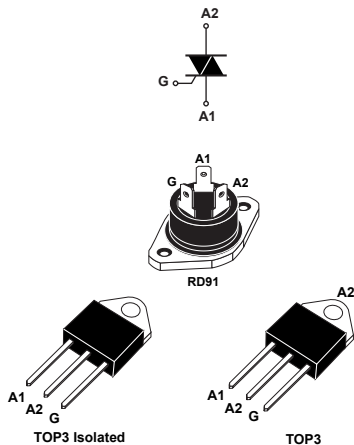


800 V and 600 V, 40 A standard Triacs in TOP3 and RD91 package



Features

- High current Triac
- Low thermal resistance
- BTA40 and BTA41 UL1557 recognized components (file ref: 81734)
- RoHS (2002/95/EC) compliant packages
- UL-94, V0 flammability package resin compliance

Application

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

Description

Available in power packages, the BTA40, BTA41, and BTB41 are suitable for general purpose AC switching.

When used with the properly dimensioned heatsink, the BTA40, BTA41 and BTB41 can enable AC switching systems up to 9 kW. Refer to STMicroelectronics application note [AN533](#) for thermal management of Triacs.

The BTA40, and BTA41 provides an insulated tab (rated at 2500 V rms). They are recognized by UL. Representative samples of these components have been evaluated by UL and meet applicable UL requirements for the UL 1557 standard (file Ref. 81734).

Product status link	
BTA40	RD91 package
BTA41	TOP3 isolated package
BTB41	TOP3 package

Product summary	
$I_{T(RMS)}$	40 A
V_{DRM}/V_{RRM}	600 V to 800 V
I_{GT}	50 mA

1 Characteristics

Table 1. Absolute maximum ratings

Symbol	Parameters			Value	Unit
$I_{T(RMS)}$	RMS on-state current (180° conduction angle)	BTA40, BTA41	$T_c = 80\text{ °C}$	40	A
		BTB41	$T_c = 95\text{ °C}$		
I_{TSM}	Non repetitive surge peak on-state current (full cycle, T_j initial = 25 °C)	$t_p = 16,7\text{ ms}$		420	A
		$t_p = 20\text{ ms}$		400	
I^2t	I^2t value for fusing	$t_p = 10\text{ ms}$		1000	A ² s
di/dt	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$, $t_r \leq 100\text{ ns}$	$f = 120\text{ Hz}$	$T_j = 125\text{ °C}$	50	A/ μ s
V_{DSM}, V_{RSM}	Non repetitive surge peak off-state voltage	$t_p = 20\text{ ms}$	$T_j = 25\text{ °C}$	$V_{DRM}, V_{RRM} + 100$	V
I_{GM}	Peak gate current	$t_p = 20\text{ }\mu$ s	$T_j = 125\text{ °C}$	8	A
$P_{G(AV)}$	Average gate power dissipation	$T_j = 125\text{ °C}$		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 ($T_j = 25\text{ °C}$, unless otherwise specified) - standard (4 quadrants)

Symbol	Parameters	Quadrant		Values	Unit
$I_{GT}^{(1)}$	$V_D = 12\text{ V}$, $R_L = 33\text{ }\Omega$	I - II - III	Max.	50	mA
		IV		100	
V_{GT}		I - II - III	Max.	1.3	V
V_{GD}	$V_D = V_{DRM}$, $R_L = 3.3\text{ k}\Omega$, $T_j = 125\text{ °C}$	I - II - III	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	Max.	160	
$dV/dt^{(2)}$	$V_D = 67\text{ % } V_{DRM}$ gate open, $T_j = 125\text{ °C}$		Min.	500	V/ μ s
$(dV/dt)_c^{(2)}$	$(di/dt)_c = 20\text{ A/ms}$, $T_j = 125\text{ °C}$		Min.	10	V/ μ s

