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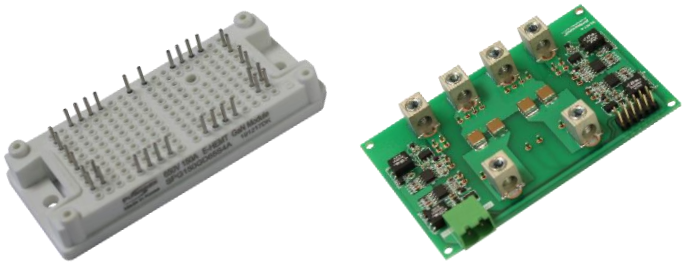
81726 Munich, Germany
www.infineon.com

GS-EVx-FB-650V150A-SP1x

GS-EVM-FB-650V150A-SP1
GS-EVB-FB-650V150A-SP1A

650V 150A Full-Bridge Power Module with External Gate Driver Board

Technical Manual



SEMIPOWEREX®

Visit www.gansystems.com for the latest version of this technical manual.

WARNING:
PCB surface can become hot. Contact may cause burns. Do not touch!

CAUTION!
This product contains parts that are susceptible to damage by electrostatic discharge (ESD). Always follow ESD prevention procedures when handling the product.

Please refer to the Evaluation Board/Kit Important Notice on page 13

Overview

GS-EVM-FB-650V150A-SP1 is 650V 150A full-bridge Power Module. This 650V 150A GaN E-mode full-bridge Power Module provides ultra-low E_{SW} (switching losses), ultra-small system form factor, and low $R_{DS(on)}$. The module is designed for high-efficiency high switching frequency applications such as PV inverters, energy storage systems, UPS, VFD and other general-purpose use. GS-EVB-FB-650V150A-SP1A is the external gate driver board for the 650V 150A Full-Bridge Module GS-EVM-FB-650V150A-SP1. They are created in partnership with SemiPowerEx and intended for testing and evaluation purposes only.

Features

➢ *GS-EVM-FB-650V150A-SP1*

- Includes 4 GS-065-150-1-D (650V 150A E-mode Die)
- Ultra low 0.2 ^{0}C/W $R_{Q\_JUNC\_PLATE}$
- Low $R_{DS(on)}$ and low switching losses (E_{SW})
- Industry-standard case with Press-Fit Pins

➢ *GS-EVB-FB-650V150A-SP1A*

- Optimized gate drive
- Easy -3V to 6V Input
- Ultra-high dV/dt ruggedness 200V/ns

Applications

- PV Inverters
- Energy storage systems
- UPS
- VFD
- EV Chargers

Contents

The GS-EVx-FB-650V150A-SP1x includes the following hardware.

Table 1 GS-EVx-FB-650V150A-SP1x Evaluation Kit Contents

Quantity	Description
1	GS-EVM-FB-650V150A-SP1 650V 150A Full-Bridge Module
2	GS-EVB-FB-650V150A-SP1A 650V 150A Full-Bridge Module Driver Board

