

# 1 Characteristics

**Table 2: Absolute ratings (limiting values)**

Symbol	Parameter			Value	Unit
$I_{T(RMS)}$	RMS on-state current (full sine wave)	D <sup>2</sup> PAK, TO-220AB	$T_C = 133\text{ °C}$	8	A
		TO-220A Ins.	$T_C = 116\text{ °C}$		
$I_{TSM}$	Non repetitive surge peak on-state current (full cycle, $T_j$ initial = 25 °C)	f = 50 Hz	$t_p = 20\text{ ms}$	80	A
		f = 60 Hz	$t_p = 16.7\text{ ms}$	84	
$I^2t$	$I^2t$ value for fusing		$t_p = 10\text{ ms}$	42	A <sup>2</sup> s
dl/dt	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$ , $t_r \leq 100\text{ ns}$	f = 50 Hz	$T_j = 150\text{ °C}$	50	A/ $\mu$ s
$V_{DSM} / V_{RSM}$	Non repetitive surge peak off-state voltage	$t_p = 10\text{ ms}$	$T_j = 25\text{ °C}$	$V_{DRM}/V_{RRM} + 100$	V
$I_{GM}$	Peak forward gate current	$t_p = 20\text{ }\mu$ s	$T_j = 150\text{ °C}$	4	A
$P_{G(AV)}$	Average gate power dissipation		$T_j = 150\text{ °C}$	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 ( $T_j = 25\text{ °C}$  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
$V_{GT}$				1.0		
$V_{GD}$	$V_D = V_{DRM}$ , $R_L = 3.3\text{ k}\Omega$	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	
		II		80	110	
$dV/dt^{(2)}$	$V_D = 2/3 \times V_{DRM}$ , gate open	$T_j = 150\text{ °C}$	Min.	1000	1500	V/ $\mu$ s
$(dl/dt)^c^{(2)}$	Without snubber	$T_j = 150\text{ °C}$	Min.	11	14	A/ms

**Notes:**

<sup>(1)</sup>minimum  $I_{GT}$  is guaranteed at 20% of  $I_{GT}$  max.

<sup>(2)</sup>for both polarities of A2 referenced to A1.

Table 4: Static characteristics

Symbol	Test conditions			Value	Unit
$V_T^{(1)}$	$I_{TM} = 11 \text{ A}$ , $t_p = 380 \mu\text{s}$	$T_j = 25 \text{ }^\circ\text{C}$	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 $\Omega$
$I_{DRM} / I_{RRM}$	$V_{DRM} = V_{RRM}$	$T_j = 25 \text{ }^\circ\text{C}$	Max.	5	$\mu\text{A}$
		$T_j = 150 \text{ }^\circ\text{C}$	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	

