



High Voltage Standard Rectifier Module

$V_{RRM} = 2200\text{ V}$

$I_{FAV} = 2 \times 120\text{ A}$

$V_F = 1.13\text{ V}$

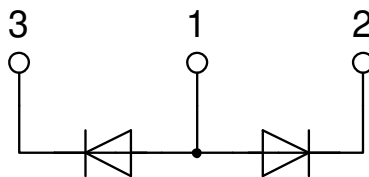
Common Anode

Part number

MDA95-22N1B



Backside: isolated



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: TO-240AA

- Isolation Voltage: 4800 V~
- Industry standard outline
- RoHS compliant
- Height: 30 mm
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

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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	$V_R = 2200\text{ V}$			200	μA	
		$V_R = 2200\text{ V}$			15	mA	
V_F	forward voltage drop	$I_F = 150\text{ A}$			1.20	V	
		$I_F = 300\text{ A}$			1.43	V	
		$I_F = 150\text{ A}$	$T_{VJ} = 125^\circ\text{C}$			1.13	V
		$I_F = 300\text{ A}$				1.46	V
I_{FAV}	average forward current	$T_C = 100^\circ\text{C}$			120	A	
$I_{F(RMS)}$	RMS forward current	180° sine			180	A	
V_{F0}	threshold voltage	} for power loss calculation only			0.75	V	
r_F	slope resistance				1.95	m Ω	
R_{thJC}	thermal resistance junction to case				0.26	K/W	
R_{thCH}	thermal resistance case to heatsink			0.2		K/W	
P_{tot}	total power dissipation				481	W	
I_{FSM}	max. forward surge current	t = 10 ms; (50 Hz), sine	$T_{VJ} = 45^\circ\text{C}$			2.80	kA
		t = 8,3 ms; (60 Hz), sine	$V_R = 0\text{ V}$			3.03	kA
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 150^\circ\text{C}$			2.38	kA
		t = 8,3 ms; (60 Hz), sine	$V_R = 0\text{ V}$			2.57	kA
I^2t	value for fusing	t = 10 ms; (50 Hz), sine	$T_{VJ} = 45^\circ\text{C}$			39.2	kA ² s
		t = 8,3 ms; (60 Hz), sine	$V_R = 0\text{ V}$			38.1	kA ² s
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 150^\circ\text{C}$			28.3	kA ² s
		t = 8,3 ms; (60 Hz), sine	$V_R = 0\text{ V}$			27.5	kA ² s
C_J	junction capacitance	$V_R = 400\text{ V}; f = 1\text{ MHz}$	$T_{VJ} = 25^\circ\text{C}$		116	pF	



Package TO-240AA				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	
Weight					76	g	
M_D	mounting torque		2.5		4	Nm	
M_T	terminal torque		2.5		4	Nm	
$d_{Spp/App}$	creepage distance on surface striking distance through air	terminal to terminal	13.0	9.7		mm	
$d_{Spb/Apb}$		terminal to backside	16.0	16.0		mm	
V_{ISOL}	isolation voltage	t = 1 second			4800	V	
		t = 1 minute	50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA		4000	V	



Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MDA95-22N1B	MDA95-22N1B	Box	36	510571

Equivalent Circuits for Simulation

* on die level

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



Rectifier

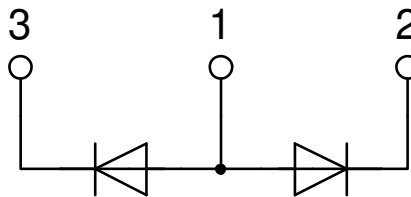
$V_{0\ max}$	threshold voltage	0.75	V
$R_{0\ max}$	slope resistance *	0.76	mΩ



Outlines TO-240AA



General tolerance: DIN ISO 2768 class „c“



Rectifier



Fig. 1 Surge overload current
 I_{TSM} , I_{FSM} : Crest value, t : duration

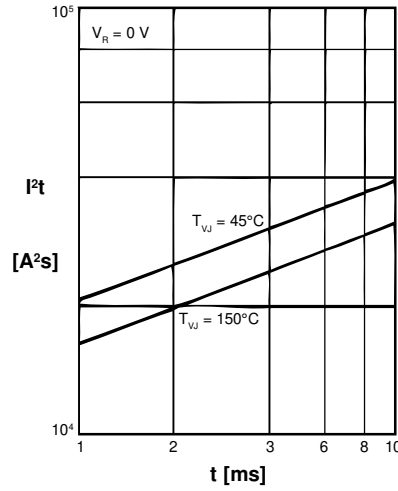


Fig. 2 I^2t versus time (1-10 ms)



Fig. 3 Maximum forward current at case temperature

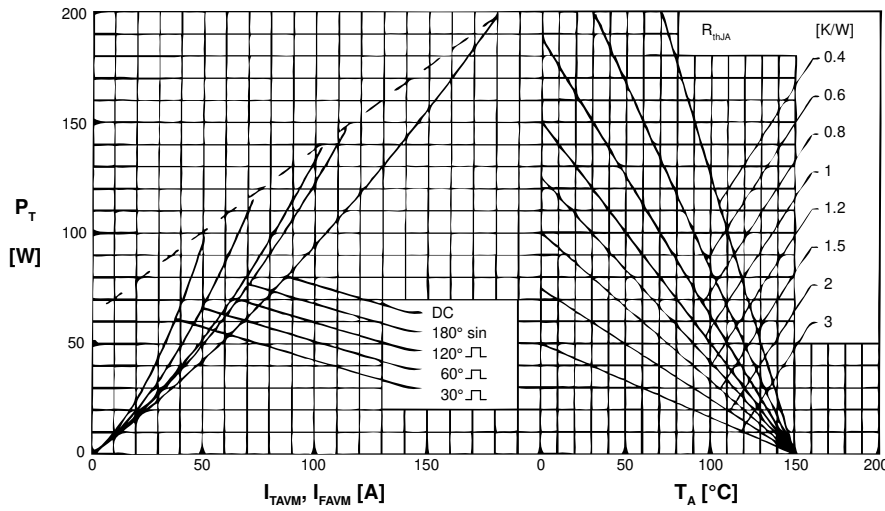


Fig. 4 Power dissipation vs. onstate current and ambient temperature (per diode)



Fig. 6 Single phase rectifier bridge: Power dissipation versus direct output current and ambient temperature; R = resistive load, L = inductive load



Rectifier



Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature



Fig. 7 Transient thermal impedance junction to case (per diode)

R_{thJC} for various conduction angles d:

d	R_{thJC} [K/W]
DC	0.26
180°	0.28
120°	0.30
60°	0.34
30°	0.38

Constants for Z_{thJC} calculation:

i	R_{thi} [K/W]	t_i [s]
1	0.013	0.0012
2	0.072	0.0470
3	0.175	0.3940



Fig. 8 Transient thermal impedance junction to heatsink (per thyristor)

R_{thJK} for various conduction angles d:

d	R_{thJK} [K/W]
DC	0.46
180°	0.48
120°	0.50
60°	0.54
30°	0.58

Constants for Z_{thJK} calculation:

i	R_{thi} [K/W]	t_i [s]
1	0.013	0.0012
2	0.072	0.0470
3	0.175	0.3940
4	0.200	1.3200