

### APPLICATIONS

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

### KEY PARAMETERS

|             |                 |
|-------------|-----------------|
| $V_{DRM}$   | <b>4200V</b>    |
| $I_{T(AV)}$ | <b>2380A</b>    |
| $I_{TSM}$   | <b>53750A</b>   |
| $dV/dt^*$   | <b>1000V/μs</b> |
| $di/dt$     | <b>400A/μs</b>  |

\*Higher dV/dt selections available

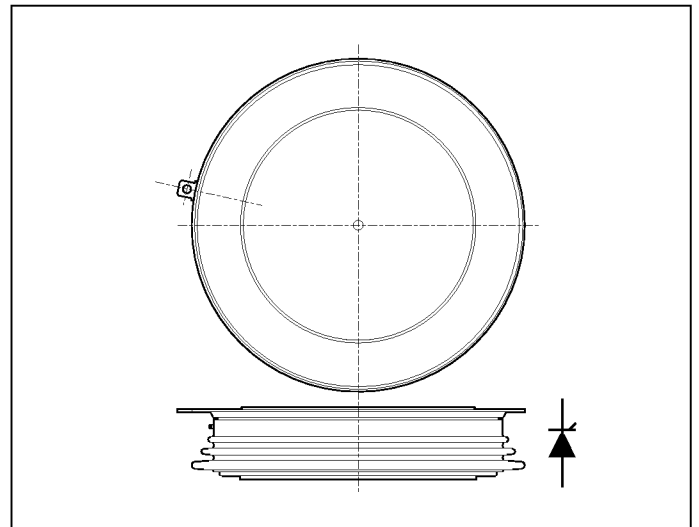
### FEATURES

- Double Side Cooling.
- High Surge Capability.

### VOLTAGE RATINGS

| Type Number | Repetitive Peak Voltages<br>$V_{DRM}$ $V_{RRM}$<br>$V$ | Conditions  |
|-------------|--|---|
| DCR1595SW42 | 4200   | $T_{vj} = 0^\circ \text{ to } 125^\circ \text{C}$ ,<br>$I_{DRM} = I_{RRM} = 400\text{mA}$ ,<br>$V_{DRM}, V_{RRM} t_p = 10\text{ms}$ ,<br>$V_{DSM} \text{ \& \ } V_{RSM} =$<br>$V_{DRM} \text{ \& \ } V_{RRM} + 100\text{V}$<br>Respectively |
| DCR1595SW41 | 4100   |   |
| DCR1595SW40 | 4000   |   |
| DCR1595SW39 | 3900   |   |
| DCR1595SW38 | 3800   |   |
| DCR1595SW37 | 3700   |   |

Lower voltage grades available.



Outline type code: W. See package outline for further information.

### CURRENT RATINGS

| Symbol                                 | Parameter                            | Conditions   | Max. | Units |
|--|--------------------------------------|--|------|-------|
| <b>Double Side Cooled</b>              |                                      |  |      |       |
| $I_{T(AV)}$                            | Mean on-state current                | Half wave resistive load, $T_{case} = 80^\circ \text{C}$ | 2380 | A     |
| $I_{T(RMS)}$                           | RMS value                            | Half wave resistive load, $T_{case} = 80^\circ \text{C}$ | 3735 | A     |
| $I_T$                                  | Continuous (direct) on-state current | $T_{case} = 80^\circ \text{C}$                           | 3360 | A     |
| <b>Single Side Cooled (Anode side)</b> |                                      |  |      |       |
| $I_{T(AV)}$                            | Mean on-state current                | Half wave resistive load, $T_{case} = 80^\circ \text{C}$ | 1530 | A     |
| $I_{T(RMS)}$                           | RMS value                            | Half wave resistive load, $T_{case} = 80^\circ \text{C}$ | 2405 | A     |
| $I_T$                                  | Continuous (direct) on-state current | $T_{case} = 80^\circ \text{C}$                           | 2010 | A     |

## DCR1595SW

### SURGE RATINGS

| Symbol    | Parameter                               | Conditions                                | Max.               | Units            |
|-----------|---|---|--------------------|------------------|
| $I_{TSM}$ | Surge (non-repetitive) on-state current | 10ms half sine; $T_{case} = 125^{\circ}C$ | 43.0               | kA               |
| $I^2t$    | $I^2t$ for fusing                       | $V_R = 50\% V_{RRM}$ - 1/4 sine           | $9.25 \times 10^6$ | A <sup>2</sup> s |
| $I_{TSM}$ | Surge (non-repetitive) on-state current | 10ms half sine; $T_{case} = 125^{\circ}C$ | 53.75              | kA               |
| $I^2t$    | $I^2t$ for fusing                       | $V_R = 0$                                 | $14.4 \times 10^6$ | A <sup>2</sup> s |

