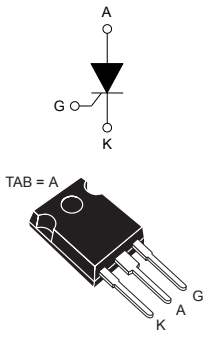
TM8050H-8W

Datasheet

80 A 800 V high temperature thyristor (SCR) in TO-247 package



TO-247 uninsulated

Features

- High junction temperature: T_j = 150 °C
- Blocking voltage: V_{DRM} = V_{RRM} = 800 V
- Nominal current: $I_{T(RMS)}$ = 80 A
- Gate triggering current: I_{GT} max. = 50 mA
- High noise immunity: dV/dt > 1 kV/µs
- Through hole package TO-247
- Increase of thermal margin due to extended T_j up to 150 °C
- Low I_D and I_R in blocking state
- Ecopack2 (includes halogen free and RoHS compliance)

Applications

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

Product status link
TM8050H-8W

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

Description

Available in through hole package TO-247, the TM8050H-8W is an 800 V SCR thyristor suitable for applications where high power switching ($I_{T(RMS)}$ = 80 A) and low power dissipation (V_{TM} = 1.55 V at 160 A) are key features. These features make it ideal for motorbike voltage regulator, by-pass AC switch, controlled rectifier bridge, solid state relay, battery charger, welding equipment and motor driver applications.

1 Characteristics

Table 1. 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, V_R = 0 V	t_p = 8.3 ms	T_j initial = 25 °C	731	A
		t_p = 10 ms		670	
I^2t	I^2t value for fusing		T_j = 25 °C	2245	A^2s
V_{RRM} / V_{DRM}	Maximum repetitive symmetric blocking voltage			800	V
V_{DSM}	Maximum non-repetitive direct blocking voltage	t_p = 10 ms		1000	V
dI/dt	Critical rate of rise of on-state current I_G = 2 x I_{GT} , tr ≤ 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 2. Electrical characteristics (T_j = 25 °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

Table 3. Static characteristics

Symbol	Test conditions			Value	Unit
V_{TM}	I_{TM} = 160 A, t_p = 380 µs	T_j = 25 °C	Max.	1.55	V
V_{TO}	On state threshold voltage	T_j = 150 °C	Max.	0.85	
R_D	On state 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.)	50	

