Bulletin PD-20769 rev. A 08/03

International
IOR Rectifier

20CTH03
20CTH03S
20CTH03-1
20CTH03FP

Hyperfast Rectifier

t_{rr} = 35ns max.
$I_{F(AV)}$ = 20Amp
V_R = 300V

Features

- Hyperfast Recovery Time
- Low Forward Voltage Drop
- Low Leakage Current
- 175°C Operating Junction Temperature

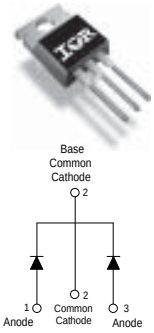
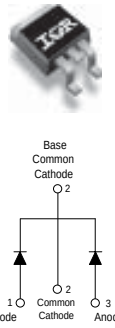
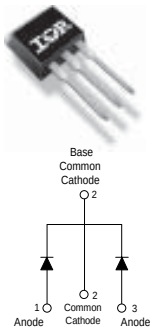
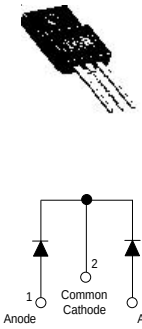
Description/ Applications

International Rectifier's 300V series are the state of the art Hyperfast recovery rectifiers designed with optimized performance of forward voltage drop and Hyperfast recovery time.
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 the output rectification stage of SMPS, UPS, DC-DC converters as well as freewheeling diodes in low voltage inverters and chopper motor drives.
Their 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 Reverse Voltage		300	V
$I_{F(AV)}$	Average Rectified Forward Current	@ T_C = 160°C Per Diode	10	A
	@ T_C = 135°C (FULLPACK)	Per Diode		
		Per Device	20	
I_{FSM}	Non Repetitive Peak Surge Current @ T_J = 25°C		120	
T_J, T_{STG}	Operating Junction and Storage Temperatures		- 65 to 175	°C

Case Styles

20CTH03	20CTH03S	20CTH03-1	20CTH03FP
			
TO-220AB	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	300	-	-	V	I_R = 100µA
V_F	Forward Voltage	-	1.05	1.25	V	I_F = 10A, T_J = 25°C
		-	0.85	0.95	V	I_F = 10A, T_J = 125°C
I_R	Reverse Leakage Current	-	-	20	µA	V_R = V_R Rated
		-	6	200	µA	T_J = 125°C, V_R = V_R Rated
C_T	Junction Capacitance	-	30	-	pF	V_R = 300V
L_S	Series Inductance	-	8	-	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	-	-	35	ns	I_F = 1A, di_F/dt = 50A/µs, V_R = 30V	
		-	-	30		I_F = 1A, di_F/dt = 100A/µs, V_R = 30V	
		-	31	-		T_J = 25°C	I_F = 10A di_F/dt = 200A/µs V_R = 200V
		-	42	-		T_J = 125°C	
I_{RRM}	Peak Recovery Current	-	2.4	-	A	T_J = 25°C	
		-	5.6	-		T_J = 125°C	
Q_{rr}	Reverse Recovery Charge	-	36	-	nC	T_J = 25°C	
		-	120	-		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 Diode	-	-	1.5	°C/W
		Fullpack (Per Diode)	-	-	3.9	

