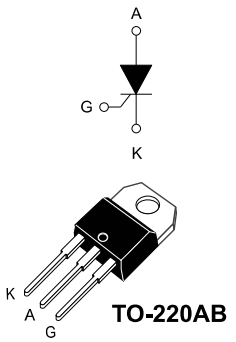
TN5015H-6I

High temperature 50 A SCRs

Datasheet - production data



Features

- High junction temperature: T_j = 150 °C
- High noise immunity dV/dt = 500V/µs up to 150 °C
- Gate triggering current I_{GT} = 15 mA
- Peak off-state voltage V_{DRM}/V_{RRM} = 600 V
- High turn-on current rise dI/dt = 100 A/µs
- ECOPACK®2 compliant component
- Insulated package TO-220AB:
  - Insulated voltage: 2500 V_{RMS}
  - Complies with UL 1557 (File ref : E81734)

Applications

- Motorbike voltage regulator circuits
- Inrush current limiting circuits
- Motor control circuits and starters
- Solid state relays

Description

This device offers high thermal performance operation up to 50 A thanks to its junction temperature T_j up to 150 °C.
Its fully tab insulated (thanks to ceramic inside) TO-220AB package allows a back to back configuration.

Its trade-off noise immunity (dV/dt = 500 V/µs) versus its gate triggering current (I_{GT} = 15 mA) and its turn-on current rise (dI/dt = 100 A/µs) allow to design robust and compact control circuit for voltage regulator in motorbikes and industrial drives, overvoltage crowbar protection, motor control circuits in power tools and kitchen appliances, inrush current limiting circuits.

Table 1: Device summary

Order code	Package	V_{DRM}/V_{RRM}	I_{GT}
TN5015H-6I	TO-220AB ins.	600 V	15 mA

This is information on a product in full production. www.st.com

1 Characteristics

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

Symbol	Parameter			Value	Unit
$I_{T(RMS)}$	RMS on-state current (180 ° conduction angle)		T_c = 75 °C	50	A
$I_{T(AV)}$	Average on-state current (180 ° conduction angle)		T_c = 81 °C	30	A
			T_c = 97 °C	25	
			T_c = 111 °C	20	
I_{TSM}	Non repetitive surge peak on-state current (T_j initial = 25 °C)		t_p = 8.3 ms	493	A
			t_p = 10 ms	450	
I^2t	I^2t value for fusing		t_p = 10 ms	1012	A^2s
dI/dt	Critical rate of rise of on-state current I_G = 2 x I_{GT}, tr ≤ 100 ns		f = 60 Hz	100	A/µs
V_{DRM}/V_{RRM}	Repetitive peak off-state voltage		T_j = 150 °C	600	V
V_{DSM}/V_{RSM}	Non repetitive surge peak off-state voltage		t_p = 10 ms	V_{DRM}/V_{RRM} + 100	V
I_{GM}	Peak gate current	t_p = 20 µs	T_j = 150 °C	4	A
$P_{G(AV)}$	Average gate power dissipation		T_j = 150 °C	1	W
V_{RGM}	Maximum peak reverse gate voltage			5	V
T_{stg}	Storage junction temperature range			-40 to +150	°C
T_j	Maximum operating junction temperature			-40 to +150	°C
T_l	Maximum lead temperature soldering during 10 s			260	°C
V_{ins}	Insulation RMS voltage, 1 minute			2500	V

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		Max.	15	mA
V_{GT}			Max.	1.3	V
V_{GD}	V_D = V_{DRM}, R_L = 3.3 kΩ	T_j = 150 °C	Min.	0.15	V
I_H	I_T = 500 mA, gate open		Max.	60	mA
I_L	I_G = 1.2 x I_{GT}		Max.	80	mA
dV/dt	V_D = 402 V, gate open	T_j = 150 °C	Min.	500	V/µs
t_{gt}	I_{TM} = 100 A, V_D = 402 V, I_G = 30 mA, (dI_G/dt) max = 0.2 A/µs		Typ.	1.9	µs
t_q	I_{TM} = 100 A, V_D = 402 V, (dI_G/dt)max = 30 A/µs, V_R = 25 V, dV_D/dt = 50 V/µs	T_j = 150 °C	Typ.	85	µs

