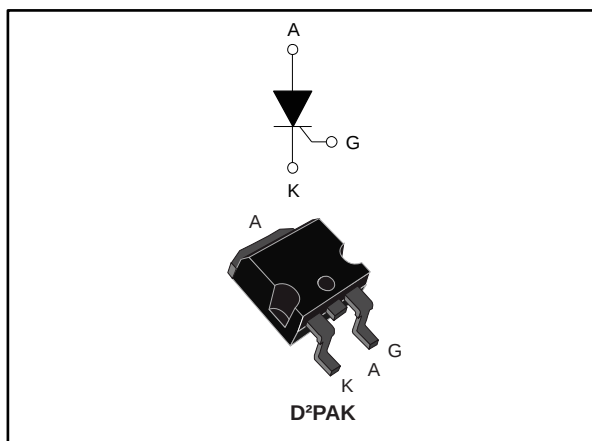


30 A - 1200 V automotive grade SCR Thyristor

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 D²PAK package, it is ideal for compact SMD designs on surface mount boards or insulated metal substrate boards.

Features

- AEC-Q101 qualified
- High junction temperature: $T_j = 150\text{ }^{\circ}\text{C}$
- AC off state voltage: $\pm 1200\text{ V}$
- Nominal on-state current: 30 A_{RMS}
- High noise immunity: 1000 V/ μs
- Max. gate triggering current: 50 mA
- ECOPACK[®]1 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 $^{\circ}\text{C}$

1 Characteristics

Table 2: Absolute ratings (limiting values)

Symbol	Parameter		Value	Unit
$I_{T(RMS)}$	RMS on-state current (180 ° conduction angle)		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
		$t_p = 10 \text{ ms}$	300	
V_{DRM} / V_{RRM}	Repetitive off-state voltage (50-60 Hz)		1200	V
di/dt	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$, $t_r \leq 100 \text{ ns}$	$f = 50 \text{ Hz}$	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 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.)	D ² PAK	0.8	°C/W
$R_{th(j-a)}$	Junction to ambient (DC, typ., $S_{cu} = 1 \text{ cm}^2$)		45	

1.1 Characteristics (curves)

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

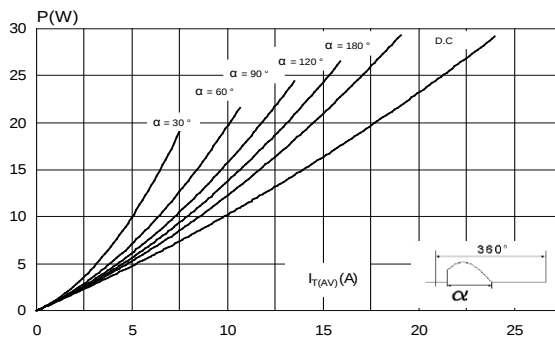


Figure 2: Average and DC on-state current versus case temperature

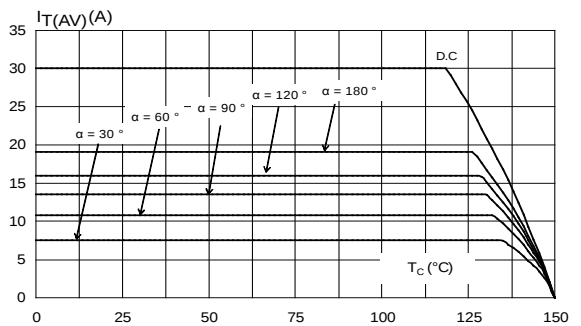


Figure 3: On-state characteristics (maximum values)

