TN1205H

High temperature 12 A SCRs

Datasheet – production data

Features

- High junction temperature: T_j = 150 °C
- Medium current SCRs
- High noise immunity up to 150 °C
- RoHS (2002/95/EC) compliant
- 600 V V_{DRM}, V_{RRM}

Application

- General purpose AC line load switching
- Motor control circuits
- Small home appliances
- Lighting
- Inrush current limiting circuits
- Over-voltage crowbar protection

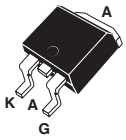
Description

Available in standard gate triggering levels, the TN1205H SCR series has very high switching capability up to junction temperature of 150 °C.

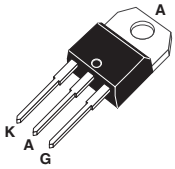
These products fit all modes of control found in applications such as overvoltage crowbar protection, motor control circuits in power tools and kitchen aids, inrush current limiting circuits, capacitive discharge ignition and voltage regulation circuits.

These products are particulary adapted for use in areas where the ambient temperature is high or the ventilation low, or where an increase of power density is required.

Through-hole or surface-mount packages provide performance in a limited space area.



D²PAK
(TN1205H-6G)



TO-220AB
(TN1205H-6T)

Table 1. Device summary

Order code	Package	V_{DRM}, V_{RRM}	I_{GT}
TN1205H-6T	TO-220AB	600 V	2 to 5 mA
TN1205H-6G	D²PAK		

1 Characteristics

Table 2. Absolute ratings (limiting values)

Symbol	Parameter			Value	Unit
$I_{T(RMS)}$	On-state rms current (180° conduction angle)	TO220-AB, D^2PAK	T_c = 136 °C	12	A
$I_{T(AV)}$	Average on-state current (180° conduction angle)			7.6	A
I_{TSM}	Non repetitive surge peak on-state current	t_p = 8.3 ms	T_j = 25 °C	126	A
		t_p = 10 ms		120	
I^2t	I^2t Value for fusing		t_p = 10 ms	72	A^2S
V_{DSM}, V_{RSM}	Non repetitive surge peak off-state voltage		t_p = 10 ms	V_{DRM}, V_{RRM} +100	V
dI/dt	Critical rate of rise of on-state current I_G = 2 x I_{GT}, $t_r \leq$ 100 ns	F = 60 Hz	T_j = 150 °C	100	A/µs
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} T_j	Storage junction temperature range Operating junction temperature range			- 40 to + 150	°C
T_L	Maximum lead temperature for soldering during 10 s.			260	°C

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.	2	mA
			MAX.	5	
V_{GT}	V_D = V_{DRM}, R_L = 3.3 kΩ		MAX.	1.3	V
V_{GD}	V_D = V_{DRM}, R_L = 3.3 kΩ		MIN.	0.2	V
I_H	I_T = 500 mA gate open		MAX.	20	mA
I_L	I_G = 1.2 I_{GT}		MAX.	40	mA
dV/dt	V_D = 67% V_{DRM} gate open	T_j = 125 °C	MIN.	200	V/µs
		T_j = 150 °C		100	
t_{gt}	I_{TM} = 40 A, V_D = 500 V, I_G = 100 mA, dI_G/dt = 5 A/µs		typ.	1.9	µs
t_q	V_{DM} = 335 V, Tj =125 °C, I_{TM} = 20 A, V_R = 25 V, $(dI_T/dt)_{Max}$ = 30 A/µs, dV_D/dt = 50 V/µs, R_{GK} = 100 Ω		typ.	65	µs

Table 4. Static characteristics

Symbol	Test conditions			Value	Unit
V_T	I_{TM} = 24 A, t_p = 380 µs	T_j = 25 °C	MAX.	1.6	V
V_{TD}	Threshold voltage	T_j = 150 °C		0.8	V
R_d	Dynamic resistance	T_j = 150 °C		30	mΩ
I_{DRM} I_{RRM}	V_{DRM} = V_{RRM}	T_j = 25 °C		5	µA
		T_j = 125 °C		1	mA
		T_j = 150 °C		3	

Table 5. Thermal resistance

Symbol	Parameter			Value Max.	Unit
$R_{th(j-c)}$	Junction to case (DC)			1.3	°C/W
$R_{th(j-a)}$	Junction to ambient (DC)	$S^{(1)}$ = 1 cm^2	D^2PAK	45	°C/W
			TO-220AB	60	