Table 4: Static characteristics

Symbol	Test conditions			Value	Unit
V_{TM}	I_{TM} = 100 A, t_p = 380 µs	T_j = 25 °C	Max.	1.65	V
V_{TO}	Threshold voltage	T_j = 150 °C	Max.	0.85	
R_D	Dynamic resistance	T_j = 150 °C	Max.	9	mΩ
I_{DRM}, I_{RRM}	V_D = V_{DRM} = V_{RRM}	T_j = 25 °C	Max.	10	µA
		T_j = 150 °C		6	mA

Table 5: Thermal parameters

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case (DC)	Max.	1.5	°C/W
$R_{th(j-a)}$	Junction to ambient (DC)	Typ.	60	

Notes:

(1)S = Copper surface under tab

1.1 Characteristics (curves)

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

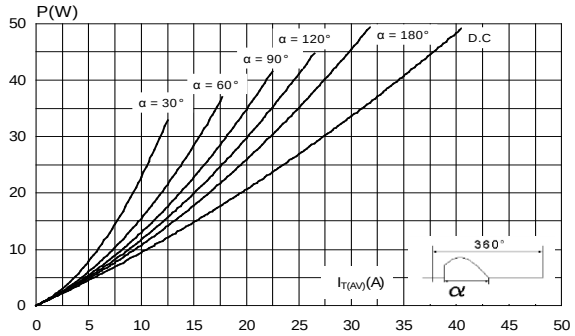


Figure 2: Average and DC on-state current versus case temperature

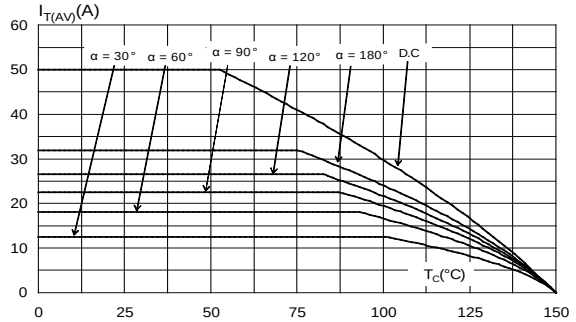


Figure 3: Average and D.C. on state current versus ambient temperature

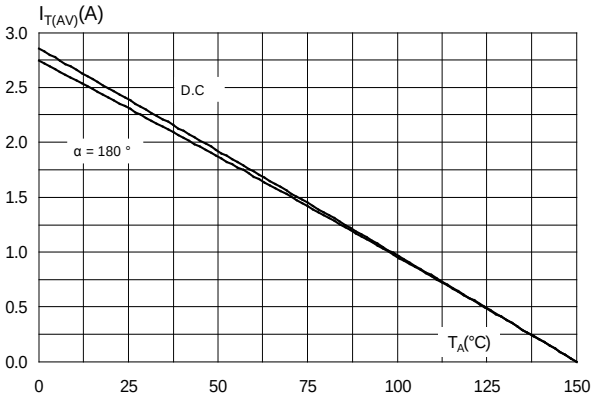


Figure 4: Relative variation of thermal impedance versus pulse duration

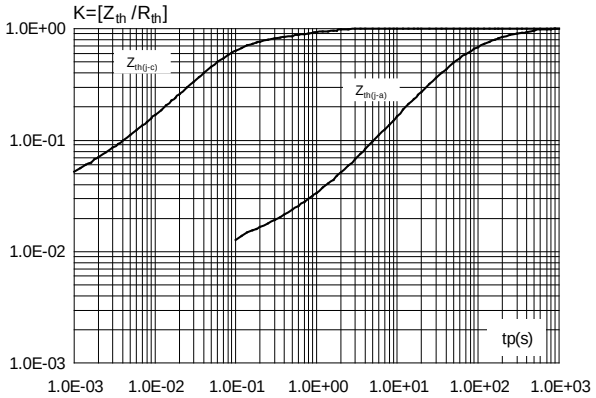


Figure 5: Relative variation of gate trigger current and gate voltage versus junction temperature (typical values)

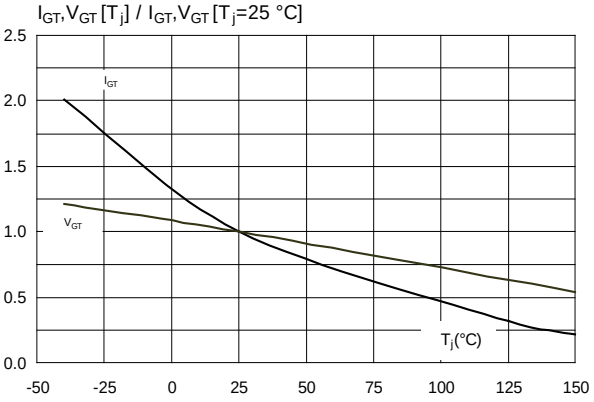


Figure 6: Relative variation of holding and latching current versus junction temperature (typical values)

