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TN1605H-8x RTM **800 V High Temperature** **SCRs**

Product Marketing SCR-Triac

Discrete & Filter Division

Automotive & Discrete Group

Why 800 V 150 °C SCR ?

Controlling inrush power at start-up with reliable solution

The high temperature SCR drives bigger power in AC/DC portion thanks to its 800 V rated now at 150°C junction operations

- No more Electro-mechanical parts
- Meet IEC61000-4-x for Inrush limitation
- Converter efficiency improvement
- Low stand-by losses
- Easier-to-design drive circuit
- Strong immunity to external disturbances

Where to use 800 V 150 °C SCR ?

Consumer



- TV SMPS
- Vacuum Cleaner
- Personal device charger
- E-bike chargers
- LED Light dimmer
- Smart plug

Smart Appliances



- Air Conditioning
- Induction heating
- Washing Machine
- Fridge
- Dish Washer

Industrial



- Server PS unit
- 5G repeater
- LED lighting
- AC Motor control
- Voltage regulator

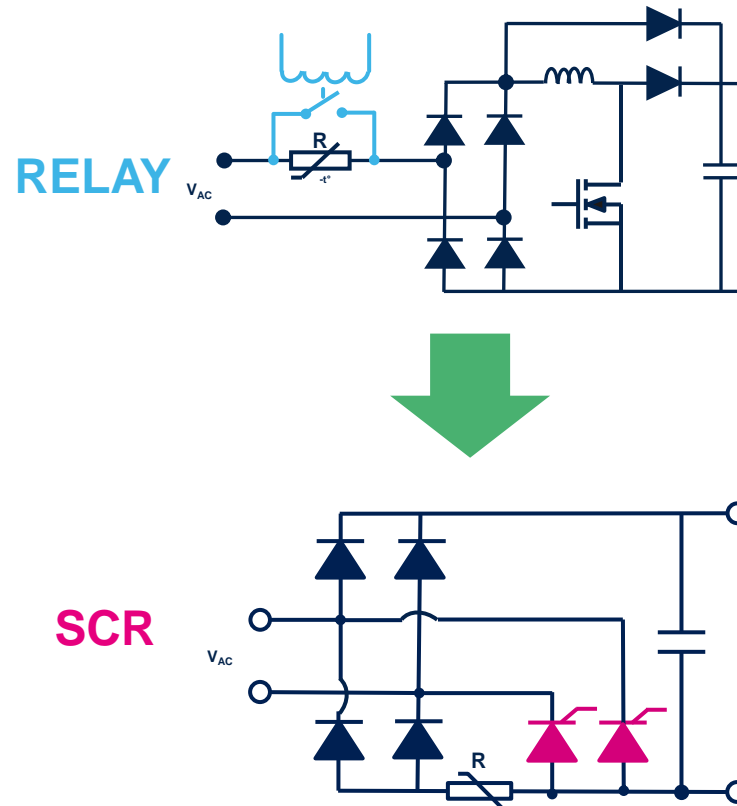
Renewable energy



- Solar inverter
- UPS
- EV chargers

Topology trend for ICL in AC/DC converter

Migrate from electromechanical **Relay** to STMicroelectronics **SCR**

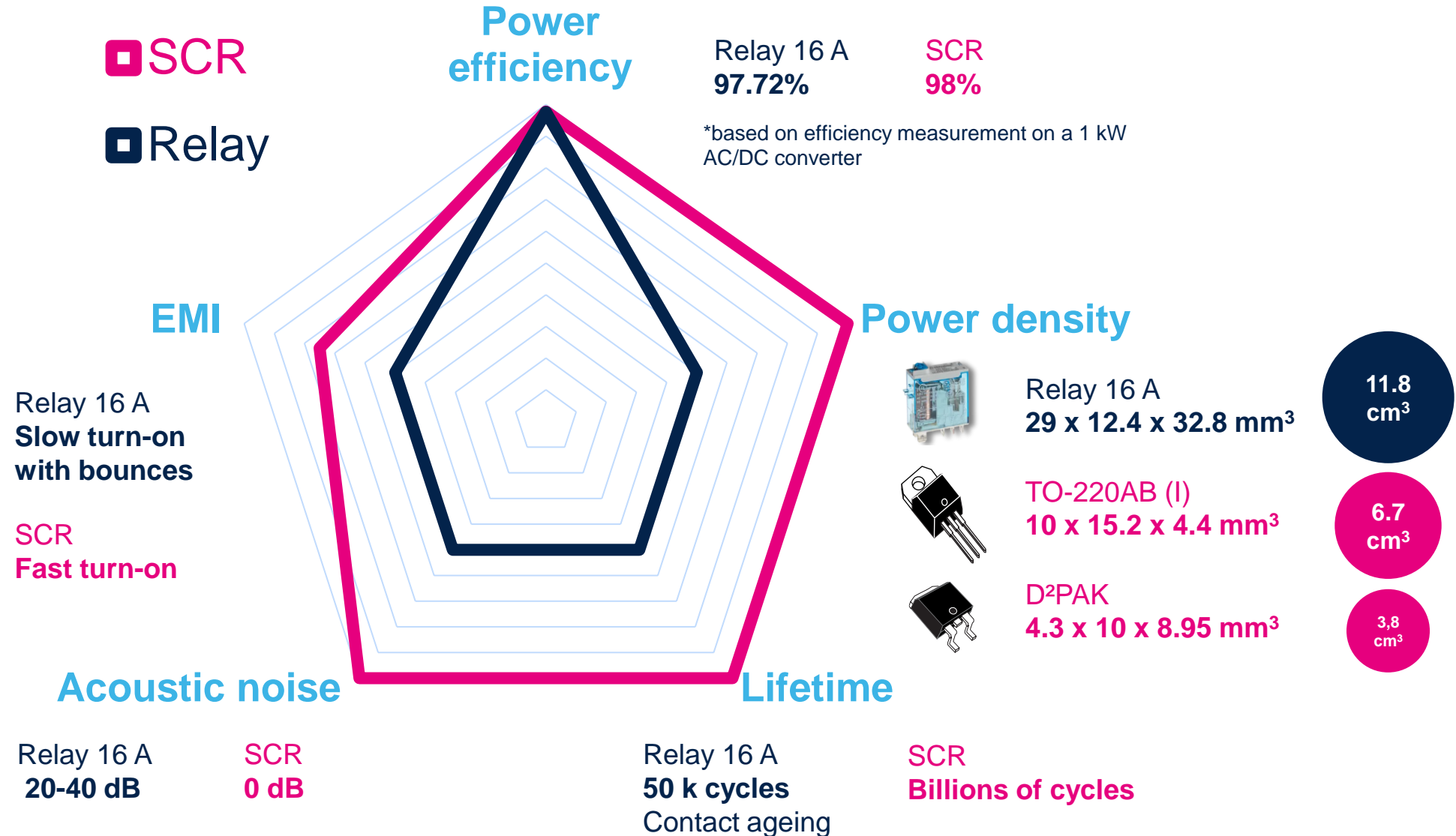


Application Benefits

- Power efficiency
- Power density
- Lifetime
- Acoustic noise
- Robustness to EMI

