1 Characteristics

Table 2. Absolute maximum ratings

Symbol	Parameter			Value	Unit
$I_{T(RMS)}$	On-state rms current (Full sine wave)	TO-220AB	T_c = 121 °C	30	A
		TO-220AB insulated	T_c = 92 °C		
I_{TSM}	Non repetitive surge peak on-state current (Full cycle, T_j initial = 25 °C)	f = 50 Hz	t = 20 ms	270	A
		f = 60 Hz	t = 16.7ms	284	
I^2t	I^2t value for fusing	t_p = 10 ms		487	A^2s
V_{RSM}, V_{DSM}	Non repetitive surge peak off-state voltage	t_p = 10 µs	T_j = 25 °C	V_{RRM}, V_{DRM} +100	V
dI/dt	Critical rate of rise of on-state current I_G = 2 x I_{GT}, $t_r \leq$ 100 ns	F = 120 Hz	T_j = 150 °C	50	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
T_{stg}	Storage junction temperature range			- 40 to + 150	°C
T_j	Operating junction temperature range			- 40 to + 150	°C

Table 3. Electrical characteristics (T_j = 25 °C, unless otherwise specified)

Symbol	Test conditions	Quadrant		Value		Unit
				T3035H	T3050H	
I_{GT} (1)	V_D = 12 V R_L = 33 Ω	I - II - III	MAX.	35	50	mA
V_{GT}		I - II - III	MAX.	1.0		V
V_{GD}	V_D = V_{DRM} R_L = 3.3 kΩ	I - II - III	MIN.	0.15		V
I_H (2)	I_T = 500 mA		MAX.	60	75	mA
I_L	I_G = 1.2 I_{GT}	I - III	MAX.	75	90	mA
		II		90	110	
dV/dt (2)	V_D = 67 %V_{DRM} gate open	T_j = 150 °C	MIN.	1000	1500	V/µs
(dI/dt)c (2)	Without snubber	T_j = 150 °C	MIN.	33	44	A/ms

1. Minimum I_{GT} is guaranted at 20 % of I_{GT} max.
2. For both polarities of A2 referenced to A1

Table 4. Static characteristics

Symbol	Test conditions			Value	Unit
V_{TM} (1)	I_{TM} = 42 A t_p = 380 µs	T_j = 25 °C	MAX.	1.55	V
V_{to} (1)	Threshold voltage	T_j = 150 °C	MAX.	0.85	V
R_d (1)	Dynamic resistance	T_j = 150 °C	MAX.	15	mΩ
I_{DRM} I_{RRM}	V_{DRM} = V_{RRM}	T_j = 25 °C	MAX.	10	µA
		T_j = 150 °C		8.5	mA
	V_D/V_R = 400V (at peak mains voltage)	T_j = 150 °C	MAX.	7	
	V_D/V_R = 200V (at peak mains voltage)	T_j = 150 °C		5.5	

1. for both polarities of A2 referenced to A1.

Table 5. Thermal resistance

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case (AC)	TO-220AB	0.8	°C/W
		TO-220AB Insul	1.6	
$R_{th(j-a)}$	Junction to ambient	TO-220AB / TO-220AB Insul	60	°C/W

Figure 1. Maximum power dissipation versus rms on-state current (full cycle 180°)

