

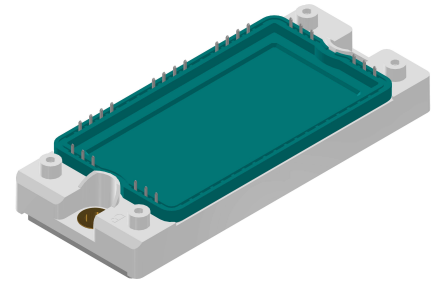
# High Voltage Standard Rectifier Module

<b>3~ Rectifier</b>
$V_{RRM} = 2200\text{ V}$
$I_{DAV} = 240\text{ A}$
$I_{FSM} = 1500\text{ A}$

## 3~ Rectifier Bridge

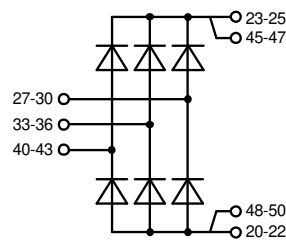
Part number

**MDNA240U2200ED**



Backside: isolated

 E72873



### Features / Advantages:

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

### 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: 4300 V~
- Industry standard outline
- RoHS compliant
- Height: 30 mm
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

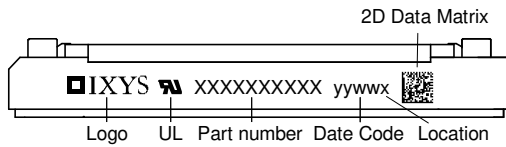
### Disclaimer Notice

Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at [www.littelfuse.com/disclaimer-electronics](http://www.littelfuse.com/disclaimer-electronics).

Rectifier				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
$V_{RSM}$	max. non-repetitive reverse blocking voltage					2300	V
$V_{RRM}$	max. repetitive reverse blocking voltage					2200	V
$I_R$	reverse current	$V_R = 2200$ V		$T_{VJ} = 25^\circ\text{C}$		200	$\mu\text{A}$
		$V_R = 2200$ V		$T_{VJ} = 150^\circ\text{C}$		2	mA
$V_F$	forward voltage drop	$I_F = 80$ A		$T_{VJ} = 25^\circ\text{C}$		1.27	V
		$I_F = 240$ A				1.90	V
		$I_F = 80$ A		$T_{VJ} = 125^\circ\text{C}$		1.22	V
		$I_F = 240$ A				2.00	V
$I_{DAV}$	bridge output current	$T_C = 90^\circ\text{C}$		$T_{VJ} = 150^\circ\text{C}$		240	A
		rectangular	$d = 120^\circ$				
$V_{FO}$	threshold voltage			$T_{VJ} = 150^\circ\text{C}$		0.79	V
$r_F$	slope resistance					5.1	m $\Omega$
$R_{thJC}$	thermal resistance junction to case					0.35	K/W
$R_{thCH}$	thermal resistance case to heatsink				0.10		K/W
$P_{tot}$	total power dissipation			$T_C = 25^\circ\text{C}$		355	W
$I_{FSM}$	max. forward surge current	$t = 10$ ms; (50 Hz), sine		$T_{VJ} = 45^\circ\text{C}$		1.50	kA
		$t = 8,3$ ms; (60 Hz), sine		$V_R = 0$ V		1.62	kA
		$t = 10$ ms; (50 Hz), sine		$T_{VJ} = 150^\circ\text{C}$		1.28	kA
		$t = 8,3$ ms; (60 Hz), sine		$V_R = 0$ V		1.38	kA
$I^2t$	value for fusing	$t = 10$ ms; (50 Hz), sine		$T_{VJ} = 45^\circ\text{C}$		11.3	kA <sup>2</sup> s
		$t = 8,3$ ms; (60 Hz), sine		$V_R = 0$ V		10.9	kA <sup>2</sup> s
		$t = 10$ ms; (50 Hz), sine		$T_{VJ} = 150^\circ\text{C}$		8.13	kA <sup>2</sup> s
		$t = 8,3$ ms; (60 Hz), sine		$V_R = 0$ V		7.87	kA <sup>2</sup> s
$C_J$	junction capacitance	$V_R = 700$ V; $f = 1$ MHz		$T_{VJ} = 25^\circ\text{C}$		40	pF



