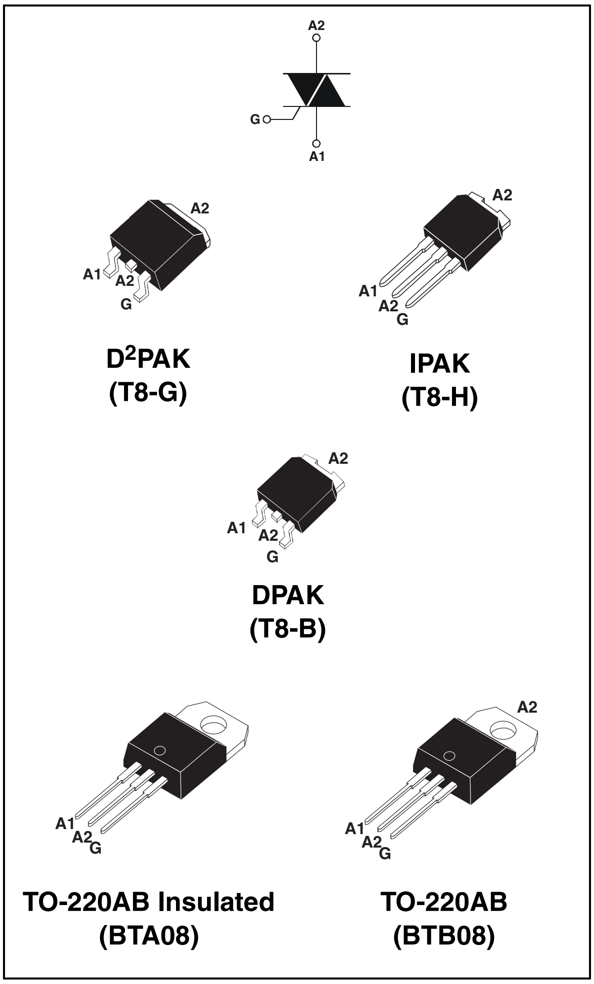
BTA08, BTB08 and T8 Series

SNUBBERLESS™, LOGIC LEVEL & STANDARD

8A TRIACS

Table 1: Main Features

Symbol	Value	Unit
$I_{T(RMS)}$	8	A
V_{DRM}/V_{RRM}	600 and 800	V
$I_{GT\ (Q_1)}$	5 to 50	mA



DESCRIPTION

Available either in through-hole or surface-mount packages, the **BTA08, BTB08** and **T8** triac series is 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, motor speed controllers,...

The snubberless versions (BTA/BTB...W and T8 series) are specially recommended for use on inductive loads, thanks to their high commutation performances.
Logic level versions are designed to interface directly with low power drivers such as microcontrollers.
By using an internal ceramic pad, the BTA series provides voltage insulated tab (rated at $2500V_{RMS}$) complying with UL standards (file ref.: E81734).

Table 2: Order Codes

Part Number	Marking
BTA08-xxxxxRG	See page table 8 on page 10
BTB08-xxxxxRG	
T8xx-xxxG	
T8xx-xxxH	
T8xx-xxxB	

Table 3: Absolute Maximum Ratings

Symbol	Parameter			Value	Unit
$I_{T(RMS)}$	RMS on-state current (full sine wave)	IPAK/D²PAK/ DPAK/TO-220AB	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 = 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 $I_G = 2 \times I_{GT}$, $t_r \leq 100$ 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} T_j	Storage junction temperature range Operating junction temperature range			- 40 to + 150 - 40 to + 125	°C

Tables 4: Electrical Characteristics (T_j = 25°C, unless otherwise specified)