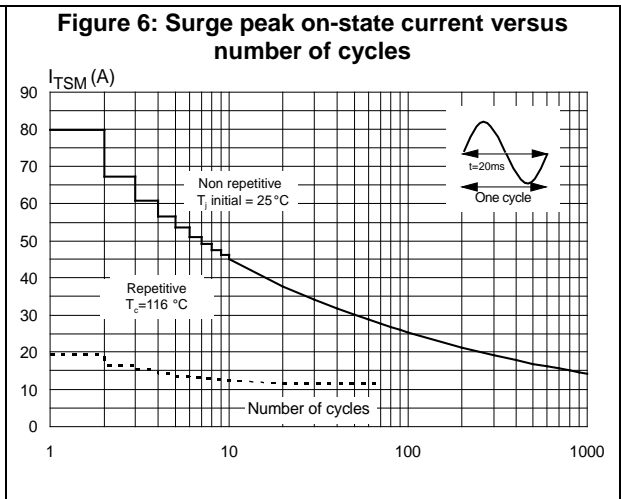
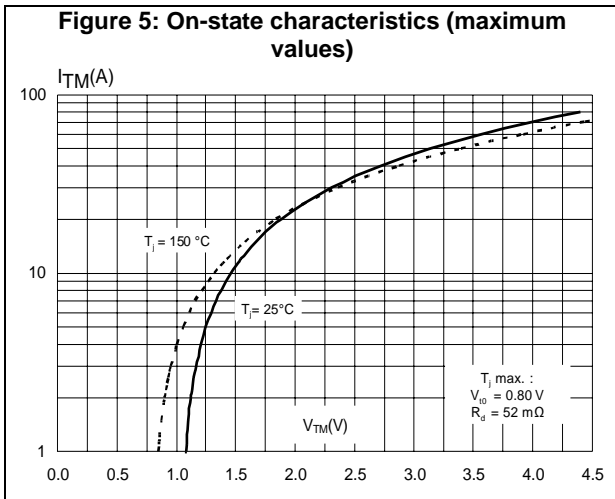
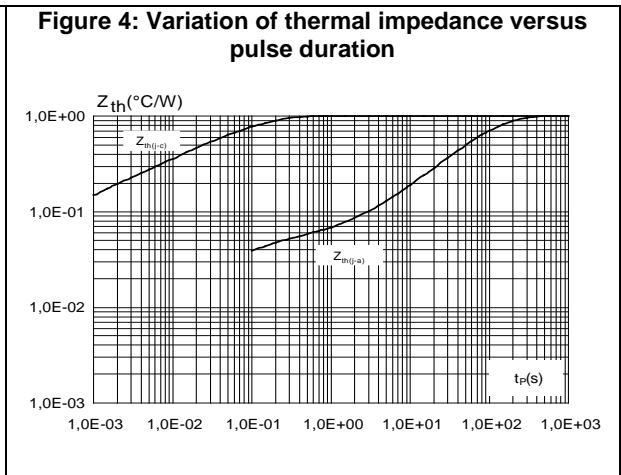
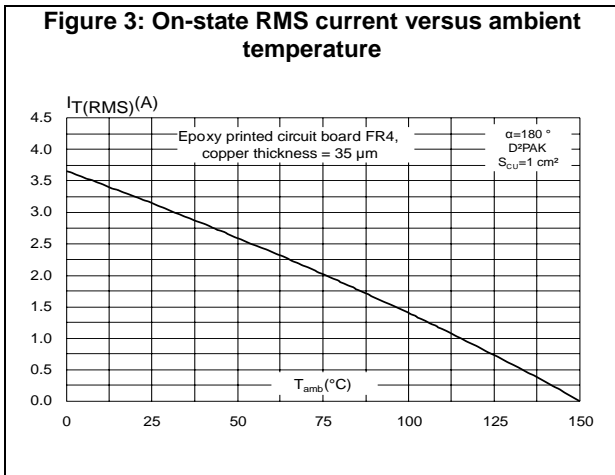
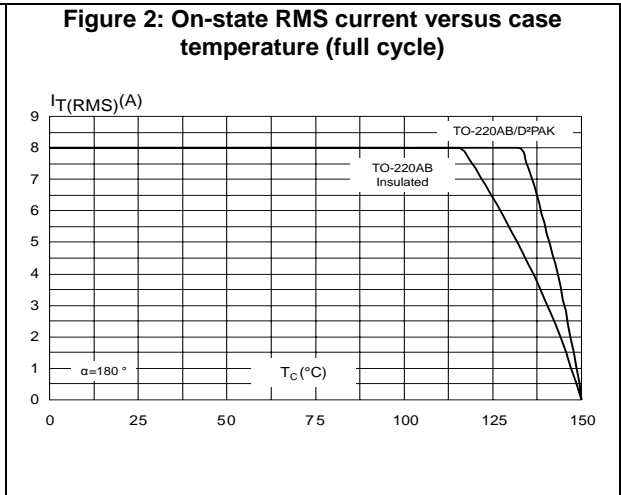
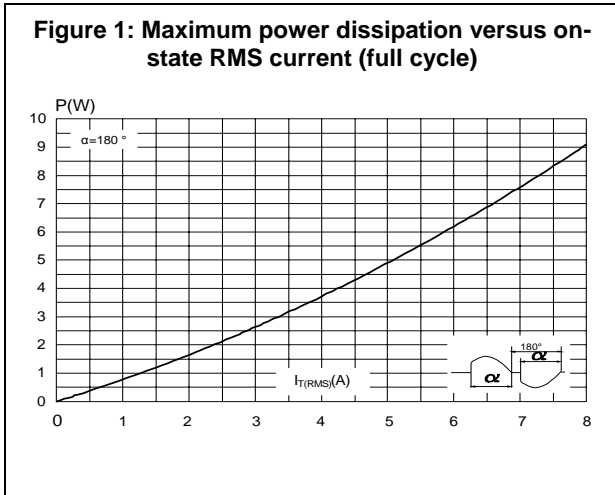
**Notes:**

