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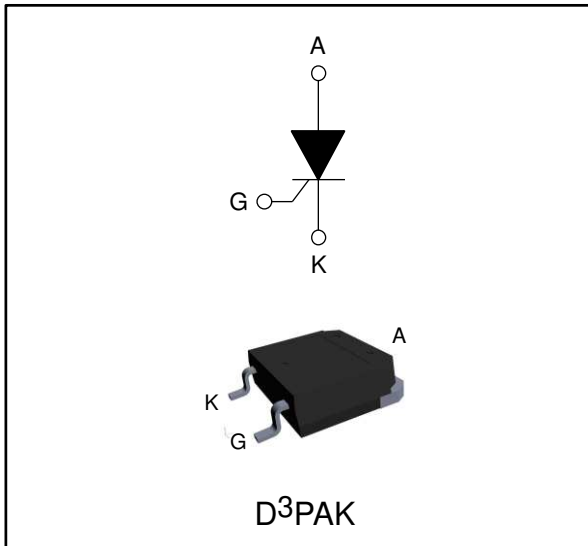
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## 80 A high temperature Thyristor (SCR)

Datasheet - production data



### Applications

- AC-DC rectifier controlled bridge
- Motorbike voltage regulator
- Variable speed motor drive
- Battery charging system
- AC solid state relay
- By-pass switch of UPS
- Industrial welding systems
- Motor soft starter

### Description

Available in high power package (D<sup>3</sup>PAK), the device is suitable in applications where power switching ( $I_{T(RMS)} = 80\text{ A}$  at  $T_C = 130\text{ °C}$ ) and power dissipation ( $V_{TM} = 1.55\text{ V}$  at  $160\text{ A}$ ) are critical, such as motorbike voltage regulator, by-pass AC switch, controlled rectifier bridge, solid state relay, battery charger, welding equipment and motor driver applications. The TM8050H-8D3 is available in surface mount D<sup>3</sup>PAK package.

### Features

- High junction temperature:  $T_j = 150\text{ °C}$
- Blocking voltage:  $V_{DRM} = V_{RRM} = 800\text{ V}$
- Nominal current:  $I_{T(RMS)} = 80\text{ A}$
- Gate triggering current:  $I_{GT\text{ max.}} = 50\text{ mA}$
- High noise immunity:  $dV/dt > 1\text{ kV}/\mu\text{s}$
- Surface mounted device D<sup>3</sup>PAK
- Increase of thermal margin due to extended  $T_j$  up to  $150\text{ °C}$
- Low  $I_D$  and  $I_R$  in blocking state
- High compact power SMD design

Table 1: Device summary

Symbol	Value
$I_{T(RMS)}$	80 A
$V_{DRM}/V_{RRM}$	800 V
$I_{GT}$	50 mA
$T_j$	150 °C

# 1 Characteristics

**Table 2: Absolute ratings (limiting values)**

Symbol	Parameter		Value	Unit	
$I_{T(RMS)}$	RMS on-state current (180 ° conduction angle)		80	A	
$I_{T(AV)}$	Average on-state current (180 ° conduction angle)				
$I_{TSM}$	Non repetitive surge peak on-state current	$t_p = 8.3 \text{ ms}$	731	A	
		$t_p = 10 \text{ ms}$			
$I^2t$	$I^2t$ value for fusing		2245	$A^2s$	
$V_{RRM} / V_{DRM}$	Maximum repetitive symmetric blocking voltage			800	V
$di/dt$	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$ , $t_r \leq 100 \text{ ns}$	$f = 50 \text{ Hz}$	$T_j = 25 \text{ °C}$	200	$A/\mu s$
$I_{GM}$	Peak gate current	$t_p = 20 \mu s$	$T_j = 150 \text{ °C}$	8	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 during 10 to 30 s duration			245	°C

