

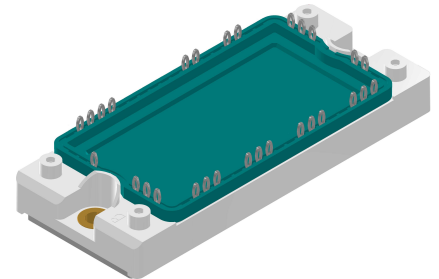
High Voltage Standard Rectifier Module

3~ Rectifier	Brake Chopper
$V_{RRM} = 2200 \text{ V}$	$V_{CES} = 1700 \text{ V}$
$I_{DAV} = 360 \text{ A}$	$I_{C25} = 200 \text{ A}$
$I_{FSM} = 1900 \text{ A}$	$V_{CE(sat)} = 2.1 \text{ V}$

3~ Rectifier Bridge + Brake Unit + NTC

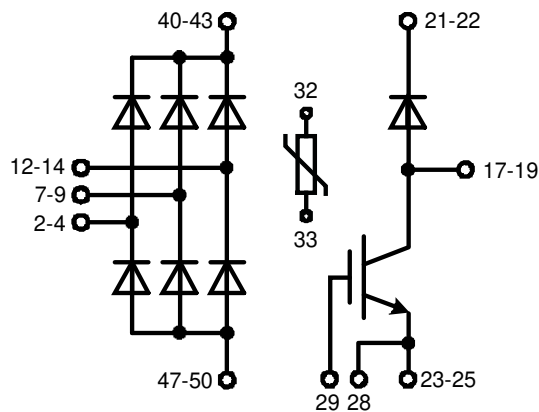
Part number

MDNA360UB2200PTED



Backside: isolated

 E72873



Features / Advantages:

- Brake with Infineon IGBT³

Applications:

- 3~ Rectifier with brake unit for drive inverters

Package: E2-Pack

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

Disclaimer Notice

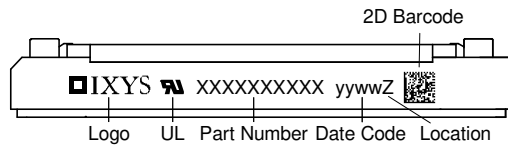
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Rectifier				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
V_{RSM}	max. non-repetitive reverse blocking voltage					2300	V
V_{RRM}	max. repetitive reverse blocking voltage					2200	V
I_R	reverse current	$V_R = 2200$ V		$T_{VJ} = 25^\circ\text{C}$		100	μA
		$V_R = 2200$ V		$T_{VJ} = 150^\circ\text{C}$		3	mA
V_F	forward voltage drop	$I_F = 120$ A		$T_{VJ} = 25^\circ\text{C}$		1.25	V
		$I_F = 360$ A				1.80	V
		$I_F = 120$ A		$T_{VJ} = 125^\circ\text{C}$		1.23	V
		$I_F = 360$ A				1.98	V
I_{DAV}	bridge output current	$T_C = 85^\circ\text{C}$		$T_{VJ} = 150^\circ\text{C}$		360	A
		rectangular	$d = \frac{1}{3}$				
V_{F0}	threshold voltage			$T_{VJ} = 150^\circ\text{C}$		0.82	V
r_F	slope resistance					3.4	m Ω
		} for power loss calculation only					
R_{thJC}	thermal resistance junction to case					0.25	K/W
R_{thCH}	thermal resistance case to heatsink				0.1		K/W
P_{tot}	total power dissipation			$T_C = 25^\circ\text{C}$		500	W
I_{FSM}	max. forward surge current	$t = 10$ ms; (50 Hz), sine		$T_{VJ} = 45^\circ\text{C}$		1.90	kA
		$t = 8,3$ ms; (60 Hz), sine		$V_R = 0$ V		2.05	kA
		$t = 10$ ms; (50 Hz), sine		$T_{VJ} = 150^\circ\text{C}$		1.62	kA
		$t = 8,3$ ms; (60 Hz), sine		$V_R = 0$ V		1.75	kA
I^2t	value for fusing	$t = 10$ ms; (50 Hz), sine		$T_{VJ} = 45^\circ\text{C}$		18.1	kA ² s
		$t = 8,3$ ms; (60 Hz), sine		$V_R = 0$ V		17.5	kA ² s
		$t = 10$ ms; (50 Hz), sine		$T_{VJ} = 150^\circ\text{C}$		13.0	kA ² s
		$t = 8,3$ ms; (60 Hz), sine		$V_R = 0$ V		12.7	kA ² s
C_J	junction capacitance	$V_R = 400$ V; $f = 1$ MHz		$T_{VJ} = 25^\circ\text{C}$		73	pF



