



20CTH03PbF  
20CTH03FPPbF

## Hyperfast Rectifier

### Features

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

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

### 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.


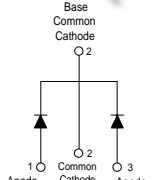

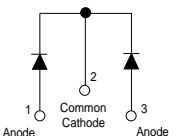
The planar structure and the platinum doped life time control guarantee the best overall performance, ruggedness and reliability characteristics.

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 @ $T_C = 160^\circ\text{C}$ 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	
<p>20CTH03PbF</p>  <div style="text-align: center;"> <p>Base Common Cathode</p>  <p>1 Anode    2 Common Cathode    3 Anode</p> <p>TO-220AB</p> </div>	<p>20CTH03FPPbF</p>  <div style="text-align: center;">  <p>1 Anode    2 Common Cathode    3 Anode</p> <p>TO-220 FULLPACK</p> </div>

**Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise specified)**

Parameters	Min	Typ	Max	Units	Test Conditions
V <sub>BR</sub> , V <sub>F</sub> Breakdown Voltage, Blocking Voltage	300	-	-	V	I <sub>R</sub> = 100μA
V <sub>F</sub> Forward Voltage	-	1.05	1.25	V	I <sub>F</sub> = 10A, T <sub>J</sub> = 25°C
	-	0.85	0.95	V	I <sub>F</sub> = 10A, T <sub>J</sub> = 125°C
I <sub>R</sub> Reverse Leakage Current	-	-	20	μA	V <sub>R</sub> = V <sub>R</sub> Rated
	-	6	200	μA	T <sub>J</sub> = 125°C, V <sub>R</sub> = V <sub>R</sub> Rated
C <sub>T</sub> Junction Capacitance	-	30	-	pF	V <sub>R</sub> = 300V
L <sub>S</sub> Series Inductance	-	8	-	nH	Measured lead to lead 5mm from package body

**Dynamic Recovery Characteristics @ T<sub>C</sub> = 25°C (unless otherwise specified)**

Parameters	Min	Typ	Max	Units	Test Conditions
t <sub>rr</sub> Reverse Recovery Time	-	-	35	ns	I <sub>F</sub> = 1A, di <sub>F</sub> /dt = 50A/μs, V <sub>R</sub> = 30V
	-	-	30		I <sub>F</sub> = 1A, di <sub>F</sub> /dt = 100A/μs, V <sub>R</sub> = 30V
	-	31	-	ns	T <sub>J</sub> = 25°C
	-	42	-		T <sub>J</sub> = 125°C
I <sub>RRM</sub> Peak Recovery Current	-	2.4	-	A	T <sub>J</sub> = 25°C
	-	5.6	-		T <sub>J</sub> = 125°C
Q <sub>rr</sub> Reverse Recovery Charge	-	36	-	nC	T <sub>J</sub> = 25°C
	-	120	-		T <sub>J</sub> = 125°C

I<sub>F</sub> = 10A  
di<sub>F</sub>/dt = 200A/μs  
V<sub>R</sub> = 200V

**Thermal - Mechanical Characteristics**

Parameters	Min	Typ	Max	Units
T <sub>J</sub> Max. Junction Temperature Range	-	-	175	°C
T <sub>Stg</sub> Max. Storage Temperature Range	- 65	-	175	
R <sub>thJC</sub> ① Thermal Resistance, Per Diode	-	-	1.5	°C/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

