

# HiPerFRED Module

$V_{RRM} = 1200\text{ V}$   
 $I_{DAV} = 19\text{ A}$   
 $t_{rr} = 40\text{ ns}$

High Performance Fast Recovery Diode  
 Low Loss and Soft Recovery  
 1~ Rectifier Bridge

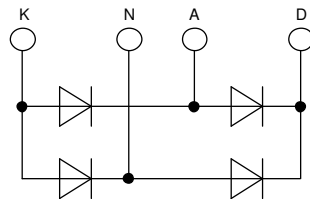
Part number

**VBE17-12NO7**



Backside: isolated

 E72873



### 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: ECO-PAC1

- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Base plate: Copper internally DCB isolated
- Advanced power cycling

### Disclaimer Notice

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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	$V_R = 1200\text{ V}$	$T_{VJ} = 25^{\circ}C$		60	$\mu A$	
		$V_R = 1200\text{ V}$	$T_{VJ} = 125^{\circ}C$		0.25	mA	
$V_F$	forward voltage drop	$I_F = 10\text{ A}$	$T_{VJ} = 25^{\circ}C$		2.92	V	
		$I_F = 20\text{ A}$			3.52	V	
		$I_F = 10\text{ A}$	$T_{VJ} = 150^{\circ}C$		1.95	V	
		$I_F = 20\text{ A}$			2.52	V	
$I_{DAV}$	bridge output current	$T_C = 85^{\circ}C$ rectangular $d = 1.5$	$T_{VJ} = 150^{\circ}C$		19	A	
$V_{FO}$	threshold voltage	} for power loss calculation only	$T_{VJ} = 150^{\circ}C$		1.39	V	
$r_F$	slope resistance				55	m $\Omega$	
$R_{thJC}$	thermal resistance junction to case				2.5	K/W	
$R_{thCH}$	thermal resistance case to heatsink			0.30		K/W	
$P_{tot}$	total power dissipation		$T_C = 25^{\circ}C$		50	W	
$I_{FSM}$	max. forward surge current	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}; V_R = 0\text{ V}$	$T_{VJ} = 45^{\circ}C$		40	A	
$C_J$	junction capacitance	$V_R = 600\text{ V}$ $f = 1\text{ MHz}$	$T_{VJ} = 25^{\circ}C$		3	pF	
$I_{RM}$	max. reverse recovery current	} $I_F = 10\text{ A}; V_R = 600\text{ V}$ $-di_F/dt = 200\text{ A}/\mu\text{s}$	$T_{VJ} = 25^{\circ}C$		5	A	
			$T_{VJ} = 100^{\circ}C$		8	A	
$t_{rr}$	reverse recovery time		$T_{VJ} = 25^{\circ}C$		40	ns	
			$T_{VJ} = 100^{\circ}C$		115	ns	



Package ECO-PAC1		Ratings				
Symbol	Definition	Conditions	min.	typ.	max.	Unit
$I_{RMS}$	RMS current	per terminal			100	A
$T_{VJ}$	virtual junction temperature		-40		150	°C
$T_{op}$	operation temperature		-40		125	°C
$T_{stg}$	storage temperature		-40		125	°C
<b>Weight</b>				19		g
$M_D$	mounting torque		1.4		2	Nm
$d_{Spp/App}$	creepage distance on surface / striking distance through air	terminal to terminal	6.0			mm
$d_{Spb/Apb}$		terminal to backside	10.0			mm
$V_{ISOL}$	isolation voltage	t = 1 second 50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA	3600			V
		t = 1 minute	3000			V



Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	VBE17-12NO7	VBE17-12NO7	Box	25	482773

