



60EPU02

Ultrafast Soft Recovery Diode

Features

- Ultrafast Recovery
- 175°C Operating Junction Temperature

Benefits

- Reduced RFI and EMI
- Higher Frequency Operation
- Reduced Snubbing
- Reduced Parts Count

 $t_{rr} = 35\text{ns}$ $I_{F(AV)} = 60\text{Amp}$ $V_R = 200\text{V}$ **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

Parameters	Max	Units
V_R Cathode to Anode Voltage	200	V
$I_{F(AV)}$ Continuous Forward Current, $T_C = 127^\circ\text{C}$	60	A
I_{FSM} Single Pulse Forward Current, $T_C = 25^\circ\text{C}$	800	
I_{FRM} ① Maximum Repetitive Forward Current	120	
T_J, T_{STG} Operating Junction and Storage Temperatures	- 55 to 175	°C

① Square Wave, 20kHz

Case Styles	
 60EPU02 TO-247AC (Modified)	 60APU02 TO-247AC

Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Parameters		Min	Typ	Max	Units	Test Conditions
V_{BR}, V_r	Breakdown Voltage, Blocking Voltage	200	-	-	V	$I_R = 100\mu\text{A}$
V_F	Forward Voltage	-	0.98	1.08	V	$I_F = 60\text{A}$
		-	0.81	0.88	V	$I_F = 60\text{A}, T_J = 175^\circ\text{C}$
I_R	Reverse Leakage Current	-	-	50	μA	$V_R = V_R$ Rated
		-	-	2	mA	$T_J = 150^\circ\text{C}, V_R = V_R$ Rated
C_T	Junction Capacitance	-	87	-	pF	$V_R = 200\text{V}$
L_S	Series Inductance	-	8.0	-	nH	Measured lead to lead 5mm from package body

Dynamic Recovery Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Parameters		Min	Typ	Max	Units	Test Conditions
t_{rr}	Reverse Recovery Time	-	-	35	ns	$I_F = 1.0\text{A}, dI_F/dt = 200\text{A}/\mu\text{s}, V_R = 30\text{V}$
		-	28	-		$T_J = 25^\circ\text{C}$
		-	50	-		$T_J = 125^\circ\text{C}$
I_{RRM}	Peak Recovery Current	-	4	-	A	$T_J = 25^\circ\text{C}$
		-	8	-		$T_J = 125^\circ\text{C}$
Q_{rr}	Reverse Recovery Charge	-	59	-	nC	$T_J = 25^\circ\text{C}$
		-	220	-		$T_J = 125^\circ\text{C}$

Thermal - Mechanical Characteristics

Parameters		Min	Typ	Max	Units
R_{thJC}	Thermal Resistance, Junction to Case			0.70	K/W
$R_{thCS} \text{ (2)}$	Thermal Resistance, Case to Heatsink		0.2		
Wt	Weight		5.5		g
			0.2		(oz)
T	Mounting Torque			1.2	N*m