1. S = Copper surface under tab

Figure 1. Maximum average power dissipation vs. average on-state current

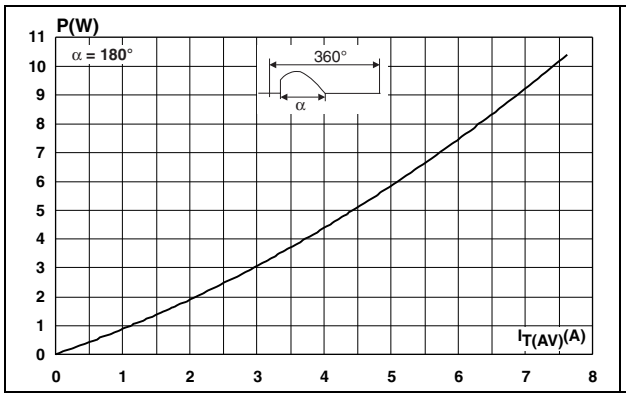


Figure 2. Average and DC on-state current vs. case temperature

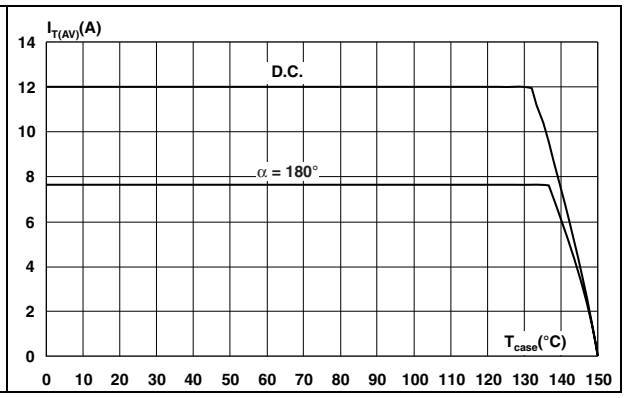


Figure 3. Average and DC on-state current vs. ambient temperature

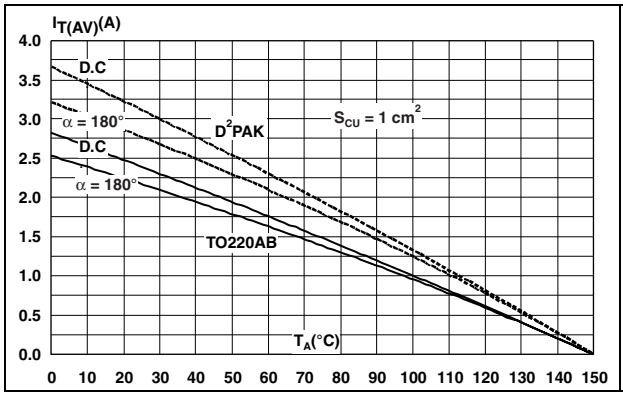


Figure 4. Relative variation of thermal impedance vs. pulse duration

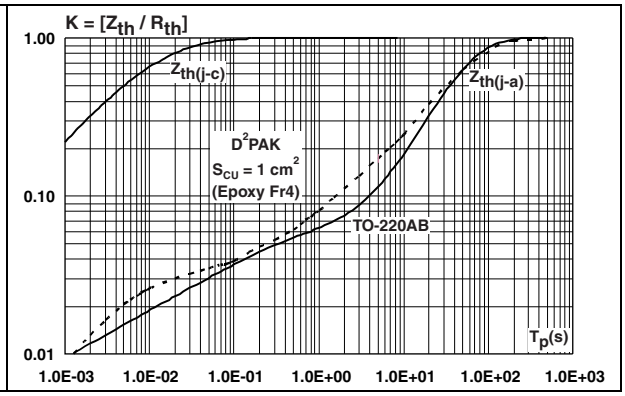


Figure 5. Relative variation of I_{GT},V_{GT}, I_H, I_L vs. junction temperature (typical values)

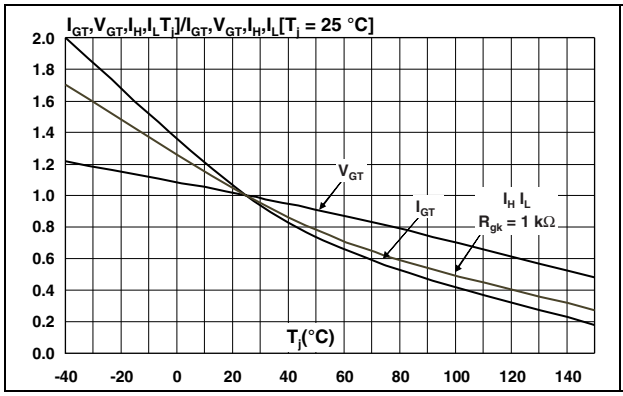


Figure 6. Relative variation of static dV/dt immunity vs. junction temperature (typical values)

