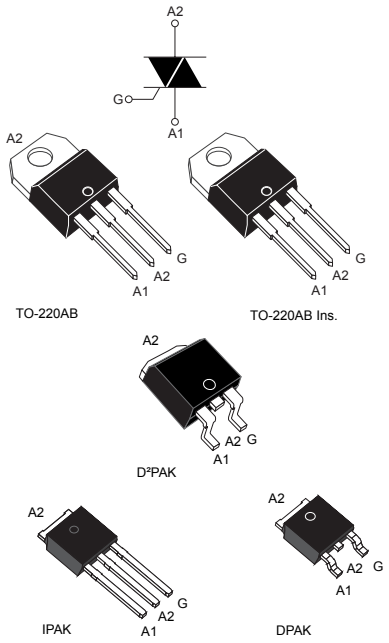
BTA08, BTB08, T810
T835, T850
Datasheet

Snubberless™, logic level and standard 8 A Triacs



Features

- On-state rms current, $I_{T(RMS)}$ 8 A
- Repetitive peak off-state voltage, V_{DRM} / V_{RRM} 600 V to 800 V
- Triggering gate current, I_{GT} 5 to 50 mA

Description

Available either in through-hole and surface-mount packages, these devices are suitable for general purpose AC switching. They can be used as an ON/OFF function in applications such as static relays, heating regulation, induction motor starting circuits or for phase control operation in light dimmers and motor speed controllers, etc.

The Snubberless versions (BTA, BTB08_xxxxW and T8 series) are specially recommended for use on inductive loads, thanks to their high commutation performance.

Logic level versions are designed to interface directly with low power drivers such as Microcontrollers.

By using an internal ceramic pad, the BTA series provide voltage insulated tab (rated at 2500 V_{RMS}) in compliance with UL standards (file ref.: E81734).

Product status link
BTA08,BTB08,T810,T835,T850

1 Characteristics

Table 1. Absolute maximum ratings (T_j = 25 °C unless otherwise stated)

Symbol	Parameter			Value	Unit
$I_{T(RMS)}$	RMS on-state current (full sine wave)	IPAK, DPAK,TO-220AB, D²PAK	T_c = 110 °C	8	A
		TO-220AB Ins.	T_c = 100 °C		
I_{TSM}	Non repetitive surge peak on-state current (full cycle, T_j initial = 25 °C)	f = 50 Hz	t = 20 ms	80	A
		f = 60 Hz	t_p = 16.7 ms	84	
I^2t	I^2t value for fusing		t_p = 10 ms	36	A^2s
dI/dt	Critical rate of rise of on-state current I_G = 2 x I_{GT}, tr ≤ 100 ns	f = 120 Hz	T_j = 125 °C	50	A/µs
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 2. Electrical characteristics (T_j = 25 °C, unless otherwise specified) Snubberless and logic level (3 quadrants)

Symbol	Parameter	Quadrant		T8			BTA08/BTB08				Unit
				10	35	50	TW	SW	CW	BW	
I_{GT} (1)	V_D = 12 V, R_L = 30 Ω	I - II - III	Max.	10	35	50	5	10	35	50	mA
V_{GT}		I - II - III	Max.	1.2							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 = 100 mA	I - II - III	Max.	15	35	75	10	15	35	50	mA
I_L	I_G = 1.2 x I_{GT}	I - III	Max.	25	50	70	10	25	50	70	mA
		II	Max.	30	60	110	15	30	60	80	
dV/dt (2)	V_D = 67% V_{DRM}, gate open, T_j = 125 °C		Max.	40	400	1000	20	40	400	1000	V/µs
(dI/dt)c (2)	(dV/dt)c = 0.1 V/µs, T_j = 125 °C		Min.	5.4			3.5	5.4			A/ms
	(dV/dt)c = 10 V/µs, T_j = 125 °C		Min.	2.8			1.5	2.98			
	Without snubber, T_j = 125 °C		Min.		4.5	7			4.5	7	

1. *Minimum I_{GT} is guaranteed at 5 % of I_{GT} max.*
2. *For both polarities of A2 referenced to A1*

Table 3. Standard (4 quadrants)

Symbol	Parameter	Quadrant		BTA08/BTB08		Unit
				C	B	
I_{GT} (1)	V_D = 12 V, R_L = 33 Ω	I - II - III	Max.	25	50	mA
		IV		50	100	
V_{GT}		All	Max.	1.3		V
V_{GD}	V_D = V_{DRM}, R_L = 33 Ω, T_j = 125 °C	All	Min.	0.2		V
I_H (2)	I_T = 500 mA	I - II - III	Max.	25	50	mA
I_L	I_G = 1.2 I_{GT}	I - III - IV	Max.	40	50	mA
		II		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 = 3.5 A/ms, T_j = 125 °C		Min.	5	10	A/ms

1. *Minimum I_{GT} is guaranteed at 5 % of I_{GT} max.*
2. *For both polarities of A2 referenced to A1*

Table 4. Static electrical characteristics

Symbol	Test conditions			Value	Unit
V_{TM} (1)	I_{TM} = 11 A, t_p = 380 µs	T_j = 25 °C	Max.	1.55	V
V_{TO} (1)	threshold on-state voltage	T_j = 125 °C	Max.	0.85	V
R_D (1)	Dynamic resistance	T_j = 125 °C	Max.	50	mΩ
I_{DRM} I_{RRM}	V_{DRM} = V_{RRM}	T_j = 25 °C	Max.	5	µA
		T_j = 125 °C	Max.	1	mA

