

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

### KEY PARAMETERS

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

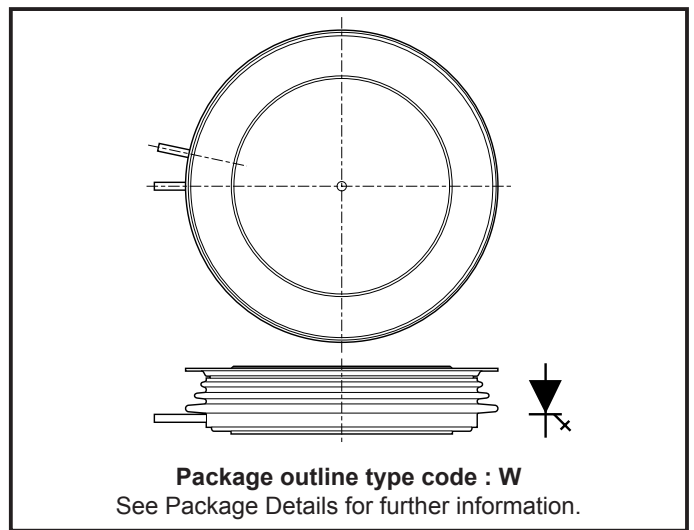


Fig.1 Package outline

### VOLTAGE RATINGS

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

### CURRENT RATINGS

Symbol	Parameter	Conditions	Max.	Units
$I_{TCM}$	Repetitive peak controllable on-state current	$V_D = V_{DRM}$ , $T_j = 125^{\circ}\text{C}$ , $dI_{GQ}/dt = 40\text{A}/\mu\text{s}$ , $C_s = 4.0\mu\text{F}$ , $L_s \leq 200\text{nH}$	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

## DG858DW45

### SURGE RATINGS

Symbol	Parameter	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. $T_j = 125^\circ\text{C}$	$2.0 \times 10^6$	$\text{A}^2\text{s}$
$di_T/dt$	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% $V_{DRM}$ ; $V_{RG} = -2\text{V}$ , $T_j = 125^\circ\text{C}$	750	$\text{V}/\mu\text{s}$
$L_S$	Peak stray inductance in snubber circuit	$I_T = 3000\text{A}$ , $V_D = V_{DRM}$ , $T_j = 125^\circ\text{C}$ , $di_{GQ}/dt = 40\text{A}/\mu\text{s}$ , $C_s = 4.0\mu\text{F}$	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	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 DATA

Symbol	Parameter	Conditions	Min.	Max.	Units
$R_{th(j-hs)}$	DC thermal resistance - junction to heatsink surface	Double side cooled	-	0.011	$^\circ\text{C}/\text{W}$
		Anode side cooled	-	0.017	$^\circ\text{C}/\text{W}$
		Cathode side cooled	-	0.03	$^\circ\text{C}/\text{W}$
$R_{th(c-hs)}$	Contact thermal resistance	Clamping force 40kN With mounting compound	per contact	-	0.0021 $^\circ\text{C}/\text{W}$
$T_{vj}$	Virtual junction temperature		-40	125	$^\circ\text{C}$
$T_{OP}/T_{stg}$	Operating junction/storage temperature range		-40	125	$^\circ\text{C}$
-	Clamping force		36.0	44.0	kN

**CHARACTERISTICS**

<b>T<sub>j</sub> = 125°C unless stated otherwise</b>					
<b>Symbol</b>	<b>Parameter</b>	<b>Conditions</b>	<b>Min.</b>	<b>Max.</b>	<b>Units</b>
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> = 2V	-	100	mA
I <sub>RRM</sub>	Peak reverse current	At V <sub>RRM</sub>	-	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 = 4.0μF, di <sub>GQ</sub> /dt = 40/μs	-	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

**RELIABILITY**

	<b>Conditions</b>	<b>Limit</b>	<b>Units</b>
DC blocking reliability	V <sub>dc</sub> = 3500V, T <sub>j</sub> = -40 to + 125°C, ambient cosmic radiation at sea level, in open air, 100% duty cycle.	100	FIT