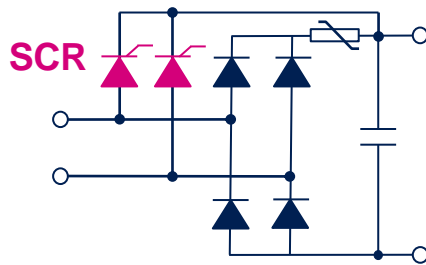


Performance comparison vs electromechanical relay

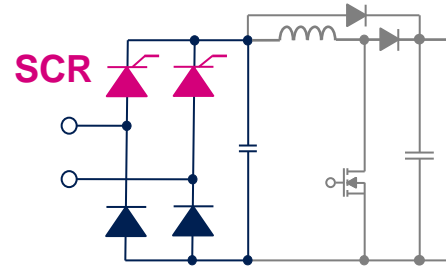


High Temp. SCR in Digital Inrush Current Limiters

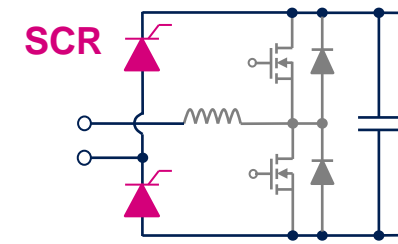
A reliable proposal to build any AC / DC rectifier bridge



**By-pass parallel
High-side SCRs**
< 3.6 kW



Mixed Bridge
< 15 kW



Totem Pole Boost
< 8 kW

Standard input full bridge rectifier

Bridgeless - Totem pole PFC

Inrush current resistor used

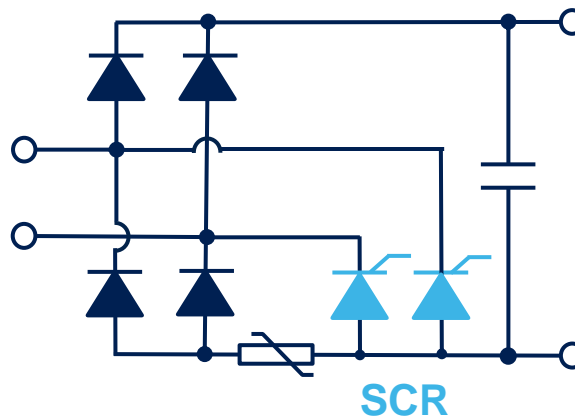
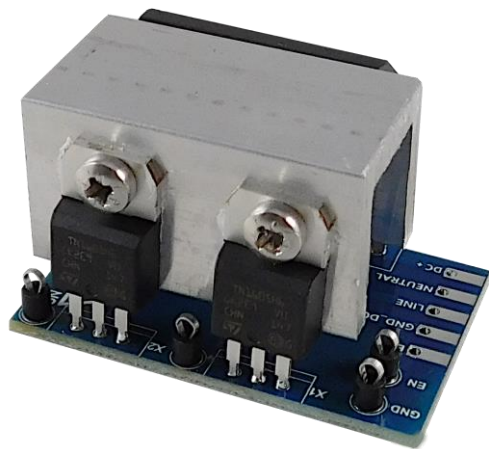
Voltage control

No need of MCU

MCU driving

STEVAL Low Side Inrush Current

STEVAL-SCR002V1



KEY FEATURES

- **Low side BYPASS or SMART** Inrush Control
- Input AC voltage: 90-265 VAC, 50/60 Hz
- Power range : from 50 W up to 1000 W
- Robust and Immune: IEC 61000-4-5 surge: **2 kV**
IEC 61000-4-4 EFT burst : 4 kV min
Low EMI Noise (EN 55014)

KEY PRODUCTS

- **TN1605H-8T** → High TJ SCR in TO-220
- **Z0110MN** → 1 A SMD TRIAC
- **STTH110A** → 1 A Ultrafast Diode

