

1 Characteristics

Table 2: Absolute ratings (limiting values)

Symbol	Parameter			Value	Unit
$I_{T(RMS)}$	RMS on-state current (full sine wave)	D ² PAK, TO-220AB	$T_C = 136\text{ }^{\circ}\text{C}$	8	A
		TO-220AB Ins.	$T_C = 123\text{ }^{\circ}\text{C}$		
I_{TSM}	Non repetitive surge peak on-state current (full cycle, T_J initial = $25\text{ }^{\circ}\text{C}$)	$f = 50\text{ Hz}$	$t_p = 20\text{ ms}$	80	A
		$f = 60\text{ Hz}$	$t_p = 16.7\text{ ms}$	84	
I^2t	I^2t value for fusing		$t_p = 10\text{ ms}$	42	A ² s
di/dt	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$, $t_r \leq 100\text{ ns}$	$f = 50\text{ Hz}$	$T_J = 150\text{ }^{\circ}\text{C}$	50	A/ μs
V_{DSM} / V_{RSM}	Non repetitive surge peak off- state voltage	$t_p = 10\text{ ms}$	$T_J = 25\text{ }^{\circ}\text{C}$	$V_{DRM}/V_{RRM} + 100$	V
I_{GM}	Peak forward 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
				T835H	T850H	
$I_{GT}^{(1)}$	$V_D = 12\text{ V}$, $R_L = 33\text{ }\Omega$	I - II - III	Max.	35	50	mA
V_{GT}			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.	35	75	mA
I_L	$I_G = 1.2 \times I_{GT}$	I - III	Max.	50	60	mA
		II		80	110	
$dV/dt^{(2)}$	$V_D = 2/3 \times V_{DRM}$, gate open	$T_J = 150\text{ }^{\circ}\text{C}$	Min.	1000	1500	V/ μs
$(di/dt)_c^{(2)}$	Without snubber	$T_J = 150\text{ }^{\circ}\text{C}$	Min.	11	14	A/ms

Notes:

⁽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
$V_T^{(1)}$	$I_{TM} = 11 \text{ A}$, $t_p = 380 \text{ } \mu\text{s}$	$T_j = 25 \text{ } ^\circ\text{C}$	Max.	1.5	V
$V_{T0}^{(1)}$	Threshold voltage	$T_j = 150 \text{ } ^\circ\text{C}$	Max.	0.80	V
$R_d^{(1)}$	Dynamic resistance	$T_j = 150 \text{ } ^\circ\text{C}$	Max.	52	m Ω
$I_{DRM} / I_{RRM}^{(2)}$	$V_{DRM} = V_{RRM}$	$T_j = 25 \text{ } ^\circ\text{C}$	Max.	5	μA
		$T_j = 150 \text{ } ^\circ\text{C}$	Max.	3.1	mA
	$V_D/V_R = 400 \text{ V}$ (at peak mains voltage)	$T_j = 150 \text{ } ^\circ\text{C}$	Max.	2.5	
	$V_D/V_R = 200 \text{ V}$ (at peak mains voltage)	$T_j = 150 \text{ } ^\circ\text{C}$	Max.	2.0	

Notes:⁽¹⁾for both polarities of A2 referenced to A1⁽²⁾ $t_p = 380 \text{ } \mu\text{s}$

Table 5: Thermal parameters

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case (AC)	D ² PAK, TO-220AB	1.85	$^\circ\text{C/W}$
		TO-220AB Ins.	3.7	
$R_{th(j-a)}$	Junction to ambient ($S_{cu} = 1 \text{ cm}^2$)	D ² PAK	45	
	Junction to ambient	TO-220AB, TO-220AB Ins.	60	

1.1 Characteristics (curves)

Figure 1: Maximum power dissipation versus on-state RMS current (full cycle)