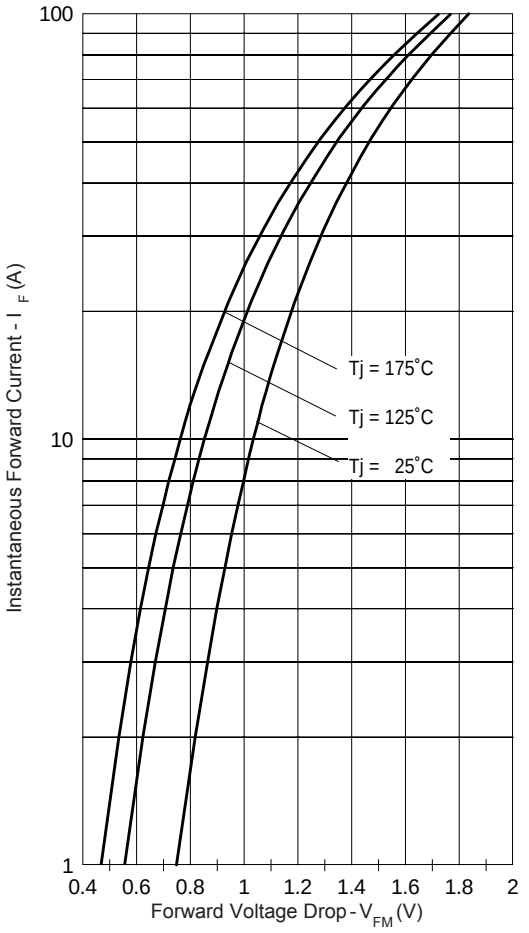


Fig. 1 - Typical Forward Voltage Drop Characteristics

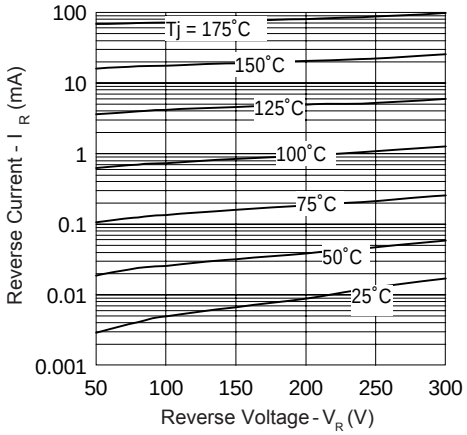


Fig. 2 - Typical Values of Reverse Current Vs. Reverse Voltage

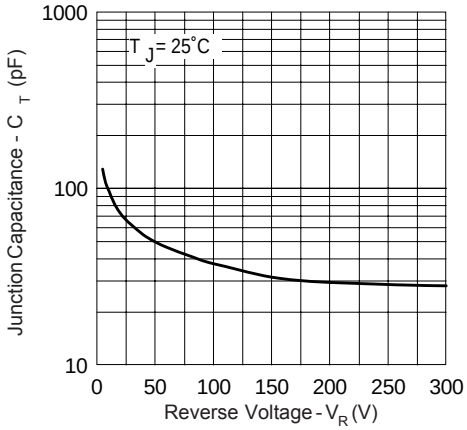


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

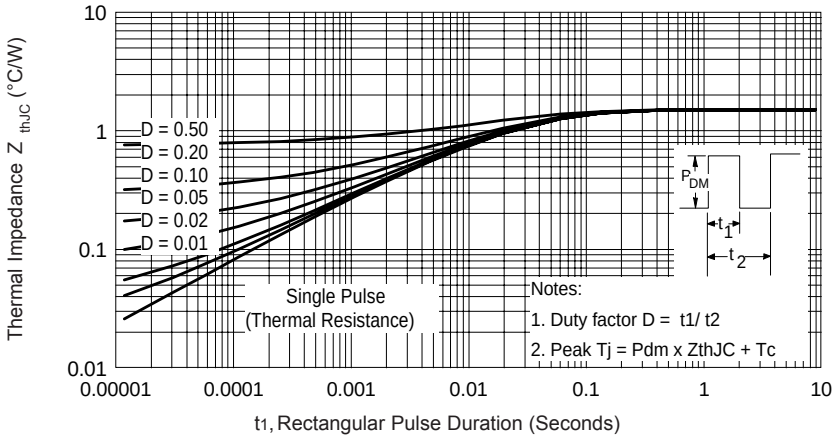


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics

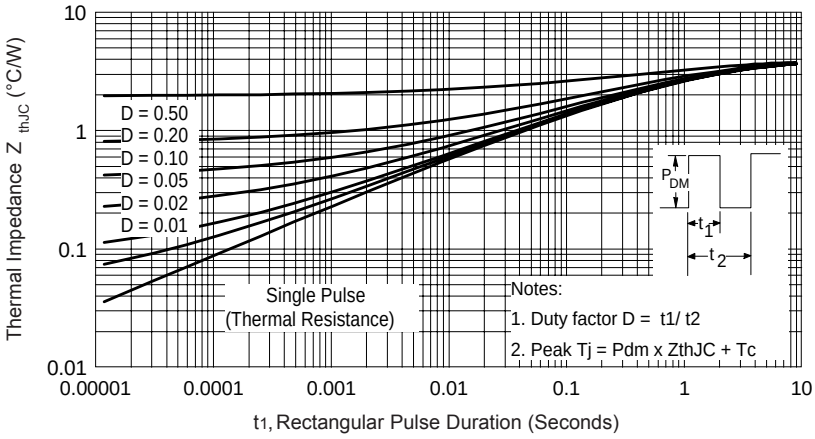


Fig. 5 - Max. Thermal Impedance Z_{thJC} Characteristics (FULLPACK)

