

# SPOC™ Smart Guard 12V

## Daughterboard description

Z8F80805014

## About this document

### Scope and purpose

This document explains the latest evaluation boards ([Daughterboards ordering information](#)) for the SPOC™ Smart Guard 12V. It focuses on the [daughterboard \(DB\)](#), which are part of a kit that includes a [motherboard \(MB\)](#). The DB requires a motherboard MB ([Motherboards ordering information](#)) to function, as they are not functional as standalone components. For information on the MB, visit the company website.

### Intended audience

This user guide is intended for automotive electronics engineers, designers, and technicians who are responsible for the development, testing, and implementation of high side switch solutions using the SPOC™ Smart Guard 12V devices. The target audience includes individuals who require a detailed understanding of the DB's features, functionality, and operation, as well as those who need to integrate the device into their automotive systems. This document is also relevant for application engineers, system designers, and quality assurance personnel who are involved in the development and validation of automotive electronic control units (ECUs) that utilize high side switch technology. Additionally, the guide may be useful for students and researchers in the field of automotive electronics who are interested in learning about the application and implementation of high side switch devices in automotive systems. The intended audience is assumed to have a basic understanding of automotive electronics, electrical engineering principles, and microcontroller-based systems.

### About this product group

#### Products

SPOC™ Smart Guard 12V devices

**Note:** *[printed circuit board \(PCB\)](#) and auxiliary circuits are NOT optimized for final customer design.*

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Important notice

## Important notice

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Safety precautions

## Safety precautions

**Note:** Note the following warnings regarding the hazards associated with development systems.

**Table 1** Safety precautions

	<p><b>Warning:</b> The DC-link potential of this board is up to 1000 VDC. When measuring voltage waveforms by oscilloscope, high voltage differential probes must be used. Failure to do so may result in personal injury or death.</p>
	<p><b>Warning:</b> The evaluation or reference board contains DC bus capacitors which take time to discharge after removal of the main supply. Before working on the drive system, wait five minutes for capacitors to discharge to safe voltage levels. Failure to do so may result in personal injury or death. Darkened display LEDs are not an indication that capacitors have discharged to safe voltage levels.</p>
	<p><b>Warning:</b> The evaluation or reference board is connected to the grid input during testing. Hence, high-voltage differential probes must be used when measuring voltage waveforms by oscilloscope. Failure to do so may result in personal injury or death. Darkened display LEDs are not an indication that capacitors have discharged to safe voltage levels.</p>
	<p><b>Warning:</b> Remove or disconnect power from the drive before you disconnect or reconnect wires, or perform maintenance work. Wait five minutes after removing power to discharge the bus capacitors. Do not attempt to service the drive until the bus capacitors have discharged to zero. Failure to do so may result in personal injury or death.</p>
	<p><b>Caution:</b> The heat sink and device surfaces of the evaluation or reference board may become hot during testing. Hence, necessary precautions are required while handling the board. Failure to comply may cause injury.</p>
	<p><b>Caution:</b> Only personnel familiar with the drive, power electronics and associated machinery should plan, install, commission and subsequently service the system. Failure to comply may result in personal injury and/or equipment damage.</p>
	<p><b>Caution:</b> The evaluation or reference board contains parts and assemblies sensitive to electrostatic discharge (ESD). Electrostatic control precautions are required when installing, testing, servicing or repairing the assembly. Component damage may result if ESD control procedures are not followed. If you are not familiar with electrostatic control procedures, refer to the applicable ESD protection handbooks and guidelines.</p>
	<p><b>Caution:</b> A drive that is incorrectly applied or installed can lead to component damage or reduction in product lifetime. Wiring or application errors such as undersizing the motor, supplying an incorrect or inadequate AC supply, or excessive ambient temperatures may result in system malfunction.</p>
	<p><b>Caution:</b> The evaluation or reference board is shipped with packing materials that need to be removed prior to installation. Failure to remove all packing materials that are unnecessary for system installation may result in overheating or abnormal operating conditions.</p>

## **General information**

The smart power switches (SPS) evaluation kit consists of a *MB* and a *DB*. Depending on the device's features, the DB provides additional functionalities. It is essential to note that the setup and operation of the DB are contingent upon its combination with a MB. The two components are designed to work in tandem, and the DB's functionality is optimized when used in conjunction with an MB. For users requiring information regarding the MB, including its specifications, setup, and operation, we recommend consulting the relevant documentation available on our homepage. This will provide a more comprehensive understanding of the entire evaluation kit and its capabilities.

