# STEVAL-SCR002V1



### Data brief



Product summary		
Inrush current limiter for active AC-DC bridge rectifier	STEVAL- SCR002V1	
600 V, 16 A high temperature SCR	TN1605H-6T	
600 V, 1 A standard Triac	Z0107MN 5AA4	
1000 V, 1 A ultrafast diode	STTH110A	
Applications	AC-DC Converters	

## Inrush current limiter for active AC-DC bridge rectifier

#### **Features**

- Two TN1605H-6T 16 A 600 V Hi Tj SCRs in a TO-220 package, used to bypass the inrush resistor
- Compact solution: 43.6 x 28.5 mm (≈ 1.8 sq in)
- Compatible with AC-DC converters with or without PFC in all modes: CCM, CRM, and DCM
- Enable signal (EN = 3.3 V to 15 V) versus GND\_DC (DC or PWM signal)
- Suitable for applications from 50 W up to 1000 W (230 V<sub>RMS</sub>, T<sub>AMB</sub> = 60°C)
- Compliant with AC or DC input voltage: 90-265  $V_{AC}$ , 50/60 Hz, or 120-400  $V_{DC}$
- Robust, immune (2 kV IEC 61000-4-5, 4 kV IEC 61000-4-4)
- Low EMI noise (EN55014 and EN55022) solution

### **Description**

The STEVAL-SCR002V1 introduces a simple and innovative AC-DC front-end circuit that allows the designer to perform an inrush current limitation in any converter with input rectifier bridge topologies.

Based on a discrete control circuit made of one Z0110MN SMD triac and two STTH110A diodes, it offers a compact and non-insulated high voltage driver for the mains SCR. The drive circuit synchronizes the SCR gate signals with the AC line polarity and powers directly the SCR gate from the mains. This operation does not generate reverse losses in the SCRs.

This STEVAL-SCR002V1 solid-state solution provides a high reliability, a long service lifetime, an electromagnetic interference reduction, and a faster response compared to electromechanical solutions.

This solution is also compatible with an inrush current limitation performed either in the NTC/PTC bypass mode or in the MCU phase-control mode.

The enable control pin of the SCR driver is referenced to GND\_DC. Therefore, an uninsulated power supply or a direct control by the MCU can be used.

With five wires to connect, the STEVAL-SCR002V1 is designed for an easy implementation on existing AC-DC converters for plug-and-play tests.

It is suitable for applications with an RMS current up to 4.3 A (at an ambient temperature of  $60^{\circ}$ C).



# 1 Configurations



DB4576 - Rev 2



# 2 Schematic diagrams

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A T-filter (R1-C1-R2) is placed on top of the Z0110MN gate to maximize the EFT immunity of the low side ICL driver. Refer to AN5649 for further information.



## 3 Board versions

#### Table 1. STEVAL-SCR002V1 versions

PCB version	Schematic diagrams	Bill of materials
STEVAL\$SCR002V1A (1)	STEVAL\$SCR002V1A schematic diagrams	STEVAL\$SCR002V1A bill of materials

1. This code identifies the STEVAL-SRC002V1 evaluation board first version. It is printed on the board PCB.

### **Revision history**

#### Table 2. Document revision history

Date	Revision	Changes
04-Jul-2022	1	Initial release.
19-Sep-2022	2	Updated cover page image.

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