



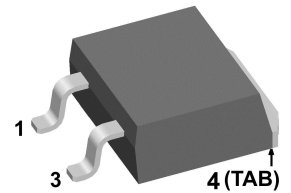
# HiPerFRED

$V_{RRM} = 1200\text{ V}$   
 $I_{FAV} = 12\text{ A}$   
 $t_{rr} = 40\text{ ns}$

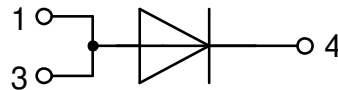
High Performance Fast Recovery Diode  
 Low Loss and Soft Recovery  
 Single Diode

Part number

**DSEP12-12AZ**



Backside: cathode



**Features / Advantages:**

- Planar passivated chips
- Very low leakage current
- Very short recovery time
- Improved thermal behaviour
- Very low I<sub>rm</sub>-values
- Very soft recovery behaviour
- Avalanche voltage rated for reliable operation
- Soft reverse recovery for low EMI/RFI
- Low I<sub>rm</sub> 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-263 (D2Pak-HV)

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

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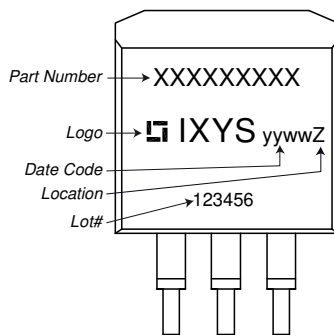


Fast Diode				Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit	
$V_{RSM}$	max. non-repetitive reverse blocking voltage	$T_{VJ} = 25^{\circ}C$			1200	V	
$V_{RRM}$	max. repetitive reverse blocking voltage	$T_{VJ} = 25^{\circ}C$			1200	V	
$I_R$	reverse current, drain current	$V_R = 1200 V$	$T_{VJ} = 25^{\circ}C$		100	$\mu A$	
		$V_R = 1200 V$	$T_{VJ} = 150^{\circ}C$		0.5	mA	
$V_F$	forward voltage drop	$I_F = 15 A$	$T_{VJ} = 25^{\circ}C$		2.62	V	
		$I_F = 30 A$			3.19	V	
		$I_F = 15 A$	$T_{VJ} = 150^{\circ}C$		1.87	V	
		$I_F = 30 A$			2.56	V	
$I_{FAV}$	average forward current	$T_C = 135^{\circ}C$ rectangular $d = 0.5$	$T_{VJ} = 175^{\circ}C$		12	A	
$V_{FO}$	threshold voltage	} for power loss calculation only	$T_{VJ} = 175^{\circ}C$		1.03	V	
$r_F$	slope resistance				46	m $\Omega$	
$R_{thJC}$	thermal resistance junction to case				1.6	K/W	
$R_{thCH}$	thermal resistance case to heatsink			0.25		K/W	
$P_{tot}$	total power dissipation		$T_C = 25^{\circ}C$		95	W	
$I_{FSM}$	max. forward surge current	$t = 10 ms; (50 Hz), sine; V_R = 0 V$	$T_{VJ} = 45^{\circ}C$		90	A	
$C_J$	junction capacitance	$V_R = 600 V \quad f = 1 MHz$	$T_{VJ} = 25^{\circ}C$		5	pF	
$I_{RM}$	max. reverse recovery current	} $I_F = 15 A; V_R = 600 V$ $-di_F/dt = 200 A/\mu s$	$T_{VJ} = 25^{\circ}C$		6	A	
			$T_{VJ} = 100^{\circ}C$		9	A	
$t_{rr}$	reverse recovery time		$T_{VJ} = 25^{\circ}C$		40	ns	
			$T_{VJ} = 100^{\circ}C$		140	ns	



Package TO-263 (D2Pak-HV)		Ratings				
Symbol	Definition	Conditions	min.	typ.	max.	Unit
$I_{RMS}$	RMS current	per terminal			35	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>				1.5		g
$F_C$	mounting force with clip		20		60	N
$d_{Spp/App}$	creepage distance on surface / striking distance through air	terminal to terminal	4.2			mm
$d_{Spb/Apb}$		terminal to backside	4.7			mm

