

# PROFET™ +2 12 V Grade0 customer evaluation board

## Quick start guide

BTS7004-1EPZ BTS7006-1EPZ, BTS7008-1EPZ, BTS7008-2EPZ, BTS7040-1EPZ, BTS7080-2EPZ

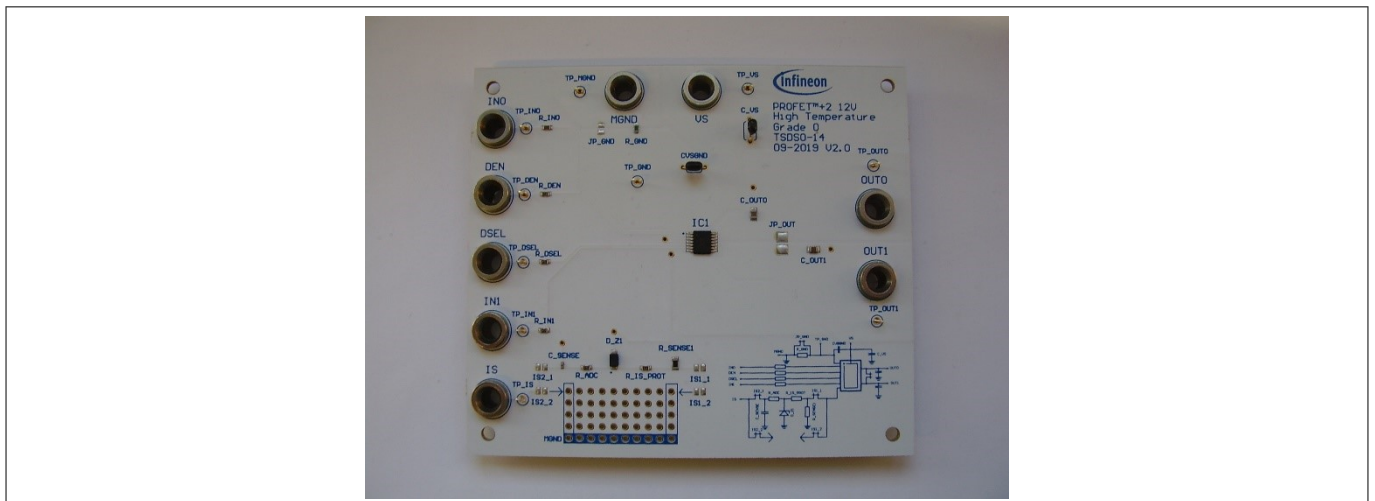
## About this document

### Scope and purpose

This document provides a quick introduction to the Grade0 PROFET™ +2 12V customer evaluation board, which is designed to handle all devices in the PROFET™ +2 12V Grade0 family.

The intention of the evaluation board is to give the customers a quick start for lab evaluation of the performance to this product family.

Infineon's automotive qualified PROFET™ +2 12V family consists of six different high-side switches (from 4 mOhm to 80 mOhm) and offers an extended junction temperature range up to 175°C that allows partitioning at high ambient temperatures with higher ohmic parts. Furthermore, thanks to the AEC-Q100 Grade0 qualification, the PROFET™ +2 12V Grade0 portfolio is able to fulfill extended lifetime at elevated temperatures. The PROFET™ +2 12V Grade0 devices are suitable to drive resistive, inductive and/or capacitive loads and are the perfect fit for applications with extended or/and high temperature mission profiles, such as under the hood, powertrain and transmission applications.



**Figure 1** Customer evaluation board

### Intended audience

Customers requiring a quick start guide to the evaluation board.

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## 1 Evaluation board description

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#### 1.1 Basic features

- High-side switch with diagnosis and embedded protection
- Part of PROFET™+2 12V family
- ReverseON for low power dissipation in reverse polarity
- Green product (RoHS compliant)

#### 1.2 Protection features

- Absolute and dynamic temperature limitation with controlled reactivation
- Overcurrent protection (tripping) with Intelligent Latch or Intelligent Restart Control
- Undervoltage shutdown
- Overvoltage protection with external components
- Maximum temperature for board and device: 175 °C

#### 1.3 Diagnostic features

- Proportional load current sense
- Open load in ON and OFF state
- Short circuit to ground and battery

#### 1.4 Product validation

Qualified for automotive applications. Product validation according to AEC-Q100 Grade0.

