

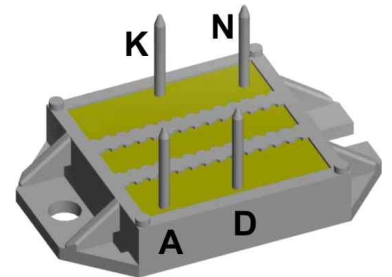
HiPerFRED Module

$V_{RRM} = 1200\text{ V}$
 $I_{DAV} = 59\text{ A}$
 $t_{rr} = 60\text{ ns}$

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

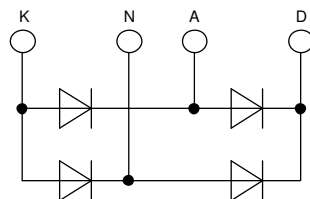
Part number

VBE55-12N07



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	$V_R = 1200\text{ V}$	$T_{VJ} = 25^{\circ}C$		250	μA	
		$V_R = 1200\text{ V}$	$T_{VJ} = 150^{\circ}C$		1	mA	
V_F	forward voltage drop	$I_F = 30\text{ A}$	$T_{VJ} = 25^{\circ}C$		2.71	V	
		$I_F = 60\text{ A}$			3.21	V	
		$I_F = 30\text{ A}$	$T_{VJ} = 150^{\circ}C$		1.75	V	
		$I_F = 60\text{ A}$			2.23	V	
I_{DAV}	bridge output current	$T_C = 85^{\circ}C$ rectangular $d = 0.5$	$T_{VJ} = 150^{\circ}C$		59	A	
V_{FO}	threshold voltage	} for power loss calculation only	$T_{VJ} = 150^{\circ}C$		1.31	V	
r_F	slope resistance				15	m Ω	
R_{thJC}	thermal resistance junction to case				0.9	K/W	
R_{thCH}	thermal resistance case to heatsink			0.30		K/W	
P_{tot}	total power dissipation		$T_C = 25^{\circ}C$		140	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	$V_R = 600\text{ V}$ $f = 1\text{ MHz}$	$T_{VJ} = 25^{\circ}C$		12	pF	
I_{RM}	max. reverse recovery current	} $I_F = 30\text{ A}; V_R = 600\text{ V}$ $-di_F/dt = 200\text{ A}/\mu\text{s}$	$T_{VJ} = 25^{\circ}C$		8.5	A	
			$T_{VJ} = 100^{\circ}C$		13	A	
t_{rr}	reverse recovery time		$T_{VJ} = 25^{\circ}C$		60	ns	
			$T_{VJ} = 100^{\circ}C$		170	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
Weight				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	3600			V
		t = 1 minute	3000			V



Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	VBE55-12NO7	VBE55-12NO7	Box	25	482803

