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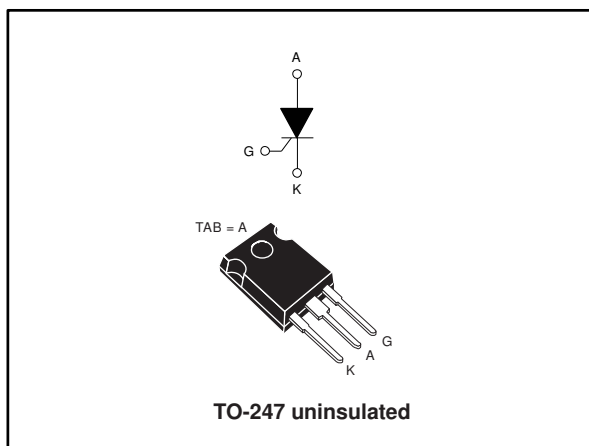
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80 A high temperature Thyristor (SCR)

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: $I_{GT\text{ max.}} = 50\text{ mA}$
- High noise immunity: $dV/dt > 1\text{ kV}/\mu\text{s}$
- Through hole package TO-247
- Ecopack[®]2 (includes halogen free & RoHS compliance)
- Increase of thermal margin due to extended T_j up to 150 °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 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 ² 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/ μs
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}	$I_T = 80 \text{ A}$, $V_D = V_{DRM}$, $I_G = 200 \text{ mA}$, $dI_G/dt = 0.2 \text{ A}/\mu\text{s}$		Typ.	3	μs	
dV/dt	$V_D = 67 \text{ \% } V_{DRM}$, gate open	$T_j = 150 \text{ °C}$	Min.	1000	V/ μs	
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	μs	
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 Ω
I_{DRM}	$V_D = V_{DRM} = V_R = V_{RRM} = 800 \text{ V}$	$T_j = 25 \text{ °C}$	Max.	20	μA	
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 1: Maximum average power dissipation versus average on-state current

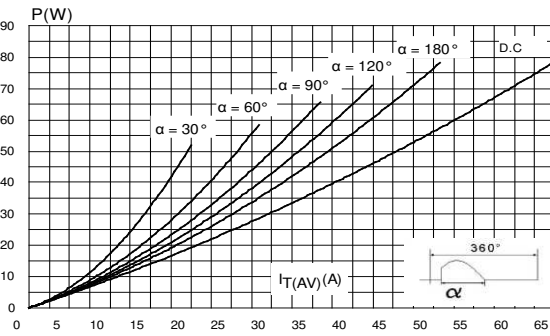


Figure 2: Average and DC on-state current versus case temperature

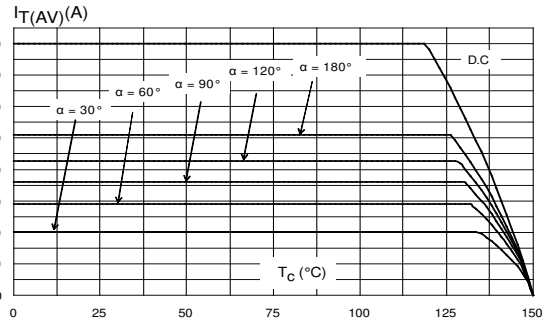


Figure 3: Average and D.C. on state current versus ambient temperature

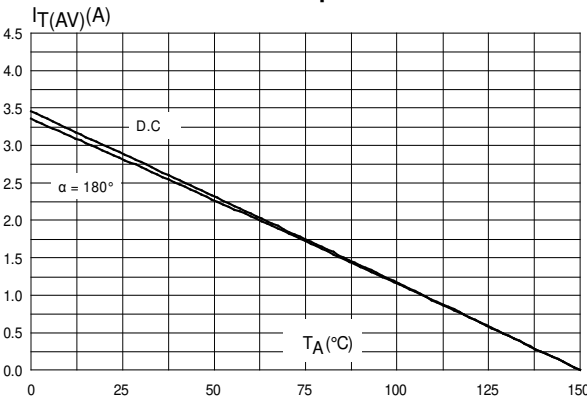


Figure 4: On-state characteristics (maximum values)

