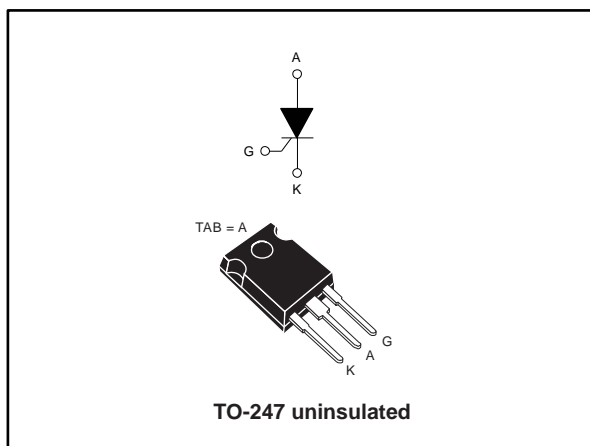


30 A - 1200 V automotive grade SCR Thyristor

Datasheet - production data




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.

Features

- AEC-Q101 qualified 
- High junction temperature: $T_j = 150\text{ °C}$
- 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

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)		30	A
$I_{T(AV)}$	Average on-state current (180 ° conduction angle)		19	A
$I_{TSM}^{(1)}$	Non repetitive surge peak on-state current	$t_p = 8.3 \text{ ms}$	330	A
		$t_p = 10 \text{ ms}$		
V_{DRM} / V_{RRM}	Repetitive off-state voltage (50-60 Hz)		1200	V
di/dt	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}, tr \leq 100 \text{ ns}$	$f = 50 \text{ Hz}$	200	A/ μs
I_{GM}	Peak forward gate current	$t_p = 20 \mu\text{s}$	8	A
$P_{G(AV)}$	Average gate power dissipation		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 A²s for $T_j = 25 \text{ °C}$ and $t_p = 10 \text{ ms}$

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

Symbol	Test Conditions		Value	Unit		
I_{GT}	$V_D = 12 \text{ V}, R_L = 33 \Omega$	Min.	10	mA		
		Max.	50			
V_{GT}	$V_D = 12 \text{ V}, R_L = 33 \Omega$	Max.	1.3	V		
V_{GD}	$V_D = 2/3 \times V_{DRM}, R_L = 3.3 \text{ k}\Omega$	$T_j = 150 \text{ °C}$	Min.	0.2	V	
I_H	$I_T = 500 \text{ mA}, \text{ gate open}$		Max.	100	mA	
I_L	$I_G = 1.2 \times I_{GT}$		Max.	125	mA	
t_{gt}	$I_T = 60 \text{ A}, V_D = 2/3 \times V_{DRM}, I_G = 100 \text{ mA}, di_G/dt = 0.2 \text{ A}/\mu\text{s}$		Typ.	1	μs	
dV/dt	$V_D = 2/3 \times V_{DRM}, \text{ gate open}$	$T_j = 150 \text{ °C}$	Min.	1000	V/ μs	
t_q	$I_T = 20 \text{ A}, di_T/dt = 10 \text{ A}/\mu\text{s}, V_R = 75 \text{ V}, V_D = 2/3 \times V_{DRM}, dV_D/dt = 20 \text{ V}/\mu\text{s}, t_p = 100 \mu\text{s}$	$T_j = 150 \text{ °C}$	Typ.	150	μs	
V_{TM}	$I_{TM} = 60 \text{ A}, t_p = 380 \mu\text{s}$		Max.	1.65	V	
V_{TO}	Threshold voltage		$T_j = 150 \text{ °C}$	Max.	0.88	V
R_D	Dynamic resistance		$T_j = 150 \text{ °C}$	Max.	14	m Ω
I_{DRM}/I_{RRM}	$V_D = V_{DRM}, V_R = V_{RRM}$	$T_j = 25 \text{ °C}$	Max.	5	μA	
		$T_j = 125 \text{ °C}$	Max.	3	mA	
		$T_j = 150 \text{ °C}$	Max.	5	mA	
I_{DSM}/I_{RSM}	$V_D = V_{DSM}, V_R = V_{RSM}$		$T_j = 25 \text{ °C}$	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)

