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With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

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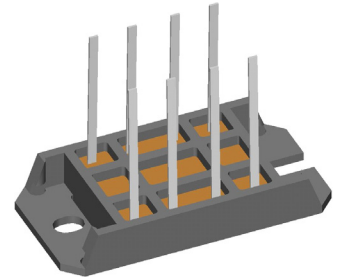
# Thyristor Module

<b>3~ Rectifier</b>	
$V_{RRM} =$	1200
$I_{DAV} =$	45
$I_{FSM} =$	320

3~ Rectifier Bridge, half-controlled (high-side)

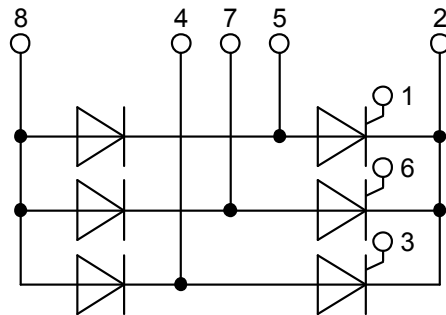
Part number

VVZ40-12io1



Backside: isolated

E72873



**Features / Advantages:**

- Package with DCB ceramic base plate
- Improved temperature and power cycling
- Planar passivated chips
- Very low forward voltage drop
- Very low leakage current

**Applications:**

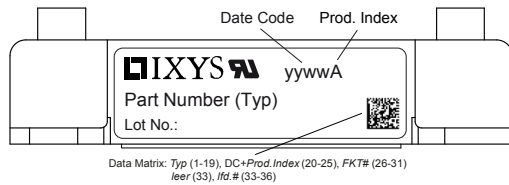
- Line rectifying 50/60 Hz
- Drives
- SMPS
- UPS

**Package: V1-B-Pack**

- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Soldering pins for PCB mounting
- Height: 17 mm
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

Rectifier				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	$V_{R/D} = 1200 V$	$T_{VJ} = 25^{\circ}C$		300	$\mu A$	
		$V_{R/D} = 1200 V$	$T_{VJ} = 125^{\circ}C$		5	mA	
$V_T$	forward voltage drop	$I_T = 15 A$	$T_{VJ} = 25^{\circ}C$		1,12	V	
		$I_T = 45 A$			1,47	V	
		$I_T = 15 A$	$T_{VJ} = 125^{\circ}C$		1,07	V	
		$I_T = 45 A$			1,52	V	
$I_{DAV}$	bridge output current	$T_C = 100^{\circ}C$	$T_{VJ} = 125^{\circ}C$		45	A	
		rectangular $d = 1/3$					
$V_{T0}$	threshold voltage	} for power loss calculation only	$T_{VJ} = 125^{\circ}C$		0,85	V	
$r_T$	slope resistance				15	m $\Omega$	
$R_{thJC}$	thermal resistance junction to case				1	K/W	
$R_{thCH}$	thermal resistance case to heatsink			0,60		K/W	
$P_{tot}$	total power dissipation		$T_C = 25^{\circ}C$		100	W	
$I_{TSM}$	max. forward surge current	$t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}C$		320	A	
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$	$V_R = 0 V$		345	A	
		$t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$	$T_{VJ} = 125^{\circ}C$		270	A	
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$	$V_R = 0 V$		295	A	
$I^2t$	value for fusing	$t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}C$		510	A <sup>2</sup> s	
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$	$V_R = 0 V$		495	A <sup>2</sup> s	
		$t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$	$T_{VJ} = 125^{\circ}C$		365	A <sup>2</sup> s	
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$	$V_R = 0 V$		360	A <sup>2</sup> s	
$C_J$	junction capacitance	$V_R = 400 V \quad f = 1 \text{ MHz}$	$T_{VJ} = 25^{\circ}C$		16	pF	
$P_{GM}$	max. gate power dissipation	$t_p = 30 \mu s$	$T_C = 125^{\circ}C$		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	$T_{VJ} = 125^{\circ}C; f = 50 \text{ Hz}$ repetitive, $I_T = 45 A$			150	A/ $\mu s$	
		$t_p = 200 \mu s; di_G/dt = 0,3 A/\mu s;$ $I_G = 0,3 A; V_D = 2/3 V_{DRM}$ non-repet., $I_T = 15 A$			500	A/ $\mu s$	
$(dv/dt)_{cr}$	critical rate of rise of voltage	$V_D = 2/3 V_{DRM}$ $R_{GK} = \infty$ ; method 1 (linear voltage rise)	$T_{VJ} = 125^{\circ}C$		1000	V/ $\mu s$	
$V_{GT}$	gate trigger voltage	$V_D = 6 V$	$T_{VJ} = 25^{\circ}C$		1	V	
			$T_{VJ} = -40^{\circ}C$		1,2	V	
$I_{GT}$	gate trigger current	$V_D = 6 V$	$T_{VJ} = 25^{\circ}C$		65	mA	
			$T_{VJ} = -40^{\circ}C$		80	mA	
$V_{GD}$	gate non-trigger voltage	$V_D = 2/3 V_{DRM}$	$T_{VJ} = 125^{\circ}C$		0,2	V	
$I_{GD}$	gate non-trigger current				5	mA	
$I_L$	latching current	$t_p = 30 \mu s$	$T_{VJ} = 25^{\circ}C$		150	mA	
		$I_G = 0,3 A; di_G/dt = 0,3 A/\mu s$					
$I$	holding current	$V_D = 6 V \quad R_{GK} = \infty$	$T_{VJ} = 25^{\circ}C$		100	mA	
$t_{gd}$	gate controlled delay time	$V_D = 1/2 V_{DRM}$	$T_{VJ} = 25^{\circ}C$		2	$\mu s$	
		$I_G = 0,3 A; di_G/dt = 0,3 A/\mu s$					
$t_q$	turn-off time	$V_R = 100 V; I_T = 15 A; V_D = 2/3 V_{DRM}$ $di/dt = 10 A/\mu s; dv/dt = 20 V/\mu s; t_p = 300 \mu s$	$T_{VJ} = 125^{\circ}C$		150	$\mu s$	

