Quick Start Guide

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TDINV3000W050_0v1
For evaluation purposes only

Design files and more at
transphormusa.com/pv30kit

TDINV3000W050_0v1

Evaluation Platform

3.0 kW inverter

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Highest Performance, Highest Reliability GaN

qs006.0

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Equipment Needed

➡ The TDINV3000W050_0v1 board

➡ Texas Instruments F28035 control card (included)

➡ Low-voltage DC power supply for auxiliary voltage
  - 12V power supply (included)

➡ High-voltage DC power supply
  - 400V maximum
  - 3.0 kW capable

➡ Resistor load for $240V_{AC}$/3.0 kW
  - Must be isolated from high-voltage DC power supply

➡ Firmware for programming and advanced configuration (included)

Cautions and Warnings

This evaluation board is intended to demonstrate GaN FET technology and is for demonstration purposes only and no guarantees are made for standards compliance.

There are areas of this evaluation board that have exposed access to hazardous high voltage levels. Exercise caution to avoid contact with those voltages. Also note that the evaluation board may retain high voltage temporarily after input power has been removed. Exercise caution when handling.

When testing converters on an evaluation board, ensure adequate cooling. Apply cooling air with a fan blowing across the converter or across a heatsink attached to the converter. Monitor the converter temperature to ensure it does not exceed the maximum rated per the datasheet specification.

Typical Waveforms with Stock Firmware
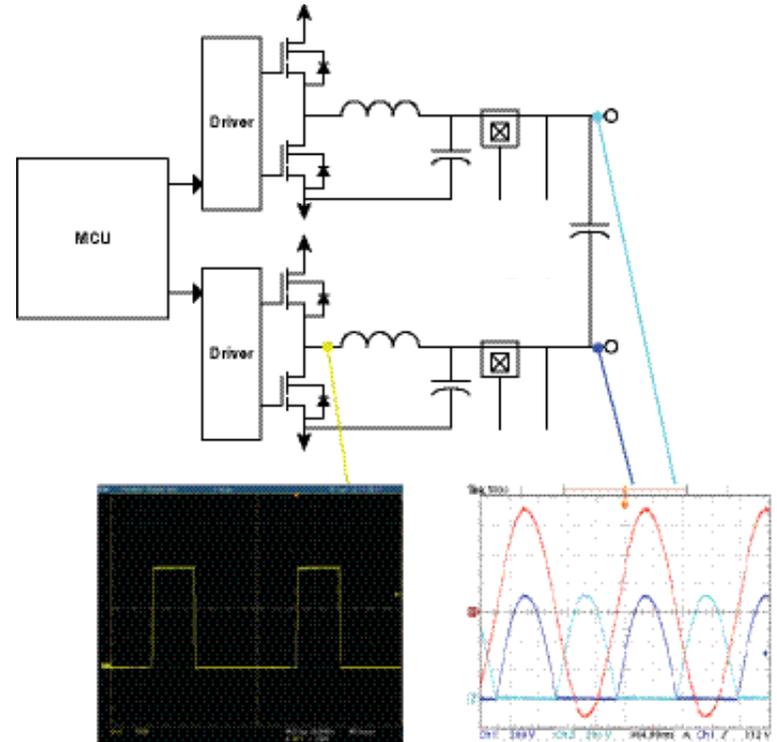
Typical Performance Curves
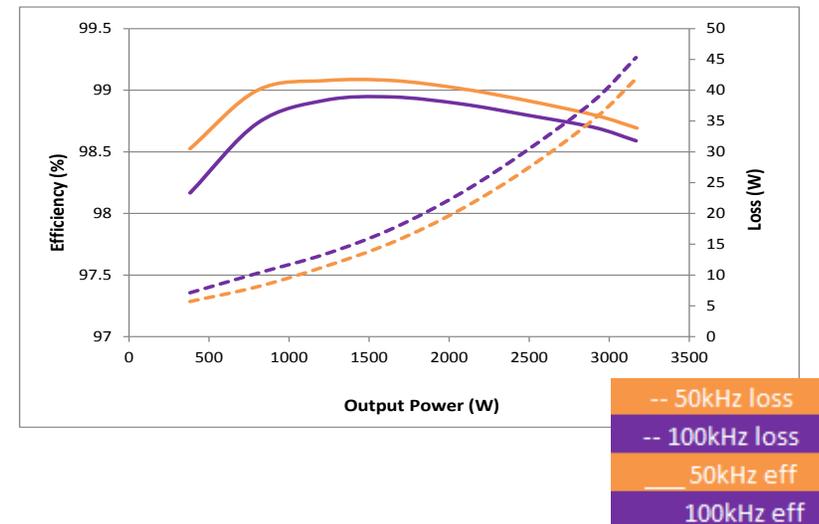
Circuit Diagram
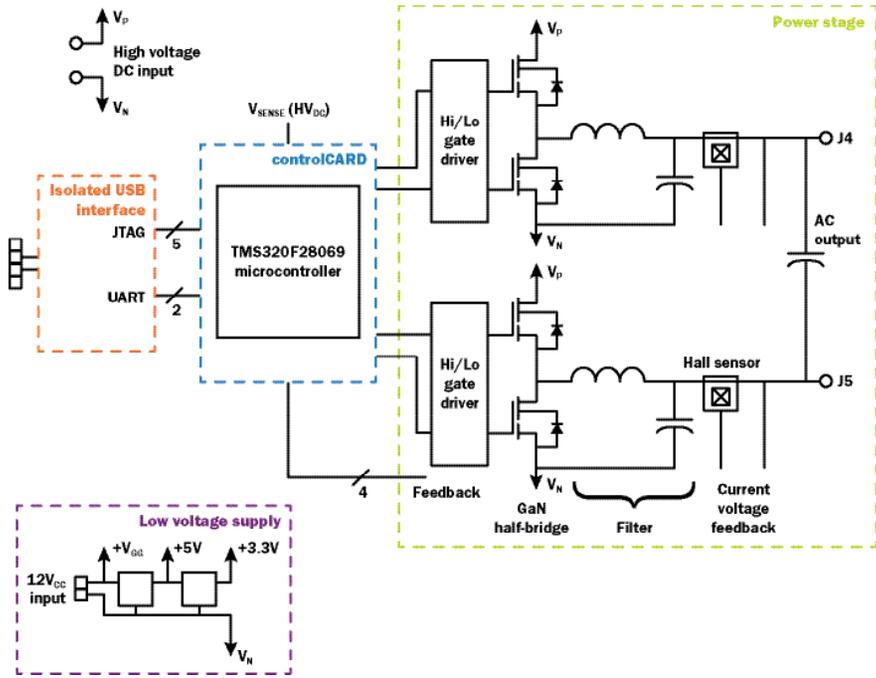
Driver Circuit