(2) Mounting Surface, Flat, Smooth and Greased

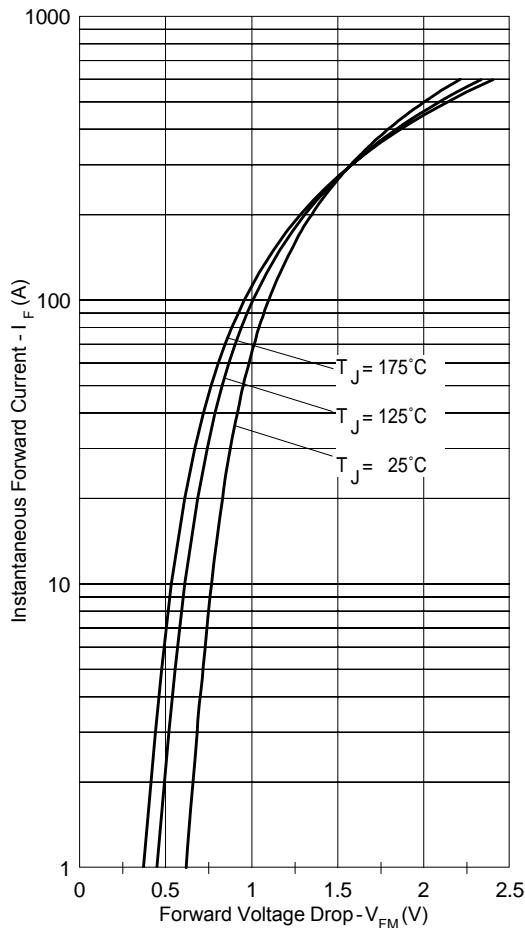


Fig.1-Typical Forward Voltage Drop Characteristics

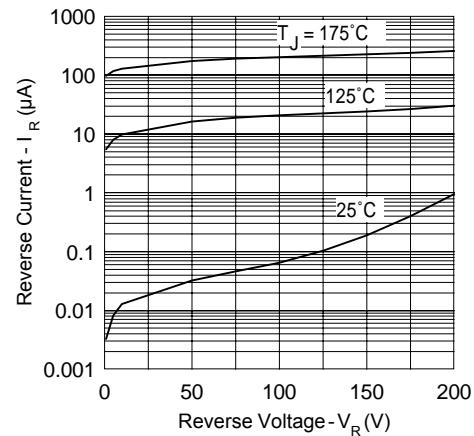


Fig.2-Typical Values Of Reverse Current Vs. Reverse Voltage

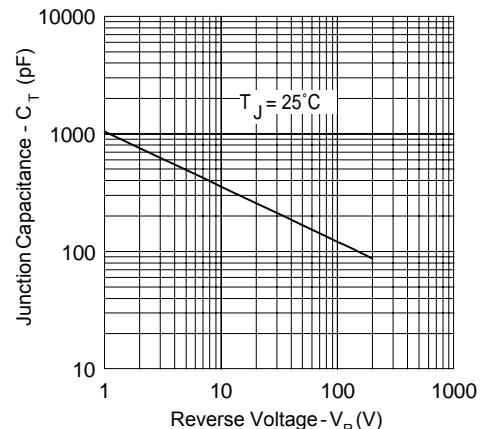


Fig.3-Typical Junction Capacitance Vs. Reverse Voltage

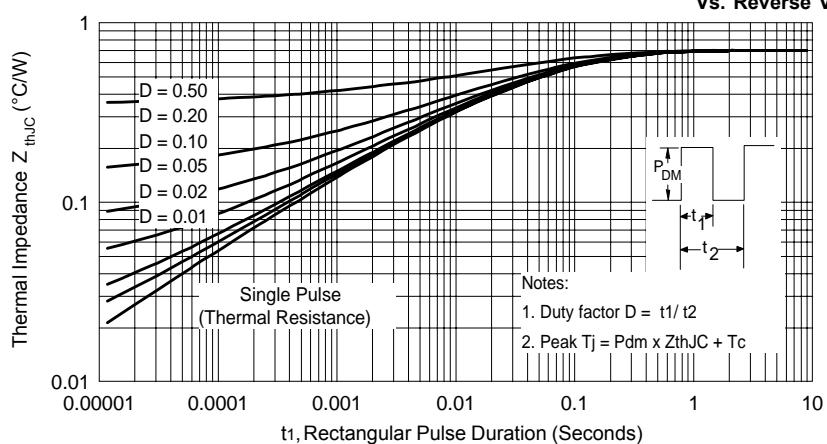


Fig.4-Max. Thermal Impedance Z_{thJC} Characteristics

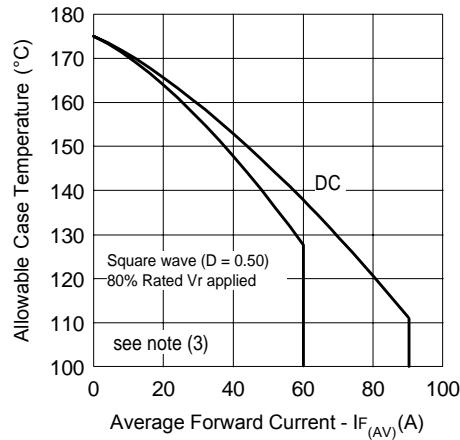


Fig. 5-Max. Allowable Case Temperature Vs. Average Forward Current

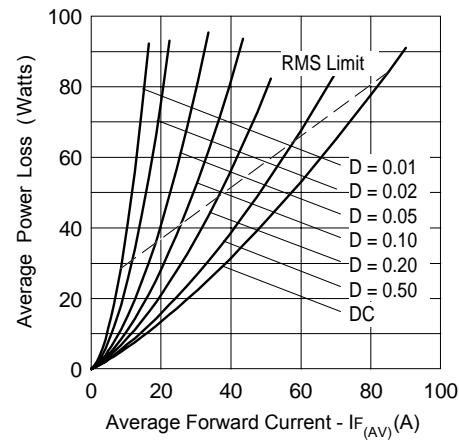
