

Thyristor Module

$$V_{RRM} = 1200V$$

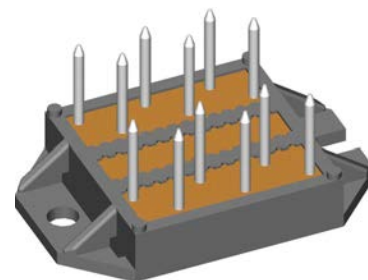
$$I_{TAV} = 16A$$

$$V_T = 1,19V$$

AC Controlling
 3~ full-controlled

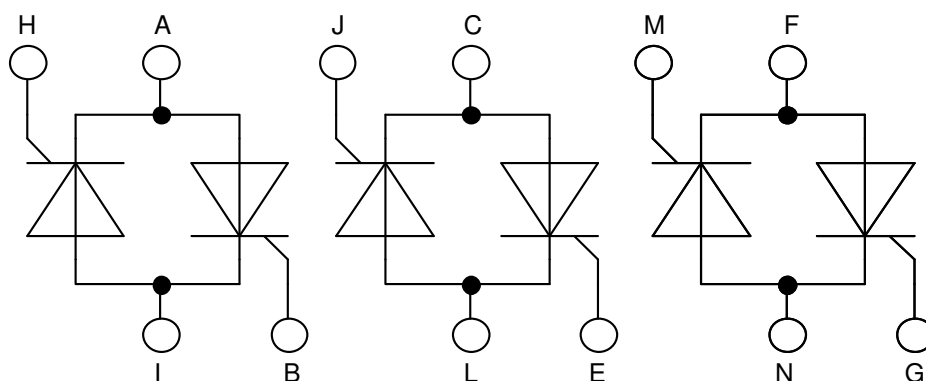
Part number

VWO35-12HO7



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: ECO-PAC1

- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Soldering pins for PCB mounting
- Height: 9 mm
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

