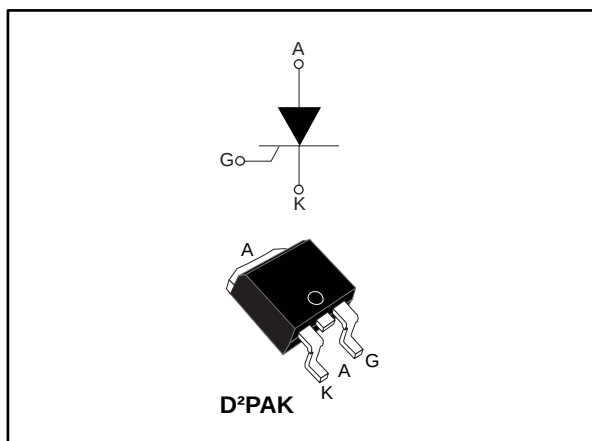


High temperature 16 A SCRs

Datasheet - production data



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: $T_j = 150\text{ °C}$
- Gate triggering current $I_{GT} = 6\text{ mA}$
- High noise immunity $dV/dt = 200\text{ V}/\mu\text{s}$ up to 150 °C
- Blocking voltage $V_{DRM}/V_{RRM} = 600\text{ V}$
- High turn-on current rise $dI/dt: 100\text{ A}/\mu\text{s}$
- 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, $T_j = 25\text{ °C}$ unless otherwise specified)

Symbol	Parameter			Value	Unit
I _{T(RMS)}	RMS on-state current (180 ° conduction angle)		T _c = 133 °C	16	A
I _{T(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 ² t	I ² t value for fusing	t _p = 10 ms		98	A ² s
dI/dt	Critical rate of rise of on-state current	I _G = 2 × 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}	$V_D = 12\text{ V}$, $R_L = 33\text{ }\Omega$	25 °C	Min.	3.5	mA
		Typ.		4.5	
		Max.		6	
V_{GT}		Max.		1.3	V
V_{GD}	$V_D = 600$, $R_L = 3.3\text{ k}\Omega$	150 °C	Min.	0.15	V
I_L	$I_G = 1.2 \times I_{GT}$	25 °C	Max.	40	mA
I_H	$I_T = 500\text{ mA}$, gate open		Max.	20	
dV/dt	$V_D = 402\text{ V}$, gate open	150 °C	Min.	200	$V/\mu s$
t_{gt}	$I_{TM} = 32\text{ A}$, $V_D = 402\text{ V}$, $I_G = 12\text{ mA}$, (di_G/dt) max = 0.2 A/ μs	25 °C	Typ.	1.9	μs
t_q	$I_{TM} = 32\text{ A}$, $V_D = 402\text{ V}$, $(di/dt)_{off} = 30\text{ A}/\mu s$, $V_R = 25\text{ V}$, $dV_D/dt = 20\text{ V}/\mu s$	150 °C	Typ.	70	μs

Table 4: Static electrical characteristics

Symbol	Test conditions	T_j		Value	Unit
V_{TM}	$I_{TM} = 32\text{ A}$, $t_p = 380\text{ }\mu\text{s}$	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	m Ω
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	$^{\circ}\text{C/W}$
$R_{th(j-a)}$	Junction to ambient (DC)	$S^{(1)} = 1\text{ cm}^2$	Typ.	45	

