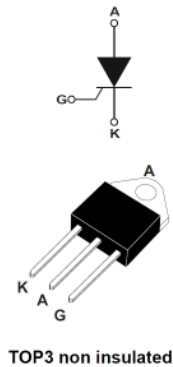


50 A – 1200 V non insulated SCR thyristor



Features

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

Application

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

Product status link

[BTW69-1200N](#)

Product summary

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

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.

1 Characteristics

Table 1. Absolute maximum ratings

Symbol	Parameters		Value	Unit	
$I_{T(RMS)}$	RMS on-state current (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 (full cycle, T_j initial = 25 °C, $V_R = 0$ V)		$t_p = 8.3$ ms	763	A
			$t_p = 10$ ms	700	
I^2t	I^2t value for fusing	$t_p = 10$ ms, $T_j = 25\text{ °C}$		2450	A ² s
di/dt	Critical rate of rise of on-state current Gate supply: $I_G = 100$ mA, $di_G/dt = 1$ A/μs			100	A/μs
I_{GM}	Peak gate current	$t_p = 20$ μs	$T_j = 125\text{ °C}$	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	T_j		Value	Unit
I_{GT}	$V_D = 12$ V, $R_L = 33\ \Omega$		Min.	8	mA
			Max.	50	
V_{GT}			Max.	1.3	V
V_{GD}	$V_D = V_{DRM}$, $R_L = 3.3$ kΩ	$T_j = 125\text{ °C}$	Min.	0.2	V
I_H	$I_T = 500$ mA, gate open		Max.	100	mA
I_L	$I_G = 1.2 \times I_{GT}$		Max.	125	mA
t_{gt}	$I_T = 50$ A, $V_D = V_{DRM}$, $I_G = 200$ mA, $di_G/dt = 0.2$ A/μs		Typ.	2	μs
dV/dt	$V_D = 67\%$, V_{DRM} gate open	$T_j = 125\text{ °C}$	Min.	1000	V/μs
t_q	$V_D = 800$ V, $I_{TM} = 50$ A, $V_R = 75$ V, $t_p = 100$ μs, $dI_{TM}/dt = 30$ A/μs, $dV_D/dt = 20$ V/μs	$T_j = 125\text{ °C}$	Typ.	100	μs
V_{TM}	$I_{TM} = 100$ A, $t_p = 380$ μs	$T_j = 125\text{ °C}$	Max.	1.6	V
V_{TO}	Threshold on-state voltage	$T_j = 125\text{ °C}$	Max.	0.9	V
R_D	On-state dynamic resistance	$T_j = 125\text{ °C}$	Max.	8.5	mΩ
I_{DRM}/I_{RRM}	$V_D = V_{DRM}$, $V_R = V_{RRM}$	$T_j = 25\text{ °C}$	Max.	10	μA
		$T_j = 125\text{ °C}$		5	mA

