AEC-Q101 AUTOMOTIVE SCR THYRISTORS

life.augmented

Give your EV AC/DC conversion the reliability it deserves

ST Automotive SCR Thyristors give back control of inrush current and capacitor discharges in electric vehicles.

ST's AEC-Q101 qualified automotive thyristors offer 1200V blocking capability at 150°C junction temperature.

With optimized power density and surge current capability, they fit automotive applications such as on-board chargers, belt starter generators and battery management systems.

These automotive-grade thyristors can also be used in industrial battery chargers and UPS, soft starters in motor drives or solid-state relays.

KEY FEATURES & BENEFITS

- AEC-Q101 qualified at 1200 V
- Temperature: 150°C max.
- On-state RMS current:
- 30 to 60 A
- Blocking voltage: 1200 V
- Non-repetitive surge voltage: 1400 V
- Turn-on robustness: 200 A/µs
- High off-state immunity: 1000 V/µs
- High-creepage surface mount and through-hole package options
- Lead-free plating and Halogen-free

KEY BENEFIT

- 125°C ambient compatibility
- +1% PFC efficiency vs relays
- Smart inrush current limitation with IEC61000-3-3 compliance
- Zero off-state power loss
- Easier compliance with IEC61000-4-4 and IEC61000-4-5

KEY APPLICATIONS

- Automotive
  - On-board chargers
  - Fast safety disconnection
  - Battery management systems
- Industrial
  - Battery chargers
  - Renewable energy inverters
  - Solid state relays
  - Uninterruptible power supplies (bypass)
  - Motor drives (inrush current limiter, soft start)

The EV Challenges

Automotive Standards
AEC imposes reinforced qualification processes and reliability levels

Charging
Inrush current limitationwith passive components limits system lifetime

Vibrations in Vehicle
Source of early failures of relays and other mechanical elements

Energy Savings
Low power conversion efficiency and excessive off-state standby losses

Electro Magnetic Interferences
Increased electronics complexity = difficult qualification for IEC61000-3-3, IEC61000-4-4 and IEC61000-4-5

ST Automotive Thyristors answers EV challenges

CHALLENGES	SOLUTIONS	BENEFITS
Automotive Standards	T_J Max 150°C @1200V	AEC-Q101 Qualified
Vibrations in Vehicle	No moving parts	Improved Reliability
Charging	SCR in Phase Control	Smart Inrush Current Limitation with IEC61000-3-3 compliance
Energy Savings	Optimized V_{TO} and R_D 5µA off-state current	+1% efficiency VS relaysZero off-state power loss
Electric Magnetic Interference	dV/dt = 1kV/µs, dI/dt = 200A/µs, V_{DSM} = 1.4kV	Eases EMI compliance with IEC61000-4-4, IEC61000-4-5

Automotive Thyristors SCR

Part Number	Package	Junction Temperature	Repetitive Peak Off-state Voltage	RMS On-state Current	Non-repetitive Peak Current	Noise Immunity	Thermal Resistance
		T_J	V_{DRM}, V_{RRM}	I_{TRMS}	I_{TSM}	dV/dt	$R_{TH(J-C)}$
		(°C)	(V)	(A)	(A)	(V/µs)	(°C/W)
TN3050H-12GY	D²PAK	150	1200	30	300	1000	0.8
TN3050H-12WY	TO-247			30	300	1000	0.3
TN6050HP-12WY	TO-247			60	600	1000	0.3

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