DCR820SG

Phase Control Thyristor

Supersedes October 2000 version, DS4214-5.1
DS4214-6.0 July 2001

FEATURES

- Double Side Cooling
- High Surge Capability

APPLICATIONS

- High Power Drives
- High Voltage Power Supplies
- DC Motor Control
- Welding
- Battery Chargers

VOLTAGE RATINGS

Type Number	Repetitive Peak Voltages V_{DRM} V_{RRM} V	Conditions
DCR820SG65	6500	T_{vj} = 0° to 125°C,
DCR820SG64	6400	I_{DRM} = I_{RRM} = 50mA,
DCR820SG63	6300	V_{DRM}, V_{RRM} t_p = 10ms,
DCR820SG62	6200	V_{DSM} & V_{RSM} =
DCR820SG61	6100	V_{DRM} & V_{RRM} + 100V
DCR820SG60	6000	Respectively

Lower voltage grades available.

ORDERING INFORMATION

When ordering, select the required part number shown in the Voltage Ratings selection table.

For example:

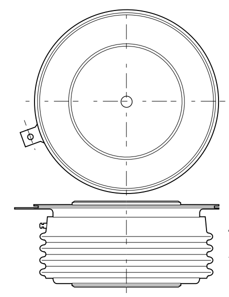
DCR820SG62

Note: Please use the complete part number when ordering and quote this number in any future correspondance relating to your order.

KEY PARAMETERS

V_{DRM}	**6500V**
$I_{T(AV)}$	**387A**
I_{TSM}	**6000A**
dVdt*	**1000V/µs**
dI/dt	**100A/µs**

***Higher dV/dt selections available**



Outline type code: G.
See Package Details for further information.

Fig. 1 Package outline

CURRENT RATINGS

T_{case} = 60˚C unless stated otherwise

Symbol	Parameter	Conditions	Max.	Units
Double Side Cooled				
$I_{T(AV)}$	Mean on-state current	Half wave resistive load	387	A
$I_{T(RMS)}$	RMS value	-	608	A
I_T	Continuous (direct) on-state current	-	567	A
Single Side Cooled (Anode side)				
$I_{T(AV)}$	Mean on-state current	Half wave resistive load	260	A
$I_{T(RMS)}$	RMS value	-	408	A
I_T	Continuous (direct) on-state current	-	357	A

CURRENT RATINGS

T_{case} = 80˚C unless stated otherwise

Symbol	Parameter	Conditions	Max.	Units
Double Side Cooled				
$I_{T(AV)}$	Mean on-state current	Half wave resistive load	310	A
$I_{T(RMS)}$	RMS value	-	485	A
I_T	Continuous (direct) on-state current	-	447	A
Single Side Cooled (Anode side)				
$I_{T(AV)}$	Mean on-state current	Half wave resistive load	204	A
$I_{T(RMS)}$	RMS value	-	321	A
I_T	Continuous (direct) on-state current	-	279	A

SURGE RATINGS

Symbol	Parameter	Conditions	Max.	Units
I_{TSM}	Surge (non-repetitive) on-state current	10ms half sine; T_{case} = 125°C V_R = 50% V_{RRM} - 1/4 sine	4.8	kA
I^2t	I^2t for fusing		115 x 10^3	A^2s
I_{TSM}	Surge (non-repetitive) on-state current	10ms half sine; T_{case} = 125°C V_R = 0	6.0	kA
I^2t	I^2t for fusing		180 x 10^3	A^2s

THERMAL AND MECHANICAL DATA

Symbol	Parameter	Conditions		Min.	Max.	Units
$R_{th(j-c)}$	Thermal resistance - junction to case	Double side cooled	dc	-	0.032	°C/W
		Single side cooled	Anode dc	-	0.064	°C/W
			Cathode dc	-	0.064	°C/W
$R_{th(c-h)}$	Thermal resistance - case to heatsink	Clamping force 12.0kN with mounting compound	Double side	-	0.008	°C/W
			Single side	-	0.016	°C/W
T_{vj}	Virtual junction temperature	On-state (conducting)		-	135	°C
		Reverse (blocking)		-	125	°C
T_{stg}	Storage temperature range			–55	150	°C
-	Clamping force			10.8	13.2	kN