Package E2-Pack		Ratings				
Symbol	Definition	Conditions	min.	typ.	max.	Unit
$I_{RMS}$	RMS current	per terminal			200	A
$T_{VJ}$	virtual junction temperature		-40		150	°C
$T_{op}$	operation temperature		-40		125	°C
$T_{stg}$	storage temperature		-40		125	°C
<b>Weight</b>				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; $I_{ISOL} \leq 1$ mA	4300			V
		t = 1 minute	3600			V



**Part description**

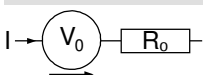
- M = Module
- D = Diode
- N = High Voltage Standard Rectifier
- A = (>= 2000V)
- 240 = Current Rating [A]
- U = 3- Rectifier Bridge
- 2200 = Reverse Voltage [V]
- ED = E2-Pack

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MDNA240U2200ED	MDNA240U2200ED	Box	6	514878

**Equivalent Circuits for Simulation**

\* on die level

$T_{VJ} = 150$  °C

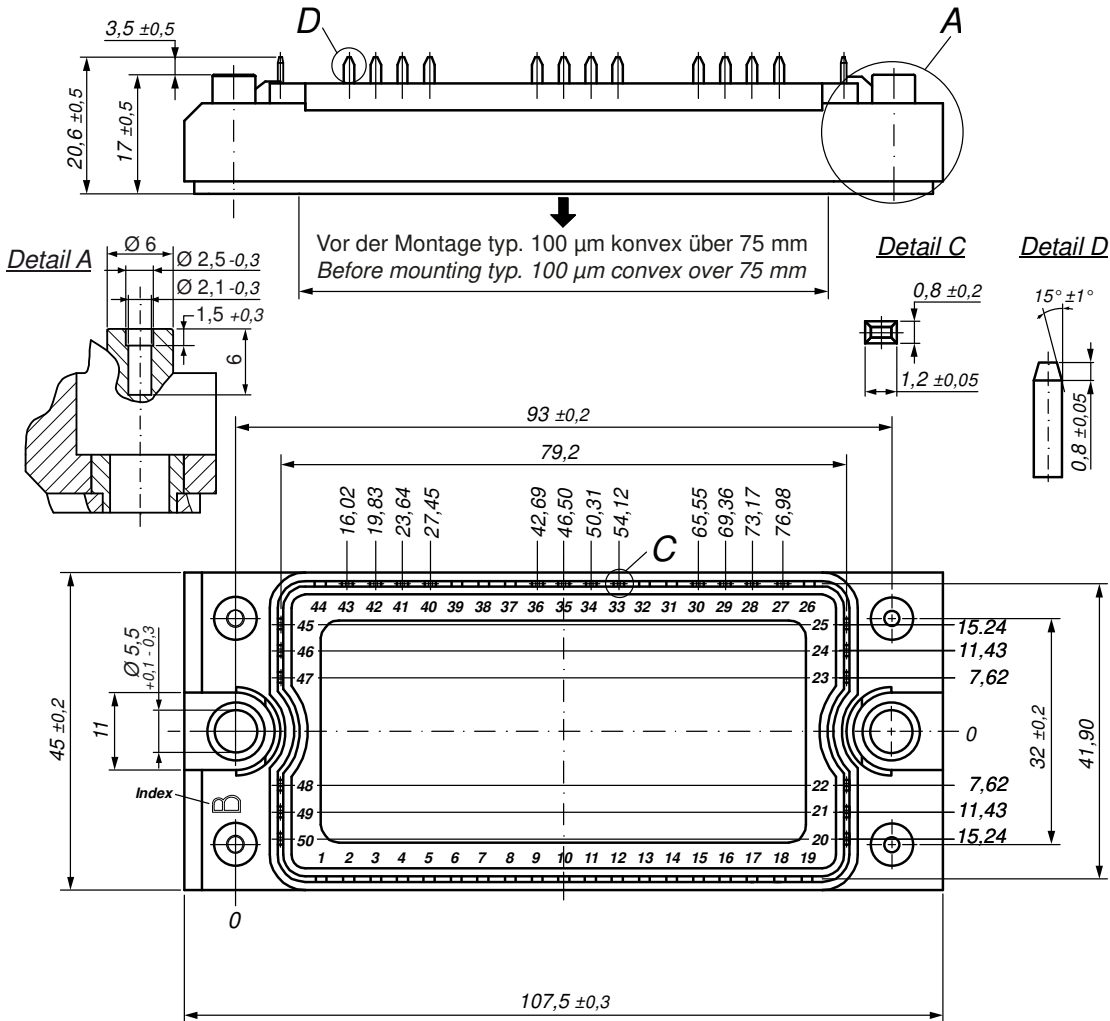


**Rectifier**

$V_{0\ max}$	threshold voltage	0.79	V
$R_{0\ max}$	slope resistance *	2	mΩ



**Outlines E2-Pack**

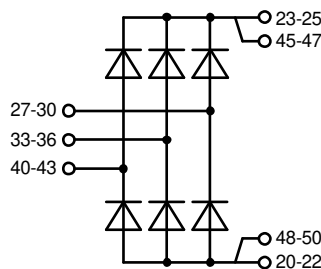


**Bemerkung / Note:**

- 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:  $\oplus 0.1$
- Montageanleitung / Mounting instruction: [www.ixys.com](http://www.ixys.com) **Application note IXAN0024**

