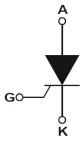
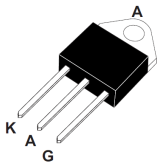
BTW69-1200N

Datasheet

50 A – 1200 V non insulated SCR thyristor





TOP3 non insulated

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 °C	50	A
$IT_{(AV)}$	Average on-state current (180° conduction angle)		T_c = 102 °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°C		2450	A^2s
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 °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
V_{GRM}	Maximum peak reverse gate voltage			5	V

Table 2. Electrical characteristics (T_j = 25°C, unless otherwise specified)

Symbol	Test conditions	T_j		Value	Unit
I_{GT}	V_D = 12 V, R_L = 33 Ω		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 °C	Min.	0.2	V
I_H	I_T = 500 mA, gate open		Max.	100	mA
I_L	I_G = 1.2 x 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 °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 °C	Typ.	100	µs
V_{TM}	I_{TM} = 100 A, t_p = 380 µs	T_j = 125 °C	Max.	1.6	V
V_{TO}	Threshold on-state voltage	T_j = 125 °C	Max.	0.9	V
R_D	On-state dynamic resistance	T_j = 125 °C	Max.	8.5	mΩ
I_{DRM}/I_{RRM}	V_D = V_{DRM}, V_R = V_{RRM}	T_j = 25 °C	Max.	10	µA
		T_j = 125 °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 ambiant (D.C)	50	

1.1 Characteristics (curves)

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

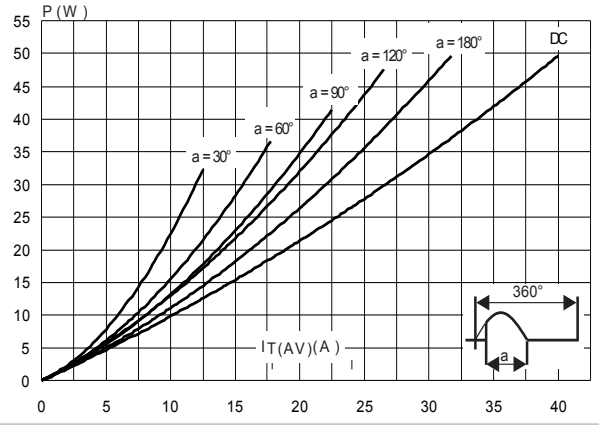


Figure 2. Correlation between maximum average power dissipation and maximum allowable temperatures

