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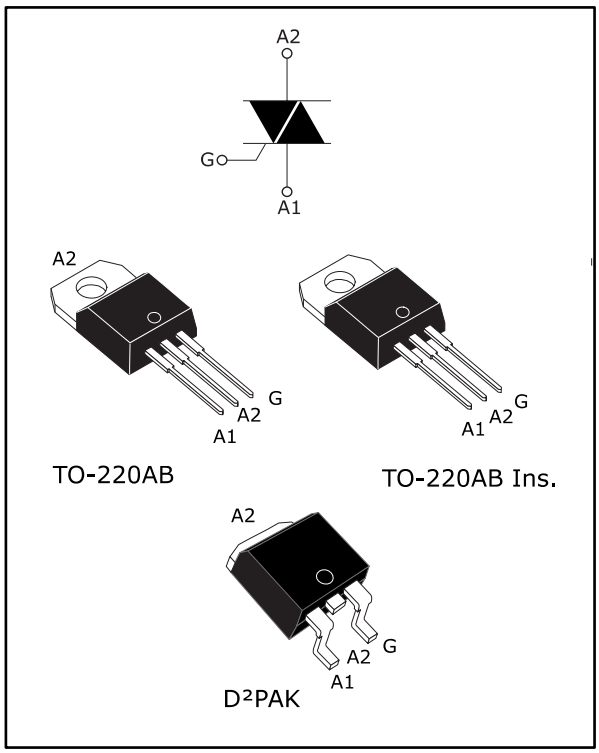
BTA10, BTB10, T10xx

10 A Snubberless™, logic level and standard Triacs

Datasheet - production data



Features

- Medium current triac
- Low thermal resistance with clip bonding
- Low thermal resistance insulation ceramic for insulated BTA
- High commutation (4Q) or very high commutation (3Q, Snubberless™) capability
- BTA series UL1557 certified (file ref: 81734)
- Packages are RoHS (2002/95/EC) compliant

Description

Available either in through-hole or surface mount packages, the BTA10, BTB10 and T10xx Triac series are suitable for general purpose mains power AC switching. They can be used as ON/OFF function in applications such as static relays, heating regulation or induction motor starting circuit. They are also recommended for phase control operations in light dimmers and appliance motors speed controllers.

The Snubberless™ versions (W suffix and T10xx) are especially recommended for use on inductive loads, because of their high commutation performance. By using an internal ceramic pad, the Snubberless™ series provide an insulated tab (rated at 2500 V_{RMS}) complying with UL standards (file reference: E81734).

Table 1: Device summary

Symbol	Parameter	BTA10, BTB10, T10xx
$I_{T(RMS)}$	RMS on-state current	10 A
V_{DRM}/V_{RRM}	Repetitive peak off-state voltage	600 and 800 V
I_{GT}	Triggering gate current	25 to 50 mA

1 Characteristics

Table 2: Absolute maximum ratings

Symbol	Parameter			Value	Unit
$I_{T(RMS)}$	RMS on-state current (full sine wave)	TO-220AB	T_c = 105 °C	10	A
		TO-220AB Ins.	T_c = 95 °C		
I_{TSM}	Non repetitive surge peak on-state current (full cycle, T_j initial = 25 °C)	F = 50 Hz	t_p = 20 ms	100	A
		F = 60 Hz	t_p = 16.7 ms	105	
I^2t	I^2t value for fusing	t_p = 10 ms		55	A^2s
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 = 125 °C	50	A/µs
V_{DSM}/V_{RSM}	Non repetitive surge peak off-state voltage	t_p = 10 ms	T_j = 25 °C	V_{DRM}/V_{RRM} + 100	V
I_{GM}	Peak gate current	t_p = 20 µs	T_j = 125 °C	4	A
$P_{G(AV)}$	Average gate power dissipation		T_j = 125 °C	1	W
T_{stg}	Storage junction temperature range			-40 to +150	°C
T_j	Operating junction temperature range			-40 to +125	°C

