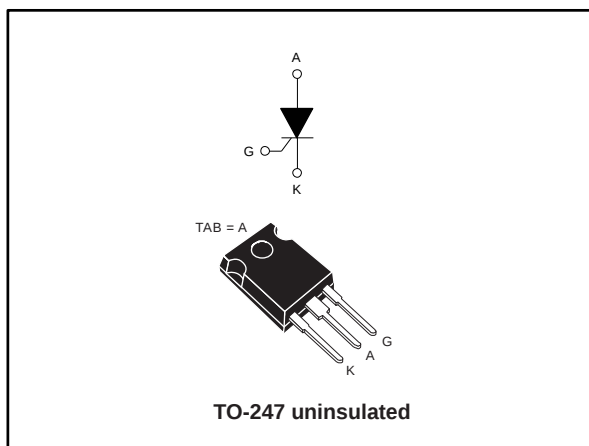


80 A high temperature Thyristor (SCR)

Datasheet - production data



Features

- High junction temperature: $T_j = 150\text{ }^{\circ}\text{C}$
- Blocking voltage: $V_{\text{DRM}} = V_{\text{RRM}} = 800\text{ V}$
- Nominal current: $I_{\text{T(RMS)}} = 80\text{ A}$
- Gate triggering current: $I_{\text{GT max.}} = 50\text{ mA}$
- 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 $150\text{ }^{\circ}\text{C}$
- 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 ($I_{\text{T(RMS)}} = 80\text{ A}$ at $T_c = 126\text{ }^{\circ}\text{C}$) and power dissipation ($V_{\text{TM}} = 1.55\text{ V}$ 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
$I_{\text{T(RMS)}}$	80 A
$V_{\text{DRM}}/V_{\text{RRM}}$	800 V
I_{GT}	50 mA
T_j	150 $^{\circ}\text{C}$

1 Characteristics

Table 2: Absolute ratings (limiting values)

Symbol	Parameter			Value	Unit
I _{T(RMS)}	RMS on-state current (180 ° conduction angle)		T _C = 126 °C	80	A
I _{T(AV)}	Average on-state current (180 ° conduction angle)			50	A
I _{TSM}	Non repetitive surge peak on-state current	t _p = 8.3 ms	T _j initial = 25 °C	731	A
		t _p = 10 ms		670	
I ² t	I ² t value for fusing		T _j = 25 °C	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 x I _{GT} , t _r ≤ 100 ns	f = 50 Hz	T _j = 25 °C	200	A/μs
I _{GM}	Peak gate current	t _p = 20 μs	T _j = 150 °C	8	A
P _{G(AV)}	Average gate power dissipation		T _j = 150 °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 V, R _L = 33 Ω		Min.	2.5	mA
			Max.	50	
V _{GT}	V _D = 12 V, R _L = 33 Ω		Max.	1.5	V
V _{GD}	V _D = V _{DRM} , R _L = 3.3 kΩ	T _j = 150 °C	Min.	0.2	V
I _H	I _T = 500 mA, gate open		Max.	100	mA
I _L	I _G = 1.2 x I _{GT}		Max.	125	mA
t _{gt}	I _T = 80 A, V _D = V _{DRM} , I _G = 200 mA, dI _G /dt = 0.2 A/μs		Typ.	3	μs
dV/dt	V _D = 67 % V _{DRM} , gate open	T _j = 150 °C	Min.	1000	V/μs
t _q	I _T = 33 A, dI _T /dt = 10 A/μs, V _R = 75 V, V _D = 400 V, dV _D /dt = 20 V/μs, t _P = 100 μs	T _j = 150 °C	Max.	150	μs
V _{TM}	I _{TM} = 160 A, t _P = 380 μs	T _j = 25 °C	Max.	1.55	V
V _{TO}	Threshold voltage	T _j = 150 °C	Max.	0.85	V
R _D	Dynamic resistance	T _j = 150 °C	Max.	5.5	mΩ
I _{DRM}	V _D = V _{DRM} = V _R = V _{RRM} = 800 V	T _j = 25 °C	Max.	20	μA
I _{RRM}		T _j = 150 °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