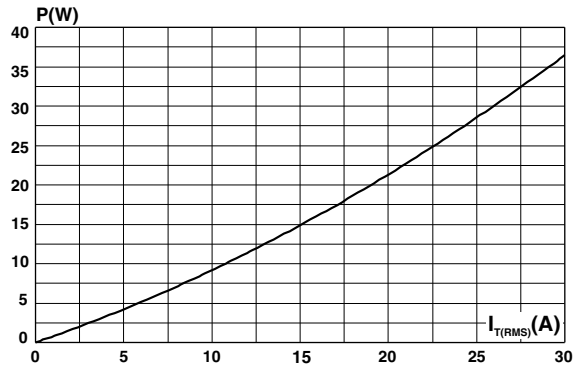


Figure 2. On-state rms current vs case temperature

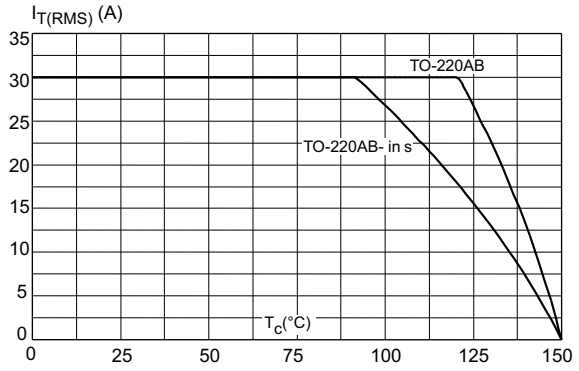


Figure 3. On-state rms current versus ambient temperature (free air convection)

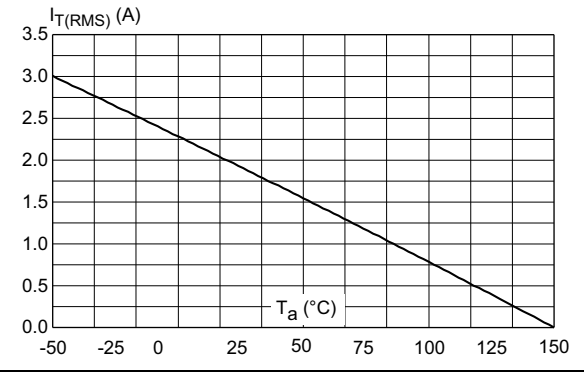


Figure 4. Relative variation of thermal impedance versus pulse duration

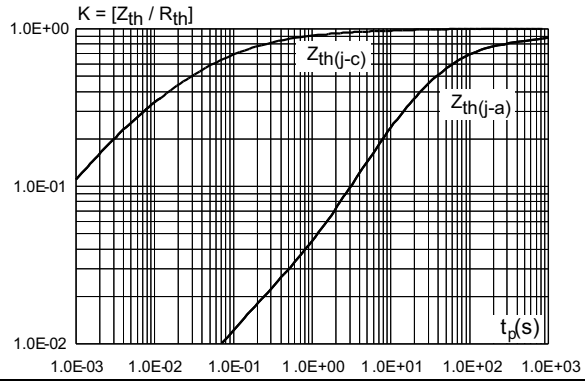


Figure 5. Relative variation of gate trigger current and gate trigger voltage versus junction temperature

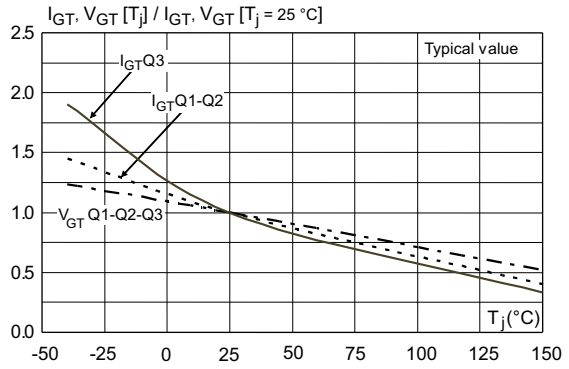


Figure 6. Relative variation of holding current and latching current vs junction temperature (typical value)

