



## DGT408BRP

## Reverse Blocking Gate Turn-off Thyristor

## Target Information

DS4415-2.1 February 2002

## FEATURES

- Reverse Blocking Capability
- Double Side Cooling
- High Reliability In Service
- High Voltage Capability
- Fault Protection Without Fuses
- High Surge Current Capability
- Turn-off Capability Allows Reduction In Equipment Size And Weight. Low Noise Emission Reduces Acoustic Cladding Necessary For Environmental Requirements

## APPLICATIONS

- Variable speed A.C. motor drive inverters (VSD-AC)
- Uninterruptable Power Supplies
- High Voltage Converters
- Choppers
- Welding
- Induction Heating
- DC/DC Converters.

## KEY PARAMETERS

$I_{TCM}$	800A
$V_{DRM}/V_{RRM}$	4500V
$dV_D/dt$	1000V/ $\mu$ s
$di_T/dt$	300A/ $\mu$ s

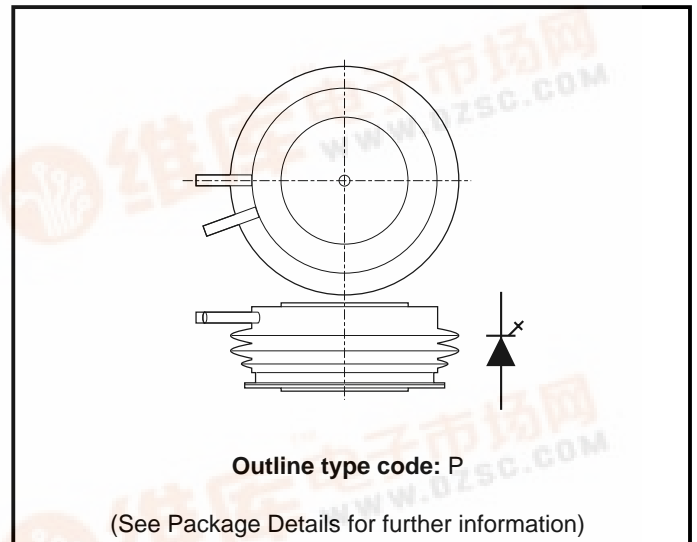


Fig. 1 Package outline

## VOLTAGE RATINGS

Type Number	Repetitive Peak Off-state Voltage $V_{DRM}$ V	Repetitive Peak Reverse Voltage $V_{RRM}$ V	Conditions
DGT408BRP4540	4500	4500	$T_{vj} = 115^{\circ}\text{C}$ , $I_{DM} = 50\text{mA}$ , $I_{RRM} = 50\text{mA}$

## CURRENT RATINGS

Symbol	Parameter	Conditions	Max.	Units
$I_{TCM}$	Repetitive peak controllable on-state current	$V_D = V_{DRM}$ , $T_j = 115^{\circ}\text{C}$ , $di_{GQ}/dt = 30\text{A}/\mu\text{s}$ , $C_s = 2.0\mu\text{F}$	800	A
$I_{T(AV)}$	Mean on-state current	$T_{HS} = 80^{\circ}\text{C}$ . Double side cooled. Half sine 50Hz.	-	A
$I_{T(RMS)}$	RMS on-state current	$T_{HS} = 80^{\circ}\text{C}$ . Double side cooled. Half sine 50Hz.	-	A

## SURGE RATINGS

Symbol	Parameter	Conditions	Max.	Units
$I_{TSM}$	Surge (non-repetitive) on-state current	10ms half sine. $T_j = 115^\circ\text{C}$	6.0	kA
$I^2t$	$I^2t$ for fusing	10ms half sine. $T_j = 115^\circ\text{C}$	$0.18 \times 10^6$	$\text{A}^2\text{s}$
$di_r/dt$	Critical rate of rise of on-state current	$V_D = 3000\text{V}$ , $I_T = 800\text{A}$ , $T_j = 115^\circ\text{C}$ , $I_{FG} > 30\text{A}$ , Rise time $> 1.5\mu\text{s}$	300	$\text{A}/\mu\text{s}$
$dV_D/dt$	Rate of rise of off-state voltage	To 66% $V_{DRM}$ ; $R_{GK} \leq 1.5\Omega$ , $T_j = 115^\circ\text{C}$	-	$\text{V}/\mu\text{s}$
		To 66% $V_{DRM}$ ; $V_{RG} = -2\text{V}$ , $T_j = 115^\circ\text{C}$	1000	$\text{V}/\mu\text{s}$
$L_S$	Peak stray inductance in snubber circuit	-	200	nH