Table 3: Static electrical characteristics

Symbol	Test Conditions	T_j		Value	Unit
V_T(1)	I_{TM} = 14 A, t_p = 380 µs	25 °C	Max.	1.55	V
V_{TO}	threshold on-state voltage	125 °C	Max.	0.85	V
R_D	Dynamic resistance	125 °C	Max.	40	mΩ
I_{DRM}/I_{RRM}	V_{DRM} = V_{RRM}	25 °C	Max.	5	µA
		125 °C		1	mA

Notes:

(1)For both polarities of A2 referenced to A1

Table 4: Electrical characteristics (T_j = 25 °C, unless otherwise specified) - Snubberless™ (3 quadrants)

Symbol	Parameter	Quadrant		BTA10/BTB10		T1050	Unit
				CW	BW		
I_{GT}(1)	V_D = 12 V, R_L = 33 Ω	I - II - III	Max.	35	50		mA
V_{GT}		I - II - III	Max.	1.3			V
V_{GD}	V_D = V_{DRM}, R_L = 3,3 kΩ, T_j = 125 °C	I - II - III	Min.	0.2			V
I_H(2)	I_T = 500 mA		Max.	35	50		mA
I_L	I_G = 1.2 I_{GT}	I - III	Max.	50	70		mA
		II	Max.	60	80		
dV/dt(2)	V_D = 67 % V_{DRM} gate open, T_j = 125 °C		Min.	500	1000		V/µs
(dI/dt)c(2)	(dI/dt)c = 5.3 A/ms, T_j = 125 °C		Min.	5.5	9		A/ms

Notes:

(1) Minimum I_{GT} is guaranteed at 5 % of I_{GT} max.

(2) For both polarities of A2 referenced to A1

Table 5: Electrical characteristics (T_j = 25 °C, unless otherwise specified) - standard Triac (4 quadrants)

Symbol	Parameter	Quadrant		Value		Unit
				C	B	
I_{GT}(1)	V_D = 12 V, R_L = 33 Ω	I - II - III	Max.	25	50	mA
		IV	Max.	50	100	
V_{GT}		All	Max.	1.3		V
V_{GD}	V_D = V_{DRM}, R_L = 3,3 kΩ, T_j = 125 °C	I - II - III	Min.	0.2		V
I_H(2)	I_T = 500 mA		Max.	25	50	mA
I_L	I_G = 1.2 I_{GT}	I - III	Max.	40	50	mA
		II	Max.	80	100	
dV/dt(2)	V_D = 67 % V_{DRM} gate open, T_j = 125 °C		Min.	200	400	V/µs
(dV/dt)c(2)	(dI/dt)c = 4.4 A/ms, T_j = 125 °C		Min.	5	10	V/µs

Notes:

(1) Minimum I_{GT} is guaranteed at 5 % of I_{GT} max.

(2) For both polarities of A2 referenced to A1

Table 6: Thermal resistance

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$ (typ.)	Junction to case (AC)	TO-220AB / D²PAK	1.5	°C/W
		TO-220AB insulated	2.4	
$R_{th(j-a)}$ (max.)	Junction to ambient (S[(1)] = 1 cm²)	D²PAK	45	
	Junction to ambient	TO-220AB / TO-220AB ins	60	

Notes:

(1)Copper surface under tab.

1.1 Characteristics (curves)

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

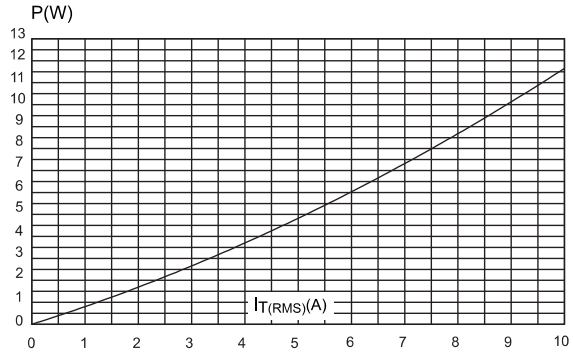


Figure 2: RMS on-state current versus case temperature (full cycle)

