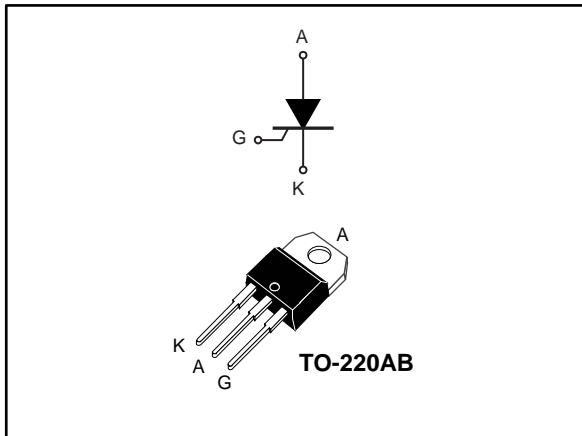


## High temperature 20 A SCRs

Datasheet - production data


**Description**

Packaged in a non-isolated TO-220AB, this device offers high thermal performance during operation of up to 20 A<sub>RMS</sub>, 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 <sub>DRM</sub> /V <sub>RRM</sub>	I <sub>GT</sub>
TN2010H-6T	TO-220AB	600 V	10 mA

**Features**

- High junction temperature: T<sub>j</sub> = 150 °C
- High noise immunity dV/dt = 400 V/μs up to 150 °C
- Gate triggering current I<sub>GT</sub> = 10 mA
- Peak off-state voltage V<sub>DRM</sub>/V<sub>RRM</sub> = 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),  $T_j = 25\text{ °C}$  unless otherwise specified**

Symbol	Parameter		Value	Unit
$I_{T(RMS)}$	RMS on-state current (180 ° conduction angle)	$T_c = 132\text{ °C}$	20	A
$I_{T(AV)}$	Average on-state current (180 ° conduction angle)	$T_c = 132\text{ °C}$	12.7	A
		$T_c = 137\text{ °C}$	10	
		$T_c = 140\text{ °C}$	8	
$I_{TSM}$	Non repetitive surge peak on-state current ( $T_j$ initial = 25 °C)	$t_p = 8.3\text{ ms}$	197	A
		$t_p = 10\text{ ms}$	180	
$I^2t$	$I^2t$ value for fusing	$t_p = 10\text{ ms}$	162	$A^2s$
$di/dt$	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$ , $t_r \leq 100\text{ ns}$	$f = 60\text{ Hz}$	100	$A/\mu s$
$V_{DSM}/V_{RSM}$	Non repetitive surge peak off-state voltage	$t_p = 10\text{ ms}$	700	V
$I_{GM}$	Peak gate current	$t_p = 20\text{ }\mu s$	$T_j = 150\text{ °C}$	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
$T_j$	Operating junction temperature range		-40 to +150	°C
$T_L$	Maximum lead temperature for soldering during 10 s		260	°C

