

### Features

- High current TRIAC
- Low thermal resistance with clip bonding
- High commutation capability
- BTA series UL1557 certified (File ref: 81734)
- Packages are RoHS (2002/95/EC) compliant

### Applications

- On/off function in static relays, heating regulation, induction motor starting circuits
- Phase control operations in light dimmers, motor speed controllers, and similar

### Description

Available in high power packages, the BTA/BTB40-41 series is suitable for general purpose AC switching.

The BTA series provides an insulated tab (rated at 2500 V rms).



**Table 1. Device summary**

Symbol	Parameter	BTA40 <sup>(1)</sup>	BTA41 <sup>(1)</sup>	BTB41	Unit
$I_{T(RMS)}$	On-state rms current	40	41	41	A
$V_{DRM}/V_{RRM}$	Repetitive peak off-state voltage	600 and 800	600 and 800	600 and 800	V
$I_{GT}$	Triggering gate current	50	50	50	mA

1. Insulated package

# 1 Characteristics

**Table 2. Absolute maximum ratings**

Symbol	Parameter			Value	Unit
$I_{T(RMS)}$	On-state rms current (full sine wave)	TOP3	$T_c = 95\text{ }^\circ\text{C}$	40	A
		RD91 / TOP ins.	$T_c = 80\text{ }^\circ\text{C}$		
$I_{TSM}$	Non repetitive surge peak on-state current (full cycle, $T_j$ initial = $25\text{ }^\circ\text{C}$ )	F = 50 Hz	t = 20 ms	400	A
		F = 60 Hz	t = 16.7 ms	420	
$I^2t$	$I^2t$ Value for fusing	$t_p = 10\text{ ms}$		1000	$\text{A}^2\text{s}$
dl/dt	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$ , $t_r \leq 100\text{ ns}$	F = 120 Hz	$T_j = 125\text{ }^\circ\text{C}$	50	$\text{A}/\mu\text{s}$
$V_{DSM}/V_{RSM}$	Non repetitive surge peak off-state voltage	$t_p = 10\text{ ms}$	$T_j = 25\text{ }^\circ\text{C}$	$V_{DSM}/V_{RSM} + 100$	V
$I_{GM}$	Peak gate current	$t_p = 20\text{ }\mu\text{s}$	$T_j = 125\text{ }^\circ\text{C}$	8	A
$P_{G(AV)}$	Average gate power dissipation		$T_j = 125\text{ }^\circ\text{C}$	1	W
$T_{stg}$ $T_j$	Storage junction temperature range Operating junction temperature range			- 40 to + 150 - 40 to + 125	$^\circ\text{C}$

**Table 3. Electrical characteristics ( $T_j = 25\text{ }^\circ\text{C}$ , unless otherwise specified)**

Symbol	Parameter			Value	Unit	
$I_{GT}^{(1)}$	$V_D = 12\text{ V}$ $R_L = 33\text{ }\Omega$	I - II - III	MAX.	50	mA	
		IV		100		
$V_{GT}$		ALL	MAX.	1.3	V	
$V_{GD}$	$V_D = V_{DRM}$ $R_L = 3.3\text{ k}\Omega$ $T_j = 125\text{ }^\circ\text{C}$	ALL	MIN.	0.2	V	
$I_H^{(2)}$	$I_T = 500\text{ mA}$		MAX.	80	mA	
$I_L$	$I_G = 1.2 I_{GT}$	I - III - IV	MAX.	70	mA	
		II		160		
$dV/dt^{(2)}$	$V_D = 67\% V_{DRM}$ gate open	$T_j = 125\text{ }^\circ\text{C}$	MIN.	500	$\text{V}/\mu\text{s}$	
$(dV/dt)_c^{(2)}$	$(dl/dt)_c = 20\text{ A/ms}$		$T_j = 125\text{ }^\circ\text{C}$	MIN.	10	$\text{V}/\mu\text{s}$

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

**Table 4. Static characteristics**

Symbol	Test conditions		Value	Unit	
$V_T^{(1)}$	$I_{TM} = 60\text{ A}$ $t_p = 380\ \mu\text{s}$	$T_j = 25\text{ }^\circ\text{C}$	MAX.	1.55	V
$V_{t0}^{(2)}$	Threshold voltage	$T_j = 125\text{ }^\circ\text{C}$	MAX.	0.85	V
$R_d^{(2)}$	Dynamic resistance	$T_j = 125\text{ }^\circ\text{C}$	MAX.	10	m $\Omega$
$I_{DRM}$ $I_{RRM}$	$V_{DRM} = V_{RRM}$	$T_j = 25\text{ }^\circ\text{C}$	MAX.	5	$\mu\text{A}$
		$T_j = 125\text{ }^\circ\text{C}$		5	mA

