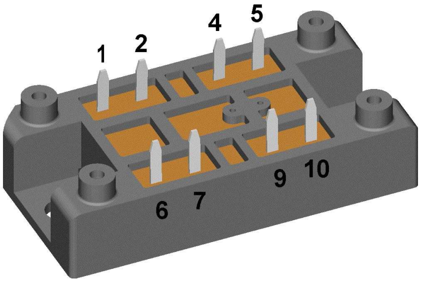
Thyristor Module

V_{RRM} = 1200 V
I_{TAV} = 27 A
V_T = 1.28 V

AC Controlling
2~ full-controlled

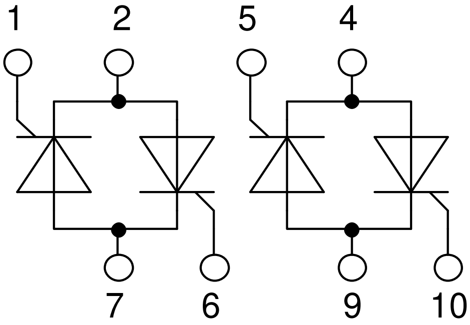
Part number

VW2x60-12io1



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: V1-A-Pack

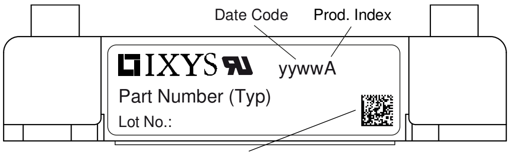
- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Soldering pins for PCB mounting
- Height: 17 mm
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

Rectifier

					Ratings		
Symbol	**Definition**	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
$V_{RSM/DSM}$	*max. non-repetitive reverse/forward blocking voltage*		T_{VJ} = 25°C			1300	V
$V_{RRM/DRM}$	*max. repetitive reverse/forward blocking voltage*		T_{VJ} = 25°C			1200	V
$I_{R/D}$	*reverse current, drain current*	$V_{R/D}$ = 1200 V	T_{VJ} = 25°C			100	µA
		$V_{R/D}$ = 1200 V	T_{VJ} = 125°C			5	mA
V_T	*forward voltage drop*	I_T = 40 A	T_{VJ} = 25°C			1.25	V
		I_T = 80 A				1.65	V
		I_T = 40 A	T_{VJ} = 125°C			1.28	V
		I_T = 80 A				1.75	V
I_{TAV}	*average forward current*	T_C = 85°C	T_{VJ} = 125°C			27	A
I_{RMS}	*RMS forward current per phase*	180° sine				60	A
V_{T0}	*threshold voltage*	*for power loss calculation only*	T_{VJ} = 125°C			0.85	V
r_T	*slope resistance*					11	mΩ
R_{thJC}	*thermal resistance junction to case*					0.92	K/W
R_{thCH}	*thermal resistance case to heatsink*				0.3		K/W
P_{tot}	*total power dissipation*		T_C = 25°C			110	W
I_{TSM}	*max. forward surge current*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			520	A
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			560	A
		t = 10 ms; (50 Hz), sine	T_{VJ} = 125°C			440	A
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			475	A
I^2t	*value for fusing*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			1.35	kA^2s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			1.31	kA^2s
		t = 10 ms; (50 Hz), sine	T_{VJ} = 125°C			970	A^2s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			940	A^2s
C_J	*junction capacitance*	V_R = 400 V f = 1 MHz	T_{VJ} = 25°C		64		pF
P_{GM}	*max. gate power dissipation*	t_P = 30 µs	T_C = 125°C			10	W
		t_P = 300 µs				5	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			100	A/µs
		t_P = 200 µs; di_G/dt = 0.45 A/µs;					
		I_G = 0.45 A; V = ⅔ V_{DRM}	non-repet., I_T = 27 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			1.5	V
			T_{VJ} = -40°C			1.6	V
I_{GT}	*gate trigger current*	V_D = 6 V	T_{VJ} = 25°C			100	mA
			T_{VJ} = -40°C			200	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 = 10 µs	T_{VJ} = 25°C			450	mA
		I_G = 0.45 A; di_G/dt = 0.45 A/µs					
I_H	*holding current*	V_D = 6 V R_{GK} = ∞	T_{VJ} = 25°C			200	mA
t_{gd}	*gate controlled delay time*	V_D = ½ V_{DRM}	T_{VJ} = 25°C			2	µs
		I_G = 0.45 A; di_G/dt = 0.45 A/µs					
t_q	*turn-off time*	V_R = 100 V; I_T = 20A; V = ⅔ V_{DRM}	T_{VJ} = 100 °C		150		µs
		di/dt = 10 A/µs dv/dt = 15 V/µs	t_p = 200 µs				