Brake IGBT + Diode				Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit	
V_{CES}	collector emitter voltage				1700	V	
V_{GES}	max. DC gate voltage				±20	V	
V_{GEM}	max. transient gate emitter voltage				±30	V	
I_{C25}	collector current				200	A	
I_{C100}					135	A	
P_{tot}	total power dissipation				935	W	
$V_{CE(sat)}$	collector emitter saturation voltage	$I_C = 150 \text{ A}; V_{GE} = 15 \text{ V}$			2.1	V	
					3.2	V	
$V_{GE(th)}$	gate emitter threshold voltage	$I_C = 4 \text{ mA}; V_{GE} = V_{CE}$	5.5	6.0	6.5	V	
I_{CES}	collector emitter leakage current	$V_{CE} = V_{CES}; V_{GE} = 0 \text{ V}$			0.12	mA	
					2.3	mA	
I_{GES}	gate emitter leakage current	$V_{GE} = \pm 20 \text{ V}$			500	nA	
$Q_{G(on)}$	total gate charge	$V_{CE} = 900 \text{ V}; V_{GE} = 15 \text{ V}; I_C = 150 \text{ A}$		310		nC	
$t_{d(on)}$	turn-on delay time	inductive load $V_{CE} = 900 \text{ V}; I_C = 150 \text{ A}$ $V_{GE} = \pm 15 \text{ V}; R_G = 10 \Omega$					
t_r	current rise time						
$t_{d(off)}$	turn-off delay time						
t_f	current fall time						
E_{on}	turn-on energy per pulse						
E_{off}	turn-off energy per pulse						
$RBSOA$	reverse bias safe operating area	$V_{GE} = \pm 15 \text{ V}; R_G = 10 \Omega$					
I_{CM}		$V_{CEK} = 1700 \text{ V}$			280	A	
$SCSOA$	short circuit safe operating area	$V_{CEK} = 1700 \text{ V}$					
t_{SC}	short circuit duration	$V_{CE} = 1300 \text{ V}; V_{GE} = \pm 15$			10	µs	
I_{SC}	short circuit current	$R_G = 10 \Omega$; non-repetitive		400		A	
R_{thJC}	thermal resistance junction to case				0.16	K/W	
R_{thCH}	thermal resistance case to heatsink			0.25		K/W	
Brake Diode							
V_{RRM}	max. repetitive reverse voltage				1700	V	
I_{F25}	forward current				145	A	
I_{F100}					90	A	
V_F	forward voltage	$I_F = 100 \text{ A}$			2.20	V	
					2.00	V	
I_R	reverse current	$V_R = V_{RRM}$			tbd	mA	
					tbd	mA	
Q_{rr}	reverse recovery charge	$V_R = 900 \text{ V}$ $-di_f/dt = 2500 \text{ A}/\mu\text{s}$ $I_F = 100 \text{ A}; V_{GE} = 0 \text{ V}$					
I_{RM}	max. reverse recovery current						
t_{rr}	reverse recovery time						
E_{rec}	reverse recovery energy						
R_{thJC}	thermal resistance junction to case				0.39	K/W	
R_{thCH}	thermal resistance case to heatsink			0.62		K/W	

Package E2-Pack		Ratings				
Symbol	Definition	Conditions	min.	typ.	max.	Unit
I_{RMS}	RMS current	per terminal			30	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 t = 1 minute	3600 3000			V V
		50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA				



Part description

M = Module
 D = Diode
 N = High Voltage Standard Rectifier
 A = ($\geq 2000V$)
 360 = Current Rating [A]
 UB = 3- Rectifier Bridge + Brake Unit
 2200 = Reverse Voltage [V]
 PT = PressFit-Pin, Thermistor
 ED = E2-Pack
 - = Hyphen
 PC = Phase Change Material

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MDNA360UB2200PTED	MDNA360UB2200PTED	Blister	28	515682
Alternative	MDNA360UB2200PTED-PC	MDNA360UB2200PTED	Blister	28	514541

