

# HiPerFRED

$$V_{RRM} = 1200\text{ V}$$

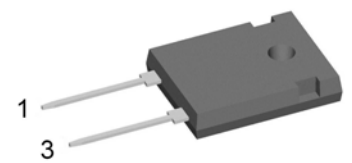
$$I_{FAV} = 60\text{ A}$$

$$t_{rr} = 40\text{ ns}$$

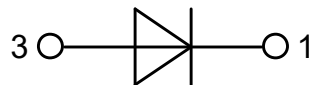
High Performance Fast Recovery Diode  
 Low Loss and Soft Recovery  
 Single Diode

Part number

**DSEP60-12A**



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-247

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

### Disclaimer Notice

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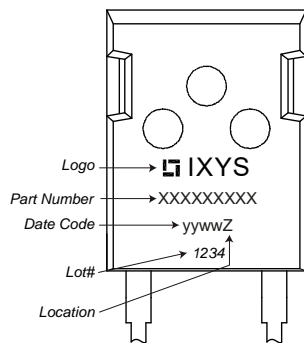


Fast Diode				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
$V_{RSM}$	max. non-repetitive reverse blocking voltage					1200	V
$V_{RRM}$	max. repetitive reverse blocking voltage					1200	V
$I_R$	reverse current, drain current	$V_R = 1200\text{ V}$	$T_{VJ} = 25^\circ\text{C}$			650	$\mu\text{A}$
		$V_R = 1200\text{ V}$	$T_{VJ} = 150^\circ\text{C}$			2,5	mA
$V_F$	forward voltage drop	$I_F = 60\text{ A}$	$T_{VJ} = 25^\circ\text{C}$			2,66	V
				$I_F = 120\text{ A}$			3,18
		$I_F = 60\text{ A}$	$T_{VJ} = 150^\circ\text{C}$				1,81
				$I_F = 120\text{ A}$			2,40
$I_{FAV}$	average forward current	$T_c = 115^\circ\text{C}$ rectangular $d = 0.5$	$T_{VJ} = 175^\circ\text{C}$				60
$V_{F0}$	threshold voltage	} for power loss calculation only				1,08	V
$r_F$	slope resistance						
$R_{thJC}$	thermal resistance junction to case					0,45	K/W
$R_{thCH}$	thermal resistance case to heatsink				0,25		K/W
$P_{tot}$	total power dissipation			$T_c = 25^\circ\text{C}$		330	W
$I_{FSM}$	max. forward surge current	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}; V_R = 0\text{ V}$		$T_{VJ} = 45^\circ\text{C}$		500	A
$C_J$	junction capacitance	$V_R = 600\text{ V}$ $f = 1\text{ MHz}$		$T_{VJ} = 25^\circ\text{C}$		30	pF
$I_{RM}$	max. reverse recovery current	} $I_F = 60\text{ A}; V_R = 600\text{ V}$		$T_{VJ} = 25^\circ\text{C}$		13	A
				$T_{VJ} = 100^\circ\text{C}$		20	A
$t_{rr}$	reverse recovery time	} $-di_F/dt = 200\text{ A}/\mu\text{s}$		$T_{VJ} = 25^\circ\text{C}$		80	ns
				$T_{VJ} = 100^\circ\text{C}$		220	ns



Package TO-247			Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit
$I_{RMS}$	RMS current	per terminal			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>				6		g
$M_D$	mounting torque		0,8		1,2	Nm
$F_C$	mounting force with clip		20		120	N

**Product Marking**



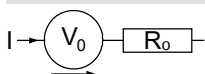
Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	DSEP60-12A	DSEP60-12A	Tube	30	477133

Similar Part	Package	Voltage class
DSEP60-12B	TO-247AD (2)	1200
DSEP60-12AR	ISOPLUS247 (2)	1200
DHG60I1200HA	TO-247AD (2)	1200

