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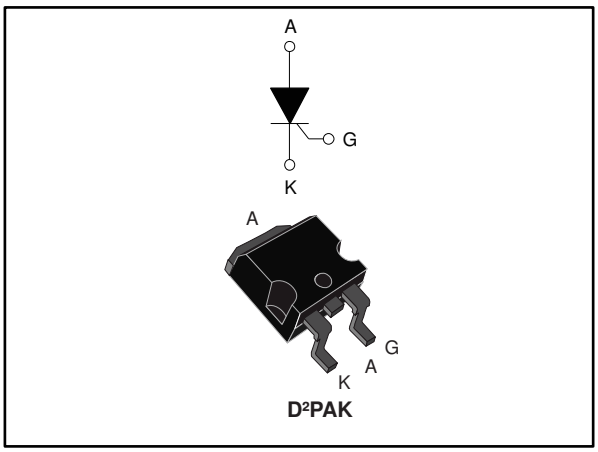
TN3050H-12GY-TR

30 A - 1200 V automotive grade SCR Thyristor

Datasheet - production data



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®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

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.

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.)	D²PAK	0.8	°C/W
$R_{th(j-a)}$	Junction to ambient (DC, typ., S_{cu} = 1 cm^2)		45	

1.1 Characteristics (curves)

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

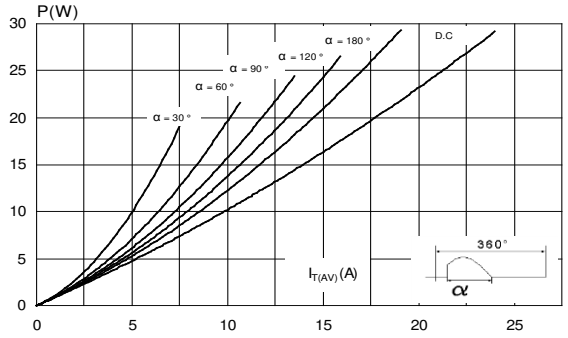


Figure 2: Average and DC on-state current versus case temperature

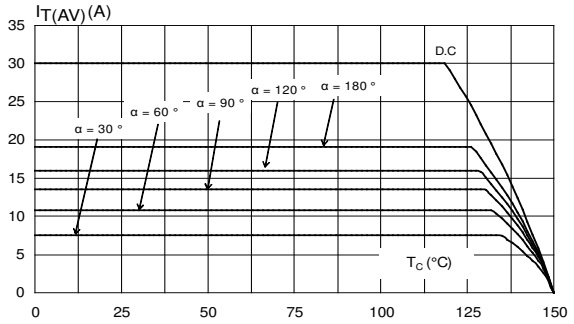


Figure 3: On-state characteristics (maximum values)

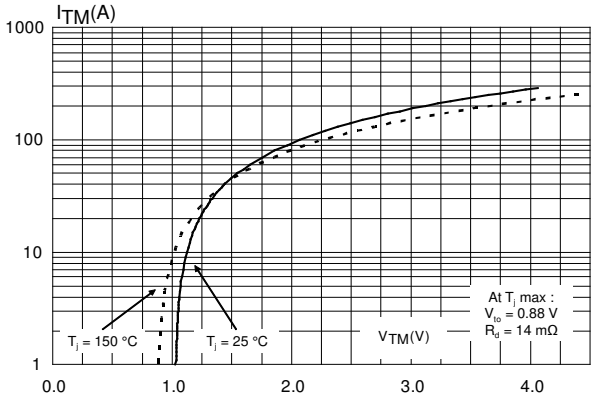


Figure 4: Average and D.C. on-state current versus ambient temperature

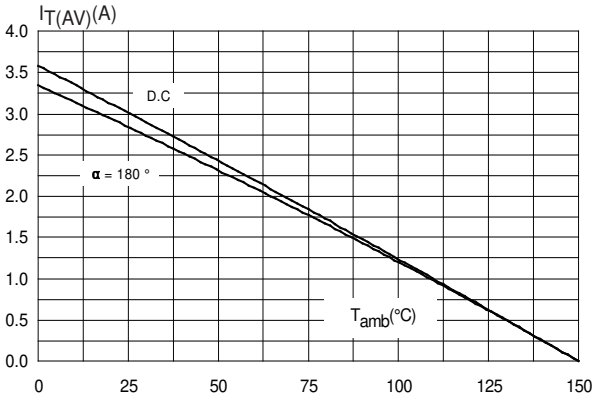


Figure 5: Relative variation of thermal imped-ance junction to case and junction to ambient versus pulse duration