#### 1.5 Set up details

- Jumper JP\_GND must be set
- A DC power supply (typically 12 V) needs to be connected to VS
- A load (for example, a bulb or a power resistor) can be connected to OUT0 or OUT1
- To enable the device a 3.3 V or 5 V signal, such as the digital output of a microcontroller or signal generator for example, needs to be available to IN0 and/or IN1 and DEN, respectively
- The ground reference of the digital enable signal (MGND contact), the negative load contact, and the negative/GND output of the DC power supply have to be connected together

The voltage at IS can be measured with a voltmeter. If IN=DEN=high, the load current can be calculated with this formula:  $I_{load} = \text{voltage}(IS) \times kILIS / 1.2 \text{ k}\Omega$

**2 Board connectors and functions**

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**Table 1 Evaluation board connectors and functions**

Connector	Function
INO	Input signal for channel 0 of IC1 <ul style="list-style-type: none"> <li>3.3 V or 5 V logical input</li> <li>Turns the device ON/OFF and resets the fault if triggered</li> </ul>
DEN	Sense enable signal of IC1 <ul style="list-style-type: none"> <li>3.3 V or 5 V logical input</li> <li>Turns measurements signalized at the IS pin ON/OFF and resets the fault if triggered</li> </ul>
DSEL	Diagnostic select signal <ul style="list-style-type: none"> <li>3.3 V or 5 V logical input</li> <li>Selects the channel which has to be diagnosed</li> </ul>
IN1	Input signal for channel 1 of IC1 <ul style="list-style-type: none"> <li>3.3 V or 5 V logical input</li> <li>Turns the device ON/OFF and resets the fault if triggered</li> </ul>
IS	Sense output of IC1
OUT0	Output0 of IC1 <ul style="list-style-type: none"> <li>Connects a grounded load to this pin, such as a power resistor, 12 V heating elements, or a glow plug for example</li> </ul>
OUT1	Output1 of IC1 <ul style="list-style-type: none"> <li>Connects a grounded load to this pin, such as a power resistor, 12 V heating elements, or a glow plug for example</li> </ul>
VS	Supply pin <ul style="list-style-type: none"> <li>Connects the positive supply voltage (4.1 V ... 28 V, typical 12 V DC) to this pin</li> </ul>
MGND	Ground pin <ul style="list-style-type: none"> <li>Connection for the module X_GND to the device GND</li> </ul>
JP_GND	Ground resistor <ul style="list-style-type: none"> <li>Closes the jumper to use the 47 Ω default sense resistor</li> </ul>
JP_OUT	Output connection <ul style="list-style-type: none"> <li>Closes the jumper to increase the current capabilities performances in case of a single channel device</li> </ul>

**Table 2 Component values**

Component name	Value	Description
C_VSGND	47 nF	High Operating Temperature Radial Leded Multilayer Ceramic Capacitor