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

**Table 5. Thermal resistance**

Symbol	Test conditions		Value	Unit
$R_{th(j-c)}$	Junction to case (AC)	RD91 (insulated) / TOP3 insulated	0.9	$^\circ\text{C/W}$
		TOP3	0.6	
$R_{th(j-a)}$	Junction to ambient	TOP3 / TOP3 insulated	50	$^\circ\text{C/W}$

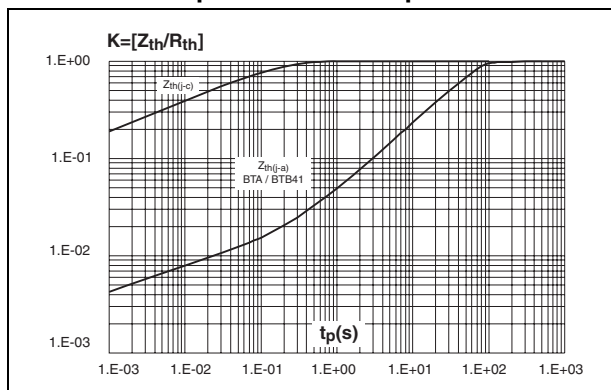
**Figure 1. Maximum power dissipation versus on-state rms current (full cycle)**



**Figure 2. On-state rms current versus case temperature (full cycle)**



**Figure 3. Relative variation of thermal impedance versus pulse duration**



**Figure 4. On-state characteristics (maximum values)**

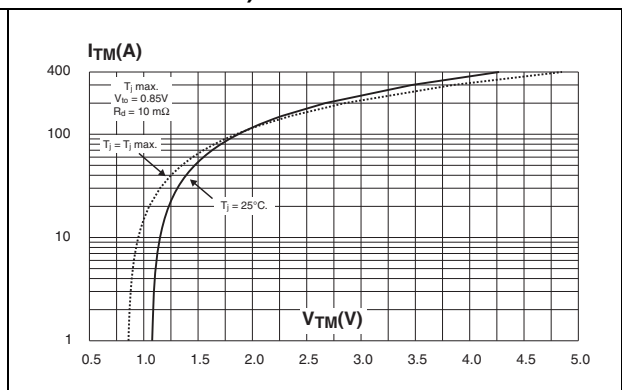


Figure 5. Surge peak on-state current versus number of cycles



Figure 6. Non-repetitive surge peak on-state current for a sinusoidal pulse and corresponding value of  $I^2t$

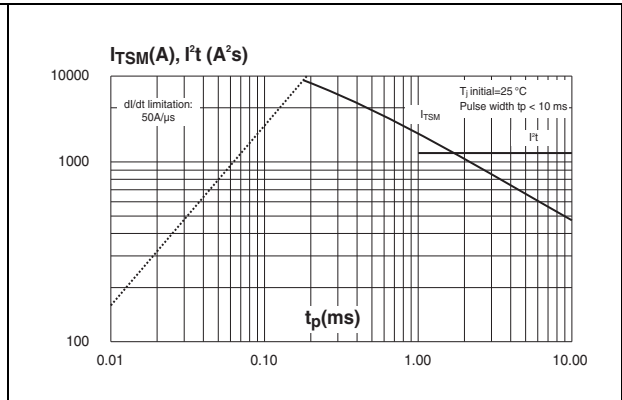


Figure 7. Relative variation of gate trigger, holding and latching current versus junction temperature



