

DCR1673SZ

Phase Control Thyristor

Supersedes October 2000 version, DS4650-6.0

DS4650-7.0 July 2001

FEATURES

- Double Side Cooling
- High Surge Capability
- High Mean Current
- Fatigue Free

APPLICATIONS

- High Power Drives
- High Voltage Power Supplies
- DC Motor Control

VOLTAGE RATINGS

Type Number	Repetitive Peak Voltages V _{DRM} V V	Conditions
DCR1673SZ28 DCR1673SZ27 DCR1673SZ26 DCR1673SZ25 DCR1673SZ24	2800 2700 2600 2500 2400	$\begin{split} & T_{vj} = 0^{\circ} \text{ to } 125^{\circ}\text{C}, \\ & I_{\text{DRM}} = I_{\text{RRM}} = 500\text{mA}, \\ & V_{\text{DRM}}, V_{\text{RRM}} t_{p} = 10\text{ms}, \\ & V_{\text{DSM}} \& V_{\text{RSM}} = \\ & V_{\text{DRM}} \& V_{\text{RRM}} + 100\text{V} \\ & \text{Respectively} \end{split}$

Lower voltage grades available.

ORDERING INFORMATION

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

For example:

DCR1673SZ27

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

KEY PARAMETERS

 $\begin{array}{lll} {\rm V_{DRM}} & 2800 {\rm V} \\ {\rm I_{T(AV)}} & 5088 {\rm A} \\ {\rm I_{TSM}} & 83000 {\rm A} \\ {\rm dVdt^*} & 1000 {\rm V/\mu s} \\ {\rm dI/dt} & 250 {\rm A/\mu s} \\ \end{array}$

*Higher dV/dt selections available

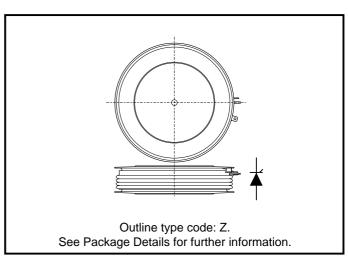


Fig. 1 Package outline



CURRENT RATINGS

$T_{\text{case}} = 60^{\circ}\text{C}$ unless stated otherwise

Symbol	Parameter	Conditions	Max.	Units			
Double Sic	Double Side Cooled						
I _{T(AV)}	Mean on-state current	Half wave resistive load	5088	А			
I _{T(RMS)}	RMS value	-	7995	А			
I _T	Continuous (direct) on-state current	-	7280	Α			
Single Side	Single Side Cooled (Anode side)						
I _{T(AV)}	Mean on-state current	Half wave resistive load	3300	Α			
I _{T(RMS)}	RMS value	-	5180	Α			
I _T	Continuous (direct) on-state current	-	4350	Α			

CURRENT RATINGS

$T_{case} = 80^{\circ}C$ unless stated otherwise

Symbol	Parameter	Conditions	Max.	Units			
Double Sid	Double Side Cooled						
I _{T(AV)}	Mean on-state current	Half wave resistive load	3990	А			
I _{T(RMS)}	RMS value	-	6320	А			
I _T	Continuous (direct) on-state current	-	5570	Α			
Single Side	Single Side Cooled (Anode side)						
I _{T(AV)}	Mean on-state current	Half wave resistive load	2540	А			
I _{T(RMS)}	RMS value	-	3980	Α			
I _T	Continuous (direct) on-state current	-	3250	А			



SURGE RATINGS

Symbol	Parameter	Conditions	Max.	Units
I _{TSM}	Surge (non-repetitive) on-state current	10ms half sine; T _{case} = 125°C	66.4	kA
l²t	I ² t for fusing	V _R = 50% V _{RRM} - 1/4 sine	22.0 x 10 ⁶	A²s
I _{TSM}	Surge (non-repetitive) on-state current	10ms half sine; T _{case} = 125°C	83.0	kA
l ² t	I ² t for fusing	V _R = 0	34.4 x 10 ⁶	A²s