■ **SNUBBERLESS and Logic Level (3 quadrants)**

Symbol	Test Conditions	Quadrant		T8		BTA08 / BTB08				Unit
				T810	T835	TW	SW	CW	BW	
I_{GT} (1)	V_D = 12 V R_L = 30 Ω	I - II - III	MAX.	10	35	5	10	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 = 100 mA		MAX.	15	35	10	15	35	50	mA
I_L	$I_G = 1.2\ I_{GT}$	I - III	MAX.	25	50	10	25	50	70	mA
		II		30	60	15	30	60	80	
dV/dt (2)	V_D = 67 %V_{DRM} gate open T_j = 125°C		MIN.	40	400	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			2.8	-	1.5	2.98	-	-	
	Without snubber T_j = 125°C			-	4.5	-	-	4.5	7	

■ **Standard (4 quadrants)**

Symbol	Test Conditions	Quadrant		BTA08 / BTB08		Unit
				C	B	
I_{GT} (1)	V_D = 12 V R_L = 30 Ω	I - II - III IV	MAX.	25 50	50 100	mA
V_{GT}		ALL	MAX.	1.3		V
V_{GD}	$V_D = V_{DRM}$ R_L = 3.3 kΩ T_j = 125°C	ALL	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 - 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 = 5.3 A/ms T_j = 125°C		MIN.	5	10	V/µs

Table 5: Static Characteristics

Symbol	Test Conditions			Value	Unit
V_T (2)	I_{TM} = 11 A t_p = 380 µs	T_j = 25°C	MAX.	1.55	V
V_{to} (2)	Threshold voltage	T_j = 125°C	MAX.	0.85	V
R_d (2)	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		1	mA

Note 1: minimum I_{GT} is guaranted at 5% of I_{GT} max.

Note 2: for both polarities of A2 referenced to A1.

Table 6: Thermal resistance

Symbol	Parameter			Value	Unit
$R_{th(j-c)}$	Junction to case (AC)		IPAK / D²PAK / DPAK / TO-220AB	1.6	°C/W
			TO-220AB Insulated	2.5	
$R_{th(j-a)}$	Junction to ambient	S = 1 cm^2	D²PAK	45	°C/W
		S = 0.5 cm^2	DPAK	70	
			TO-220AB / TO-220AB Insulated	60	
			IPAK	100	

S = Copper surface under tab.

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

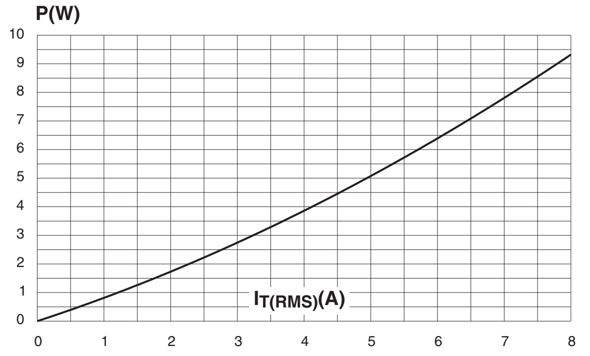


Figure 2: RMS on-state current versus case temperature (full cycle)

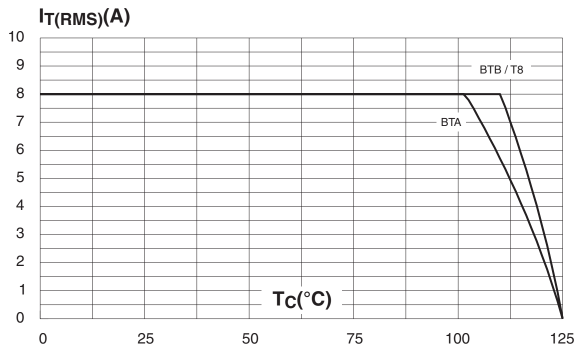


Figure 3: RMS on-state current versus ambient temperature (printed circuit board FR4, copper thickness: 35µm) (full cycle)

