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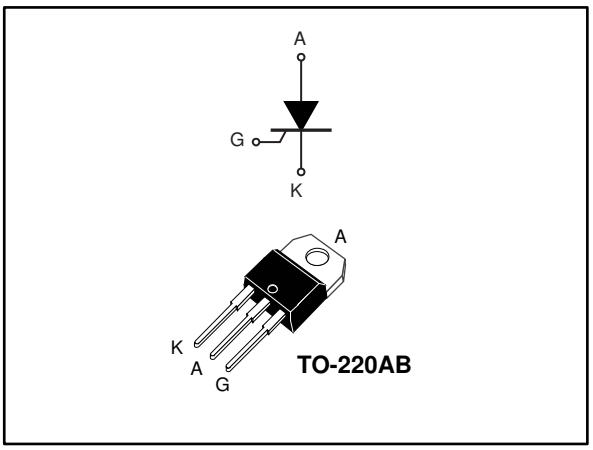
TN2010H-6T

High temperature 20 A SCRs

Datasheet - production data



Description

Packaged in a non-isolated TO-220AB, this device offers high thermal performance during operation of up to 20 A_{RMS}, thanks to a junction temperature of up to 150 °C.

The combination of noise immunity and low gate triggering current allows to design strong and compact control circuit.

Table 1: Device summary

Order code	Package	V_{DRM}/V_{RRM}	I_{GT}
TN2010H-6T	TO-220AB	600 V	10 mA

Features

- High junction temperature: T_j = 150 °C
- High noise immunity dV/dt = 400 V/µs up to 150 °C
- Gate triggering current I_{GT} = 10 mA
- Peak off-state voltage V_{DRM}/V_{RRM} = 600 V
- High turn on current rise dI/dt = 100 A/µs
- ECOPACK®2 compliant component

Applications

- Motorbike voltage regulator circuits
- Inrush current limiting circuits
- Motor control circuits and starters
- Light dimmers
- Solid state relays

1 Characteristics

Table 2: Absolute maximum ratings (limiting values), T_j = 25 °C unless otherwise specified

Symbol	Parameter			Value	Unit
$I_{T(RMS)}$	RMS on-state current (180 ° conduction angle)		T_c = 132 °C	20	A
$I_{T(AV)}$	Average on-state current (180 ° conduction angle)		T_c = 132 °C	12.7	A
			T_c = 137 °C	10	
			T_c = 140 °C	8	
I_{TSM}	Non repetitive surge peak on-state current (T_j initial = 25 °C)		t_p = 8.3 ms	197	A
			t_p = 10 ms	180	
I^2t	I^2t value for fusing		t_p = 10 ms	162	A^2s
dI/dt	Critical rate of rise of on-state current I_G = 2 x I_{GT}, tr ≤ 100 ns		f = 60 Hz	100	A/µs
V_{DSM}/V_{RSM}	Non repetitive surge peak off-state voltage		t_p = 10 ms	700	V
I_{GM}	Peak gate current	t_p = 20 µs	T_j = 150 °C	4	A
$P_{G(AV)}$	Average gate power dissipation		T_j = 150 °C	1	W
V_{RGM}	Maximum peak reverse gate voltage			5	V
T_{stg}	Storage junction temperature range			-40 to +150	°C
T_j	Operating junction temperature range			-40 to +150	°C
T_L	Maximum lead temperature for soldering during 10 s			260	°C

Table 3: Electrical characteristics (T_j = 25 °C unless otherwise specified)

Symbol	Test conditions			Value	Unit
I_{GT}	V_D = 12 V, R_L = 33 Ω		Typ.	5	mA
			Max.	10	
V_{GT}			Max.	1.3	V
V_{GD}	V_D = V_{DRM}, R_L = 3.3 kΩ	T_j = 150 °C	Min.	0.1	V
I_H	I_T = 500 mA, gate open		Max.	40	mA
I_L	I_G = 1.2 x I_{GT}		Max.	60	mA
dV/dt	V_D = 402 V, gate open	T_j = 150 °C	Min.	400	V/µs
t_{gt}	I_{TM} = 40 A, V_D = 402 V, I_G = 20 mA, (dI_G/dt) max = 0.2 A/µs		Typ.	1.9	µs
t_q	I_{TM} = 40 A, V_D = 402 V, (dI/dt)off = 30 A/µs, V_R = 25 V, dV_D/dt = 40 V/µs	T_j = 150 °C	Typ.	70	µs