### THERMAL AND MECHANICAL DATA

| Symbol        | Parameter                             | Conditions                                      | Min.        | Max. | Units       |               |
|---------------|---------------------------------------|---|-------------|------|-------------|---------------|
| $R_{th(j-c)}$ | Thermal resistance - junction to case | Double side cooled                              | dc          | -    | 0.008       | $^{\circ}C/W$ |
|               |                                       | Single side cooled                              | Anode dc    | -    | 0.016       | $^{\circ}C/W$ |
|               |                                       |   | Cathode dc  | -    | 0.016       | $^{\circ}C/W$ |
| $R_{th(c-h)}$ | Thermal resistance - case to heatsink | Clamping force 70.0kN<br>with mounting compound | Double side | -    | 0.001       | $^{\circ}C/W$ |
|               |                                       |   | Single side | -    | 0.002       | $^{\circ}C/W$ |
| $T_{vj}$      | Virtual junction temperature          | On-state (conducting)                           |             | -    | 135         | $^{\circ}C$   |
|               |                                       | Reverse (blocking)                              |             | -    | 125         | $^{\circ}C$   |
| $T_{stg}$     | Storage temperature range             |   | -55         | 125  | $^{\circ}C$ |               |
| -             | Clamping force                        |   | 63.0        | 77.0 | kN          |               |

## DYNAMIC CHARACTERISTICS

| Symbol            | Parameter  | Conditions   | Typ.           | Max. | Units      |            |
|-------------------|--|--|----------------|------|------------|------------|
| $I_{RRM}/I_{DRM}$ | Peak reverse and off-state current               | At $V_{RRM}/V_{DRM}$ , $T_{case} = 125^{\circ}C$   | -              | 400  | mA         |            |
| dV/dt             | Maximum linear rate of rise of off-state voltage | To 67% $V_{DRM}$ , $T_j = 125^{\circ}C$ , Gate open circuit  | -              | 1000 | V/ $\mu$ s |            |
| dI/dt             | Rate of rise of on-state current                 | From 67% $V_{DRM}$ to $2 \times I_{T(AV)}$<br>Gate source 30V, 10 $\Omega$<br>$t_r \leq 0.5\mu$ s, $T_j = 125^{\circ}C$  | 50Hz, 60s      | -    | 200        | A/ $\mu$ s |
|                   |  |  | Non-repetitive | -    | 400        | A/ $\mu$ s |
| $V_{T(TO)}$       | Threshold voltage                                | At $T_{vj} = 125^{\circ}C$   | -              | 1.03 | V          |            |
| $r_T$             | On-state slope resistance                        | At $T_{vj} = 125^{\circ}C$   | -              | 0.19 | m $\Omega$ |            |
| $t_{gd}$          | Delay time                                       | $V_D = 67\% V_{DRM}$ , Gate source 30V, 15 $\Omega$<br>Rise time 0.5 $\mu$ s, $T_j = 25^{\circ}C$  | 0.5            | 2.0  | $\mu$ s    |            |
| $t_q$             | Turn-off time                                    | $I_T = 5000A$ , $t_p = 3.5ms$ , $T_j = 125^{\circ}C$ ,<br>$V_R = 900V$ , $dI_{RR}/dt = 4A/\mu$ s,<br>$V_{DR} = 67\% V_{DRM}$ , $dV_{DR}/dt = 20V/\mu$ s linear | 550            | 1000 | $\mu$ s    |            |
| $I_L$             | Latching current                                 | $T_j = 25^{\circ}C$ , $V_D = 5V$   | 200            | 1000 | mA         |            |
| $I_H$             | Holding current                                  | $I_{TM} = 500A$ , $I_T = 5A$ , $R_{GK} = \infty$ , $T_j = 25^{\circ}C$   | 50             | 250  | mA         |            |

## GATE TRIGGER CHARACTERISTICS AND RATINGS

| Symbol      | Parameter                 | Conditions                                   | Max. | Units |
|-------------|---------------------------|--|------|-------|
| $V_{GT}$    | Gate trigger voltage      | $V_{DRM} = 5V$ , $T_{case} = 25^{\circ}C$    | 4.0  | V     |
| $I_{GT}$    | Gate trigger current      | $V_{DRM} = 5V$ , $T_{case} = 25^{\circ}C$    | 400  | 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       | 30   | A     |
| $P_{G(M)}$  | Peak gate power           | See Fig.7/8 Gate Characteristics curve/table | 150  | W     |
| $P_{G(AV)}$ | Mean gate power           |  | 10   | W     |