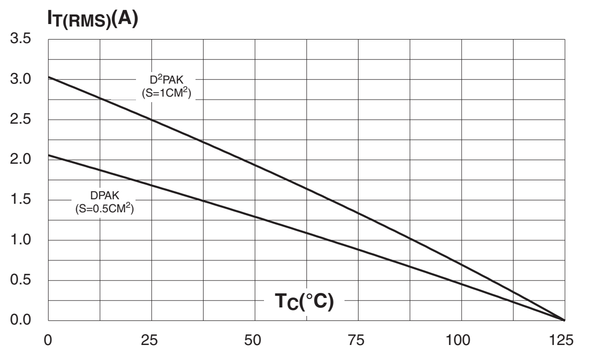


Figure 4: Relative variation of thermal impedance versus pulse duration

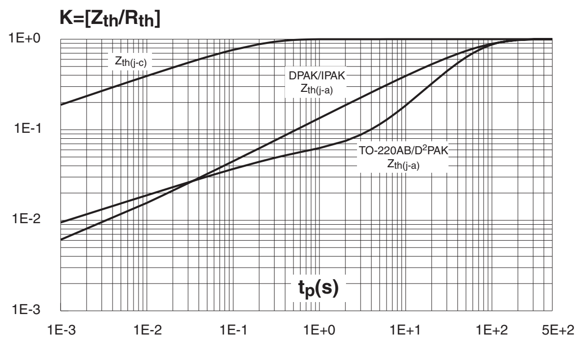


Figure 5: On-state characteristics (maximum values)

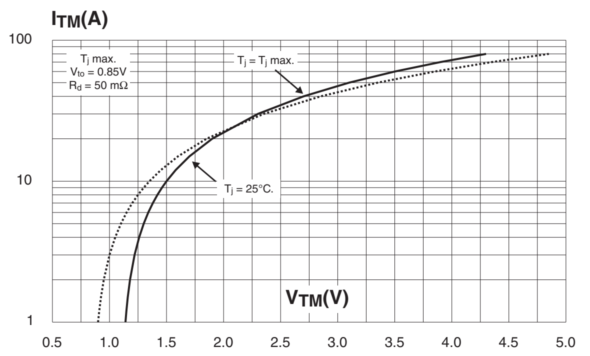


Figure 6: Surge peak on-state current versus number of cycles

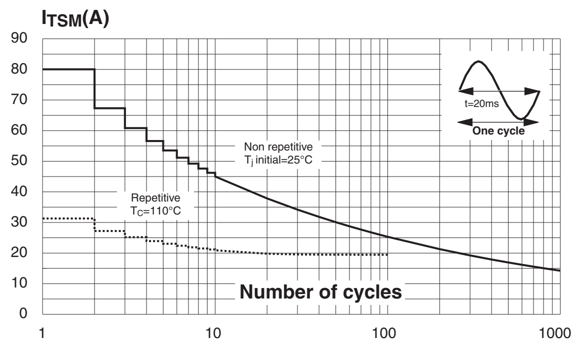


Figure 7: Non-repetitive surge peak on-state current for a sinusoidal pulse with width t_p < 10 ms and corresponding value of I^2t

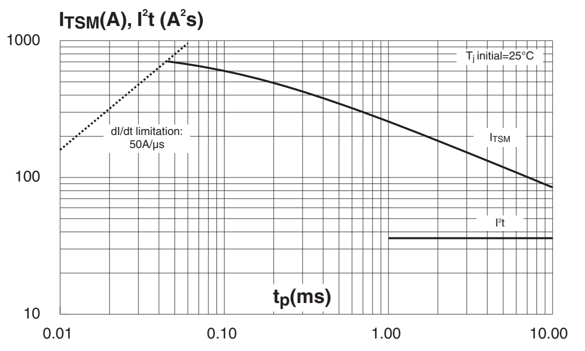


Figure 8: Relative variation of gate trigger current, holding current and latching current versus junction temperature (typical values)

