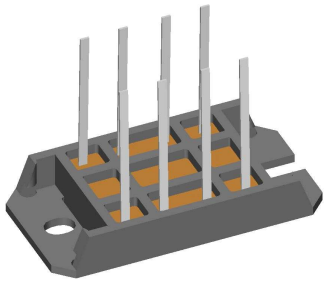
Thyristor Module

3~ Rectifier		
V_{RRM}	=	1600 V
I_{DAV}	=	45 A
I_{FSM}	=	320 A

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

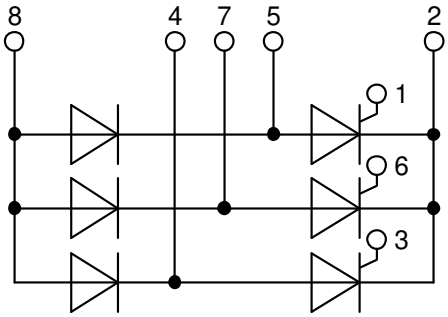
Part number

VVZ40-16io1



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

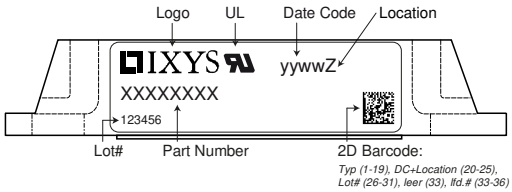
Package: V1-B-Pack

- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Soldering pins for PCB mounting
- Height: 10 mm
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

Rectifier

Symbol	Definition	Conditions		Ratings min.	typ.	max.	Unit
$V_{RSM/DSM}$	*max. non-repetitive reverse/forward blocking voltage*		T_{VJ} = 25°C			1700	V
$V_{RRM/DRM}$	*max. repetitive reverse/forward blocking voltage*		T_{VJ} = 25°C			1600	V
$I_{R/D}$	*reverse current, drain current*	$V_{R/D}$ = 1600 V	T_{VJ} = 25°C			300	µA
		$V_{R/D}$ = 1600 V	T_{VJ} = 125°C			5	mA
V_T	*forward voltage drop*	I_T = 15 A	T_{VJ} = 25°C			1.12	V
		I_T = 45 A				1.47	V
		I_T = 15 A	T_{VJ} = 125°C			1.07	V
		I_T = 45 A				1.52	V
I_{DAV}	*bridge output current*	T_C = 100°C	T_{VJ} = 125°C			45	A
		rectangular d = ⅓					
V_{T0}	*threshold voltage* } *for power loss calculation only*		T_{VJ} = 125°C			0.85	V
r_T	*slope resistance* }					15	mΩ
R_{thJC}	*thermal resistance junction to case*					1	K/W
R_{thCH}	*thermal resistance case to heatsink*				0.6		K/W
P_{tot}	*total power dissipation*		T_C = 25°C			100	W
I_{TSM}	*max. forward surge current*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			320	A
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			345	A
		t = 10 ms; (50 Hz), sine	T_{VJ} = 125°C			270	A
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			295	A
I^2t	*value for fusing*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			510	A²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			495	A²s
		t = 10 ms; (50 Hz), sine	T_{VJ} = 125°C			365	A²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			360	A²s
C_J	*junction capacitance*	V_R = 400 V f = 1 MHz	T_{VJ} = 25°C		16		pF
P_{GM}	*max. gate power dissipation*	t_P = 30 µs	T_C = 125°C			10	W
		t_P = 300 µs				1	W
P_{GAV}	*average gate power dissipation*					0.5	W
$(di/dt)_{cr}$	*critical rate of rise of current*	T_{VJ} = 125°C; f = 50 Hz	repetitive, I_T = 45 A			150	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 = 15 A			500	A/µs
$(dv/dt)_{cr}$	*critical rate of rise of voltage*	V = ⅔ V_{DRM}	T_{VJ} = 125°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	V
			T_{VJ} = -40°C			1.2	V
I_{GT}	*gate trigger current*	V_D = 6 V	T_{VJ} = 25°C			65	mA
			T_{VJ} = -40°C			80	mA
V_{GD}	*gate non-trigger voltage*	V_D = ⅔ V_{DRM}	T_{VJ} = 125°C			0.2	V
I_{GD}	*gate non-trigger current*					5	mA
I_L	*latching current*	t_p = 30 µs	T_{VJ} = 25°C			150	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 = 15A; V = ⅔ V_{DRM}	T_{VJ} = 100 °C		150		µs
		di/dt = 10 A/µs dv/dt = 20 V/µs t_p = 300 µs					