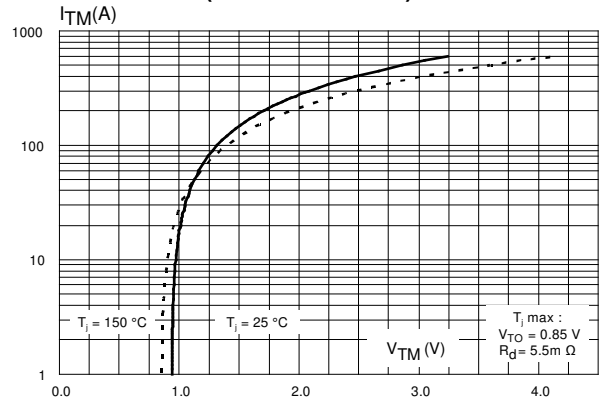


Figure 5: Relative variation of thermal impedance junction to case and junction to ambient versus pulse duration

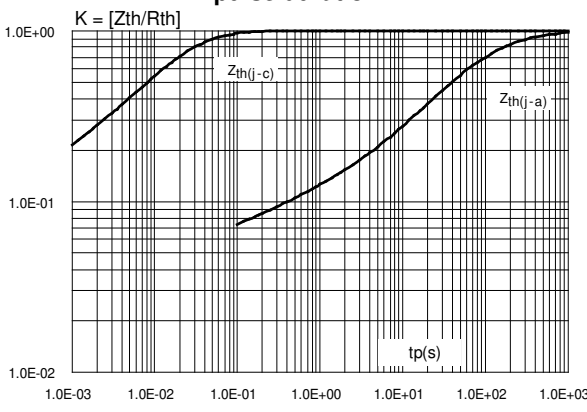
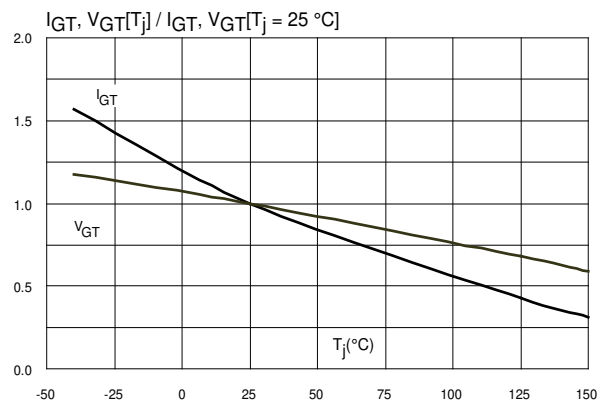
