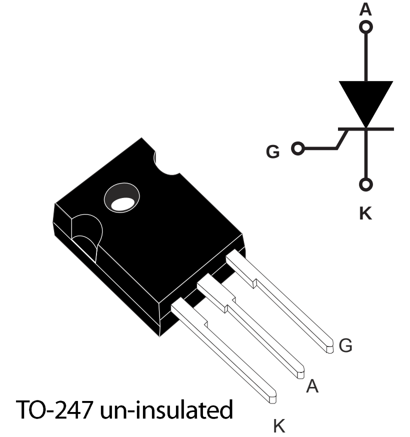
TN5050H-12WY

50 A - 1200 V automotive grade SCR Thyristor

Datasheet - production data



TO-247 un-insulated

Features

- AEC-Q101 qualified
- On-state current: 50 A_{RMS}
- Blocking voltage: +/- 1200 V
- High static and dynamic commutation:
  - dI/dt = 200 A/µs
  - dV/dt = 1000 V/µs
- I_{GT} = 50 mA
- ECOPACK®2 compliant component

Applications

- Automotive
  - On board, off board battery charger
- Solar, wind renewable energy inverters
- Solid state relays
- UPS
  - Bypass
  - ICL (inrush current limiter)
  - Battery charger
- Industrial welding systems
- Voltage control rectifier

Description

Available in TO-247 high power package, the TN5050H-12WY autograde is suitable in applications such as automotive / stationary battery charger, renewable energy generator, interruptible power supply, solid state relay, welding equipment and motor drive applications.

Its power switching, voltage robustness and power dissipation performances are the key features for functions such as a 80 A AC switch, an AC phasing inverter and an AC-DC controlled rectifier bridge.

The TN5050H-12WY is an automotive grade product and offers a superior performance in surge current handling, thermal cooling capabilities and overvoltage robustness.

Table 1: Device summary

Symbol	Value
$I_{T(RMS)}$	50 A
V_{DRM}/V_{RRM}	1200 V
V_{DSM}/V_{RSM}	1300 V
I_{GT}	50 mA
T_j	150 °C

1 Characteristics

Table 2: Absolute ratings (limiting values, T_j = 25 °C unless otherwise stated)

Symbol	Parameter			Value	Unit
V_{DRM} / V_{RRM}	Repetitive off-state voltage (50-60 Hz)		T_j = 150 °C	1200	V
$I_{T(RMS)}$	RMS on-state current (180 ° conduction angle)		T_C = 137 °C	50	A
$I_{T(AV)}$	Average on-state current (180 ° conduction angle)			32	
$I_{T(RMS)}$	RMS on-state current (180 ° conduction angle)		T_C = 125 °C	80	A
$I_{T(AV)}$	Average on-state current (180 ° conduction angle)			51	
I_{TSM}[1]	Non repetitive surge peak on-state current, T_j initial = 25 °C		t_p = 8.3 ms	633	A
			t_p = 10 ms	580	
dI/dt	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$, tr ≤ 100 ns	f = 50 Hz	T_j = 150 °C	200	A/µs
I_{GM}	Peak forward gate current	T_j = 150 °C	t_p = 20 µs	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 = 1680 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	V
V_{GD}	V_D = 2/3 x V_{DRM}, R_L = 3.3 kΩ	T_j = 150 °C	Min.	0.15	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 = 50 A , V_D = V_{DRM}, I_G = 200 mA, dI_G/dt = 0.2 A/µs		Typ.	3	µs
dV/dt	V_D = 2/3 x V_{DRM}, gate open	T_j = 150 °C	Min.	1000	V/µs
t_q	I_T = 33 A, V_D = 800 V, V_R = 75 V, t_P = 100 µs, dI_T/dt = 10 A/µs, dV_D/dt = 20 V/µs,	T_j = 150 °C	Typ.	150	µs
V_{TM}	I_{TM} = 100 A, t_P = 380 µs		Max.	1.55	V
V_{TO}	Threshold voltage	T_j = 150 °C	Max.	0.88	V
R_D	Dynamic resistance	T_j = 150 °C	Max.	6	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.	7.5	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.)	0.3	°C/W
$R_{th(j-a)}$	Junction to ambient	50	°C/W