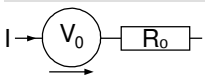
Package V1-B-Pack				Ratings			
Symbol	**Definition**	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
I_{RMS}	*RMS current*	per terminal				100	A
T_{VJ}	*virtual junction temperature*			-40		125	°C
T_{op}	*operation temperature*			-40		100	°C
T_{stg}	*storage temperature*			-40		125	°C
Weight					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
$d_{Spb/Apb}$			*terminal to backside*	12.0			mm
V_{ISOL}	*isolation voltage*	t = 1 second	50/60 Hz, RMS; I_{ISOL} ≤ 1 mA	3600			V
		t = 1 minute		3000			V



Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	VVZ40-16io1	VVZ40-16io1	Box	5	466379

Equivalent Circuits for Simulation

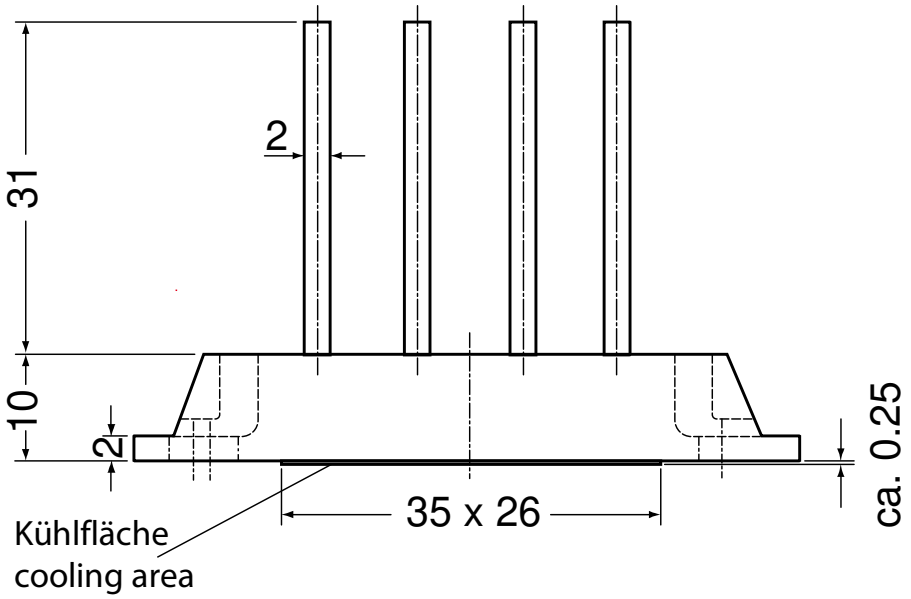
** on die level* T_{VJ} = 125°C

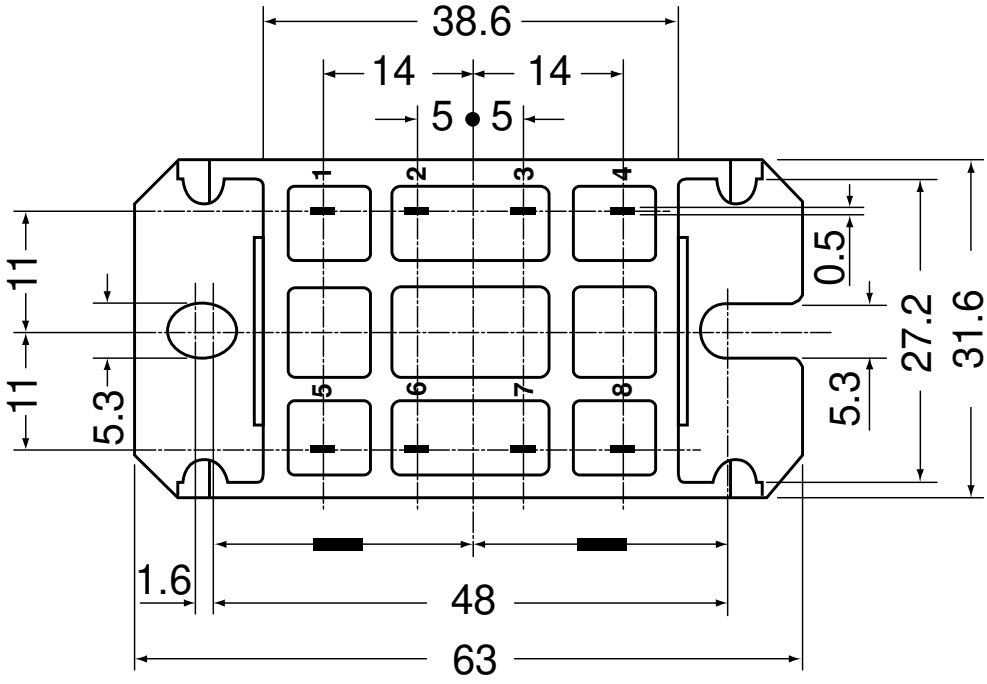


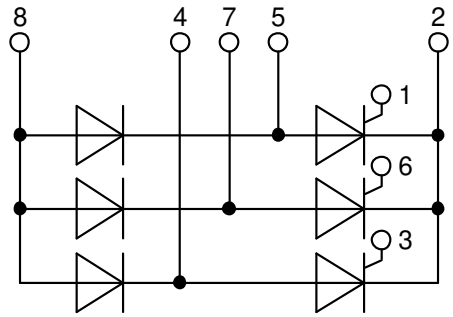
Thyristor

$V_{0\,max}$	*threshold voltage*	0.85	V
$R_{0\,max}$	*slope resistance **	12.5	mΩ

