

# 1 Characteristics

**Table 2. Absolute maximum ratings**

Symbol	Parameter			Value	Unit
$I_{T(RMS)}$	On-state rms current (Full sine wave)	TO-220AB	$T_c = 121\text{ }^{\circ}\text{C}$	30	A
		TO-220AB insulated	$T_c = 92\text{ }^{\circ}\text{C}$		
$I_{TSM}$	Non repetitive surge peak on-state current (Full cycle, $T_j$ initial = $25\text{ }^{\circ}\text{C}$ )	$f = 50\text{ Hz}$	$t = 20\text{ ms}$	270	A
		$f = 60\text{ Hz}$	$t = 16.7\text{ ms}$	284	
$I^2t$	$I^2t$ value for fusing	$t_p = 10\text{ ms}$		487	$\text{A}^2\text{s}$
$V_{RSM}, V_{DSM}$	Non repetitive surge peak off-state voltage	$t_p = 10\text{ }\mu\text{s}$	$T_j = 25\text{ }^{\circ}\text{C}$	$V_{RRM}, V_{DRM} +100$	V
$di/dt$	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}, t_r \leq 100\text{ ns}$	$F = 120\text{ Hz}$	$T_j = 150\text{ }^{\circ}\text{C}$	50	$\text{A}/\mu\text{s}$
$I_{GM}$	Peak gate current	$t_p = 20\text{ }\mu\text{s}$	$T_j = 150\text{ }^{\circ}\text{C}$	4	A
$P_{G(AV)}$	Average gate power dissipation		$T_j = 150\text{ }^{\circ}\text{C}$	1	W
$T_{stg}$	Storage junction temperature range			- 40 to + 150	$^{\circ}\text{C}$
$T_j$	Operating junction temperature range			- 40 to + 150	$^{\circ}\text{C}$

**Table 3. Electrical characteristics ( $T_j = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)**

Symbol	Test conditions	Quadrant		Value		Unit
				T3035H	T3050H	
$I_{GT}^{(1)}$	$V_D = 12\text{ V}$ $R_L = 33\text{ }\Omega$	I - II - III	MAX.	35	50	mA
$V_{GT}$		I - II - III	MAX.	1.0		V
$V_{GD}$	$V_D = V_{DRM}$ $R_L = 3.3\text{ k}\Omega$	I - II - III	MIN.	0.15		V
$I_H^{(2)}$	$I_T = 500\text{ mA}$		MAX.	60	75	mA
$I_L$	$I_G = 1.2\text{ }I_{GT}$	I - III	MAX.	75	90	mA
		II		90	110	
$dV/dt^{(2)}$	$V_D = 67\text{ }\%V_{DRM}$ gate open	$T_j = 150\text{ }^{\circ}\text{C}$	MIN.	1000	1500	$\text{V}/\mu\text{s}$
$(di/dt)_c^{(2)}$	Without snubber	$T_j = 150\text{ }^{\circ}\text{C}$	MIN.	33	44	$\text{A}/\text{ms}$

1. Minimum  $I_{GT}$  is guaranteed at 20 % of  $I_{GT}$  max.

2. For both polarities of A2 referenced to A1

Table 4. Static characteristics

Symbol	Test conditions			Value	Unit
$V_{TM}^{(1)}$	$I_{TM} = 42\text{ A}$ $t_p = 380\text{ }\mu\text{s}$	$T_j = 25\text{ }^{\circ}\text{C}$	MAX.	1.55	V
$V_{to}^{(1)}$	Threshold voltage	$T_j = 150\text{ }^{\circ}\text{C}$	MAX.	0.85	V
$R_d^{(1)}$	Dynamic resistance	$T_j = 150\text{ }^{\circ}\text{C}$	MAX.	15	$\text{m}\Omega$
$I_{DRM}$ $I_{RRM}$	$V_{DRM} = V_{RRM}$	$T_j = 25\text{ }^{\circ}\text{C}$	MAX.	10	$\mu\text{A}$
		$T_j = 150\text{ }^{\circ}\text{C}$		8.5	mA
	$V_D/V_R = 400\text{V}$ (at peak mains voltage)	$T_j = 150\text{ }^{\circ}\text{C}$	MAX.	7	
	$V_D/V_R = 200\text{V}$ (at peak mains voltage)	$T_j = 150\text{ }^{\circ}\text{C}$		5.5	

1. for both polarities of A2 referenced to A1.