# DG858DW45

## CURVES

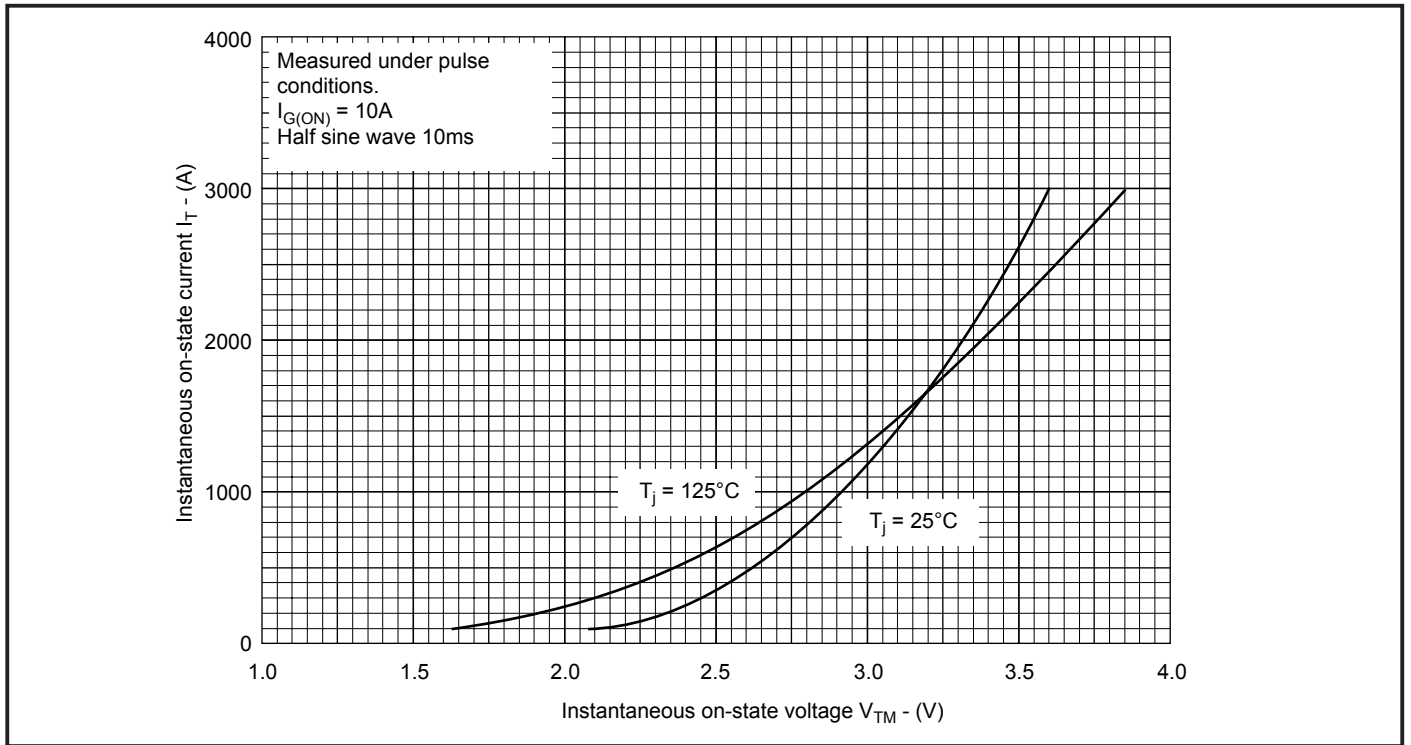