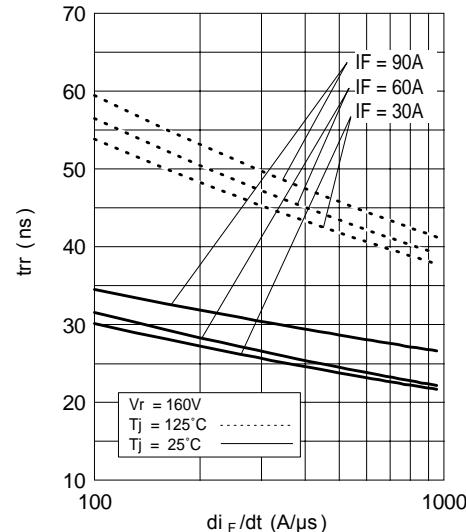
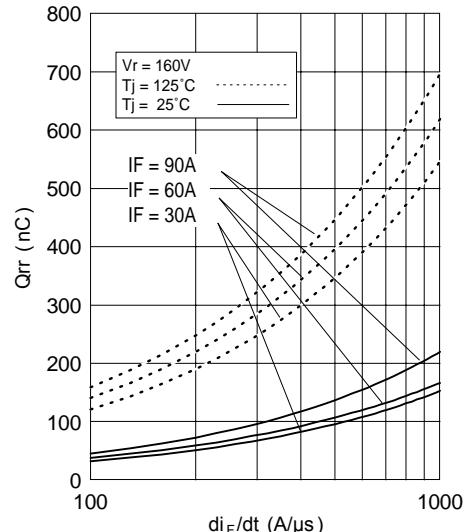


Fig. 6-Forward Power Loss Characteristics

Fig. 7-Typical Reverse Recovery time vs. di_F/dt Fig. 8-Typical Stored Charge vs. di_F/dt

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

Reverse Recovery Circuit

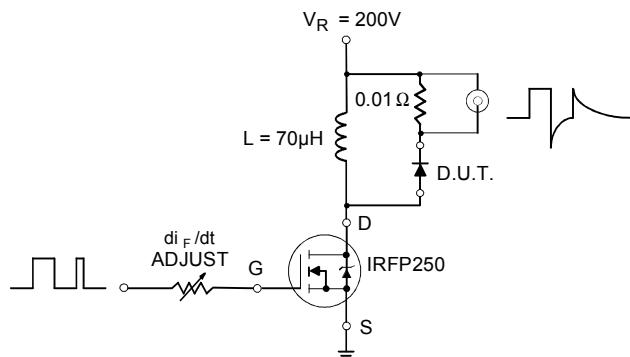
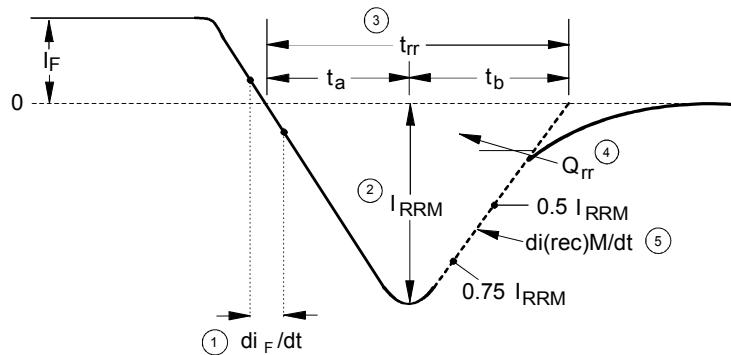


Fig. 9- Reverse Recovery Parameter Test Circuit



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. $di(\text{rec}) M / dt$ - Peak rate of change of current during t_b portion of t_{rr}