**Detail A:** PCB-Montage / Mounting on PCB <sup>L</sup>

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



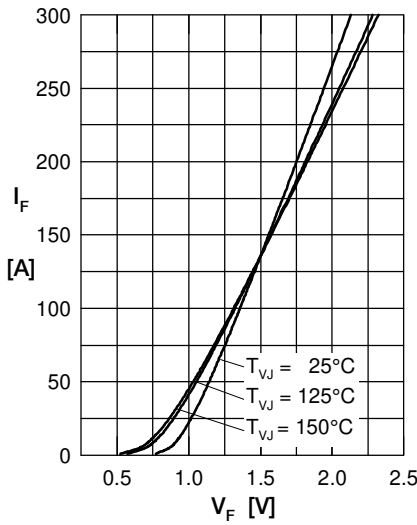
**Rectifier**


Fig. 1 Forward current versus voltage drop per diode

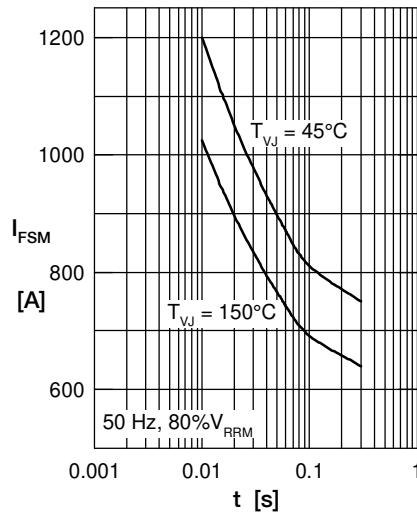


Fig. 2 Surge overload current

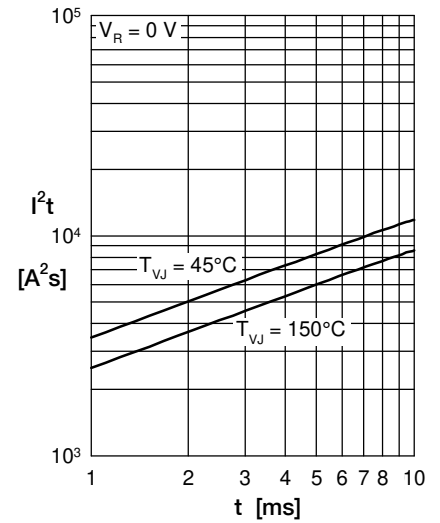
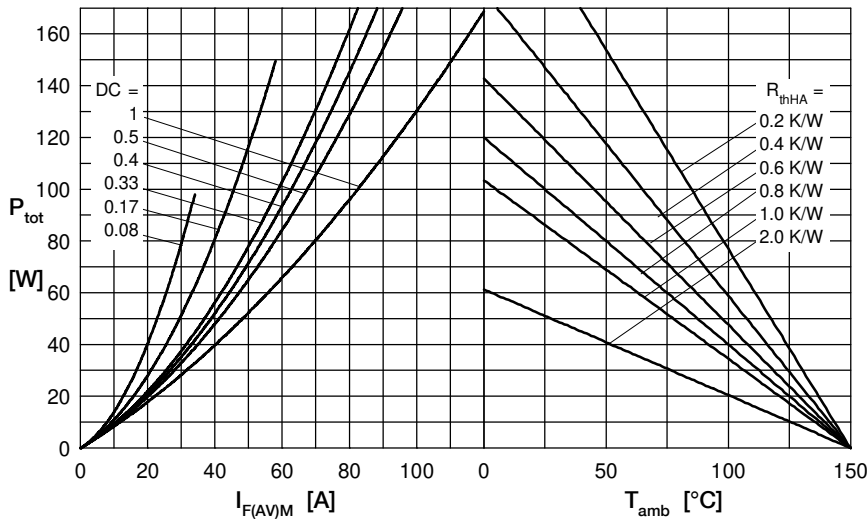

 Fig. 3  $I^2t$  versus time per diode


