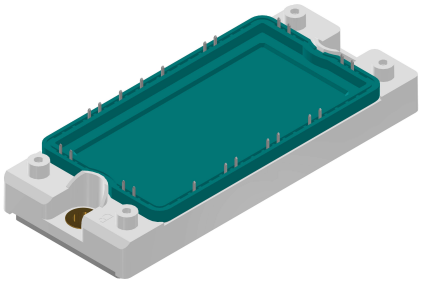
Thyristor Module

3~ Rectifier		
V_{RRM}	=	1800 V
I_{DAV}	=	120 A
I_{FSM}	=	500 A

3~ Rectifier Bridge, half-controlled (high-side) + free wheeling Diode

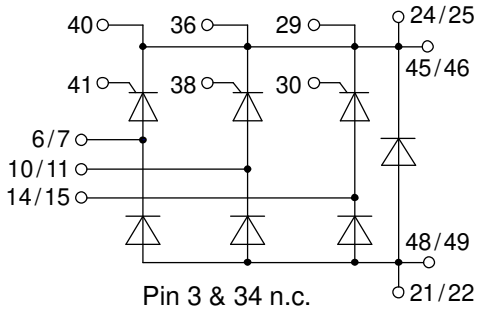
Part number

MCMA120UJ1800ED



Backside: isolated

E72873



Features / Advantages:

- Thyristor/Standard Rectifier for line frequency
- Planar passivated chips
- Long-term stability
- Low forward voltage drop
- Leads suitable for PC board soldering
- Copper base plate with Direct Copper Bonded Al2O3-ceramic
- Improved temperature and power cycling

Applications:

- Diode for main rectification
- For single and three phase bridge configurations
- Supplies for DC power equipment
- Input rectifiers for PWM inverter
- Battery DC power supplies
- Field supply for DC motors

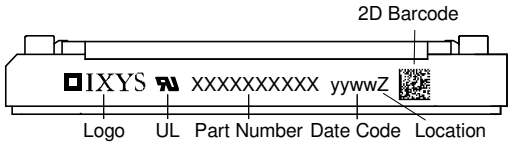
Package: E2-Pack

- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Soldering pins for PCB mounting
- Height: 17 mm
- Base plate: Copper internally DCB isolated
- Advanced power cycling
- Phase Change Material available

Rectifier

Symbol	Definition	Conditions		Ratings min.	typ.	max.	Unit
$V_{RSM/DSM}$	*max. non-repetitive reverse/forward blocking voltage*		T_{VJ} = 25°C			1900	V
$V_{RRM/DRM}$	*max. repetitive reverse/forward blocking voltage*		T_{VJ} = 25°C			1800	V
$I_{R/D}$	*reverse current, drain current*	$V_{R/D}$ = 1800 V	T_{VJ} = 25°C			50	µA
		$V_{R/D}$ = 1800 V	T_{VJ} = 125°C			10	mA
V_T	*forward voltage drop*	I_T = 40 A	T_{VJ} = 25°C			1.33	V
		I_T = 120 A				1.70	V
		I_T = 40 A	T_{VJ} = 125°C			1.36	V
		I_T = 120 A				1.88	V
I_{DAV}	*bridge output current*	T_C = 80°C	T_{VJ} = 150°C			120	A
		rectangular d = ⅓					
V_{T0}	*threshold voltage* } *for power loss calculation only*		T_{VJ} = 150°C			0.83	V
r_T	*slope resistance* }					13.6	mΩ
R_{thJC}	*thermal resistance junction to case*					0.65	K/W
R_{thCH}	*thermal resistance case to heatsink*				0.1		K/W
P_{tot}	*total power dissipation*		T_C = 25°C			190	W
I_{TSM}	*max. forward surge current*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			500	A
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			540	A
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			425	A
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			460	A
I^2t	*value for fusing*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			1.25	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			1.22	kA²s
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			905	A²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			880	A²s
C_J	*junction capacitance*	V_R = 400 V f = 1 MHz	T_{VJ} = 25°C		18		pF
P_{GM}	*max. gate power dissipation*	t_P = 30 µs	T_C = 150°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} = 150°C; f = 50 Hz	repetitive, I_T = 120 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 = 40 A			500	A/µs
$(dv/dt)_{cr}$	*critical rate of rise of voltage*	V = ⅔ V_{DRM}	T_{VJ} = 150°C			1000	V/µs
		R_{GK} = ∞; method 1 (linear voltage rise)					
V_{GT}	*gate trigger voltage*	V_D = 6 V	T_{VJ} = 25°C			1.4	V
			T_{VJ} = -40°C			1.6	V
I_{GT}	*gate trigger current*	V_D = 6 V	T_{VJ} = 25°C			70	mA
			T_{VJ} = -40°C			150	mA
V_{GD}	*gate non-trigger voltage*	V_D = ⅔ V_{DRM}	T_{VJ} = 150°C			0.2	V
I_{GD}	*gate non-trigger current*					5	mA
I_L	*latching current*	t_p = 10 µs	T_{VJ} = 25°C			150	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			100	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 = 40A; V = ⅔ V_{DRM}	T_{VJ} = 125 °C		500		µs
		di/dt = 10 A/µs dv/dt = 20 V/µs t_p = 200 µs					

