





Phase Control Thyristor

Preliminary Information

DS5932-2 August 2010 (LN 27490)

FEATURES

- Double Side Cooling
- High Surge Capability

APPLICATIONS

- High Power Drives
- High Voltage Power Supplies
- Static Switches

VOLTAGE RATINGS

Part and Ordering Number	Repetitive Peak Voltages V _{DRM} and V _{RRM} V	Conditions
DCR2560A85* DCR2560A80 DCR2560A75 DCR2560A70	8500 8000 7500 7000	$\begin{split} T_{vj} = -40^{\circ}\text{C to } 125^{\circ}\text{C}, \\ I_{DRM} = I_{RRM} = 300\text{mA}, \\ V_{DRM}, V_{RRM} t_p = 10\text{ms}, \\ V_{DSM} \& V_{RSM} = \\ V_{DRM} \& V_{RRM} + 100V \\ respectively \end{split}$

Lower voltage grades available. *8200V @ -40°C, 8500V @ 0°C

ORDERING INFORMATION

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

For example:

DCR2560A85

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

KEY PARAMETERS

V_{DRM}	8500V
I _{T(AV)}	2560A
I _{TSM}	32500A
dV/dt*	1500V/µs
dl/dt	200A/μs

* Higher dV/dt selections available

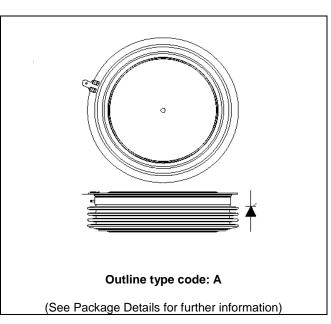


Fig. 1 Package outline





CURRENT RATINGS

T_{case} = 60°C unless stated otherwise

Symbol	Parameter	Test Conditions	Max.	Units
Double Sid	de Cooled			
I _{T(AV)}	Mean on-state current	Half wave resistive load	2555	А
I _{T(RMS)}	RMS value	-	4013	А
Ιτ	Continuous (direct) on-state current	-	3710	А

SURGE RATINGS

Symbol	Parameter	Test Conditions	Max.	Units
I _{TSM}	Surge (non-repetitive) on-state current	10ms half sine, T _{case} = 125°C	32.5	kA
l ² t	I ² t for fusing	$V_R = 0$	5.28	MA ² s

THERMAL AND MECHANICAL RATINGS

Symbol	Parameter	Test Conditions		Min.	Max.	Units
R _{th(j-c)}	Thermal resistance – junction to case	Double side cooled	DC	-	0.00603	°C/W
		Single side cooled	Anode DC	-	0.01024	°C/W
			Cathode DC	-	0.01467	°C/W
R _{th(c-h)}	Thermal resistance – case to heatsink	Clamping force 83.0kN	Double side	-	0.001	°C/W
		(with mounting compound)	Single side	-	0.002	°C/W
T _{vj}	Virtual junction temperature	Blocking V _{DRM} / V _{RRM}		-	125	°C
T _{stg}	Storage temperature range			-55	125	°C
F _m	Clamping force			74.0	91.0	kN





DYNAMIC CHARACTERISTICS

Symbol	Parameter	Test Conditions		Min.	Max.	Units
I _{RRM} /I _{DRM}	Peak reverse and off-state current	At V _{RRM} /V _{DRM} , T _{case} = 125°C		-	300	mA
dV/dt	Max. linear rate of rise of off-state voltage	To 67% V _{DRM} , T _j = 125°C, ga	ate open	-	1500	V/µs
dl/dt	Rate of rise of on-state current	From 67% V _{DRM} to 2x I _{T(AV)}	Repetitive 50Hz	-	100	A/µs
		Gate source 30V, 10Ω,	Non-repetitive	-	200	A/µs
		$t_r < 0.5 \mu s, T_j = 125 ^{\circ} C$				
V _{T(TO)}	Threshold voltage – Low level	500 to 1600A at T _{case} = 125°	С	-	0.9	V
	Threshold voltage – High level	1600 to 4000A at T _{case} = 125	S°C	-	1.18	V
r _T	On-state slope resistance – Low level	500A to 1600A at T _{case} = 125	5°C	-	0.65	mΩ
	On-state slope resistance – High level	1600A to 4000A at T _{case} = 12	25°C	-	0.46	mΩ
t _{gd}	Delay time	$V_D = 67\% V_{DRM}$, gate source 30V, 10Ω		-	3	μs
	,	$t_r = 0.5 \mu s, T_j = 25^{\circ}C$				
t _q	Turn-off time	$I_T = 3000A$, $T_j = 125$ °C, $V_R = 200V$, $dI/dt = 1A/\mu s$,			1000	μs
		$dV_{DR}/dt = 20V/\mu s linear$				
Qs	Stored charge	$I_T = 3000 A, T_j = 125 ^{\circ} C, dI/dt - 1A/\mu s, V_{Rpeak} \sim 5100 V, V_R \sim 3400 V$		5150	7950	μC
IL	Latching current	$T_j = 25$ °C, $V_D = 5V$		-	3	А
I _H	Holding current	$T_j = 25$ °C, $R_{G-K} = \infty$, $I_{TM} = 500$ A, $I_T = 5$ A		-	300	mA
_						





