

# FRED

$$V_{RRM} = 1200V$$

$$I_{FAV} = 109A$$

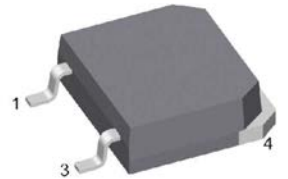
$$t_{rr} = 40ns$$

## Fast Recovery Epitaxial Diode Single Diode

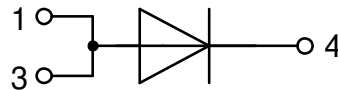
### Part number

**DSEI120-12AZ**

Marking on Product: DSEI120-12AZ



Backside: cathode



### Features / Advantages:

- Planar passivated chips
- Low leakage current
- Very short recovery time
- Improved thermal behaviour
- Very low  $I_{rm}$ -values
- Very soft recovery behaviour
- Avalanche voltage rated for reliable operation
- Soft reverse recovery for low EMI/RFI
- Low  $I_{rm}$  reduces:
  - Power dissipation within the diode
  - Turn-on loss in the commutating switch

### Applications:

- Antiparallel diode for high frequency switching devices
- Antisaturation diode
- Snubber diode
- Free wheeling diode
- Rectifiers in switch mode power supplies (SMPS)
- Uninterruptible power supplies (UPS)

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

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

### Disclaimer Notice

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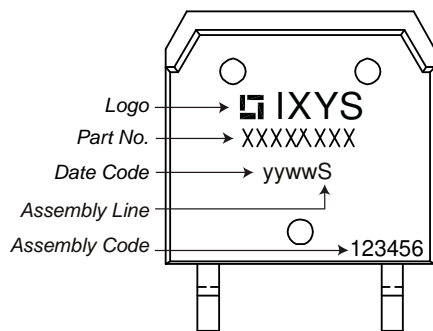


Fast Diode				Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit	
$V_{RSM}$	max. non-repetitive reverse blocking voltage	$T_{VJ} = 25^{\circ}C$			1200	V	
$V_{RRM}$	max. repetitive reverse blocking voltage	$T_{VJ} = 25^{\circ}C$			1200	V	
$I_R$	reverse current, drain current	$V_R = 1200 V$	$T_{VJ} = 25^{\circ}C$		300	$\mu A$	
		$V_R = 960 V$	$T_{VJ} = 125^{\circ}C$		20	mA	
$V_F$	forward voltage drop	$I_F = 70 A$	$T_{VJ} = 25^{\circ}C$		1,80	V	
		$I_F = 140 A$				V	
		$I_F = 70 A$	$T_{VJ} = 150^{\circ}C$		1,55	V	
		$I_F = 140 A$				V	
$I_{FAV}$	average forward current	$T_C = 60^{\circ}C$ rectangular $d = 0.5$	$T_{VJ} = 150^{\circ}C$		109	A	
$V_{FO}$	threshold voltage	} for power loss calculation only	$T_{VJ} = 150^{\circ}C$		1,20	V	
$r_F$	slope resistance				4,6	m $\Omega$	
$R_{thJC}$	thermal resistance junction to case				0,35	K/W	
$R_{thCH}$	thermal resistance case to heatsink			0,15		K/W	
$P_{tot}$	total power dissipation		$T_C = 25^{\circ}C$		357	W	
$I_{FSM}$	max. forward surge current	$t = 10 ms; (50 Hz), sine; V_R = 0 V$	$T_{VJ} = 45^{\circ}C$		600	A	
$C_J$	junction capacitance	$V_R = 600V f = 1 MHz$	$T_{VJ} = 25^{\circ}C$		56	pF	
$I_{RM}$	max. reverse recovery current	} $I_F = 75 A; V_R = 350 V$ $-di_F/dt = 200 A/\mu s$	$T_{VJ} = 25^{\circ}C$		tbd	A	
			$T_{VJ} = 100^{\circ}C$		25	A	
$t_{rr}$	reverse recovery time		$T_{VJ} = 25^{\circ}C$		40	ns	
			$T_{VJ} = 100^{\circ}C$		tbd	ns	



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		150	°C
$T_{op}$	operation temperature		-40		125	°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
$d_{Spb/Apb}$		terminal to backside	5,6			mm

### Product Marking



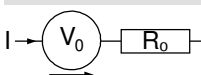
Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	DSEI120-12AZ-TUB	DSEI120-12AZ	Tube	30	520332

Similar Part	Package	Voltage class
DSEP90-12AZ	TO-268AA (D3Pak) (2HV)	1200
DSEP60-12AZ	TO-268AA (D3Pak) (2HV)	1200