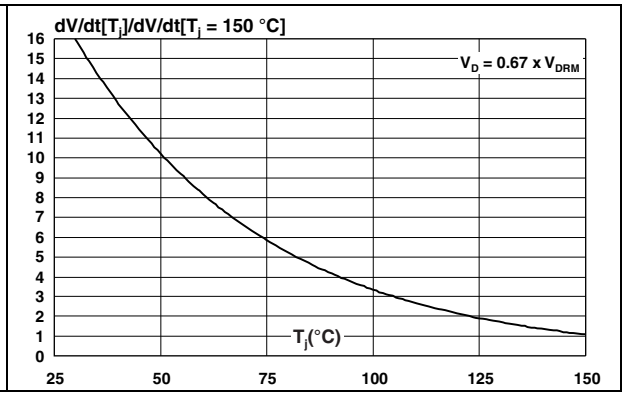


Figure 7. Surge peak on-state current vs. number of cycles

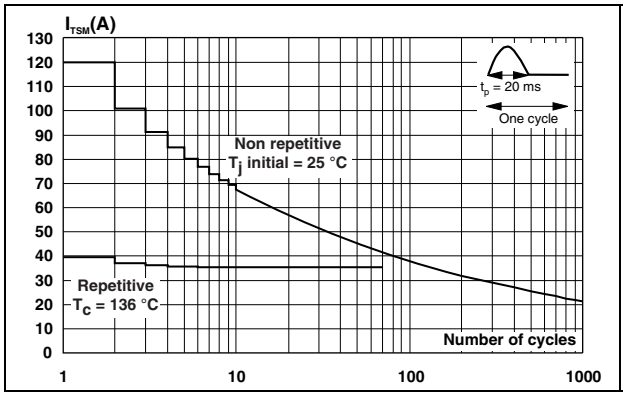


Figure 8. Non repetitive surge peak on-state current and corresponding value of I^2t vs. sinusoidal pulse width

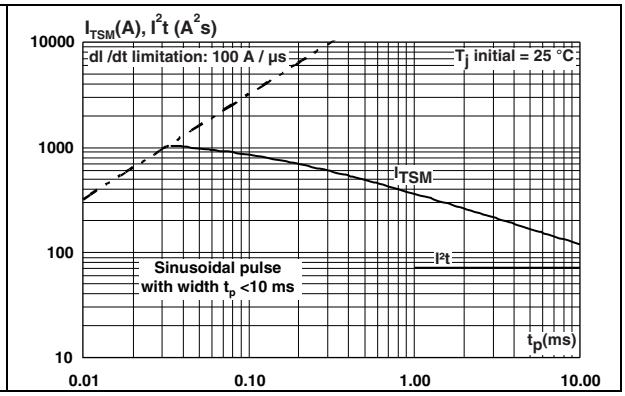


Figure 9. On-state characteristics (maximum values)

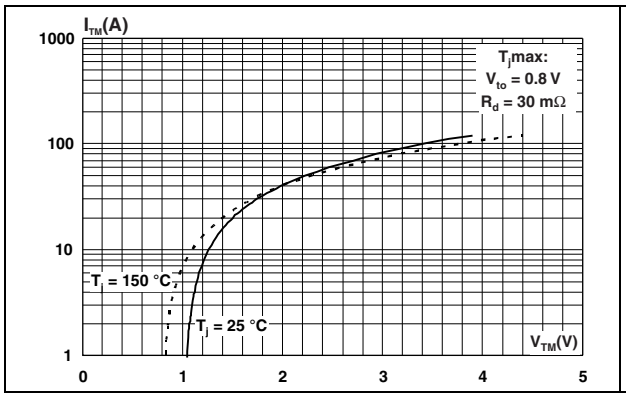


Figure 10. Relative variation of leakage current vs. junction temperature for different values of blocking voltage

