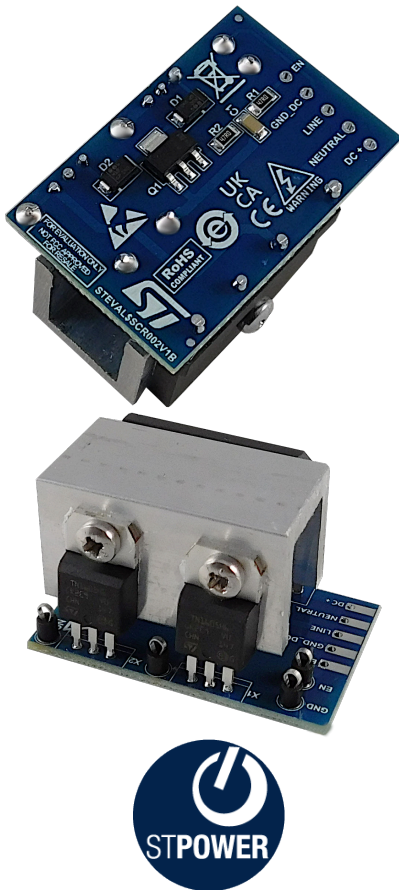


## Inrush current limiter for active AC-DC bridge rectifier



### Features

- Two **TN1605H-8T** 16 A - 800 V Hi Tj SCRs in a TO-220 package, used to bypass the inrush resistor
- Compact solution: 43.6 x 28.5 mm ( $\approx 1.8$  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<sub>AC</sub>, 50/60 Hz, 4.3 A<sub>RMS</sub> or 120-400 V<sub>DC</sub>, 2 A
- 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.

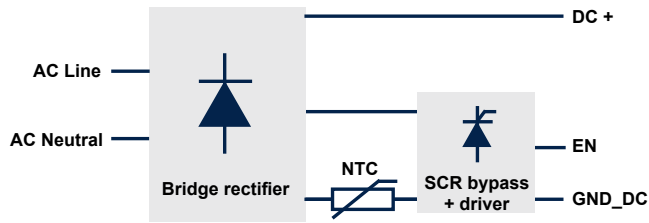
With five wires to connect, the **STEVAL-SCR002V1** is designed for an easy implementation on existing AC-DC converters for plug-and-play tests.

It is suitable for applications with an RMS current up to 4.3 A (at an ambient temperature of 60°C).

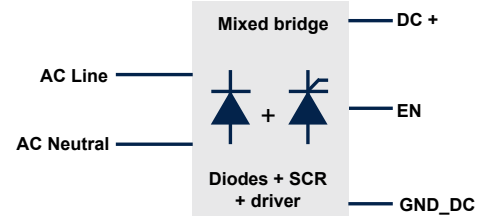
Product summary	
Inrush current limiter for active AC-DC bridge rectifier	<a href="#">STEVAL-SCR002V1</a>
16 A 800 V High Temperature SCR in TO-220AB	<a href="#">TN1605H-8T</a>
600 V, 1 A standard Triac	<a href="#">Z0107MN 5AA4</a>
1000 V, 1 A ultrafast diode	<a href="#">STTH110A</a>
Applications	<a href="#">AC-DC Converters</a>

# 1 Configurations

Figure 1. STEVAL- SRC002V1 circuit configurations



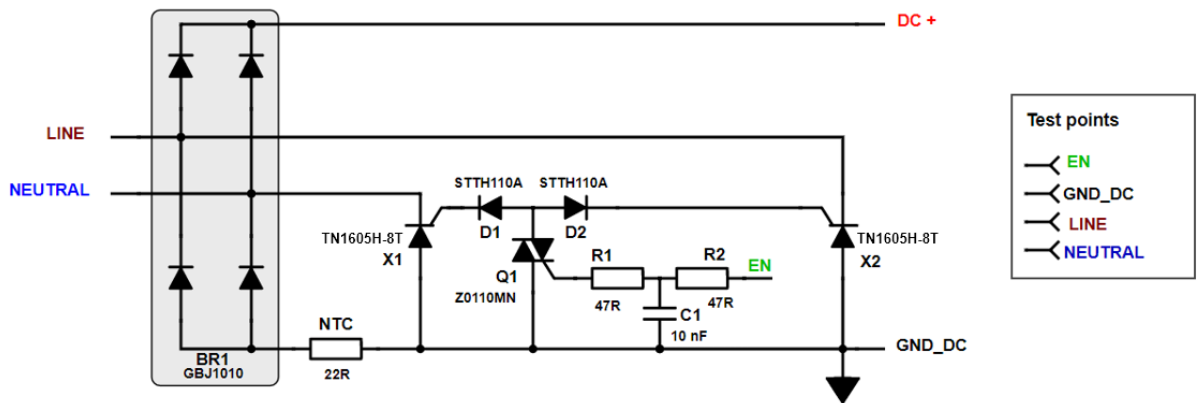
**NTC bypass configuration**  
Original configuration



**Phase control mixed bridge configuration**  
Thermistor to be removed

## 2 Schematic diagrams

Figure 2. STEVAL-SCR002V1 circuit schematic



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 <sup>(1)</sup>	STEVAL\$SCR002V1A schematic diagrams	STEVAL\$SCR002V1A bill of materials
STEVAL\$SCR002V1B <sup>(2)</sup>	STEVAL\$SCR002V1B schematic diagrams	STEVAL\$SCR002V1B bill of materials

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

## Revision history

**Table 2. Document revision history**

Date	Revision	Changes
04-Jul-2022	1	Initial release.
18-Jul-2022	2	Updated cover page image.
03-Nov-2022	3	Updated cover page features.
29-Nov-2023	4	Replaced TN1605H-6T with TN1605H-8T. Updated Cover page image, Features, Product summary, Section 2 Schematic diagrams and Section 3 Board versions.

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