1. *For both polarities of A2 referenced to A1*

Table 5. Thermal resistance

Symbol	Parameter			Value	Unit
$R_{th(j-c)}$	Max. junction to case thermal resistance (AC)		IPAK / D2PAK / DPAK / TO-220AB	1.6	°C/W
			TO-220AB Insulated	2.5	
$R_{th(j-a)}$	Junction to ambient (typ.)	S = 2 cm² (1)	D²PAK	45	°C/W
		S = 1 cm²(1)	DPAK	70	
	Junction to ambient (typ.)		TO-220AB / TO-220AB Insulated	60	
			IPAK	100	

1. *S = Copper surface under tab.*

1.1 Characteristics (curves)

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

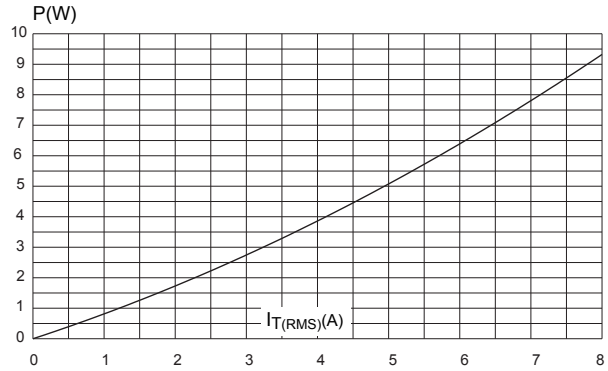


Figure 2. RMS on-state current versus temperature (full cycle)

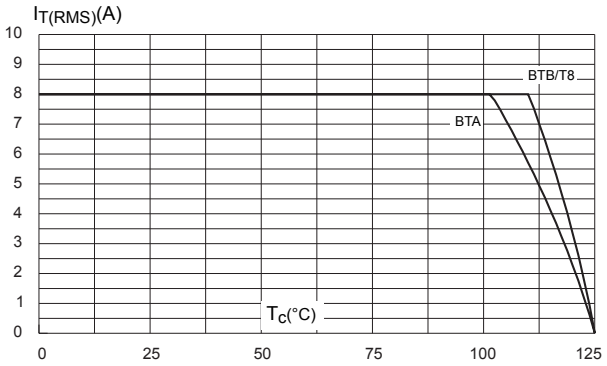


Figure 3. RMS on-state current versus ambient temperature (full cycle)

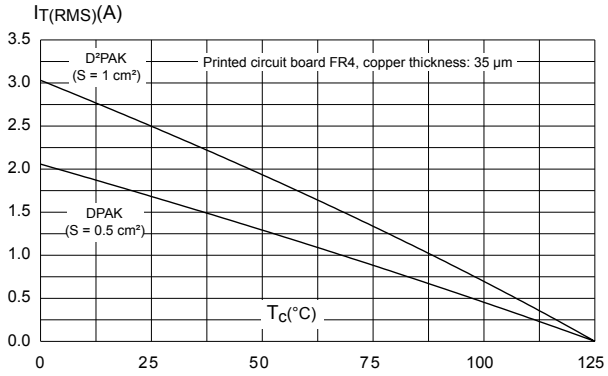


Figure 4. Relative variation of thermal impedance versus pulse duration

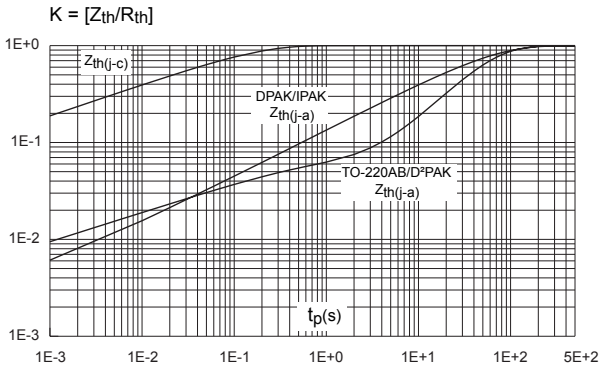


Figure 5. On-state characteristics (maximum values)

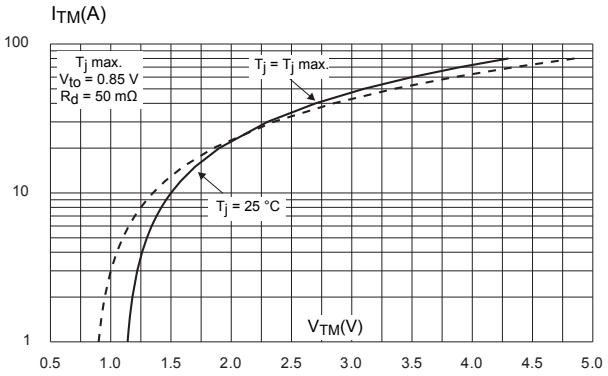


Figure 6. Surge peak on-state current versus number of cycles

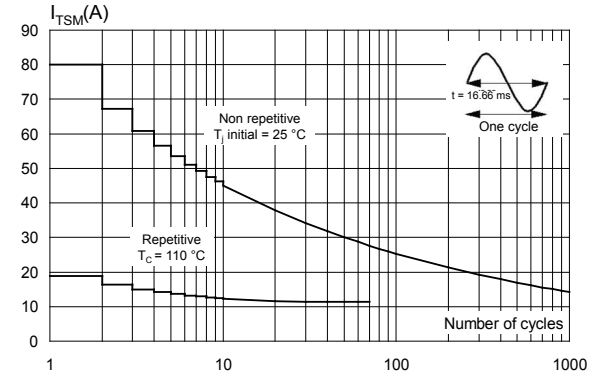


Figure 7. Non repetitive surge peak on-state current for a sinusoidal pulse (t_p < 10 ms)