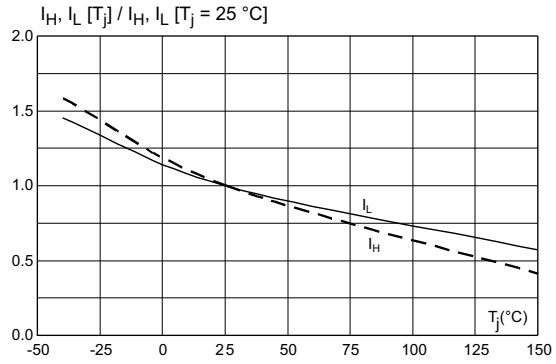


Figure 7. Surge peak on-state current vs number of cycles

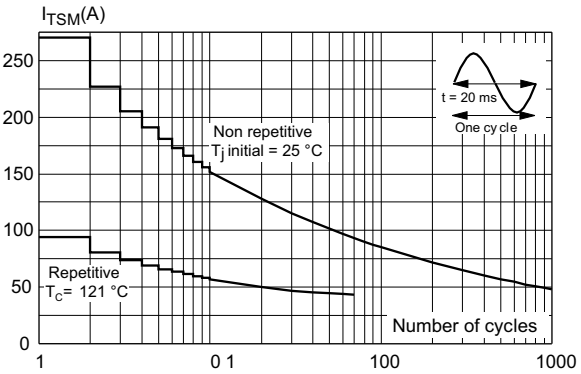


Figure 8. Non repetitive surge peak on-state current for a sinusoidal pulse

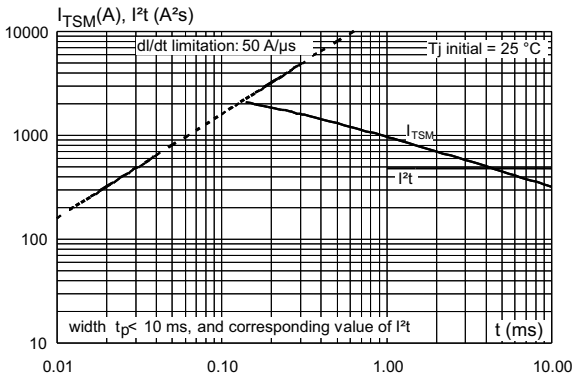


Figure 9. On state characteristics (maximum values)

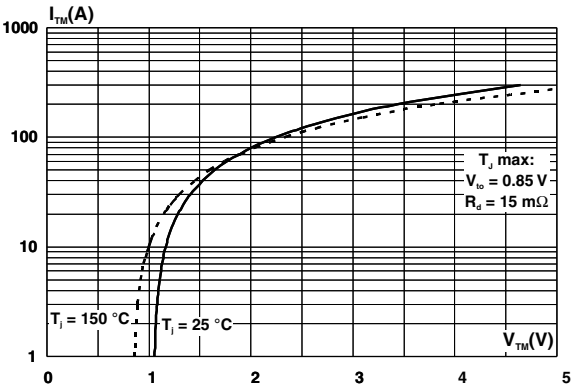


Figure 10. Relative variation of critical rate of decrease of main current verus junction temperature

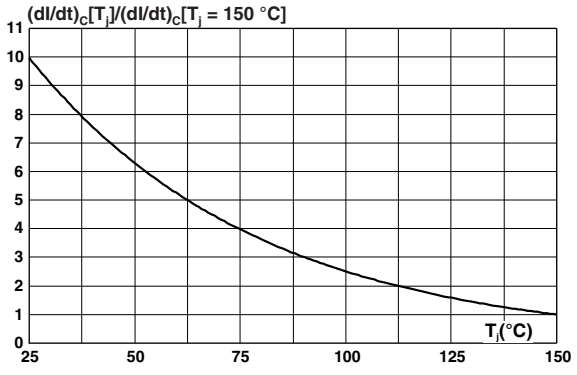


Figure 11. Relative variation of static dV/dt immunity vs junction temperature

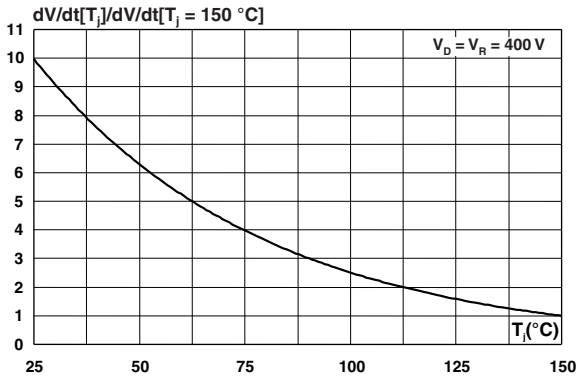


Figure 12. Relative variation of leakage current vs junction temperature for different values of blocking voltage

