

Quick Start Guide

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TDTP2500B066B

For evaluation purposes only

Design files and more at
[https://www.transphormusa.com/en/evaluation-kit/
TDTP2500B066B-kit/](https://www.transphormusa.com/en/evaluation-kit/TDTP2500B066B-kit/)

TDTP2500B066B

Evaluation Platform
2.5kW bridgeless totem-pole PFC

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Highest Performance, Highest Reliability GaN

Equipment Needed

- ➔ The TDTP2500B066B main board
- ➔ The TDHB-65H050G4BS-DC daughtercard
- ➔ The sync-rect daughtercard
- ➔ Microchip DSPIC33CK256MP506 (MA330048)
- ➔ High-voltage AC power supply for input
- ➔ 12V_{DC} auxiliary power adapter (included)
- ➔ Electronic/resistive load
 - Power range: 350W to 1250W (lowline), 350W to 2500W (highline)

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.

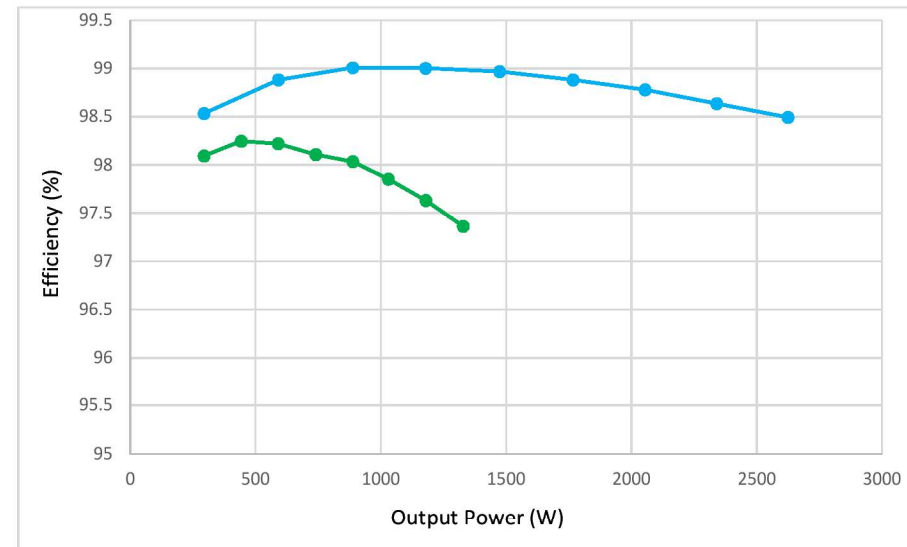
There are areas of this evaluation board that have exposed access to hazardous high voltage levels. Exercise caution to avoid contact with those voltages. Also note that the evaluation board may retain high voltage temporarily after input power has been removed. Exercise caution when handling.

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.

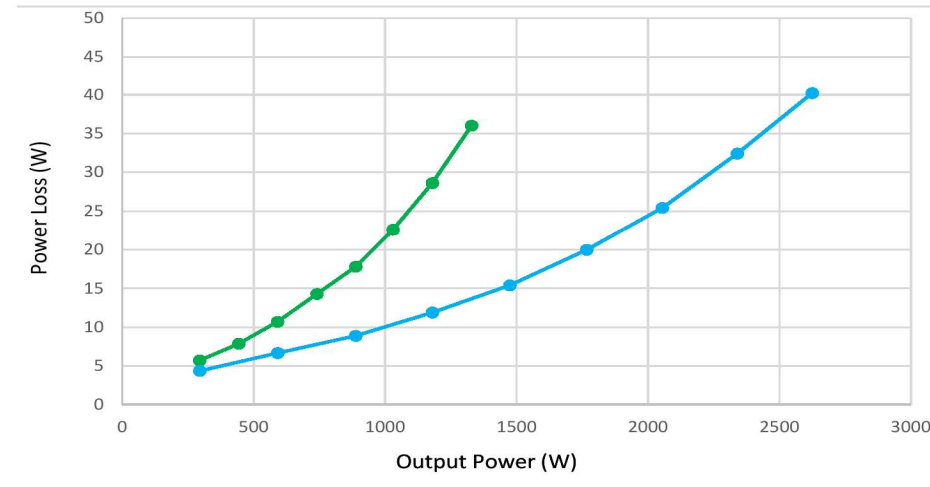
See page 5 for operating guidelines.

