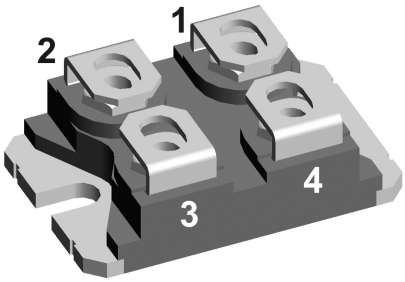
Thyristor

V_{RRM}	=	2x 1200 V
I_{TAV}	=	40 A
V_T	=	1,29 V

Phase leg

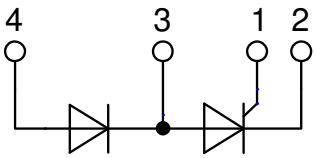
Part number

MCD40-12io6



Backside: isolated

E72873



Features / Advantages:

- Thyristor for line frequency
- Planar passivated chip
- Long-term stability

Applications:

- Line rectifying 50/60 Hz
- Softstart AC motor control
- DC Motor control
- Power converter
- AC power control
- Lighting and temperature control

Package: SOT-227B (minibloc)

- Isolation Voltage: 3000 V~
- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Base plate: Copper internally DCB isolated
- Advanced power cycling

Terms _Conditions of usage:

The data contained in this product data sheet is exclusively intended for technically trained staff. The user will have to evaluate the suitability of the product for the intended application and the completeness of the product data with respect to his application. The specifications of our components may not be considered as an assurance of component characteristics. The information in the valid application- and assembly notes must be considered. Should you require product information in excess of the data given in this product data sheet or which concerns the specific application of your product, please contact the sales office, which is responsible for you.
Due to technical requirements our product may contain dangerous substances. For information on the types in question please contact the sales office, which is responsible for you.
Should you intend to use the product in aviation, in health or live endangering or life support applications, please notify. For any such application we urgently recommend
- to perform joint risk and quality assessments;
- the conclusion of quality agreements;
- to establish joint measures of an ongoing product survey, and that we may make delivery dependent on the realization of any such measures.

IXYS reserves the right to change limits, conditions and dimensions. Data according to IEC 60747and per semiconductor unless otherwise specified 20150827b

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Rectifier				Ratings			
Symbol	**Definition**	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
$V_{RSM/DSM}$	*max. non-repetitive reverse/forward blocking voltage*		T_{VJ} = 25°C			1300	V
$V_{RRM/DRM}$	*max. repetitive reverse/forward blocking voltage*		T_{VJ} = 25°C			1200	V
$I_{R/D}$	*reverse current, drain current*	$V_{R/D}$ = 1200 V	T_{VJ} = 25°C			100	µA
		$V_{R/D}$ = 1200 V	T_{VJ} = 125°C			6	mA
V_T	*forward voltage drop*	I_T = 40 A	T_{VJ} = 25°C			1,29	V
		I_T = 80 A				1,61	V
		I_T = 40 A	T_{VJ} = 125°C			1,29	V
		I_T = 80 A				1,70	V
I_{TAV}	*average forward current*	T_C = 95°C	T_{VJ} = 150°C			40	A
$I_{T(RMS)}$	*RMS forward current*	180° sine				63	A
V_{T0}	*threshold voltage* } *for power loss calculation only*		T_{VJ} = 150°C			0,87	V
r_T	*slope resistance* }					10,5	mΩ
R_{thJC}	*thermal resistance junction to case*					0,7	K/W
R_{thCH}	*thermal resistance case to heatsink*				0,10		K/W
P_{tot}	*total power dissipation*		T_C = 25°C			180	W
I_{TSM}	*max. forward surge current*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			500	A
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			540	A
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			425	A
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			460	A
I^2t	*value for fusing*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			1,25	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			1,22	kA²s
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			905	A²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			880	A²s
C_J	*junction capacitance*	V_R = 400 V f = 1 MHz	T_{VJ} = 25°C		25		pF
P_{GM}	*max. gate power dissipation*	t_P = 30 µs	T_C = 150°C			10	W
		t_P = 300 µs				5	W
P_{GAV}	*average gate power dissipation*					0,5	W
$(di/dt)_{cr}$	*critical rate of rise of current*	T_{VJ} = 150°C; f = 50 Hz	repetitive, I_T = 120 A			100	A/µs
		t_P = 200 µs; di_G/dt = 0,3 A/µs;					
		I_G = 0,3 A; V = ⅔ V_{DRM}	non-repet., I_T = 40 A			500	A/µs
$(dv/dt)_{cr}$	*critical rate of rise of voltage*	V = ⅔ V_{DRM}	T_{VJ} = 150°C			1000	V/µs
		R_{GK} = ∞; method 1 (linear voltage rise)					
V_{GT}	*gate trigger voltage*	V_D = 6 V	T_{VJ} = 25°C			1,5	V
			T_{VJ} = -40°C			1,6	V
I_{GT}	*gate trigger current*	V_D = 6 V	T_{VJ} = 25°C			100	mA
			T_{VJ} = -40°C			150	mA
V_{GD}	*gate non-trigger voltage*	V_D = ⅔ V_{DRM}	T_{VJ} = 150°C			0,2	V
I_{GD}	*gate non-trigger current*					5	mA
I_L	*latching current*	t_p = 10 µs	T_{VJ} = 25°C			450	mA
		I_G = 0,3 A; di_G/dt = 0,3 A/µs					
I_H	*holding current*	V_D = 6 V R_{GK} = ∞	T_{VJ} = 25°C			100	mA
t_{gd}	*gate controlled delay time*	V_D = ½ V_{DRM}	T_{VJ} = 25°C			2	µs
		I_G = 0,3 A; di_G/dt = 0,3 A/µs					
t_q	*turn-off time*	V_R = 100 V; I_T = 40 A; V = ⅔ V_{DRM}	T_{VJ} = 125 °C		150		µs
		di/dt = 10 A/µs dv/dt = 20 V/µs t_p = 200 µs					