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

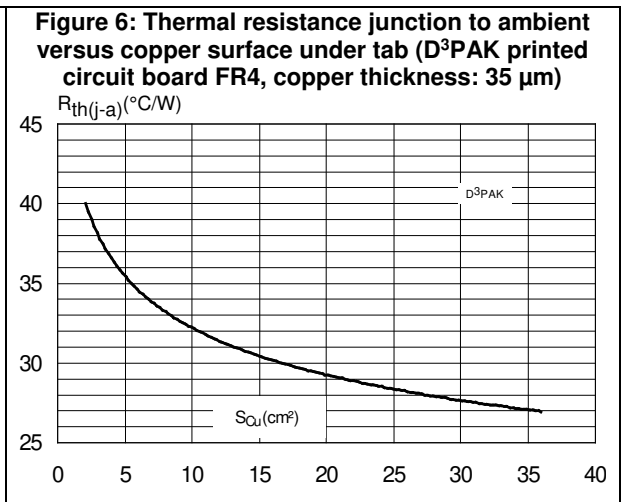
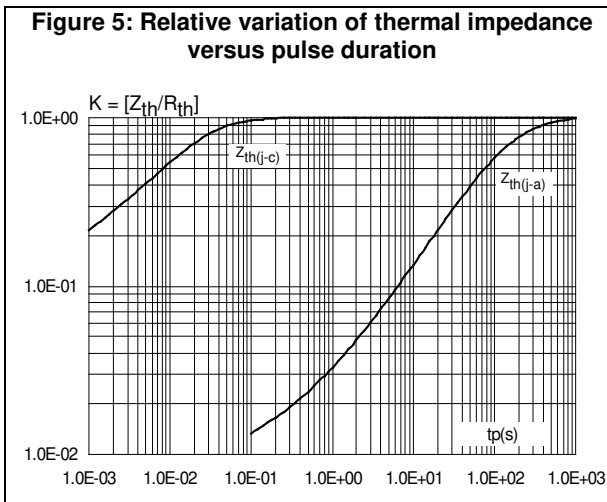
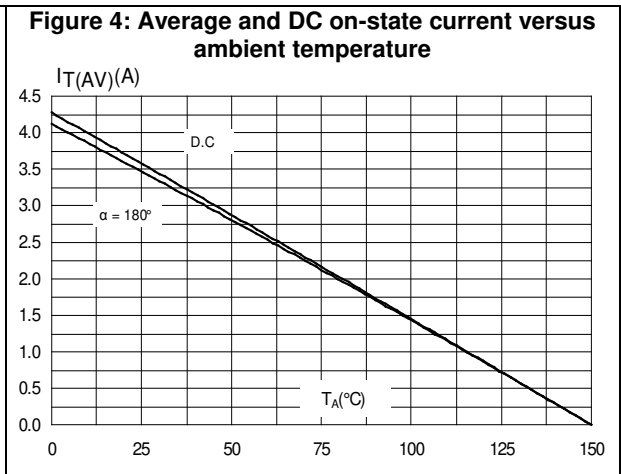
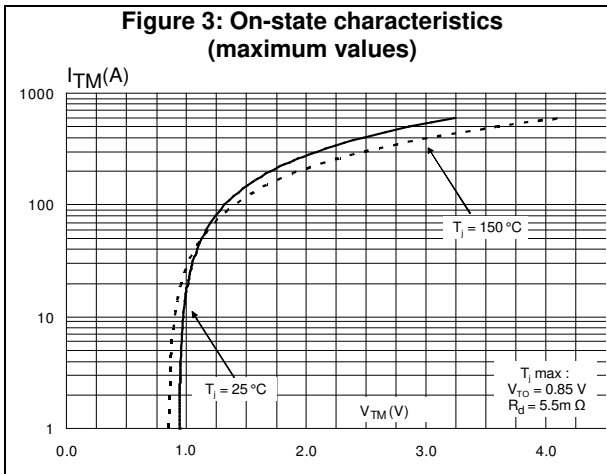
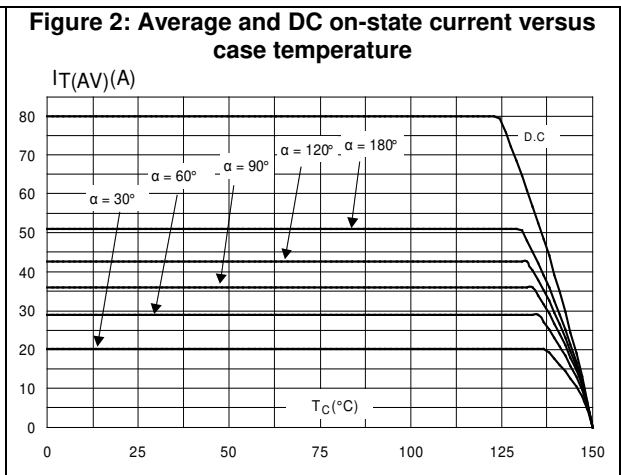
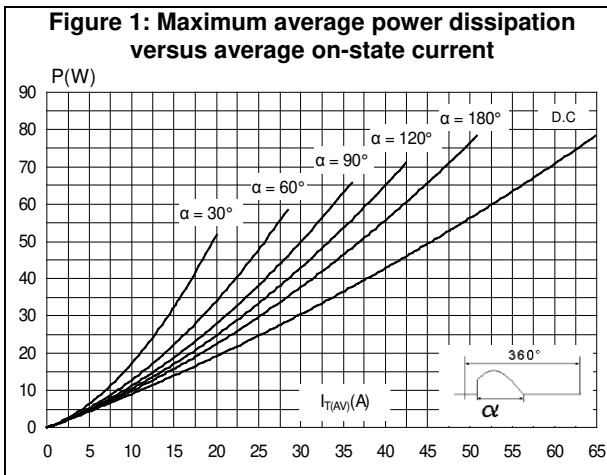
Symbol	Test Conditions		Value	Unit		
$I_{GT}$	$V_D = 12 \text{ V}$ , $R_L = 33 \Omega$		Min.	2.5	mA	
			Max.	50		
$V_{GT}$	$V_D = 12 \text{ V}$ , $R_L = 33 \Omega$		Max.	1.5	V	
$V_{GD}$	$V_D = V_{DRM}$ , $R_L = 3.3 \text{ k}\Omega$	$T_j = 150 \text{ °C}$	Min.	0.2	V	
$I_H$	$I_T = 500 \text{ mA}$ , gate open		Max.	100	mA	
$I_L$	$I_G = 1.2 \times I_{GT}$		Max.	125	mA	