Step 1: Connect the Board

#3 Connect high-voltage DC power supply (400V max)

#4 Connect high-voltage AC load

#1 Insert F28035 control card

#2 Connect 12 adapter
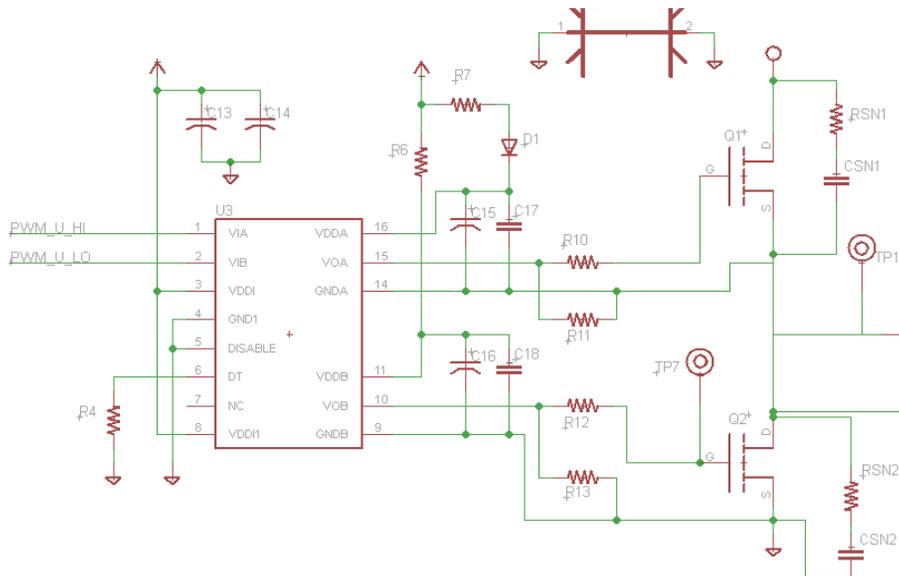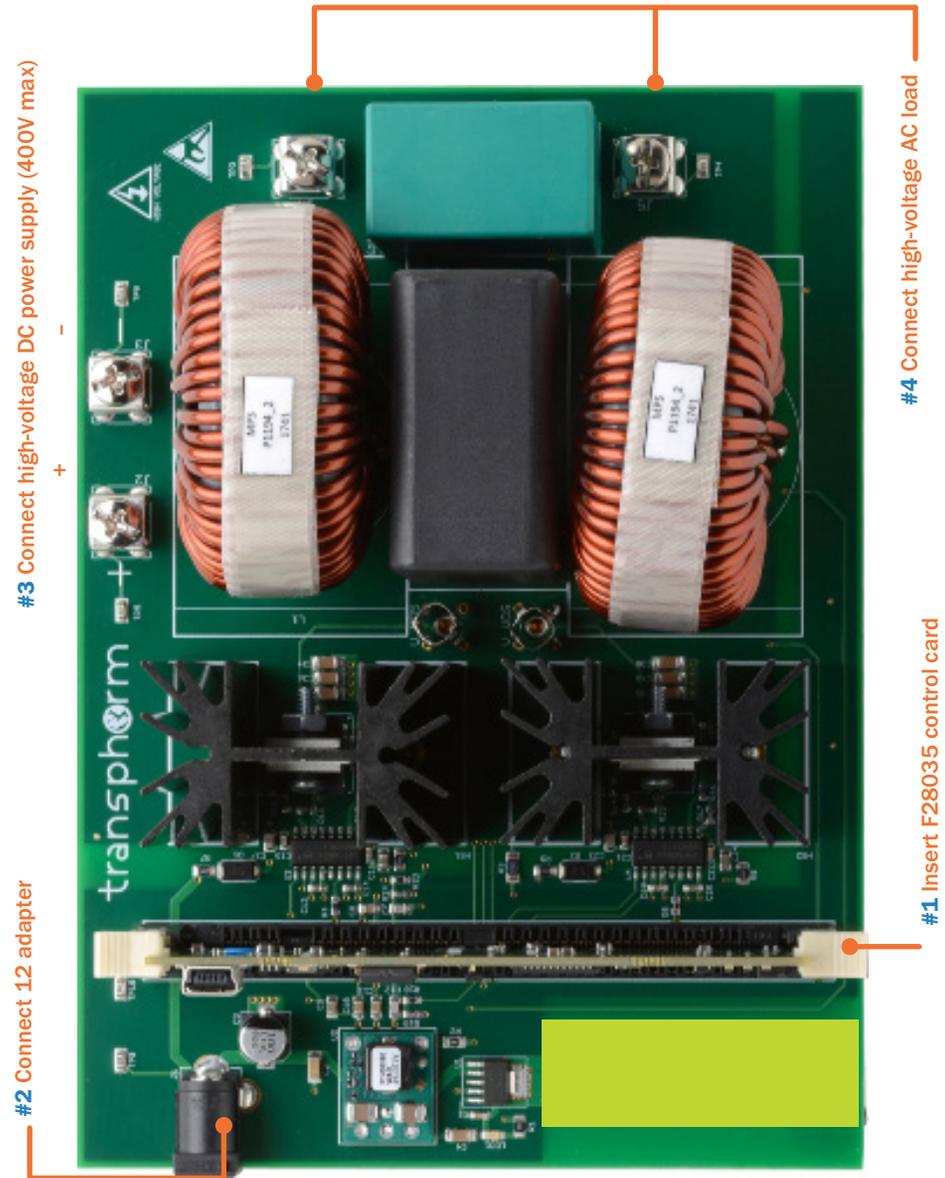
Note:
DO NOT apply too much force to the J2, J3, J4 and J5 connectors, as excessive force may bend and/or crack the PCB.