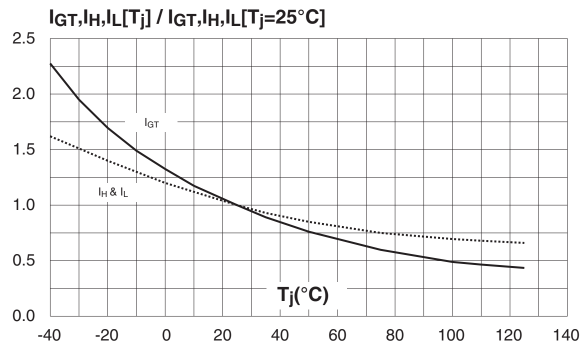


Figure 9: Relative variation of critical rate of decrease of main current versus (dV/dt)c (typical values) (Snubberless & Logic level types)

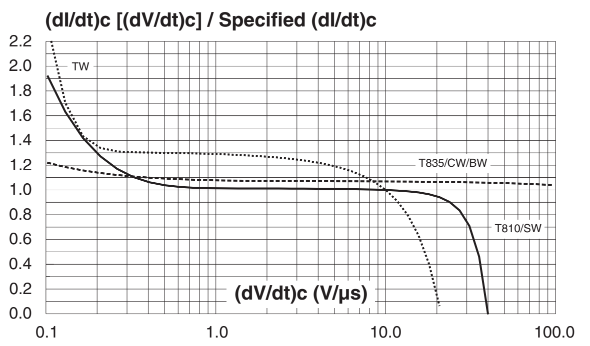


Figure 10: Relative variation of critical rate of decrease of main current versus (dV/dt)c (typical values) (Standard types)

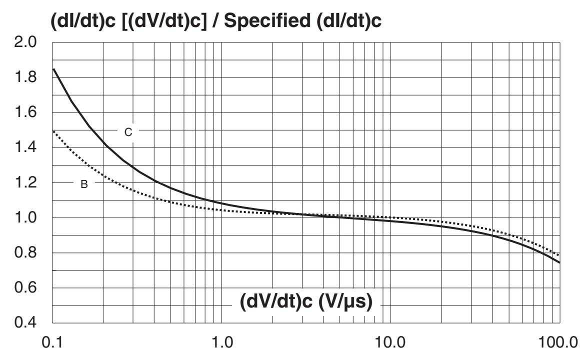


Figure 11: Relative variation of critical rate of decrease of main current versus junction temperature

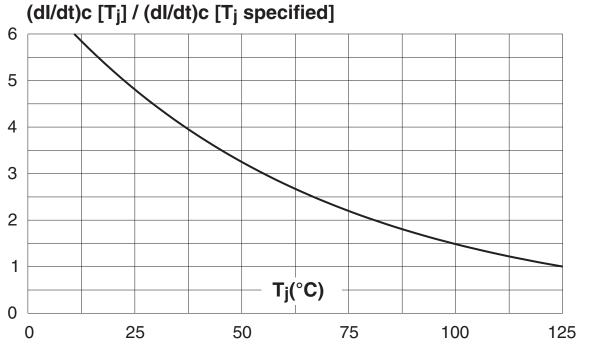


Figure 12: DPAK and D^2PAK Thermal resistance junction to ambient versus copper surface under tab (printed circuit board FR4, copper thickness: 35 µm)

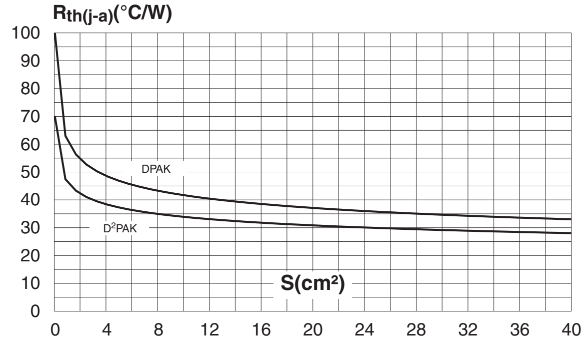


Figure 13: Ordering Information Scheme (BTA08 and BTB08 series)