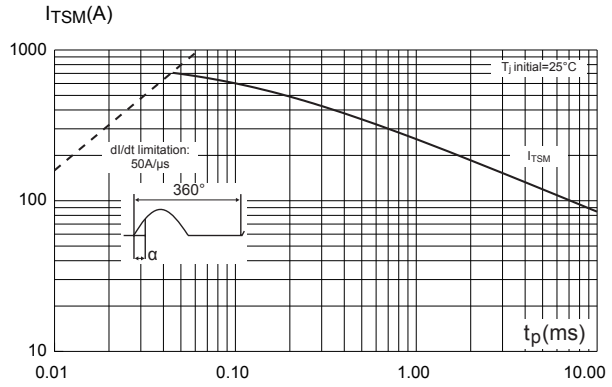


Figure 8. Relative variation of gate trigger current

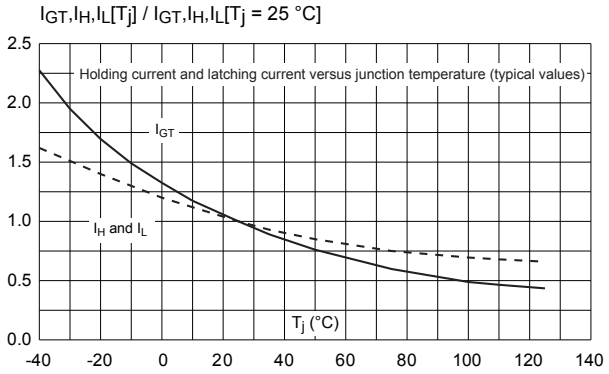


Figure 9. Relative variation of critical rate of decrease of main current versus (dV/dt)c (typical values)

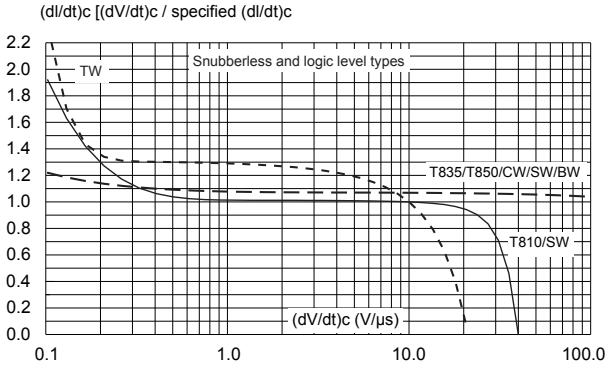


Figure 10. Relative variation of critical rate of decrease of main current versus (dV/dt)c (typical values)

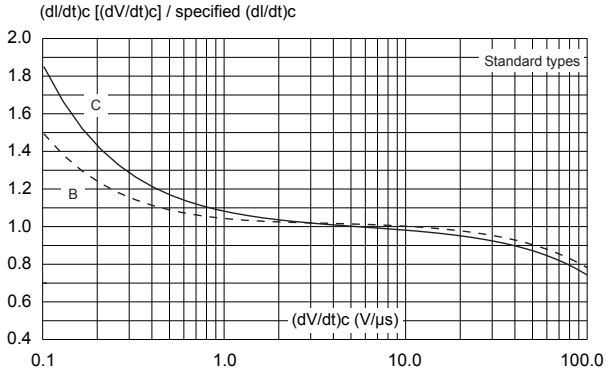


Figure 11. Relative variation of critical rate of decrease of main current versus junction temperature

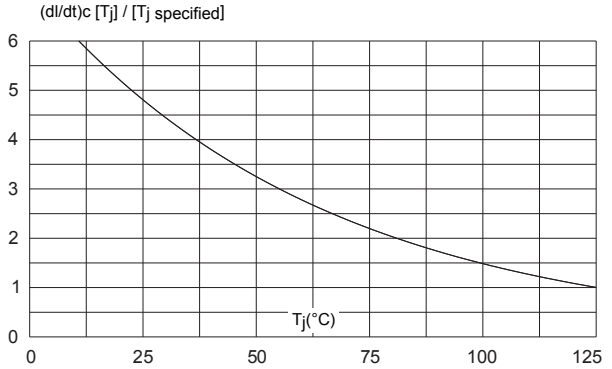
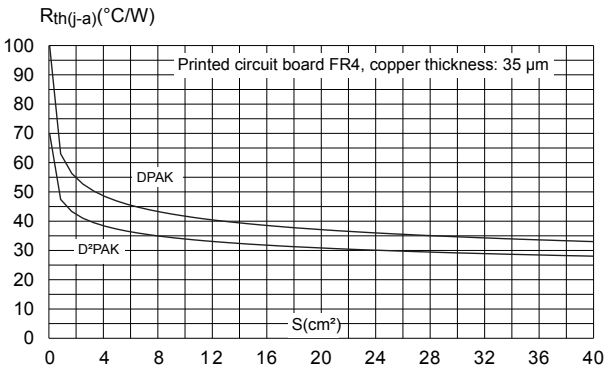


Figure 12. DPAK and D2PAK thermal resistance junction to ambient versus copper surface under tab



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.