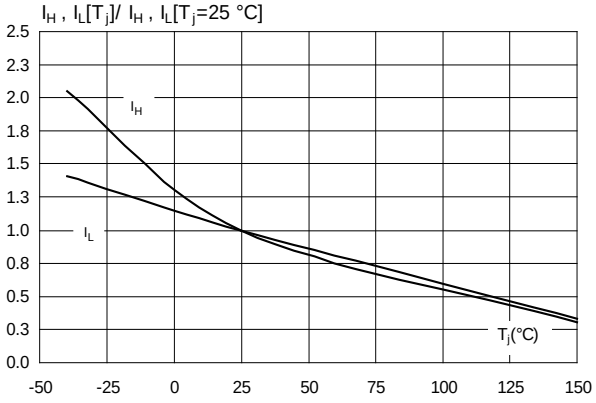


Figure 7: Relative variation of static dV/dt immunity versus junction temperature (typical values)

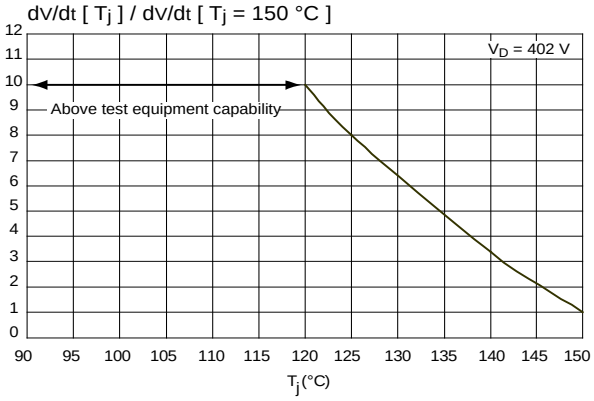


Figure 8: Surge peak on-state current versus number of cycles

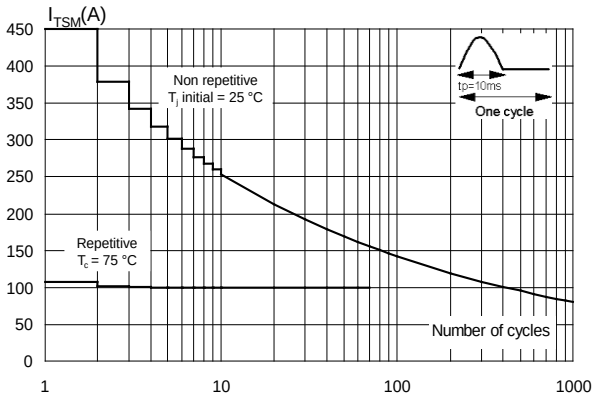


Figure 9: Non repetitive surge peak on-state current for a sinusoidal pulse with width t_p < 10 ms

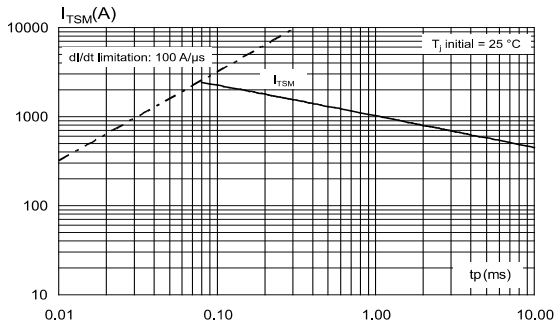


Figure 10: On-state characteristics (maximum values)

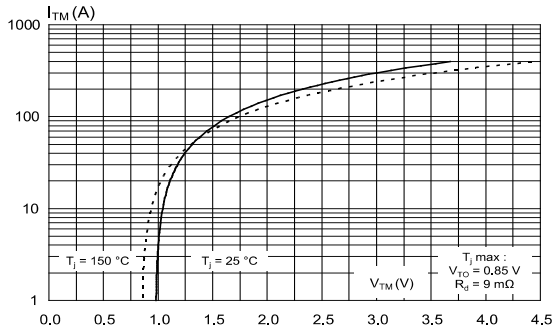
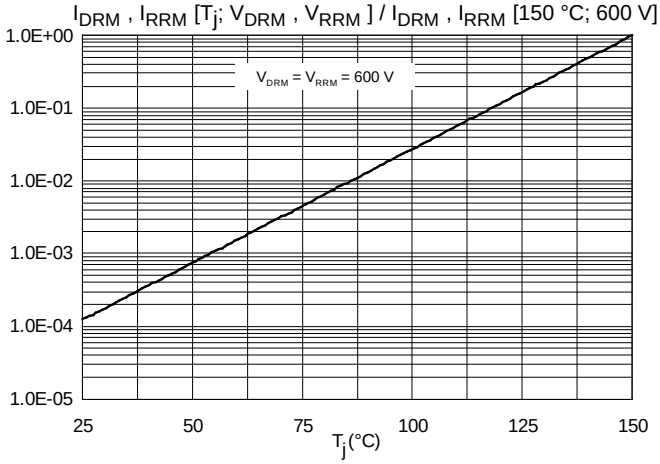


