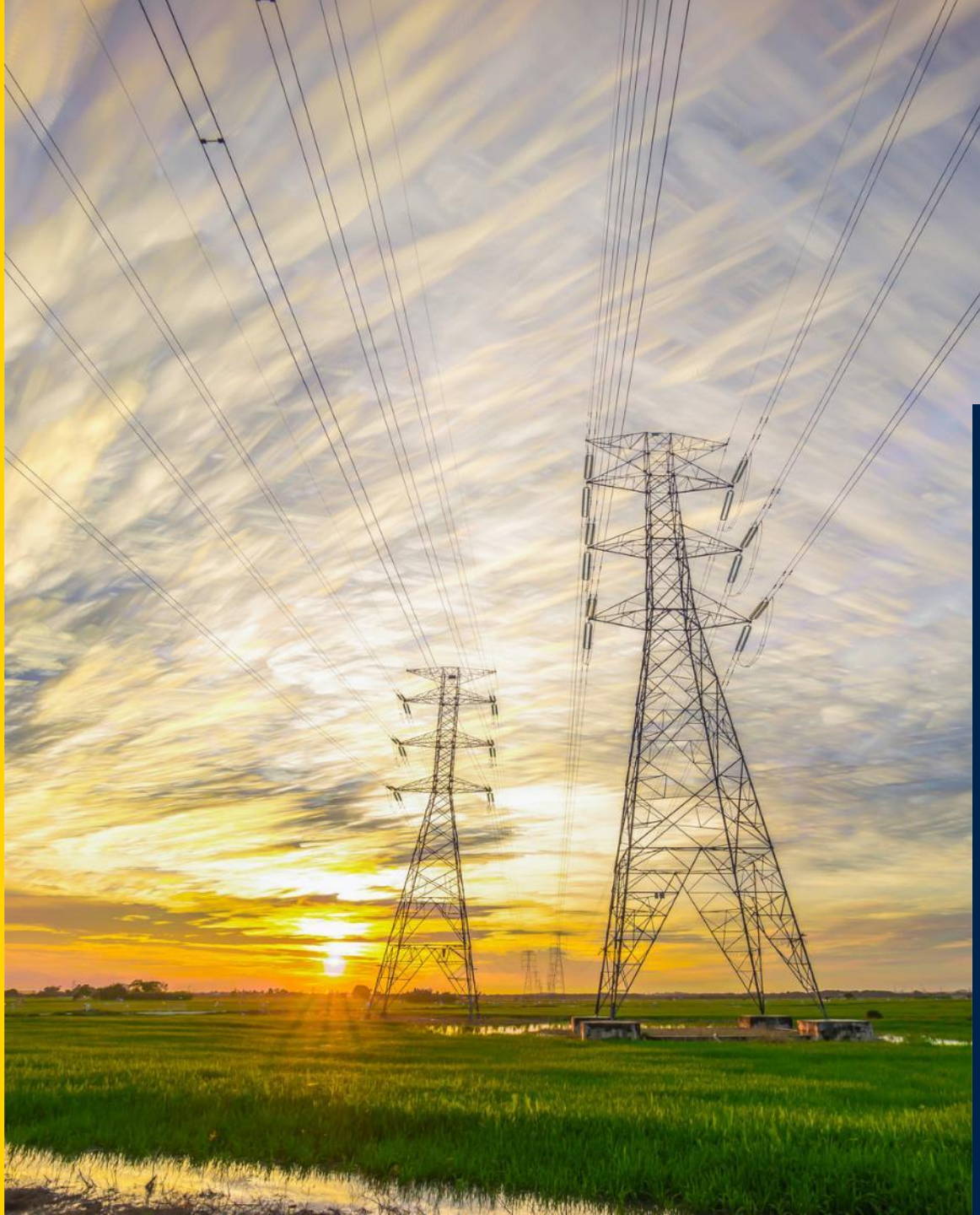

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Thyristors (SCRs), triacs, and AC switches portfolio

Discrete and Filter Division

Automotive and Discrete Group

Environmentally friendly thyristors (SCR), triacs, and AC switches

HF HALOGEN FREE

No fluorine

No chlorine

No bromine

No iodine

No astatine

RoHS 2011/65/EU (REACh compliant)

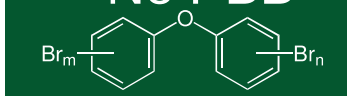
No lead plating

No mercury

No cadmium

No hexavalent chromium

No PBB



No PBDE

UL94-V0 flammability

SUSTAINABLE TECHNOLOGY by ST

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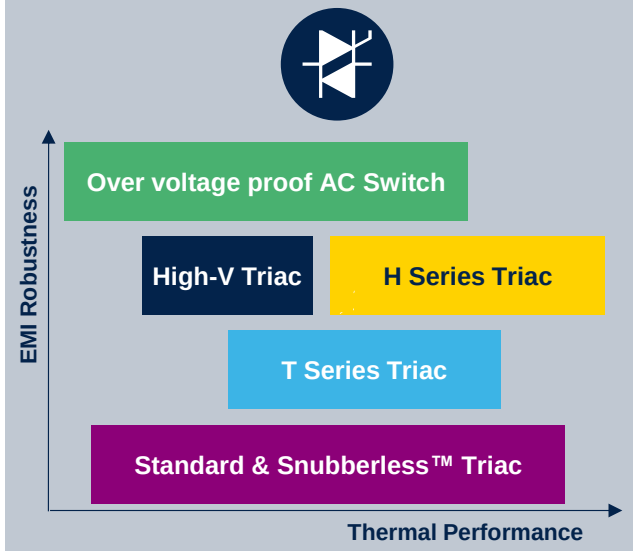
High-voltage, high-temperature thyristor portfolio

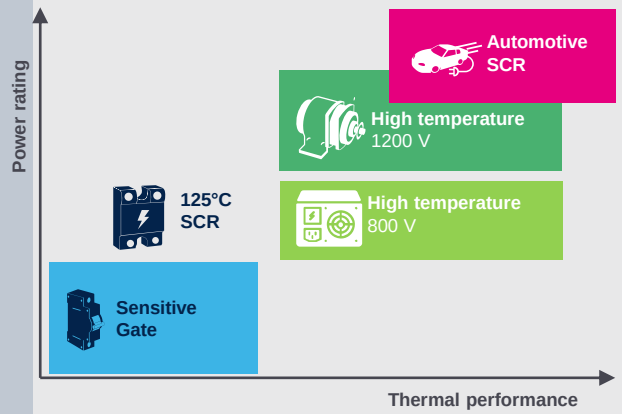
Enable higher system density with efficiency, robustness & digital control

Up to 1200 V and 150°C

Triacs & AC switches

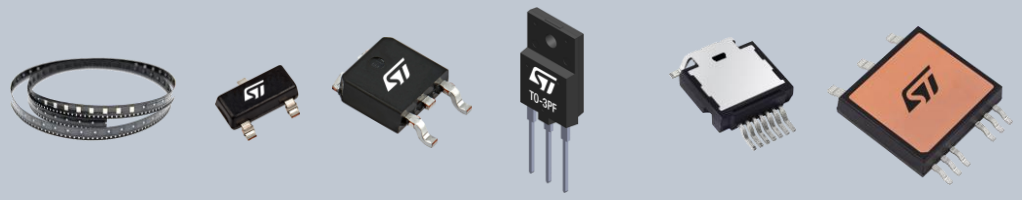


SCRs



Broad range, reliable supplier	Legacy home appliance devices
1200 V automotive SCR	TN3050H-12Y, TN4050HP-12Y, TN6050H-12Y
150°C H series thyristor	T4015H-6T/T1635H-8G
Top-side cooling	STTN6050H-12M1Y

Advanced packaging



BARE DIE | SOT-23 | DPAK | TO3-PF | HU3PAK | ACEPACK SMIT

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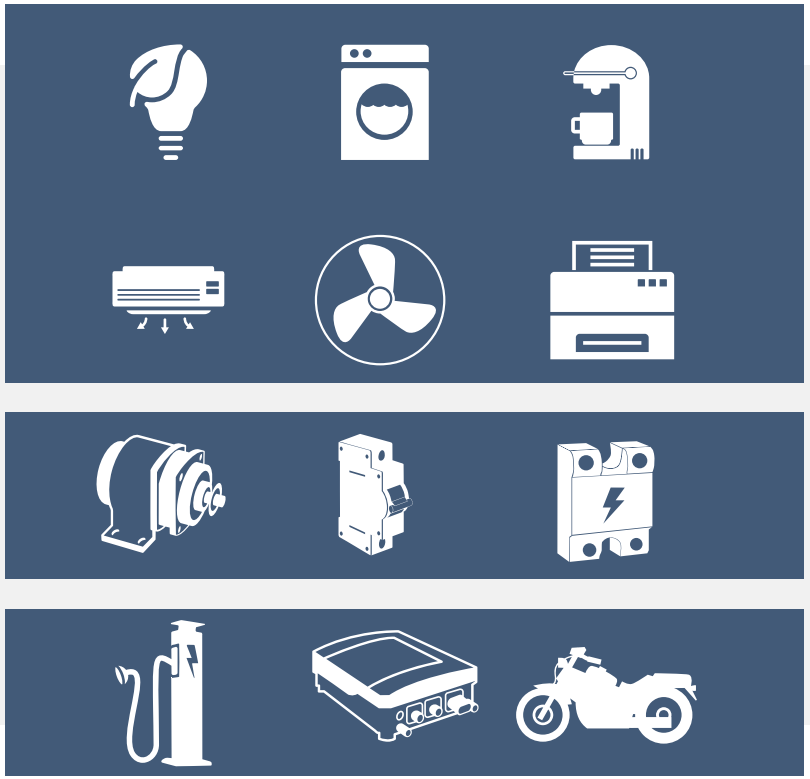
Thyristor innovation for emerging applications

Reliable solutions for vehicle electrification, renewable energies, smart industry, and digital appliances



- Industrial, automotive, and medical grade technology
- Robust and immune dedicated products
- Roadmap to 1800 V, 200 A, discrete & power modules
- Dedicated local application & engineering teams
- Complete portfolio of solutions, wide design tool set
- Long-term supply commitment

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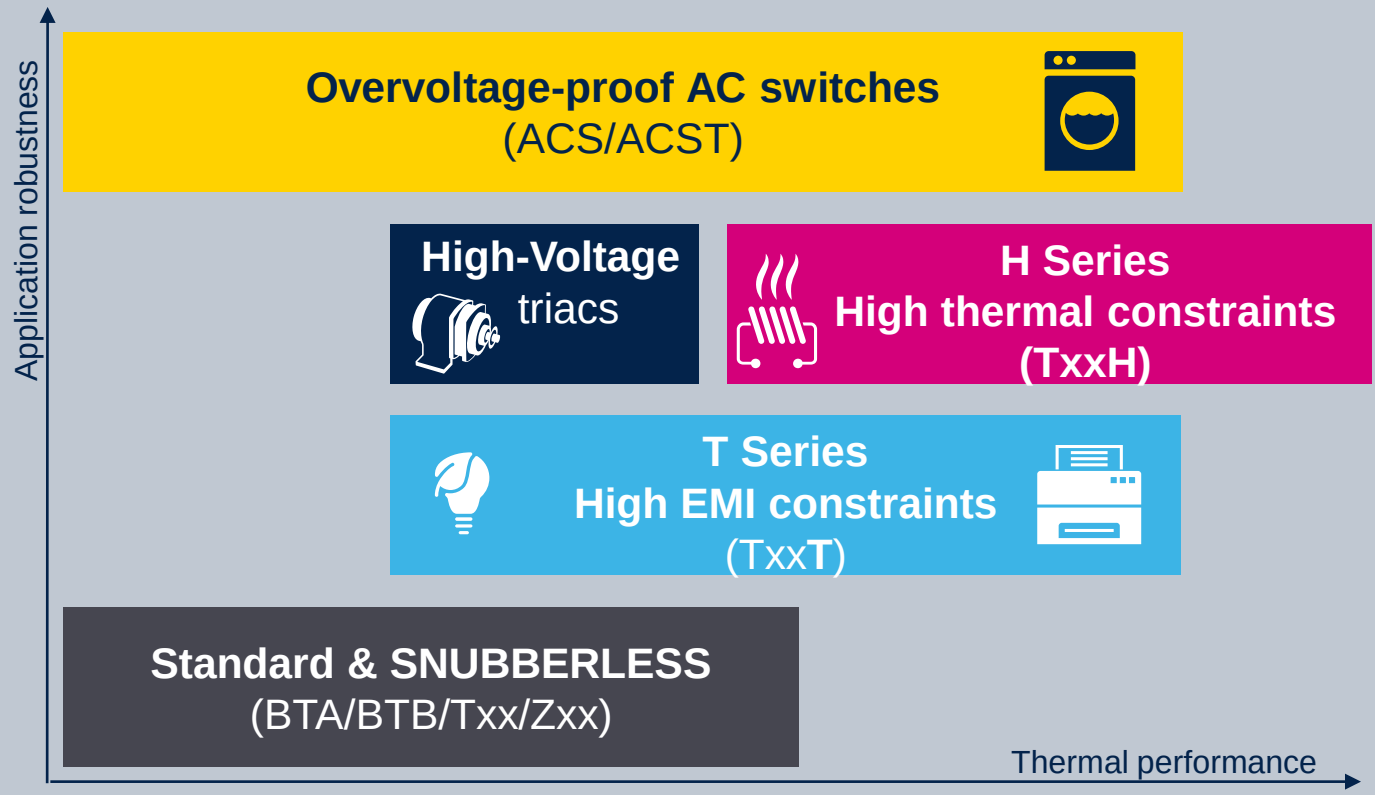
Complete range of triacs and AC switches

Bidirectional conduction



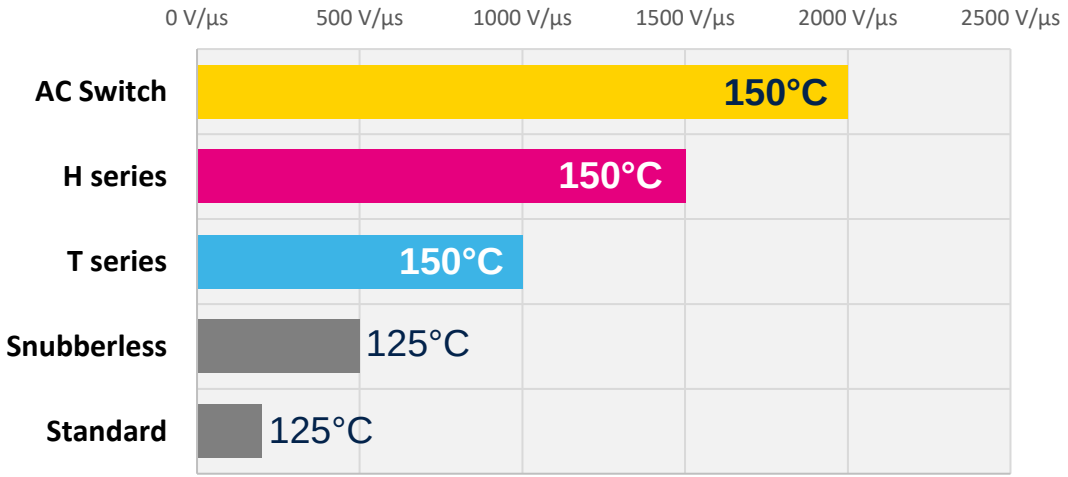
Electrical specifications:

- V_{DRM}: 600 to 1200 V
- $I_{T(RMS)}$: 0.2 to 50 A
- I_{GT}: 3 to 50 mA
- T_{Jmax}: 125 to 150°C