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

2. For both polarities of A2 referenced to A1

Table 3. Static electrical characteristics

Symbol	Test conditions	T_j		Value	Unit
$V_{TM}^{(1)}$	$I_{TM} = 60\text{ A}$, $t_p = 380\text{ }\mu$ s	25 °C	Max.	1.55	V
$V_{TO}^{(1)}$	threshold on-state voltage	125 °C	Max.	0.85	V
$R_D^{(1)}$	Dynamic resistance	125 °C	Max.	10	m Ω
I_{DRM}/I_{RRM}	$V_T = V_{DRM}$, $V_T = V_{RRM}$	25 °C	Max.	5	μ A
		125 °C		5	mA

1. For both polarities of A2 referenced to A1

Table 4. Thermal resistance

Symbol	Parameters		Value	Unit
$R_{th(j-c)}$	Junction to case (AC)	BTA40 / BTA41	0.9	°C/W
		BTB41	0.6	
$R_{th(j-a)}$	Junction to ambient	BTA40 / BTA41 / BTB41	50	

1.1 Characteristics (curves)

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

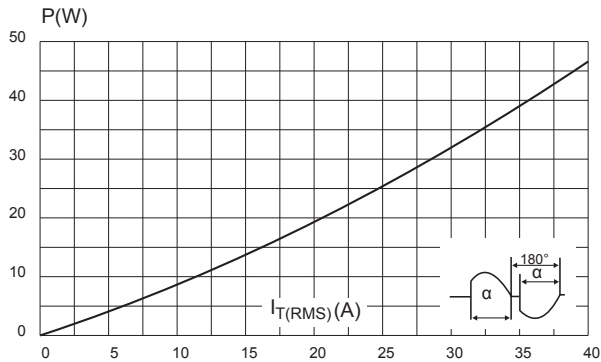


Figure 2. RMS on-state current versus case temperature (full cycle)

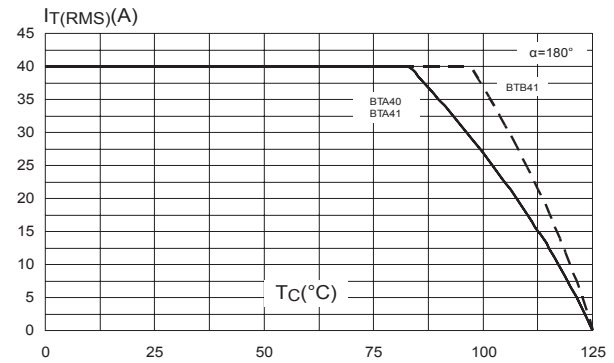


Figure 3. Relative variation of thermal impedance versus pulse duration

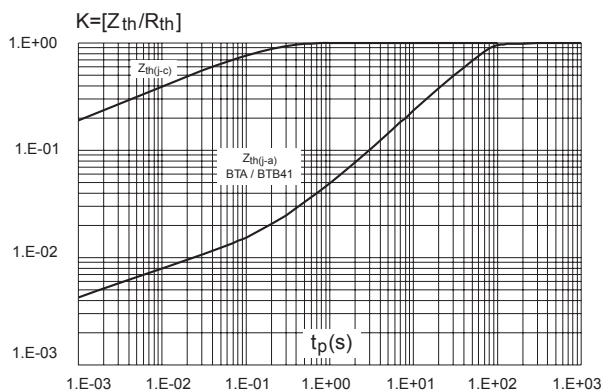


Figure 4. On-state characteristics (maximum values)

