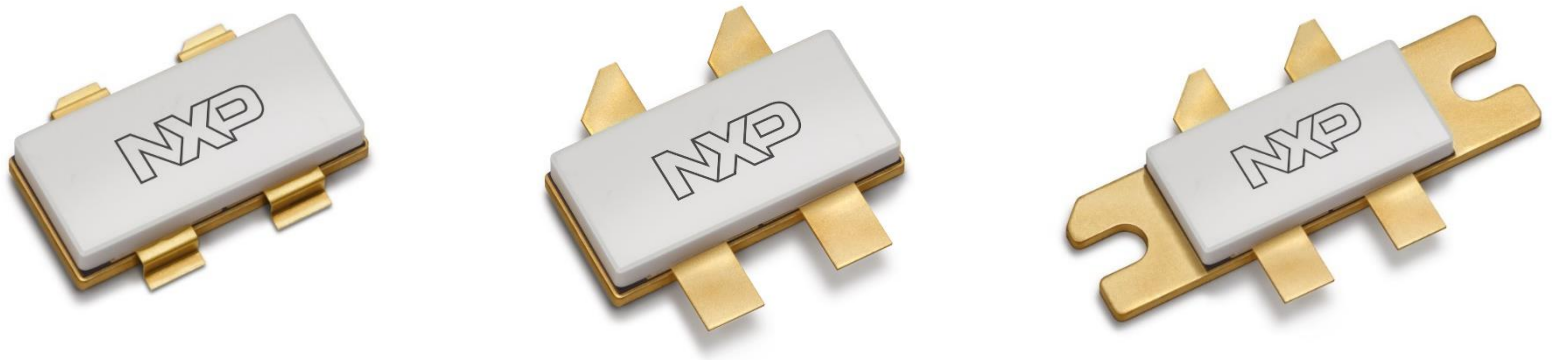
SECURE CONNECTIONS
FOR A SMARTER WORLD

# License

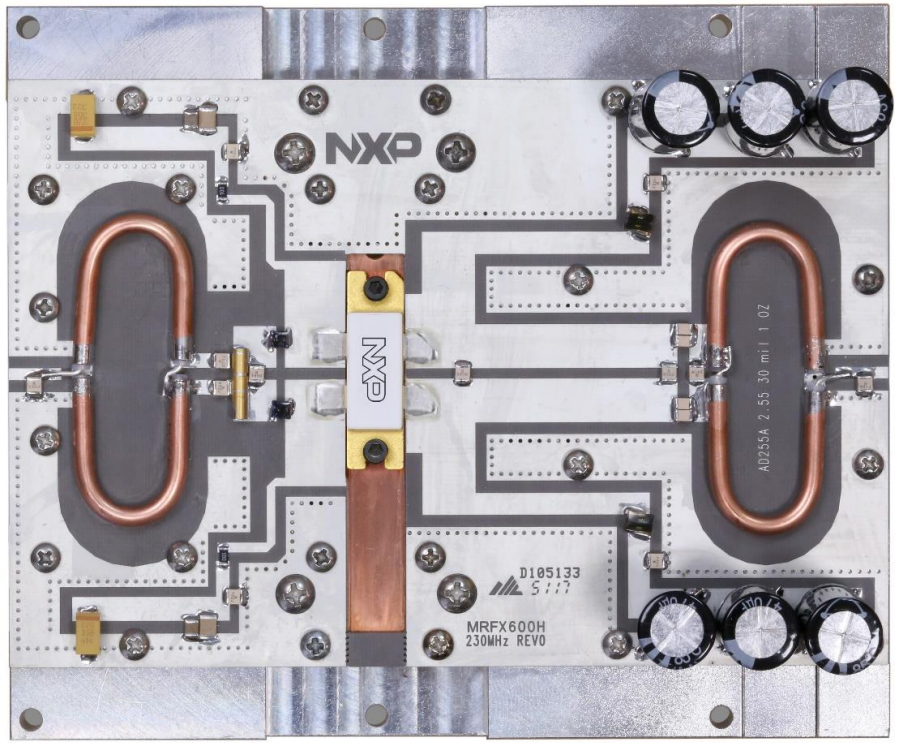
- Open and read the License.pdf included in the same zip file as the document you are currently reading. By using the documentation materials included in this zip file, you indicate that you accept the terms of the agreement.