2.1 DPAK package information

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

Figure 13. DPAK package outline

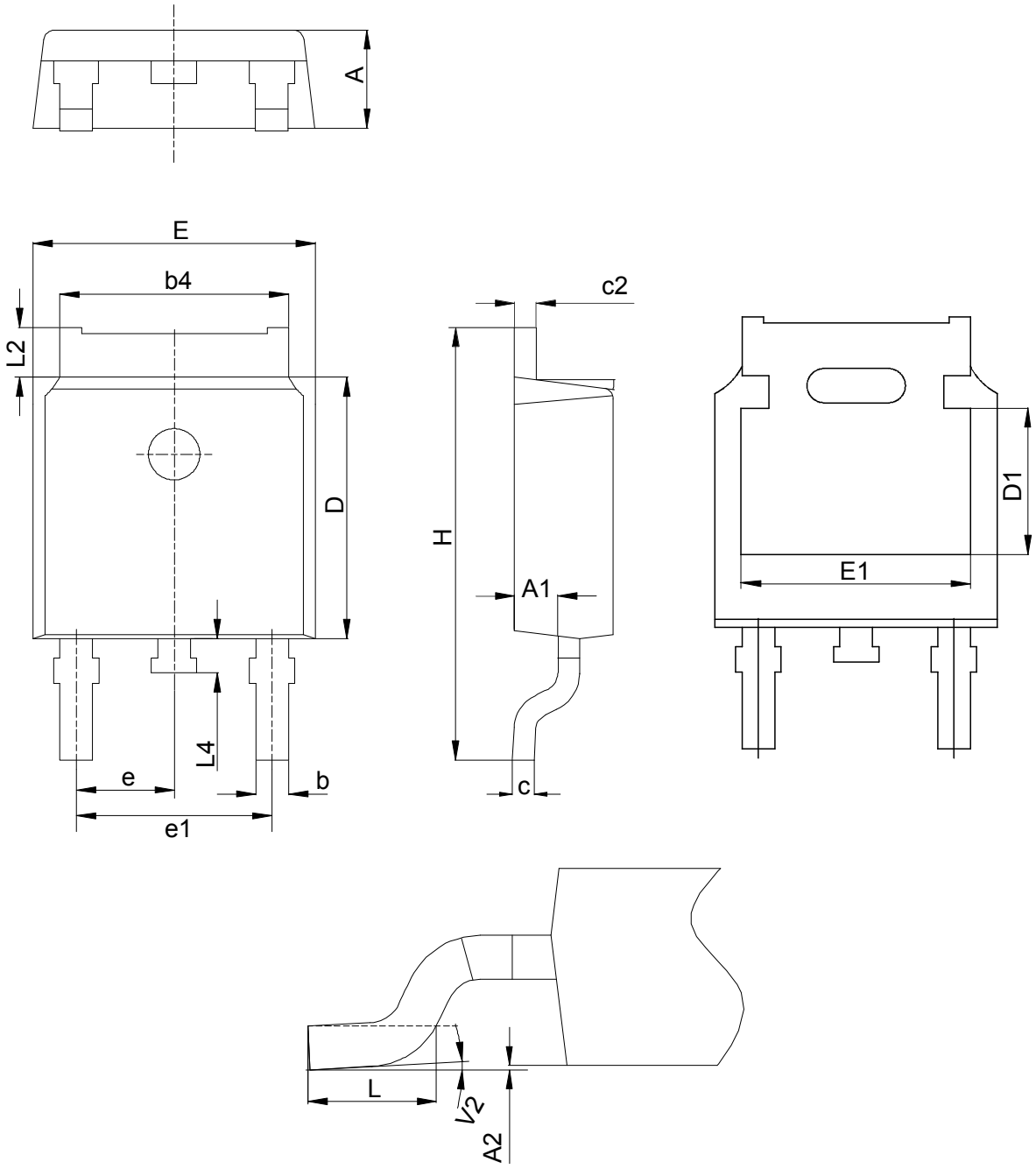


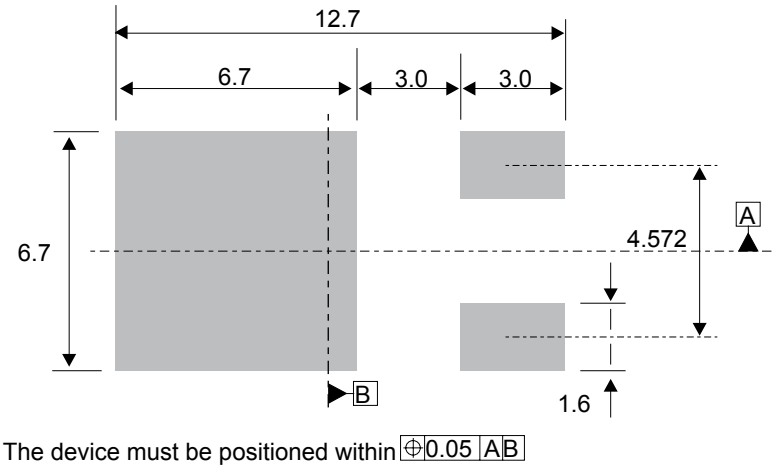
Table 6. DPAK package mechanical data

Ref.	Dimensions					
	Millimeters			Inches[1]		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.18		2.40	0.0858		0.0945
A1	0.90		1.10	0.0354		0.0433
A2	0.03		0.23	0.0012		0.0091
b	0.64		0.90	0.0252		0.354
b4	4.95		5.46	0.1949		0.2150
c	0.46		0.61	0.0181		0.0240
c2	0.46		0.60	0.0181		0.0236
D	5.97		6.22	0.2350		0.2449
D1	5.10			0.2008		
E	6.35		6.73	0.2500		0.2650
E1	4.32			0.1701		
e		2.29			0.0900	
e1		4.57			0.1800	
H	9.35		10.40	0.3681		0.4094
L	1.00		1.78	0.0394		0.0701
L2			1.27			0.0500
L4	0.60		1.02	0.0236		0.0402
V2	0°		+8°	0°		+8°