Outlines V1-B-Pack







Thyristor

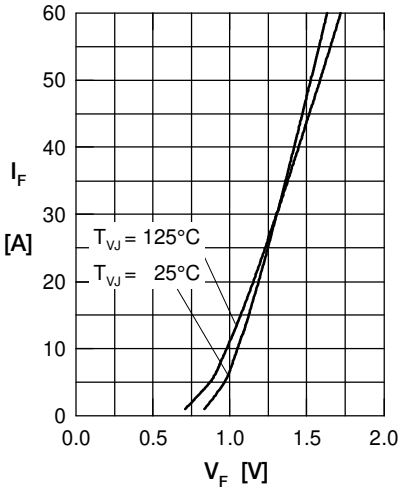


Fig. 1 Forward current vs. voltage drop per thyristor

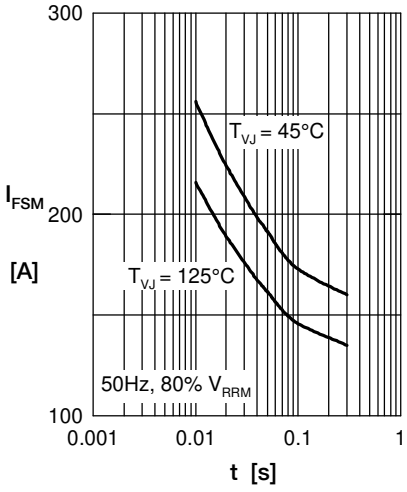


Fig. 2 Surge overload current vs. time per thyristor

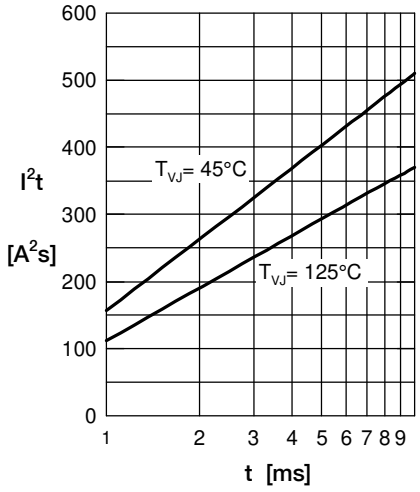


Fig. 3 I^2t vs. time per thyristor

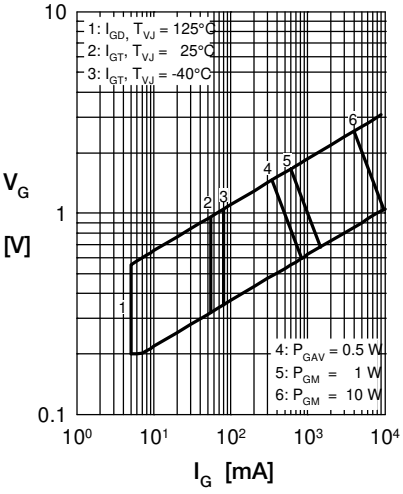


Fig. 4 Gate trigger characteristics