Table 4: Static characteristics

Symbol	Test conditions			Value	Unit
V_{TM}	I_{TM} = 40 A, t_p = 380 µs	T_j = 25 °C	Max.	1.6	V
V_{TO}	Threshold voltage	T_j = 150 °C	Max.	0.82	
R_D	Dynamic resistance	T_j = 150 °C	Max.	17.5	mΩ
I_{DRM}, I_{RRM}	$V_D = V_{DRM}$, $V_R = V_{RRM}$	T_j = 25 °C	Max.	5	µA
		T_j = 125 °C		2	mA
		T_j = 150 °C		3.9	

Table 5: Thermal parameters

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case (DC)	Max.	1.0	°C/W
$R_{th(j-a)}$	Junction to ambient (DC)	Typ.	60	

1.1 Characteristics (curves)

Figure 1: Maximum power dissipation versus average on-state current

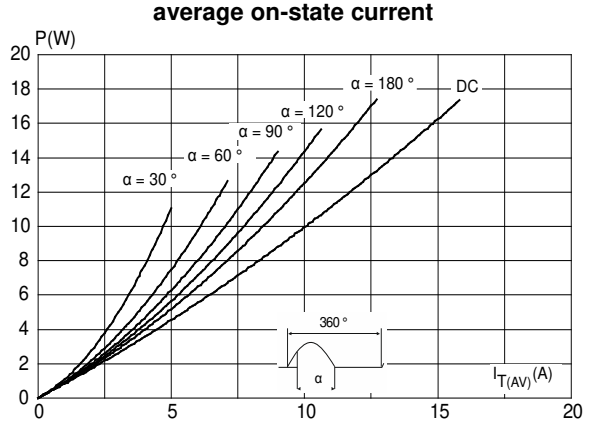


Figure 2: Average and DC on-state current versus case temperature

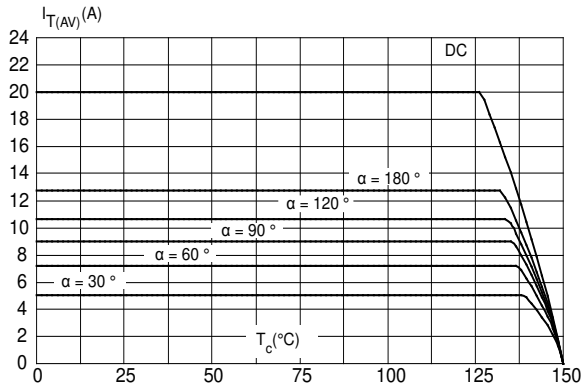


Figure 3: Average and D.C. on state current versus ambient temperature

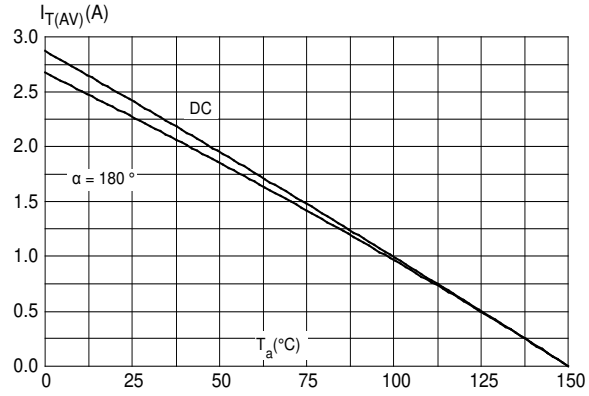


Figure 4: Relative variation of thermal impedance versus pulse duration

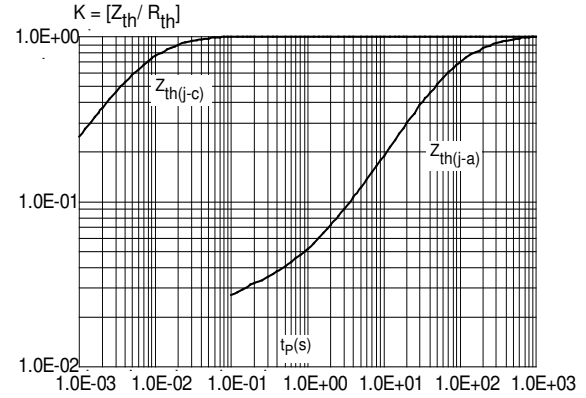


Figure 5: Relative variation of gate triggering current and gate voltage versus junction temperature (typical values)

