Bulletin PD-20695 rev. B 02/04

International
IOR Rectifier

15ETL06
15ETL06S
15ETL06-1
15ETL06FP

Ultra-low V_F Hyperfast Rectifier for Discontinuous Mode PFC

Features

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

V_F = 0.99V typ.
$I_{F(AV)}$ = 15Amp
V_R = 600V

Description

State of the art, ultra-low V_F, soft-switching Hyperfast Rectifiers optimized for Discontinuous (Critical) Mode (DCM) Power Factor Correction (PFC).
The minimised conduction loss, optimized stored charge and low recovery current minimize the switching losses and reduce over dissipation in the switching element and snubbers.
The device is also intended for use as a free wheeling diode in power supplies and other power switching applications.

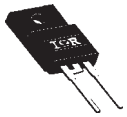
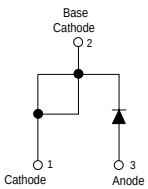
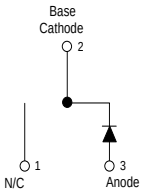
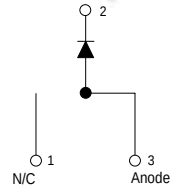
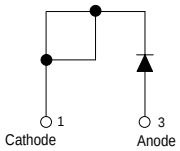
Applications

AC-DC SMPS 70W-400W
e.g. Laptop & Printer AC Adaptors, Desktop PC, TV & Monitor, Games units and DVD AC-DC power supplies.

Absolute Maximum Ratings

	Parameters	Max	Units
V_{RRM}	Peak Repetitive Reverse Voltage	600	V
$I_{F(AV)}$	Average Rectified Forward Current @ T_C = 154°C @ T_C = 120°C (FULLPACK)	15	A
I_{FSM}	Non Repetitive Peak Surge Current @ T_J = 25°C	250	
I_{FM}	Peak Repetitive Forward Current	30	
T_J, T_{STG}	Operating Junction and Storage Temperatures	- 65 to 175	°C

Case Styles

15ETL06	15ETL06S	15ETL06-1	15ETL06FP
			
			
TO-220AC	D^2PAK	TO-262	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	-	0.99	1.05	V	I_F = 15A, T_J = 25°C
		-	0.85	0.92	V	I_F = 15A, T_J = 150°C
I_R	Reverse Leakage Current	-	0.1	10	µA	V_R = V_R Rated
		-	15	120	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	-	60	120	ns	I_F = 1A, di_F/dt = 100A/µs, V_R = 30V	
		-	190	270		I_F = 15A, di_F/dt = 100A/µs, V_R = 30V	
		-	220	-		T_J = 25°C	I_F = 15A di_F/dt = 200A/µs V_R = 390V
		-	320	-		T_J = 125°C	
I_{RRM}	Peak Recovery Current	-	19	-	A	T_J = 25°C	
		-	26	-		T_J = 125°C	
Q_{rr}	Reverse Recovery Charge	-	2.2	-	µC	T_J = 25°C	
		-	4.3	-		T_J = 125°C	

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	-	1.0	1.3	°C/W
		Fullpack (Per Leg)	-	3.0	3.5	
R_{thJA} ①	Thermal Resistance, Junction to Ambient	Per Leg	-	-	70	
R_{thCS} ②	Thermal Resistance, Case to Heatsink		-	0.5	-	
	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

