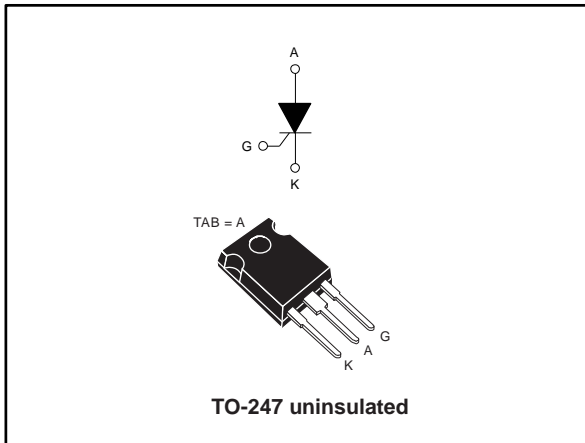


## 80 A high temperature Thyristor (SCR)

Datasheet - production data



### 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:  $I_{GT\ max.} = 50\text{ mA}$
- High noise immunity:  $dV/dt > 1\text{ kV}/\mu\text{s}$
- Through hole package TO-247
- Ecopack<sup>®</sup>2 (includes halogen free & RoHS compliance)
- Increase of thermal margin due to extended  $T_j$  up to  $150\text{ °C}$
- Low  $I_D$  and  $I_R$  in blocking state

### Applications

- Solid state switch
- Battery charging system
- Variable speed motor drive
- Industrial welding systems
- AC-DC rectifier controlled bridge
- Soft starter systems

### Description

Available in high power package (TO-247), the device is suitable in applications where power switching ( $I_{T(RMS)} = 80\text{ A}$  at  $T_C = 126\text{ °C}$ ) and power dissipation ( $V_{TM} = 1.55\text{ V}$  at  $160\text{ A}$ ) are critical, such as motorbike voltage regulator, bypass AC switch, controlled rectifier bridge, solid state relay, battery charger, welding equipment and motor driver applications. The TM8050H-8W is available in through hole TO-247 package.

**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 <sup>2</sup> s	
$V_{RRM} / V_{DRM}$	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/ $\mu\text{s}$
$I_{GM}$	Peak gate current	$t_p = 20 \text{ }\mu\text{s}$	$T_j = 150 \text{ °C}$	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	