1. *Dimensions in inches are given for reference only*

Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

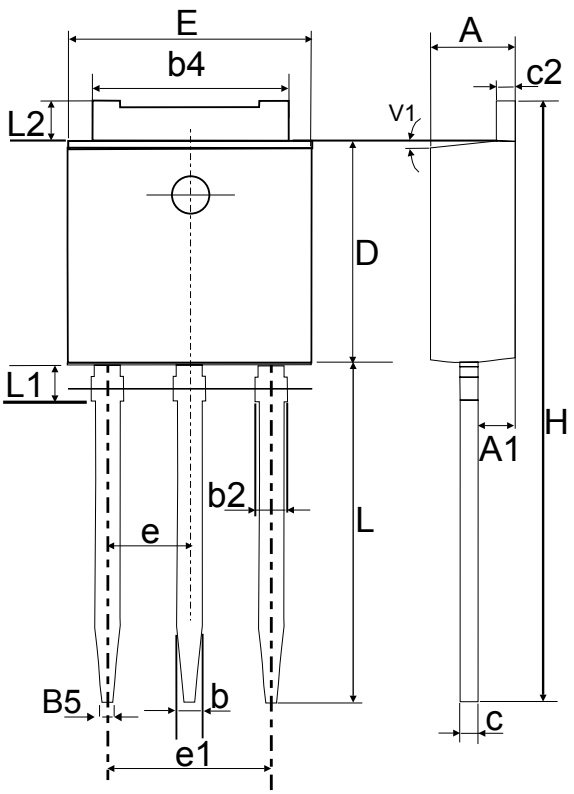
Figure 14. DPAK recommended footprint (dimensions are in mm)



