

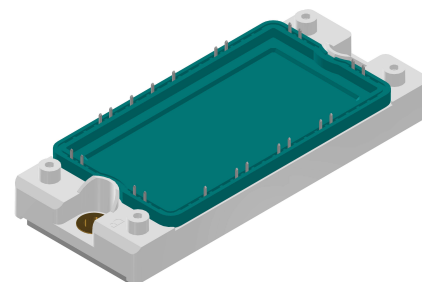
Thyristor Module

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

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

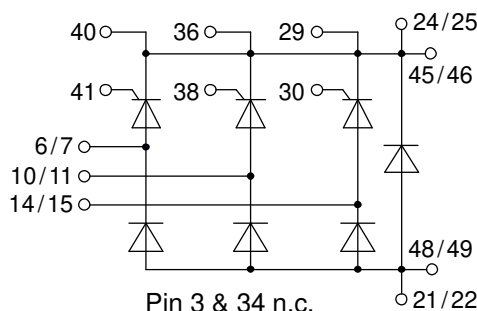
Part number

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

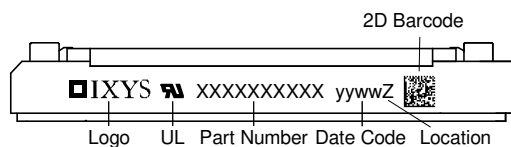
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Rectifier				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
$V_{RSM/DSM}$	max. non-repetitive reverse/forward blocking voltage	$T_{VJ} = 25^{\circ}\text{C}$				1900	V
$V_{RRM/DRM}$	max. repetitive reverse/forward blocking voltage	$T_{VJ} = 25^{\circ}\text{C}$				1800	V
$I_{R/D}$	reverse current, drain current	$V_{R/D} = 1800\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$			50	μA
		$V_{R/D} = 1800\text{ V}$	$T_{VJ} = 125^{\circ}\text{C}$			10	mA
V_T	forward voltage drop	$I_T = 40\text{ A}$	$T_{VJ} = 25^{\circ}\text{C}$			1.33	V
		$I_T = 120\text{ A}$				1.70	V
		$I_T = 40\text{ A}$	$T_{VJ} = 125^{\circ}\text{C}$			1.36	V
		$I_T = 120\text{ A}$				1.88	V
I_{DAV}	bridge output current	$T_C = 80^{\circ}\text{C}$ rectangular $d = \frac{1}{3}$	$T_{VJ} = 150^{\circ}\text{C}$			120	A
V_{T0}	threshold voltage	} for power loss calculation only	$T_{VJ} = 150^{\circ}\text{C}$			0.83	V
r_T	slope resistance					13.6	m Ω
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		$T_C = 25^{\circ}\text{C}$			190	W
I_{TSM}	max. forward surge current	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}\text{C}$			500	A
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			540	A
		$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 150^{\circ}\text{C}$			425	A
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			460	A
I^2t	value for fusing	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}\text{C}$			1.25	kA ² s
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			1.22	kA ² s
		$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 150^{\circ}\text{C}$			905	A ² s
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			880	A ² s
C_J	junction capacitance	$V_R = 400\text{ V}$ $f = 1\text{ MHz}$	$T_{VJ} = 25^{\circ}\text{C}$		18		pF
P_{GM}	max. gate power dissipation	$t_p = 30\text{ }\mu\text{s}$	$T_C = 150^{\circ}\text{C}$			10	W
		$t_p = 300\text{ }\mu\text{s}$				5	W
P_{GAV}	average gate power dissipation					0.5	W
$(di/dt)_{cr}$	critical rate of rise of current	$T_{VJ} = 150^{\circ}\text{C}; f = 50\text{ Hz}$ repetitive, $I_T = 120\text{ A}$				100	A/ μs
		$t_p = 200\text{ }\mu\text{s}; di_G/dt = 0.45\text{ A}/\mu\text{s};$ $I_G = 0.45\text{ A}; V = \frac{2}{3} V_{DRM}$ non-repet., $I_T = 40\text{ A}$				500	A/ μs
$(dv/dt)_{cr}$	critical rate of rise of voltage	$V = \frac{2}{3} V_{DRM}$ $R_{GK} = \infty$; method 1 (linear voltage rise)	$T_{VJ} = 150^{\circ}\text{C}$			1000	V/ μs
V_{GT}	gate trigger voltage	$V_D = 6\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$			1.4	V
			$T_{VJ} = -40^{\circ}\text{C}$			1.6	V
I_{GT}	gate trigger current	$V_D = 6\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$			70	mA
			$T_{VJ} = -40^{\circ}\text{C}$			150	mA
V_{GD}	gate non-trigger voltage	$V_D = \frac{2}{3} V_{DRM}$	$T_{VJ} = 150^{\circ}\text{C}$			0.2	V
I_{GD}	gate non-trigger current					5	mA
I_L	latching current	$t_p = 10\text{ }\mu\text{s}$	$T_{VJ} = 25^{\circ}\text{C}$			150	mA
		$I_G = 0.45\text{ A}; di_G/dt = 0.45\text{ A}/\mu\text{s}$					
I_H	holding current	$V_D = 6\text{ V}$ $R_{GK} = \infty$	$T_{VJ} = 25^{\circ}\text{C}$			100	mA
t_{gd}	gate controlled delay time	$V_D = \frac{1}{2} V_{DRM}$	$T_{VJ} = 25^{\circ}\text{C}$			2	μs
		$I_G = 0.45\text{ A}; di_G/dt = 0.45\text{ A}/\mu\text{s}$					
t_q	turn-off time	$V_R = 100\text{ V}; I_T = 40\text{ A}; V = \frac{2}{3} V_{DRM}$ $di/dt = 10\text{ A}/\mu\text{s}$ $dv/dt = 20\text{ V}/\mu\text{s}$ $t_p = 200\text{ }\mu\text{s}$	$T_{VJ} = 125^{\circ}\text{C}$		500		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 _{Spt/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

