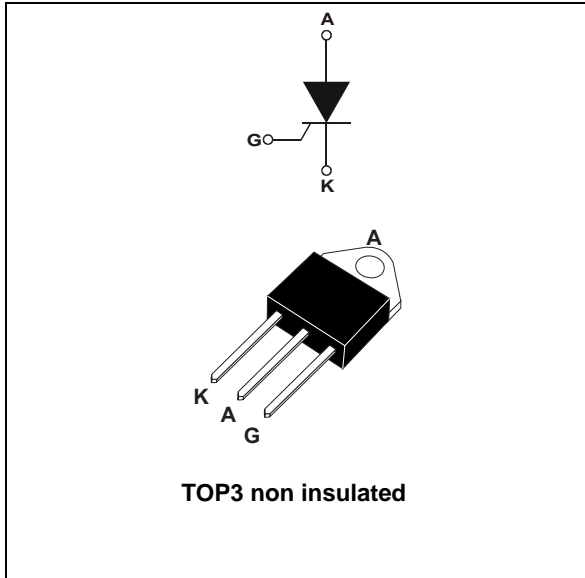


## 50 A – 1200 V non insulated SCR thyristor

Datasheet - production data



### Description

Available in non insulated TOP3 high power package, the BTW69-1200N is suitable for applications where power switching and power dissipation are critical, such as by-pass switch, controlled AC rectifier bridge, in solid state relay, battery charger, uninterruptible power supply, welding equipment and motor driver applications.

Based on a clip assembly technology, the BTW69-1200N offers a superior performance in surge current handling and thermal cooling capabilities.

Table 1. Device summary

Symbol	Value
$I_{T(RMS)}$	50 A
$V_{DRM}/V_{RRM}$	1200 V
$I_{GT}$	50 mA

### Features

- On-state rms current: 50 A
- Blocking voltage: 1200 V
- Gate current: 50 mA

### Applications

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

# 1 Characteristics

**Table 2. Absolute maximum ratings (limiting values)**

Symbol	Parameter		Value	Unit	
$I_{T(RMS)}$	On-state current rms (180° conduction angle)		$T_c = 102\text{ °C}$	50	A
$I_{T(AV)}$	Average on-state current (180° conduction angle)		$T_c = 102\text{ °C}$	31	A
$I_{TSM}$	Non repetitive surge peak on-state current	$t_p = 8.3\text{ ms}$	$T_j = 25\text{ °C}$	763	A
		$t_p = 10\text{ ms}$		700	
$I^2t$	$I^2t$ Value	$t_p = 10\text{ ms}$	$T_j = 25\text{ °C}$	2450	A <sup>2</sup> s
$di/dt$	Critical rate of rise of on-state current Gate supply: $I_G = 100\text{ mA}$ , $di_G/dt = 1\text{ A}/\mu\text{s}$			100	A/ $\mu\text{s}$
$I_{GM}$	Peak gate current	$t_p = 20\text{ }\mu\text{s}$	$T_j = 125\text{ °C}$	8	A
$P_{G(AV)}$	Average gate power dissipation		$T_j = 125\text{ °C}$	1	W
$T_{stg}$ $T_j$	Storage junction temperature range Operating junction temperature range			- 40 to + 150 - 40 to + 125	°C
$V_{GM}$	Maximum peak reverse gate voltage			5	V

**Table 3. 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.	8	mA		
		MAX.	50			
$V_{GT}$		MAX.	1.3	V		
$V_{GD}$	$V_D = V_{DRM}$ , $R_L = 3.3\text{ k}\Omega$	$T_j = 125\text{ °C}$	MIN.	0.2	V	
$I_H$	$I_T = 500\text{ mA}$ , gate open		MAX.	100	mA	
$I_L$	$I_G = 1.2 \times I_{GT}$		TYP.	125	mA	
$t_{gt}$	$I_T = 50\text{ A}$ , $V_D = V_{DRM}$ , $I_G = 200\text{ mA}$ , $di_G/dt = 0.2\text{ A}/\mu\text{s}$		TYP.	2	$\mu\text{s}$	
$dV/dt$	$V_D = 67\% V_{DRM}$ , gate open	$T_j = 125\text{ °C}$	MIN.	1000	V/ $\mu\text{s}$	
$t_q$	$V_D = 800\text{ V}$ , $I_{TM} = 50\text{ A}$ , $V_R = 75\text{ V}$ , $t_p = 100\text{ }\mu\text{s}$ , $dI_{TM}/dt = 30\text{ A}/\mu\text{s}$ , $dV_D/dt = 20\text{ V}/\mu\text{s}$	$T_j = 125\text{ °C}$	TYP.	100	$\mu\text{s}$	
$V_{TM}$	$I_{TM} = 100\text{ A}$ , $t_p = 380\text{ }\mu\text{s}$	$T_j = 25\text{ °C}$	MAX.	1.6	V	
$V_{t0}$	Threshold voltage		$T_j = 125\text{ °C}$	MAX.	0.9	V
$R_D$	Dynamic resistance		$T_j = 125\text{ °C}$	MAX.	8.5	m $\Omega$
$I_{DRM}$ $I_{RRM}$	$V_D = V_{DRM}$ $V_R = V_{RRM}$	$T_j = 25\text{ °C}$	MAX.	10	$\mu\text{A}$	
		$T_j = 125\text{ °C}$		5	mA	