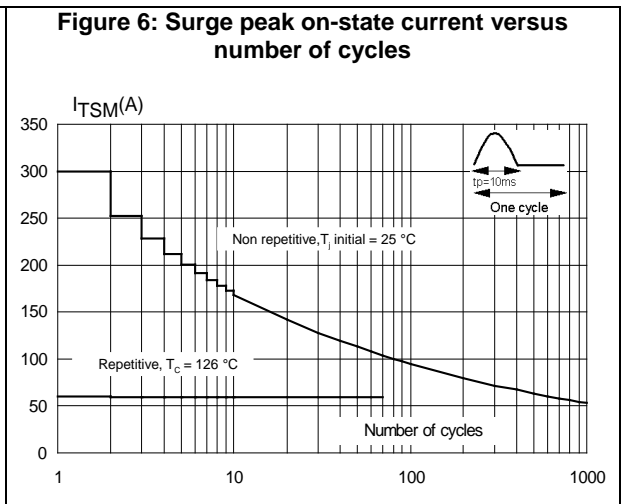
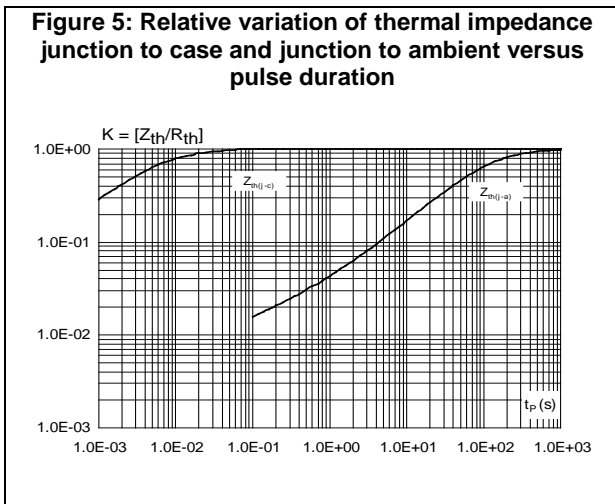
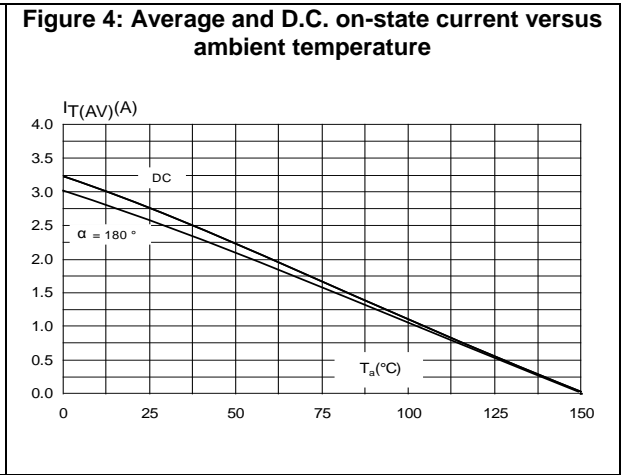
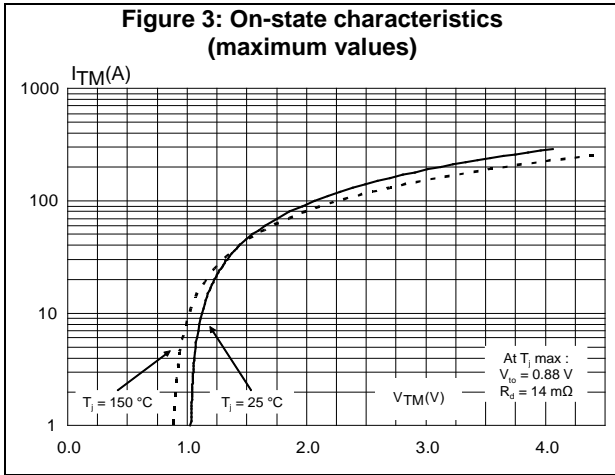
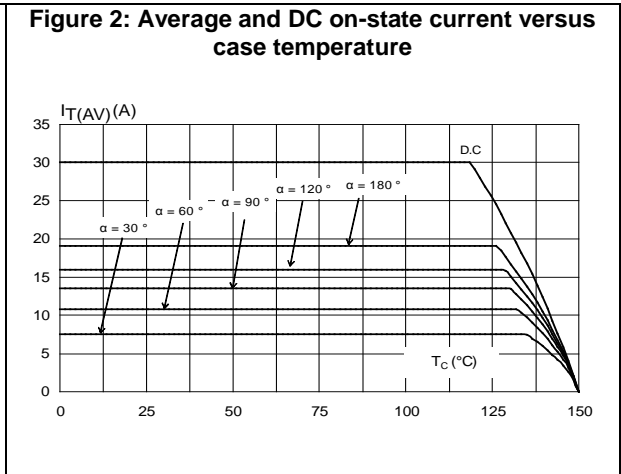
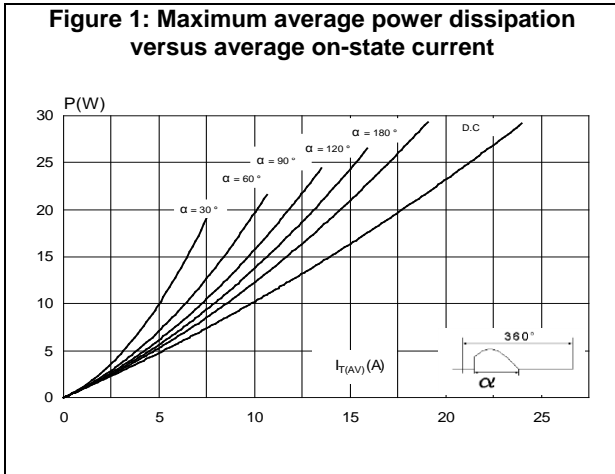