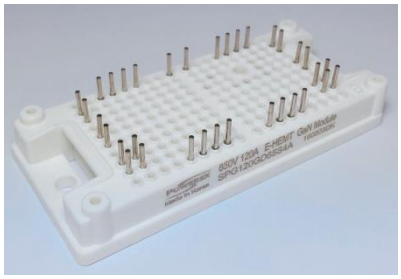


Figure 1 650V 150A GaN Power Module

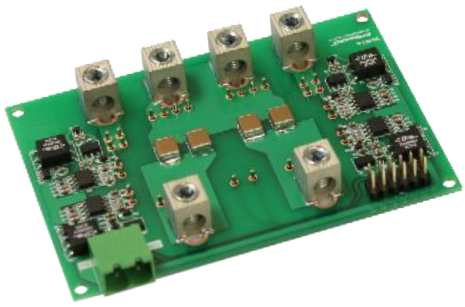


Figure 2 External Gate Driver Board

Technical Specifications

Block Diagram of Power Module

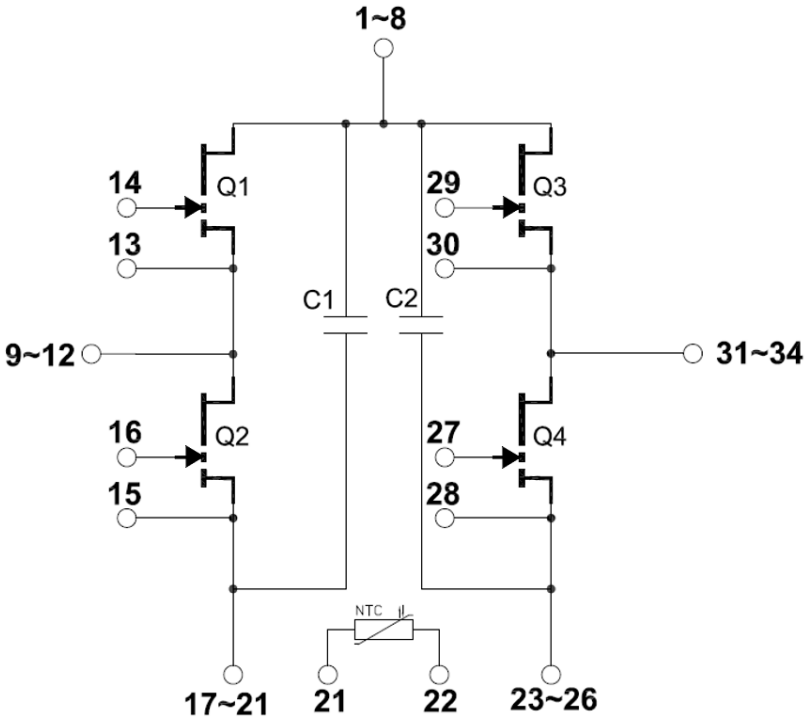


Figure 3 650V 150A GaN Power Module Block Diagram

Electrical Characteristics

(T_J=25°C, and V_{GS} = 6V, unless otherwise noted)

Symbol	Parameter	Conditions	Values	Units
V_{DSS}	Drain-Source Blocking Voltage	V_{GS}=0V, I_{DSS}=250mA	650	V
V_{GSS}	Gate-Source Voltage, continuous		-10 ~ 7	V
I_{DSS}	Drain-Source Leakage Current	V_{GS}=0V, V_{DS}=650V	3 (~100)	uA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=6V	0.25 (~1.0)	mA
I_{DS} *	Continuous Drain Current	T_C=25° C	188	A
		T_C=71° C	150	A
$V_{GS(th)}$	Gate-Source Threshold Voltage	V_{DS}=V_{GS}, I_D=21mA	1.2 (0.8~2.5)	V
$R_{DS(ON)}$	Drain-Source ON Resistance	V_{GS}=6V, T_j=25° C, I_{DS}=120A	10 (~17)	mΩ
		V_{GS}=6V, T_j=150° C, I_{DS}=120A	20	mΩ
$T_{j(op)}$	Operating Junction Temperature (Chip)		-55 ~ 150	° C
T_{stg}	Storage Temperature (Module)		-40 ~ 125	° C
V_{ISO}	Isolation Voltage	RMS, f=50Hz, t=1 minutes	2,500	V
Rth(j-c)	Thermal Resistance		0.14	°C/W
Weight	Module		35.4	g

