

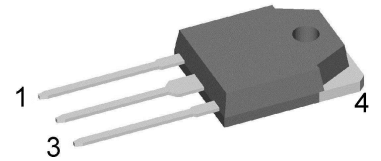
# HiPerFRED

$V_{RRM}$	=	400 V
$I_{FAV}$	=	60 A
$t_{rr}$	=	45 ns

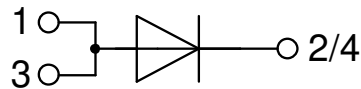
High Performance Fast Recovery Diode  
 Low Loss and Soft Recovery  
 Single Diode

Part number

**DPG60IM400QB**



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-3P

- Industry standard outline compatible with TO-247
- RoHS compliant
- Epoxy meets UL 94V-0

### Disclaimer Notice

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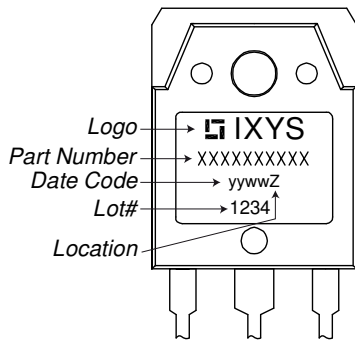


Fast Diode				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
$V_{RSM}$	max. non-repetitive reverse blocking voltage					400	V
$V_{RRM}$	max. repetitive reverse blocking voltage					400	V
$I_R$	reverse current, drain current	$V_R = 400\text{ V}$	$T_{VJ} = 25^\circ\text{C}$			1	$\mu\text{A}$
		$V_R = 400\text{ V}$	$T_{VJ} = 150^\circ\text{C}$			0.3	mA
$V_F$	forward voltage drop	$I_F = 60\text{ A}$	$T_{VJ} = 25^\circ\text{C}$			1.47	V
		$I_F = 120\text{ A}$				1.80	V
		$I_F = 60\text{ A}$	$T_{VJ} = 150^\circ\text{C}$			1.22	V
		$I_F = 120\text{ A}$				1.59	V
$I_{FAV}$	average forward current	$T_C = 125^\circ\text{C}$ rectangular $d = 0.5$	$T_{VJ} = 175^\circ\text{C}$			60	A
$V_{FO}$	threshold voltage	} for power loss calculation only				0.81	V
$r_F$	slope resistance					6.1	m $\Omega$
$R_{thJC}$	thermal resistance junction to case					0.55	K/W
$R_{thCH}$	thermal resistance case to heatsink				0.3		K/W
$P_{tot}$	total power dissipation			$T_C = 25^\circ\text{C}$		275	W
$I_{FSM}$	max. forward surge current	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}; V_R = 0\text{ V}$		$T_{VJ} = 45^\circ\text{C}$		450	A
$C_J$	junction capacitance	$V_R = 200\text{ V}$ $f = 1\text{ MHz}$		$T_{VJ} = 25^\circ\text{C}$		61	pF
$I_{RM}$	max. reverse recovery current	} $I_F = 60\text{ A}; V_R = 240\text{ V}$ $-di_F/dt = 200\text{ A}/\mu\text{s}$		$T_{VJ} = 25^\circ\text{C}$		4	A
				$T_{VJ} = 125^\circ\text{C}$		9.5	A
$t_{rr}$	reverse recovery time			$T_{VJ} = 25^\circ\text{C}$		45	ns
				$T_{VJ} = 125^\circ\text{C}$		85	ns



Package TO-3P			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>				5		g
$M_D$	mounting torque		0.8		1.2	Nm
$F_C$	mounting force with clip		20		120	N

**Product Marking**



**Part description**

- D = Diode
- P = HiPerFRED
- G = extreme fast
- 60 = Current Rating [A]
- IM = Single Diode
- 400 = Reverse Voltage [V]
- QB = TO-3P (3)

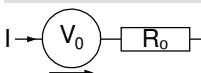
Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	DPG60IM400QB	DPG60IM400QB	Tube	30	501915

Similar Part	Package	Voltage class
DPF60IM400HB	TO-247AD (3)	400
DPG60I400HA	TO-247AD (2)	400