1.1 Characteristics (curves)

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

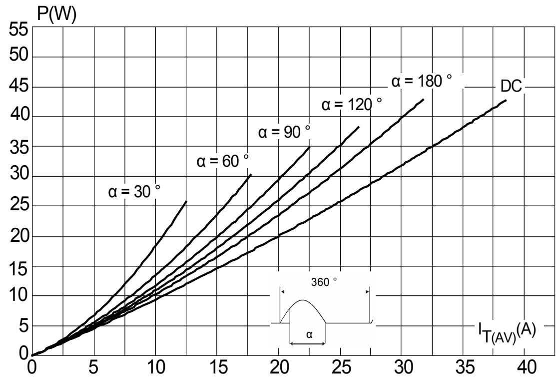


Figure 2: Correlation between maximum average power dissipation and maximum allowable temperatures (T_{amb} and T_{case})

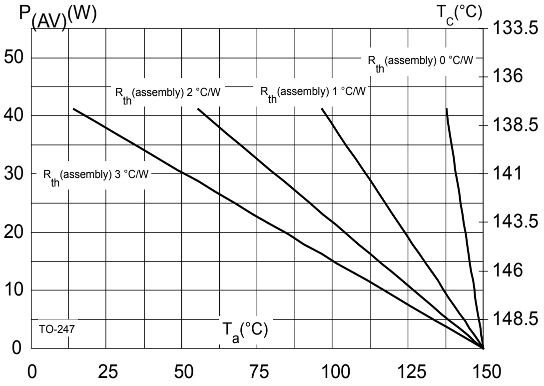


Figure 3: Average and D.C. on-state current versus case temperature

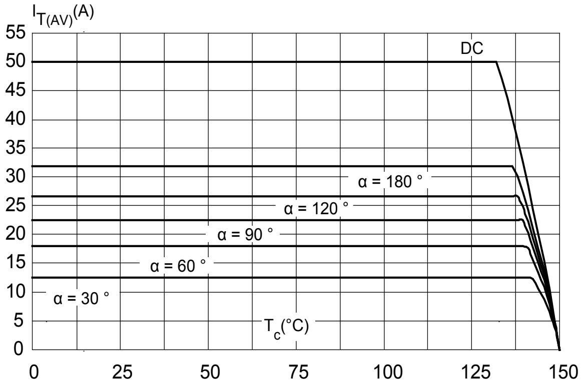


Figure 4: Average and D.C. on-state current versus ambient temperature

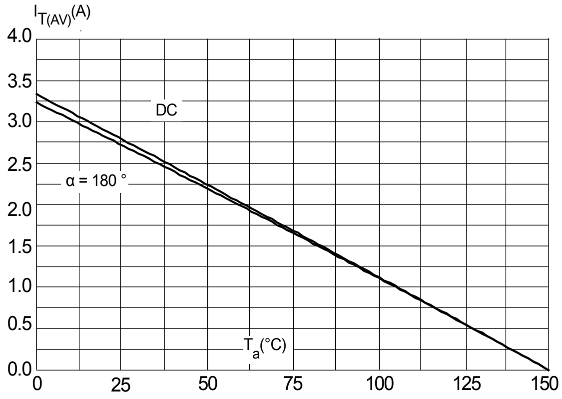


Figure 5: Relative variation of thermal impedance junction to case and junction to ambient versus pulse duration

