

**FEATURES**

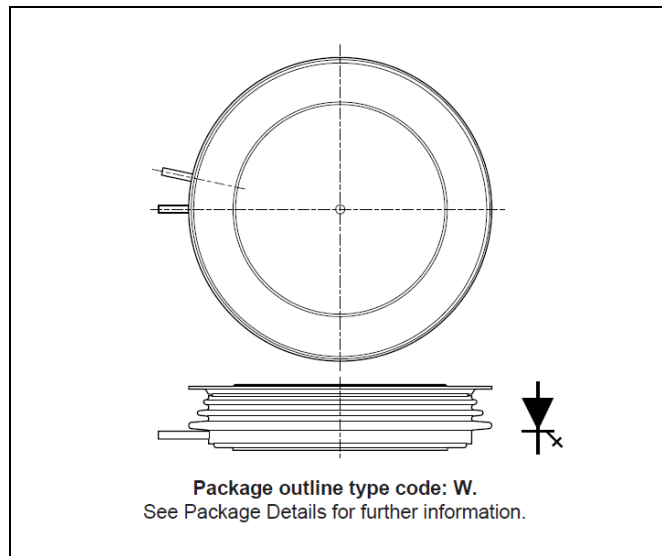
- Double Side Cooling
- High Reliability In Service
- High Voltage Capability
- Fault Protection Without Fuses
- High Surge Current Capability
- Turn-off Capability Allows Reduction in Equipment Size and Weight. Low Noise Emission Reduces Acoustic Cladding Necessary For Environmental Requirements

**APPLICATIONS**

- Variable speed AC motor drive inverters (VSD-AC) including Traction drives
- Uninterruptable Power Supplies
- High Voltage Converters
- Choppers
- Welding
- Induction Heating
- DC/DC Converters

**KEY PARAMETERS**

<b><math>I_{TCM}</math></b>	<b>3000A</b>
<b><math>V_{DRM}</math></b>	<b>4500V</b>
<b><math>I_{T(AV)}</math></b>	<b>1100A</b>
<b><math>dV_D/dt^*</math></b>	<b>750V/<math>\mu</math>s</b>
<b><math>di_T/dt</math></b>	<b>300A/<math>\mu</math>s</b>



**Fig. 1 Package outline**

**VOLTAGE RATINGS**

Type Number	Repetitive Peak Off-state Voltage $V_{DRM}$ (V)	Repetitive Peak Reverse Voltage $V_{RRM}$ (V)	Conditions
DG858DW45	4500	16	$T_{vj} = 125^{\circ}\text{C}$ , $I_{DM} = 100\text{mA}$ , $I_{RRM} = 50\text{mA}$

**CURRENT RATINGS**

Symbol	Parameter	Conditions	Max.	Units
$I_{TCM}$	Repetitive peak controllable on-state current	$V_D = V_{DRM}$ , $T_j = 125^{\circ}\text{C}$ , $di_{GQ}/dt = 40\text{A}/\mu\text{s}$ , $C_S = 4\mu\text{F}$ , $L_S < 200\text{nH}$	3000	A
$I_{T(AV)}$	Mean on-state current	$T_{HS} = 80^{\circ}\text{C}$ , Double side cooled. Half sine 50Hz	1100	A
$I_{T(RMS)}$	RMS on-state current	$T_{HS} = 80^{\circ}\text{C}$ , Double side cooled. Half sine 50Hz	1720	A

**SURGE RATINGS**

Symbol	Parameter	Test Conditions	Max.	Units
$I_{TSM}$	Surge (non repetitive) on-state current	10ms half sine. $T_j = 125^\circ\text{C}$	20.0	kA
$I^2t$	$I^2t$ for fusing	10ms half sine. $T_j = 125^\circ\text{C}$	2.0	$\text{MA}^2\text{s}$
$di_T/dt$	Critical rate of rise of on-state current	$V_D = 3000\text{V}$ , $I_T = 3000\text{A}$ , $T_j = 125^\circ\text{C}$ , $I_{FG} > 40\text{A}$ , Rise time $> 1.0 \mu\text{s}$	300	$\text{A}/\mu\text{s}$
$dV_D/dt$	Rate of rise of off-state voltage	To 66% $V_{DRM}$ ; $R_{GK} \leq 22\Omega$ , $T_j = 125^\circ\text{C}$	20	$\text{V}/\mu\text{s}$
		To 66% $V_{DRM}$ ; $V_{RG} \leq -2\text{V}$ , $T_j = 125^\circ\text{C}$	750	$\text{V}/\mu\text{s}$
$L_S$	Peak stray inductance in snubber circuit	$I_T = 3000\text{A}$ , $V_D = V_{DRM}$ , $T_j = 125^\circ\text{C}$ , $dI_{GQ} = 40\text{A}/\mu\text{s}$ , $C_S = 4.0\mu\text{F}$	200	nH