Table 5. Thermal resistance

Symbol	Parameter		Value	Unit
R <sub>th(j-c)</sub>	Junction to case (AC)	TO-220AB	0.8	°C/W
		TO-220AB Insul	1.6	
R <sub>th(j-a)</sub>	Junction to ambient	TO-220AB / TO-220AB Insul	60	°C/W

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

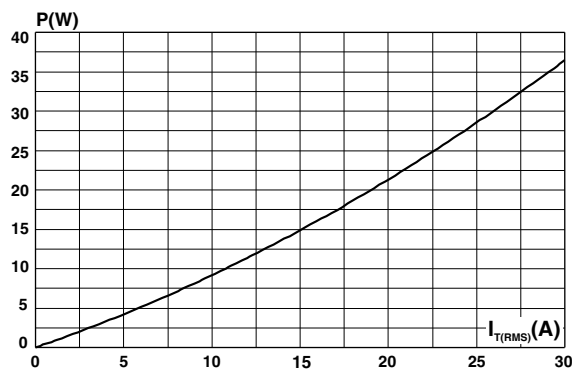


Figure 2. On-state rms current vs case temperature

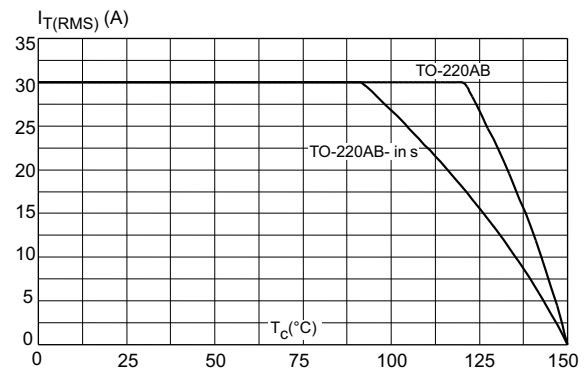


Figure 3. On-state rms current versus ambient temperature (free air convection)

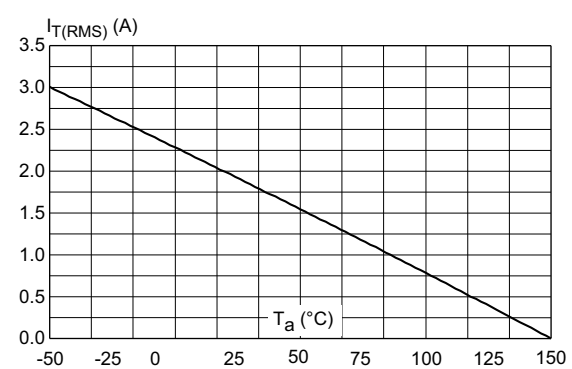
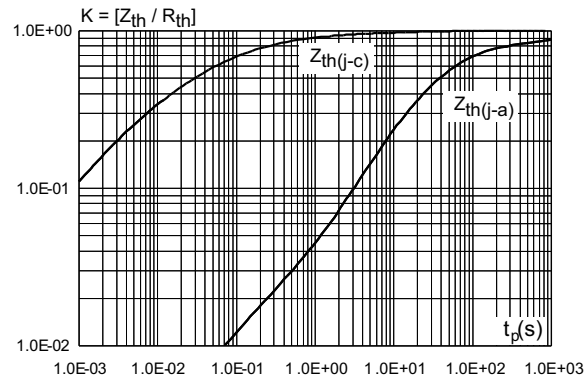
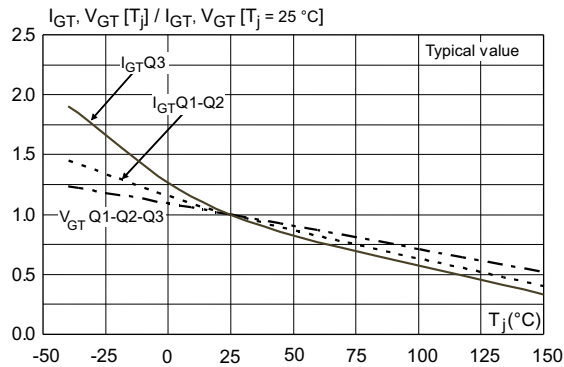


