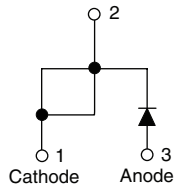


Ultrafast Soft Recovery Diode, 60 A FRED Pt®

60EPU04PbF

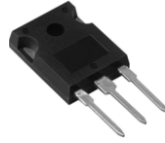


Cathode to base

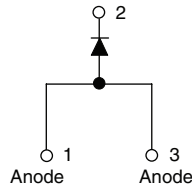


TO247AC modified

60APU04PbF



Cathode to base



TO-247AC

FEATURES

- Ultrafast recovery
- 175 °C operating junction temperature
- Compliant to RoHS directive 2002/95/EC
- Designed and qualified for industrial level



RoHS*
COMPLIANT

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.

PRODUCT SUMMARY

t_{rr}	50 ns
$I_{F(AV)}$	60 A
V_R	400 V

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Cathode to anode voltage	V_R		400	V
Continuous forward current	$I_{F(AV)}$	$T_C = 127\text{ °C}$	60	A
Single pulse forward current	I_{FSM}	$T_C = 25\text{ °C}$	600	
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 ($T_J = 25\text{ °C}$ unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Breakdown voltage, blocking voltage	V_{BR}, V_R	$I_R = 100\ \mu\text{A}$	400	-	-	V
Forward voltage	V_F	$I_F = 60\ \text{A}$	-	1.05	1.25	
		$I_F = 60\ \text{A}, T_J = 175\text{ °C}$	-	0.87	1.03	
		$I_F = 60\ \text{A}, T_J = 125\text{ °C}$	-	0.93	1.10	
Reverse leakage current	I_R	$V_R = V_R\ \text{rated}$	-	-	50	μA
		$T_J = 150\text{ °C}, V_R = V_R\ \text{rated}$	-	-	2	mA