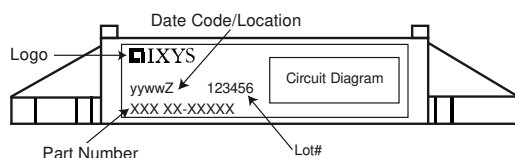
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Rectifier				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
$V_{RSM/DSM}$	max. non-repetitive reverse/forward blocking voltage	$T_{VJ} = 25^{\circ}\text{C}$				1300	V
$V_{RRM/DRM}$	max. repetitive reverse/forward blocking voltage	$T_{VJ} = 25^{\circ}\text{C}$				1200	V
$I_{R/D}$	reverse current, drain current	$V_{R/D} = 1200\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$			50	μA
		$V_{R/D} = 1200\text{ V}$	$T_{VJ} = 125^{\circ}\text{C}$			2	mA
V_T	forward voltage drop	$I_T = 15\text{ A}$	$T_{VJ} = 25^{\circ}\text{C}$			1,23	V
		$I_T = 30\text{ A}$				1,48	V
		$I_T = 15\text{ A}$	$T_{VJ} = 125^{\circ}\text{C}$			1,19	V
		$I_T = 30\text{ A}$				1,51	V
I_{TAV}	average forward current	$T_C = 85^{\circ}\text{C}$	$T_{VJ} = 125^{\circ}\text{C}$			16	A
I_{RMS}	RMS forward current per phase	180° sine				35	A
V_{T0}	threshold voltage	} for power loss calculation only	$T_{VJ} = 125^{\circ}\text{C}$			0,88	V
r_T	slope resistance					21	m Ω
R_{thJC}	thermal resistance junction to case					1,3	K/W
R_{thCH}	thermal resistance case to heatsink				0,5		K/W
P_{tot}	total power dissipation		$T_C = 25^{\circ}\text{C}$			77	W
I_{TSM}	max. forward surge current	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}\text{C}$			200	A
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			215	A
		$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 125^{\circ}\text{C}$			170	A
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			185	A
I^2t	value for fusing	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}\text{C}$			200	A ² s
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			190	A ² s
		$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 125^{\circ}\text{C}$			145	A ² s
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			140	A ² s
C_J	junction capacitance	$V_R = 400\text{ V}$ $f = 1\text{ MHz}$	$T_{VJ} = 25^{\circ}\text{C}$		7		pF
P_{GM}	max. gate power dissipation	$t_p = 30\text{ }\mu\text{s}$	$T_C = 125^{\circ}\text{C}$			5	W
		$t_p = 300\text{ }\mu\text{s}$				2,5	W
P_{GAV}	average gate power dissipation					0,5	W
$(di/dt)_{cr}$	critical rate of rise of current	$T_{VJ} = 125^{\circ}\text{C}; f = 50\text{ Hz}$ repetitive, $I_T = 45\text{ A}$				100	A/ μs
		$t_p = 200\text{ }\mu\text{s}; di_G/dt = 0,15\text{ A}/\mu\text{s};$ $I_G = 0,15\text{ A}; V_D = \frac{2}{3} V_{DRM}$ non-repet., $I_T = 15\text{ A}$				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)	$T_{VJ} = 125^{\circ}\text{C}$			500	V/ μs
V_{GT}	gate trigger voltage	$V_D = 6\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$			1,5	V
			$T_{VJ} = -40^{\circ}\text{C}$			2,5	V
I_{GT}	gate trigger current	$V_D = 6\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$			25	mA
			$T_{VJ} = -40^{\circ}\text{C}$			50	mA
V_{GD}	gate non-trigger voltage	$V_D = \frac{2}{3} V_{DRM}$	$T_{VJ} = 125^{\circ}\text{C}$			0,2	V
I_{GD}	gate non-trigger current					3	mA
I_L	latching current	$t_p = 10\text{ }\mu\text{s}$	$T_{VJ} = 25^{\circ}\text{C}$			75	mA
		$I_G = 0,1\text{ A}; di_G/dt = 0,1\text{ A}/\mu\text{s}$					
I_H	holding current	$V_D = 6\text{ V}$ $R_{GK} = \infty$	$T_{VJ} = 25^{\circ}\text{C}$			50	mA
t_{gd}	gate controlled delay time	$V_D = \frac{1}{2} V_{DRM}$	$T_{VJ} = 25^{\circ}\text{C}$			2	μs
		$I_G = 0,1\text{ A}; di_G/dt = 0,1\text{ A}/\mu\text{s}$					
t_q	turn-off time	$V_R = 100\text{ V}; I_T = 15\text{ A}; V_D = \frac{2}{3} V_{DRM}$ $di/dt = 10\text{ A}/\mu\text{s}; dv/dt = 20\text{ V}/\mu\text{s}; t_p = 200\text{ }\mu\text{s}$	$T_{VJ} = 100^{\circ}\text{C}$		150		μs

Package ECO-PAC1				Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit	
I _{RMS}	<i>RMS current</i>	per terminal			40	A	
T _{VJ}	<i>virtual junction temperature</i>		-40		125	°C	
T _{op}	<i>operation temperature</i>		-40		100	°C	
T _{stg}	<i>storage temperature</i>		-40		125	°C	
Weight				19		g	
M _D	<i>mounting torque</i>		1,4		2	Nm	
d _{Spp/App}	<i>creepage distance on surface striking distance through air</i>	<i>terminal to terminal</i>	6,0			mm	
d _{Spb/Apb}		<i>terminal to backside</i>	10,0			mm	
V _{ISOL}	<i>isolation voltage</i>	t = 1 second	3600			V	
		t = 1 minute	3000			V	
		50/60 Hz, RMS; I _{ISOL} ≤ 1 mA					

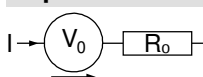


Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	VWO35-12ho7	VWO35-12ho7	Box	25	479667