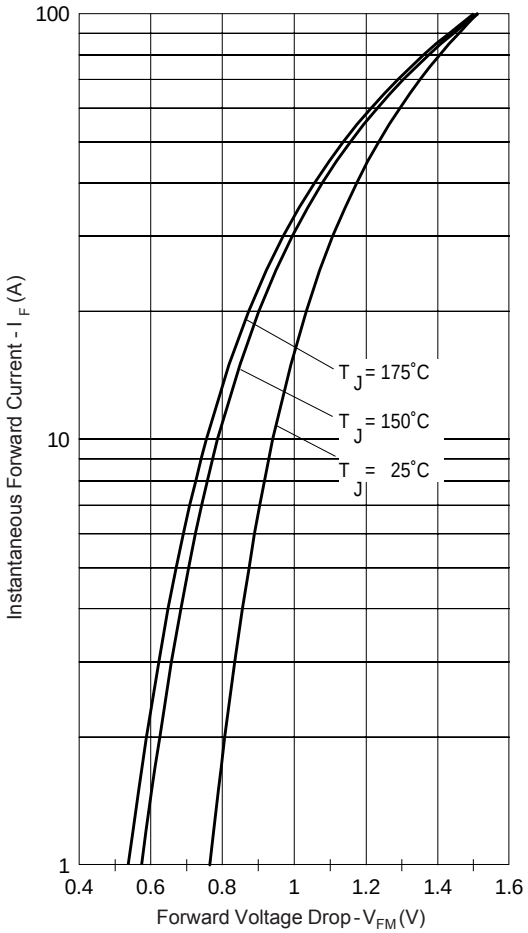


Fig. 1 - Typical Forward Voltage Drop Characteristics

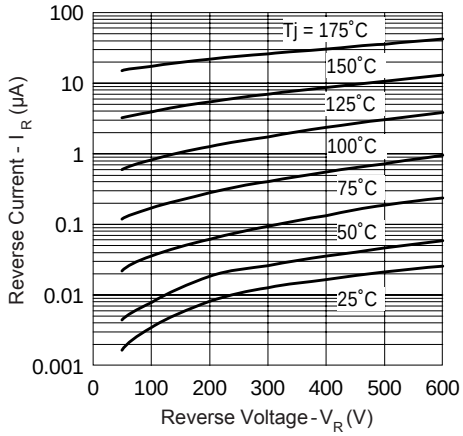


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage

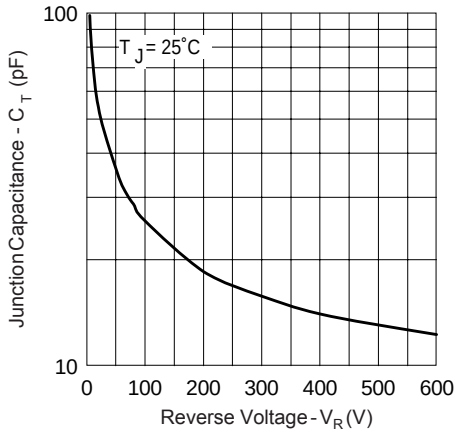


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

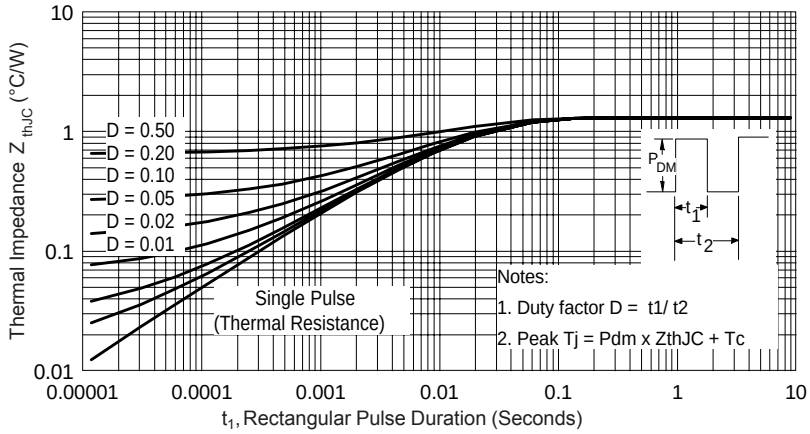


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics

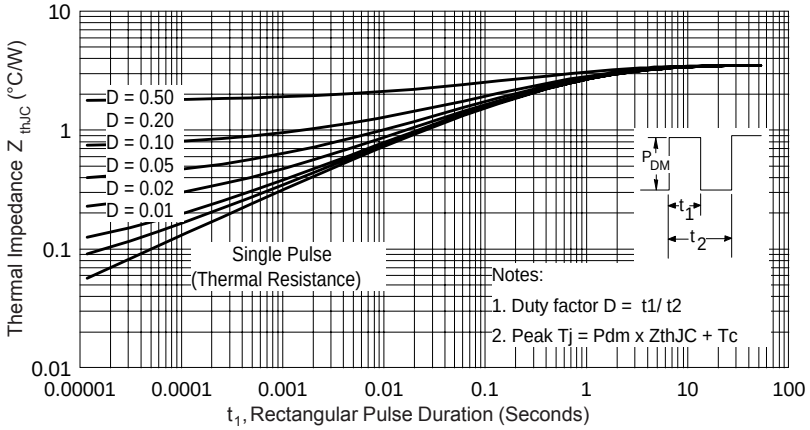


Fig. 5 - Max. Thermal Impedance Z_{thJC} Characteristics (FULLPACK)

