SGS-THOMSON MICROELECTRONICS

MDS50

DIODE / THYRISTOR MODULE

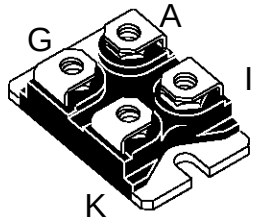
FEATURES

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

DESCRIPTION

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

The small volume (7cm^3) and weight (29g) of the ISOTOP package are well adapted to new generation of medium size module market applications.

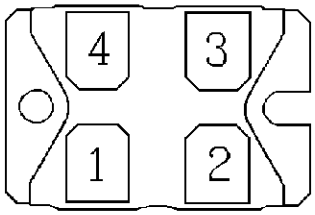


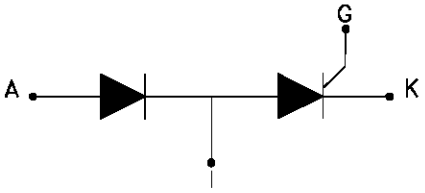
Screw version

ISOTOP™
(Plastic)

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	Tc = 85°C	35	A
I_{TSM} I_{FSM}	Non repetitive surge peak on-state current (Tj initial = 25°C)	tp = 8.3ms	630	A
		tp = 10ms	600	
I^2t	I^2t value for fusing	tp = 10ms	1800	A^2s
dI/dt	Critical rate of rise of on-state current Gate supply : I_G = 800mA – di_G/dt = 1A/µs		100	A/µs
T_{stg} T_j	Storage temperature range Operating junction temperature range		- 40 + 150 - 40 + 125	°C

Symbol	Parameter	MDS50			Unit
		-800	-1000	-1200	
V_{DRM} V_{RRM}	Repetitive peak off-state voltage Tj = 125 °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 W (tp = 20 µs) $P_{G\ (AV)}$= 1 W I_{FGM} = 4 A (tp = 20 µs) V_{RGM} = 5V.

ELECTRICAL CHARACTERISTICS (SCR)

Symbol	Test Conditions			Value	Unit
I_{GT}	V_D=12V (DC) R_L=33Ω	Tj=25°C	MAX	50	mA
V_{GT}	V_D=12V (DC) R_L=33Ω	Tj=25°C	MAX	1.5	V
V_{GD}	V_D=V_{DRM} R_L=3.3kΩ	Tj=125°C	MIN	0.2	V
tgt	V_D=V_{DRM} I_G = 500mA dI_G/dt = 3A/µs	Tj=25°C	TYP	2	µs
I_L	I_G=1.2 I_{GT}	Tj=25°C	TYP	60	mA
			MAX	120	
I_H	I_T= 0.5A gate open	Tj=25°C	TYP	40	mA
			MAX	80	
V_{TM}	I_{TM}= 110A tp= 380µs	Tj=25°C	MAX	1.75	V
I_{DRM} I_{RRM}	V_{DRM} Rated V_{RRM} Rated	Tj=25°C	MAX	0.05	mA
		Tj=125°C	MAX	10	
tq	I_T= 110A V_R=75V V_D=67%V_{DRM} dI/dt=30A/µs dV/dt=20V/µs Gate open	Tj=125°C	TYP	100	µs
dV/dt *	Linear slope up to V_D=67%V_{DRM} gate open	Tj=125°C	MIN	500	V/µs

* For higher guaranteed values, please consult us.

