Bulletin PD-20765 04/02

International
IOR Rectifier

15ETH06FP

Hyperfast Rectifier

Features

- Hyperfast Recovery Time
- Low Forward Voltage Drop
- Low Leakage Current
- 175°C Operating Junction Temperature
- Fully Isolated package (V_{INS} = 2500 V_{RMS})
- UL E78996 approved

t_{rr} = 22ns typ.
$I_{F(AV)}$ = 15Amp
V_R = 600V

Description/ Applications

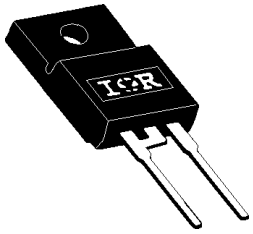
State of the art Hyperfast recovery rectifiers designed with optimized performance of forward voltage drop, Hyperfast recover time, and soft recovery.
The planar structure and the platinum doped life time control guarantee the best overall performance, ruggedness and reliability characteristics.
These devices are intended for use in PFC Boost stage in the AC-DC section of SMPS, inverters or as freewheeling diodes.
The IR extremely optimized stored charge and low recovery current minimize the switching losses and reduce over dissipation in the switching element and snubbers.

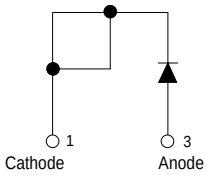
Absolute Maximum Ratings

	Parameters		Max	Units
V_{RRM}	Peak Repetitive Peak Reverse Voltage		600	V
$I_{F(AV)}$	Average Rectified Forward Current	@ T_C = 134°C	15	A
I_{FSM}	Non Repetitive Peak Surge Current	@ T_J = 25°C	180	
I_{FM}	Peak Repetitive Forward Current		30	
T_J, T_{STG}	Operating Junction and Storage Temperatures		- 65 to 175	°C

Case Styles

15ETH06FP





TO-220 FULLPACK

Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

	Parameters	Min	Typ	Max	Units	Test Conditions
V_{BR}, V_r	Breakdown Voltage, Blocking Voltage	600	-	-	V	I_R = 100µA
V_F	Forward Voltage	-	1.8	2.2	V	I_F = 15A, T_J = 25°C
		-	1.3	1.6	V	I_F = 15A, T_J = 150°C
I_R	Reverse Leakage Current	-	0.2	50	µA	V_R = V_R Rated
		-	30	500	µA	T_J = 150°C, V_R = V_R Rated
C_T	Junction Capacitance	-	20	-	pF	V_R = 600V
L_S	Series Inductance	-	8.0	-	nH	Measured lead to lead 5mm from package body

Dynamic Recovery Characteristics @ T_C = 25°C (unless otherwise specified)

	Parameters	Min	Typ	Max	Units	Test Conditions	
t_{rr}	Reverse Recovery Time	-	22	30	ns	I_F = 1A, di_F/dt = 100A/µs, V_R = 30V	
		-	28	35		I_F = 15A, di_F/dt = 100A/µs, V_R = 30V	
		-	29	-		T_J = 25°C	I_F = 15A di_F/dt = 200A/µs V_R = 390V
		-	75	-		T_J = 125°C	
I_{RRM}	Peak Recovery Current	-	3.5	-	A	T_J = 25°C	
		-	7	-		T_J = 125°C	
Q_{rr}	Reverse Recovery Charge	-	57	-	nC	T_J = 25°C	
		-	300	-		T_J = 125°C	
t_{rr}	Reverse Recovery Time	-	51	-	ns	T_J = 125°C	I_F = 15A di_F/dt = 800A/µs V_R = 390V
I_{RRM}	Peak Recovery Current	-	20	-	A		
Q_{rr}	Reverse Recovery Charge	-	580	-	nC		

