

FEATURES

- Double Side Cooling
- High Surge Capability
- Low Inductance Internal Construction

APPLICATIONS

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

VOLTAGE RATINGS

Part and Ordering Number	Repetitive Peak Voltages V_{DRM} and V_{RRM} V	Conditions
DCR720E18 DCR720E16 DCR720E14 DCR720E12	1800 1600 1400 1200	$T_{\text{vj}} = 0^{\circ} \text{ to } 125^{\circ}\text{C}$, $I_{\text{DRM}} = I_{\text{RRM}} = 30\text{mA}$, $V_{\text{DRM}}, V_{\text{RRM}}, t_p = 10\text{ms}$, $V_{\text{DSM}} \text{ \& } V_{\text{RSM}} =$ $V_{\text{DRM}} \text{ \& } V_{\text{RRM}} + 100\text{V}$ respectively

Lower voltage grades available.

ORDERING INFORMATION

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

For example:

DCR720E16

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}	1800V
$I_{\text{T(AV)}}$	724A
I_{TSM}	9800A
dV/dt^*	1000V/ μs
dI/dt	700A/ μs

*Higher dV/dt selections available

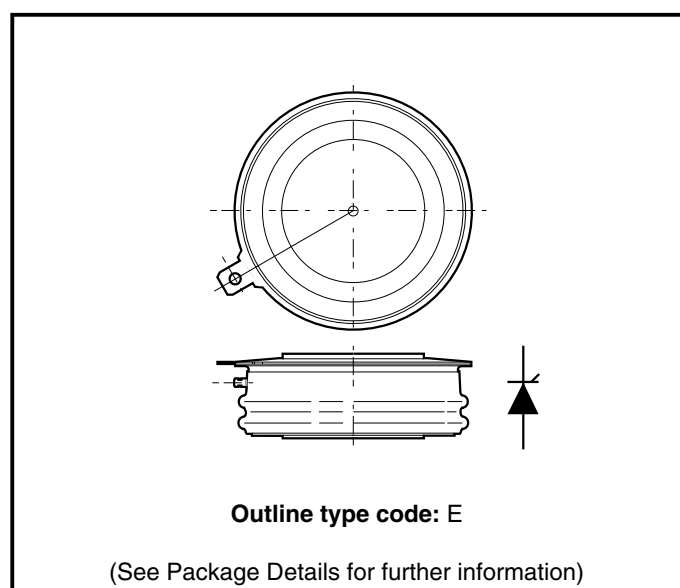


Fig. 1 Package outline

CURRENT RATINGS

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

Symbol	Parameter	Test Conditions	Max.	Units
Double Side Cooled				
$I_{T(AV)}$	Mean on-state current	Half wave resistive load	724	A
$I_{T(RMS)}$	RMS value	-	1140	A
I_T	Continuous (direct) on-state current	-	1025	A
Single Side Cooled				
$I_{T(AV)}$	Mean on-state current	Half wave resistive load	500	A
$I_{T(RMS)}$	RMS value	-	790	A
I_T	Continuous (direct) on-state current	-	670	A

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

Symbol	Parameter	Test Conditions	Max.	Units
Double Side Cooled				
$I_{T(AV)}$	Mean on-state current	Half wave resistive load	570	A
$I_{T(RMS)}$	RMS value	-	895	A
I_T	Continuous (direct) on-state current	-	790	A
Single Side Cooled				
$I_{T(AV)}$	Mean on-state current	Half wave resistive load	390	A
$I_{T(RMS)}$	RMS value	-	610	A
I_T	Continuous (direct) on-state current	-	505	A

SURGE RATINGS

Symbol	Parameter	Test Conditions	Max.	Units
I_{TSM}	Surge (non-repetitive) on-state current	10ms half sine, $T_{case} = 125^{\circ}C$	7.8	kA
I^2t	I^2t for fusing	$V_R = 50\% V_{RRM}$ - 1/4 sine	0.3×10^6	A ² s
I_{TSM}	Surge (non-repetitive) on-state current	10ms half sine, $T_{case} = 125^{\circ}C$	9.8	kA
I^2t	I^2t for fusing	$V_R = 0$	0.48×10^6	A ² s