Triac and AC switch series

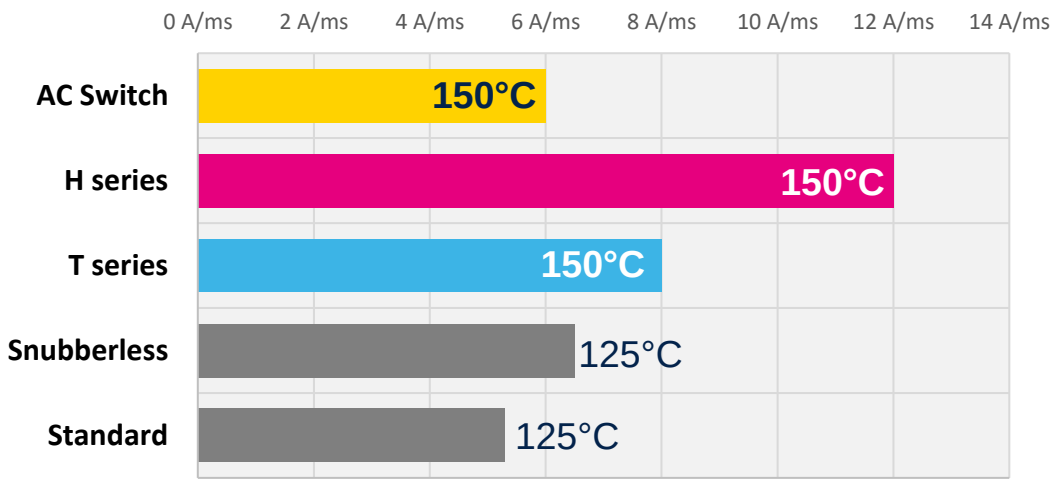
Performance comparison for 12 A triac, 800 V, I_{GT} = 35 mA

(dV/dt) improvement



Sensitive triac is designed to withstand higher dV/dt without false triggering

(dI/dt)c improvement



Triac turn–off allows handling stronger load current

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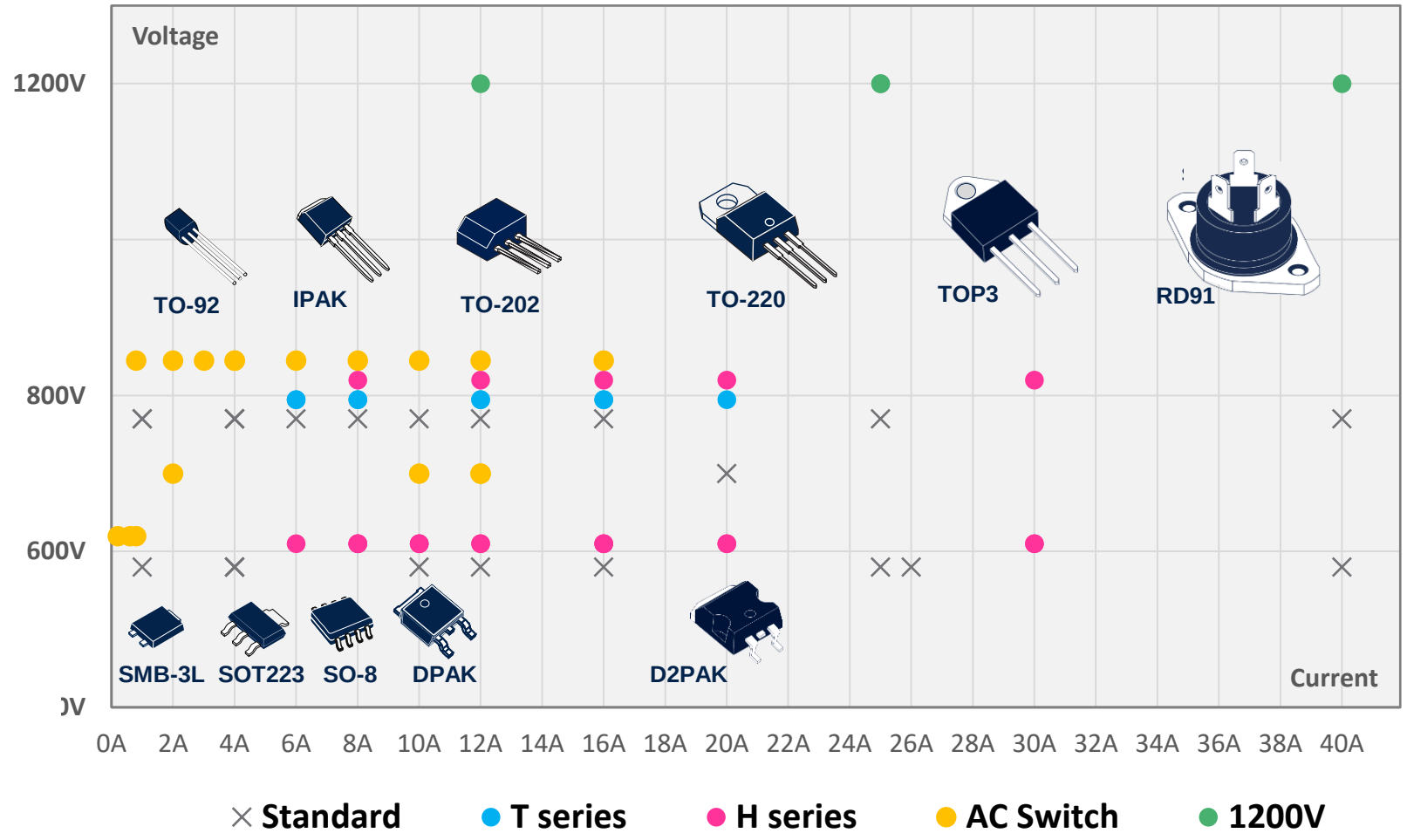
AC switch = ACST1235-8 **H series** = T1235H-8 **T series** = T1235T-8 **SNUBBERLESS** = BTA12-800CW **standard** = BTA12-800B

Triac product range

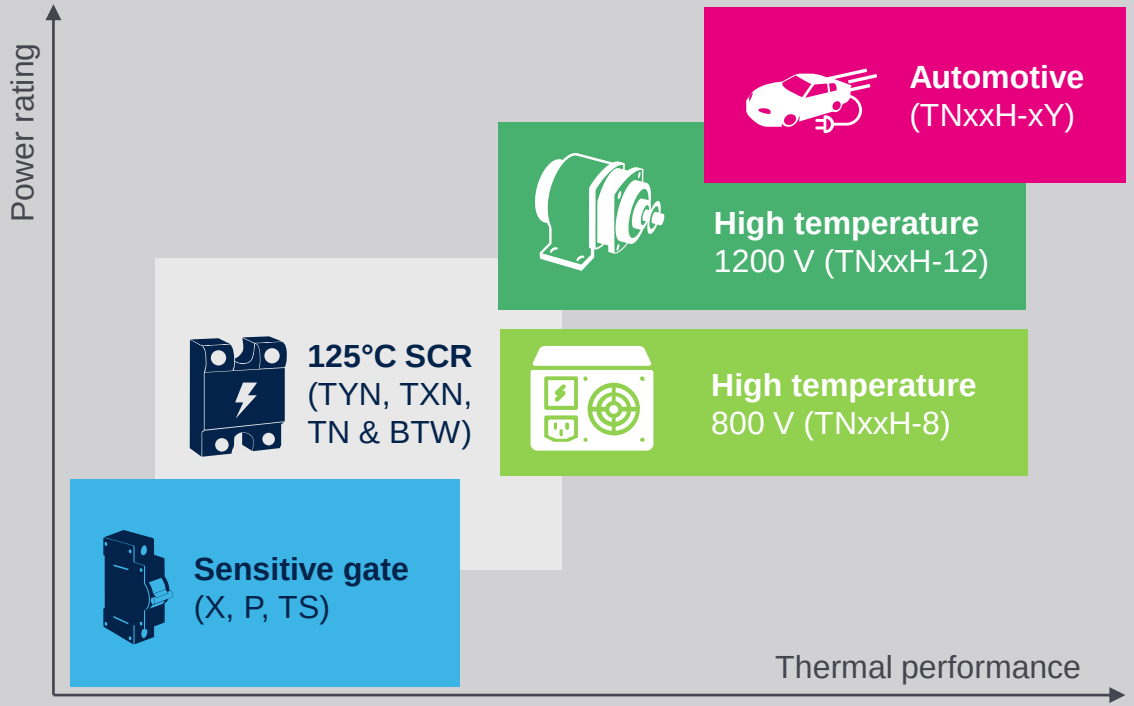
2500 V

Insulated package



Complete range of triacs and AC switches

Unidirectional conduction



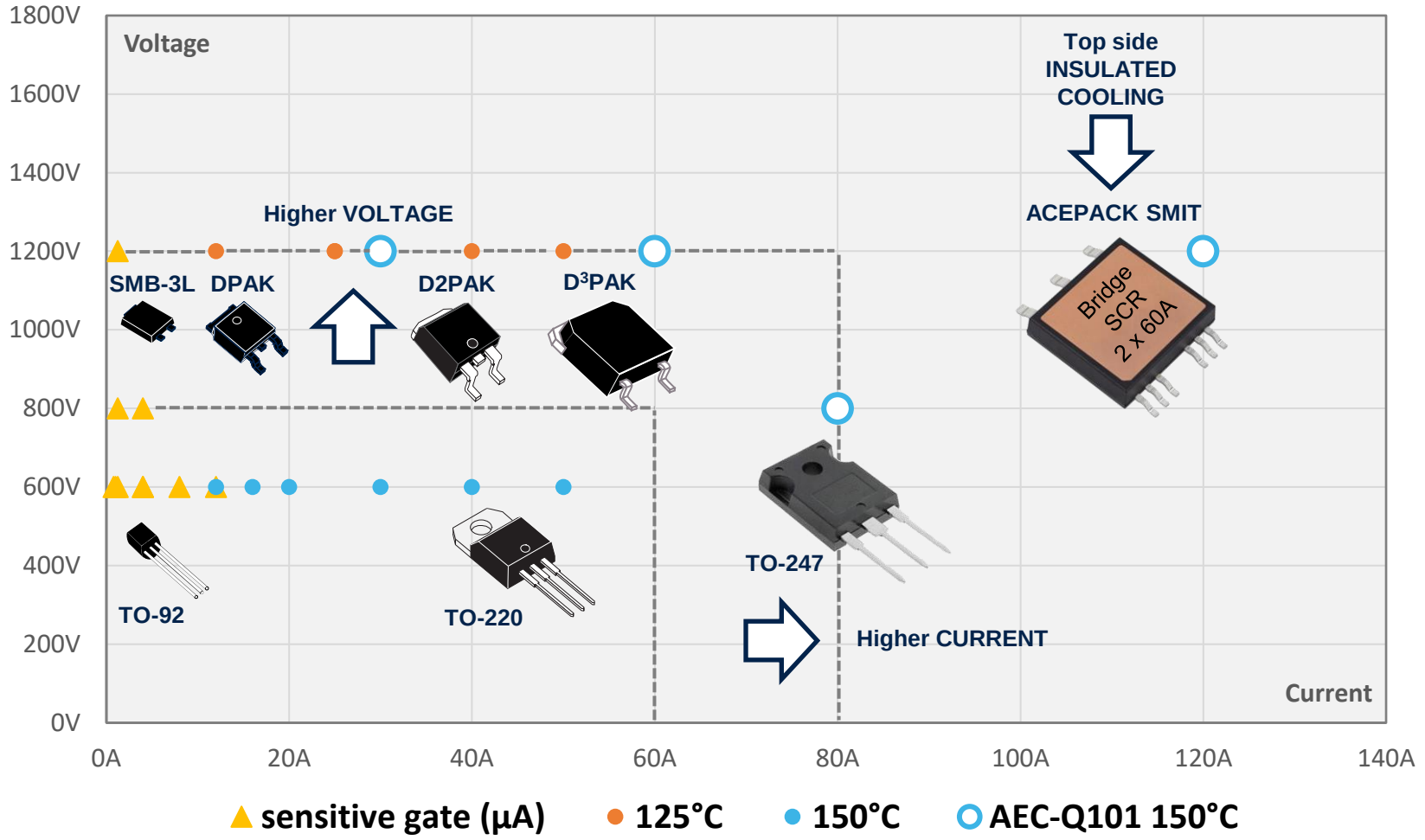
Electrical specifications:

- V_{DRM}: 400 to 1200 V
- $I_{T(RMS)}$: 0.25 to 130 A
- I_{GT}: 5 µA to 50 mA
- $T_{J\ MAX}$: 125 to 150°C

SCR product range

2500 V

Insulated package



Low-power triacs and sensitive-gate SCRs

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Low-power triacs (loads <200 W)

	I_T	V		Sensitivity				Packages							
	Amp	600 V	800 V	3 mA	5 mA	10 mA	25 mA 35 mA	TO-92	SO-8	SMBflat-3L	SOT-223	IPAK	DPAK	TO-220	TO-220FP
Standard triacs (4 quadrants)															
Z006	0.8	●			●			●			●				
Z01	1	●	●	●	●	●	●	●	●	●	●				
Z04	4	●	●	●	●	●	●					●	●		
T4_Q	4	●			●							●	●		
SNUBBERLESS triacs (3 quadrants)															
T4	4	●	●		●	●	●					●	●	●	●
ACS* and ACST															
ACS102	0.2	●			●				●						
ACS108	0.8	●	●		●	●		●		●	●				
ACST2	2		●			●							●		●
ACST3	3		●			●							●		
ACST4	4		●			●	●						●		

Washing machines

Irrigation

Inrush limiter for LEDs

Coffee machines

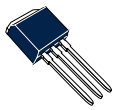
SMBflat-3L

SO-8

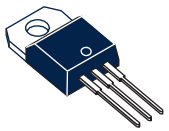
SOT-223

DPAK

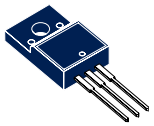
IPAK



TO-220AB



TO-220FPAB



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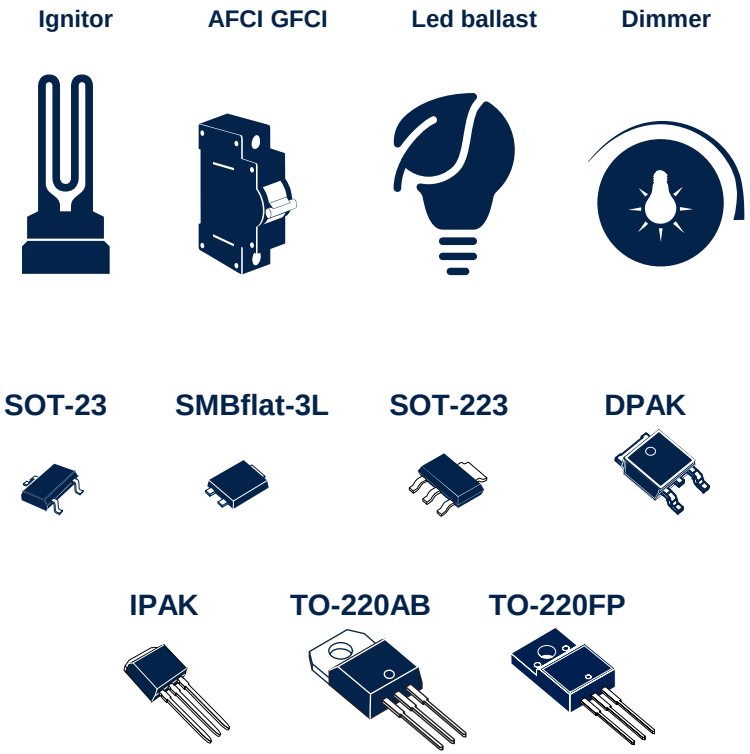
Sensitive-gate SCRs

	I_T	V			Sensitivity					Packages							
	Amp	600 V	800 V	1250 V	5 µA	50 µA	100 µA	150 µA	200 µA	TO-92	SMBflat-3L	SOT-223	SOT23	IPAK	DPAK	TO-220	TO-220FP
X and P01 families																	
X006/P01	0.8	●			●	●			●	●		●					
X01	1	●						●			●		●				
X02	1.25	●	●			●			●	●	●	●					
X04	4	●	●			●			●					●	●		
TS family																	
TS420	4	●							●					●	●	●	
TS820	8	●							●					●	●		●
TS1220	12	●							●					●	●		●
TS family overvoltage protected																	
TS110	1.25			●			●			●	●						



