

High Voltage Thyristor Module

$$V_{RRM} = 2000\text{ V}$$

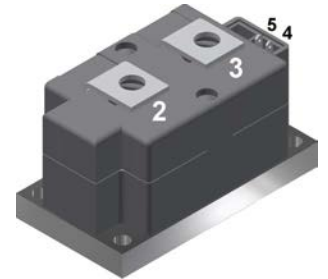
$$I_{TAV} = 600\text{ A}$$

$$V_T = 1,06\text{ V}$$

Single Thyristor

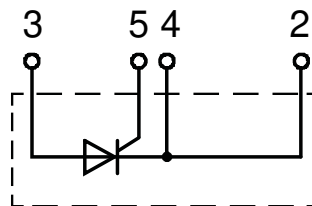
Part number

MCO600-20io1



Backside: isolated

 E72873



Features / Advantages:

- Thyristor for line frequency
- Planar passivated chip
- Long-term stability
- Direct Copper Bonded Al₂O₃-ceramic

Applications:

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

Package: Y1

- Isolation Voltage: 4800 V~
- Industry standard outline
- RoHS compliant
- Soldering pins for PCB mounting
- Base plate: Copper internally DCB isolated
- Advanced power cycling

Disclaimer Notice

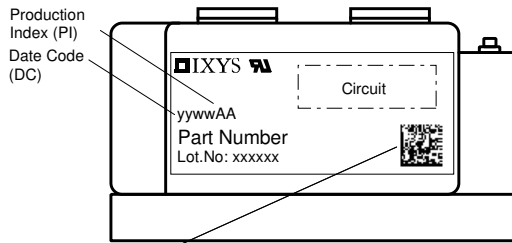
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Thyristor				Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit	
$V_{RSM/DSM}$	max. non-repetitive reverse/forward blocking voltage	$T_{VJ} = 25^{\circ}C$			2100	V	
$V_{RRM/DRM}$	max. repetitive reverse/forward blocking voltage	$T_{VJ} = 25^{\circ}C$			2000	V	
I_{RD}	reverse current, drain current	$V_{R/D} = 2000\text{ V}$	$T_{VJ} = 25^{\circ}C$		2	mA	
		$V_{R/D} = 2000\text{ V}$	$T_{VJ} = 125^{\circ}C$		40	mA	
V_T	forward voltage drop	$I_T = 600\text{ A}$	$T_{VJ} = 25^{\circ}C$		1,12	V	
		$I_T = 1200\text{ A}$			1,34	V	
		$I_T = 600\text{ A}$	$T_{VJ} = 125^{\circ}C$		1,06	V	
		$I_T = 1200\text{ A}$			1,33	V	
I_{TAV}	average forward current	$T_C = 85^{\circ}C$	$T_{VJ} = 140^{\circ}C$		600	A	
$I_{T(RMS)}$	RMS forward current	180° sine			940	A	
V_{T0}	threshold voltage	} for power loss calculation only	$T_{VJ} = 140^{\circ}C$		0,81	V	
r_T	slope resistance				0,4	mΩ	
R_{thJC}	thermal resistance junction to case				0,065	K/W	
R_{thCH}	thermal resistance case to heatsink			0,02		K/W	
P_{tot}	total power dissipation		$T_C = 25^{\circ}C$		1770	W	
I_{TSM}	max. forward surge current	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}C$		15,0	kA	
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$		16,2	kA	
		$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 140^{\circ}C$		12,8	kA	
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$		13,8	kA	
I^2t	value for fusing	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}C$		1,13	MA ² s	
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$		1,09	MA ² s	
		$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 140^{\circ}C$		812,8	kA ² s	
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$		788,8	kA ² s	
C_J	junction capacitance	$V_R = 700\text{ V}$ $f = 1\text{ MHz}$	$T_{VJ} = 25^{\circ}C$		469	pF	
P_{GM}	max. gate power dissipation	$t_p = 30\text{ }\mu\text{s}$	$T_C = 140^{\circ}C$		120	W	
		$t_p = 300\text{ }\mu\text{s}$			60	W	
P_{GAV}	average gate power dissipation				20	W	
$(di/dt)_{cr}$	critical rate of rise of current	$T_{VJ} = 140^{\circ}C; f = 50\text{ Hz}$ repetitive, $I_T = 1800\text{ A}$			100	A/ μs	
		$t_p = 200\text{ }\mu\text{s}; di_G/dt = 1\text{ A}/\mu\text{s};$ $I_G = 1\text{ A}; V_D = \frac{2}{3} V_{DRM}$ non-repet., $I_T = 600\text{ A}$			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)	$T_{VJ} = 140^{\circ}C$		1000	V/ μs	
V_{GT}	gate trigger voltage	$V_D = 6\text{ V}$	$T_{VJ} = 25^{\circ}C$		2	V	
			$T_{VJ} = -40^{\circ}C$		3	V	
I_{GT}	gate trigger current	$V_D = 6\text{ V}$	$T_{VJ} = 25^{\circ}C$		300	mA	
			$T_{VJ} = -40^{\circ}C$		400	mA	
V_{GD}	gate non-trigger voltage	$V_D = \frac{2}{3} V_{DRM}$	$T_{VJ} = 140^{\circ}C$		0,25	V	
I_{GD}	gate non-trigger current				10	mA	
I_L	latching current	$t_p = 30\text{ }\mu\text{s}$	$T_{VJ} = 25^{\circ}C$		400	mA	
		$I_G = 1\text{ A}; di_G/dt = 1\text{ A}/\mu\text{s}$					
I_H	holding current	$V_D = 6\text{ V}$ $R_{GK} = \infty$	$T_{VJ} = 25^{\circ}C$		300	mA	
t_{gd}	gate controlled delay time	$V_D = \frac{1}{2} V_{DRM}$	$T_{VJ} = 25^{\circ}C$		2	μs	
		$I_G = 1\text{ A}; di_G/dt = 1\text{ A}/\mu\text{s}$					
t_q	turn-off time	$V_R = 100\text{ V}; I_T = 600\text{ A}; V_D = \frac{2}{3} V_{DRM}$ $di/dt = 10\text{ A}/\mu\text{s}; dv/dt = 50\text{ V}/\mu\text{s}; t_p = 200\text{ }\mu\text{s}$	$T_{VJ} = 125^{\circ}C$		350	μs	