Figure 11: Relative variation of leakage current versus junction temperature



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, halogen-free package

2.1 TO-220AB package information

Figure 12: TO-220AB (NIns. & Ins.) package outline

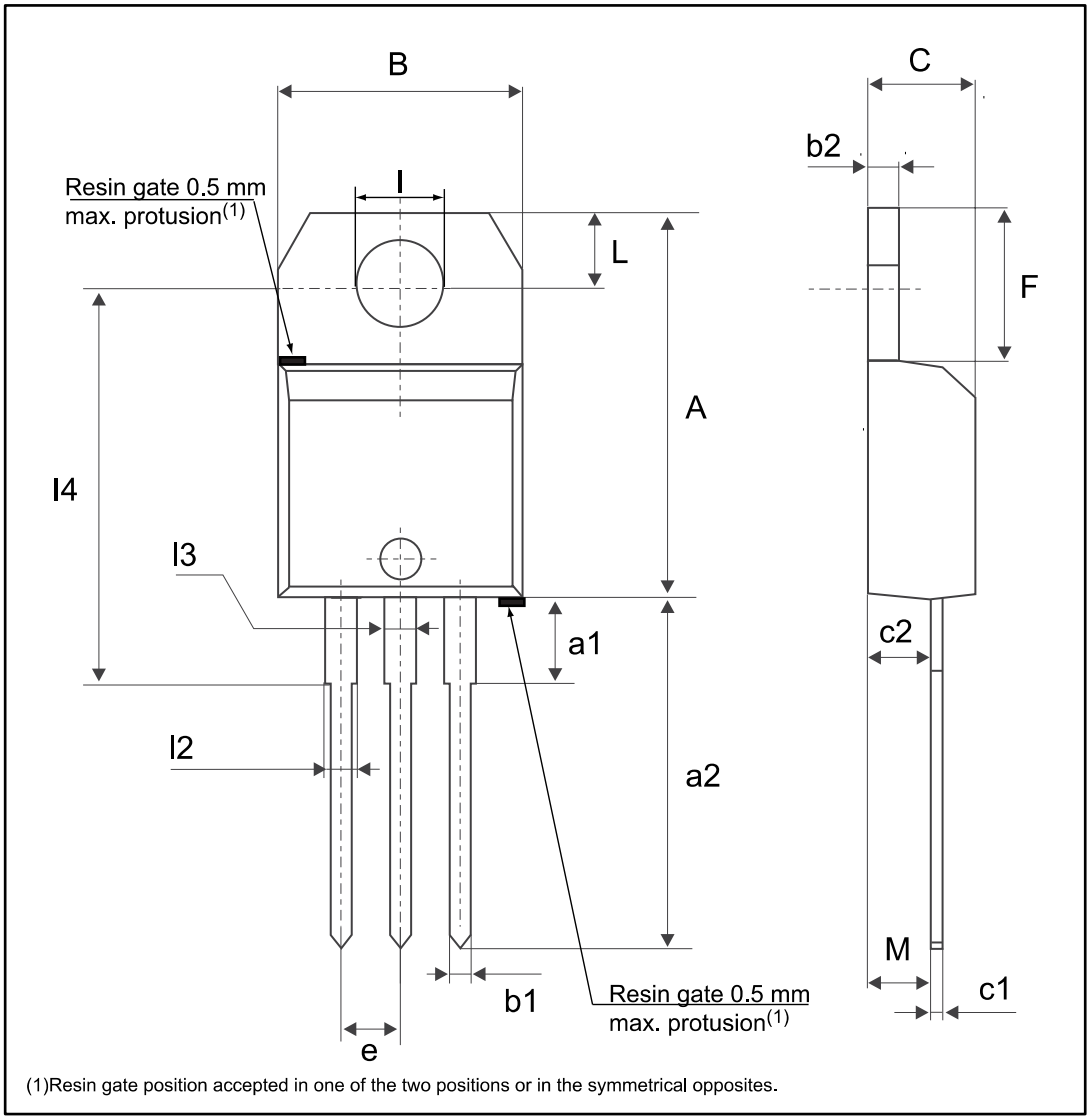


Table 6: TO-220AB (NIns. & Ins.) package mechanical data

Ref.	Dimensions					
	Millimeters			Inches[(1)]		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	15.20		15.90	0.5984		0.6260
a1		3.75			0.1476	
a2	13.00		14.00	0.5118		0.5512
B	10.00		10.40	0.3937		0.4094
b1	0.61		0.88	0.0240		0.0346
b2	1.23		1.32	0.0484		0.0520
C	4.40		4.60	0.1732		0.1811
c1	0.49		0.70	0.0193		0.0276