Equivalent Circuits for Simulation

* on die level

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

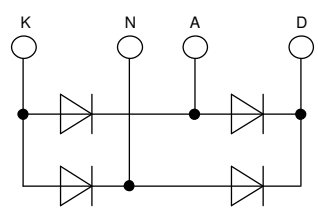
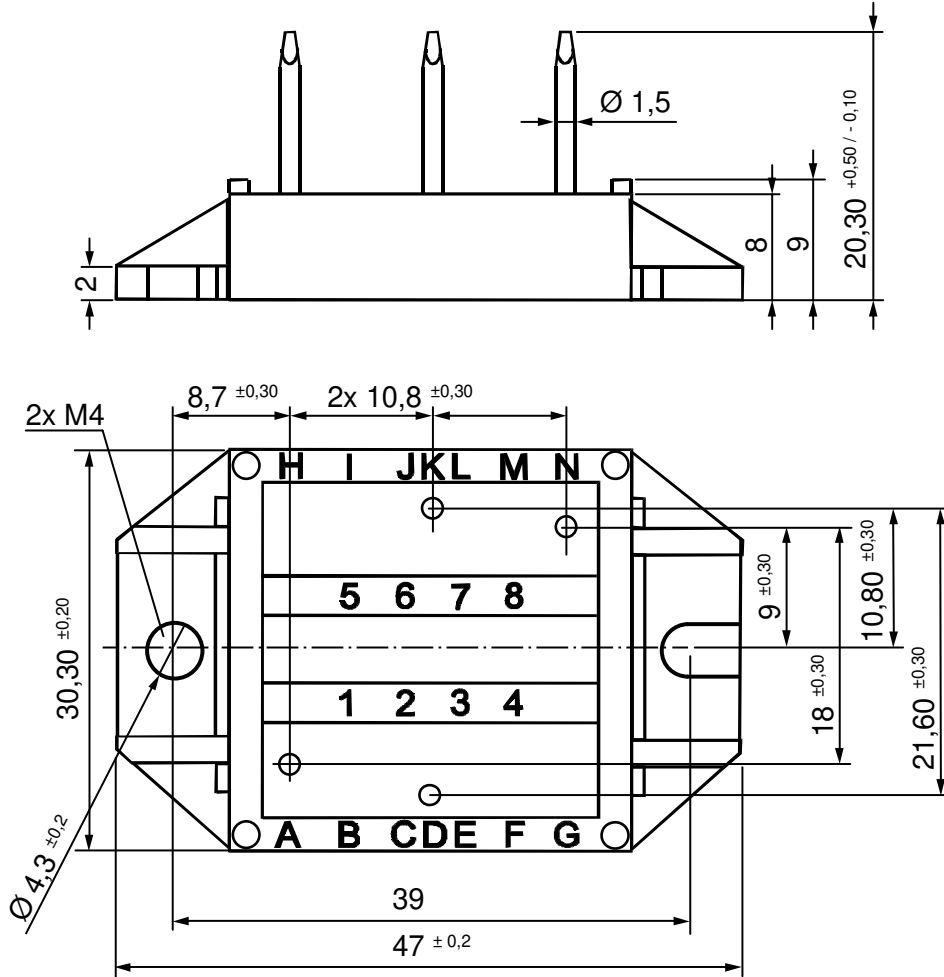