CURVES

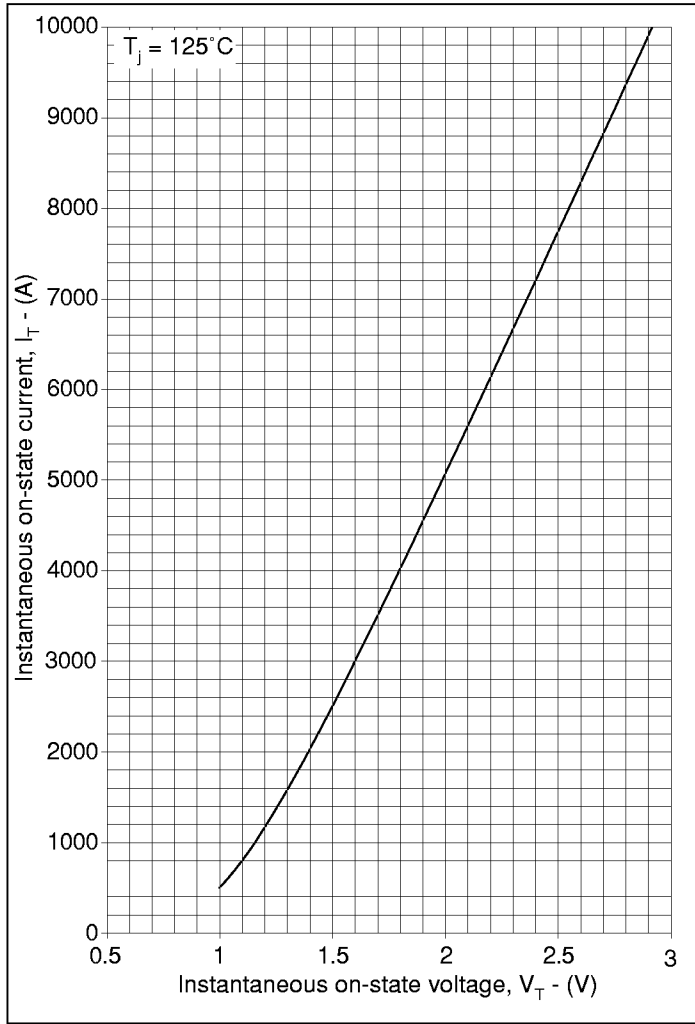


Fig.1 Maximum (limit) on-state characteristics

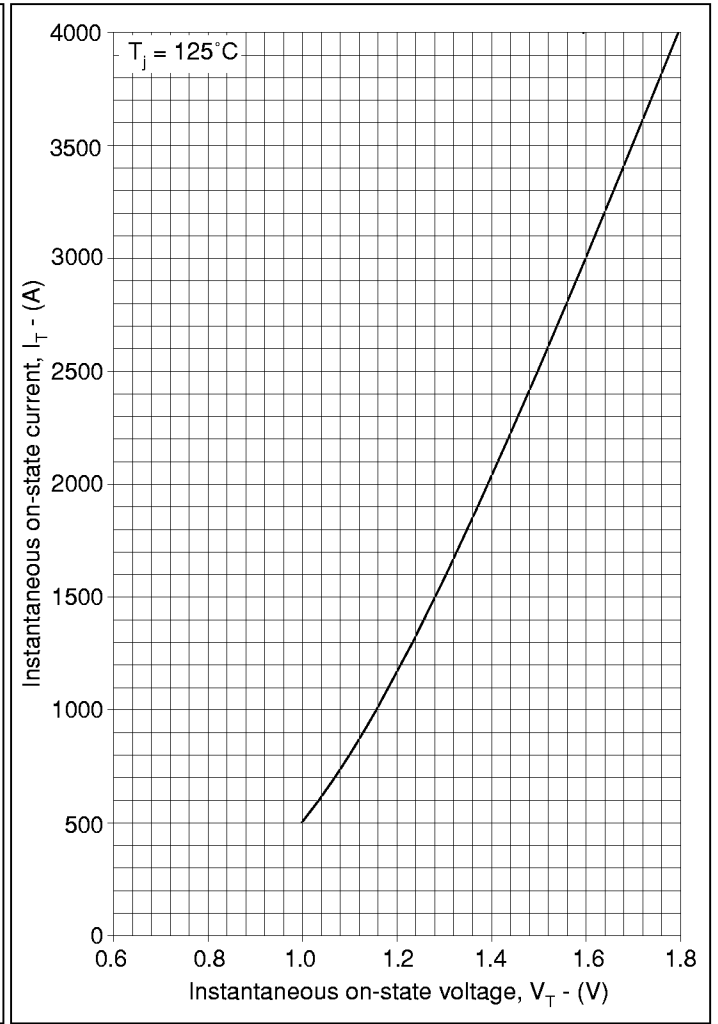


Fig.2 Maximum (limit) on-state characteristics

$V_{TM}$  Equation:-

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

Where

A = 0.02866651

B = 0.1590393

C =  $1.947584 \times 10^{-4}$

D =  $-5.23298 \times 10^{-3}$

these values are valid for  $T_j = 125^\circ\text{C}$  for  $I_T$  500A to 10000A