c2	2.40		2.72	0.0945		0.1071
e	2.40		2.70	0.0945		0.1063
F	6.20		6.60	0.2441		0.2598
I	3.73		3.88	0.1469		0.1528
L	2.65		2.95	0.1043		0.1161
I2	1.14		1.70	0.0449		0.0669
I3	1.14		1.70	0.0449		0.0669
I4	15.80	16.40	16.80	0.6220	0.6457	0.6614
M		2.6			0.1024	

Notes:

(1)Inch dimensions are for reference only.

3 Ordering information

Figure 13: Ordering information scheme

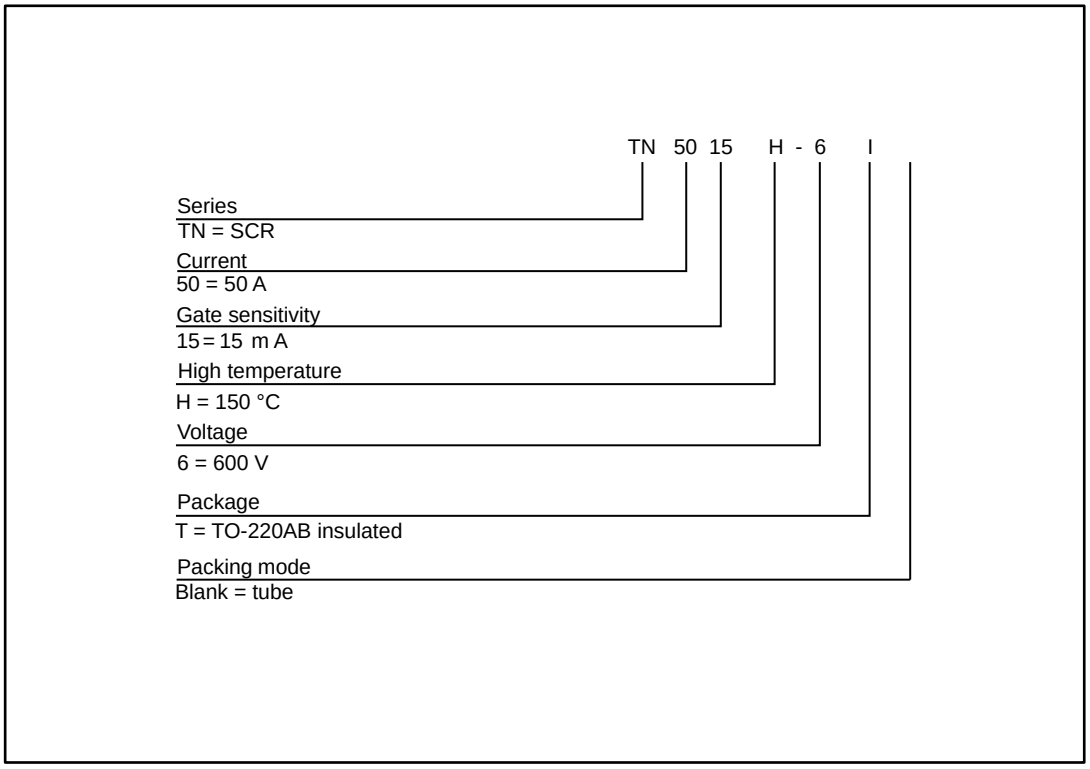


Table 7: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
TN5015H-6I	TN5015H6I	TO-220AB ins.	2.3 g	50	Tube

4 Revision history

Table 8: Document revision history

Date	Revision	Changes
02-Jun-2017	1	Initial release.

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