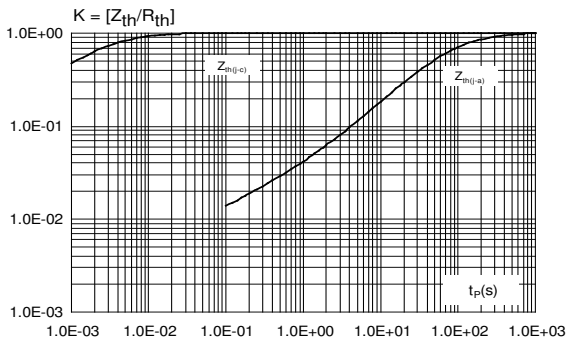


Figure 6: Thermal resistance junction to ambient versus copper surface under tab (printed circuit board FR4, copper thickness: 35 µm)

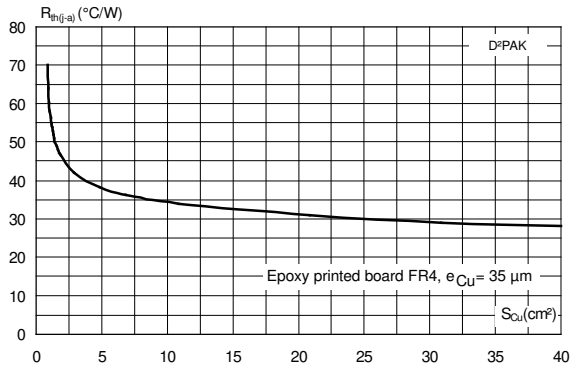


Figure 7: Surge peak on-state current versus number of cycles

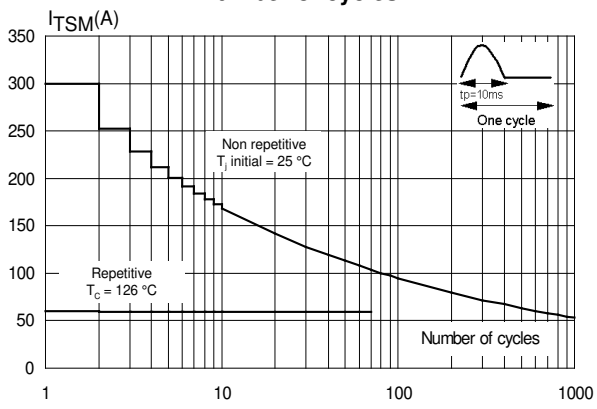


Figure 8: Non repetitive surge peak on-state current for a sinusoidal pulse (t_p < 10 ms)

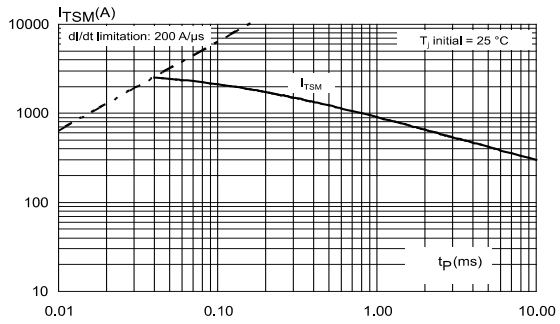


Figure 9: Relative variation of holding and latching current versus junction temperature (typical values)

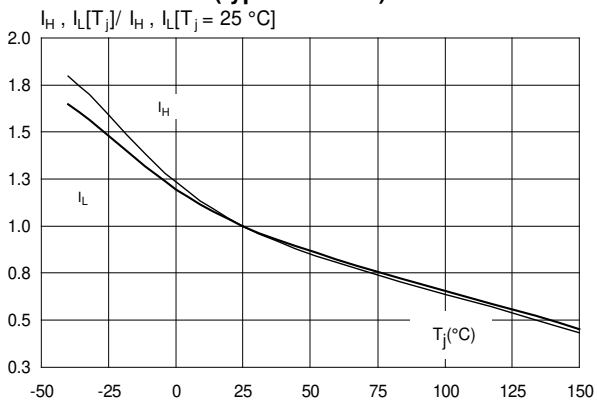


Figure 10: Relative variation of gate triggering current and voltage versus junction temperature