Temperature Sensor NTC

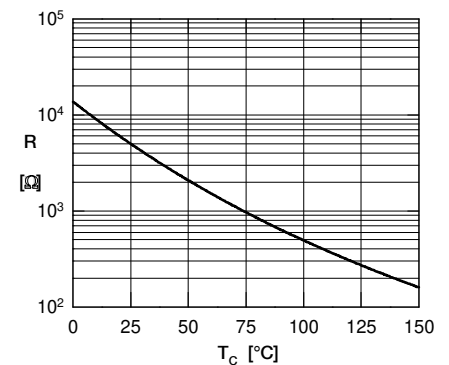
Symbol	Definition	Conditions	min.	typ.	max.	Unit
R_{25}	resistance	$T_{VJ} = 25^\circ$	4.85	5	5.15	k Ω
$B_{25/50}$	temperature coefficient			3375		K

Equivalent Circuits for Simulation

* on die level

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

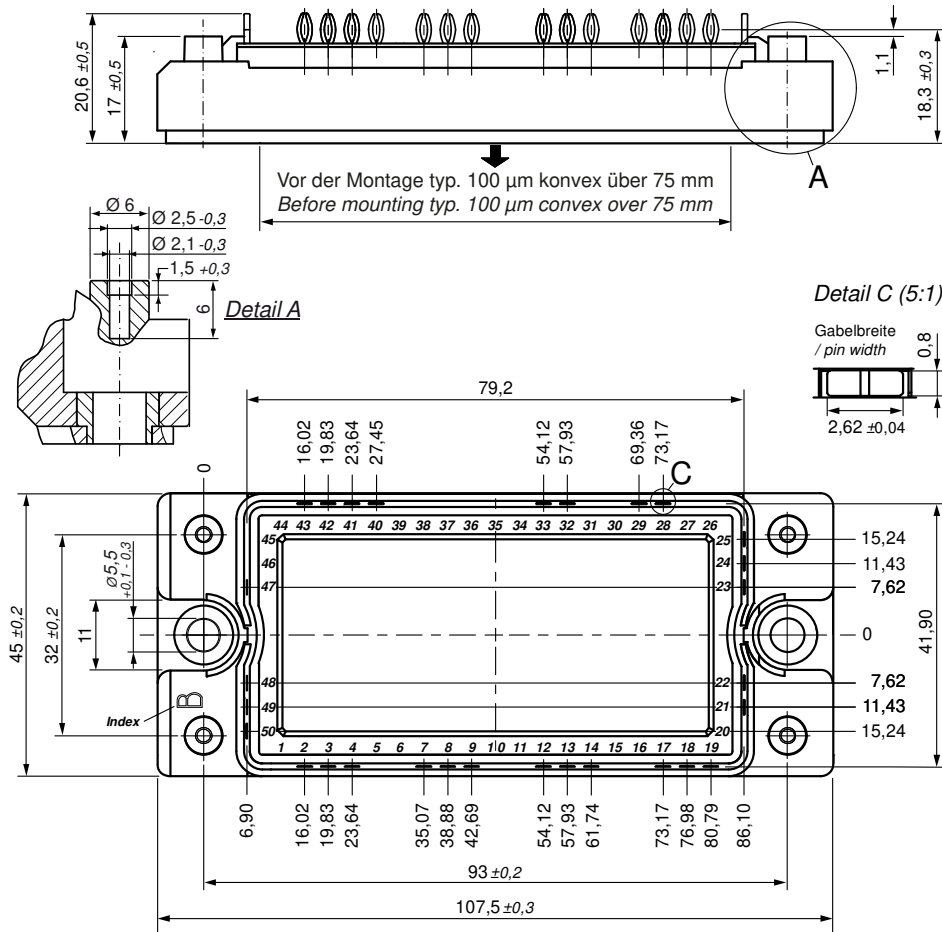
		Rectifier	Brake IGBT +	Brake Diode	
V_0	threshold voltage	0.82	1.1	1.25	V
R_0	slope resistance *	1.5	9.2	8.5	m Ω



Typ. NTC resistance vs. temperature



Outlines E2-Pack



Bemerkung / Note:

- Nicht tolerierte 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: $\oplus 0,1$
- Bohrlochdurchmesser / Diameter of drill: **Ø 2.35 mm**
- Endlochdurchmesser / Diameter of plated holes: **Ø 2.14 - 2.29 mm** (Cu thickness in via typ. 50 µm)
- Beschichtung / Plating: **chem. Sn max. 15 µm**
- Einpresskraft / Insert Force: per terminal with a typ. insert speed of 7 mm/s: **typ. 90 N**
- Weitere Angaben / Further information: www.ixys.com **Application note IXAN0077**
- 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**

