

DIODE / THYRISTOR MODULE

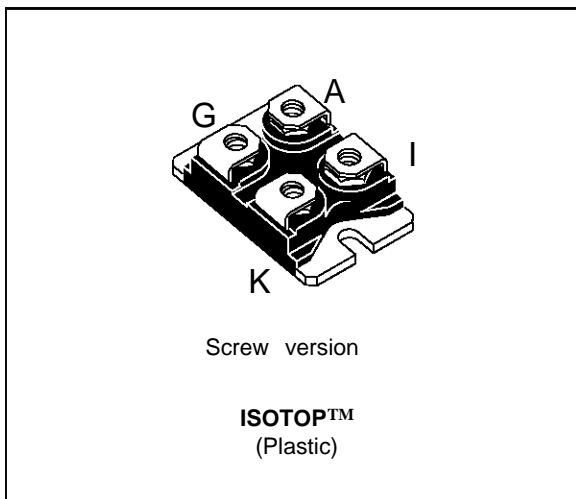
FEATURES

- $V_{DRM} = V_{RRM}$ UP TO 1200 V
- $I_{T(AV)} = 35$ A
- HIGH SURGE CAPABILITY
- INSULATED PACKAGE :
INSULATING VOLTAGE 2500 V(RMS)

DESCRIPTION

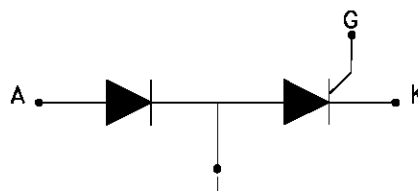
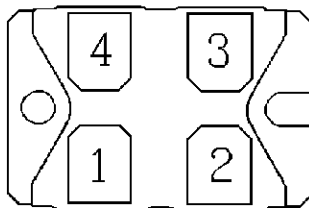
The MDS50 family are constituted of one rectifier diode and general purpose SCR. Suited for power supplies up to 400 Hz on resistive or inductive load.

The small volume (7cm³) and weight (29g) of the ISOTOP package are well adapted to new generation of medium size module market applications.



PIN CONNECTIONS

- 1 : Thyristor Gate (G)
- 2 : Thyristor Cathode (K)
- 3 : Thyristor Anode/Diode Cathode (I)
- 4 : Diode Anode(A)



ABSOLUTE RATINGS (limiting values)

| Symbol | Parameter | | Value | Unit |
|--------------|---|--------------------------|------------|------------------|
| $I_{T(RMS)}$ | RMS on-state current | | 70 | A |
| $I_{T(AV)}$ | Average on-state current Single phase circuit, 180° conduction angle per device | $T_c = 85^\circ\text{C}$ | 35 | A |
| I_{TSM} | Non repetitive surge peak on-state current (T_j initial = 25°C) | $t_p = 8.3\text{ms}$ | 630 | A |
| I_{FSM} | | $t_p = 10\text{ms}$ | 600 | |
| I^2t | I^2t value for fusing | $t_p = 10\text{ms}$ | 1800 | A ² s |
| di/dt | Critical rate of rise of on-state current Gate supply : $I_G = 800\text{mA}$ - $di_G/dt = 1\text{A}/\mu\text{s}$ | | 100 | A/ μs |
| T_{stg} | Storage temperature range | | - 40 + 150 | °C |
| T_j | Operating junction temperature range | | - 40 + 125 | |

| Symbol | Parameter | MDS50 | | | Unit |
|------------------------|--|-------|-------|-------|------|
| | | -800 | -1000 | -1200 | |
| V_{DRM} V_{RRM} | Repetitive peak off-state voltage $T_j = 125^\circ\text{C}$ | 800 | 1000 | 1200 | V |

TM : ISOTOP is a trademark of SGS-THOMSON Microelectronics

THERMAL RESISTANCES

| Symbol | Parameter | Value | Unit |
|--------------|--------------------------------|-------|------|
| Rth (j-c) DC | Junction to case for DC | 0.75 | °C/W |
| Rth (c-h) | Contact (case to heatsink) (4) | 0.05 | °C/W |

(4) With contact grease utilisation

GATE CHARACTERISTICS (maximum values)

 $P_{GM} = 50 \text{ W}$ ($t_p = 20 \mu\text{s}$) P_G (AV)= 1 W $I_{FGM} = 4 \text{ A}$ ($t_p = 20 \mu\text{s}$) $V_{RGM} = 5 \text{ V}$.