1.1 Characteristics curves

Figure 1. Maximum average power dissipation versus average on-state current

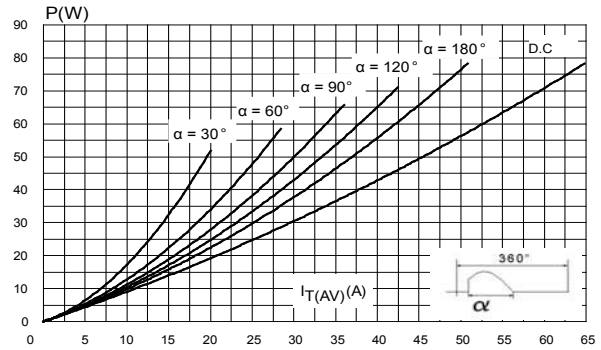


Figure 2. Average and DC on-state current versus case temperature

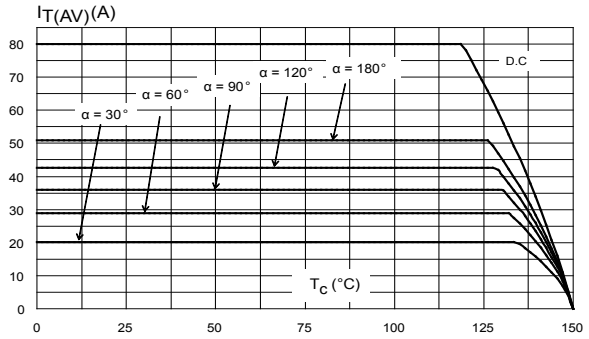


Figure 3. Average and D.C. on state current versus ambient temperature

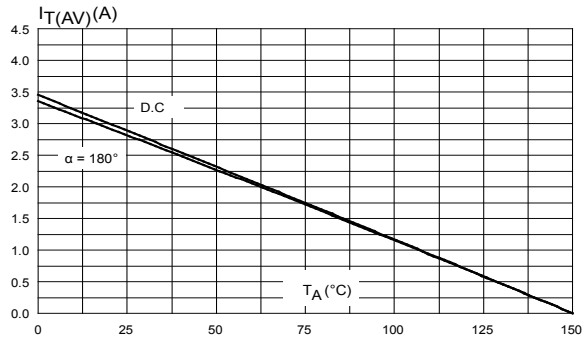


Figure 4. On-state characteristics (maximum values)

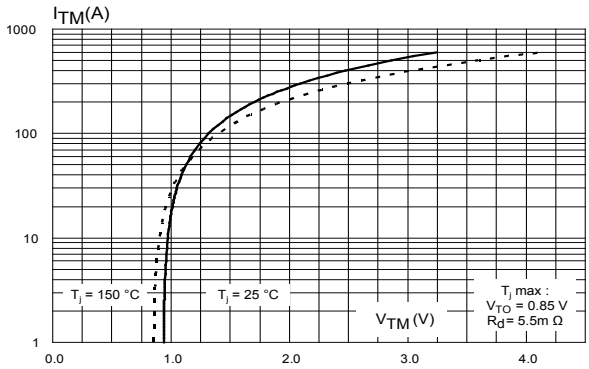


Figure 5. Relative variation of thermal impedance junction to case and junction to ambient versus pulse duration

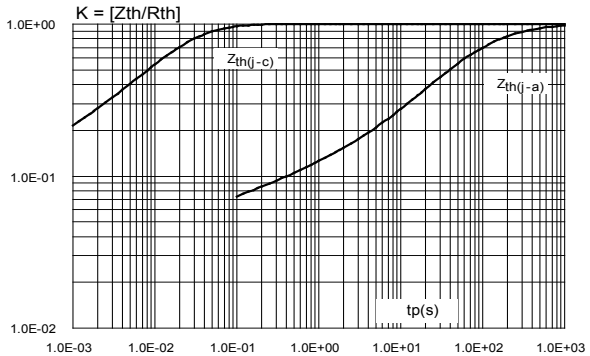


Figure 6. Relative variation of gate trigger current and gate voltage versus junction temperature

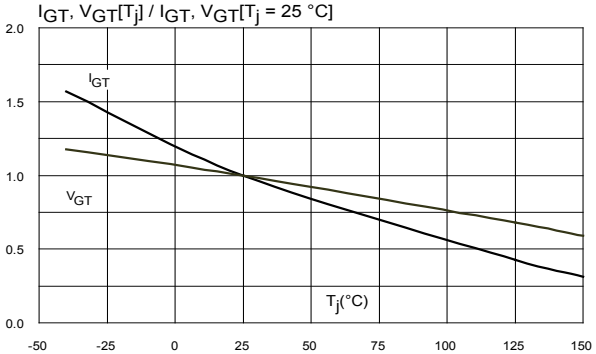


Figure 7. Relative variation of holding current and latching current versus junction temperature (typical values)

