



# FRED

$V_{RRM}$	=	1200 V
$I_{FAV}$	=	20 A
$t_{rr}$	=	50 ns

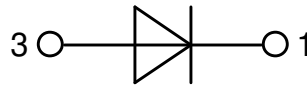
## Fast Recovery Epitaxial Diode Single Diode

**Part number**

**DSEI20-12A**



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-220**

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

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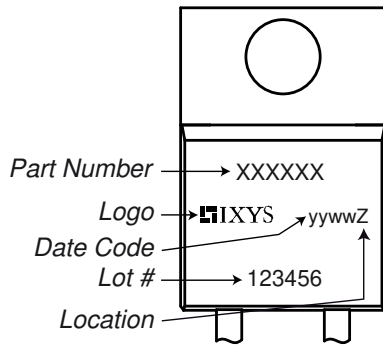


Fast Diode				Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit	
$V_{RSM}$	max. non-repetitive reverse blocking voltage	$T_{VJ} = 25^{\circ}C$			1200	V	
$V_{RRM}$	max. repetitive reverse blocking voltage	$T_{VJ} = 25^{\circ}C$			1200	V	
$I_R$	reverse current, drain current	$V_R = 1200\text{ V}$	$T_{VJ} = 25^{\circ}C$		750	$\mu A$	
		$V_R = 960\text{ V}$	$T_{VJ} = 125^{\circ}C$		7	mA	
$V_F$	forward voltage drop	$I_F = 20\text{ A}$	$T_{VJ} = 25^{\circ}C$		2.38	V	
		$I_F = 40\text{ A}$			2.72	V	
		$I_F = 20\text{ A}$	$T_{VJ} = 150^{\circ}C$		1.99	V	
		$I_F = 40\text{ A}$			2.43	V	
$I_{FAV}$	average forward current	$T_C = 110^{\circ}C$ rectangular $d = 0.5$	$T_{VJ} = 150^{\circ}C$		20	A	
$V_{FO}$	threshold voltage	} for power loss calculation only	$T_{VJ} = 150^{\circ}C$		1.69	V	
$r_F$	slope resistance				20.2	m $\Omega$	
$R_{thJC}$	thermal resistance junction to case				0.8	K/W	
$R_{thCH}$	thermal resistance case to heatsink			0.50		K/W	
$P_{tot}$	total power dissipation		$T_C = 25^{\circ}C$		155	W	
$I_{FSM}$	max. forward surge current	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}; V_R = 0\text{ V}$	$T_{VJ} = 45^{\circ}C$		200	A	
$C_J$	junction capacitance	$V_R = 600\text{ V}$ $f = 1\text{ MHz}$	$T_{VJ} = 25^{\circ}C$		14	pF	
$I_{RM}$	max. reverse recovery current	} $I_F = 15\text{ A}; V_R = 540\text{ V}$ $-di_F/dt = 200\text{ A}/\mu s$	$T_{VJ} = 25^{\circ}C$		8	A	
			$T_{VJ} = 100^{\circ}C$		12	A	
$t_{rr}$	reverse recovery time		$T_{VJ} = 25^{\circ}C$		125	ns	
			$T_{VJ} = 100^{\circ}C$		250	ns	



Package TO-220			Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit
$I_{RMS}$	RMS current	per terminal			35	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>				2		g
$M_D$	mounting torque		0.4		0.6	Nm
$F_C$	mounting force with clip		20		60	N

**Product Marking**

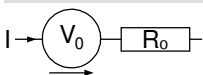


Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	DSEI20-12A	DSEI20-12A	Tube	50	463191