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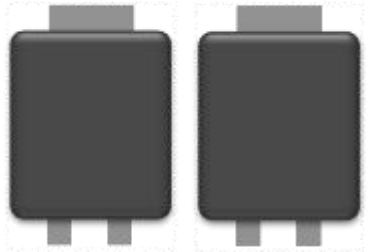
Sensitive SCR for e-breakers

Large product range, tailored by market, smallest package

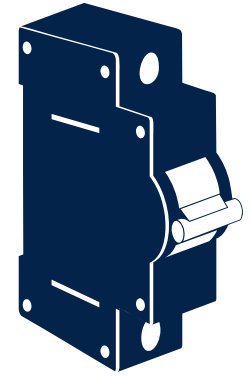
x1
SOT223

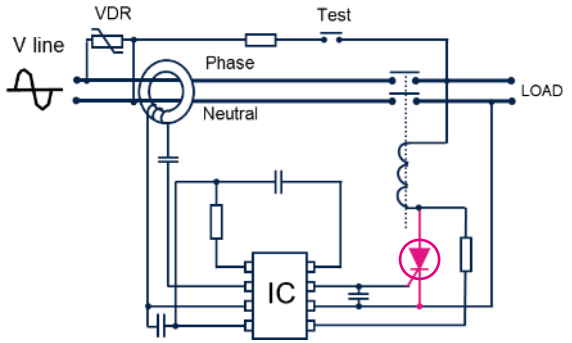


x2
SMBFlat-3L

x3
SOT23

		Legacy	220 V market	110 V market	Legacy
PARAMETER		**X0202**	**TS110**	**X0115**	**P0102**
I_{GT}		N/A	N/A	30 µA	N/A
		200 µA	100 µA	150 µA	200 µA
Tq (typ)			30 µs	20 µs	20 µs
$I_{T(RMS)}$		1.25 A	1.25 A	0.8 A	0.25 A
I_{TSM}		25 A	20 A	7.6 A	7 A
V_{DRM}		800 V	800 V	600 V	200 V
V_{DSM}		N/A	1250 V	750 V	N/A
dI/dt		50 A/µs	100 A/µs	50 A/µs	50 A/µs
dV/dt		10 V/µs	100 V/µs	80 V/µs	200 V/µs
Packages	TO-92	X0202NA	TS110-8A1		
	SOT-223	X0202NN			P0102DN
	SMBF-3L	X0202NUF	TS110-8UF	X0115MUF	
	SOT23			X0115ML	P0102BL





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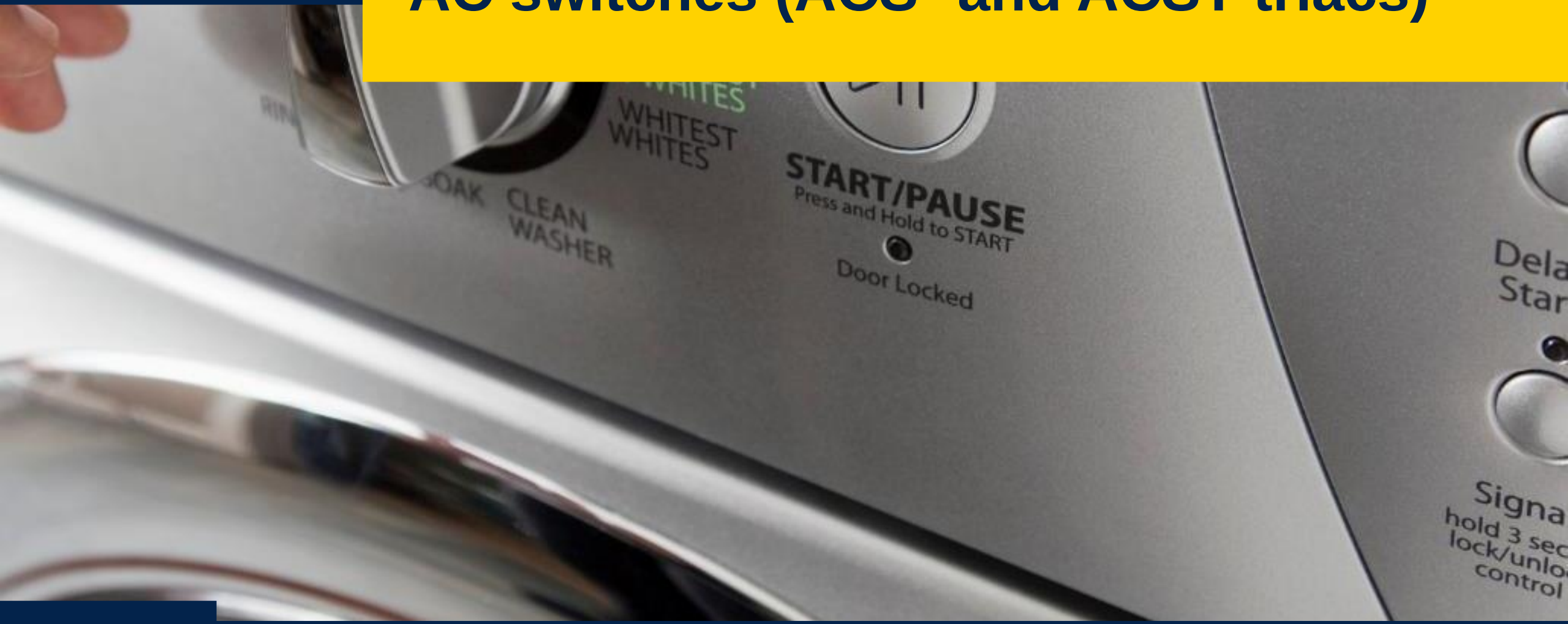
AC switches (ACS* and ACST triacs)



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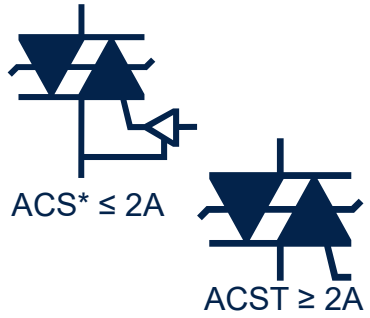
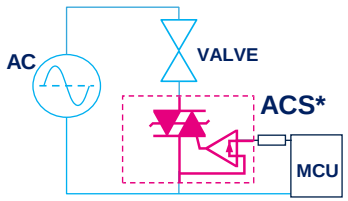
Overvoltage-protected AC switches and triacs

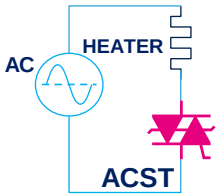
Overvoltage protection	EOS 2 kV without MOV
High junction temp. options	Improved reliability
Best-in-class application robustness	EFT up to 6 kV
5 to 10 mA gate current	Direct MCU drive
Surface mount options	Reduced PCB footprint



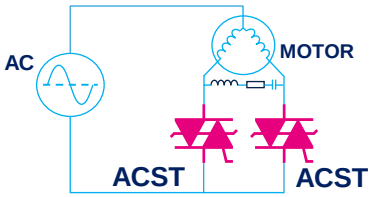
Actuator drive



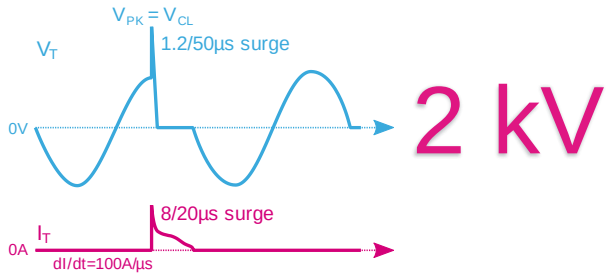
Heating



Motor drive



IEC 61000-4-5



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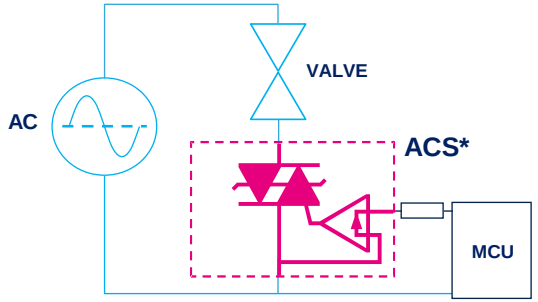
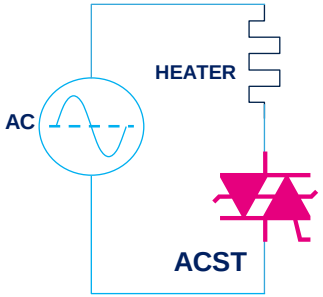
Overvoltage-protected ACS* switches and triacs Applications and topologies

ACS **switches**	**AC loads < 2A** • Solenoids • Valves • Actuators	**Door lock**	**Washing machine**	**Valve**	**Garden irrigation**
ACST **triacs**	**AC load ≥ 2A** • Pumps • Inductive motors • Compressors	**Refrigeration compressor**	**AC motor control**	**Rolling shutter**	**HVAC**

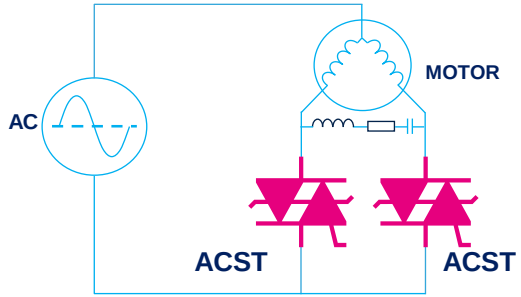
Actuator drive



Heating



Motor drive



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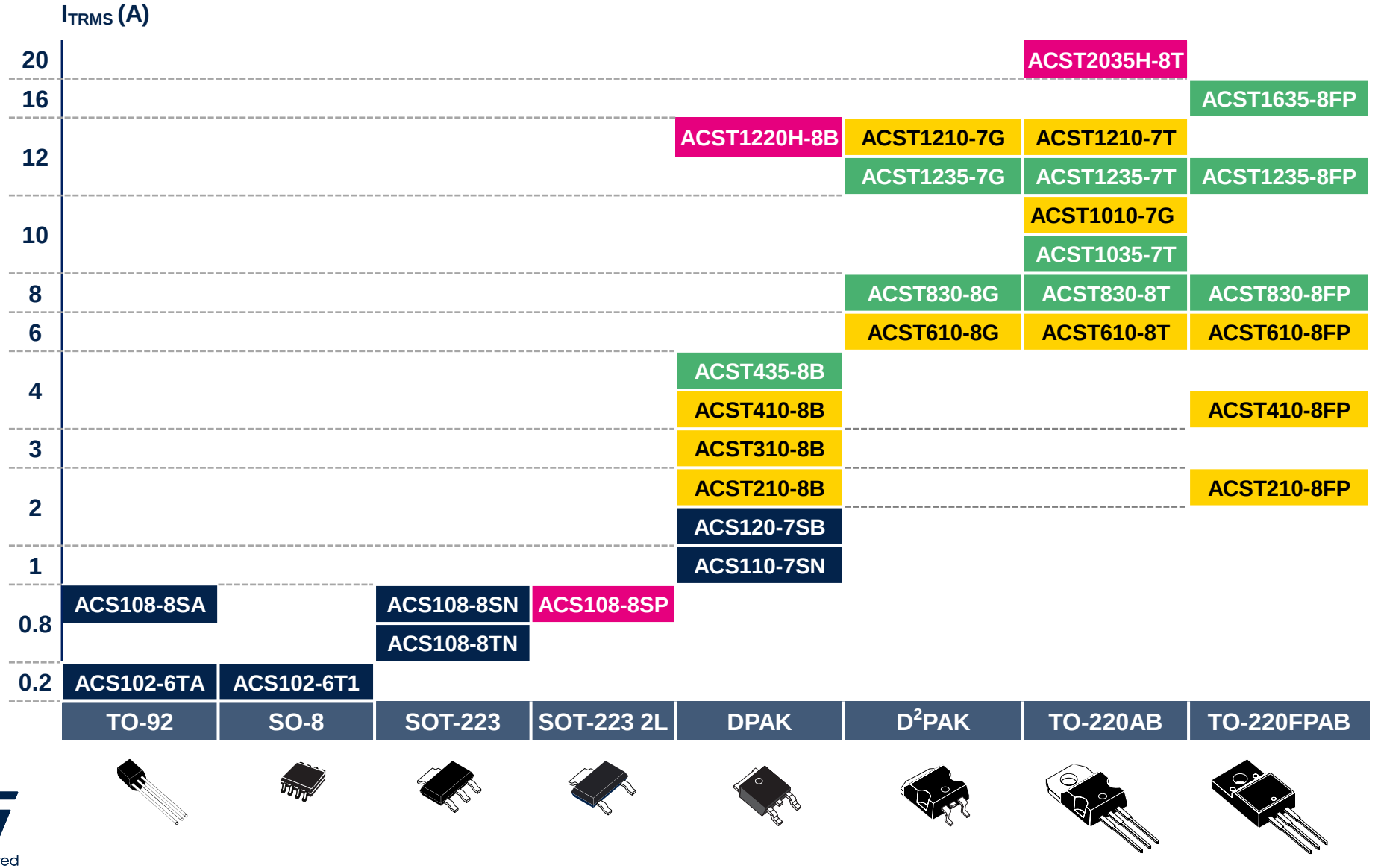
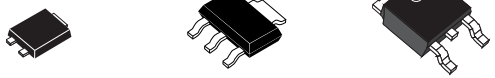
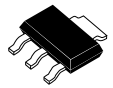
ACS/ACST switches for highly robust applications

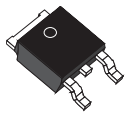


Overvoltage-protected AC switches (<2A)

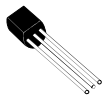
Part number	Package	$I_{T(RMS)}$ (A)	V_{DRM} / V_{RRM} (V)	I_{GT} (mA)	I_{TSM} (A)	dV/dt (1) (V/µs)	$(dI/dt)_c$ (A/ms)	Max. T_J (°C)
		RMS on-state current	Repetitive peak off-state voltage	Triggering gate current	Nonrepetitive surge peak on-state current	Rising ratio of off voltage	Rate of decrease of on-state current	Junction temperature
		Max. (A)	Max. (V)	Max. (mA)	Max. (A)	Min. (V/µs)	Min. (A/ms)	Max. (°C)
Logic-level ACS*								
ACS102-6T1	SO-8	**0.2**	600	5	7	300	0.15	125
ACS302-6T1	SO-20			5 (x3)				
ACS108-8TN	SOT-223	**0.8**	800	5	13	600	0.8	
ACS108-8SA	TO-92			10	13	2000	2	
ACS108-8SN	SOT-223 3L							
ACS108-8SP	SOT-223 2L							
ACS120-7SB	DPAK	**2**	700	10	20	500	1	
ACS120-7ST	TO-220AB							

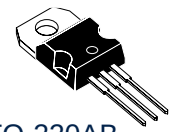

SMBflat-3L


SOT-223


DPAK

Surface mount


TO-92


TO-220AB

Noninsulated

RoHS 2011/65/EU

HF HALOGEN FREE

(1) Measured at 400 V

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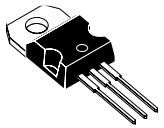
Overvoltage-protected AC switches (>2A)