DYNAMIC CHARACTERISTICS

Symbol	Parameter	Test Conditions		Min.	Max.	Units
I_{RRM}/I_{RRM}	Peak reverse and off-state current	At V_{RRM}/V_{DRM} , $T_{case} = 125^{\circ}C$		-	30	mA
dV/dt	Max. linear rate of rise of off-state voltage	To 67% V_{DRM} , $T_j = 125^{\circ}C$		-	1000	V/ μ s
dI/dt	Rate of rise of on-state current	From 67% V_{DRM} to 1100A	Repetitive 50Hz	-	350	A/ μ s
		Gate source 20V, 10 Ω , $t_r \leq 0.5\mu$ s, $T_j = 125^{\circ}C$	Non-repetitive	-	700	A/ μ s
$V_{T(TO)}$	Threshold voltage	At $T_{vj} = 125^{\circ}C$		-	0.88	V
r_T	On-state slope resistance	At $T_{vj} = 125^{\circ}C$		-	0.65	m Ω
t_{gd}	Delay time	$V_D = 67\% V_{DRM}$, gate source 10V, 5 Ω $t_r = 0.5\mu$ s, $T_j = 25^{\circ}C$		-	1.5	μ s
t_q	Turn-off time	$I_T = 500A$, $t_p = 1ms$, $T_j = 125^{\circ}C$, $V_R = 50V$, $dI_{RR}/dt = 20A/\mu$ s, $V_{DR} = 67\% V_{DRM}$, $dV_{DR}/dt = 20V/\mu$ s linear		300	400	μ s
I_L	Latching current	$T_j = 25^{\circ}C$, $V_D = 5V$		-	500	mA
I_H	Holding current	$T_j = 25^{\circ}C$, $V_D = 5V$		-	70	mA

THERMAL AND MECHANICAL RATINGS

Symbol	Parameter	Test Conditions		Min.	Max.	Units
$R_{th(j-c)}$	Thermal resistance - junction to case	Double side cooled	DC	-	0.041	°CW
		Single side cooled	Anode DC	-	0.074	°CW
			Cathode DC	-	0.092	°CW
$R_{th(c-h)}$	Thermal resistance - case to heatsink	Clamping force 8.0kN (with mounting compound)	Double side	-	0.018	°CW
			Single side	-	0.036	°CW
T_{vj}	Virtual junction temperature	On-state (conducting)		-	135	°C
		Reverse (blocking)		-	125	°C
T_{stg}	Storage temperature range			-55	125	°C
F_m	Clamping force			7.2	8.8	kN

GATE TRIGGER CHARACTERISTICS AND RATINGS

Symbol	Parameter	Test Conditions	Max.	Units
V_{GT}	Gate trigger voltage	$V_{DRM} = 5V, T_{case} = 25^{\circ}C$	3	V
I_{GT}	Gate trigger current	$V_{DRM} = 5V, T_{case} = 25^{\circ}C$	150	mA
V_{GD}	Gate non-trigger voltage	At $V_{DRM}, T_{case} = 125^{\circ}C$	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 table, gate characteristics curve	100	W
$P_{G(AV)}$	Mean gate power	-	5	W