**Table 3: Electrical characteristics ( $T_j = 25\text{ °C}$  unless otherwise specified)**

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

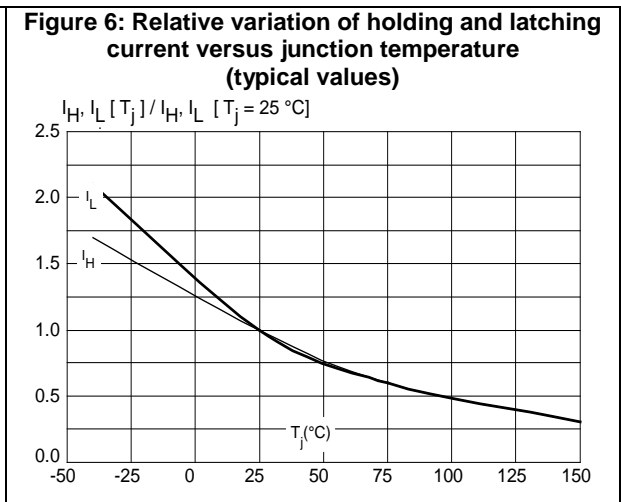
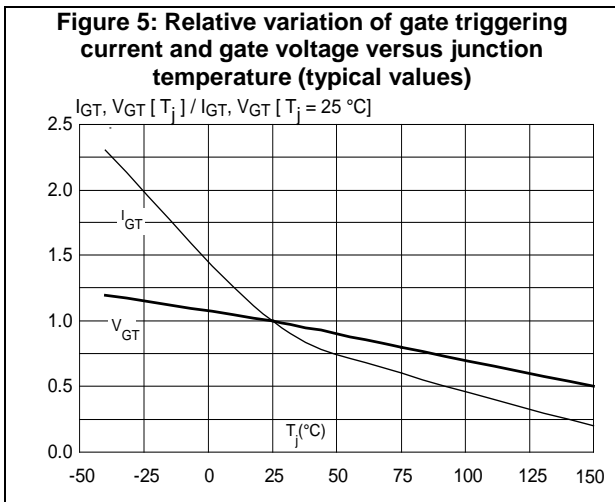
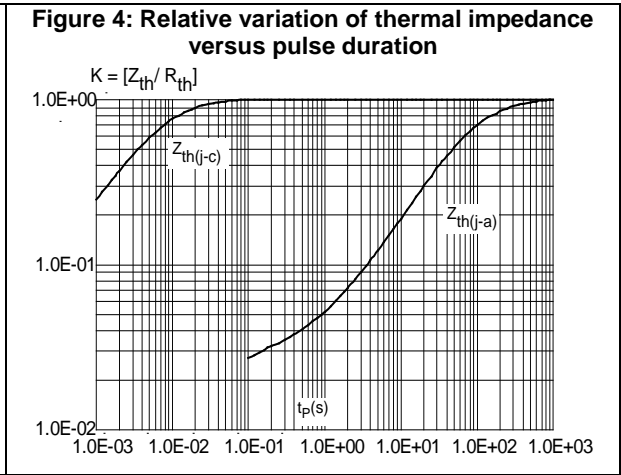
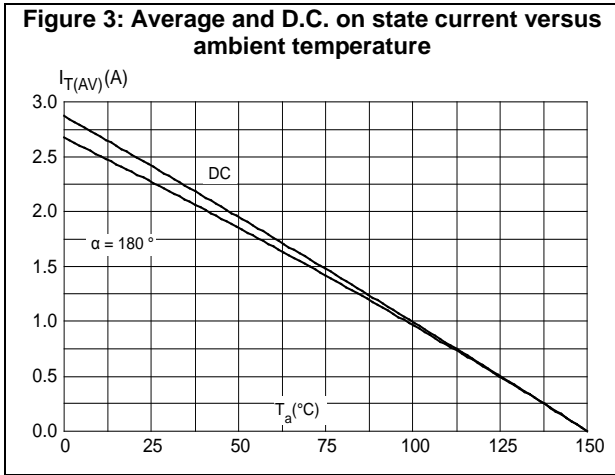
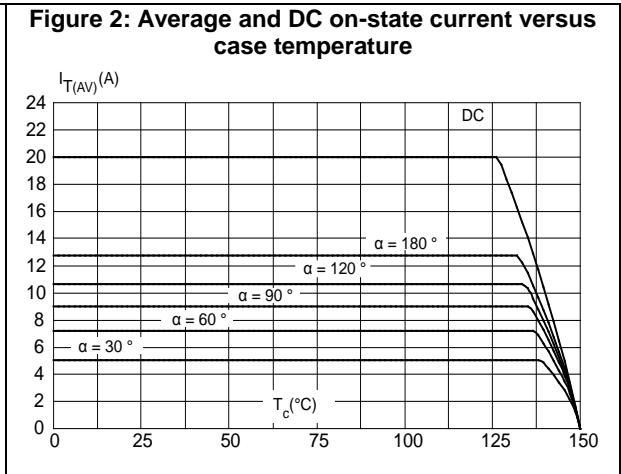
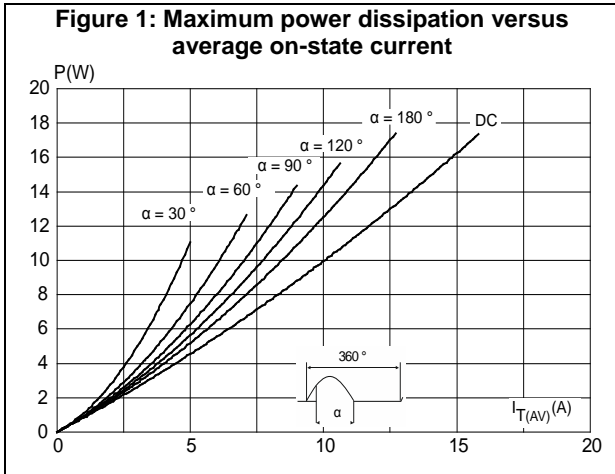
Table 4: Static characteristics