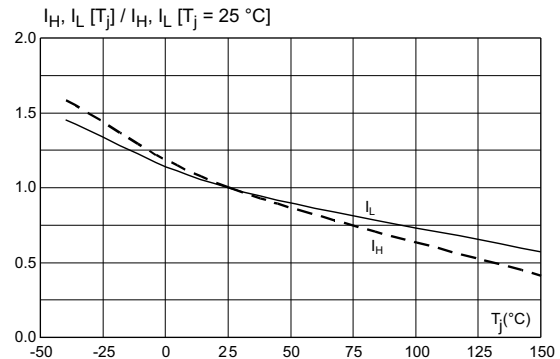
Figure 4. Relative variation of thermal impedance versus pulse duration



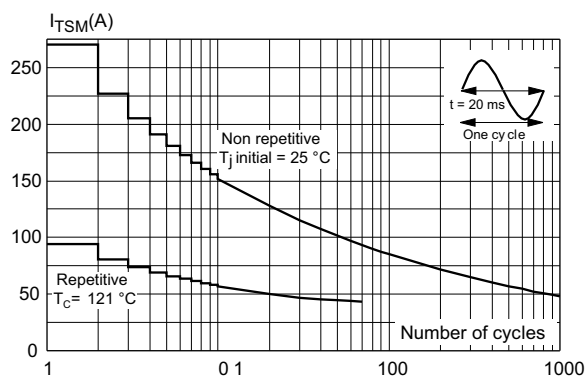
**Figure 5. Relative variation of gate trigger current and gate trigger voltage versus junction temperature**



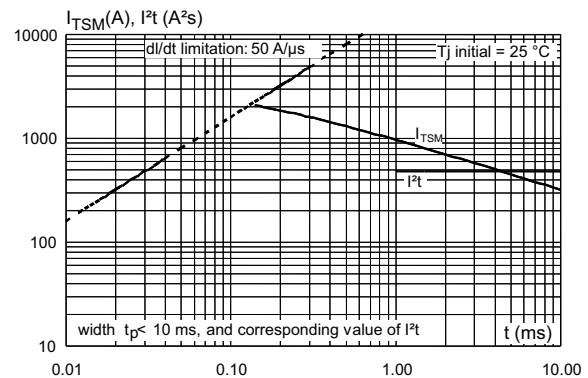
**Figure 6. Relative variation of holding current and latching current vs junction temperature (typical value)**



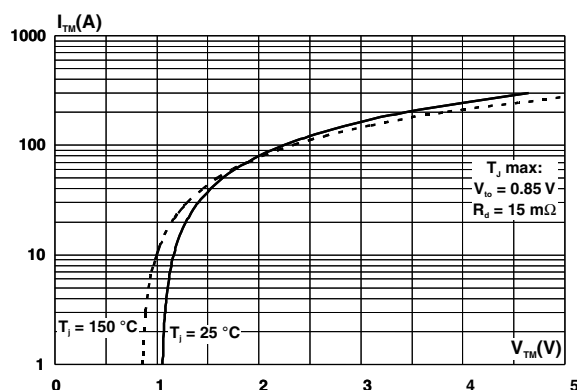
**Figure 7. Surge peak on-state current vs number of cycles**