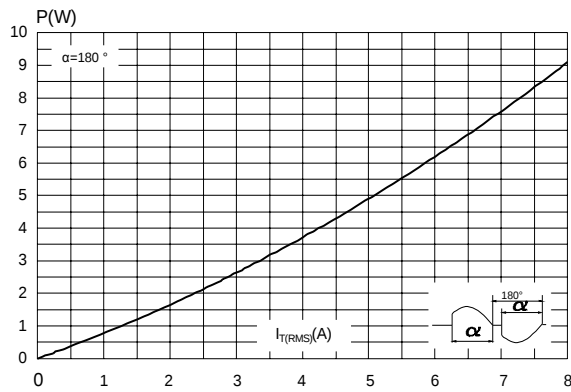


Figure 2: On-state RMS current versus case temperature (full cycle)

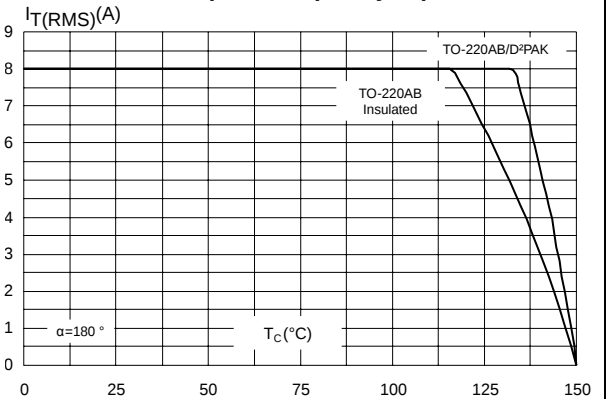


Figure 3: On-state RMS current versus ambient temperature

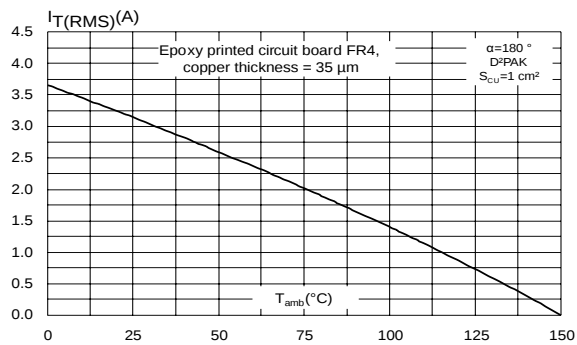


Figure 4: Variation of thermal impedance versus pulse duration

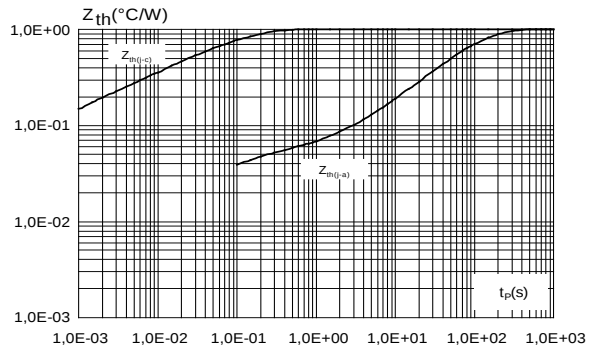


Figure 5: On-state characteristics (maximum values)