**Equivalent Circuits for Simulation**

\* on die level

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

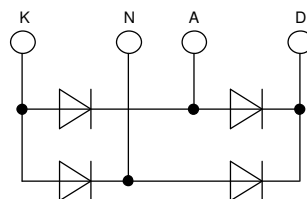
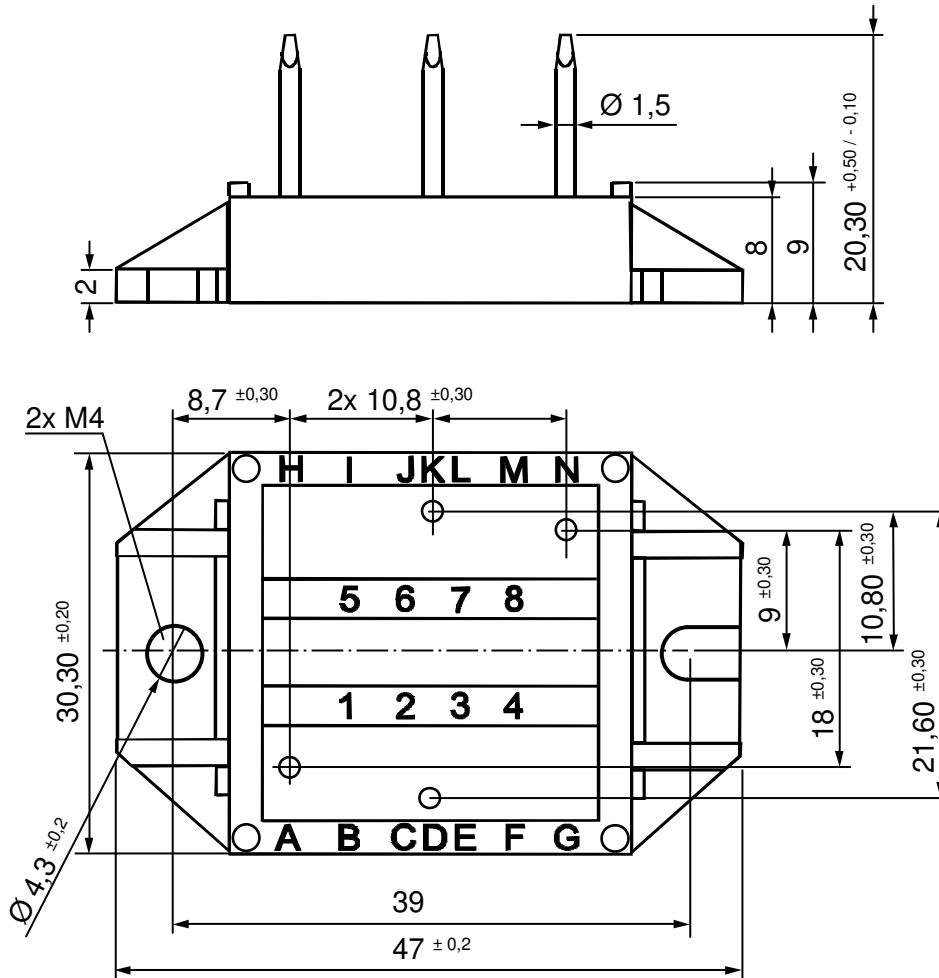