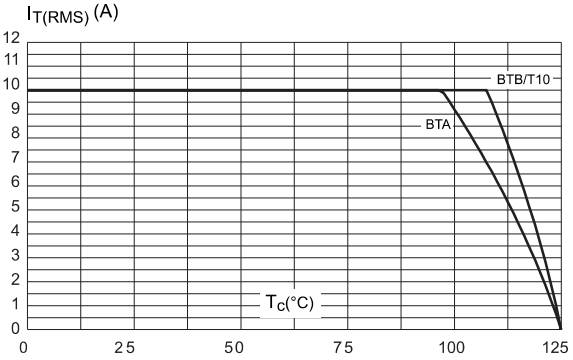


Figure 3: Relative variation of thermal impedance versus pulse duration

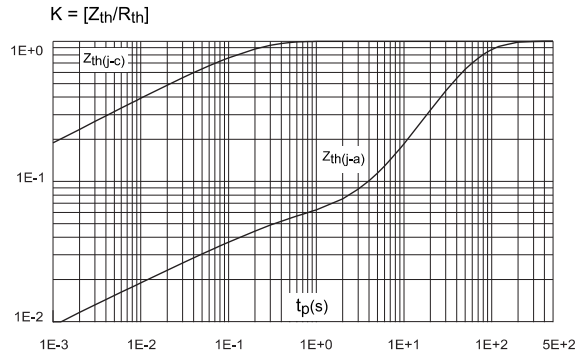


Figure 4: On-state characteristics (maximum values)

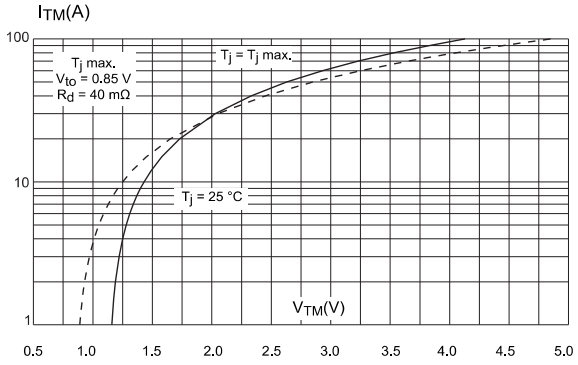


Figure 5: Surge peak on-state current versus number of cycles

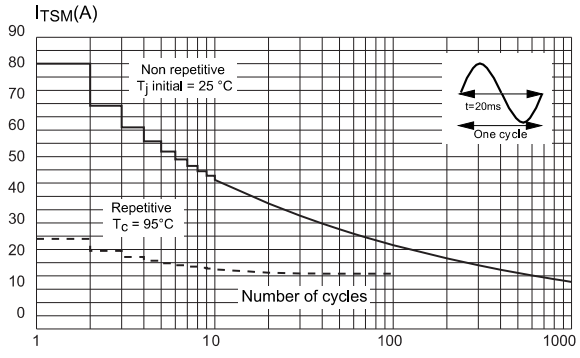


Figure 6: Non repetitive surge peak on-state current versus sinusoidal pulse width (t_P < 10 ms)

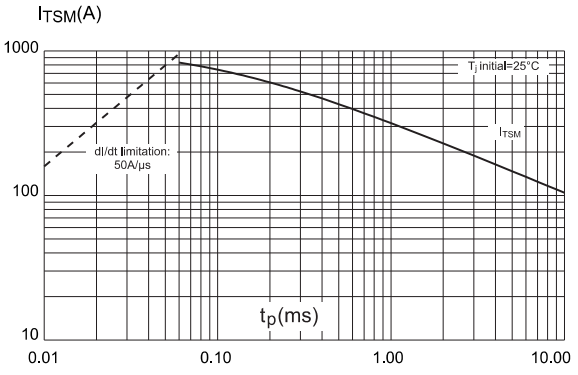


Figure 7: Relative variation of gate trigger current, holding current and latching current versus junction temperature (typical values)

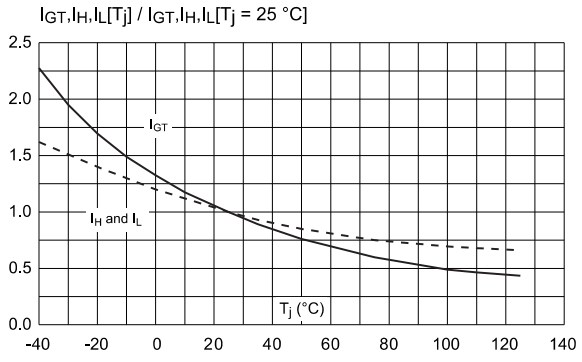


Figure 8: Relative variation of critical rate of decrease of main current versus (dV/dt)c (typical values)

