

Thyristor

$$V_{RRM} = 1200V$$

$$I_{TAV} = 57A$$

$$V_T = 1.2V$$


Single Thyristor

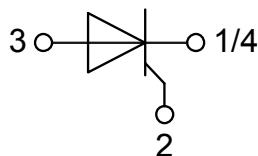
Part number

MCO50-12io1



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)

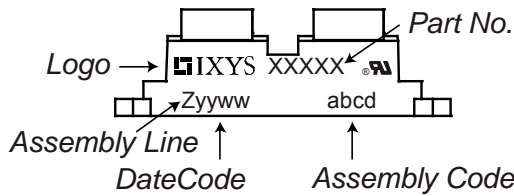
- Isolation Voltage: 3000 V~
- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Base plate: Copper internally DCB isolated
- Advanced power cycling

Thyristor				Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit	
$V_{RSM/DSM}$	max. non-repetitive reverse/forward blocking voltage	$T_{VJ} = 25^{\circ}C$			1300	V	
$V_{RRM/DRM}$	max. repetitive reverse/forward blocking voltage	$T_{VJ} = 25^{\circ}C$			1200	V	
I_{RD}	reverse current, drain current	$V_{R/D} = 1200 V$	$T_{VJ} = 25^{\circ}C$		50	μA	
		$V_{R/D} = 1200 V$	$T_{VJ} = 125^{\circ}C$		3	mA	
V_T	forward voltage drop	$I_T = 50 A$	$T_{VJ} = 25^{\circ}C$		1.27	V	
		$I_T = 100 A$			1.53	V	
		$I_T = 50 A$	$T_{VJ} = 125^{\circ}C$		1.20	V	
		$I_T = 100 A$			1.50	V	
I_{TAV}	average forward current	$T_C = 80^{\circ}C$	$T_{VJ} = 150^{\circ}C$		57	A	
$I_{T(RMS)}$	RMS forward current	180° sine			90	A	
V_{T0}	threshold voltage	} for power loss calculation only	$T_{VJ} = 150^{\circ}C$		0.88	V	
r_T	slope resistance				6	m Ω	
R_{thJC}	thermal resistance junction to case				0.72	K/W	
R_{thCH}	thermal resistance case to heatsink			0.20		K/W	
P_{tot}	total power dissipation		$T_C = 25^{\circ}C$		170	W	
I_{TSM}	max. forward surge current	t = 10 ms; (50 Hz), sine	$T_{VJ} = 45^{\circ}C$		740	A	
		t = 8,3 ms; (60 Hz), sine	$V_R = 0 V$		800	A	
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 150^{\circ}C$		630	A	
		t = 8,3 ms; (60 Hz), sine	$V_R = 0 V$		680	A	
I^2t	value for fusing	t = 10 ms; (50 Hz), sine	$T_{VJ} = 45^{\circ}C$		2.74	kA ² s	