Package V1-B-Pack			Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit
$I_{RMS}$	RMS current	per terminal			100	A
$T_{VJ}$	virtual junction temperature		-40		125	°C
$T_{op}$	operation temperature		-40		100	°C
$T_{stg}$	storage temperature		-40		125	°C
<b>Weight</b>				30		g
$M_D$	mounting torque		2		2,5	Nm
$d_{Spp/App}$	creepage distance on surface   striking distance through air	terminal to terminal	6,0			mm
$d_{Spb/Appb}$		terminal to backside	12,0			mm
$V_{ISOL}$	isolation voltage	t = 1 second	3600			V
		t = 1 minute	3000			V

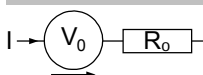


Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	VVZ40-12io1	VVZ40-12io1	Box	5	466352

### Equivalent Circuits for Simulation

\* on die level

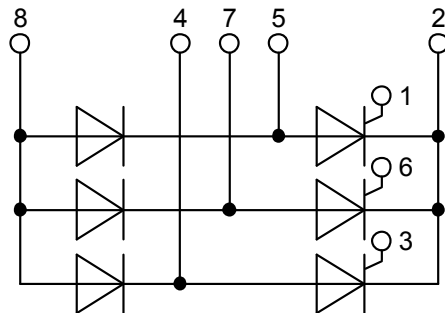
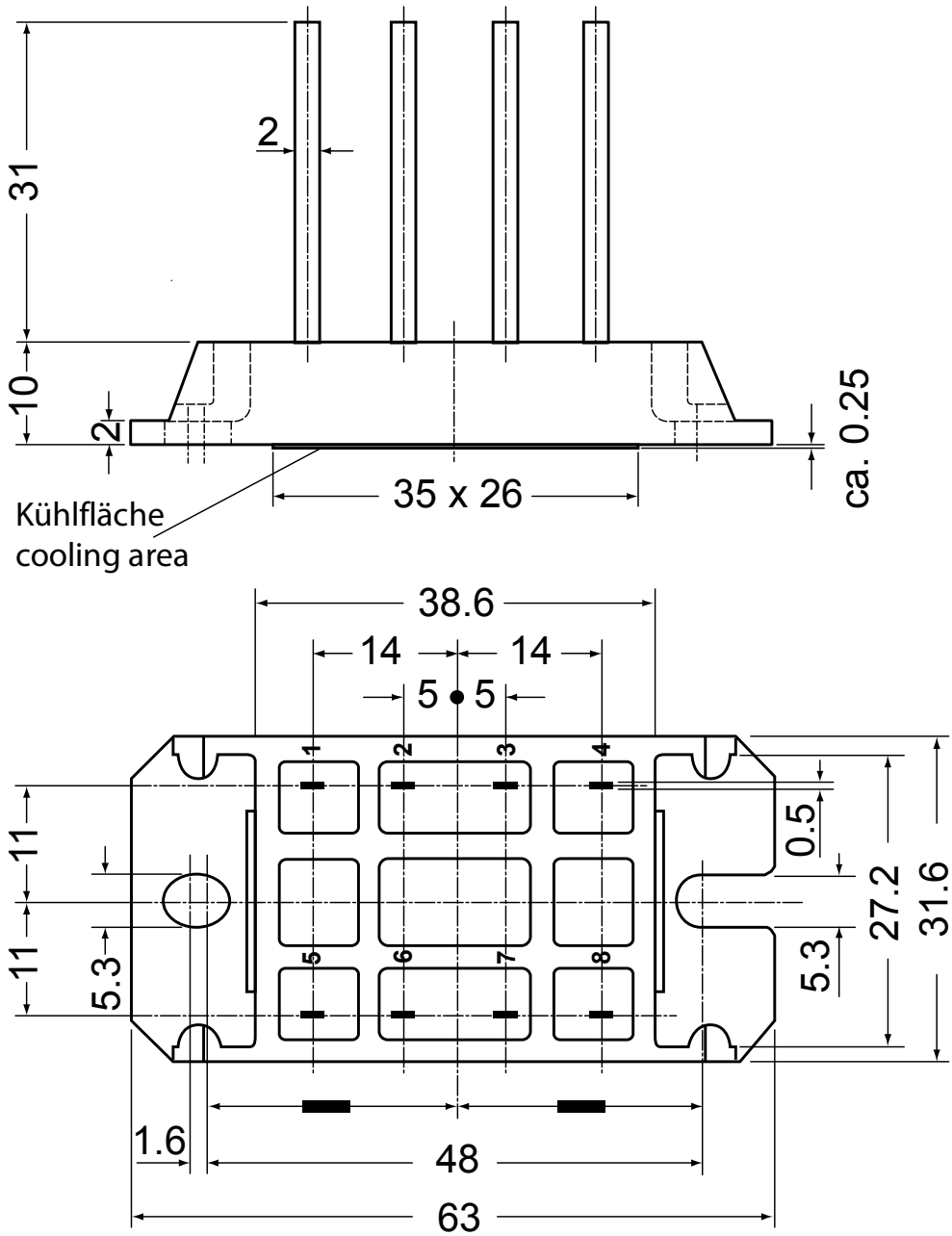
$T_{VJ} = 125\text{ °C}$



