

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}	3000A
V_{DRM}	4500V
$I_{T(AV)}$	1100A
dV_D/dt	750V/μs
dI_T/dt	300A/μs

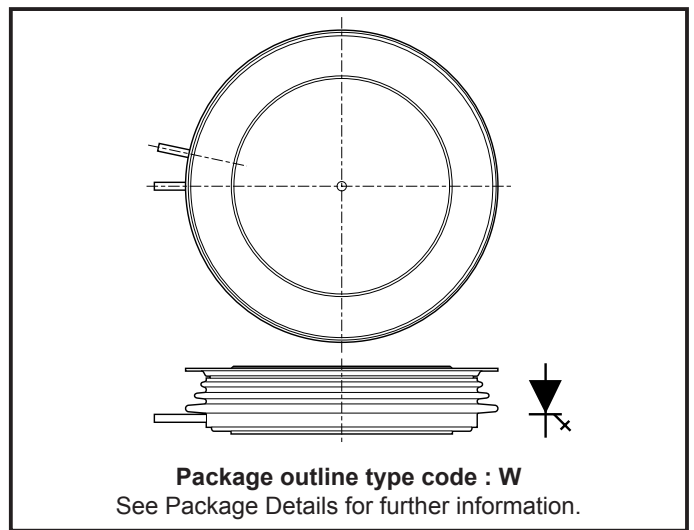


Fig.1 Package outline

VOLTAGE RATINGS

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

CURRENT RATINGS

Symbol	Parameter	Conditions	Max.	Units
I_{TCM}	Repetitive peak controllable on-state current	$V_D = V_{DRM}, T_j = 125^{\circ}C, di_{GQ}/dt = 40A/\mu s,$ $C_s = 4.0\mu F, L_s \leq 200nH$	3000	A
$I_{T(AV)}$	Mean on-state current	$T_{HS} = 80^{\circ}C.$ Double side cooled, half sine 50Hz.	1100	A
$I_{T(RMS)}$	RMS on-state current	$T_{HS} = 80^{\circ}C.$ Double side cooled, half sine 50Hz.	1720	A

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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. $T_j = 125^\circ\text{C}$	2.0×10^6	A^2s
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	-	μs
$t_{OFF(min)}$	Minimum permissible off time		100	-	μs

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

T_j = 125°C unless stated otherwise					
Symbol	Parameter	Conditions	Min.	Max.	Units
V _{TM}	On-state voltage	At 3000A peak, I _{G(ON)} = 10A d.c.	-	3.85	V
I _{DM}	Peak off-state current	V _{DRM} = 4500V, V _{RG} = 2V	-	100	mA
I _{RRM}	Peak reverse current	At V _{RRM}	-	50	mA
V _{GT}	Gate trigger voltage	V _D = 24V, I _T = 100A, T _j = 25°C	-	1.2	V
I _{GT}	Gate trigger current	V _D = 24V, I _T = 100A, T _j = 25°C	-	4.0	A
I _{RGM}	Reverse gate cathode current	V _{RGM} = 16V, No gate/cathode resistor	-	50	mA
E _{ON}	Turn-on energy	V _D = 2000V	-	4400	mJ
t _d	Delay time	I _T = 3000A, di _T /dt = 300A/μs	-	2.0	μs
t _r	Rise time	I _{FG} = 40A, rise time < 1.0μs	-	6.0	μs
E _{OFF}	Turn-off energy	I _T = 3000A, V _{DM} = 4200V Snubber Cap Cs = 4.0μF, di _{GQ} /dt = 40/μs	-	12500	mJ
t _{gs}	Storage time		-	26	μs
t _{gf}	Fall time		-	2.5	μs
t _{gq}	Gate controlled turn-off time		-	28.5	μs
Q _{GQ}	Turn-off gate charge		-	12500	μC
Q _{GQT}	Total turn-off gate charge		-	25000	μC
I _{GQM}	Peak reverse gate current		-	950	A

