

## Standard Rectifier

$$V_{RRM} = 2 \times 1200V$$

$$I_{FAV} = 45A$$

$$V_F = 1.23V$$

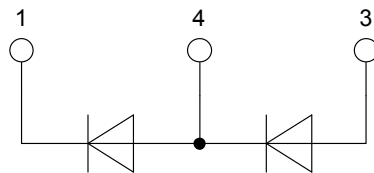
Phase leg

Part number

DSP45-12AZ



Backside: anode/cathode



### Features / Advantages:

- Planar passivated chips
- Very low leakage current
- Very low forward voltage drop
- Improved thermal behaviour

### Applications:

- Diode for main rectification
- For single and three phase bridge configurations

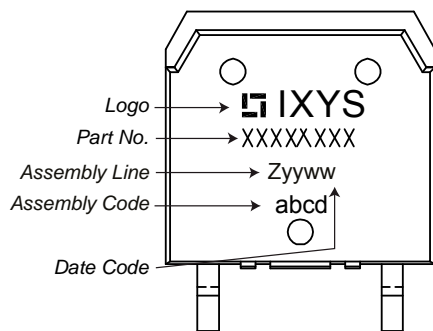
### Package: TO-268AA (D3Pak-HV)

- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0

Rectifier				Ratings		
Symbol	Definition	Conditions	min.	typ.	max.	Unit
$V_{RSM}$	max. non-repetitive reverse blocking voltage	$T_{VJ} = 25^{\circ}C$			1300	V
$V_{RRM}$	max. repetitive reverse blocking voltage	$T_{VJ} = 25^{\circ}C$			1200	V
$I_R$	reverse current	$V_R = 1200 V$	$T_{VJ} = 25^{\circ}C$		40	$\mu A$
		$V_R = 1200 V$	$T_{VJ} = 150^{\circ}C$		1.5	mA
$V_F$	forward voltage drop	$I_F = 45 A$	$T_{VJ} = 25^{\circ}C$		1.26	V
		$I_F = 90 A$			1.57	V
		$I_F = 45 A$	$T_{VJ} = 150^{\circ}C$		1.23	V
		$I_F = 90 A$			1.66	V
$I_{FAV}$	average forward current	$T_C = 130^{\circ}C$ 180° sine	$T_{VJ} = 175^{\circ}C$		45	A
$V_{FO}$	threshold voltage	} for power loss calculation only	$T_{VJ} = 175^{\circ}C$		0.81	V
$r_F$	slope resistance				9.1	m $\Omega$
$R_{thJC}$	thermal resistance junction to case				0.55	K/W
$R_{thCH}$	thermal resistance case to heatsink			0.15		K/W
$P_{tot}$	total power dissipation		$T_C = 25^{\circ}C$		270	W
$I_{FSM}$	max. forward surge current	$t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}C$		480	A
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$	$V_R = 0 V$		520	A
		$t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$	$T_{VJ} = 150^{\circ}C$		410	A
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$	$V_R = 0 V$		440	A
$I^2t$	value for fusing	$t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}C$		1.15	kA <sup>2</sup> s
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$	$V_R = 0 V$		1.13	kA <sup>2</sup> s
		$t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$	$T_{VJ} = 150^{\circ}C$		840	A <sup>2</sup> s
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$	$V_R = 0 V$		805	A <sup>2</sup> s
$C_J$	junction capacitance	$V_R = 400 V; f = 1 \text{ MHz}$	$T_{VJ} = 25^{\circ}C$		18	pF

Package TO-268AA (D3Pak-HV)			Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit
$I_{RMS}$	RMS current	per terminal			70	A
$T_{VJ}$	virtual junction temperature		-40		175	°C
$T_{op}$	operation temperature		-40		150	°C
$T_{stg}$	storage temperature		-40		150	°C
<b>Weight</b>				4		g
$F_C$	mounting force with clip		20		120	N
$d_{Spp/App}$	creepage distance on surface   striking distance through air	terminal to terminal	9.4			mm
$d_{Spbl/Apb}$		terminal to backside	5.6			mm

## Product Marking



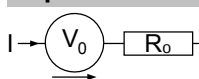
Ordering	Part Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	DSP45-12AZ	DSP45-12AZ	Tube	30	514134

Similar Part	Package	Voltage class
DSP45-16AZ	TO-268AA (D3Pak) (2HV)	1600
DSP45-12A	TO-247AD (3)	1200
DSP45-16A	TO-247AD (3)	1600
DSP45-16AR	ISOPLUS247 (3)	1600
DSP45-18A	TO-247AD (3)	1800