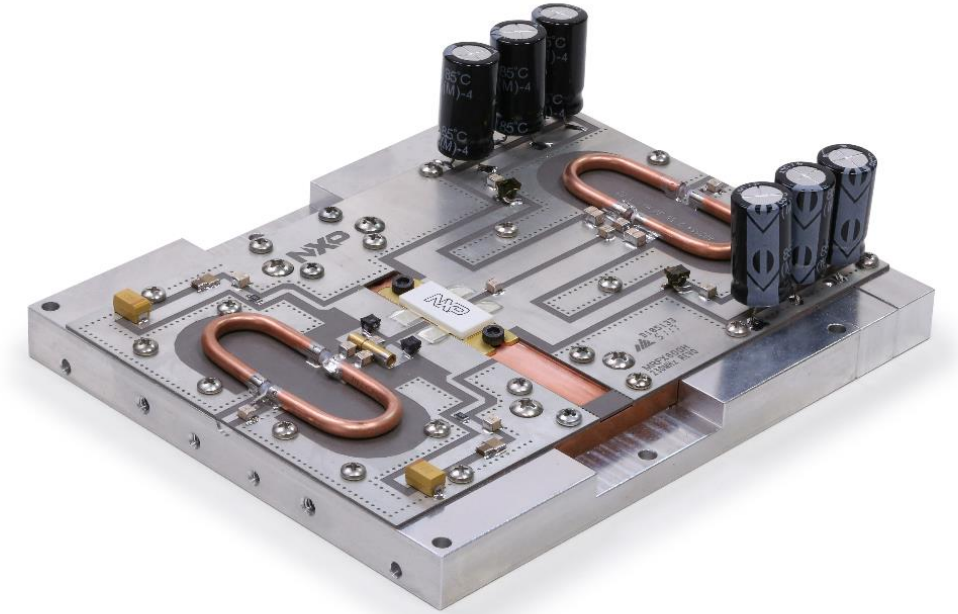
# Introduction

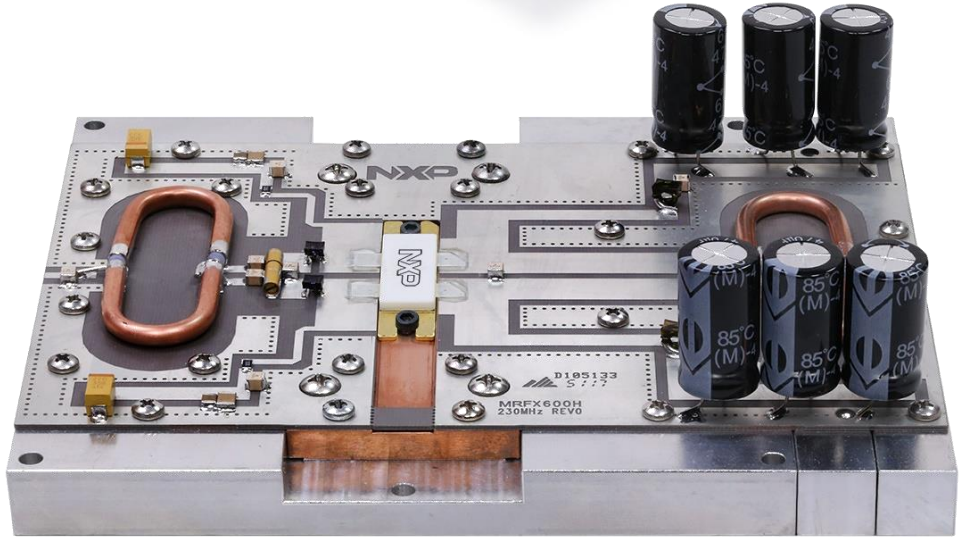
- The NXP MRFX600H is a 1.8-400 MHz, 600 W CW RF power LDMOS transistor housed in an NI-780 air-cavity ceramic package. Its unmatched input and output allows wide frequency range utilization.
  - Further details about the device, including its data sheet, are available here
- The following pages describe the 230 MHz pulse test fixture (evaluation board).
- The test fixture can be ordered through NXP's distribution partners and etailers using part number MRFX600H-230MHZ.