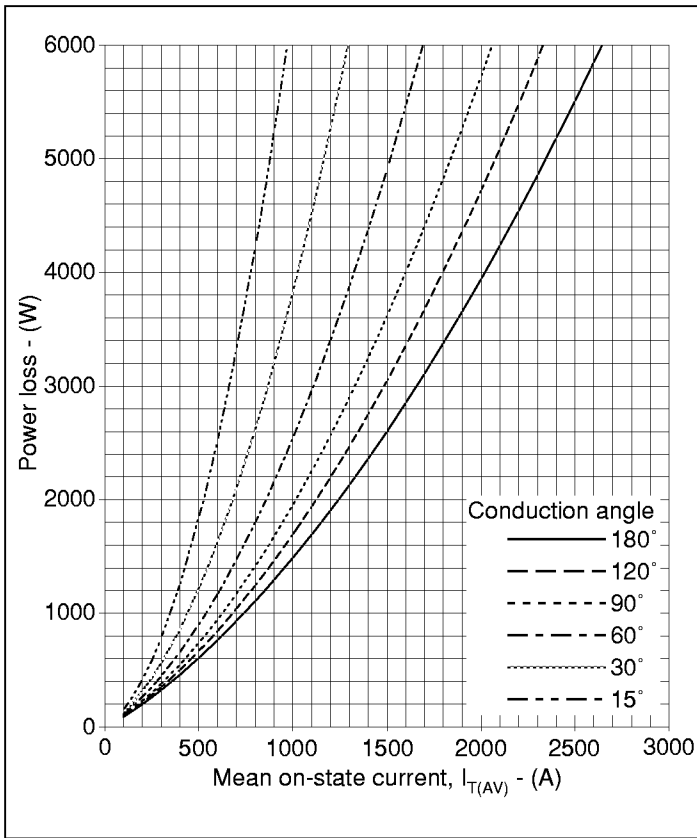


Fig.3 Sine wave power dissipation curves

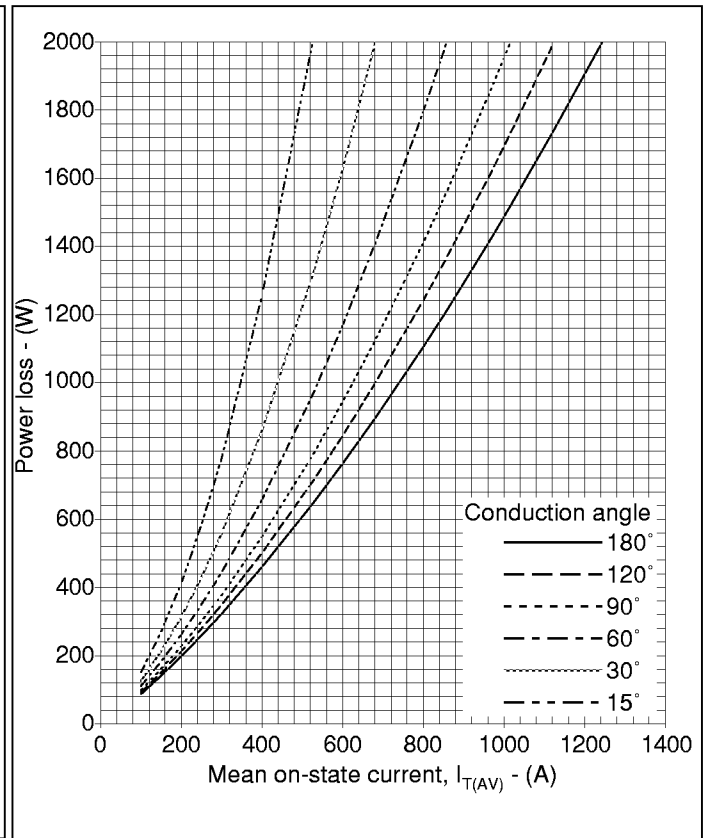


Fig.4 Sine wave power dissipation curves

