

Bulletin PD-20893 rev. A 10/06

International IOR Rectifier

20CTH03PbF
20CTH03FPPbF

Hyperfast Rectifier

Features

- Hyperfast Recovery Time
- Low Forward Voltage Drop
- Low Leakage Current
- 175°C Operating Junction Temperature
- Lead-Free ("PbF" suffix)

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.

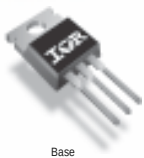
Their extremely optimized stored charge and low recovery current minimize the switching losses and reduce over dissipation in the switching element and snubbers.

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

Absolute Maximum Ratings

Parameters	Max	Units
V_{RRM} Peak Repetitive Reverse Voltage	300	V
$I_{F(AV)}$ Average Rectified Forward Current @ $T_C = 160^\circ\text{C}$ Per Diode @ $T_C = 135^\circ\text{C}$ (FULLPACK) Per Diode Per Device	10	A
	20	
	120	
I_{FSM} Non Repetitive Peak Surge Current @ $T_J = 25^\circ\text{C}$	120	
T_J, T_{STG} Operating Junction and Storage Temperatures	- 65 to 175	$^\circ\text{C}$

Case Styles

20CTH03PbF  Base Common Cathode 2 1 2 3 Anode Common Cathode Anode TO-220AB	20CTH03FPPbF  2 1 2 3 Anode Common Cathode Anode TO-220 FULLPACK
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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	300	-	-	V	$I_R = 100\mu\text{A}$
V_F Forward Voltage	-	1.05	1.25	V	$I_F = 10\text{A}, T_J = 25^\circ\text{C}$
	-	0.85	0.95	V	$I_F = 10\text{A}, T_J = 125^\circ\text{C}$
I_R Reverse Leakage Current	-	-	20	μA	$V_R = V_R \text{ Rated}$
	-	6	200	μA	$T_J = 125^\circ\text{C}, V_R = V_R \text{ Rated}$
C_T Junction Capacitance	-	30	-	pF	$V_R = 300\text{V}$
L_S Series Inductance	-	8	-	nH	Measured lead to lead 5mm from package body

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

Parameters	Min	Typ	Max	Units	Test Conditions
t_{rr} Reverse Recovery Time	-	-	35	ns	$I_F = 1\text{A}, di_F/dt = 50\text{A}/\mu\text{s}, V_R = 30\text{V}$
	-	-	30		$I_F = 1\text{A}, di_F/dt = 100\text{A}/\mu\text{s}, V_R = 30\text{V}$
	-	31	-		$T_J = 25^\circ\text{C}$
	-	42	-		$T_J = 125^\circ\text{C}$
I_{RRM} Peak Recovery Current	-	2.4	-	A	$T_J = 25^\circ\text{C}$
	-	5.6	-		$T_J = 125^\circ\text{C}$
Q_{rr} Reverse Recovery Charge	-	36	-	nC	$T_J = 25^\circ\text{C}$
	-	120	-		$T_J = 125^\circ\text{C}$

Thermal - Mechanical Characteristics

Parameters	Min	Typ	Max	Units
T_J Max. Junction Temperature Range	-	-	175	$^\circ\text{C}$
T_{Stg} Max. Storage Temperature Range	- 65	-	175	
R_{thJC} ① Thermal Resistance, Per Diode	-	-	1.5	$^\circ\text{C}/\text{W}$
Junction to Case Fullpack (Per Diode)	-	-	3.9	
Device Marking	20CTH03			Case Style TO-220
	20CTH03FP			Case Style Fullpack