GATE TRIGGER CHARACTERISTICS AND RATINGS

Symbol	Parameter	Test Conditions	Max.	Units
V_{GT}	Gate trigger voltage	V _{DRM} = 5V, T _{case} = 25°C	1.5	V
V_{GD}	Gate non-trigger voltage	At 50% V _{DRM} , T _{case} = 125°C	0.4	V
I _{GT}	Gate trigger current	V _{DRM} = 5V, T _{case} = 25°C	400	mA
I _{GD}	Gate non-trigger current	At 50% V _{DRM} , T _{case} = 125°C	10	mA

CURVES

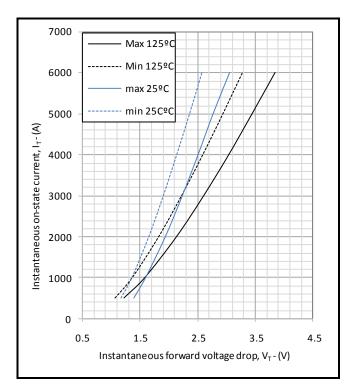


Fig.2 Maximum & minimum on-state characteristics

 V_{TM} **EQUATION** Where A = -0.224010

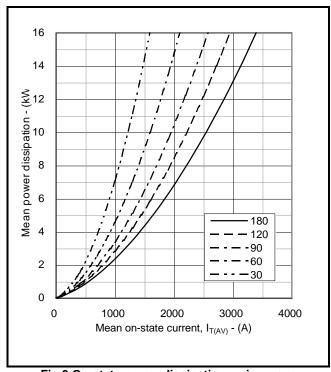
B = 0.1725829

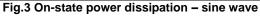
 $V_{TM} = A + Bln (I_T) + C.I_T + D.\sqrt{I_T}$ C = 0.000292

D = 0.01039

these values are valid for $T_i = 125$ °C for $I_T 500$ A to 4200A







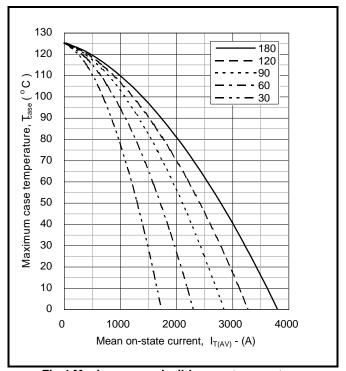


Fig.4 Maximum permissible case temperature, double side cooled – sine wave

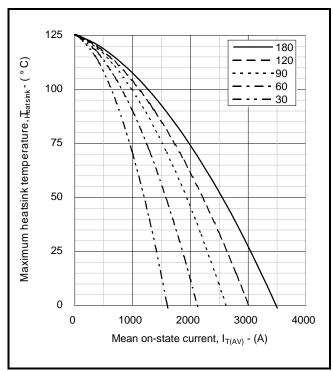


Fig.5 Maximum permissible heatsink temperature, double side cooled – sine wave

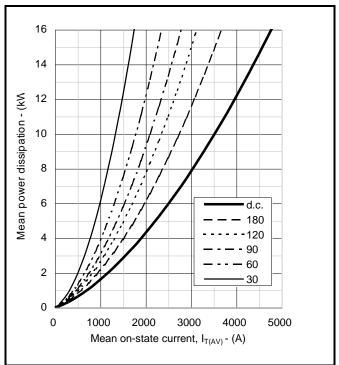


Fig.6 On-state power dissipation - rectangular wave



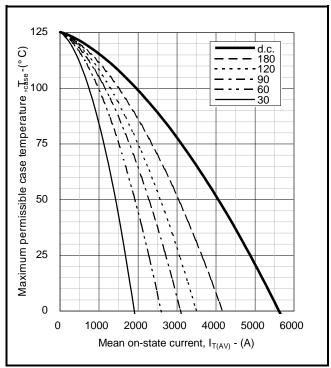


Fig.7 Maximum permissible case temperature, double side cooled - rectangular wave

