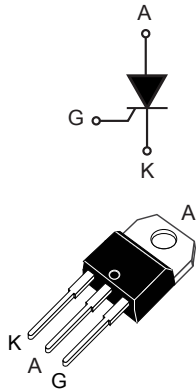


## 30 A 800 V high temperature SCR thyristors in TO-220AB package


**TO-220AB**

### Features

- High junction temperature:  $T_j = 150\text{ °C}$
- $800\text{ V } V_{DRM} / V_{RRM}$
- $900\text{ V } V_{DSM} / V_{RSM}$
- Low  $I_{GT}$ : 15 mA
- High static immunity  $dV/dt = 1000\text{ V}/\mu\text{s}$  at  $150\text{ °C}$
- High turn-on rise  $dI/dt$  at  $200\text{ A}/\mu\text{s}$
- Halogen-free molding, lead-free plating
- ECOPACK2 compliant

### Application

- Inrush current limiting circuits in AC/DC converters
- General purpose AC line load switching
- Heating resistor control, solid state relays

### Description

Thanks to its junction temperature  $T_j$  up to  $150\text{ °C}$ , the **TN3015H-8T** offers high thermal performance operation up to 30 A RMS in a TO-220AB package.

Its trade-off noise immunity ( $dV/dt = 1000\text{ V}/\mu\text{s}$ ) versus its gate triggering current ( $I_{GT} = 15\text{ mA}$ ) and its turn-on current rise ( $dI/dt = 200\text{ A}/\mu\text{s}$ ) allow to design 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.

#### Product status

TN3015H-8T

#### Product summary

Order code	TN3015H-8T
Package	TO-220AB
$I_{T(RMS)}$	30 A
$V_{DRM}/V_{RRM}$	800 V
$T_j$ (max.)	$150\text{ °C}$

# 1 Characteristics

**Table 1. Absolute maximum ratings (limiting values),  $T_j = 25\text{ °C}$  unless otherwise specified**

Symbol	Parameter		Value	Unit
$I_{T(RMS)}$	RMS on-state current (180 ° conduction angle)	$T_c = 129\text{ °C}$	30	A
$I_{T(AV)}$	Average on-state current (180 ° conduction angle)	$T_c = 129\text{ °C}$	19	A
		$T_c = 135\text{ °C}$	15	
		$T_c = 140\text{ °C}$	11	
$I_{TSM}$	Non repetitive surge peak on-state current ( $T_j$ initial = 25 °C)	$t_p = 8.3\text{ ms}$	329	A
		$t_p = 10\text{ ms}$	300	
$I^2t$	$I^2t$ value for fusing	$t_p = 10\text{ ms}$	450	$A^2s$
$di/dt$	$I_G = 2 \times I_{GT}$ , $tr \leq 100\text{ ns}$ Critical rate of rise of on-state current	$f = 50\text{ Hz}$	200	$A/\mu s$
$V_{DRM}/V_{RRM}$	Repetitive peak off-state voltage	$T_j = 150\text{ °C}$	800	V
$V_{DSM}/V_{RSM}$	Non repetitive surge peak off-state voltage	$t_p = 10\text{ ms}$	900	V
$I_{GM}$	Peak gate current	$t_p = 20\text{ }\mu s$ , $T_j = 150\text{ °C}$	4	A
$P_{G(AV)}$	Average gate power dissipation	$T_j = 150\text{ °C}$	1	W
$V_{RGM}$	Maximum peak reverse gate voltage		5	V
$T_{stg}$	Storage junction temperature range		-40 to +150	°C
$T_j$	Maximum operating junction temperature		-40 to +150	°C
$T_l$	Maximum lead temperature soldering during 10 s		260	°C