Driver Board Pin Description

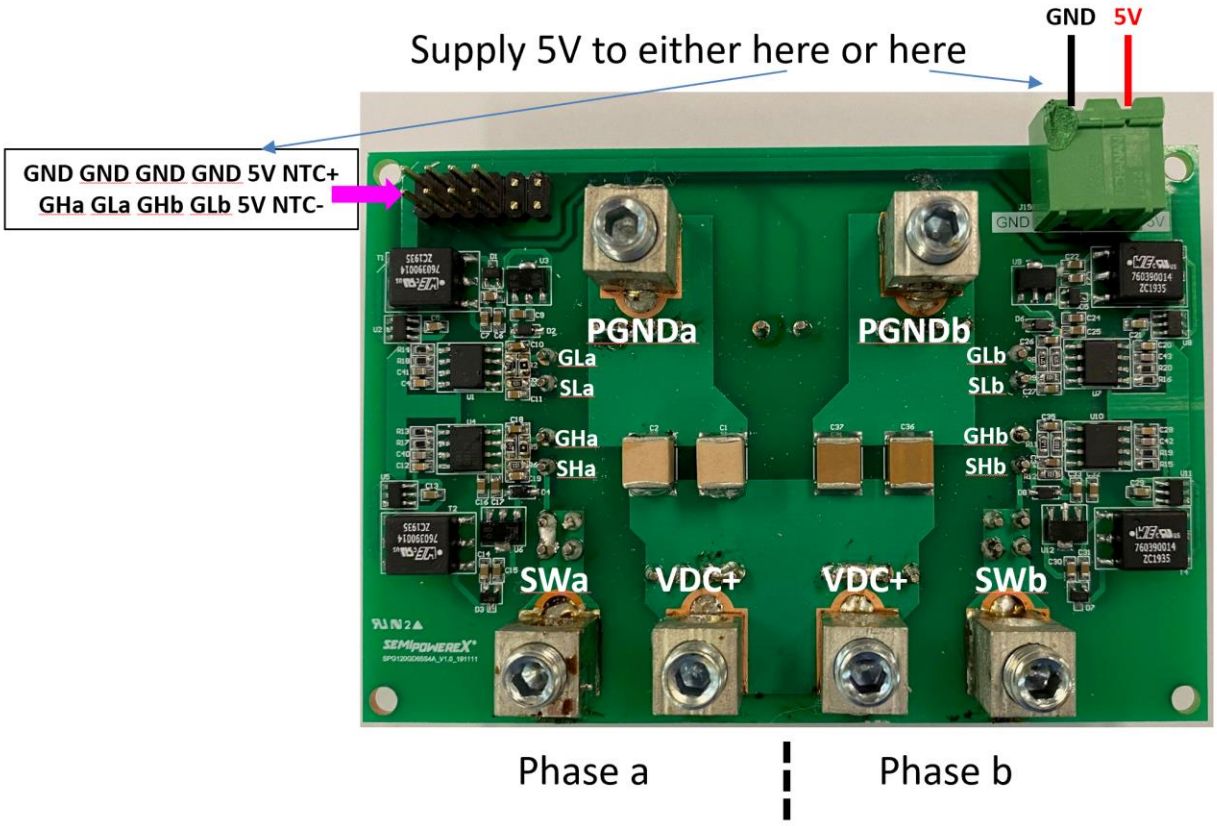


Figure 4 Driver Board Pin Desciption

Driver Board Schematics

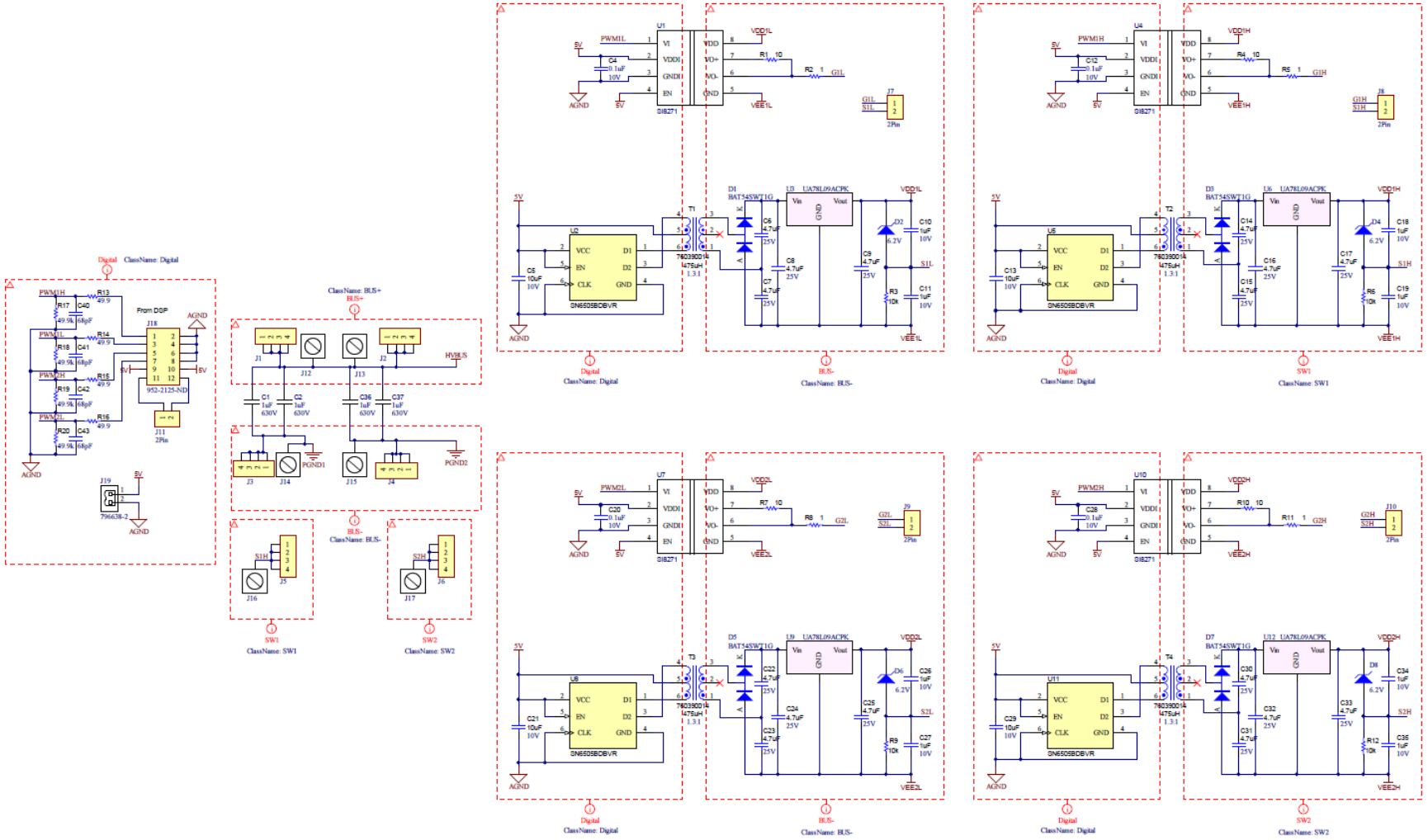


Figure 5 Driver Board Schematics

Driver Board PCB Prints