**Equivalent Circuits for Simulation**

\* on die level

$T_{VJ} = 175^{\circ}C$

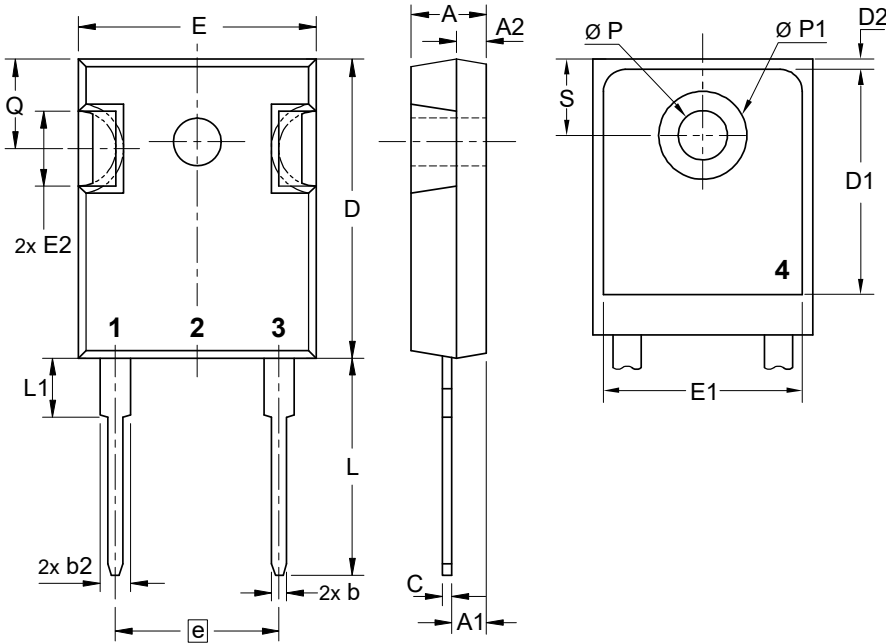


**Fast Diode**

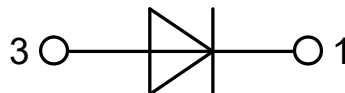
$V_{0\ max}$	threshold voltage	1,08	V
$R_{0\ max}$	slope resistance *	6,8	mΩ



**Outlines TO-247**



Sym.	Inches		Millimeter	
	min.	max.	min.	max.
A	0.185	0.209	4.70	5.30
A1	0.087	0.102	2.21	2.59
A2	0.059	0.098	1.50	2.49
D	0.819	0.845	20.79	21.45
E	0.610	0.640	15.48	16.24
E2	0.170	0.216	4.31	5.48
e	0.430 BSC		10.92 BSC	
L	0.780	0.800	19.80	20.30
L1	-	0.177	-	4.49
Ø P	0.140	0.144	3.55	3.65
Q	0.212	0.244	5.38	6.19
S	0.242 BSC		6.14 BSC	
b	0.039	0.055	0.99	1.40
b2	0.065	0.094	1.65	2.39
b4	0.102	0.135	2.59	3.43
c	0.015	0.035	0.38	0.89
D1	0.515	-	13.07	-
D2	0.020	0.053	0.51	1.35
E1	0.530	-	13.45	-
Ø P1	-	0.29	-	7.39