**Fast Diode**

$V_{0\ max}$	threshold voltage	1.39	V
$R_{0\ max}$	slope resistance *	53	mΩ



**Outlines ECO-PAC1**



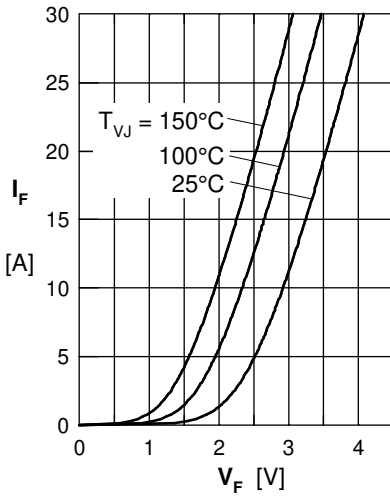
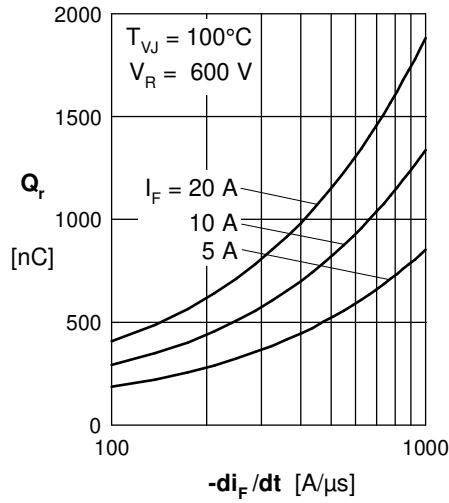
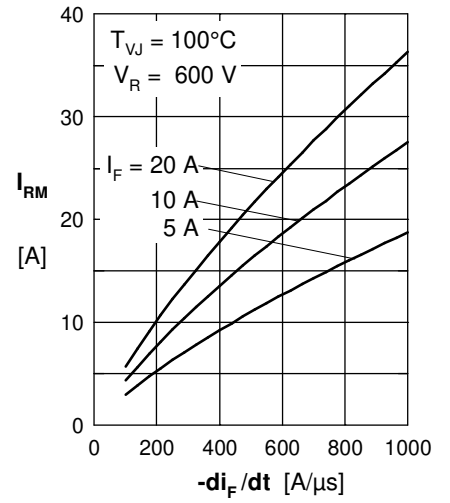
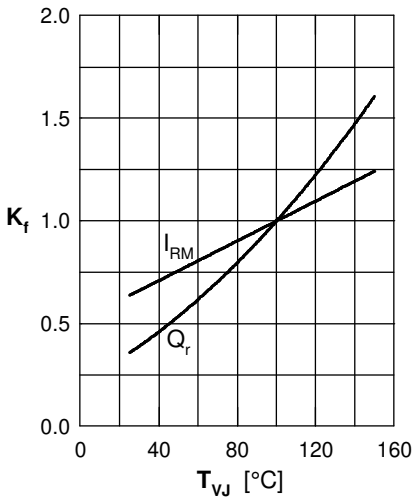
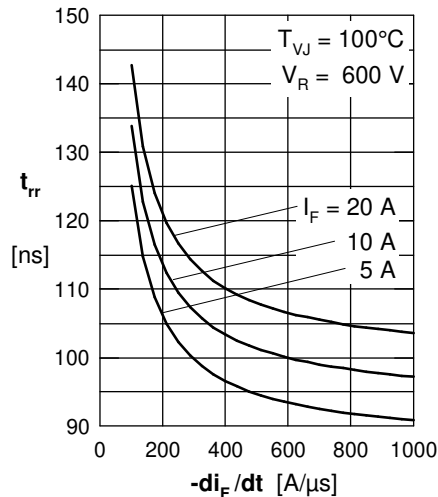
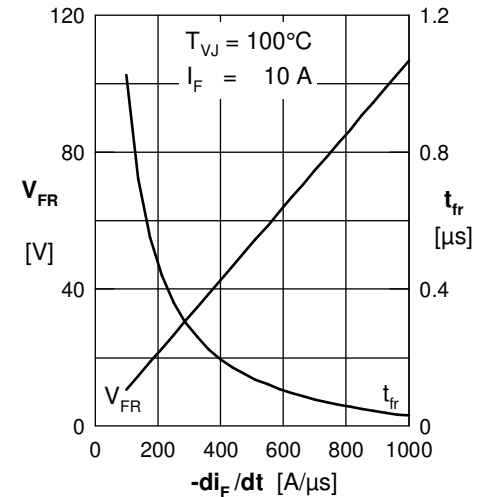
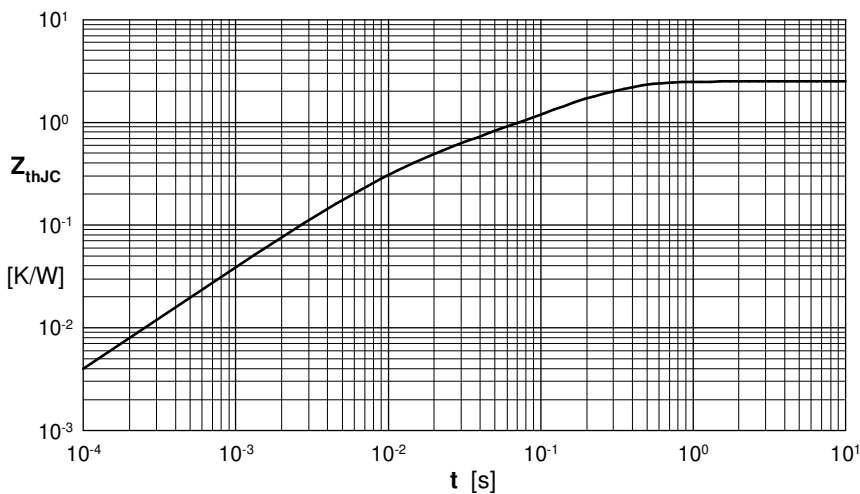
**Fast Diode**

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

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

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

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

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

 Fig. 6 Peak forward voltage  $V_{FR}$  and  $t_{fr}$  vs.  $-di_F/dt$ 


Fig. 7 Transient thermal resistance junction to case

i	$R_{thi}$ (K/W)	$t_i$ (s)
1	0.8776	0.0052
2	0.3378	0.0003
3	0.0678	0.0004
4	1.2168	0.0092