## GATE RATINGS

Symbol	Parameter	Conditions	Min.	Max.	Units
$V_{RGM}$	Peak reverse gate voltage	This value maybe exceeded during turn-off	-	16	V
$I_{FGM}$	Peak forward gate current		20	70	A
$P_{FG(AV)}$	Average forward gate power		-	10	W
$P_{RGM}$	Peak reverse gate power		-	15	kW
$di_{GQ}/dt$	Rate of rise of reverse gate current		15	60	$\text{A}/\mu\text{s}$
$t_{ON(min)}$	Minimum permissible on time		20	-	$\mu\text{s}$
$t_{OFF(min)}$	Minimum permissible off time		100	-	$\mu\text{s}$

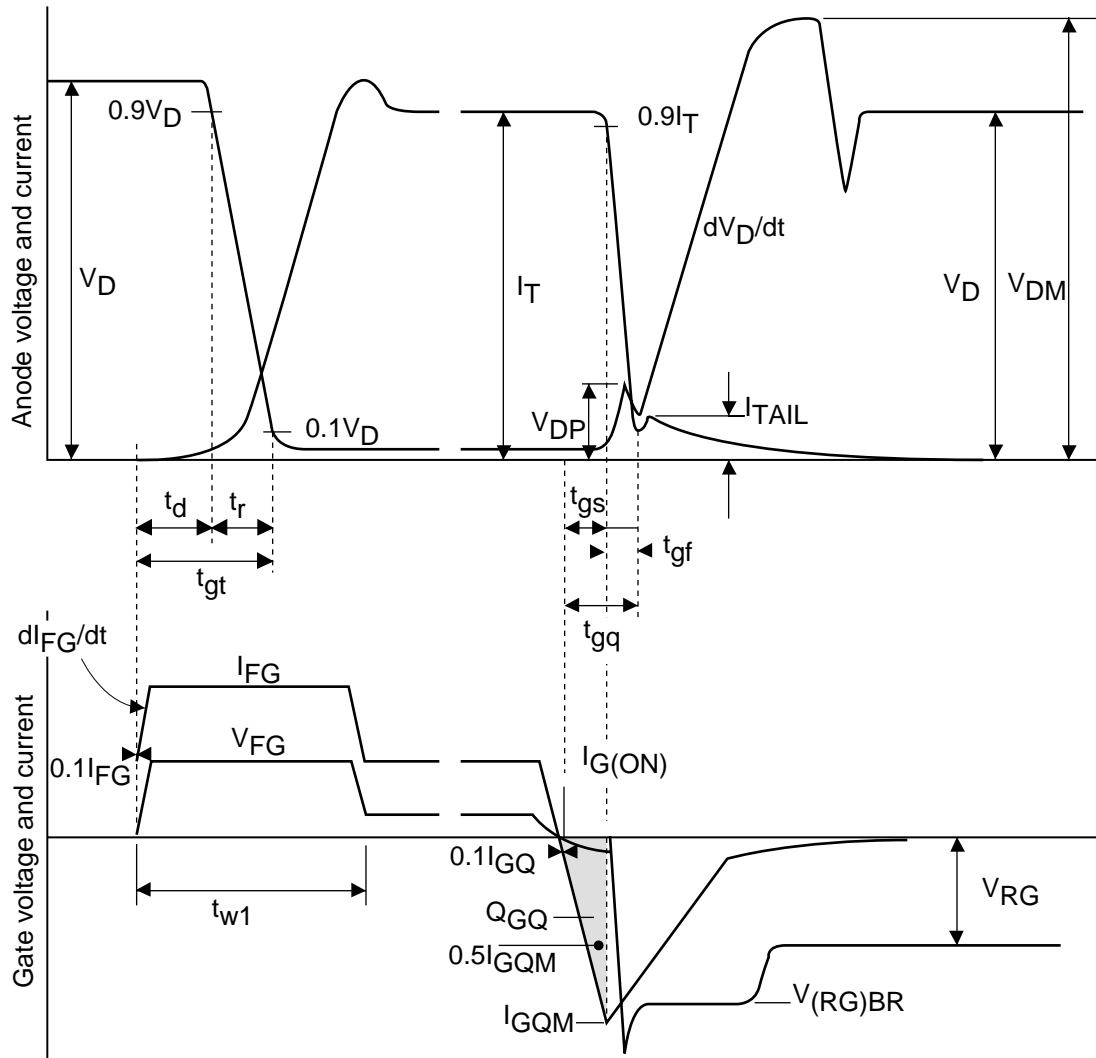
## THERMAL RATINGS AND MECHANICAL DATA

Symbol	Parameter	Conditions		Min.	Max.	Units
$R_{th(j-hs)}$	DC thermal resistance - junction to heatsink surface	Double side cooled		-	0.041	$^\circ\text{C}/\text{W}$
		Anode side cooled		-	0.07	$^\circ\text{C}/\text{W}$
		Cathode side cooled		-	0.1	$^\circ\text{C}/\text{W}$
$R_{th(c-hs)}$	Contact thermal resistance	Clamping force 12.0kN With mounting compound	per contact	-	0.009	$^\circ\text{C}/\text{W}$
$T_{vj}$	Virtual junction temperature			-	125	$^\circ\text{C}$
$T_{OP}/T_{stg}$	Operating junction/storage temperature range			-40	125	$^\circ\text{C}$
-	Clamping force			11.0	15.0	kN

## CHARACTERISTICS

$T_j = 115^\circ\text{C}$  unless stated otherwise

Symbol	Parameter	Conditions	Min.	Max.	Units