BT A 08 - 600 BW (RG)

Triac series

Insulation
A = insulated
B = non insulated

Current
08 = 8A

Voltage
600 = 600V
800 = 800V

Sensitivity and type
B = 50mA Standard
C = 25mA Standard
SW = 10mA Logic Level
BW = 50mA Snubberless
CW = 35mA Snubberless
TW = 5mA Logic Level

Packing mode
RG = Tube

Figure 14: Ordering Information Scheme (T8 series)

T 8 10 - 600 B (-TR)

Triac series

Current
8 = 8A

Sensitivity
10 = 10mA
35 = 35mA

Voltage
600 = 600V
800 = 800V

Package
B = DPAK
G = D²PAK
R = I²PAK

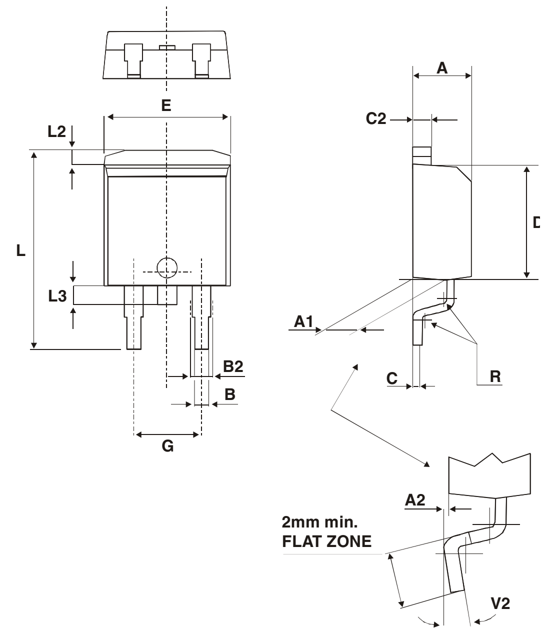
Packing mode
Blanck = Tube
-TR = Tape & Reel

Table 7: Product Selector

Part Number	Voltage (xxx)		Sensitivity	Type	Package
	600 V	800 V			
BTA/BTB08-xxxB	X	X	50 mA	Standard	TO-220AB
BTA/BTB08-xxxBW	X	X	50 mA	Snubberless	TO-220AB
BTA/BTB08-xxxC	X	X	25 mA	Standard	TO-220AB
BTA/BTB08-xxxCW	X	X	35 mA	Snubberless	TO-220AB
BTA/BTB08-xxxSW	X	X	10 mA	Logic level	TO-220AB
BTA/BTB08-xxxTW	X	X	5 mA	Logic Level	TO-220AB
T810-xxxG	X	X	10 mA	Logic Level	D^2PAK
T810-xxxH	X	X	10 mA	Logic Level	IPAK
T835-xxxB	X	X	35 mA	Snubberless	DPAK
T835-xxxG	X	X	35 mA	Snubberless	D^2PAK
T835-xxxH	X	X	35 mA	Snubberless	IPAK

BTB: non insulated TO-220AB package

Figure 15: D²PAK Package Mechanical Data



REF.	DIMENSIONS					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.30		4.60	0.169		0.181
A1	2.49		2.69	0.098		0.106
A2	0.03		0.23	0.001		0.009
B	0.70		0.93	0.027		0.037
B2	1.25	1.40		0.048	0.055	
C	0.45		0.60	0.017		0.024
C2	1.21		1.36	0.047		0.054
D	8.95		9.35	0.352		0.368
E	10.00		10.28	0.393		0.405
G	4.88		5.28	0.192		0.208
L	15.00		15.85	0.590		0.624
L2	1.27		1.40	0.050		0.055
L3	1.40		1.75	0.055		0.069
R		0.40			0.016	
V2	0°		8°	0°		8°

Figure 16: D²PAK Foot Print Dimensions
(in millimeters)