ELECTRICAL CHARACTERISTICS (SCR)

| Symbol | Test Conditions | | Value | Unit | |
|------------------------|--|-------------------------|-------|------|------------------|
| I_{GT} | $V_D=12\text{V}$ (DC) $R_L=33\Omega$ | $T_j=25^\circ\text{C}$ | MAX | 50 | mA |
| V_{GT} | $V_D=12\text{V}$ (DC) $R_L=33\Omega$ | $T_j=25^\circ\text{C}$ | MAX | 1.5 | V |
| V_{GD} | $V_D=V_{DRM}$ $R_L=3.3\text{k}\Omega$ | $T_j=125^\circ\text{C}$ | MIN | 0.2 | V |
| tgt | $V_D=V_{DRM}$ $I_G = 500\text{mA}$ $di_G/dt = 3\text{A}/\mu\text{s}$ | $T_j=25^\circ\text{C}$ | TYP | 2 | μs |
| I_L | $I_G=1.2 I_{GT}$ | $T_j=25^\circ\text{C}$ | TYP | 60 | mA |
| | | | MAX | 120 | |
| I_H | $I_T= 0.5\text{A}$ gate open | $T_j=25^\circ\text{C}$ | TYP | 40 | mA |
| | | | MAX | 80 | |
| V_{TM} | $I_{TM}= 110\text{A}$ $t_p= 380\mu\text{s}$ | $T_j=25^\circ\text{C}$ | MAX | 1.75 | V |
| I_{DRM} I_{RRM} | V_{DRM} Rated V_{RRM} Rated | $T_j=25^\circ\text{C}$ | MAX | 0.05 | mA |
| | | $T_j=125^\circ\text{C}$ | MAX | 10 | |
| tq | $I_T= 110\text{A}$ $V_R=75\text{V}$ $V_D=67\%V_{DRM}$ $di/dt=30\text{A}/\mu\text{s}$ $dV/dt=20\text{V}/\mu\text{s}$ Gate open | $T_j=125^\circ\text{C}$ | TYP | 100 | μs |
| dV/dt * | Linear slope up to $V_D=67\%V_{DRM}$ gate open | $T_j=125^\circ\text{C}$ | MIN | 500 | V/ μs |

* For higher guaranteed values, please consult us.

ELECTRICAL CHARACTERISTICS (DIODE)

| Symbol | Test Conditions | | Value | Unit |
|--------|-------------------|-------------------------|-------|---------------|
| V_F | $I_F=110\text{A}$ | $T_j=25^\circ\text{C}$ | 1.75 | V |
| I_R | $V_R=V_{RRM}$ | $T_j=125^\circ\text{C}$ | 10 | mA |
| | | $T_j=25^\circ\text{C}$ | 50 | μA |

Fig. 1 : Maximum Average Power dissipation versus average on-state current.
(Sinusoidal waveform : Thyristor or Diode)

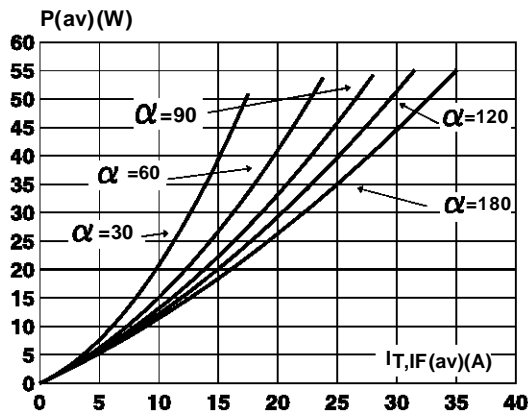


Fig. 3 : Maximum average power dissipation versus average on-state current.
(Rectangular waveform : Thyristor or Diode)

