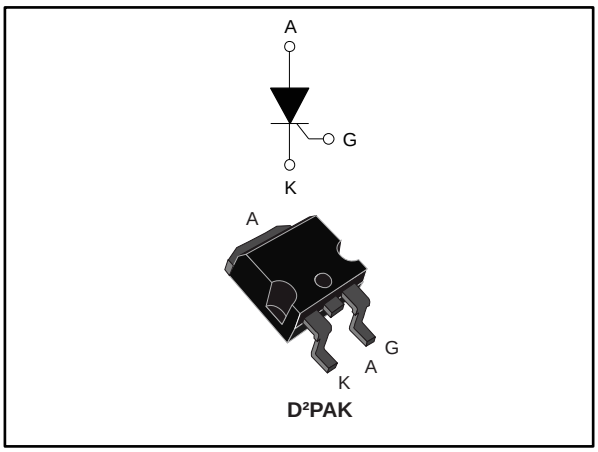
TN3050H-12GY-TR

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

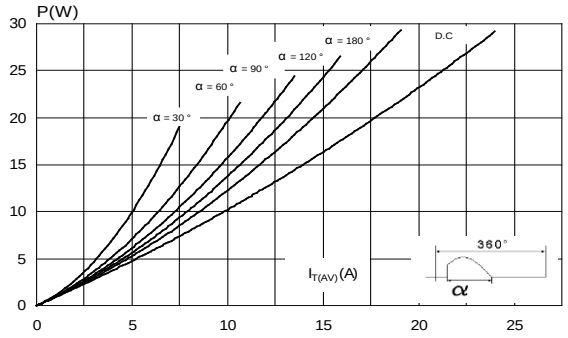


Figure 2: Average and DC on-state current versus case temperature

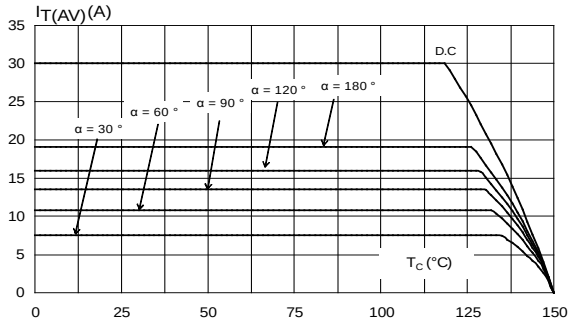


Figure 3: On-state characteristics (maximum values)

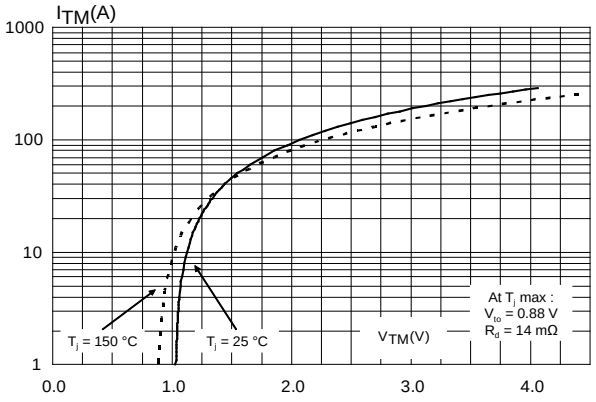


Figure 4: Average and D.C. on-state current versus ambient temperature

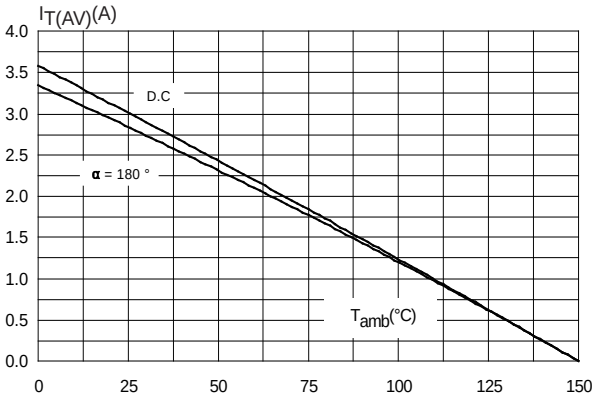


Figure 5: Relative variation of thermal imped-ance junction to case and junction to ambient versus pulse duration