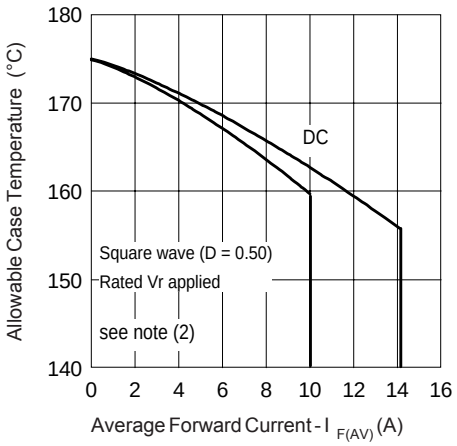


Fig. 6 - Max. Allowable Case Temperature Vs. Average Forward Current

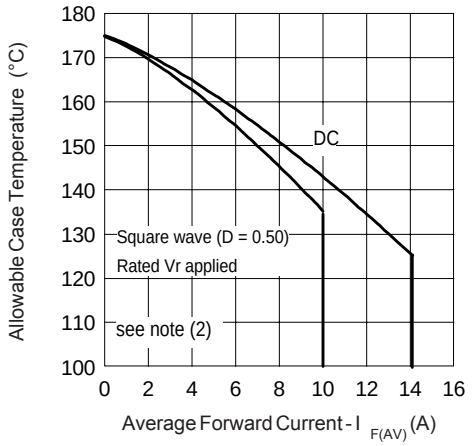


Fig. 7 - Max. Allowable Case Temperature Vs. Average Forward Current (FULLPACK)