$t_{gt}$	$I_T = 80 \text{ A}$ , $V_D = V_{DRM}$ , $I_G = 200 \text{ mA}$ , $di_G/dt = 0.2 \text{ A}/\mu s$		Typ.	3	$\mu s$	
$dV/dt$	$V_D = 67 \% V_{DRM}$ , gate open	$T_j = 150 \text{ °C}$	Min.	1000	$V/\mu s$	
$t_q$	$I_T = 33 \text{ A}$ , $di_T/dt = 10 \text{ A}/\mu s$ , $V_R = 75 \text{ V}$ , $V_D = 400 \text{ V}$ , $dV_D/dt = 20 \text{ V}/\mu s$ , $t_P = 100 \mu s$	$T_j = 150 \text{ °C}$	Max.	150	$\mu s$	
$V_{TM}$	$I_{TM} = 160 \text{ A}$ , $t_P = 380 \mu s$		$T_j = 25 \text{ °C}$	Max.	1.55	V
$V_{TO}$	Threshold voltage		$T_j = 150 \text{ °C}$	Max.	0.85	V
$R_D$	Dynamic resistance		$T_j = 150 \text{ °C}$	Max.	5.5	$m\Omega$
$I_{DRM}$	$V_D = V_{DRM} = V_R = V_{RRM} = 800 \text{ V}$		$T_j = 25 \text{ °C}$	Max.	20	$\mu A$
$I_{RRM}$			$T_j = 150 \text{ °C}$	Max.	2.5	mA