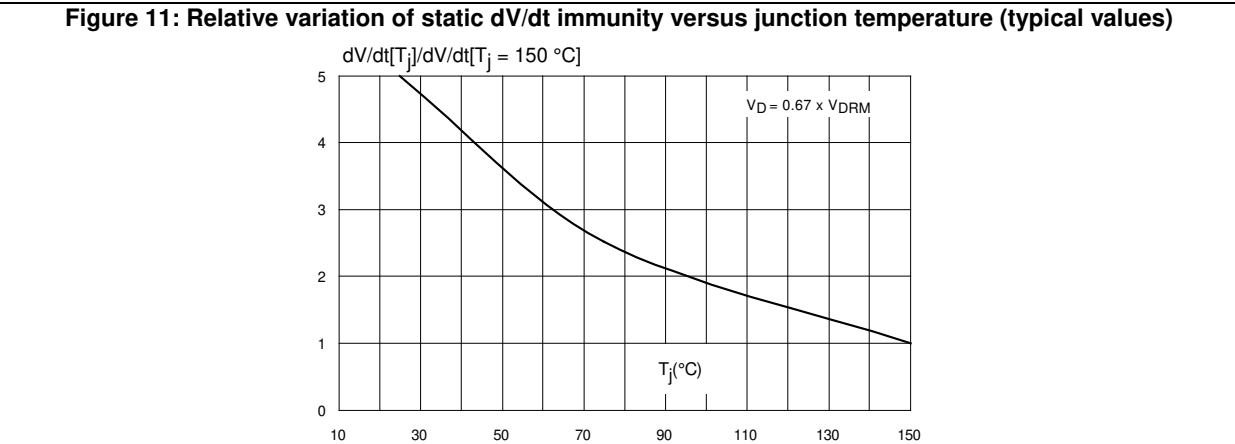
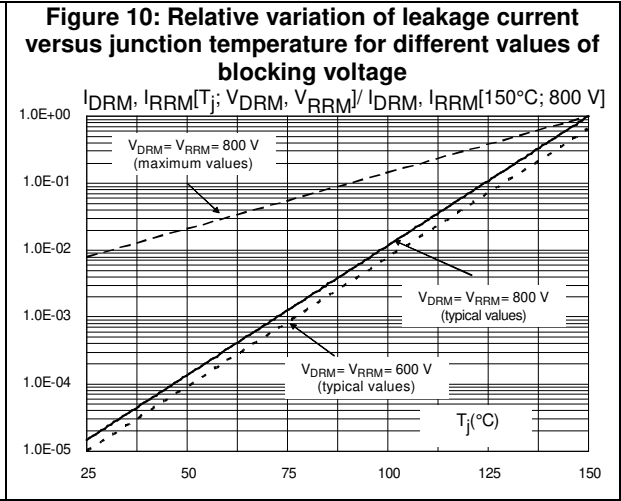
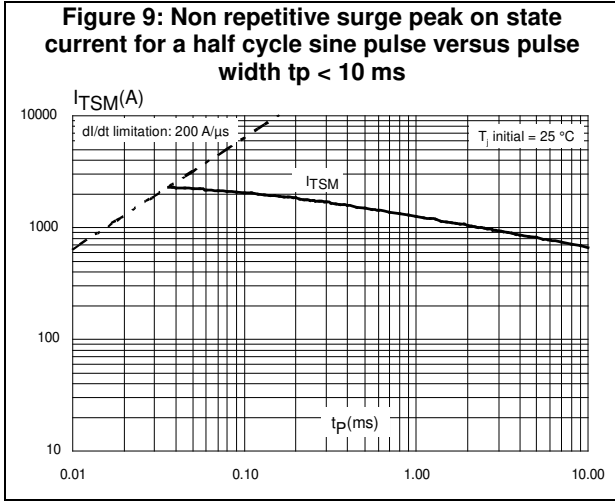
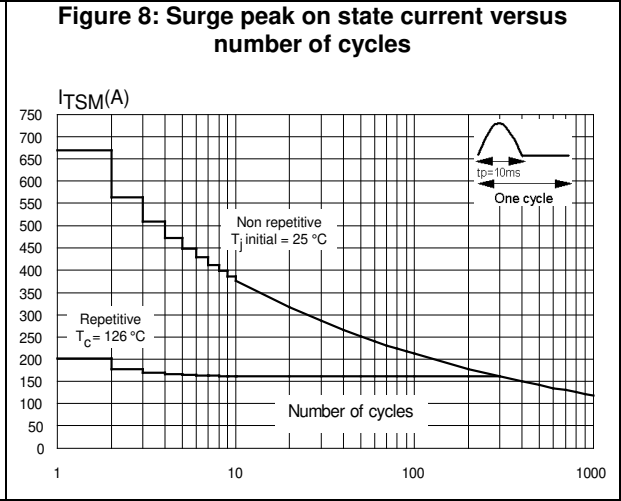
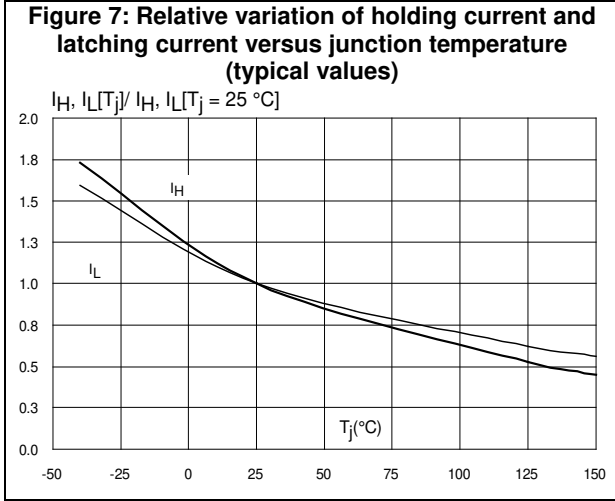