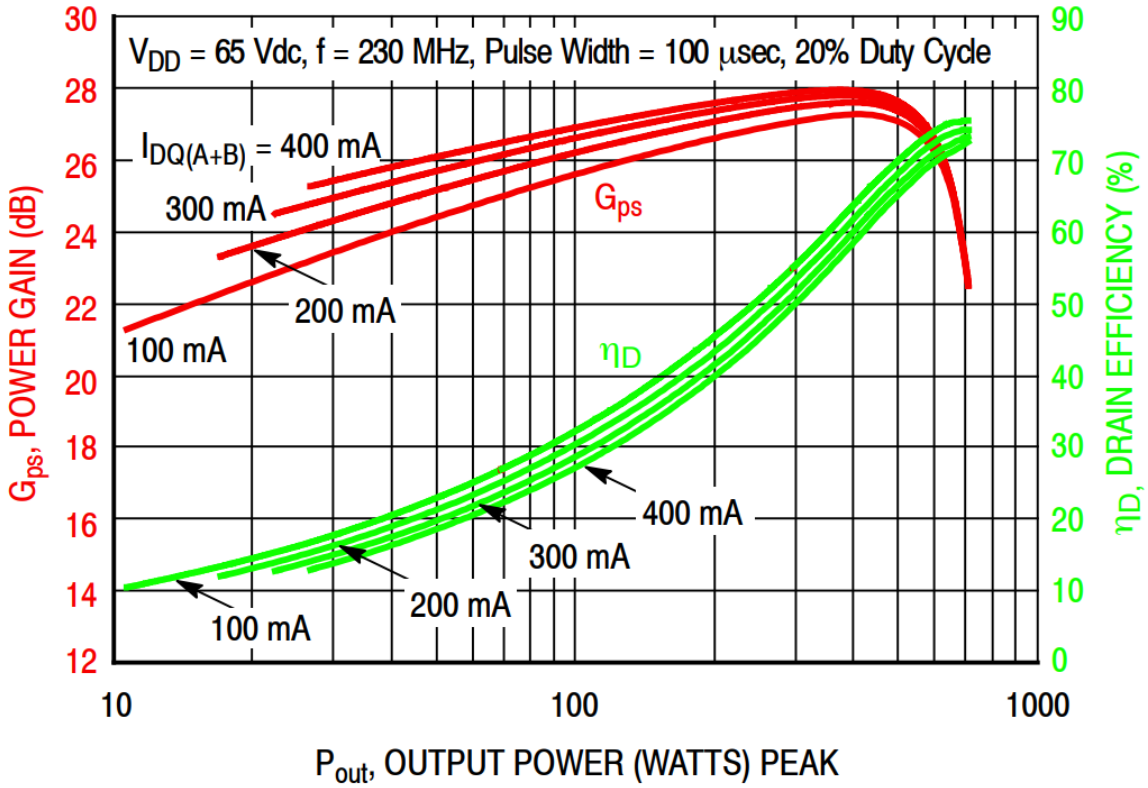
# **Fixture Overview** – 10.16 cm x  15.24 cm (4.0″ x 6.0″)