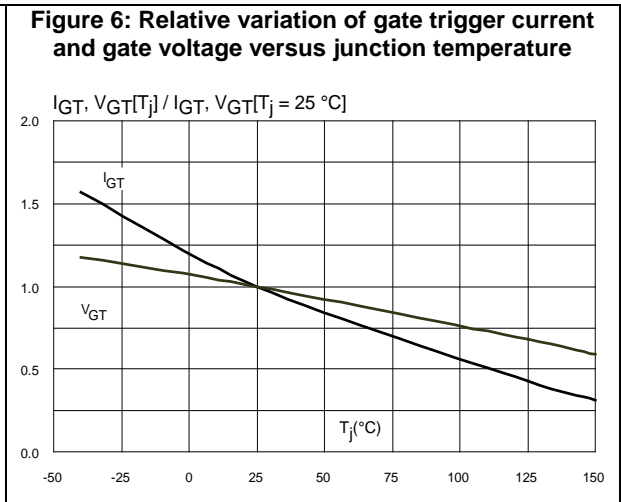
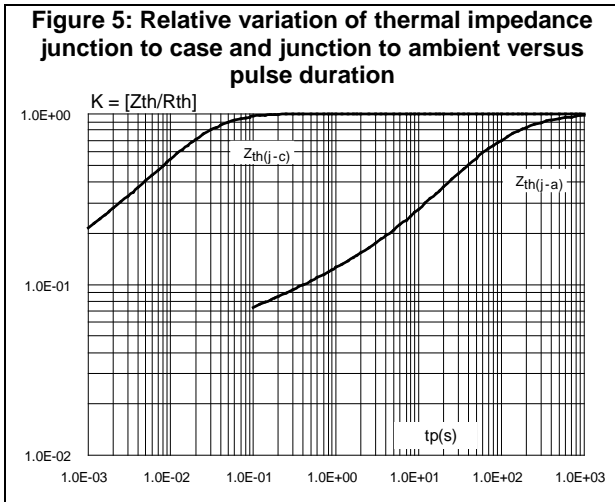
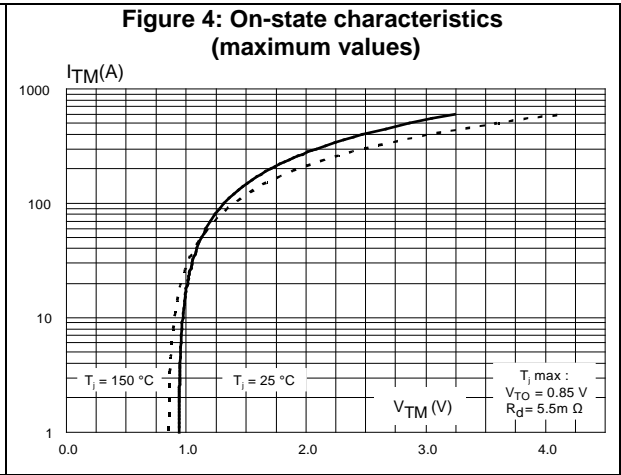
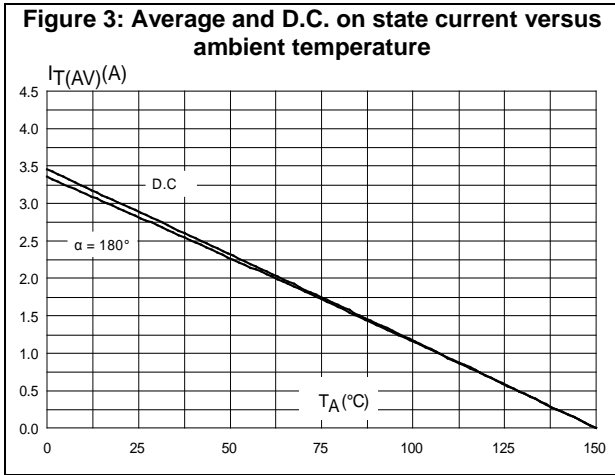
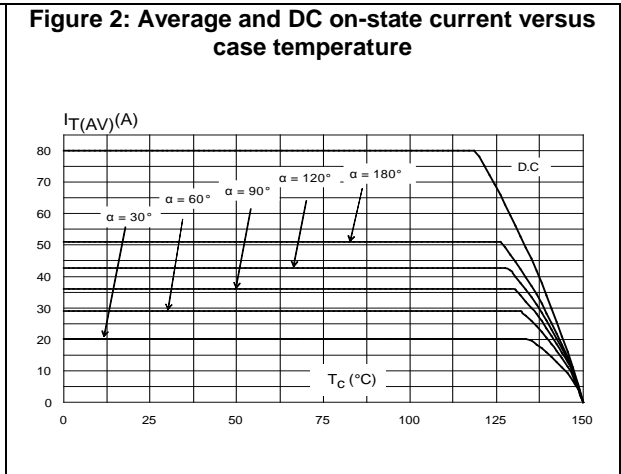
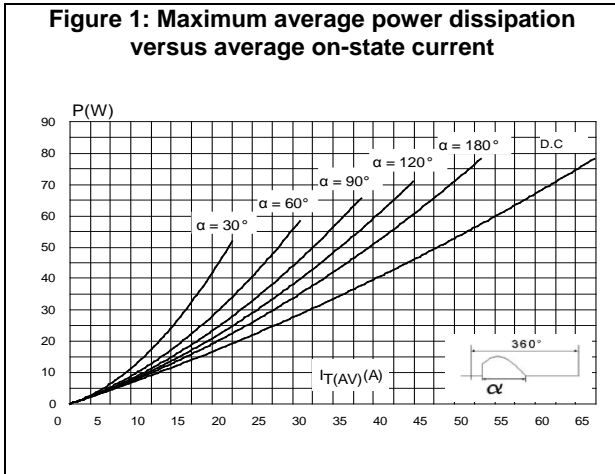
**Table 3: Electrical characteristics ( $T_j = 25 \text{ °C}$  unless otherwise specified)**

