SPOC™ Wire Guard 12V 1-channel

Daughterboard description

Z8F80805024

About this document

Scope and purpose

This document explains the latest evaluation boards (Daughterboards ordering information) for the SPOC™ Wire Guard 12V 1-channel devices. It focuses on the *daughterboard (DB)*, which are part of a kit that includes a *motherboard (MB)*. The DB requires a 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™ Wire Guard 12V 1-channel 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

Target applications

This product is optimized for:

- Fail operational power supply and power supply protection
- Fuse and relay replacement in 12 V power distribution
- ECU main switch
- Active supply during parking mode

Products

SPOC™ Wire Guard 12V 1-channel devices

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

Safety precautions

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

Table 1 **Safety precautions**

⚠	**Warning:** *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.*
⚠	**Warning:** *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.*
⚠	**Warning:** *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.*
⚠	**Warning:** *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.*
⚠	**Caution:** *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.*
⚠	**Caution:** *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.*
⚠	**Caution:** *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.*
⚠	**Caution:** *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.*
⚠	**Caution:** *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.*

Table of contents

1 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 jacks OUT0 to OUT7 are in use. For the best current capability, it is recommended to use the maximum available banana jacks. This is described in each DB chapter.

The solder jumper (SJ_RSO) can be used to bypass the resistor RSO in case the DB is used in a *serial peripheral interface (SPI) daisy chain* configuration. For the typical configuration (not a daisy chain), the jumper shall be open to ensure protection against voltage transients.

2 Daughterboard

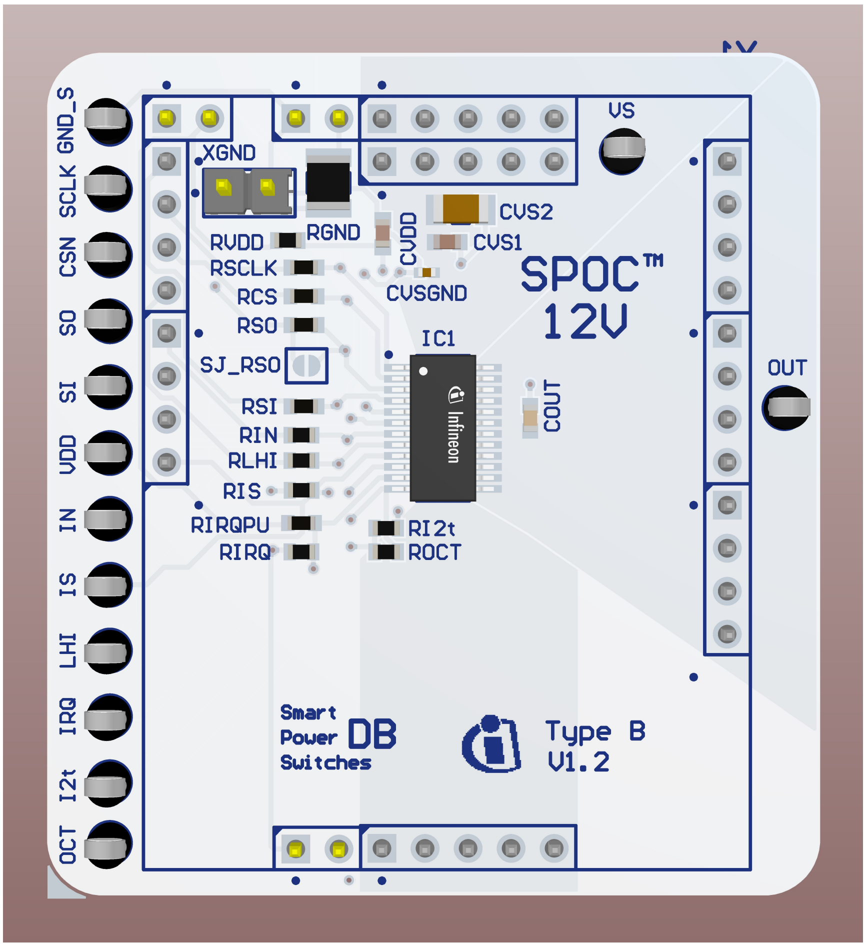

Figure 1 SPOC™ Wire Guard 12V 1-channel - 3D view

The OUT current is provided via banana socket OUT0 to OUT5.