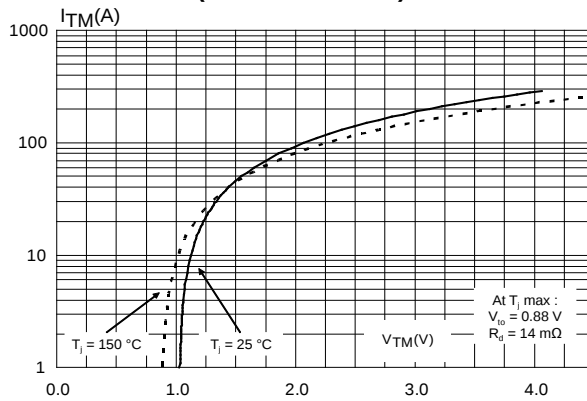


Figure 4: Average and D.C. on-state current versus ambient temperature

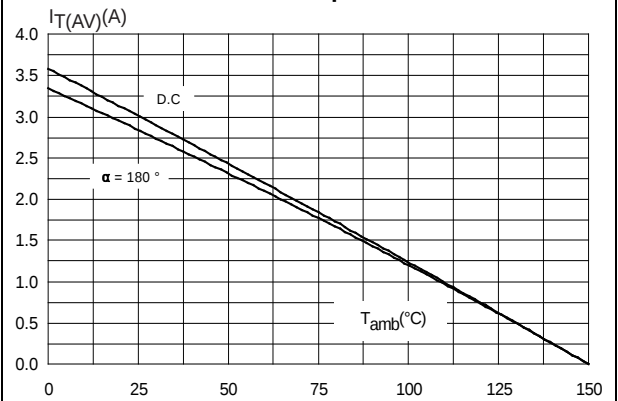


Figure 5: Relative variation of thermal impedance junction to case and junction to ambient versus pulse duration

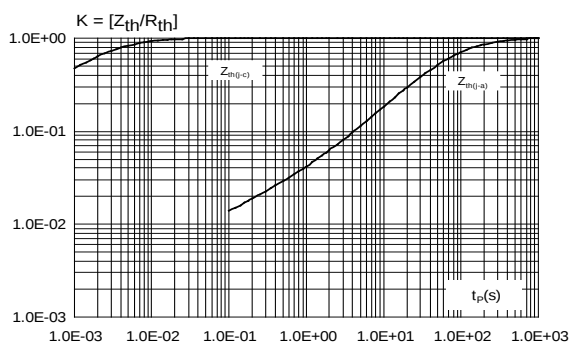


Figure 6: Thermal resistance junction to ambient versus copper surface under tab (printed circuit board FR4, copper thickness: 35 μm)