**Product Marking**



Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	DSEP12-12AZ-TRL	DSEP12-12AZ-TRL	Tape & Reel	800	515345
Alternative	DSEP12-12AZ-TUB	DSEP12-12AZ	Tube	50	523894

Similar Part	Package	Voltage class
DSEP12-12BZ	TO-263AB (D2Pak) (2HV)	1200

**Equivalent Circuits for Simulation**

\* on die level

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



**Fast Diode**

$V_{0\ max}$	threshold voltage	1.03	V
$R_{0\ max}$	slope resistance *	43	mΩ

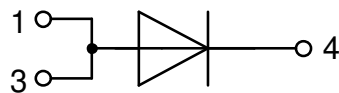


**Outlines TO-263 (D2Pak-HV)**



Dim.	Millimeter		Inches	
	min	max	min	max
A	4.06	4.83	0.160	0.190
A1	typ. 0.10		typ. 0.004	
A2	2.41		0.095	
b	0.51	0.99	0.020	0.039
b2	1.14	1.40	0.045	0.055
c	0.40	0.74	0.016	0.029
c2	1.14	1.40	0.045	0.055
D	8.38	9.40	0.330	0.370
D1	8.00	8.89	0.315	0.350
D2	2.3		0.091	
E	9.65	10.41	0.380	0.410
E1	6.22	8.50	0.245	0.335
e	2,54 BSC		0,100 BSC	
e1	4.28		0.169	
H	14.61	15.88	0.575	0.625
L	1.78	2.79	0.070	0.110
L1	1.02	1.68	0.040	0.066
W	typ. 0.02	0.040	typ. 0.0008	0.002