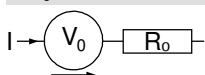
M = Module
 C = Thyristor (SCR)
 M = Thyristor
 A = (up to 1800V)
 120 = Current Rating [A]
 UJ = 3~ Rectifier Bridge, half-controlled (high-side) + free wheeling Diode
 1800 = Reverse Voltage [V]
 ED = E2-Pack

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

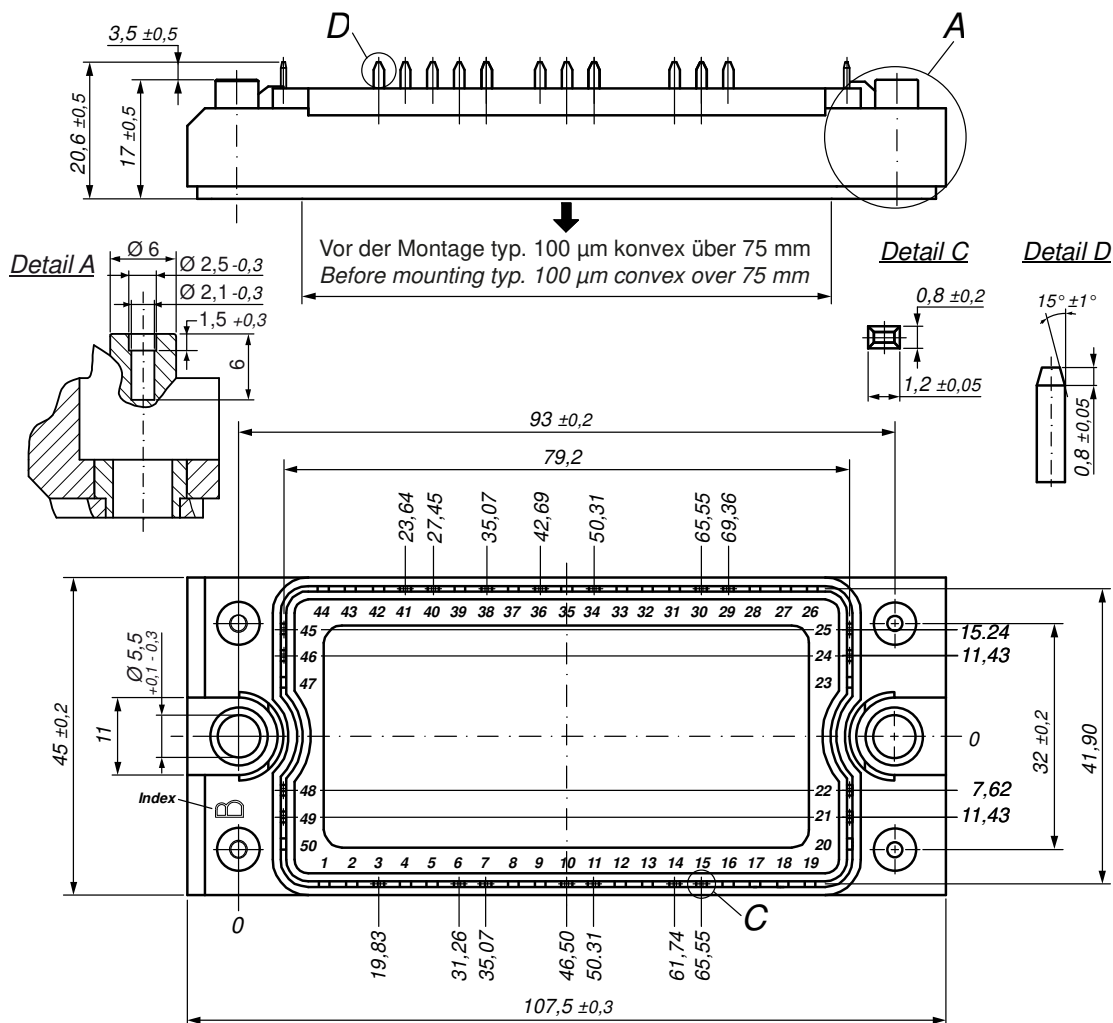
Equivalent Circuits for Simulation

* on die level

$T_{VJ} = 150^{\circ}\text{C}$



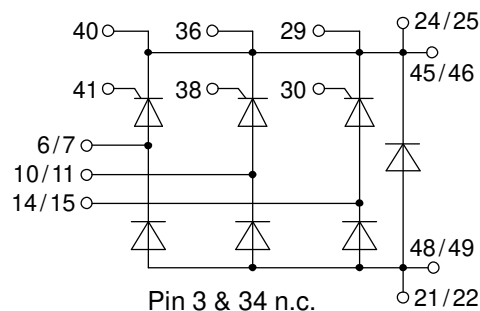
$V_{0\max}$	threshold voltage	0.83	V
$R_{0\max}$	slope resistance *	10.5	mΩ

Outlines E2-Pack

Bemerkung / Note:

- Nichttolerierete 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: $\pm 0,1$