## Equivalent Circuits for Simulation

\* on die level

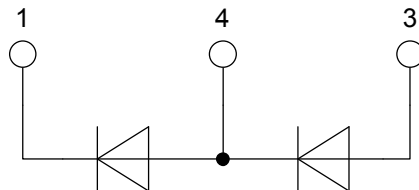
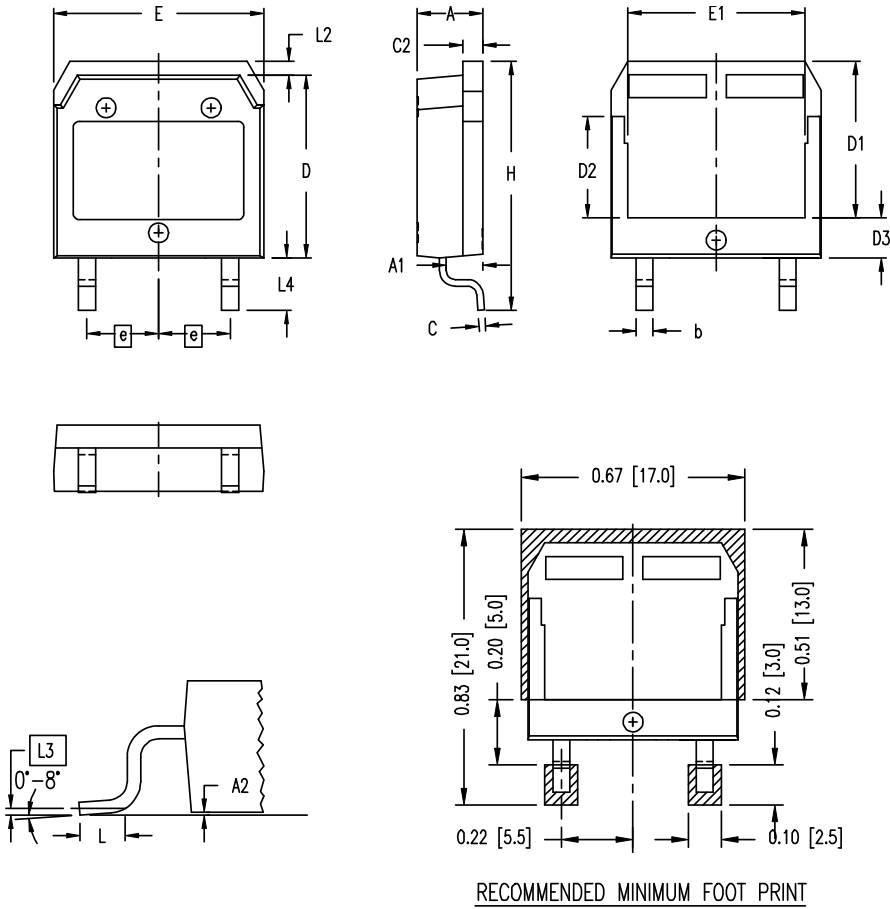
$T_{VJ} = 175\text{ °C}$



