

DCR6990M18

Phase Control Thyristor

DS5902 1.0 December 2006 (LN25055)

FEATURES

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

KEY PARAMETERS

| V_{DRM} | 1800V |
|------------------|----------|
| $I_{T(AV)}$ | 6987A |
| I _{TSM} | 98000A |
| dV/dt* | 1000V/µs |
| dl/dt | 250A/μs |

APPLICATIONS

- High Voltage 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 |
|--|--|---|
| DCR6990M18 DCR6990M16 DCR6990M14 DCR6990M12 | 1800 1600 1400 1200 | $\begin{split} & T_{vj} = 0 \text{C to } 125 \text{C}, \\ & I_{DRM} = I_{RRM} = 500 \text{mA}, \\ & V_{DRM}, V_{RRM} t_p = 10 \text{ms}, \\ & V_{DSM} \& V_{RSM} = \\ & V_{DRM} \& V_{RRM} + 100 V \\ & \text{respectively} \end{split}$ |

Lower voltage grades available.

Outline type code: M. (See Package Details for further information)

Fig. 1 Package outline

ORDERING INFORMATION

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

For example:

DCR6990M14

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



CURRENT RATINGS

$T_{case} = 60$ °C unless stated otherwise

| Symbol | Parameter | Test Conditions | Max. | Units | | |
|---------------------|--------------------------------------|--------------------------|-------|-------|--|--|
| Double Si | de Cooled | | | l | | |
| I _{T(AV)} | Mean on-state current | Half wave resistive load | 6987 | Α | | |
| I _{T(RMS)} | RMS value | - | 10976 | Α | | |
| I _T | Continuous (direct) on-state current | - | 10169 | Α | | |
| Single Sid | Single Side Cooled (Anode side) | | | | | |
| I _{T(AV)} | Mean on-state current | Half wave resistive load | 4559 | Α | | |
| I _{T(RMS)} | RMS value | - | 7161 | Α | | |
| Ι _Τ | Continuous (direct) on-state current | - | 6058 | Α | | |

T_{case} = 80℃ unless stated otherwise

| Symbol | Parameter | Test Conditions | Max. | Units | | |
|---------------------|--------------------------------------|--------------------------|------|-------|--|--|
| Double Si | de Cooled | | I | | | |
| $I_{T(AV}$ | Mean on-state current | Half wave resistive load | 5446 | А | | |
| I _{T(RMS)} | RMS value | - | 8586 | Α | | |
| I _T | Continuous (direct) on-state current | - | 7769 | А | | |
| Single Sid | Single Side Cooled (Anode side) | | | | | |
| $I_{T(AV)}$ | Mean on-state current | Half wave resistive load | 3500 | А | | |
| I _{T(RMS)} | RMS value | - | 5497 | А | | |
| I _T | Continuous (direct) on-state current | - | 4518 | Α | | |



SURGE RATINGS

| Symbol | Parameter | Test Conditions | | Units |
|------------------|--|---|----------------------|------------------|
| I _{TSM} | Surge (non-repetitive) on-state current | 10ms half sine, T _{case} = 125°C | 78.0 | kA |
| l ² t | I ² t for fusing | $V_R = 50\%VRRM - \frac{1}{4}$ Sine | 30.4×10 ⁶ | A ² s |
| I _{TSM} | Surge (non-repetitive) on-state current | 10ms half sine, T _{case} = 125°C | 98.0 | kA |
| l ² t | I ² t for fusing | $V_R = 0$ | 48×10 ⁶ | A 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 | - | 0.005 | °C/W |
| | | Single side cooled | Anode DC | - | 0.01 | °C/W |
| | | | Cathode DC | - | 0.01 | °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 | On-state (conducting) | | - | 135 | °C |
| | | Reverse (blocking) | | | 125 | °C |
| T _{stg} | Storage temperature range | | | -55 | 125 | °C |
| F _m | Clamping force | | | 74.0 | 91.0 | kN |

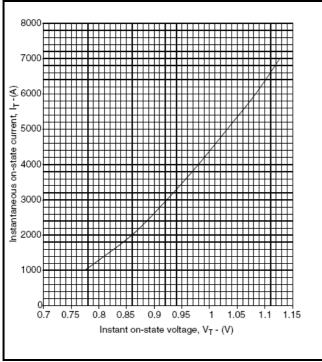


DYNAMIC CHARACTERISTICS

| 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 | | - | 500 | mA |
| dV/dt | Max. linear rate of rise of off-state voltage | To 67% V_{DRM} , $T_j = 125$ °C, ga | ate open | - | 1000 | V/µs |
| dl/dt | Rate of rise of on-state current | From 67% V _{DRM} to 1000A | Repetitive 50Hz | - | 250 | A/µs |
| | | Gate source 20V, 20Ω, | Non-repetitive | - | 500 | A/µs |
| | | $t_r = 0.5 \mu s$ to 1A, $T_j = 125^{\circ}$ | | | | |
| $V_{T(TO)}$ | Threshold voltage – Low level | At T _{vj} = 125°C | | - | 0.77 | V |
| r _T | On-state slope resistance – Low level | At T _{vj} = 125°C | | - | 0.05 | mΩ |
| t _{gd} | Delay time | $V_D = 67\% \ V_{DRM}$, gate source 30V, 15 Ω | | - | 2 | μs |
| | | $t_r = 0.5 \mu s, T_j = 25^{\circ} C$ | | | | |
| ΙL | Latching current | $T_j = 25^{\circ}C, V_D = 5V$ | | 150 | 750 | mA |
| I _H | Holding current | $T_j = 25$ °C, $V_{G-K} = \infty$ | | 40 | 200 | mA |