Package V1-A-Pack

Symbol	Definition	Conditions		Ratings 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					37		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; $I_{ISOL} \le 1$ mA	3600			V
		t = 1 minute		3000			V

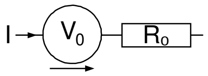


Data Matrix: *Typ* (1-19), DC+*Prod.Index* (20-25), *FKT#* (26-31)
leer (33), *lfd.#* (33-36)

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	VW2x60-12io1	VW2x60-12io1	Blister	24	519000

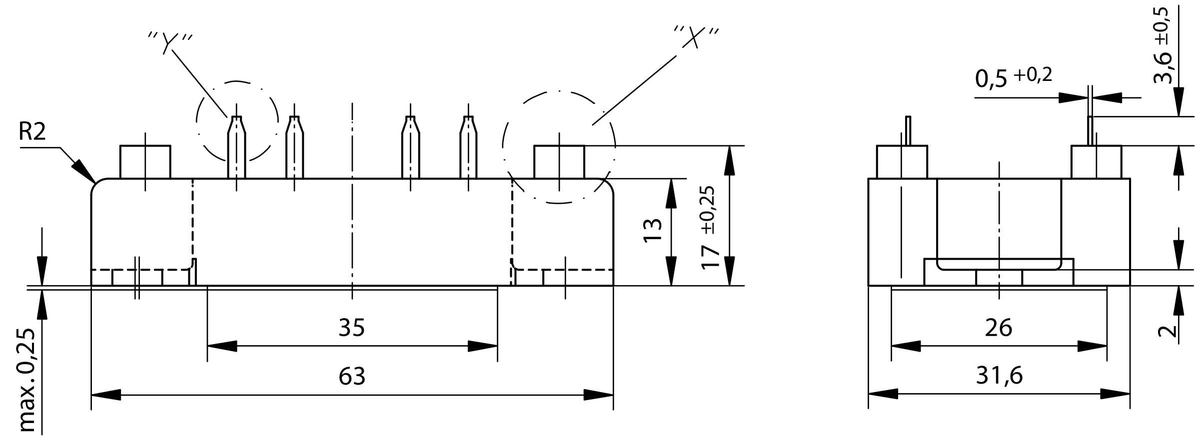
Equivalent Circuits for Simulation

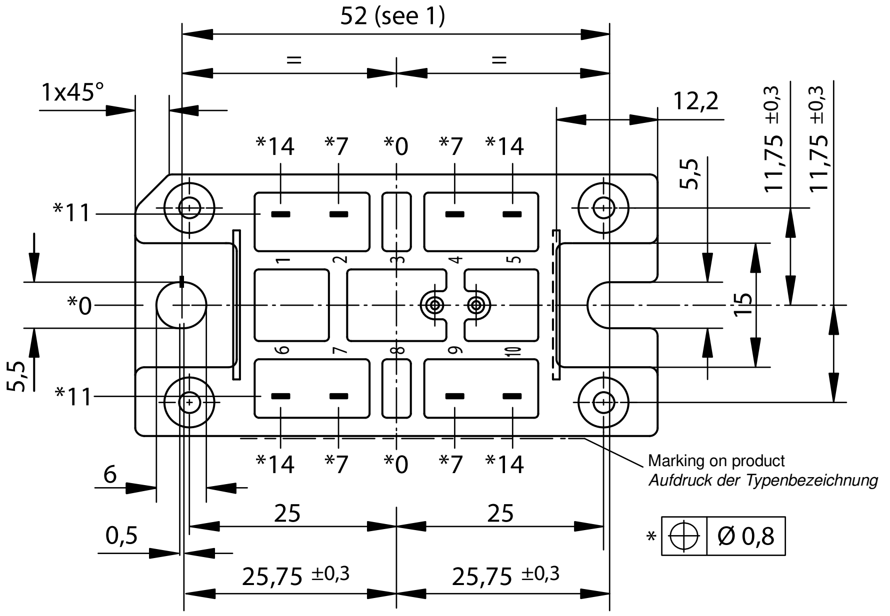
* *on die level* $T_{VJ} = 125°C$

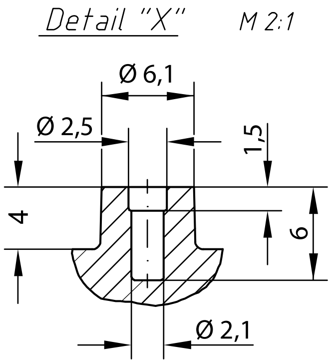


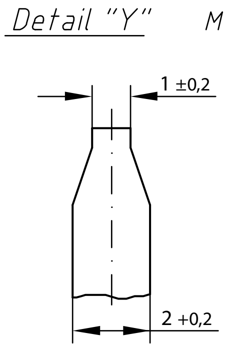
		Thyristor	
$V_{0\,max}$	*threshold voltage*	0.85	V
$R_{0\,max}$	*slope resistance **	8.5	mΩ

Outlines V1-A-Pack