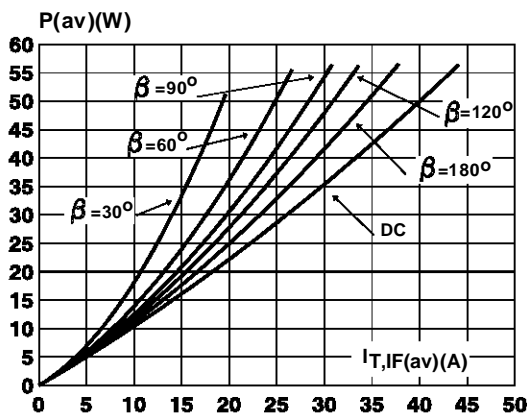


Fig.5 : Maximum total power dissipation versus output current on resistive or inductive load.
(Single phase bridge rectifier : 2 packages MDS50)

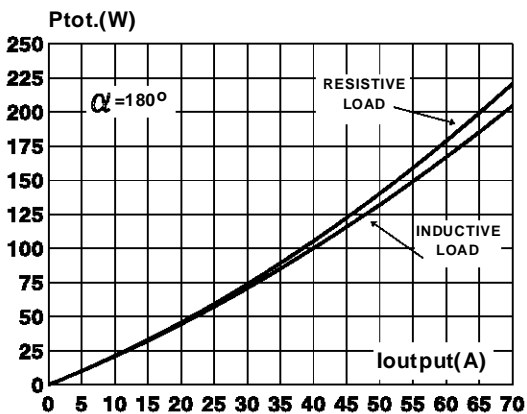


Fig. 2 : Correlation between maximum average power dissipation and maximum allowable temperature (T_{amb}) for different thermal resistances heatsink + contact.
(Sinusoidal waveform : Thyristor or Diode)

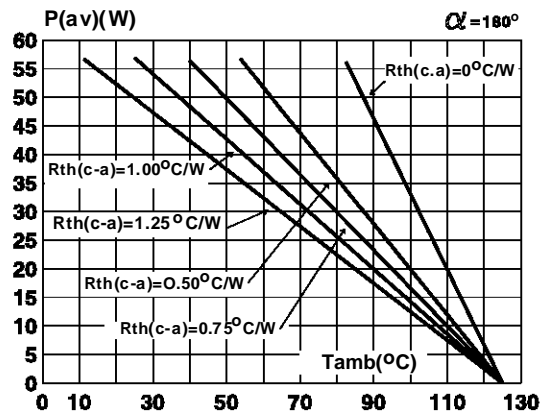


Fig.4 : Correlation between maximum average power dissipation and maximum allowable temperature (T_{amb}) for different thermal resistances heatsink + contact.
(Rectangular waveform : Thyristor or Diode)

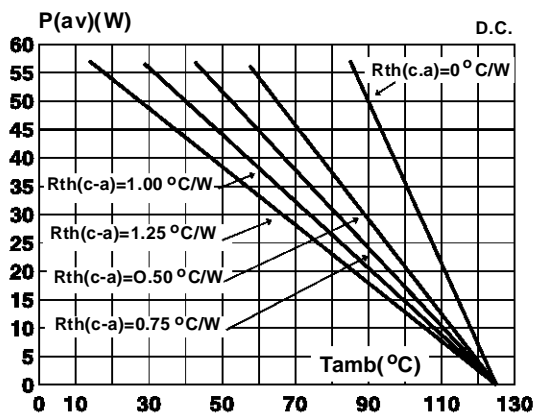


Fig. 6 : Correlation between maximum total average power dissipation and maximum ambient allowable temperature for different thermal resistances heatsink + contact.
(Single phase bridge rectifier : 2 packages : MDS50)

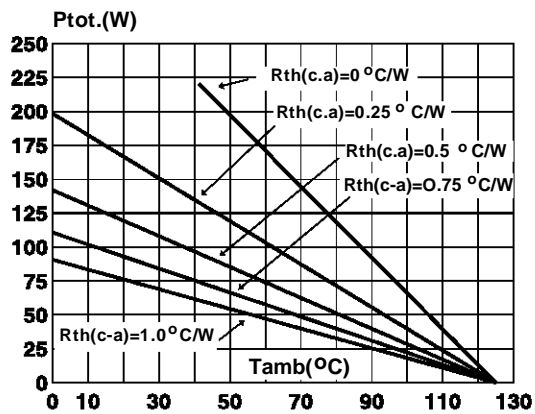


Fig. 7 : Maximum total power dissipation versus output current .
(Three phase bridge rectifier : 3 packages : MDS50)