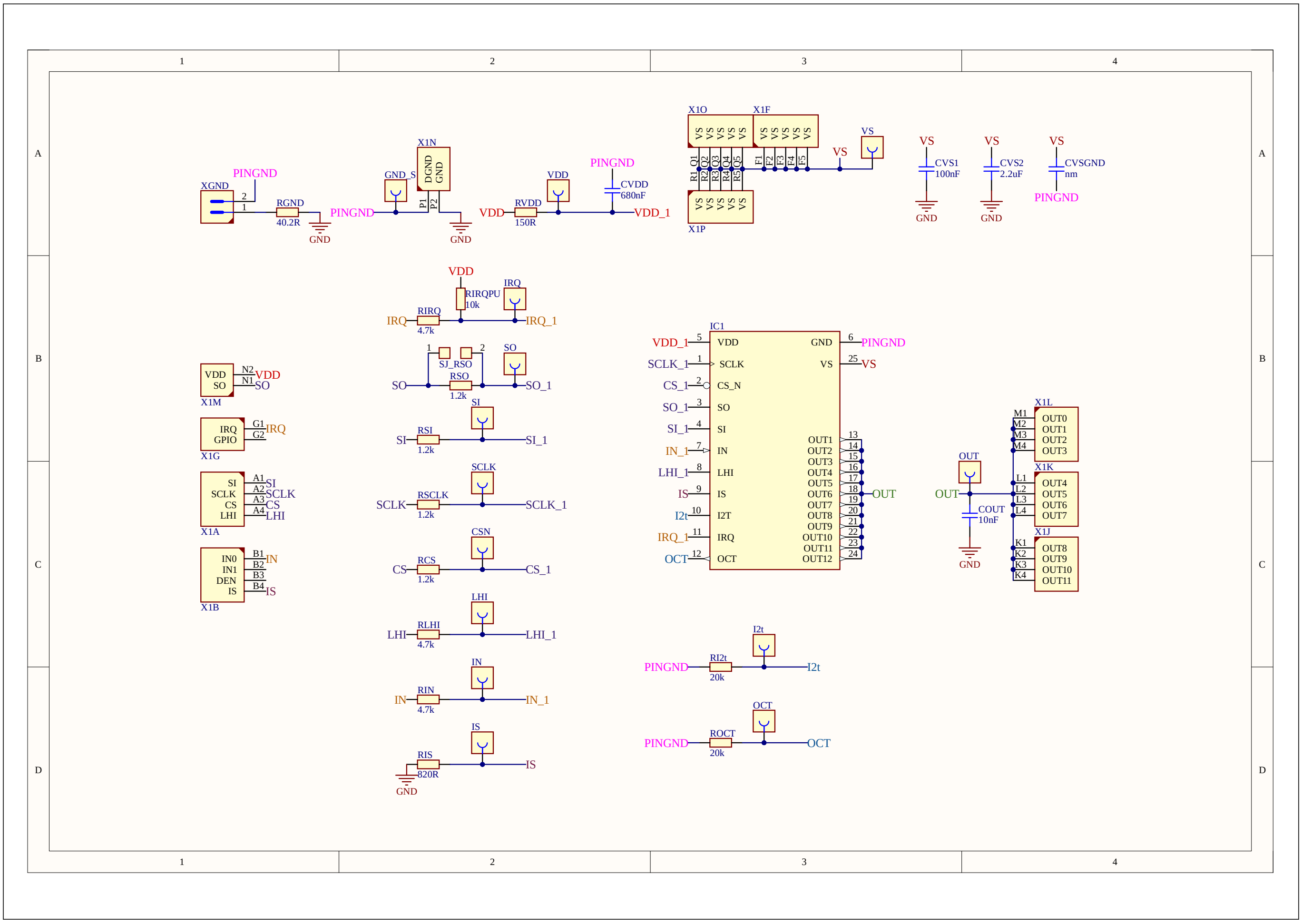

Figure 2 SPOC™ Wire Guard 12V 1-channel - schematic

Table 2 Product list of compatible devices for this DB

Device name	Channels	$I_{L(NOM)}$ [A]
BTS80009-SWPF-1ES	1	34.5
BTS80014-SWPF-1ES	1	27.3
BTS80022-SWPF-1ES	1	21.6
BTS80045-SWPF-1ES	1	15.3

2.1 Bill of material

Table 3 Bill of materials

Designator	Qty	Description
COUT	1	CAP/CERA/10 nF/0603(1608)/SMD
CSN, GND_S, I2t, IN, IRQ, IS, LHI, OCT, OUT, SCLK, SI, SO, VDD, VS	14	Black bead terminal assembly 1.02 mm hole
CVDD	1	CAP/Ceramic/680 nF/0603 (1608)/SMD

(table continues...)

Table 3 (continued) Bill of materials

Designator	Qty	Description
CVS1	1	CAP/Ceramic/100 nF/0603 (1608)/SMD
CVS2	1	not assembled/CAP/1206 (3216)/SMD
CVSGND	1	CAP/CERA/47 nF/0402 (1005)/SMD
RCS, RSCLK, RSI, RSO	4	RES/STD/1.2 k/0603 (1608)/SMD
RGND	1	RES/STD/40.2 R/1210 (3225)/SMD
RI2t, ROCT	2	RES/STD/20 k/0603 (1608)/SMD
RIN, RIRQ, RLHI	3	RES/STD/4.7 k/0603 (1608)/SMD
RIRQPU	1	RES/STD/10 k/0603 (1608)/SMD
RIS	1	RES/STD/820 R/0603 (1608)/SMD
RVDD	1	RES/Resistor Chip/150 R/0603 (1608)/SMD
SJ_RSO	1	Solder Jumper 2 Pins
XGND	1	Through hole 0.025 SQ Post Header, 2.54 mm pitch, 2 pin, vertical, single row

3 Appendices

3.1 Daughterboards ordering information

Table 4 **Daughterboards ordering information**

Sales part name	**Sales product number**
D-BTS80009-SWPF-1ES-1	SP006152047
D-BTS80014-SWPF-1ES-1	SP006152049
D-BTS80022-SWPF-1ES-1	SP006152051
D-BTS80045-SWPF-1ES-1	SP006152054

3.2 Motherboards ordering information

Table 5 **Motherboards ordering information**

Board name	**Sales part name**	**Sales product number**
SPS Motherboard Lite	M-SMART-POWER-LITE-5	SP006136123
SPS Motherboard	M-SMART-POWER-SWT-5	SP006041408

Glossary

daisy chain

daisy chain

A wiring scheme in which multiple devices are wired together in sequence or in a ring.

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.

SPI

serial peripheral interface (SPI)

A synchronous serial communication interface specification used for inter-chip communication, primarily in embedded systems.

Revision history

Document revision	Date of release	Description of changes
Rev. 1.00	2026-04-01	Initial release

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