① Mounting Surface, Flat, Smooth and Greased

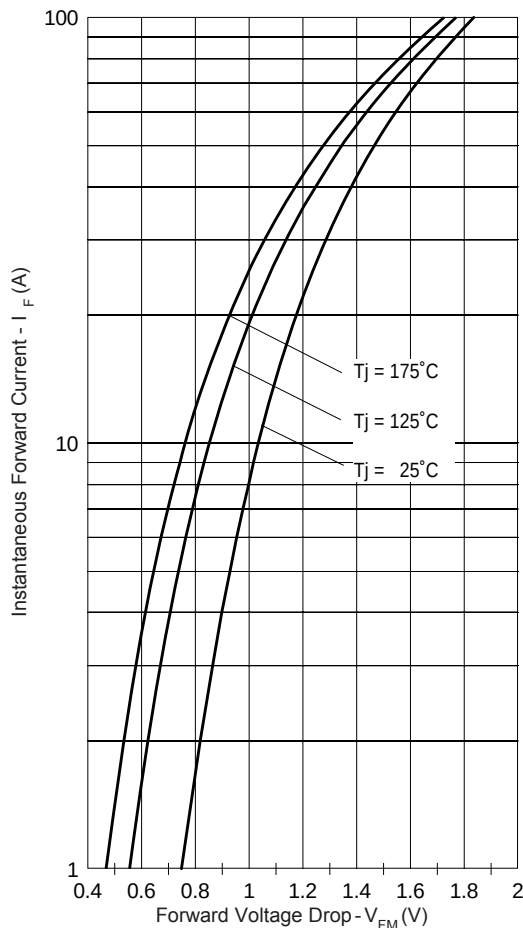


Fig. 1 - Typical Forward Voltage Drop Characteristics

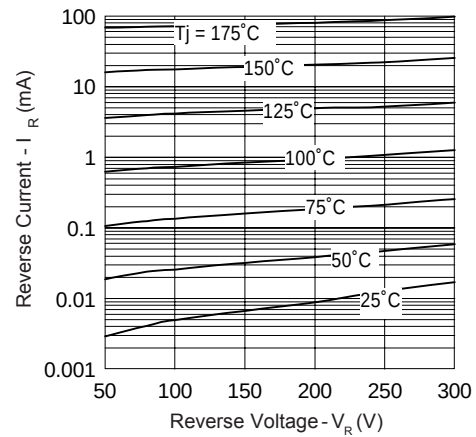


Fig. 2 - Typical Values of Reverse Current Vs. Reverse Voltage

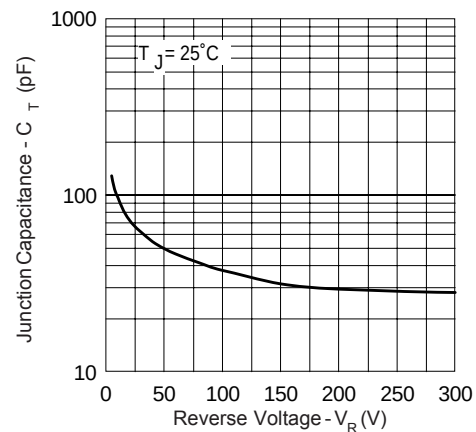


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

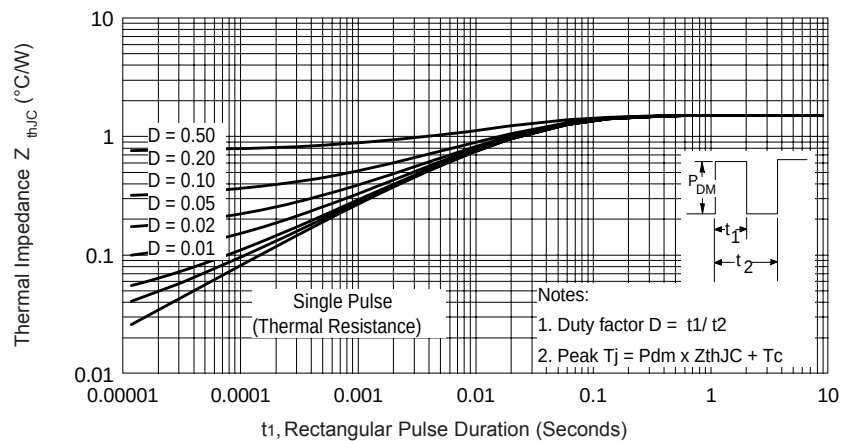


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics

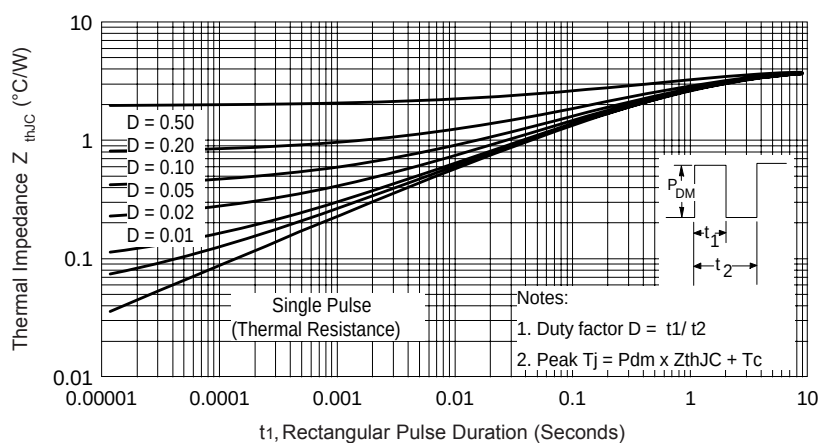
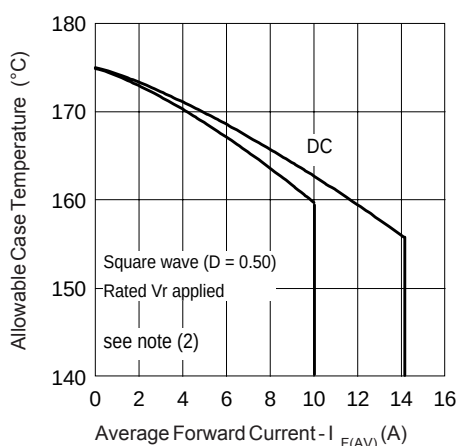