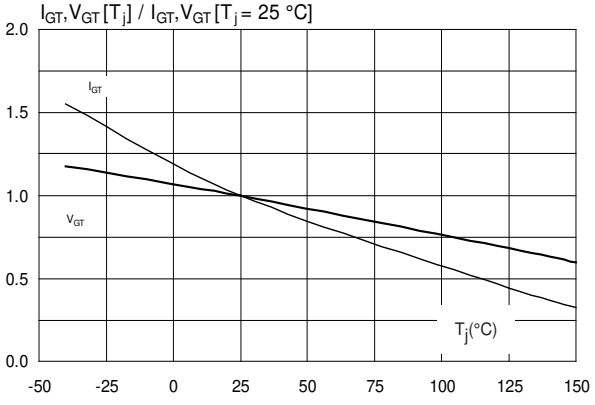


Figure 11: Relative variation of leakage current versus junction temperature for different values of blocking voltage

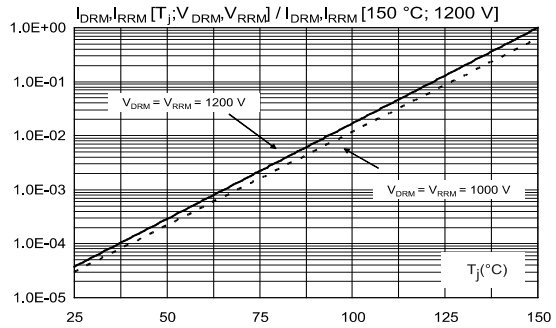
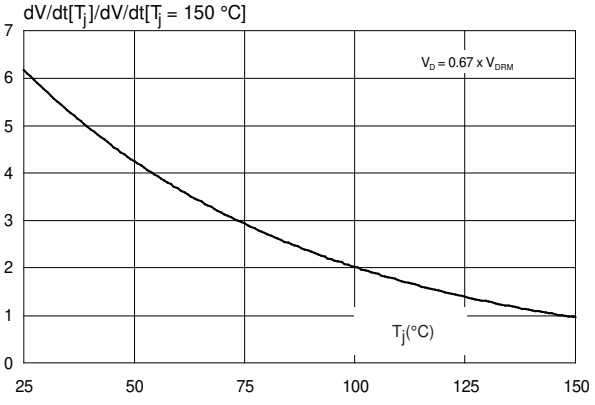


Figure 12: Relative variation of the static dV/dt immunity versus junction temperature (typical values)