Equivalent Circuits for Simulation

* on die level

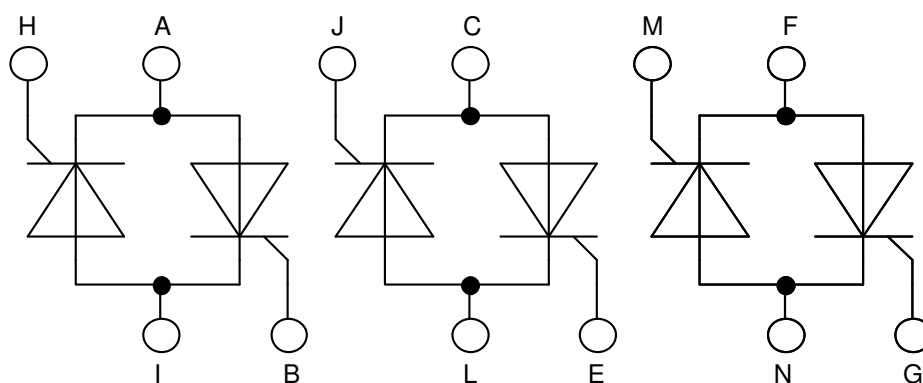
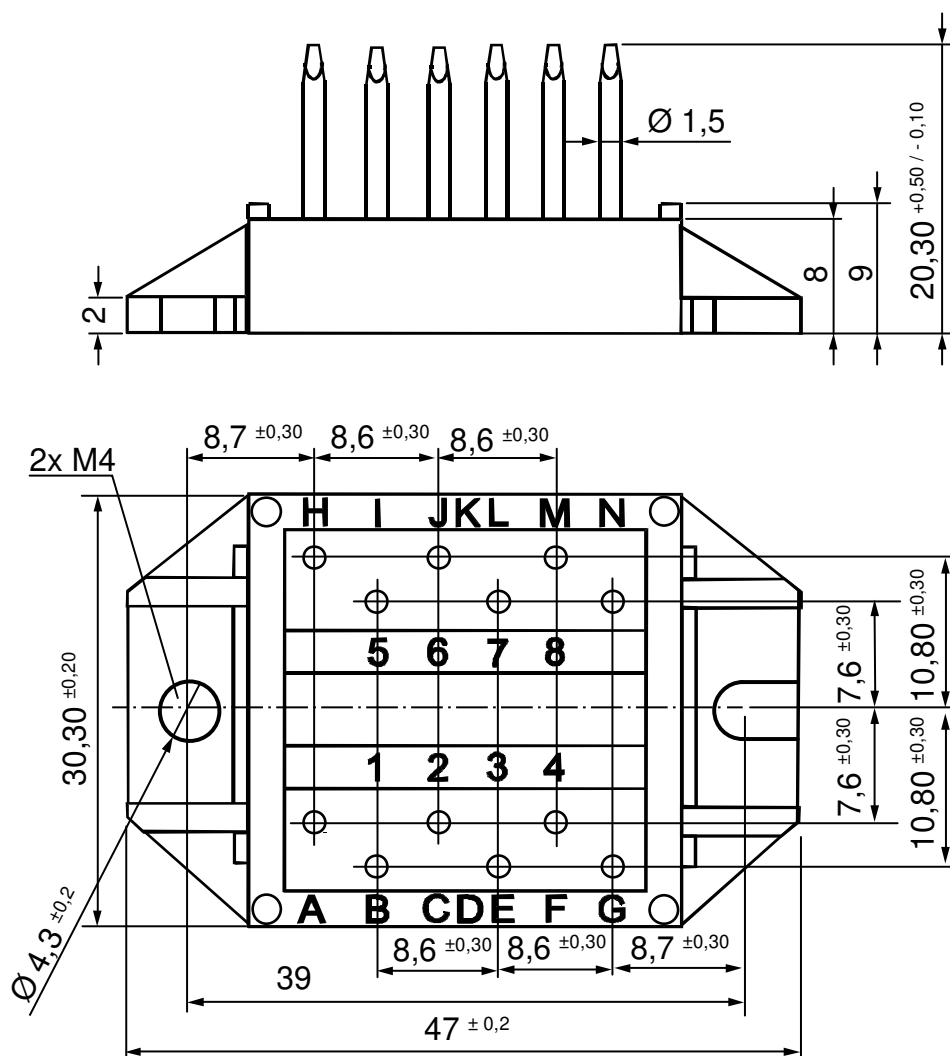
$T_{VJ} = 125^{\circ}\text{C}$