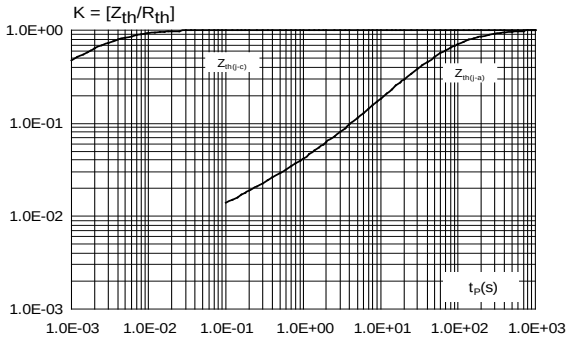


Figure 6: Thermal resistance junction to ambient versus copper surface under tab (printed circuit board FR4, copper thickness: 35 µm)

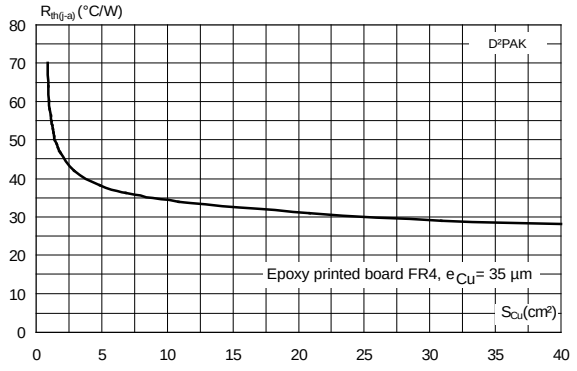


Figure 7: Surge peak on-state current versus number of cycles

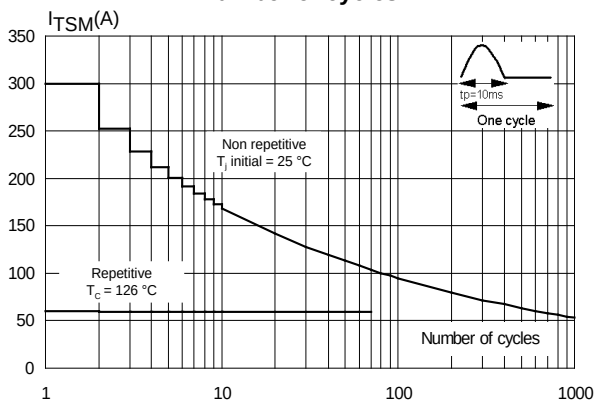


Figure 8: Non repetitive surge peak on-state current for a sinusoidal pulse (t_p < 10 ms)

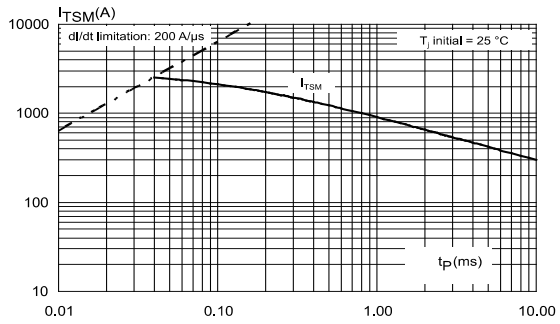


Figure 9: Relative variation of holding and latching current versus junction temperature (typical values)

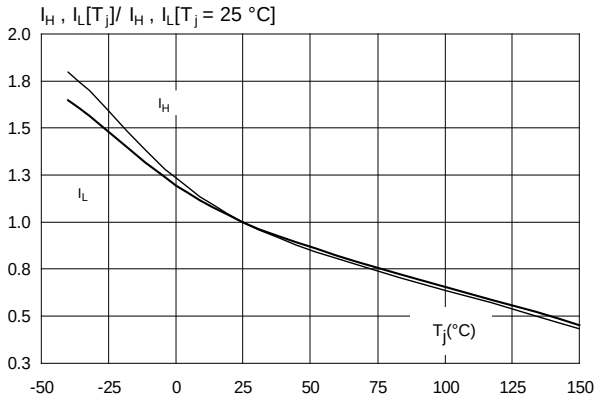


Figure 10: Relative variation of gate triggering current and voltage versus junction temperature

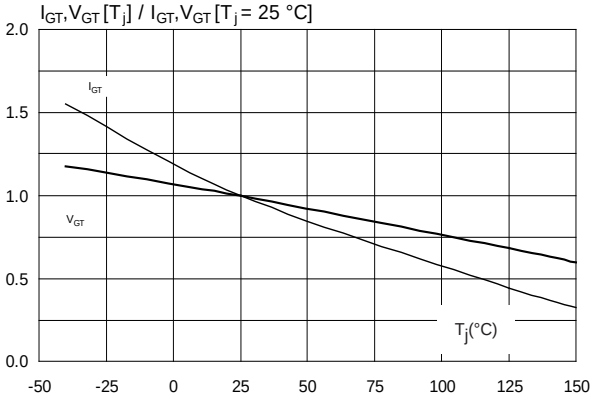


Figure 11: Relative variation of leakage current versus junction temperature for different values of blocking voltage