Junction capacitance	C_T	$V_R = 400\ \text{V}$	-	50	-	pF
Series inductance	L_S	Measured lead to lead 5 mm from package body	-	3.5	-	nH

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

60EPU04PbF, 60APU04PbF



Vishay High Power Products Ultrafast Soft Recovery Diode,
60 A FRED Pt®

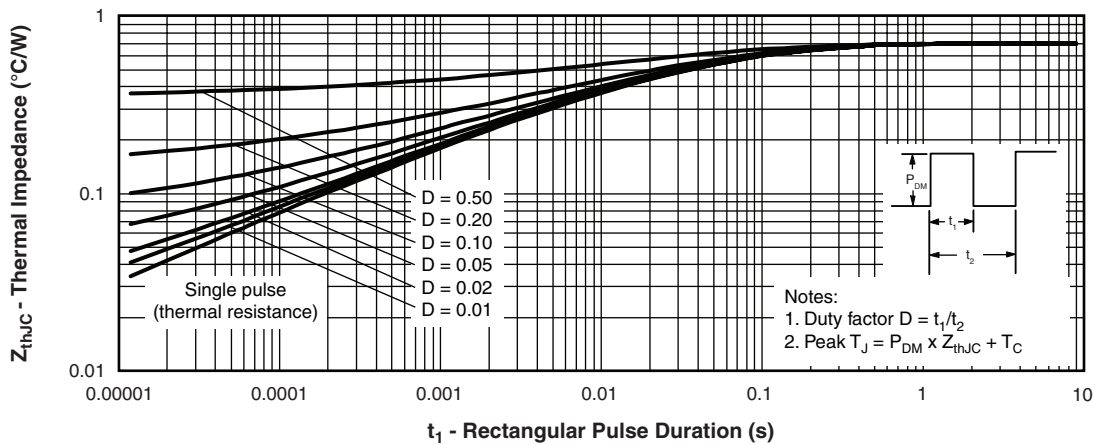
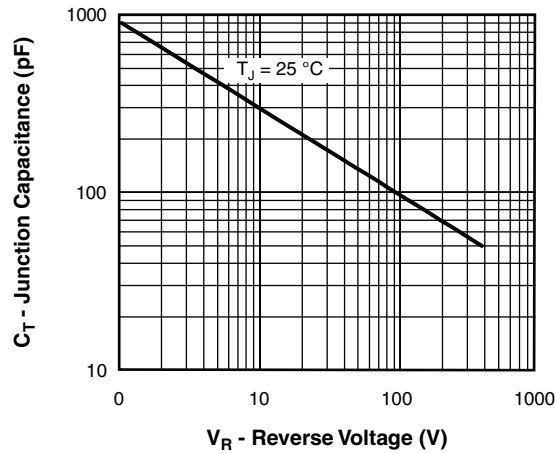
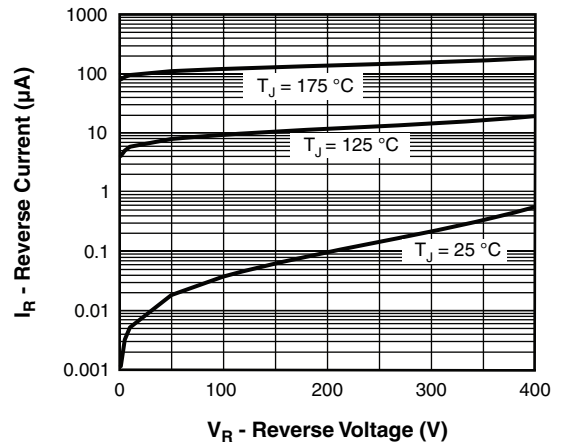
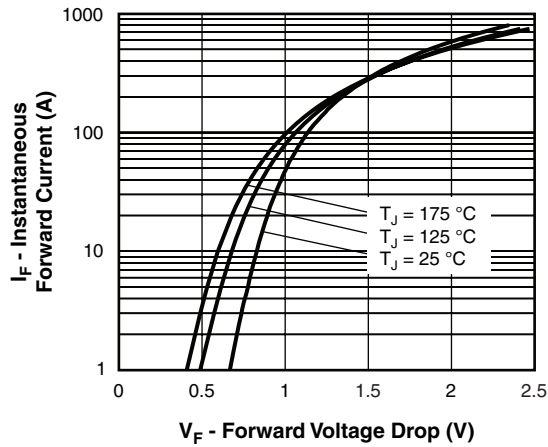
DYNAMIC RECOVERY CHARACTERISTICS ($T_C = 25\text{ }^\circ\text{C}$ unless otherwise specified)							
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS	
Reverse recovery time	t_{rr}	$I_F = 1\text{ A}$, $di_F/dt = 200\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$	-	50	60	ns	
		$T_J = 25\text{ }^\circ\text{C}$	-	85	-		
		$T_J = 125\text{ }^\circ\text{C}$	-	145	-		
Peak recovery current	I_{RRM}	$I_F = 60\text{ A}$ $di_F/dt = 200\text{ A}/\mu\text{s}$ $V_R = 200\text{ V}$	$T_J = 25\text{ }^\circ\text{C}$	-	8.8	-	A
			$T_J = 125\text{ }^\circ\text{C}$	-	15.4	-	
Reverse recovery charge	Q_{rr}	$I_F = 60\text{ A}$ $di_F/dt = 200\text{ A}/\mu\text{s}$ $V_R = 200\text{ V}$	$T_J = 25\text{ }^\circ\text{C}$	-	375	-	nC
			$T_J = 125\text{ }^\circ\text{C}$	-	1120	-	