# Typical Pulse Performance

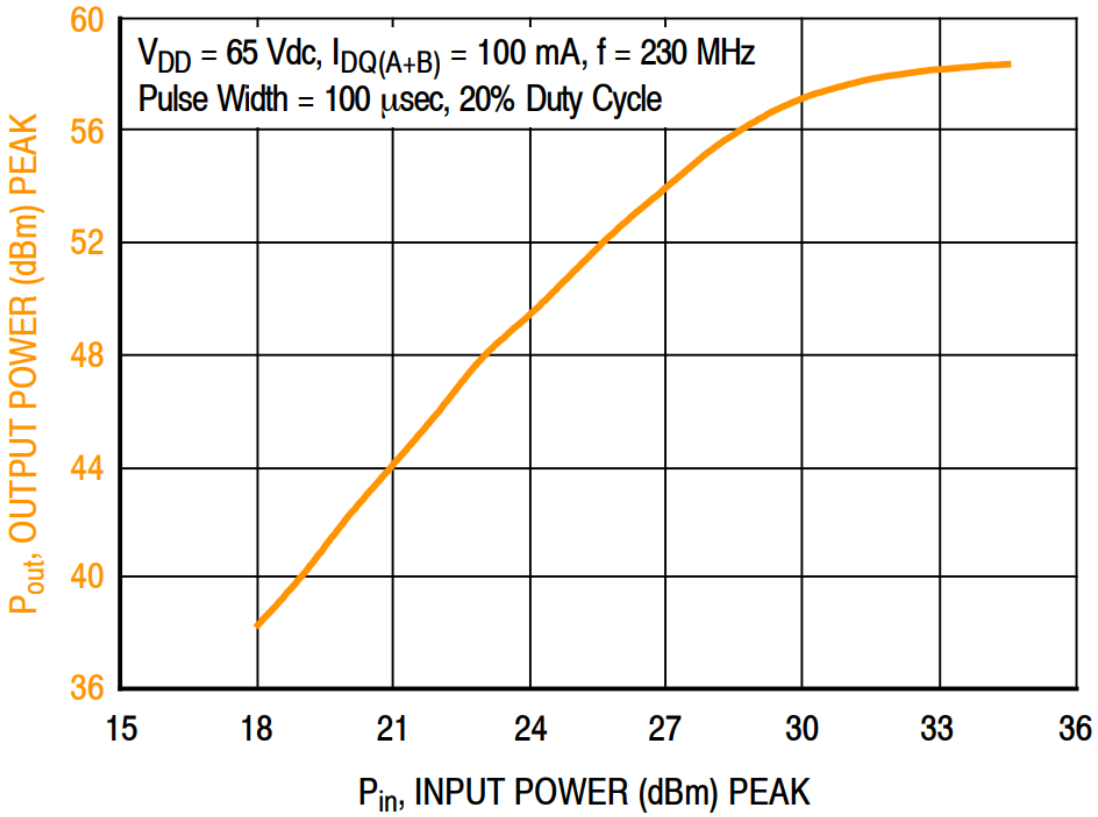


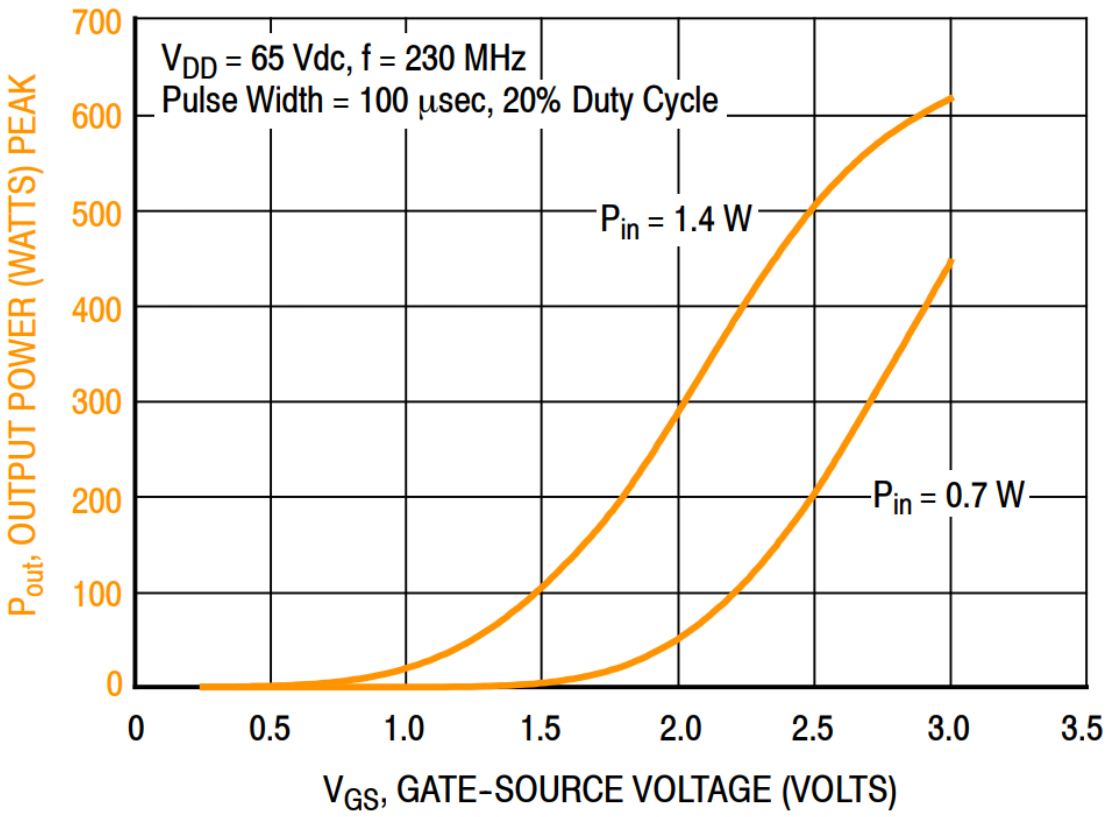

| f (MHz) | P1dB (W) | P3dB (W) |
|---|---|---|
| 230 | 610 | 677 |

Typical Performance (P1dB), $V_{DD}$ = 65 Vdc, $I_{DQ}$ = 100 mA, $P_{in}$ = 1.4 W (31 dBm), Pulse

| Frequency (MHz) | Signal Type | Output Power (W) | Power Gain (dB) | Drain Efficiency (%) |
|---|---|---|---|---|
| 230 | Pulse (100 µsec, 20% Duty Cycle) | 600 Peak | 26.4 | 74.4 |