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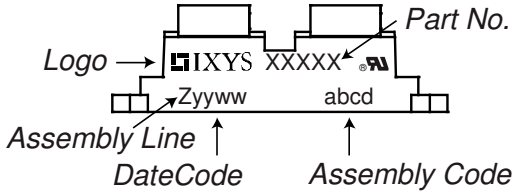
Package SOT-227B (minibloc)					Ratings			
Symbol	**Definition**	**Conditions**			**min.**	**typ.**	**max.**	**Unit**
I_{RMS}	*RMS current*	per terminal					150	A
T_{VJ}	*virtual junction temperature*				-40		150	°C
T_{op}	*operation temperature*				-40		125	°C
T_{stg}	*storage temperature*				-40		150	°C
Weight						30		g
M_D	*mounting torque*				1,1		1,5	Nm
M_T	*terminal torque*				1,1		1,5	Nm
$d_{Spp/App}$	*creepage distance on surface | striking distance through air*		*terminal to terminal*	10,5	3,2			mm
$d_{Spb/Apb}$			*terminal to backside*	8,6	6,8			mm
V_{ISOL}	*isolation voltage*	t = 1 second	50/60 Hz, RMS; I_{ISOL} ≤ 1 mA		3000			V
		t = 1 minute			2500			V

Product Marking

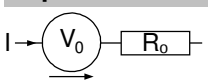


Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MCD40-12io6	MCD40-12io6	Tube	10	469742

Similar Part	Package	Voltage class
MCD40-16io6	SOT-227B (minibloc)	1600
CLA60PD1200NA	SOT-227B (minibloc)	1200
CLA100PD1200NA	SOT-227B (minibloc)	1200

Equivalent Circuits for Simulation

** on die level* T_{VJ} = 150 °C



Thyristor

$V_{0\,max}$	*threshold voltage*	0,87	V
$R_{0\,max}$	*slope resistance **	9,7	mΩ

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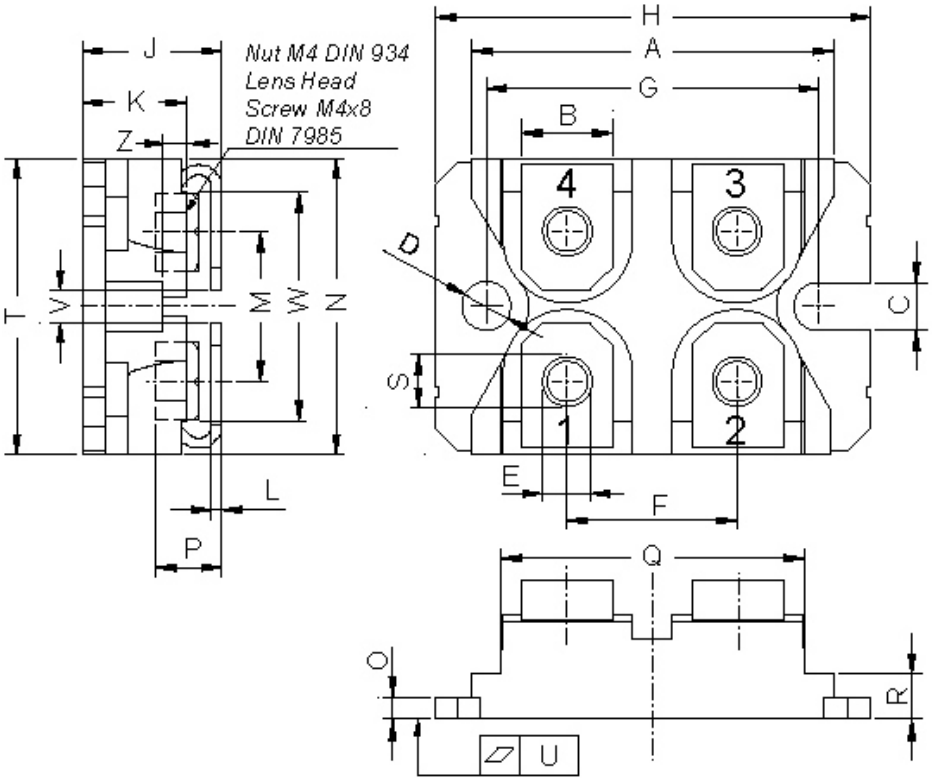
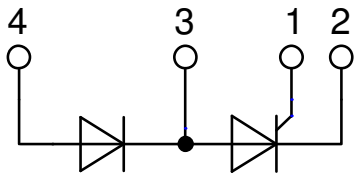
Outlines SOT-227B (minibloc)