Symbol	Test Conditions		Value	Unit		
$I_{GT}$	$V_D = 12 \text{ V}$ , $R_L = 33 \text{ }\Omega$	Min.	2.5	mA		
		Max.	50			
$V_{GT}$	$V_D = 12 \text{ V}$ , $R_L = 33 \text{ }\Omega$		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	
$t_{gt}$	$I_T = 80 \text{ A}$ , $V_D = V_{DRM}$ , $I_G = 200 \text{ mA}$ , $di/dt = 0.2 \text{ A}/\mu\text{s}$		Typ.	3	$\mu\text{s}$	
$dV/dt$	$V_D = 67 \text{ \% } V_{DRM}$ , gate open	$T_j = 150 \text{ °C}$	Min.	1000	V/ $\mu\text{s}$	
$t_q$	$I_T = 33 \text{ A}$ , $di_T/dt = 10 \text{ A}/\mu\text{s}$ , $V_R = 75 \text{ V}$ , $V_D = 400 \text{ V}$ , $dV_D/dt = 20 \text{ V}/\mu\text{s}$ , $t_P = 100 \text{ }\mu\text{s}$	$T_j = 150 \text{ °C}$	Max.	150	$\mu\text{s}$	
$V_{TM}$	$I_{TM} = 160 \text{ A}$ , $t_P = 380 \text{ }\mu\text{s}$		$T_j = 25 \text{ °C}$	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	$\mu\text{A}$	
$I_{RRM}$		$T_j = 150 \text{ °C}$	Max.	2.5	mA	

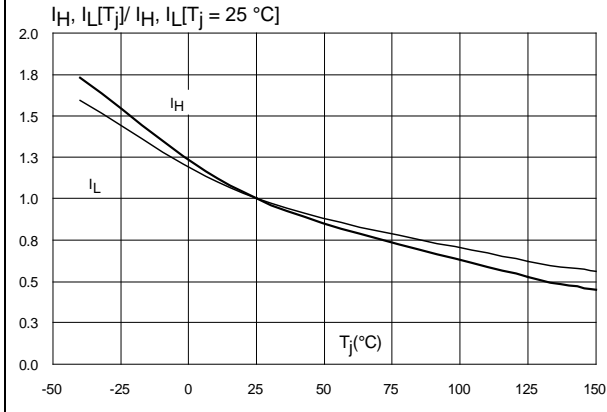
Table 4: Thermal parameters

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction to case (DC,max.)	0.30	°C/W
$R_{th(j-a)}$	Junction to ambient (DC, typ., $S_{cu} = 2.1 \text{ cm}^2$ )	50	

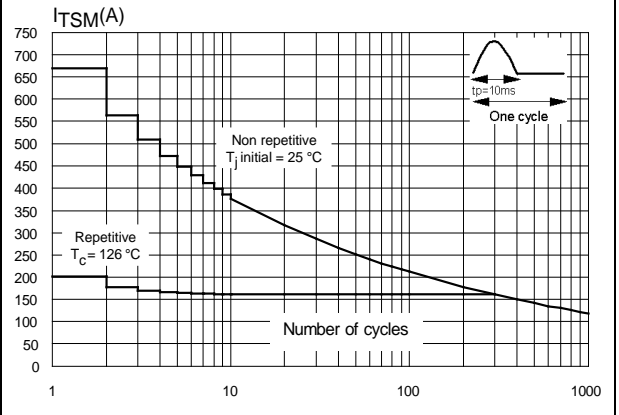
# 1.1 Characteristics (curves)