CURVES

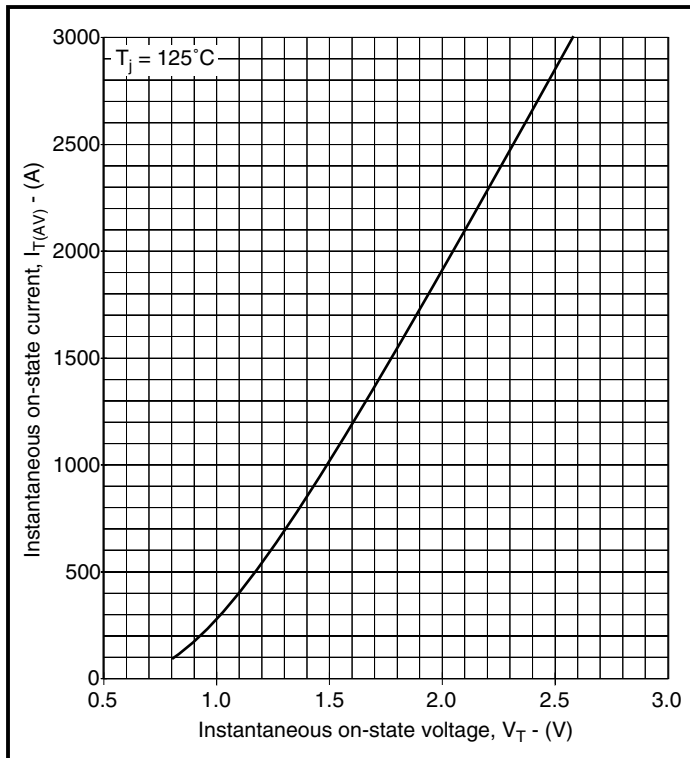


Fig.2 Maximum (limit) on-state characteristics

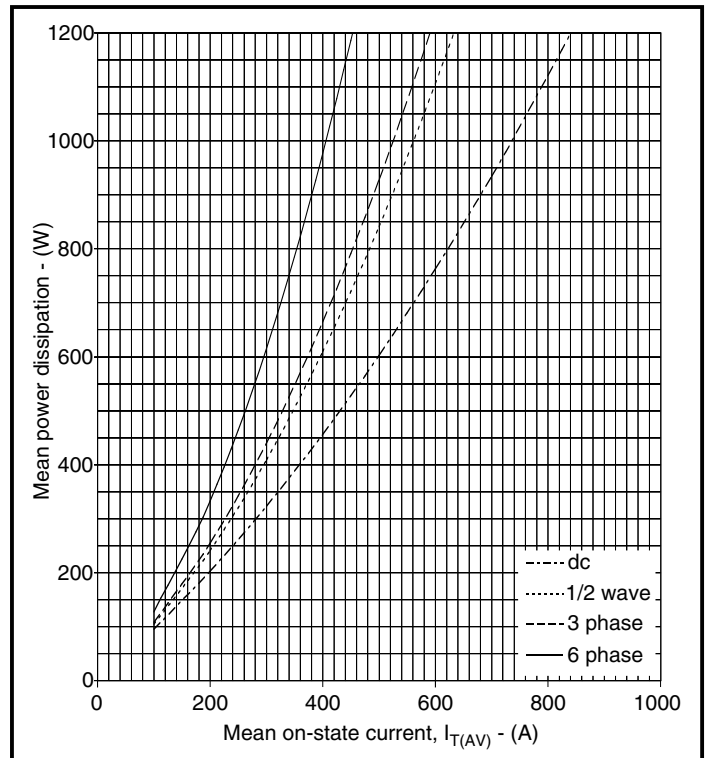


Fig.3 Power dissipation

V_{TM} Equation:-

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

Where

- A = 0.2366
- B = 0.1182
- C = 0.0005
- D = -0.0019

