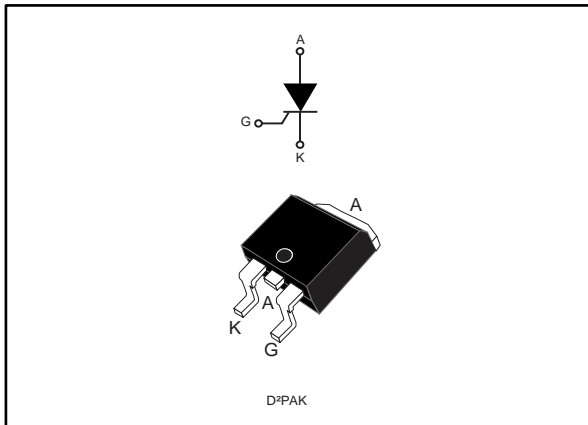


## High temperature 20 A SCRs

Datasheet - production data



### Features

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

### Applications

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

### Description

This device offers high thermal performance during operation of up to  $20\text{ A}_{RMS}$ , thanks to a junction temperature of up to  $150\text{ °C}$ .

Its D<sup>2</sup>PAK package allows modern SMD designs as well as compact back to back configuration.

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

**Table 1: Device summary**

Order code	Package	$V_{DRM}/V_{RRM}$	$I_{GT}$
TN2010H-6G	D <sup>2</sup> PAK	600 V	10 mA

# 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	$t_p = 20\text{ }\mu s$	$T_j = 150\text{ °C}$	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	
$T_j$	Operating junction temperature range		-40 to +150	°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

