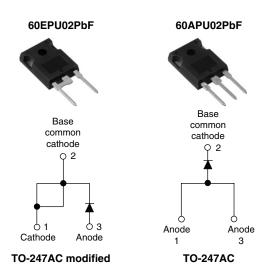


Vishay High Power Products

Ultrafast Soft Recovery Diode, 60 A FRED PtTM



PRODUCT SUMMARY				
t _{rr}	35 ns			
I _{F(AV)}	60 A			
V_{R}	200 V			

FEATURES

- · Ultrafast recovery
- 175 °C operating junction temperature
- Lead (Pb)-free ("PbF" suffix)
- Designed and qualified for industrial level





BENEFITS

- · Reduced RFI and EMI
- · Higher frequency operation
- · Reduced snubbing
- · Reduced parts count

DESCRIPTION/APPLICATIONS

These diodes are optimized to reduce losses and EMI/RFI in high frequency power conditioning systems.

The softness of the recovery eliminates the need for a snubber in most applications. These devices are ideally suited for HF welding, power converters and other applications where switching losses are not significant portion of the total losses.

ABSOLUTE MAXIMUM RATINGS					
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS	
Cathode to anode voltage	V _R		200	V	
Continuous forward current	I _{F(AV)}	T _C = 127 °C	60		
Single pulse forward current	I _{FSM}	T _C = 25 °C	800	Α	
Maximum repetitive forward current	I _{FRM}	Square wave, 20 kHz	120		
Operating junction and storage temperatures	T_J , T_{Stg}		- 55 to 175	°C	

ELECTRICAL SPECIFICATIONS (T _J = 25 °C unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Breakdown voltage, blocking voltage	V _{BR} , V _R	I _R = 100 μA	200	-	-	.,
Forward voltage V _F	I _F = 60 A	-	0.98	1.08	V	
	I _F = 60 A, T _J = 175 °C	-	0.81	0.88		
Daverse leekage augrent		$V_R = V_R$ rated	-	-	50	μΑ
Reverse leakage current I _R	T _J = 150 °C, V _R = V _R rated	-	-	2	mA	
Junction capacitance	C _T	V _R = 200 V	-	87	-	pF
Series inductance	L _S	Measured lead to lead 5 mm from package body	ı	8.0	-	nH

^{*} Pb containing terminations are not RoHS compliant, exemptions may apply

60EPU02PbF/60APU02PbF



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DYNAMIC RECOVERY CHARACTERISTICS (T _C = 25 °C unless otherwise specified)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
I _F = 1.0 A, d		$I_F = 1.0 \text{ A}, dI_F/dt =$	200 A/μs, V _R = 30 V	-	-	35	
Reverse recovery time	t _{rr}	T _J = 25 °C		-	28	-	ns
		T _J = 125 °C	$I_F = 60 \text{ A}$ $dI_F/dt = 200 \text{ A/}\mu\text{s}$ $V_B = 160 \text{ V}$	=	50	=	
Peak recovery current I _{RRM}	1	T _J = 25 °C		-	4	-	۸
	IRRM	T _J = 125 °C		-	8	=	Α
Reverse recovery charge Q _{rr}	0	T _J = 25 °C		=	59	=	20
	Q _{rr}	T _J = 125 °C		-	220	-	nC

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Thermal resistance, junction to case	R _{thJC}		-	-	0.70	K/W
Thermal resistance, case to heatsink	R _{thCS}	Mounting surface, flat, smooth and greased	-	0.2	-	- K/W
Weight			-	5.5	-	g
weigni		-	0.2	-	OZ.	
Mounting torque			-	-	1.2	N · m
Marking device		Case style TO-247AC modified		60EPU02		
		Case style TO-247AC		60APU02		

Document Number: 94021 Revision: 07-Apr-08



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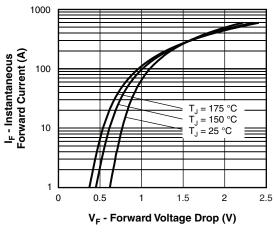