**Equivalent Circuits for Simulation**

*\* on die level*

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

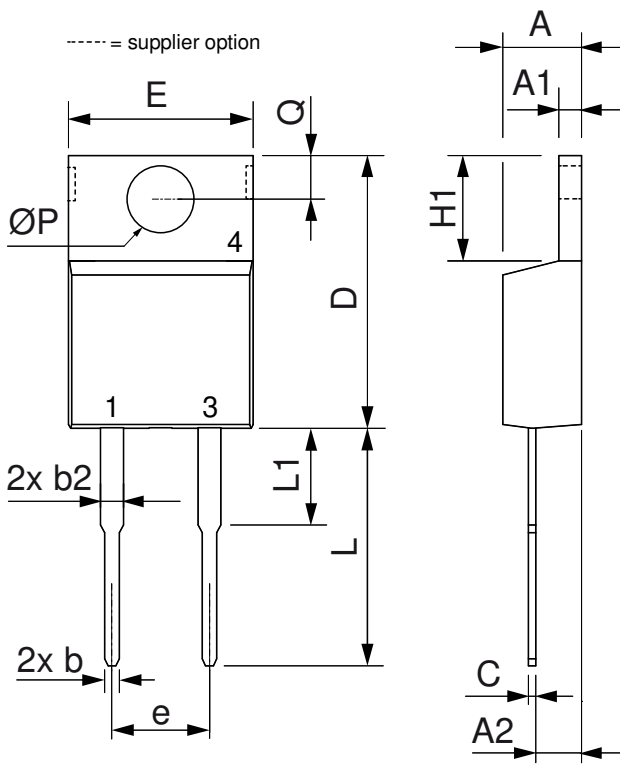


**Fast Diode**

$V_{0\ max}$	threshold voltage	1.69	V
$R_{0\ max}$	slope resistance *	17	mΩ



**Outlines TO-220**



Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.32	4.82	0.170	0.190
A1	1.14	1.39	0.045	0.055
A2	2.29	2.79	0.090	0.110
b	0.64	1.01	0.025	0.040
b2	1.15	1.65	0.045	0.065
C	0.35	0.56	0.014	0.022
D	14.73	16.00	0.580	0.630
E	9.91	10.66	0.390	0.420
e	5.08	BSC	0.200	BSC
H1	5.85	6.85	0.230	0.270
L	12.70	13.97	0.500	0.550
L1	2.79	5.84	0.110	0.230
ØP	3.54	4.08	0.139	0.161
Q	2.54	3.18	0.100	0.125