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	-	
Weight			-	5.5	-	g
			-	0.2	-	oz.
Mounting torque			1.2 (10)	-	2.4 (20)	N · m (lbf · in)
Marking device		Case style TO-247AC modified	60EPU04			
		Case style TO-247AC	60APU04			



60EPU04PbF, 60APU04PbF

Ultrafast Soft Recovery Diode, Vishay High Power Products
60 A FRED Pt®



60EPU04PbF, 60APU04PbF



Vishay High Power Products Ultrafast Soft Recovery Diode,
60 A FRED Pt®

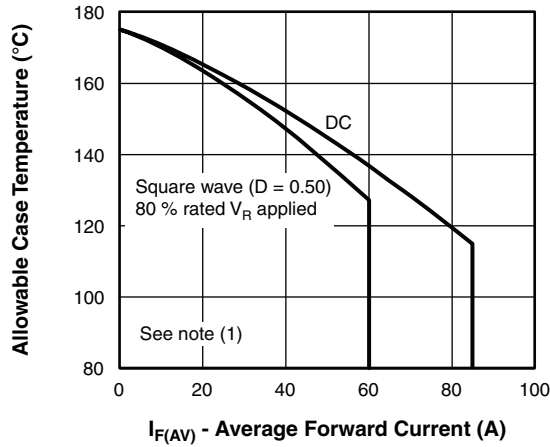


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

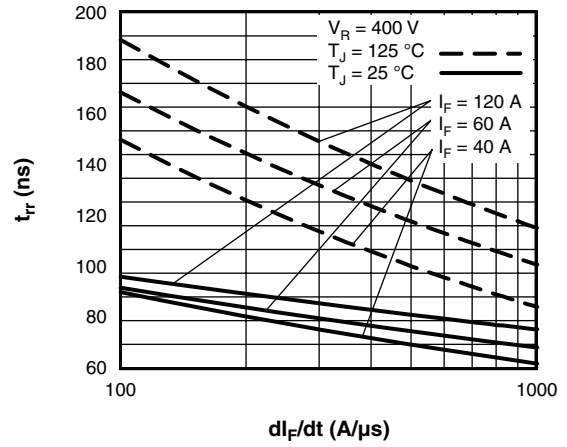


Fig. 7 - Typical Reverse Recovery Time vs. di_F/dt

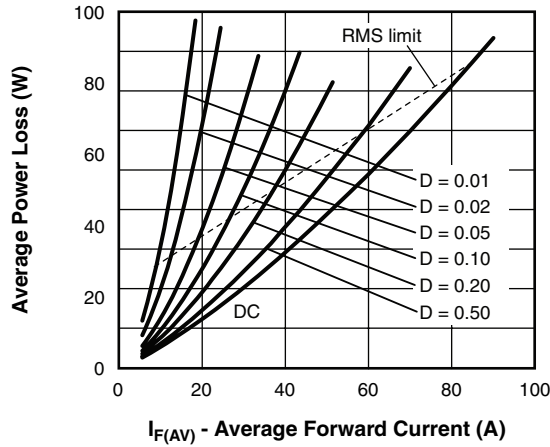


Fig. 6 - Forward Power Loss Characteristics

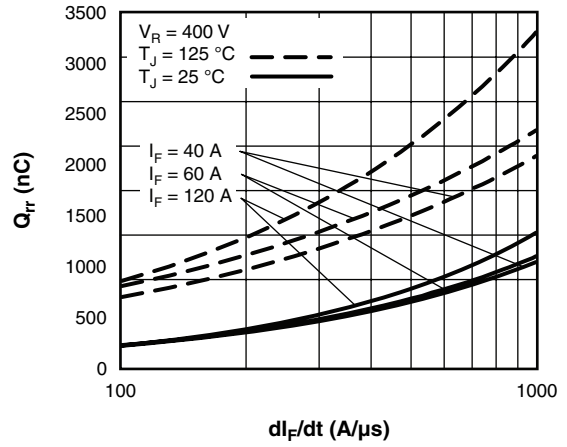


Fig. 8 - Typical Stored Charge vs. di_F/dt

Note

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

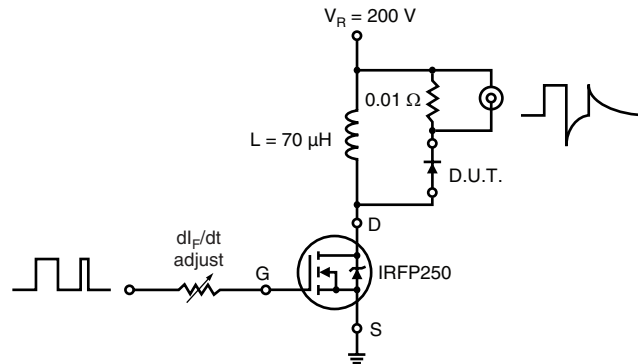
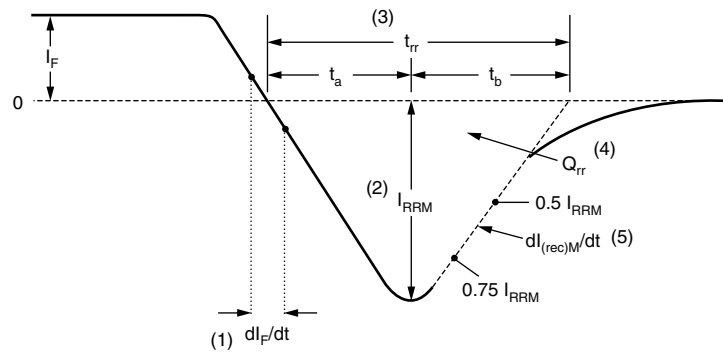


Fig. 9 - Reverse Recovery Parameter Test Circuit



(1) di_F/dt - rate of change of current through zero crossing

(2) I_{RRM} - peak reverse recovery current

(3) t_{rr} - reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through $0.75 I_{RRM}$ and $0.50 I_{RRM}$ extrapolated to zero current.

(4) Q_{rr} - area under curve defined by t_{rr} and I_{RRM}

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

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

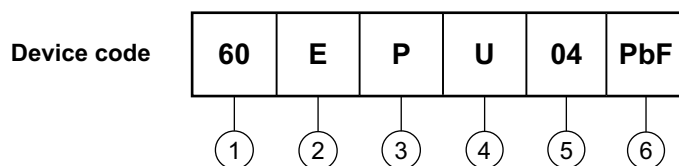
Fig. 10 - Reverse Recovery Waveform and Definitions

60EPU04PbF, 60APU04PbF



Vishay High Power Products Ultrafast Soft Recovery Diode,
60 A FRED Pt®

ORDERING INFORMATION TABLE



- 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 (04 = 400 V)
- 6** -
 - None = Standard production
 - PbF = Lead (Pb)-free

LINKS TO RELATED DOCUMENTS		
Dimensions	TO-247AC modified	www.vishay.com/doc?95253
	TO-247AC	www.vishay.com/doc?95223
Part marking information	TO-247AC modified	www.vishay.com/doc?95255
	TO-247AC	www.vishay.com/doc?95226



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