GATE TRIGGER CHARACTERISTICS AND RATINGS

| Symbol | Parameter | Test Conditions | Max. | Units |
|--------------------|---------------------------|--|------|-------|
| V _{GT} | Gate trigger voltage | V _{DRM} = 5V, T _{case} = 25℃ | 3.5 | V |
| V_{GD} | Gate non-trigger voltage | At V _{DRM} , T _{case} = 125℃ | 0.25 | V |
| I _{GT} | Gate trigger current | V _{DRM} = 5V, T _{case} = 25℃ | 500 | mA |
| 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 forward gate voltage | - | 5 | V |
| I _{FGM} | Peak forward gate current | Anode positive with respect to cathode | 30 | А |
| P_{GM} | Peak gate power | See Gate Characteristics curve/table | 150 | W |
| P _{G(AV)} | Mean gate power | - | 10 | W |



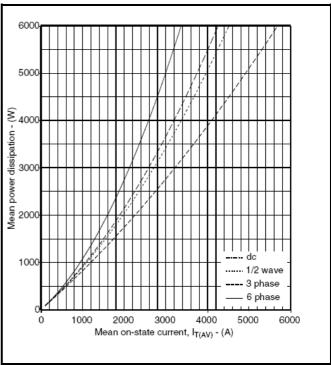


Fig.2 Maximum (limit) on-state characteristics

Fig.3 Power dissipation curves

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\begin{split} &V_{TM} \text{ Equation:-} \\ &V_{TM} = A + Bln \; (I_T) + C.I_T + D.\sqrt{I_T} \\ &Where \qquad A = 0.4624 \\ &B = 0.0275 \\ &C = 2.2501 \times 10^{-5} \\ &D = 0.0032 \\ \end{split} these values are valid for T_i = 125^{\circ}C for I_T 500A to 7000A
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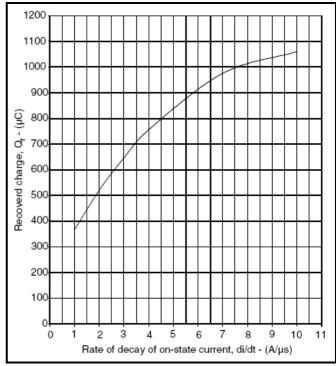


Fig.4 Recovered charge



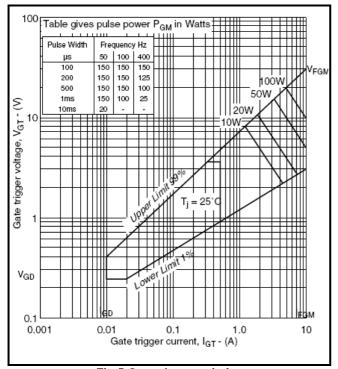


Fig.5 Gate characteristics

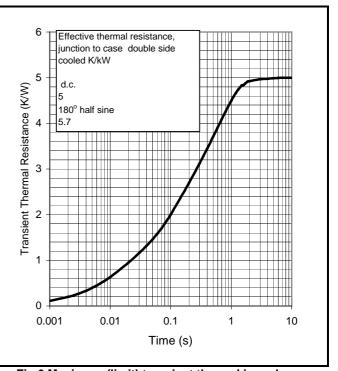


Fig.6 Maximum (limit) transient thermal impedancejunction to case (°C/W)

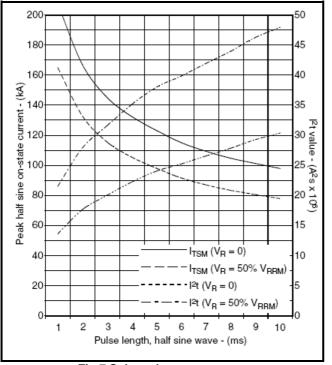


Fig.7 Sub-cycle surge current

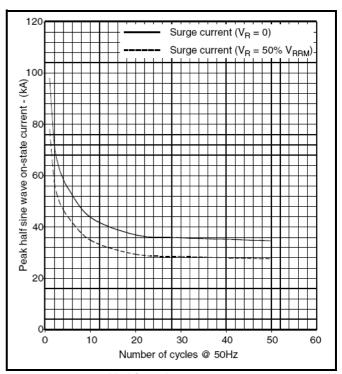


Fig.8 Multi-cycle surge current



PACKAGE DETAILS

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

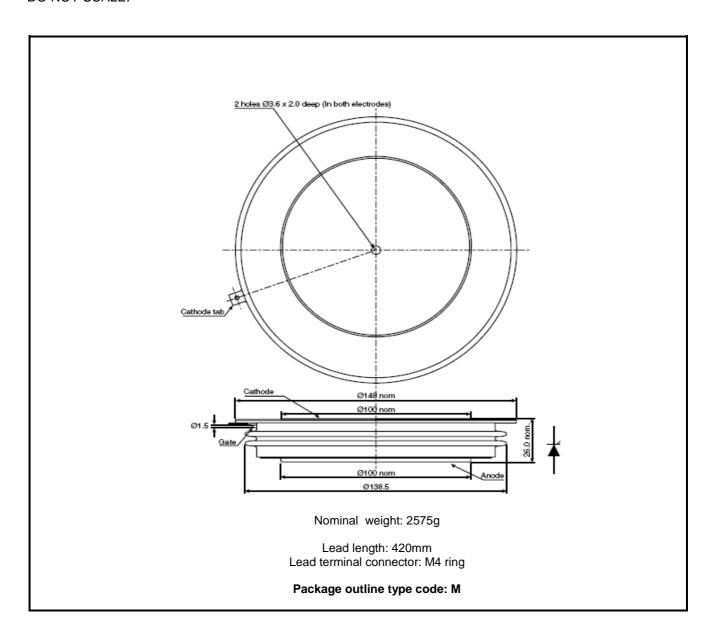


Fig.7 Package outline

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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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