Thyristor

$V_{0\ max}$	threshold voltage	0,85	V
$R_{0\ max}$	slope resistance *	12,5	mΩ

**Outlines V1-B-Pack**



## Thyristor

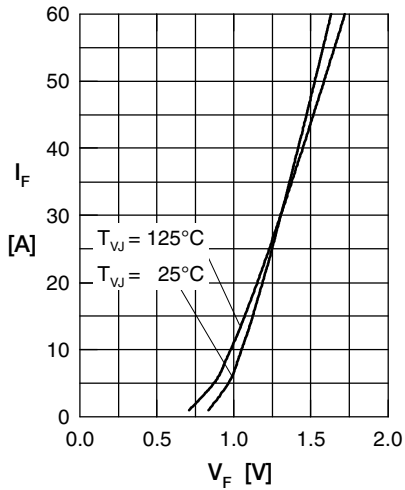


Fig. 1 Forward current vs. voltage drop per thyristor

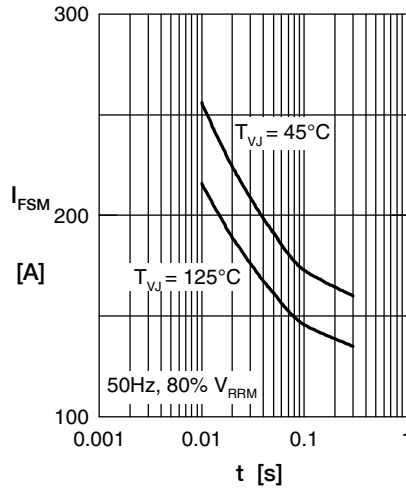


Fig. 2 Surge overload current vs. time per thyristor

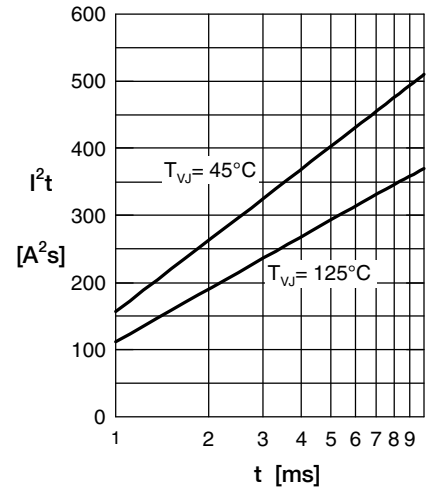


Fig. 3  $I^2t$  vs. time per thyristor

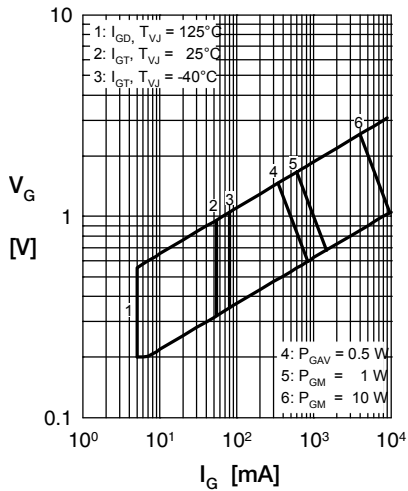