Table 3. Thermal resistance

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

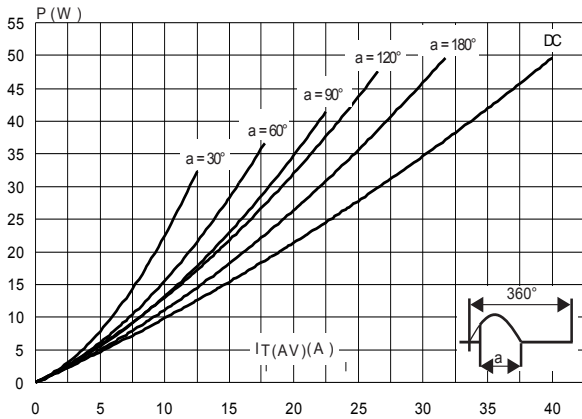
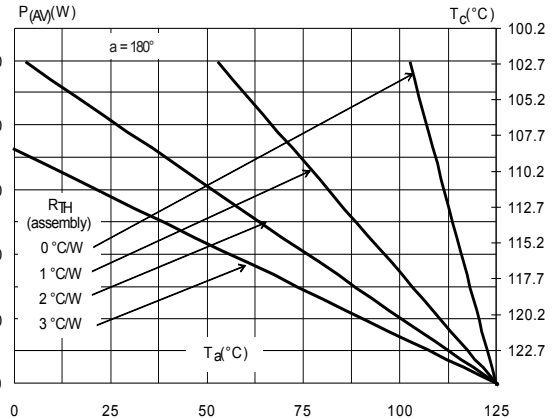
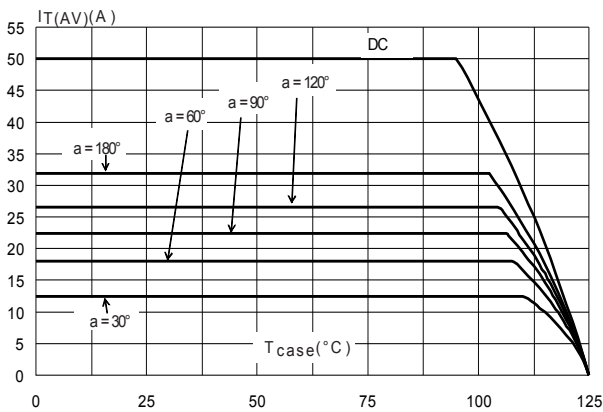
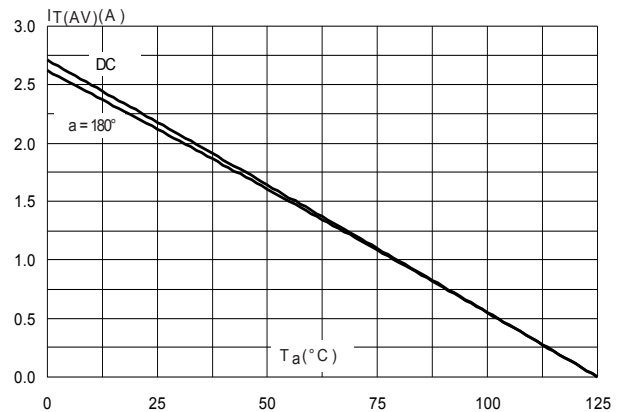
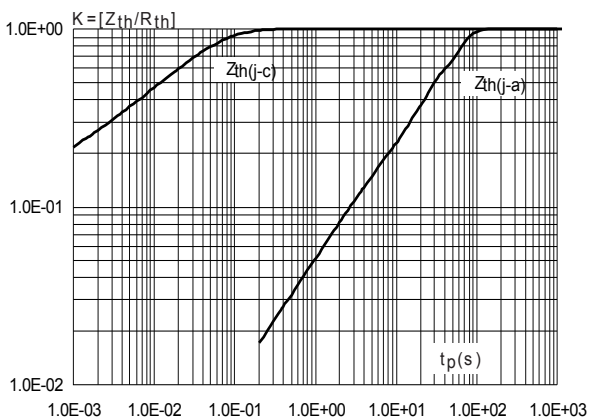
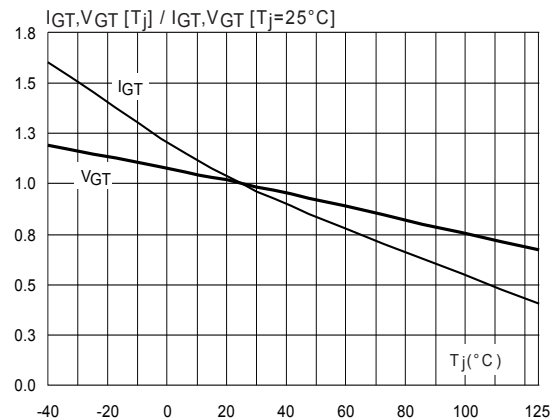
1.1 Characteristics (curves)
Figure 1. Maximum average power dissipation versus average on-state current

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

Figure 3. Average 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)

