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 °C	40	A
		BTB41	T_c = 95 °C		
I_{TSM}	Non repetitive surge peak on-state current (full cycle, T_j initial = 25 °C)		t_p = 16,7 ms	420	A
			t_p = 20 ms	400	
I^2t	I^2t value for fusing	t_p = 10 ms		1000	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 = 20 ms	T_j = 25 °C	V_{DRM}, V_{RRM} + 100	V
I_{GM}	Peak gate current	t_p = 20 µs	T_j = 125 °C	8	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) - standard (4 quadrants)

Symbol	Parameters	Quadrant		Values	Unit
I_{GT}(1)	V_D = 12 V, R_L = 33 Ω	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 kΩ, T_j = 125 °C	I - II - III	Min.	0.2	V
I_H(2)	I_T = 500 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 % V_{DRM} gate open, T_j = 125 °C		Min.	500	V/µs
(dV/dt)c(2)	(dI/dt)c = 20 A/ms, T_j = 125 °C		Min.	10	V/µs

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 A, t_p = 380 µs	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	mΩ
I_{DRM}/I_{RRM}	V_T = V_{DRM}, V_T = V_{RRM}	25 °C	Max.	5	µA
		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)

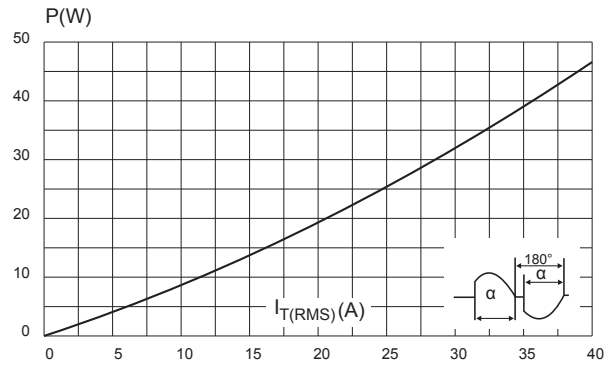


Figure 2. RMS on-state current versus case temperature (full cycle)

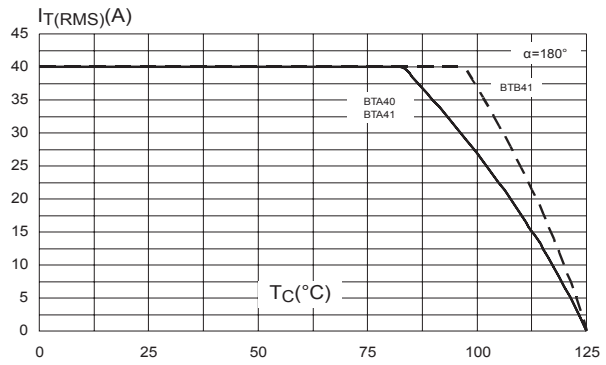


Figure 3. Relative variation of thermal impedance versus pulse duration

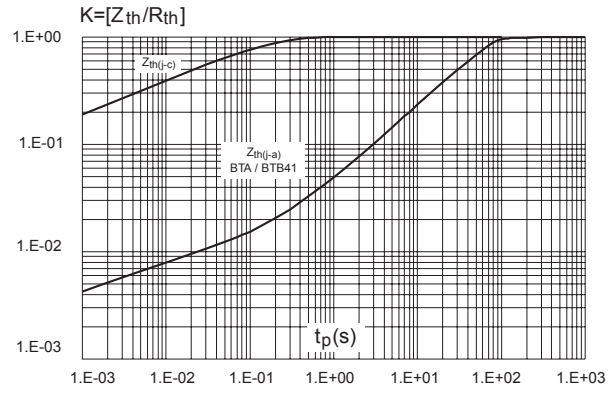


Figure 4. On-state characteristics (maximum values)

