

## Features

- On-state rms current: 30 A
- Blocking voltage: up to 1200 V
- Gate current: 50 mA
- UL 2500 V insulation (file ref E81734)

## Applications

- Solid state relays
- Battery charging system
- Uninterruptible power supply
- Variable speed motor drive
- Industrial welding systems
- By pass AC switch

## Description

Available in a high power insulated package, the BTW68 series is suitable for applications where power handling and power dissipation are critical such as solid state relays, welding equipment and high power motor control.

Based on a clip assembly technology, this device offers a superior performance in surge current handling capabilities.

Thanks to the internal ceramic pad, the device provides high voltage insulation (2500  $V_{RMS}$ ) and complies with UL standards (file ref: E81734).

### Product status link

[BTW68](#)

### Product summary

$I_{T(RMS)}$	30 A
$V_{DRM}/V_{RRM}$	600 to 1200 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)	$T_c = 80\text{ °C}$	30 A	
$I_{T(AV)}$	Average on-state current (180° conduction angle)	$T_c = 80\text{ °C}$	19 A	
$I_{TSM}$	Non repetitive surge peak on-state current (full cycle, $T_j$ initial = 25 °C, $V_R = 0\text{ V}$ )	$t_j = 25\text{ °C}$	$t_p = 8.3\text{ ms}$	420 A
			$t_p = 10\text{ ms}$	400 A
$I^2t$	$I^2t$ value for fusing	$T_j = 25\text{ °C}$	800 A <sup>2</sup> s	
$di/dt$	Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$ , $t_r \leq 100\text{ ns}$	$F = 60\text{ Hz}$ , $T_j = 125\text{ °C}$	100 A/ $\mu$ s	
$I_{GM}$	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	
$V_{GRM}$	Maximum peak reverse gate voltage		5 V	

**Table 2. Electrical characteristics ( $T_j = 25\text{ °C}$ , unless otherwise specified)**

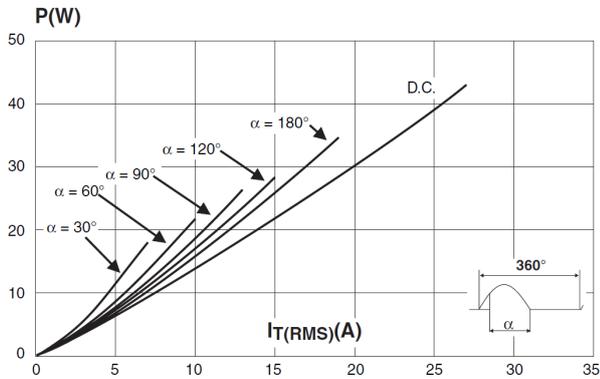
Symbol	Test conditions	Value	Unit	
$I_{GT}$	$V_D = 12\text{ V}$ , $R_L = 33\text{ }\Omega$	Min.	50 mA	
$V_{GT}$		Max.	1.5 V	
$V_{GD}$	$V_D = V_{DRM}$ , $R_L = 3.3\text{ k}\Omega$	$T_j = 125\text{ °C}$	Min. 0.2 V	
$t_{gt}$	$V_D = V_{DRM}$ , $I_G = 200\text{ mA}$ , $di_G/dt = 1.5\text{ A}/\mu$ s	Typ.	2 $\mu$ s	
$I_H$	$I_T = 500\text{ mA}$ , gate open	Max.	75 mA	
$I_L$	$I_G = 1.2 \times I_{GT}$	Typ.	40 mA	
$dV/dt$	$V_D = 67\%$ , $V_{DRM}$ gate open	$T_j = 125\text{ °C}$	$V_{DRM} = 800\text{ V}$	Min. 500 V/ $\mu$ s
			$V_{DRM} = 1000\text{ V}$	250
$t_q$	$V_D = 67\% V_{DRM}$ , $I_{TM} = 60\text{ A}$ , $V_R = 75\text{ V}$ , $t_p = 100\text{ }\mu$ s, $dI_{TM}/dt = 30\text{ A}/\mu$ s, $dV_D/dt = 20\text{ V}/\mu$ s	$T_j = 125\text{ °C}$	Typ. 100 $\mu$ s	
$V_{TM}$	$I_{TM} = 60\text{ A}$ , $t_p = 380\text{ }\mu$ s	Max.	2.1 V	
$I_{DRM}$	$V_{DRM} = V_{RRM}$	$T_j = 25\text{ °C}$	Max. 20 $\mu$ A	
$I_{RRM}$		$T_j = 125\text{ °C}$	6 mA	