**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 versus junction temperature**

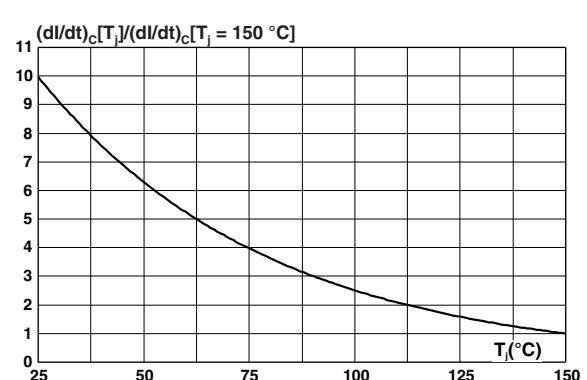


Figure 11. Relative variation of static dV/dt immunity vs junction temperature

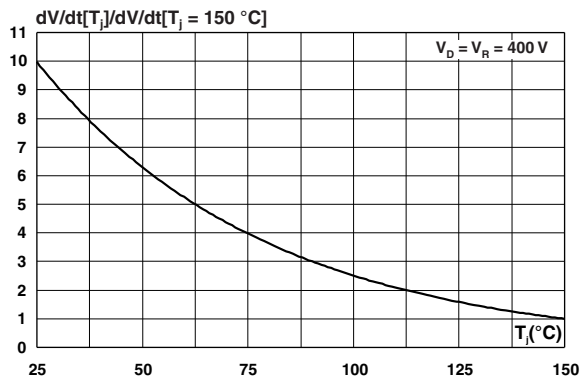


Figure 12. Relative variation of leakage current vs junction temperature for different values of blocking voltage

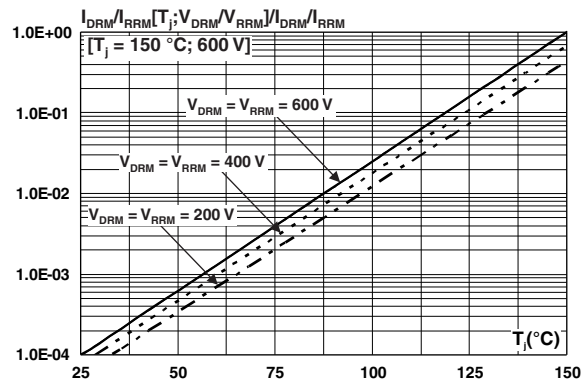
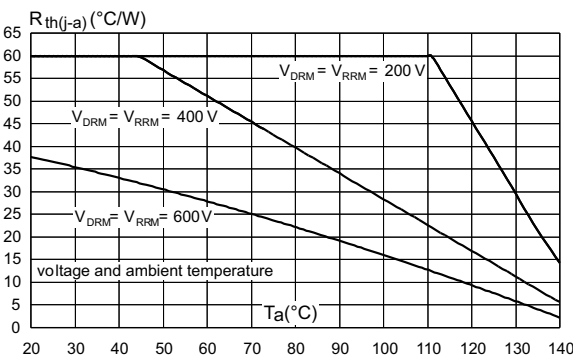


Figure 13. Acceptable junction to ambient thermal resistance versus repetitive peak off-state voltage and ambient temperature