**Fast Diode**

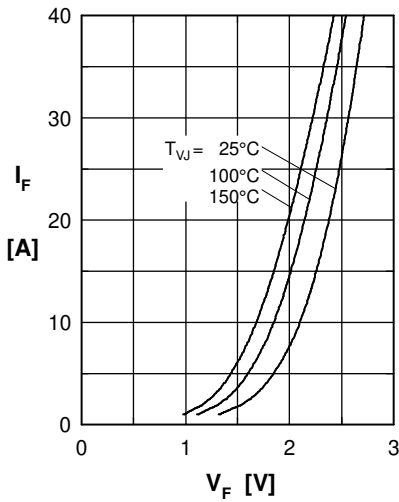


Fig. 1 Forward current  $I_F$  versus max. forward voltage drop  $V_F$

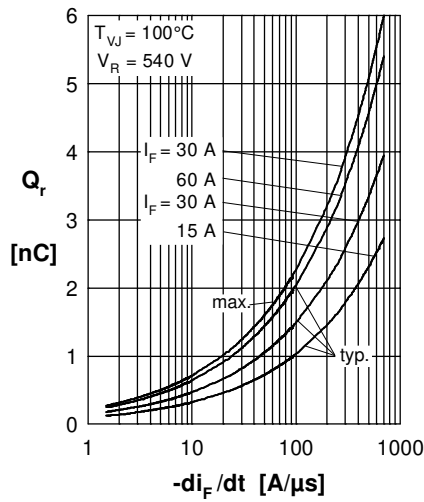


Fig. 2 Typ. reverse recov. charge  $Q_r$  versus  $-di_F/dt$

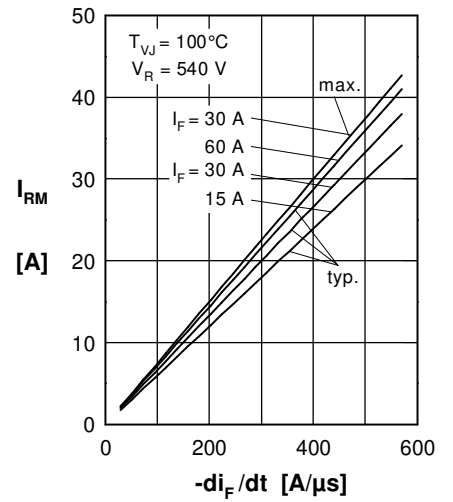


Fig. 3 Typ. peak reverse current  $I_{RM}$  versus  $-di_F/dt$

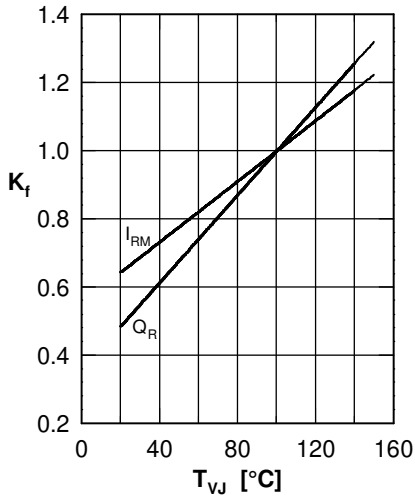


Fig. 4 Dynamic parameters  $Q_r$ ,  $I_{RM}$  versus  $T_{VJ}$

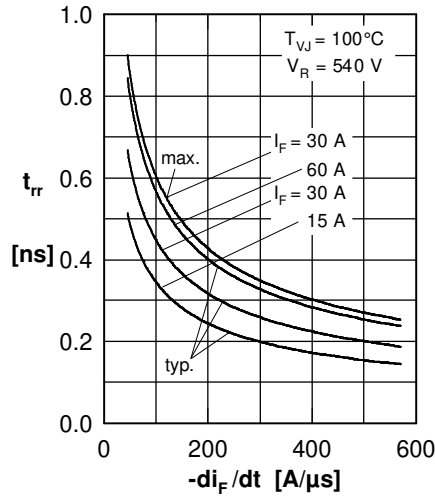


Fig. 5 Typ. recovery time  $t_{rr}$  versus  $-di_F/dt$

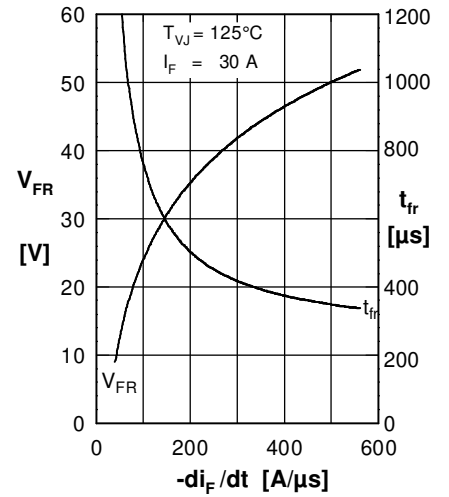


Fig. 6 Typ. peak forward voltage  $V_{FR}$  and  $t_{fr}$  versus  $di_F/dt$

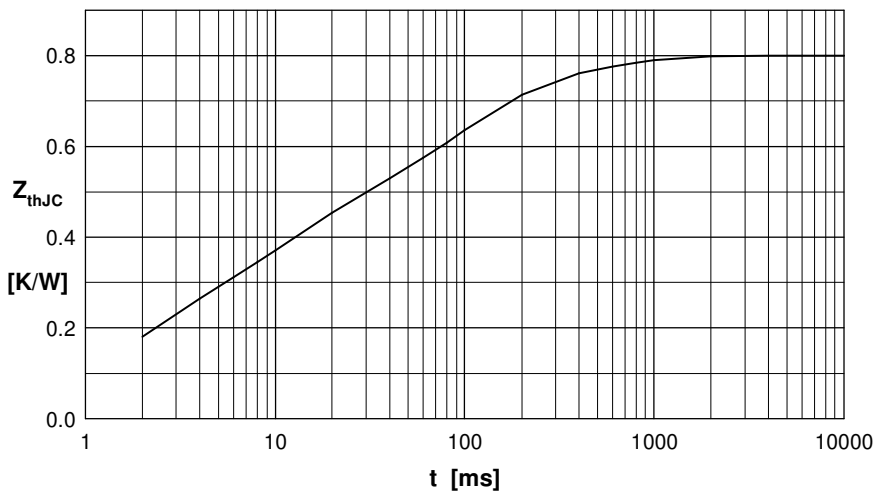


Fig. 7 Transient thermal impedance junction to case

Constants for  $Z_{thJC}$  calculation:

i	$R_{thi}$ (K/W)	$t_i$ (s)
1	0.200	0.0018
2	0.220	0.0100
3	0.080	0.5000
4	0.300	0.0900