Table 4. Thermal resistance

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction to case (DC, typ.)	0.45	°C/W
$R_{th(j-a)}$	Junction to ambient (DC)	50	°C/W

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

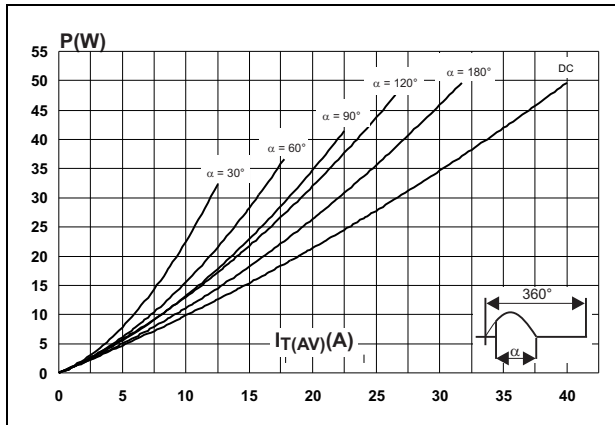


Figure 2. Correlation between maximum average power dissipation and maximum allowable temperatures

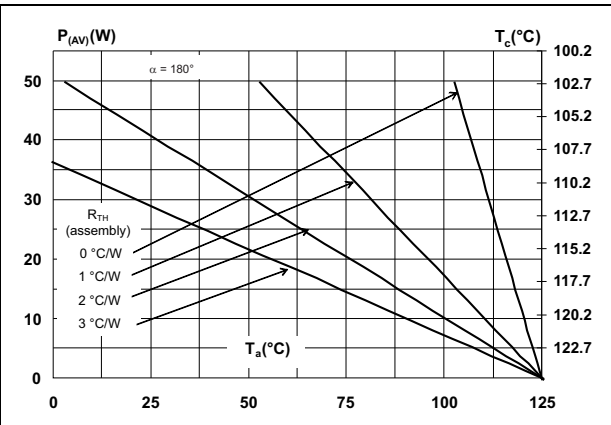


Figure 3. Average and DC on-state current versus case temperature

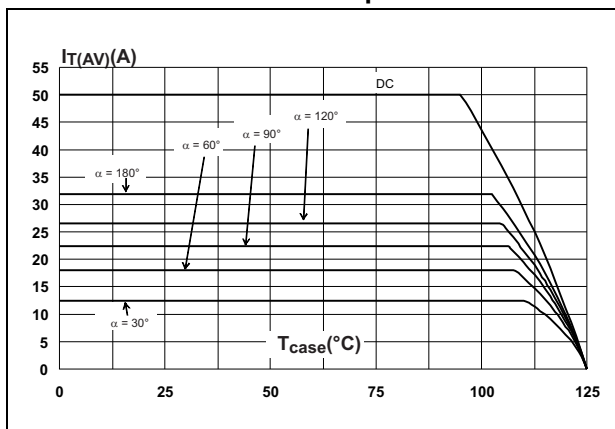


Figure 4. Average and DC on-state current versus ambient temperature

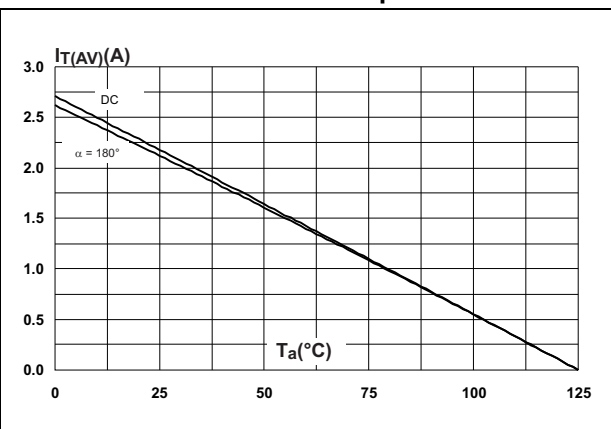


