

## HiPerFRED

$V_{RRM}$  = 600 V  
 $I_{FAV}$  = 60 A  
 $t_{rr}$  = 35 ns

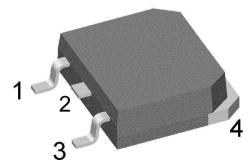
High Performance Fast Recovery Diode

Low Loss and Soft Recovery

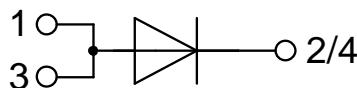
Single Diode

Part number

DSEP60-06AT



Backside: cathode



**Features / Advantages:**

- Planar passivated chips
- Very 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)

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

**Terms .Conditions of usage:**

The data contained in this product data sheet is exclusively intended for technically trained staff. The user will have to evaluate the suitability of the product for the intended application and the completeness of the product data with respect to his application. The specifications of our components may not be considered as an assurance of component characteristics. The information in the valid application- and assembly notes must be considered. Should you require product information in excess of the data given in this product data sheet or which concerns the specific application of your product, please contact your local sales office.

Due to technical requirements our product may contain dangerous substances. For information on the types in question please contact your local sales office. Should you intend to use the product in aviation, in health or life endangering or life support applications, please notify. For any such application we urgently recommend

- to perform joint risk and quality assessments;
- the conclusion of quality agreements;
- to establish joint measures of an ongoing product survey, and that we may make delivery dependent on the realization of any such measures.

## Fast Diode

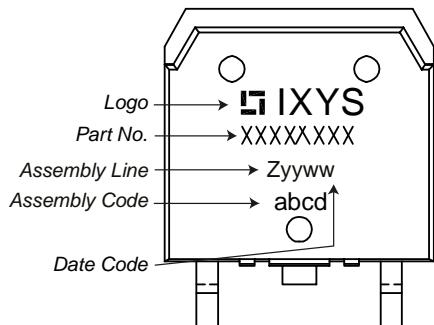
Symbol	Definition	Conditions	Ratings			
			min.	typ.	max.	
$V_{RSM}$	max. non-repetitive reverse blocking voltage	$T_{VJ} = 25^\circ\text{C}$			600	V
$V_{RRM}$	max. repetitive reverse blocking voltage	$T_{VJ} = 25^\circ\text{C}$			600	V
$I_R$	reverse current, drain current	$V_R = 600 \text{ V}$ $V_R = 600 \text{ V}$	$T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 150^\circ\text{C}$		650 2.5	$\mu\text{A}$ mA
$V_F$	forward voltage drop	$I_F = 60 \text{ A}$ $I_F = 120 \text{ A}$ $I_F = 60 \text{ A}$ $I_F = 120 \text{ A}$	$T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 150^\circ\text{C}$		2.04 2.33 1.39 1.70	V V V V
$I_{FAV}$	average forward current	$T_C = 130^\circ\text{C}$ rectangular	$T_{VJ} = 175^\circ\text{C}$		60	A
$V_{F0}$ $r_F$	threshold voltage slope resistance } for power loss calculation only		$T_{VJ} = 175^\circ\text{C}$		0.95 5	V $\text{m}\Omega$
$R_{thJC}$	thermal resistance junction to case				0.45	K/W
$R_{thCH}$	thermal resistance case to heatsink			0.15		K/W
$P_{tot}$	total power dissipation		$T_C = 25^\circ\text{C}$		330	W
$I_{FSM}$	max. forward surge current	$t = 10 \text{ ms}; (50 \text{ Hz}), \text{sine}; V_R = 0 \text{ V}$	$T_{VJ} = 45^\circ\text{C}$		600	A
$C_J$	junction capacitance	$V_R = 400 \text{ V}$ $f = 1 \text{ MHz}$	$T_{VJ} = 25^\circ\text{C}$		67	pF
$I_{RM}$	max. reverse recovery current		$T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 100^\circ\text{C}$		8 13	A A
$t_{rr}$	reverse recovery time	$I_F = 60 \text{ A}; V_R = 300 \text{ V}$ $-di_F/dt = 200 \text{ A}/\mu\text{s}$	$T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 100^\circ\text{C}$		35 110	ns ns

## Package TO-268AA (D3Pak)

Symbol	Definition	Conditions	Ratings		
			min.	typ.	max.
$I_{RMS}$	$RMS$ current	per terminal <sup>1)</sup>			70 A
$T_{VJ}$	virtual junction temperature		-55		175 °C
$T_{op}$	operation temperature		-55		150 °C
$T_{stg}$	storage temperature		-55		150 °C
<b>Weight</b>				5	g
$F_c$	mounting force with clip		20		120 N

<sup>1)</sup>  $I_{RMS}$  is typically limited by the pin-to-chip resistance (1); or by the current capability of the chip (2). In case of (1) and a product with multiple pins for one chip-potential, the current capability can be increased by connecting the pins as one contact.