The device must be positioned within ⌖0.05 AB

2.2 IPAK package information

Figure 15. **IPAK package outline**



Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

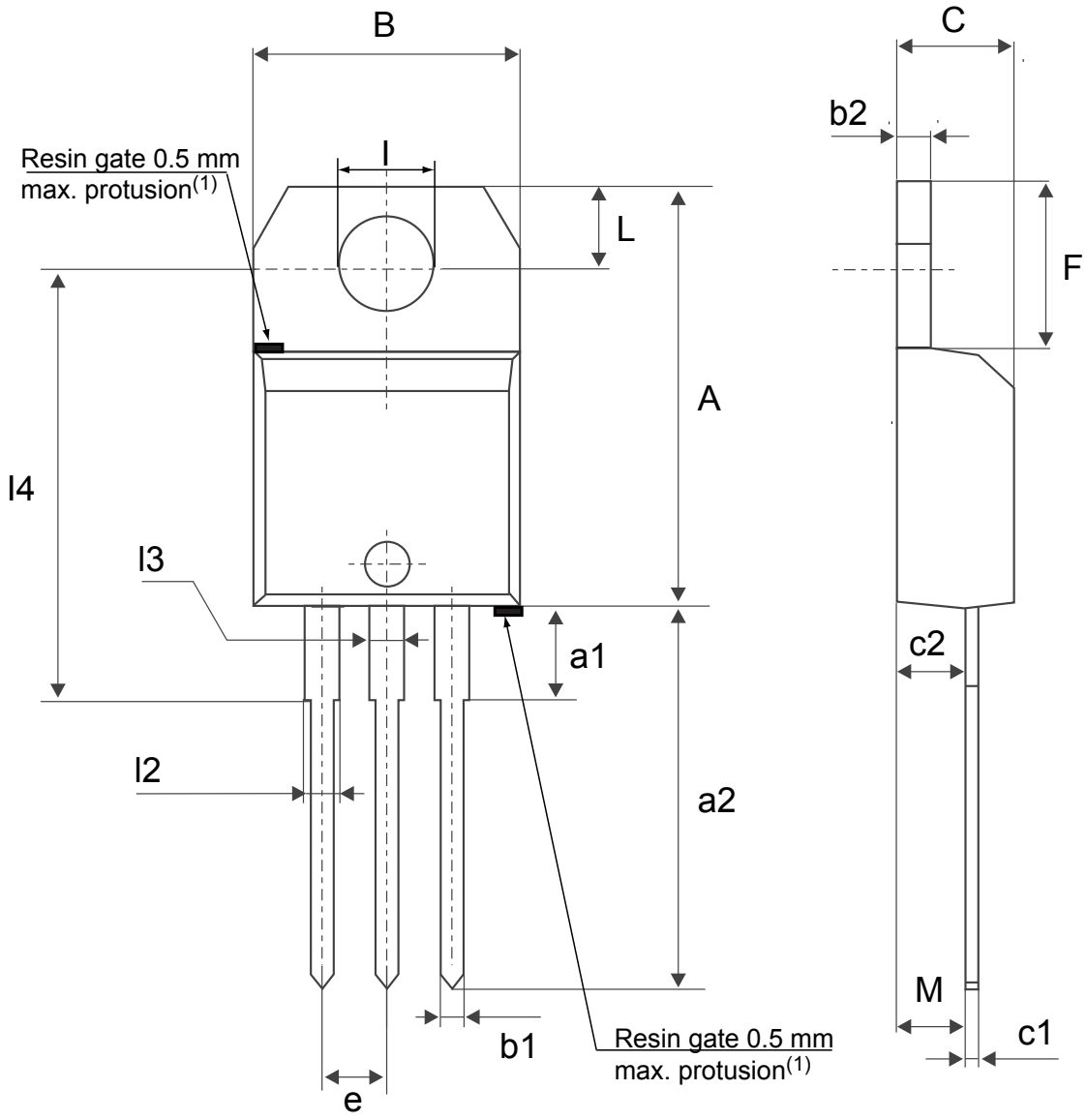
Table 7. IPAK package mechanical data

Ref.	Dimensions					
	Millimeters			Inches[1]		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.20		2.40	0.0866		0.0945
A1	0.90		1.10	0.0354		0.0433
b	0.64		0.90	0.0252		0.0354
b2			0.95			0.0374
b4	5.20		5.43	0.2047		0.2138
B5		0.30			0.0118	
c	0.45		0.60	0.0177		0.0236
c2	0.46		0.60	0.0181		0.0236
D	6.00		6.20	0.2362		0.2441
E	6.40		6.65	0.2520		0.2618
e		2.28			0.0898	
e1	4.40		4.60	0.1732		0.1811
H		16.10			0.6339	
L	9.00		9.60	0.3545		0.3780
L1	0.80		1.20	0.0315		0.0472
L2		0.80	1.25		0.0315	0.0492
V1		10°			10°	

1. *Inch dimensions are for reference only.*

2.3 TO-220AB Insulated package information

Figure 16. **TO-220AB Insulated package outline**



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

Figure 17. **TO-220AB Insulated package outline**

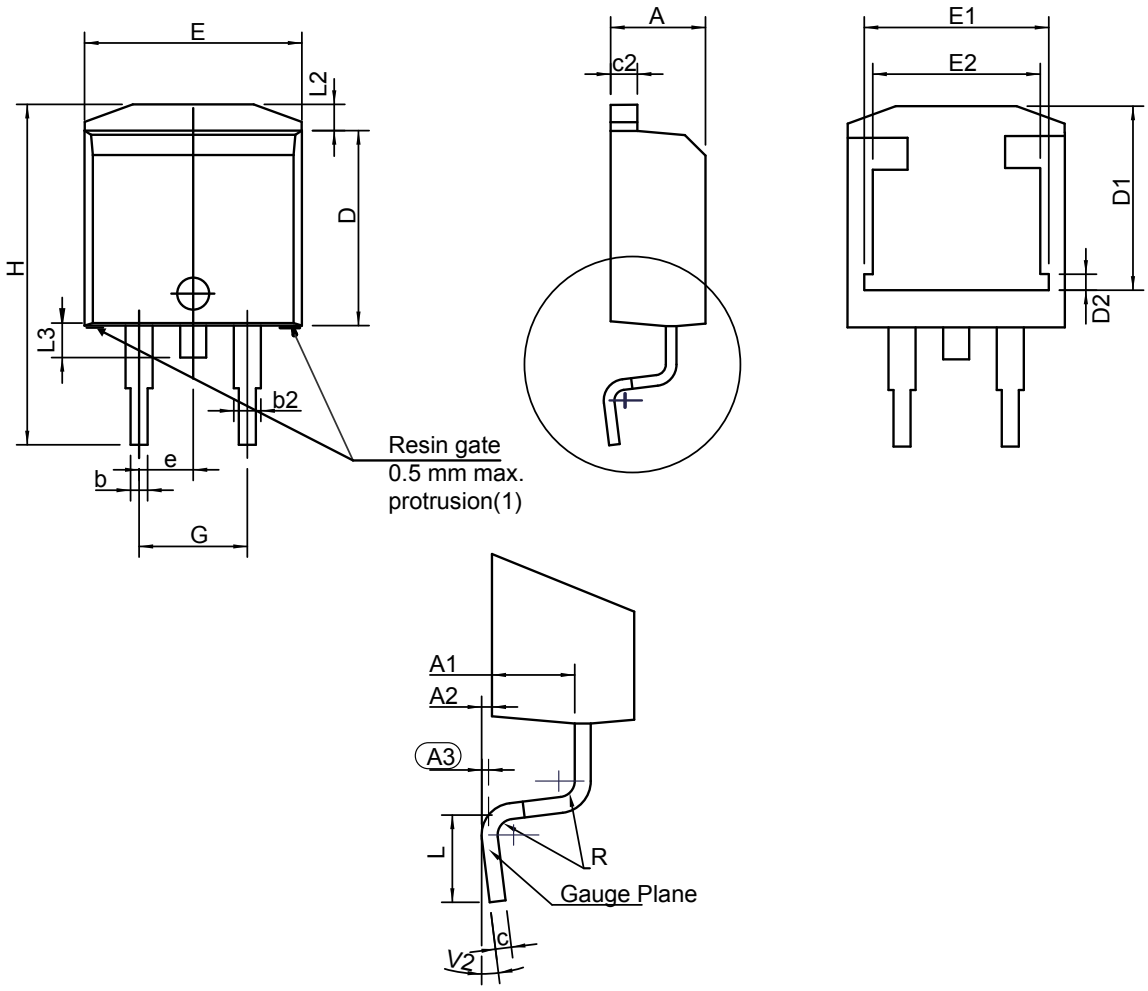
Table 8. **TO-220AB Insulated package mechanical data**

Ref.	Dimensions					
	Millimeters			Inches		
	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	