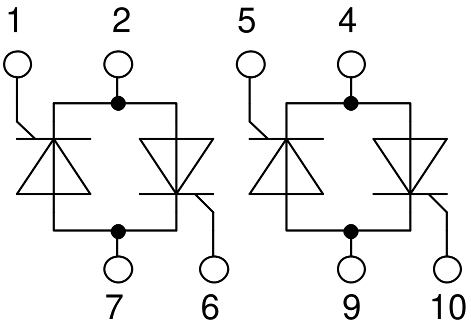






Remarks / ***Bemerkungen:***

1. Nominal distance mounting screws on heat sink: 52 mm / *Nennabstand Befestigungsschrauben auf Kühlkörper: 52 mm*
2. General tolerance / *Allgemeintoleranz*: DIN ISO 2768 -T1-c
3. Surface treatment of pins: tin plated (Sn) in hot dip / *Oberflächenbehandlung der Pins: verzinnt (Sn) im Tauchbad*
4. *Detail X*:
   EJOT PT® self-tapping screws (dimension K25) to be recommended for mounting on PCB
   selbstschneidende Schraube (Größe K25) empfohlen für die PCB-Montage
   Take care on the maximum screw length according to board thickness and the maximum hole depth of 6 mm
   Bei der Wahl der Schraubenlänge die PCB-Dicke und die maximale Lochtiefe von 6mm beachten
   Recommended mounting torque: 1.5 Nm / *Empfohlenes Drehmoment: 1.5 Nm*