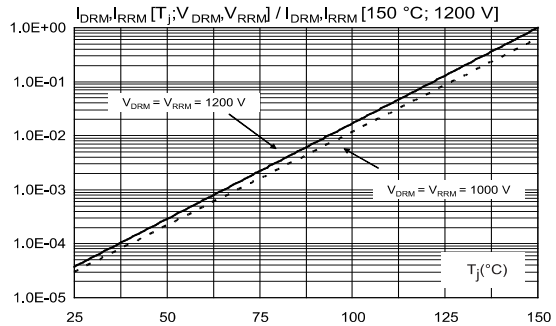
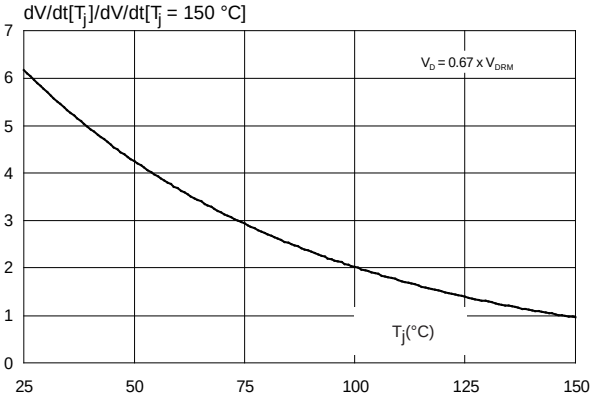


Figure 12: Relative variation of the static dV/dt immunity versus junction temperature (typical values)



