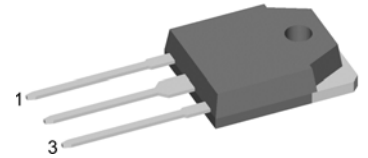
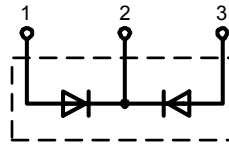


# HiPerFRED

High Performance Fast Recovery Diode  
 Low Loss and Soft Recovery  
 Common Cathode

$V_{RRM} = 400\text{ V}$   
 $I_{FAV} = 2 \times 30\text{ A}$   
 $t_{rr} = 45\text{ ns}$

Part number (Marking on product)  
**DPG 60 C 400QB**



### 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
  - Epoxy meets UL 94V-0
  - RoHS compliant

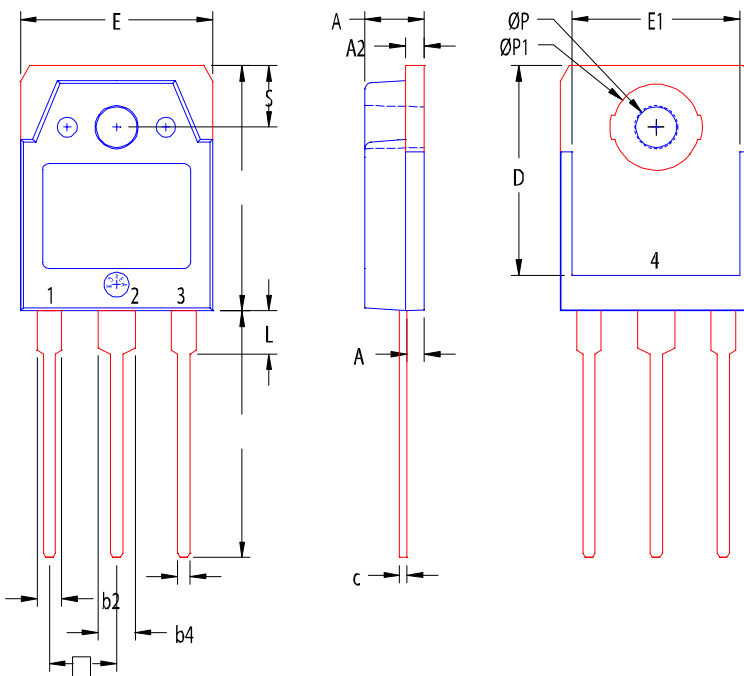
### Ratings

Symbol	Definition	Conditions	Ratings			Unit	
			min.	typ.	max.		
$V_{RRM}$	max. repetitive reverse voltage	$T_{VJ} = 25\text{ °C}$			400	V	
$I_R$	reverse current	$V_R = 400\text{ V}$			1	$\mu\text{A}$	
		$V_R = 400\text{ V}$			0.2	mA	
$V_F$	forward voltage	$I_F = 30\text{ A}$			1.41	V	
		$I_F = 60\text{ A}$			1.69	V	
		$I_F = 30\text{ A}$	$T_{VJ} = 150\text{ °C}$			1.13	V
		$I_F = 60\text{ A}$	$T_{VJ} = 150\text{ °C}$			1.46	V
$I_{FAV}$	average forward current	rectangular, $d = 0.5$			30	A	
$V_{FO}$	threshold voltage	} for power loss calculation only			0.76	V	
$r_F$	slope resistance				10.7	m $\Omega$	
$R_{thJC}$	thermal resistance junction to case				0.95	K/W	
$T_{VJ}$	virtual junction temperature		-55		175	$^{\circ}\text{C}$	
$P_{tot}$	total power dissipation	$T_C = 25\text{ °C}$			160	W	
$I_{FSM}$	max. forward surge current	$t_p = 10\text{ ms (50 Hz), sine}$			300	A	
$I_{RM}$	max. reverse recovery current	$I_F = 30\text{ A};$		4		A	
		$-di_F/dt = 200\text{ A}/\mu\text{s}$	$T_{VJ} = 125\text{ °C}$			A	
$t_{rr}$	reverse recovery time	$V_R = 100\text{ V}$		45		ns	
			$T_{VJ} = 125\text{ °C}$			ns	
$C_J$	junction capacitance	$V_R = 200\text{ V}; f = 1\text{ MHz}$		30		pF	
$E_{AS}$	non-repetitive avalanche energy	$I_{AS} = 9\text{ A}; L = 100\text{ }\mu\text{H}$			0.5	mJ	
$I_{AR}$	repetitive avalanche current	$V_A = 1.5 \cdot V_R$ typ.; $f = 10\text{ kHz}$			0.9	A	