$V_{TM}$	On-state voltage	At 800A peak, $I_{G(ON)} = 4\text{A d.c.}$	-	4.7	V
$I_{DM}$	Peak off-state current	$V_{DRM} = 4500\text{V}$ , $V_{RG} = 0\text{V}$	-	50	mA
$I_{RRM}$	Peak reverse current	At $V_{RRM}$	-	50	mA
$V_{GT}$	Gate trigger voltage	$V_D = 24\text{V}$ , $I_T = 100\text{A}$ , $T_j = 25^\circ\text{C}$	-	1.0	V
$I_{GT}$	Gate trigger current	$V_D = 24\text{V}$ , $I_T = 100\text{A}$ , $T_j = 25^\circ\text{C}$	-	1.5	A
$I_{RGM}$	Reverse gate cathode current	$V_{RGM} = 16\text{V}$ , No gate/cathode resistor	-	50	mA
$E_{ON}$	Turn-on energy	$V_D = 3000\text{V}$	-	1200	mJ
$t_d$	Delay time	$I_T = 800\text{A}$ , $di_T/dt = 300\text{A}/\mu\text{s}$	-	1.5	$\mu\text{s}$
$t_r$	Rise time	$I_{FG} = 30\text{A}$ , rise time $< 1.5\mu\text{s}$	-	5.0	$\mu\text{s}$
$E_{OFF}$	Turn-off energy	$I_T = 800\text{A}$ , $V_{DM} = 3000\text{V}$ Snubber Cap $C_s = 2.0\mu\text{F}$ , $di_{GQ}/dt = 30\text{A}/\mu\text{s}$	-	3000	mJ
$t_{gs}$	Storage time		-	15.0	$\mu\text{s}$
$t_{gf}$	Fall time		-	1.5	$\mu\text{s}$
$t_{gq}$	Gate controlled turn-off time		-	15.5	$\mu\text{s}$
$Q_{GQ}$	Turn-off gate charge		-	-	$\mu\text{C}$
$Q_{GQT}$	Total turn-off gate charge		-	-	$\mu\text{C}$
$I_{GQM}$	Peak reverse gate current		-	850	A



Recommended gate conditions:

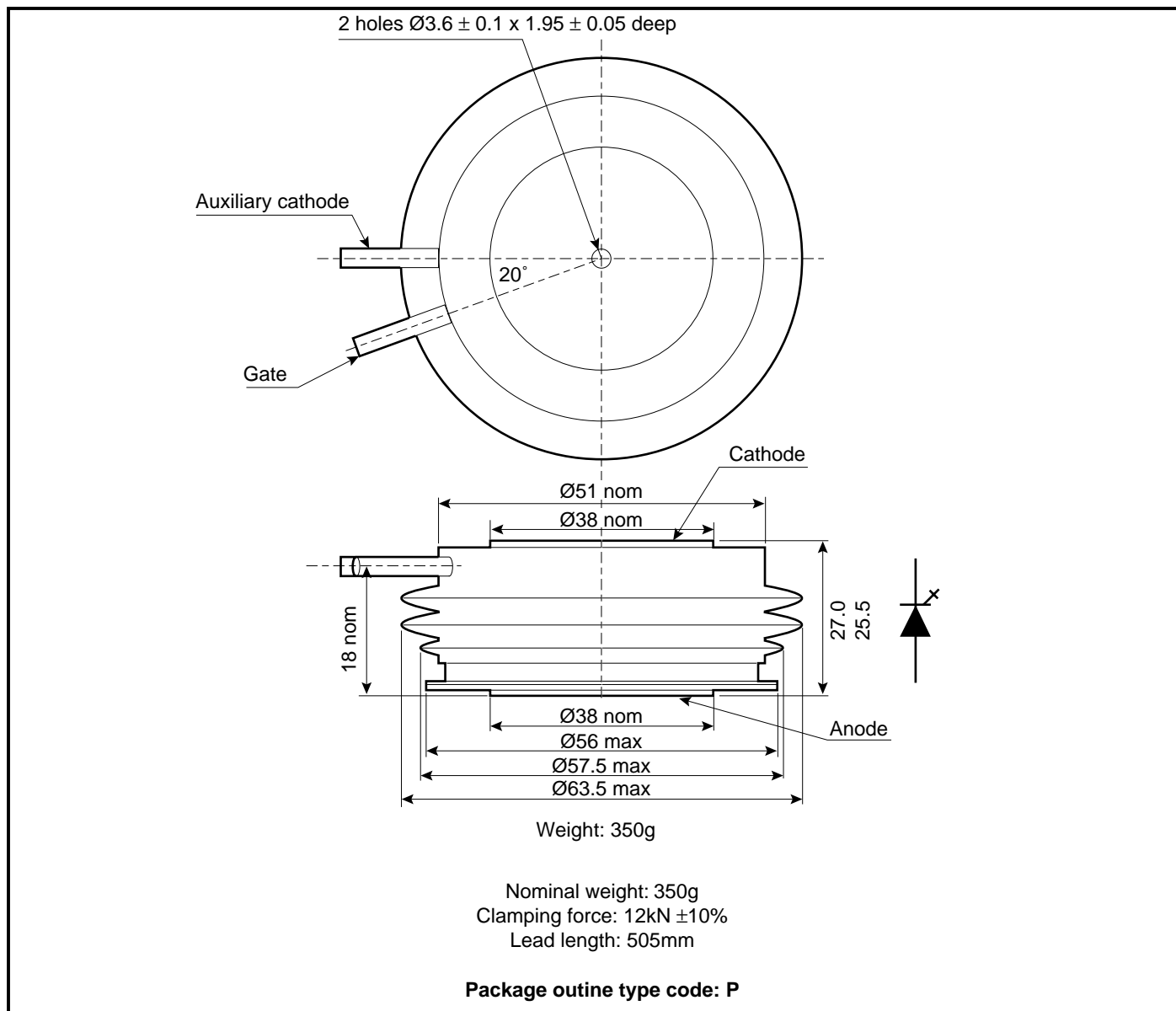
$I_{TCM} = 800A$   
 $I_{FG} = 30A$   
 $I_{G(ON)} = 4A \text{ d.c.}$   
 $t_{w1(min)} = 20\mu s$   
 $I_{GQM} = 300A$   
 $di_{GQ}/dt = 30A/\mu s$   
 $Q_{GQ} =$   
 $V_{RG(min)} = 2V$   
 $V_{RG(max)} = 16V$

These are recommended Dynex Semiconductor conditions. Other conditions are permitted

Fig.2 General switching waveforms

## PACKAGE DETAILS

For further package information, please visit our website or contact your nearest Customer Service Centre. All dimensions in mm, unless stated otherwise. DO NOT SCALE.



## POWER ASSEMBLY CAPABILITY

The Power Assembly group was set up to provide a support service for those customers requiring more than the basic semiconductor, and has developed a flexible range of heatsink and clamping systems in line with advances in device voltages and current capability of our semiconductors.

We offer an extensive range of air and liquid cooled assemblies covering the full range of circuit designs in general use today. The Assembly group continues to offer high quality engineering support dedicated to designing new units to satisfy the growing needs of our customers.

Using the latest CAD methods our team of design and applications engineers aim to provide the Power Assembly Complete Solution (PACs).

## DEVICE CLAMPS

Disc devices require the correct clamping force to ensure their safe operation. The PACS range includes a varied selection of pre-loaded clamps to suit all of our manufactured devices. Types available include cube clamps for single side cooling of 'T' 23mm and 'E' 30mm discs, and bar clamps right up to 83kN for our 'Z' 100mm thyristors and diodes.

Clamps are available for single or double side cooling, with high insulation versions for high voltage assemblies.

Please refer to our application note on device clamping, AN4839

## HEATSINKS

The Power Assembly group has its own proprietary range of extruded aluminium heatsinks. They have been designed to optimise the performance of Dynex semiconductors. Data with respect to air natural, forced air and liquid cooling (with flow rates) is available on request.

For further information on device clamps, heatsinks and assemblies, please contact your nearest sales representative or customer service office.



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**No Annotation:** The product parameters are fixed and the product is available to datasheet specification.

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