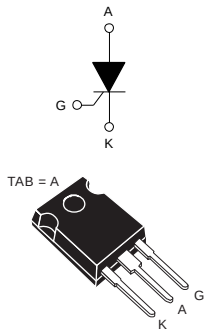
TN3050H-12WY

30 A - 1200 V automotive grade SCR Thyristor

Datasheet - production data



TO-247 uninsulated

Features

- AEC-Q101 qualified
- High junction temperature: T_j = 150 °C
- AC off state voltage: +/- 1200 V
- Nominal on-state current: 30 A_{RMS}
- High noise immunity: 1000 V/µs
- Max. gate triggering current: 50 mA
- Ecopack®2 compliant component

Applications

- Automotive applications: on board and off board battery charger
- Renewable energy inverters
- Solid state relay
- 3-Phase heating or motor soft start control
- UPS (uninterruptible power supply)
- Bypass SSR / hybrid relay
- Inrush current limiter in battery charger
- AC-DC voltage controlled rectifier
- Industrial welding systems

Description

This device is an automotive grade SCR Thyristor designed for applications such as automotive and stationary battery chargers.

This SCR Thyristor, rated for a 30 A RMS power switching, offers superior performances in peak voltage robustness up to 1400 V and surge current handling up to 300 A sine wave pulse. Its key features allow the design of functions such as a 42 A RMS AC switch (dual back-to-back SCRs) and a 38 A av. AC-DC controlled rectifier bridge.

Available in through-hole TO-247 package, this power package allows a thermal operation up to 30 A RMS with a higher case temperature of 126 °C.

Table 1: Device summary

Symbol	Value
$I_{T(RMS)}$	30 A
V_{DRM}/V_{RRM}	1200 V
V_{DSM}/V_{RSM}	1400 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)		T_C = 126 °C	30	A
$I_{T(AV)}$	Average on-state current (180 ° conduction angle)			19	A
I_{TSM}(1)	Non repetitive surge peak on-state current	t_p = 8.3 ms	T_j initial = 25 °C	330	A
		t_p = 10 ms		300	
V_{DRM} / V_{RRM}	Repetitive off-state voltage (50-60 Hz)		T_j = 150 °C	1200	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 = 150 °C	200	A/µs
I_{GM}	Peak forward 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
T_{stg}	Storage junction temperature range			-40 to +150	°C
T_j	Operating junction temperature			-40 to +150	°C

Notes:

(1)ST recommend I^2t value for fusing = 450 A^2s for T_j = 25 °C and t_P = 10 ms

Table 3: 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.	10	mA
			Max.	50	
V_{GT}	V_D = 12 V, R_L = 33 Ω		Max.	1.3	V
V_{GD}	V_D = 2/3 x 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 = 60 A , V_D = 2/3 x V_{DRM}, I_G = 100 mA, dI_G/dt = 0.2 A/µs		Typ.	1	µs
dV/dt	V_D = 2/3 x V_{DRM}, gate open	T_j = 150 °C	Min.	1000	V/µs
t_q	I_T = 20 A, dI_T/dt = 10 A/µs, V_R = 75 V, V_D = 2/3 x V_{DRM}, dV_D/dt = 20 V/µs, t_P = 100 µs	T_j = 150 °C	Typ.	150	µs
V_{TM}	I_{TM} = 60 A, t_P = 380 µs		Max.	1.65	V
V_{TO}	Threshold voltage	T_j = 150 °C	Max.	0.88	V
R_D	Dynamic resistance	T_j = 150 °C	Max.	14	mΩ
I_{DRM}/I_{RRM}	V_D = V_{DRM}, V_R = V_{RRM}	T_j = 25 °C	Max.	5	µA
		T_j = 125 °C	Max.	3	mA
		T_j = 150 °C	Max.	5	mA
I_{DSM}/I_{RSM}	V_D = V_{DSM}, V_R = V_{RSM}	T_j = 25 °C	Max.	10	µA

Table 4: Thermal parameters

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case (DC, max.)	TO-247	0.8	°C/W
$R_{th(j-a)}$	Junction to ambient (typ.)		50	