Thermal - Mechanical Characteristics

	Parameters		Min	Typ	Max	Units
T_J	Max. Junction Temperature Range		-	-	175	°C
T_{Stg}	Max. Storage Temperature Range		- 65	-	175	
R_{thJC}	Thermal Resistance, Junction to Case	Per Leg	-	1.3	1.5	°C/W
R_{thJA} ①	Thermal Resistance, Junction to Ambient	Per Leg	-	-	70	
R_{thCS} ②	Thermal Resistance, Case to Heatsink		-	1.5	-	
	Weight		-	2.0	-	g
			-	0.07	-	(oz)
	Mounting Torque		6.0	-	12	Kg-cm
			5.0	-	10	lbf.in

① Typical Socket Mount
② Mounting Surface, Flat, Smooth and Greased

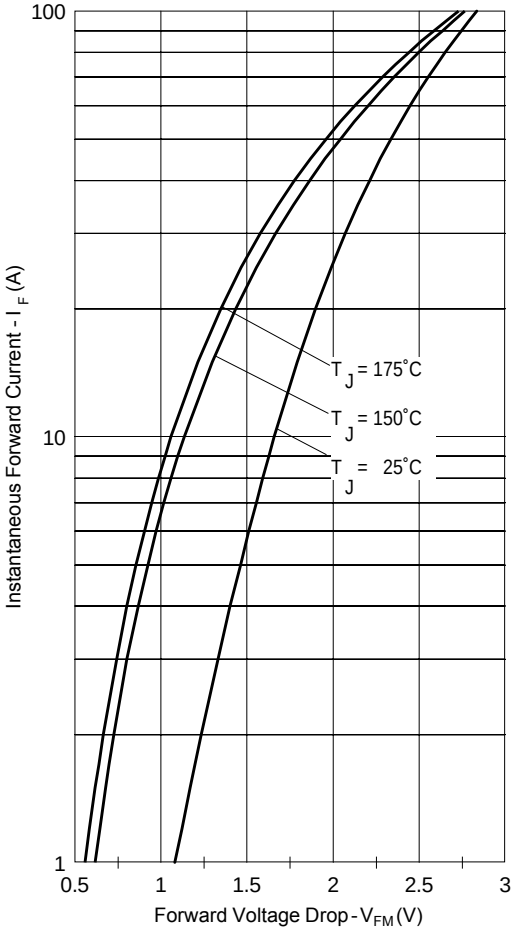


Fig. 1 - Typical Forward Voltage Drop Characteristics

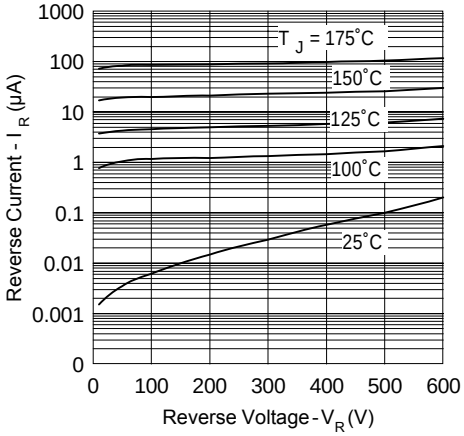


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage

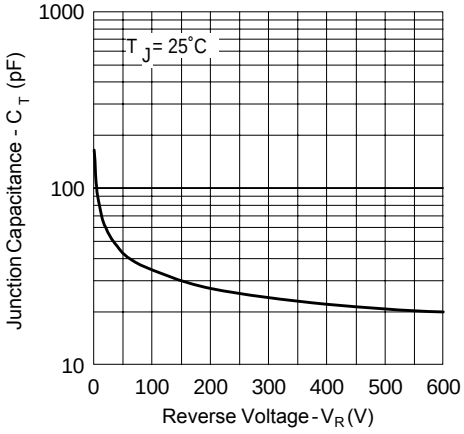


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

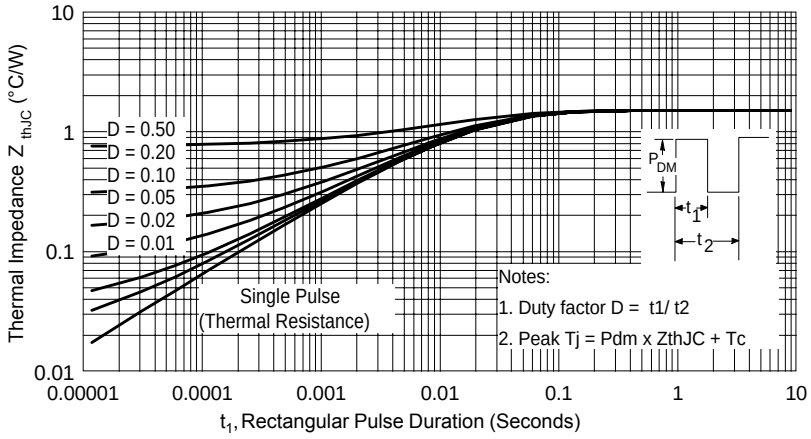


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics

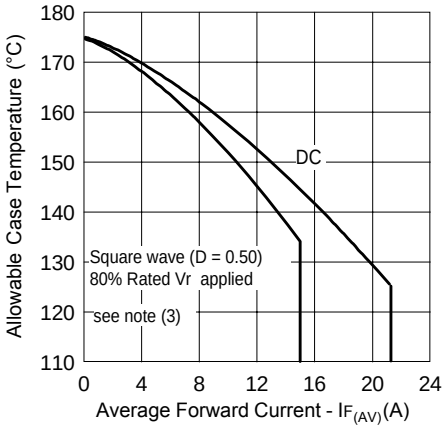