Figure 7: Non repetitive surge peak on-state current for a sinusoidal pulse ($t_p < 10$ ms)

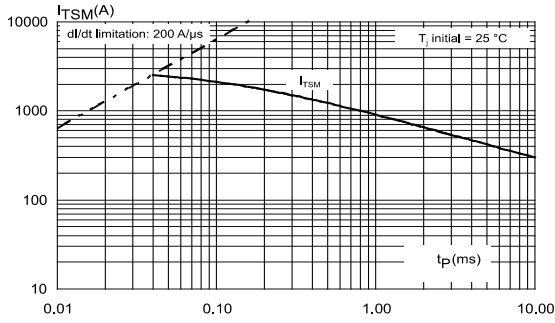


Figure 8: Relative variation of holding and latching current versus junction temperature (typical values)

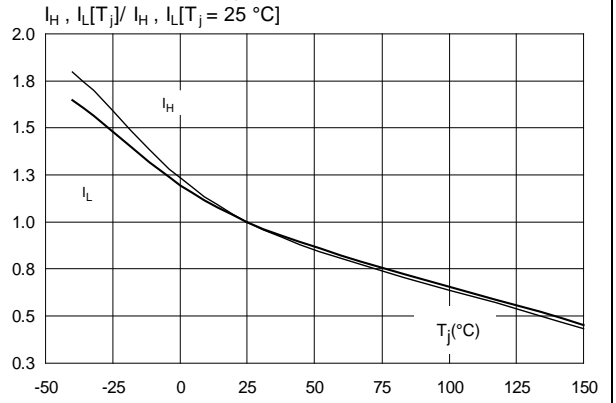


Figure 9: Relative variation of gate triggering current and voltage versus junction temperature

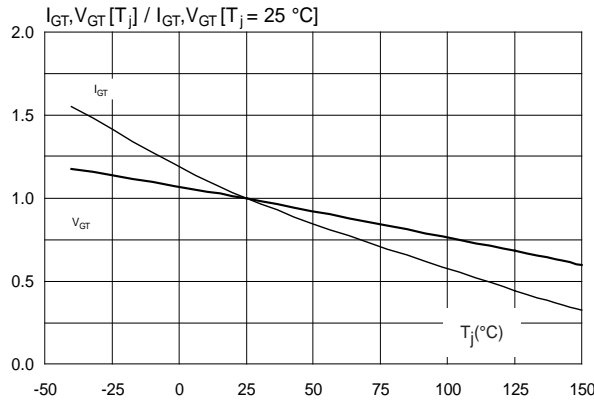


Figure 10: Relative variation of the static dV/dt immunity versus junction temperature (typical values)

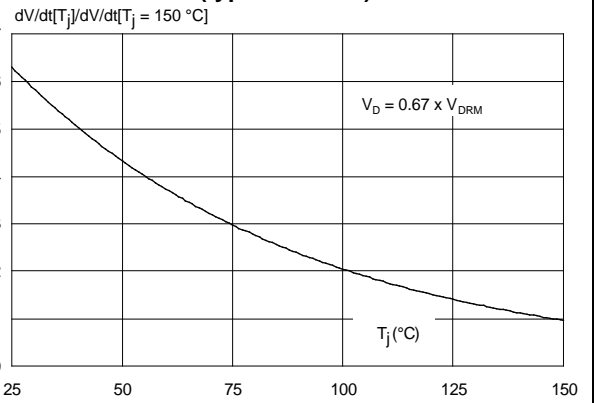
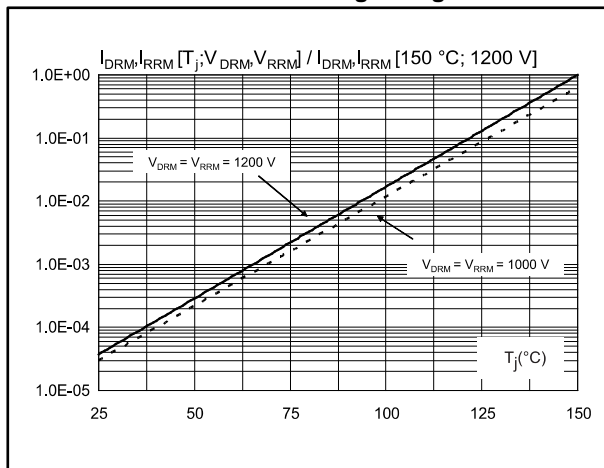