ELECTRICAL CHARACTERISTICS (DIODE)

Symbol	Test Conditions		Value	Unit
V_F	I_F=110A	Tj=25°C	1.75	V
I_R	V_R=V_{RRM}	Tj=125°C	10	mA
		Tj=25°C	50	µA

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

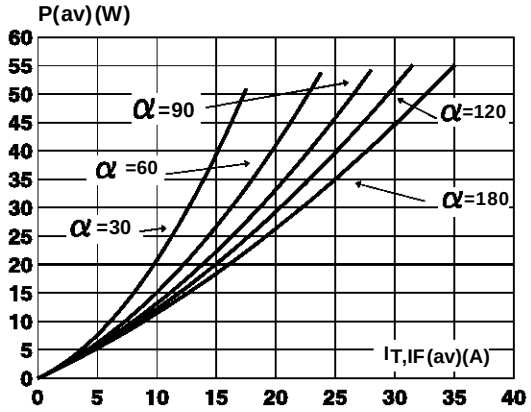


Fig. 2 : Correlation between maximum average power dissipation and maximum allowable temperature (Tamb) for different thermal resistances heatsink + contact.
(Sinusoidal waveform : Thyristor or Diode)

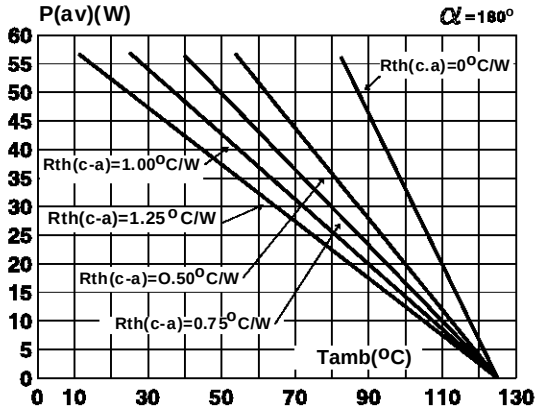


Fig. 3 : Maximum average power dissipation versus average on-state current.
(Rectangular waveform : Thyristor or Diode)

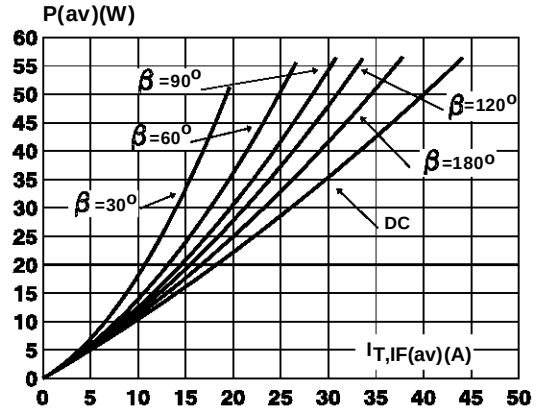


Fig.4 : Correlation between maximum average power dissipation and maximum allowable temperature (Tamb) for different thermal resistances heatsink + contact.
(Rectangular waveform : Thyristor or Diode)

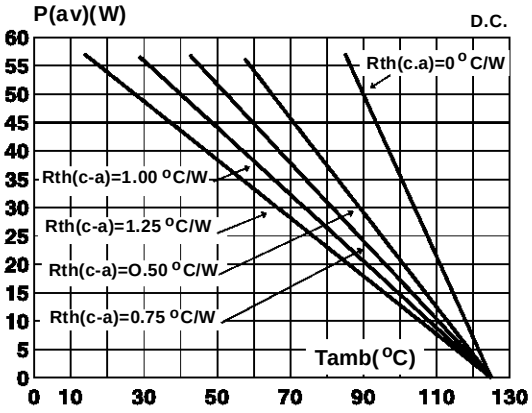


Fig.5 : Maximum total power dissipation versus output current on resistive or inductive load.
(Single phase bridge rectifier : 2 packages MDS50)

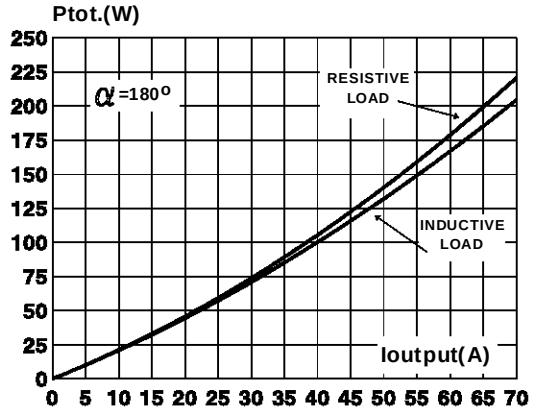


Fig. 6 : Correlation between maximum total average power dissipation and maximum ambiant allowable temperature for different thermal resistances heatsink + contact.
(Single phase bridge rectifier : 2 packages : MDS50)