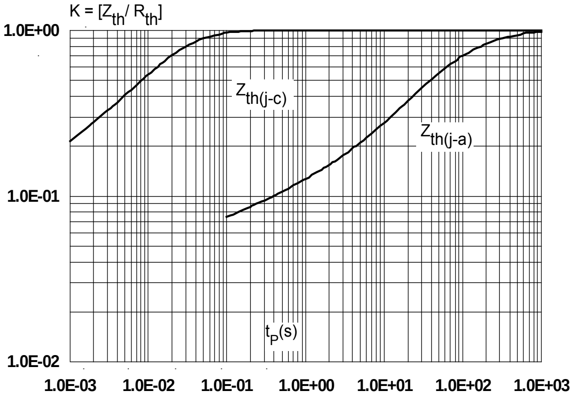


Figure 6: Relative variation of gate trigger current and gate voltage versus junction temperature (typical values)

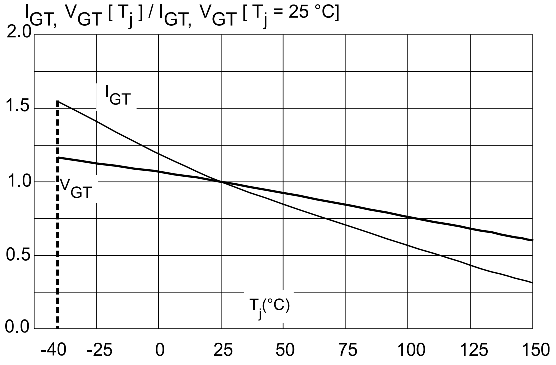


Figure 7: Relative variation of holding and latching current versus junction temperature (typical values)

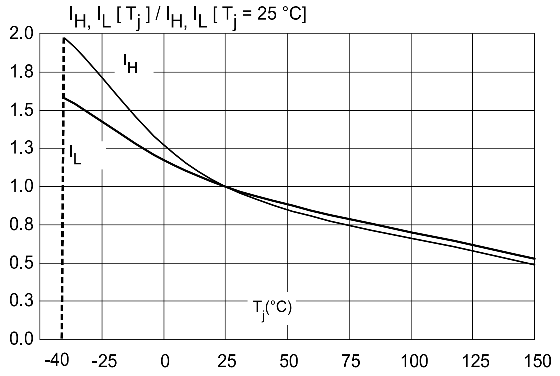


Figure 8: Surge peak on-state current versus number of cycles

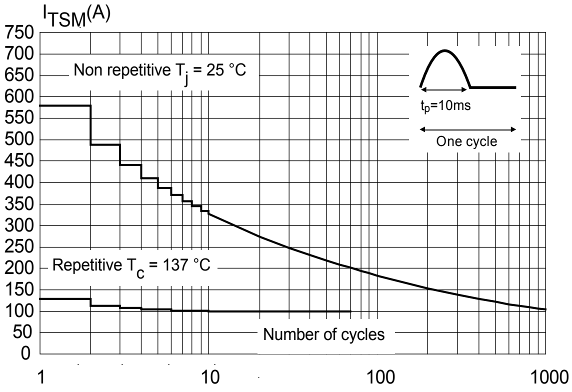


Figure 9: Non repetitive surge peak on-state current for a sinusoidal pulse (tp < 10 ms)

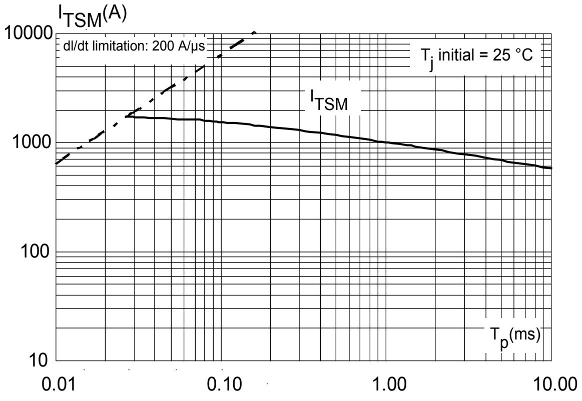


Figure 10: On-state characteristics (maximum values)