DYNAMIC CHARACTERISTICS

Symbol	Parameter	Conditions		Min.	Max.	Units
I_{RRM}/I_{DRM}	Peak reverse and off-state current	At V_{RRM}/V_{DRM}, T_{case} = 125°C		-	50	mA
dV/dt	Maximum linear rate of rise of off-state voltage	To 67% V_{DRM} T_j = 125°C.		-	1000	V/µs
dI/dt	Rate of rise of on-state current	From 67% V_{DRM} to 1000A, Gate source 10V, 5Ω $t_r \leq$ 0.5µs. T_j = 125°C.	Repetitive 50Hz	-	50	A/µs
			Non-repetitive	-	100	A/µs
$V_{T(TO)}$	Threshold voltage	At T_{vj} = 125°C		-	1.6	V
r_T	On-state slope resistance	At T_{vj} = 125°C		-	3.5	mΩ
t_{gd}	Delay time	V_D = 67% V_{DRM}, Gate source 20V, 10Ω Rise time 0.5µs, T_j = 25°C		-	3.3	µs
I_L	Latching current	T_j = 25°C, V_D = 20V.		-	1	A
I_H	Holding current	T_j = 25°C, V_D = 5V, I_T = 5A, I_{TM} = 500A		30	120	mA
t_q	Turn-off time	I_T = 500A, t_p = 1ms, T_j = 125°C, V_{RM} = 100V, dI_{RR}/dt = 10A/µs, dV_{DR}/dt = 25V/µs to 3000V		500	1200	µs
Q_S	Stored charge - triangular approximation through I_{RR} and 25% I_{RR}	I_T = 320A, $-dI_T/dt$ = 6A/µs		600	1500	µC

GATE TRIGGER CHARACTERISTICS AND RATINGS

Symbol	Parameter	Conditions	Typ.	Max.	Units
V_{GT}	Gate trigger voltage	V_{DRM} = 5V, T_{case} = 25°C	-	3.0	V
I_{GT}	Gate trigger current	V_{DRM} = 5V, T_{case} = 25°C	-	300	mA
V_{GD}	Gate non-trigger voltage	At V_{DRM} T_{case} = 125°C	-	0.25	V
V_{FGM}	Peak forward gate voltage	Anode positive with respect to cathode	-	30	V
V_{FGN}	Peak forward gate voltage	Anode negative with respect to cathode	-	0.25	V
V_{RGM}	Peak reverse gate voltage		-	5	V
I_{FGM}	Peak forward gate current	Anode positive with respect to cathode	-	10	A
P_{GM}	Peak gate power	See Fig.8/9 Gate characteristics curves and table	-	100	W
$P_{G(AV)}$	Mean gate power		-	5	W