		t = 8,3 ms; (60 Hz), sine	$V_R = 0 V$		2.66	kA ² s	
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 150^{\circ}C$		1.99	kA ² s	
		t = 8,3 ms; (60 Hz), sine	$V_R = 0 V$		1.93	kA ² s	
C_J	junction capacitance	$V_R = 400 V$ f = 1 MHz	$T_{VJ} = 25^{\circ}C$		32	pF	
P_{GM}	max. gate power dissipation	$t_p = 30 \mu s$	$T_C = 150^{\circ}C$		10	W	
		$t_p = 300 \mu s$			1	W	
P_{GAV}	average gate power dissipation				0.5	W	
$(di/dt)_{cr}$	critical rate of rise of current	$T_{VJ} = 150^{\circ}C$; f = 50 Hz	repetitive, $I_T = 150 A$		100	A/ μs	
		$t_p = 200 \mu s$; $di_G/dt = 0.3 A/\mu s$; $I_G = 0.3 A$; $V_D = \frac{2}{3} V_{DRM}$	non-repet., $I_T = 50 A$		500	A/ μs	
$(dv/dt)_{cr}$	critical rate of rise of voltage	$V_D = \frac{2}{3} V_{DRM}$ $R_{GK} = \infty$; method 1 (linear voltage rise)	$T_{VJ} = 150^{\circ}C$		1000	V/ μs	
V_{GT}	gate trigger voltage	$V_D = 6 V$	$T_{VJ} = 25^{\circ}C$		1.4	V	
			$T_{VJ} = -40^{\circ}C$		1.6	V	
I_{GT}	gate trigger current	$V_D = 6 V$	$T_{VJ} = 25^{\circ}C$		80	mA	
			$T_{VJ} = -40^{\circ}C$		200	mA	
V_{GD}	gate non-trigger voltage	$V_D = \frac{2}{3} V_{DRM}$	$T_{VJ} = 150^{\circ}C$		0.2	V	
I_{GD}	gate non-trigger current				5	mA	
I_L	latching current	$t_p = 10 \mu s$	$T_{VJ} = 25^{\circ}C$		450	mA	
		$I_G = 0.3 A$; $di_G/dt = 0.3 A/\mu s$					
I_H	holding current	$V_D = 6 V$ $R_{GK} = \infty$	$T_{VJ} = 25^{\circ}C$		100	mA	
t_{gd}	gate controlled delay time	$V_D = \frac{1}{2} V_{DRM}$	$T_{VJ} = 25^{\circ}C$		2	μs	
		$I_G = 0.3 A$; $di_G/dt = 0.3 A/\mu s$					
t_q	turn-off time	$V_R = 100 V$; $I_T = 50 A$; $V_D = \frac{2}{3} V_{DRM}$ $di/dt = 10 A/\mu s$; $dv/dt = 15 V/\mu s$; $t_p = 200 \mu s$	$T_{VJ} = 150^{\circ}C$		150	μs	