**GATE RATINGS**

Symbol	Parameter	Test Conditions	Min.	Max.	Units
$V_{RGM}$	Peak reverse gate voltage	This value may exceeded during turn-off	-	16	V
$I_{FGM}$	Peak forward gate current		-	100	A
$P_{FG(AV)}$	Average forward gate power		-	20	W
$P_{RGM}$	Peak reverse gate power		-	24	kW
$di_{GQ}/dt$	Rate of rise of reverse gate current		20	60	$\text{A}/\mu\text{s}$
$t_{ON(min)}$	Minimum permissible on time		50	-	$\mu\text{s}$
$t_{OFF(min)}$	Minimum permissible off time		100	-	$\mu\text{s}$

**THERMAL AND MECHANICAL RATINGS**

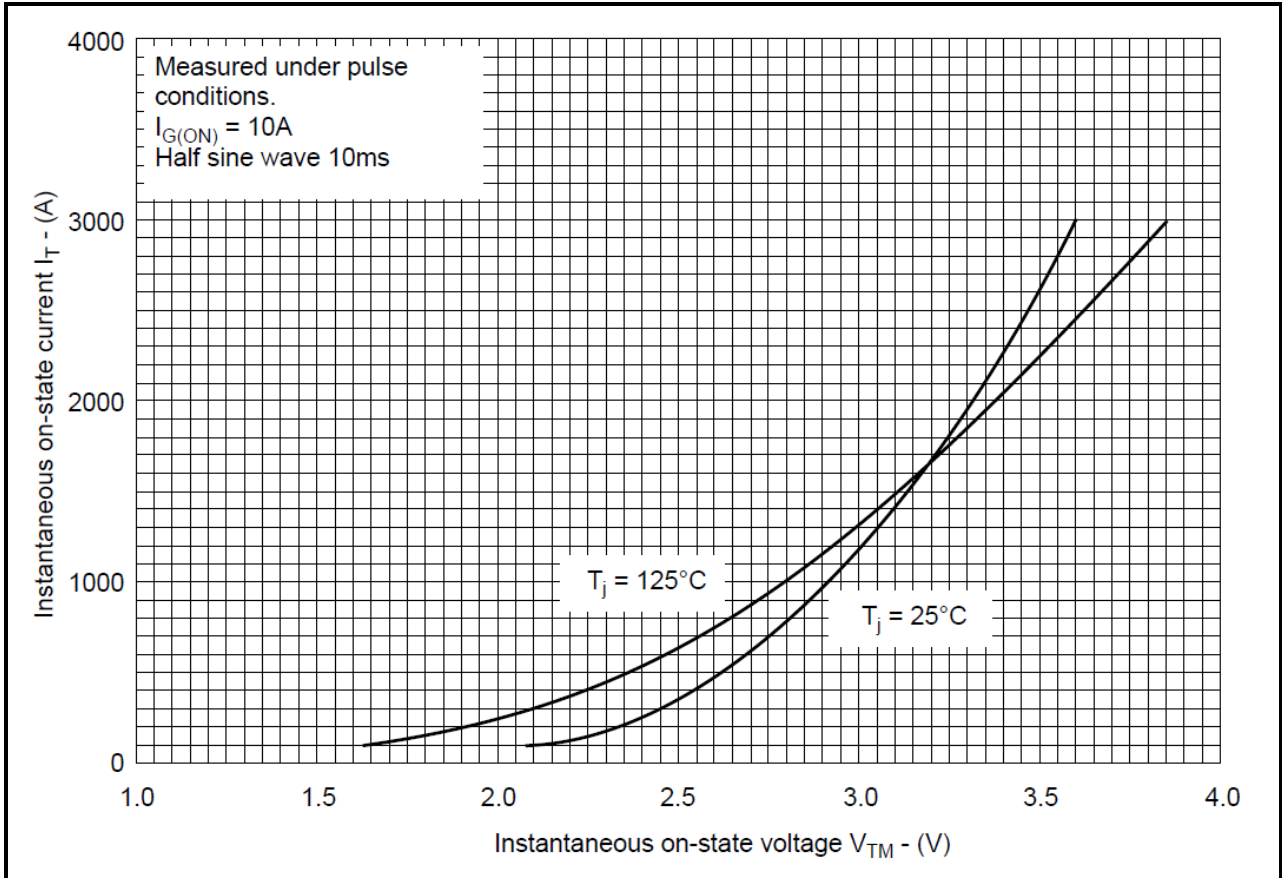
Symbol	Parameter	Test Conditions	Min.	Max.	Units	
$R_{th(j-hs)}$	Thermal resistance – junction to heatsink surface	Double side cooled	DC	-	0.011	$^\circ\text{C}/\text{W}$
		Single side cooled	Anode DC	-	0.017	$^\circ\text{C}/\text{W}$
			Cathode DC	-	0.033	$^\circ\text{C}/\text{W}$
$R_{th(c-hs)}$	Contact thermal resistance	Clamping force 36.0kN With mounting compound	Per contact	-	0.0021	$^\circ\text{C}/\text{W}$
$T_{vj}$	Virtual junction temperature	On-state (conducting)	-40	125	$^\circ\text{C}$	
$T_{op}/T_{stg}$	Operating junction/storage temperature range		-40	125	$^\circ\text{C}$	
$F_m$	Clamping force		36.0	44.0	kN	