**Table 2. Electrical characteristics ( $T_j = 25\text{ °C}$  unless otherwise specified)**

Symbol	Test conditions		Value	Unit	
$I_{GT}$	$V_D = 12\text{ V}$ , $R_L = 33\text{ }\Omega$	Min.	5	mA	
		Max.	15		
$V_{GT}$		Max.	1.3	V	
$V_{GD}$	$V_D = V_{DRM}$ , $R_L = 3.3\text{ k}\Omega$	$T_j = 150\text{ °C}$	Min.	0.2	V
$I_H$	$I_T = 500\text{ mA}$ , gate open		Max.	50	mA
$I_L$	$I_G = 1.2 \times I_{GT}$		Max.	70	mA
$dV/dt$	$V_D = 536\text{ V}$ , gate open	$T_j = 150\text{ °C}$	Min.	1000	$V/\mu s$
$t_{gt}$	$I_{TM} = 60\text{ A}$ , $V_D = 536\text{ V}$ , $I_G = 30\text{ mA}$ , $(di_G/dt) = 0.2\text{ A}/\mu s$		Typ.	1.9	$\mu s$
$t_q$	$I_T = 60\text{ A}$ , $t_p = 100\text{ }\mu s$ , $(di/dt)_{OFF} = 10\text{ A}/\mu s$ , $V_D = 536\text{ V}$ , $V_R = 25\text{ V}$ , $dV_D/dt = 40\text{ V}/\mu s$	$T_j = 125\text{ °C}$	Typ.	70	$\mu s$
		$T_j = 150\text{ °C}$	Typ.	85	$\mu s$

**Table 3. Static characteristics**

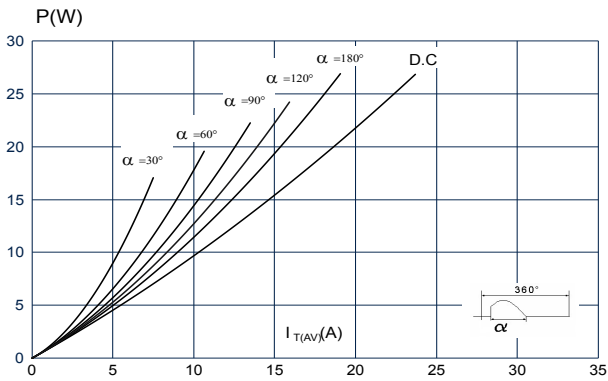
Symbol	Test conditions			Value	Unit
$V_{TM}$	$I_{TM} = 60 \text{ A}$ , $t_p = 380 \mu\text{s}$	$T_j = 25 \text{ }^\circ\text{C}$	Max.	1.55	V
$V_{TO}$	Threshold voltage	$T_j = 150 \text{ }^\circ\text{C}$	Max.	0.85	
$R_D$	Dynamic resistance	$T_j = 150 \text{ }^\circ\text{C}$	Max.	12	m $\Omega$
$I_{DRM}$ , $I_{RRM}$	$V_D = V_{DRM}$ , $V_R = V_{RRM}$	$T_j = 25 \text{ }^\circ\text{C}$	Max.	1.8	$\mu\text{A}$
		$T_j = 150 \text{ }^\circ\text{C}$		7	mA

**Table 4. Thermal parameters**

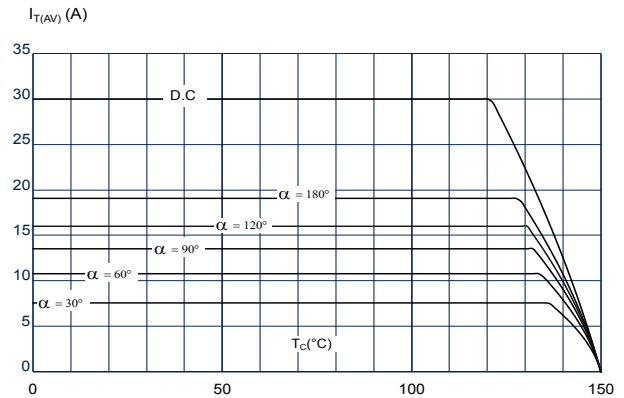
Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction to case (DC)	Max.	0.8
$R_{th(j-a)}$	Junction to ambient	Typ.	60

