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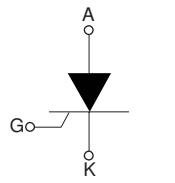
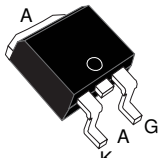
TN1605H-6G

High temperature 16 A SCRs

Datasheet - production data





D²PAK

Description

Designed with high immunity switching to external surges, this device offers robust switching up to its 150°C maximum T_j.

The combination of noise immunity and low gate triggering current allows to design strong and compact control circuit.

Table 1: Device summary

Order code	Package	V_{DRM}/V_{RRM}	I_{GT}
TN1605H-6G	D²PAK	600	6 mA

Features

- High junction temperature: T_j = 150 °C
- Gate triggering current I_{GT} = 6 mA
- High noise immunity dV/dt = 200 V/µs up to 150 °C
- Blocking voltage V_{DRM}/V_{RRM} = 600 V
- High turn-on current rise dI/dt: 100 A/µs
- ECOPACK®2 compliant component

Applications

- Motorbikes voltage regulator circuits
- Inrush current limiting circuits
- Motor control circuits and starters
- Light dimmers
- Solid state relays

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 = 133 °C	16	A
$IT_{(AV)}$	Average on-state current (180° conduction angle)		T_c = 133 °C	10	A
			T_c = 138 °C	8	
			T_c = 142 °C	6	
I_{TSM}	Non repetitive surge peak on-state current	t_p = 8.3 ms	T_j initial = 25 °C	153	A
		t_p = 10 ms		140	
I^2t	I^2t value for fusing	t_p = 10 ms		98	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		700	V
$P_G(AV)$	Average gate power dissipation		T_j = 150 °C	1	W
V_{RGM}	Maximum peak reverse gate voltage			5	V
I_{GM}	Peak gate current	t_p = 20 µs	T_j = 150 °C	4	A
T_{stg}	Storage junction temperature range			-40 to +150	°C
T_j	Operating junction temperature range			-40 to +150	°C

Table 3: Dynamic characteristics

Symbol	Parameter	T_j		Value	Unit
I_{GT}	V_D = 12 V, R_L = 33 Ω	25 °C	Min.	3.5	mA
		Typ.		4.5	
		Max.		6	
V_{GT}		Max.		1.3	V
V_{GD}	V_D = 600, R_L = 3.3 kΩ	150 °C	Min.	0.15	V
I_L	I_G = 1.2 x I_{GT}	25 °C	Max.	40	mA
I_H	I_T = 500 mA, gate open		Max.	20	
dV/dt	V_D = 402 V, gate open	150 °C	Min.	200	V/µs
t_{gt}	I_{TM} = 32 A, V_D = 402 V, I_G = 12 mA, (dI_G/dt) max = 0.2 A/µs	25 °C	Typ.	1.9	µs
t_q	I_{TM} = 32 A, V_D = 402 V, $(dI/dt)_{off}$ = 30 A/µs, V_R = 25 V, dV_D/dt = 20 V/µs	150 °C	Typ.	70	µs

Table 4: Static electrical characteristics

Symbol	Test conditions	T_j		Value	Unit
V_{TM}	I_{TM} = 32 A, t_p = 380 µs	25 °C	Max.	1.6	V
V_{TO}	Threshold on-state voltage	150 °C	Max.	0.82	V
R_D	Dynamic resistance	150 °C	Max.	25	mΩ
I_{DRM}/I_{RRM}	V_{DRM} = V_{RRM}	25 °C	Max.	5	µA
		125 °C		1.5	mA
		150 °C		3.1	

Table 5: Thermal resistance

Symbol	Parameter			Value	Unit
$R_{th(j-c)}$	Junction to case (DC)		Max.	1.1	°C/W
$R_{th(j-a)}$	Junction to ambient (DC)	S(1) = 1 cm2	Typ.	45	

Notes:

(1)S = copper surface under tab

1.1 Characteristics (curves)

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

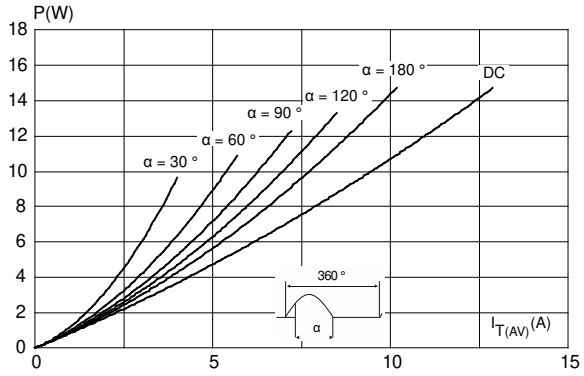


Figure 2: Average and DC on-state current versus case temperature

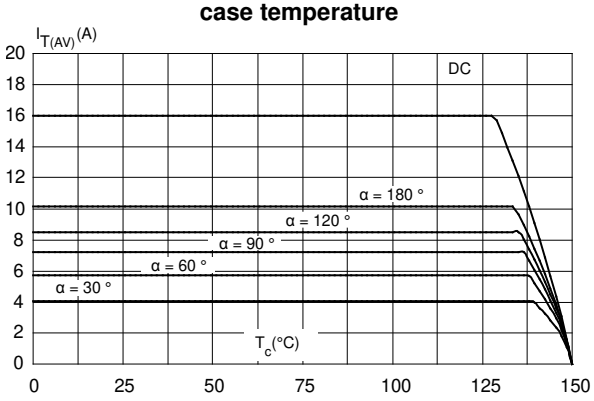


Figure 3: Average and DC on-state current versus ambient temperature

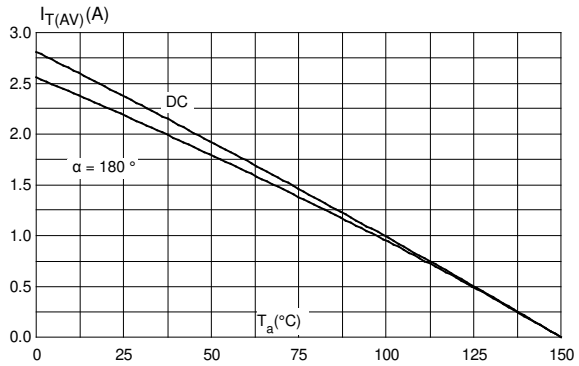


Figure 4: Relative variation of thermal impedance versus pulse duration

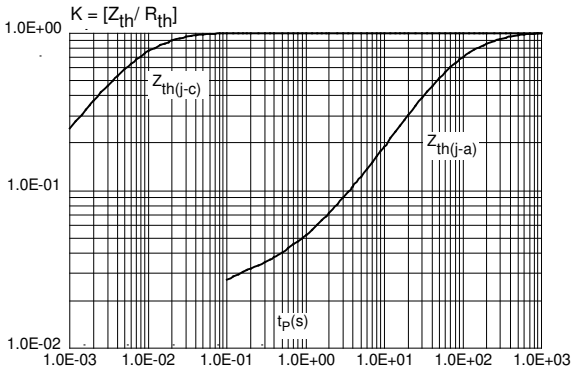


Figure 5: Relative variation of gate trigger current and gate voltage versus junction temperature (typical values)

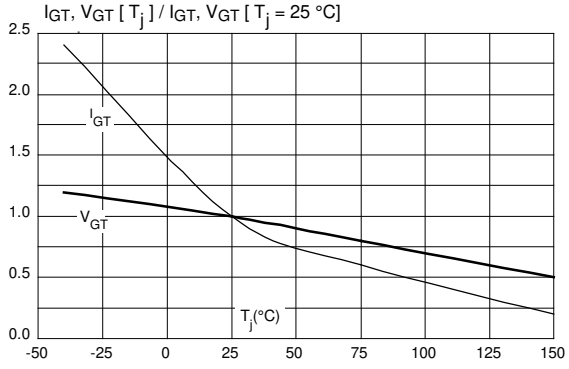


Figure 6: Relative variation of holding and latching current versus junction temperature (typical values)

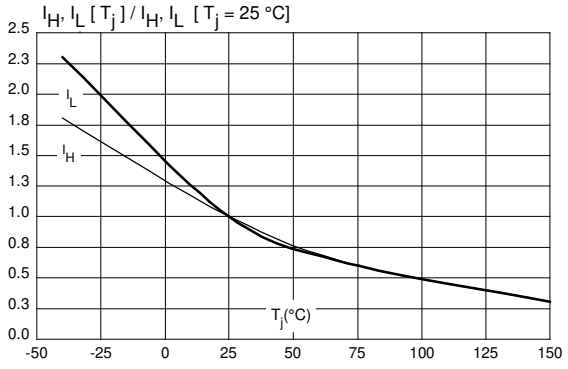


Figure 7: Relative variation of static dV/dt immunity versus junction temperature (typical values)