CURVES

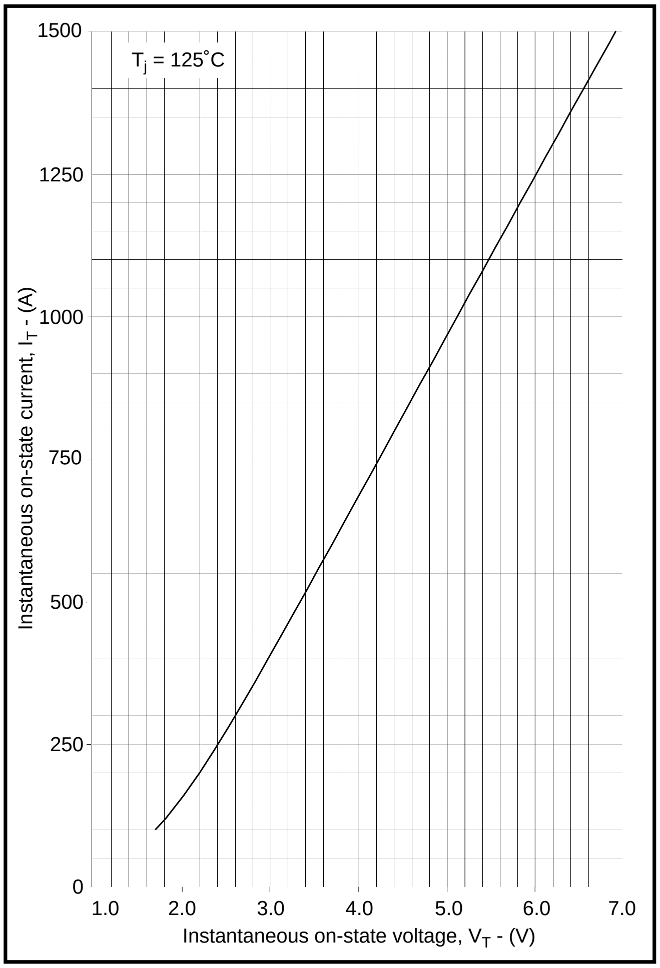


Fig.2 Maximum (limit) on-state characteristics

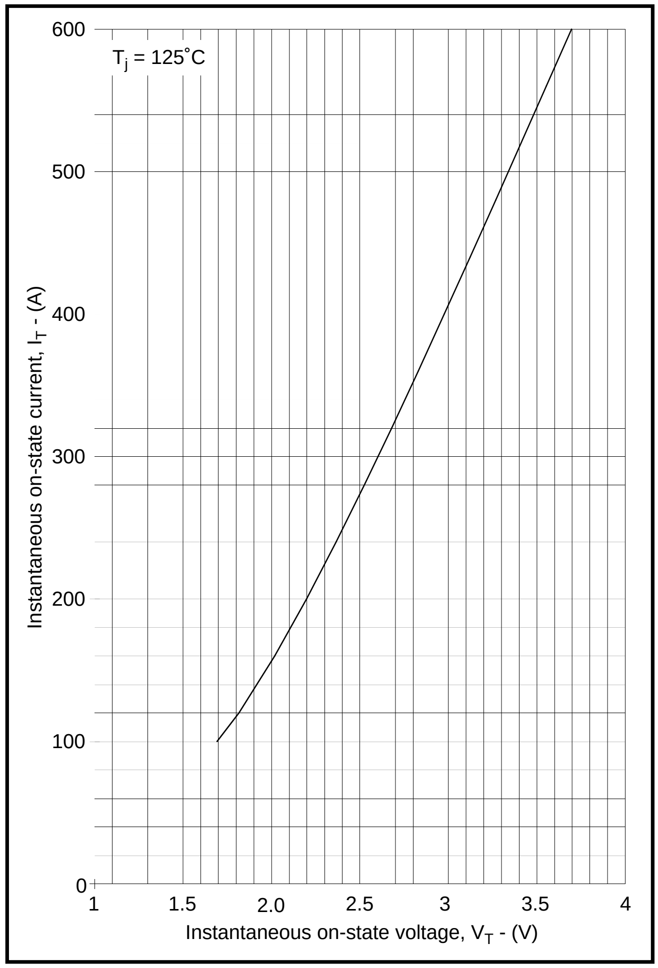


Fig.3 Maximum (limit) on-state characteristics

V_{TM} Equation:-

$V_{TM} = A + B\ln(I_T) + C.I_T + D.\sqrt{I_T}$

Where A = -0.759775
B = 0.639225