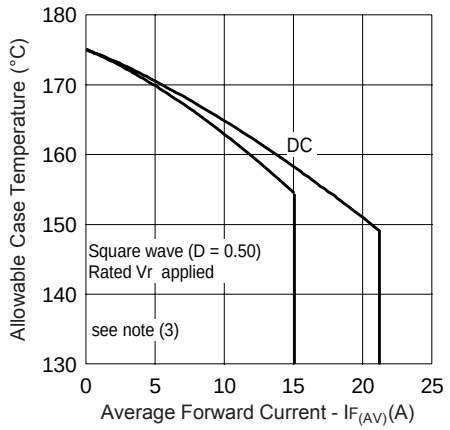


Fig. 6 - Max. Allowable Case Temperature Vs. Average Forward Current

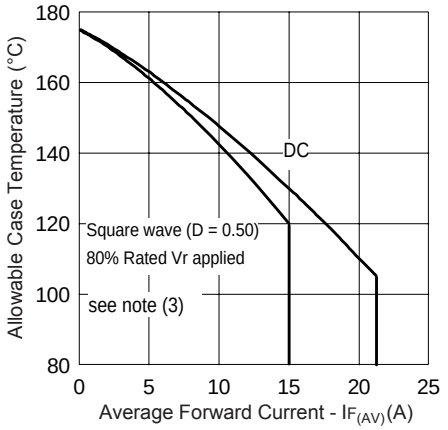


Fig. 7 - Max. Allowable Case Temperature Vs. Average Forward Current (FULLPACK)

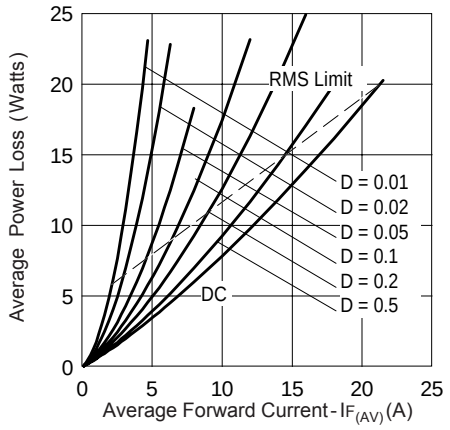


Fig. 8 - Forward Power Loss Characteristics

(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. 8);
Pd_{REV} = Inverse Power Loss = $V_{R1} \times I_R (1 - D)$;
$I_R @ V_{R1}$ = rated V_R