**CHARACTERISTICS**
**T<sub>j</sub> = 125°C unless stated otherwise**

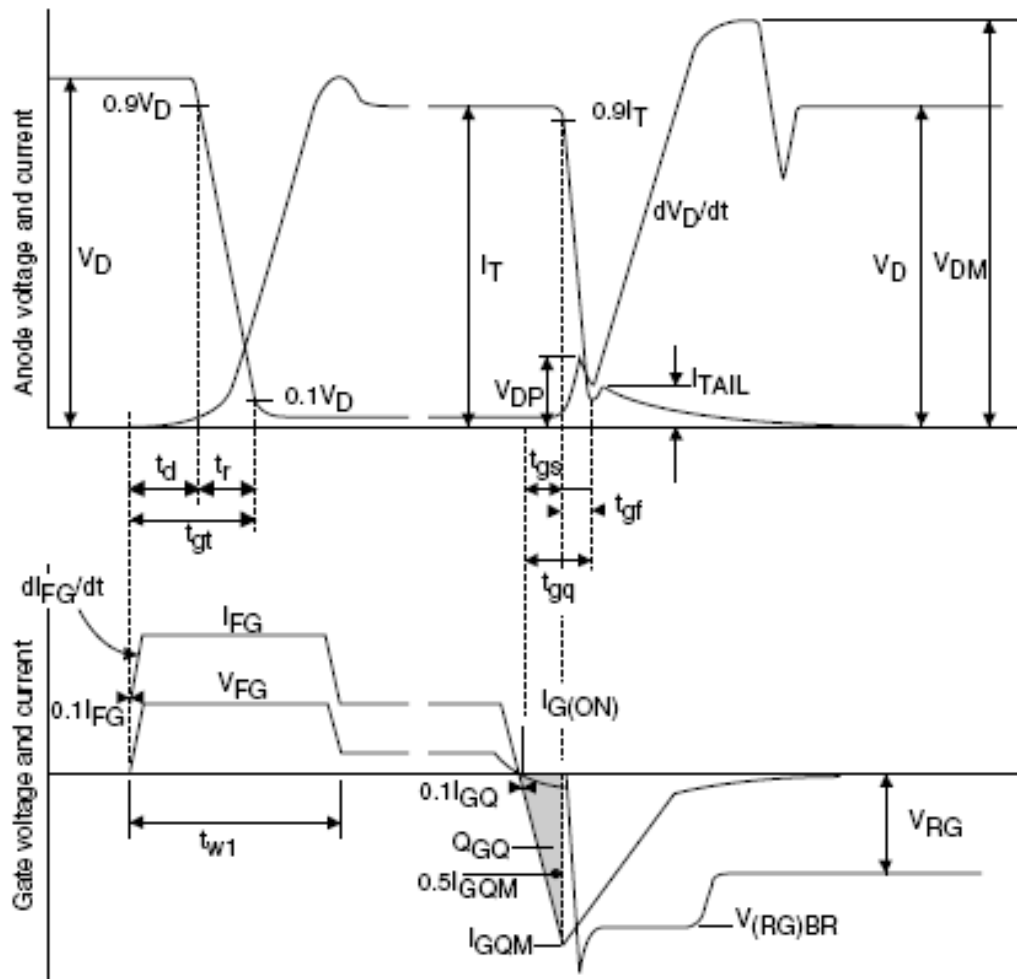
Symbol	Parameter	Test Conditions	Min.	Max.	Units
V <sub>TM)</sub>	On-state voltage	At 3000A peak, I <sub>G(ON)</sub> = 10A d.c.	-	3.85	V
I <sub>DM</sub>	Peak off-state current	V <sub>DRM</sub> = 4500V, V <sub>RG</sub> = 0V	-	100	mA
I <sub>RRM</sub>	Peak reverse current	V <sub>RRM</sub> = 16V	-	50	mA
V <sub>GT</sub>	Gate trigger voltage	V <sub>D</sub> = 24V, I <sub>T</sub> = 100A, T <sub>j</sub> = 25°C	-	1.2	V
I <sub>GT</sub>	Gate trigger current	V <sub>D</sub> = 24V, I <sub>T</sub> = 100A, T <sub>j</sub> = 25°C	-	4.0	A
I <sub>RGM</sub>	Reverse gate cathode current	V <sub>RGM</sub> = 16V, No gate/cathode resistor	-	50	mA
E <sub>ON</sub>	Turn-on Energy	V <sub>D</sub> = 2000V	-	4400	mJ