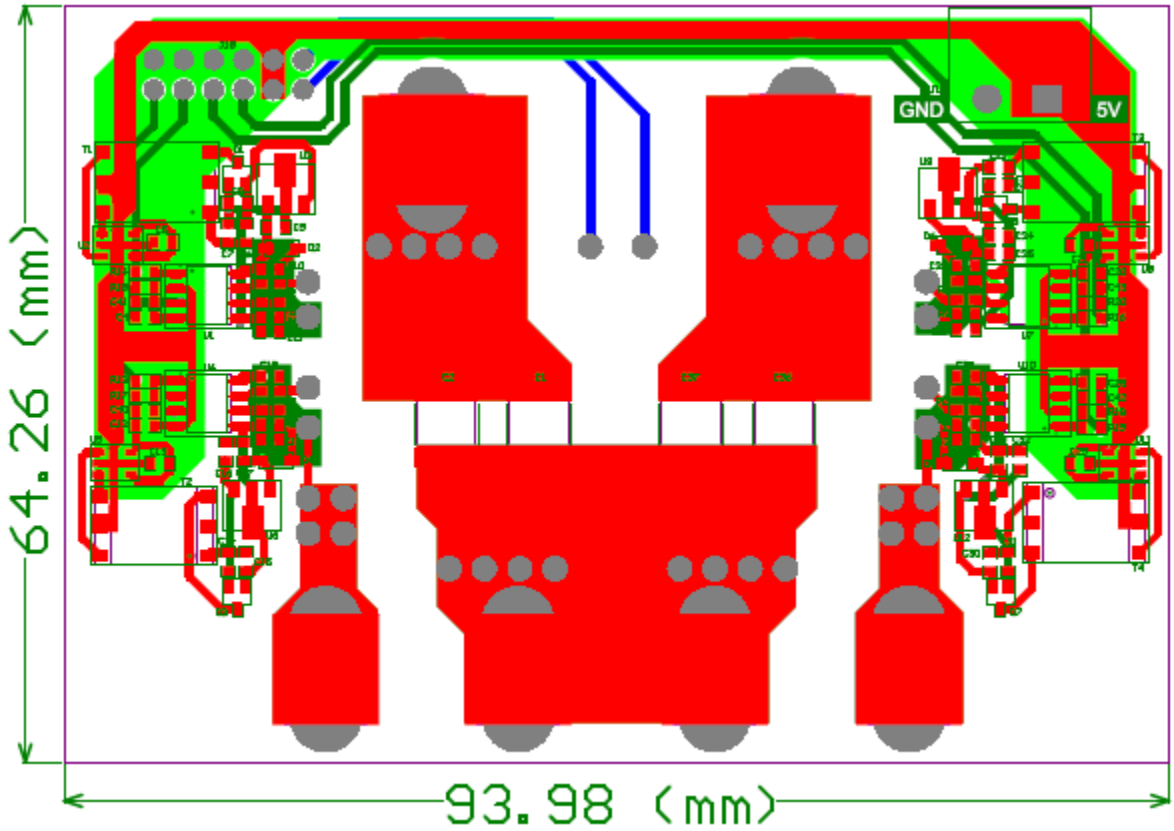


Figure 6 Driver Board PCB Prints

Test Results

Double Pulse Test (GS-EVx-FB-650V150A-SP1x)

- Test Condition: V_{DS} = 400V, I_D = 150A, $R_{g\text{-}ON}$ = 20Ω, $R_{g\text{-}OFF}$ = 5Ω