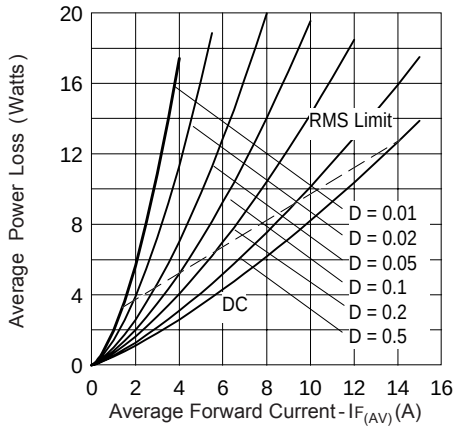


Fig. 8 - Forward Power Loss Characteristics

(2) 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

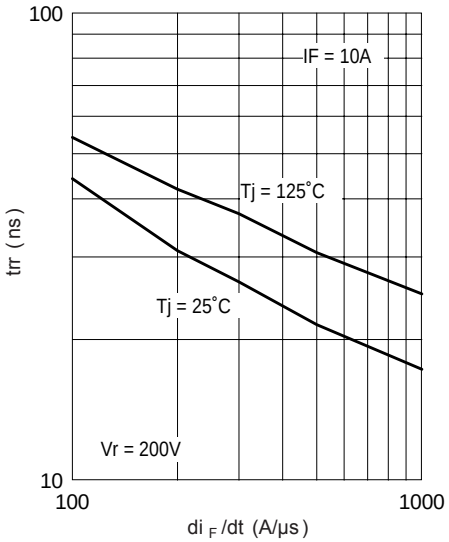


Fig. 9 - Typical Reverse Recovery vs. di_F/dt

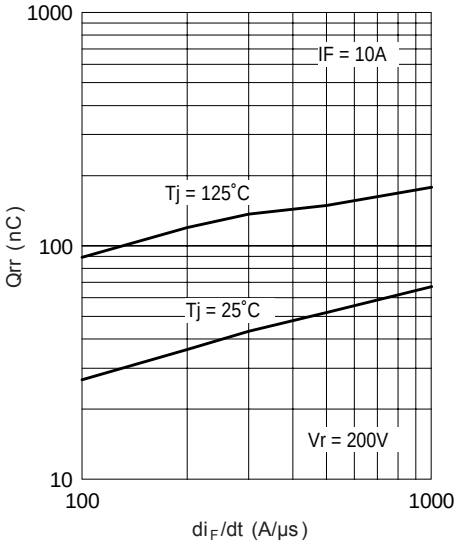


Fig. 10 - Typical Stored Charge vs. di_F/dt

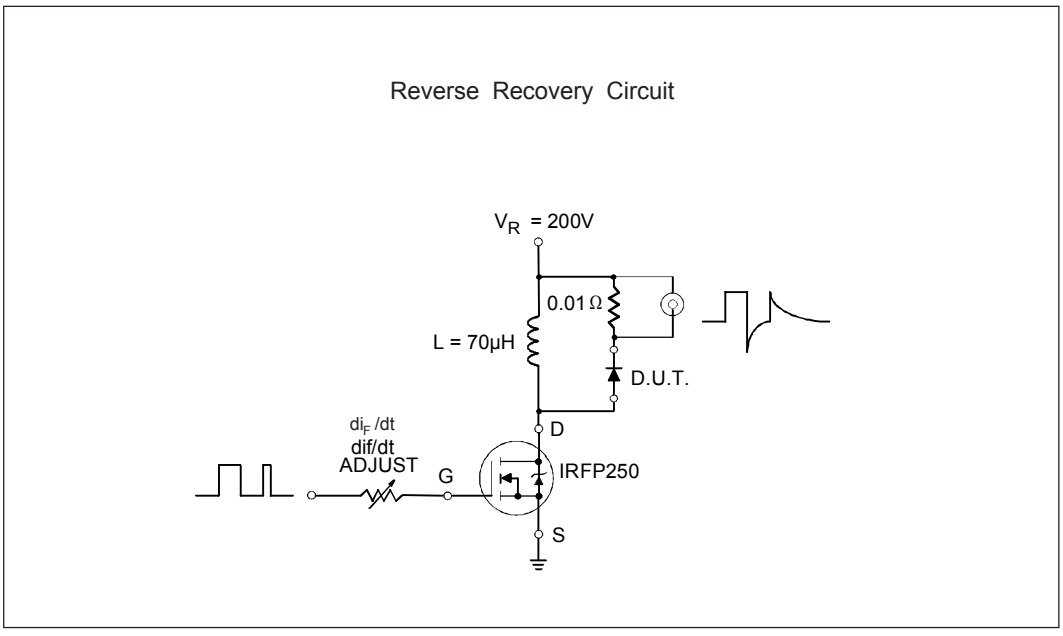
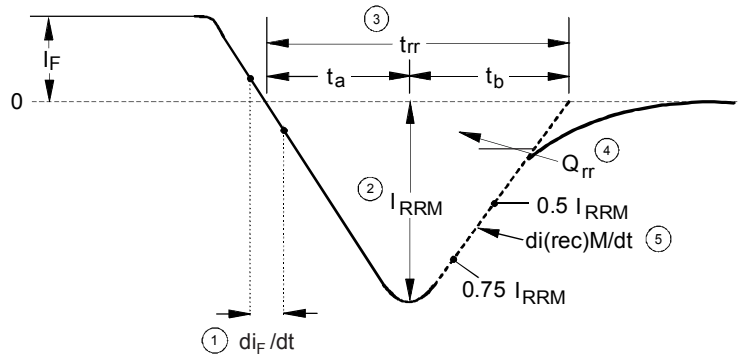