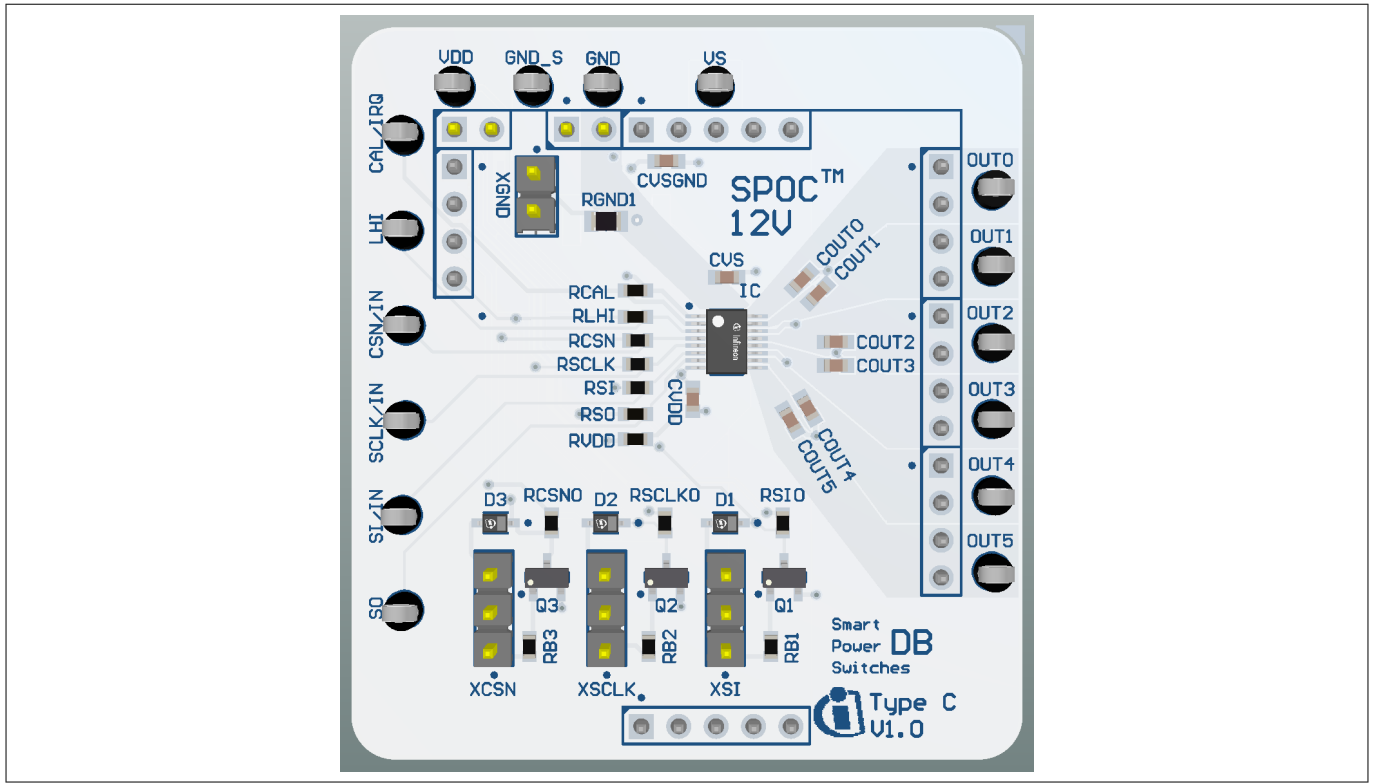
The usage of a ground resistor RGND is recommended. Therefore, it is suggested to close the jumper XGND. Depending on which DB is plugged onto the MB, a different amount of banana sockets OUT0 to OUT7 are in use. For the best current capability, it is recommended to use the maximum available banana sockets. This is described in the dedicated DB chapter.