## 1.1 Characteristics (curves)

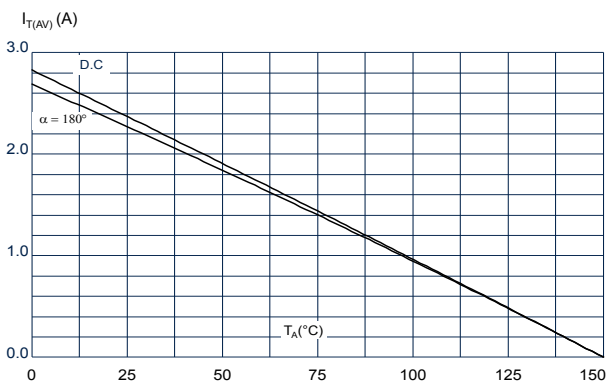
**Figure 1. Maximum average power dissipation versus average on-state current**



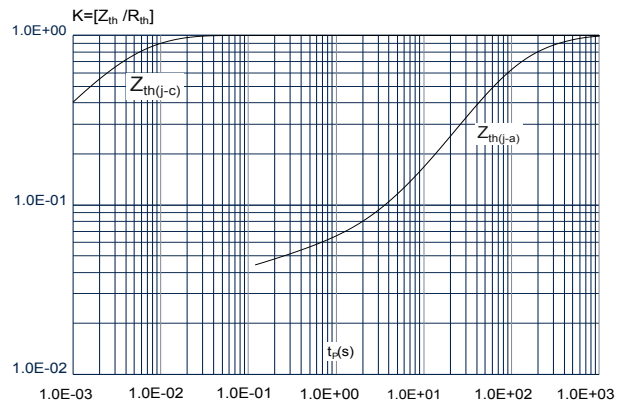
**Figure 2. Average and DC on-state current versus case temperature**



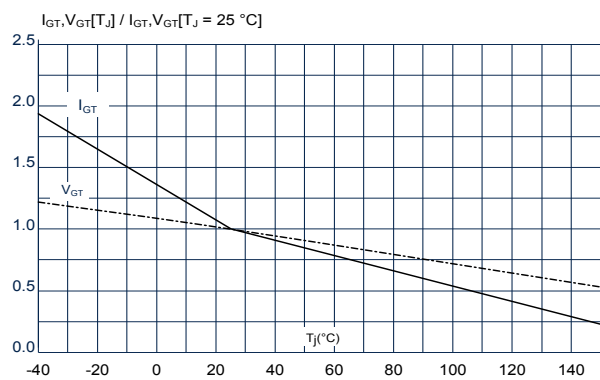
**Figure 3. Average and D.C. on state current versus ambient temperature**



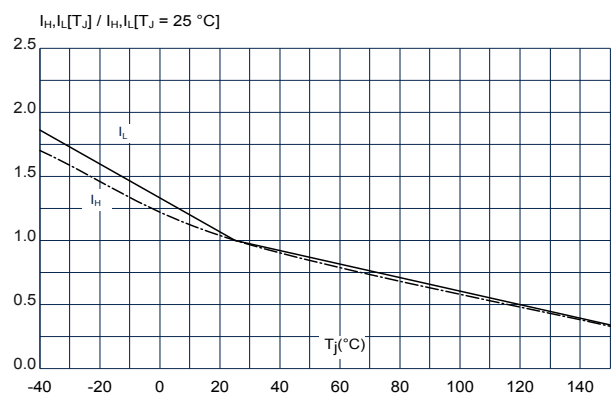
**Figure 4. Relative variation of thermal impedance junction to case and junction to ambient versus pulse duration**