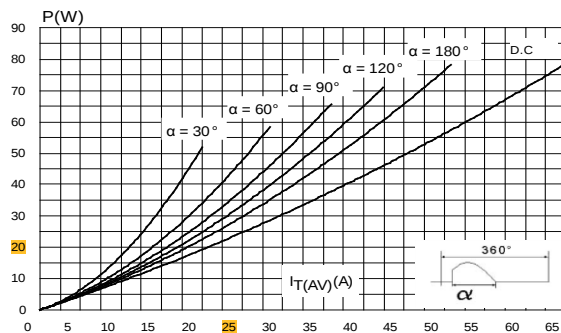


Figure 2: Average and DC on-state current versus case temperature

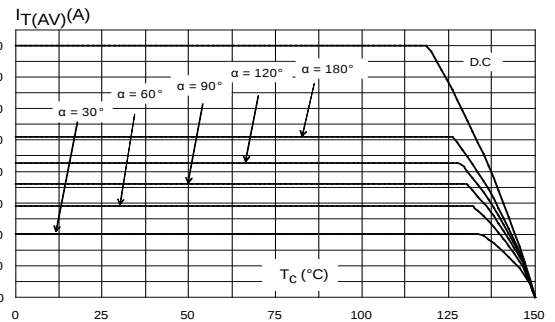


Figure 3: Average and D.C. on state current versus ambient temperature

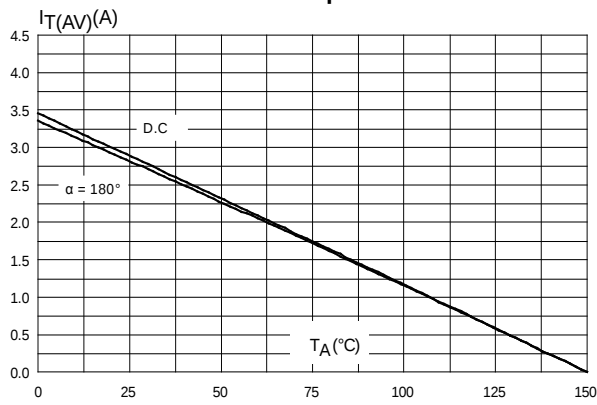


Figure 4: On-state characteristics (maximum values)

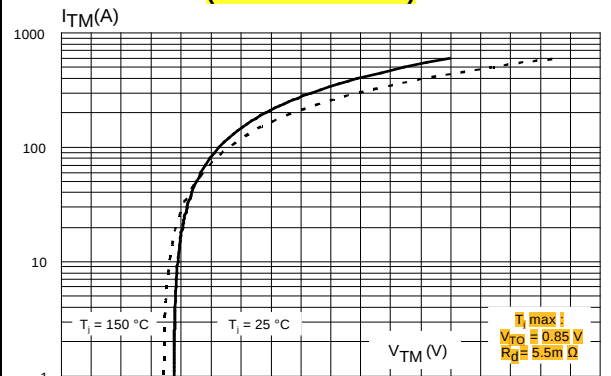


Figure 5: Relative variation of thermal impedance junction to case and junction to ambient versus pulse duration

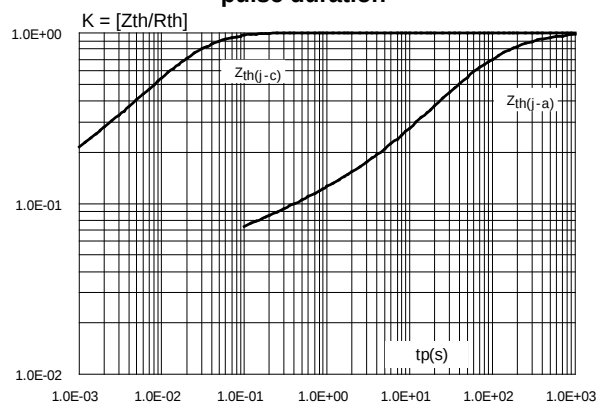


Figure 6: Relative variation of gate trigger current and gate voltage versus junction temperature