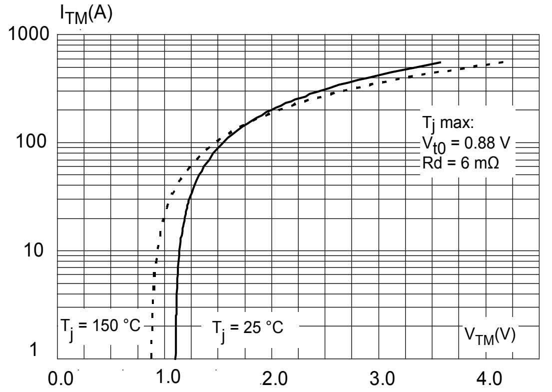
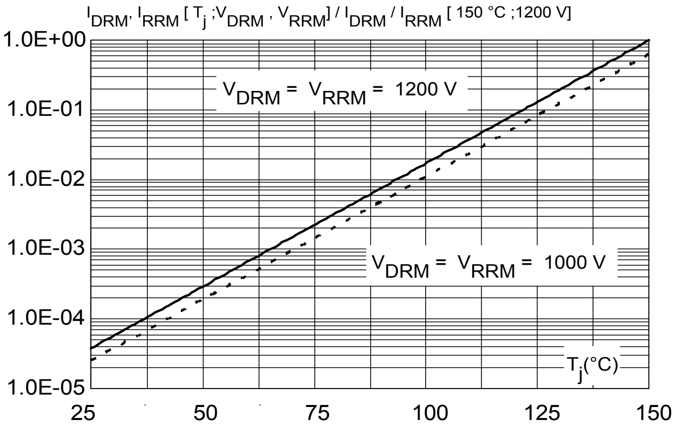


Figure 11: Relative variation of leakage current versus junction temperature for different values of blocking voltage (typical values)