### Equivalent Circuits for Simulation

\* on die level

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



**Fast Diode**

$V_{0\ max}$  threshold voltage

1,2

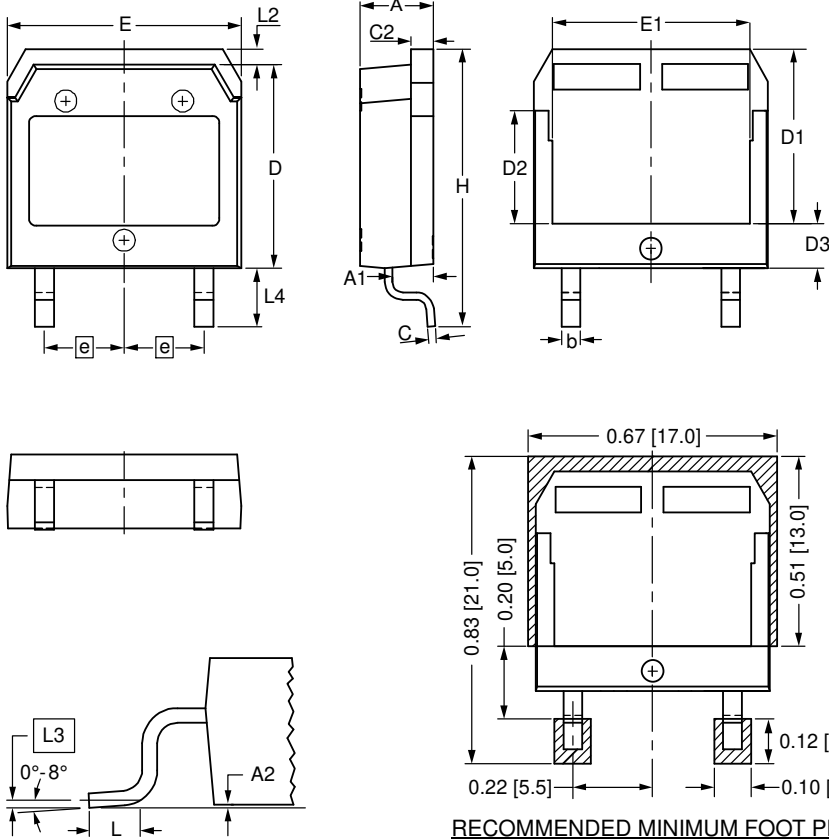
V

$R_{0\ max}$  slope resistance \*

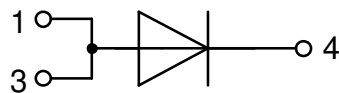
mΩ



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



Dim.	Millimeter		Inches	
	min	max	min	max
A	4.90	5.10	0.193	0.201
A1	2.70	2.90	0.106	0.114
A2	0.02	0.25	0.001	0.010
b	1.15	1.45	0.045	0.057
C	0.40	0.65	0.016	0.026
C2	1.45	1.60	0.057	0.063
D	13.80	14.00	0.543	0.551
D1	11.80	12.10	0.465	0.476
D2	7.50	7.80	0.295	0.307
D3	2.90	3.20	0.114	0.126
E	15.85	16.05	0.624	0.632
E1	13.30	13.60	0.524	0.535
e	5.450 BSC		0.215 BSC	
H	18.70	19.10	0.736	0.752
L	1.70	2.00	0.067	0.079
L2	1.00	1.15	0.039	0.045
L3	0.250 BSC		0.010 BSC	
L4	3.80	4.10	0.150	0.161