1.1 Characteristics (curves)

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

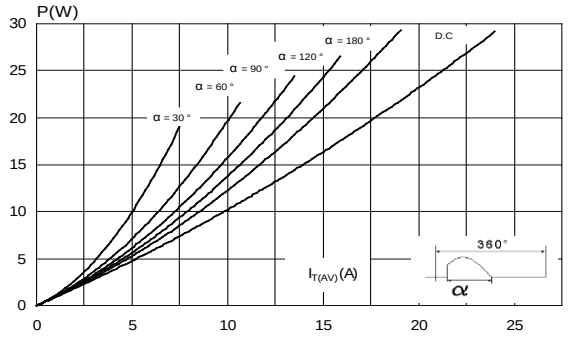


Figure 2: Average and DC on-state current versus case temperature

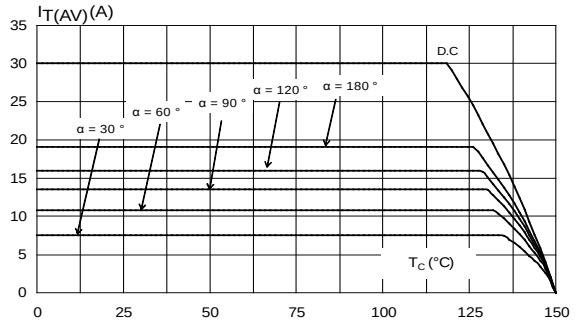


Figure 3: On-state characteristics (maximum values)

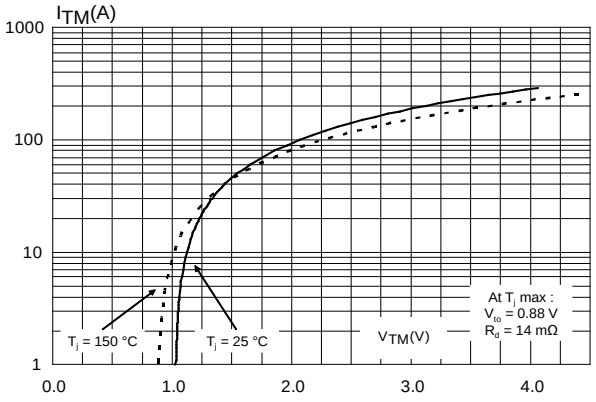


Figure 4: Average and D.C. on-state current versus ambient temperature

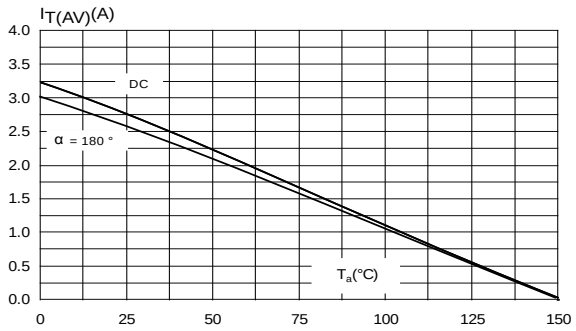


Figure 5: Relative variation of thermal impedance junction to case and junction to ambient versus pulse duration

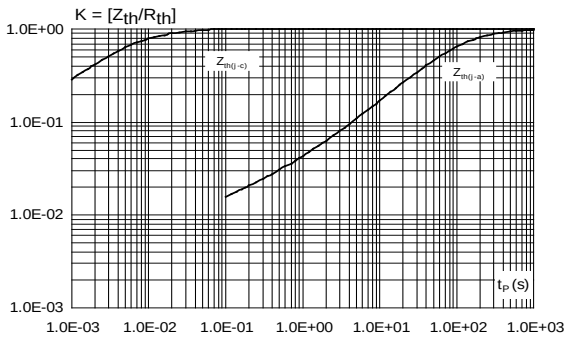


Figure 6: Surge peak on-state current versus number of cycles

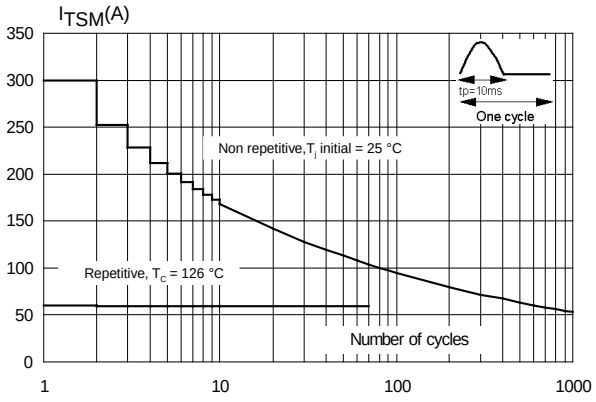


Figure 7: Non repetitive surge peak on-state current for a sinusoidal pulse (t_p < 10 ms)