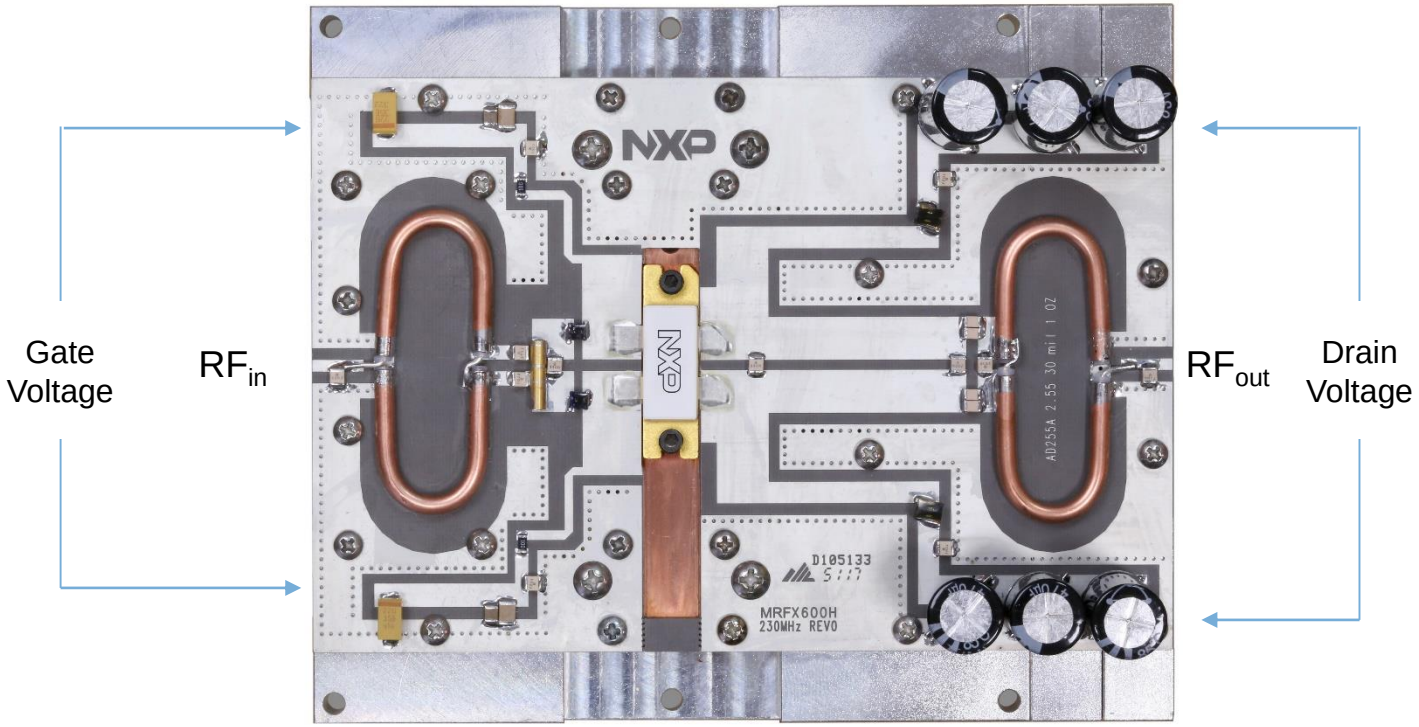
# Typical Pulse Performance – 2/2



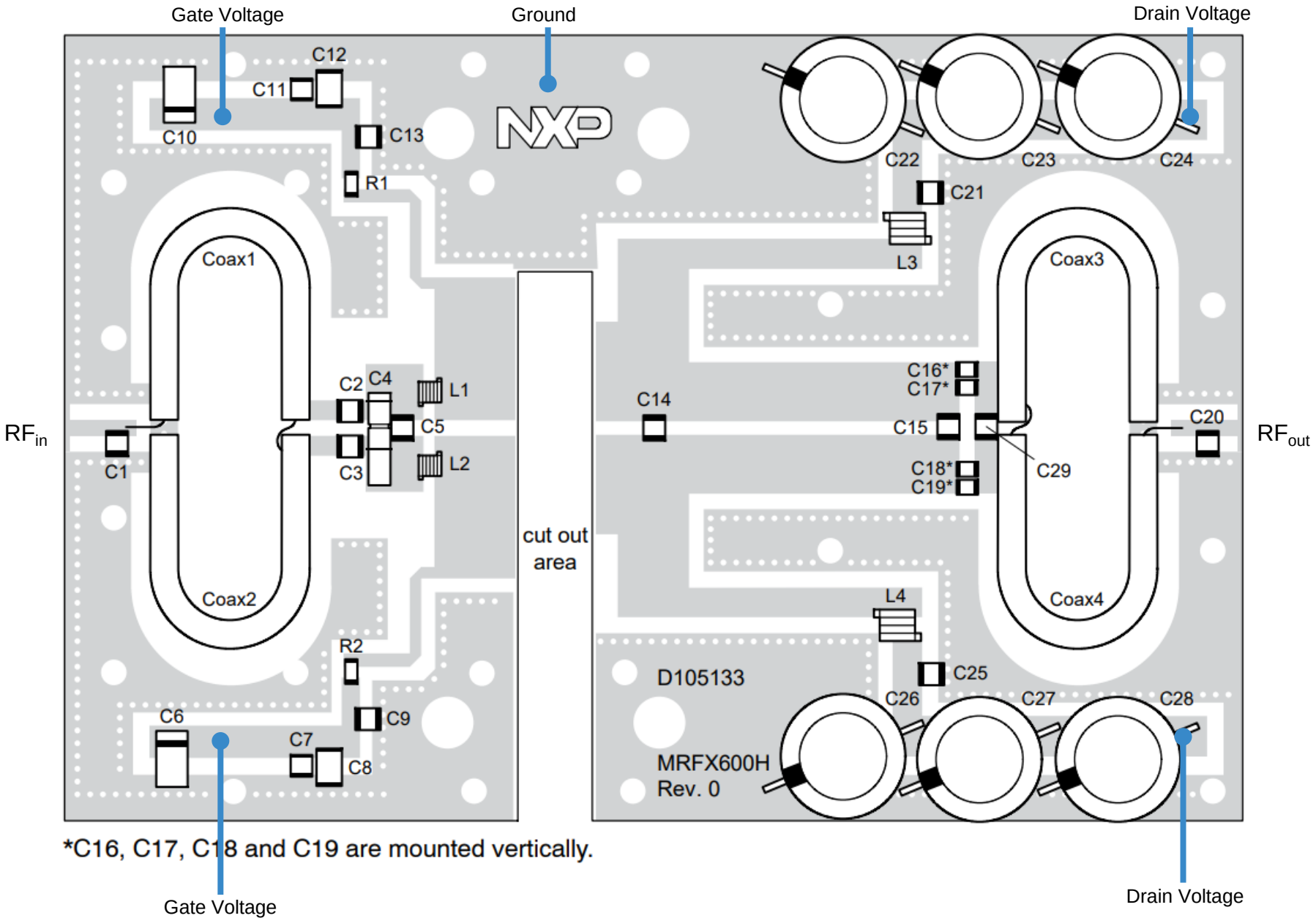



# Quick Start

1. Mount the reference circuit onto a heatsink capable of dissipating more than 60 W in order to provide enough thermal dissipation (the circuit is capable for more but has been measured in pulse conditions).
2. Connect the ground.
3. Terminate the RF output with a 50 ohm load capable of handling more than 600 W peak power.
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 slowly to 65 V. Current should be 0 A.
7. Raise the gate voltage slowly until the drain current reaches the desired level (drain quiescent current $I_{DQ(A+B)}$ = 100 mA typically). The gate voltage should be around 2.9 V.
8. Set the RF input to pulse conditions (typically 100 µs pulse width with 20% duty cycle).
9. Raise the RF input slowly to 1.4 W (31 dBm).
10. Check the RF output power (typically 600 W peak), the drain current (around 12 A peak for this power level) and the temperature of the board.