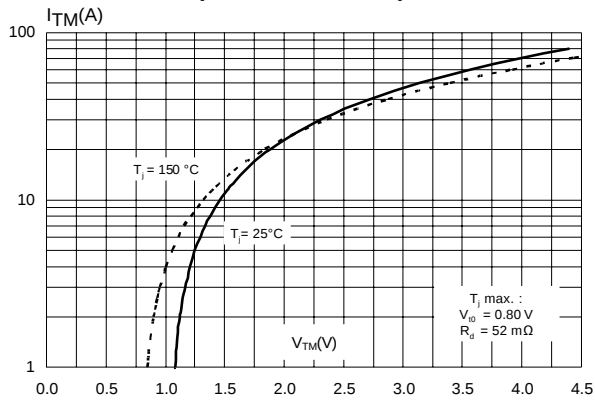


Figure 6: Surge peak on-state current versus number of cycles

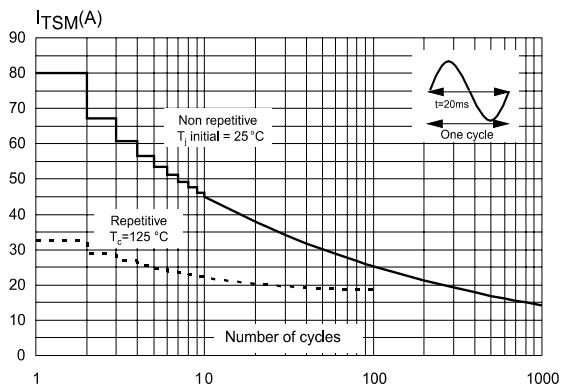
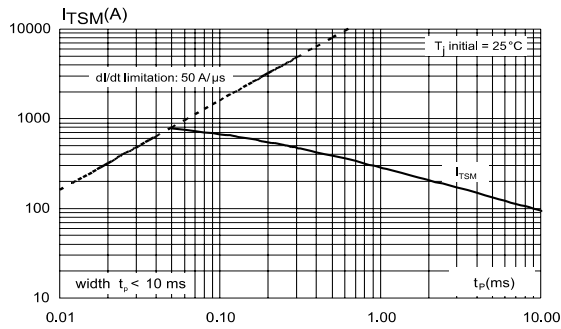
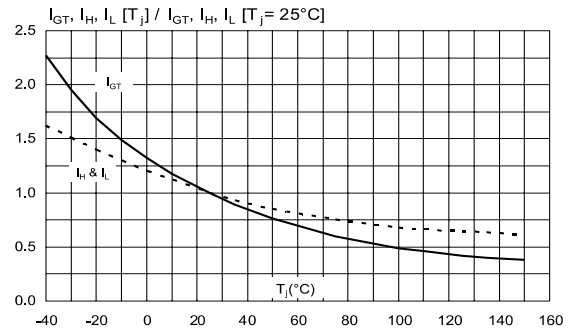
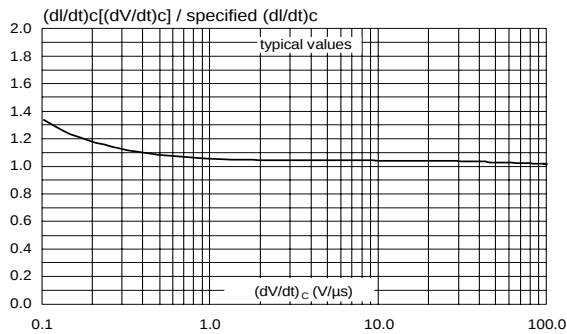
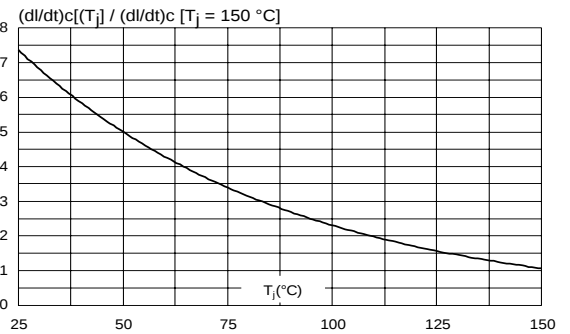
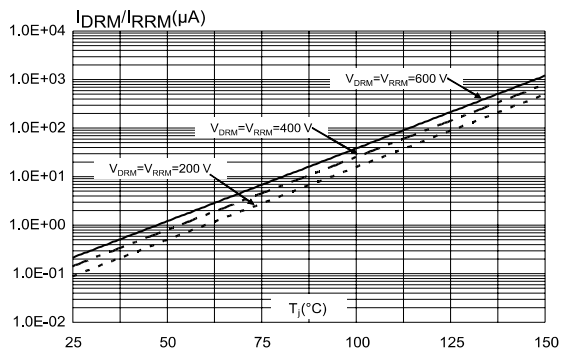
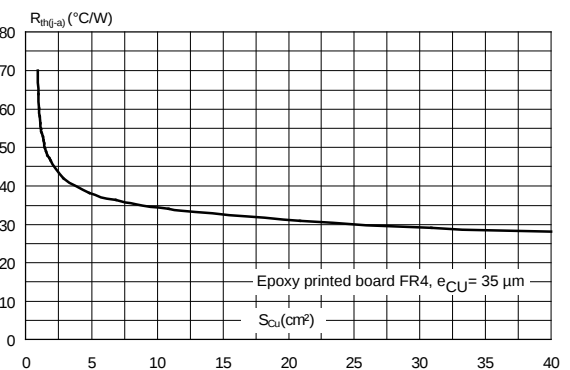