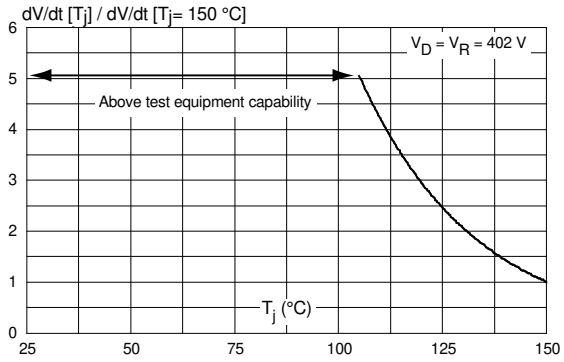


Figure 8: Surge peak on-state current versus number of cycles

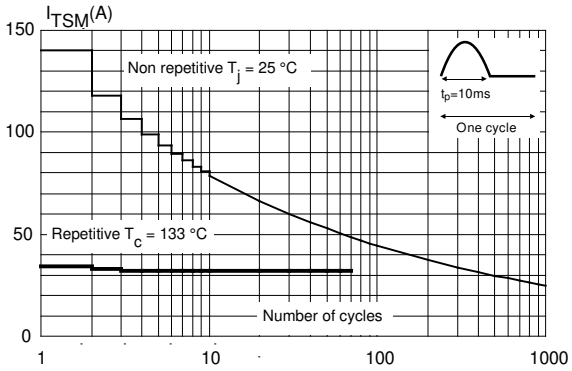


Figure 9: Non repetitive surge peak on-state current versus sinusoidal pulse width (t_P < 10 ms).

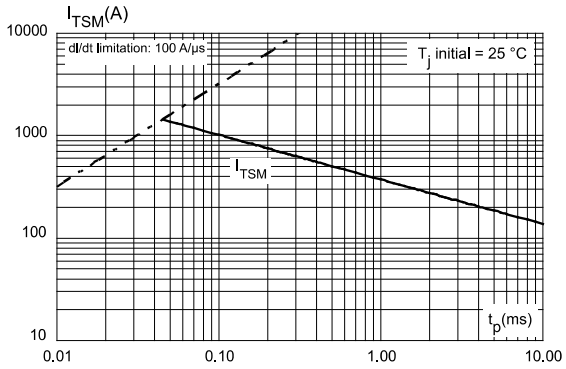


Figure 10: On-state characteristics (maximum values)

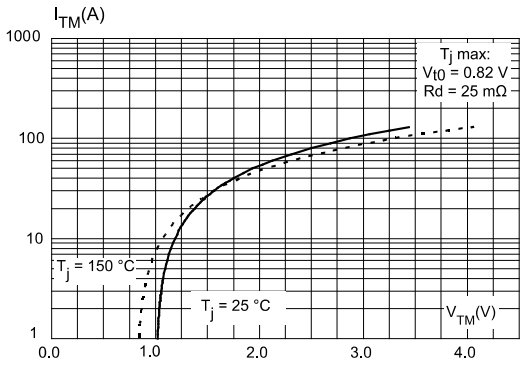
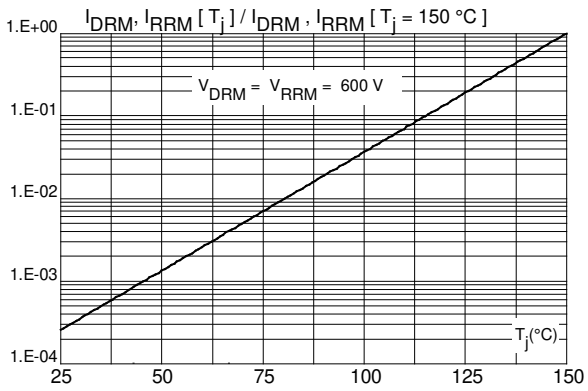


Figure 11: Relative variation of leakage current versus junction temperature (tP < 10ms)