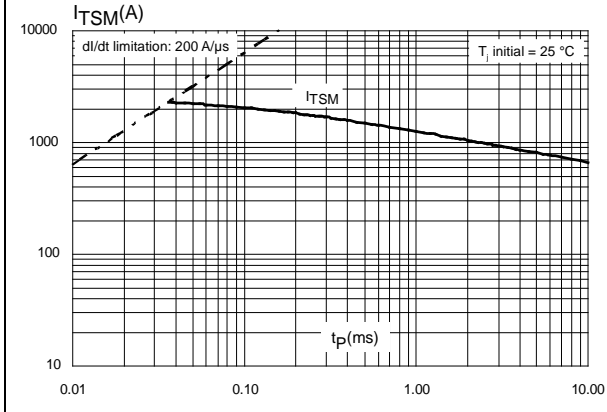
**Figure 7: Relative variation of holding current and latching current versus junction temperature (typical values)**



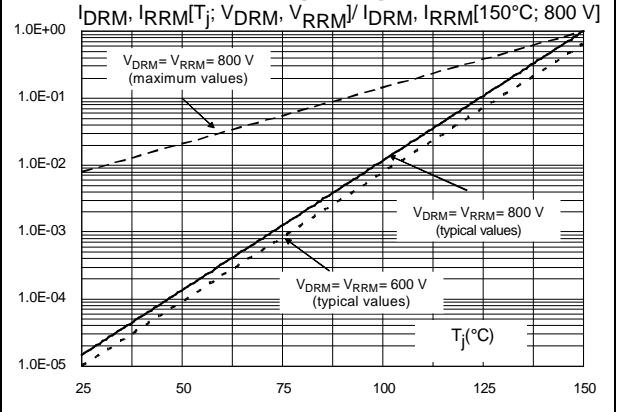
**Figure 8: Surge peak on state current versus number of cycles**



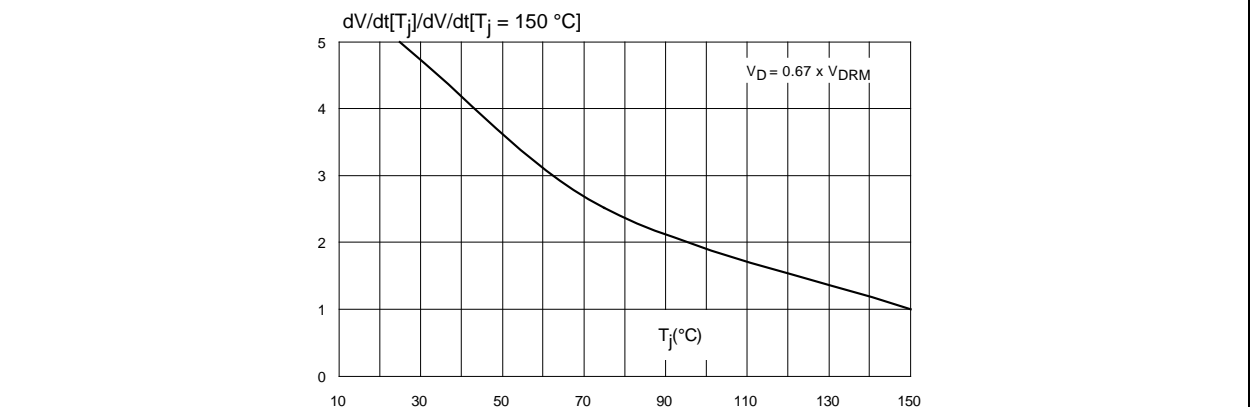
**Figure 9: Non repetitive surge peak on state current for a half cycle sine pulse versus pulse width  $t_p < 10\text{ms}$**