C = 0.004376
D = -0.092153

these values are valid for T_j = 125˚C for I_T 100A to 1500A

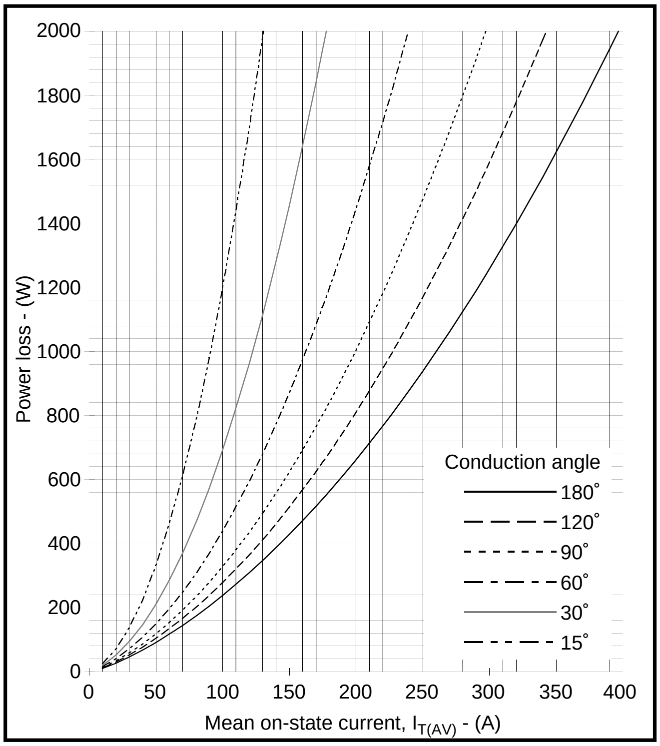


Fig.4 Sine wave power dissipation curves

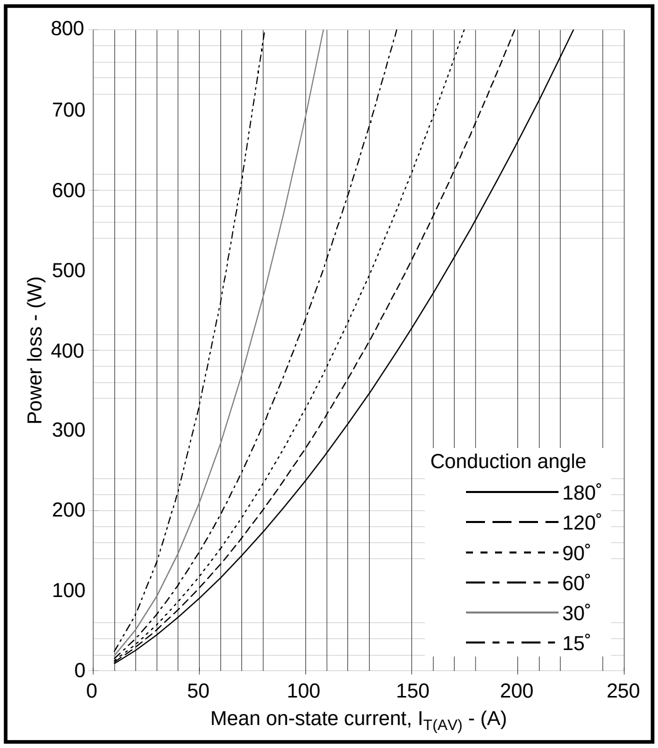


Fig.5 Sine wave power dissipation curves

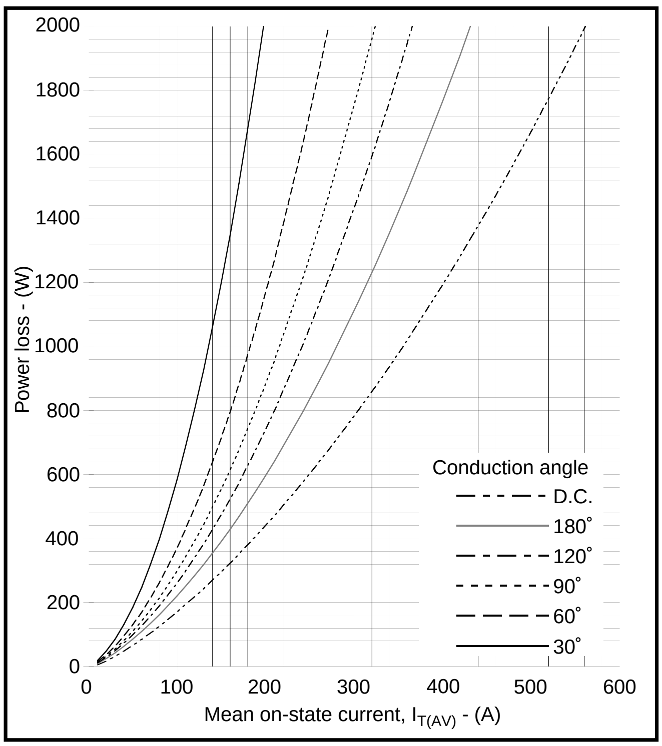