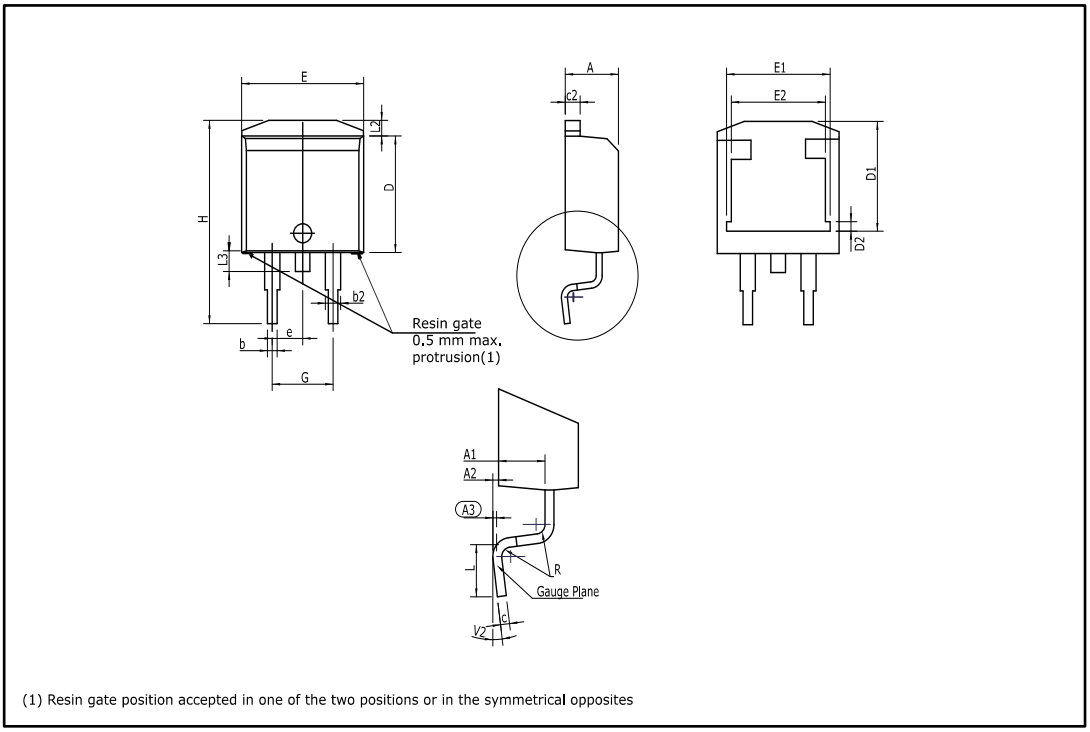
2 Package information

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 UL 94,V0
- Lead-free package

2.1 D²PAK package information

Figure 12: D²PAK package outline



(1) Resin gate position accepted in one of the two positions or in the symmetrical opposites