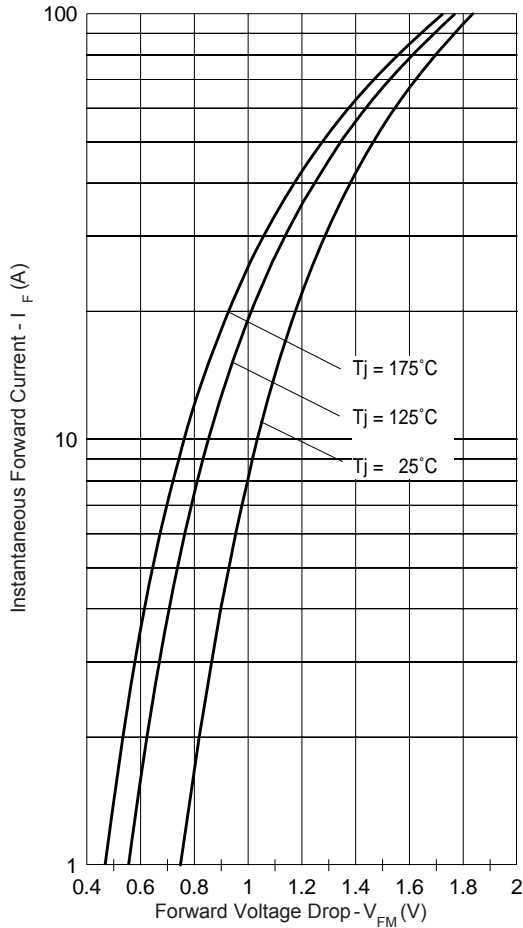


Fig. 1 - Typical Forward Voltage Drop Characteristics

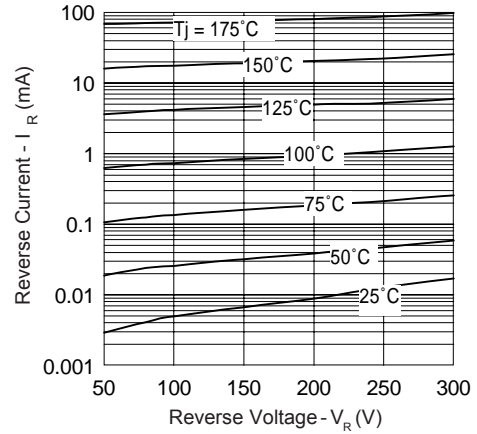


Fig. 2 - Typical Values of Reverse Current Vs. Reverse Voltage

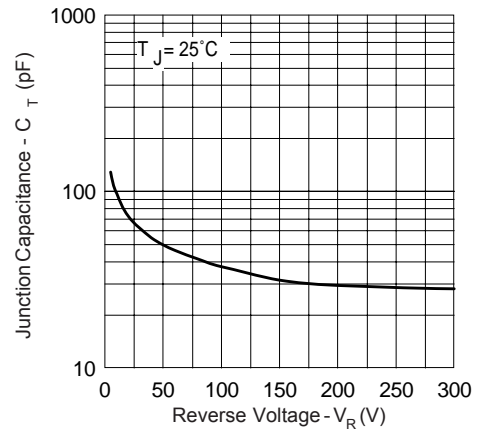


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

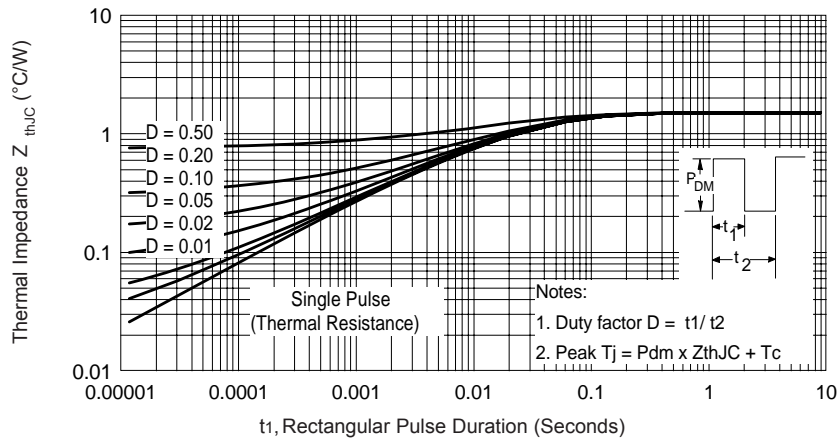


Fig. 4 - Max. Thermal Impedance  $Z_{thJC}$  Characteristics

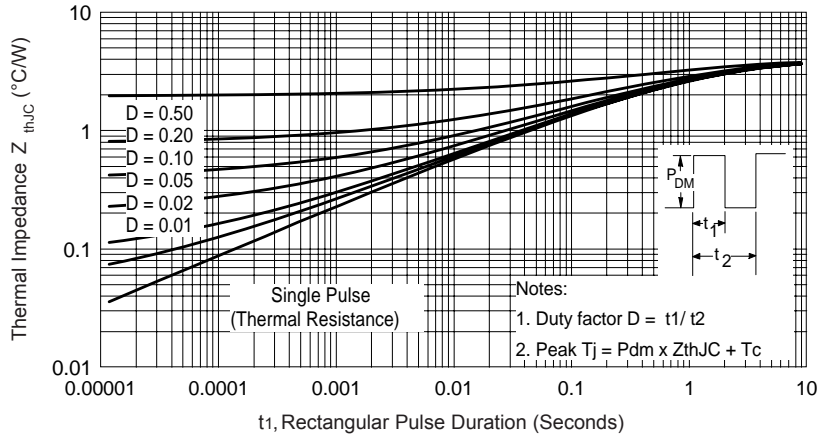


Fig. 5 - Max. Thermal Impedance  $Z_{thJC}$  Characteristics (FULLPACK)