Package E2-Pack				Ratings			
Symbol	**Definition**	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
I_{RMS}	*RMS current*	per terminal				50	A
T_{VJ}	*virtual junction temperature*			-40		150	°C
T_{op}	*operation temperature*			-40		125	°C
T_{stg}	*storage temperature*			-40		125	°C
Weight					176		g
M_D	*mounting torque*			3		6	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

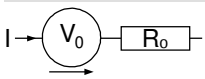


Part description

M = Module
C = Thyristor (SCR)
M = Thyristor
A = (up to 1800V)
120 = Current Rating [A]
UJ = 3~ Rectifier Bridge, half-controlled (high-side) + free wheeling Diode
1800 = Reverse Voltage [V]
ED = E2-Pack

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MCMA120UJ1800ED	MCMA120UJ1800ED	Box	6	510125

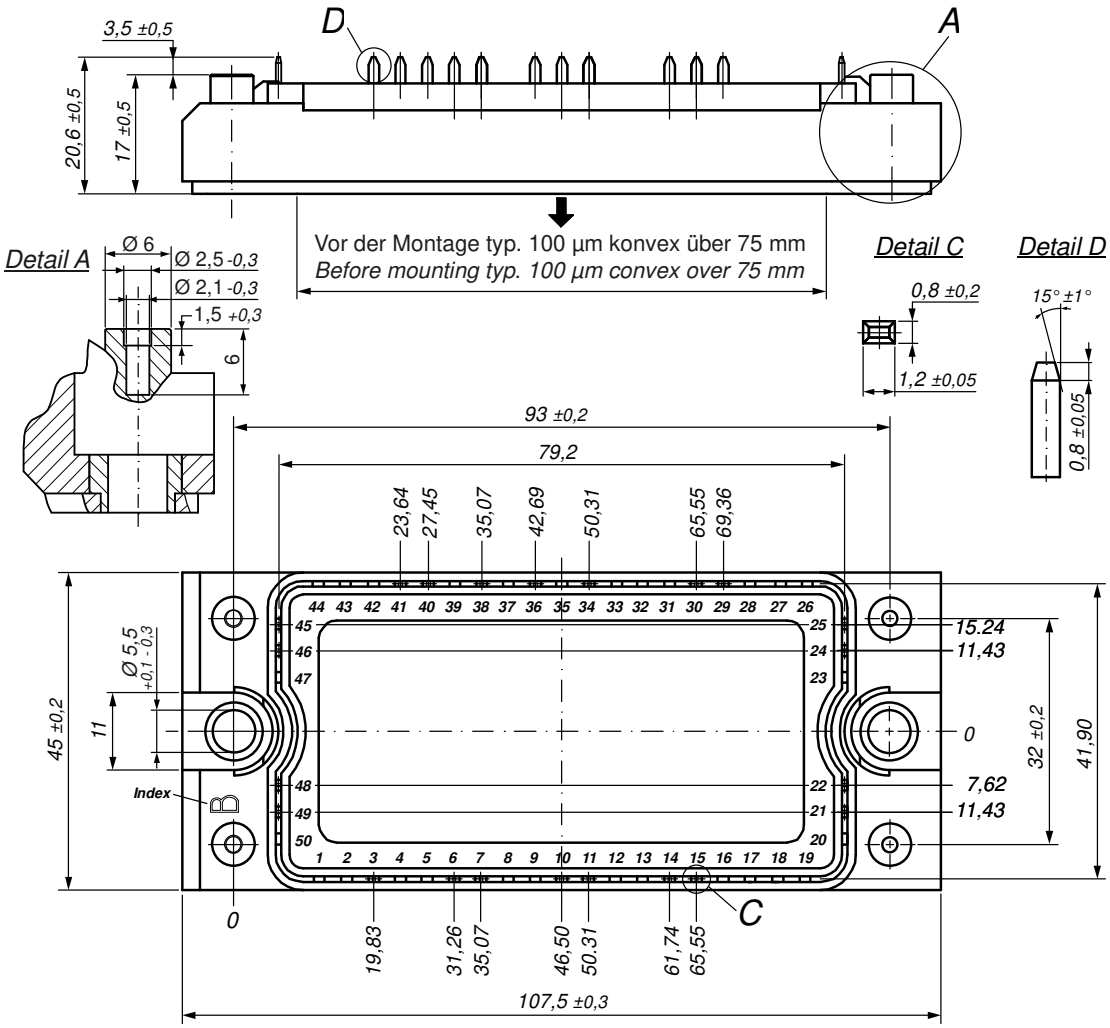
Equivalent Circuits for Simulation ** on die level* T_{VJ} = 150°C