Fig. 1 - Typical Forward Voltage Drop Characteristics

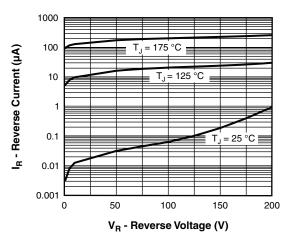


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

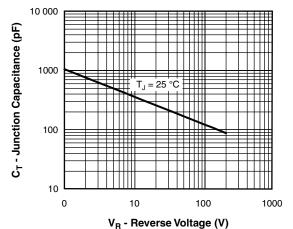


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

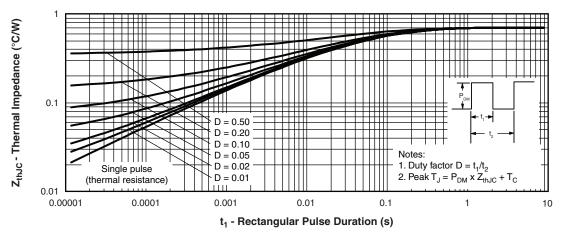


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

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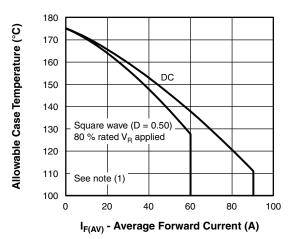


Fig. 5 - Maximum Allowable Case Temperature vs.
Average Forward Current

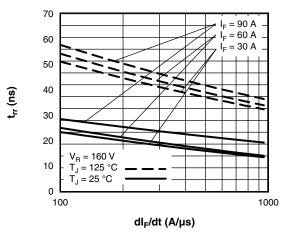


Fig. 7 - Typical Reverse Recovery Time vs. dI_F/dt

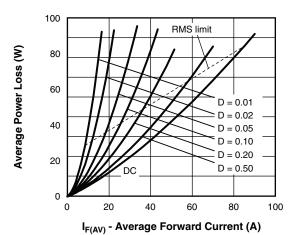


Fig. 6 - Forward Power Loss Characteristics

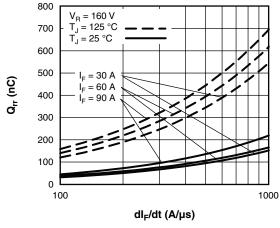


Fig. 8 - Typical Stored Charge vs. dl_F/dt

Note

 $\begin{array}{l} \text{(1) Formula used: } T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}; \\ Pd = Forward power loss = I_{F(AV)} \times V_{FM} \text{ at } (I_{F(AV)}/D) \text{ (see fig. 6);} \\ Pd_{REV} = Inverse power loss = V_{R1} \times I_R \text{ (1 - D); } I_R \text{ at } V_{R1} = 80 \text{ \% rated } V_R \\ \end{array}$



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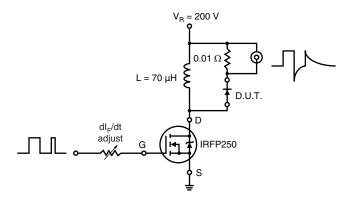
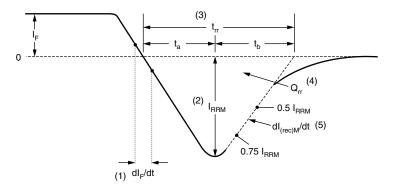


Fig. 9 - Reverse Recovery Parameter Test Circuit



- (1) dl_F/dt rate of change of current through zero crossing
- (2) I_{RRM} peak reverse recovery current
- (3) $\rm t_{rr}$ reverse recovery time measured from zero crossing point of negative going $\rm I_F$ to point where a line passing through 0.75 $\rm I_{RRM}$ and 0.50 $\rm I_{RRM}$ extrapolated to zero current.
- (4) $\rm Q_{rr}$ area under curve defined by $\rm t_{rr}$ and $\rm I_{BBM}$

$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

(5) $dl_{(rec)M}/dt$ - peak rate of change of current during t_b portion of t_{rr}

Fig. 10 - Reverse Recovery Waveform and Definitions

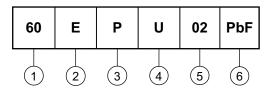
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ORDERING INFORMATION TABLE

Device code



1 - Current rating (60 = 60 A)

2 - Circuit configuration:

E = Single diode

A = Single diode, 3 pins

3 - Package:

P = TO-247AC (modified)

4 - Type of silicon:

U = Ultrafast recovery

5 - Voltage rating (02 = 200 V)

6 - None = Standard production

• PbF = Lead (Pb)-free

LINKS TO RELATED DOCUMENTS					
Dimensions http://www.vishay.com/doc?95001					
Part marking information	http://www.vishay.com/doc?95006				

Document Number: 94021 Revision: 07-Apr-08



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Revision: 18-Jul-08

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