Notes:⁽¹⁾S = copper surface under tab

1.1 Characteristics (curves)

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

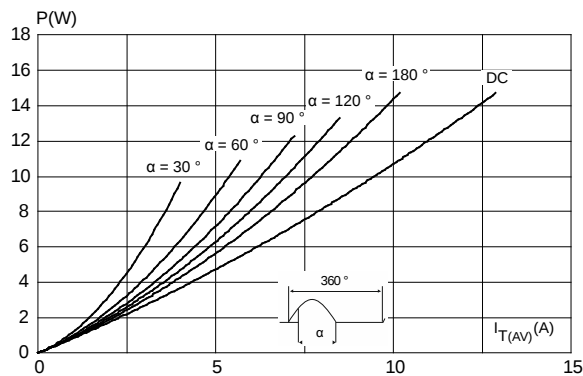


Figure 2: Average and DC on-state current versus case temperature

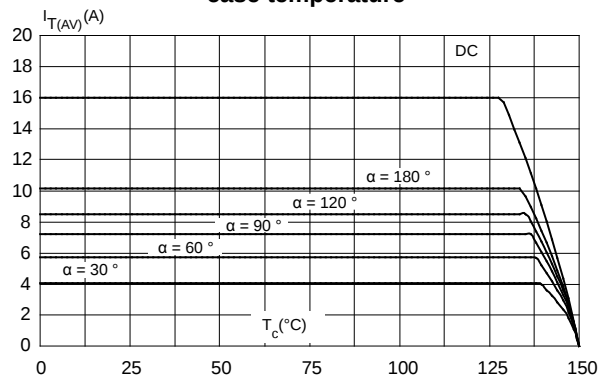


Figure 3: Average and DC on-state current versus ambient temperature

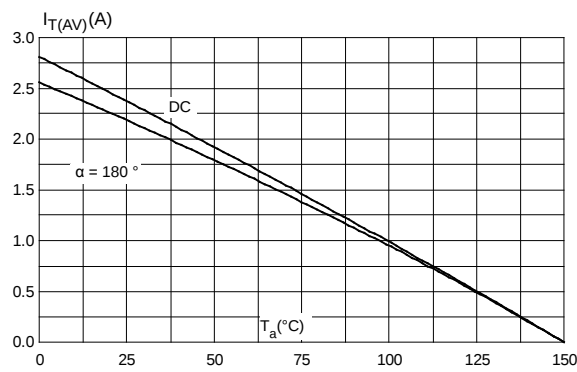


Figure 4: Relative variation of thermal impedance versus pulse duration

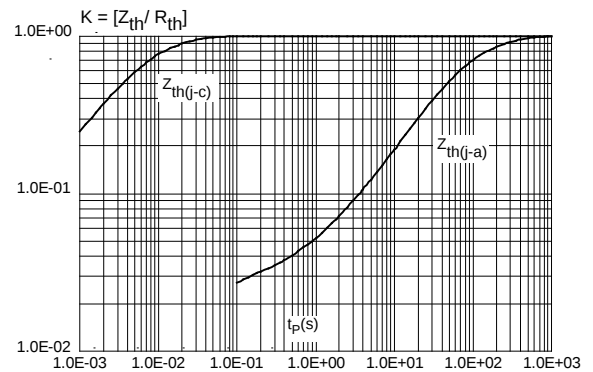


Figure 5: Relative variation of gate trigger current and gate voltage versus junction temperature (typical values)

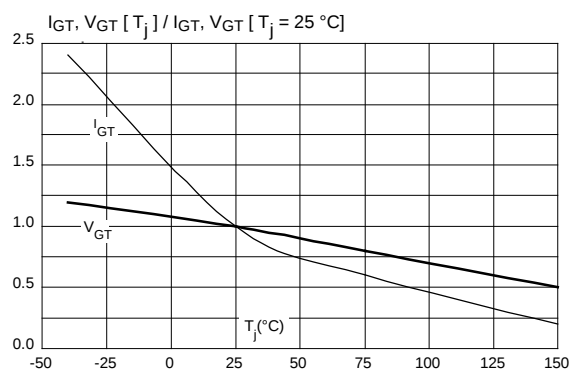


Figure 6: Relative variation of holding and latching current versus junction temperature (typical values)

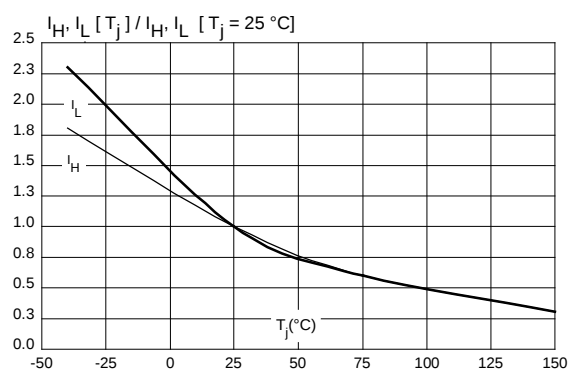


Figure 7: Relative variation of static dV/dt immunity versus junction temperature (typical values)

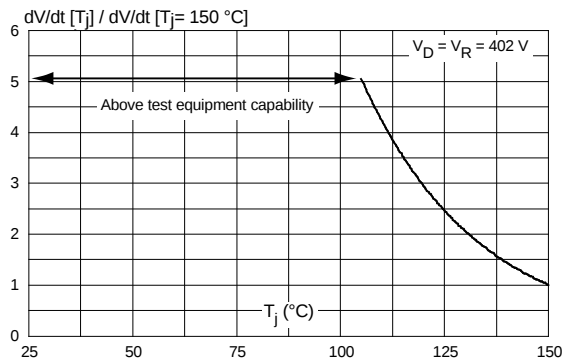


Figure 8: Surge peak on-state current versus number of cycles

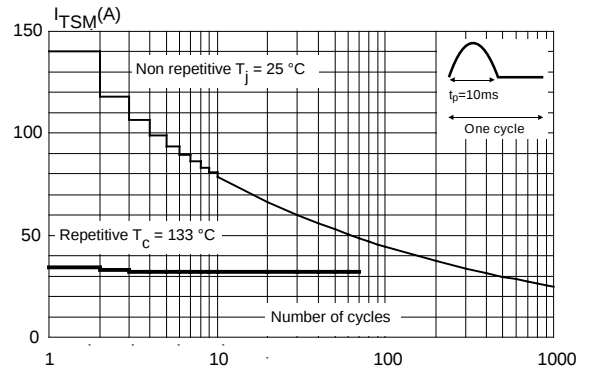


Figure 9: Non repetitive surge peak on-state current versus sinusoidal pulse width ($t_p < 10\text{ ms}$).