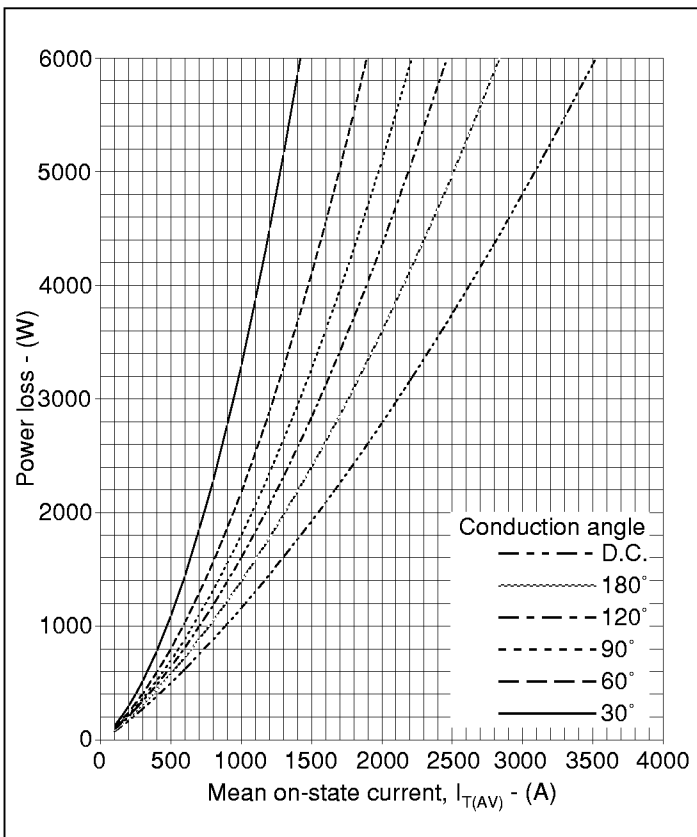


Fig.5 Square wave power dissipation curves

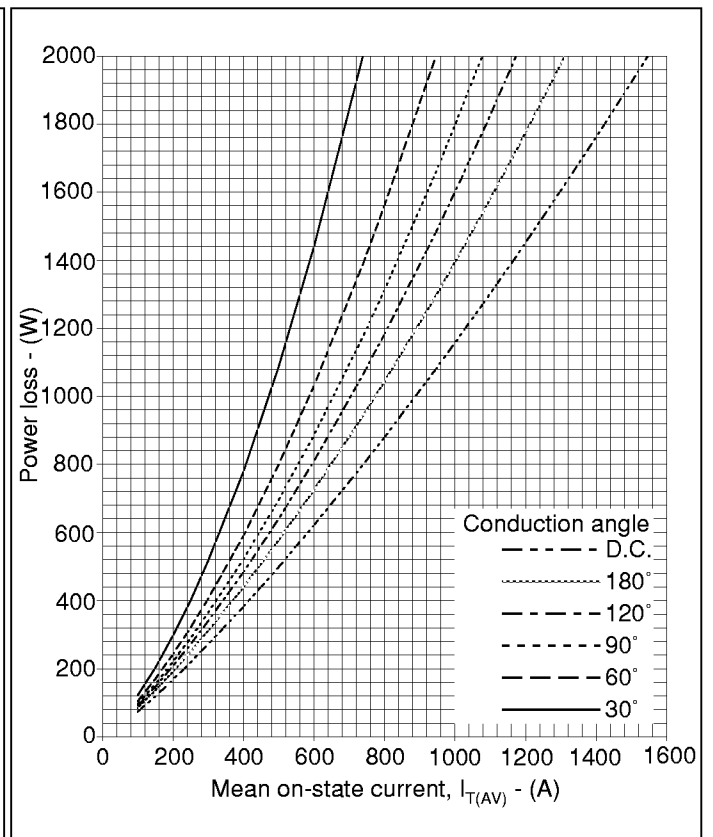


Fig.6 Square wave power dissipation curves