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**1 6-channel daughterboard**

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**Figure 1 SPOC™ Smart Guard 6-channel 12V - 3D view**

The OUT0 current is provided via banana socket OUT0.  
 The OUT1 current is provided via banana socket OUT1.  
 The OUT2 current is provided via banana socket OUT2.  
 The OUT3 current is provided via banana socket OUT3.  
 The OUT4 current is provided via banana socket OUT4.  
 The OUT5 current is provided via banana socket OUT5.

Limp home connectors:

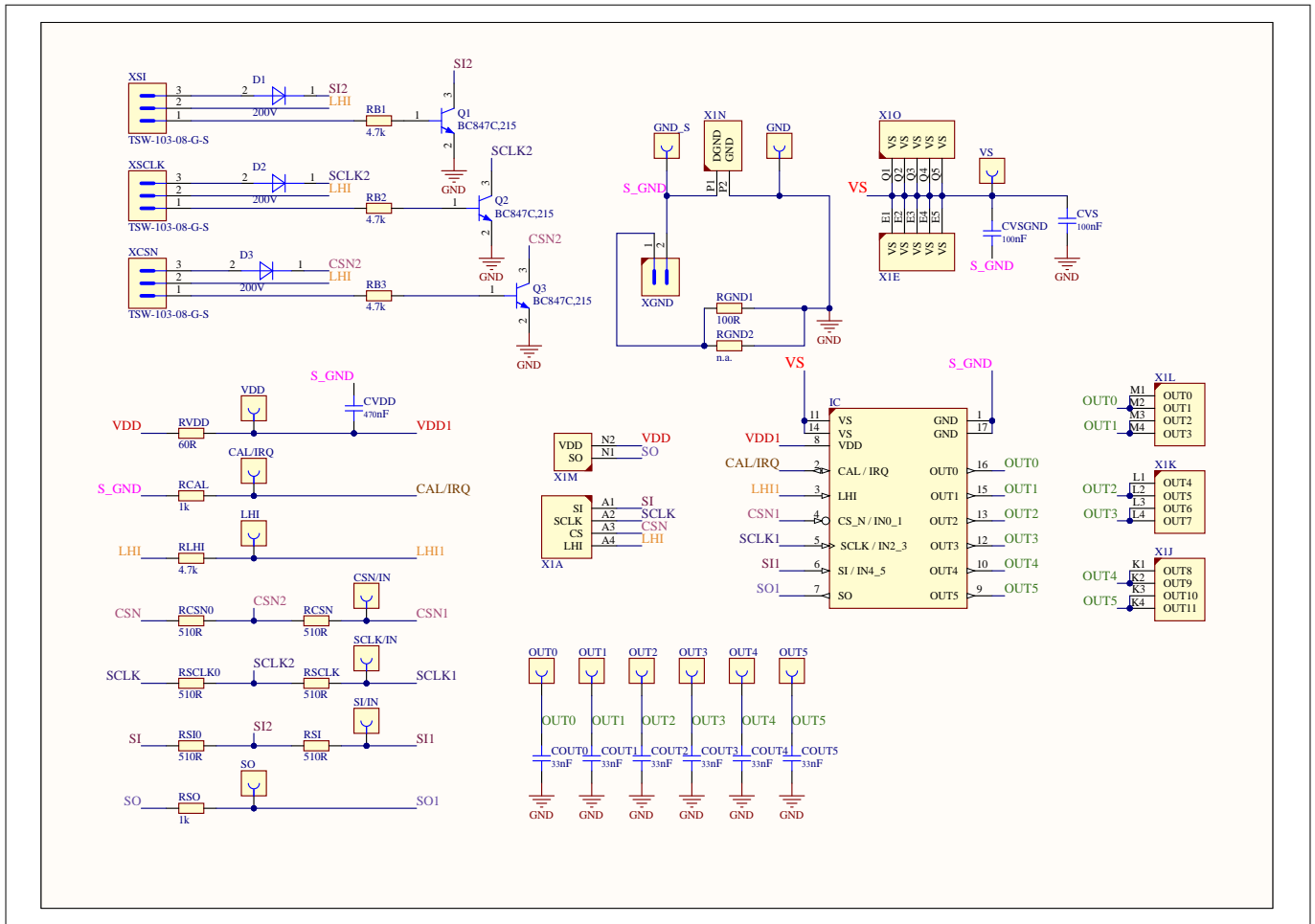
- XSI:
  - Position 1-2: OUT4 and OUT5 switched-OFF
  - Position 2-3: OUT4 and OUT5 switched-ON
- XSCLK:
  - Position 1-2: OUT2 and OUT3 switched-OFF
  - Position 2-3: OUT2 and OUT3 switched-ON
- XCSN:
  - Position 1-2: OUT0 and OUT1 switched-OFF
  - Position 2-3: OUT0 and OUT1 switched-ON