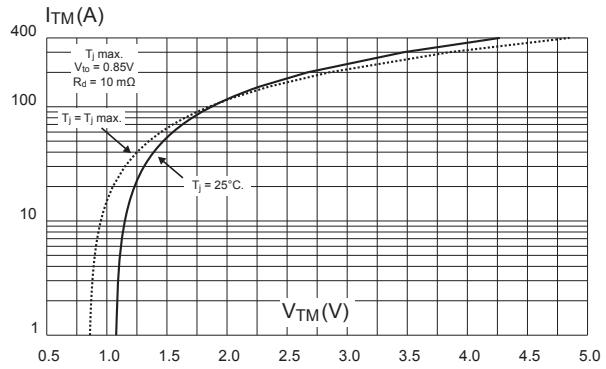


Figure 5. Surge peak on-state current versus number of cycles

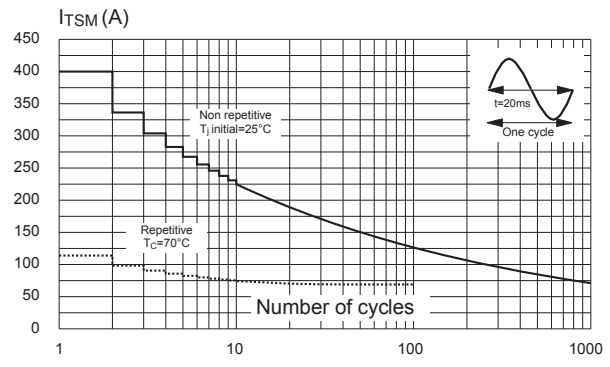


Figure 6. Non-repetitive surge peak on-state current for a sinusoidal pulse

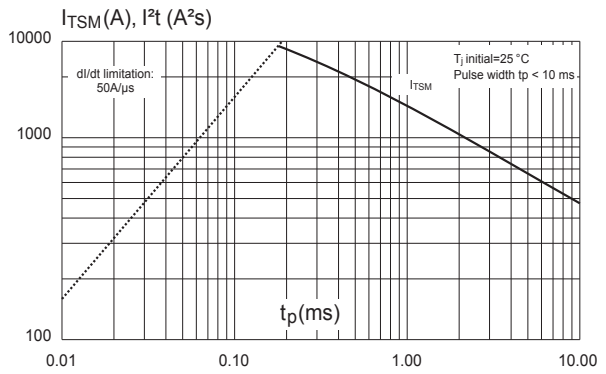


Figure 7. Relative variation of gate trigger current, holding and latching current versus junction temperature

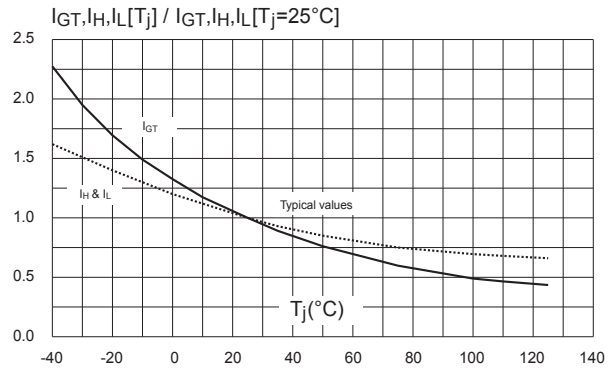


Figure 8. Relative variation of critical rate of decrease of main current versus (dV/dt)c (typical values)

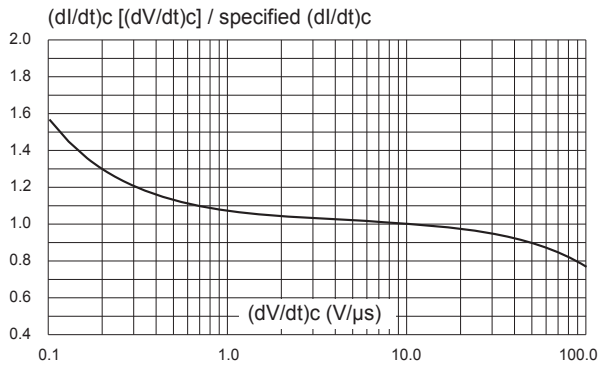
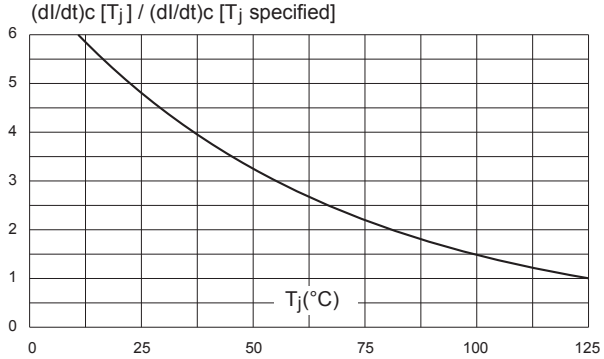


Figure 9. Relative variation of critical rate of decrease of main current versus junction temperature (typical values)