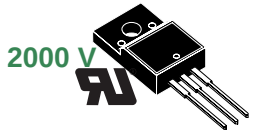
Part number	Package				$I_{T(RMS)}$	V_{DRM} / V_{RRM}	I_{GT}	I_{TSM}	dV/dt	(dI/dt)c	Max. T_J
					Max (A)	Max (V)	Max (mA)	Max (A)	Min (V/µs)	Min (A/ms)	Max (°C)
	DPAK	D2PAK	TO-220AB	TO-220AB full Pack	RMS on-state current	Repetitive peak off-state voltage	Triggering gate current	Nonrepetitive surge peak on-state current	Rising ratio of off voltage	Rate of decrease of on-state current	Junction temperature
Logic level (direct MCU drive)											
ACST210-8	B			FP	**2**	800	10	8	500	0.5	125
ACST310-8	B				**3**			20	500	1	
ACST410-8	B			FP	**4**			30	500	2	
ACST610-8		G	T	FP	**6**			45	500	3.5	
ACST1010-7			T		**10**	700		100	200	4	
ACST1210-7		G			**12**			120	200	5	
SNUBBERLESS* (I_{GT}>20 mA)											
ACST435-8	B				**4**	800	35	30	1000	5	125
ACST830-8		G	T	FP	**8**		30	80	2000	8	
ACST1035-7		G			**10**	700	35	100	2000	12	
ACST1220		G			**12**						
ACST1235-7		G			**12**			120	2000	14	
High-temperature SNUBBERLESS*											
ACST1235-8				FP	**12**	800	35	120	2000	6	150
ACST1635-8				FP	**16**			140	300	4	
ACST2035H-8			T			800	35	160	1000	30	

DPAK

D²PAK



TO-220AB



TO-220FPAB

Surface Mount | **Noninsulated** | **Insulated (UL)**

RoHS 2011/65/EU

HF HALOGEN FREE

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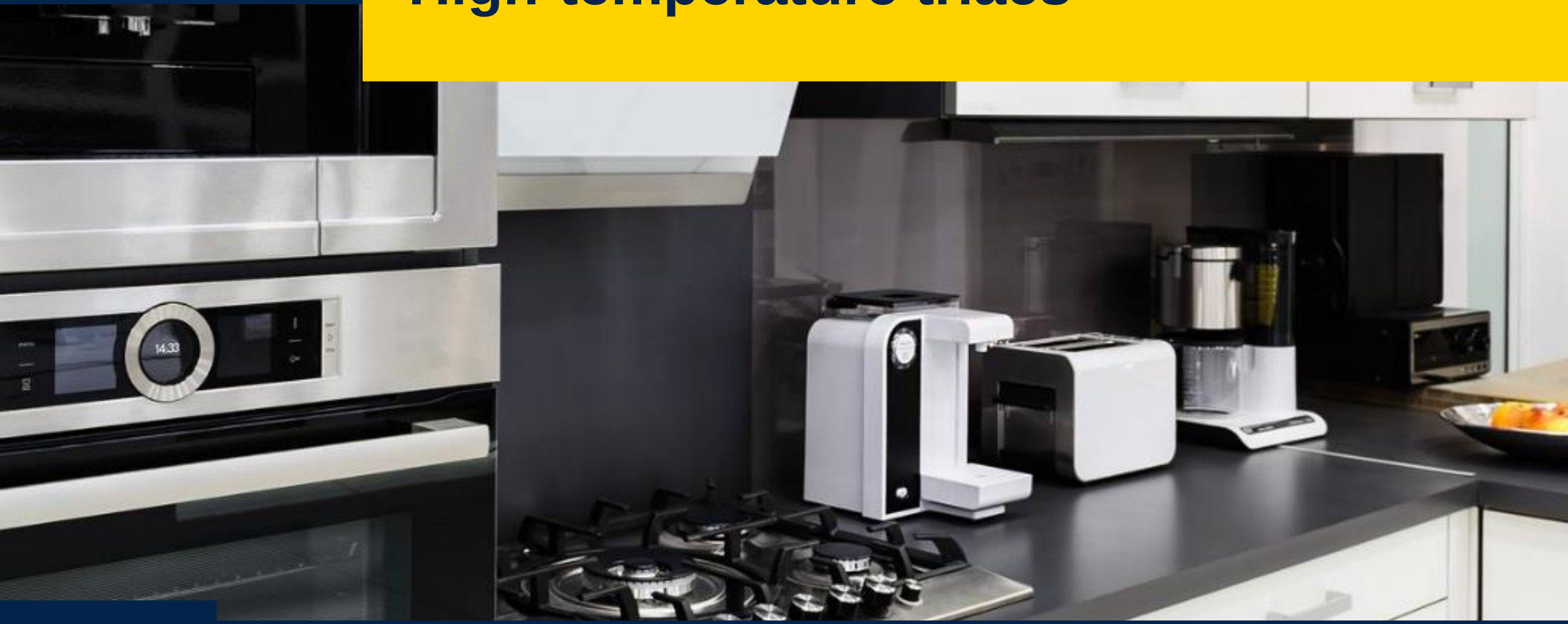
High-temperature triacs



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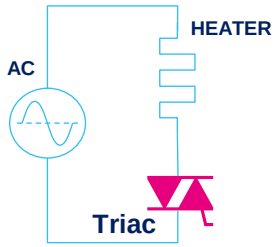
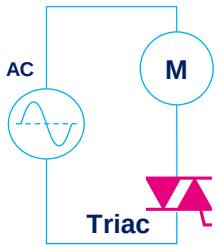
High-temperature (150°C), high-performance triacs

150°C junction operation	Improved reliability
High turn-off and noise immunity	Application robustness against EMI
Up to 800 V blocking voltage	Functional reliability
Logic Level gates available	Direct MCU drive
Wide package selection	Compact / innovative designs

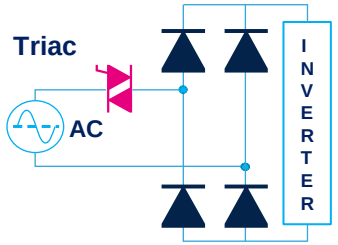
Heater/thermostat

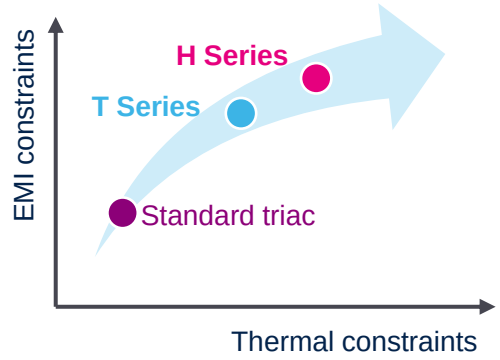


Speed drive



Inrush current limiter





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High-temperature (150°C), high-performance triacs Applications and topologies

T Series

High EMI constraints

- Inductive AC loads
- Universal motors
- Phase control

Washing machines

Laser printers

Vacuum cleaners

Light dimmers

H Series

High thermal constraints

- Inrush limiters
- High ambient temp
- Heating

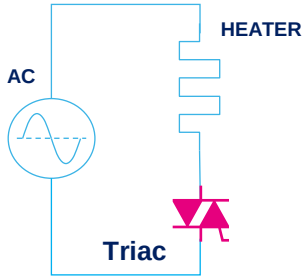
Smart plugs

Water heaters

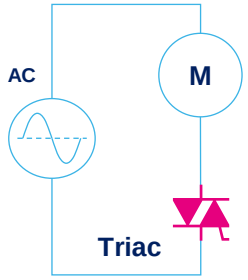
Coffee machines

AC motors

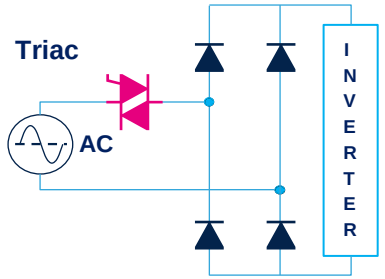
Heater/thermostat



Speed drive



Inverter inrush limiter



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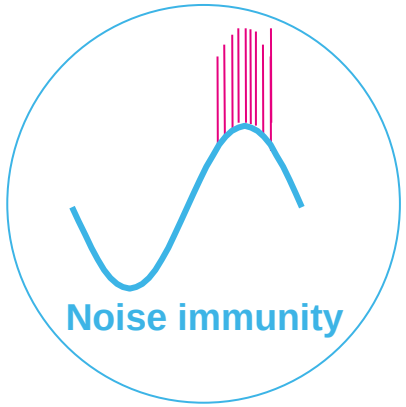
T-series triacs for applications with high EMI constraints

For robust appliances

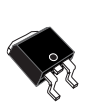


6 kV

Easy IEC 61000-4-4 design

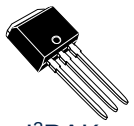
Part number	Package				$I_{T\ (RMS)}$	T_j	V_{DRM}, V_{RRM}	I_{GT}	I_{TSM}	dV/dt	(dI/dt)c
	TO-220AB	TO-220AB Ins	I2PAK	D2PAK	RMS on-state current	Junction Temp.	Repetitive peak off-state voltage	Triggering gate current	Nonrepetitive surge peak on-state current	Rising ratio of off voltage	Rate of decrease of on-state current
					Max. (A)	Max. (°C)	Max. (V)	Max. (mA)	Max. (A)	@Tj 150°C Min. (V/µs)	@Tj 150°C Min. (A/ms)
Logic Level (direct drive by MCU)											
T610T-8	T				6	150	800	10	45	170	3.7(1)
T810T-8	T			G	8				60		4(1)
T1210T-8	T			G	12				90		8(1)
T1610T-8	T	I		G	16				120		15(1)
SNUBBERLESS											
T635T-8	T				6	150	800	35	45	1000	3(2)
T835T-8	T	I		G	8				60		4(2)
T1235T-8	T	I	R	G	12				90		8(2)
T1635T-8	T	I		G	16				120		12(2)
T2035T-8				G	20				160		21(2)

(1) (dI/dt)c @ 0.1 V/µs (2) $(dI/dt)_C$ w/o RC snubber

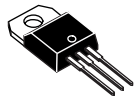


D²PAK

Surface Mount

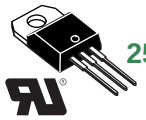


I²PAK



TO-220AB

Noninsulated



TO-220AB Ins.

Insulated (UL)

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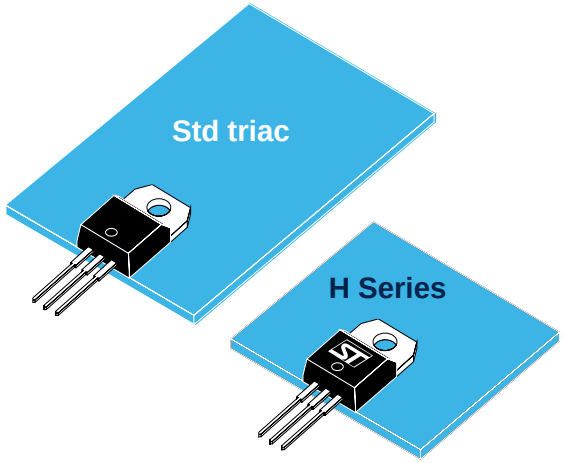
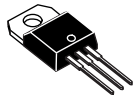
H-series triacs for applications with high thermal constraints

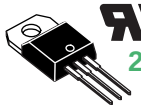
Compact solution for heavy loads



-50%
Heatsink size

D²PAK


TO-220AB


2500 V
TO-220AB Ins.

	Part number	Package			$I_{T(RMS)}$	T_J	V_{DRM}, V_{RRM}	I_{GT}	I_{TSM}	dV/dt	$(dI/dt)_c$
		TO-220AB	TO-220AB insulated	D²PAK	A	°C	V	mA	A	V/µs @150°C	A/ms @10V/µs, @150°C
					Max	Max	Max	Max	Max	Min	Min
6H-Series	600 V, 10 mA gate, Logic-Level triacs										
	T610H-6	T			6	150	600	10	60	75	2.3
	T810H-6	T		G	8				80	75	3
	T1010H-6	T		G	10				100	75	3.8
	T1610H-6	T			16				160	100	3
	600 V, 35 mA gate, SNUBBERLESS triacs										
	T835H-6	T	I	G	8	150	600	35	80	1000	11
	T1035H-6	T	I	G	10				100		13
	T1235H-6	T	I	G	12				120		16
	T1635H-6	T	I	G	16				160		21
	T2035H-6	T	I	G	20				200		27
	T3035H-6	T	I	G	30				270		33
	600 V, 50 mA gate, SNUBBERLESS triacs										
	T850H-6	T	I	G	8	150	600	50	80	1500	14
	T1050H-6	T	I	G	10				100		18
	T1250H-6	T	I	G	12				120		21
	T1650H-6	T	I	G	16				160		28
	T2050H-6	T		G	20				200		36
	T3050H-6	T	I	G	30				270		44
8H-Series	800 V, 35 mA gate, SNUBBERLESS triacs										
	T835H-8	T	I	G	8	150	800	35	80	1500	8
	T1235H-8	T	I	G	12				120		12
	T1635H-8	T	I	G	16				160		16
	T2035H-8	T	I	G	20				200		20
	T3035H-8	T	I	G	30				270		25

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High-voltage triacs and thyristors (SCR)

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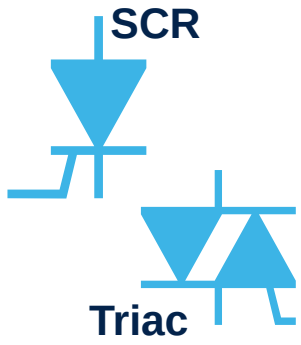
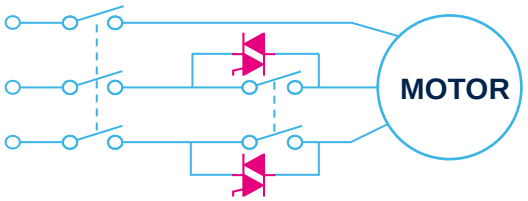
High-voltage triacs and thyristors (SCR)
High application robustness for 3-phase AC loads

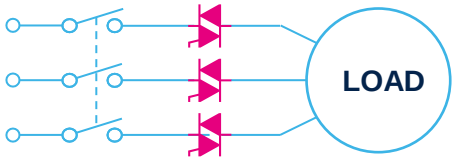
1200 V AC blocking voltage	500 V_{RMS} 3-phase AC load compatible
Low trigger current options	Compact gate drive
Outstanding dynamic perf.	Improved application robustness
High thermal performance	Enhanced thermal reliability
Surface mount options	Compact / innovative designs



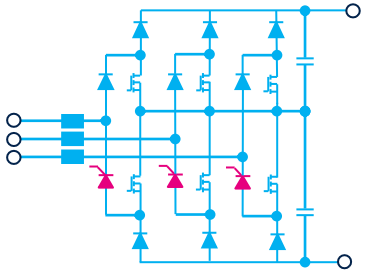
Hybrid motor starter



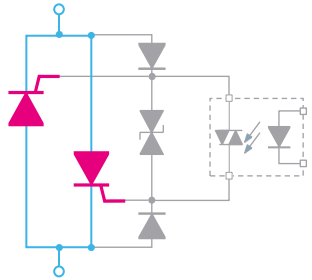
Motor soft starter



3-Phase Vienna



Isolated static switch



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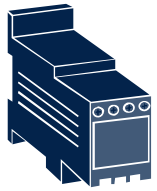
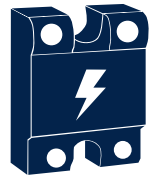
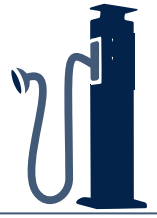
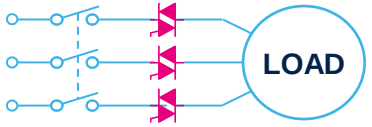
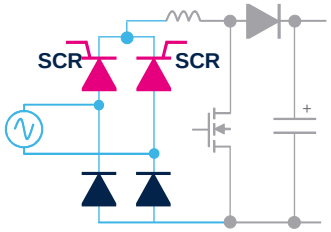
High-voltage triacs and thyristors (SCR) for power conversion

Triac	• Controlled bridges • AC switching • Motor starters	IE3 motor starter 	Heating	HVAC	Solid state relay 
SCR	• Controlled bridges • AC switching • Motor starters	Critical power UPS	Charging Station 	Renewable	Energy management