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current

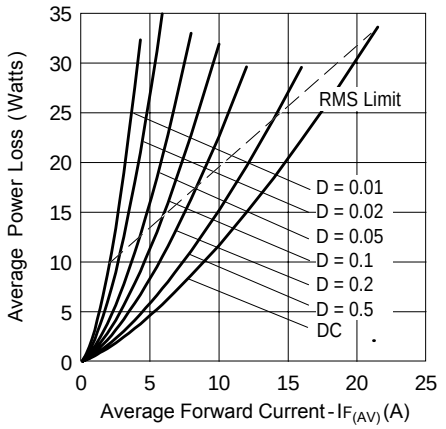


Fig. 6 - Forward Power Loss Characteristics

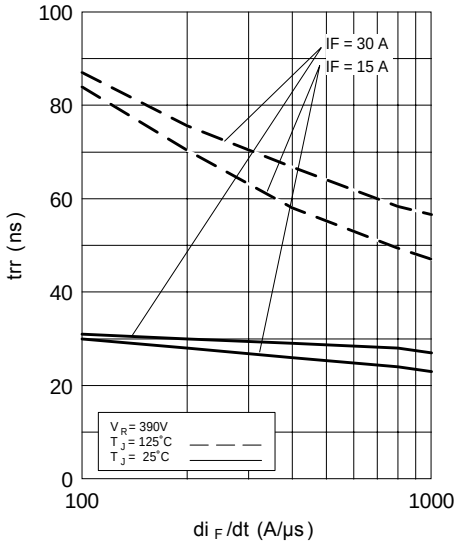


Fig. 7 - Typical Reverse Recovery vs. di_F/dt

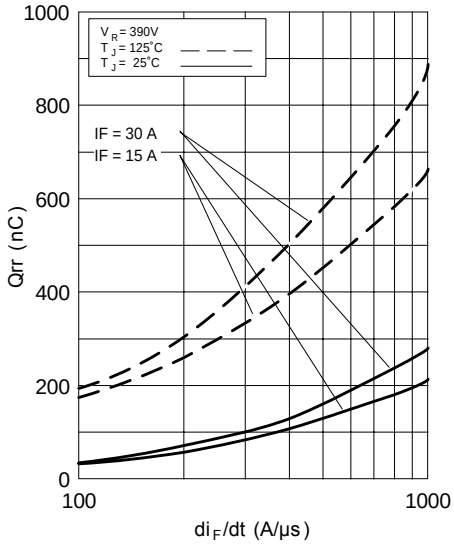


Fig. 8 - Typical Stored Charge vs. di_F/dt

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

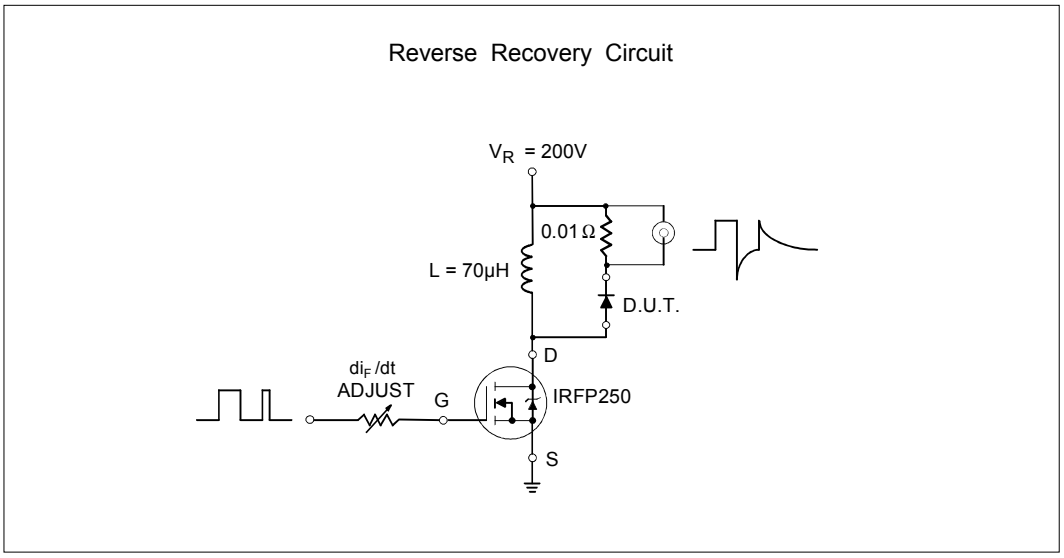
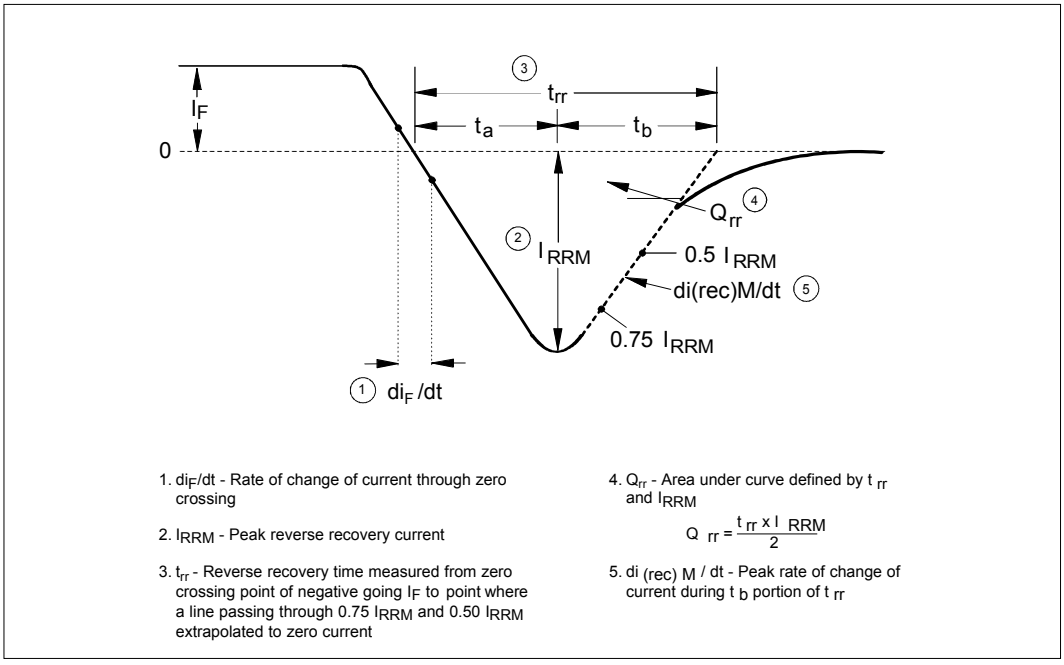