Fig.6 Square wave power dissipation curves

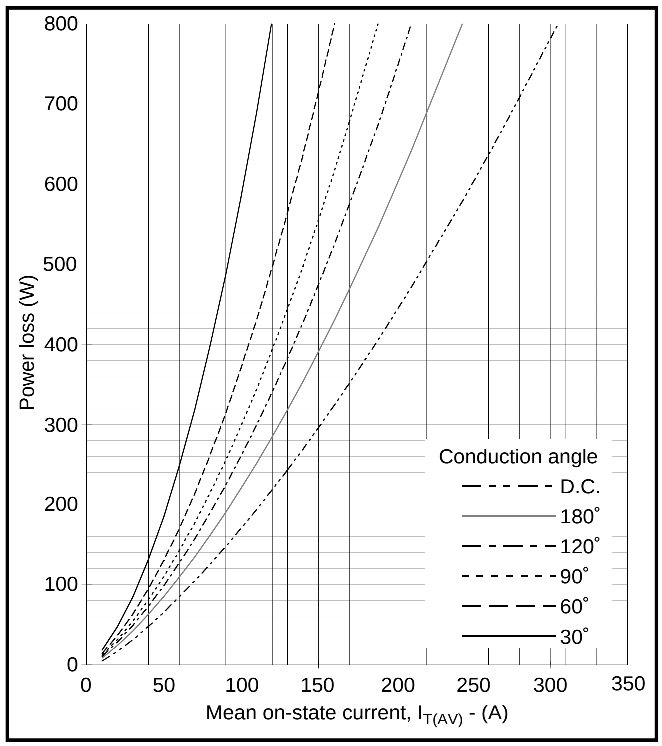
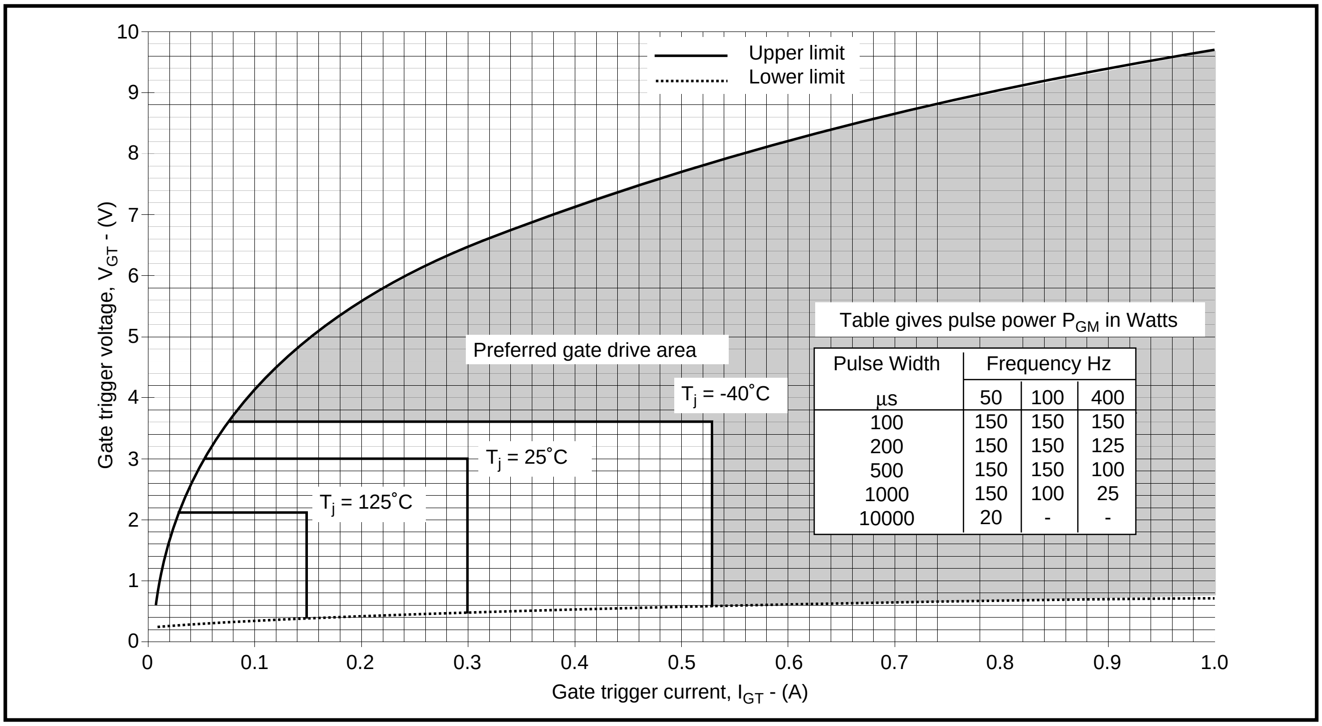


Fig.7 Square wave power dissipation curves



Pulse Width µs	Frequency Hz 50	100	400
100	150	150	150
200	150	150	125
500	150	150	100
1000	150	100	25
10000	20	-	-