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

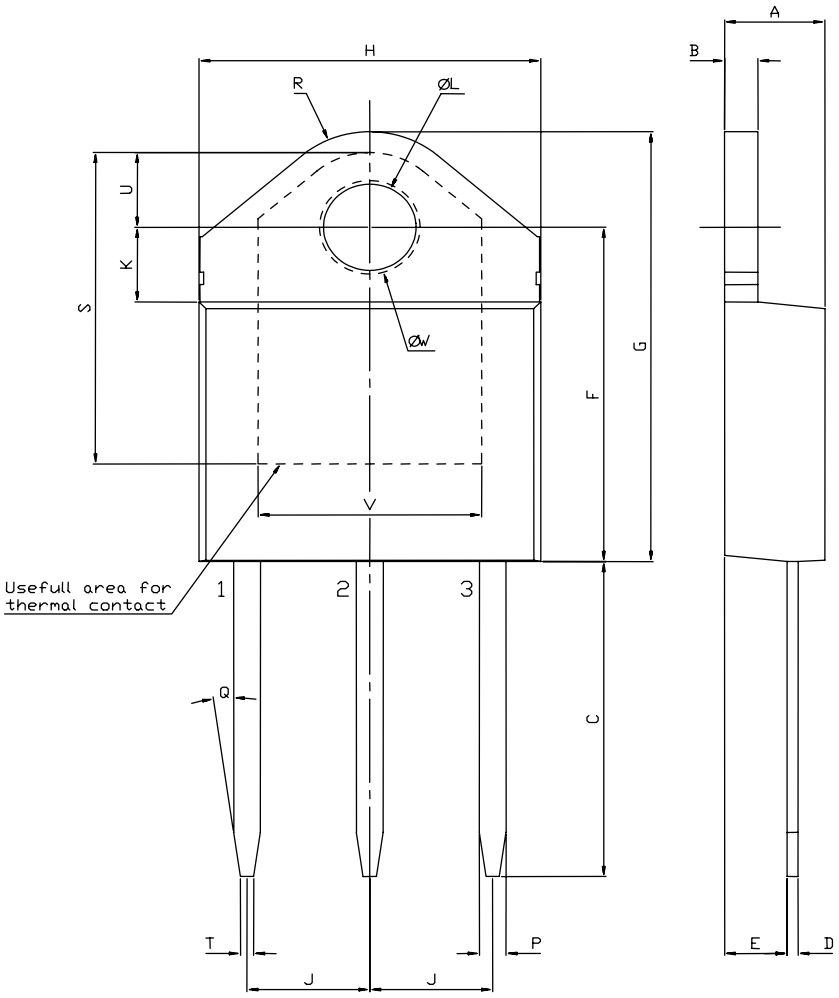


Table 5. TOP3 insulated and non-insulated mechanical data

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
M	1.20		1.40	0.0472		0.0552
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