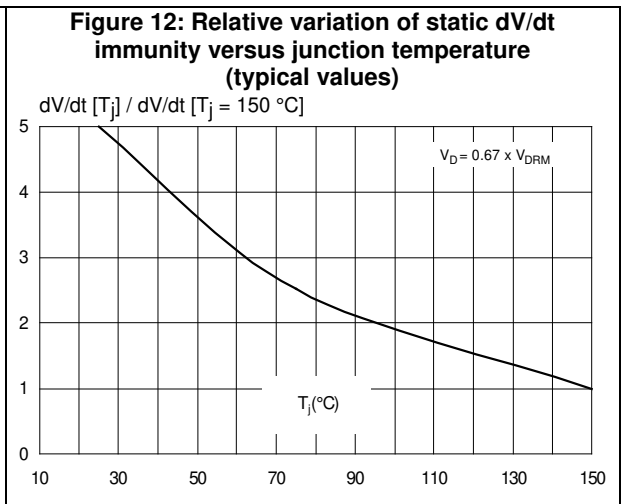
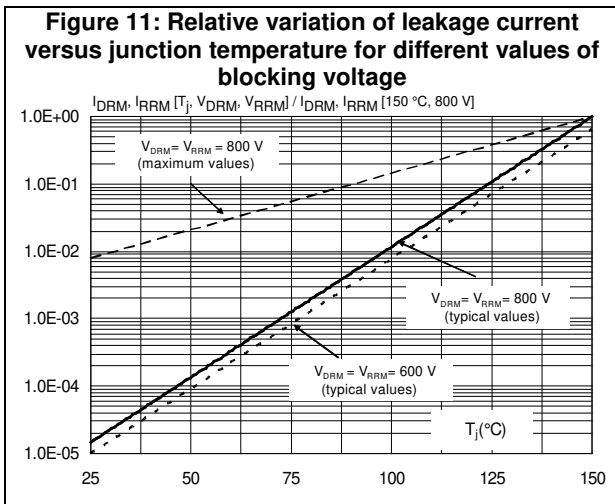
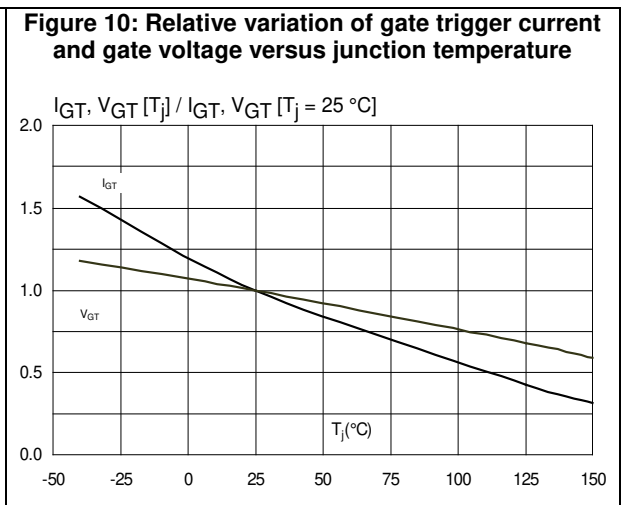
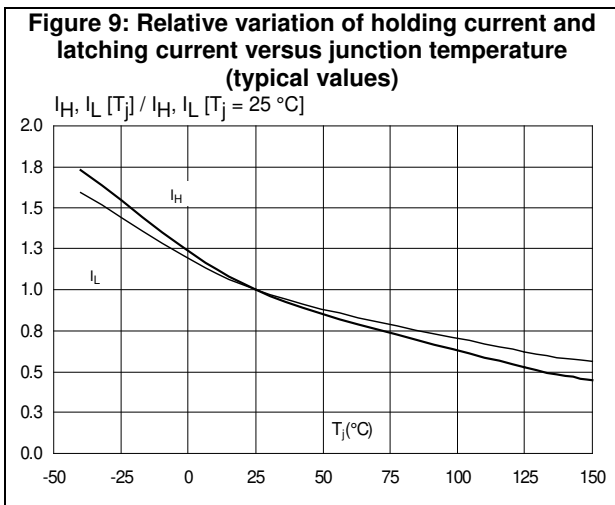
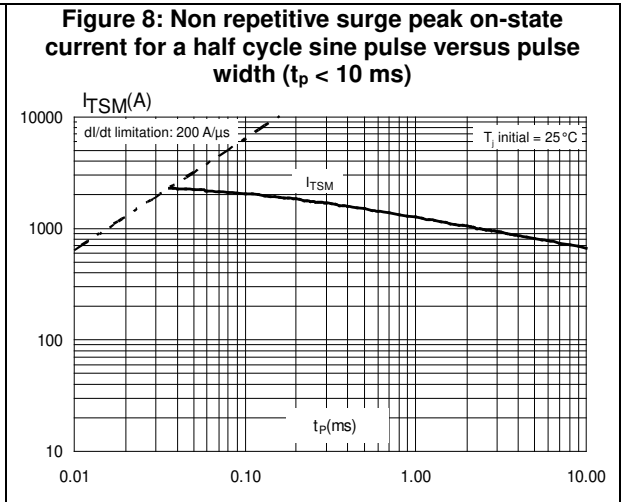
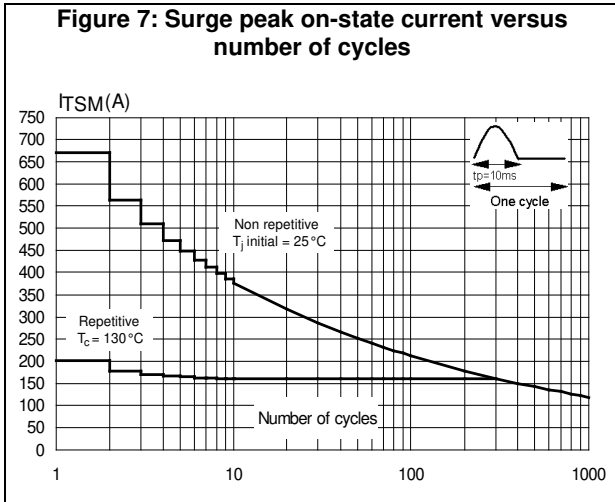
Table 4: Thermal parameters