t <sub>d</sub>	Delay time	I <sub>T</sub> = 3000A, di <sub>T</sub> /dt = 300A/μs	-	2.0	μs
t <sub>r</sub>	Rise time	I <sub>FG</sub> = 40A, rise time < 1.0μs	-	6.0	μs
E <sub>OFF</sub>	Turn-off energy	I <sub>T</sub> = 3000A, V <sub>DM</sub> = 4200V Snubber Cap Cs = 4.0μC di <sub>GQ</sub> /dt = 40A/us	-	12500	mJ
t <sub>gs</sub>	Storage time		-	26	μs
t <sub>gf</sub>	Fall time		2.5	μs	
t <sub>gq</sub>	Gate controlled turn-off time		-	28.5	μs
Q <sub>GQ</sub>	Turn-off gate charge		12500	μC	
Q <sub>GQT</sub>	Total turn-off gate charge		25000	μC	
I <sub>GQM</sub>	Peak reverse gate current		-	950	A

	Conditions	Limits	Units
DC Blocking reliability	V <sub>dc</sub> = 3500V, T <sub>j</sub> = -40 to +125°, ambient cosmic radiation at sea level, in open air, 100% duty cycle	100	FITS

**CURVES**



**Figure 2 On-state characteristics**



Recommended gate conditions:

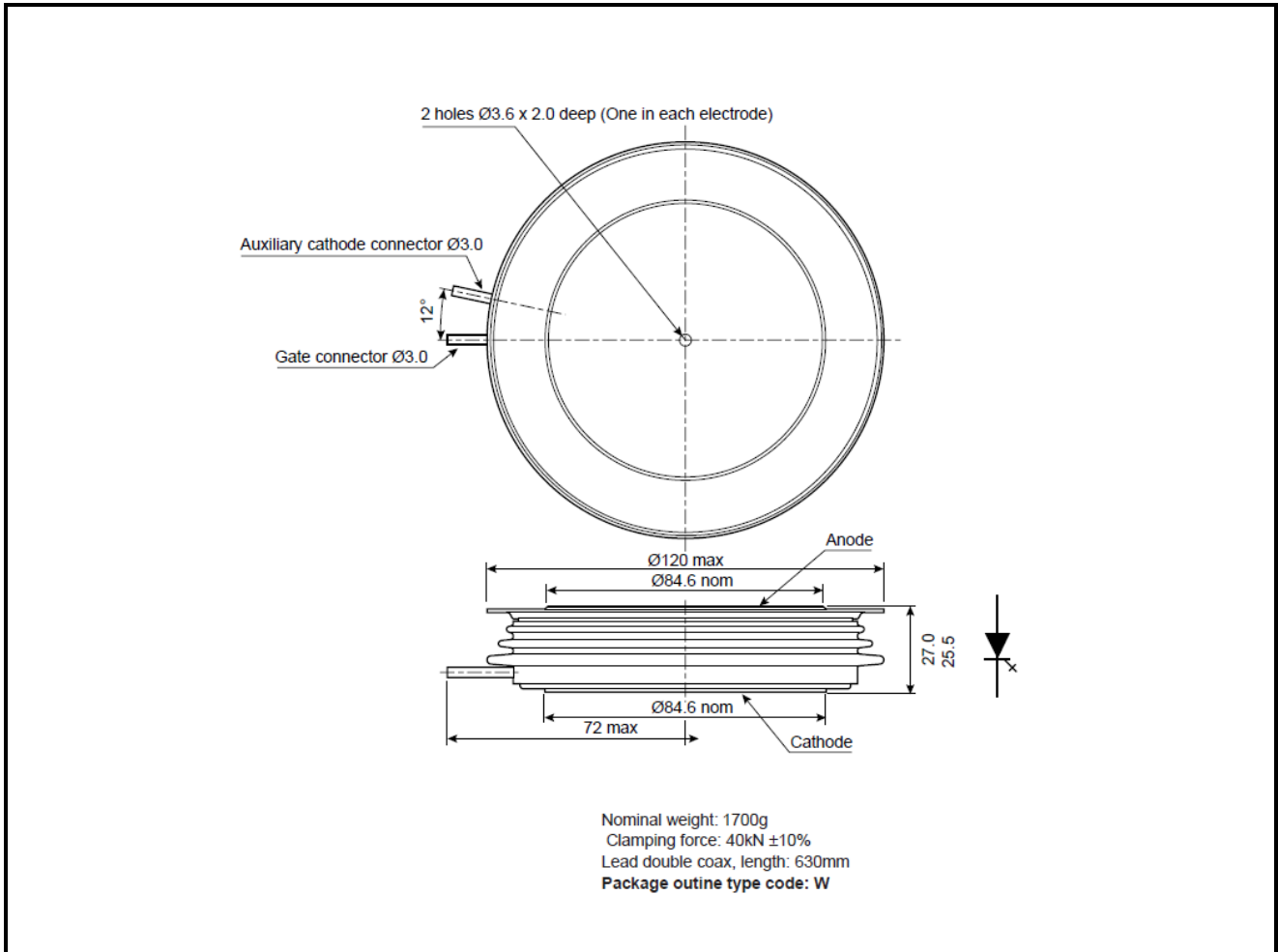
- $I_{TCM} = 1000A$
- $I_{FG} = 30A$
- $I_{G(ON)} = 4A$  d.c.
- $t_{w1(min)} = 10\mu s$
- $I_{GQM} = 420A$
- $di_{GC}/dt = 30A/\mu s$
- $Q_{GQ} = 3000\mu C$
- $V_{RG(min)} = 2V$
- $V_{RG(max)} = 16V$

These are recommended Dynex Semiconductor conditions. Other conditions are permitted according to users gate drive specifications.

Fig.24 General switching waveforms

PACKAGE DETAILS

For further package information, please contact Customer Services. All dimensions in mm, unless stated otherwise. DO NOT SCALE.



**Fig.31 Package outline**

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**HEADQUARTERS OPERATIONS****DYNEX SEMICONDUCTOR LTD**

Doddington Road, Lincoln, Lincolnshire, LN6 3LF,  
United Kingdom

Fax: +44(0)1522 500550

Tel: +44(0)1522 500500

Web: <http://www.dynexsemi.com>

**CUSTOMER SERVICE****DYNEX SEMICONDUCTOR LTD**

Doddington Road, Lincoln, Lincolnshire, LN6 3LF,  
United Kingdom

Fax: +44(0)1522 500020

Tel: +44(0)1522 502753 / 502901

Email: [Power\\_solutions@dynexsemi.com](mailto:Power_solutions@dynexsemi.com)