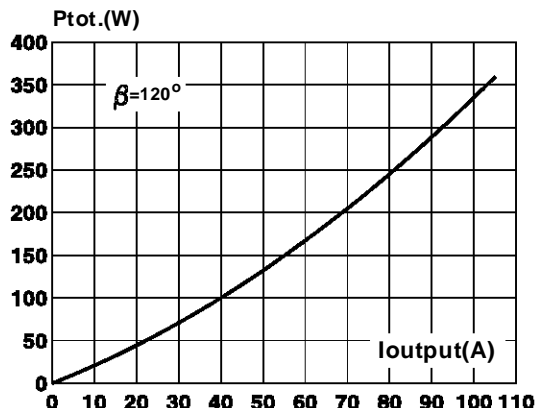


Fig. 9 : Average on-state current versus case temperature .
(Sinusoidal waveform : Thyristor or Diode)

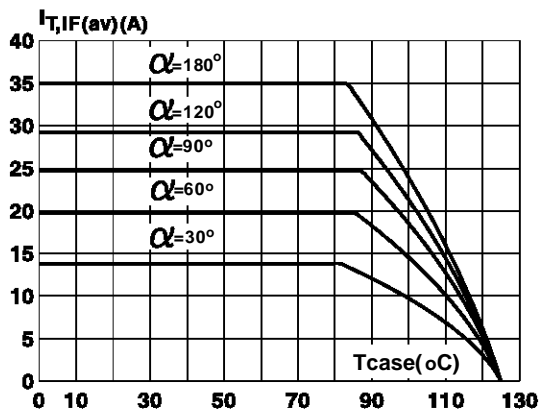


Fig. 11: Relative variation of thermal transient impedance junction to case versus pulse duration.

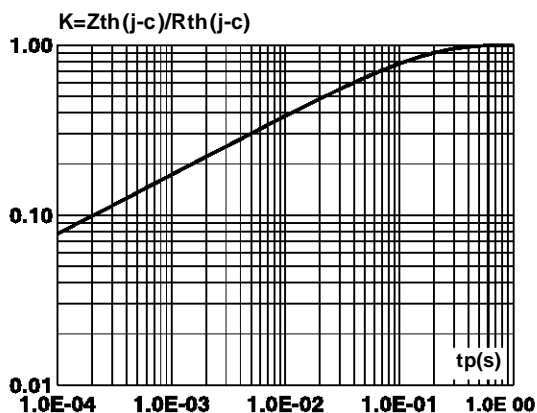


Fig.8 : Correlation between maximum average power dissipation and maximum allowable temperature (Tamb) for different thermal resistances heatsink + contact .
(Three phase bridge rectifier : 3 packages : MDS50)

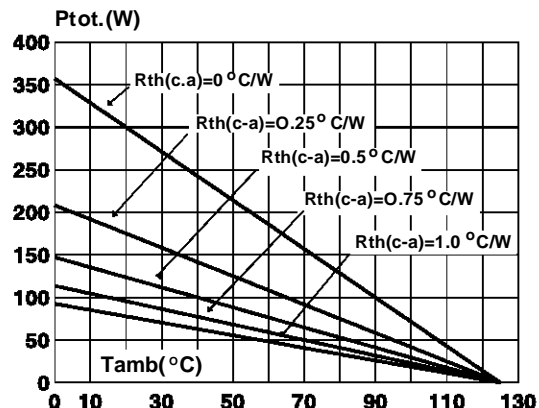


Fig. 10 : Average on-state current versus case temperature .
(Rectangular waveform : Thyristor or Diode)

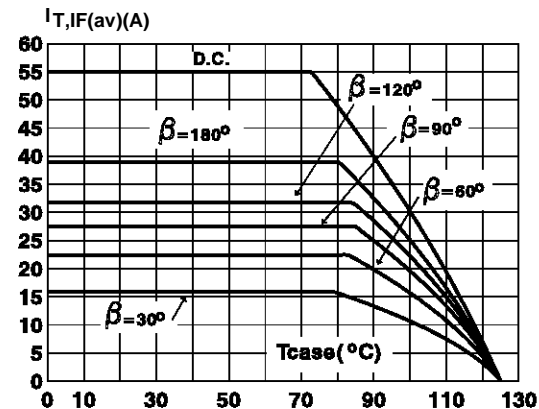


Fig.12 : Relative variation of gate trigger and holding current versus junction temperature.