Rectifier

$V_{0\ max}$	threshold voltage	0.81	V
$R_{0\ max}$	slope resistance *	6.5	mΩ

## Outlines TO-268AA (D3Pak-HV)



## Rectifier

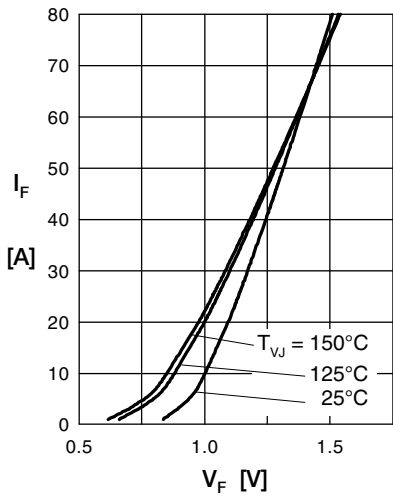


Fig. 1 Forward current versus voltage drop per diode

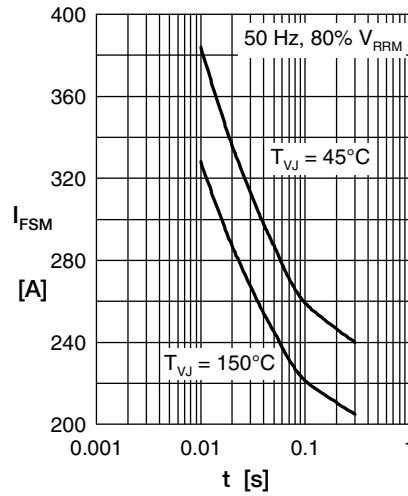


Fig. 2 Surge overload current

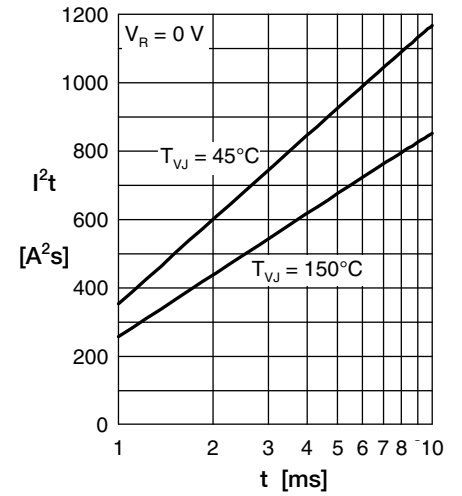


Fig. 3  $I^2t$  versus time per diode

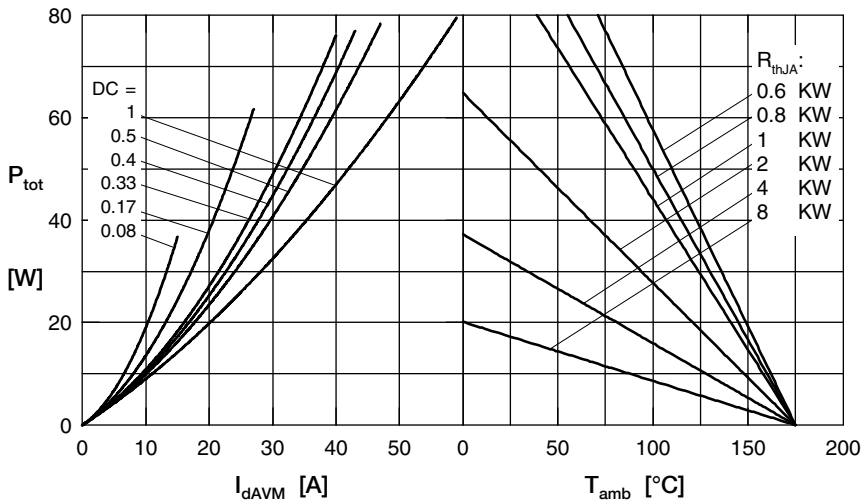


Fig. 4 Power dissipation vs. direct output current & ambient temperature

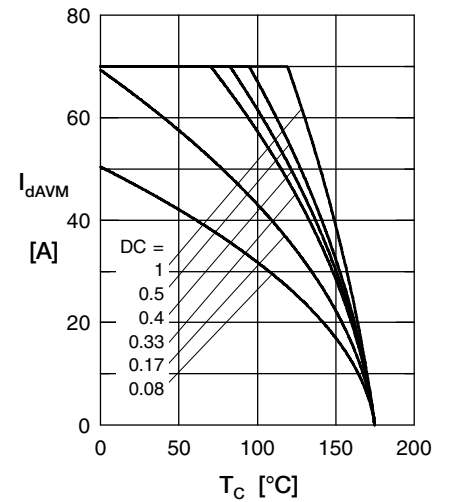


Fig. 5 Max. forward current vs. case temperature

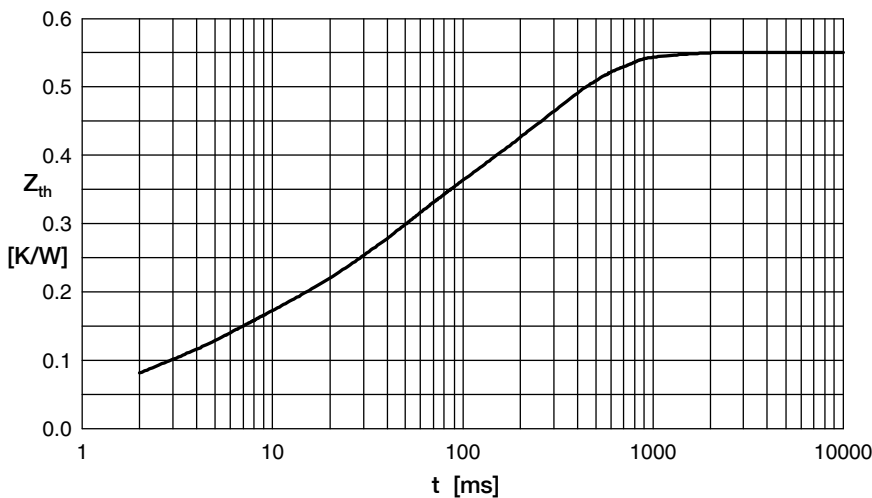


Fig. 6 Transient thermal impedance junction to case

i	$R_i$	$t_i$
1	0.033	0.0006
2	0.095	0.0039
3	0.164	0.033
4	0.258	0.272