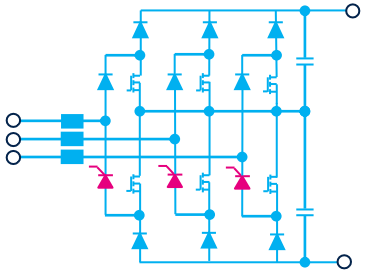
Motor soft starter



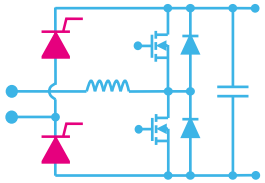
Controlled bridge



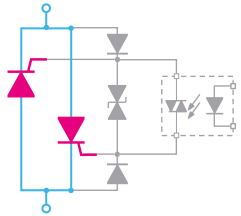
3-Phase Vienna



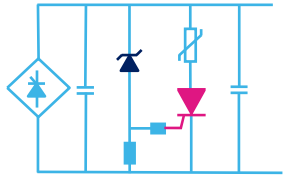
Totem pole PFC boost



Solid static relays



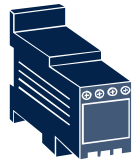
10 kV surge protection



High-voltage triacs
High application robustness for 3-phase AC loads

Part number	Package	$I_{T(RMS)}$	V_{DRM}, V_{RRM}	I_{TSM}	I_{GT}	dV/dt	$(dI/dt)_c$	T_J
		A	V	A	mA	V/µs	A/ms	°C
		Max	Max	max	Max	Min	Min	Max
12A, 1200 V, 125°C triac								
TXDV1212	TO-220AB Ins.	12	1200	120	100	2000	30	125
25A, 1200 V, 125°C triac								
T2550-12T	TO-220AB	25	1200	240	50	2500	20	125
T2550-12I	TO-220AB Ins.							
T2550-12G	D2PAK							
TPDV1225	TOP3 Ins.			230	150	2000	88	
40A, 1200 V, 125°C triac								
TPDV1240	TOP3 Ins.	40	1200	350	200	500	142	125

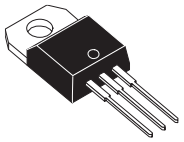
Motor starter



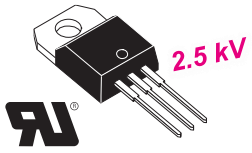
Heating

3-phase motor drive

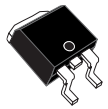
Solid-state relay



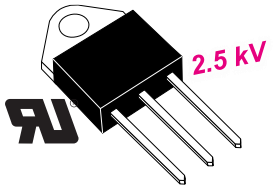
TO-220AB



TO-220AB insulated



D2PAK



TOP3 insulated

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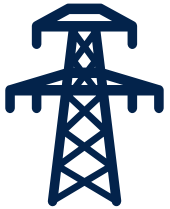
1200 V thyristors (SCR)
Reliable, compact designs for new AC-DC applications

	Part number	Package	RMS current (A)	Triggering (mA)	Surge current (A)	dV/dt (V/µs)
Industrial-grade	**1200 V, 125°C**					
	TYN1212RG	TO-220AB	12	15	120	200
	TN2540-12G	D^2PAK	25	40	300	1500
	TYN1225RG	TO-220AB	25	40	300	1500
	BTW68-1200RG	TOP3-I	30	80	400	250
	TN4050-12PI	TOP3-I	40	50	400	500
	TN4050-12WL	TO-247 LL	40	50	400	500
	BTW69-1200N	TOP3	50	50	700	1000
	BTW69-1200RG	TOP3-I	50	80	580	1000
	TN6050-12PI	TOP3-I	60	50	700	2000
	TN6050-12WL	TO-247 LL	60	50	700	2000
	TN5050H-12PI	TOP3-I	50	50	450	1500
	TN8050H-12PI	TOP3-I	80	50	680	1500
Automotive-grade	**1200 V, 150°C**					
	TN3050H-12GY	D^2PAK	30	50	300	1000
	TN3050H-12WY	TO-247	30	50	300	1000
	TN6050HP-12WY	TO-247	60	50	600	1000

Critical power UPS

HVAC

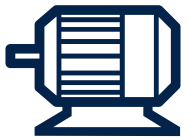
Energy management

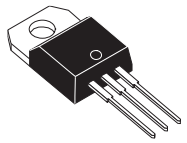


Renewable

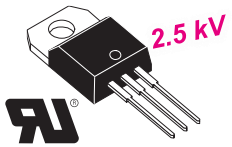
Charging stations

IE3 motor starters



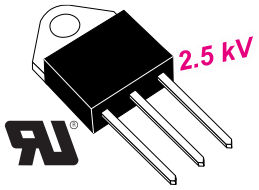


TO-220AB

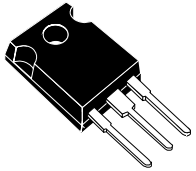


TO-220AB Ins.

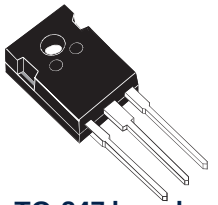
D2PAK



TOP3 insulated



TO-247



TO-247 long lead

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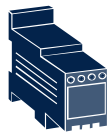
25-80 A thyristors for industrial applications

	RMS	Part number				Voltage			I_{GT} (mA)	dV/dt @ T°j (V/µs)	T°j (°C)	I_{TSM} (A)	TOP3 Ins	TO3PF	D3PACK	RD91
		SCR	Triac	3Q	4Q	600 V	800 V	1200 V								
600 V 800 V	25A		BTA26	●	●	●	●		35	1000	125	250	●			
			T2650	●		●			50	1000	125	260		●		
	30A	BTW68					●		50	500	125	400	●			
	40A		TPDV840	●			●		200	500	125	350	●			
			BTA41	●	●	●	●		50	500	125	400	●			●
			T4050	●		●			50	1000	125	400		●		
	50A	BTW69				●	●		80	1000	125	580	●			
			T5035H	●			●		35	2000	150	500	●			
	80A	TM8050H					●		50	1000	150	670			●	
1200 V	25A		TPDV1225	●				●	150	2000	125	230	●			
	30A	BTW68						●	50	250	125	400	●			
	40A		TPDV1240	●				●	200	500	125	350	●			
		TN4050						●	50	2000	125	400	●			
	50A	BTW69						●	80	1000	125	580	●			●
		TN5050H						●	50	1000	150	580	●			
	60A	TN6050						●	50	2000	125	700	●			
	80A	TN8050H						●	50	1500	150	680	●			


Motor starter

Heating

HVAC

Solid State relay

UPS

Charging Station

Renewable

Energy management

TOP3 Ins 2.5 kV

D3PACK

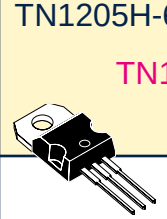
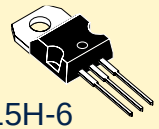
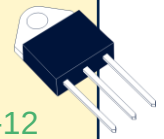
RD91 2.5 kV

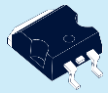
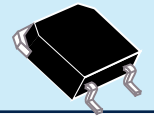
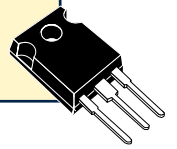
Industrial SCR thyristors for in-rush current limitation

SCR portfolio to fit a wide range of industrial applications

600 V → 800 V → 1200 V

Application	< 1 kW	< 3.6 kW	< 7.2 kW up to 50 kW	
			1-Phase	3-Phase
SMPS	TN1205H-6 TN1605H-8 TN2010H-6	TN3015H-6 TN4015H-6 TN5015H-6	TN5015H-6	TN5050H-12 TN8050H-12
Air conditioning				
Solar microinverter	TN1605H-8	TN3015H-6	TM8050H-8	
EV charging station				TM8050H-8

High-temperature thyristors (SCR)

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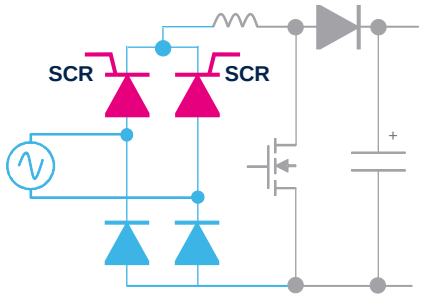
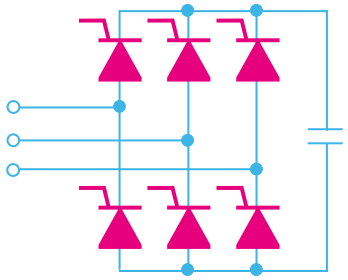
High-temperature thyristors (SCR) for better reliability and more compact designs

High junction temperature	Heatsink reduction
Up to 1200 V	Compatible with 3-phase AC chargers
Narrow triggering current	Accurate drive circuit
High noise immunity	Easier to design
Surface mount options	High application merit

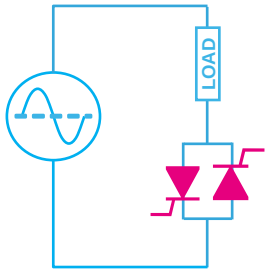
Controlled bridge

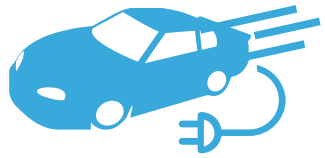


3-Phase R-Regulator



SSR





AEC-Q101 qualified

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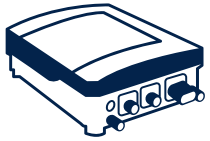
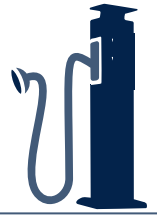
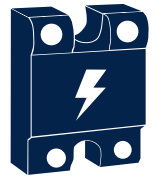
High-temperature thyristors (SCR) in industrial and automotive applications

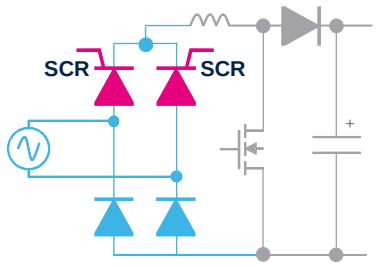
600 V 800 V	Single-phase AC • Inrush limiters • Rectifier regulators • V surge protection	Motor bike	SMPS	Battery charger	AC-DC conversion
1200 V	3-phase AC • Controlled bridges • AC switching • Motor starters	OBC	Charging station	Motor control	Solid state relay



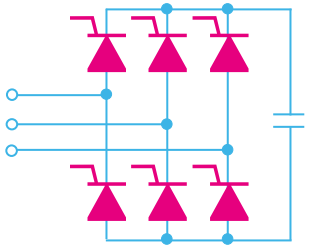




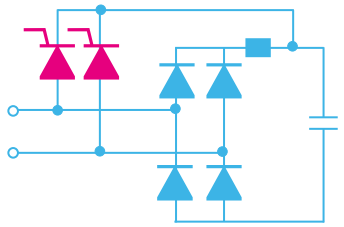
Controlled bridge



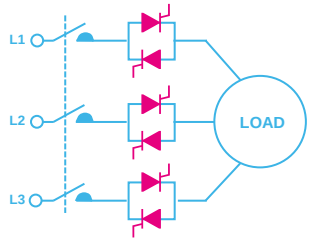
3-phase bridge



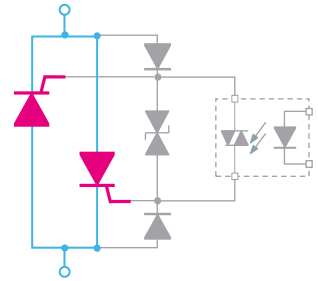
Bridge bypass



3-phase controller



Isolated static switch



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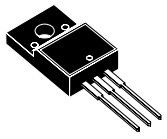
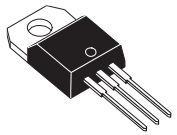
Standard thyristors (SCR)

Insulated

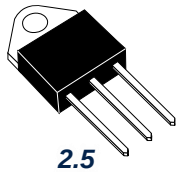
TO-220FP — 2 kV



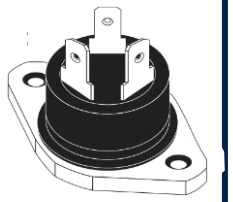
TO-220 Ins. — 2.5 kV



TOP3 Ins — 2.5 kV

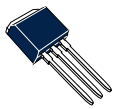


RD91

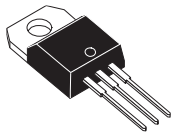


Through hole

IPAK



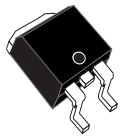
TO-220



SMD

DPAK

D2PAK



	Part number	I_{TRMS} (A)	Voltage 600 V	Voltage 800 V	I_{GT} (mA)	dV/dt @ 150°C (V/µs)	T°j (°C)	I_{TSM} (A)	IPAK	TO-220	TO-220FP	TO-220 ins	TOP3 Ins	DPAK	D2PAK	RD91
600 V 800 V	TYN606	6	●		15	200	125			●						
	TN805	8	●		5 to 15	5	125							●		
	TN815	8		●	15	150	125		●					●		
	TS820	8	●		0.2	5	125				●					
	TYN608	8	●		15	15	125			●						
	TYN610	10	●		15	200	125			●						
	TYN810	10		●	15	200	125			●						
	TN1205T	12	●		5	100	125							●		
	TN1215	12	●	●	15	200	125		●					●	●	
	TYN612M	12	●		5	50	125			●	●					
	TYN612	12	●		15	200	125			●		●				
	TYN812	12		●	5 to 15	200	125			●						
	TN1515	15	●		15	200	125							●		
	TN1625	16	●		25	500	125								●	
	TYN616	16	●		25	500	125			●						
	TYN816	16		●	25	500	125			●						
	TN2540	25	●	●	40	1500	125								●	
	TYN615	25	●		40	1500	125			●		●				
	TYN825	25		●	40	1500	125			●		●				
	BTW68	30		●	50	500	125	400					●			
	TYN640	40	●		35	1000	125			●						
	TYN840	40		●	35	1000	125			●						
	BTW69	50	●	●	80	1000	125						●			
1200 V	TYN1212	12	1200		15	200	125			●						
	TN2540-12	25	1200		40	1500	125								●	
	TYN1225	25	1200		40	1500	125			●						
	BTW68	30	1200		50	250	125						●			
	TYN4050	40	1200		50	2000	125						●			
	BTW67 - BTW69	50	1000 - 1200		80	1000	125	580					●			●
	TN4050	40	1200		50		125						●			
	TN6050	60	1200		50	2000	125						●			

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High-temperature thyristors (SCR)

	Part number	I_{TRMS} (A)	I_{GT} (mA)	dV/dt @ 150°C (V/µs)	T°j (°C)	I_{TSM} (A)	TO-220	TO-220 ins	TOP3 Ins	T0-247 HC	DPAK	D2PAK	D3PAK	H2PAK	HU3PAK	ACEPAK	Grade
600 V	TN1205H-6	12	2 to 5	100	150	120	●					●					
	TN1605H-6	16	6	200	150	140	●					●					
	TN1610H-6	16	10	1000	150	140	●	●									
	TN2010H-6	20	10	400	150	180	●	●				●					
	TN2015H-6	20	15	750	150	180	●	●									
	TN3015H-6	30	15	1000	150	270	●	●				●					
	TN4015H-6	40	15	500	150	360	●	●				●					
	TN5015H-6	50	15	500	150	450	●	●				●					
800 V	TN1605H-8	16	5 to 8	500	150	160	●	●			●	●					
	TN4035HA-8	40	35	1500	150	300						●					AEC
	TN5015H-8	50	15	1000	150	500		●				●					
	TM8050H-8	80	50	1000	150	670				●			●				
1200 V	TN3050H-12	30	50	1000	150	300				●		●					AEC
	TN3050HP-12	30	50	1000	150	300									●		AEC
	TN4050-12	40	50		125				●	●							
	TN4050HP-12	40	50	1500	150	400								●	●		AEC
	TN4050HA-12	40	50	1500	150	400						●					AEC
	TN5050H-12	50	50		150				●	●							
	TN6050-12	60	50		125				●	●							
	TN6050HP-12	60	50	1000	150	600				●							AEC
	STTN6050H-12	2x60	50		150											●	AEC
	TN8050H-12	80	50		150				●	●							
	TN13050H-12	130	50		150	1100				●							
	TN13050HA-12	130	50		150	1100				●							AEC