Fig. 5 - Max. Thermal Impedance Z_{thJC} Characteristics (FULLPACK)

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

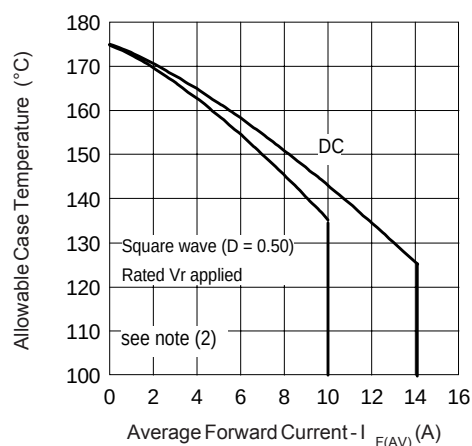


Fig. 7 - Max. Allowable Case Temperature Vs. Average Forward Current (FULLPACK)

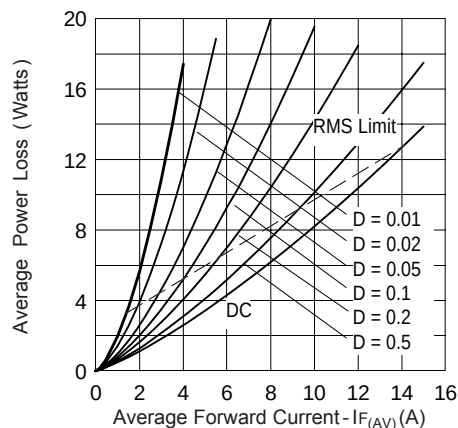


Fig. 8 - Forward Power Loss Characteristics

(2) Formula used: $T_c = T_j - (P_d + P_{d_{REV}}) \times R_{thJC}$;
 P_d = Forward Power Loss = $I_{F(AV)} \times V_{FM} @ (I_{F(AV)} / D)$
 (see Fig. 8);
 $P_{d_{REV}}$ = Inverse Power Loss = $V_{R1} \times I_R (1 - D)$;
 $I_R @ V_{R1}$ = rated V_R