Step 2: Power-up the Board

➡ Insert the control card
- LED1 ON indicates DSP power is on
- LED2 ON indicates the DSP is running
- LED2 + LED3 BLINKING indicates the DSP has stopped running due to fault protection (over voltage or current) - the board will need to be power cycled to reset the protections

➡ Connect high-voltage power supply to the +/- inputs (J2 and J3)

➡ Set output (J4 and J5) load to handle ~50W

➡ Insert V_{CC} (12V) plug to J1
- LED1 should illuminate, indicating power is applied to the 5V and 3.3V regulators

➡ Turn on high-voltage power supply
- The high-voltage supply may be switched on or raised gradually
- Gradually increase the input voltage to desired value while monitoring output voltage/waveform

Step 3: Power-down the Board

➡ Switch off the high-voltage DC supply

➡ Power off the 12V aux supply

> **Note:**
> Normal operation is $350V_{DC}$ (in) and $230V_{AC}$ (out) for 3.0 kW power at 50kHz or 100kHz. Monitor the output voltage waveforms—see Typical Waveforms with Stock Firmware on page 6.

Transphorm GaN FET

TP65H050WS
TO-247
(top view)

Key Specifications

V_{DSS} (V)	650
$V_{(TR)DSS}$ (V)	800
$R_{DS(on)eff}$ (mΩ) max*	60
Q_{RR} (nC) typ	125
Q_G (nC) typ	16

Description

The TP65H050WS 650V, 50mΩ Gallium Nitride (GaN) FET is a normally-off device. It combines state-of-the-art high voltage GaN HEMT and low voltage silicon MOSFET technologies—offering superior reliability and performance.

Transphorm GaN offers improved efficiency over silicon, through lower gate charge, lower crossover loss, and smaller reverse recovery charge.

Features

- JEDEC qualified GaN technology
- Dynamic $R_{DS(on)eff}$ production tested
- Robust design, defined by
  - Intrinsic lifetime tests
  - Wide gate safety margin
  - Transient over-voltage capability
- Very low Q_{RR}
- Reduced crossover loss
- RoHS compliant and Halogen-free packaging

TP65H050WS Datasheet available at Transphormusa.com