Thyristor

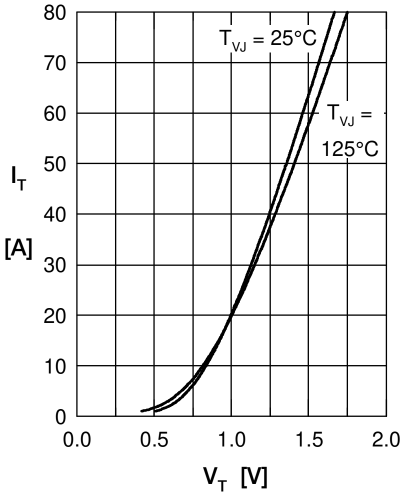


Fig. 1 Forward characteristics

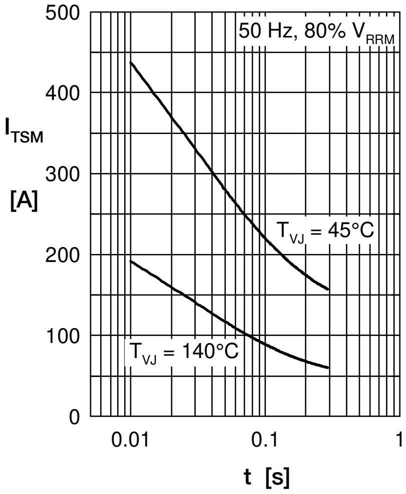


Fig. 2 Surge overload current
I_{TSM}: crest value, t: duration

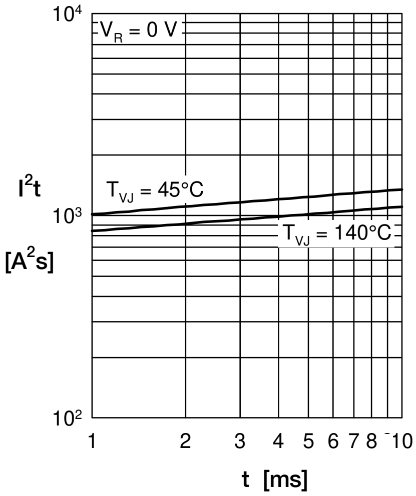


Fig. 3 I^2t versus time (1-10 s)

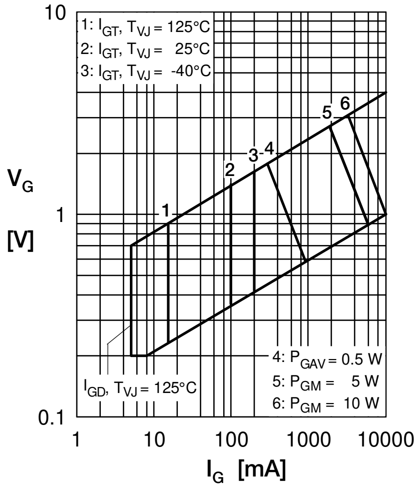


Fig. 4 Gate voltage & gate current

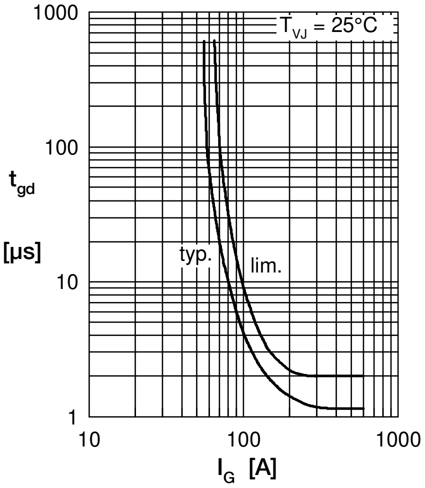


Fig. 5 Gate controlled delay time t_{gd}

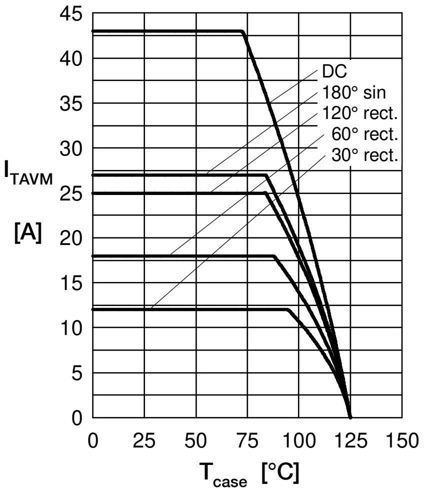


Fig. 6 Max. forward current at case temperature

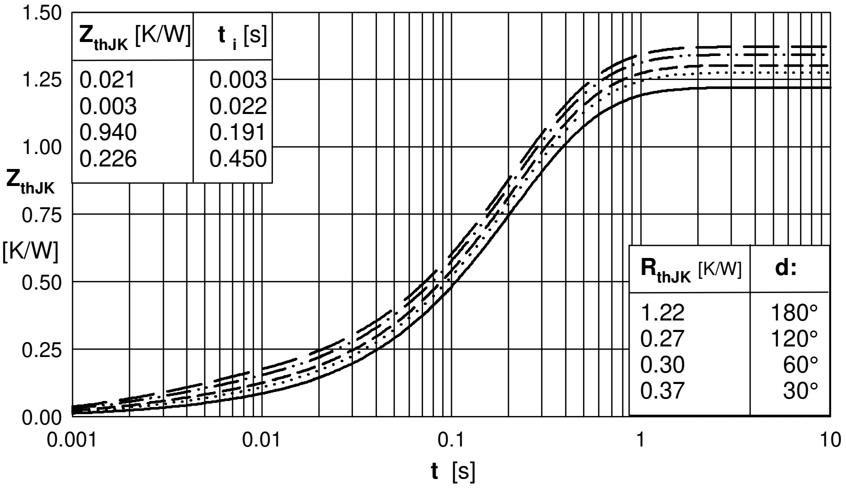


Fig. 7 Transient thermal impedance junction to heatsink (per thyristor)