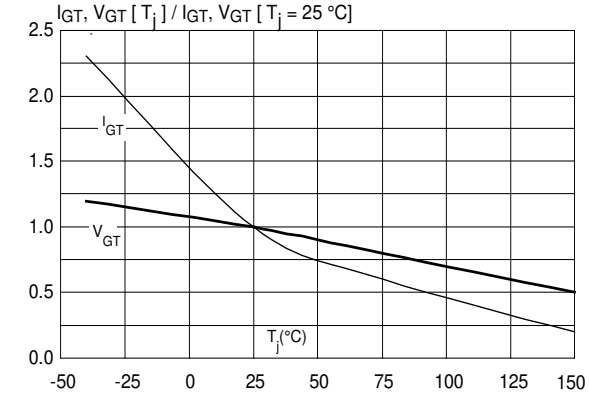


Figure 6: Relative variation of holding and latching current versus junction temperature (typical values)

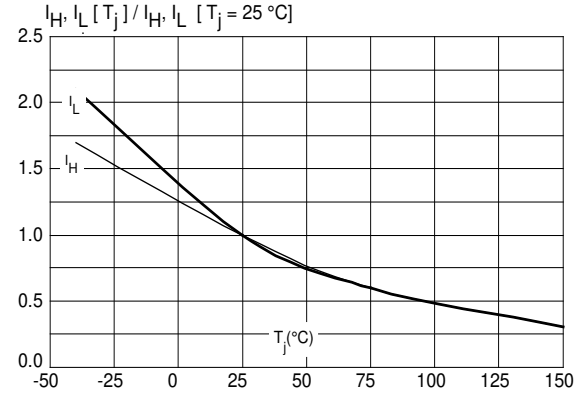


Figure 7: Relative variation of static dV/dt immunity versus junction temperature (typical values)

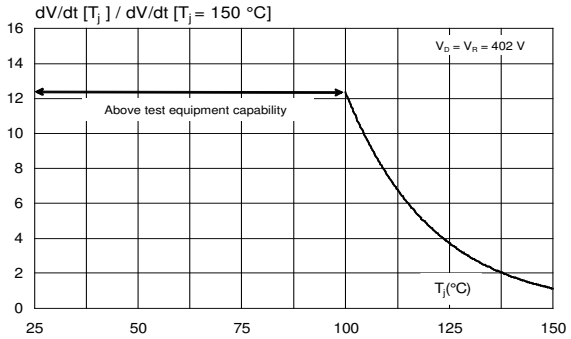


Figure 8: Surge peak on-state current versus number of cycles

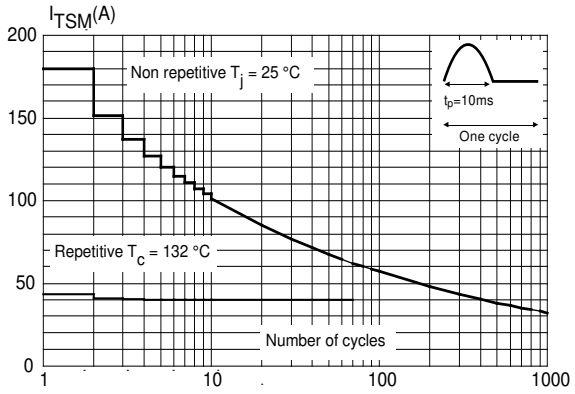


Figure 9: Non repetitive surge peak on-state current for a sinusoidal pulse with width $t_p < 10$ ms

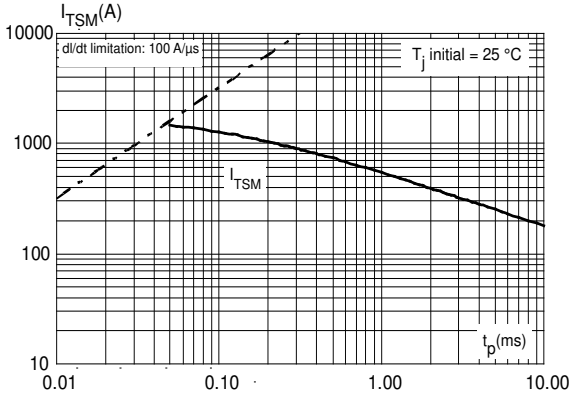


Figure 10: On-state characteristics (maximum values)