## 2 Package information

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

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

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

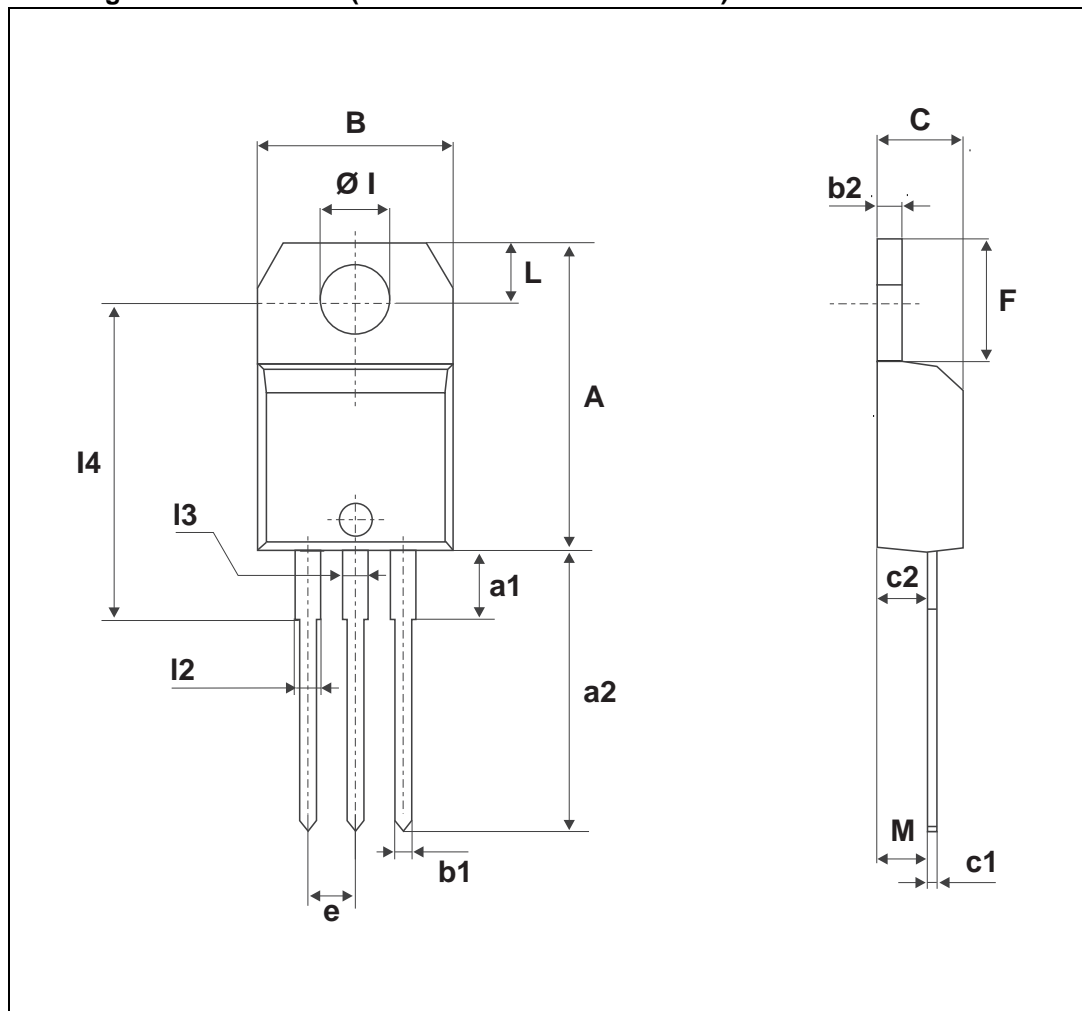


Table 6. TO-220AB package mechanical data

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

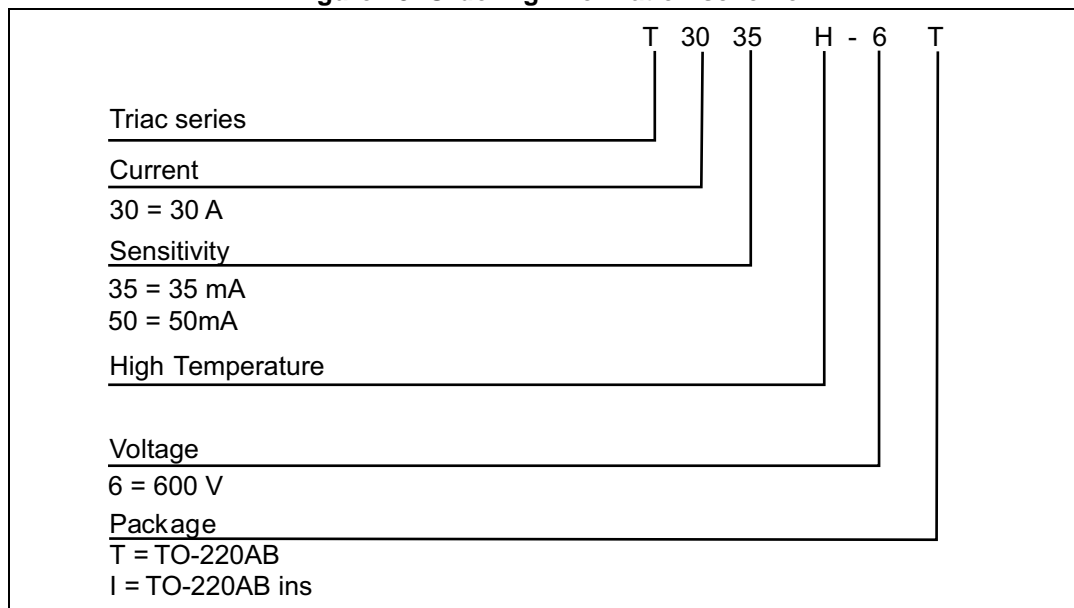


Table 7. Ordering information

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			
T3050H-6I	T3050H 6I	Insulated			

### 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 <a href="#">Table 2</a> .
14-Dec-2010	3	Updated $I_{GT}$ in <a href="#">Table 1</a> .
20-Sep-2011	4	Updated: <a href="#">Features</a> .
21-Jul-2015	5	Update <a href="#">Table 2</a> and reformatted to current standard.

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