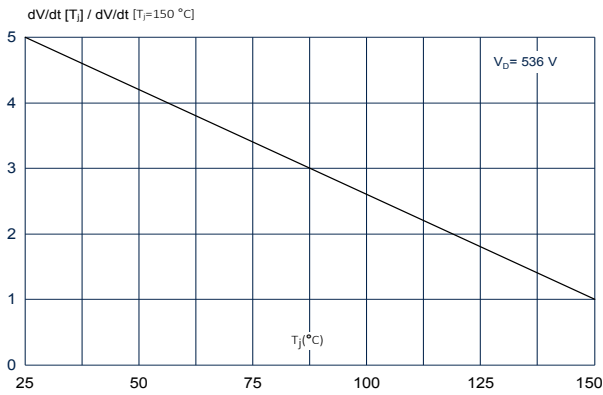
**Figure 5. Relative variation of gate trigger current and gate voltage versus junction temperature**



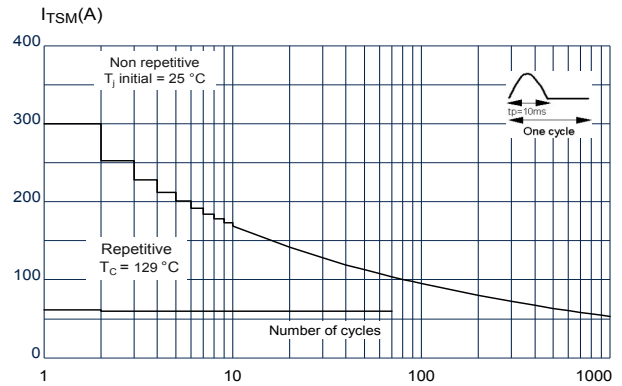
**Figure 6. Relative variation of holding and latching current versus junction temperature**



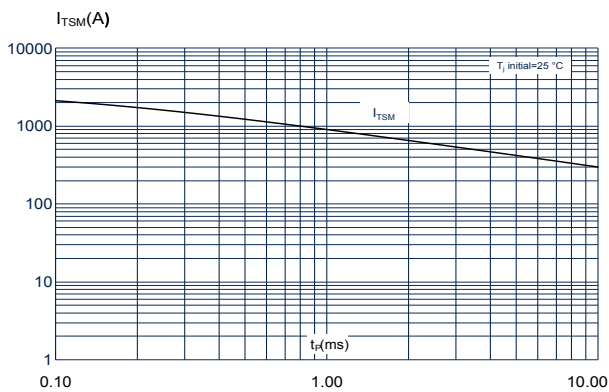
**Figure 7. Relative variation of static dV/dt immunity versus junction temperature**



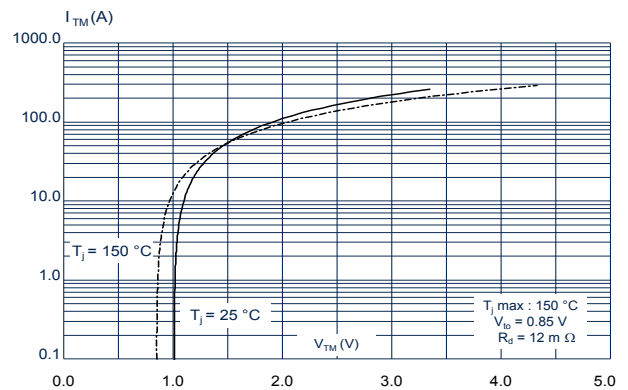
**Figure 8. Surge peak on-state current versus number of cycles**



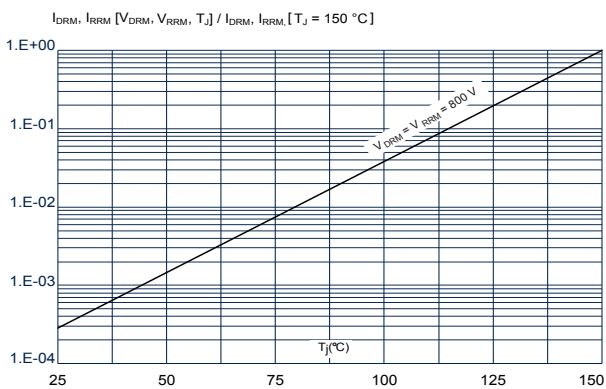
**Figure 9. Non repetitive surge peak on-state current for a sinusoidal pulse with width  $t_p < 10$  ms**