**Figure 10: Relative variation of leakage current versus junction temperature for different values of blocking voltage**



**Figure 11: Relative variation of static dV/dt immunity versus junction temperature (typical values)**



## 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 package lead finishing; halogen-free moulding resin

### 2.1 TO-247 package information

Figure 12: TO-247 package outline

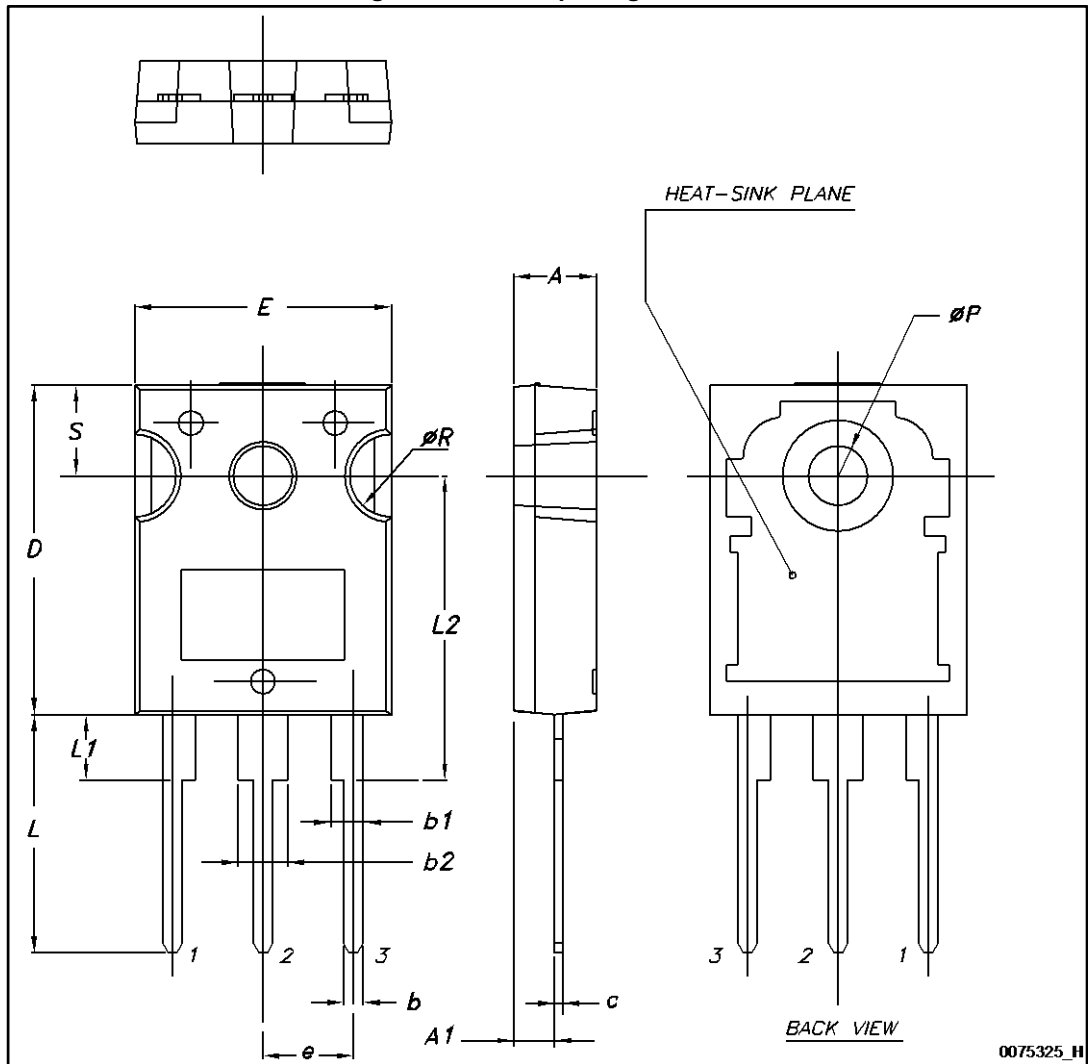


Table 5: TO-247 package mechanical data

Dim.	Dimensions					
	Millimeters			Inches <sup>(1)</sup>		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.85		5.15	0.1909		0.2028
A1	2.20		2.60	0.0866		0.1024
b	1.0		1.40	0.0394		0.0551
b1	2.0		2.40	0.0787		0.0945
b2	3.0		3.40	0.1181		0.1339
c	0.40		0.80	0.0157		0.0315
D <sup>(2)</sup>	19.85		20.15	0.7815		0.7933
E	15.45		15.75	0.6083		0.6201