Figure 11: Relative variation of leakage current versus junction temperature for different values of blocking voltage



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

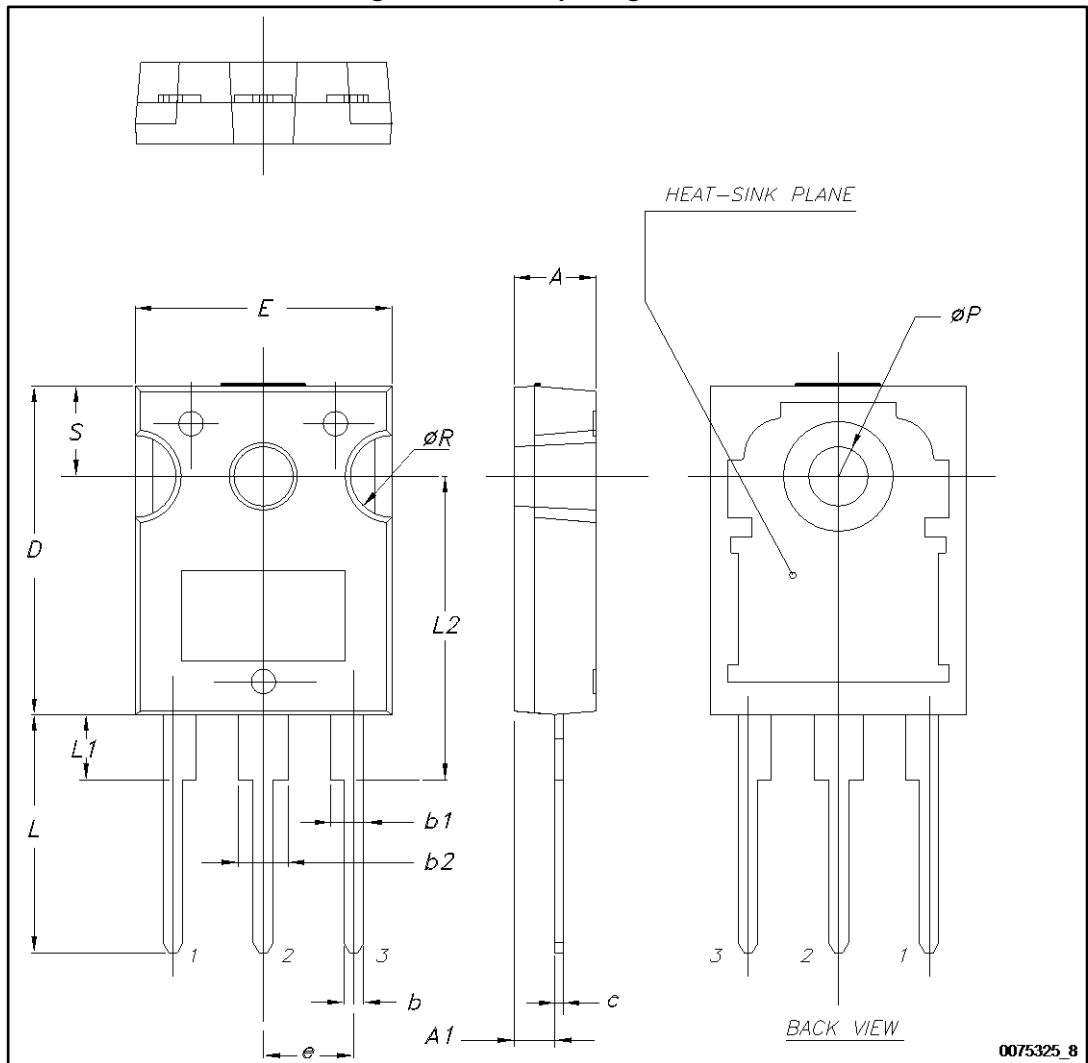


Table 5: TO-247 package mechanical data

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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