# Component Placement Reference



# Bill of Materials

| Part | Description | Part Number | Manufacturer |
|---|---|---|---|
| C1 | 13 pF Chip Capacitor | ATC100B130JT500XT | ATC |
| C2, C3 | 27 pF Chip Capacitor | ATC100B270JT500XT | ATC |
| C4 | 0.8–8.0 pF Variable Capacitor | 27291SL | Johanson Components |
| C5 | 33 pF Chip Capacitor | ATC100B330JT500XT | ATC |
| C6, C10 | 22 μF, 35 V Tantalum Capacitor | T491X226K035AT | Kemet |
| C7, C11 | 0.1 μF Chip Capacitor | CDR33BX104AKWS | AVX |
| C8, C12 | 220 nF Chip Capacitor | C1812C224K5RACTU | Kemet |
| C9, C13, C21, C25 | 1000 pF Chip Capacitor | ATC100B102JT50XT | ATC |
| C14, C29 | 39 pF Chip Capacitor | ATC100B390JT500XT | ATC |
| C15 | 43 pF Chip Capacitor | ATC100B430JT500XT | ATC |
| C16, C17, C18, C19 | 240 pF Chip Capacitor | ATC100B241JT200XT | ATC |
| C20 | 9.1 pF Chip Capacitor | ATC100B9R1BT500XT | ATC |
| C22, C23, C24, C26, C27, C28 | 470 μF, 100 V Electrolytic Capacitor | MCGPR100V477M16X32 | Multicomp |
| Coax1, 2, 3, 4 | 25 Ω Semi-rigid Coax, 2.2″ Shield Length | UT-141C-25 | Micro-Coax |
| L1, L2 | 5 nH Inductor | A02TKLC | Coilcraft |
| L3, L4 | 6.6 nH Inductor | GA3093-ALC | Coilcraft |
| R1, R2 | 10 Ω, 1/4 W Chip Resistor | CRCW120610R0JNEA | Vishay |
| PCB | Rogers AD255C, 0.030″, $\varepsilon_r$ = 2.55, 1 oz. Copper | D105133 | MTL |