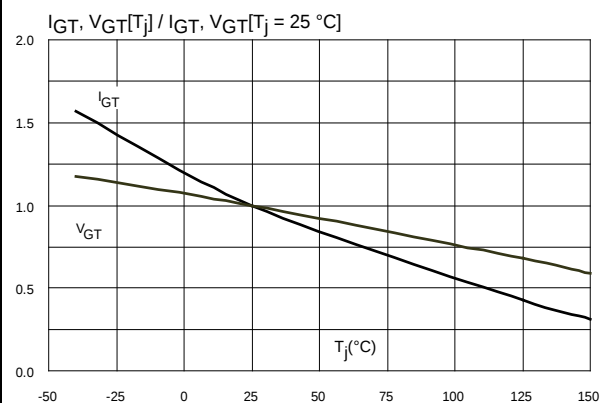


Figure 7: Relative variation of holding current and latching current versus junction temperature (typical values)

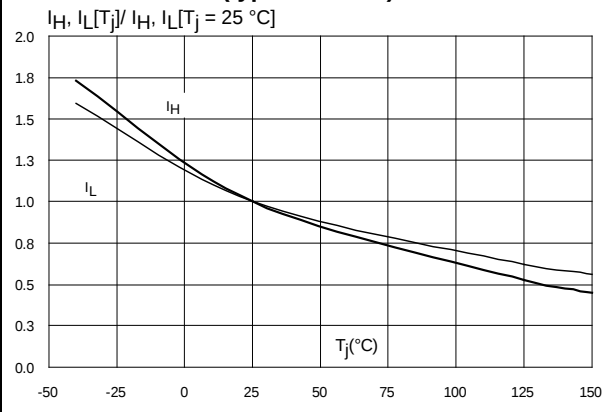


Figure 8: Surge peak on state current versus number of cycles

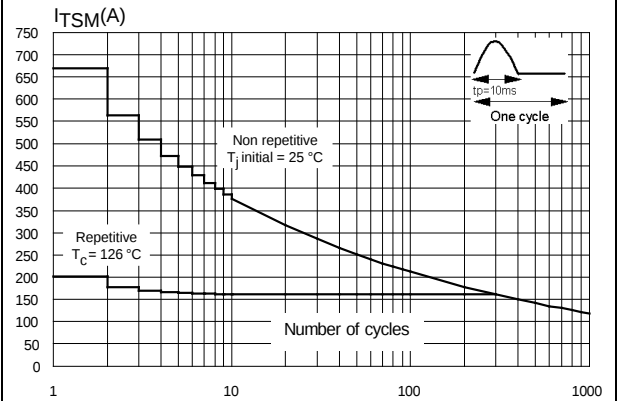


Figure 9: Non repetitive surge peak on state current for a half cycle sine pulse versus pulse width $t_p < 10$ ms

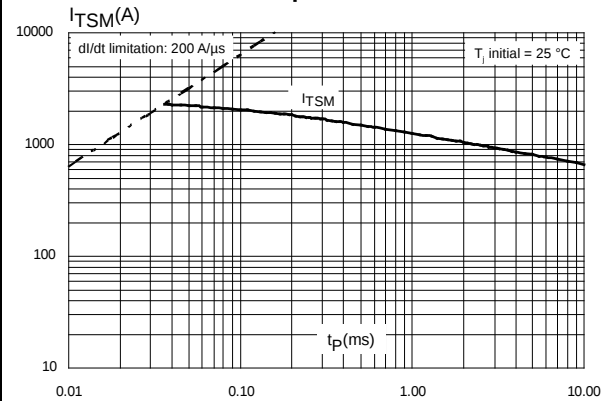


Figure 10: Relative variation of leakage current versus junction temperature for different values of blocking voltage