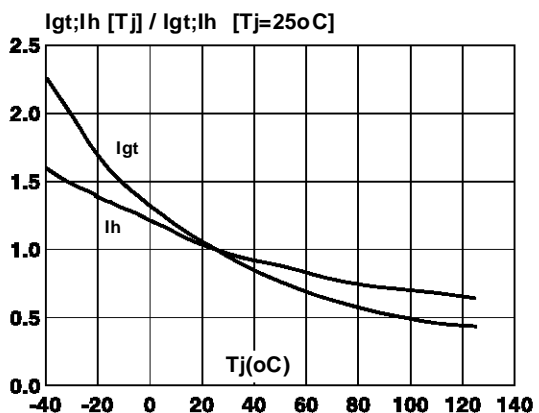


Fig.13 : Non repetitive surge peak on-state current for a sinusoidal pulse with width : $t_p \leq 10$ ms and corresponding value of I^2t .
(Thyristor or diode)

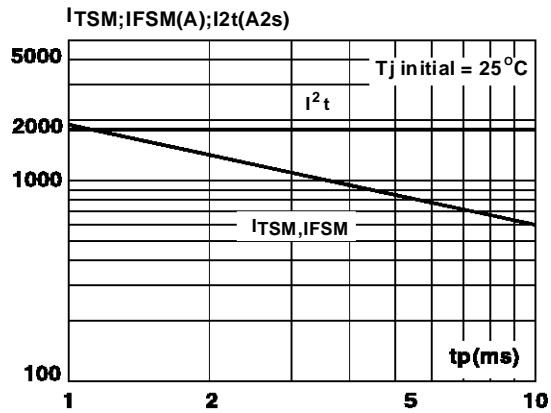


Fig. 14 : Non repetitive surge peak on-state current versus number of cycles.
(Thyristor or Diode)

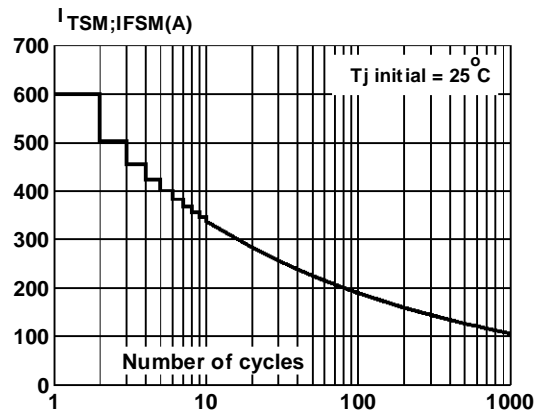
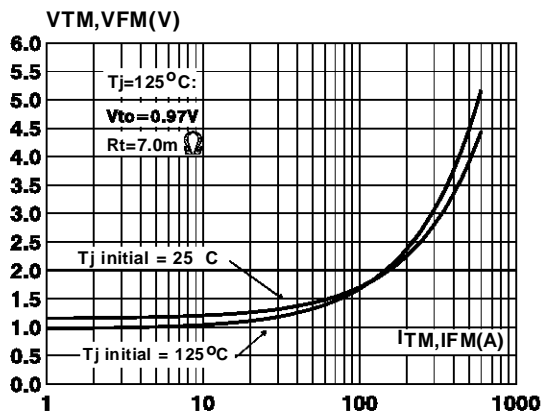