Thyristor

$V_{0\,max}$	*threshold voltage*	0.83	V
$R_{0\,max}$	*slope resistance **	10.5	mΩ

Outlines E2-Pack

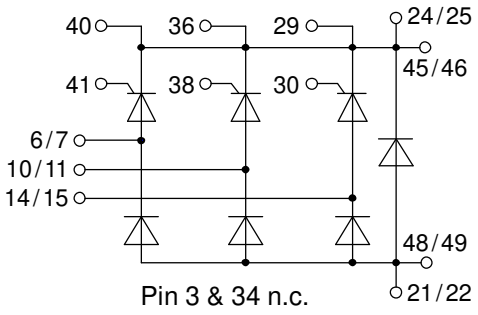


Bemerkung / ***Note:***

- Nichttolerierte Maße nach / *Measure without tolerances according DIN ISO 2768-T1-m*
- PCB-Lochmuster / *PCB hole pattern:* **see pin position**
- Toleranz Pin-Position und PCB-Lochmuster / *Tolerance of pin position and PCB hole pattern:* ⌖ **0.1**
- Montageanleitung / *Mounting instruction:* www.ixys.com **Application note IXAN0024**

***Detail A*:** PCB-Montage / *Mounting on PCB*

- Empfohlene, selbstschneidende Schraube / *Recommended, self-tapping screw:* **EJOT PT®** (Größe / *size:* **K25**)
- Max. Schraubenlänge / *Max. screw length:* **PCB-Dicke** / **thickness + 6 mm** *(*max. Lochtiefe / *hole depth)*
- Empfohlenes Drehmoment / *Recommended mounting torque:* **1.5 Nm**



Thyristor

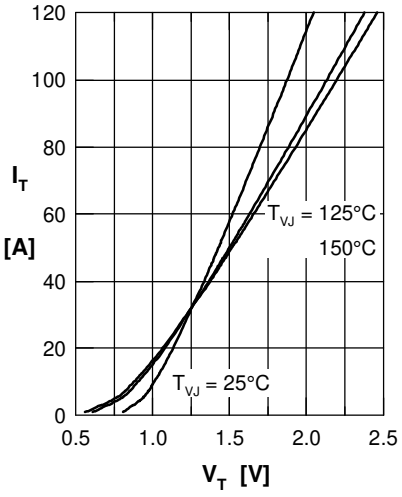


Fig. 1 Forward characteristics

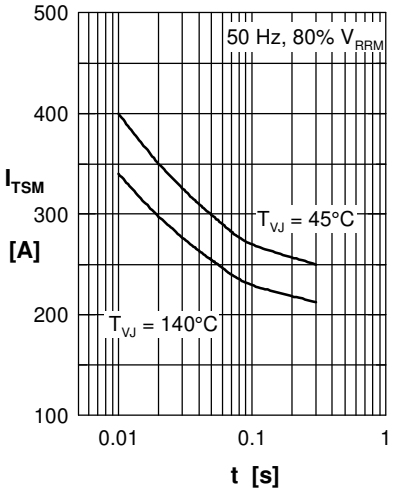


Fig. 2 Surge overload current
I_{TSM}: crest value, t: duration

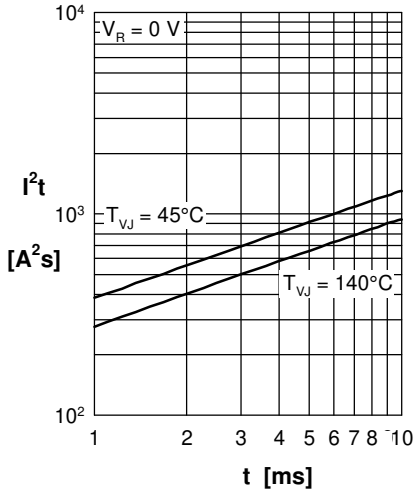


Fig. 3 I^2t versus time (1-10 s)