**Equivalent Circuits for Simulation**

\* on die level

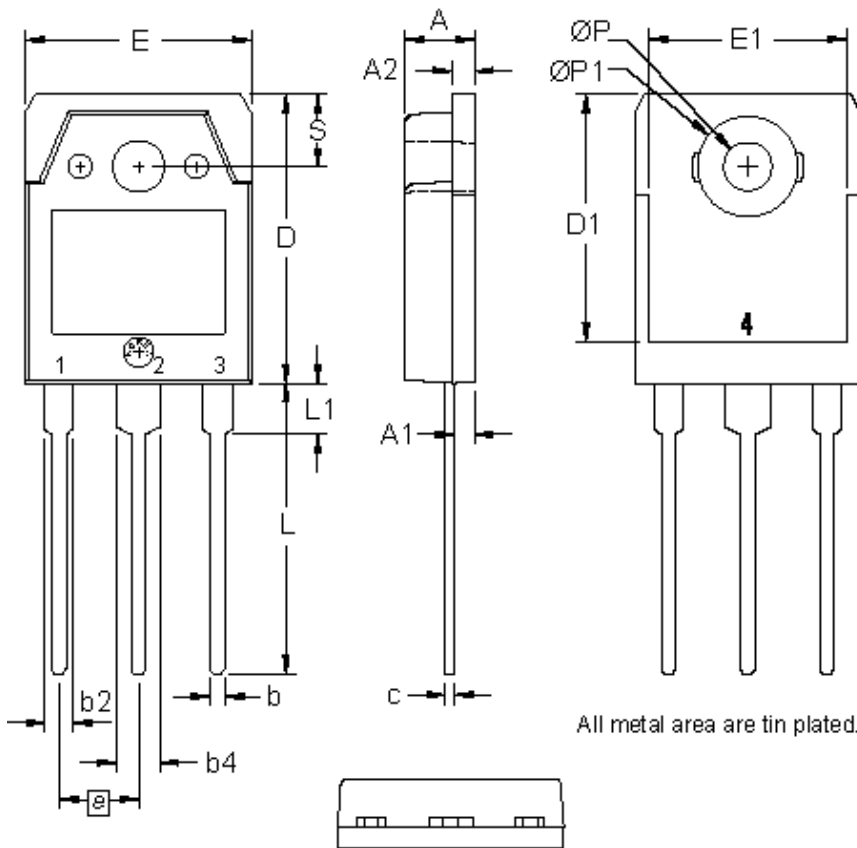
$T_{VJ} = 175^{\circ}C$



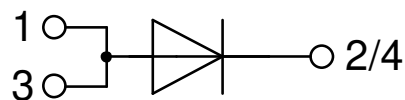
Symbol	Definition	Value	Unit
$V_{0\ max}$	threshold voltage	0.81	V
$R_{0\ max}$	slope resistance *	3.5	mΩ



**Outlines TO-3P**



Dim.	Millimeter		Inches	
	min	max	min	max
A	4.70	4.90	0.185	0.193
A1	1.30	1.50	0.051	0.059
A2	1.45	1.65	0.057	0.065
b	0.90	1.15	0.035	0.045
b2	1.90	2.20	0.075	0.087
b4	2.90	3.20	0.114	0.126
c	0.55	0.80	0.022	0.031
D	19.80	20.10	0.780	0.791
D1	16.90	17.20	0.665	0.677
E	15.50	15.80	0.610	0.622
E1	13.50	13.70	0.531	0.539
e	5.45 BSC		0.215 BSC	
L	19.80	20.20	0.780	0.795
L1	3.40	3.60	0.134	0.142
Ø P	3.20	3.40	0.126	0.134
ØP1	6.90	7.10	0.272	0.280
S	4.90	5.10	0.193	0.201