1. *Inch dimensions are for reference only.*

2.4 D²PAK package information

Figure 18. **D²PAK package outline**



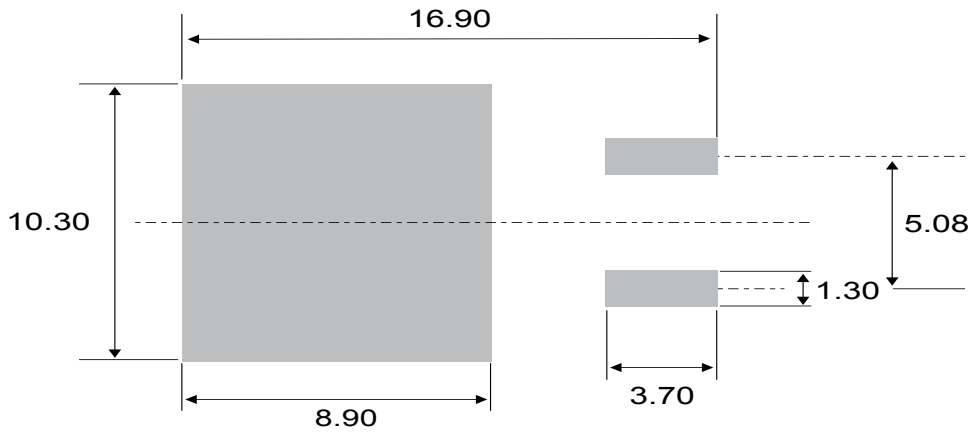
(1) Resin gate position accepted in one of the two positions or in the symmetrical opposites

Table 9. D²PAK package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	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°

1. *Dimensions in inches are given for reference only*

Figure 19. D²PAK recommended footprint (dimensions are in mm)