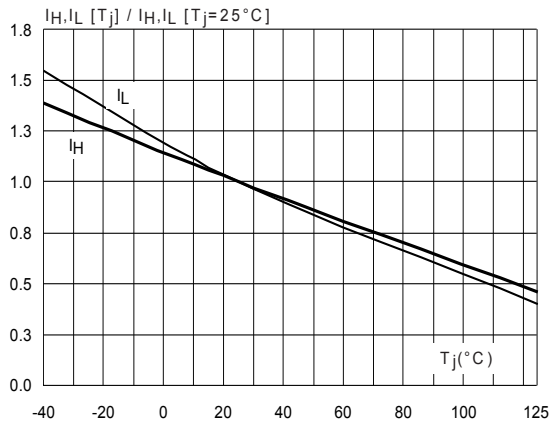


Figure 8. Surge peak on-state current versus number of cycles

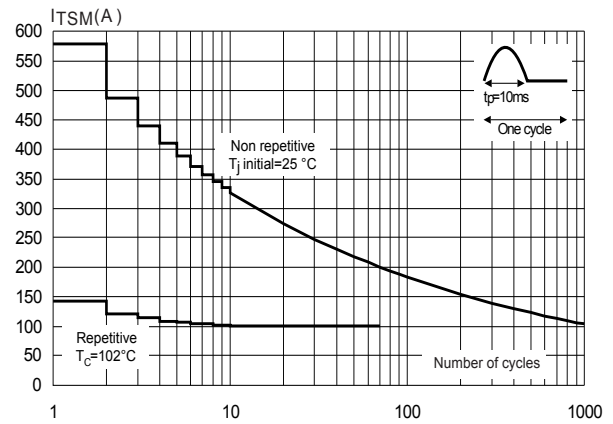


Figure 9. Non repetitive surge peak on-state current for a sinusoidal pulse with width $t_p < 10$ ms, and corresponding value of I^2t

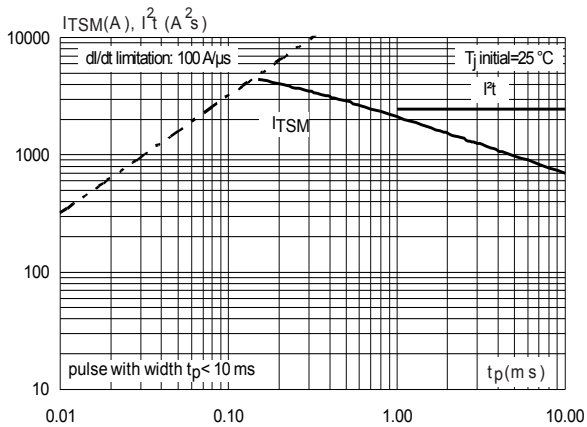


Figure 10. On-state characteristics (maximum values)

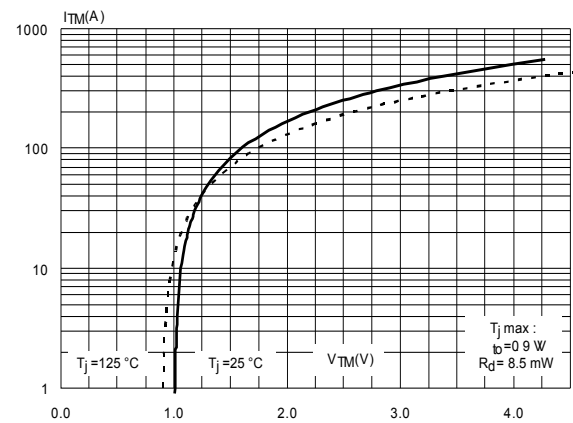


Figure 11. Relative variation of leakage current versus junction temperature for different values of blocking voltage (600 and 800 V)

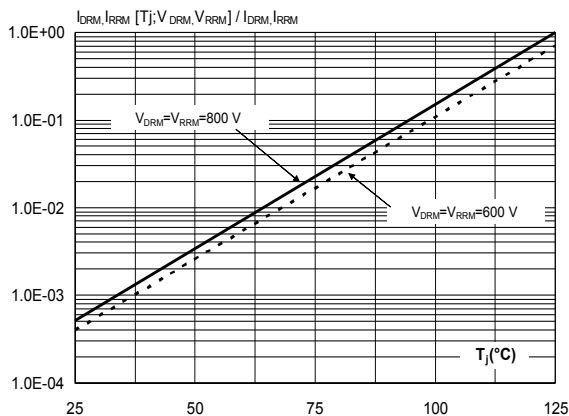
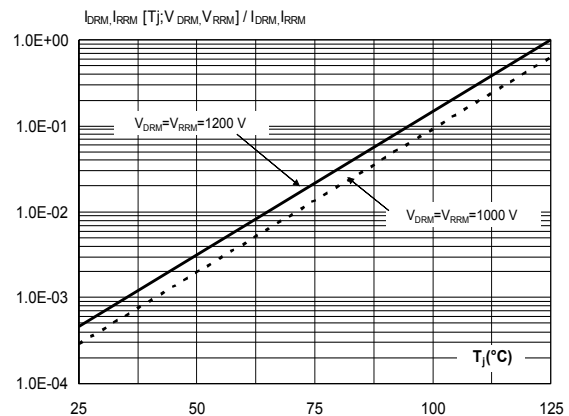