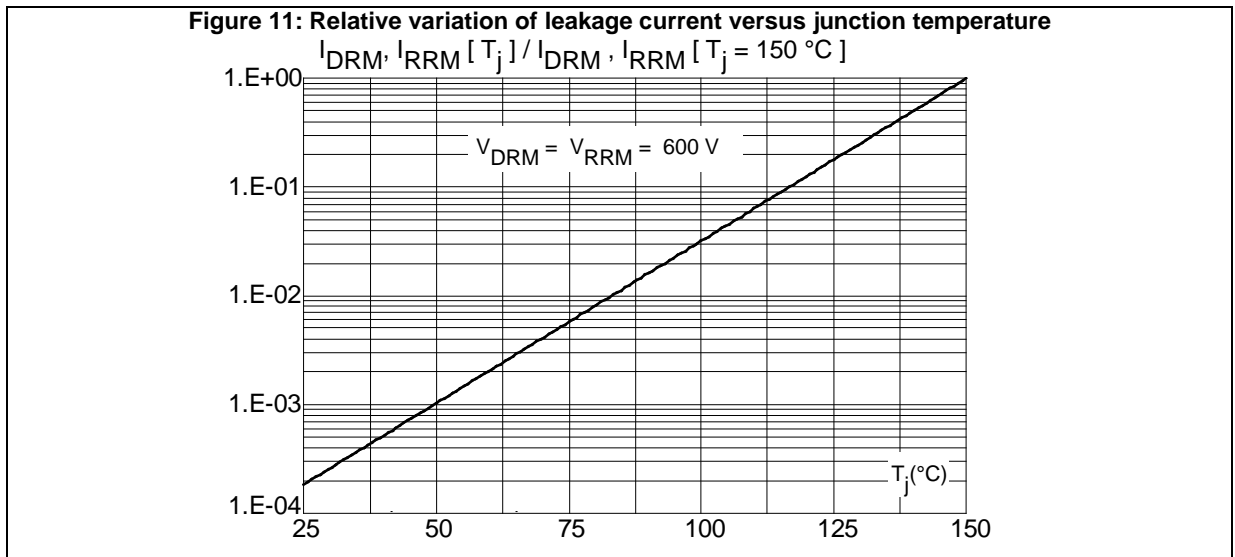
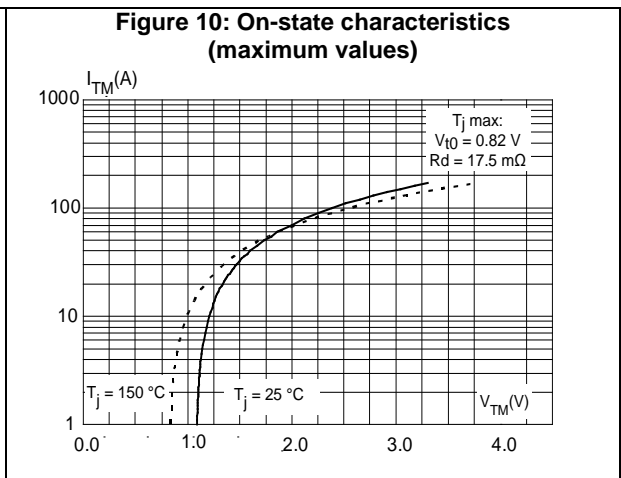
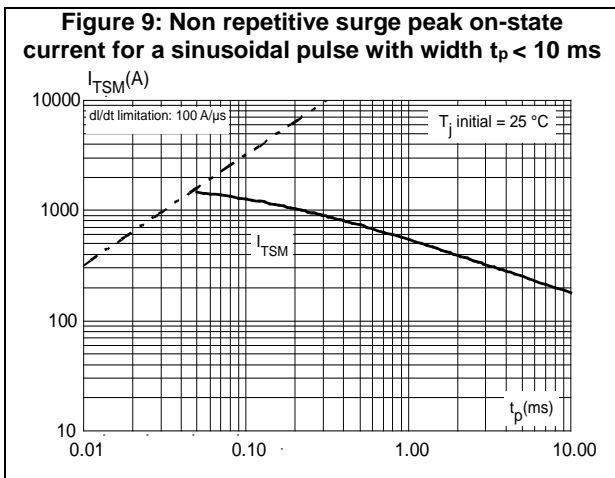
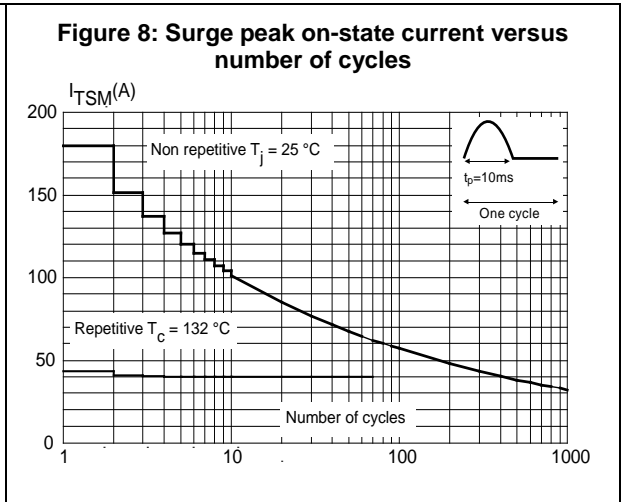
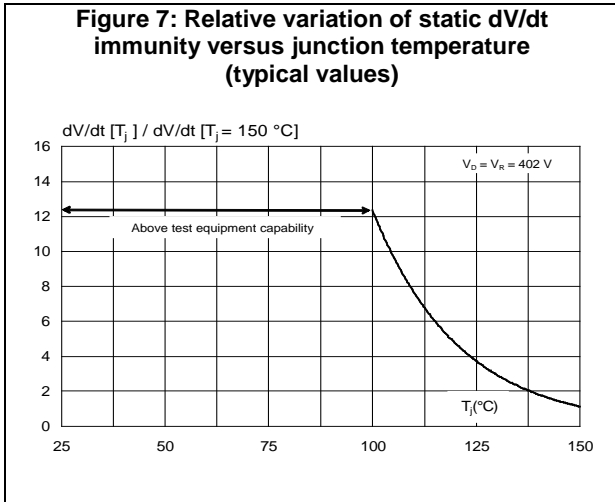
Symbol	Test conditions			Value	Unit
$V_{TM}$	$I_{TM} = 40 \text{ A}$ , $t_p = 380 \mu\text{s}$	$T_j = 25 \text{ }^\circ\text{C}$	Max.	1.6	V
$V_{TO}$	Threshold voltage	$T_j = 150 \text{ }^\circ\text{C}$	Max.	0.82	
$R_D$	Dynamic resistance	$T_j = 150 \text{ }^\circ\text{C}$	Max.	17.5	m $\Omega$
$I_{DRM}$ , $I_{RRM}$	$V_D = V_{DRM}$ , $V_R = V_{RRM}$	$T_j = 25 \text{ }^\circ\text{C}$	Max.	5	$\mu\text{A}$
		$T_j = 125 \text{ }^\circ\text{C}$		2	mA
		$T_j = 150 \text{ }^\circ\text{C}$		3.9	