Fig. 11- Reverse Recovery Parameter Test Circuit



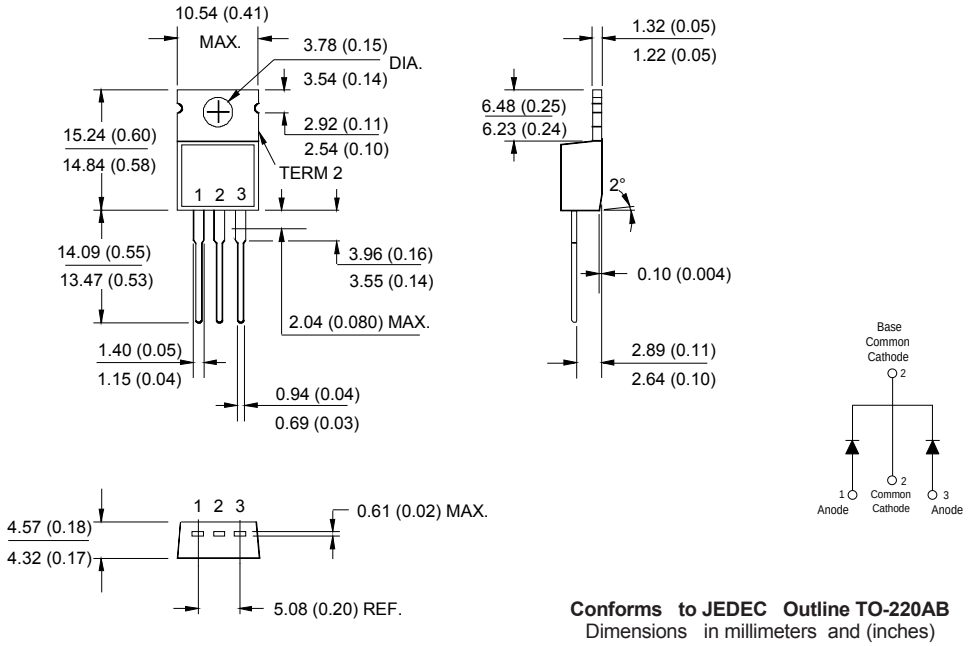
1. di_F/dt - Rate of change of current through zero crossing
2. I_{RRM} - Peak reverse recovery current
3. t_{rr} - Reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through 0.75 I_{RRM} and 0.50 I_{RRM} extrapolated to zero current
4. Q_{rr}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

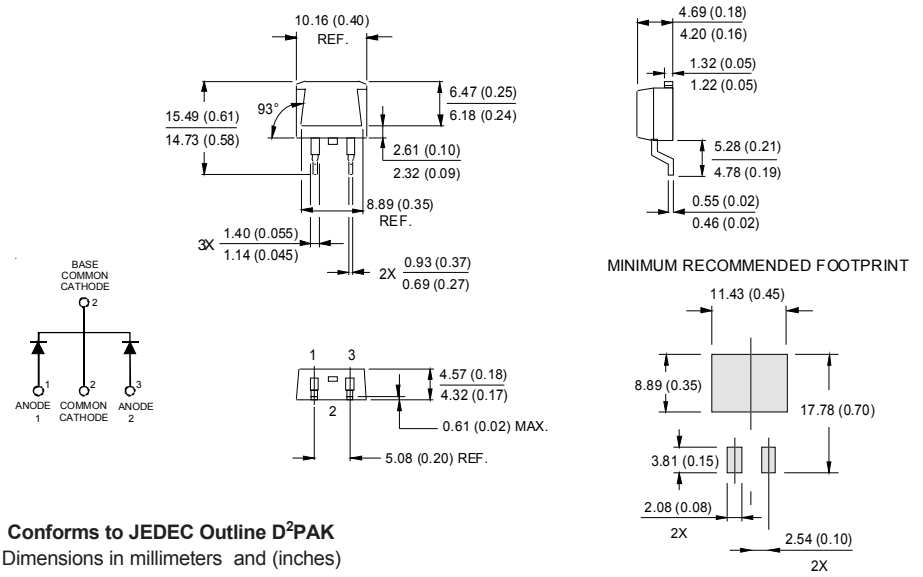
Fig. 13 - Reverse Recovery Waveform and Definitions