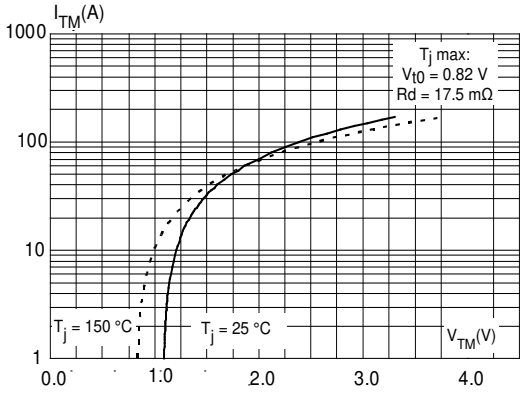
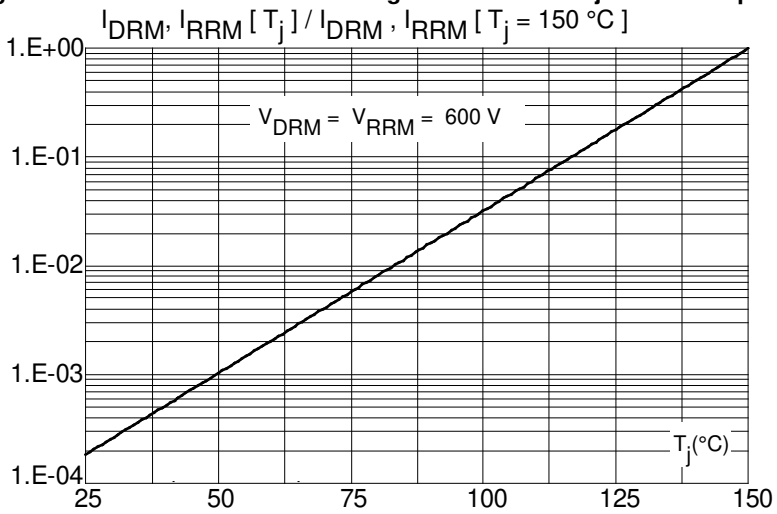