Table 5: Thermal parameters

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

# 1.1 Characteristics (curves)





## 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](http://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

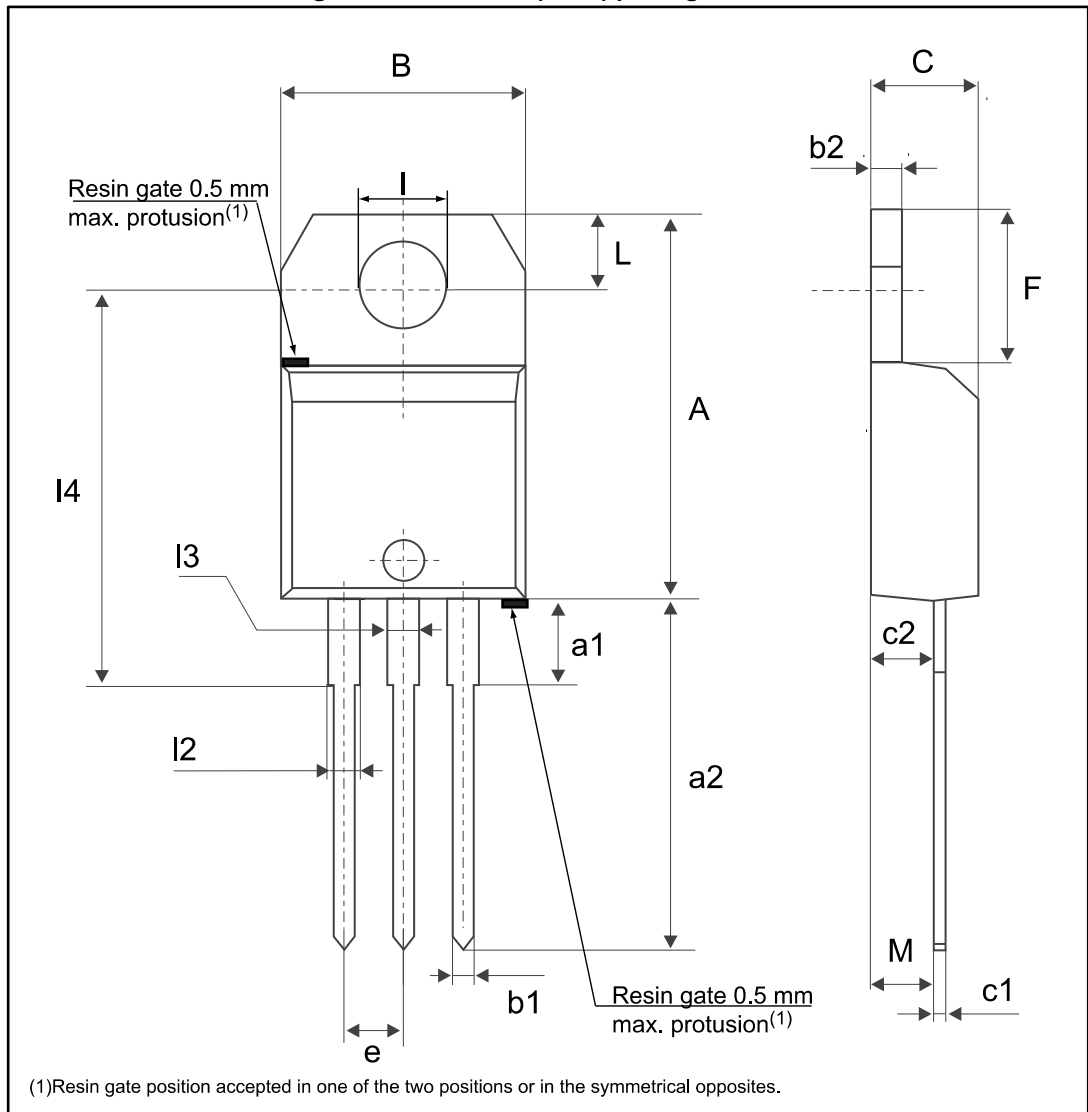


Table 6: TO-220AB (Nlns.) package mechanical data