Through hole

Surface mount

Top side cooling

Automotive-grade SCR product range

HP Series

High power density

	D2PAK	H2PAK	HU3PAK	TO-247	ACEPACK SMIT
TN3050H-12xY	●			●	
TN3050HP-12L2Y			●		
TN4050HP-12x2Y		●	●		
TN6050HP-12WY				●	
STTN6050H-12M1Y					●
STTD6050H-12M2Y					●

- Low standby and ON-state losses
- Compact & top-cooled packages
- Discretes or modules

HA Series

High robustness

	D2PAK	TO-220AB	TO-247LL
TN4050HA-12xY	●	2023	2023
TN8050HA-12W2Y			2023

- High rate of current turn-on capability
- Strong EMI immunity in OFF-state
- Extra overvoltage blocking capability

Fast HV discharge

	D2PAK	TO-247LL
TN4035HA-8GY	●	
TN12550HA-12W2Y		2023

- Very high overcurrent capability
- FMEA compliant with automotive safety standards
- High creepage TO-247 or D2PAK compact SMD package

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Package innovation

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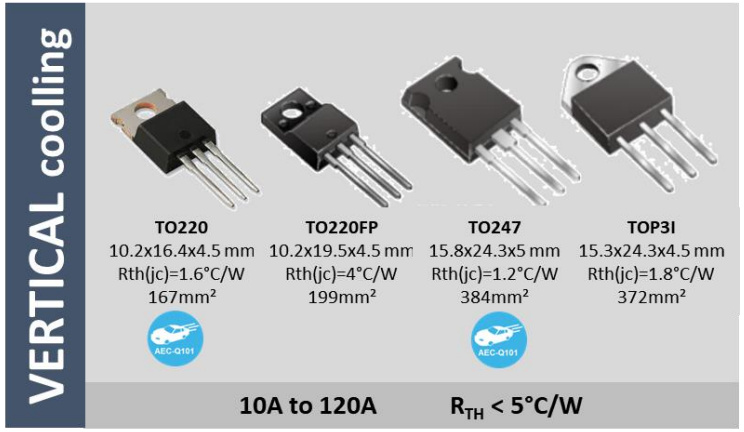
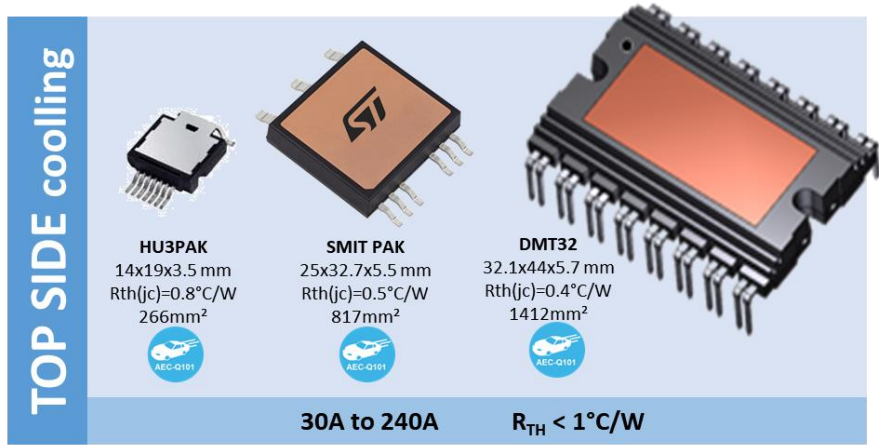
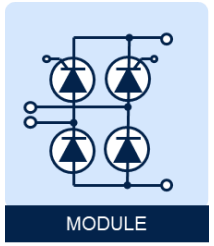
Thyristor package trends

Improved thermal dissipation
Higher power density
Automated assembly
Single heatsink

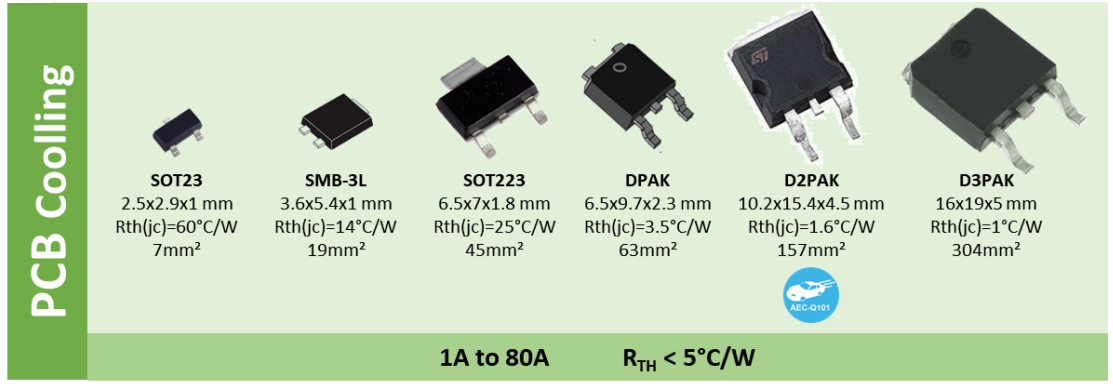






Multiple dice in one
power module

Surface-mount devices
Higher power density
Automated assembly
But compromise thermal dissipation



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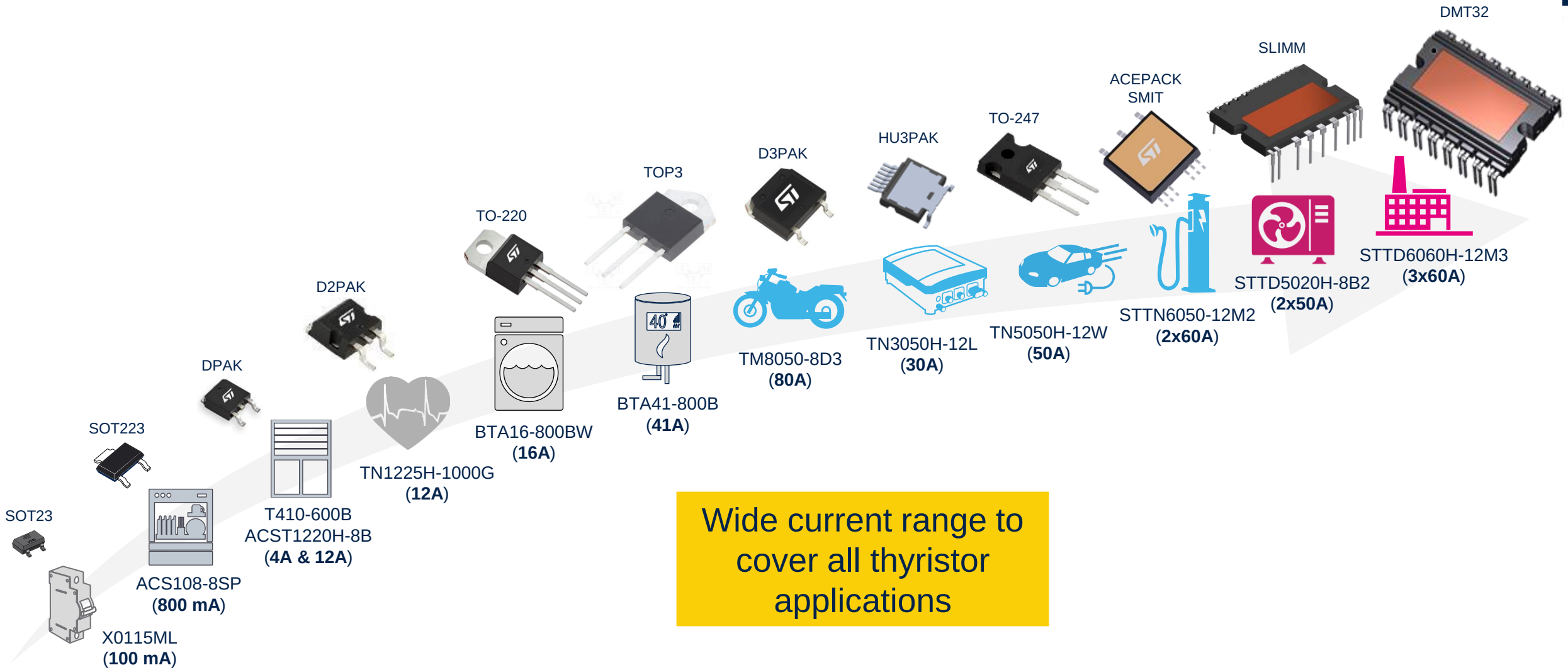
Thyristor family higher power package roadmap



Wide current range to cover all thyristor applications

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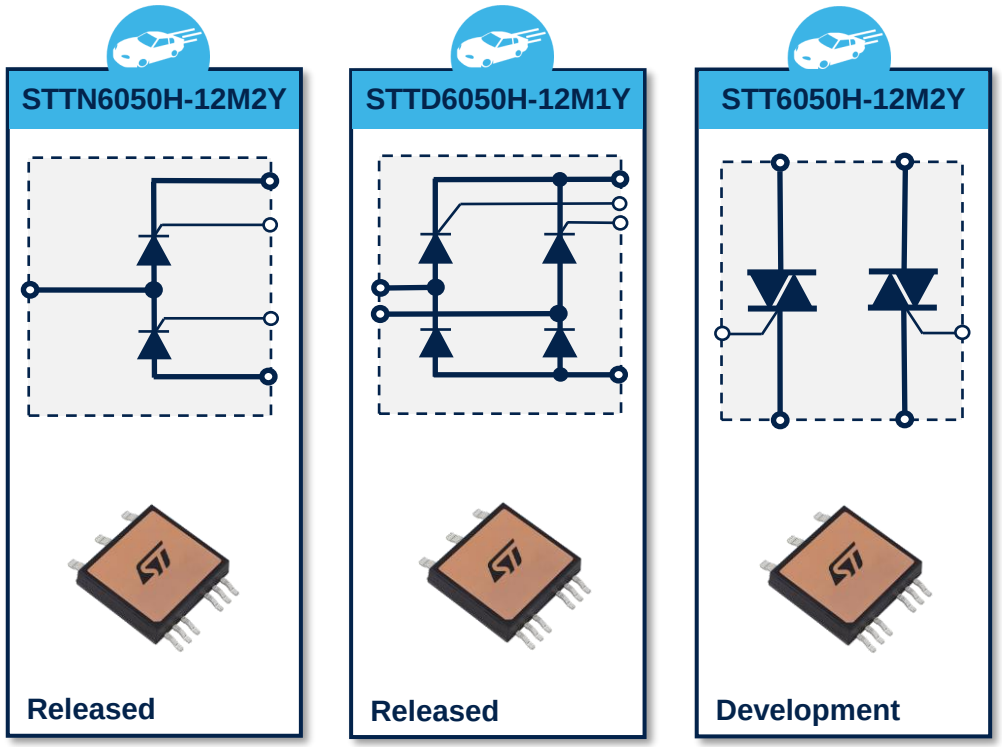
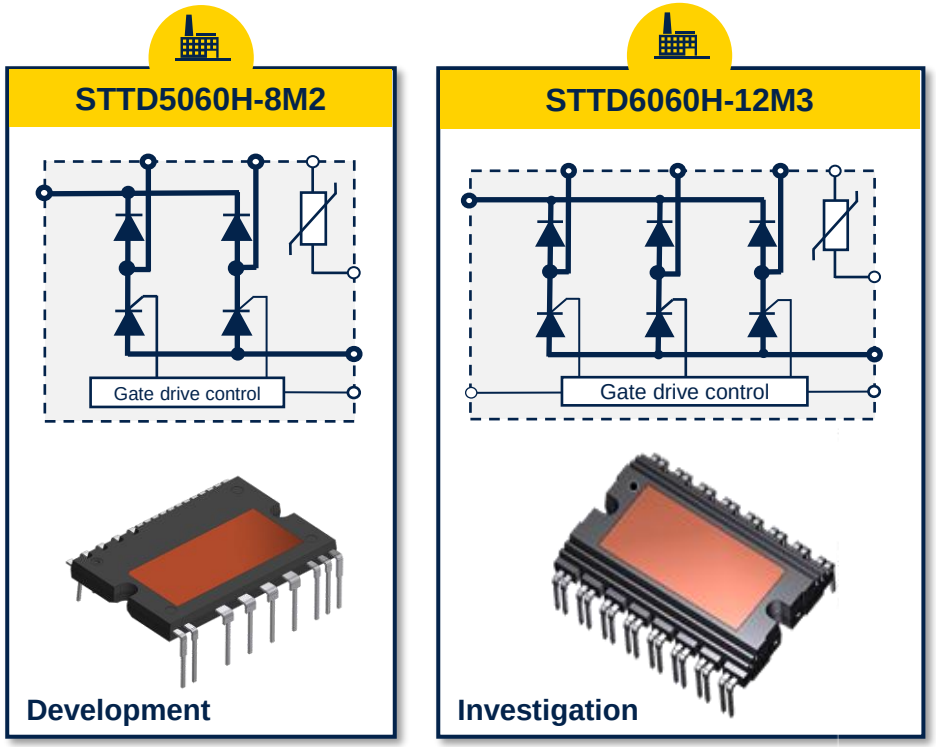
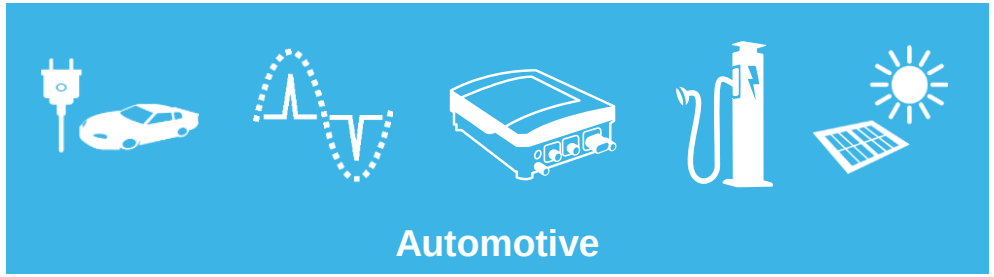
Thyristor power module







ACEPACK SMIT: surface-mount isolated top-side cooling

SLLIMM: small low-loss intelligent molded module

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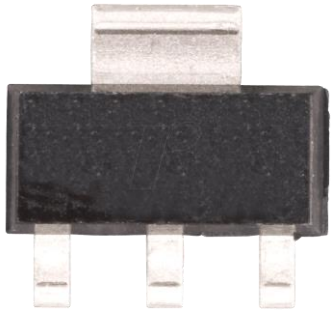
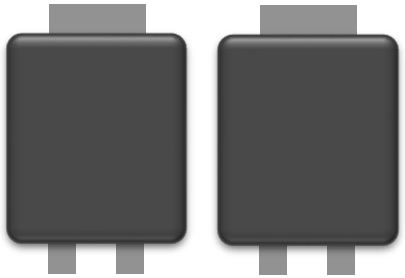
SOT23 package