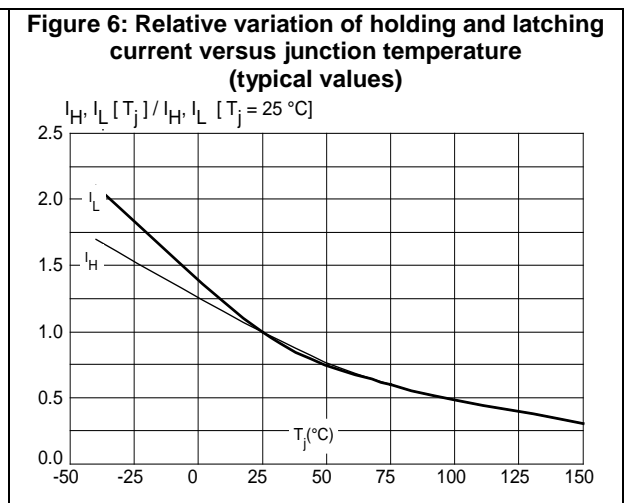
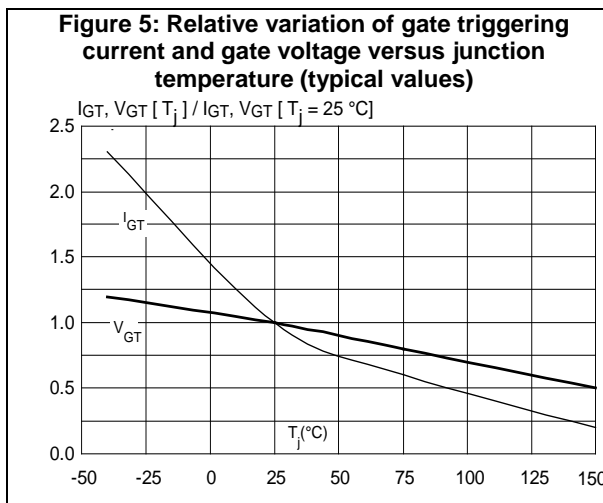
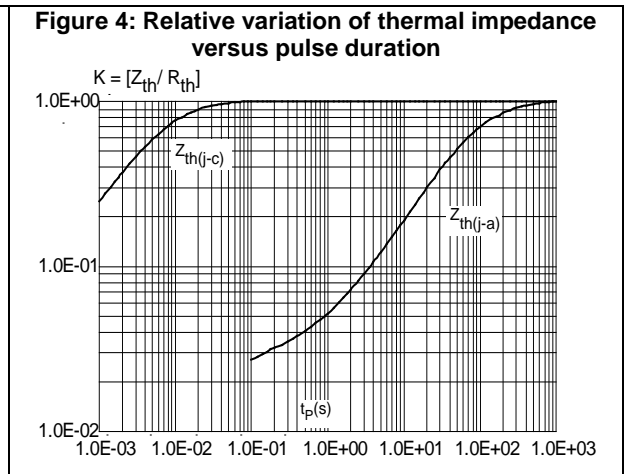
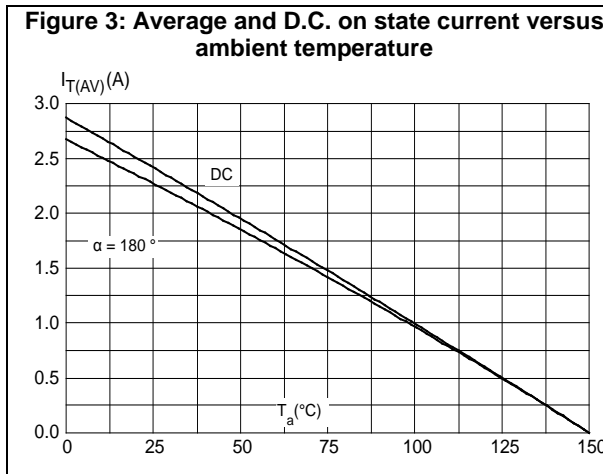
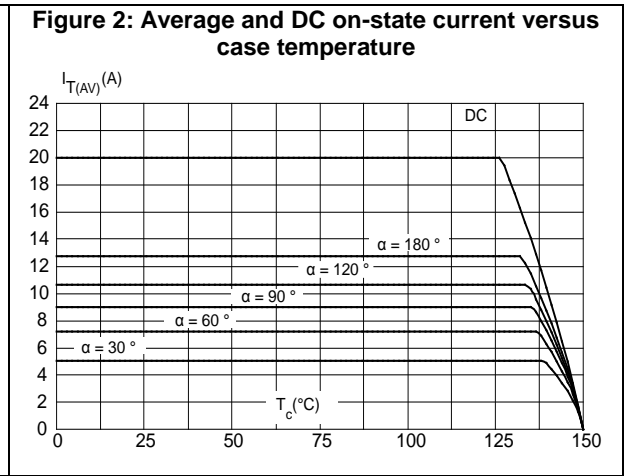
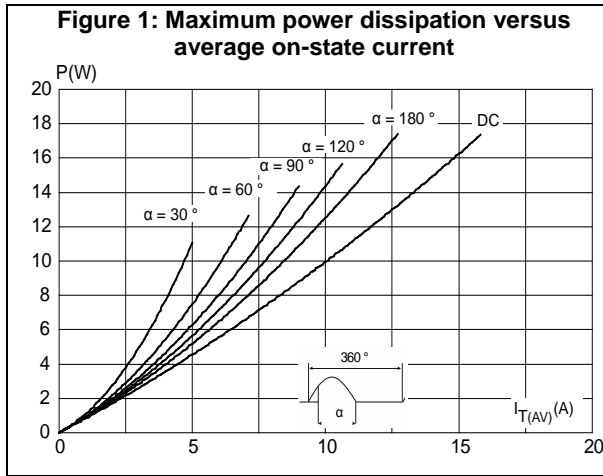
Symbol	Test conditions			Value	Unit
$V_{TM}$	$I_{TM} = 40 \text{ A}$ , $t_p = 380 \text{ } \mu\text{s}$	$T_j = 25 \text{ }^\circ\text{C}$	Max.	1.6	V
$V_{TO}$	Threshold voltage	$T_j = 150 \text{ }^\circ\text{C}$	Max.	0.82	
$R_D$	Dynamic resistance	$T_j = 150 \text{ }^\circ\text{C}$	Max.	17.5	m $\Omega$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