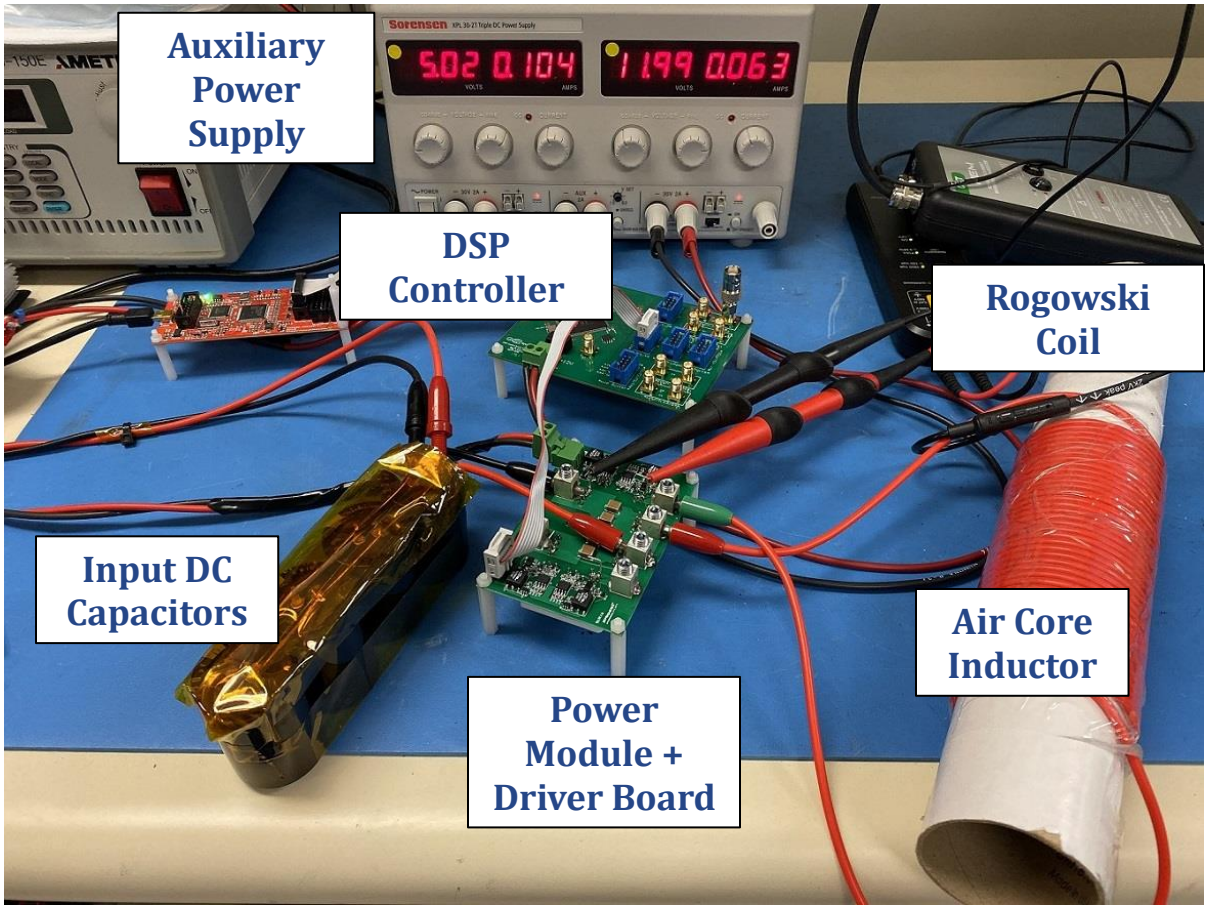


Figure 7 Double pulse test setup

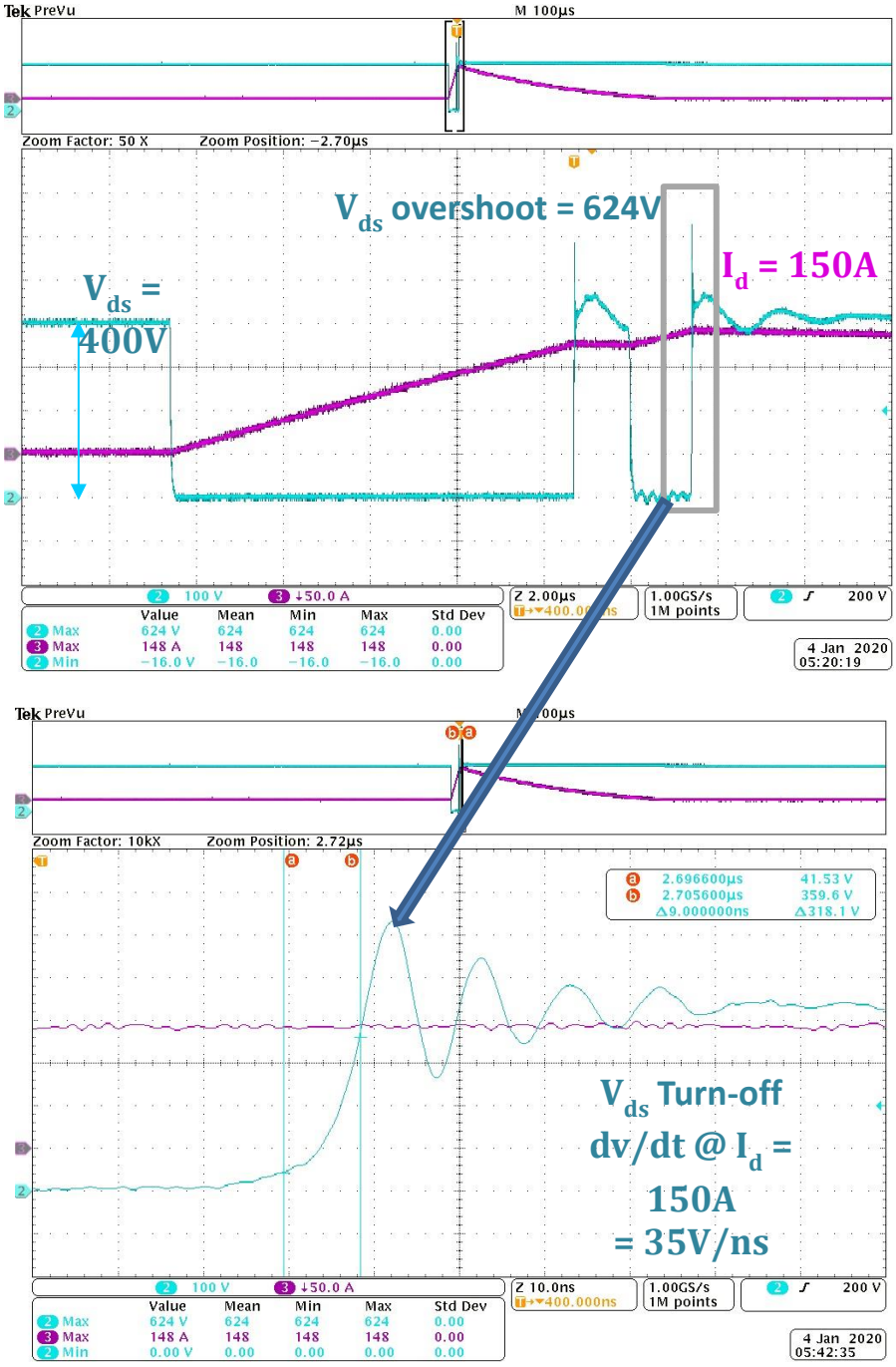


Figure 8 Double pulse test Switching OFF waveforms