Figure 7: Non-repetitive surge peak on-state current for a sinusoidal pulse**Figure 8: Relative variation of I_{GT} , I_H , I_L versus junction temperature (typical values)****Figure 9: Relative variation of critical rate of decrease of main current $(dI/dt)_c$ versus reapplied $(dV/dt)_c$** **Figure 10: Relative variation of critical rate of decrease of main current versus junction temperature****Figure 11: Leakage current versus junction temperature for different values of blocking voltage (typical values)****Figure 12: Variation of thermal resistance junction to ambient versus copper surface under tab**

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 UL94, V0
- Lead-free package leads
- Cooling method: by conduction (C)

2.1 D²PAK package information

Figure 13: D²PAK package outline

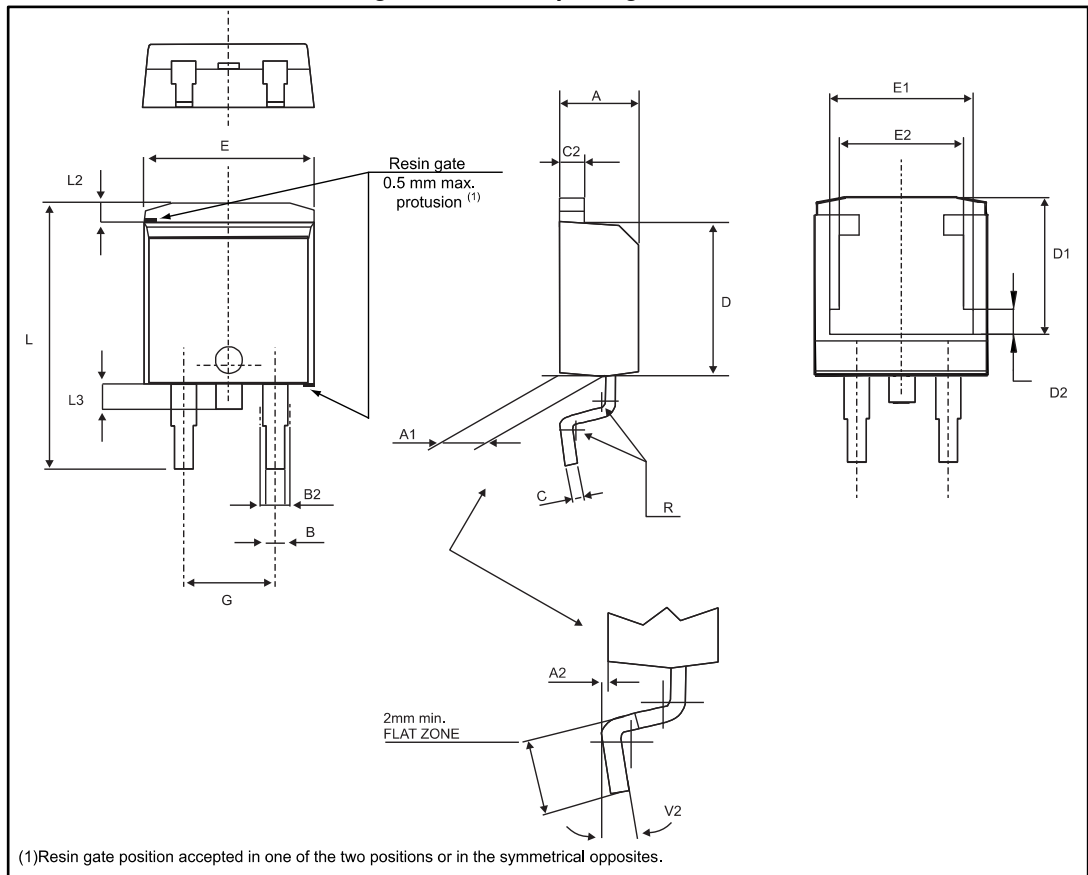
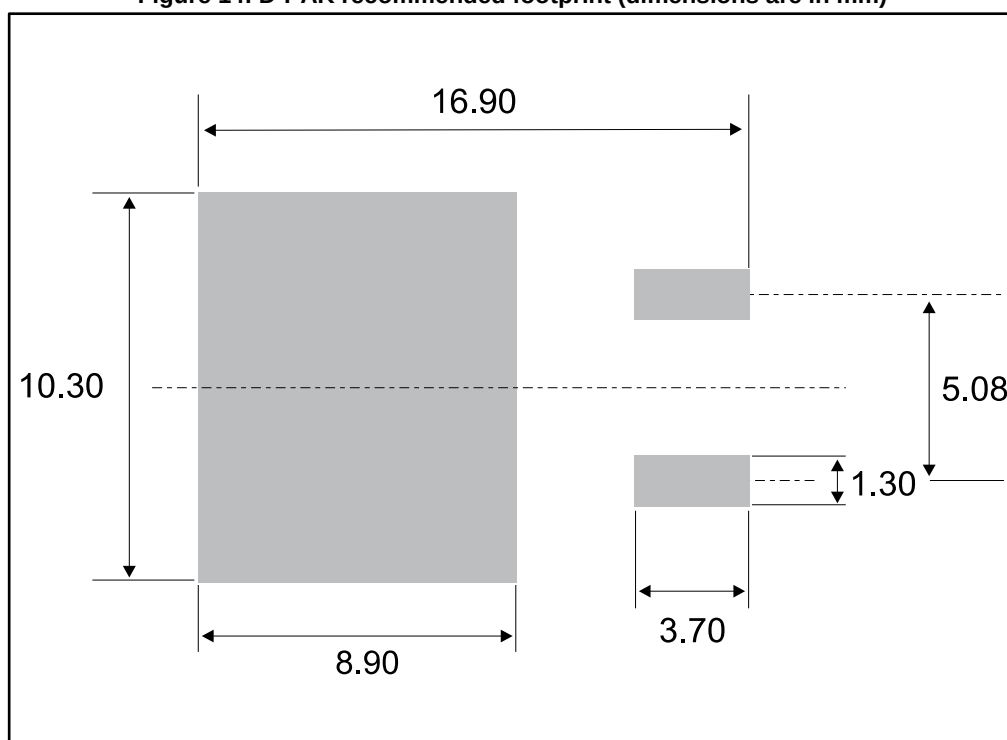


Table 6: D²PAK package mechanical data

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
B	0.70		0.93	0.0276		0.0366
B2	1.25	1.40		0.0492	0.0551	
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	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
L	15		15.85	0.5906		0.6240
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 14: D²PAK recommended footprint (dimensions are in mm)