Fig. 4 Gate trigger characteristics

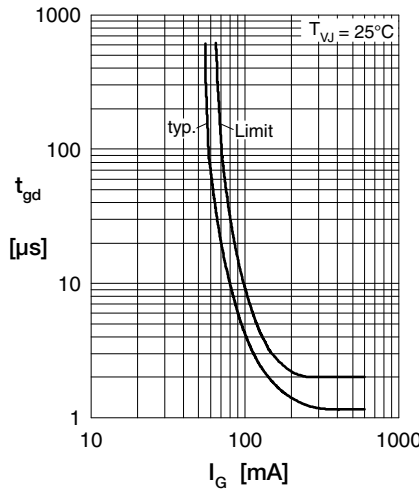


Fig. 5 Gate trigger delay time

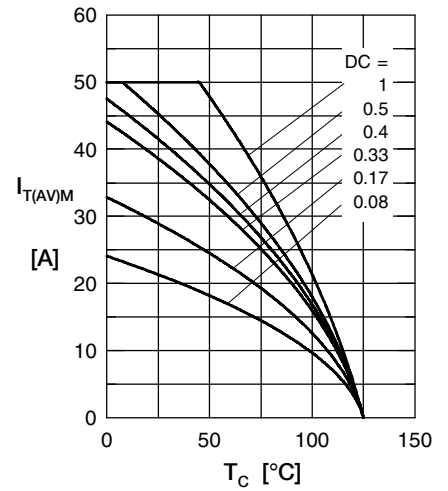


Fig. 5 Max. forward current vs. case temperature per thyristor

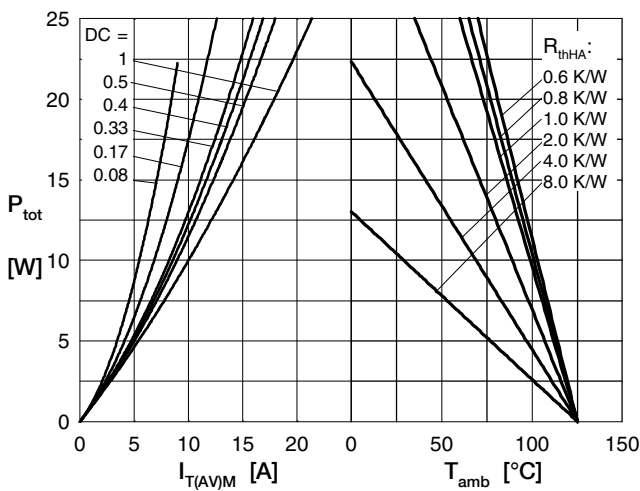


Fig. 4 Power dissipation vs. forward current and ambient temperature per thyristor

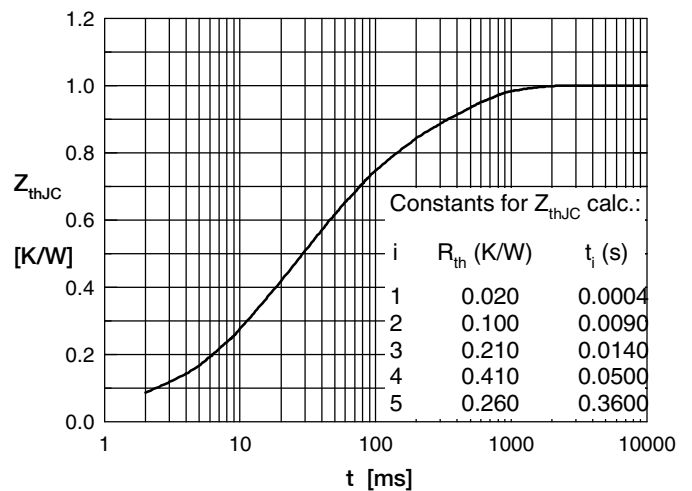


Fig. 6 Transient thermal impedance junction to case vs. time per thyristor