Typical Performance Curves

Efficiency vs Output Power



Loss vs Output Power



HIGHLINE
LOWLINE

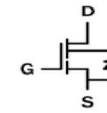
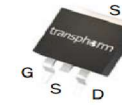
Step 2: Power-up the Board

- ➔ Insert TDHB-65H050G5BS daughter card and sync-rect daughtercards into module slots.
- ➔ Insert the MicroChip Plug-In-Module (PIM) to the Conn1 slot.
- ➔ Connect an electronic/resistive load to the corresponding marking (CN2). The requirements for the resistive load are:
 - At 115V_{AC} input: 350W and ≤1250W
 - At 230V_{AC} input: 350W and ≤2500W
- ➔ Connect the 12V_{DC} auxiliary supply (included) to the evaluation board
- ➔ With high-voltage power off, connect the high-voltage AC power input to the corresponding marking (CN1) on the PCB; N and L (PE: potential ground)
- ➔ Turn on the AC power input (85V_{AC} to 265V_{AC}, 50Hz to 60Hz); minimum power load for turn-on sequence is 350W
- ➔ Monitor CN2 output voltage with V_{DC} meter to verify that 385V ±5V is generated
- ➔ Load can be increased when AC supply is on and board is functional

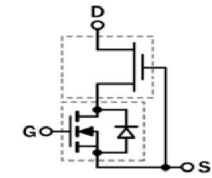


Part Number	Package	Package Configuration
TP65H050G4BS	TO-263	Source Tab

TP65H050G4BS
TO-263
(top view)



Cascode Schematic Symbol

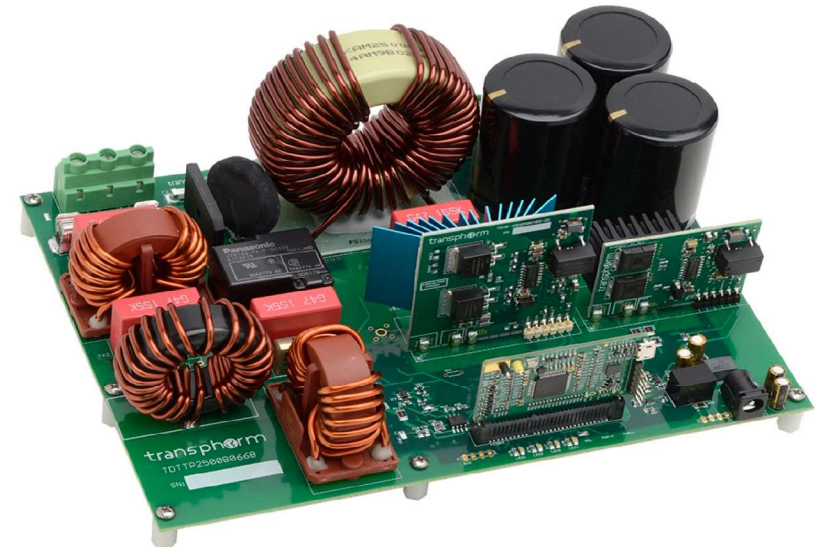


Cascode Device Structure

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

Step 3: Power-down the Board

- ➔ Switch off the high-voltage AC power input.
- ➔ Power off the Auxiliary Supply
- ➔ Verify Input and Output voltage = 0.



Note:

See page 5 for important operating guidelines

Important Operating Guidelines

The TDTP2500B066B is for evaluation purposes only and is not intended to be a finished product and does not include all protection features found in commercial power supplies. Additional warnings to keep in mind:

- ➔ An isolated AC source should be used as input. An isolated lab bench-grade power supply or the included AUX DC supply should also be used for the 12V DC power supply. Float the oscilloscope by using an isolated oscilloscope or by disabling the PE (Protective Earth) pin in the power plug. Float the current probe power supply (if any) by disabling the PE pin in the power plug.
- ➔ Use a resistive load only. The totem-pole PFC kit can work at zero load with burst mode and the output voltage will be swinging between 375V and 385V during burst mode.
- ➔ The evaluation board is not fully-tested at large load steps. **DO NOT** apply a very large step in the load (>1000W) when it is running.
- ➔ **DO NOT** manually probe the waveforms when the board is running. Set up probing before powering up the demo board.
- ➔ The auxiliary V_{DC} supply must be 12V. The evaluation board will not work under 10V or over 15V V_{DC} , for example.
- ➔ **DO NOT** touch any part of the evaluation board when it is running.
- ➔ When plugging the control cards into the socket, make sure the control cards are fully pushed down with a clicking sound.
- ➔ If the evaluation circuit goes into protection mode it will work as a diode bridge by shutting down all PWM functions. Recycle the bias power supply to reset the DSP and exit protection mode.
- ➔ **DO NOT** use a passive probe to measure control circuit signals and power circuit signals at the same time. GND1 and AGND are not the same ground.
- ➔ To get clean V_{GS} of the low side GaN FET, it is not recommended to measure the V_{DS} at the same time.
- ➔ It is not recommended to use a passive voltage probe for V_{DS} and V_{GS} measurements while simultaneously using a differential voltage probe for V_{IN} measurements, unless the differential probe has very good dv/dt immunity.

Step 1: Connect the Board