**Table 3. Thermal resistance**

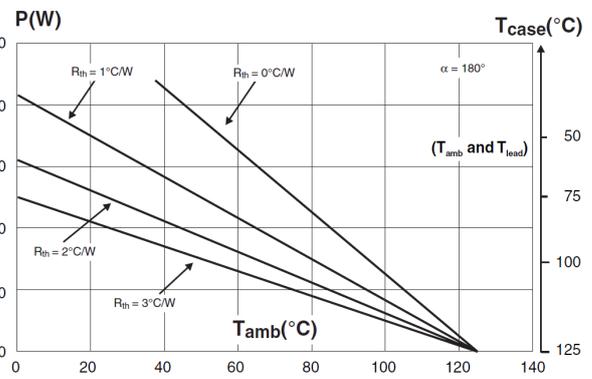
Symbol	Parameters	Value	Unit
$R_{th(j-c)}$	Junction to case (D.C.)	1.1	°C/W
$R_{th(j-a)}$	Junction to ambient	50	

## 1.1 Characteristics (curves)

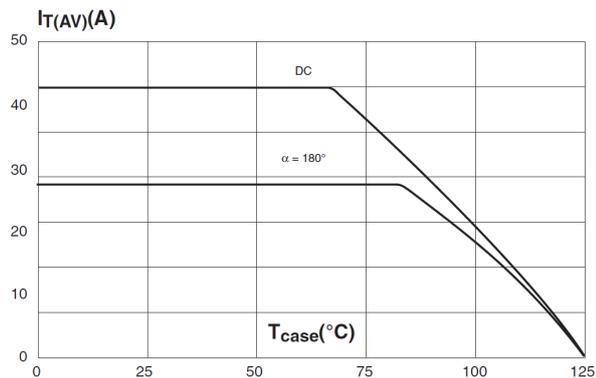
**Figure 1. Maximum average power dissipation versus average on-state current**



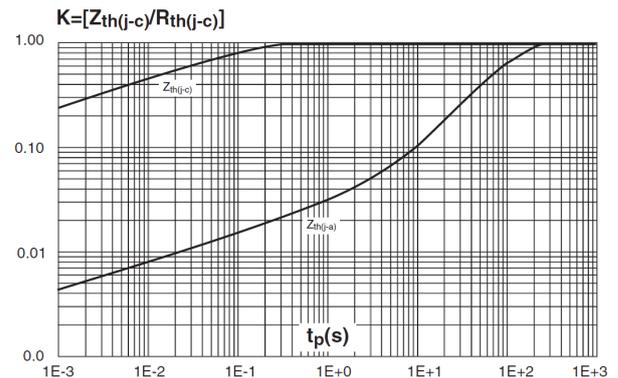
**Figure 2. Correlation between maximum average power dissipation and maximum allowable temperatures**



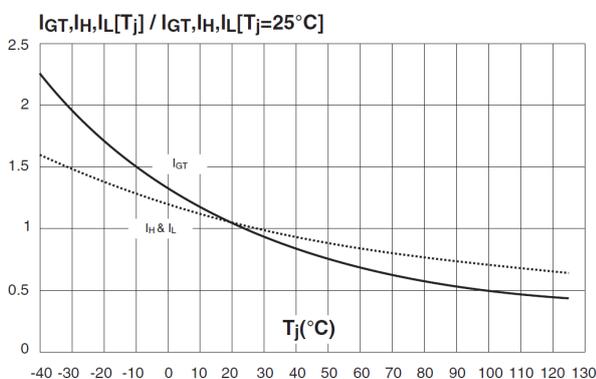
**Figure 3. Average on-state current versus case temperature**