<sup>(1)</sup>for both polarities of A2 referenced to A1

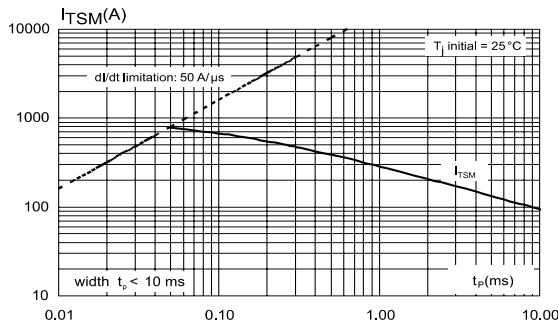
Table 5: Thermal parameters

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case (AC)	D <sup>2</sup> 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 <sup>2</sup> PAK)	D <sup>2</sup> PAK	45	
	Junction to ambient	TO-220AB, TO-220AB Ins.	60	

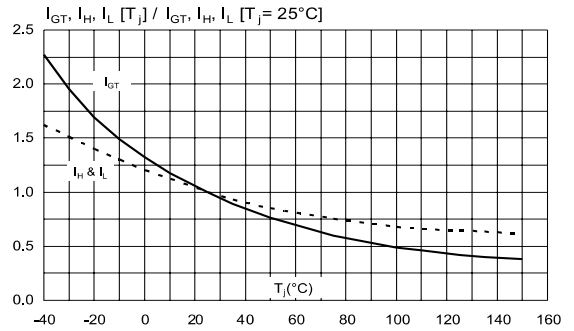
# 1.1 Characteristics (curves)



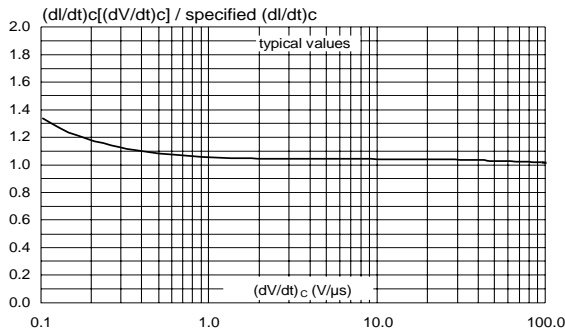
**Figure 7: Non-repetitive surge peak on-state current for a sinusoidal pulse**



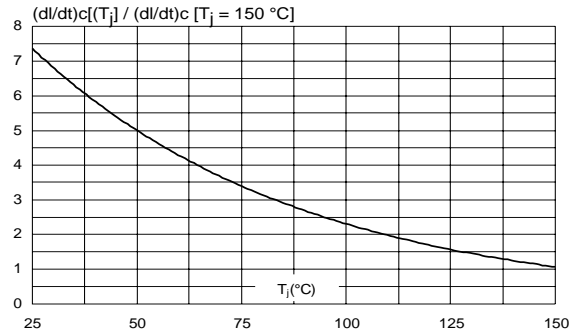
**Figure 8: Relative variation of  $I_{GT}, I_H, I_L$  vs junction temperature (typical values)**