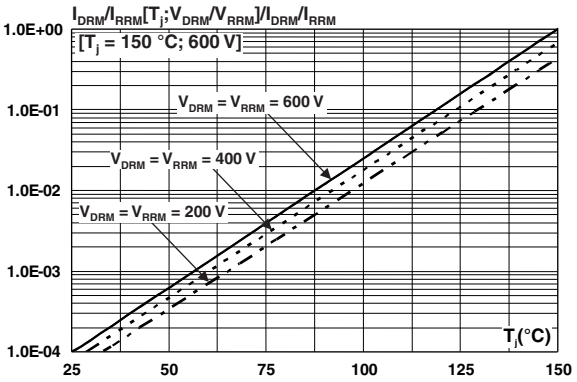
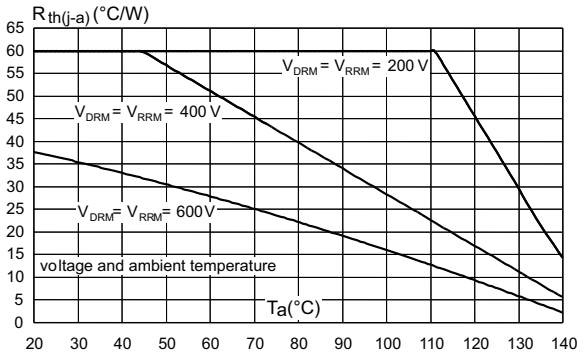


Figure 13. Acceptable junction to ambient thermal resistance versus repetitive peak off-state voltage and ambient temperature



2 Package information

- Epoxy meets UL94, V0
- Lead-free package
- Recommended torque: 0.4 to 0.6 N·m

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.