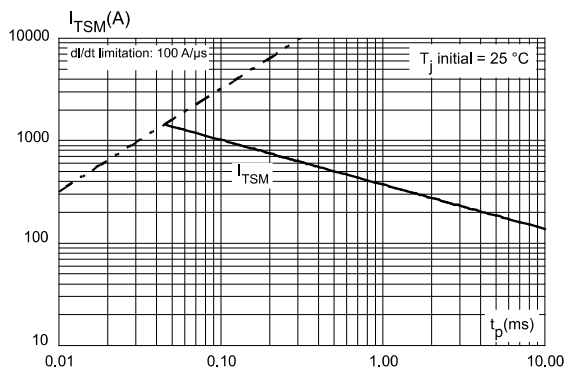


Figure 10: On-state characteristics (maximum values)

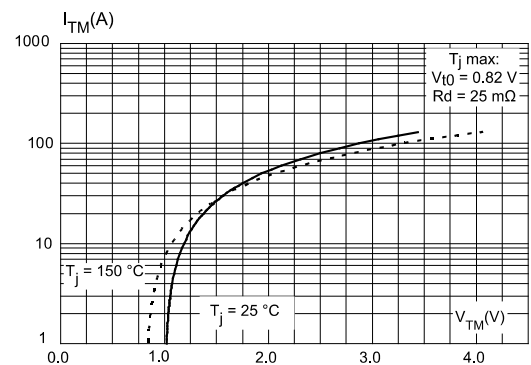
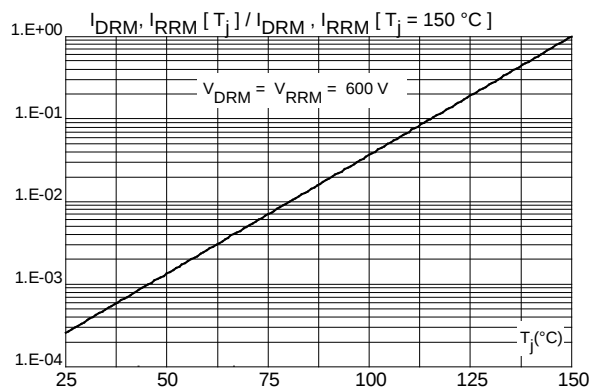


Figure 11: Relative variation of leakage current versus junction temperature ($t_P < 10\text{ ms}$)