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case (DC, max.)	D <sup>3</sup> PAK	0.25	°C/W
$R_{th(j-a)}$	Junction to ambient (DC, typ., $S_{cu} = 2.1 \text{ cm}^2$ )		40	



# 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 UL 94,V0
- Lead-free package leads, halogen-free molding resin
- Pre-conditioning moisture sensitivity MSL 1

### 2.1 D<sup>3</sup>PAK package information

Figure 13: D<sup>3</sup>PAK package dimension definitions

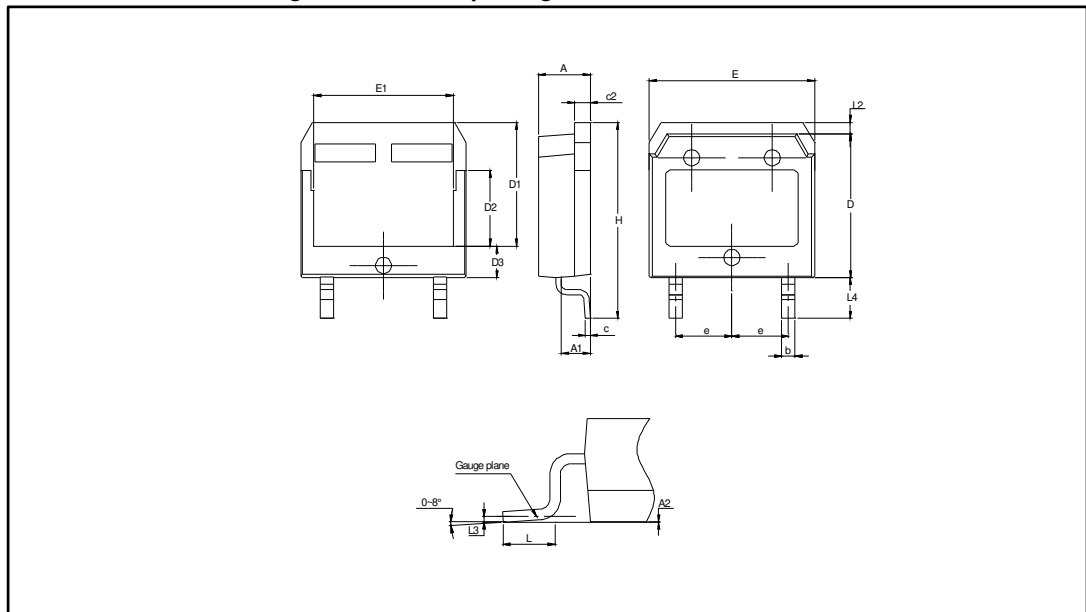


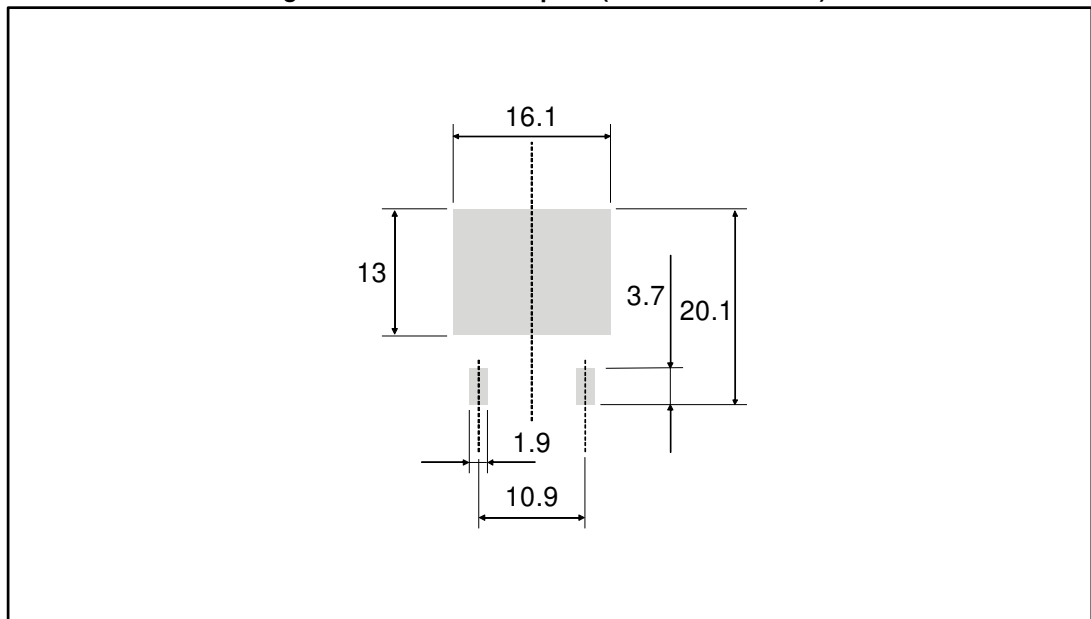
Table 5: D<sup>3</sup>PAK package mechanical data