Figure 11: Relative variation of leakage current versus junction temperature



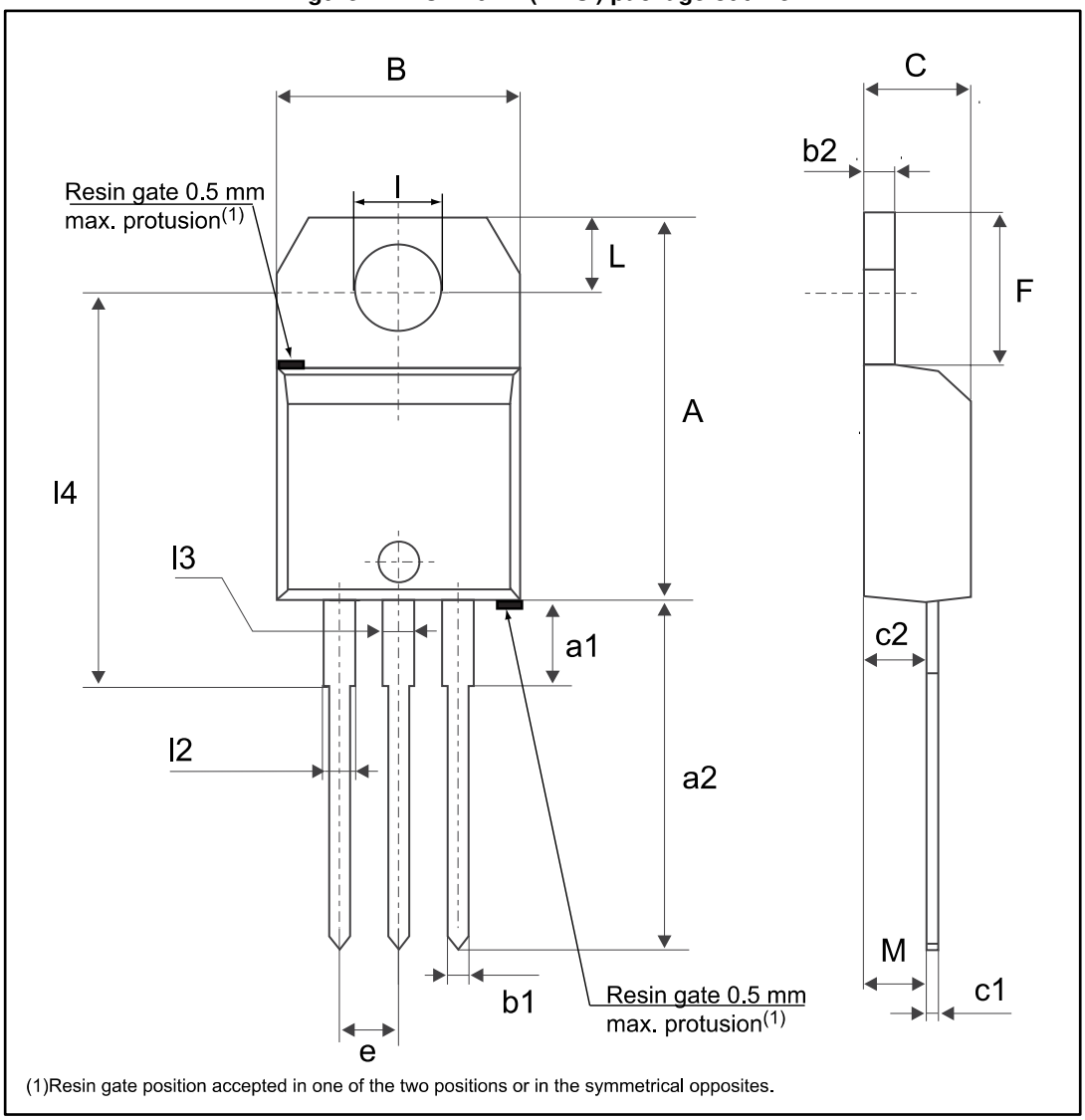
2 Package information

In order 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***. ECOPACK® is an ST trademark.

- Epoxy meets UL94, V0
- Lead-free, halogen-free package
- Recommended torque value (TO-220AB): 0.4 to 0.6 N.m

2.1 TO-220AB package information

Figure 12: TO-220AB (NIns.) package outline



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

Table 6: TO-220AB (NIns.) package mechanical data

Ref.	Dimensions					
	Millimeters			Inches[1]		
	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
l2	1.14		1.70	0.0449		0.0669
l3	1.14		1.70	0.0449		0.0669
l4	15.80	16.40	16.80	0.6220	0.6457	0.6614
M		2.6			0.1024	

Notes:

(1)Inch dimensions are for reference only.

3 Ordering information

Figure 13: Ordering information scheme

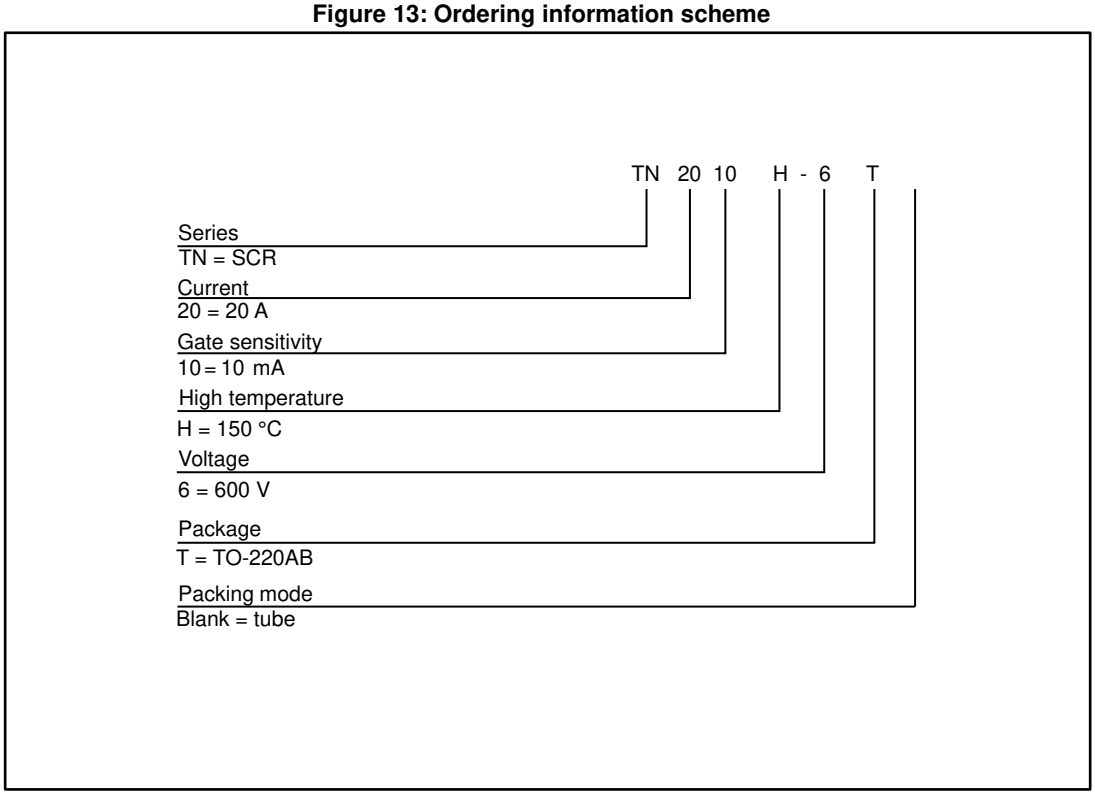


Table 7: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
TN2010H-6T	TN2010H6	TO-220AB	2.3 g	50	Tube

4 Revision history

Table 8: Document revision history

Date	Revision	Changes
29-Aug-2017	1	Initial release.

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