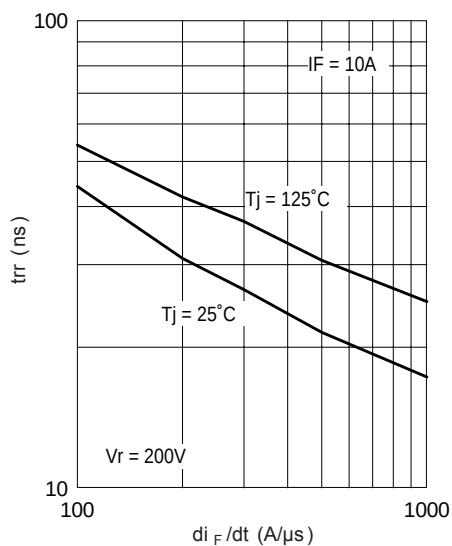


Fig. 9 - Typical Reverse Recovery vs. di_F/dt

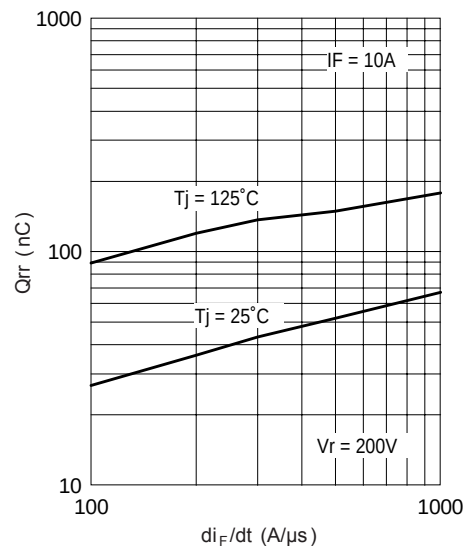


Fig. 10 - Typical Stored Charge vs. di_F/dt