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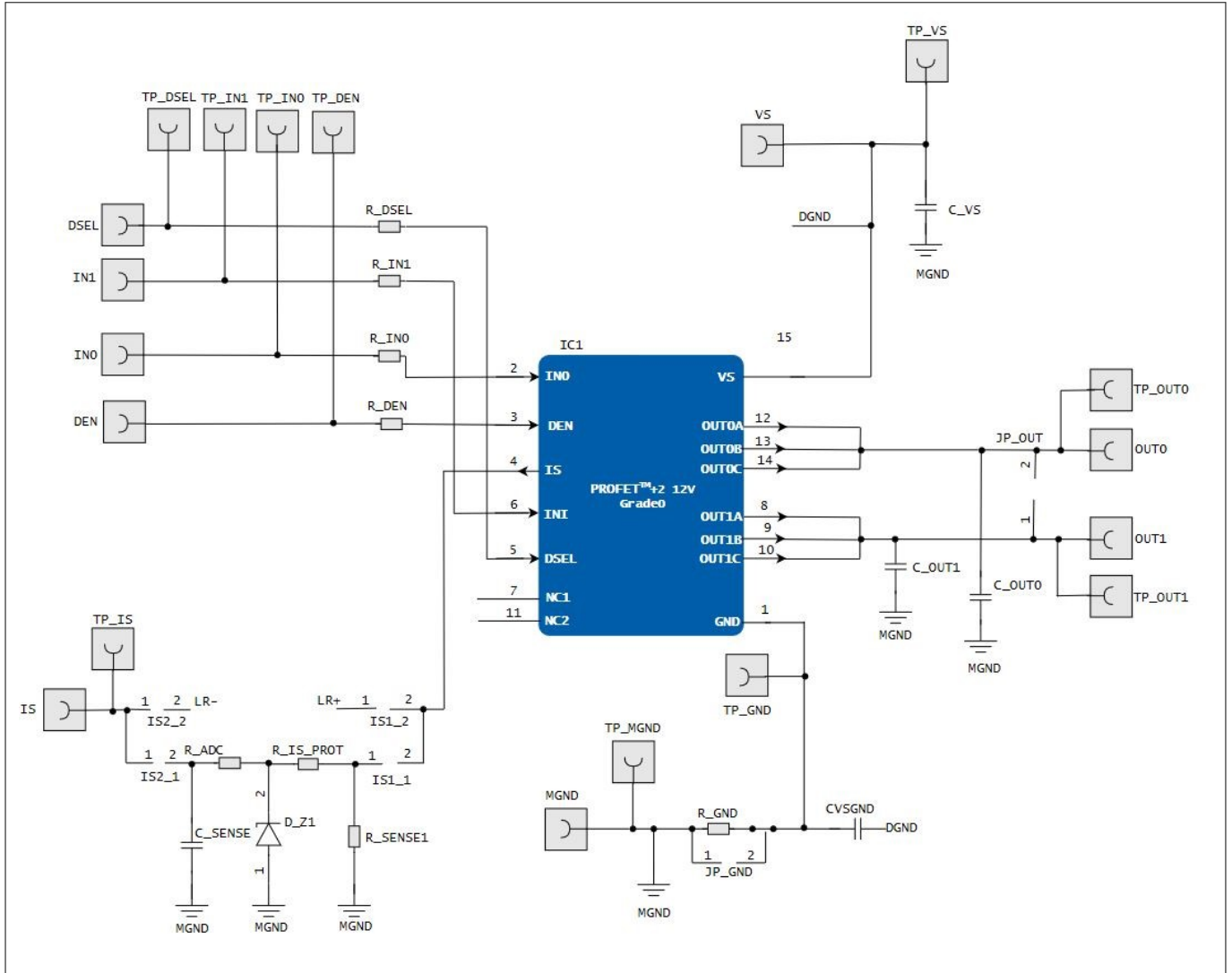
## 2 Board connectors and functions

**Table 2**                    **Component values (continued)**

<b>Component name</b>	<b>Value</b>	<b>Description</b>
R_ADC, R_DEN, R_DSEL, R_IN0, R_IN1, R_IS_PROT	4.7 k	Metal thin film chip resistor
R_SENSE1	1.21 k	Metal thin film chip resistor
C_VS	68 nF	MLCC RHS series Used for Automotive Electronic Equipment
C_SENSE	220 pF	SMD Industrial Ceramic, High Temperature, Ultra-Stable, Low Loss, 0402
R_GND	49.9 R	Thick film chip resistor
C_OUT0, C_OUT1	10 nF	Ultra-Stable, Low Loss, Multi-layer Ceramic Capacitor
D_Z1	$V_Z = 6.2\text{ V}$	Zener diode with Surge Current