Package SOT-227B (minibloc)		Ratings				
Symbol	Definition	Conditions	min.	typ.	max.	Unit
I_{RMS}	RMS current	per terminal ¹⁾			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			3000	V
		t = 1 minute	50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA		2500	V

¹⁾ I_{RMS} is typically limited by the pin-to-chip resistance (1); or by the current capability of the chip (2). In case of (1) and a product with multiple pins for one chip-potential, the current capability can be increased by connecting the pins as one contact.

Product Marking

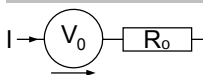


Ordering	Part Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MCO50-12io1	MCO50-12io1	Tube	10	500555

Equivalent Circuits for Simulation

* on die level

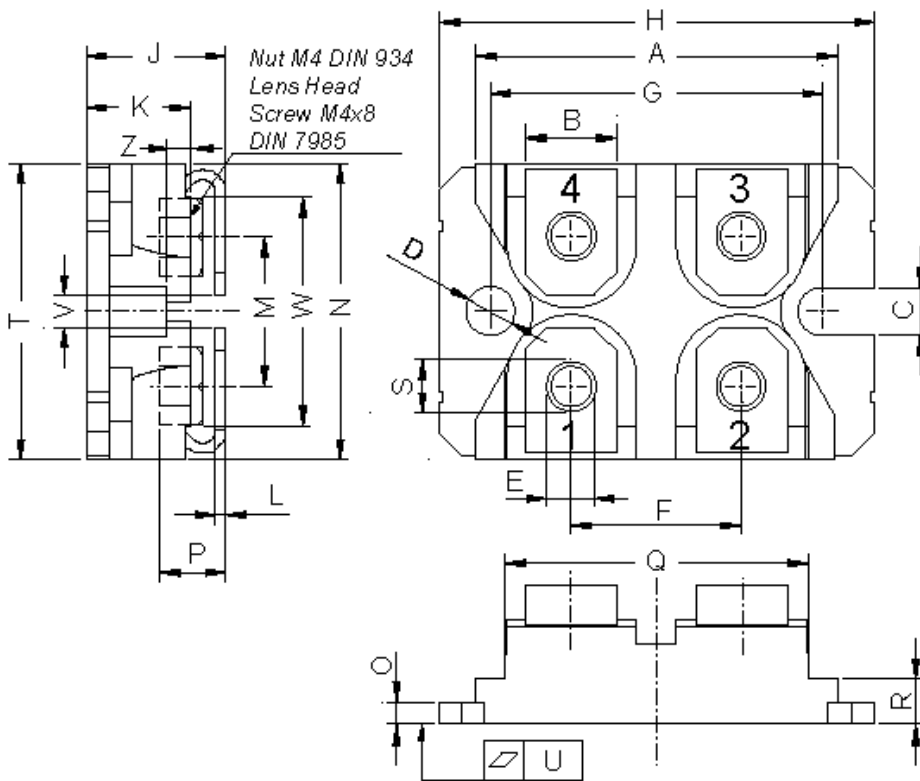
$T_{VJ} = 150$ °C



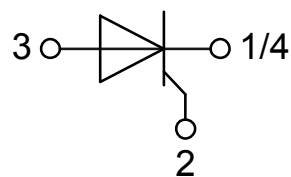
Thyristor

$V_{0\ max}$	threshold voltage	0.88	V
$R_{0\ max}$	slope resistance *	4.1	mΩ

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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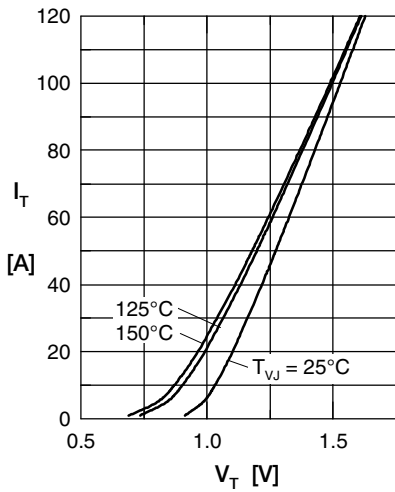


Fig. 1 Forward characteristics

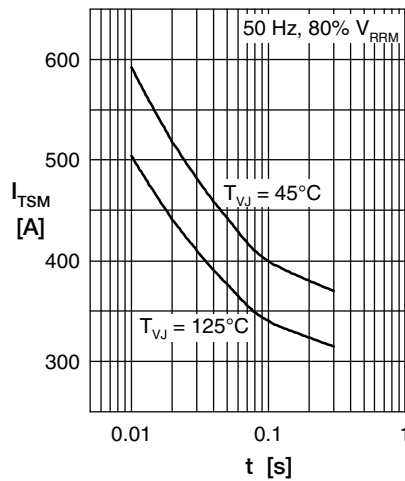


Fig. 2 Surge overload current

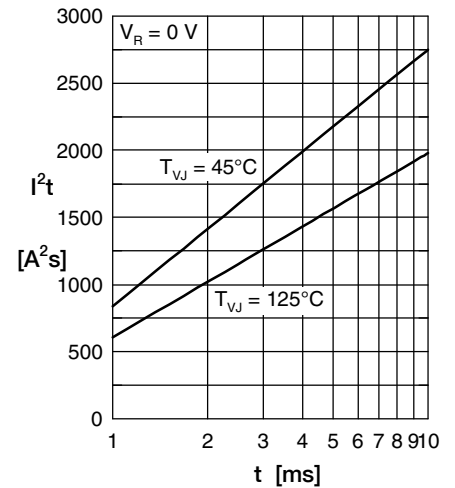


Fig. 3 I^2t versus time (1-10 ms)