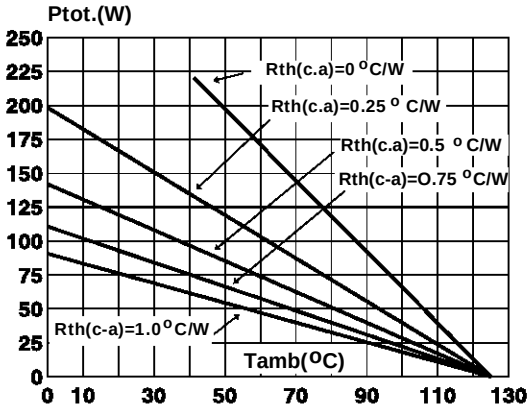


Fig. 7 : Maximun total power dissipation versus output current .
(Three phase bridge rectifier : 3 packages : MDS50)

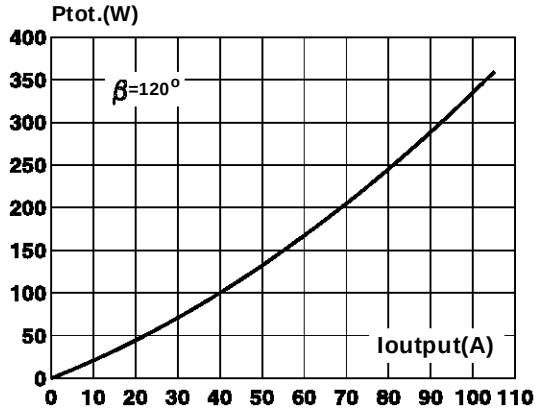


Fig.8 : Correlation between maximum average power dissipation and maximum allowable temperature (Tamb) for different thermal resistances heatsink + contact .
(Three phase bridge rectifier : 3 packages : MDS50)

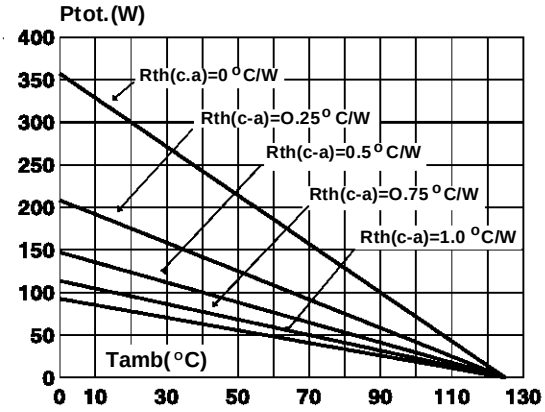


Fig. 9 : Average on-state current versus case temperature .
(Sinusoidal waveform : Thyristor or Diode)

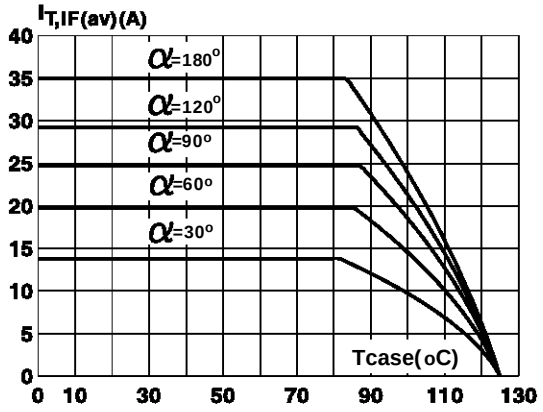


Fig. 10 : Average on-state current versus case temperature .
(Rectangular waveform : Thyristor or Diode)