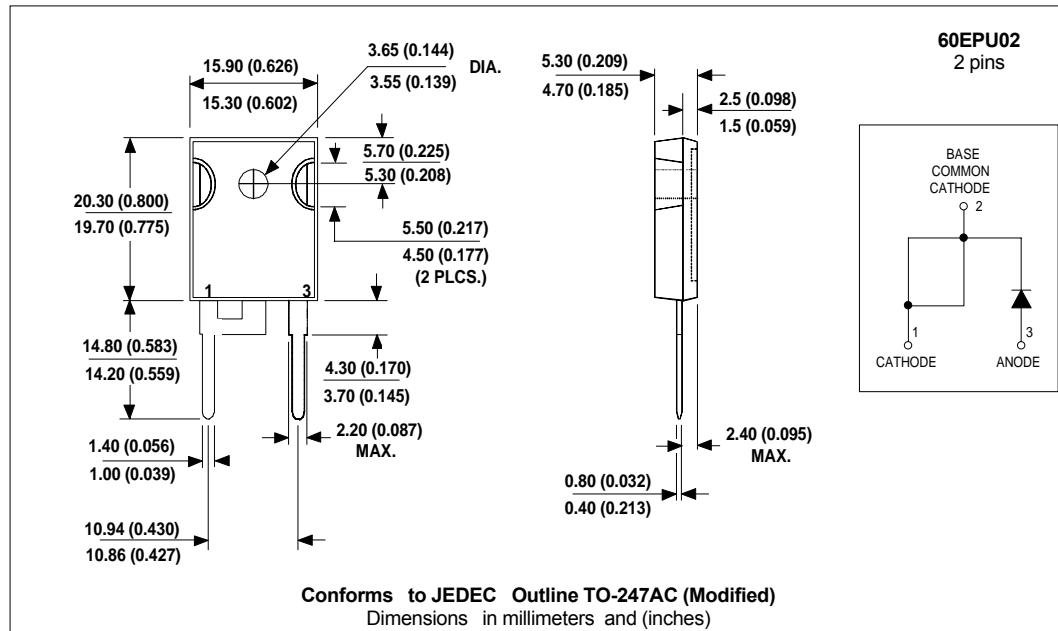
Fig. 10 - Reverse Recovery Waveform and Definitions

60EPU02

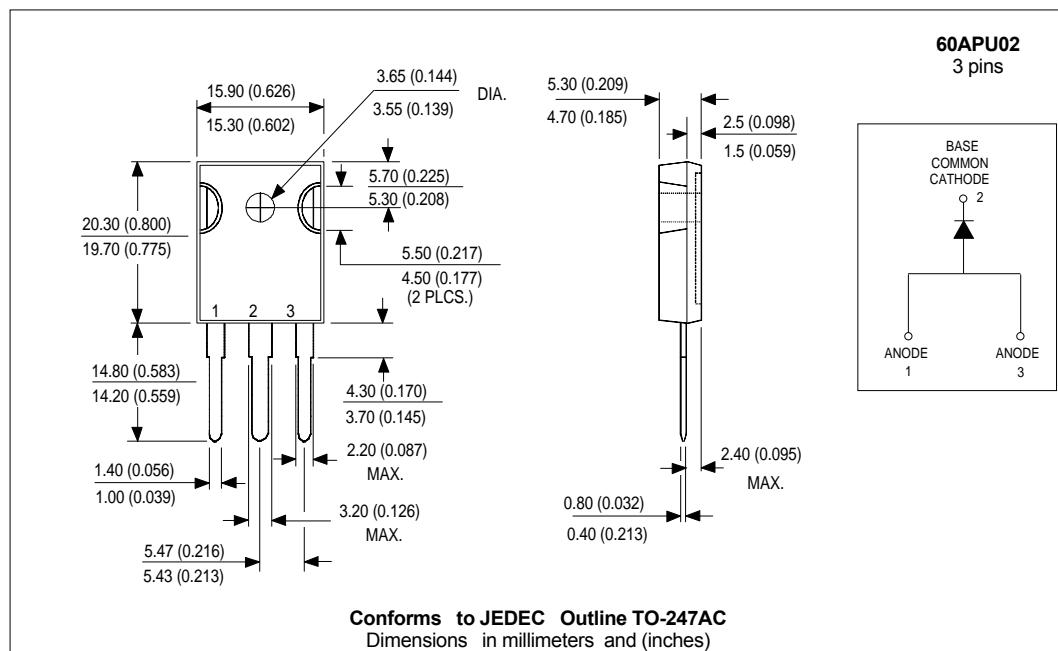
Bulletin PD-20739 rev. A 01/01

International
IR Rectifier

Outline Table



Outline Table



Ordering Information Table

Device Code				
60	E	P	U	02
1				
2				
3				
4				
5				
1	- Current Rating	(60 = 60A)		
2	- Single Diode:	E = Single Diode		
		A = Single Diode (3 pins)		
3	- TO-247AC (Modified)			
4	- Ultrafast Recovery			
	- Voltage Rating	(02 = 200V)		

International
IR Rectifier

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