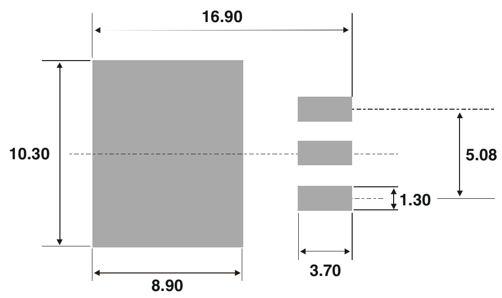
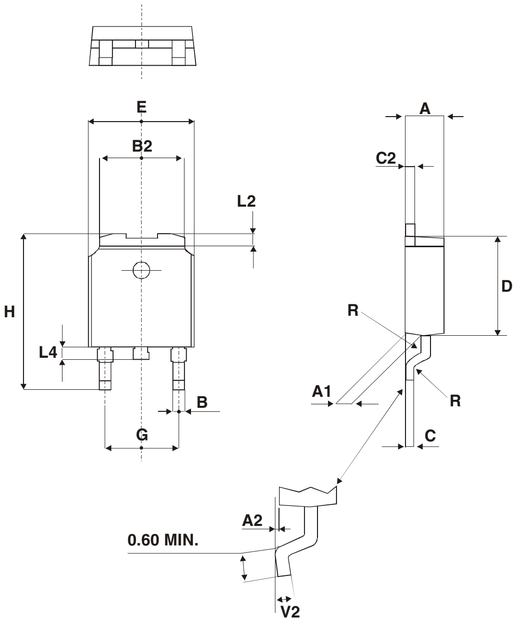


Figure 17: DPAK Package Mechanical Data



REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max	Min.	Max.
A	2.20	2.40	0.086	0.094
A1	0.90	1.10	0.035	0.043
A2	0.03	0.23	0.001	0.009
B	0.64	0.90	0.025	0.035
B2	5.20	5.40	0.204	0.212
C	0.45	0.60	0.017	0.023
C2	0.48	0.60	0.018	0.023
D	6.00	6.20	0.236	0.244
E	6.40	6.60	0.251	0.259
G	4.40	4.60	0.173	0.181
H	9.35	10.10	0.368	0.397
L2	0.80 typ.		0.031 typ.	
L4	0.60	1.00	0.023	0.039
V2	0°	8°	0°	8°

Figure 18: DPAK Foot Print Dimensions
(in millimeters)

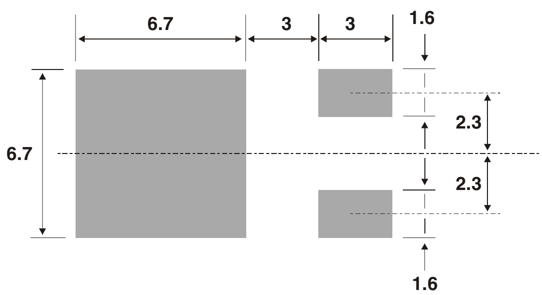
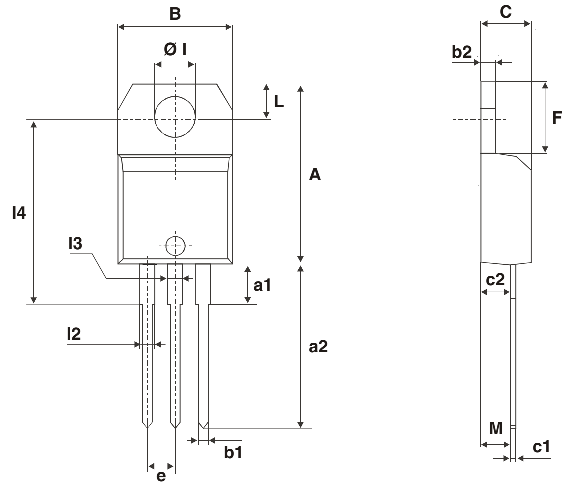
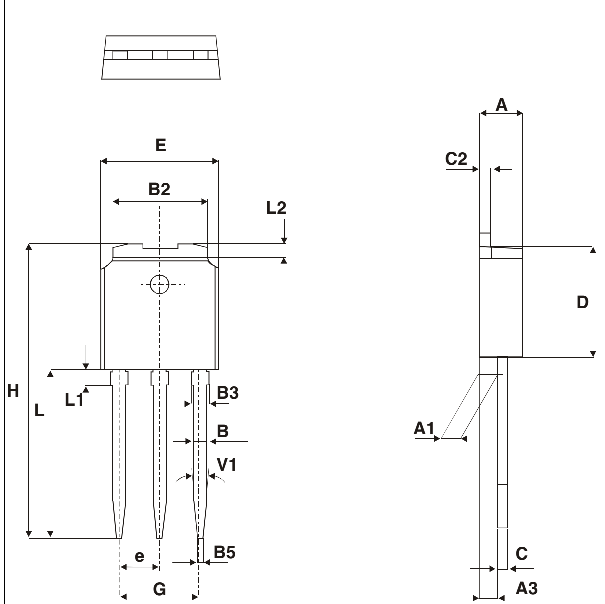