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

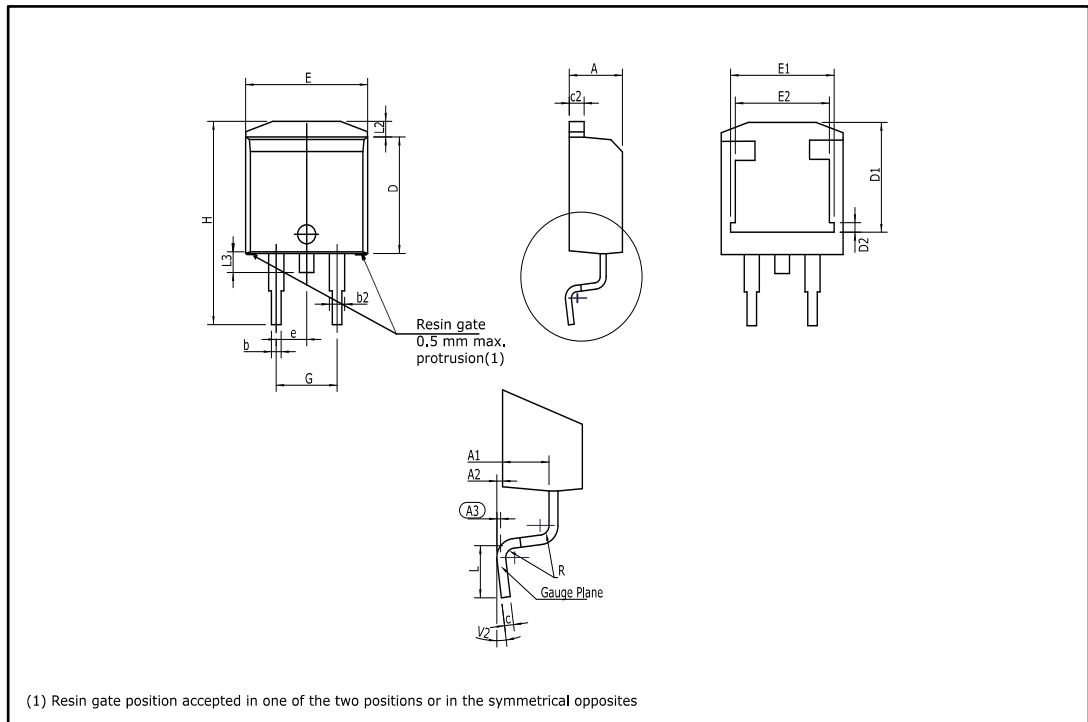
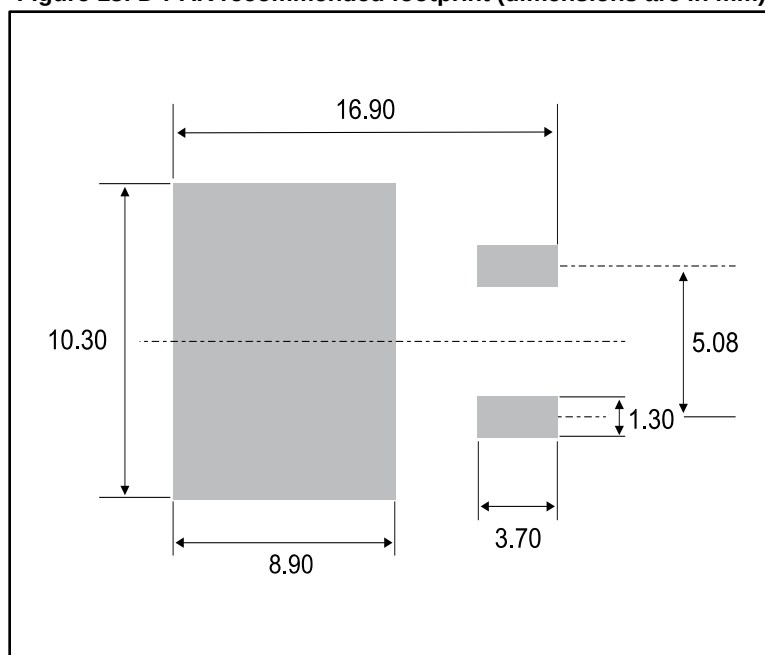


Table 6: D²PAK package mechanical data

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

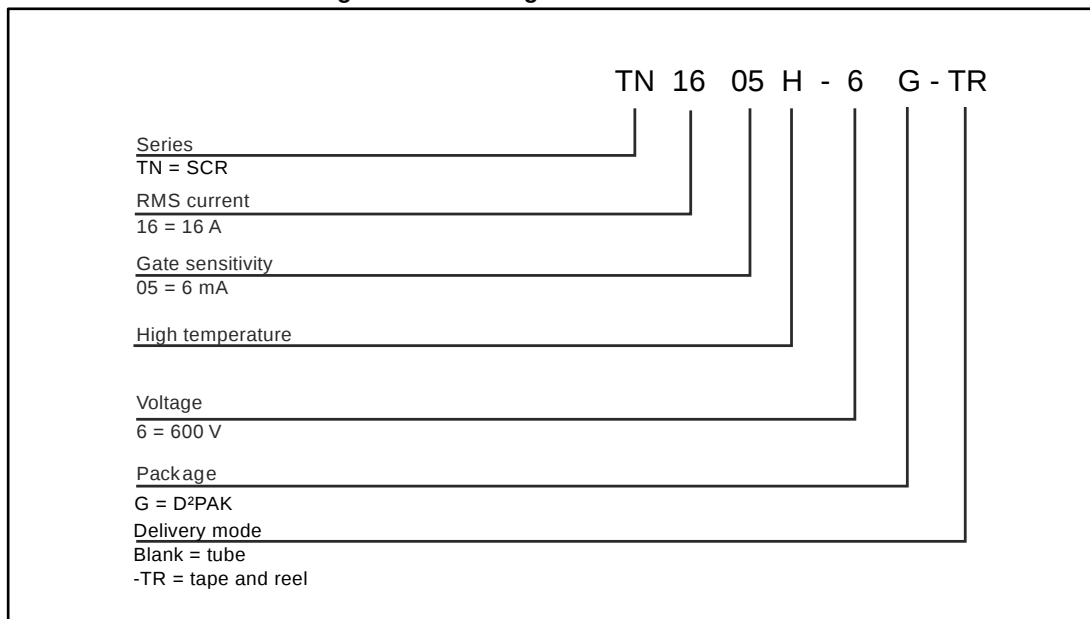


Table 7: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
TN1605H-6G	TN1605H6	D ² PAK	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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