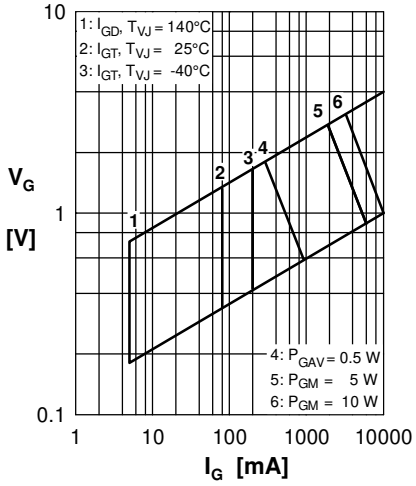


Fig. 4 Gate voltage & gate current

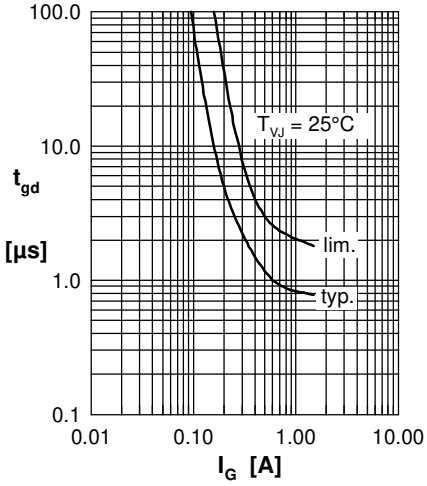


Fig. 5 Gate controlled delay time t_{gd}

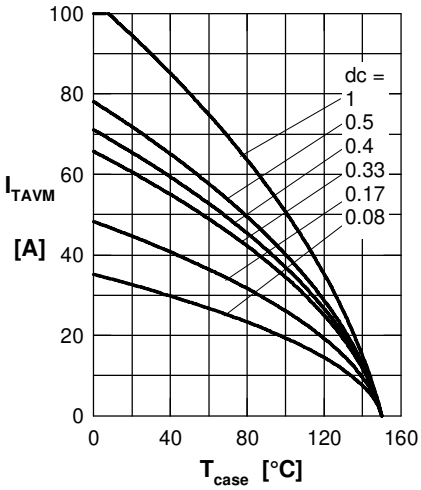


Fig. 6 Max. forward current at case temperature

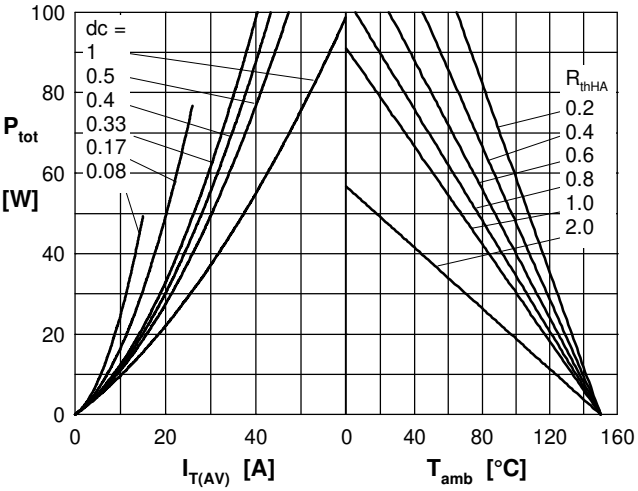
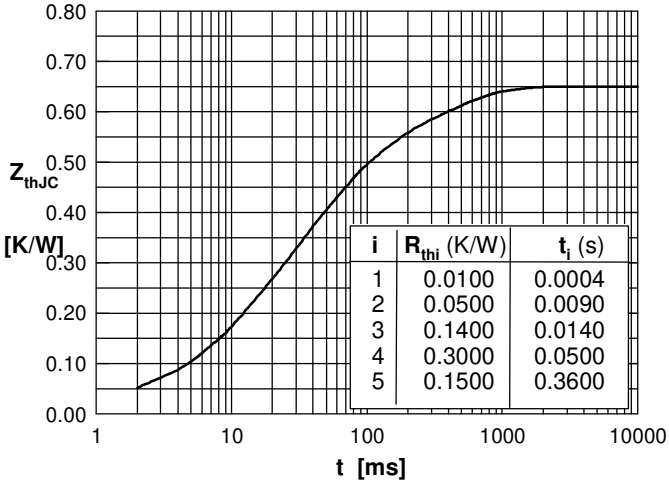


Fig. 7a Power dissipation versus direct output current
Fig. 7b and ambient temperature



i	R_{thi} (K/W)	t_i (s)
1	0.0100	0.0004
2	0.0500	0.0090
3	0.1400	0.0140
4	0.3000	0.0500
5	0.1500	0.3600

Fig. 8 Transient thermal impedance junction to case