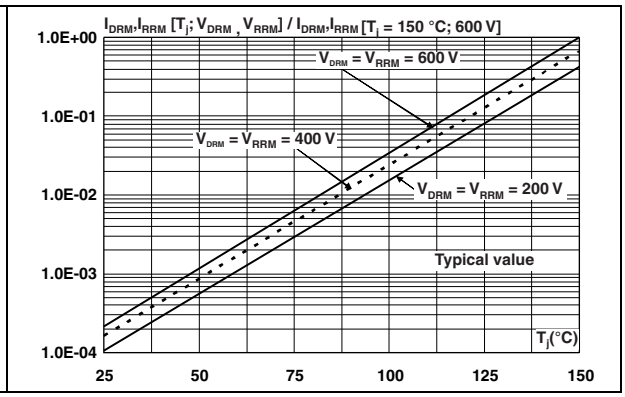
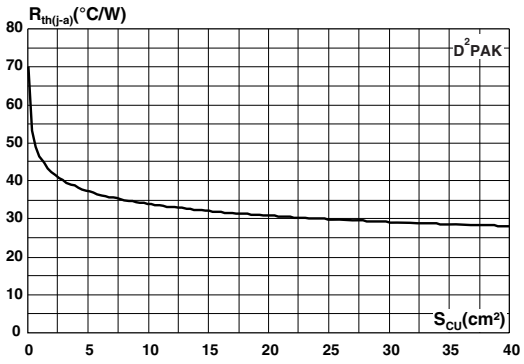
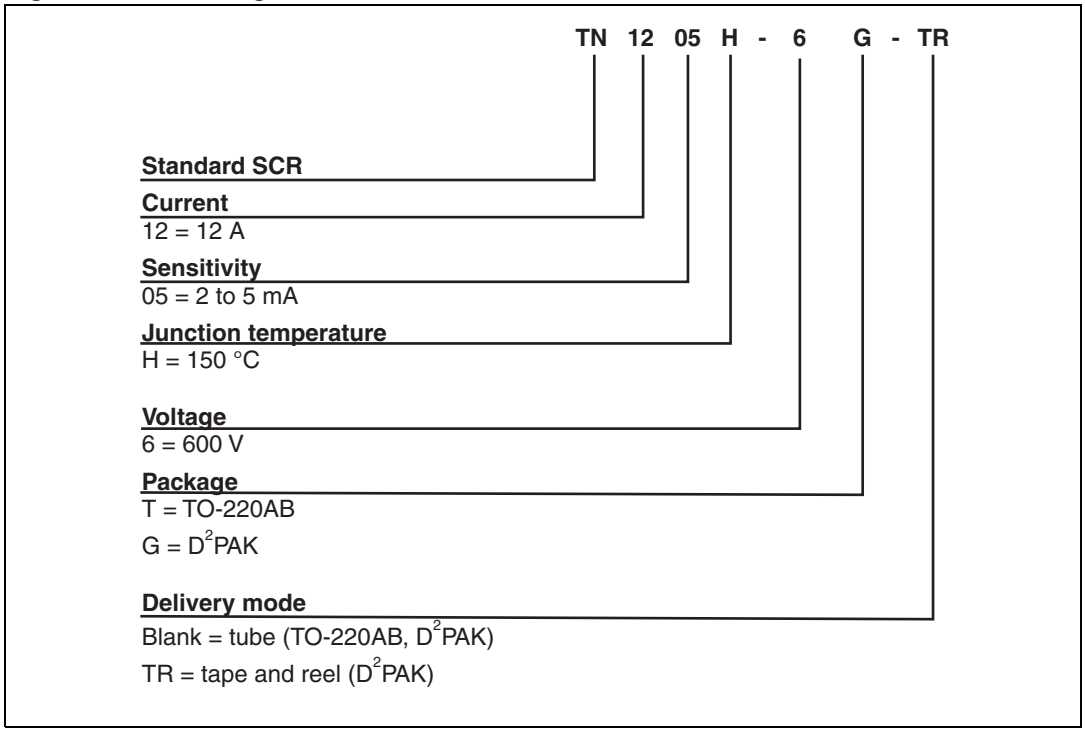


Figure 11. Thermal resistance junction to ambient vs. copper surface under tab (D^2PAK, printed circuit board FR4, copper thickness: 35 µm)