## Product Marking



Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	DSEP60-06AT	DSEP60-06AT	Tube	30	474770

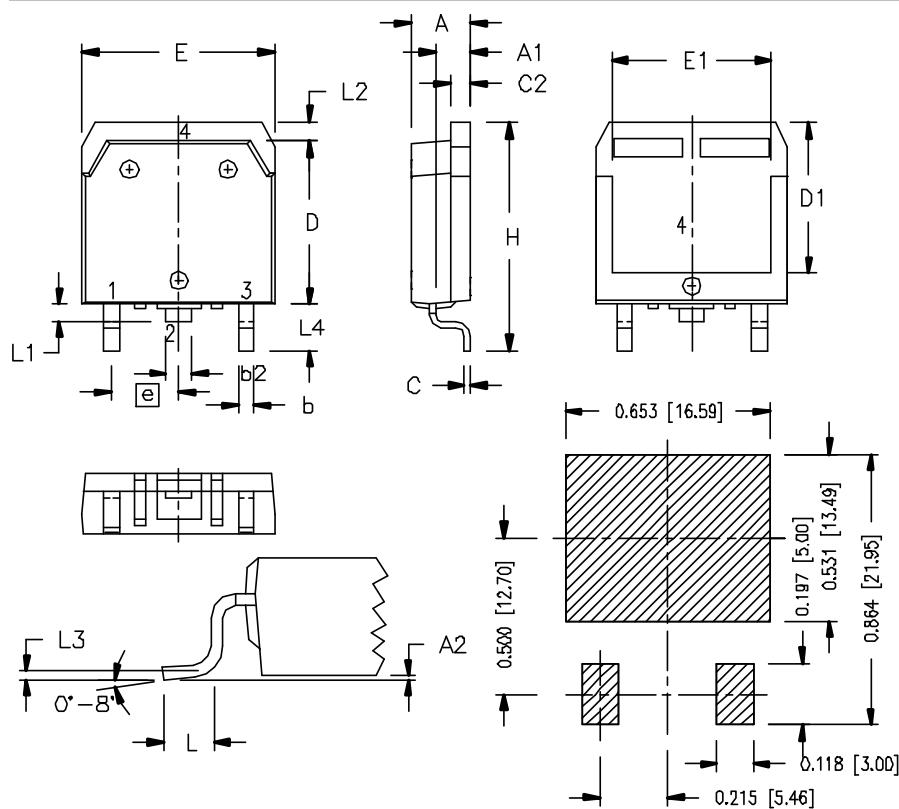
Similar Part	Package	Voltage class
DSEP60-06A	TO-247AD (2)	600
DHG60I600HA	TO-247AD (2)	600
DPH30IS600HI	ISOPLUS247 (2)	600

## Equivalent Circuits for Simulation

<sup>\*</sup> on die level $T_{VJ} = 175$  °C

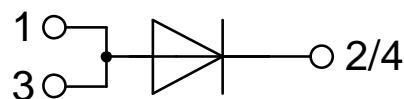
$I$	$V_0$	$R_0$	Fast Diode	
$V_{0\ max}$	threshold voltage	0.95		V
$R_{0\ max}$	slope resistance *	2.4		$\text{m}\Omega$

## Outlines TO-268AA (D3Pak)



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	0.100
b	1.15	1.45	0.045	0.057
b2	1.90	2.10	0.075	0.083
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	12.40	12.70	0.488	0.500
E	15.85	16.05	0.624	0.632
E1	13.30	13.60	0.524	0.535
e	5.45 BSC		0.215 BSC	
H	18.70	19.10	0.736	0.752
L	2.40	2.70	0.094	0.106
L1	1.20	1.40	0.047	0.055
L2	1.00	1.15	0.039	0.045
L3	0.25 BSC		0.100 BSC	
L4	3.80	4.10	0.150	0.161