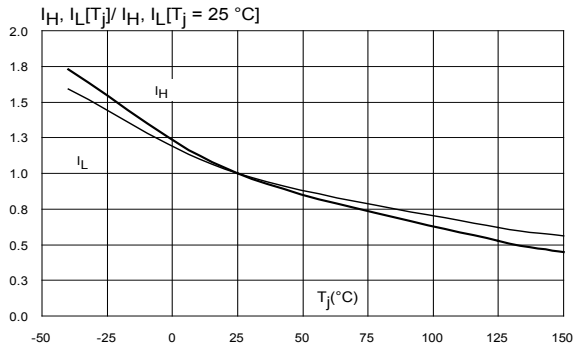


Figure 8. Surge peak on state current versus number of cycles

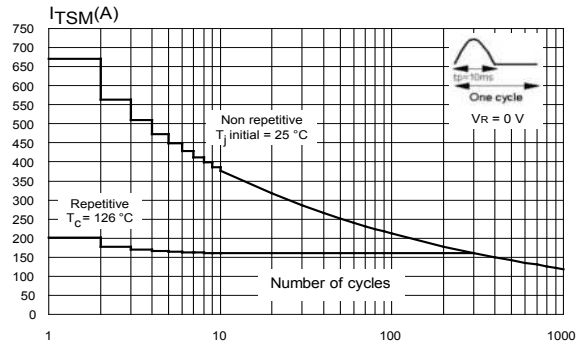


Figure 9. Non repetitive surge peak on state current for a half cycle sine pulse versus pulse width t_p < 10 ms

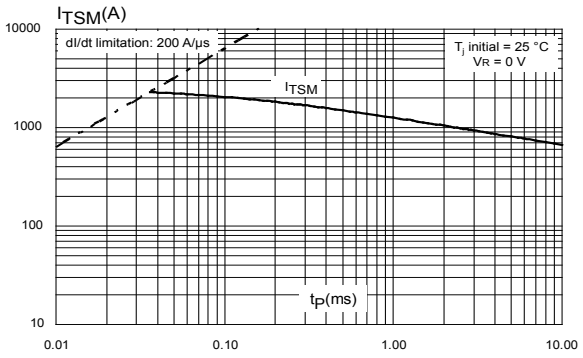


Figure 10. Relative variation of leakage current versus junction temperature for different values of blocking voltage

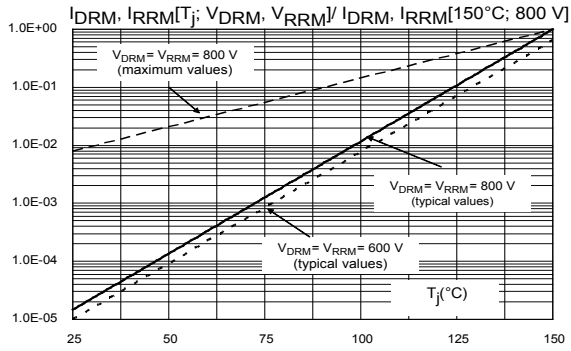
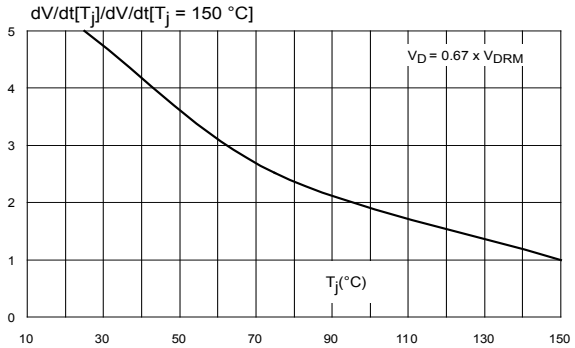


Figure 11. Relative variation of static dV/dt immunity versus junction temperature (typical values)