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

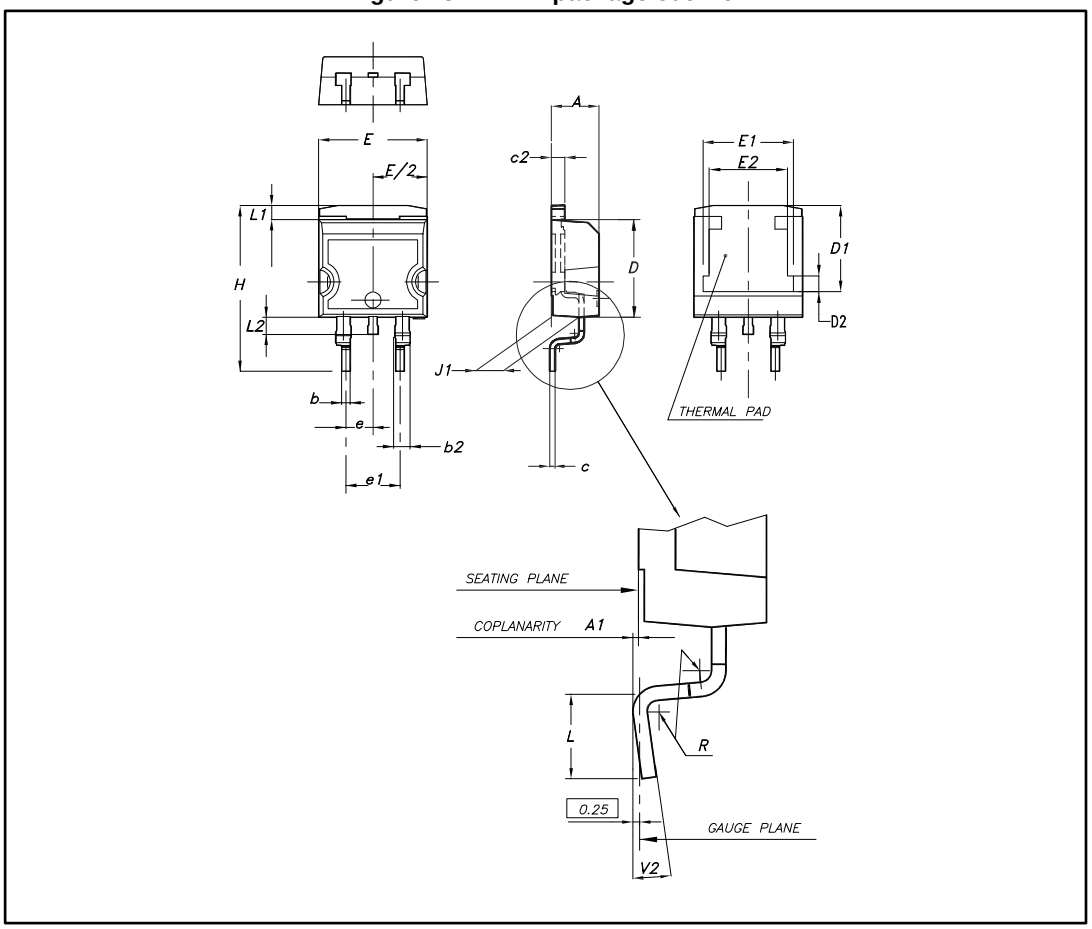


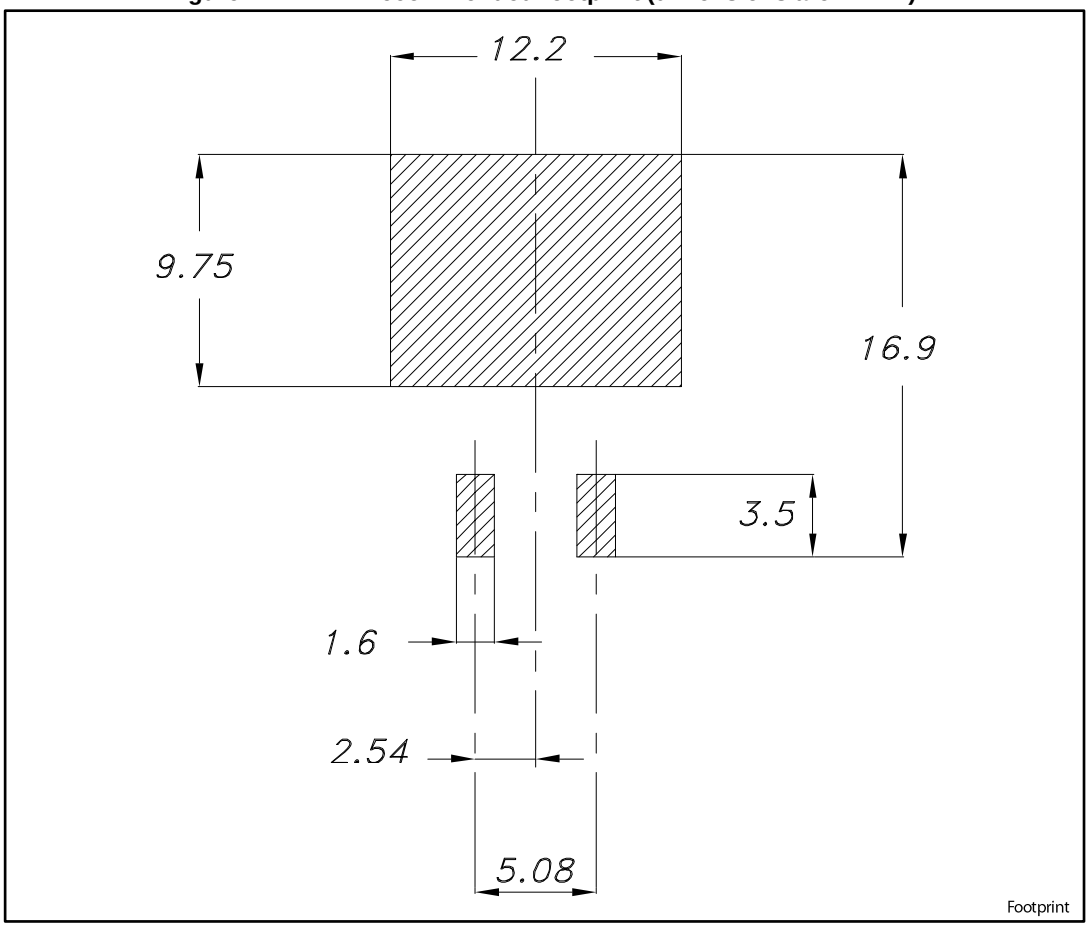
Table 5: D²PAK package mechanical data

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.

IMPORTANT NOTICE – PLEASE READ CAREFULLY

STMicroelectronics NV and its subsidiaries (“ST”) reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST’s terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers’ products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.