- Montageanleitung / Mounting instruction: www.ixys.com **Application note IXAN0024**

Detail A: PCB-Montage / Mounting on PCB ^L

- Empfohlene, selbstschneidende Schraube / Recommended, self-tapping screw: **EJOT PT®** (Größe / size: **K25**) ^L
- Max. Schraubenlänge / Max. screw length: **PCB-Dicke / thickness + 6 mm** (max. Lochtiefe / hole depth) ^L
- Empfohlenes Drehmoment / Recommended mounting torque: **1,5 Nm**



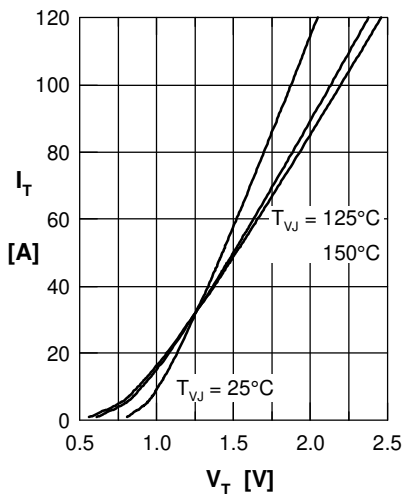
Thyristor


Fig. 1 Forward characteristics

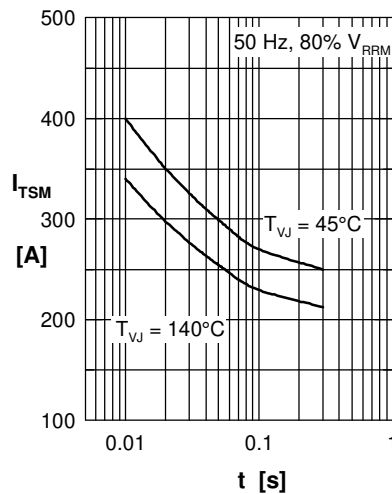
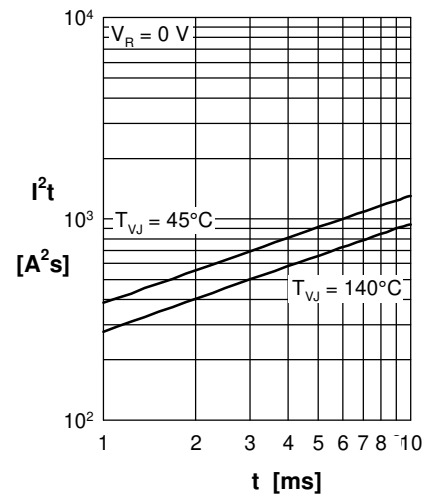
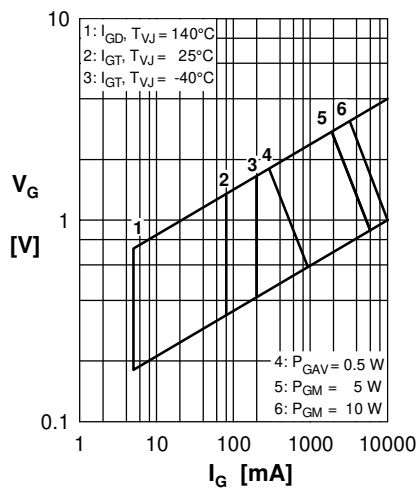