**3 Schematic**

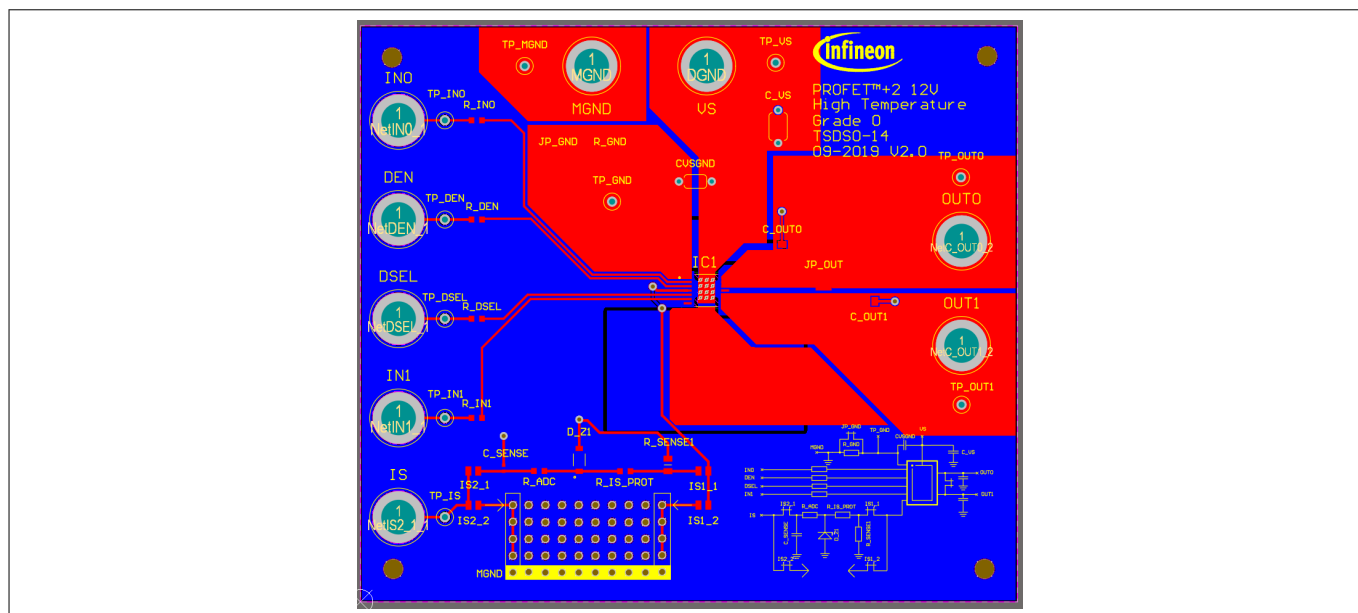
**3 Schematic**



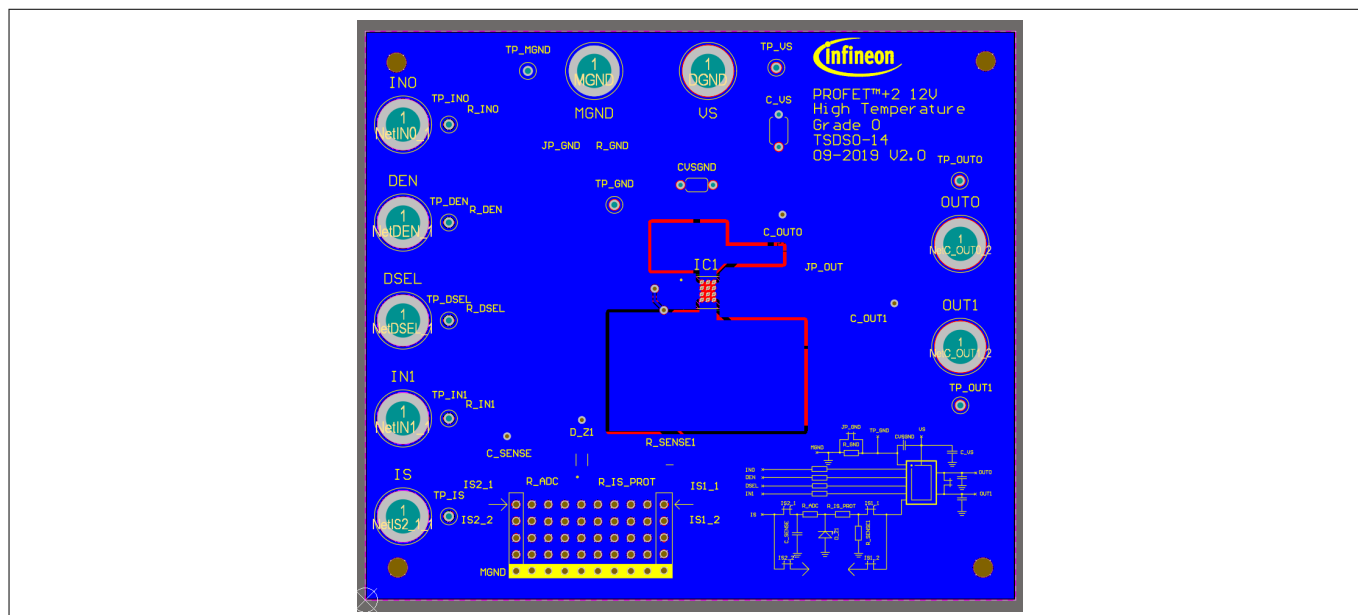
**Figure 2 Schematic of PROFET™+2 12V Grade0 customer evaluation board**

**4 Layout**

**4 Layout**



**Figure 3 Top layout**



**Figure 4 Bottom layout**

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**5 Revision history**

## **5 Revision history**

**Table 3**      **Revision history**

<b>Document version</b>	<b>Date of release</b>	<b>Description of changes</b>
Rev. 0.01	2020-04-09	User manual creation



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