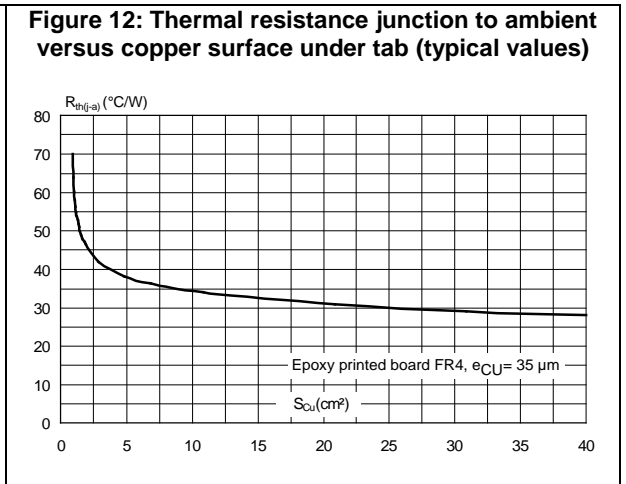
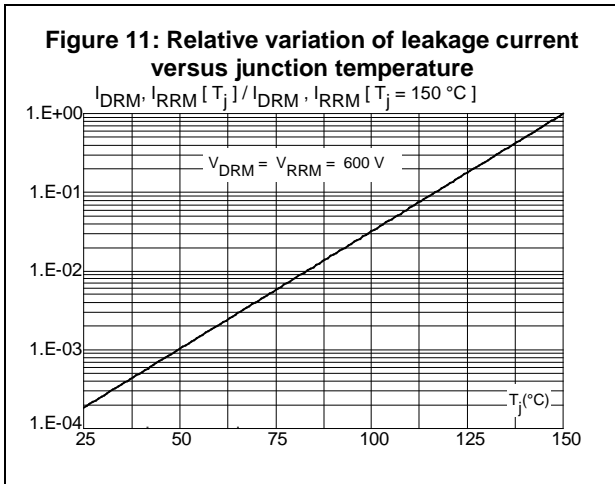
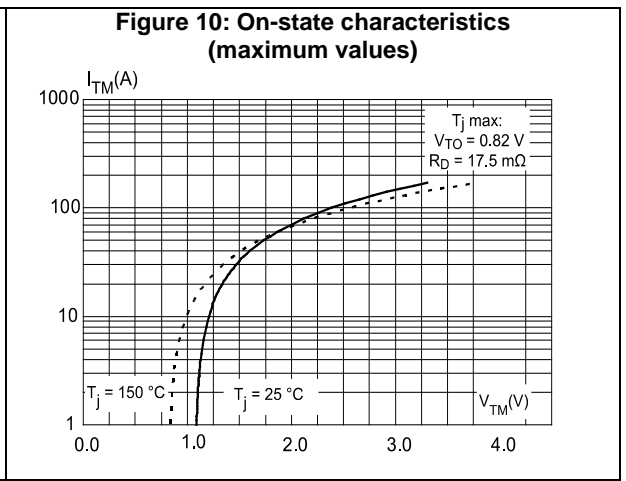
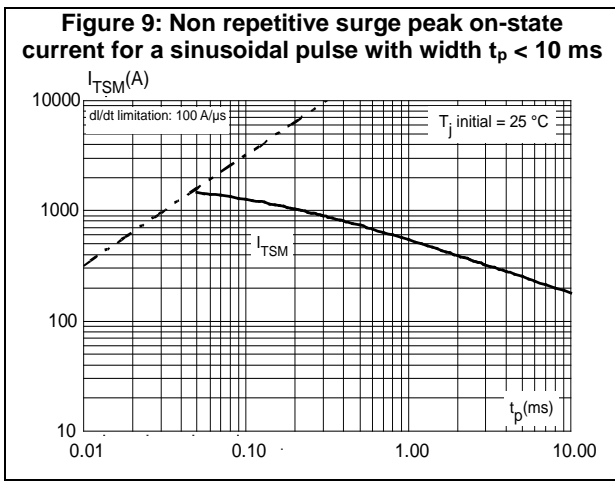
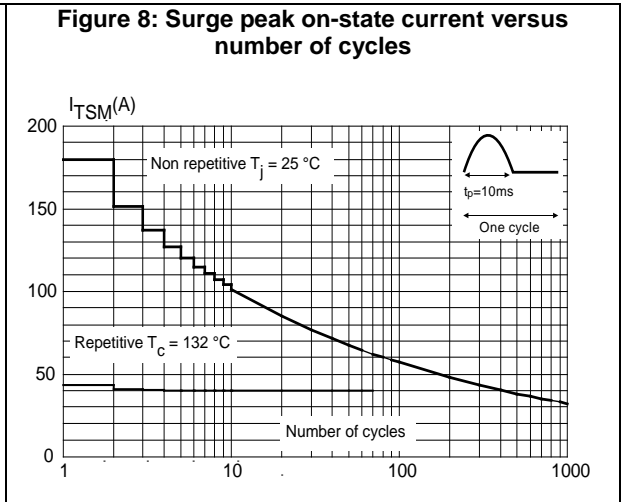
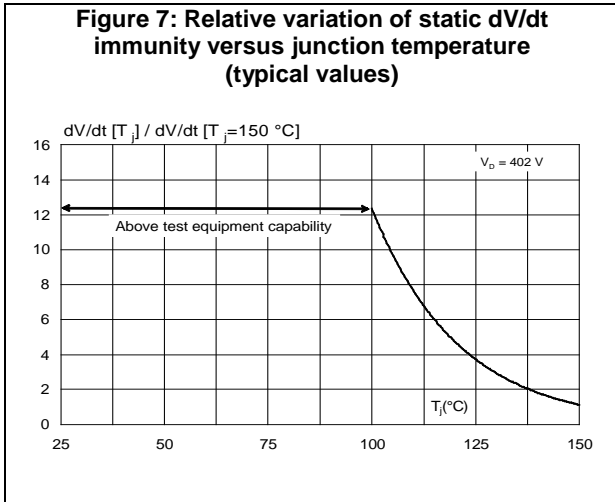
Table 5: Thermal parameters