e	5.30	5.45	5.60	0.2087	0.2146	0.2205
L	14.20		14.80	0.5591		0.5827
L1	3.70		4.30	0.1457		0.1693
L2		18.50			0.7283	
ØP <sup>(3)</sup>	3.55		3.65	0.1398		0.1437
ØR	4.50		5.50	0.1772		0.2165
S	5.30	5.50	5.70	0.2087	0.2165	0.2244

**Notes:**

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

<sup>(2)</sup>Dimension D plus gate protrusion does not exceed 20.5 mm

<sup>(3)</sup>Resin thickness around the mounting hole is not less than 0.9 mm

### 3 Ordering information

Figure 13: Ordering information scheme

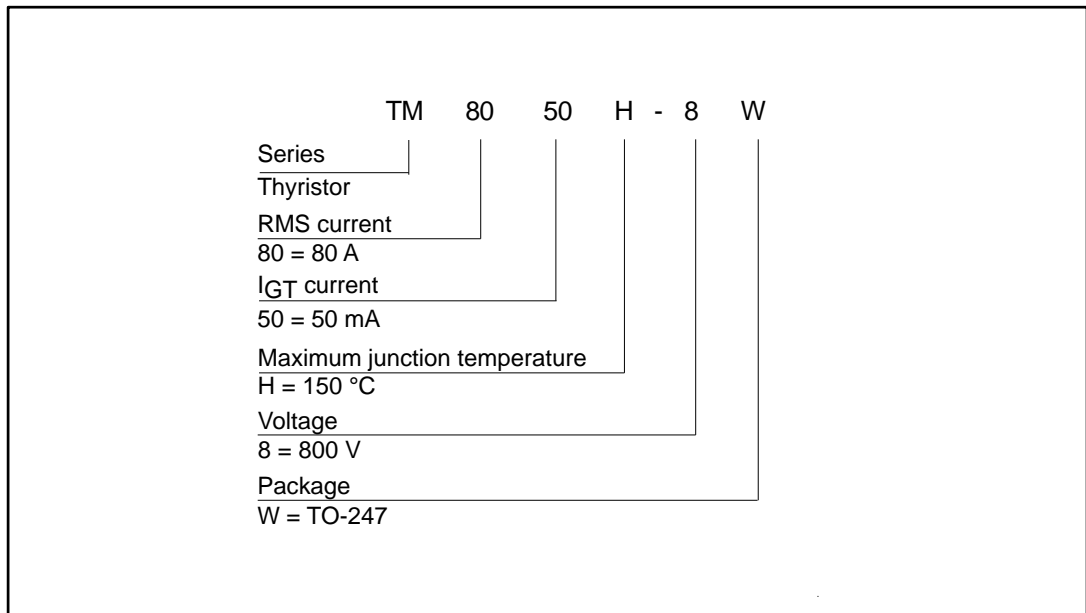


Table 6: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
TM8050H-8W	TM8050H8	TO-247	4.43 g	30	Tube

### 4 Revision history

Table 7: Document revision history

Date	Revision	Changes
03-May-2016	1	Initial release.



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