Figure 5. Relative variation of thermal impedance versus pulse duration

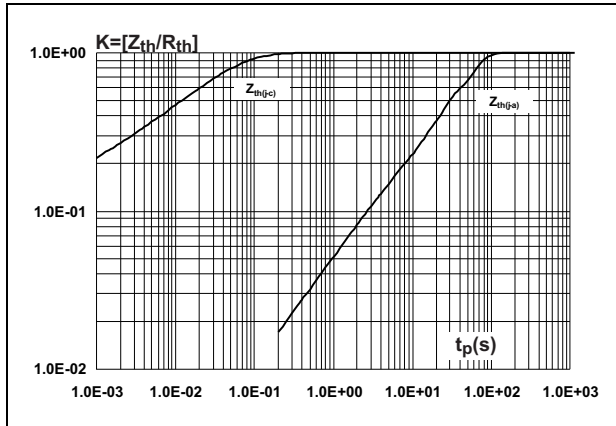


Figure 6. Relative variation of gate trigger current and gate trigger voltage versus junction temperature (typical value)

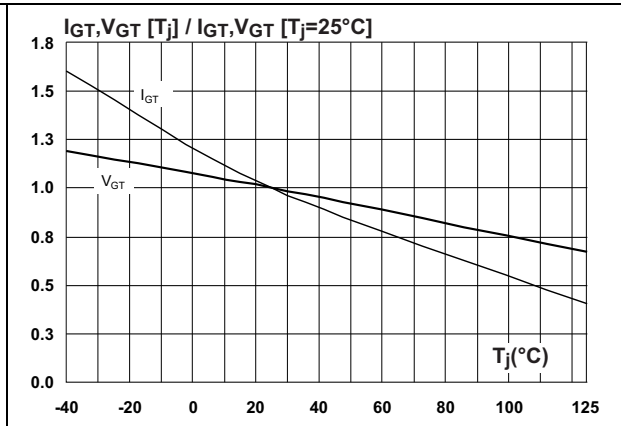


Figure 7. Relative variation of holding, and latching currents versus junction temperature (typical values)

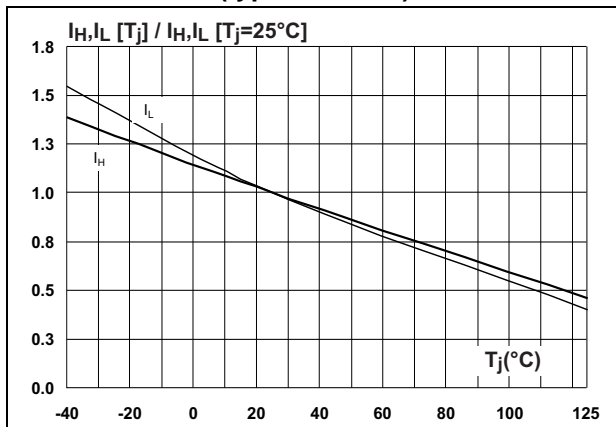


Figure 8. Surge peak on-state current versus number of cycles

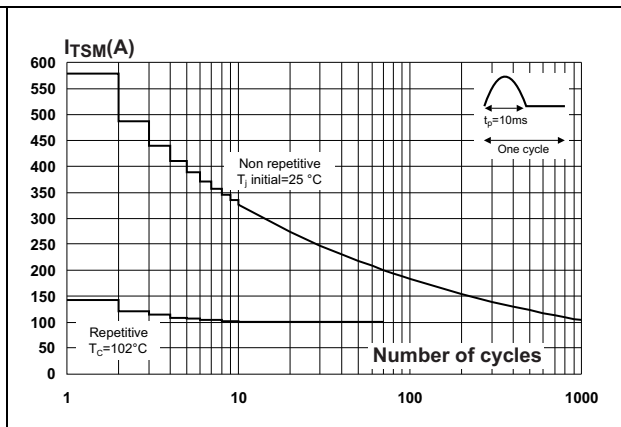


Figure 9. Non repetitive surge peak on-state current and corresponding value of I²t versus sinusoidal pulse