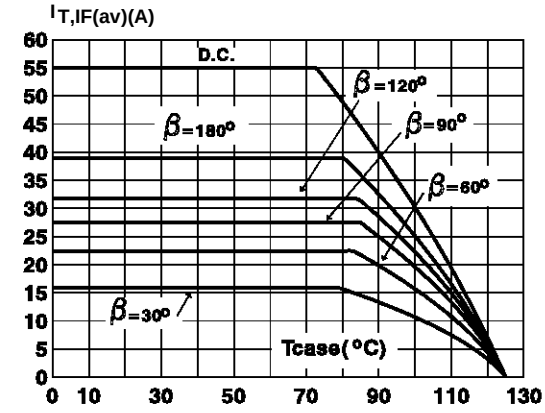


Fig. 11: Relative variation of thermal transient impedance junction to case versus pulse duration.

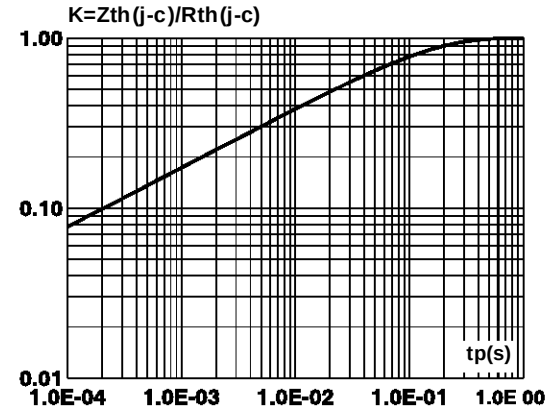


Fig.12 : Relative variation of gate trigger and holding current versus junction temperature.

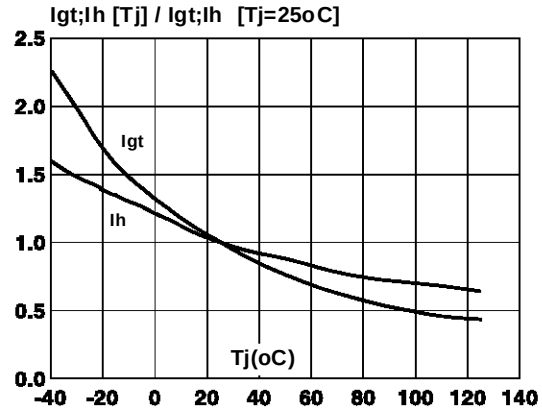


Fig.13 : Non repetitive surge peak on-state current for a sinusoidal pulse with width : tp ≤ 10 ms and corresponding value of I^2t .
(Thyristor or diode)

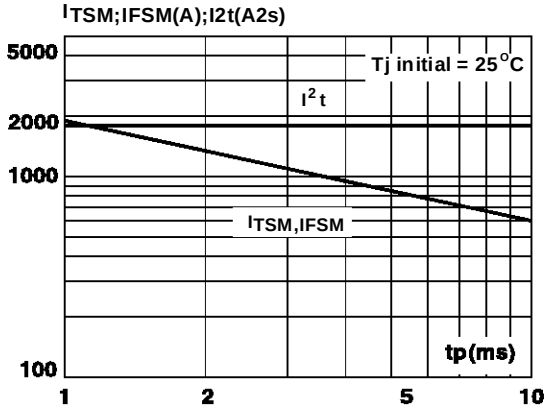


Fig. 14 : Non repetitive surge peak on-state current versus number of cycles.
(Thyristor or Diode)