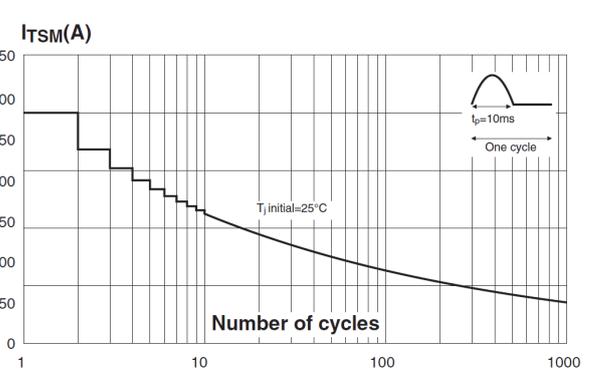
**Figure 4. Relative variation of thermal impedance versus pulse duration**



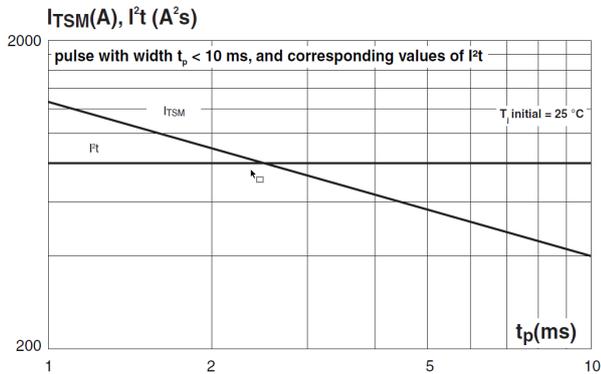
**Figure 5. Relative variation of gate trigger current versus junction temperature**



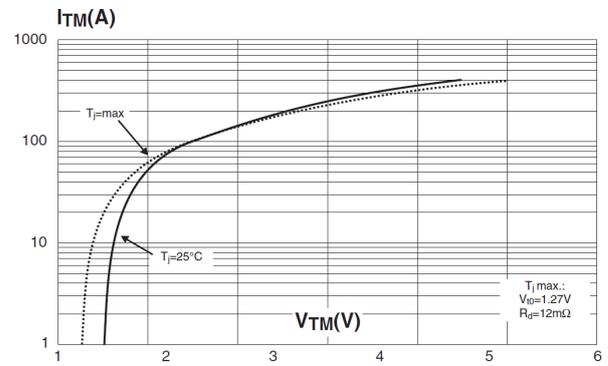
**Figure 6. Surge peak on-state current versus number of cycles**



**Figure 7. Non repetitive surge peak on-state current and corresponding value of  $I^2t$  versus sinusoidal pulse width**