Dim.	Millimeter		Inches	
	min	max	min	max
A	31.50	31.88	1.240	1.255
B	7.80	8.20	0.307	0.323
C	4.09	4.29	0.161	0.169
D	4.09	4.29	0.161	0.169
E	4.09	4.29	0.161	0.169
F	14.91	15.11	0.587	0.595
G	30.12	30.30	1.186	1.193
H	37.80	38.23	1.488	1.505
J	11.68	12.22	0.460	0.481
K	8.92	9.60	0.351	0.378
L	0.74	0.84	0.029	0.033
M	12.50	13.10	0.492	0.516
N	25.15	25.42	0.990	1.001
O	1.95	2.13	0.077	0.084
P	4.95	6.20	0.195	0.244
Q	26.54	26.90	1.045	1.059
R	3.94	4.42	0.155	0.167
S	4.55	4.85	0.179	0.191
T	24.59	25.25	0.968	0.994
U	-0.05	0.10	-0.002	0.004
V	3.20	5.50	0.126	0.217
W	19.81	21.08	0.780	0.830
Z	2.50	2.70	0.098	0.106



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Thyristor

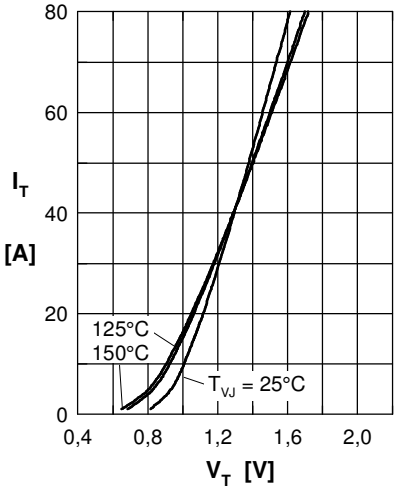

Fig. 1 Forward characteristics

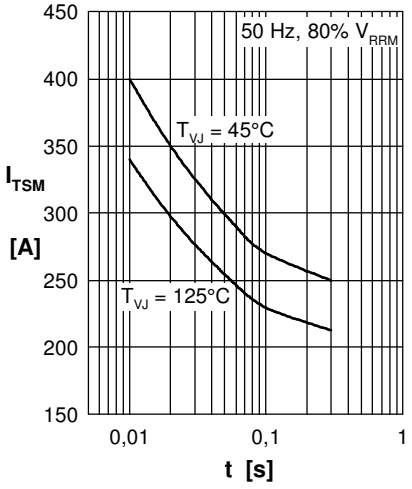

Fig. 2 Surge overload current

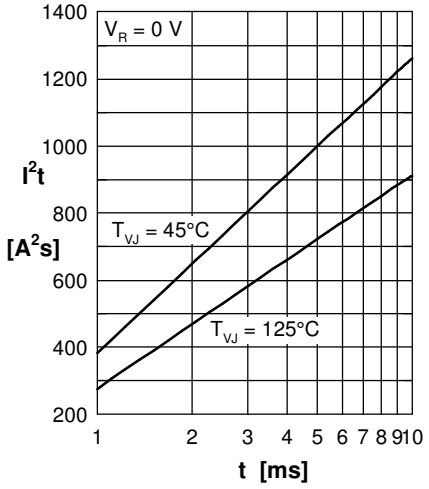

Fig. 3 I^2t versus time (1-10 ms)