these values are valid for $T_j = 125^\circ\text{C}$ for I_T 100A to 3000A

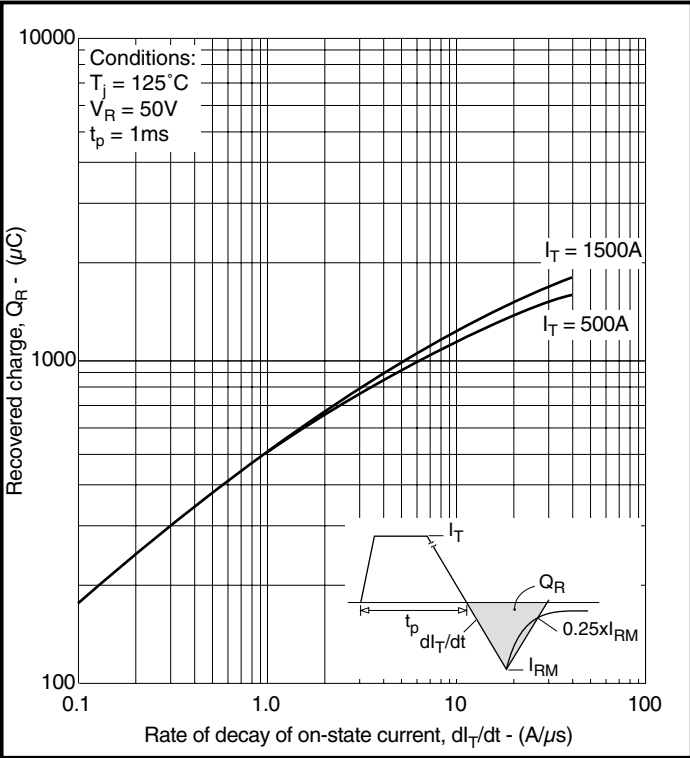


Fig.4 Stored charge

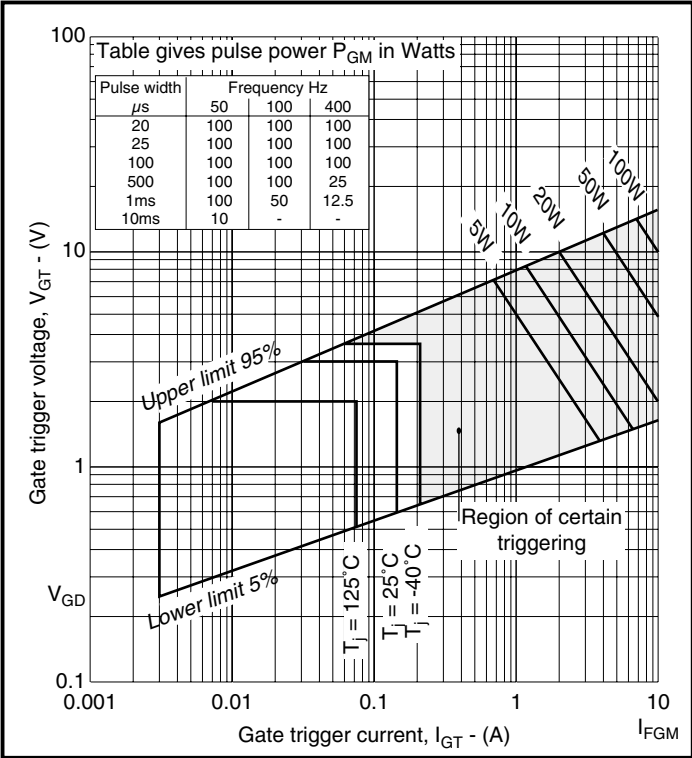


Fig.5 Gate characteristics

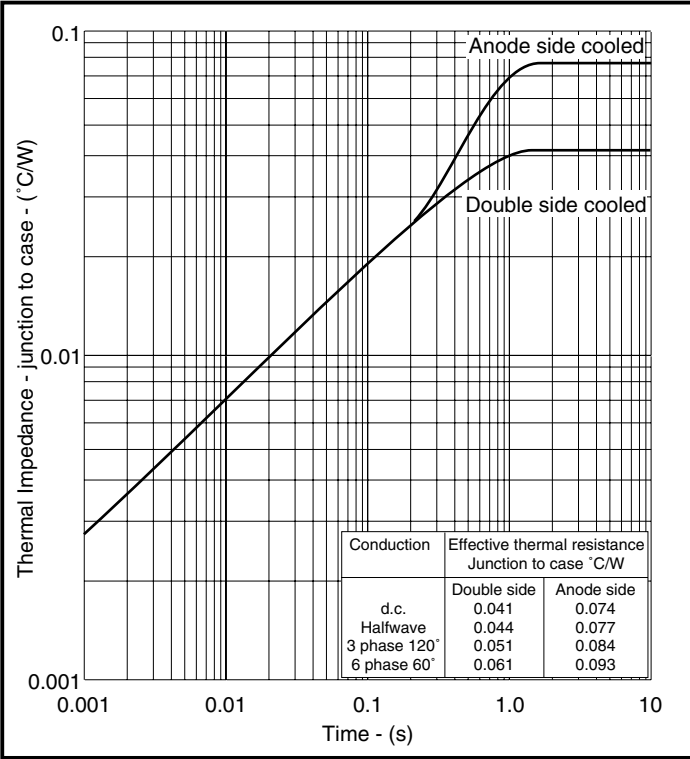


Fig.6 Maximum (limit) transient thermal impedance - junction to case $(^\circ\text{C}/\text{W})$