Thyristor

$V_{0\max}$	threshold voltage	0,88	V
$R_{0\max}$	slope resistance *	18	mΩ

Outlines ECO-PAC1



Thyristor

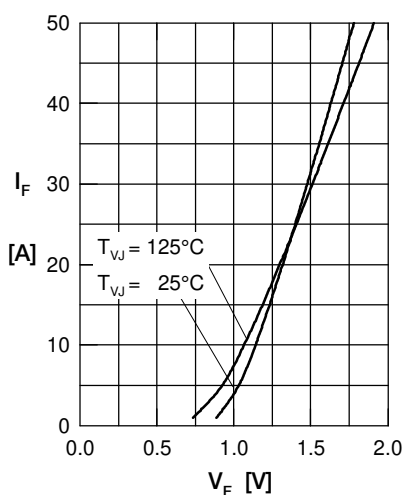


Fig. 1 Forward current vs. voltage drop per thyristor

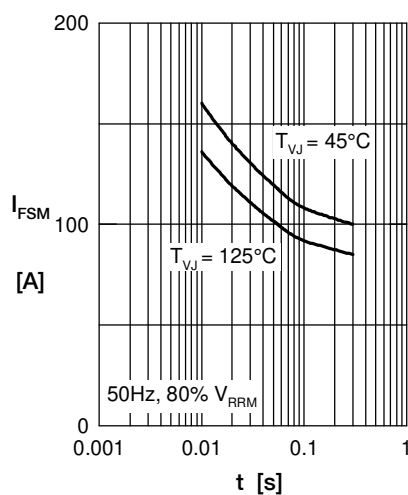


Fig. 2 Surge overload current vs. time per thyristor

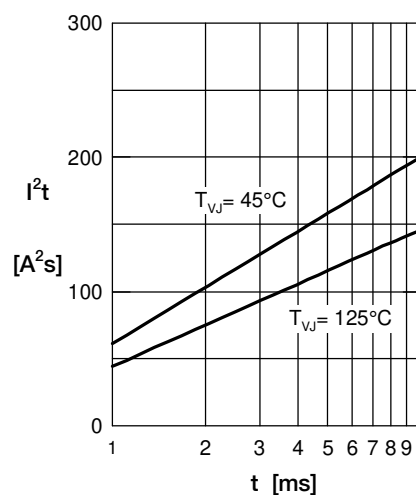


Fig. 3 I^2t vs. time per thyristor

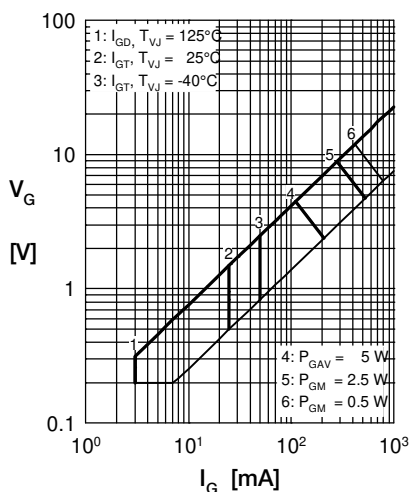