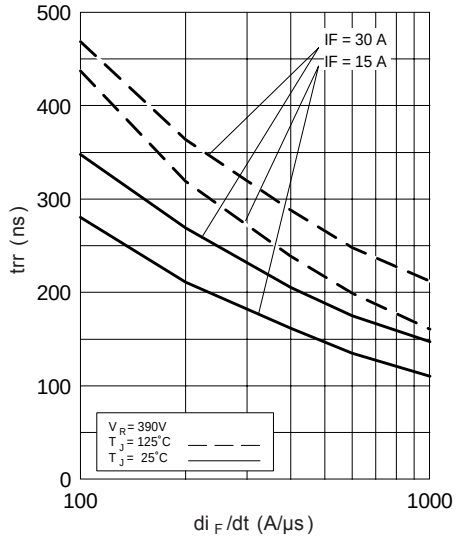


Fig. 9 - Typical Reverse Recovery vs. di_F/dt

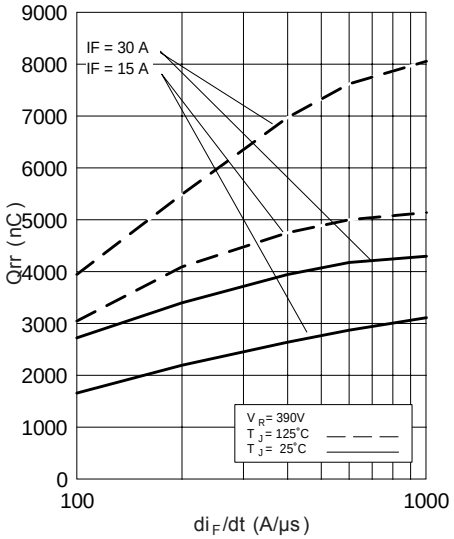


Fig. 10 - Typical Stored Charge vs. di_F/dt

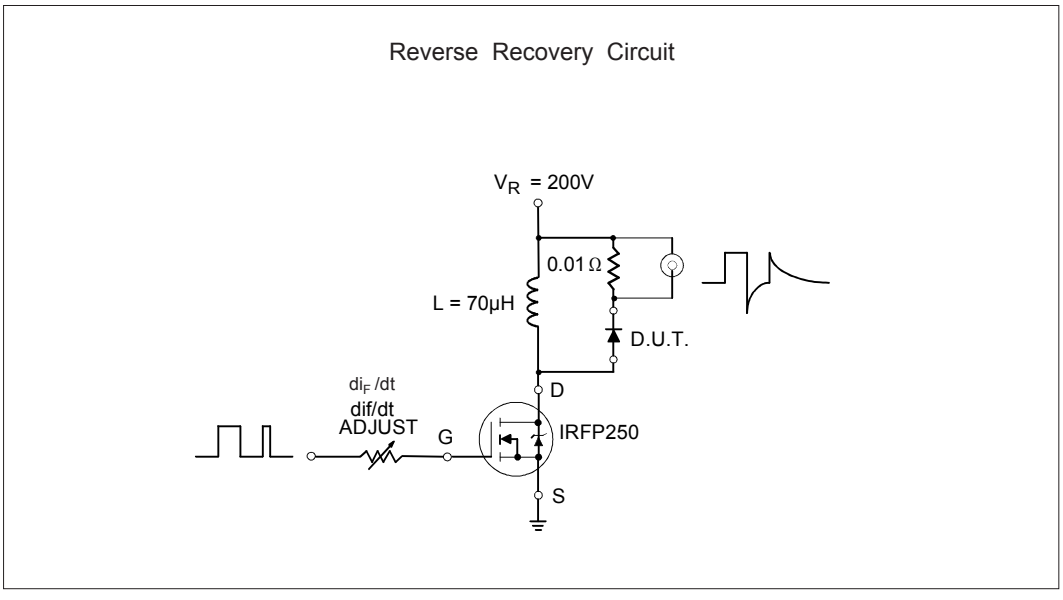
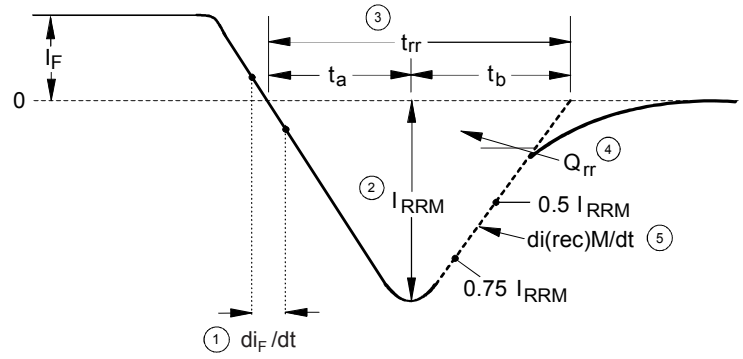


Fig. 11 - Reverse Recovery Parameter Test Circuit



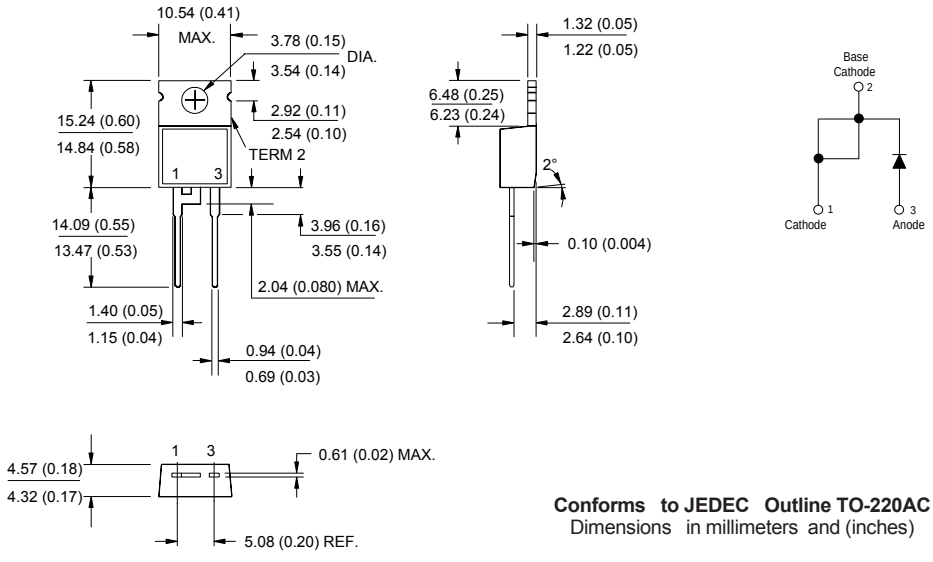
1. di_F/dt - Rate of change of current through zero crossing
2. I_{RRM} - Peak reverse recovery current
3. t_{rr} - Reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through 0.75 I_{RRM} and 0.50 I_{RRM} extrapolated to zero current
4. Q_{rr}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