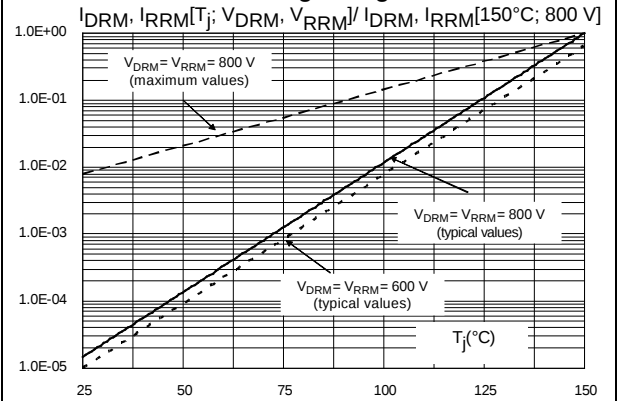
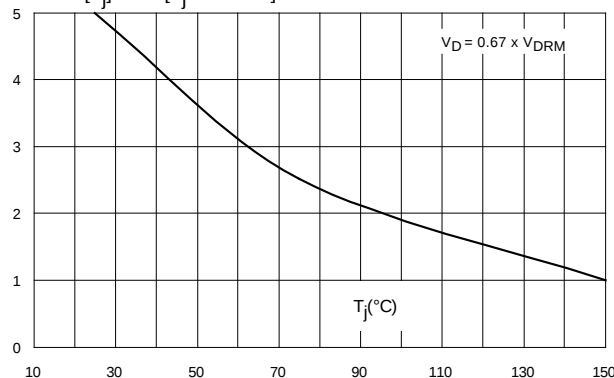


Figure 11: Relative variation of static dV/dt immunity versus junction temperature (typical values)