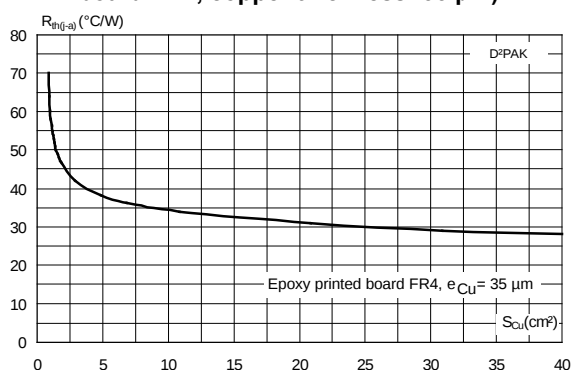
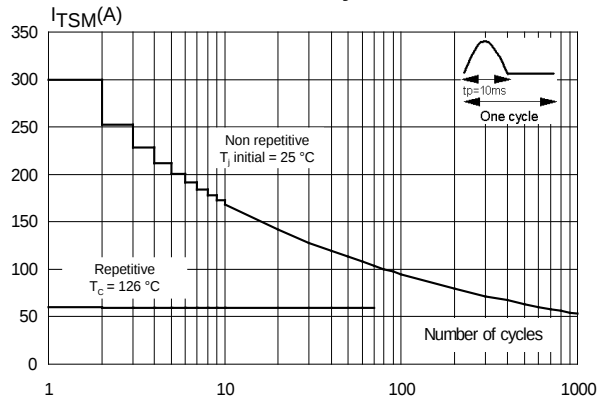
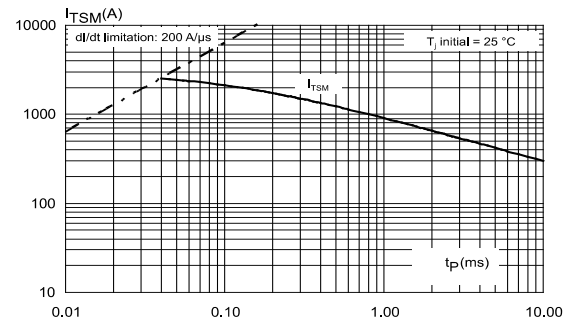
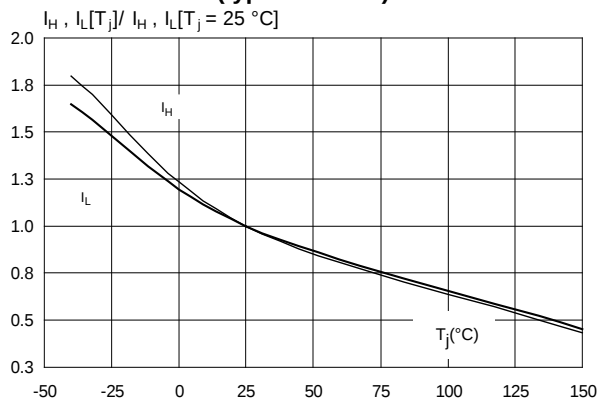
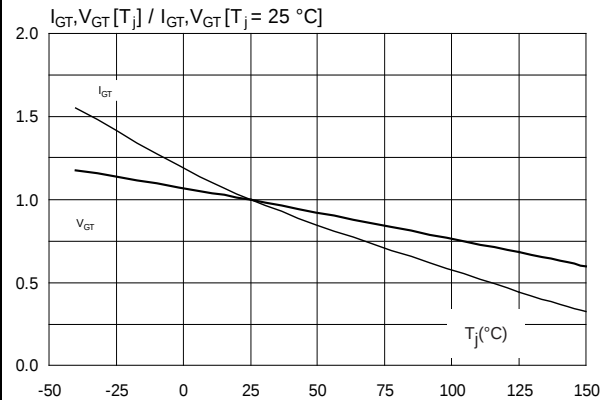
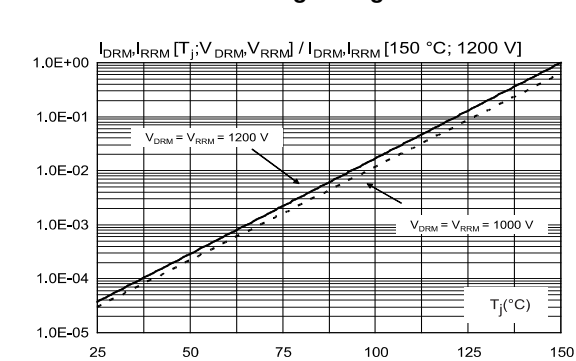
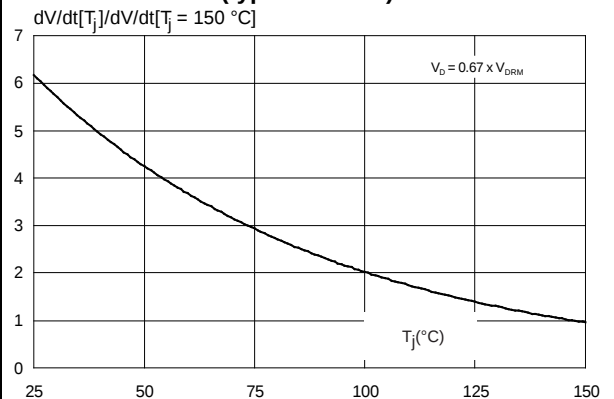


Figure 7: Surge peak on-state current versus number of cycles**Figure 8: Non repetitive surge peak on-state current for a sinusoidal pulse ($t_p < 10$ ms)****Figure 9: Relative variation of holding and latching current versus junction temperature (typical values)****Figure 10: Relative variation of gate triggering current and voltage versus junction temperature****Figure 11: Relative variation of leakage current versus junction temperature for different values of blocking voltage****Figure 12: Relative variation of the 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.