Fig.8 Gate characteristics

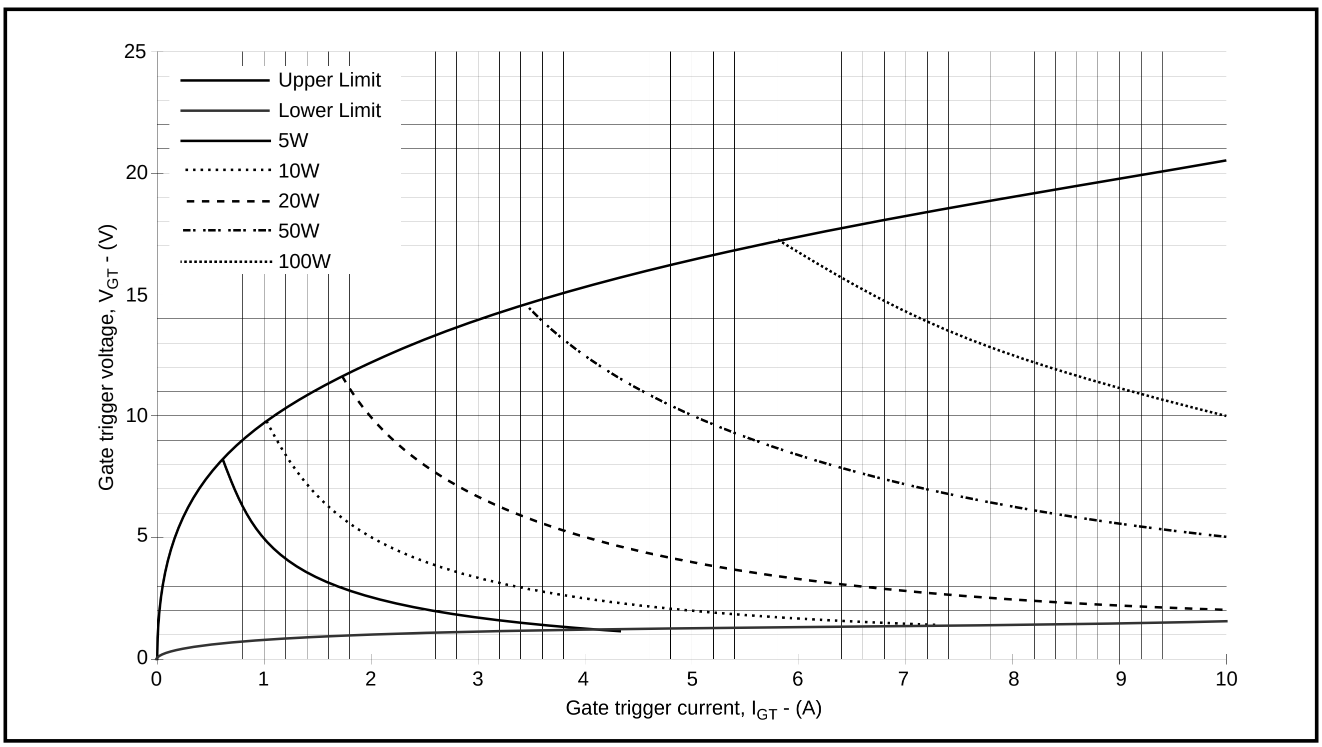


Fig.9 Gate characteristics

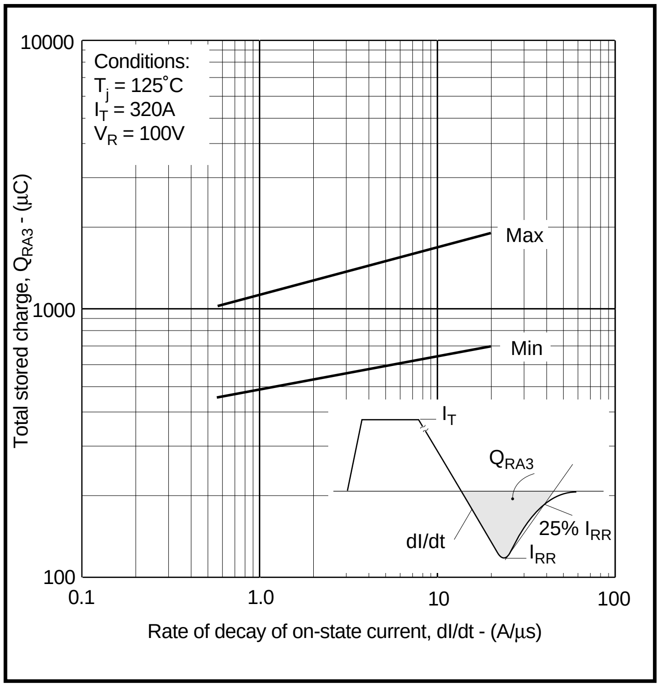


Fig.10 Stored charge

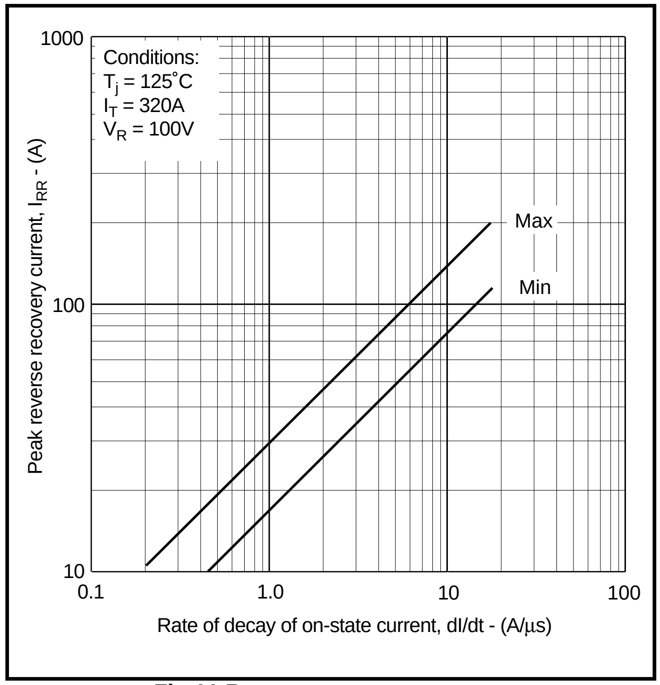