Symbol	Definition	Conditions	Ratings			Unit
			min.	typ.	max.	
$I_{RMS}$	RMS current	per pin*			50	A
$R_{thCH}$	thermal resistance case to heatsink			0.25		K/W
$M_D$	mounting torque		0.8		1.2	Nm
$F_c$	mounting force with clip		20		120	N
$T_{stg}$	storage temperature		-55		150	°C
<b>Weight</b>				5		g

\* Irms is typically limited by: 1. pin-to-chip resistance; or by 2. current capability of the chip.

In case of 1, a common cathode/anode configuration and a non-isolated backside, the whole current capability can be used by connecting the backside.

**Outlines TO-3P**


SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.185	.193	4.70	4.90
A1	.051	.059	1.30	1.50
A2	.057	.065	1.45	1.65
b	.035	.045	0.90	1.15
b2	.075	.087	1.90	2.20
b4	.114	.126	2.90	3.20
c	.022	.031	0.55	0.80
D	.780	.791	19.80	20.10
D1	.665	.677	16.90	17.20
E	.610	.622	15.50	15.80
E1	.531	.539	13.50	13.70
e	.215 BSC		5.45 BSC	
L	.779	.795	19.80	20.20
L1	.134	.142	3.40	3.60
ØP	.126	.134	3.20	3.40
ØP1	.272	.280	6.90	7.10
S	.193	.201	4.90	5.10

- 1 - GATE
- 2 - DRAIN (COLLECTOR)
- 3 - SOURCE (EMITTER)
- 4 - DRAIN (COLLECTOR)

All metal area are tin plated.