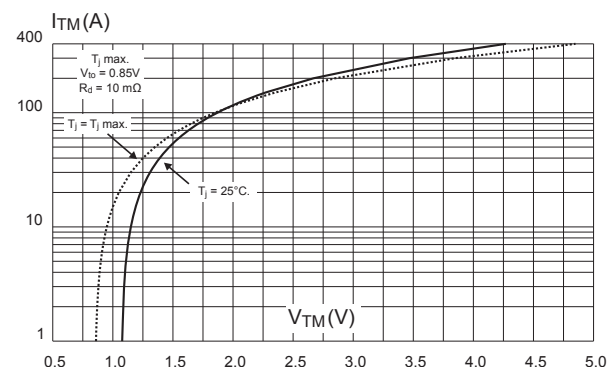


Figure 5. Surge peak on-state current versus number of cycles

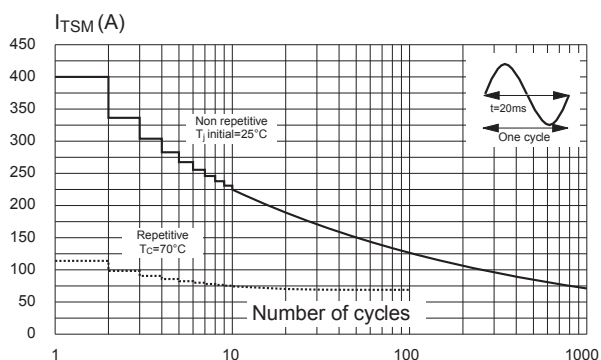


Figure 6. Non-repetitive surge peak on-state current for a sinusoidal pulse

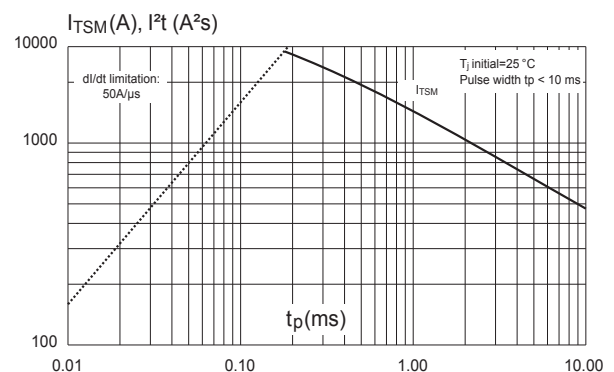


Figure 7. Relative variation of gate trigger current, holding and latching current versus junction temperature

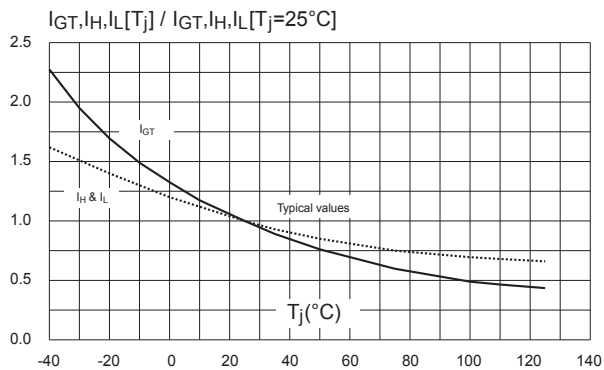


Figure 8. Relative variation of critical rate of decrease of main current versus $(dV/dt)_c$ (typical values)

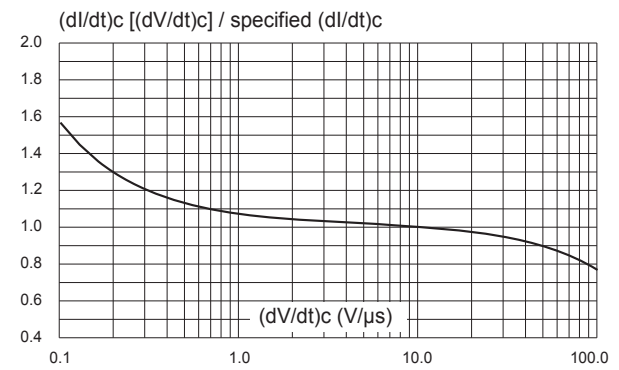
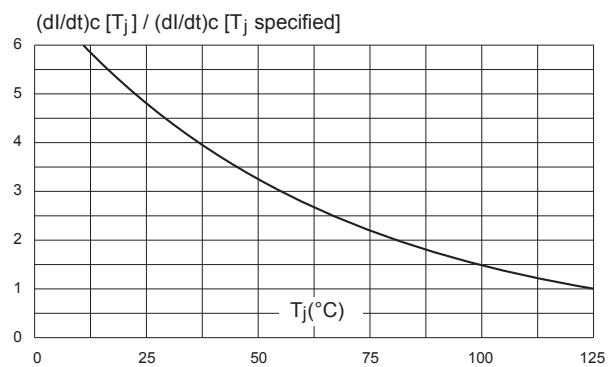