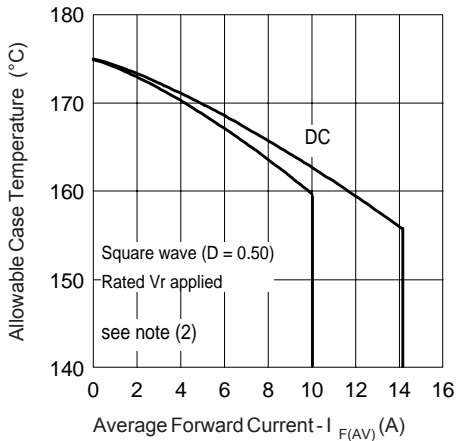


Fig. 6 - Max. Allowable Case Temperature Vs. Average Forward Current

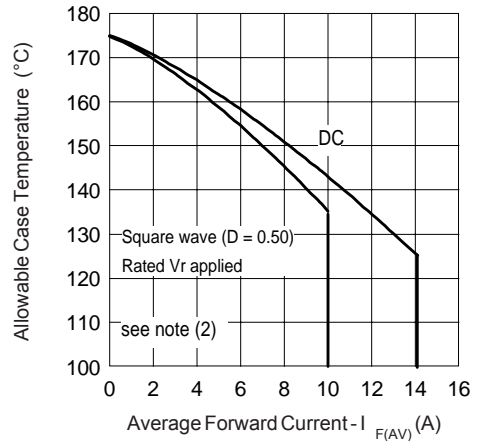


Fig. 7 - Max. Allowable Case Temperature Vs. Average Forward Current (FULLPACK)

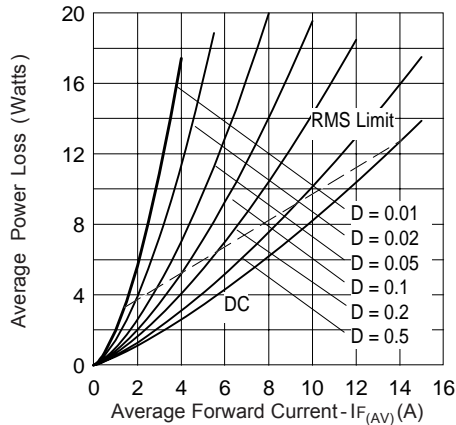


Fig. 8 - Forward Power Loss Characteristics

(2) Formula used:  $T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}$ ;  
 $Pd = \text{Forward Power Loss} = I_{F(AV)} \times V_{FM} @ (I_{F(AV)}/D)$   
 (see Fig. 8);  
 $Pd_{REV} = \text{Inverse Power Loss} = V_{R1} \times I_R (1 - D)$ ;  
 $I_R @ V_{R1} = \text{rated } V_R$