THERMAL AND MECHANICAL DATA

Symbol	Parameter	Conditions		Min.	Max.	Units
	Thermal resistance - junction to case	Double side cooled	dc	-	0.0065	°C/W
$R_{th(j-c)}$		Single side cooled	Anode dc	-	0.013	°C/W
			Cathode dc	-	0.013	°C/W
	Thermal resistance - case to heatsink	Clamping force 83.0kN with mounting compound	Double side	-	0.001	°C/W
R _{th(c-h)}			Single side	-	0.002	°C/W
T _{vj}	Virtual junction temperature	On-state (conducting)		-	135	°C
		Reverse (blocking)		-	125	°C
T _{stg}	Storage temperature range			-55	125	°C
-	Clamping force			74.0	91.0	kN



DYNAMIC CHARACTERISTICS

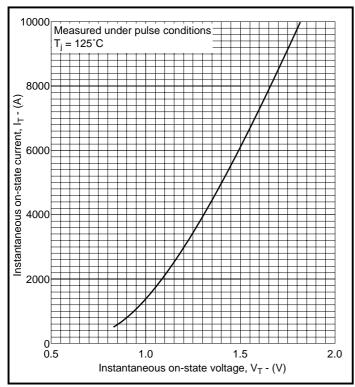
Symbol	Parameter	Conditions		Тур.	Max.	Units
I _{RRM} /I _{DRM}	Peak reverse and off-state current	At V _{RRM} /V _{DRM} , T _{case} = 125°C		-	500	mA
dV/dt	Maximum linear rate of rise of off-state voltage	To 67% V _{DRM} T _j = 125°C		-	1000	V/μs
-11/-14	Detection of an atom comment	From 67% V _{DRM} to 1100A	Repetitive 50Hz	-	250	A/μs
dl/dt	Rate of rise of on-state current	Gate source 1A $t_r = 0.5 \mu s$, $T_j = 125 ^{\circ} C$	Non-repetitive	-	500	A/μs
$V_{T(TO)}$	Threshold voltage	At T _{vj} = 125°C		-	0.82	V
r _T	On-state slope resistance	At T _{vj} = 125°C		-	0.076	mΩ
t _{gd}	Delay time	$V_D = 67\% V_{DRM}$, Gate source 20V, 10Ω $t_r = 0.5 \mu s$, $T_j = 25 ^{\circ} C$		1.0	1.5	μs
IL	Latching current	$T_{j} = 25^{\circ}C, V_{D} = 5V$		150	750	mA
I _H	Holding current	$T_j = 25^{\circ}C$, $R_{g-k} = \infty$		40	200	mA

GATE TRIGGER CHARACTERISTICS AND RATINGS

Symbol	Parameter	Conditions	Max.	Units
V _{GT}	Gate trigger voltage	V _{DRM} = 5V, T _{case} = 25°C	3.5	٧
I _{GT}	Gate trigger current	$V_{DRM} = 5V$, $T_{case} = 25^{\circ}C$	500	mA
$V_{\sf GD}$	Gate non-trigger voltage	At V _{DRM} T _{case} = 125°C	0.25	٧
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	٧
I _{FGM}	Peak forward gate current	Anode positive with respect to cathode	30	А
P_{GM}	Peak gate power	See table, gate characteristics curve	150	W
$P_{G(AV)}$	Mean gate power		10	W



