

# ESTF45D60U

## Ultra-Fast Soft Recovery Diode Module

### DESCRIPTION

FRED from EST utilizes advanced processing techniques to achieve ultrafast recovery times and higher forward current. Its soft recovery characteristics and high reliability suit for wide industrial applications.

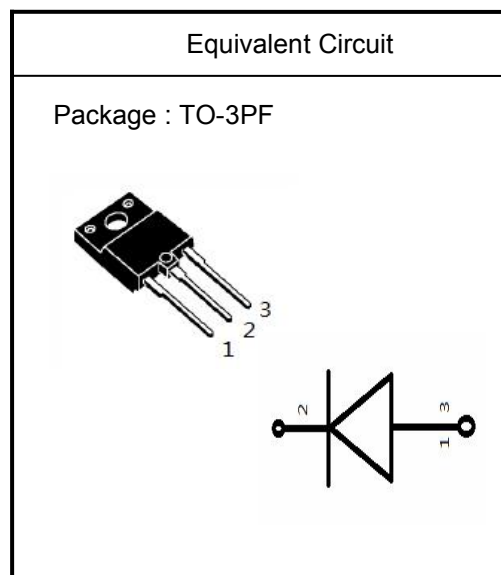
### PRODUCT FEATURES

- Ultrafast Recovery Time
- Low Recovery Loss
- Soft Reverse Recovery Characteristics
- Low Leakage Current
- Low Forward Voltage
- High Surge Current Capability

### APPLICATIONS

- Freewheeling, Snubber, Clamp
- Inversion Welder
- PFC
- Plating Power Supply
- Ultrasonic Cleaner and Welder
- Converter & Chopper
- UPS

### Equivalent Circuit and Package



### ABSOLUTE MAXIMUM RATINGS ( $T_C = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions		Values	Unit
$V_R$	Maximum D.C. Reverse Voltage		620	V
$V_{RRM}$	Maximum Repetitive Reverse Voltage			
$I_{F(AV)}$	Average Forward Current	$T_C = 100^\circ\text{C}$	45	
$I_{F(RMS)}$	RMS Forward Current	$T_C = 100^\circ\text{C}$	50	A
$I_{FSM}$	Non Repetitive Surge Forward Current	$T_J = 25^\circ\text{C}, t = 10\text{ms}, 50\text{Hz}, \text{Sine}$	300	
$P_D$	Power Dissipation		160	W
$T_J$	Junction Temperature		-55 to +150	$^\circ\text{C}$
$T_{STG}$	Storage Temperature Range		-55 to +125	$^\circ\text{C}$
Torque	To Heat Sink	Recommended (M3)	1.1	Nm
$R_{thJC}$	Junction to Case Thermal Resistance		0.8	$^\circ\text{C}/\text{W}$
Weight			6	g

### ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = 620\text{V}$			10	$\mu\text{A}$
		$V_R = 620\text{V}, T_J = 125^\circ\text{C}$			1	$\text{mA}$
$V_F$	Forward Voltage	$I_F = 30\text{A}$		2	2.2	V
		$I_F = 30\text{A}, T_J = 125^\circ\text{C}$		1.7		
$t_{rr}$	Reverse Recovery Time	$(I_F = 1\text{A}, di_F/dt = -200\text{A}/\mu\text{s}, V_R = 30\text{V})$		30	35	ns
$t_{rr}$	Reverse Recovery Time	$(I_F = 0.5\text{A}, I_R = 1\text{A}, I_{RR} = 0.25\text{A})$		35	45	ns

### ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
$t_{rr}$	Reverse Recovery Time	$I_F = 30\text{A}, V_R = 300\text{V},$ $di_F/dt = -200\text{A}/\mu\text{s}$		35		ns
$I_{RRM}$	Maximum Reverse Recovery Current				3	
$Q_{RR}$	Reverse Recovery Charge			128		nC
$t_{rr}$	Reverse Recovery Time	$I_F = 30\text{A}, V_R = 300\text{V},$ $di_F/dt = -200\text{A}/\mu\text{s}, T_J = 125^\circ\text{C}$		125		ns
$I_{RRM}$	Maximum Reverse Recovery Current				6	
$Q_{RR}$	Reverse Recovery Charge			475		nC