Figure 9. Relative variation of critical rate of decrease of main current versus junction temperature (typical values)



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 TOP3 insulated and non-insulated package information

- Epoxy meets UL94, V0
- Lead-free packages
- Recommended torque: 1.05 N·m (max. torque: 1.2 N·m)

Figure 10. TOP3 insulated and non-insulated package outline

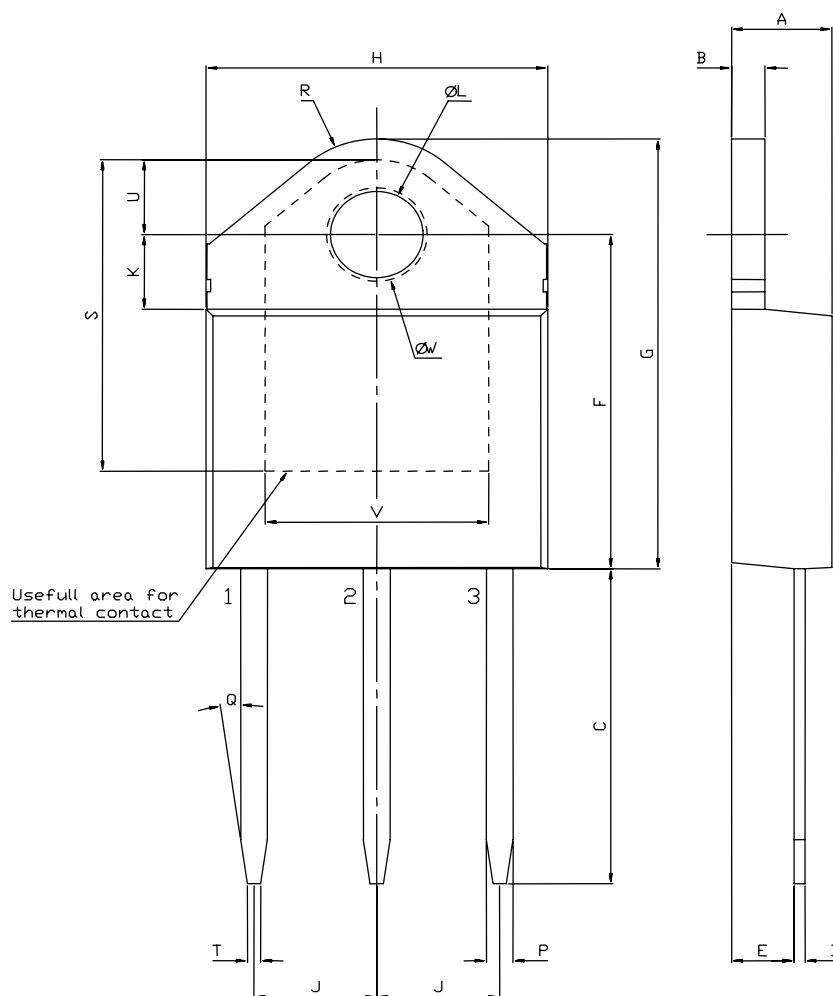


Table 5. TOP3 insulated and non-insulated mechanical data

Ref.	Dimensions					
	mm			Inches ⁽¹⁾		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40		4.60	0.1732		0.1812
B	1.45		1.55	0.0570		0.0611
C	14.35		15.60	0.5649		0.6142
D	0.50		0.70	0.0196		0.0276
E	2.70		2.90	0.1062		0.1142
F	15.80		16.50	0.6220		0.6497
G	20.40		21.10	0.8031		0.8308
H	15.10		15.50	0.5944		0.6103
J	5.40		5.65	0.2125		0.2225
K	3.40		3.65	0.1338		0.1438
L	4.08		4.17	0.1606		0.1642
P	1.10		1.30	0.0430		0.0510
R		4.60			0.1811	