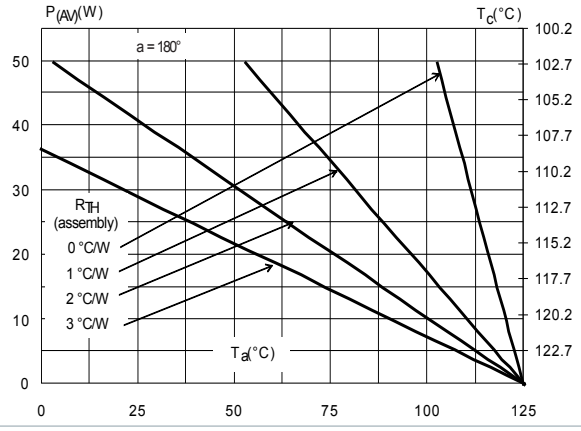


Figure 3. Average and DC on-state current versus case temperature

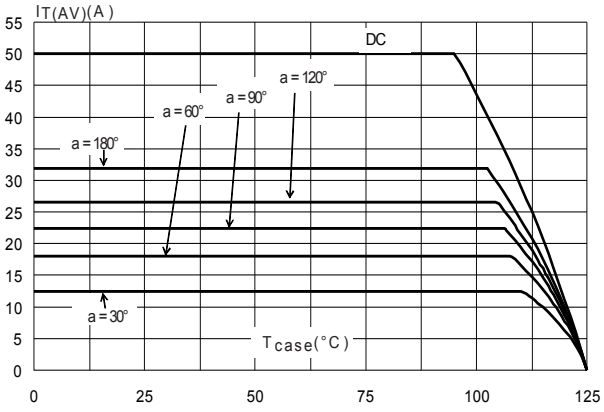


Figure 4. Average and DC on-state current versus ambient temperature

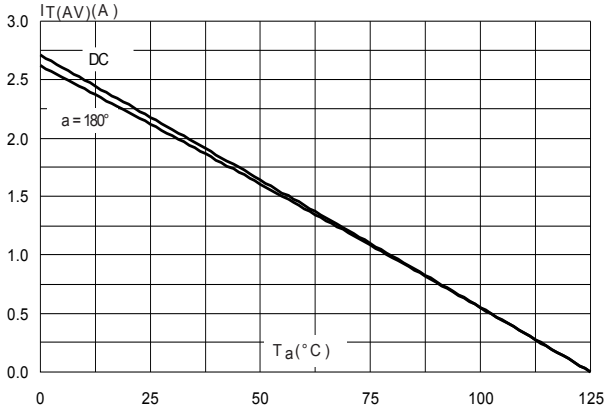


Figure 5. Relative variation of thermal impedance versus pulse duration

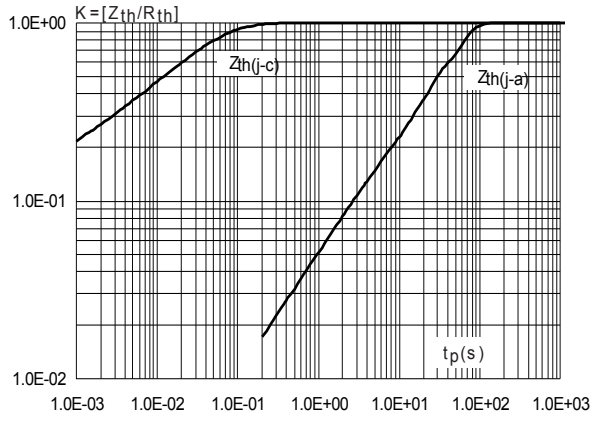


Figure 6. Relative variation of gate trigger current and gate trigger voltage versus junction temperature (typical value)

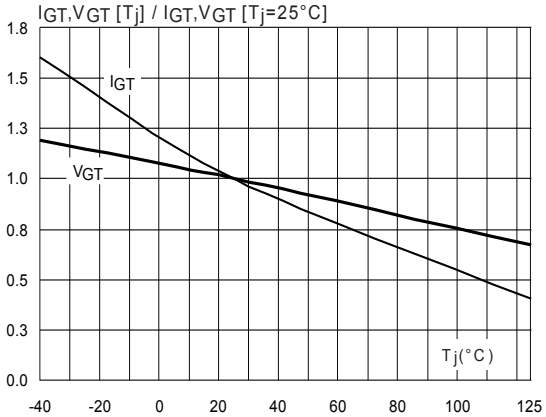


Figure 7. Relative variation of holding, and latching currents versus junction temperature (typical values)