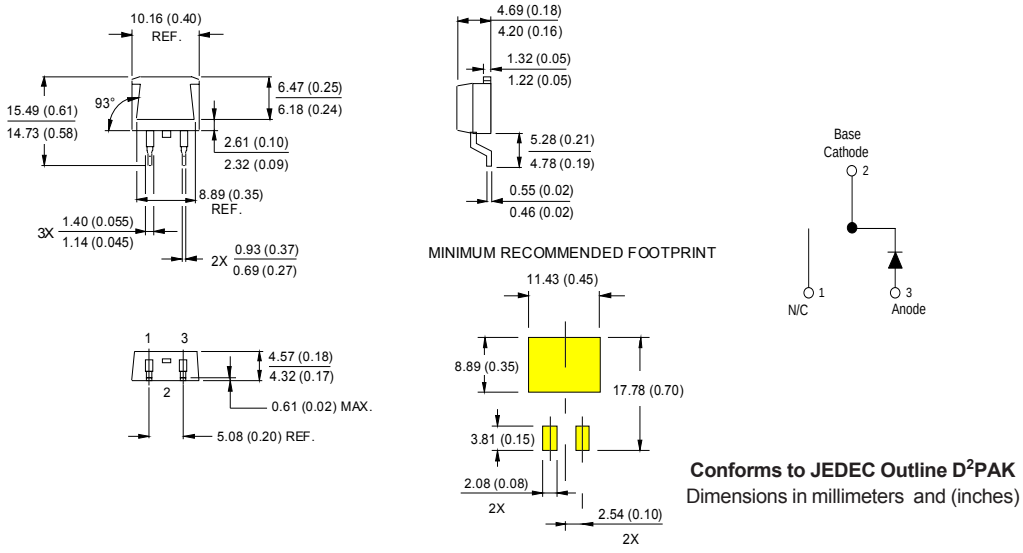
Fig. 12 - Reverse Recovery Waveform and Definitions