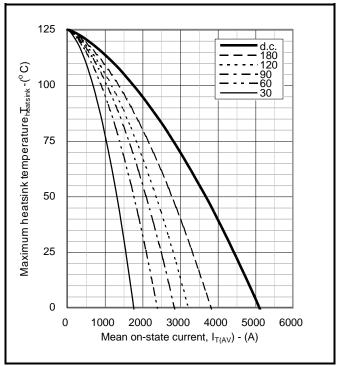
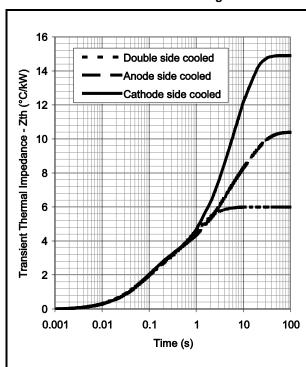


Fig.8 Maximum permissible heatsink temperature, double side cooled - rectangular wave



		1	2	3	4
Double side cooled	R _i (°C/kW)	3.01541	1.048955	0.983519	0.983519
Double side cooled	T _i (s)	0.703874	1.904794	0.059	0.059
Anode side cooled	R _i (°C/kW)	3.156003	4.092806	1.556555	1.623962
Ariode side cooled	T _i (s)	2.69023	13.79162	0.059	0.205916
Cathode side cooled	R _i (°C/kW)	7.077369	3.483481	1.745839	2.634274
Callibue side cooled	T; (s)	6.648601	8.436484	1.762119	0.08069

$$Z_{th} = \sum_{i=1}^{i=4} [R_i \times (1 - \exp(T/T_i))]$$

$\Delta R_{th(j-c)}$ Conduction

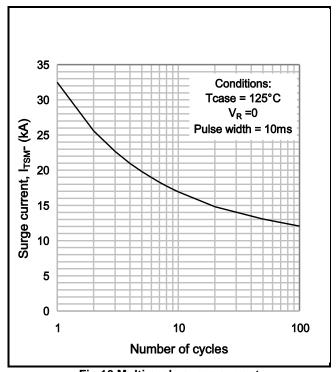
Tables show the increments of thermal resistance $R_{\text{th(j-c)}}$ when the device operates at conduction angles other than d.c.

			т			
D	Double side cooling			Ar	node Side	Cooling
	$\Delta Z_{th}(z)$				ΔZ_t	_h (z)
θ°	sine.	rect.	Ī	θ°	sine.	rect.
180	0.44	0.31		180	0.42	0.30
120	0.49	0.43	Ī	120	0.47	0.41
90	0.55	0.49	I	90	0.52	0.46
60	0.60	0.55		60	0.57	0.52
30	0.64	0.61	I	30	0.61	0.58
15	0.66	0.64	ī	15	0.63	0.61

Catl	Cathode Sided Cooling					
	ΔZ	th (z)				
θ°	sine.	rect.				
180	0.42	0.30				
120	0.47	0.41				
90	0.52	0.46				
60	0.57	0.52				
30	0.60	0.58				
15	0.62	0.60				

Fig.9 Maximum (limit) transient thermal impedance - junction to case (°C/kW)