- Epoxy meets UL94, V0
- Lead-free package leads
- Cooling method: by conduction (C)

2.1 D²PAK package information

Figure 13: D²PAK package outline

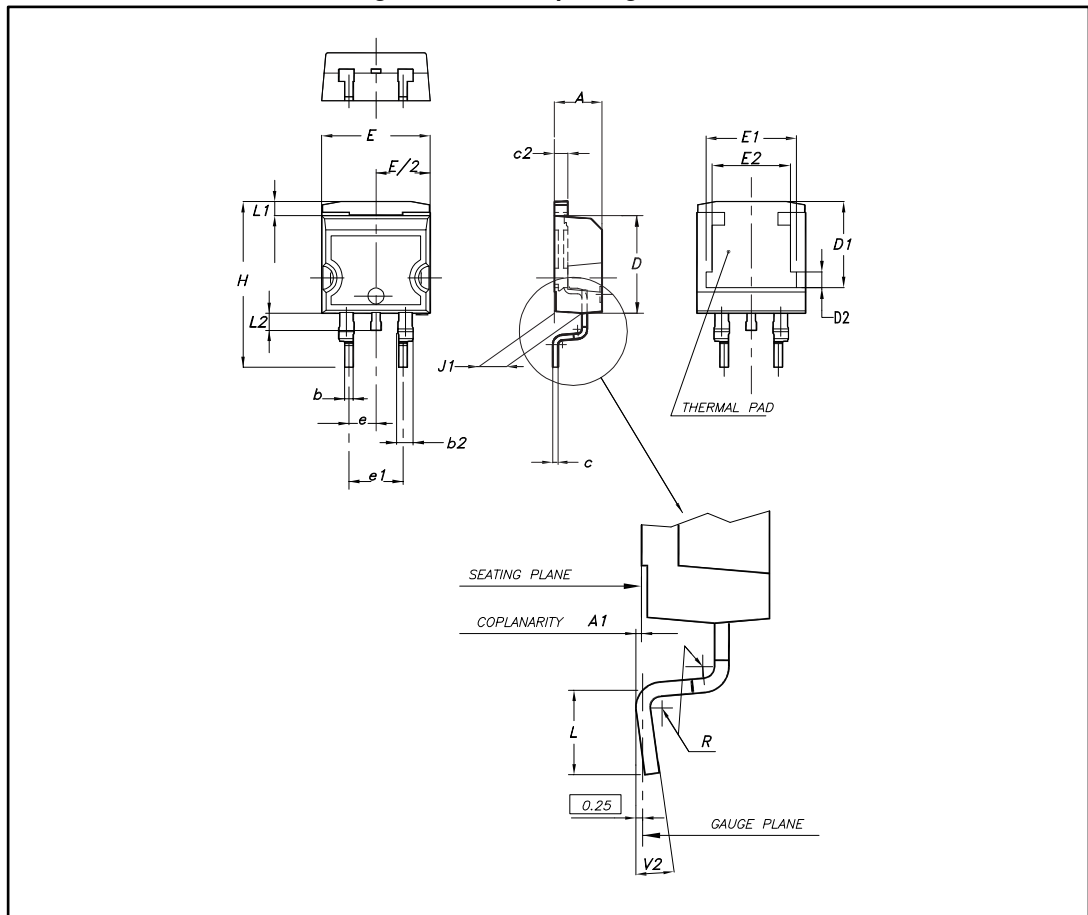
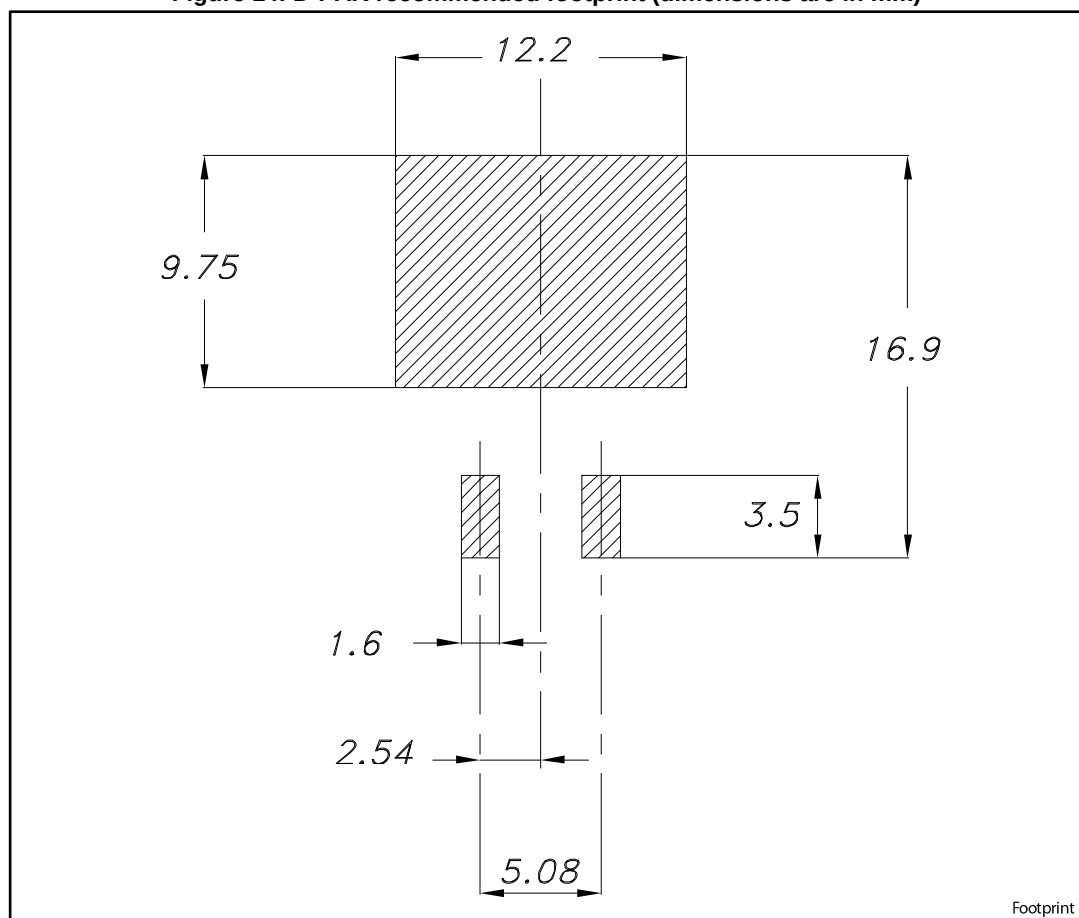