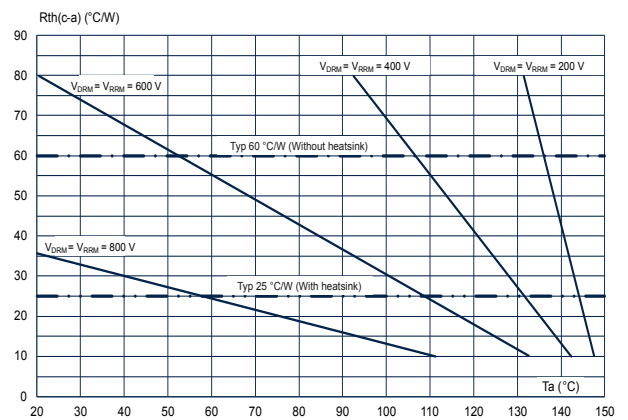
**Figure 10. On-state characteristics (maximum values)**



**Figure 11. Relative variation of leakage current versus junction temperature**



**Figure 12. Recommended maximum case-to-ambient thermal resistance versus ambient temperature for different peak off-state voltages**



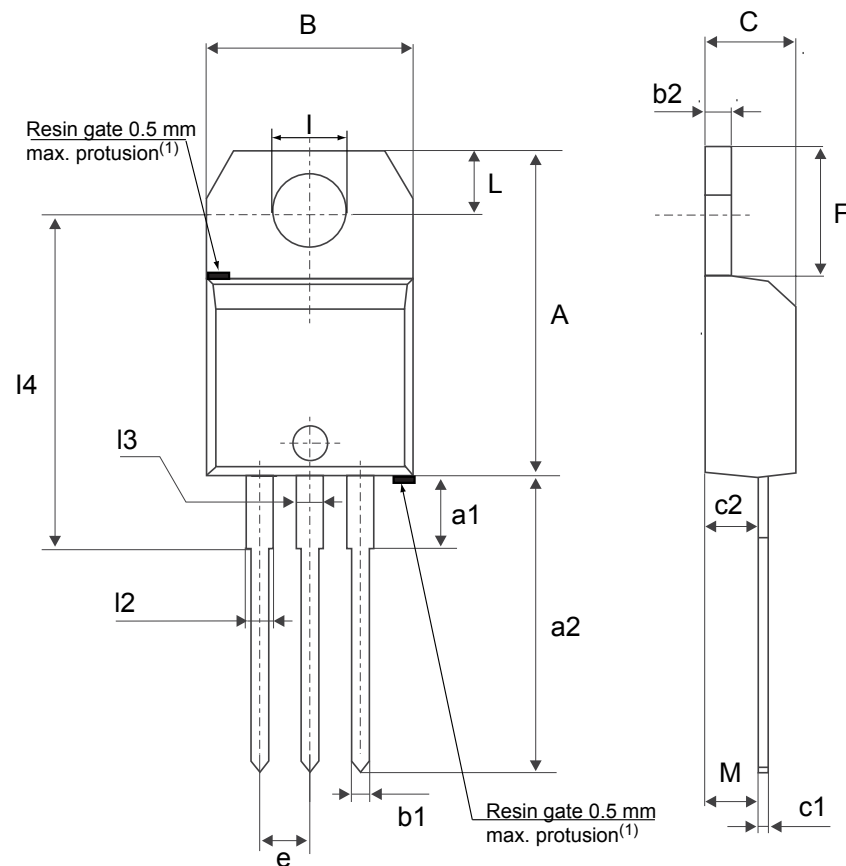
## 2 Package information

To meet environmental requirements, ST offers these devices in different grades of **ECOPACK** packages, depending on their level of environmental compliance. ECOPACK specifications, grade definitions, and product status are available at: [www.st.com](http://www.st.com). ECOPACK is an ST trademark.