Fig. 9- Reverse Recovery Parameter Test Circuit



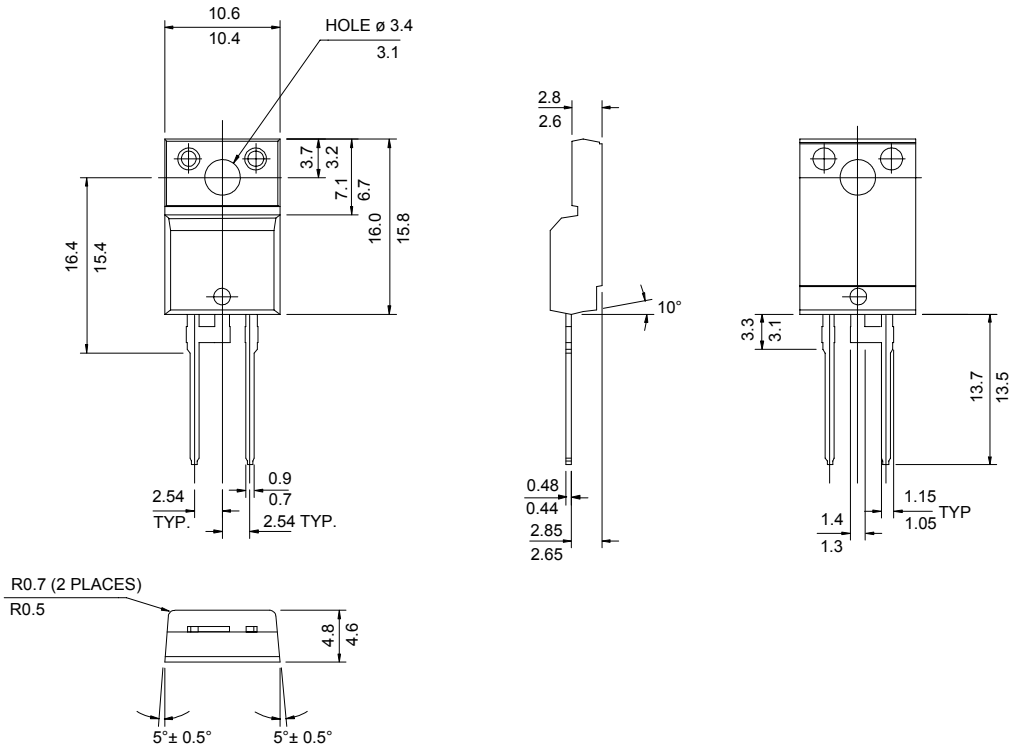
1. di_F/dt - Rate of change of current through zero crossing
2. I_{RRM} - Peak reverse recovery current
3. t_{rr} - Reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through 0.75 I_{RRM} and 0.50 I_{RRM} extrapolated to zero current
4. Q_{rr} - 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

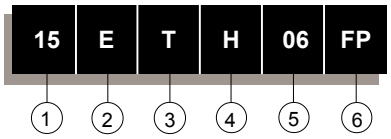
Outline Table



Dimensions in millimeters

Ordering Information Table

Device Code



1	-	Current Rating (15 = 15A)
2	-	E = Single Diode
3	-	T = TO-220
4	-	H = HyperFast Recovery
5	-	Voltage Rating (06 = 600V)
6	-	TO-220 FULLPACK

Data and specifications subject to change without notice.
This product has been designed and qualified for Industrial Level.
Qualification Standards can be found on IR's Web site.

International
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