 Fig. 2 Surge overload current
 I_{TSM} : crest value, t : duration

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


Fig. 4 Gate voltage & gate current

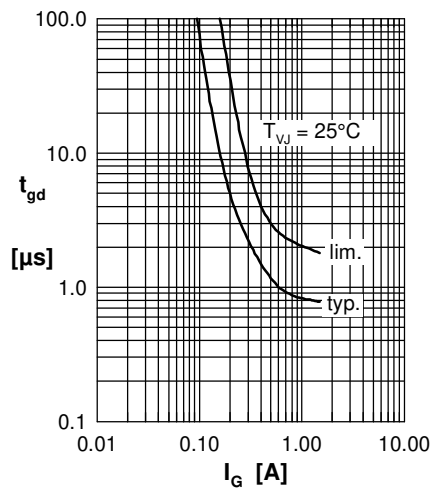
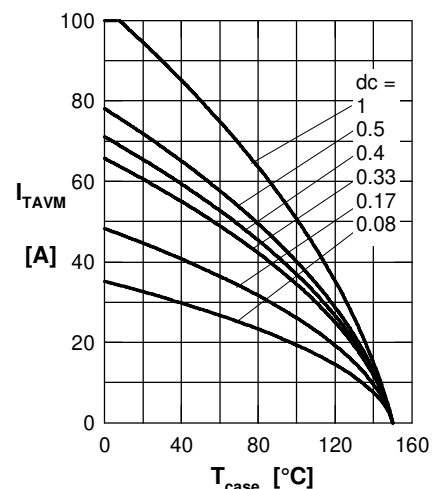

 Fig. 5 Gate controlled delay time t_{gd}


Fig. 6 Max. forward current at case temperature

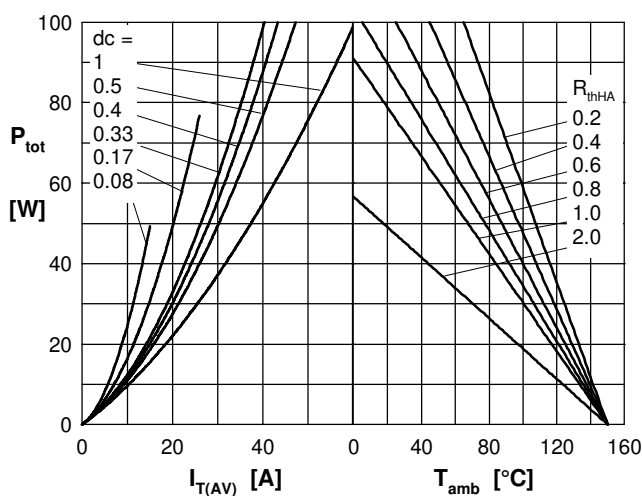
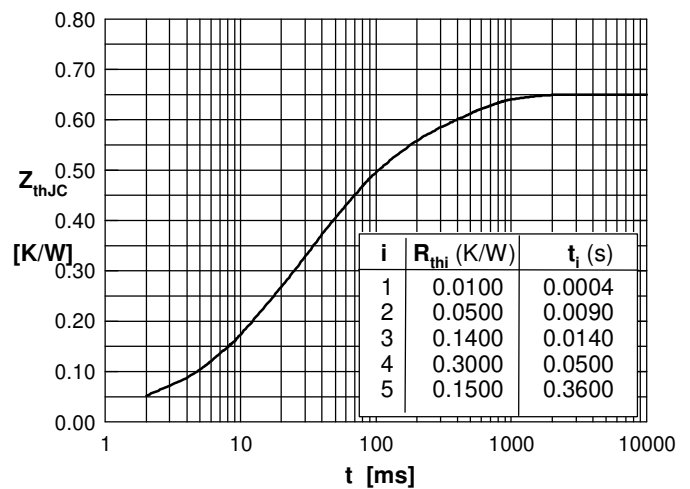

 Fig. 7a Power dissipation versus direct output current
 Fig. 7b and ambient temperature


Fig. 8 Transient thermal impedance junction to case