*All dimensions conform with and/or within JEDEC standard.*





**Fast Diode**

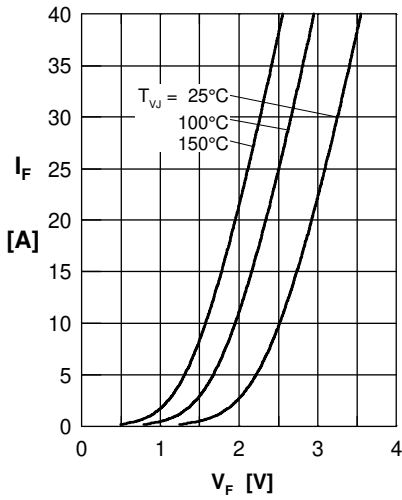


Fig. 1 Forward current  $I_F$  versus  $V_F$

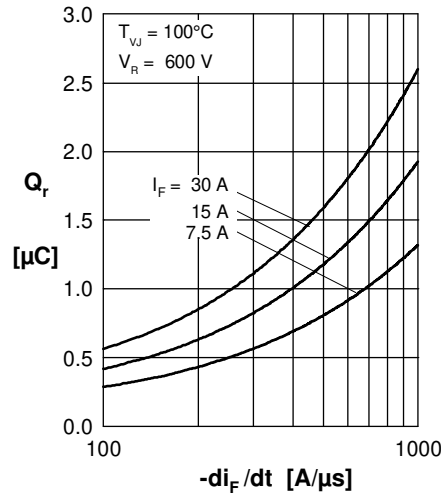


Fig. 2 Typ. reverse recov. charge  $Q_r$  versus  $-di_F/dt$

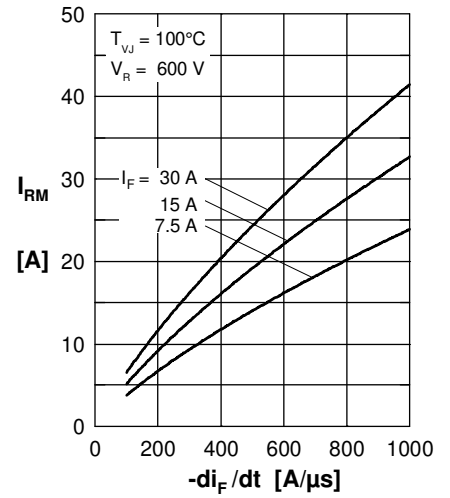


Fig. 3 Typ. peak reverse current  $I_{RM}$  versus  $-di_F/dt$

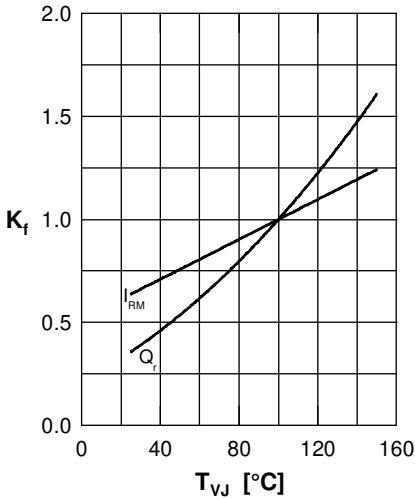


Fig. 4 Dynamic parameters  $Q_r$ ,  $I_{RM}$  versus  $T_{vj}$

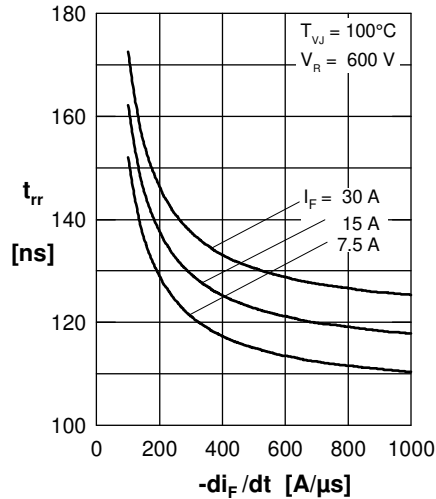


Fig. 5 Typ. recovery time  $t_{rr}$  versus  $-di_F/dt$

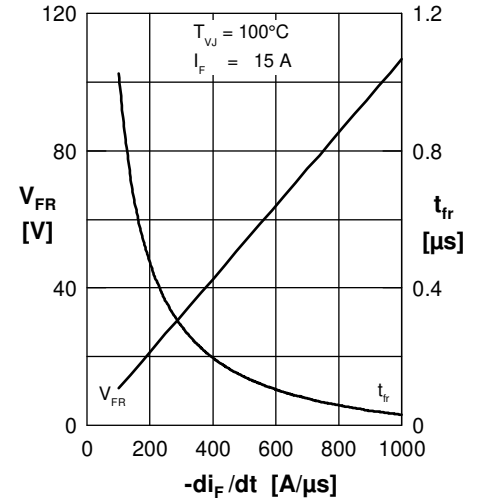


Fig. 6 Typ. peak forward voltage  $V_{FR}$  and  $t_{fr}$  versus  $di_F/dt$

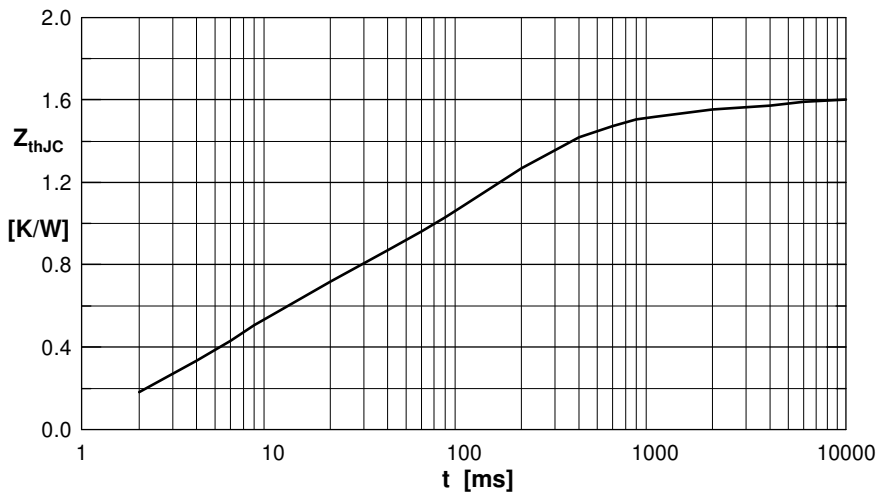


Fig. 7 Transient thermal impedance junction to case

Constants for  $Z_{thJC}$  calculation:

i	$R_{thi}$ (K/W)	$t_i$ (s)
1	0.160	0.0010
2	0.100	0.0150
3	0.500	0.0040
4	0.840	0.1200