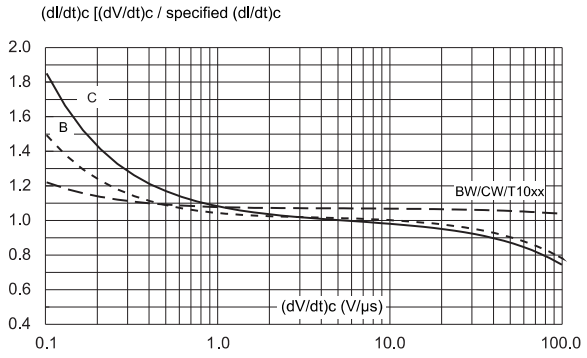


Figure 9: Relative variation of critical rate of decrease of main current versus junction temperature

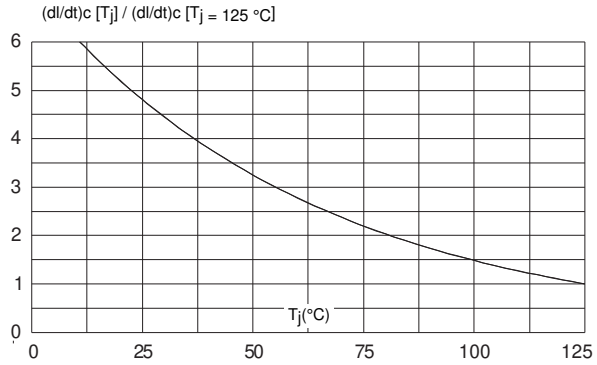
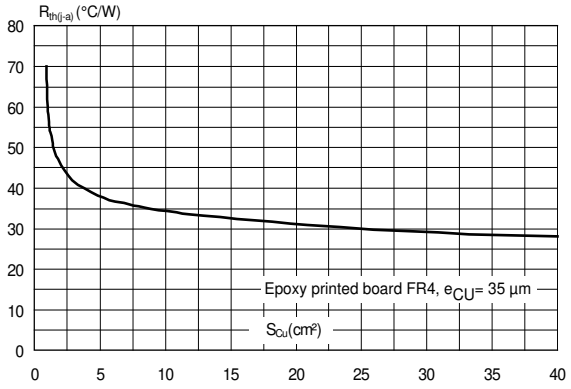


Figure 10: D2PAK thermal resistance junction to ambient versus copper surface under tab



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 UL 94,V0
- Lead-free package