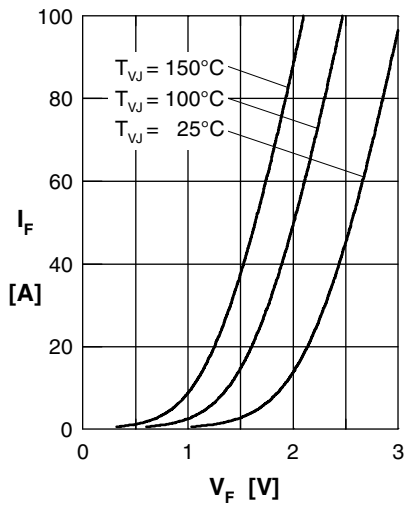
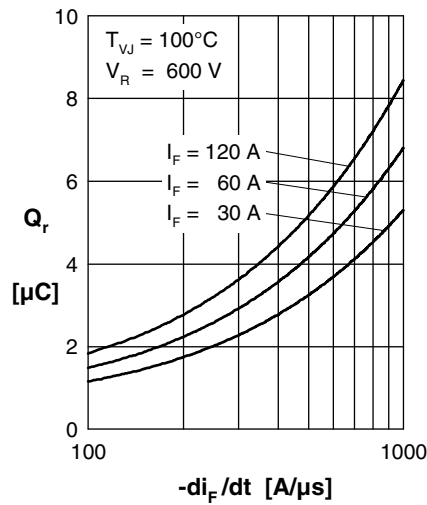
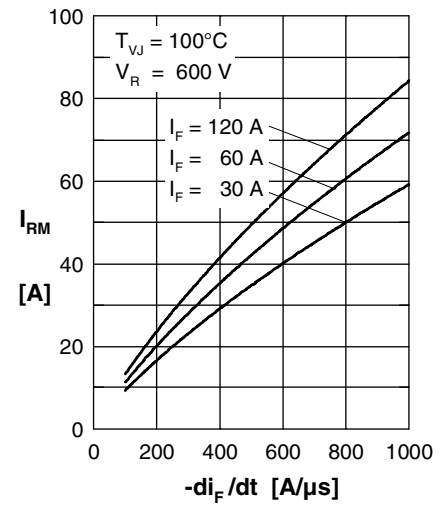
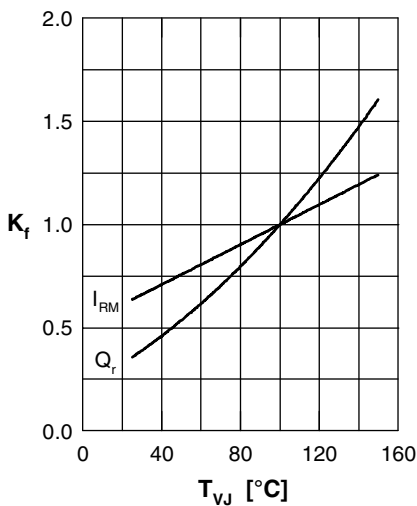
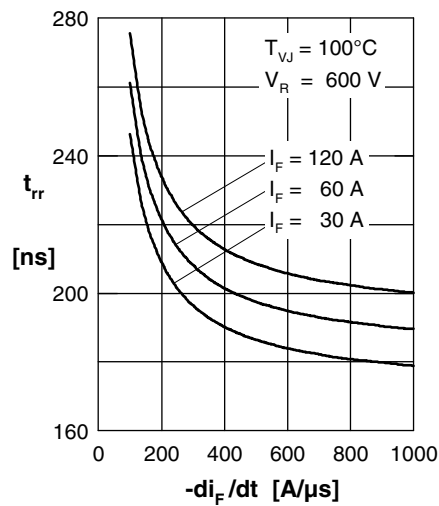
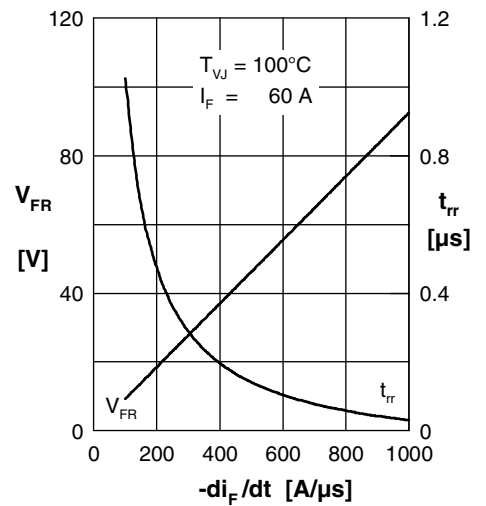
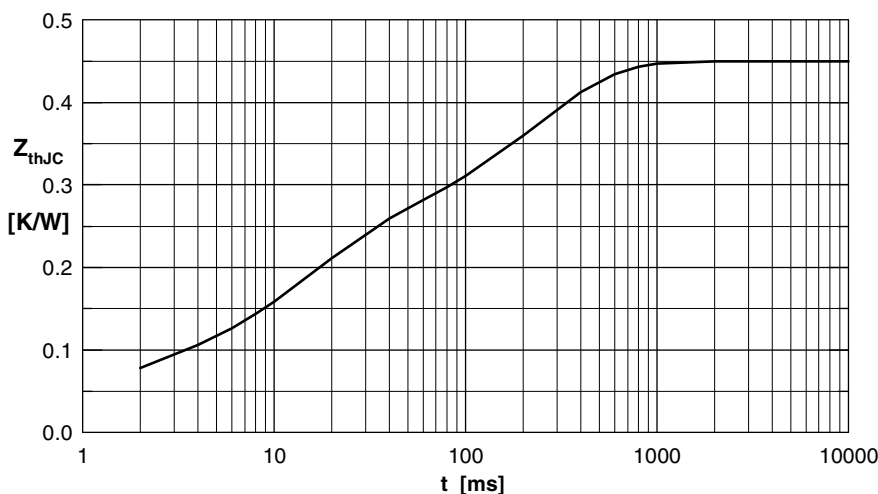
**Fast Diode**

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

 Fig. 2 Typ. reverse recov. 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  $t_{rr}$  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