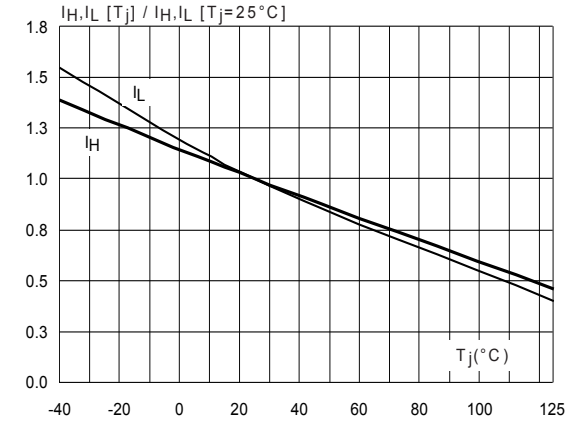


Figure 8. Surge peak on-state current versus number of cycles

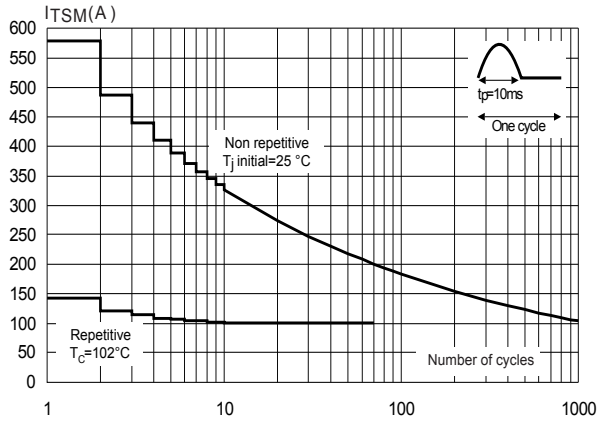


Figure 9. Non repetitive surge peak on-state current for a sinusoidal pulse with width t_p< 10 ms, and corresponding value of I^2t

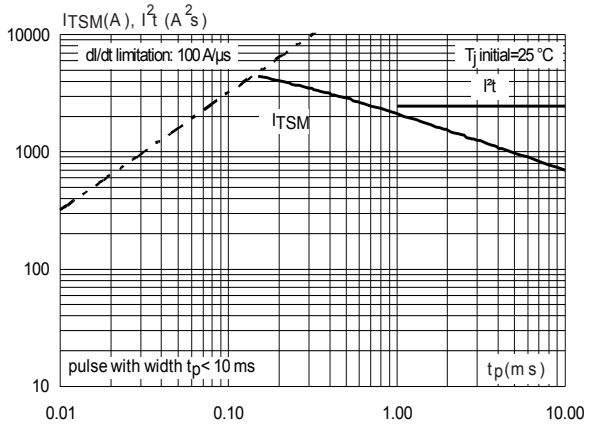


Figure 10. On-state characteristics (maximum values)

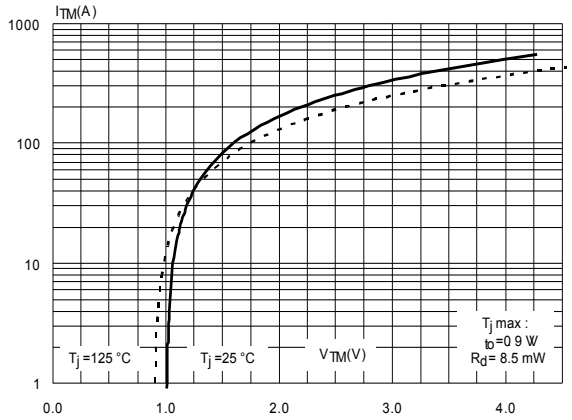


Figure 11. Relative variation of leakage current versus junction temperature for different values of blocking voltage (600 and 800 V)

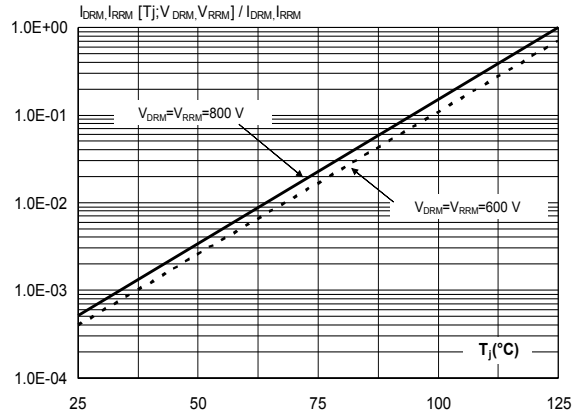
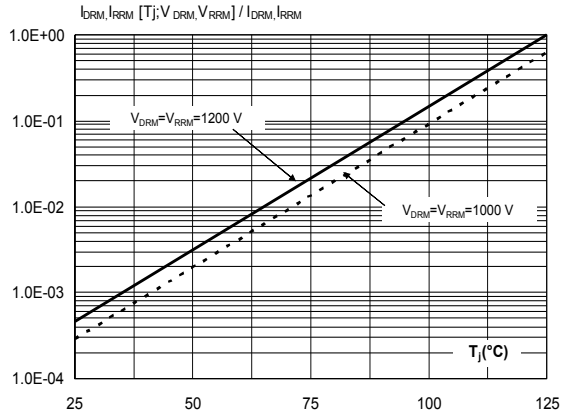