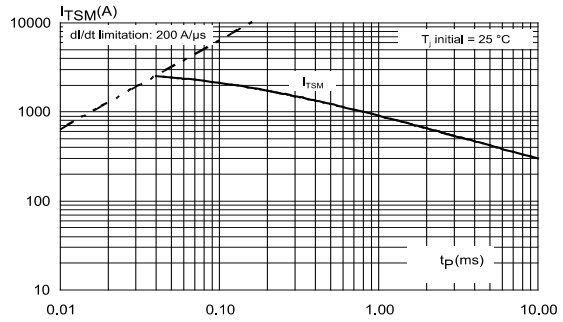


Figure 8: Relative variation of holding and latching current versus junction temperature (typical values)

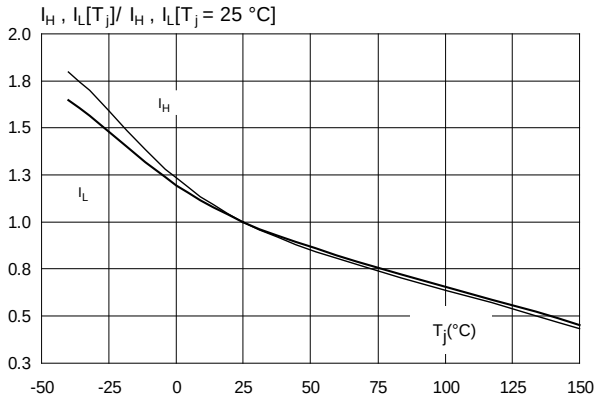


Figure 9: Relative variation of gate triggering current and voltage versus junction temperature

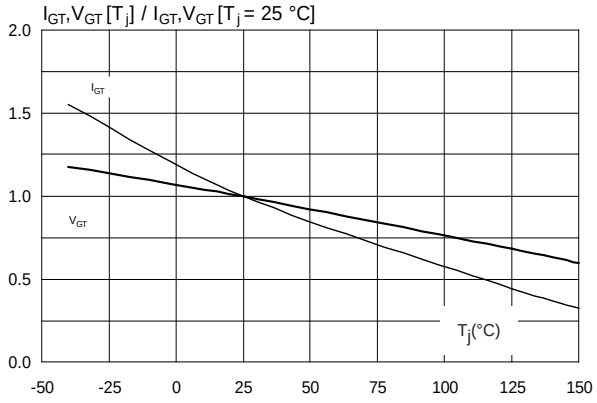


Figure 10: Relative variation of the static dV/dt immunity versus junction temperature (typical values)

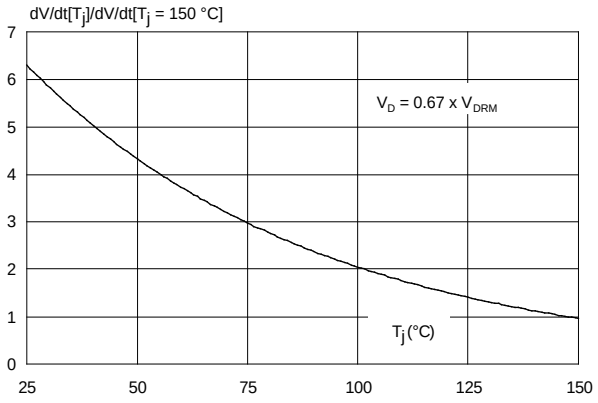
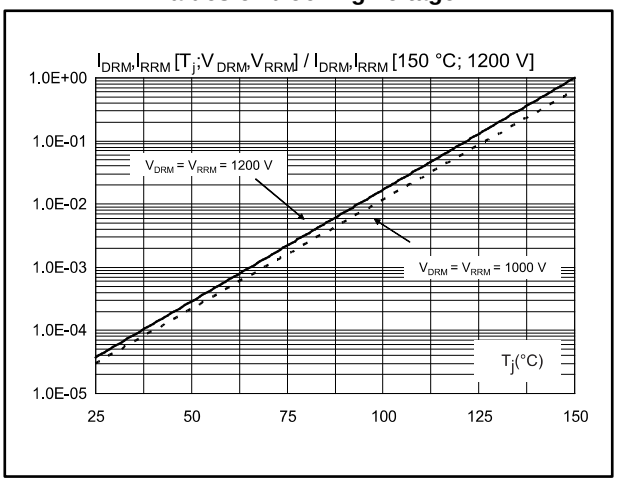