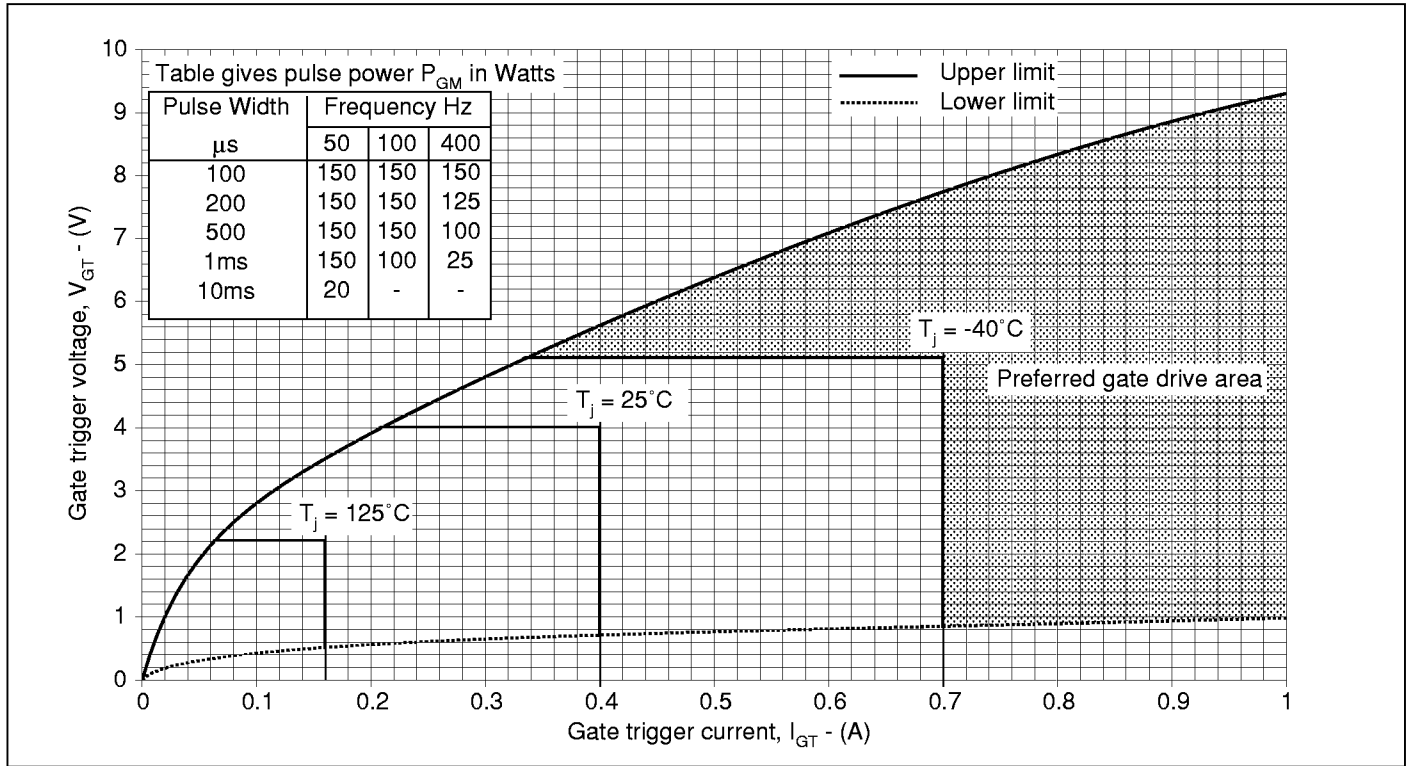


Fig.7 Gate characteristics

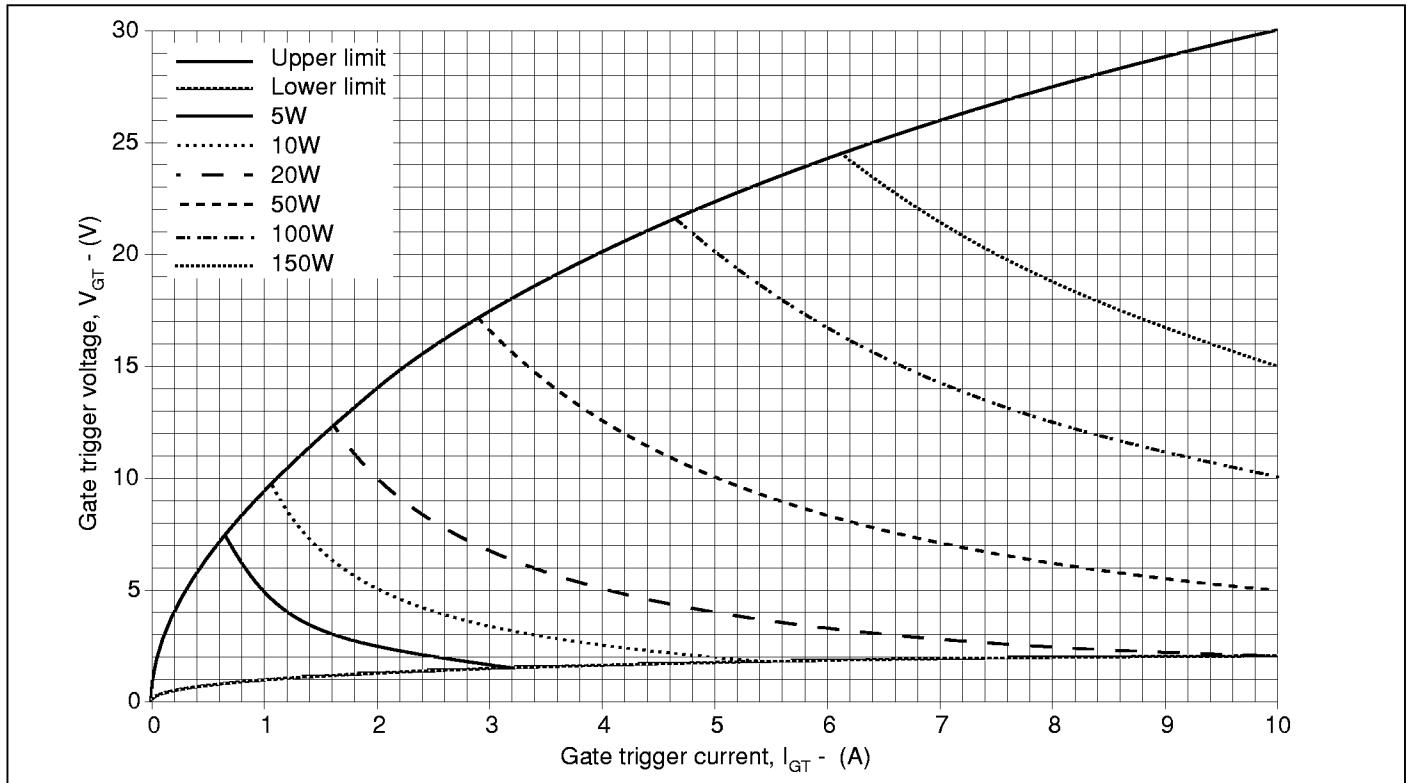


Fig.8 Gate characteristics

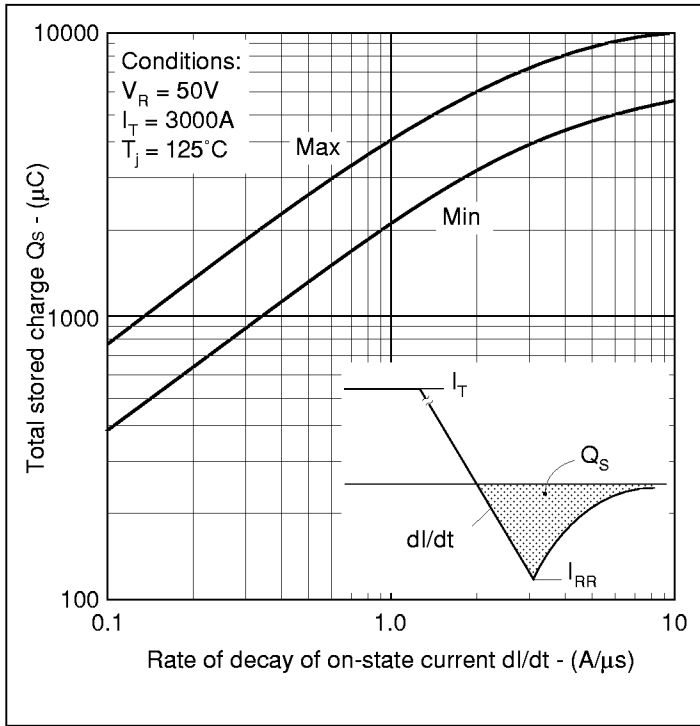