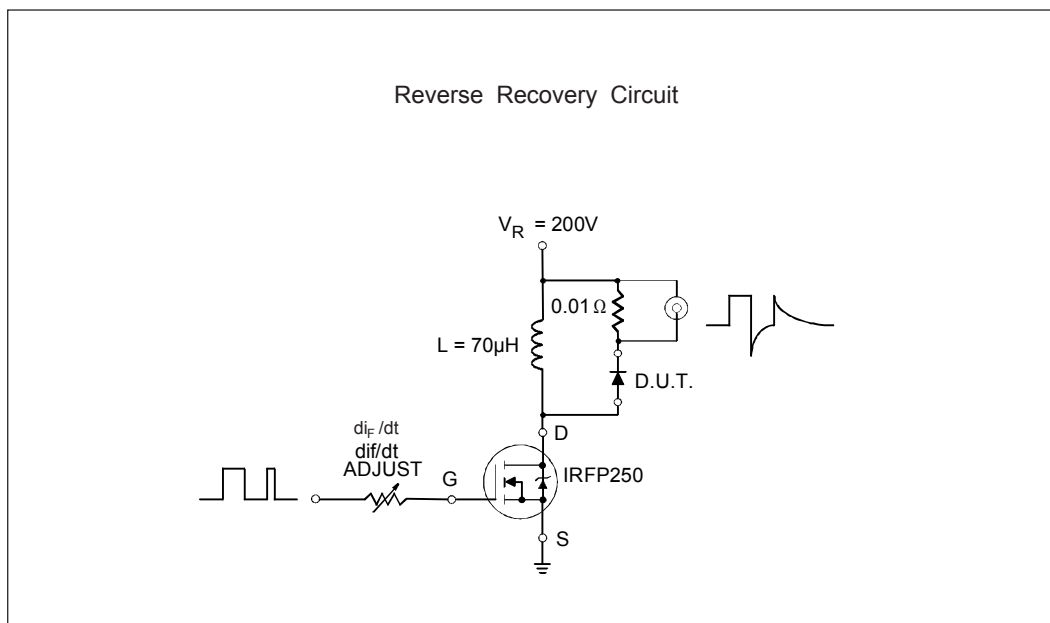


Fig. 11- Reverse Recovery Parameter Test Circuit

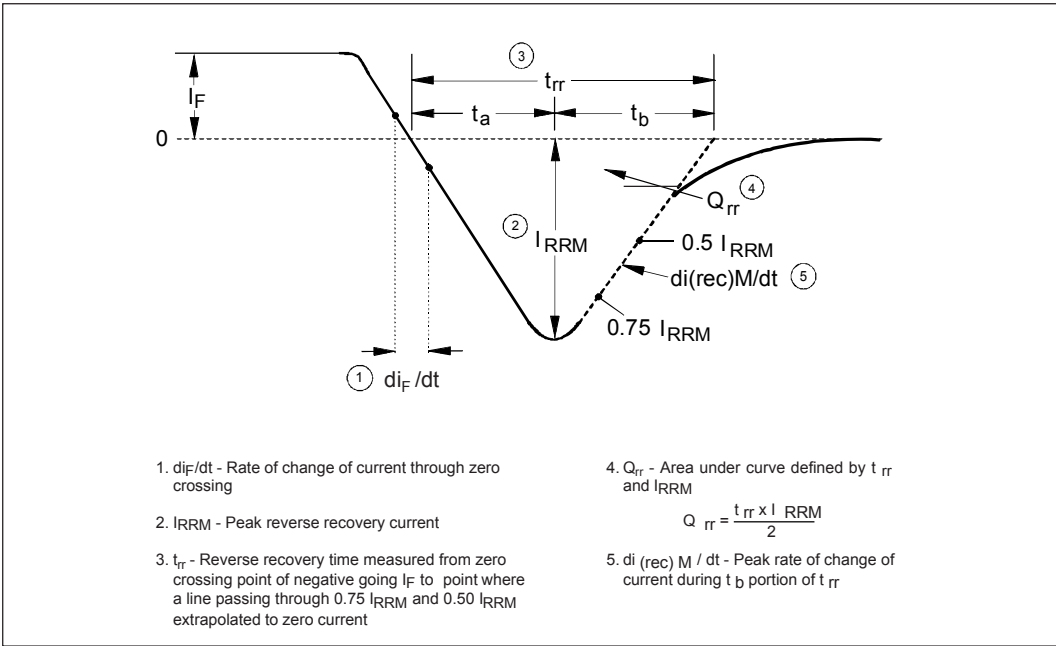
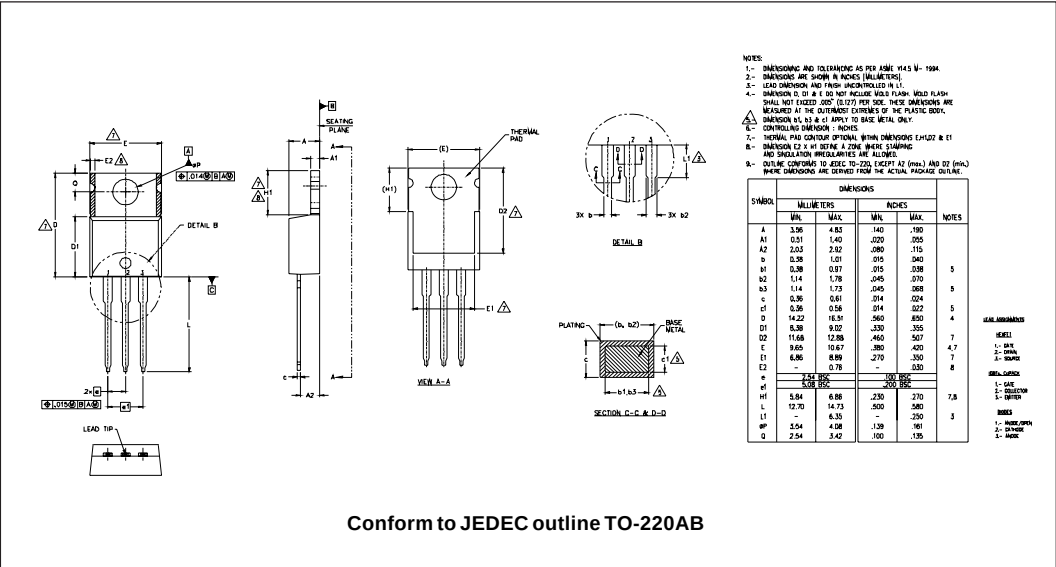
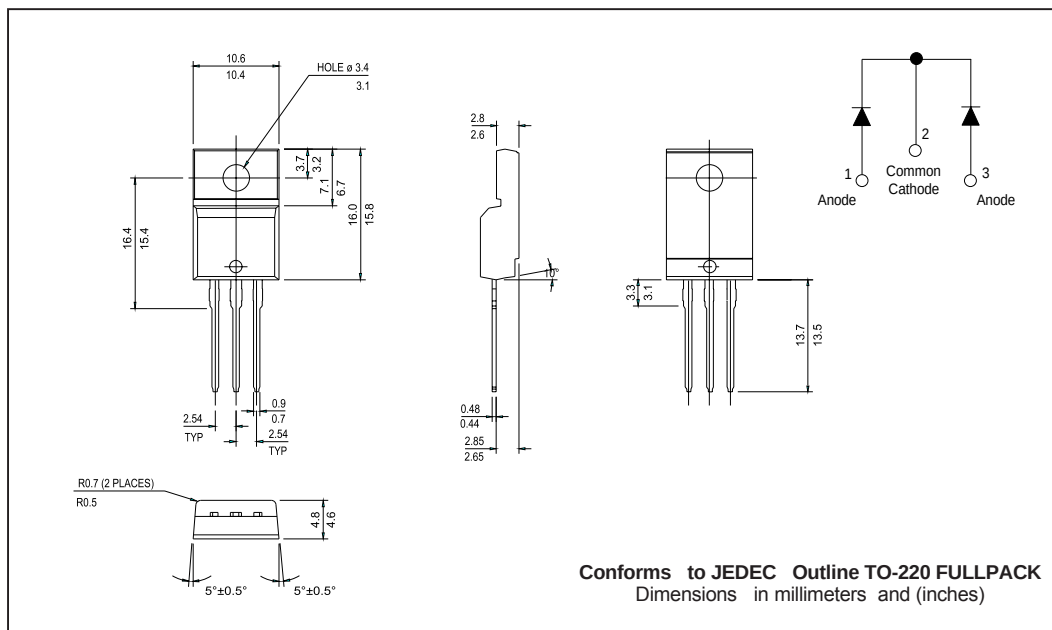