Package Y1		Ratings				
Symbol	Definition	Conditions	min.	typ.	max.	Unit
I_{RMS}	RMS current	per terminal			600	A
T_{VJ}	virtual junction temperature		-40		140	°C
T_{op}	operation temperature		-40		125	°C
T_{stg}	storage temperature		-40		125	°C
Weight				650		g
M_D	mounting torque		4,5		7	Nm
M_T	terminal torque		11		13	Nm
$d_{Spp/App}$	creepage distance on surface striking distance through air	terminal to terminal	16,0			mm
$d_{Spb/Apb}$		terminal to backside	25,0			mm
V_{ISOL}	isolation voltage	t = 1 second	4800			V
		t = 1 minute	4000			V



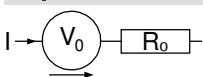
Data Matrix: part no. (1-19), DC + PI (20-25), lot.no.# (26-31), blank (32), serial no.# (33-36)

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MCO600-20io1	MCO600-20io1	Box	2	474320

Equivalent Circuits for Simulation

* on die level

$T_{VJ} = 140^{\circ}C$

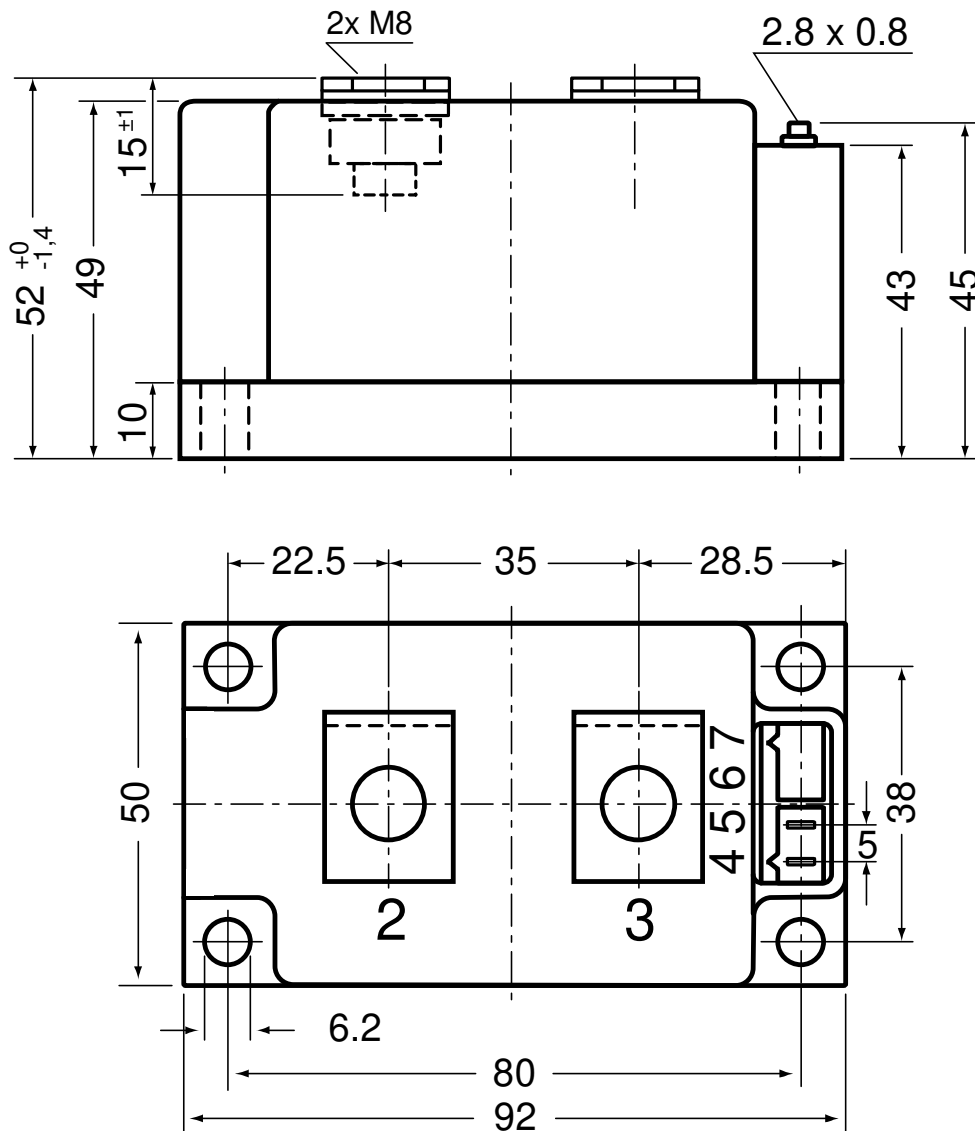


Thyristor

$V_{0\ max}$	threshold voltage	0,81	V
$R_{0\ max}$	slope resistance *	0,22	mΩ

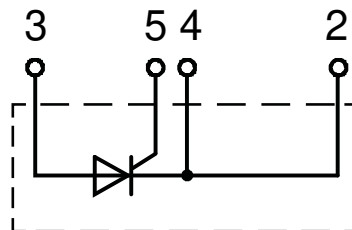


Outlines Y1



Optional accessories for modules

Keyed gate/cathode twin plugs with wire length = 350 mm, gate = white, cathode = red
Type ZY 180L (L = Left for pin pair 4/5) UL 758, style 3751



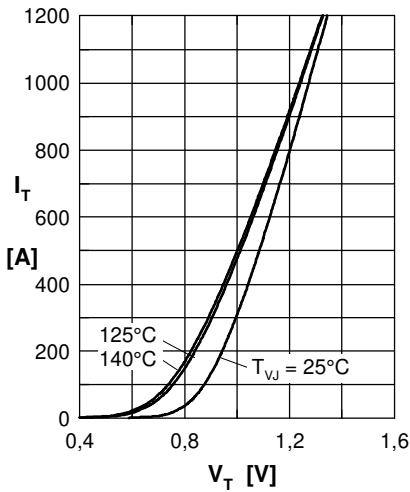
Thyristor


Fig. 1 Forward characteristics

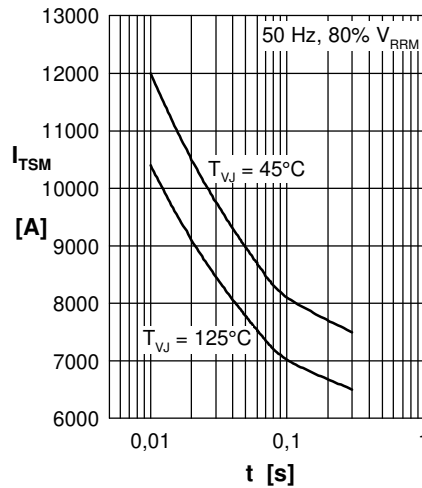


Fig. 2 Surge overload current

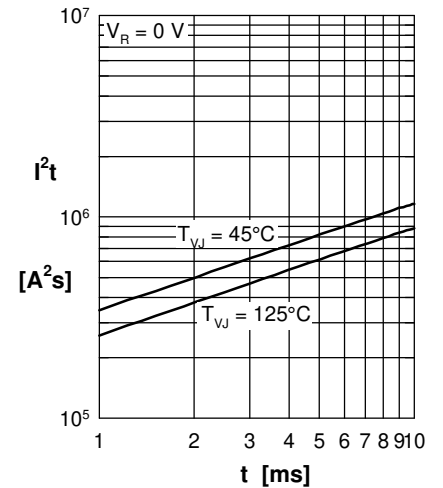
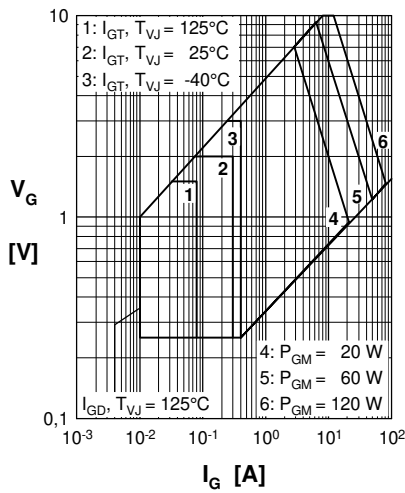