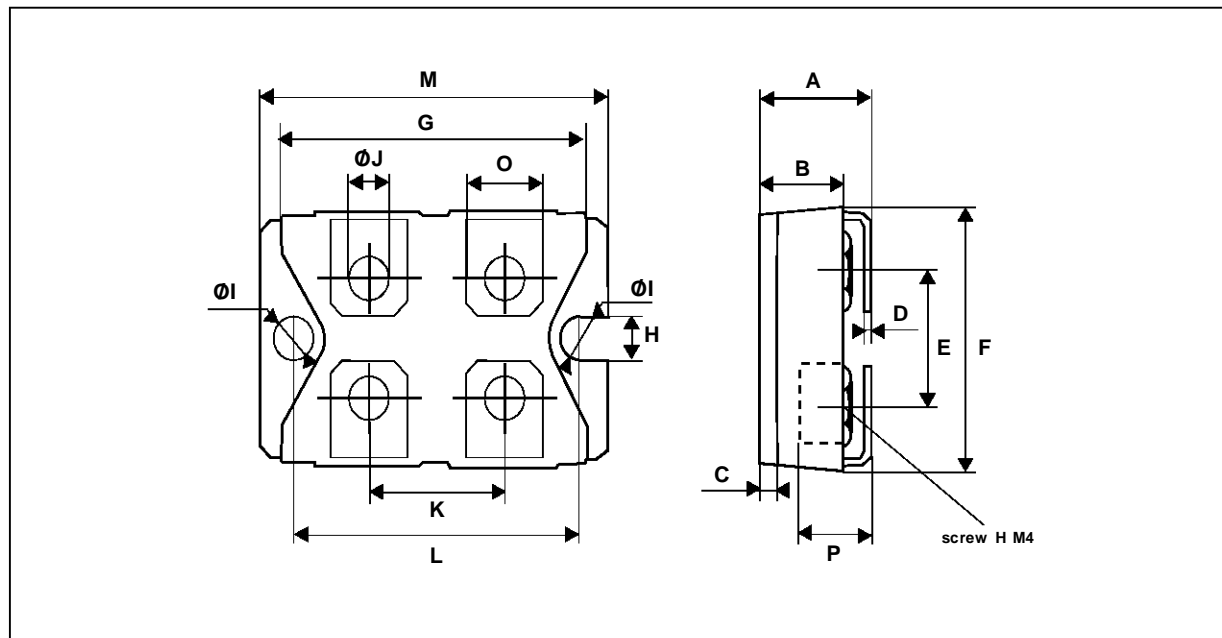
Fig. 15 : On-state characteristics .
(Maximum values)(Thyristor or Diode)



MDS50

PACKAGE MECHANICAL DATA

ISOTOP plastic : SCREW VERSION



| REF. | DIMENSIONS | | | |
|------|-------------|-------|--------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 11.80 | 12.20 | 0.465 | 0.480 |
| B | 8.90 | 9.10 | 0.350 | 0.358 |
| C | 1.95 | 2.05 | 0.077 | 0.081 |
| D | 0.75 | 0.85 | 0.029 | 0.034 |
| E | 12.60 | 12.80 | 0.496 | 0.504 |
| F | 25.10 | 25.50 | 0.988 | 1.004 |
| G | 31.50 | 31.70 | 1.240 | 1.248 |
| H | 4.00 | | 0.157 | |
| I | 4.10 | 4.30 | 0.161 | 0.169 |
| J | 4.10 | 4.30 | 0.161 | 0.169 |
| K | 14.90 | 15.10 | 0.586 | 0.595 |
| L | 30.10 | 30.30 | 1.185 | 1.193 |
| M | 37.80 | 38.20 | 1.488 | 1.504 |
| O | 7.80 | 8.20 | 0.307 | 0.323 |
| P | 5.50 | | 0.216 | |

Cooling method : C
 Marking : Type number
 Weight : 28 g. (without screws)
 Electrical isolation : 2500V(RMS)
 Capacitance : < 45 pF
 Inductance : < 5 nH

- Recommended torque value : 1.3 N.m (Max 1.5 N.m) for the 6 x M4 screws. (2 x M4 screws recommended for mounting the package on the heatsink and the 4 screws given with the screw version).
- The screws supplied with the package are adapted for mounting on a board (or others types of terminals) with a thickness of 0.6 mm min and 2.2 mm max.

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