Fig. 4 Power dissipation vs. direct output current and ambient temperature

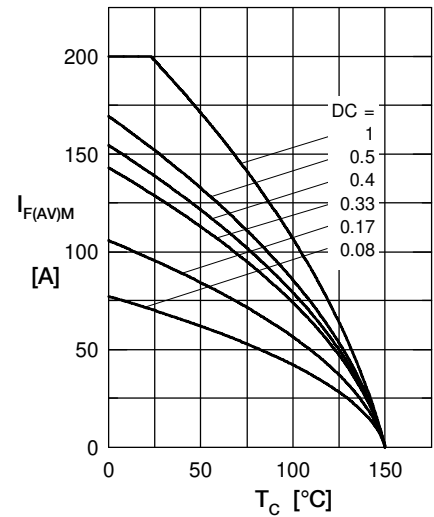


Fig. 5 Max. forward current vs. case temperature

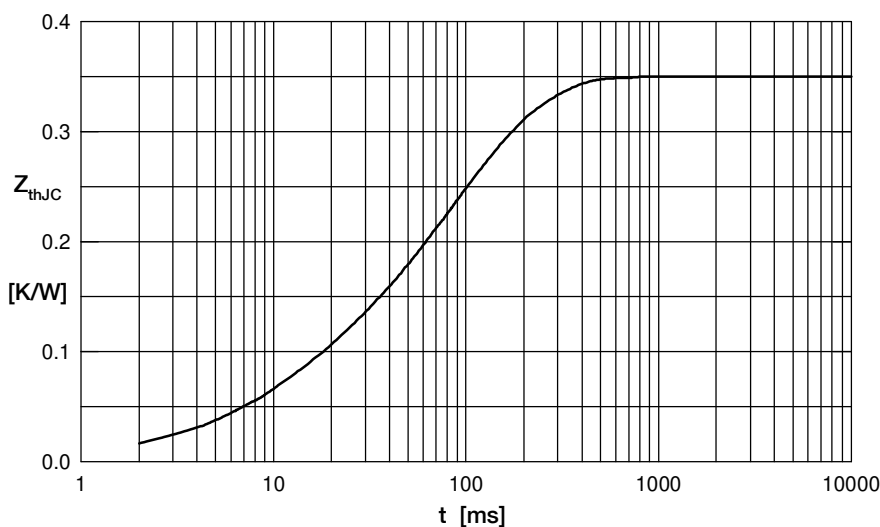


Fig. 6 Transient thermal impedance junction to case

 Constants for  $Z_{thJC}$  calculation:

i	$R_{thi}$ (K/W)	$t_i$ (s)
1	0.05	0.01
2	0.003	0.007
3	0.09	0.055
4	0.157	0.12
5	0.05	0.1