2.2 TO-220AB (NIns. and Ins.) package information

Figure 15: TO-220AB (NIns. and Ins.) package outline

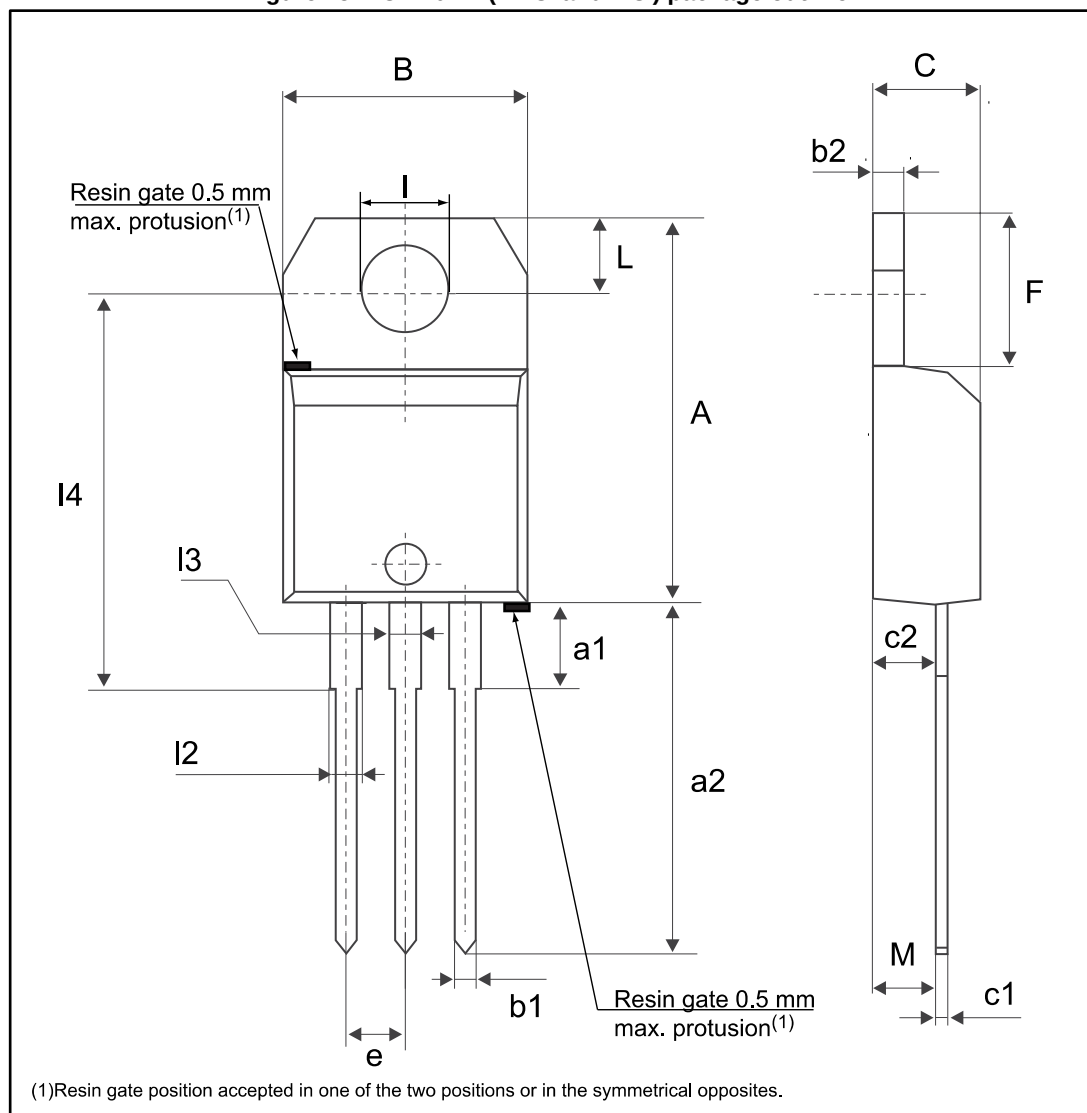


Table 7: TO-220AB (Nlns. and Ins.) package mechanical data

Ref.	Dimensions					
	Millimeters			Inches ⁽¹⁾		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	15.20		15.90	0.5984		0.6260
a1		3.75			0.1476	
a2	13.00		14.00	0.5118		0.5512
B	10.00		10.40	0.3937		0.4094
b1	0.61		0.88	0.0240		0.0346
b2	1.23		1.32	0.0484		0.0520
C	4.40		4.60	0.1732		0.1811
c1	0.49		0.70	0.0193		0.0276
c2	2.40		2.72	0.0945		0.1071
e	2.40		2.70	0.0945		0.1063
F	6.20		6.60	0.2441		0.2598
I	3.73		3.88	0.1469		0.1528
L	2.65		2.95	0.1043		0.1161
l2	1.14		1.70	0.0449		0.0669
l3	1.14		1.70	0.0449		0.0669
l4	15.80	16.40	16.80	0.6220	0.6457	0.6614
M		2.6			0.1024	