Fig. 13 - Reverse Recovery Waveform and Definitions

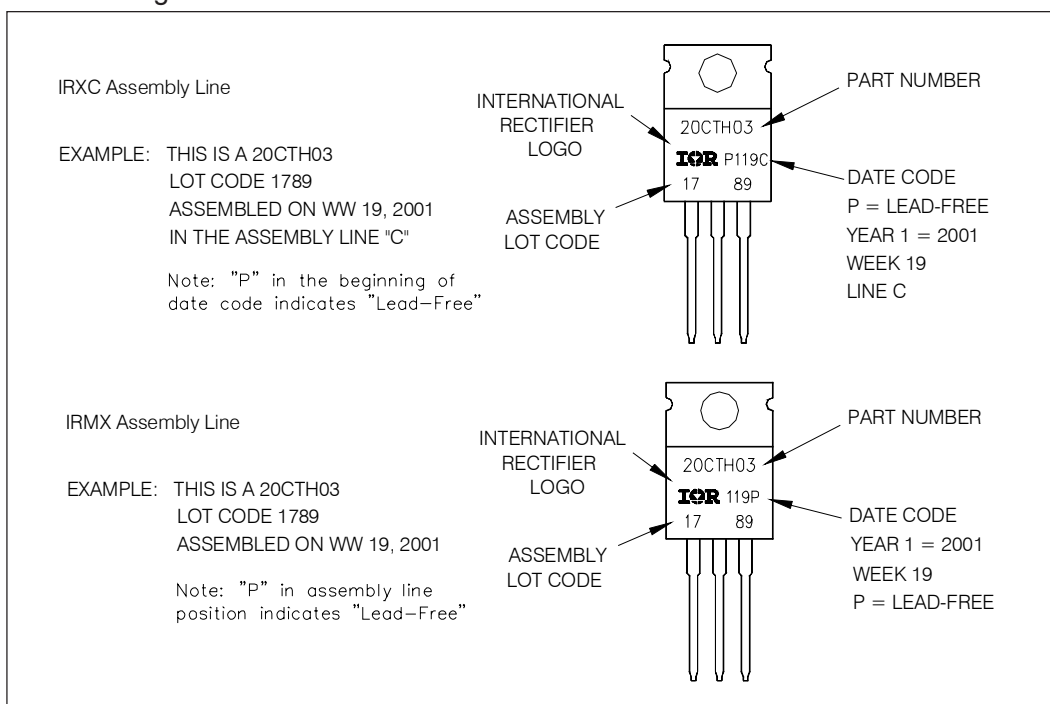
Outline Table



Outline Table



Part Marking Information



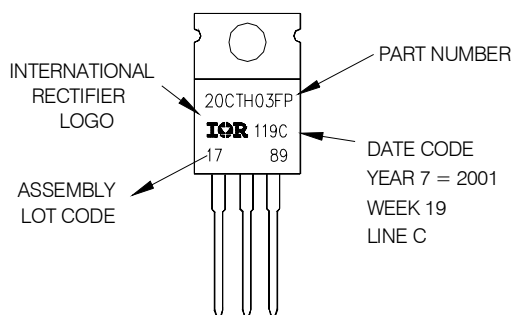
20CTH03PbF, 20CTH03FPPbF

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International
IR Rectifier

Marking Information

EXAMPLE: THIS IS A 20CTH03FP
LOT CODE 1789
ASSEMBLED ON WW 19, 2001
IN THE ASSEMBLY LINE "C"



Ordering Information Table

Device Code

20	C	T	H	03	FP	PbF
1	2	3	4	5	6	7

- | | | |
|----------|---|---|
| 1 | - | Current Rating (20 = 20A) |
| 2 | - | C = Common Cathode |
| 3 | - | T = TO-220, D ² Pak |
| 4 | - | H = HyperFast Recovery |
| 5 | - | Voltage Rating (03 = 300V) |
| 6 | - | <ul style="list-style-type: none"> • none = TO-220AB • FP = TO-220 FULLPACK |
| 7 | - | <ul style="list-style-type: none"> • none = Standard Production • PbF = Lead-Free |

Tube Standard Pack Quantity: 50 pieces

Data and specifications subject to change without notice.
This product has been designed and qualified for AEC Q101 Level and Lead-Free.
Qualification Standards can be found on IR's Web site.

International
IR Rectifier

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