RELIABILITY

	Conditions	Limit	Units
DC blocking reliability	V _{dc} = 3500V, T _j = -40 to + 125°C, ambient cosmic radiation at sea level, in open air, 100% duty cycle.	100	FIT

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CURVES

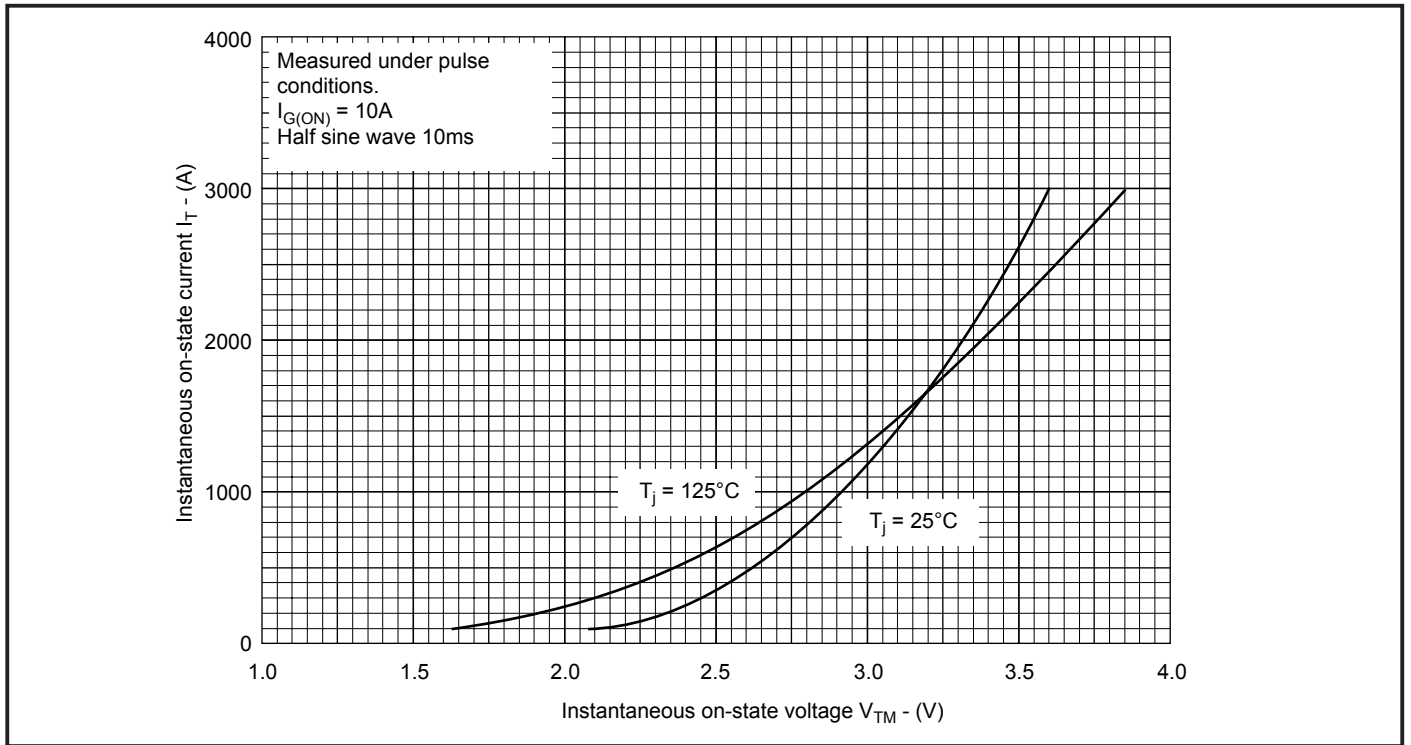
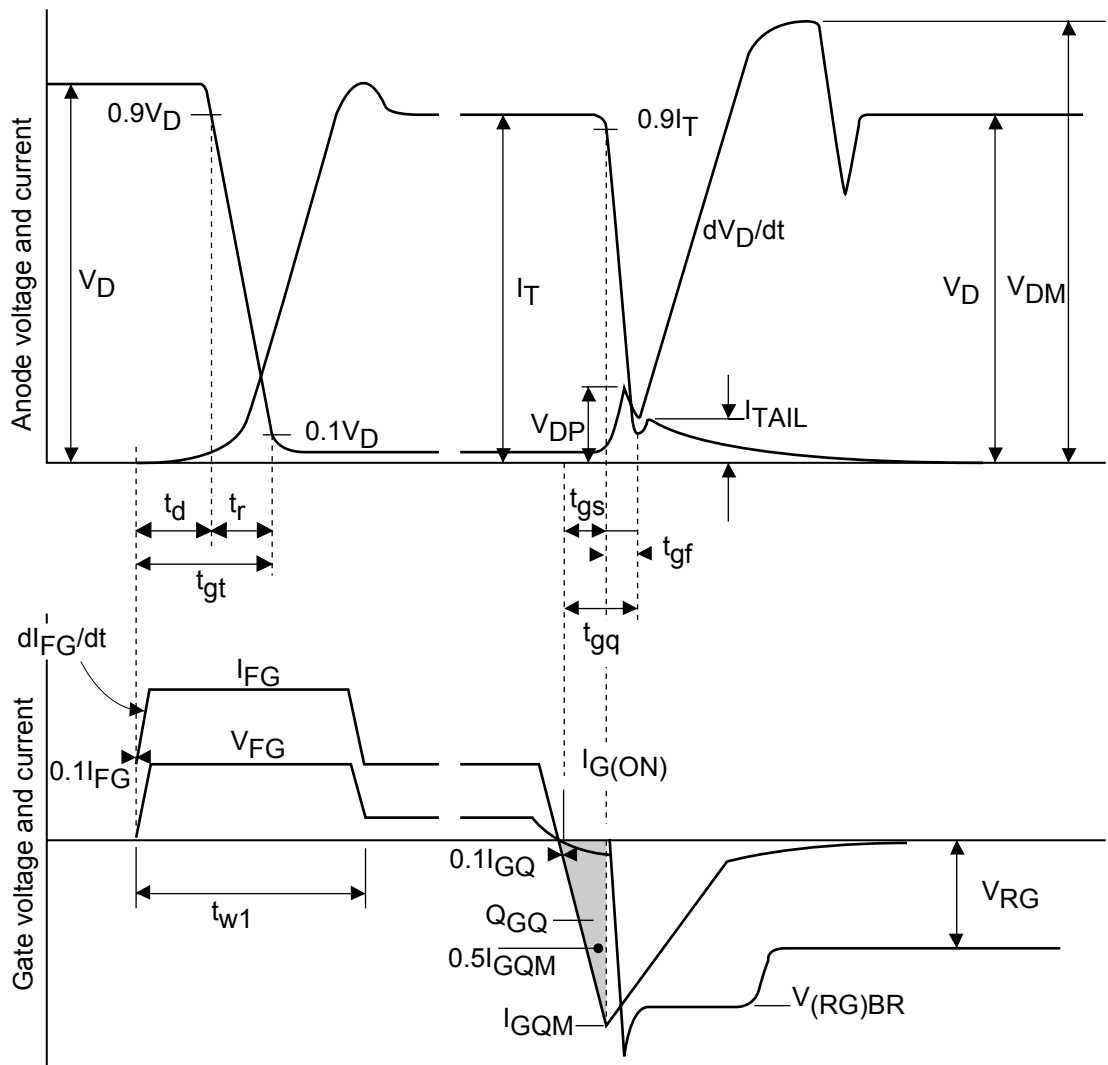


Figure 2. On-state characteristics



Recommended gate conditions:

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

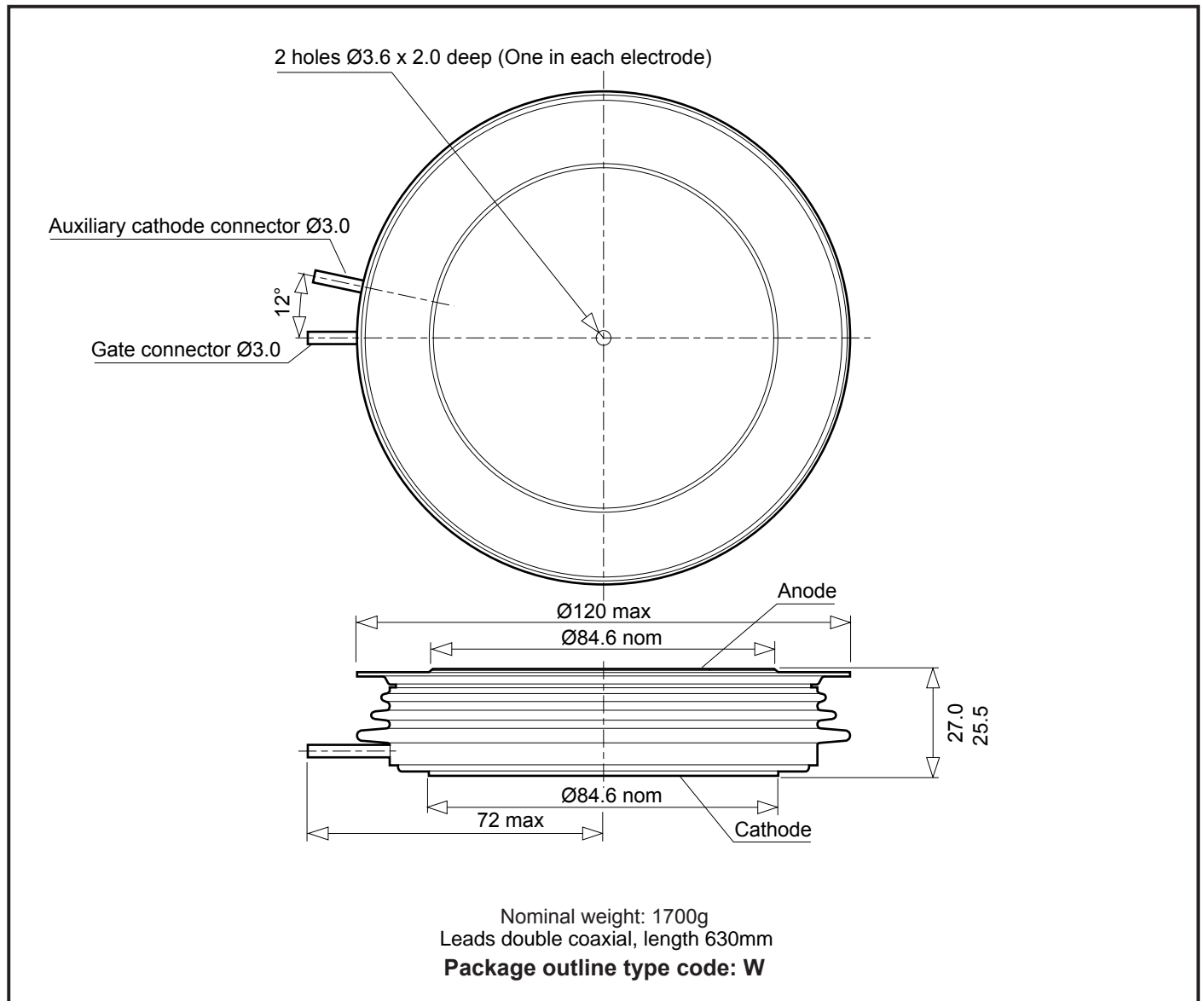
These are recommended Dynex Semiconductor conditions. Other conditions are permitted according to users gate drive specifications.

Figure 3. General switching waveforms

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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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