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

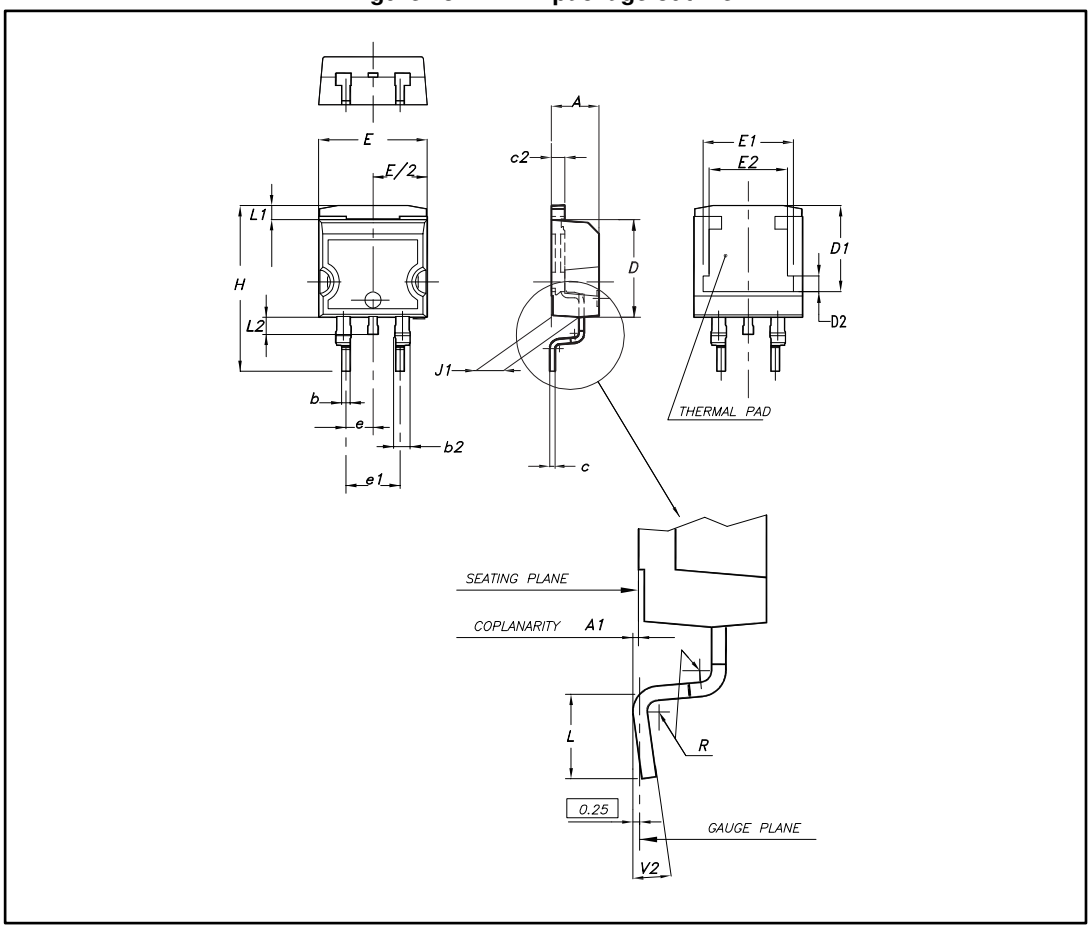


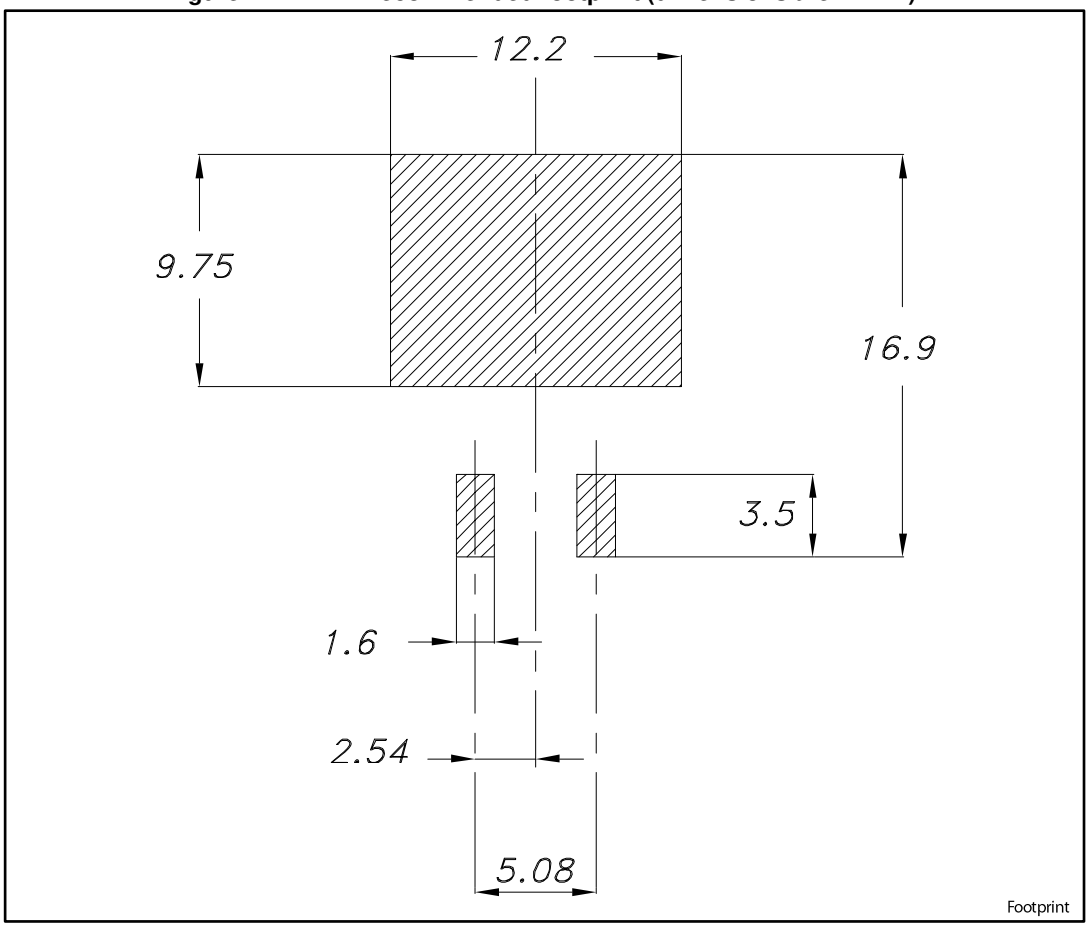
Table 5: D²PAK package mechanical data

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	D²PAK	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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