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

2.1 TO-247 package information

Figure 12: TO-247 package outline

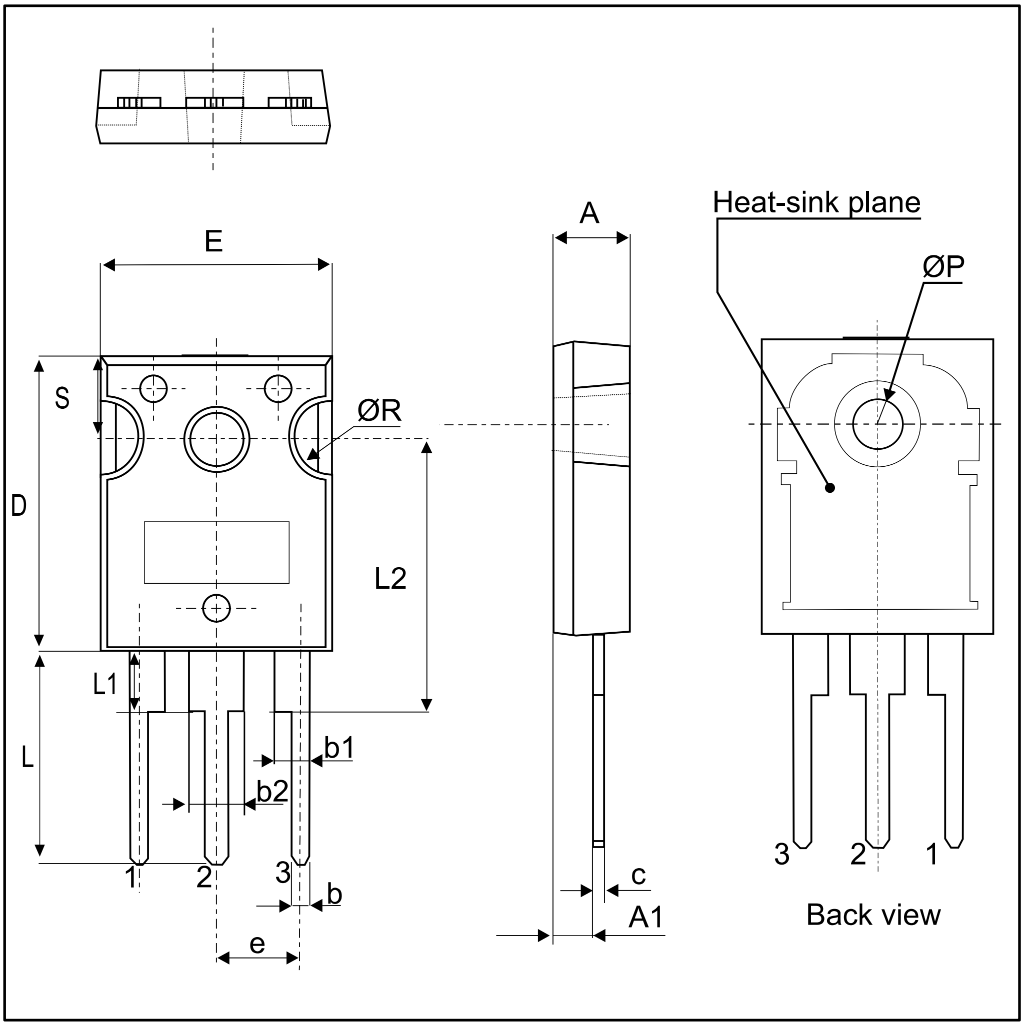


Table 5: TO-247 package mechanical data

Ref.	Dimensions					
	Millimeters			Inches[1]		
	Min.		**Max.**	**Min.**		**Max.**
A	4.85		5.15	0.1909		0.2028
A1	2.20		2.60	0.0866		0.1024
b	1.00		1.40	0.0394		0.0551
b1	2.00		2.40	0.0787		0.0945
b2	3.00		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 typ.			0.7283 typ.		
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] Inches dimensions given for reference only

[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
TN5050H-12WY	TN5050H12Y	TO-247	4.43 g	30	Tube

4 Revision history

Table 7: Document revision history

Date	Revision	Changes
07-Jan-2015	1	Initial release.
17-Oct-2017	2	Updated TO-247 package information.
20-Dec-2017	3	Updated *Table 5: "TO-247 package mechanical data"*.

IMPORTANT NOTICE – PLEASE READ CAREFULLY

LifeElectronics
Живое партнерство

ООО "ЛайфЭлектроникс" **"LifeElectronics" LLC**

ИНН 7805602321 КПП 780501001 Р/С 40702810122510004610 ФАКБ "АБСОЛЮТ БАНК" (ЗАО) в г.Санкт-Петербурге К/С 30101810900000000703 БИК 044030703

Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибьюторов Европы, Америки и Азии.

С конца 2013 года компания активно расширяет линейку поставок компонентов по направлению коаксиальный кабель, кварцевые генераторы и конденсаторы (керамические, пленочные, электролитические), за счёт заключения дистрибьюторских договоров

Мы предлагаем:

- *Конкурентоспособные цены и скидки постоянным клиентам.*
- *Специальные условия для постоянных клиентов.*
- *Подбор аналогов.*
- *Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.*

- *Приемлемые сроки поставки, возможна ускоренная поставка.*
- *Доставку товара в любую точку России и стран СНГ.*
- *Комплексную поставку.*
- *Работу по проектам и поставку образцов.*
- *Формирование склада под заказчика.*

- *Сертификаты соответствия на поставляемую продукцию (по желанию клиента).*
- *Тестирование поставляемой продукции.*
- *Поставку компонентов, требующих военную и космическую приемку.*
- *Входной контроль качества.*
- *Наличие сертификата ISO.*

В составе нашей компании организован Конструкторский отдел, призванный помогать разработчикам, и инженерам.

Конструкторский отдел помогает осуществить:

- *Регистрацию проекта у производителя компонентов.*
- *Техническую поддержку проекта.*
- *Защиту от снятия компонента с производства.*
- *Оценку стоимости проекта по компонентам.*
- *Изготовление тестовой платы монтаж и пусконаладочные работы.*

Тел: +7 (812) 336 43 04 (многоканальный)
Email: org@lifeelectronics.ru

www.lifeelectronics.ru