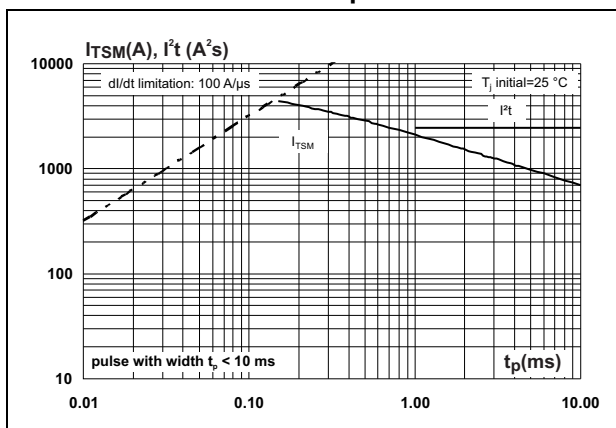


Figure 10. On-state characteristics (maximum values)

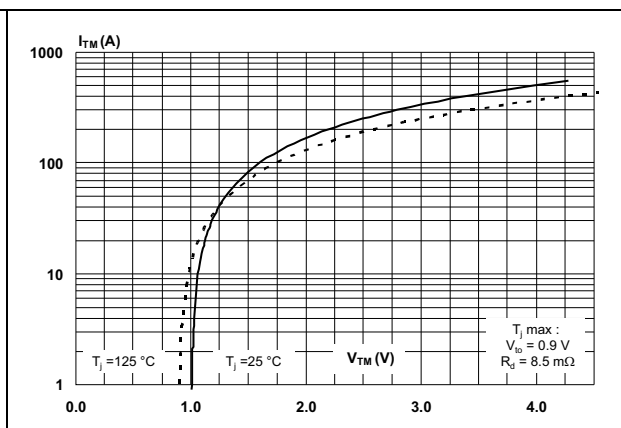
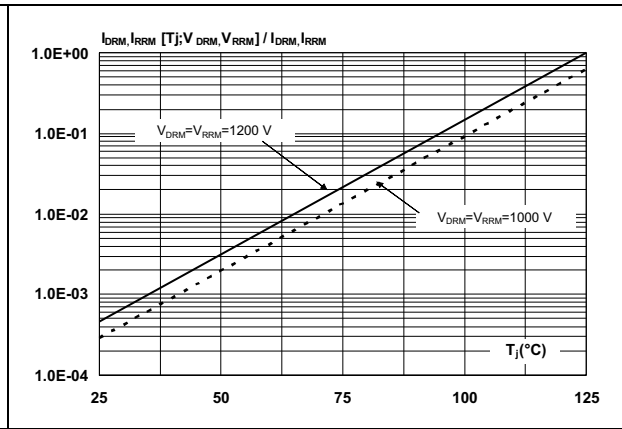
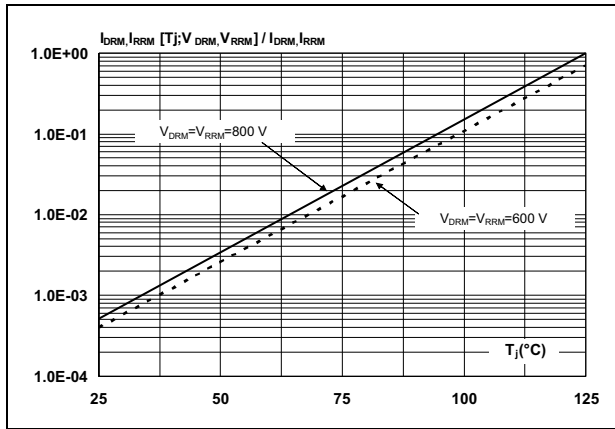


Figure 11. Relative variation of leakage current versus junction temperature for different values of blocking voltage (600 and 800 V)

Figure 12. Relative variation of leakage current versus junction temperature for different values of blocking voltage (1000 and 1200 V)



## 2 Package information

- Epoxy meets UL94,V0
- Lead-free packages
- Cooling method: by conduction (C)
- Recommended torque value: 0.9 to 1.2 N·m

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK<sup>®</sup> is an ST trademark.