2.1 D²PAK package information

Figure 11: D²PAK package outline

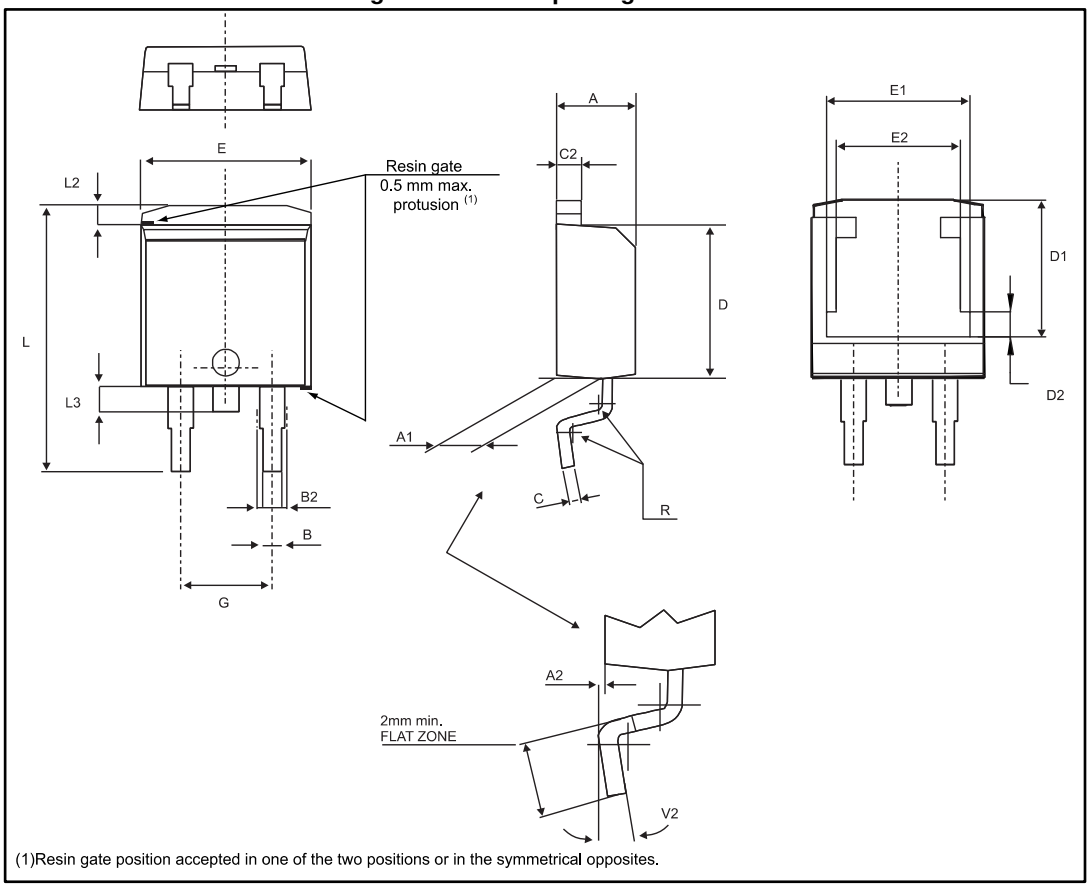


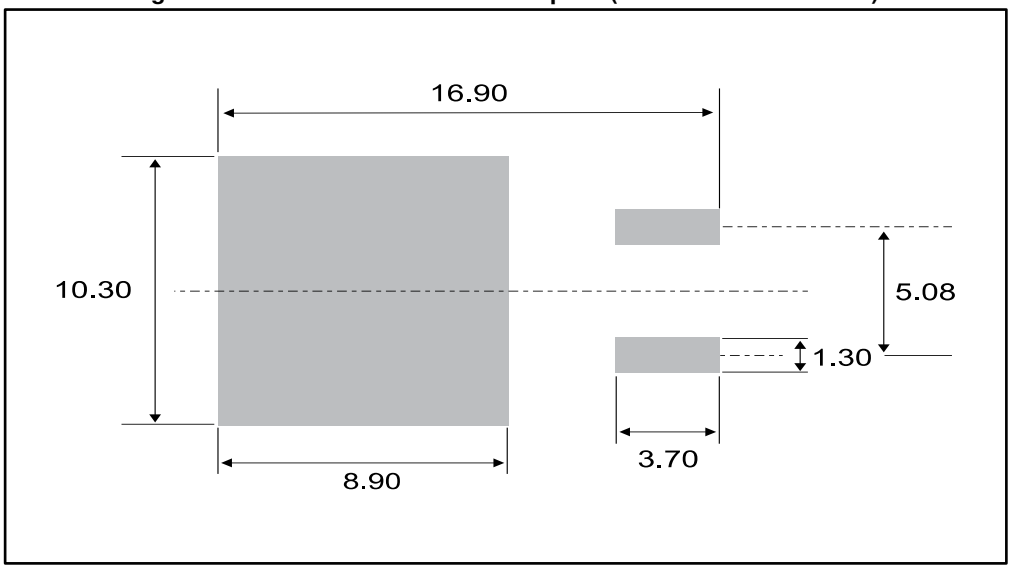
Table 7: D²PAK package mechanical data

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:

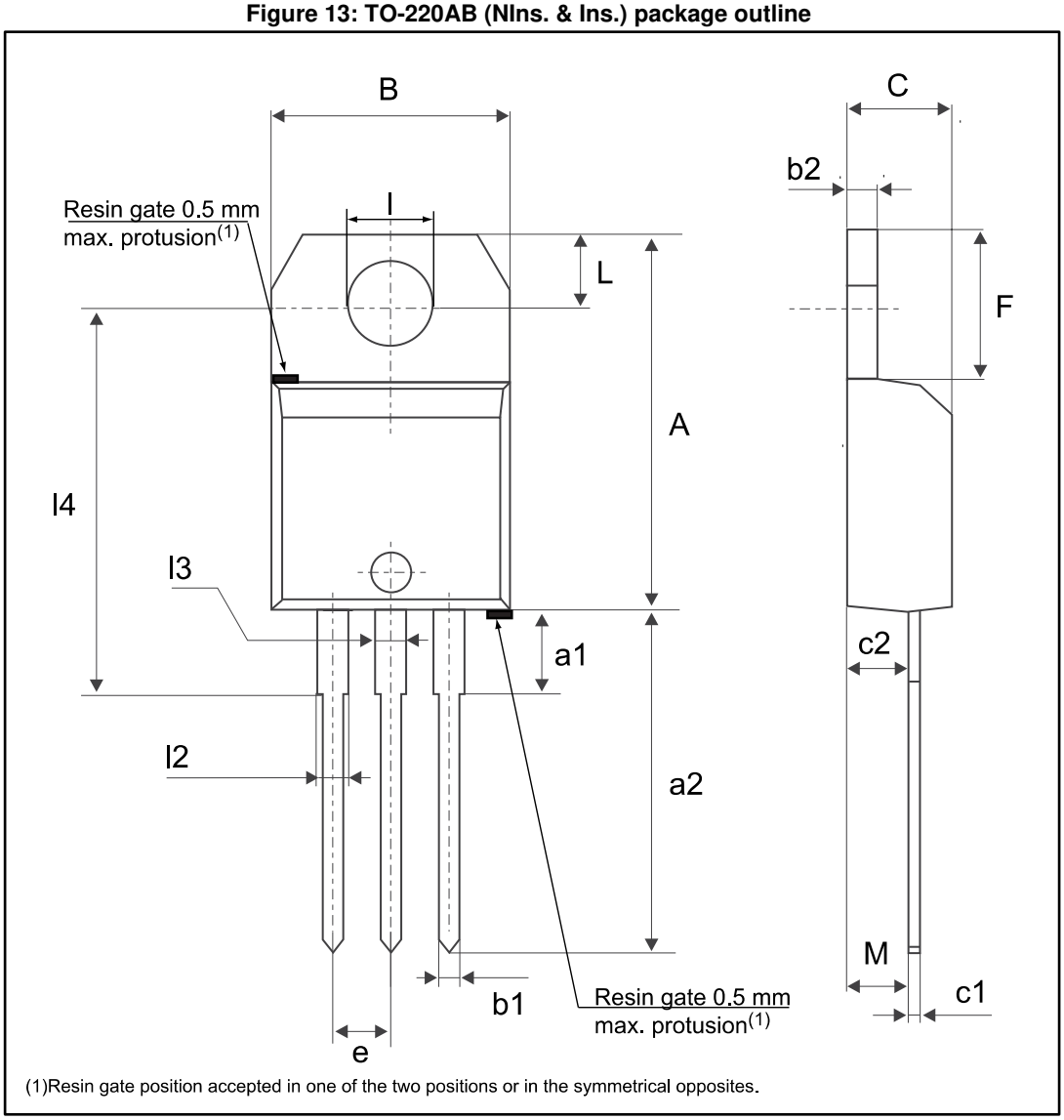
[1]Dimensions in inches are given for reference only

Figure 12: D²PAK recommended footprint (dimensions are in mm)



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

Figure 13: TO-220AB (NIns. & Ins.) package outline



(1)Resin gate position accepted in one of the two positions or in the symmetrical opposites.