Fast Diode

$V_{0\ max}$	threshold voltage	1.31	V
$R_{0\ max}$	slope resistance *	13	mΩ



Outlines ECO-PAC1



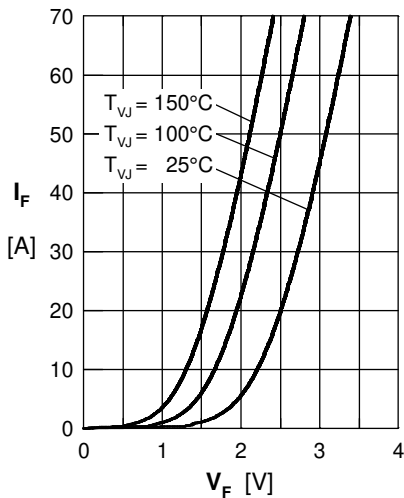
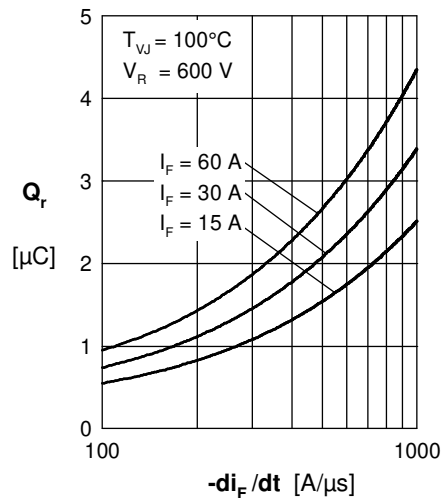
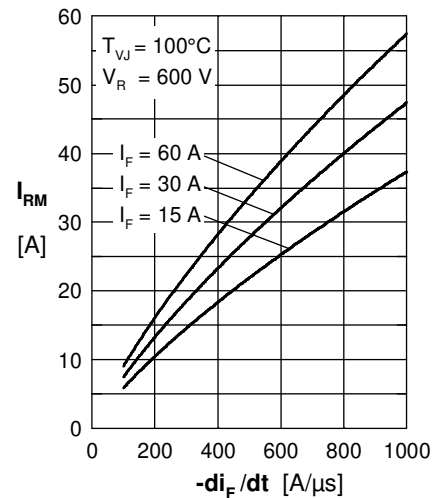
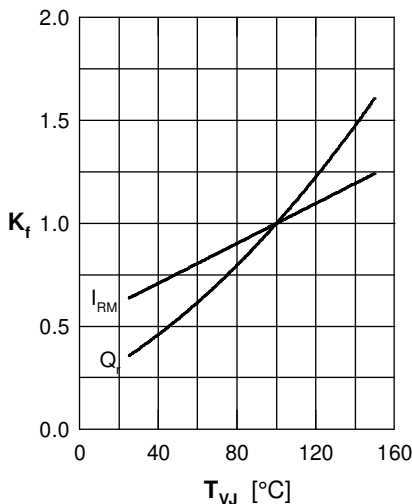
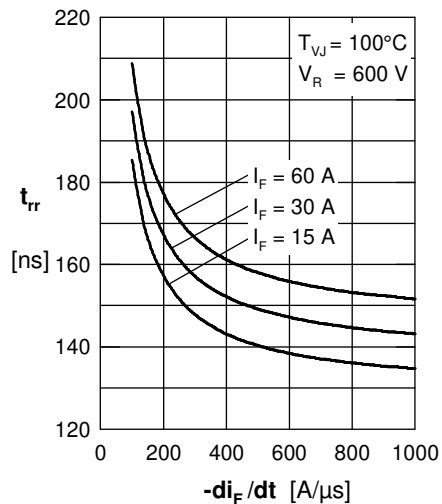
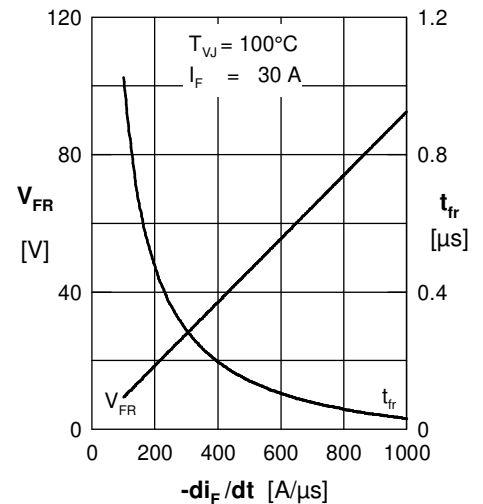
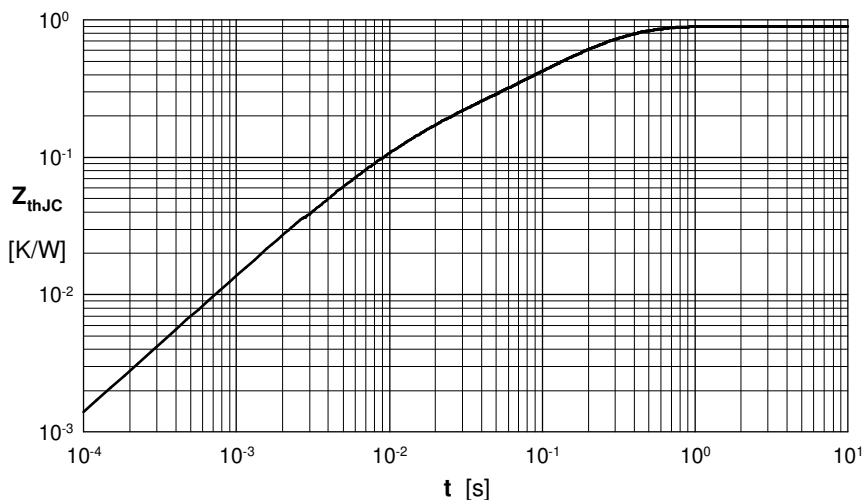
Fast Diode

 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} versus $-di_F/dt$

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


Fig. 7 Transient thermal resistance junction to case

 Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.3012	0.0052
2	0.1160	0.0003
3	0.0241	0.0004
4	0.4586	0.0092