Figure 13. TOP3 dimension definitions

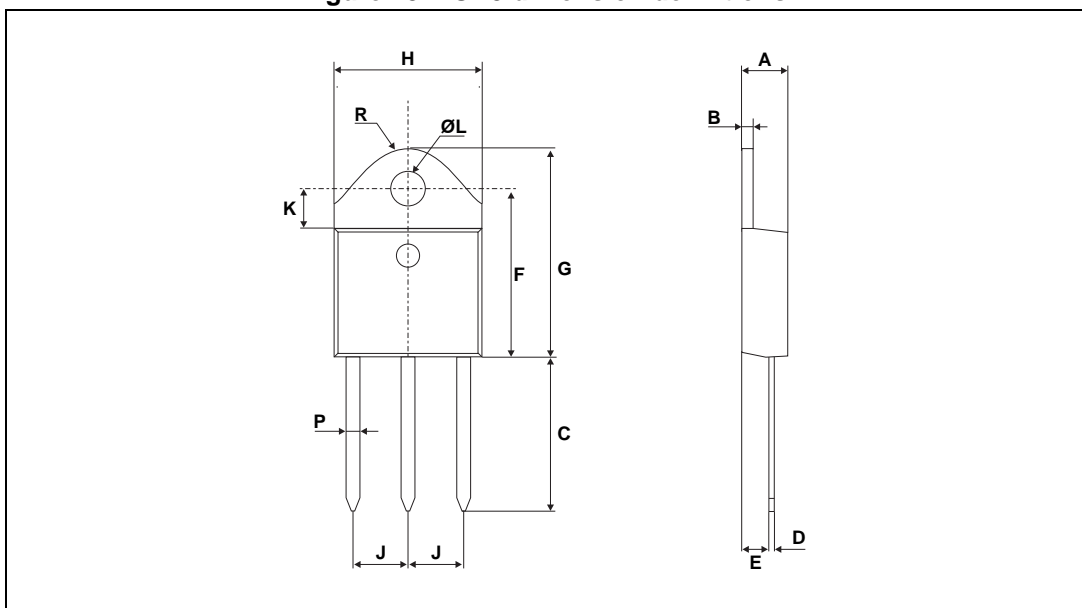


Table 5. TOP3 dimension values

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.	

### 3 Ordering information

Figure 14. Ordering information scheme

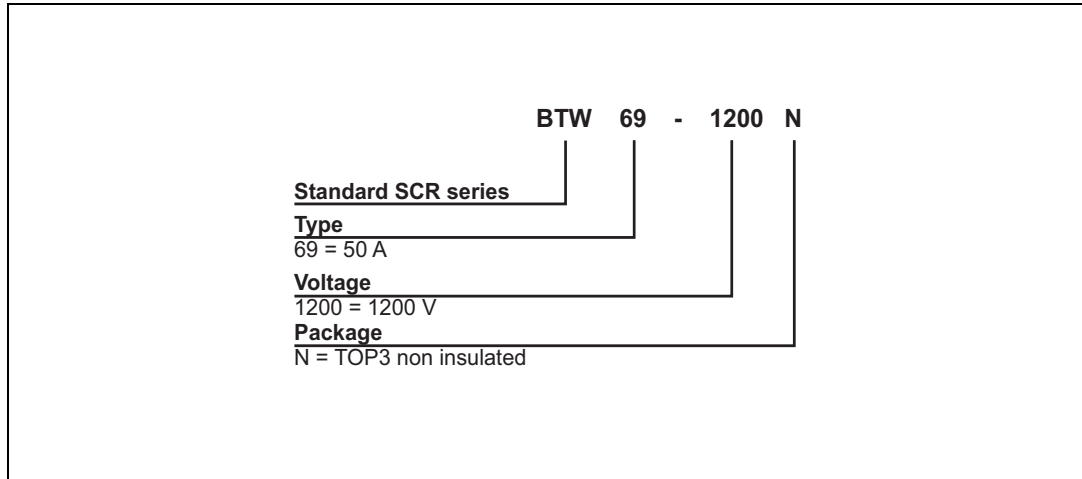


Table 6. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
BTW69-1200N	BTW691200N	TOP3	4.55 g	30	Tube

### 4 Revision history

Table 7. Document revision history

Date	Revision	Changes
14-Jun-2013	1	Initial release.



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