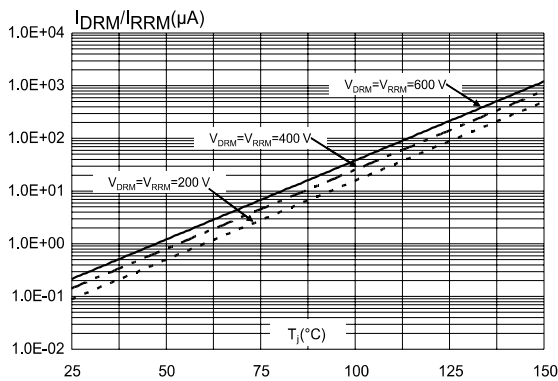
**Figure 9: Relative variation of critical rate of decrease of main current  $(dl/dt)_c$  versus reapplied  $(dV/dt)_c$**



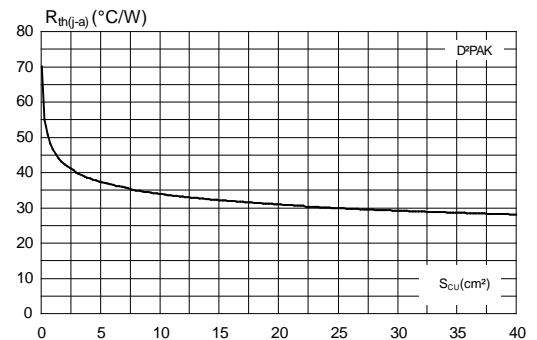
**Figure 10: Relative variation of critical rate of decrease of main current versus junction temperature**