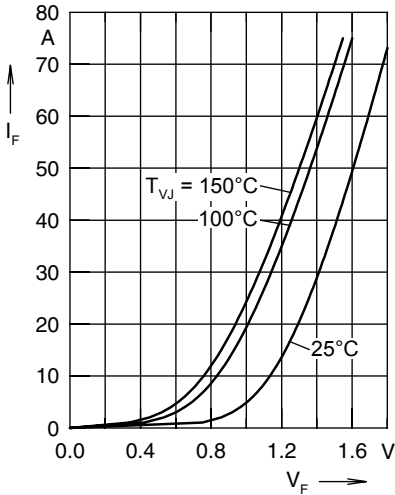


Fig. 1 Forward current  $I_F$  vs.  $V_F$

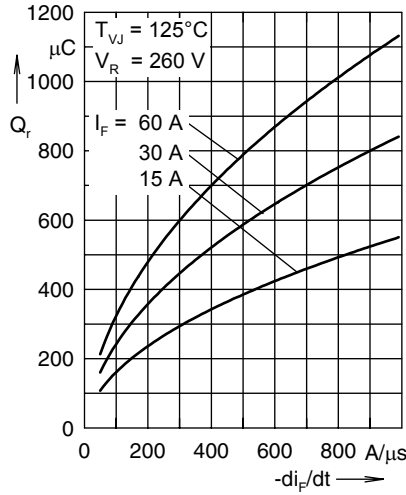


Fig. 2 Typ. reverse recovery charge  $Q_r$  versus  $-di_F/dt$

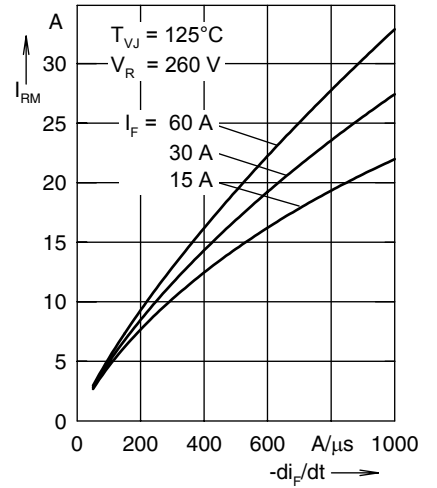


Fig. 3 Typ. peak reverse current  $I_{RM}$  versus  $-di_F/dt$

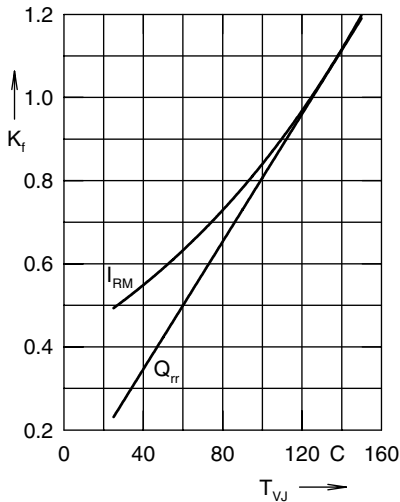


Fig. 4 Dynamic parameters  $Q_r$ ,  $I_{RM}$  versus  $T_{VJ}$

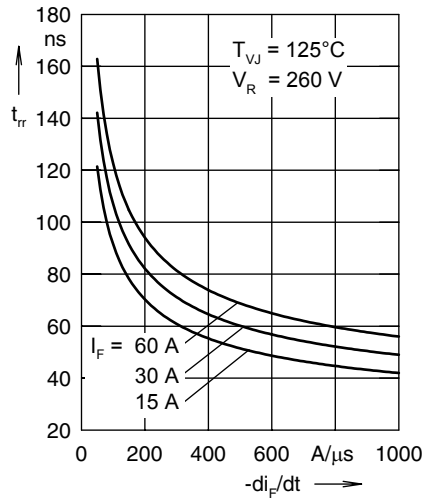


Fig. 5 Typ. recovery time  $t_{rr}$  vs.  $-di_F/dt$

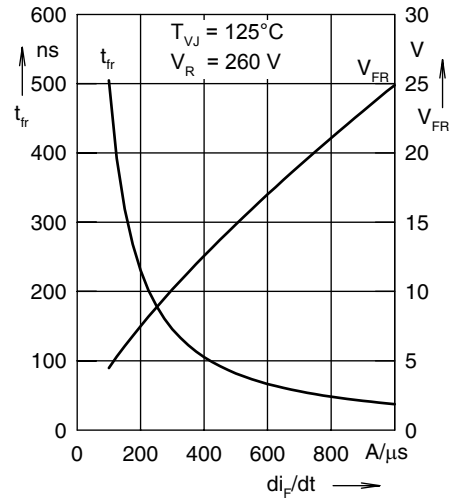


Fig. 6 Typ. peak forward voltage  $V_{FR}$  and  $t_{fr}$  versus  $di_F/dt$

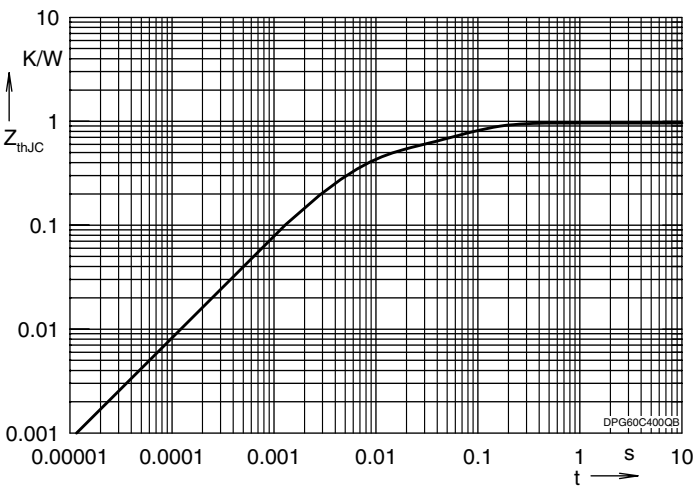


Fig. 7 Transient thermal impedance junction to case

Constants for  $Z_{thJC}$  calculation:

i	$R_{thi}$ [K/W]	$t_i$ [s]
1	0.505	0.005
2	0.195	0.0003
3	0.250	0.041