$$dV/dt[T_j]/dV/dt[T_j = 150^\circ\text{C}]$$



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

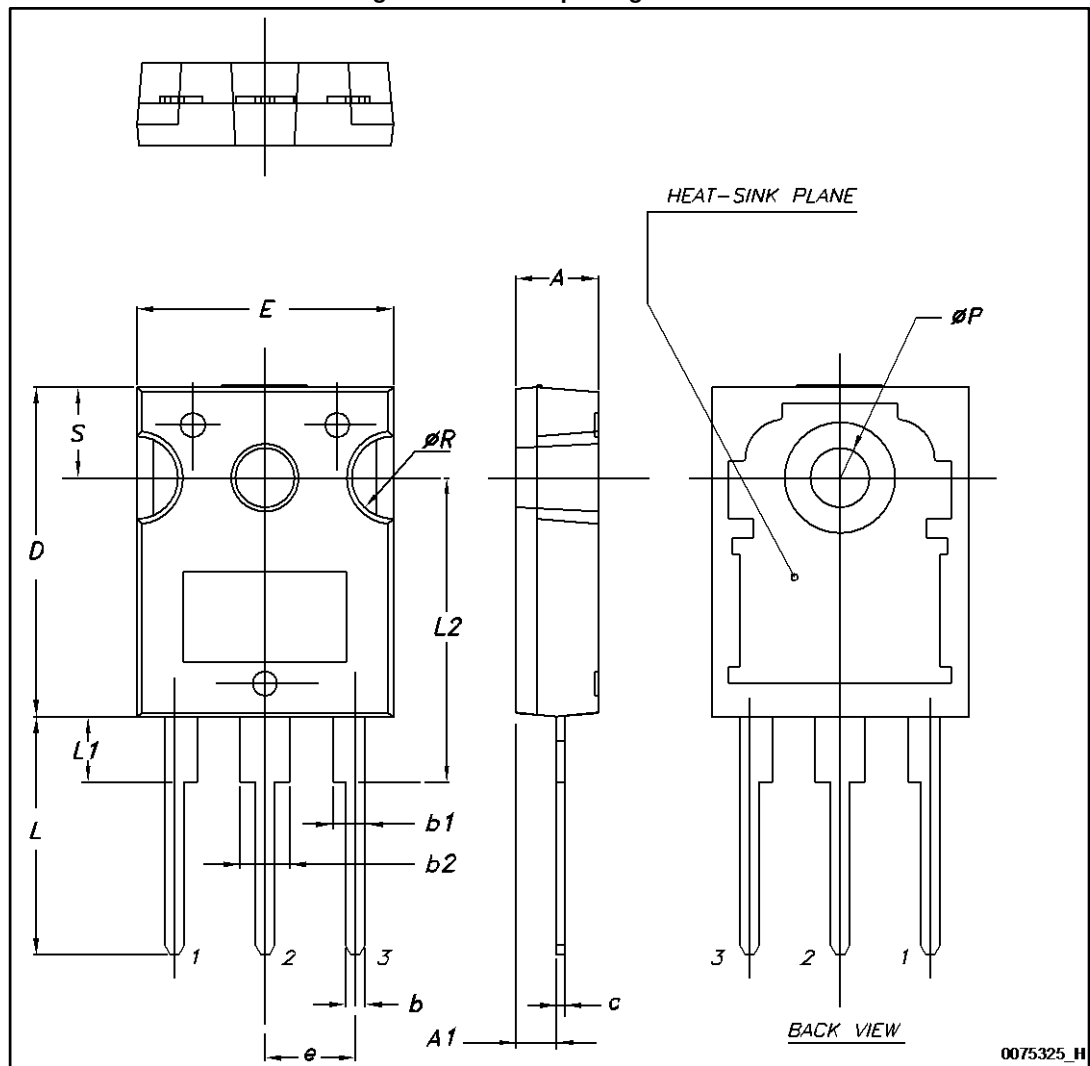


Table 5: TO-247 package mechanical data

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

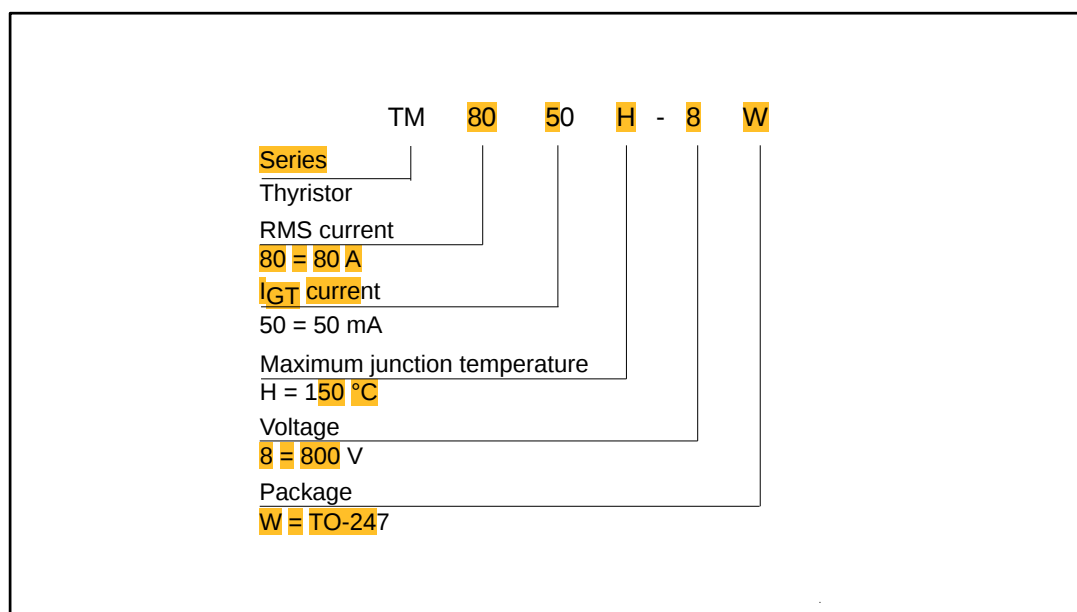


Table 6: Ordering information

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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