3 Ordering information

Figure 20. **Ordering information scheme (BTA08 and BTB08 series)**

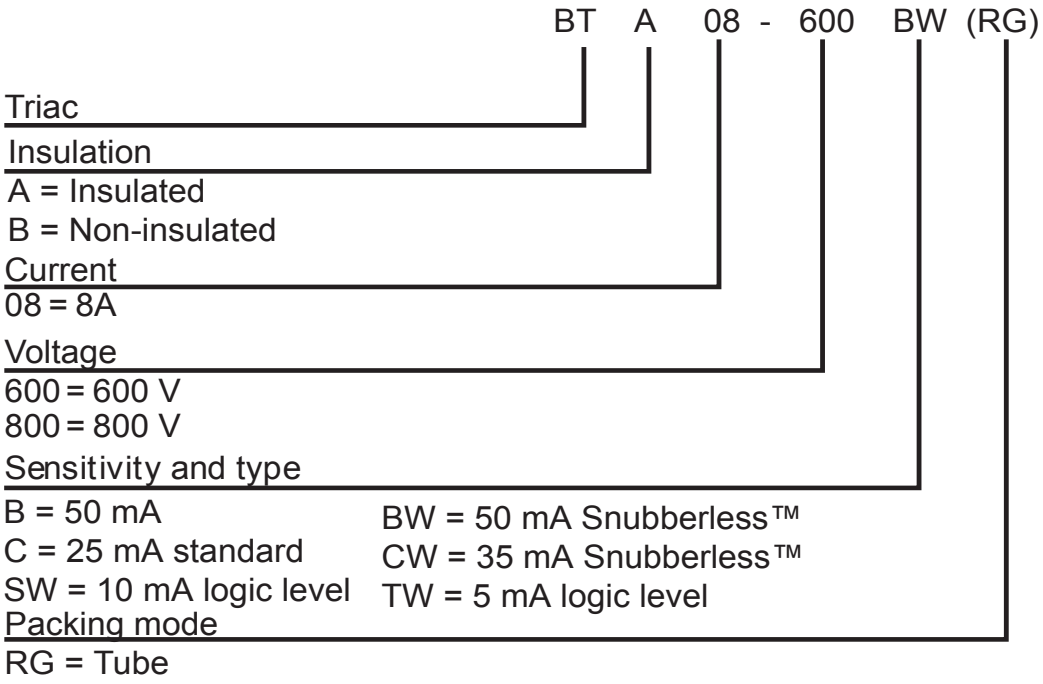


Figure 21. **Ordering information scheme (T8 series)**

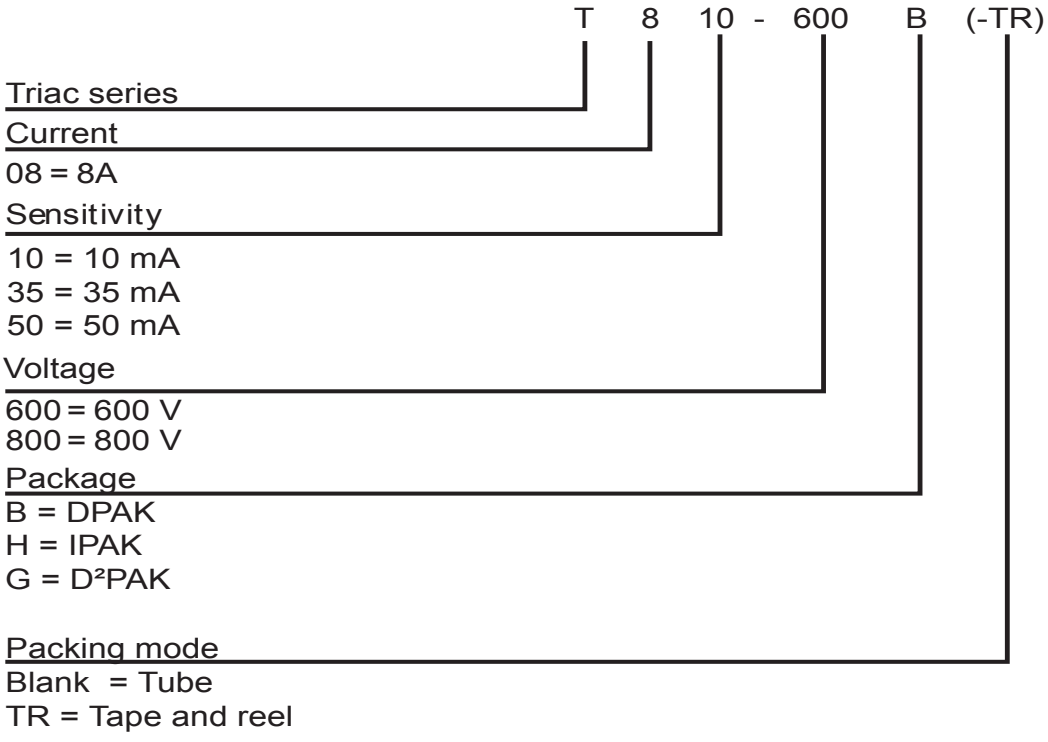


Table 10. **Product selector**

Part Number	Voltage (xxx)		Sensitivity	Type	Package
	600	800			
T810-xxxB	X	X	10 mA	Logic Level	DPAK
T835-xxxH	X		35 mA	Snubberless™	IPAK
T810-xxxG	X		10 mA	Logic Level	D^2PAK
T835-xxxG	X	X	35 mA	Snubberless™	D^2PAK
T850-xxxG	X	X	50 mA	Snubberless™	D^2PAK
BTA08-xxxS	X		10 mA	Logic Level	TO-220AB Ins.
BTA08-xxxC	X	X	35 mA	Standard	TO-220AB Ins.
BTA08-xxxB	X		50 mA	Standard	TO-220AB Ins.
BTA08-xxxTW	X		5 mA	Logic Level	TO-220AB Ins.
BTA08-xxxSW	X		10 mA	Logic Level	TO-220AB Ins.
BTA08-xxxCW	X		35 mA	Snubberless™	TO-220AB Ins.
BTA08-xxxBW	X	X	50 mA	Snubberless™	TO-220AB Ins.
BTB08-xxxS	X		10 mA	Logic Level	TO-220AB
BTB08-xxxC	X		35 mA	Standard	TO-220AB
BTB08-xxxB	X		50 mA	Standard	TO-220AB
BTB08-xxxTW	X	X	5 mA	Logic Level	TO-220AB
BTB08-xxxSW	X		10 mA	Logic Level	TO-220AB
BTB08-xxxCW	X	X	35 mA	Snubberless™	TO-220AB
BTB08-xxxBW	X		50 mA	Snubberless™	TO-220AB

Table 11. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
T810-600B	T8 1060	DPAK	0.30	75	Tube
T835-600B	T8 3560				
T835-800B	T8 3580				
T810-600B-TR	T8 1060			2500	Tape&Reel 13"
T810-800B-TR	T8 1080				
T835-600B-TR	T8 3560				
T835-800B-TR	T8 3580				
T835-600H	T8 3560	IPAK	0.40	75	Tube
T835-600G	T835-600G	D^2PAK	1.50	50	Tube
T835-8G	T835-8G				
T850-6G	T850-6G				
T850-8G	T850-8G				
T810-600G-TR	T810-600G			1000	Tape&Reel 13"
T835-600G-TR	T835-600G				
T835-8G-TR	T835-8G				
T850-6G-TR	T850-6G				
T850-8G-TR	T850-8G				
BTA08-600SRG	BTA08-600S	TO-220AB Ins.	2.30	50	Tube
BTA08-600BRG	BTA08-600B				
BTA08-600CRG	BTA08-600C				
BTA08-800CRG	BTA08-800C				
BTA08-600BWRG	BTA08-600BW				
BTA08-600CWRG	BTA08-600CW				
BTA08-600SWRG	BTA08-600SW				
BTA08-600TWRG	BTA08-600TW				
BTA08-800BWRG	BTA08-800BW				
BTB08-600BRG	BTB08-600B	TO-220AB			
BTB08-600CRG	BTB08-600C				
BTB08-600SRG	BTB08-600S				
BTB08-600BWRG	BTB08-600BW				
BTB08-600CWRG	BTB08-600CW				
BTB08-600SWRG	BTB08-600SW				
BTB08-600TWRG	BTB08-600TW				
BTB08-800CWRG	BTB08-800CW				
BTB08-800TWRG	BTB08-800TW				

Table 12. Document revision history

Date	Revision	Changes
Apr-2002	5A	Last update.
13-Feb-2006	6	TO-220AB delivery mode changed from bulk to tube. ECOPACK statement added.
10-Mar-2010	7	Updated ECOPACK statement and Figure 26
02-Jun-2014	8	Updated DPAK and IPAK package information and reformatted to current standard.
07-Nov-2016	9	Updated Table 1 and reformatted to current standard.
06-Jan-2017	10	Updated Figure 20: "Ordering information scheme (T8 series)", Table 10: "Product selector" and Table 11: "Ordering information".
09-Feb-2017	11	Added T850 package information.
24-Apr-2017	12	Updated Figure 6.. Minor text changes to improve readability.
14-Mar-2018	13	Updated Table 2. Electrical characteristics (T_j = 25 °C, unless otherwise specified) Snubberless and logic level (3 quadrants), cover image, Figure 9. Relative variation of critical rate of decrease of main current versus (dV/dt)c (typical values) and Figure 21. Ordering information scheme (T8 series).