Fig. 4 Gate trigger characteristics

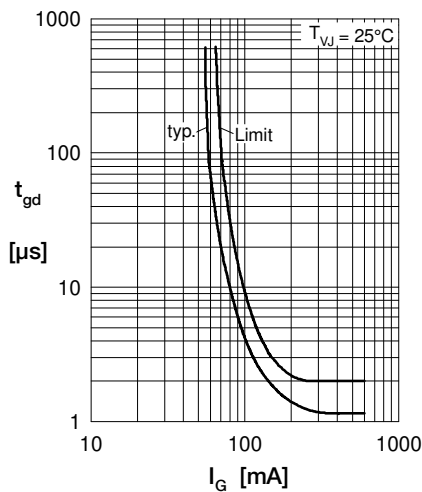


Fig. 5 Gate trigger delay time

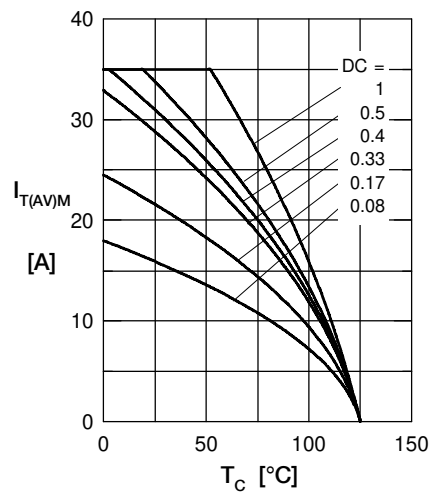


Fig. 5 Max. forward current vs. case temperature per thyristor

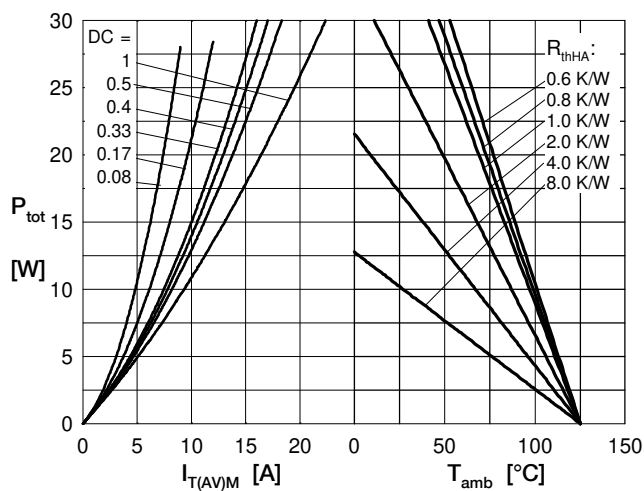


Fig. 4 Power dissipation vs. forward current and ambient temperature per thyristor

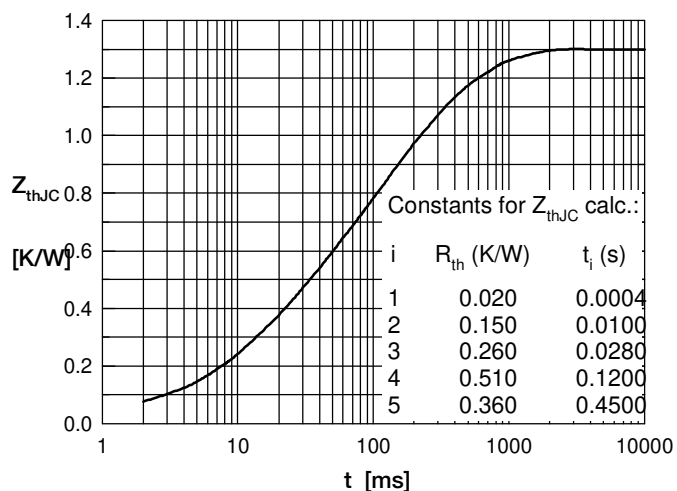


Fig. 6 Transient thermal impedance junction to case vs. time per thyristor