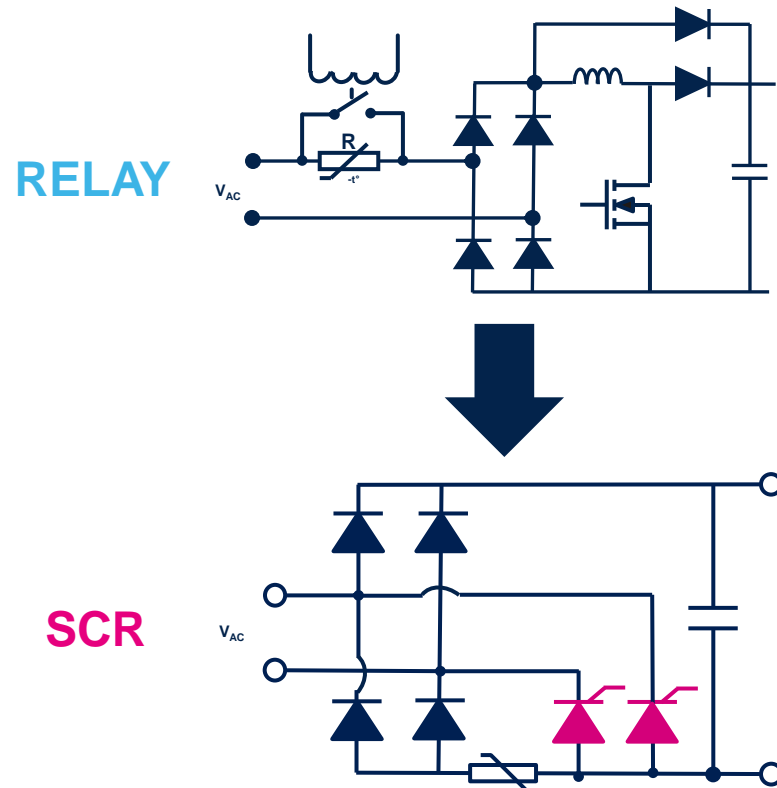
NTC bypass with High Temperature SCR

Example for a 1 kW / 230 V SMPS

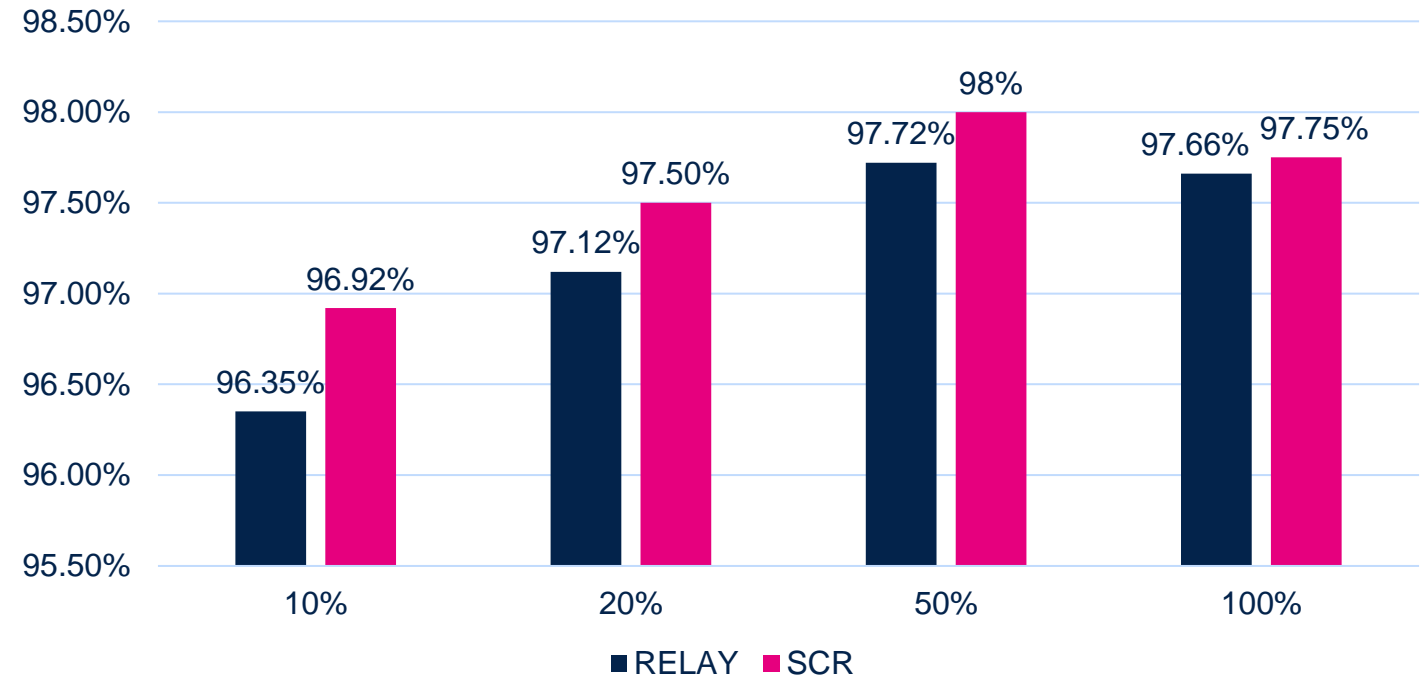
Improve your system overall efficiency by 0.4 to 0.6 %