Notes:⁽¹⁾Inch dimensions are for reference only.

3 Ordering information

Figure 16: Ordering information scheme

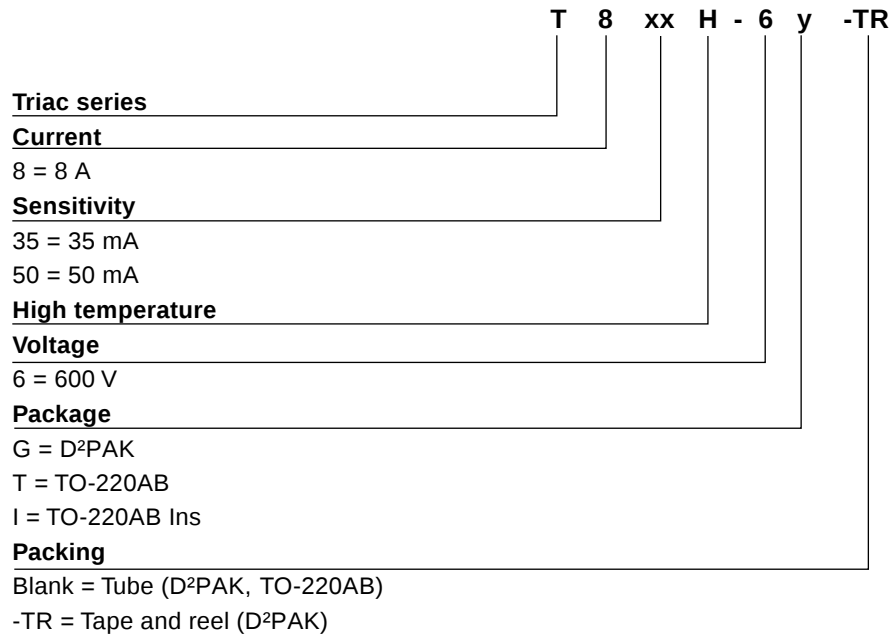


Table 8: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
T8xxH-6G	T8xxH 6G	D ² PAK	1.5 g	50	Tube
T8xxH-6G-TR	T8xxH 6G	D ² PAK	1.5 g	1000	Tape and reel
T8xxH-6T	T8xxH 6T	TO-220AB	2.3 g	50	Tube
T8xxH-6I	T8xxH 6I	TO-220AB Ins.	2.3 g	50	Tube

4 Revision history

Table 9: Document revision history

Date	Revision	Changes
17-Apr-2007	1	First issue.
19-Sep-2011	2	Updated: <i>Features, Description, Figure 2, Table 2 and 4.</i>
30-Mar-2017	3	Minor text changes. Updated Table 4: "Static characteristics" and Figure 7: "Non-repetitive surge peak on-state current for a sinusoidal pulse" .

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