Please refer to the Evaluation Board/Kit Important Notice on page 13

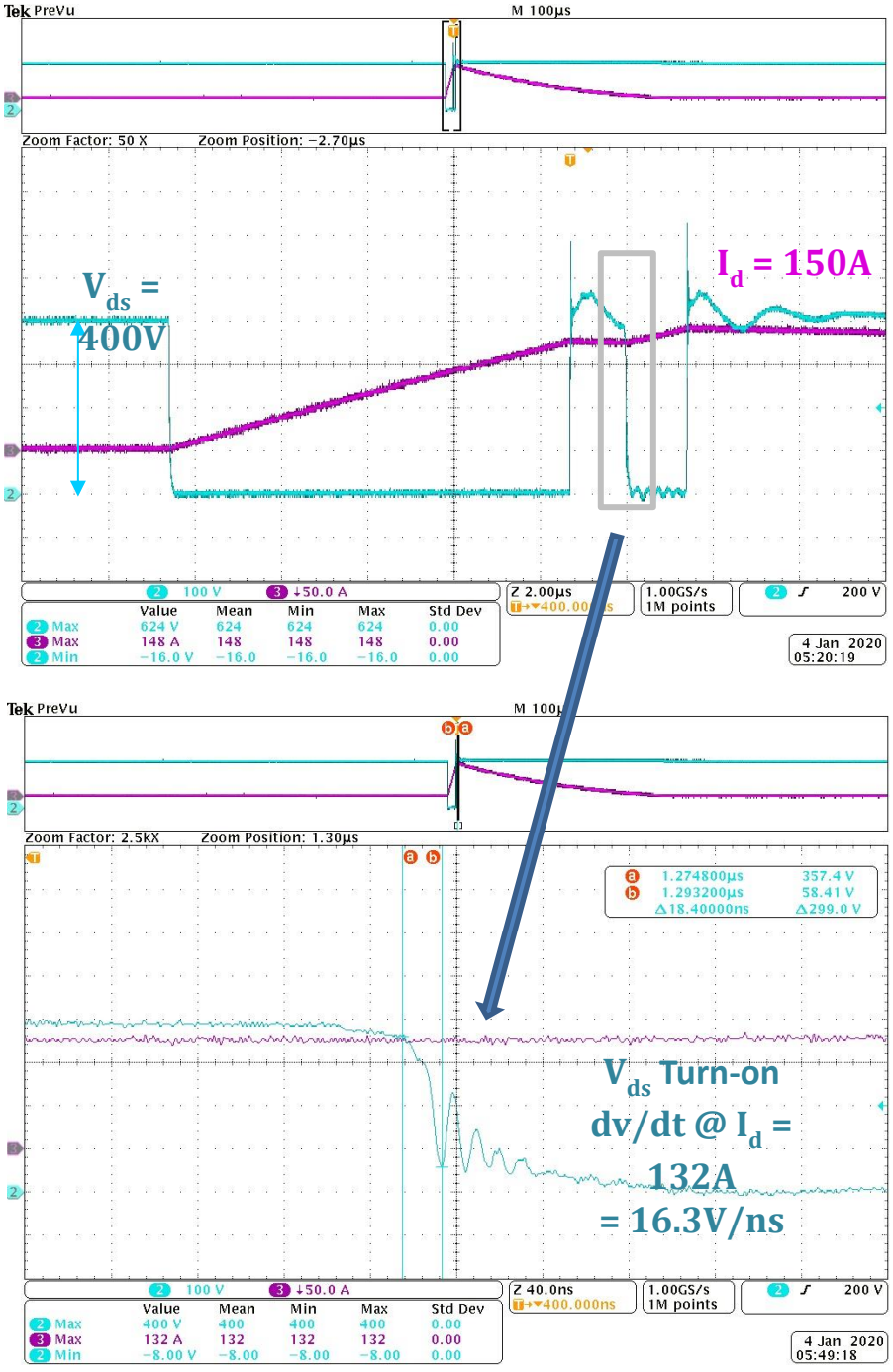


Figure 9 Double pulse test Switching ON waveforms

Please refer to the Evaluation Board/Kit Important Notice on page 13

Mechanical Drawing

Power Module

The dimensions are in mm.