Outline Table

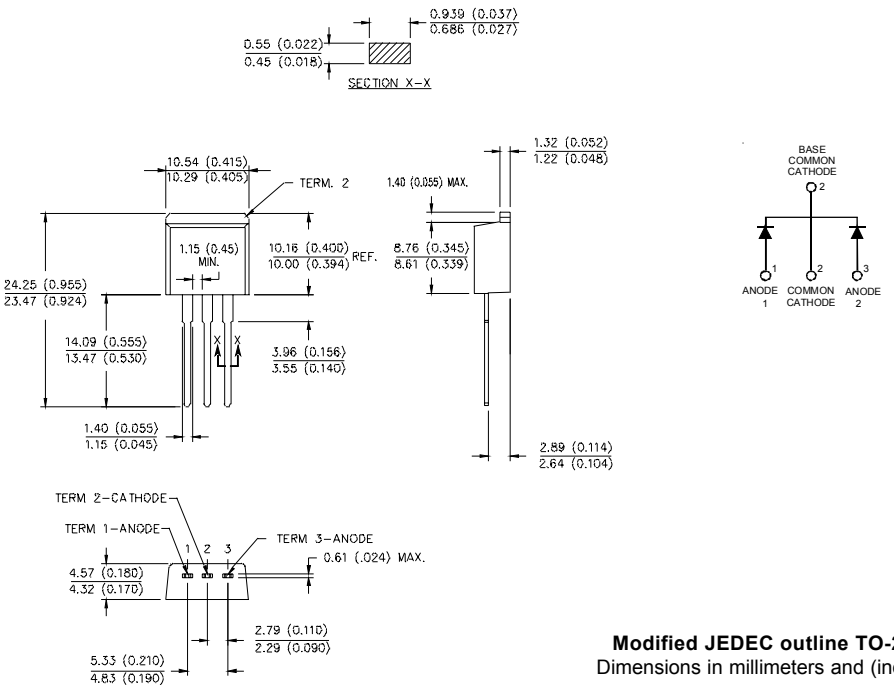


Conforms to JEDEC Outline TO-220AB
Dimensions in millimeters and (inches)

Outline Table

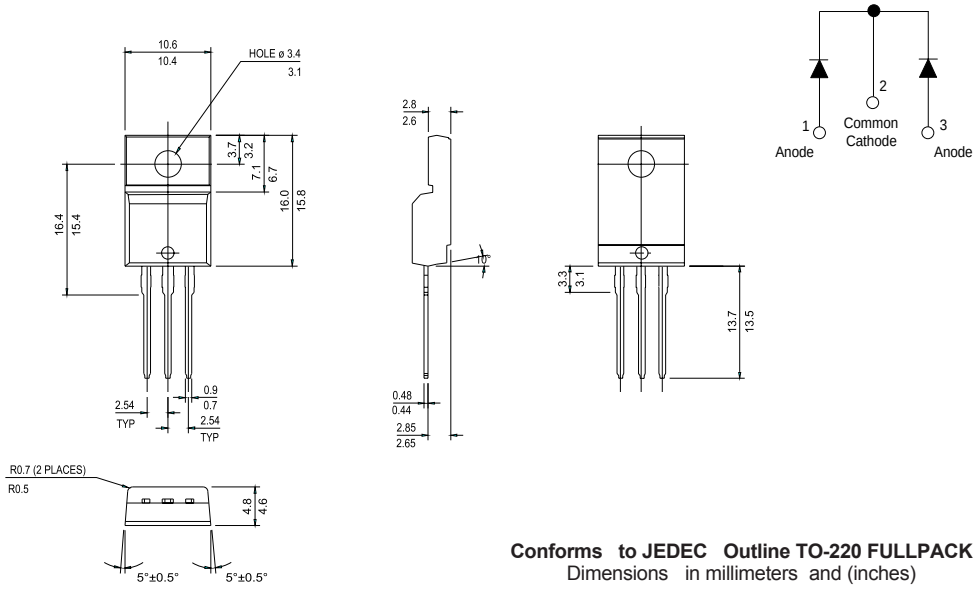


Conforms to JEDEC Outline D²PAK
Dimensions in millimeters and (inches)



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

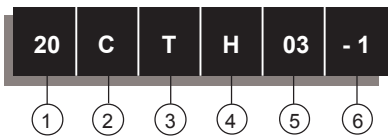
Outline Table



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

Ordering Information Table

Device Code



1	-	Current Rating (20 = 20A)
2	-	C = Common Cathode
3	-	T = TO-220, D^2Pak
4	-	H = HyperFast Recovery
5	-	Voltage Rating (03 = 300V)
6	-	None = TO-220AC
		S = D^2Pak
		"-1" = TO-262 Option
		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

IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105
TAC Fax: (310) 252-7309
Visit us at www.irf.com for sales contact information. 08/03