For more compactness, the smallest package is SOT23

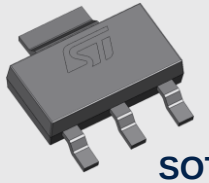


x1
SOT223

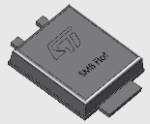


x2
SMBFlat-3L

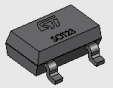
x3
SOT23



SOT223



SMBflat-3L



SOT23

Smallest thyristor package

9 mm² footprint for compact design

Creepage distance is of 1.1 mm

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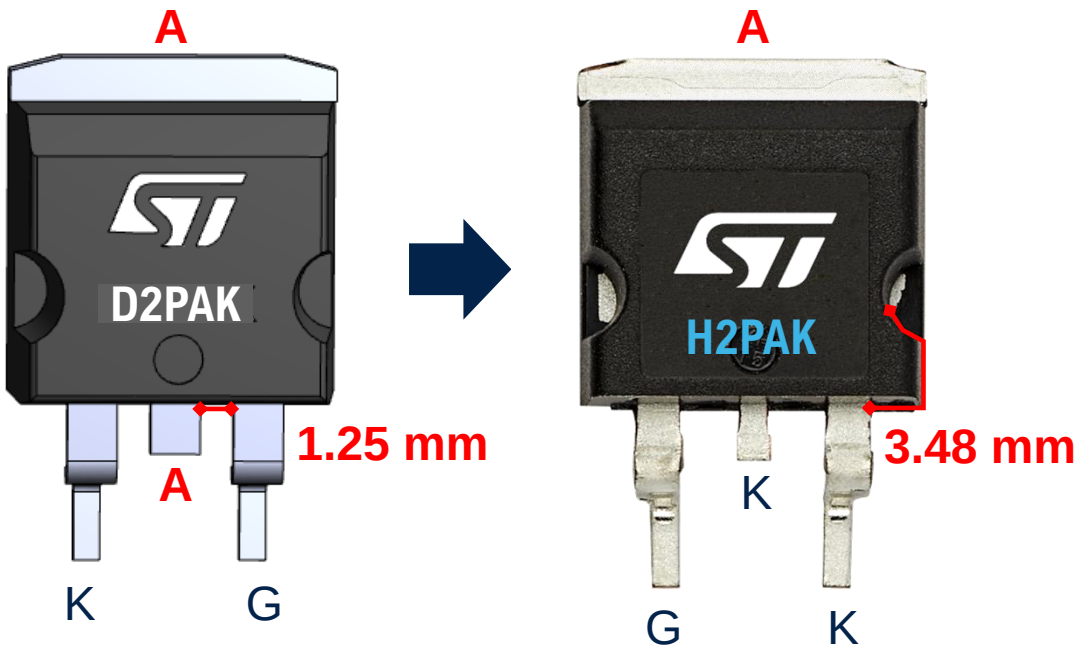
* for pollution degree 2 without insulated foil thickness, according to IEC60664

Introducing H2PAK package

H2PAK offers up to 3.48 mm creepage, compliant for 485 V_{AC} RMS



Only **1.25 mm** creepage on standard D2PAK

0.8°C / W thermal resistance

GKK pinout compared to **KAG** on standard D2PAK

1.25 mm → **3.48 mm** creepage → 485 V_{AC} RMS

Extend creepage to 5.38 mm* → 765 V_{AC} RMS

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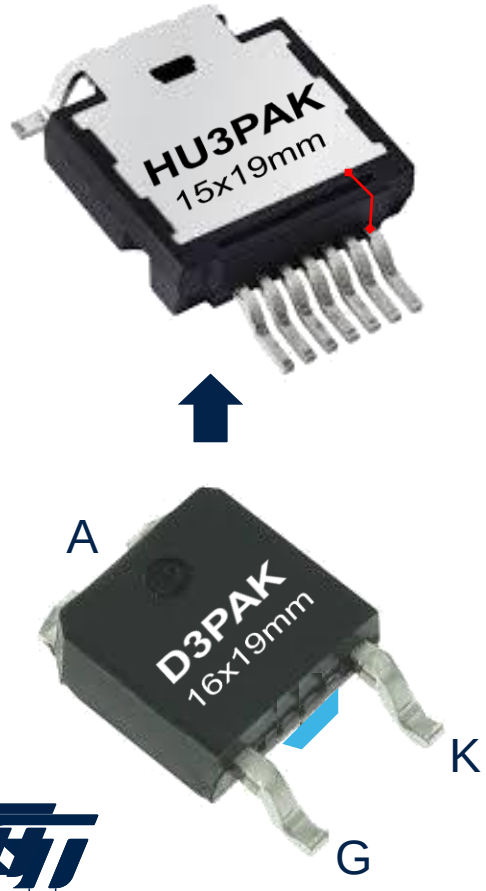
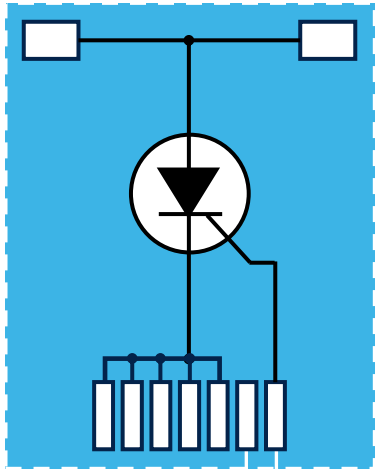
* In development, for pollution degree 2, according to IEC60664

HU3PAK package

Low profile, surface mount and top-side cooling discrete package



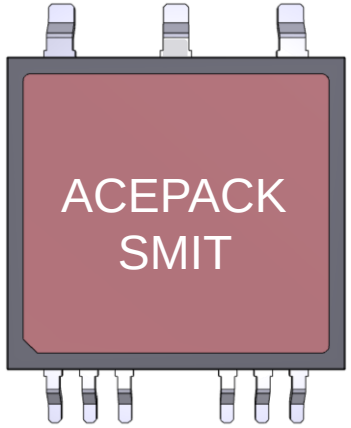


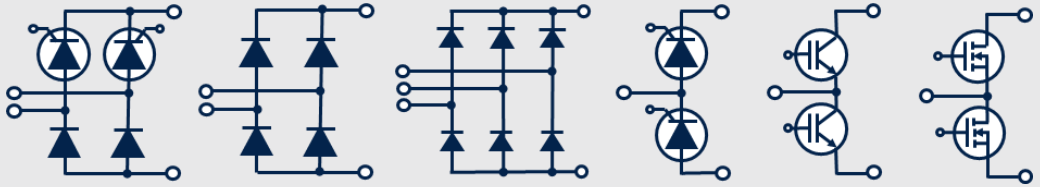
- **Package height 3.5 mm**
- **0.8°C/W thermal resistance**
- **Creepage > 3.7 mm → 515 VAC RMS ***
- **Package tab is not insulated**

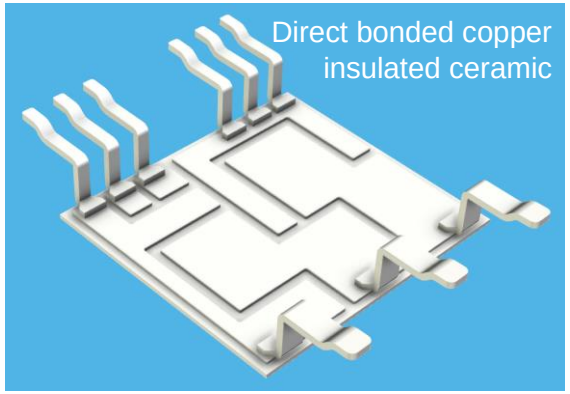
* for pollution degree 2 without insulated foil thickness, according to IEC60664

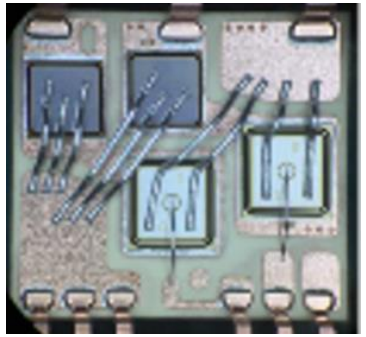
ACEPACK SMIT

The surface mount with isolated top-cooled package









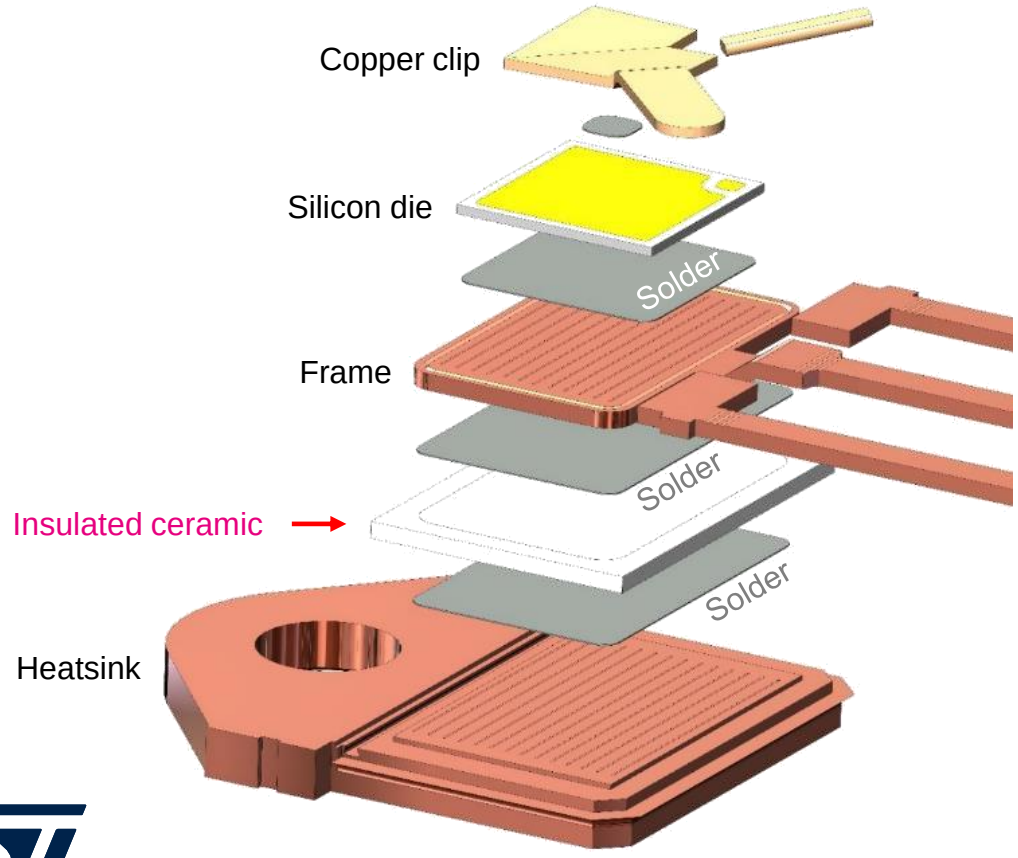
Top-side cooling → thermal resistance < 0.2°C / W

Creepage distance 7 mm 1000 V

4 kV insulation, 4 mm lead-heatsink distance

TOP3 insulated package

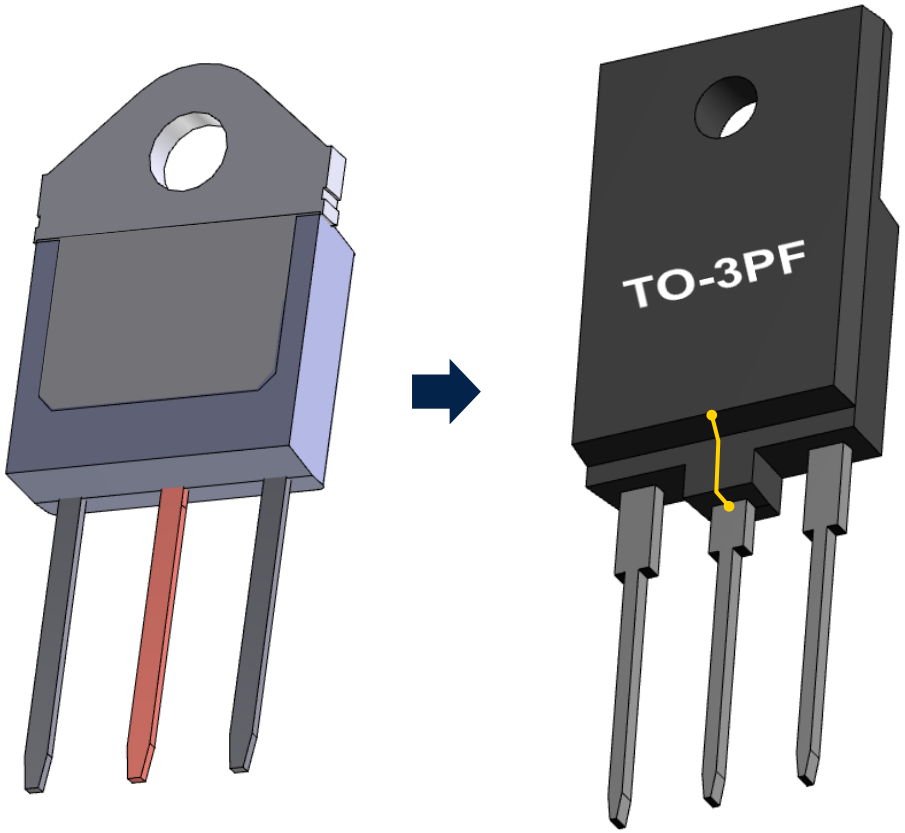
To cover the needs of industrial and high-power applications



- **Copper clip package for high power**
- **Thermal resistance junction to case < 1°C/W**
- **Ceramic insulation → 2500 V insulated**
- **Creepage distance lead to heatsink 2.80 mm**

TO-3PF package

To cover the needs of industrial and heating applications with polluted environments

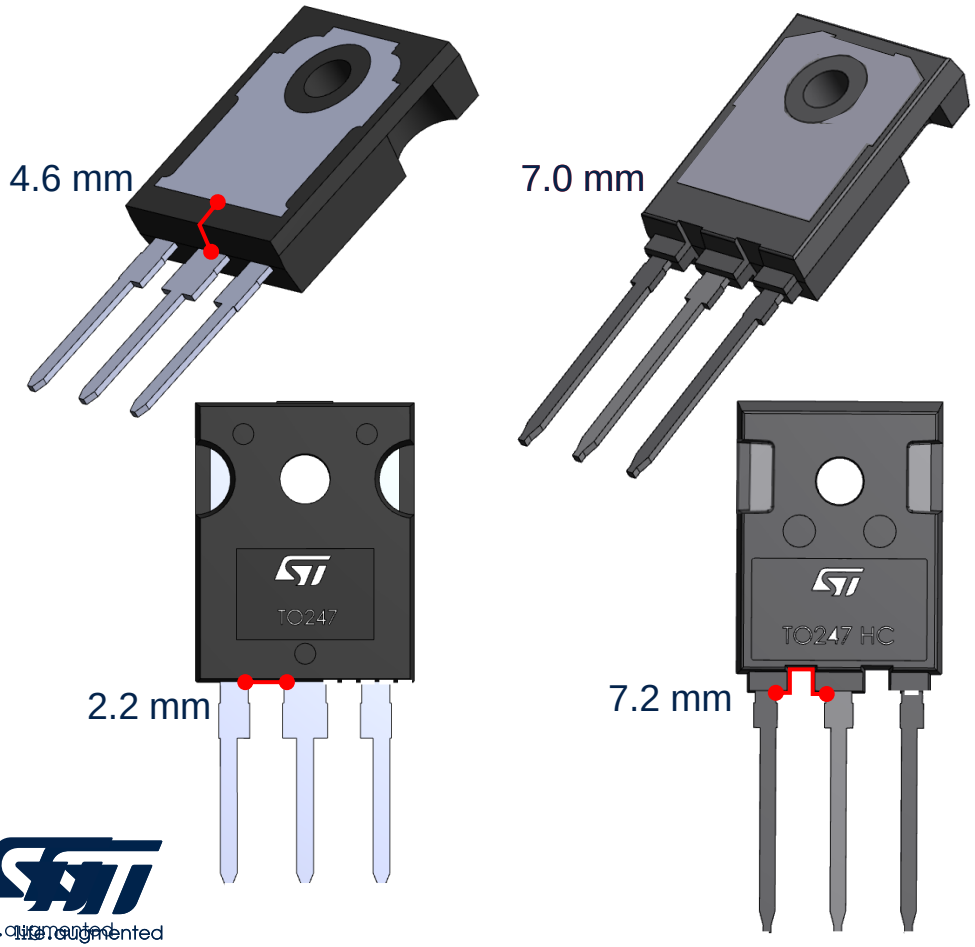


Pin to heatsink isolation
TOP3 vs TO-3PF

- **Compatible with standard TOP3 package**
- **Extended creepage 4.40 mm vs 2.80 mm**
- **Fully molded → 2500 V insulated (UL1557)**
- **UL840 certified → compatible with pollution degree 3 up to 250 VAC & 2 up to 300 V**