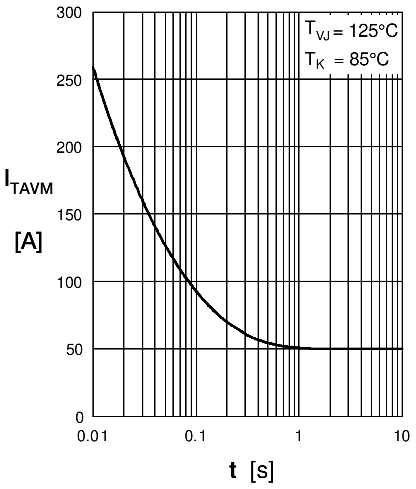


Fig. 8 Rated RMS current vs. time (360° conduction)

Rectifier

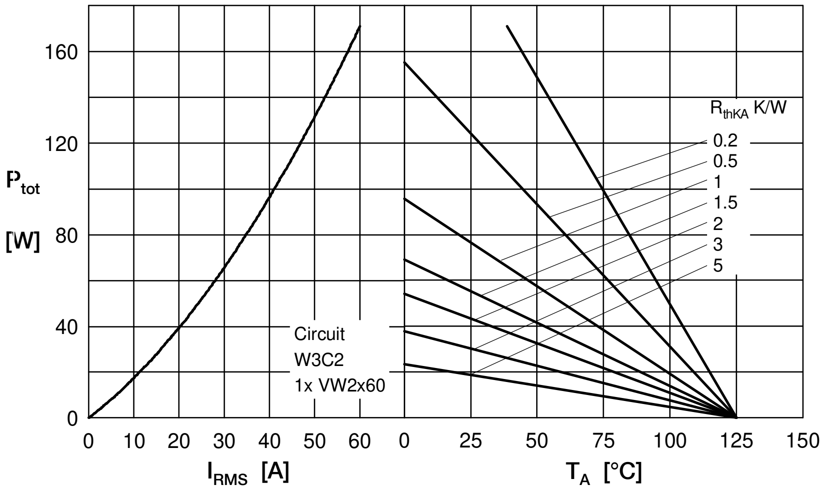


Fig. 9 Load current capability for two phase AC controller

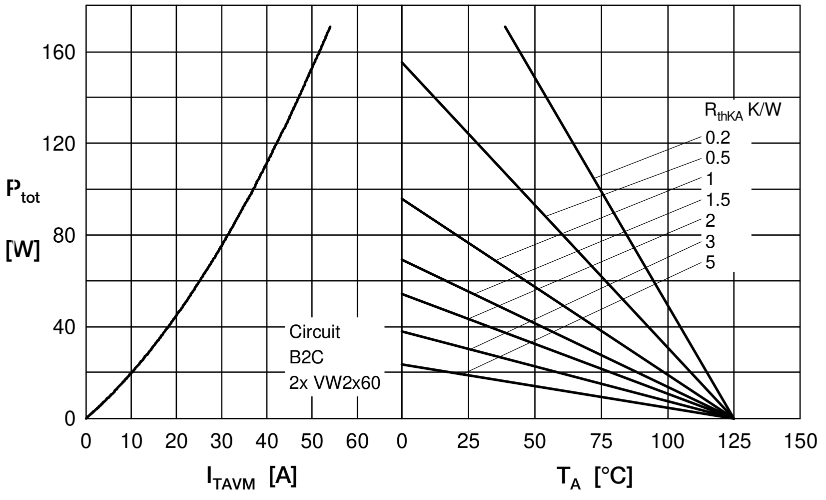


Fig. 10 Power dissipation vs. direct output current and ambient temperature
cyclo converter, four quadrant operation