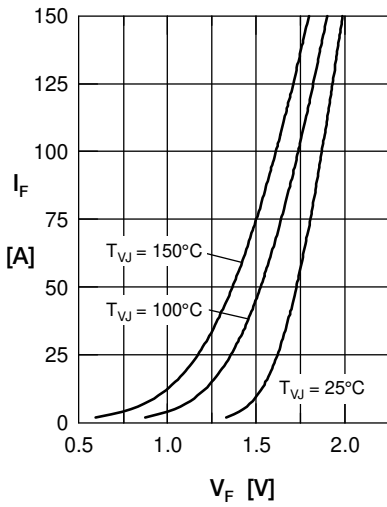
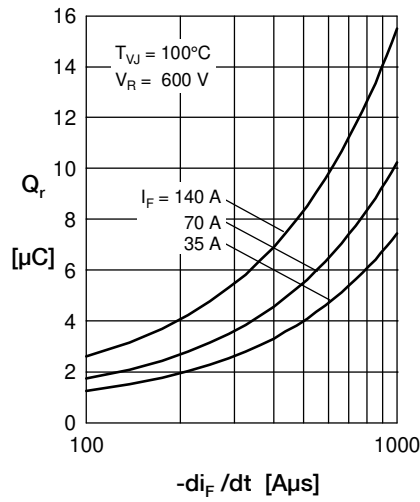
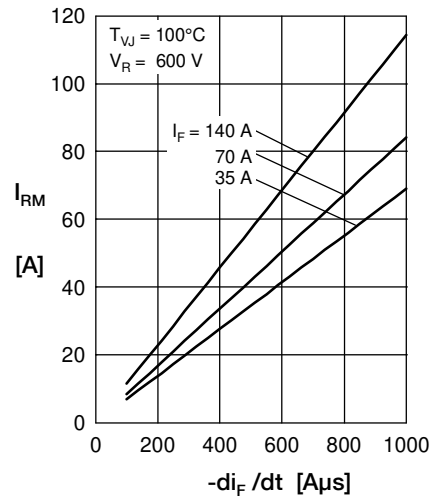
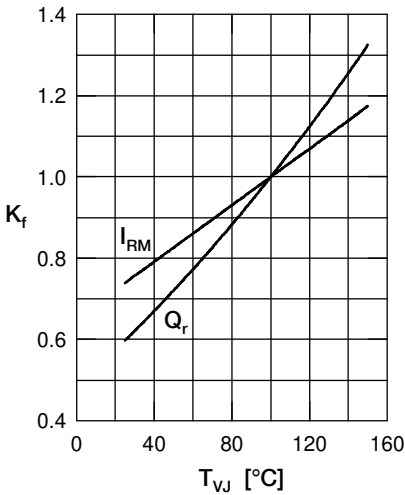
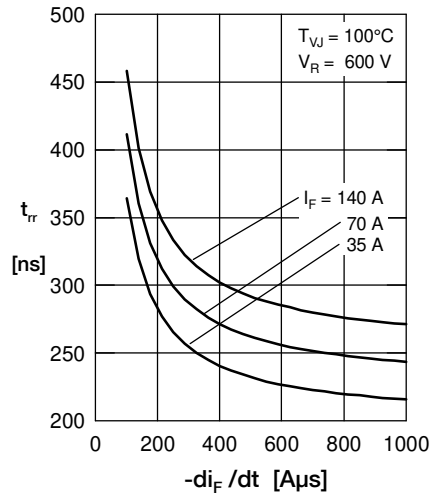
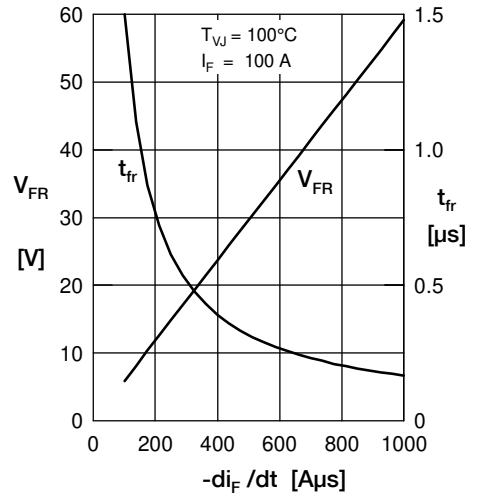
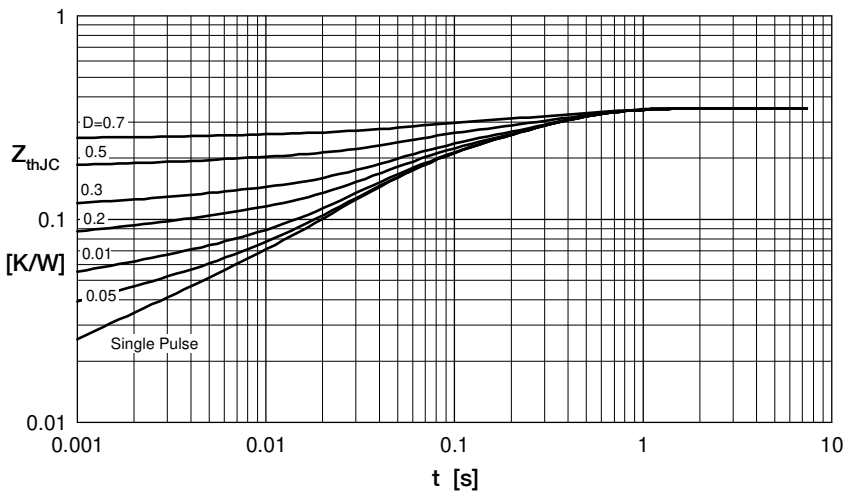
**Fast Diode**

 Fig. 1 Forward current  $I_F$  vs.  $V_F$ 

 Fig. 2 Reverse recovery charge  $Q_r$  versus  $-di_F/dt$ 

 Fig. 3 Peak reverse current  $I_{RM}$  versus  $-di_F/dt$ 

 Fig. 4 Dynamic parameters  $Q_r$ ,  $I_{RM}$  versus  $T_{VJ}$ 

 Fig. 5 Recovery time  $t_{tr}$  versus  $-di_F/dt$ 

 Fig. 6 Peak forward voltage  $V_{FR}$  and  $t_{fr}$  versus  $-di_F/dt$ 


Fig. 7 Transient thermal resistance junction to case at various duty cycles

 Constants for  $Z_{thJC}$  calculation:

i	$R_{thi}$ (K/W)	$t_i$ (s)
1	0.017	0.00038
2	0.0184	0.0026
3	0.1296	0.0387
4	0.185	0.274