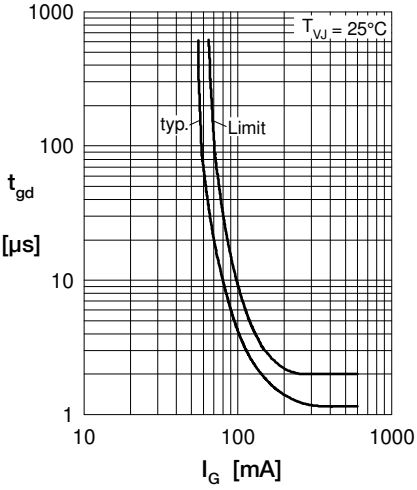


Fig. 5 Gate trigger delay time

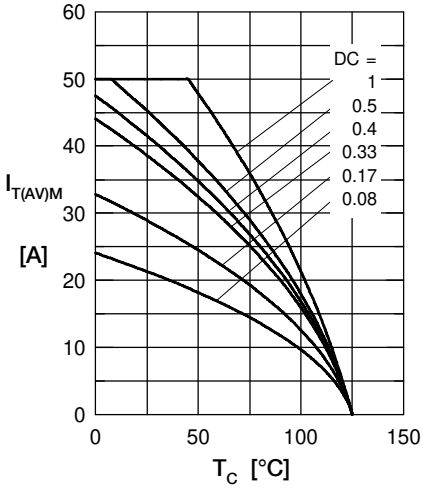


Fig. 5 Max. forward current vs. case temperature per thyristor

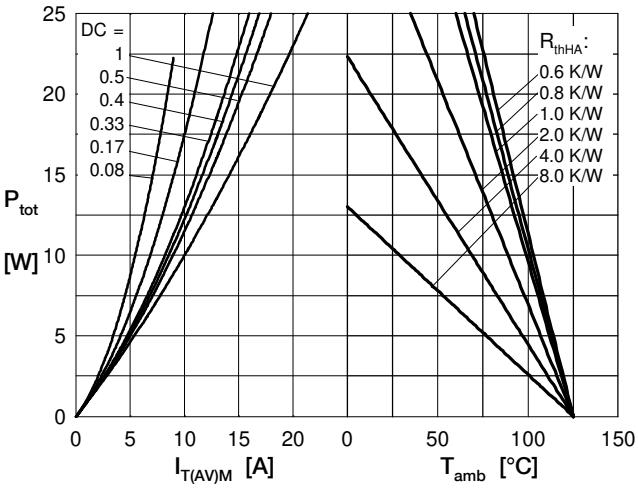


Fig. 4 Power dissipation vs. forward current and ambient temperature per thyristor

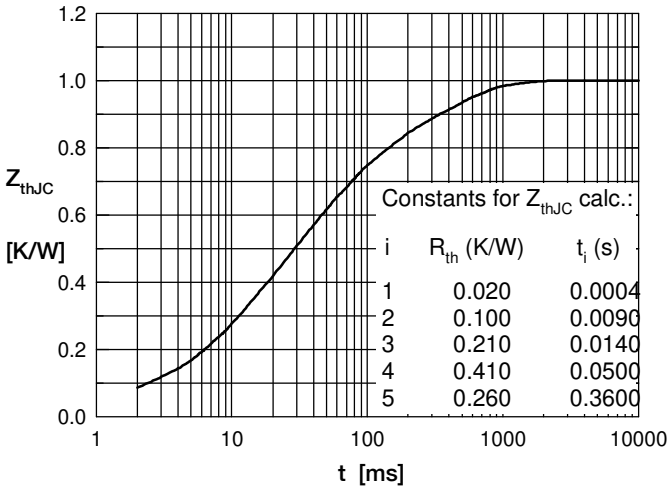


Fig. 6 Transient thermal impedance junction to case vs. time per thyristor