Fig.11 Reverse recovery current

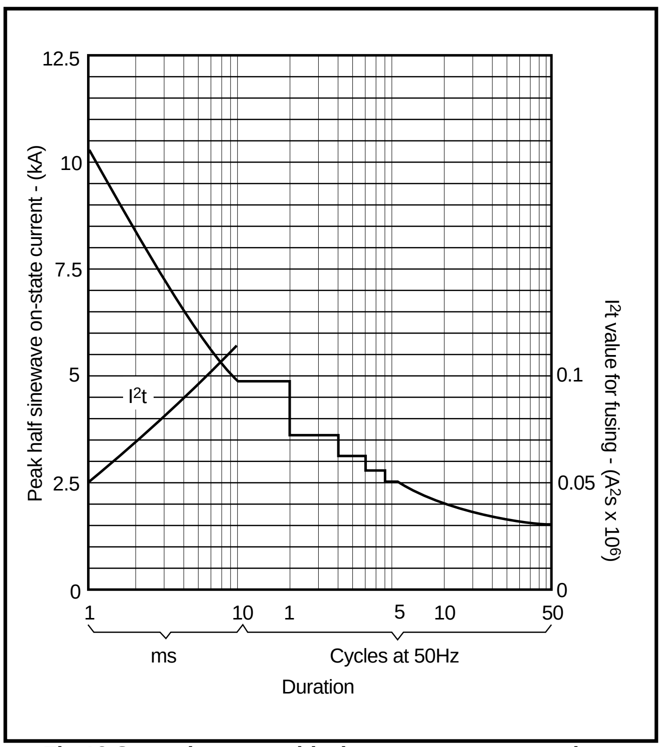


Fig.12 Surge (non-repetitive) on-state current vs time (with 50% V_{RRM} @ T_{case} = 125˚C)