**Figure 8. On-state characteristics (maximum values)**



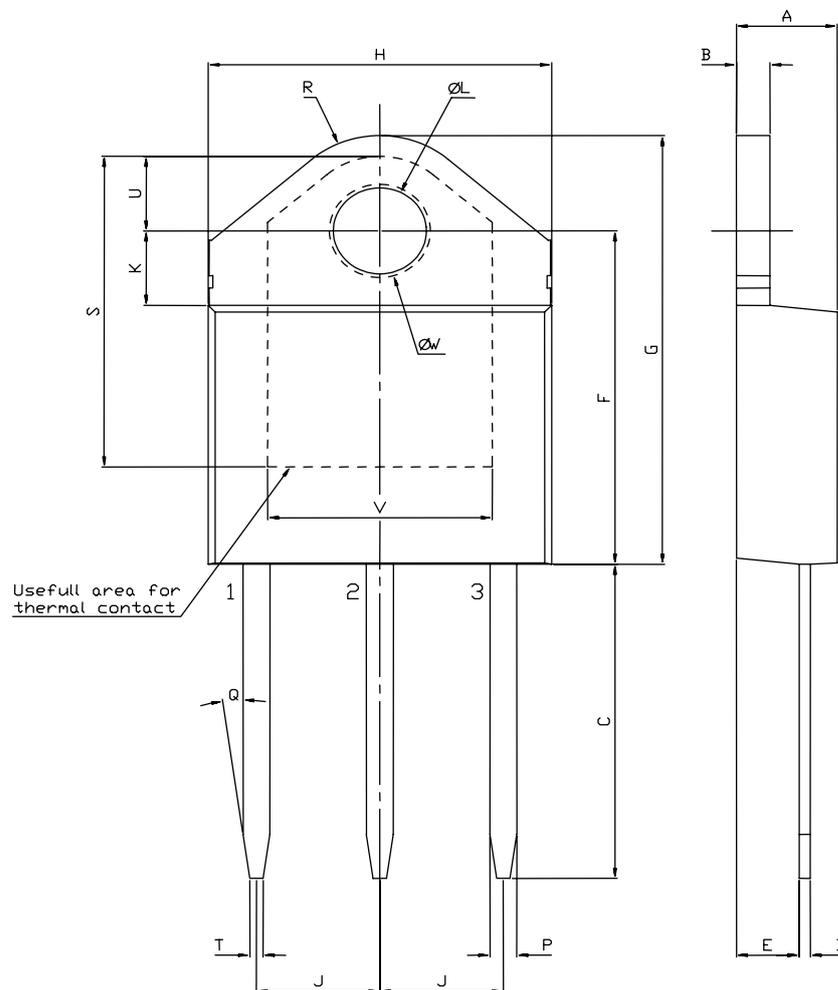
## 2 Package information

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](http://www.st.com). ECOPACK is an ST trademark.

### 2.1 TOP3 Ins. package information

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

Figure 9. TOP3 insulated and non-insulated package outline



**Table 4. TOP3 insulated and non-insulated mechanical data**

Ref.	Dimensions					
	mm			Inches <sup>(1)</sup>		
	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

### 3 Ordering information

Figure 10. Ordering information scheme

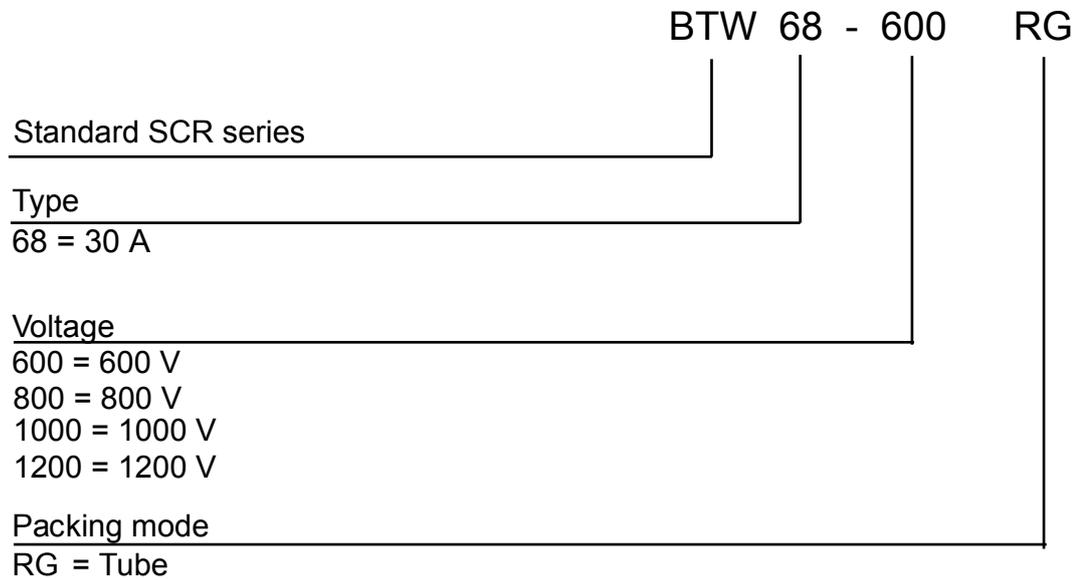


Table 5. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
BTW68-600RG	BTW68-600	TOP3 Ins.	4.5 g	30	Tube
BTW68-800RG	BTW68-800				
BTW68-1000RG	BTW68-1000				
BTW68-1200RG	BTW68-1200				

Table 6. Product Selector

Part numbers	Voltage (xxx)				Sensitivity	Package
	600 V	800 V	1000 V	1200 V		
BTW68-600RG	X				50 mA	TOP3 Ins.
BTW68-800RG		X				
BTW68-1000RG			X			
BTW68-1200RG				X		

## Revision history

**Table 7. Document revision history**

Date	Revision	Changes
Mar-1995	1	Initial release.
13-Feb-2006	2	TOP3 Insulated delivery mode changed from bulk to tube.ECOPACK statement added.
29-Jul-2010	3	Deleted part number BTW68-200RG. Updated <i>Table 2</i> , <i>Figure 7</i> and alpha angle <i>in Figure 1</i> .
06-Oct-2023	4	Updated <i>Table 4</i> .

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