1. Inches given for reference only

2.2 RD91 package information

- Epoxy meets UL94, V0
- Cooling method: Conduction
- Recommended torque: 0.9 to 1.2 N·m

Figure 11. RD91 package outline

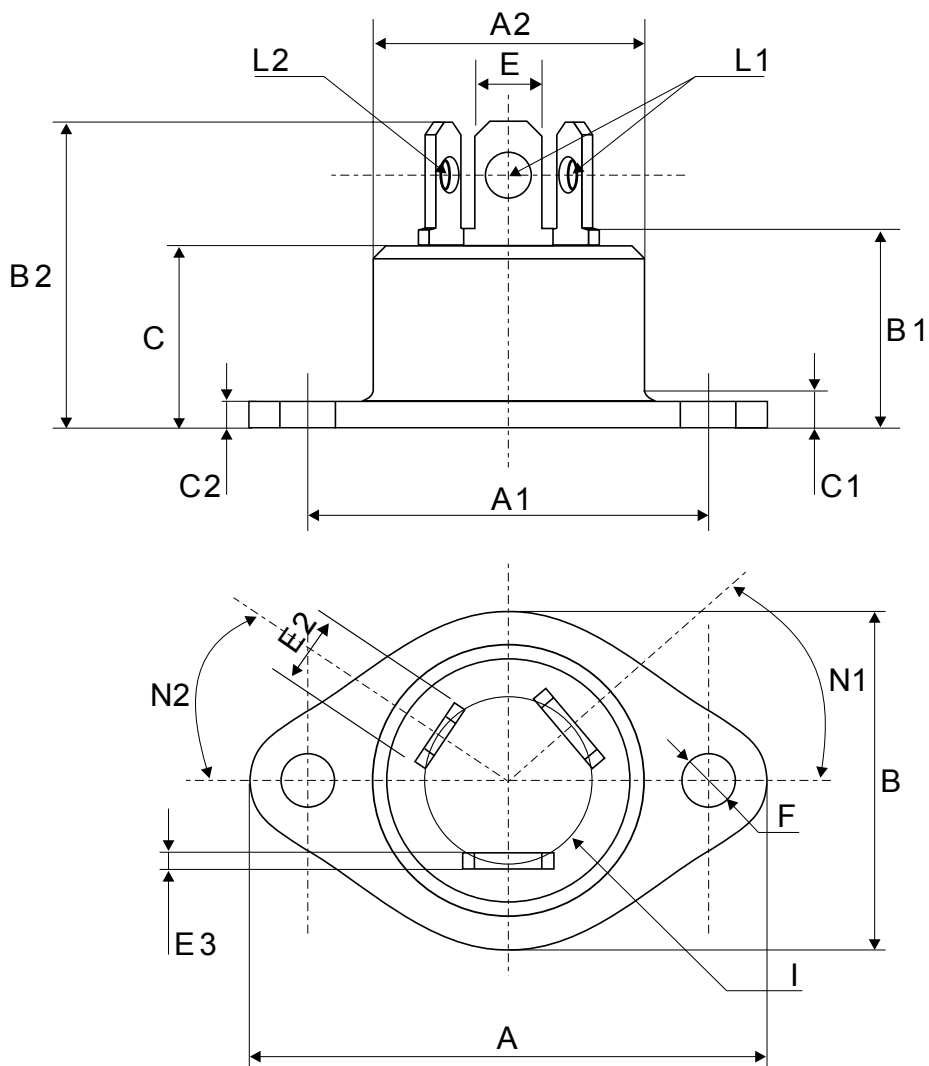


Table 6. RD91 mechanical data

Ref.	Dimensions					
	mm			Inches ⁽¹⁾		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			40.00			1.575
A1	30.10		30.30	1.185		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			0.552
C1			3.50			0.138
C2	1.90		2.10	0.074		0.083
E	6.10		6.50	0.240		0.256
E2	4.80		5.20	0.188		0.205
E3	0.70		0.90	0.027		0.036
F	4.00		4.30	0.157		0.170
I	11.20		11.60	0.440		0.536
L1	3.10		3.50	0.122		0.138
L2	1.70		1.90	0.066		0.075
N1	33°		43°	33°		43°
N2	28°		38°	28°		38°

1. Inches given for reference only

3 Ordering information

Figure 12. Ordering information scheme (BTA40, BTA41 and BTB-41 series)

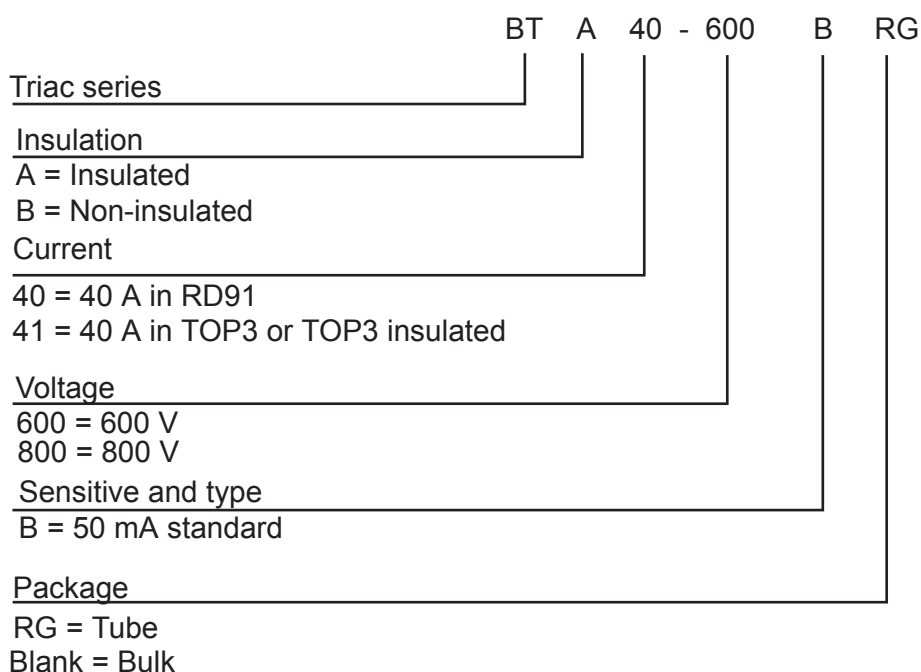


Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
BTA40-600B	BTA40600B	RD91	20 g	25	Bulk
BTA40-800B	BTA40800B	RD91	20 g	25	Bulk
BTA41-600BRG	BTA41600B	TOP3 Ins.	4.5 g	30	Tube
BTA41-800BRG	BTA41800B	TOP3 Ins.	4.5 g	30	Tube
BTB41-600BRG	BTB41600B	TOP3	4.5 g	30	Tube
BTB41-800BRG	BTB41800B	TOP3	4.5 g	30	Tube

Revision history

Table 8. 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 _c values for I _T changed in Table 3. ECOPACK statement added.
10-Aug-2009	8	Updated Table 2 to correctly place packages. Updated Figure 2. Table 5 changed to correctly place TOP3. Updated ECOPACK statement.
02-Dec-2020	9	Updated Figure 6 and Figure 12. Added Application section. Minor text changes.
28-Jan-2021	10	Updated Table 1 and Table 4.
24-Mar-2021	11	Updated coverimage.
08-Feb-2023	12	Updated Section Description .
26-Jul-2023	13	Updated Table 5. TOP3 insulated and non-insulated mechanical data .

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