High creepage TO-247

To cover the needs of industrial & automotive high-power applications



Longer leads → bending with horizontal heatsink

Extended creepage 7.0 mm min vs. 2.2 mm

For high power applications

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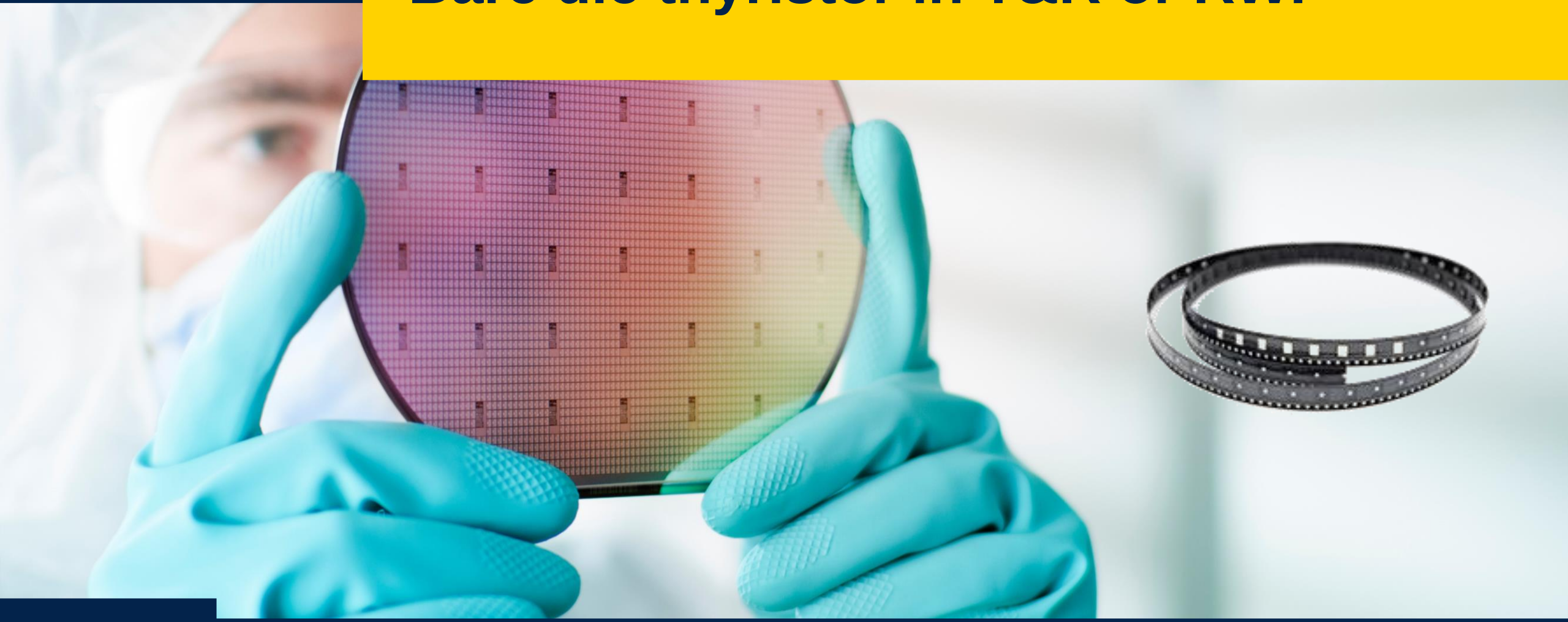
Bare die thyristor in T&R or RWF



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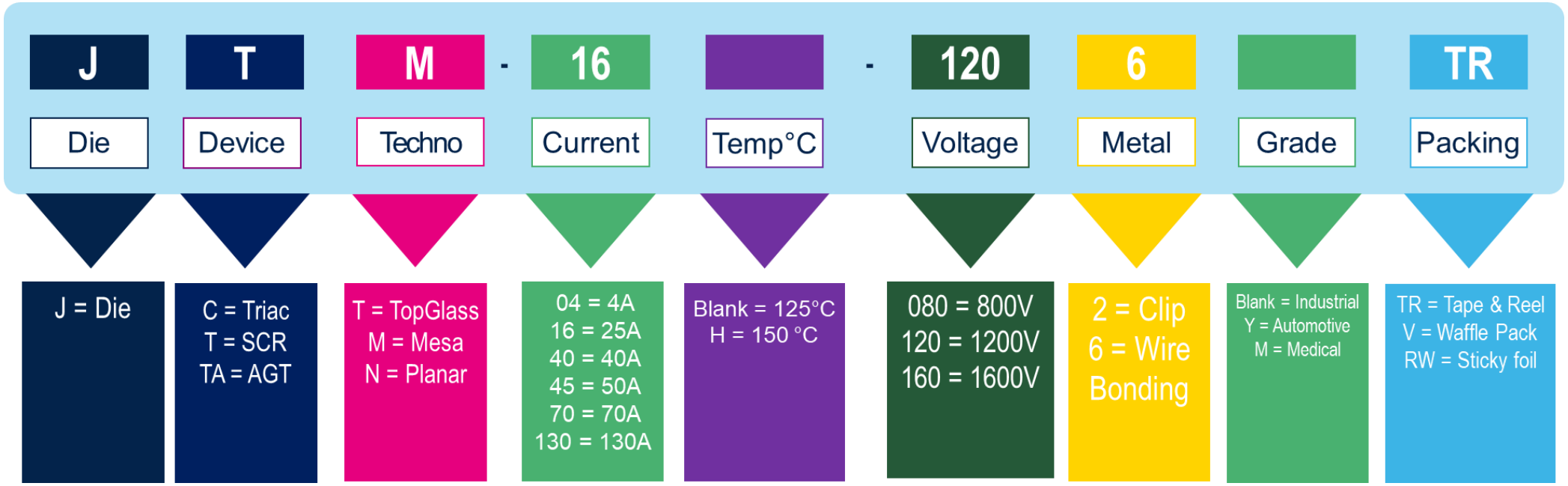
Bare die thyristor part numbering



SYMBOL	CURRENT FLOW	DEVICE NAME
	UNIDIRECTIONAL	**SCR** (Silicon Controlled Rectifier)
	UNIDIRECTIONAL	**AGT** (Anode Gated Thyristor)
	BIDIRECTIONAL	**TRIAC**

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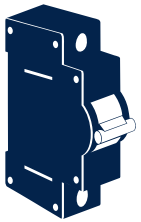
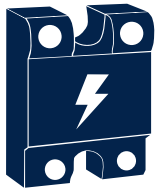
Thyristor
T&R or RWF (reconstructed wafer frame)

APPLICATIONS





PN	Product	Gate	Voltage (VDRM)	Top	X (mm)	Y (mm)	Area (mm²)	Tj (°C)	Vto (V)	Rd (mOhms)	Techno	Grade
JTT-04-060-9TR	SCR	Corner	600	Bonding	2.09	2.09	4	125			Top glass	
JTM-12-060-2VS	SCR	Corner	600	Clip	2.65	2.65	7	125			Mesa	
JTM-12-060-2V	SCR	Corner	600	Clip	3.5	3.5	12	125			Mesa	
JTM-20-060-2V	SCR	Corner	600	Clip	4.42	4.42	20	125	0.8	15	Mesa	
JTM-45-060-2V	SCR	Corner	600	Clip	6.35	6.35	40	125	1.2	10	Mesa	
JTM-50-080-2TR	SCR	Corner	800	Bonding	5.55	4.27	24	150			Mesa	
JTM-20-100-2V	SCR	Corner	1000	Clip	4.42	4.42	20	125	0.8	15	Mesa	
JCMW40-100-2E	Triac	Corner	1000	Clip	6.35	6.35	40	125	0.85	10	Mesa	
JTAN560-12-V	AGT	Corner	1200	Clip	2.59	2.97	8	125			Planar	Medical
JTN530-12-V	SCR	Corner	1200	Clip	2.59	2.97	8	125			Planar	Medical
JTN660-12-V	SCR	Corner	1200	Clip	2.49	3.68	9	125			Planar	
JTM-12-120-2TR	SCR	Corner	1200	Clip	3.5	3.5	12	125	0.77	23	Mesa	
JTM-16-120-2TR	SCR	Corner	1200	Clip	4	4	16	125	0.85	18	Mesa	
JTM-16-120-6TR	SCR	Corner	1200	Bonding	4	4	16	125	0.85	18	Mesa	
JTM-20-120-2TR	SCR	Corner	1200	Clip	4.42	4.42	20	125	0.85	14	Mesa	
JTM-40-120-2TR	SCR	Corner	1200	Clip	5.8	5.8	34	125	0.85	8	Mesa	
JTM-45-120-2TR	SCR	Corner	1200	Clip	6.35	6.35	40	125	0.93	7.1	Mesa	
JTN6050H-12-6TR	SCR	Central	1200	Bonding	6.48	6.28	41	150	0.83	6	Planar	Automotive
JTN5050H-12-6V	SCR	Central	1200	Bonding	7.73	5.53	43	150			Planar	Automotive
JTM-70-120-2TR	SCR	Corner	1200	Clip	8.5	8.5	72	125	0.9	6	Mesa	
JTM-77-120-2TR	SCR	Corner	1200	Clip	8.5	8.5	72	125	0.9	6	Mesa	

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Applications and development tools

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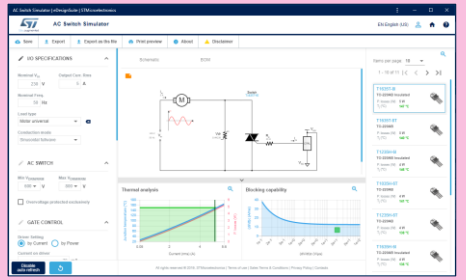
Your design support & tools

Portfolio & datasheets

Selector Guide

eDesignSuite

Intelligent design tools

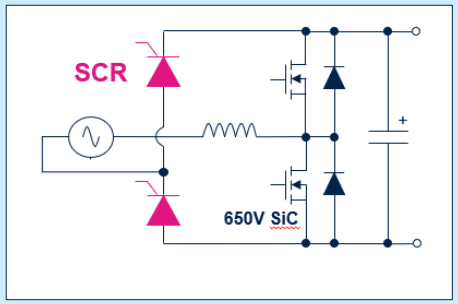


Reference designs

Evaluation boards

Application notes

Know-how & design tips



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Thyristor-based evaluation boards

Board part number	Description	Thyristor (SCR)	Triac	ACST	ACS*
Starter kit					
STEVAL-IHT007V1	Extension board with ACS switches for STM8S-DISCOVERY kit		T1010H-6G		ACS108-8UN
STEVAL-IHT005V2	Full 3.3 V ACS/Triac control using the STM32		T1635H-6T	ACST1635-8FP	
STEVAL-GLA001V1	Insulated AC switch control (Nucleo compatible)		T1635T-8FP	ACST310-8B	ACS108-8TN
Motor control					
STEVAL-IHM029V2	Universal motor control based on the STM8S		T1235T-8T		
STEVAL-IHM041V1	Universal motor driver with speed control based on the STM8		T1635T-8I		
Home appliance					
STEVAL-IHT001V2	Cold thermostat kit based on the STM8S			ACST610-8FP	ACS110-7SN
STEVAL-IHT003V2	Low loss e-starter for compressor starter circuits			ACST610-8T	
Light dimmers					
STEVAL-ILD003V2	Analog wall dimmer for CFL/LED lamps	TS820-600FP			
STEVAL-ILD004V2	Digital wall dimmer for halogen and low-consumption lamps	TS820-600FP			
Active inrush current limiters					
STEVAL-IHT008V1	Low standby loss front-end with inrush current limitation and insulated AC switch control		T1635T-8FP	ACST210-8FP	ACS108-8SN
STEVAL-ISF003V1	Low standby losses power front-end with inrush current-limitation	TN5050H-12WY			
STEVAL-SCR001V1	Inrush current solution with high side bypass SCR	TN5015H-6G			
STEVAL-SCR002V1	Inrush current solution with Low side bypass SCR	TN1605H-6T	Z0110MN		
STEVAL-DPSTPFC1	Totem pole boost				
Other applications					
STDES-OVP001V1	± 6 kV surge protection (IEC61000-4-5)		T5015H-6T		
STDES-DIS001V1	BMS active discharge reference design	TN4035H-8GY			
STDES-SSR001V1	Solid State relay 6A full SMD	TN4035HA-8GY		ACS108-8SN	

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Selected application notes

AN	Title	Version	Latest update	Type
AN1966	Triac overvoltage protection using a Transil	4	27-avr-22	application
AN2777	New high-temperature, high-performance TRIACs for optimized vacuum cleaner designs	1.2	13-sept-18	application
AN2986	AC switch triggering with 3.3 V power supply	1.4	15-janv-19	application
AN2991	Single-phase induction motor drive for refrigerator compressor application (formerly AN1354)	2.2	13-sept-18	application
AN308	Triac analog control circuits for inductive loads	4.2	13-sept-18	application
AN3168	**Noninsulated SCR / triac control circuits**	1.2	13-sept-18	application
AN390	AVS kit guidelines	6	13-sept-18	application
AN392	Microcontrollers and TRIAC-based dimmers	2.3	13-sept-18	application
AN436	Triac CONTROL BY PULSE TRANSFORMER	2.3	13-sept-18	application
AN4363	**How to select the triac, ACS, or ACST that fits your application**	2.1	15-janv-19	application
AN437	**RC snubber circuit design for TRIACs**	2.6	16-janv-19	application
AN440	Triac control with a microcontroller powered from a positive supply	4.1	03-juin-20	application
AN441	Inductive load control with AC switches	3.2	13-sept-18	application
AN442	TRIACS AND MICROCONTROLLERS - THE EASY CONNECTION	2.1	13-sept-18	application
AN4564	Is a positive power supply mandatory for my application, or could a negative output work also?	1	13-sept-18	application
AN4606	**Inrush-current limiter circuits (ICL) with triacs and thyristors (SCR) and controlled bridge design tips**	2.2	19-mars-21	application
AN4608	**How to select the right thyristor (SCR) for your application**	1	13-sept-18	application
AN4993	How to implement a SCR or a triac in a hybride relay application	1.1	13-sept-18	application
AN5114	Controlling a triac with a phototriac	2	02-août-22	application
AN533	**SCRs, TRIACs, and AC switches, thermal management precautions for handling and mounting**	3.6	16-juil-20	application
AN5649	How to evaluate and improve triacs immunity to EFT bursts	1	15-juin-20	application
AN5384	**ACEPACK SMIT module package guidelines for mounting and thermal management**	1	04-nov-19	product
AN1172	THE NEW ACS SERIES: SERIES A BREAKTHROUGH IN RUGGEDNESS & DRIVE FOR HOME APPLIANCES	2.5	16-janv-19	product
AN1379	Z01 and ACS behavior compared under fast voltage transients	5.2	13-sept-18	product
AN2703	**Parameter list for SCRs, triacs, AC Switches, and Diacs**	3	25-mars-22	product
AN302	Thyristors and TRIACs: holding current - an important parameter	3.5	16-janv-19	product
AN303	Thyristors and TRIACs: latching current	3.4	16-janv-19	product
AN3169	Technology performance comparison of triacs subjected to fast transient voltages	1.1	13-sept-18	product
AN4030	Gate to cathode capacitor, impact on triac immunity and reliability	1	13-sept-18	product
AN439	**Snubberless™ and logic level triac behavior at turn-off**	3.4	13-sept-18	product
AN4607	**Basics on the thyristor (SCR) structure and its application**	2	13-sept-18	product

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