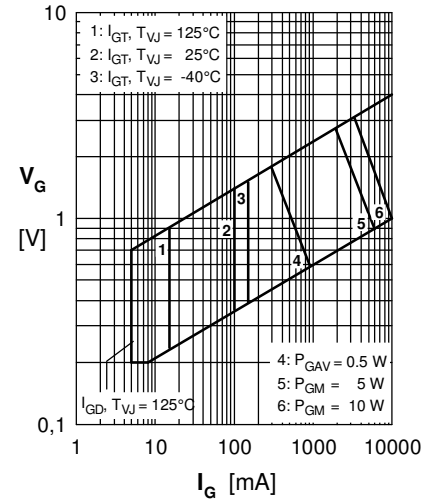

Fig. 4 Gate trigger characteristics

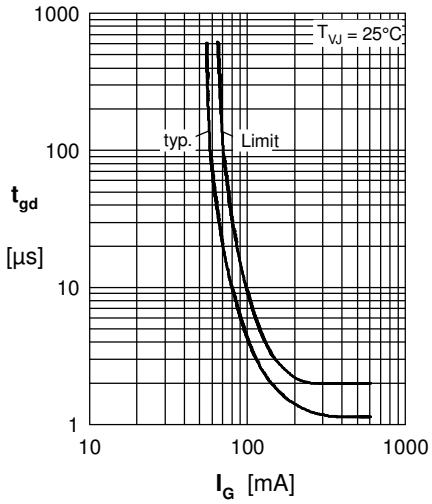

Fig. 5 Gate controlled delay time

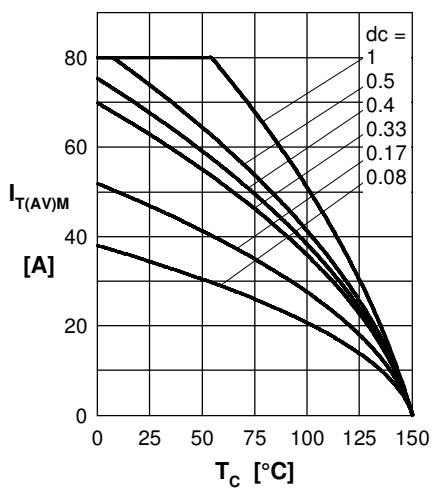

Fig. 6 Max. forward current at case temperature

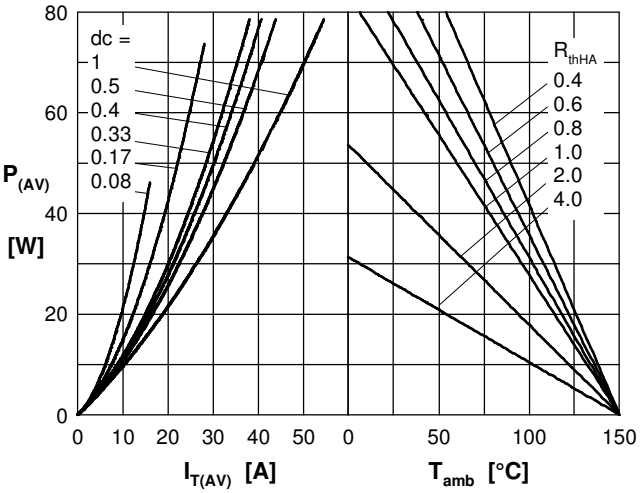

Fig. 7a Power dissipation versus direct output current
Fig. 7b and ambient temperature

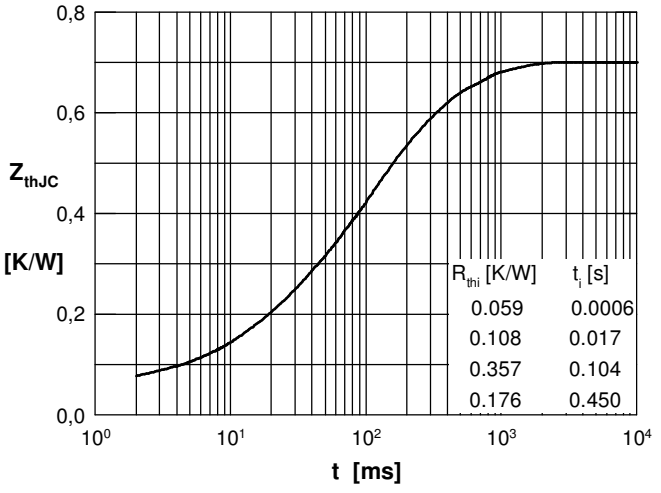

Fig. 8 Transient thermal impedance junction to case

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