### 2.1 TO-220AB package information

- Molding compound resin is halogen-free and meets flammability standard UL94 level 0
- Lead-free package leads finishing
- **ECOPACK2** compliant
- Recommended torque value: 0.55 N·m
- Maximum torque value: 0.70 N·m

**Figure 13. TO-220AB package outline**



(1) Resin gate position accepted in one of the two positions or in the symmetrical opposites.

**Table 5. TO-220AB package mechanical data**

Ref.	Dimensions					
	Millimeters			Inches <sup>(1)</sup>		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	15.20		15.90	0.5984		0.6260
a1		3.75			0.1476	
a2	13.00		14.00	0.5118		0.5512
B	10.00		10.40	0.3937		0.4094
b1	0.61		0.88	0.0240		0.0346
b2	1.23		1.32	0.0484		0.0520
C	4.40		4.60	0.1732		0.1811
c1	0.49		0.70	0.0193		0.0276
c2	2.40		2.72	0.0945		0.1071
e	2.40		2.70	0.0945		0.1063
F	6.20		6.60	0.2441		0.2598
I	3.73		3.88	0.1469		0.1528
L	2.65		2.95	0.1043		0.1161
I2	1.14		1.70	0.0449		0.0669
I3	1.14		1.70	0.0449		0.0669
I4	15.80	16.40	16.80	0.6220	0.6457	0.6614
M		2.6			0.1024	

1. Inch dimensions are for reference only.

### 3 Ordering information

Figure 14. Ordering information scheme

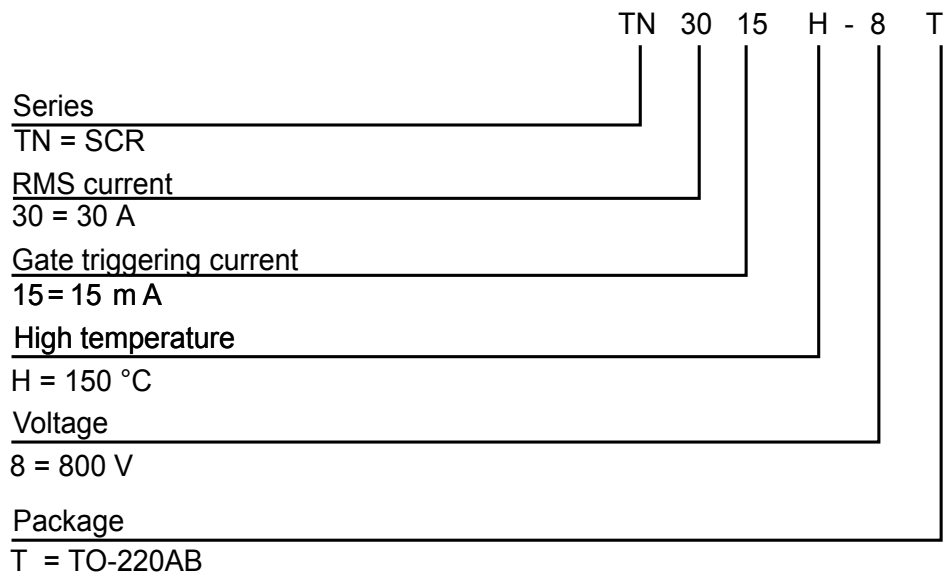


Table 6. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
TN3015H-8T	TN3015H8T	TO-220AB	1.9 g	50	Tube

## Revision history

**Table 7. Document revision history**

Date	Revision	Changes
03-Feb-2025	1	Initial release.

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