CURVES



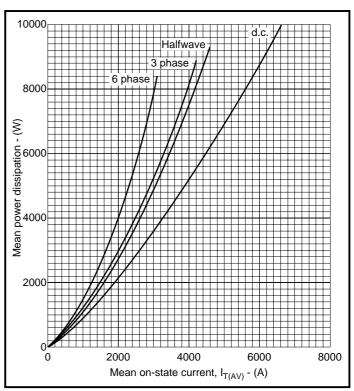


Fig.2 Maximum (limit) on-state characteristics

Fig.3 Dissipation curves

 V_{TM} Equation:-

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

Where A = 0.4769404

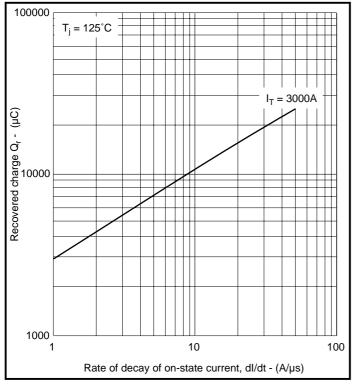
B = 0.02958434

 $C = 3.978298 \times 10^{-5}$

 $D = 6.677479 \times 10^{-3}$

these values are valid for $T_i = 125$ °C for $I_T 500A$ to 10000A





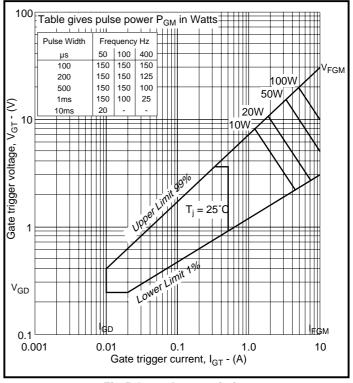
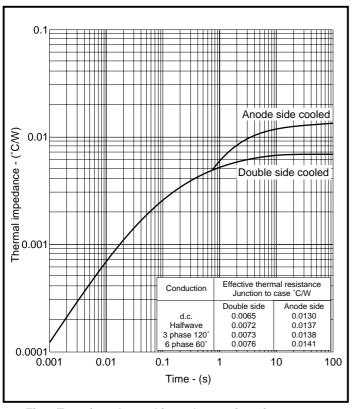
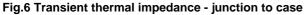


Fig.4 Recovered charge

Fig.5 Gate characteristics





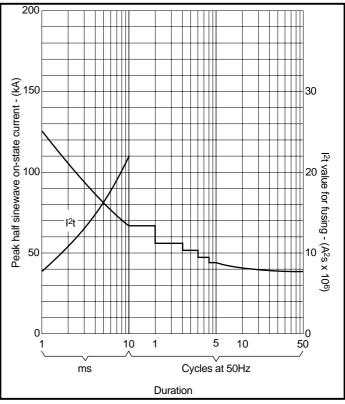
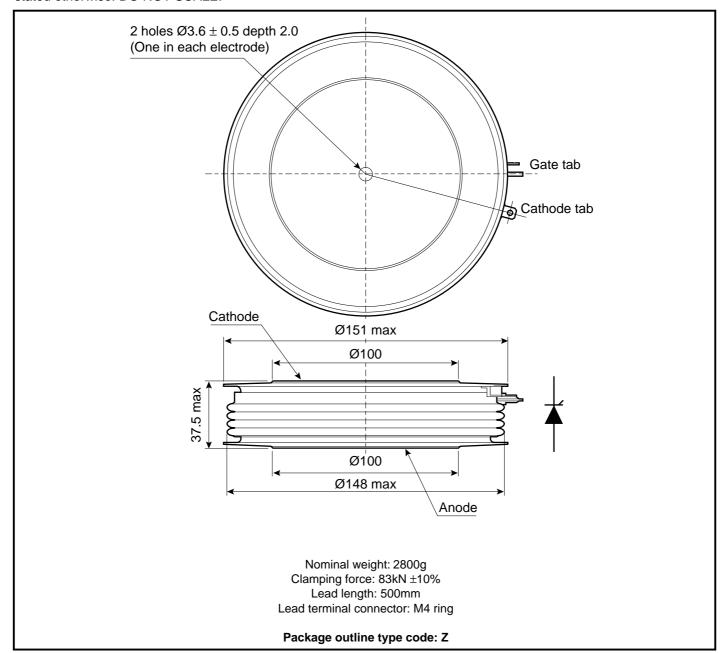


Fig.7 Surge (non-repetitive) on-state current vs time (with 50% $\rm V_{RRM}$ at $\rm T_{case}$ = 125°C)



PACKAGE DETAILS

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





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 and clamping systems in line with advances in device voltages 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

Using the latest 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 includes a varied selection of pre-loaded clamps to suit all of our manufactured devices. Types available include cube clamps for single side cooling of 'T' 23mm and 'E' 30mm discs, and bar clamps right up to 83kN for our 'Z' 100mm thyristors and diodes.

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

The Power Assembly group has its own proprietary range of extruded aluminium heatsinks. They have been designed to optimise the performance of Dynex 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 service office.



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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.

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