Table 8: TO-220AB (NIns. & 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 14: BTA10 and BTB10 series ordering information scheme

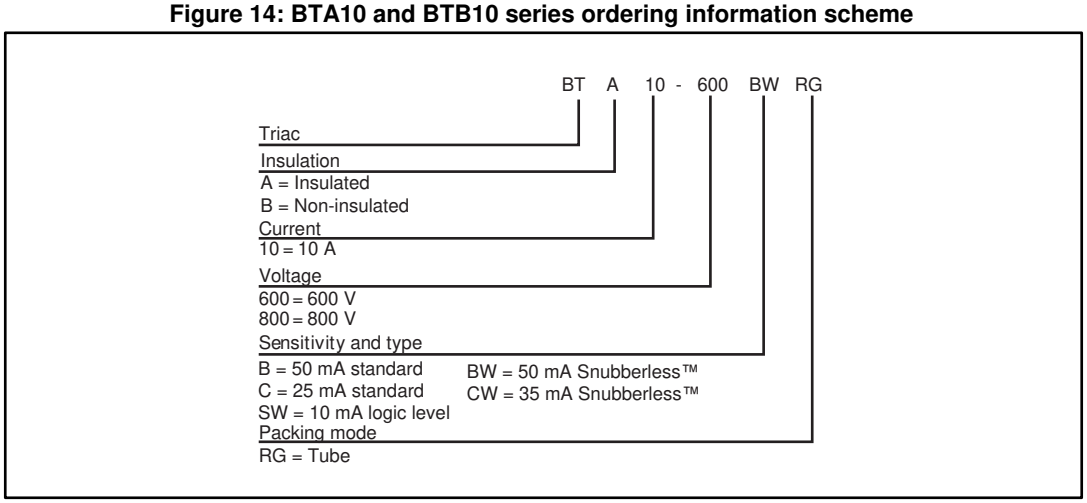


Figure 15: T10xx series ordering information scheme

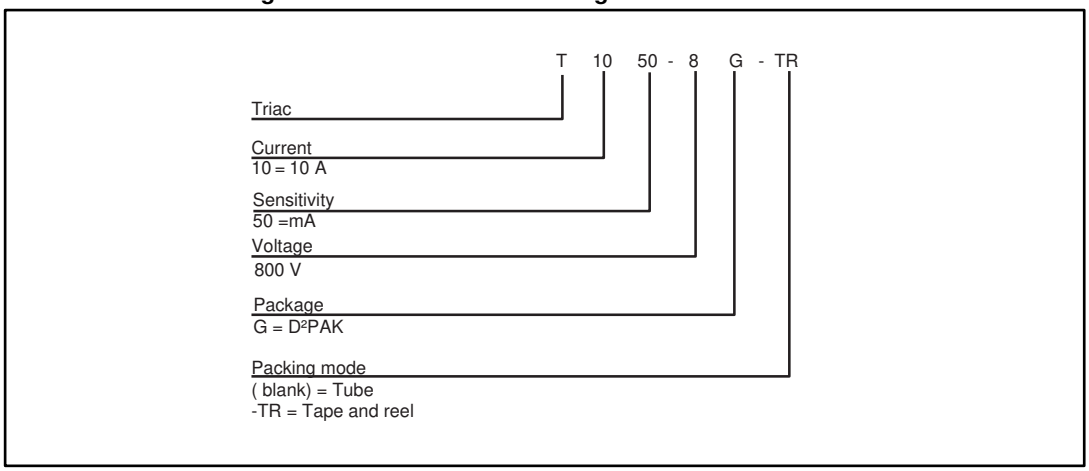


Table 9: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
BTA10-600BRG	BTA10-600B	TO-220AB Ins.	2.3 g	50	Tube
BTA10-600CRG	BTA10-600C				
BTA10-600BWRG	BTA10-600BW				
BTA10-600CWRG	BTA10-600CW				
BTA10-800BWRG	BTA10-800BW				
BTA10-800CWRG	BTA10-600CW				
BTB10-600BWRG	BTB10-600BW	TO-220AB			
BTB10-800BWRG	BTB10-800BW				
T1050-8G	T1050-8G	D²PAK	1.38 g		
T1050-8G-TR	T1050-8G			1000	Tape and reel 13"Tube

4 Revision history

Table 10: Document revision history

Date	Revision	Changes
Sep-2002	5A	Last update.
13-Feb-2006	6	TO-220AB delivery mode changed from bulk to tube. ECOPACK statement added.
06-Feb-2017	7	Added D²PAK package information.

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