Fig.9 Stored charge

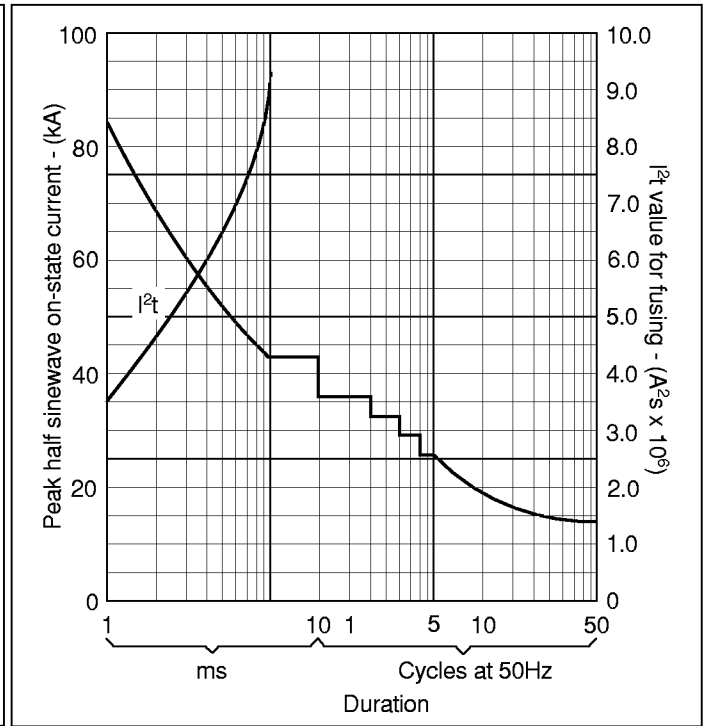


Fig.10 Surge (non-repetitive) on-state current vs time (with 50%  $V_{RRM}$  @  $T_{case} = 125^\circ C$ )