Figure 6: Relative variation of gate trigger current and gate voltage versus junction temperature





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 package lead finishing; halogen-free moulding resin

2.1 TO-247 package information

Figure 12: TO-247 package outline

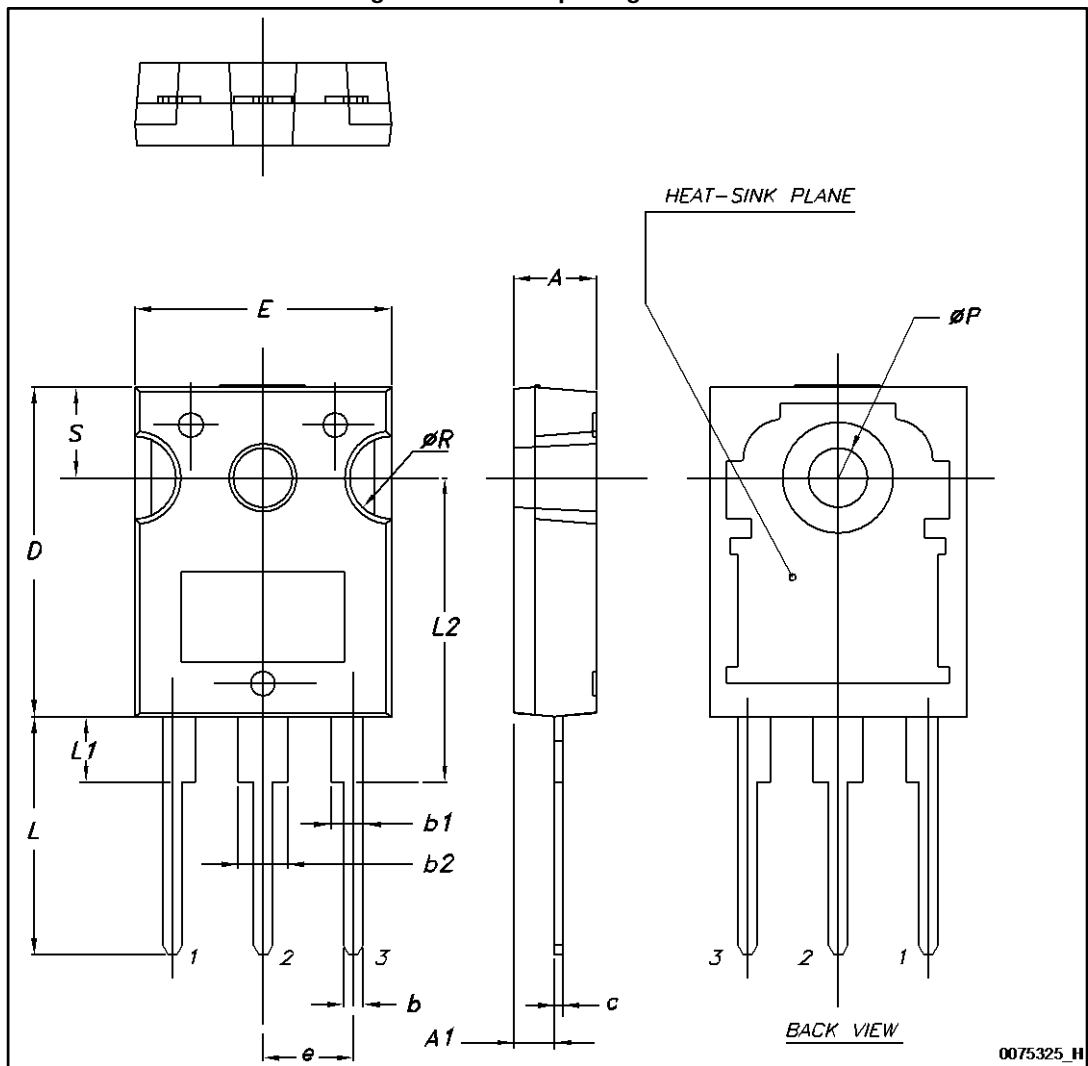


Table 5: TO-247 package mechanical data

Dim.	Dimensions					
	Millimeters			Inches ⁽¹⁾		
	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 ⁽²⁾	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 ⁽³⁾	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:

⁽¹⁾Inch dimensions given only for reference

⁽²⁾Dimension D plus gate protrusion does not exceed 20.5 mm

⁽³⁾Resin thickness around the mounting hole is not less than 0.9 mm

3 Ordering information

Figure 13: Ordering information scheme

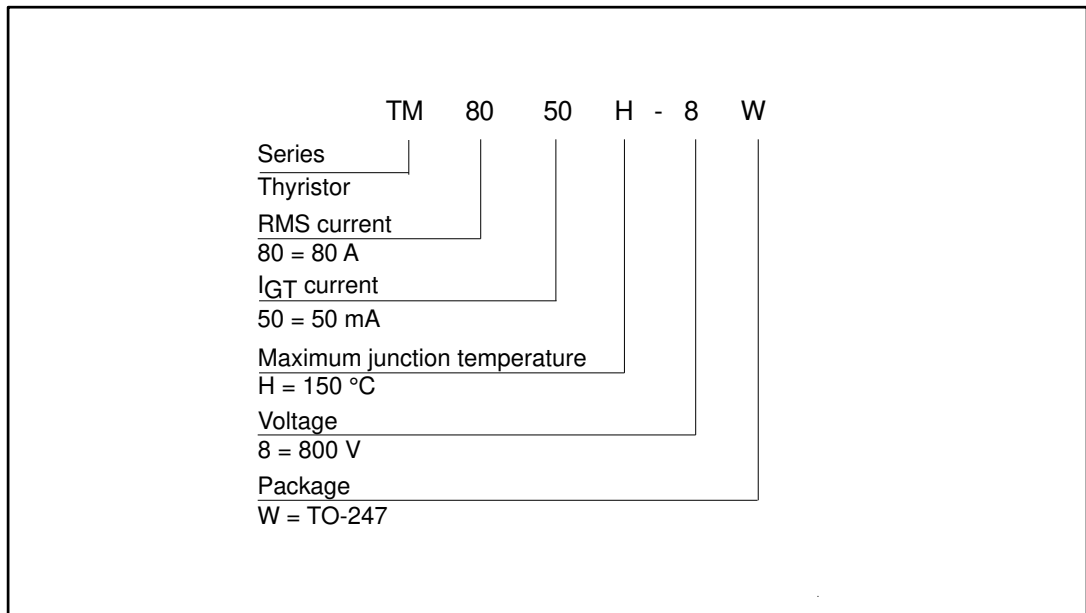


Table 6: Ordering information

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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