and still

- ✓ No acoustic noise
- ✓ High reliability
- ✓ No switch aging



Efficiency of 1 kW PFC vs. output power load


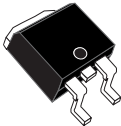
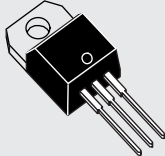
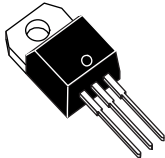




TN1605H-8x Product offer tentative

16 A 800 V High Temperature Silicon Controlled Rectifier



Package		Part Number	Samples availability	Release
DPAK		TN1605H-8B	Now	May 2023
	D2PAK	TN1605H-8G	Now	
TO-220AB		TN1605H-8T	Now	In MP
	TO-220I	TN1605H-8I	Now	



TN1605H-8 High Temperature SCR Features

800 V High Temperature SCR for robust and immune converters



Rated for AC/DC converters

- 800 V Repetitive off-state voltage for large range of application
- 150 °C fully rated for thermal vs compactness optimized designs
- 16 A rated controlled rectifier for up to 1 kW SMPS

Optimized switching features

- Tight triggering gate current 2 – 8 mA for accurate and easy control circuit
- 100 A/us turn-on di/dt to manage high inrush current

Immune to EMI disturbances

- Extra 900 V on 10 ms off-state voltage for overvoltage surge management
- High dV/dt immunity up to 500 V/ μ s

Package flexibility

- Through-hole TO-220AB & TO-220AB-I for heatsink mounting
- SMD options with low thermal resistance DPAK & D2PAK
- Insulated TO-220AB is insulated package rated at RMS 2.5 kV UL1557



The TN1605H-8x challenge in 1 kW conversion

ENGINEERING CHALLENGE

THYRISTOR SOLUTION

SYSTEM BENEFITS

Improve Immunity & Robustness

$V_{DSM} = 900 \text{ V}$; $dV/dt = 500 \text{ V}/\mu\text{s}$

Ease IEC 61000-4-x EMI std compliance

Provide reliability

800 V 150°C reliable Thyristor
With strong ITSM

Application inrush current
management

Remove mechanical switch

AC/DC rectification with SCR

Compliance with RoHS

no EMI noise generation

No contact bouncing of a
mechanical switch

Fit sensitive industrial electronics

No switch aging

Solid-State silicon switch

Lifetime savings



TN1605H-8x value proposition



The TN1605H-8x of STMicroelectronics is a 16 ARMS 800 V SCR thyristor housed in SMD D2PAK and thermally efficient through-hole TO-220AB and TO-220I packages.

The ST Silicon Controlled Rectifier offers a reliable and efficient solution for controlling the inrush current of rectifier bridges and bridgeless PFC circuits in industrial environments. Dedicated to application up to 1 kW, this 16 Amps SCR is designed to meet the high-power requirements of modern industry, while maintaining high efficiency and minimizing energy waste.

With its high voltage and noise immunity of 500 V/ μ s, a turn-on current rise of 100 A/ μ s and a gate triggering current of 8 mA, it is easy to design a robust and compact control circuit in AC/DC converters for inrush current limiting circuits and industrial drives, such as overvoltage crowbar protection, motor control circuits and power tools.

Our technology starts with You



Find out more at www.st.com

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