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)	$S^{(1)} = 2.5 \text{ cm}^2$	Typ.	45	

**Notes:**<sup>(1)</sup>S = Copper surface under tab

### 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

### 2.1 D<sup>2</sup>PAK package information

Figure 13: D<sup>2</sup>PAK package outline

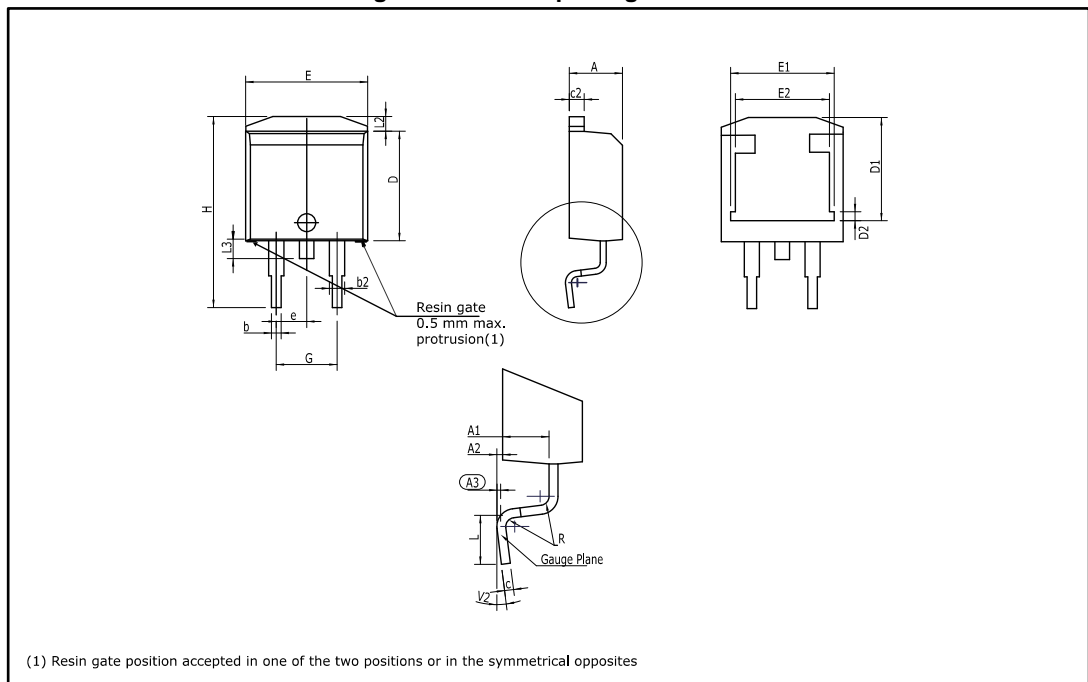
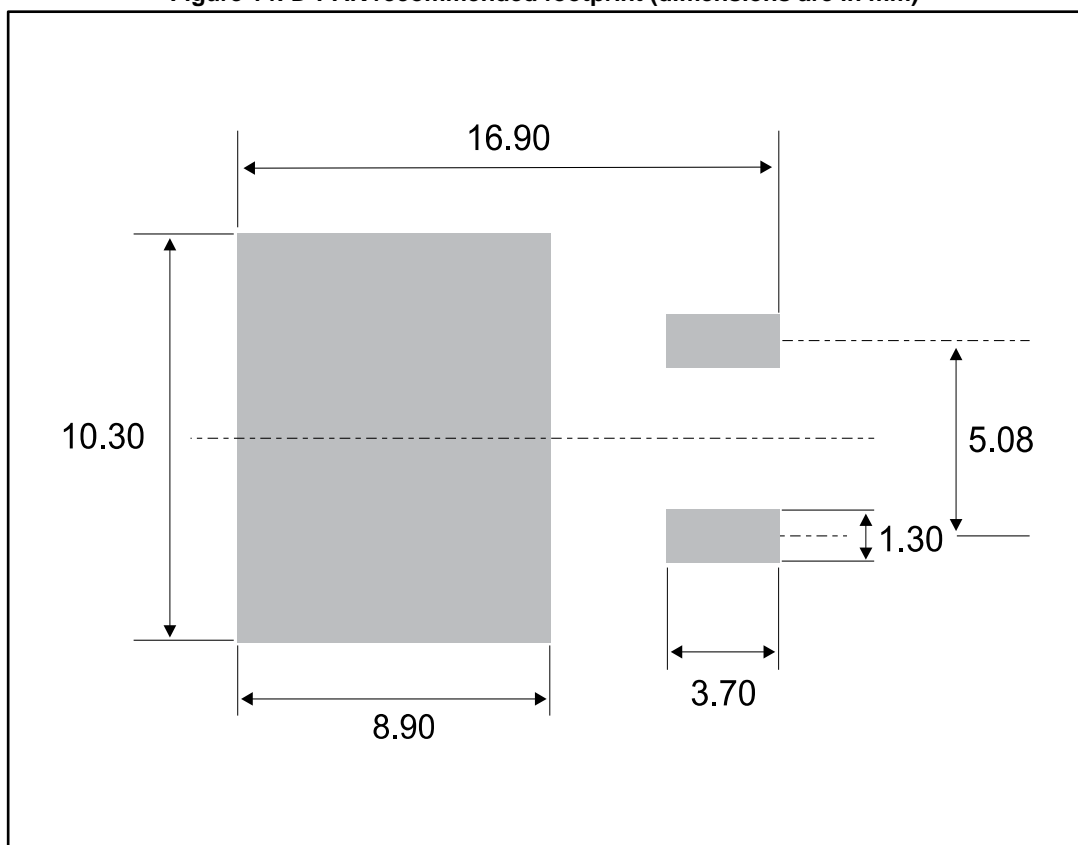