Figure 12. Relative variation of leakage current versus junction temperature for different values of blocking voltage (1000 and 1200 V)



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

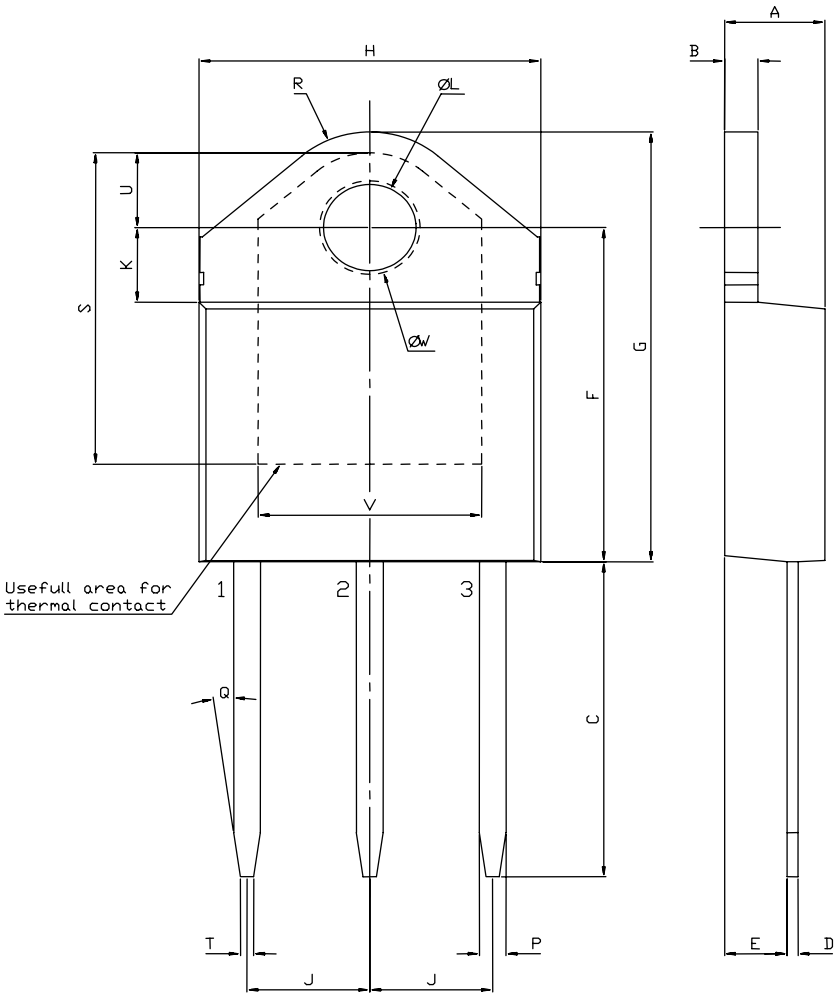


Table 4. TOP3 insulated and non-insulated mechanical data

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**

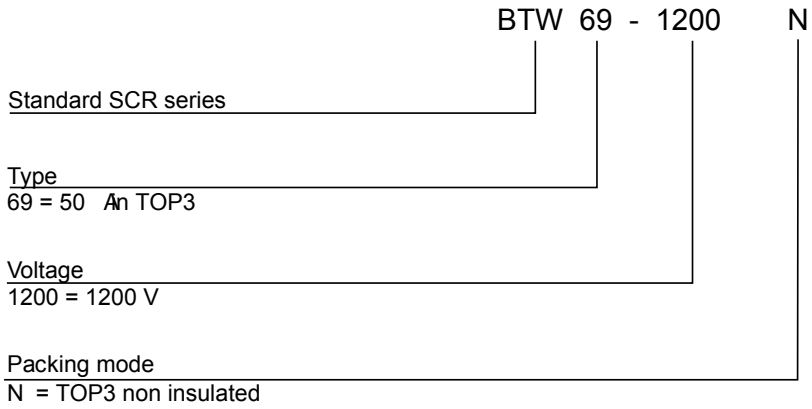


Table 5. **Ordering information**

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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