**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](http://www.st.com). ECOPACK® is an ST trademark.

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

### 2.1 D<sup>2</sup>PAK package information

Figure 13: D<sup>2</sup>PAK package outline

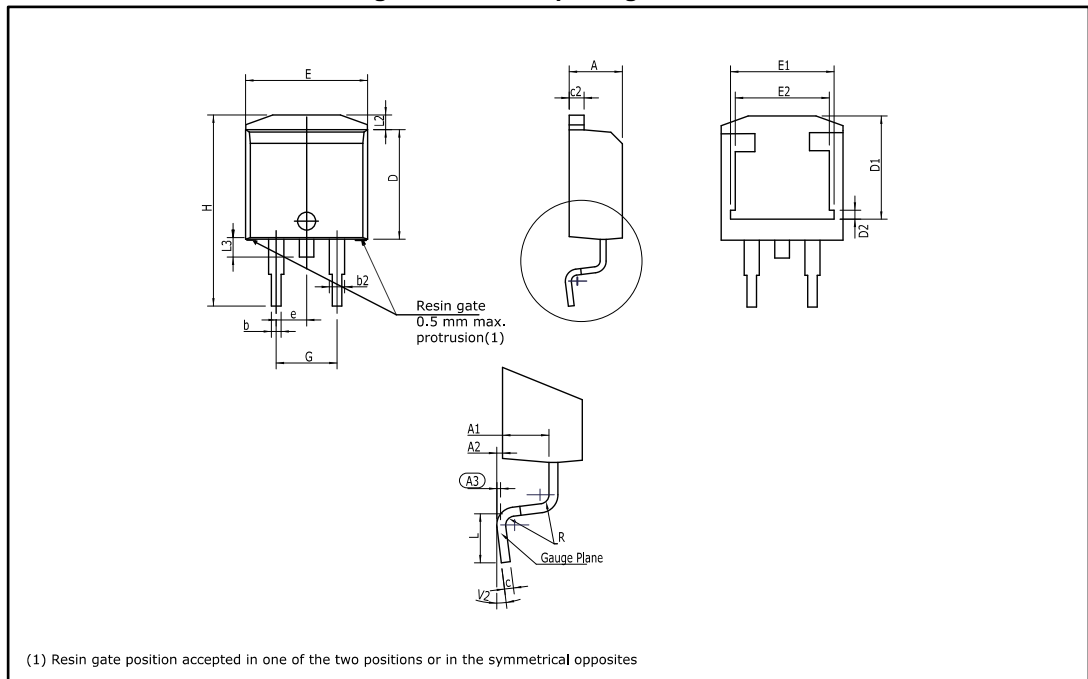
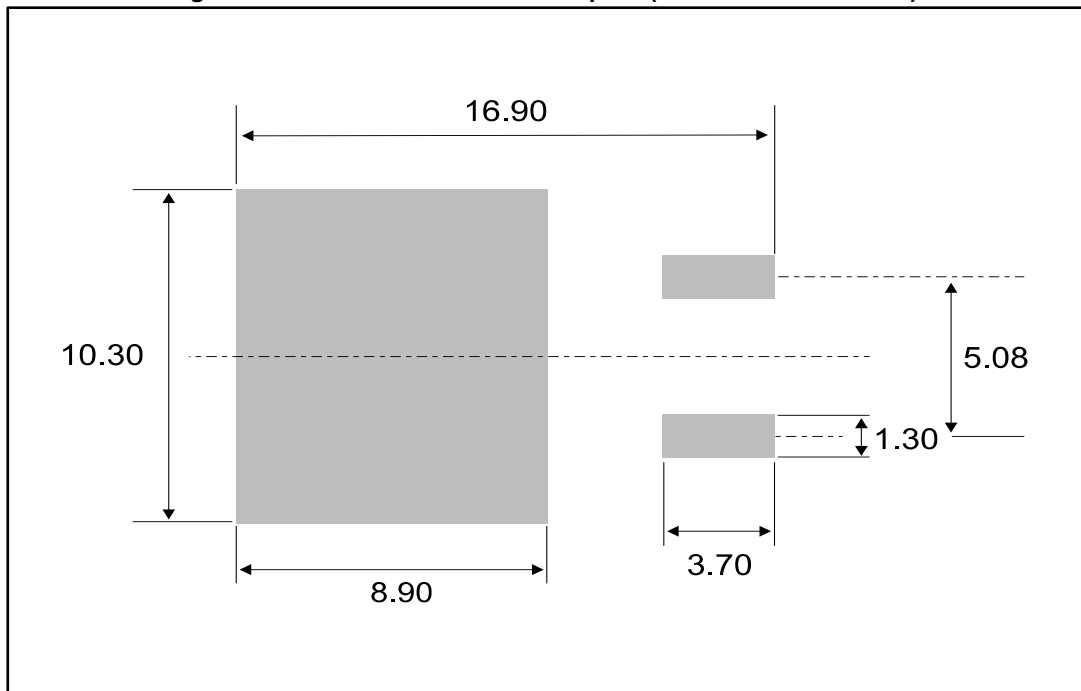


Table 6: D<sup>2</sup>PAK package mechanical data

Ref.	Dimensions					
	Millimeters			Inches <sup>(1)</sup>		
	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:**<sup>(1)</sup>Dimensions in inches are given for reference only

Figure 14: D<sup>2</sup>PAK recommended footprint (dimensions are in mm)