## Typical Performance Curves

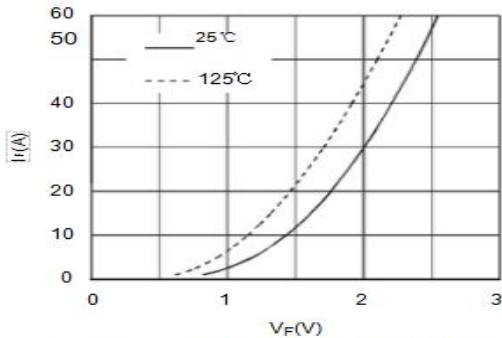


Figure 1. Forward Voltage Drop vs Forward Current

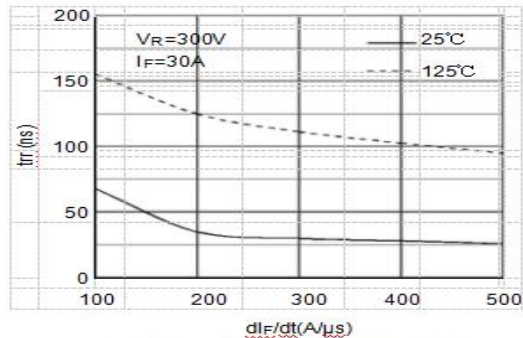


Figure 2. Reverse Recovery Time vs  $di_F/dt$

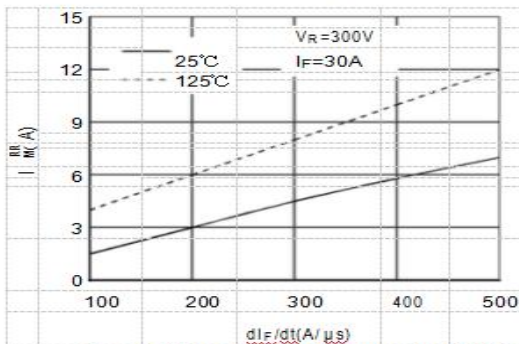


Figure 3. Reverse Recovery Current vs  $di_F/dt$

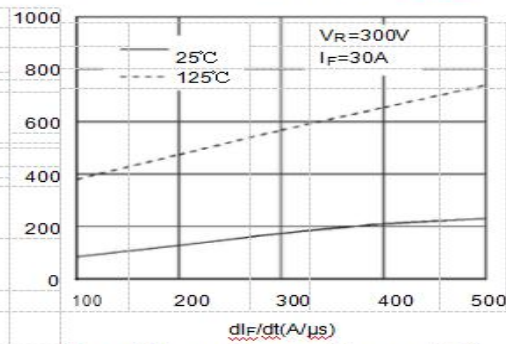


Figure 4. Reverse Recovery Charge vs  $di_F/dt$

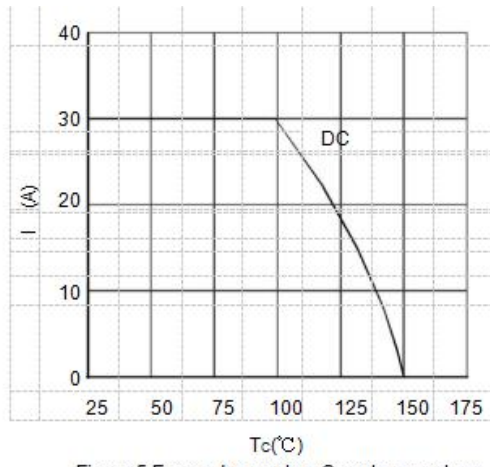


Figure 5. Forward current vs Case temperature

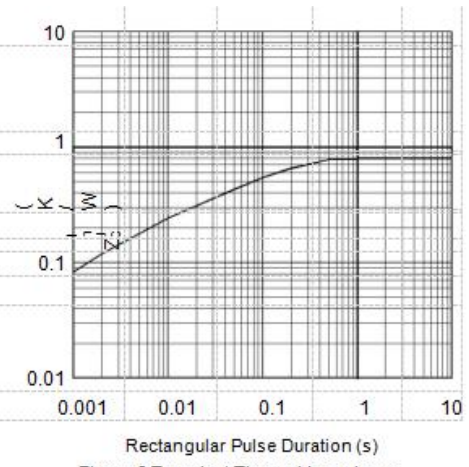


Figure 6. Transient Thermal Impedance

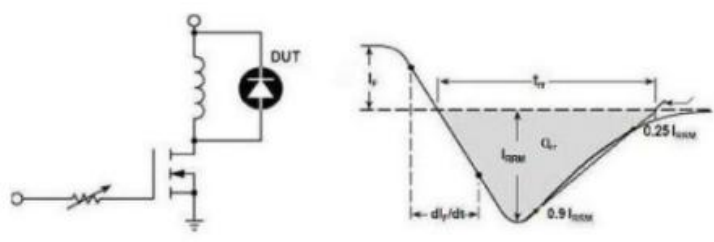


Figure 7. Diode Reverse Recovery Test Circuit and Waveform

## Package outline dimension