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	

**Notes:**

<sup>(1)</sup>Inch dimensions are for reference only.

### 3 Ordering information

Figure 13: Ordering information scheme

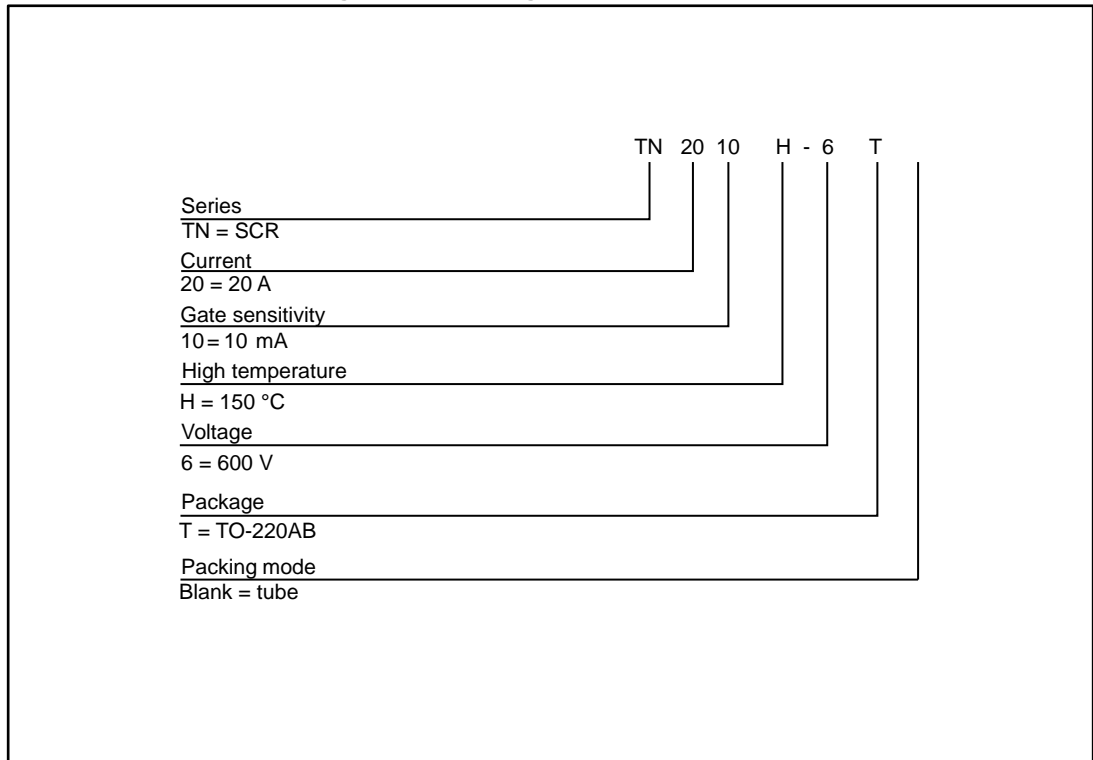


Table 7: Ordering information

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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