2 Ordering information scheme

Figure 12. Ordering information scheme

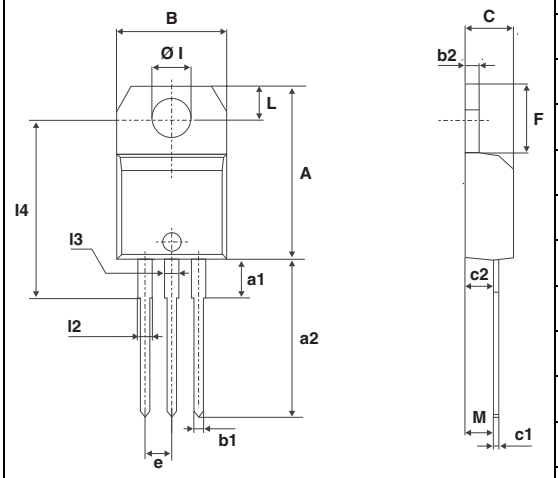


3 Package information

- Epoxy meets UL94, V0
- Lead-free package

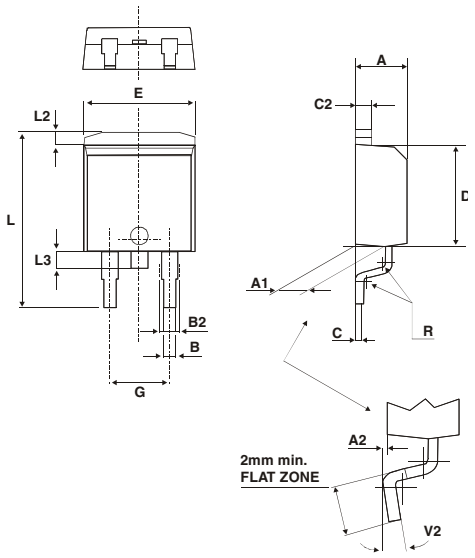
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

Table 6. TO-220AB dimensions



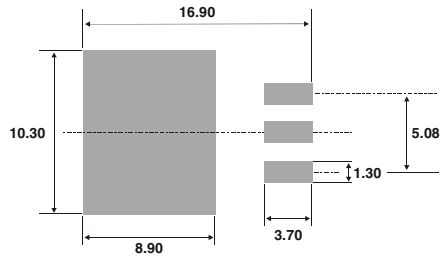
Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	15.20		15.90	0.598		0.625
a1		3.75			0.147	
a2	13.00		14.00	0.511		0.551
B	10.00		10.40	0.393		0.409
b1	0.61		0.88	0.024		0.034
b2	1.23		1.32	0.048		0.051
C	4.40		4.60	0.173		0.181
c1	0.49		0.70	0.019		0.027
c2	2.40		2.72	0.094		0.107
e	2.40		2.70	0.094		0.106
F	6.20		6.60	0.244		0.259
ØI	3.75		3.85	0.147		0.151
l4	15.80	16.40	16.80	0.622	0.646	0.661
L	2.65		2.95	0.104		0.116
l2	1.14		1.70	0.044		0.066
l3	1.14		1.70	0.044		0.066
M		2.60			0.102	

Table 7. D²PAK Dimensions



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.30		4.60	0.169		0.181
A1	2.49		2.69	0.098		0.106
A2	0.03		0.23	0.001		0.009
B	0.70		0.93	0.027		0.037
B2	1.25	1.40		0.048	0.055	
C	0.45		0.60	0.017		0.024
C2	1.21		1.36	0.047		0.054
D	8.95		9.35	0.352		0.368
E	10.00		10.28	0.393		0.405
G	4.88		5.28	0.192		0.208
L	15.00		15.85	0.590		0.624
L2	1.27		1.40	0.050		0.055
L3	1.40		1.75	0.055		0.069
R	0.40			0.016		
V2	0°		8°	0°		8°

Figure 13. Footprint (dimensions in mm)



4 Ordering information

Table 8. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
TN1205H-6T	TN1205H6T	TO-220AB	2.0 g	50	Tube
TN1205H-6G	TN1205H6G	D^2PAK	1.5 g	50	Tube
TN1205H-6G-TR	TN1205H6G	D^2PAK	1.5 g	1000	Tape and reel

5 Revision history

Table 9. Document revision history

Date	Revision	Changes
17-Feb-2011	1	First issue.
26-Sep-2011	2	Corrected typographical error in Features and Description.
17-Jan-2012	3	Updated units for t_{gt} in *Table 3*.
26-Apr-2012	4	Moved junction temperature to top of features list. Description reworded for readability. No technical changes.