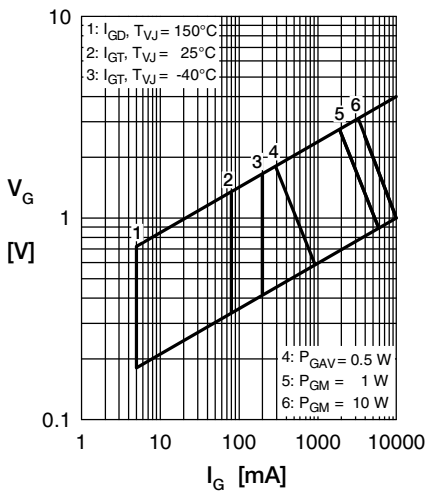


Fig. 4 Gate trigger characteristics

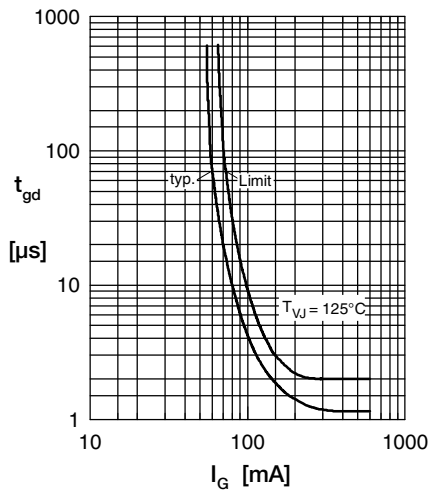


Fig. 5 Gate controlled delay time

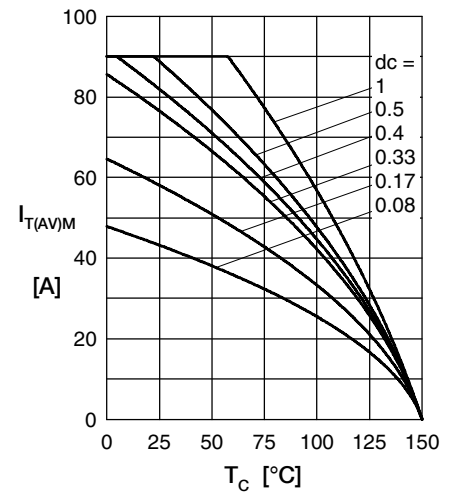


Fig. 6 Max. forward current at case temperature

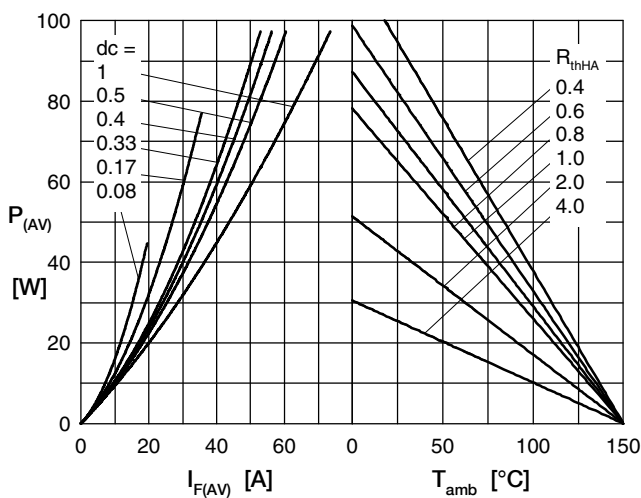


Fig. 7a Power dissipation versus direct output current
Fig. 7b and ambient temperature

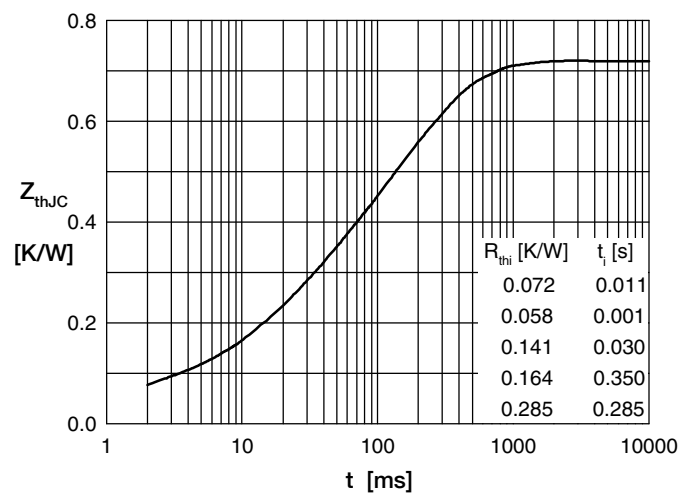


Fig. 8 Transient thermal impedance