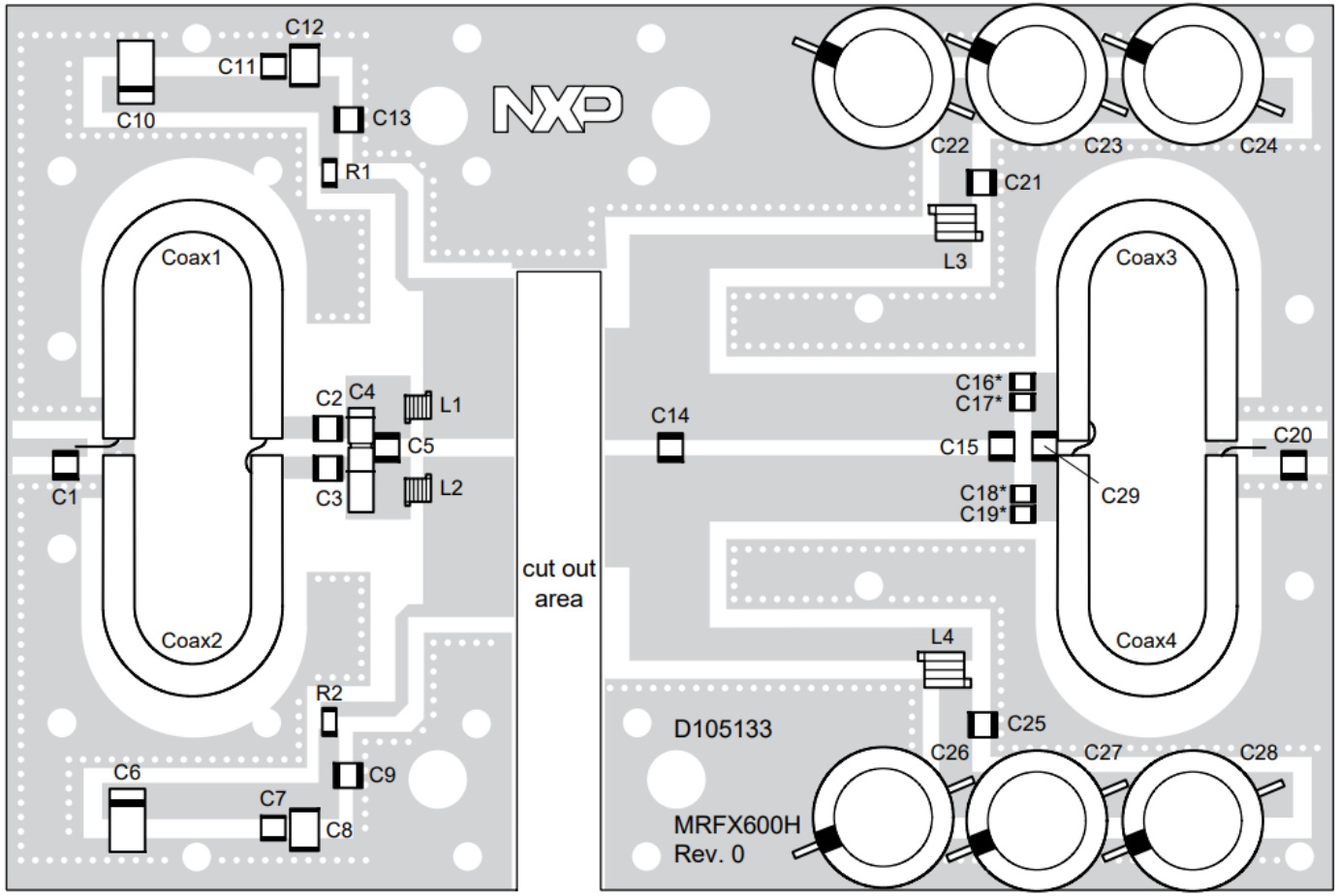
# Tuning Tips

## Input Match:

- Move C1 to the left to increase IRL.
- Adjust C4 value to increase IRL.

## Output Match:

- Move C14 to the left to reduce output power and increase efficiency.
- Move C20 and/or adjust C15 and C29 values for further trade-off between power and efficiency.

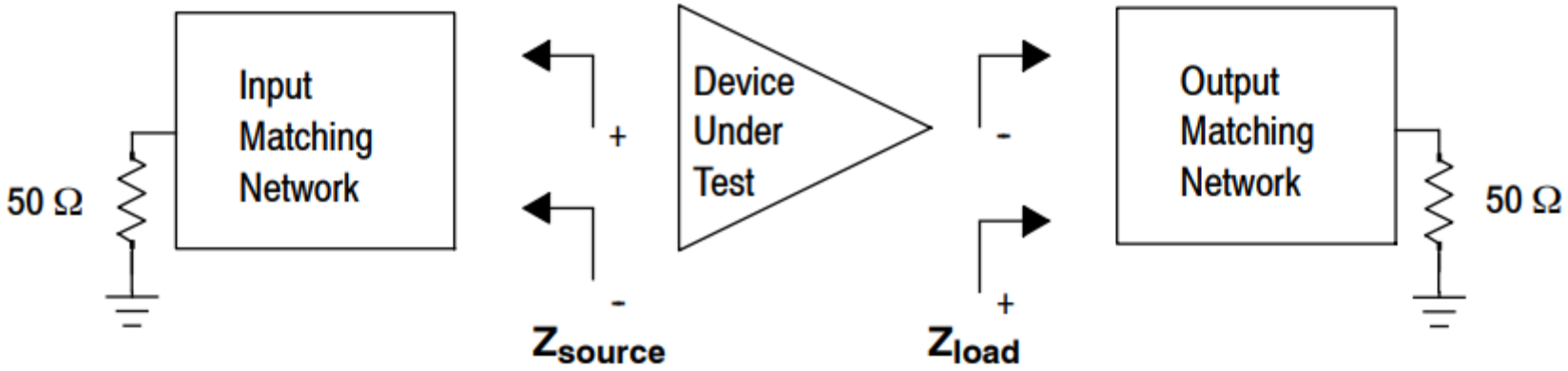


# Impedances

| f<br>MHz | $Z_{source}$<br>Ω | $Z_{load}$<br>Ω |
|---|---|---|
| 230 | 1.5 + j4.9 | 5.0 + j7.1 |

$Z_{source}$ = Test fixture impedance as measured from gate to gate, balanced configuration.

$Z_{load}$ = Test fixture impedance as measured from drain to drain, balanced configuration.



# Revision History

- The following table summarizes revisions to the content of the MRFX600H 230 MHz Reference Circuit zip file.

| Revision | Date | Description |
|---|---|---|
| 0 | September 2019 | • Initial Release |

SECURE CONNECTIONS
FOR A SMARTER WORLD