Table 6: D<sup>2</sup>PAK package mechanical data

Ref.	Dimensions					
	Millimeters			Inches <sup>(1)</sup>		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.30		4.60	0.1693		0.1811
A1	2.49		2.69	0.0980		0.1059
A2	0.03		0.23	0.0012		0.0091
A3		0.25			0.0098	
b	0.70		0.93	0.0276		0.0366
b2	1.25		1.7	0.0492		0.0669
c	0.45		0.60	0.0177		0.0236
c2	1.21		1.36	0.0476		0.0535
D	8.95		9.35	0.3524		0.3681
D1	7.50		8.00	0.2953		0.3150
D2	1.30		1.70	0.0512		0.0669
e	2.54			0.1		
E	10.00		10.28	0.3937		0.4047
E1	8.30		8.70	0.3268		0.3425
E2	6.85		7.25	0.2697		0.2854
G	4.88		5.28	0.1921		0.2079
H	15		15.85	0.5906		0.6240
L	1.78		2.28	0.0701		0.0898
L2	1.27		1.40	0.0500		0.0551
L3	1.40		1.75	0.0551		0.0689
R		0.40			0.0157	
V2	0°		8°	0°		8°

**Notes:**<sup>(1)</sup>Dimensions in inches are given for reference only

Figure 14: D<sup>2</sup>PAK recommended footprint (dimensions are in mm)





### 3 Ordering information

Figure 15: Ordering information scheme

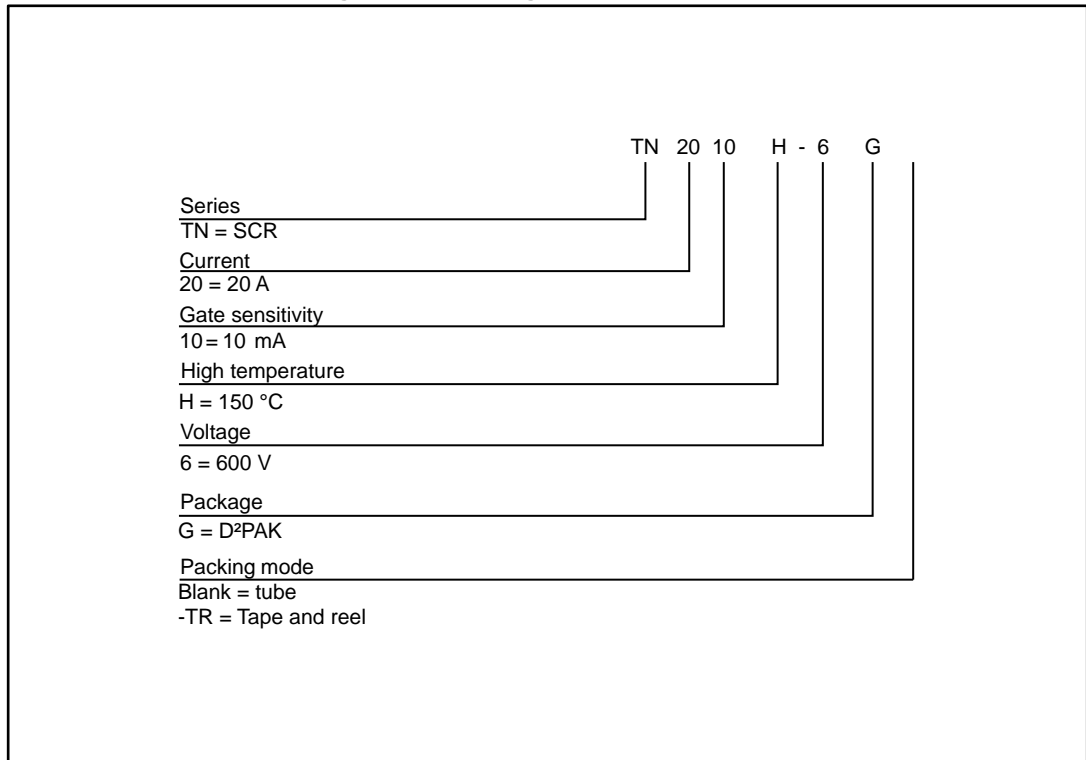


Table 7: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
TN2010H-6G	TN2010H6	D <sup>2</sup> PAK	2.3 g	50	Tube
TN2010H-6G-TR				1000	Tape and reel

### 4 Revision history

Table 8: Document revision history

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

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