Figure 12. Relative variation of leakage current versus junction temperature for different values of blocking voltage (1000 and 1200 V)



2 Package information

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 Ins. package information

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

Figure 13. TOP3 insulated and non-insulated package outline

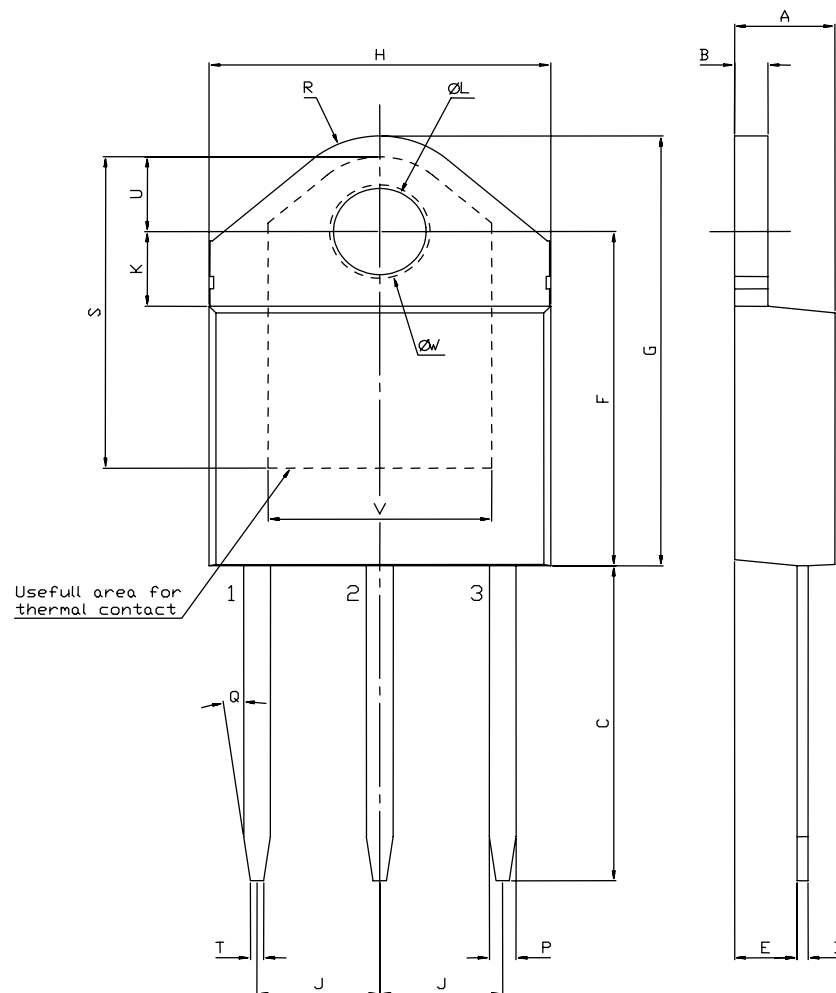


Table 4. TOP3 insulated and non-insulated mechanical data

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

3 Ordering information

Figure 14. Ordering information scheme

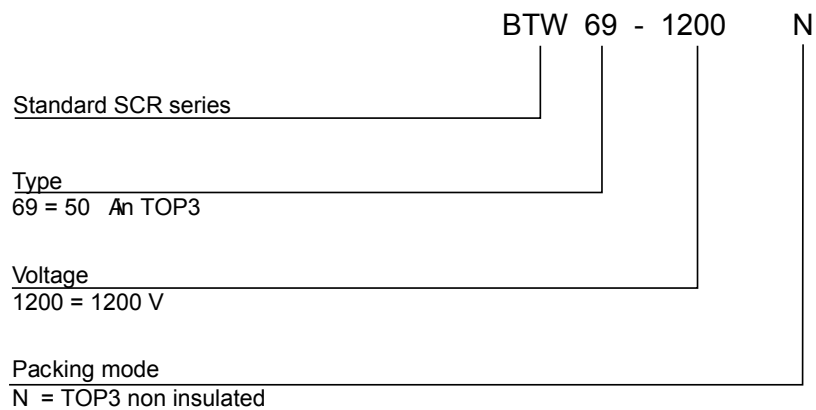


Table 5. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
BTW69-1200N	BTW691200N	TOP3	4.5 g	30	Tube

Revision history

Table 6. Document revision history

Date	Revision	Changes
14-Jun-2013	1	Initial release.
13-Jul-2023	2	Updated Table 4 .

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