 Fig. 3 I^2t versus time (1-10 ms)


Fig. 4 Gate trigger characteristics

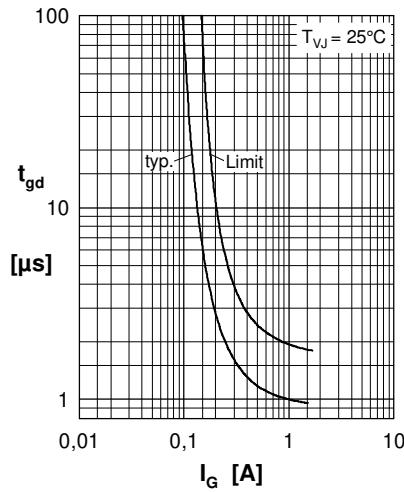


Fig. 5 Gate controlled delay time

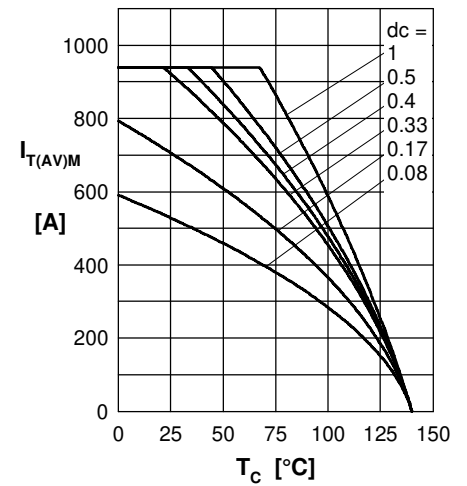


Fig. 6 Max. forward current at case temperature

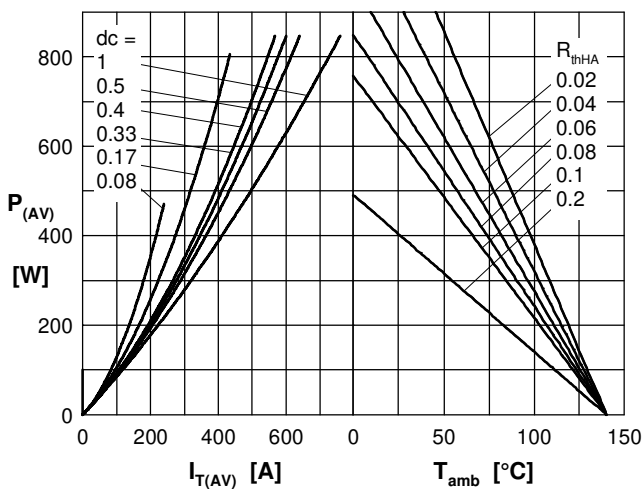
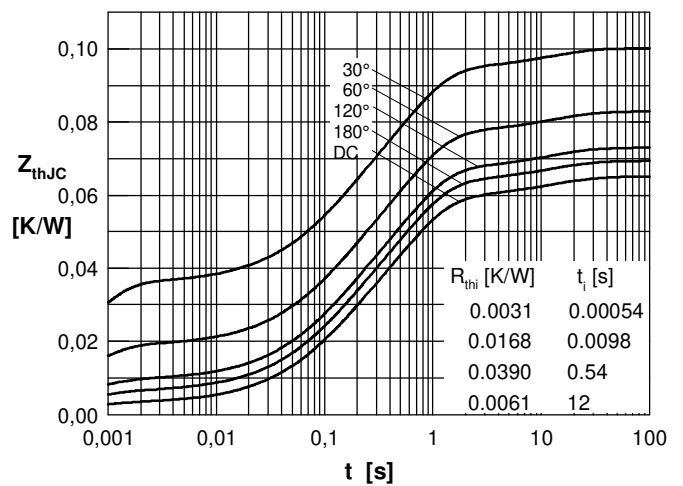

 Fig. 7a Power dissipation versus direct output current
 Fig. 7b and ambient temperature


Fig. 8 Transient thermal impedance