Table 5: D²PAK package mechanical data

Ref.	Dimensions					
	Millimeters			Inches ⁽¹⁾		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40		4.60	0.1732		0.1811
A1	0.03		0.23	0.0012		0.0091
b	0.70		0.93	0.0276		0.0366
b2	1.14		1.70	0.0449		0.0669
c	0.45		0.60	0.0177		0.0236
c2	1.23		1.36	0.0484		0.0535
D	8.95		9.35	0.3524		0.3681
D1	7.50	7.75	8.00	0.2953	0.3051	0.3150
D2	1.10	1.30	1.50	0.0433	0.0511	0.0591
E	10		10.40	0.3937		0.4094
E1	8.50	8.70	8.90	0.3346	0.3425	0.3504
E2	6.85	7.05	7.25	0.2697	0.2776	0.2854
e		2.54			0.1000	
e1	4.88		5.28	0.1921		0.2079
H	15		15.85	0.5906		0.6240
J1	2.49		2.69	0.0980		0.1059
L	2.29		2.79	0.0902		0.1098
L1	1.27		1.40	0.0500		0.0551
L2	1.30		1.75	0.0512		0.0689
R		0.4			0.0157	
V2	0°		8°	0°		8°

Notes:⁽¹⁾Dimensions in inches are given for reference only

Figure 14: D²PAK recommended footprint (dimensions are in mm)

3 Ordering information

Table 6: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
TN3050H-12GY-TR	TN3050H12Y	D ² PAK	1.4 g	1000	Tape and reel

4 Revision history

Table 7: Document revision history

Date	Revision	Changes
03-Oct-2016	1	Initial release.

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