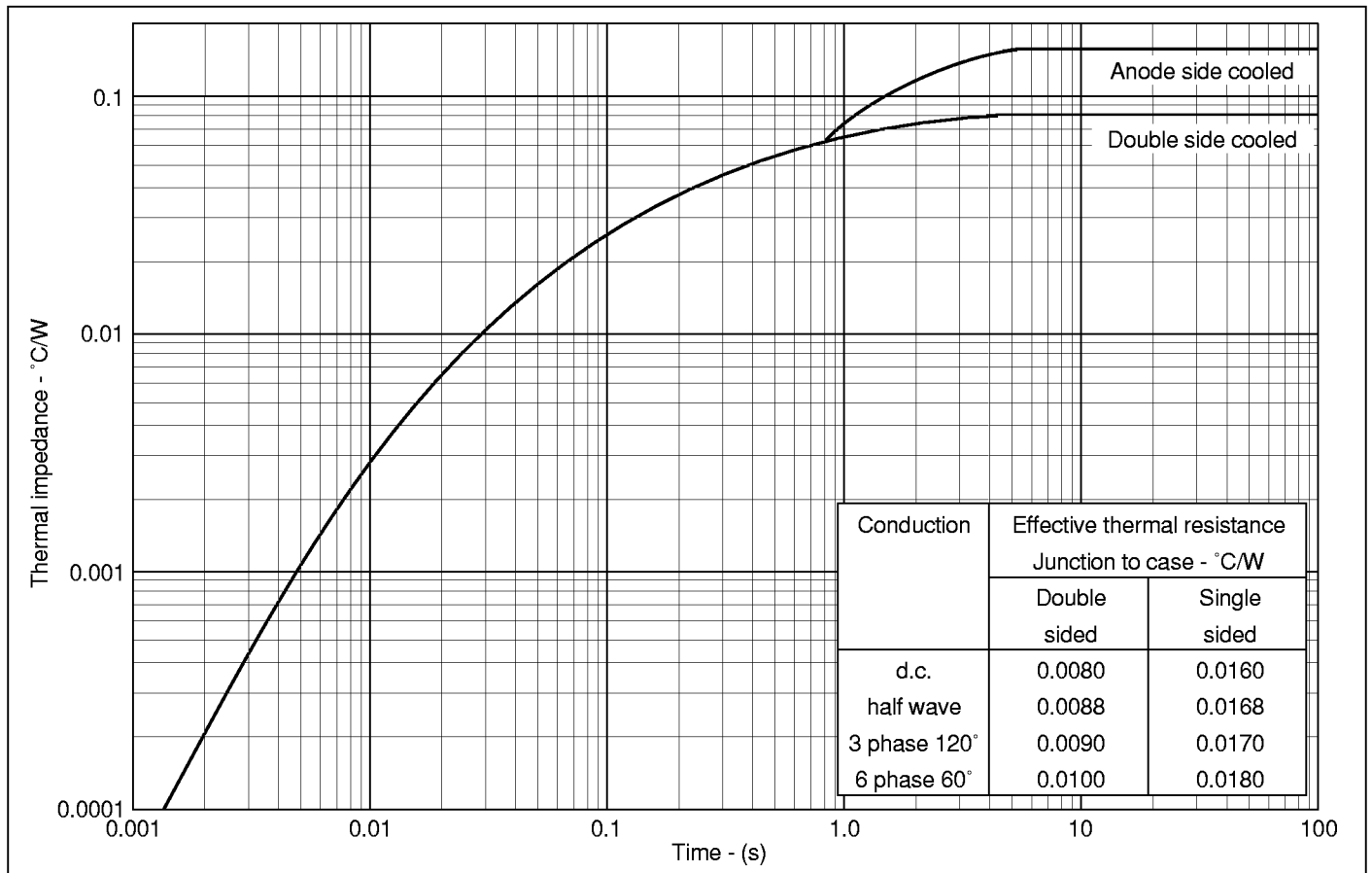
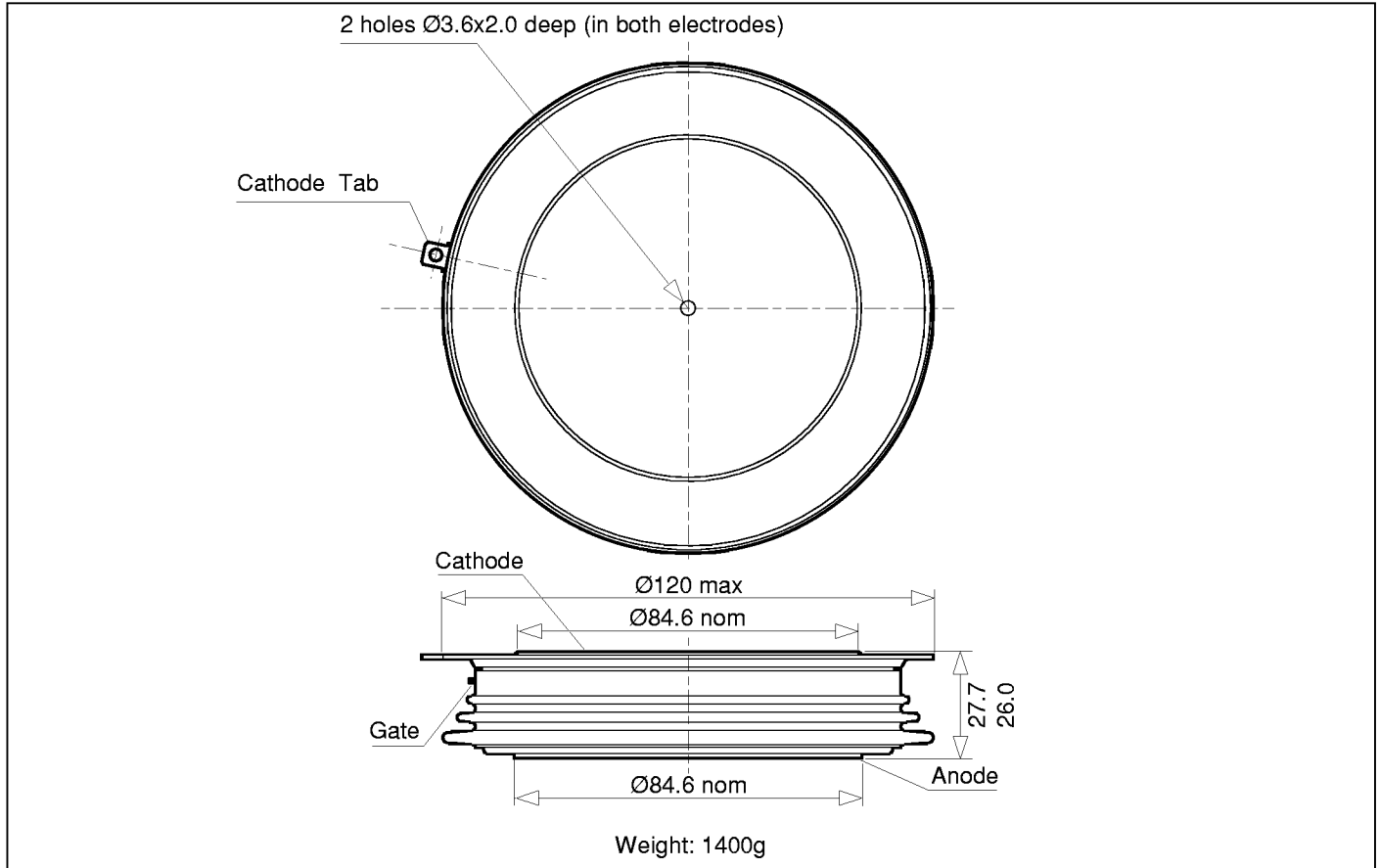


Fig.11 Maximum (limit) transient thermal impedance - junction to case

## DCR1595SW

### PACKAGE OUTLINE - W

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



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