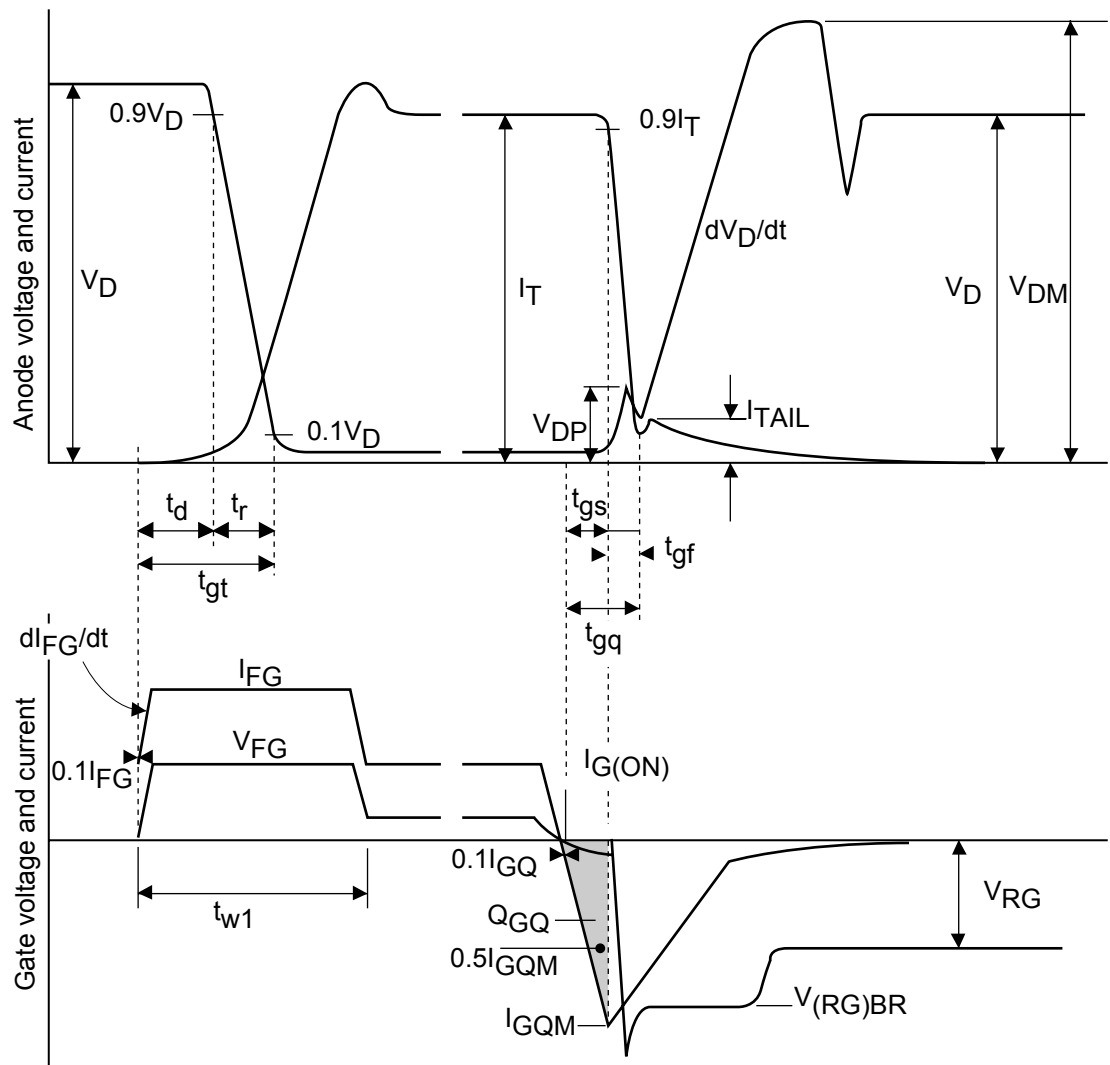