Ref.	Dimensions					
	Millimeters			Inches <sup>(1)</sup>		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.90		5.10	0.1929		0.2008
A1	2.70		2.90	0.1063		0.1142
A2	0.02		0.25	0.0008		0.0098
b	1.15		1.45	0.0453		0.0571
c	0.40		0.65	0.0157		0.0256
c2	1.45		1.61	0.0571		0.0634
D	13.80		14.00	0.5433		0.5512
D1	11.80		12.10	0.4646		0.4764
D2	7.50		7.80	0.2953		0.3071
D3	2.90		3.20	0.1142		0.1260
E	15.85		16.05	0.6240		0.6319
E1	13.30		13.60	0.5236		0.5354
e		5.45			0.2146	
H	18.70		19.10	0.7362		0.7520
L	1.70		2.00	0.0669		0.0789
L2	1.00		1.15	0.0394		0.0453
L3		0.25			0.0098	
L4	3.80		4.10	0.1496		0.1614

Notes:

(1)Dimension in inches are given for reference only.

Figure 14: Minimum footprint (dimensions in mm)





### 3 Ordering information

Figure 15: Ordering information scheme

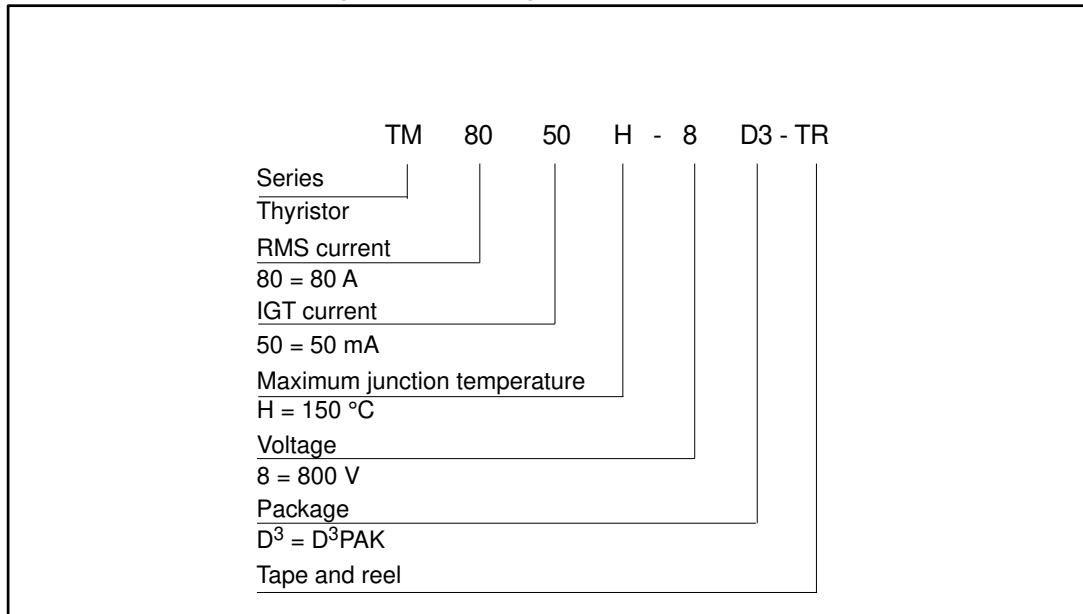


Table 6: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
TM8050H-8D3-TR	TM8050H8	D <sup>3</sup> PAK	4.2 g	400	Tape and reel

### 4 Revision history

Table 7: Document revision history

Date	Revision	Changes
11-Feb-2016	1	Initial release.
01-Apr-2016	2	Updated Table 3: "Electrical characteristics (T <sub>j</sub> = 25 °C unless otherwise specified)".
29-Apr-2016	3	Updated <a href="#">Table 4: "Thermal parameters"</a> .

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