Outline Table

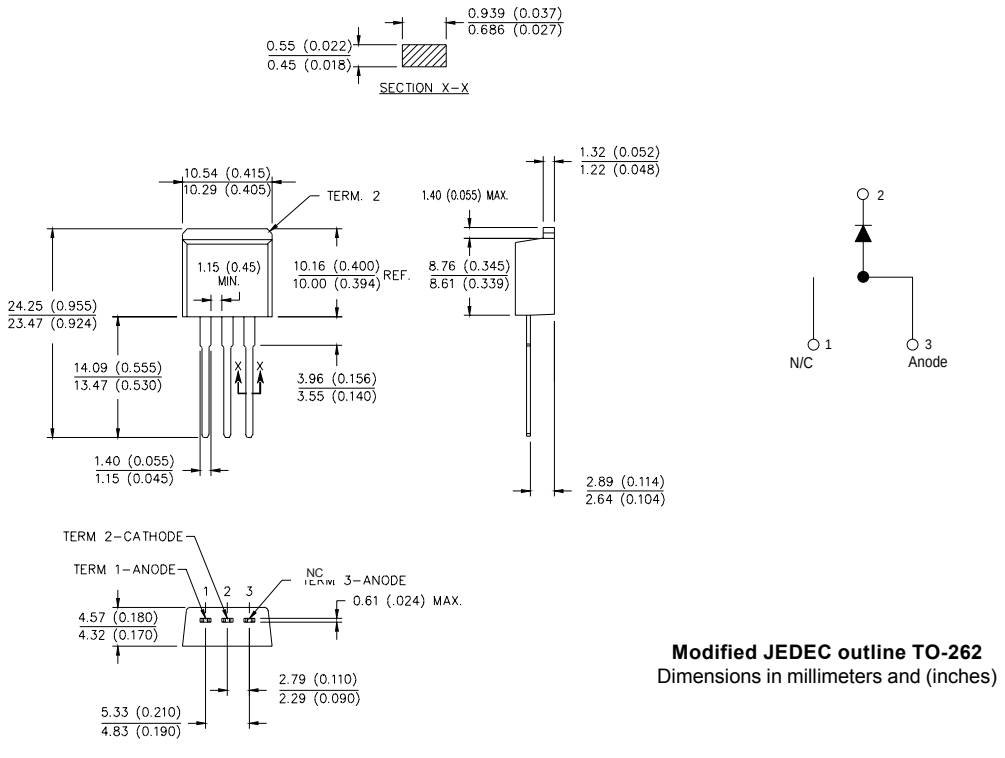


Conforms to JEDEC Outline TO-220AC
Dimensions in millimeters and (inches)

Outline Table

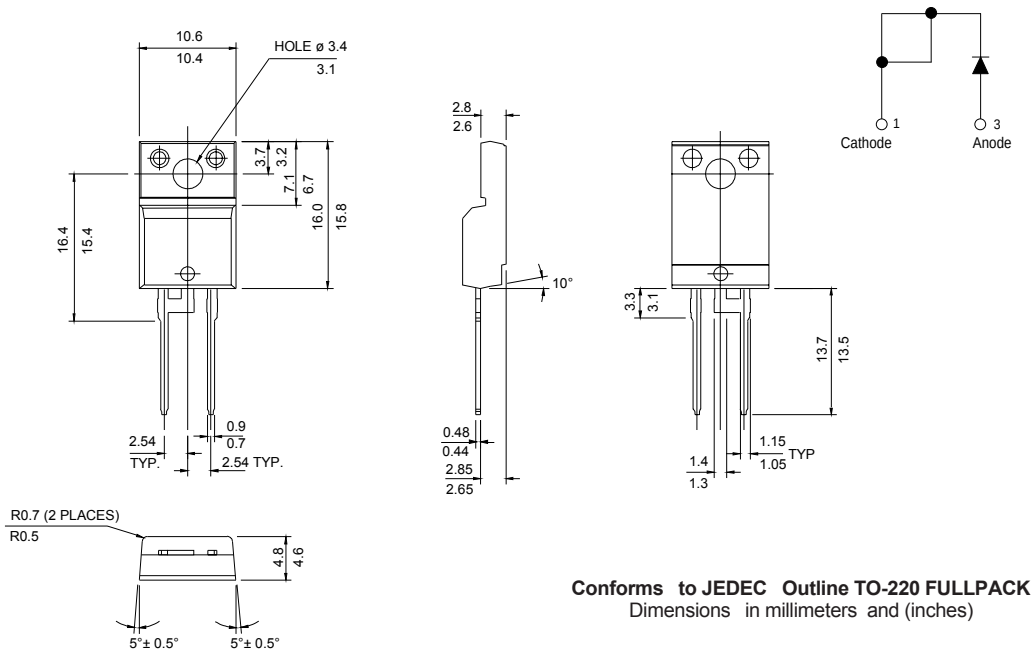


Conforms to JEDEC Outline D^2PAK
Dimensions in millimeters and (inches)



Modified JEDEC outline TO-262
Dimensions in millimeters and (inches)

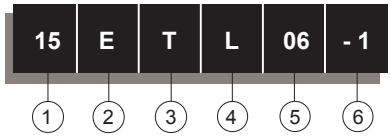
Outline Table



Conforms to JEDEC Outline TO-220 FULLPACK
Dimensions in millimeters and (inches)

Ordering Information Table

Device Code



1	-	Current Rating (15 = 15A)
2	-	E = Single Diode
3	-	T = TO-220, D^2Pak
4	-	L = Ultra-low V_F HyperFast Recovery
5	-	Voltage Rating (06 = 600V)
6	-	"-1" = TO-262 Option S = D^2Pak None = TO-220AC FP = 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
IOR Rectifier

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