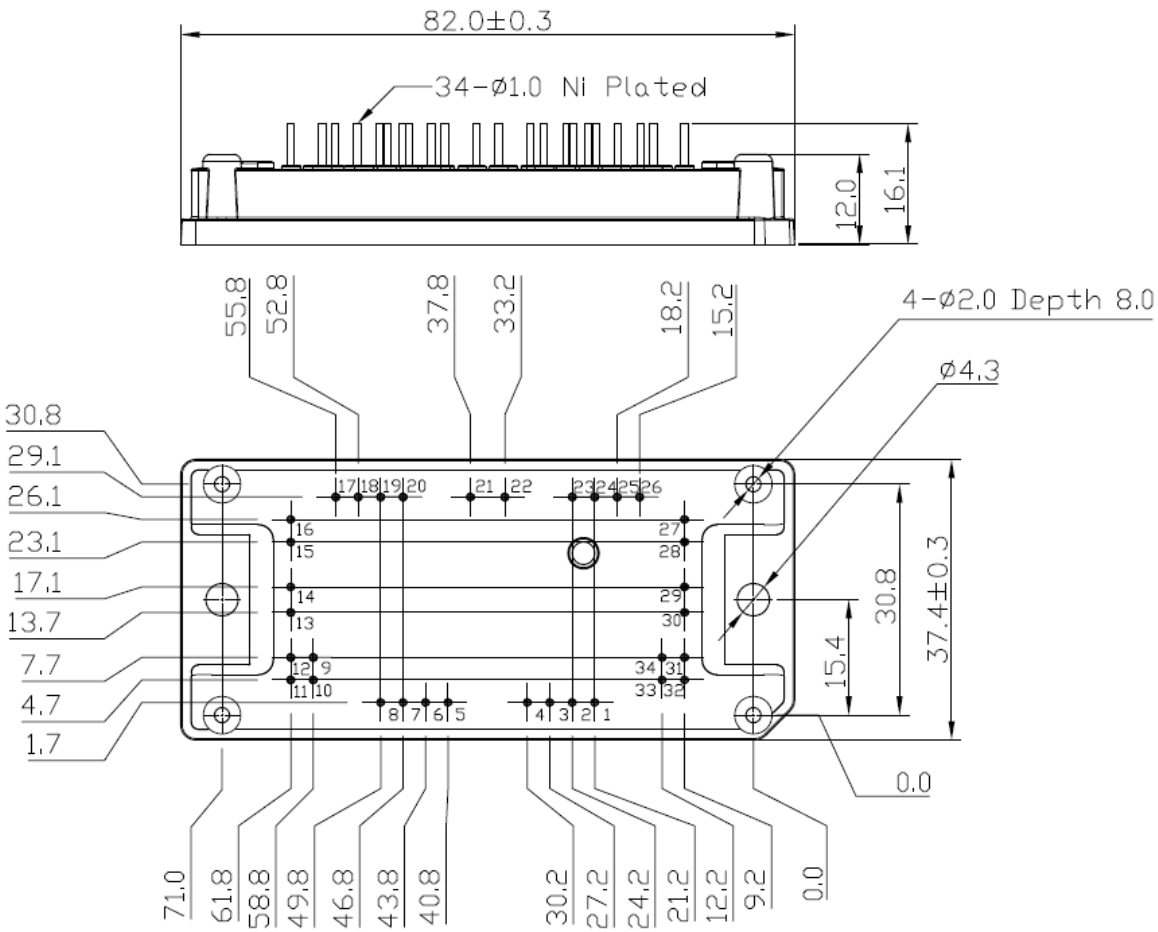


Figure 10 650V 150A GaN Full-Bridge Power Module Package Outline

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This notice contains important safety information about temperatures and voltages. For further safety concerns, please contact a GaN Systems' application engineer.

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