2.1 TO-220AB (insulated and non-insulated) package information

Figure 14. TO-220AB (insulated and non-insulated) dimension definitions

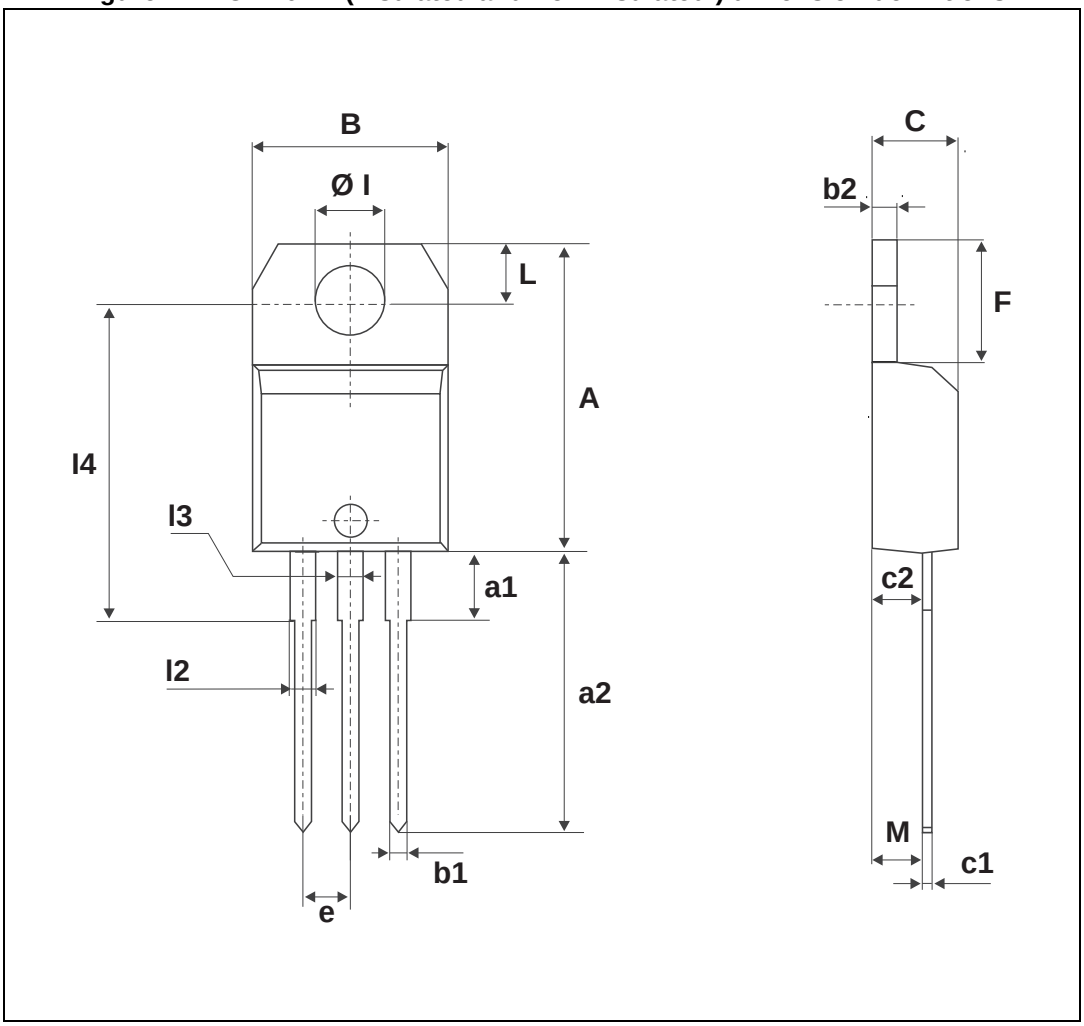


Table 6. TO-220AB package mechanical data

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	

3 Ordering information

Figure 15. Ordering information scheme

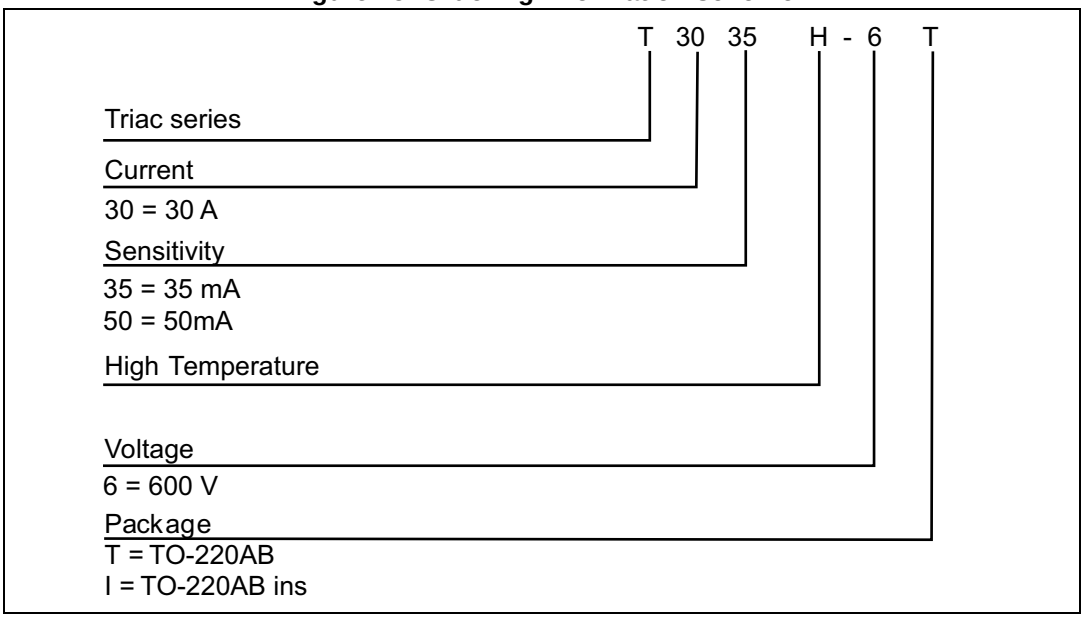


Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
T3035H-6T	T3035H 6T	TO-220AB	2.3 g	50	Tube
T3050H-6T	T3050H 6T				
T3035H-6I	T3035H 6I	TO-220AB Insulated			
T3050H-6I	T3050H 6I				

4 Revision history

Table 8. Document revision history

Date	Revision	Changes
28-Jan-2010	1	Initial release.
17-May-2010	2	Updated maximum T_j in *Table 2*.
14-Dec-2010	3	Updated I_{GT} in *Table 1*.
20-Sep-2011	4	Updated: *Features*.
21-Jul-2015	5	Update *Table 2* and reformatted to current standard.