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

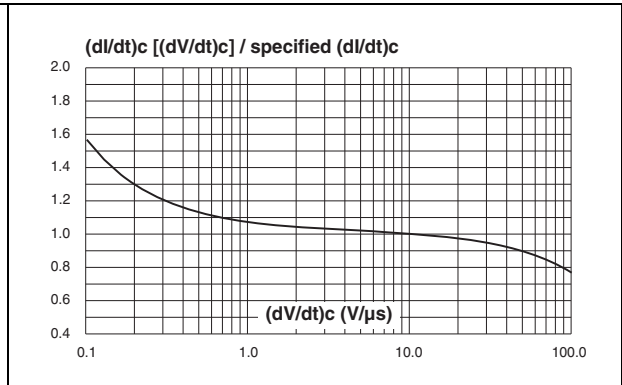
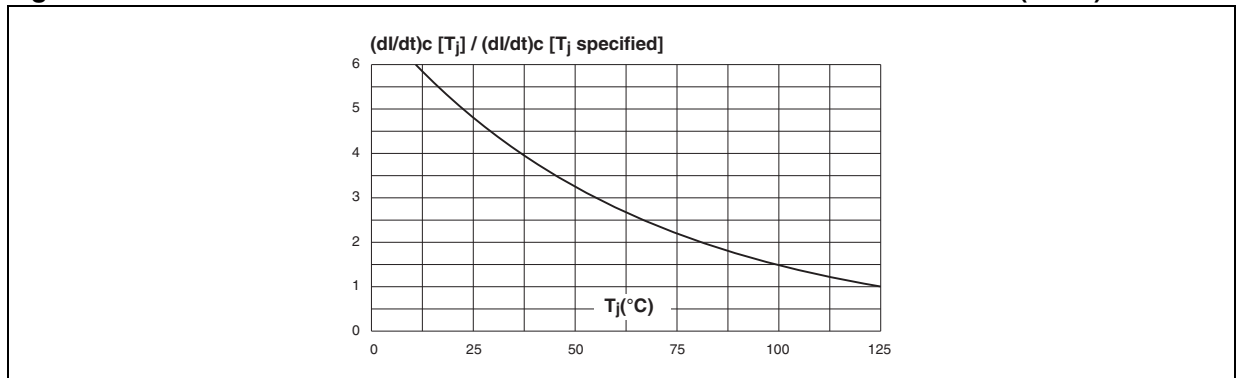


Figure 9. Relative variation of critical rate of decrease of main current versus  $(dV/dt)c$



## 2 Ordering information scheme

Figure 10. Ordering information scheme



### 3 Package information

- Epoxy meets UL94, V0
- Lead-free packages

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.

**Table 6. TOP3 insulated and non-insulated dimensions**

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.4	4.6	0.173	0.181
B	1.45	1.55	0.057	0.061
C	14.35	15.60	0.565	0.614
D	0.5	0.7	0.020	0.028
E	2.7	2.9	0.106	0.114
F	15.8	16.5	0.622	0.650
G	20.4	21.1	0.815	0.831
H	15.1	15.5	0.594	0.610
J	5.4	5.65	0.213	0.222
K	3.4	3.65	0.134	0.144
ØL	4.08	4.17	0.161	0.164
P	1.20	1.40	0.047	0.055
R	4.60 typ.		0.181 typ.	



Table 7. RD91 dimensions

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	-	40.00	-	1.575
A1	29.90	30.30	1.177	1.193
A2	-	22.00	-	0.867
B	-	27.00	-	1.063
B1	13.50	16.50	0.531	0.650
B2	-	24.00	-	0.945
C	-	14.00	-	0.551
C1	-	3.50	-	0.138
C2	1.95	3.00	0.077	0.118
E3	0.70	0.90	0.027	0.035
F	4.00	4.50	0.157	0.177
I	11.20	13.60	0.441	0.535
L1	3.10	3.50	0.122	0.138
L2	1.70	1.90	0.067	0.075
N1	33°	43°	33°	43°
N2	28°	38°	28°	38°

## 4 Ordering information

**Table 8. Ordering information**

Order code <sup>(1)</sup>	Marking	Package	Weight	Base qty	Delivery mode
BTA40-xxxB	BTA40xxxB	RD91	20 g	25	Bulk
BTA41-xxxBRG	BTA41xxxB	TOP3 Ins.	4.5 g	30	Tube
BTB41-xxxBRG	BTB41xxxB	TOP3	4.5 g	30	Tube

1. xxx = voltage

## 5 Revision history

**Table 9. Document revision history**

Date	Revision	Changes
Sep-2003	5	Last update.
25-Mar-2005	6	TOP3 delivery mode changed from bulk to tube.
14-Oct-2005	7	T <sub>c</sub> values for I <sub>T</sub> changed in Table 3. ECOPACK statement added.
10-Aug-2009	8	Updated <a href="#">Table 2</a> to correctly place packages. Updated <a href="#">Figure 2</a> . <a href="#">Table 5</a> changed to correctly place TOP3. Updated ECOPACK statement.



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