Figure 11: Relative variation of leakage current versus junction temperature for different values of blocking voltage



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

2.1 TO-247 package information

Figure 12: TO-247 package outline

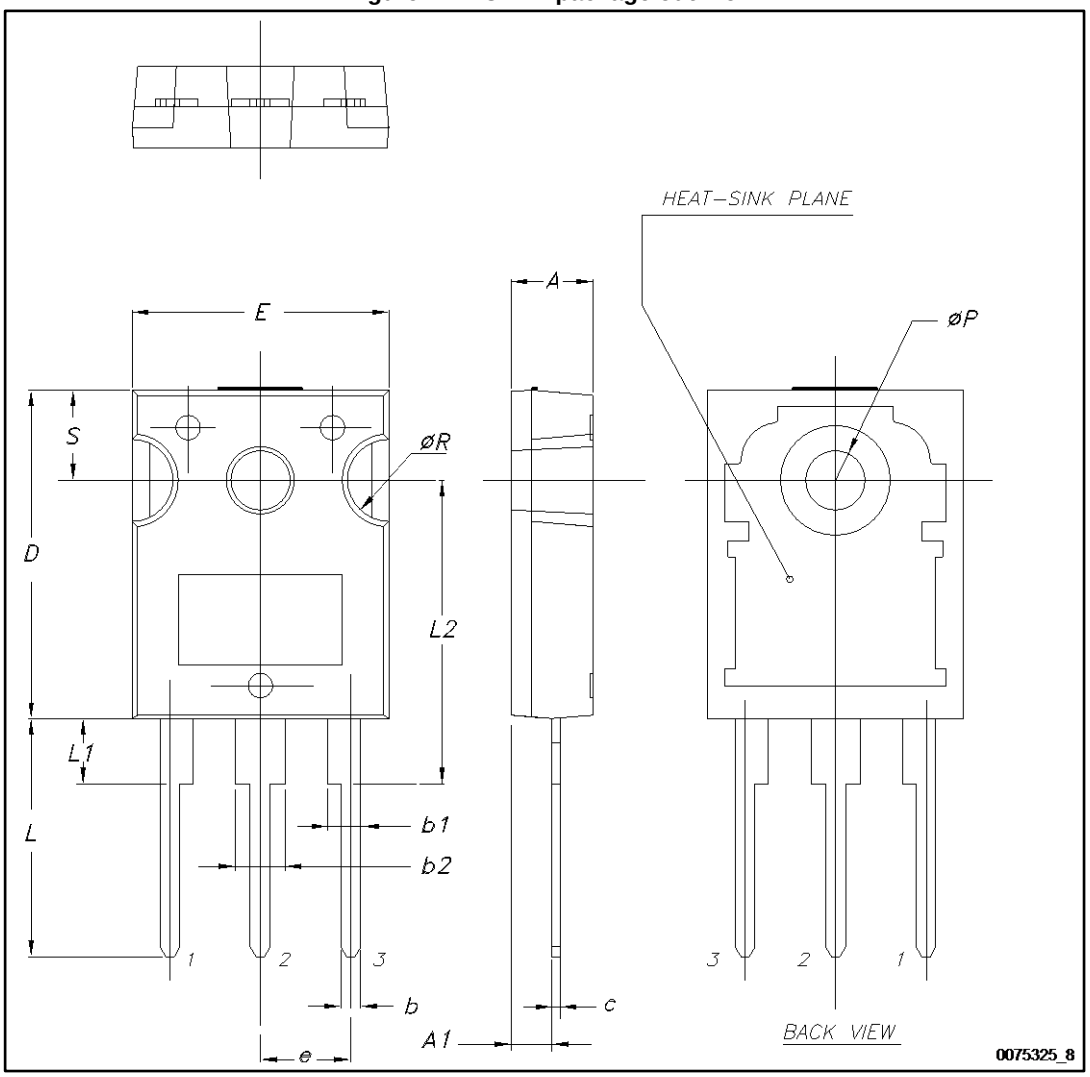


Table 5: TO-247 package mechanical data

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

Table 6: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
TN3050H-12WY	TN3050H12WY	TO-247	4.4 g	50	Tube

4 Revision history

Table 7: Document revision history

Date	Revision	Changes
16-Sep-2016	1	Initial release.
03-Oct-2016	2	Updated *Table 4: "Thermal parameters"*.

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