Figure 19: TO-220AB Package Mechanical Data



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
I4	15.80	16.40	16.80	0.622	0.646	0.661
L	2.65		2.95	0.104		0.116
I2	1.14		1.70	0.044		0.066
I3	1.14		1.70	0.044		0.066
M		2.60			0.102	

Figure 20: IPAK Package Mechanical Data



REF.	DIMENSIONS					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.20		2.40	0.086		0.094
A1	0.90		1.10	0.035		0.043
A3	0.70		1.30	0.027		0.051
B	0.64		0.90	0.025		0.035
B2	5.20		5.40	0.204		0.212
B3			0.95			0.037
B5		0.30			0.035	
C	0.45		0.60	0.017		0.023
C2	0.48		0.60	0.019		0.023
D	6		6.20	0.236		0.244
E	6.40		6.60	0.252		0.260
e		2.28			0.090	
G	4.40		4.60	0.173		0.181
H		16.10			0.634	
L	9		9.40	0.354		0.370
L1	0.8		1.20	0.031		0.047
L2		0.80	1		0.031	0.039
V1		10°			10°	

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect . The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

Table 8: Ordering Information

<table>
<tr><th>Ordering type</th><th>Marking</th><th>Package</th><th>Weight</th><th>Base qty</th><th>Delivery mode</th></tr>
<tr><td>BTA/BTB08-xxxyzRG</td><td>BTA/BTB08-xxxyz</td><td>TO-220AB</td><td>2.3 g</td><td>50</td><td>Tube</td></tr>
<tr><td>T8yy-xxxG</td><td>T8yyxx</td><td rowspan="2">D^2PAK</td><td rowspan="2">1.5 g</td><td>50</td><td>Tube</td></tr>
<tr><td>T8yy-xxxG-TR</td><td>T8yyxx</td><td>1000</td><td>Tape & reel</td></tr>
<tr><td>T8yy-xxxB</td><td>T8yyxx</td><td rowspan="2">DPAK</td><td rowspan="2">0.3 g</td><td>75</td><td>Tube</td></tr>
<tr><td>T8yy-xxxB-TR</td><td>T8yyxx</td><td>2500</td><td>Tape & reel</td></tr>
<tr><td>T8yy-xxxH</td><td>T8yyxx</td><td>IPAK</td><td>0.4 g</td><td>75</td><td>Tube</td></tr>
</table>

Note: xxx = voltage, yy = sensitivity, z = type

Table 9: Revision History

Date	Revision	Description of Changes
Apr-2002	5A	Last update.
13-Feb-2006	6	TO-220AB delivery mode changed from bulk to tube. ECOPACK statement added.