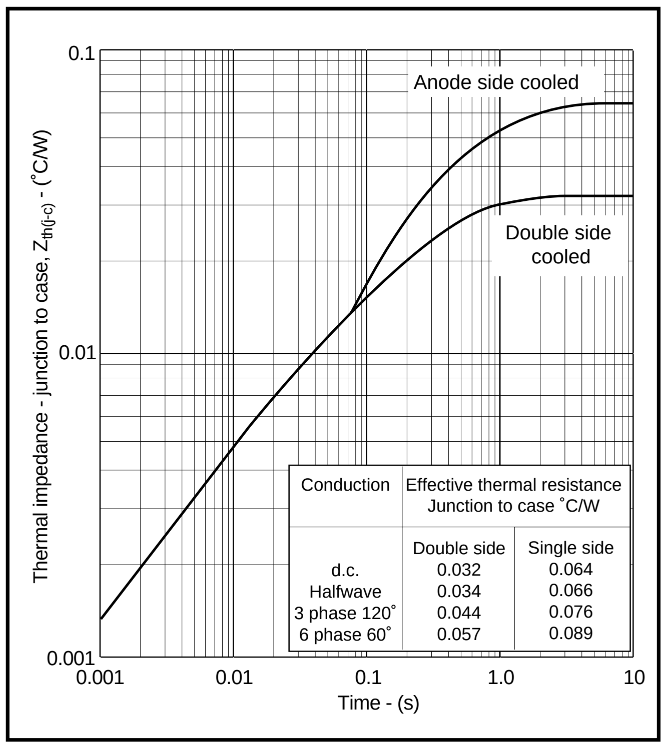
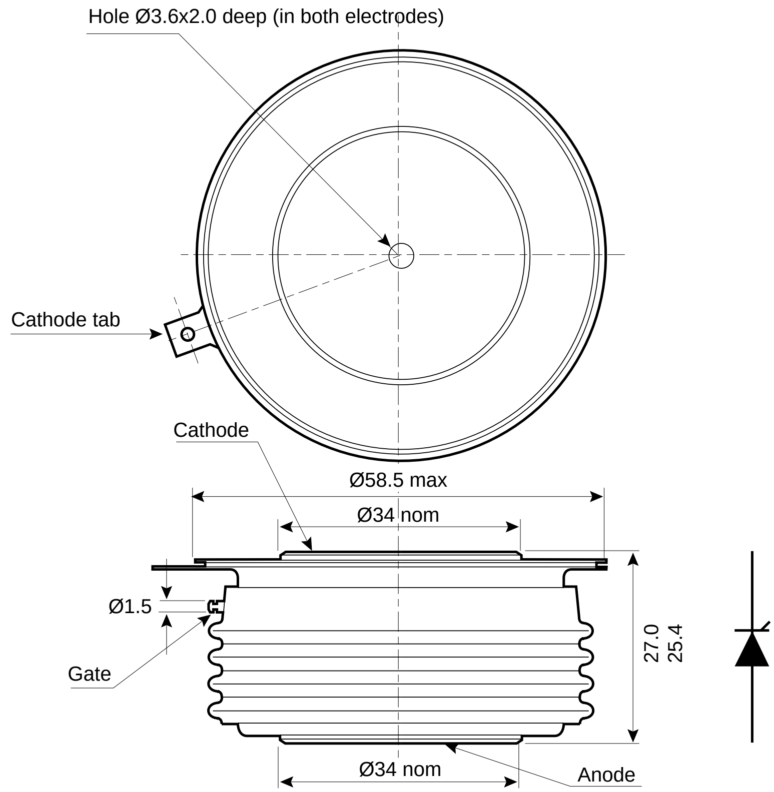


Fig.13 Maximum (limit) transient thermal impedance - junction to case

PACKAGE DETAILS

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



Nominal weight: 250g
Clamping force: 12kN ±10%
Lead lenght: 420mm
Lead terminal connector: M4 ring

Package outline type code: G

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 / clamping systems in line with advances in device types and the voltage 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 up to date 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 offers a varied selection of pre-loaded clamps to suit all of our manufactured devices. This include cube clamps for single side cooling of 'T' 22mm

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

Power Assembly has its own proprietary range of extruded aluminium heatsinks. They have been designed to optimise the performance or our 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 Services.

http://www.dynexsemi.com

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Dynex Semiconductor annotate datasheets in the top right hard corner of the front page, to indicate product status. The annotations are as follows:-

Target Information: This is the most tentative form of information and represents a very preliminary specification. No actual design work on the product has been started.

Preliminary Information: The product is in design and development. The datasheet represents the product as it is understood but details may change.

Advance Information: The product design is complete and final characterisation for volume production is well in hand.

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