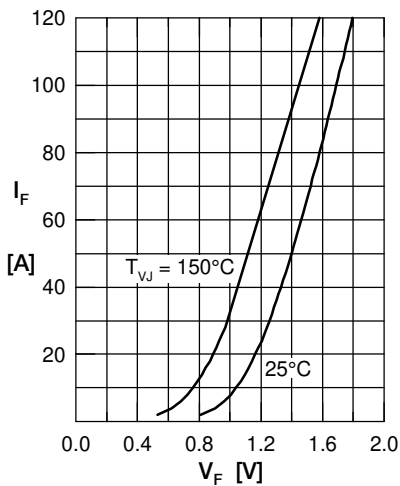
**Fast Diode**


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

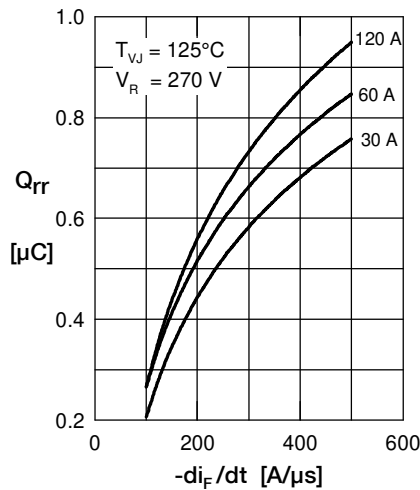


Fig. 2 Typ. reverse recov. charge  $Q_{rr}$  versus  $-di_F/dt$

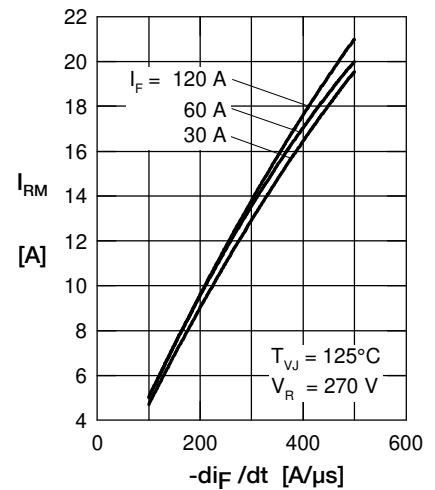


Fig. 3 Typ. reverse recov. current  $I_{RM}$  versus  $-di_F/dt$

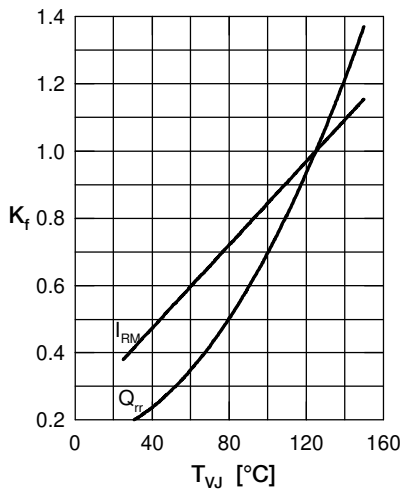


Fig. 4 Typ. dynamic parameters  $Q_{rr}$ ,  $I_{RM}$  versus  $T_{VJ}$

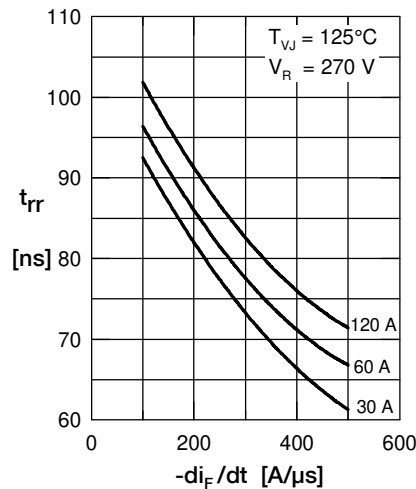


Fig. 5 Typ. reverse recov. time  $t_{rr}$  versus  $-di_F/dt$

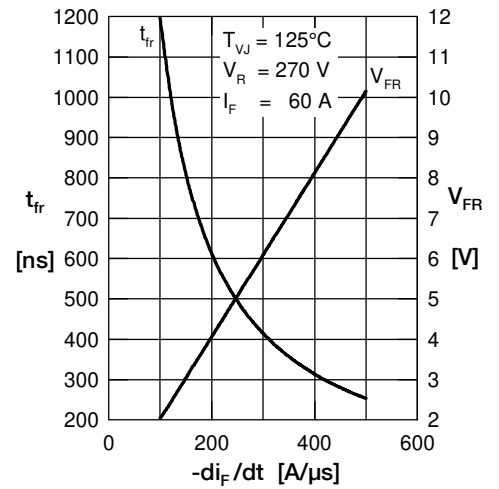


Fig. 6 Typ. forward recovery voltage  $V_{FR}$  & time  $t_{fr}$  versus  $di_F/dt$

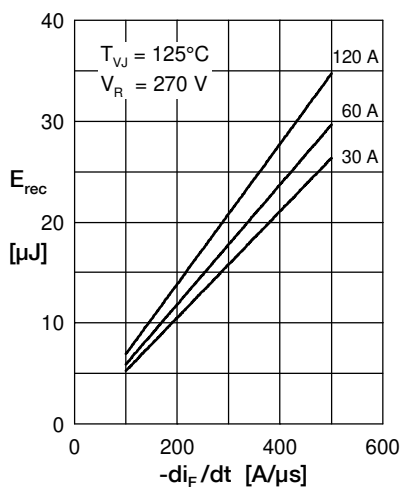


Fig. 7 Typ. recovery energy  $E_{rec}$  versus  $-di_F/dt$

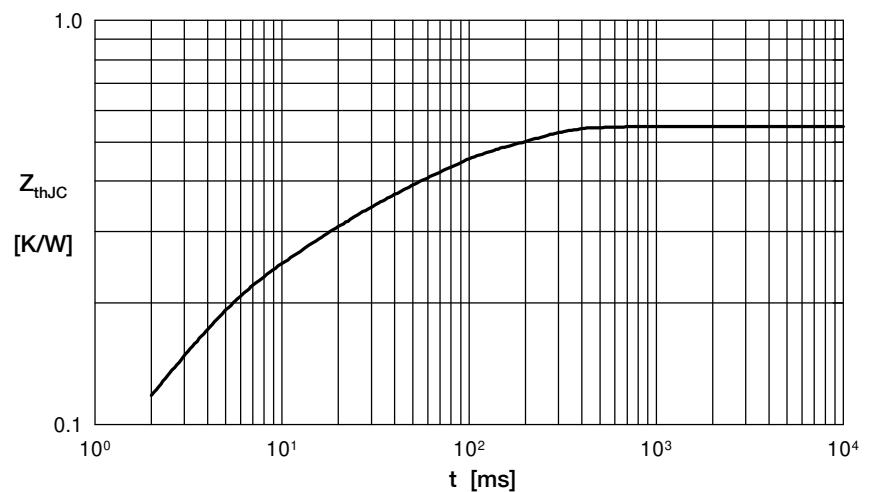


Fig. 8 Transient thermal impedance junction to case