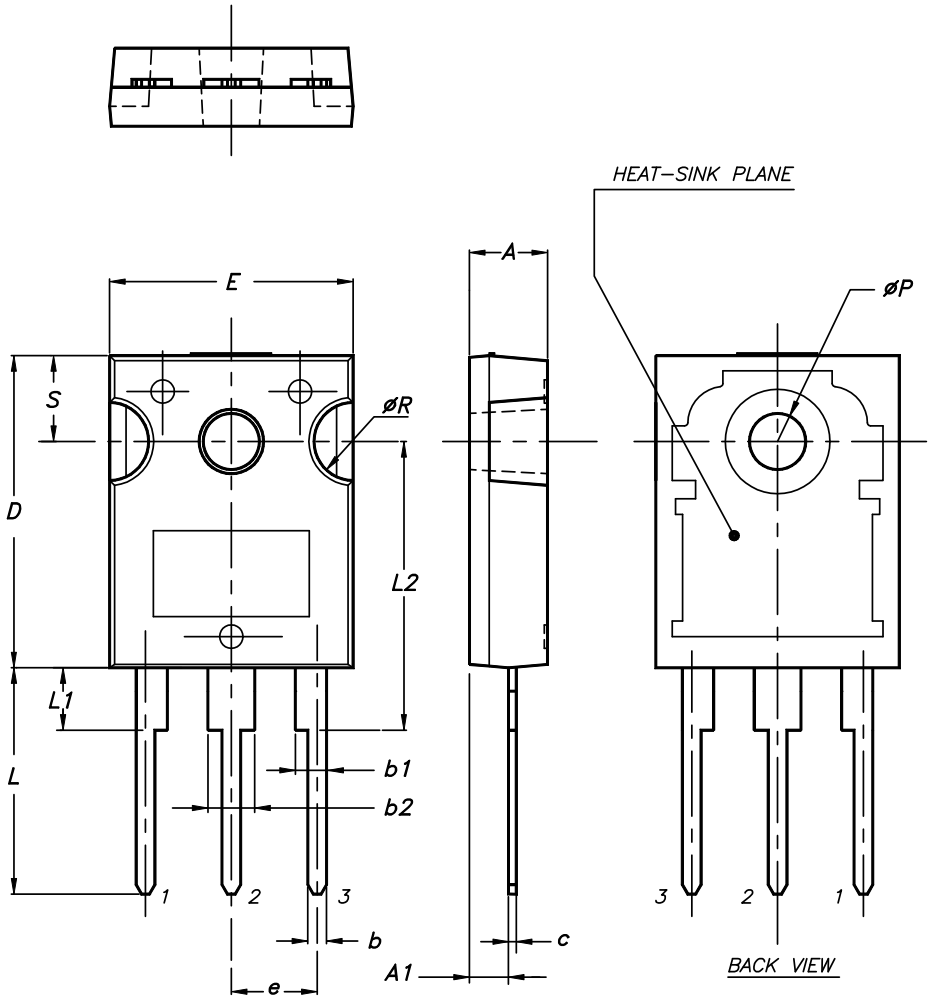
2 Package information

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.

2.1 TO-247 package information

- Epoxy meets UL 94,V0
- Recommended torque value: 0.8 N·m
- Maximum torque value: 1 N·m

Figure 12. TO-247 package outline



0075325_9

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

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**

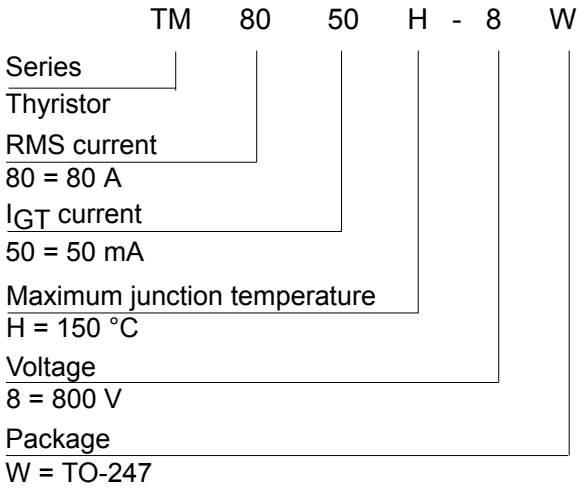


Table 6. **Ordering information**

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

Revision history

Table 7. **Document revision history**

Date	Revision	Changes
03-May-2016	1	Initial release.
08-Aug-2019	2	Updated Table 1, Figure 8 and Figure 9. Minor text change.
04-Jan-2023	3	Updated Table 1 and Figure 1.

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