Figure 2. On-state characteristics



Recommended gate conditions:

- $I_{TCM} = 3000A$
- $I_{FG} = 40A$
- $I_{G(ON)} = 10A$  d.c.
- $t_{w1(min)} = 20\mu s$
- $I_{GQM} = 1200A$
- $di_{GQ}/dt = 40A/\mu s$
- $Q_{GQ} = 12500\mu C$
- $V_{RG(min)} = 2V$
- $V_{RG(max)} = 18V$

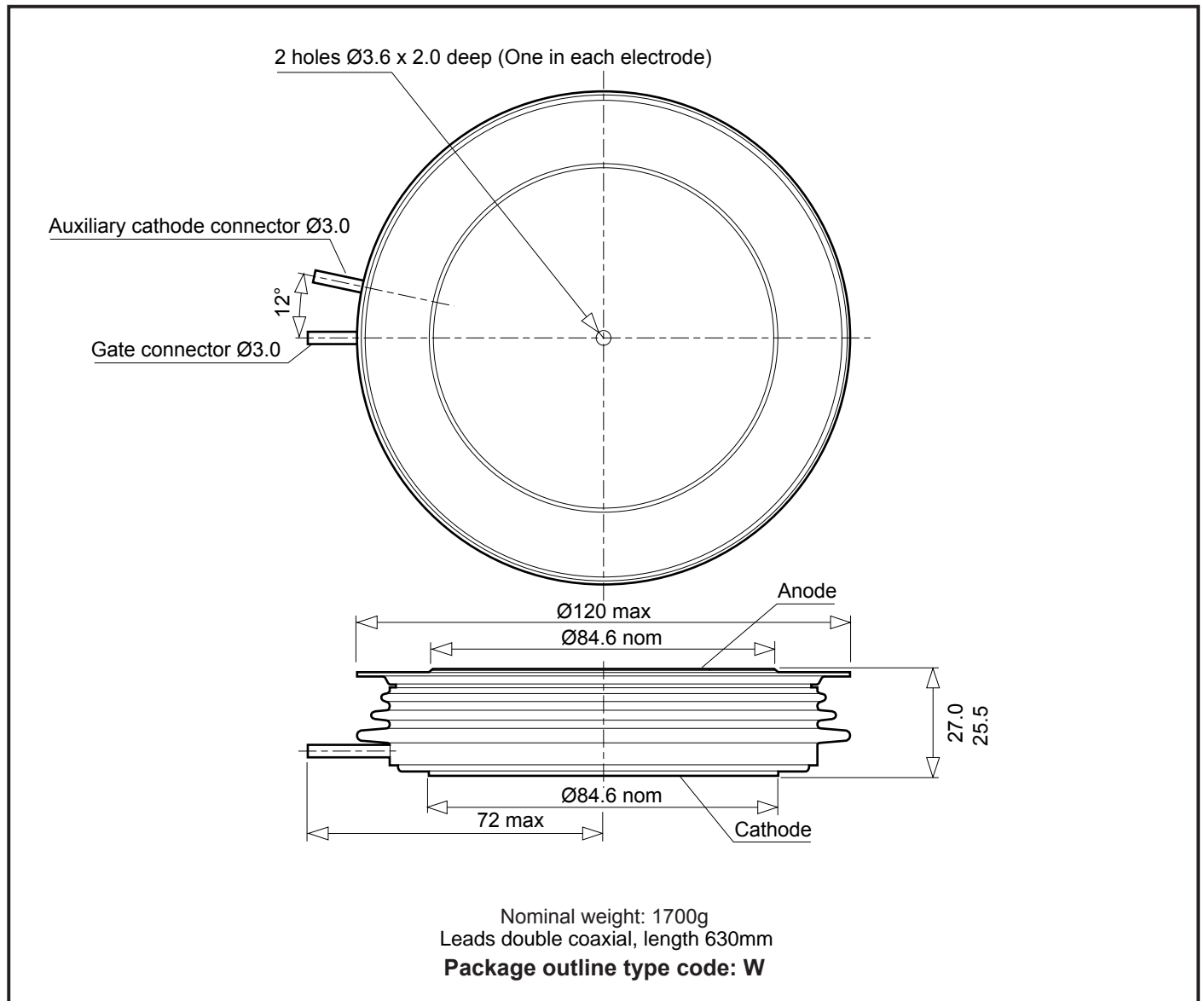
These are recommended Dynex Semiconductor conditions. Other conditions are permitted according to users gate drive specifications.

Figure 3. General switching waveforms

# DG858DW45

## PACKAGE DETAILS

For further package information, please contact your local Customer Service Centre. All dimensions in mm, unless stated otherwise. DO NOT SCALE.



## Associated Literature/Products

### Publication No. Title/Part Number

AN4571	Application note - GDU9X-XXXXX Series GTO gate drive units.
DS4567	GDU90-20721 GTO gate drive unit.
DS4568	GDU90-20722 GTO gate drive unit.
DS4150	DSF8045SK - Snubber diode.
DS4153	DSF21545SV - Antiparallel/freewheel diode.



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