## 2.2 TO-220AB Insulated package information

Figure 15: TO-220AB Insulated package outline

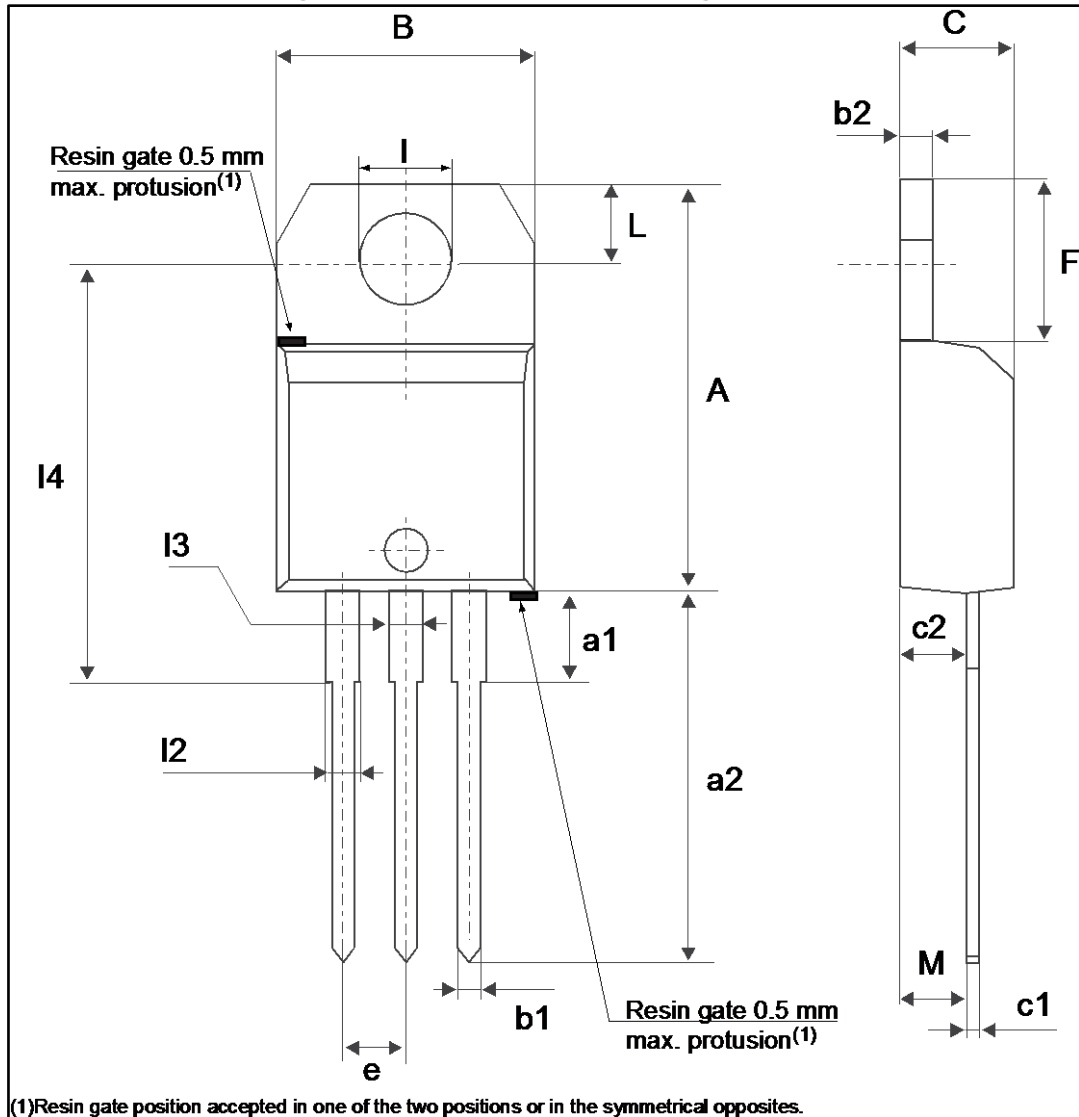




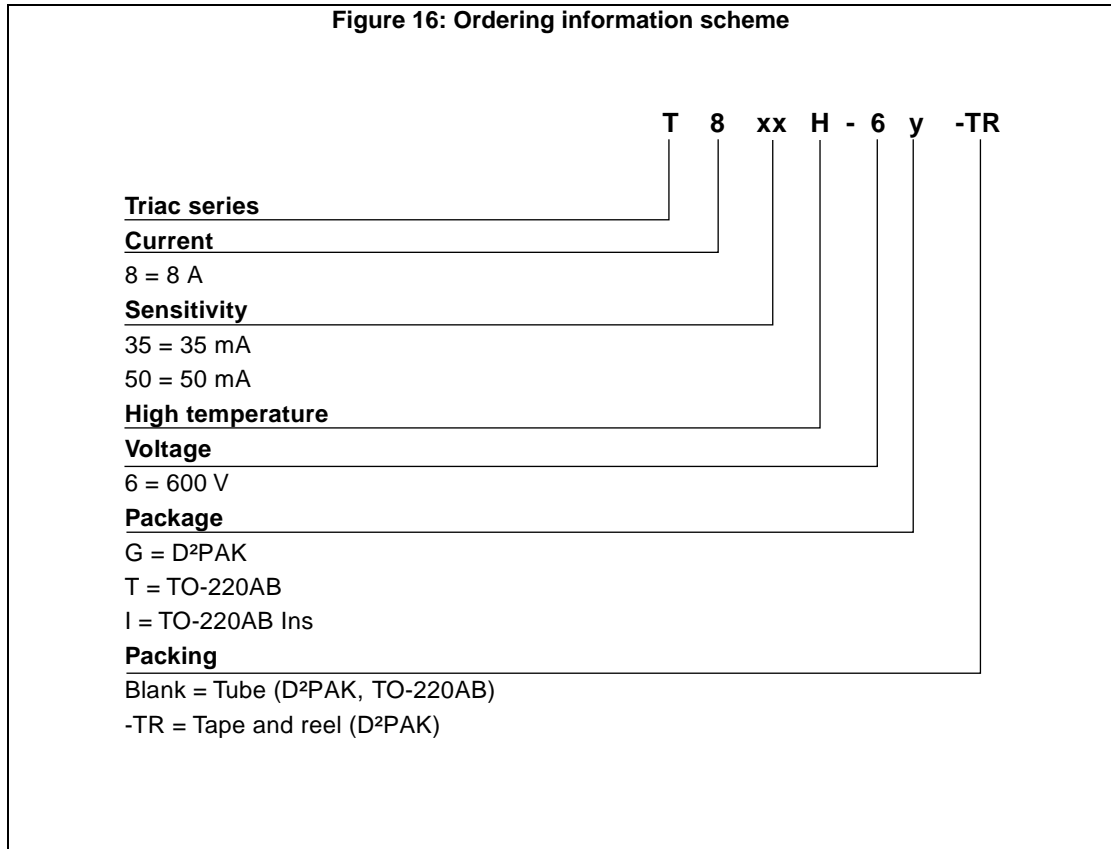
Table 7: TO-220AB Insulated package mechanical data

Ref.	Dimensions					
	Millimeters			Inches <sup>(1)</sup>		
	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
I2	1.14		1.70	0.0449		0.0669
I3	1.14		1.70	0.0449		0.0669
I4	15.80	16.40	16.80	0.6220	0.6457	0.6614
M		2.6			0.1024	

**Notes:**

<sup>(1)</sup>Inch dimensions are for reference only.

### 3 Ordering information



**Table 8: Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
T8xxH-6G	T8xxH 6G	D <sup>2</sup> PAK	1.5 g	50	Tube
T8xxH-6G-TR	T8xxH 6G	D <sup>2</sup> 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 <i>Table 4: "Static characteristics"</i> and <i>Figure 7: "Non-repetitive surge peak on-state current for a sinusoidal pulse"</i> .
07-Feb-2018	4	Updated <i>Table 2: "Absolute ratings (limiting values)"</i> , <i>Figure 2: "On-state RMS current versus case temperature (full cycle)"</i> and <i>Figure 6: "Surge peak on-state current versus number of cycles"</i> .

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