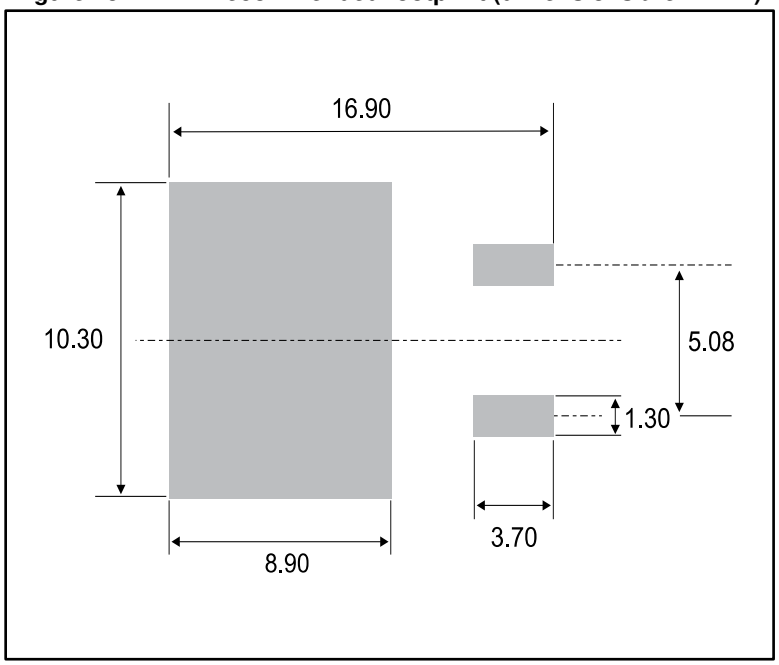
Table 6: D²PAK package mechanical data

Ref.	Dimensions					
	Millimeters			Inches[1]		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.30		4.60	0.1693		0.1811
A1	2.49		2.69	0.0980		0.1059
A2	0.03		0.23	0.0012		0.0091
A3		0.25			0.0098	
b	0.70		0.93	0.0276		0.0366
b2	1.25		1.7	0.0492		0.0669
c	0.45		0.60	0.0177		0.0236
c2	1.21		1.36	0.0476		0.0535
D	8.95		9.35	0.3524		0.3681
D1	7.50		8.00	0.2953		0.3150
D2	1.30		1.70	0.0512		0.0669
e	2.54			0.1		
E	10.00		10.28	0.3937		0.4047
E1	8.30		8.70	0.3268		0.3425
E2	6.85		7.25	0.2697		0.2854
G	4.88		5.28	0.1921		0.2079
H	15		15.85	0.5906		0.6240
L	1.78		2.28	0.0701		0.0898
L2	1.27		1.40	0.0500		0.0551
L3	1.40		1.75	0.0551		0.0689
R		0.40			0.0157	
V2	0°		8°	0°		8°

Notes:

[1]Dimensions in inches are given for reference only

Figure 13: D²PAK recommended footprint (dimensions are in mm)



3 Ordering information

Figure 14: Ordering information scheme

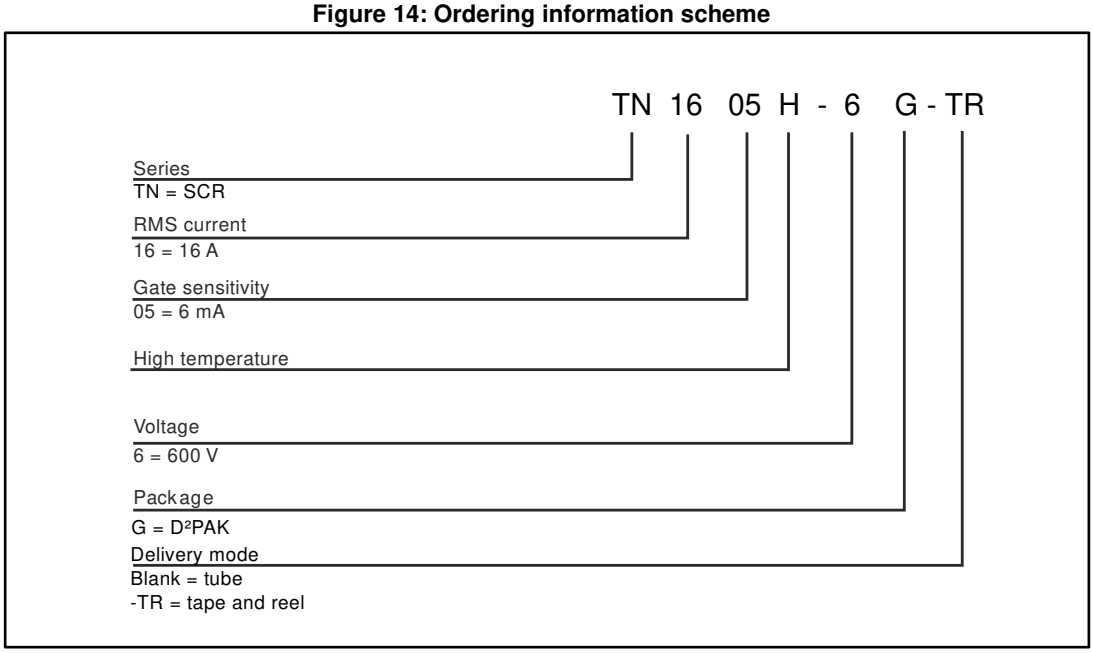


Table 7: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
TN1605H-6G	TN1605H6	D²PAK	1.5 g	50	Tube
TN1605H-6G-TR				1000	Tape and reel

4 Revision history

Table 8: Document revision history

Date	Revision	Changes
18-May-2017	1	Initial release.
26-Jun-2017	2	Updated *Table 5: "Thermal resistance"*.

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