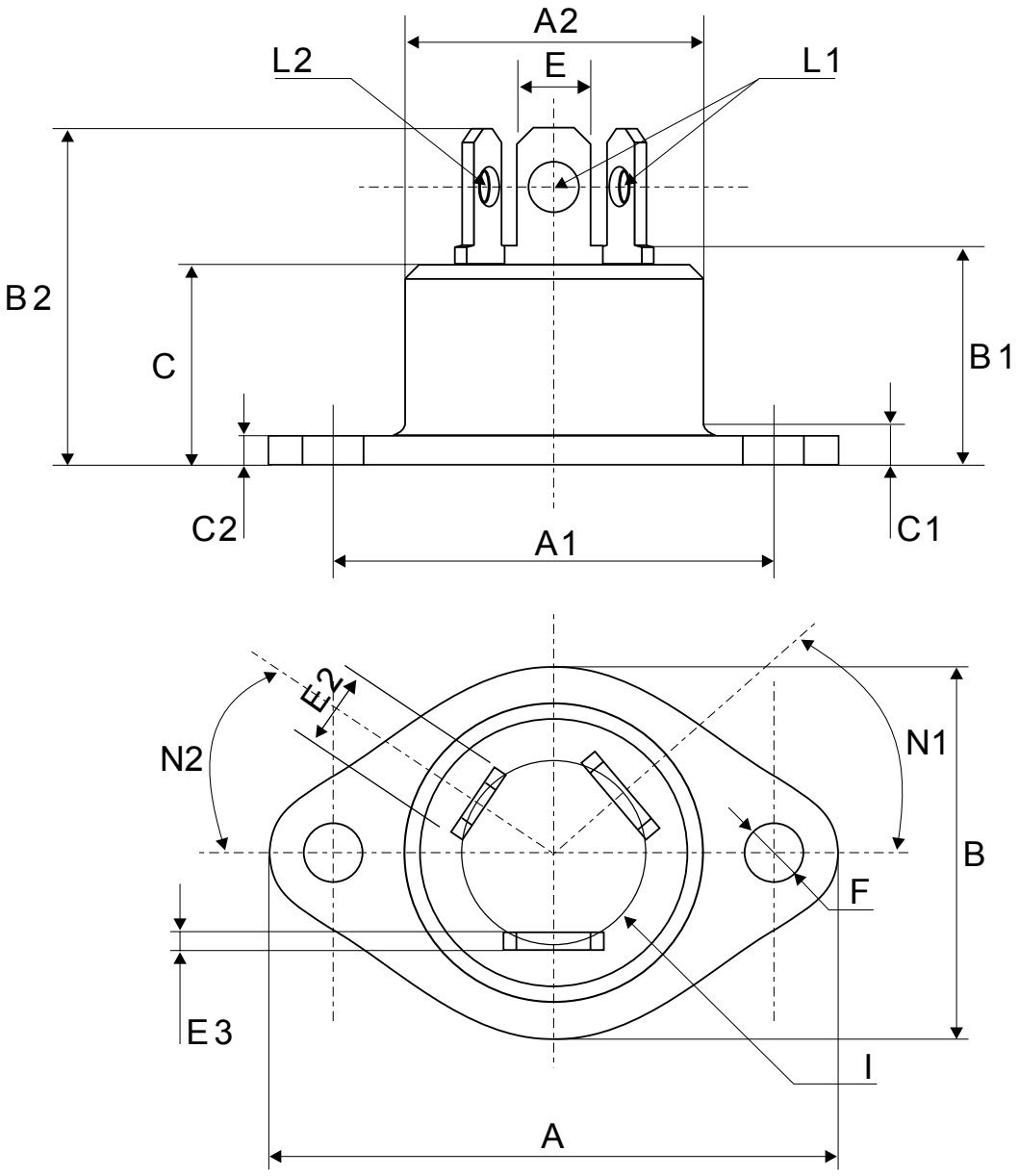


Table 6. RD91 mechanical data

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)**

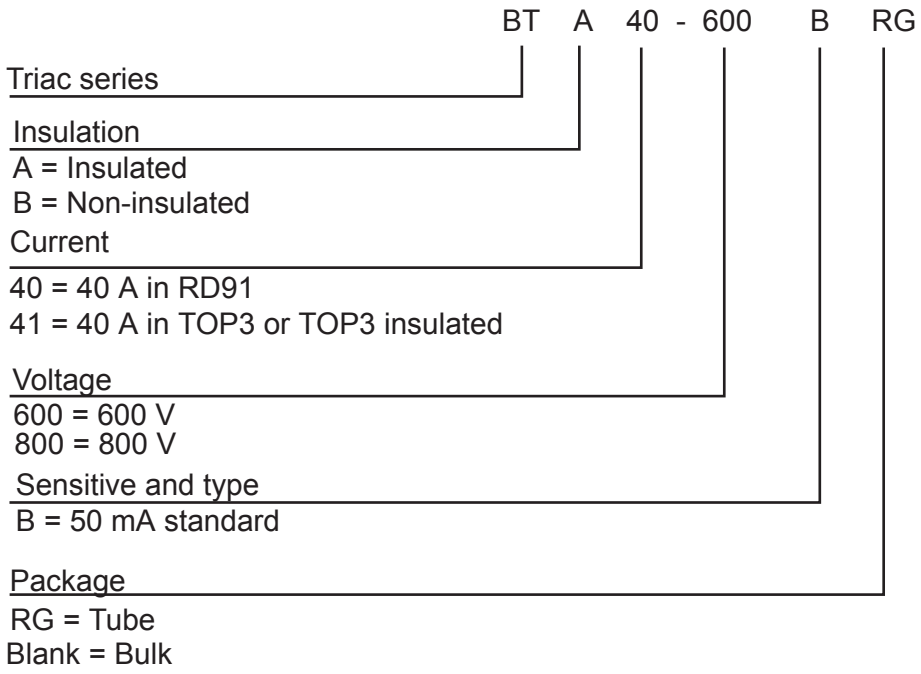


Table 7. **Ordering information**

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 change.
28-Jan-2021	10	Updated Table 1 and Table 4.
24-Mar-2021	11	Updated coverimage.