**1 6-channel daughterboard**

**Table 2 Bill of materials**

<b>Designator</b>	<b>Qty</b>	<b>Description</b>
CAL/IRQ, CSN/IN, GND, GND_S, LHI, OUT0, OUT1, OUT2, OUT3, OUT4, OUT5, SCLK/IN, SI/IN, SO, VDD, VS	16	Black bead terminal assembly 1.02mm hole
COUT0, COUT1, COUT2, COUT3, COUT4, COUT5	6	CAP / CERA / 33nF / 0603(1608) / SMD
CVDD	1	CAP / CERA / 470nF / 0603(1608) / SMD
CVS	2	CAP / CERA / 100nF / 0603(1608) / SMD /
CVSGND	2	CAP / CERA / 100nF / 0603(1608) / SMD
D1, D2, D3	3	Silicon switching diode, BAS21-03W
IC	1	SPOC™ Smart Guard 6-channel 12V, high side switch with diagnosis and embedded protection
Q1, Q2, Q3	3	NPN general-purpose transistor, 45V, 100mA, BC847C,215
RB1, RB2, RB3	3	RES / STD / 4.7k / 0603(1608) / SMD
RLHI	1	RES / STD / 4.7k / 0603(1608) / SMD
RCAL	1	RES / STD / 1k / 0603(1608) / SMD
RSO	1	RES / STD / 1k / 0603(1608) / SMD
RCSN, RCSN0, RSCLK, RSCLK0, RSI, RSI0	6	RES / STD / 510R / 0603(1608) / SMD
RGND1	1	RES / STD / 100R / 0805(2012) / SMD
RGND2	1	not assembled
RRVDD	1	RES / STD / 60R / 0805(2012) / SMD
XCSN, XSCLK, XSI	3	Through hole 0.25 square post header
XGND	1	Through hole .025 square post header, 2.54 mm pitch, 2 pin, vertical, single row

**1 6-channel daughterboard**



**Figure 2 SPOC™ Smart Guard 6-channel 12V - schematic**

**Table 3 Product list of compatible devices for this DB**

Device name	Channels	$I_{L(NOM)}$ [A]
BTS81000-SSGI-6ET	6	1

## 2 Appendices

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### 2.1 Daughterboards ordering information

**Table 4** Daughterboards ordering information

<b>Sales part name</b>	<b>Sales product number</b>
D-BTS81000-SSGI-6ET-1	SP006152067

### 2.2 Motherboards ordering information

**Table 5** Motherboards ordering information

<b>Board name</b>	<b>Sales part name</b>	<b>Sales product number</b>
SPS Motherboard Lite	M-SMART-POWER-LITE-5	SP006136123
SPS Motherboard	M-SMART-POWER-SWT-5	SP006041408

## Glossary

## Glossary

### **DB**

*daughterboard (DB)*

An expansion circuit card connected to a motherboard.

### **MB**

*motherboard (MB)*

The main printed circuit board (PCB) in general-purpose computers and other expandable systems. It holds and allows communication between many of the crucial electronic components of a system, such as the central processing unit (CPU) and memory, and provides connectors for other peripherals.

### **PCB**

*printed circuit board (PCB)*

A board that mechanically supports and electrically connects electronic components using conductive tracks, pads, and other features etched from copper sheets laminated onto a non-conductive substrate.

**Revision history**

**Revision history**

<b>Document version</b>	<b>Date of release</b>	<b>Description of changes</b>
Rev. 1.00	2026-05-26	Initial release

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aspect of this document?**

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Customer shall not touch the Evaluation Board during operation and keep a safe distance.

Customer shall not touch the Evaluation Board after disconnecting the power supply, several components may still store electrical voltage and can discharge through physical contact. Several parts, like heat sinks and transformers, may still be very hot. Allow the components to cool before touching or servicing.

The electrical installation must be completed in accordance with the appropriate safety requirements.