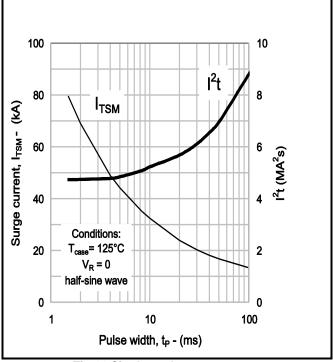


Fig.11 Single-cycle surge current

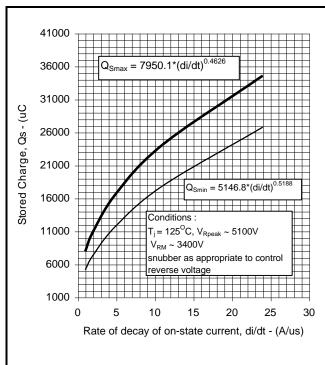


Fig.12 Stored charge

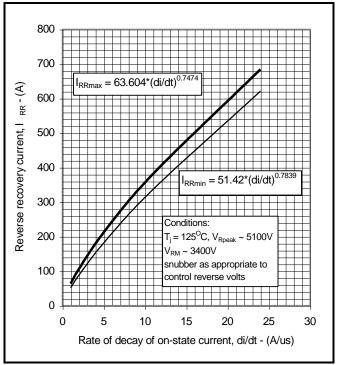


Fig.13 Reverse recovery current

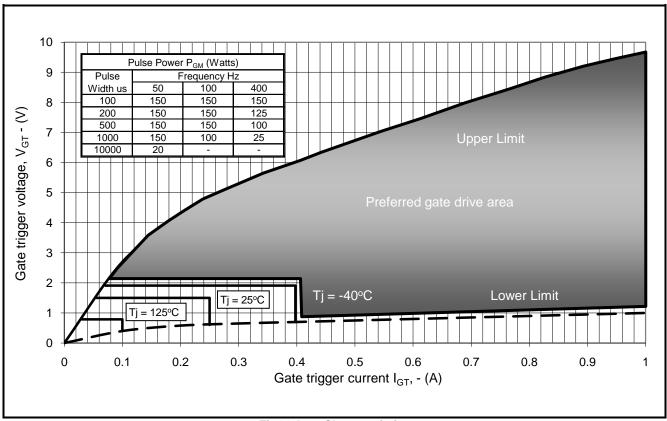


Fig14 Gate Characteristics

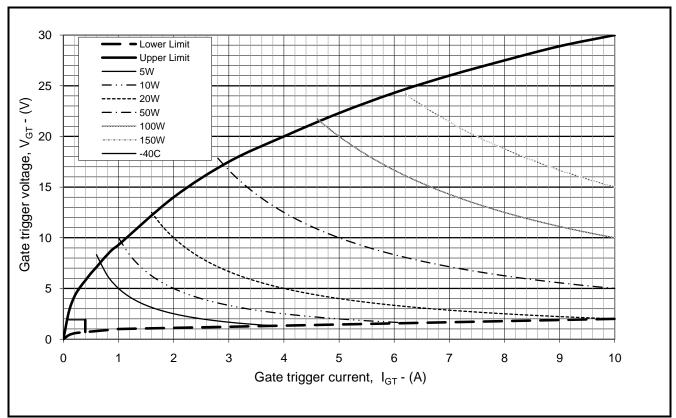


Fig. 15 Gate characteristics



PACKAGE DETAILS

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

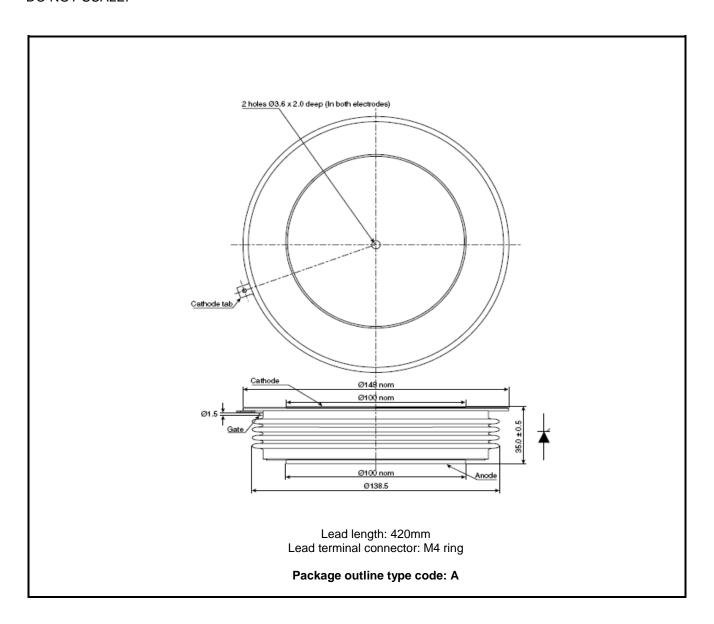


Fig.16 Package outline





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