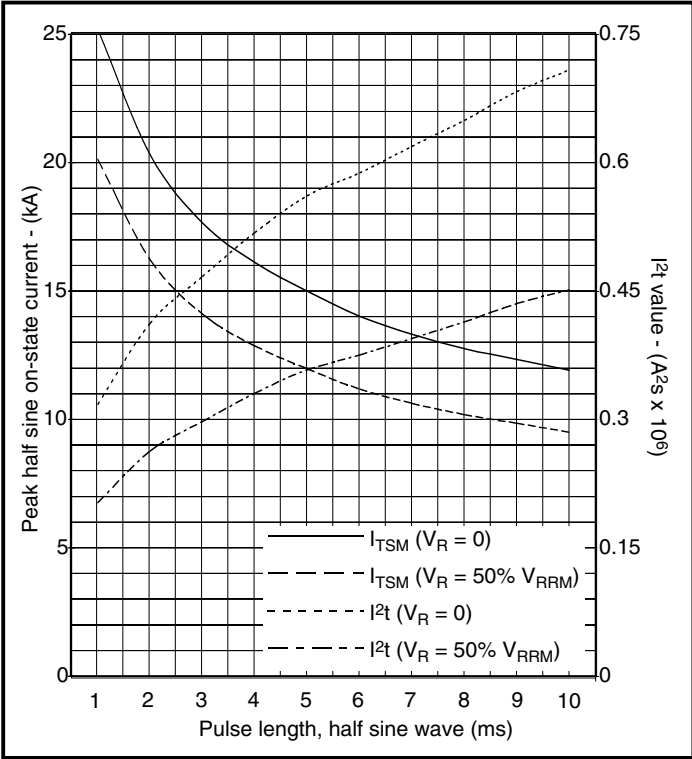


Fig.7 Sub-cycle surge currents

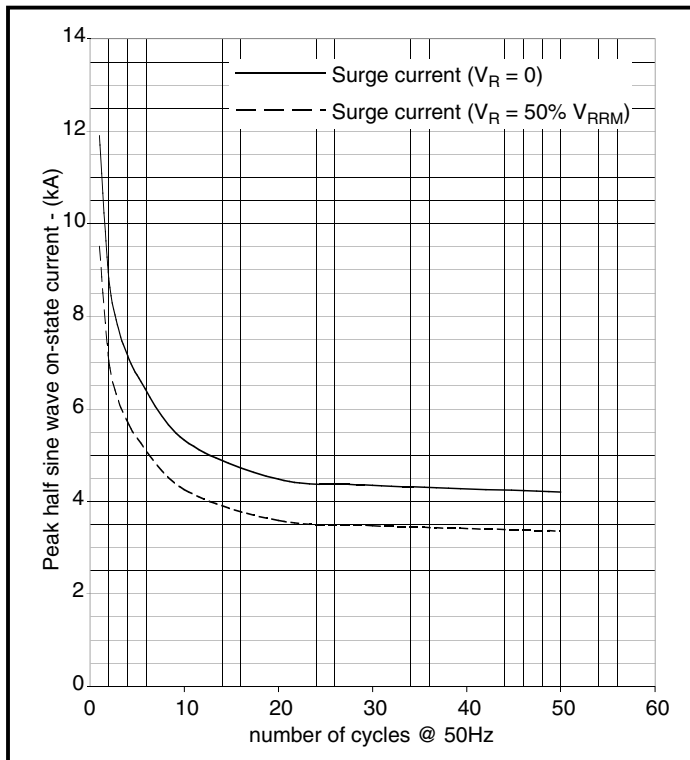
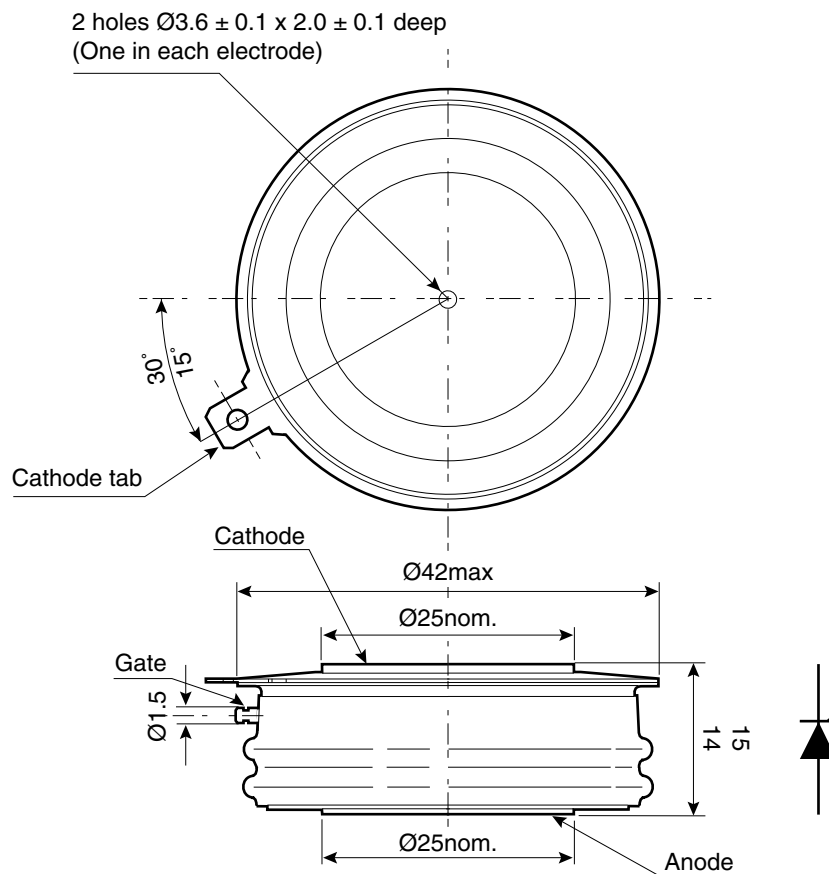


Fig.8 Multi-cycle surge currents

PACKAGE DETAILS

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



Nominal weight: 82g
Clamping force: $8\text{kN} \pm 10\%$
Lead length: 420mm
Lead terminal connector: M4 ring

Package outline type code: E

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 offers high quality engineering support dedicated to designing new units to satisfy the growing needs of our customers.

Using the latest CAD methods our team of design and applications engineers aim to provide the Power Assembly Complete Solution (PACs).

HEATSINKS

The Power Assembly group has its own proprietary range of extruded aluminium heatsinks which 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 Services.

Stresses above those listed in this data sheet may cause permanent damage to the device. In extreme conditions, as with all semiconductors, this may include potentially hazardous rupture of the package. Appropriate safety precautions should always be followed.



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