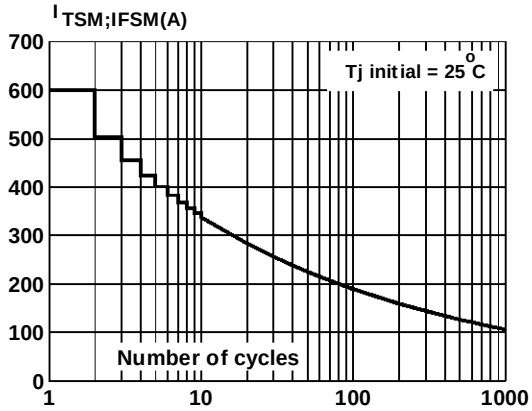
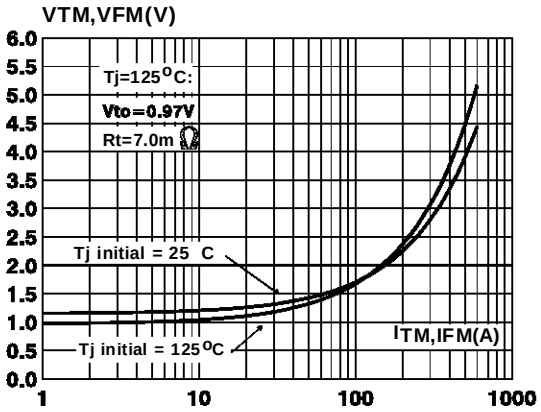
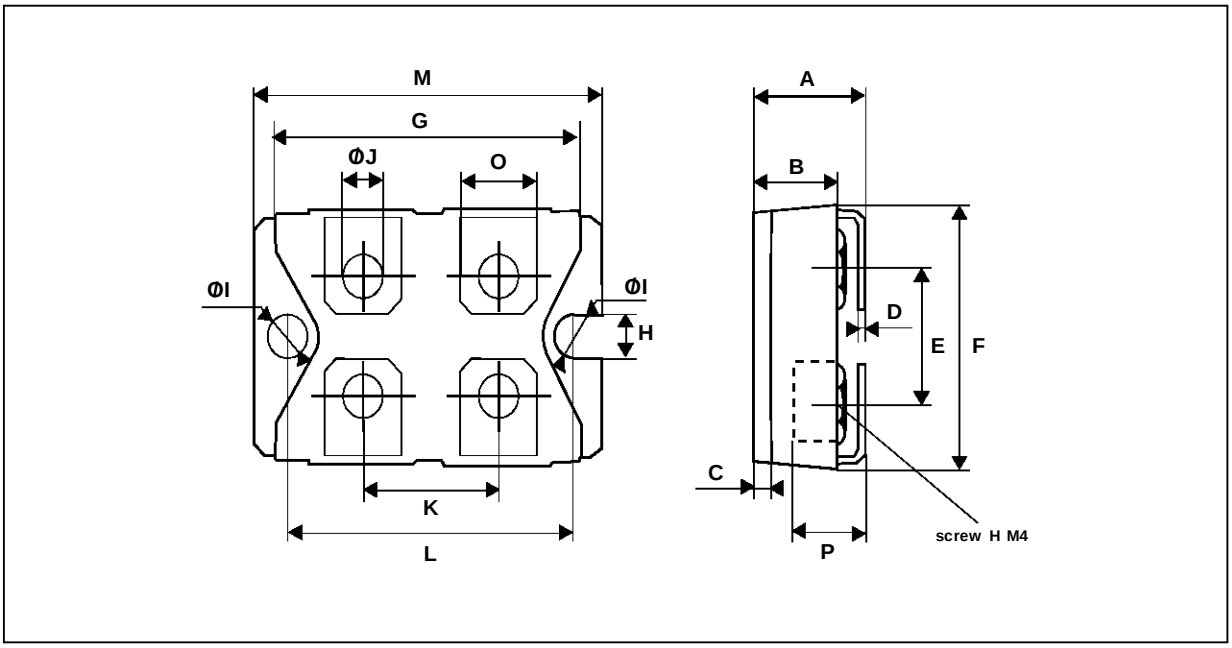


Fig. 15 : On-state characteristics .
(Maximum values)(Thyristor or Diode)



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.