RECOMMENDED MINIMUM FOOT PRINT FOR SMD



## Fast Diode

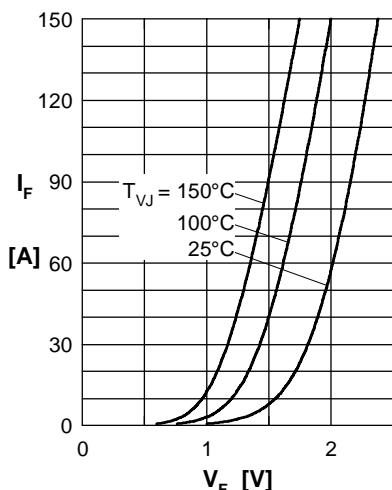
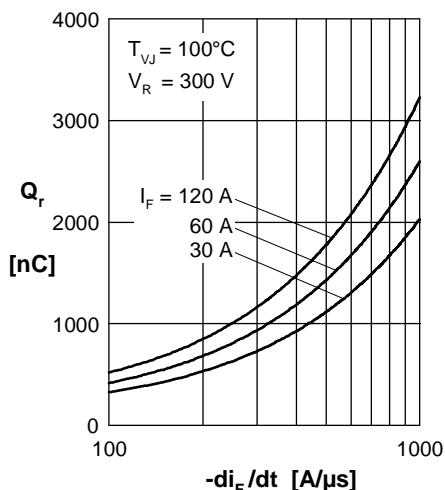
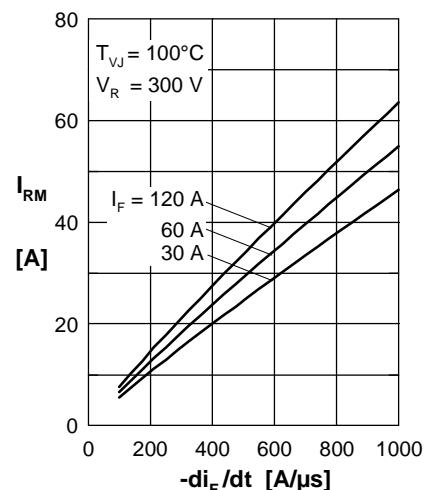
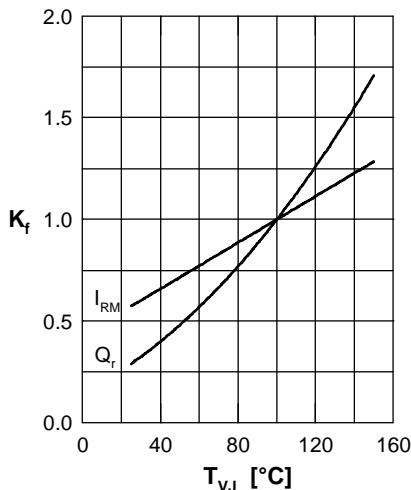
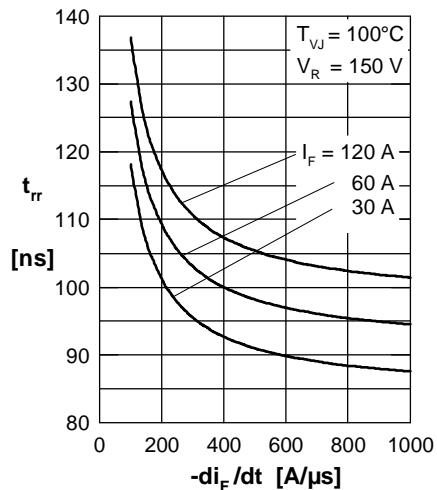
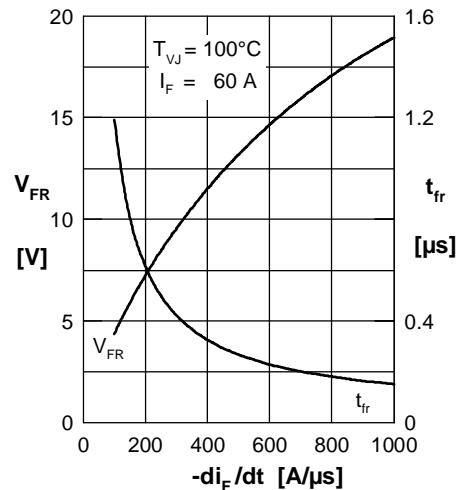
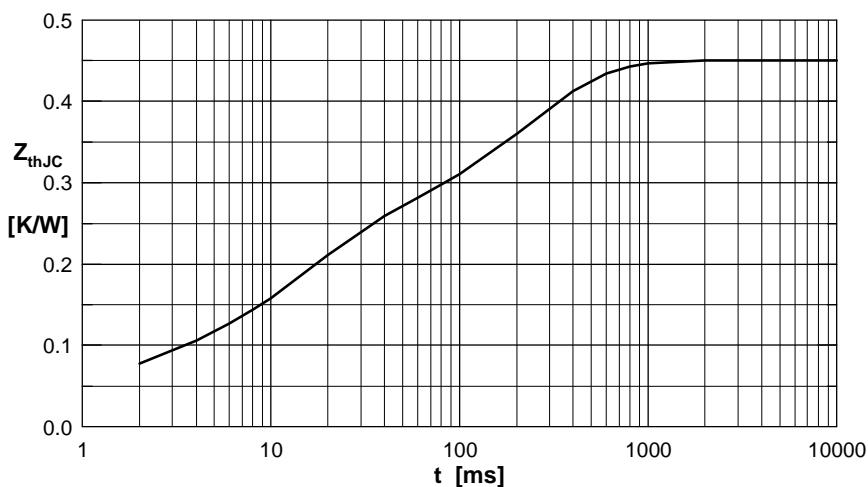
Fig. 1 Forward current  $I_F$  versus  $V_F$ Fig. 2 Typ. reverse recovery charge  $Q_r$  versus  $-di_F/dt$ Fig. 3 Typ. peak reverse current  $I_{RM}$  versus  $-di_F/dt$ Fig. 4 Typ. dynamic parameters  $Q_r$ ,  $I_{RM}$  versus  $T_{VJ}$ Fig. 5 Typ. recovery time  $t_{rr}$  versus  $-di_F/dt$ Fig. 6 Typ. peak forward voltage  $V_{FR}$  and  $t_{fr}$  versus  $di_F/dt$ 

Fig. 7 Transient thermal resistance junction to case

Constants for  $Z_{thJC}$  calculation:

i	$R_{thi}$ (K/W)	$t_i$ (s)
1	0.0050	0.0001
2	0.0550	0.0010
3	0.1750	0.0140
4	0.2150	0.2300