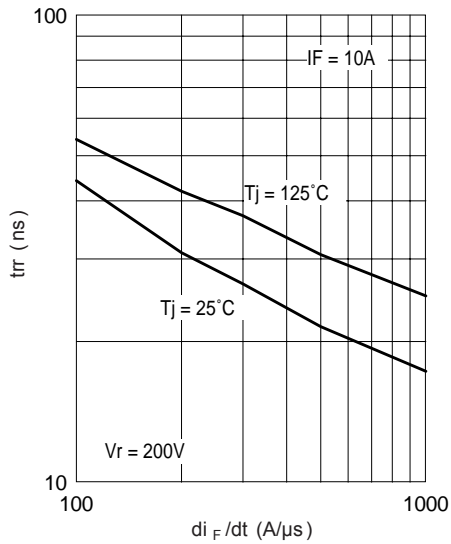


Fig. 9 - Typical Reverse Recovery vs.  $di_F/dt$

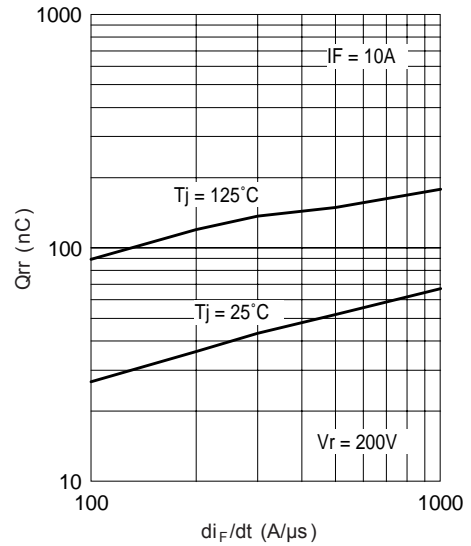


Fig. 10 - Typical Stored Charge vs.  $di_F/dt$

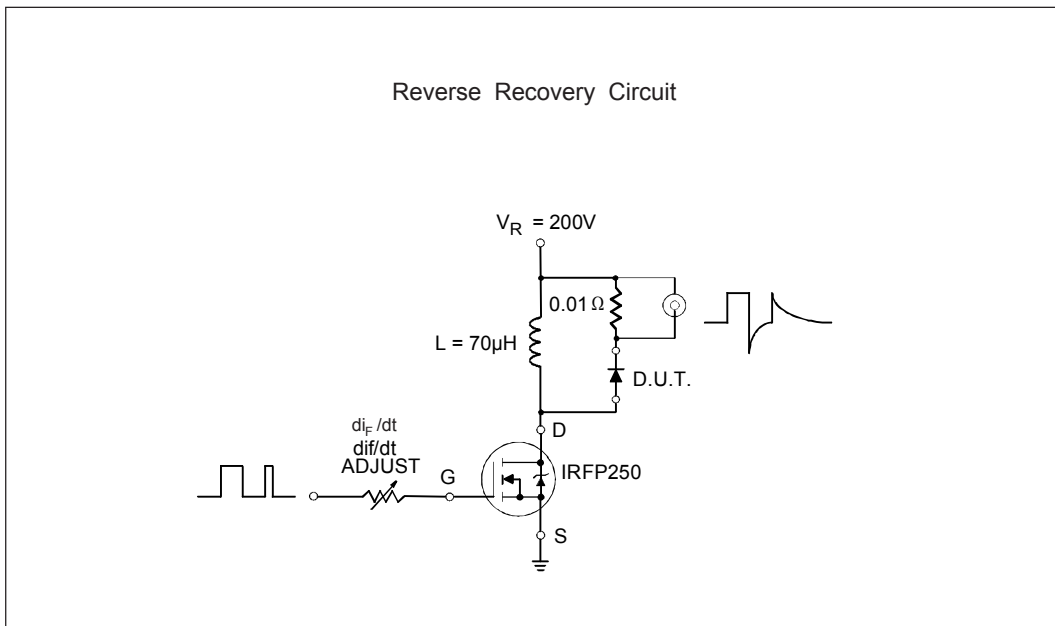


Fig. 11 - Reverse Recovery Parameter Test Circuit

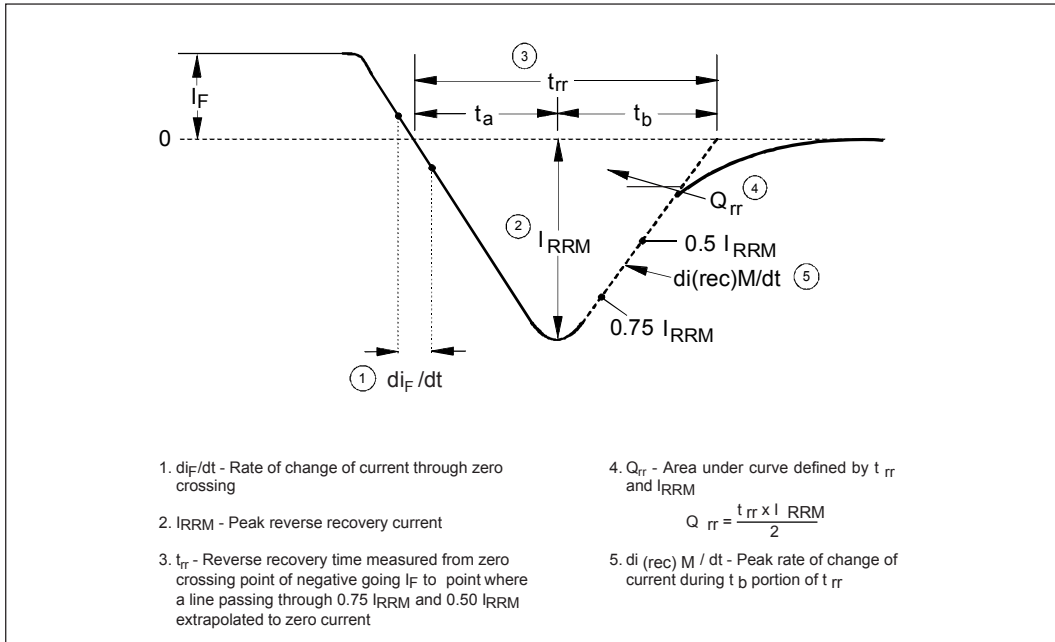
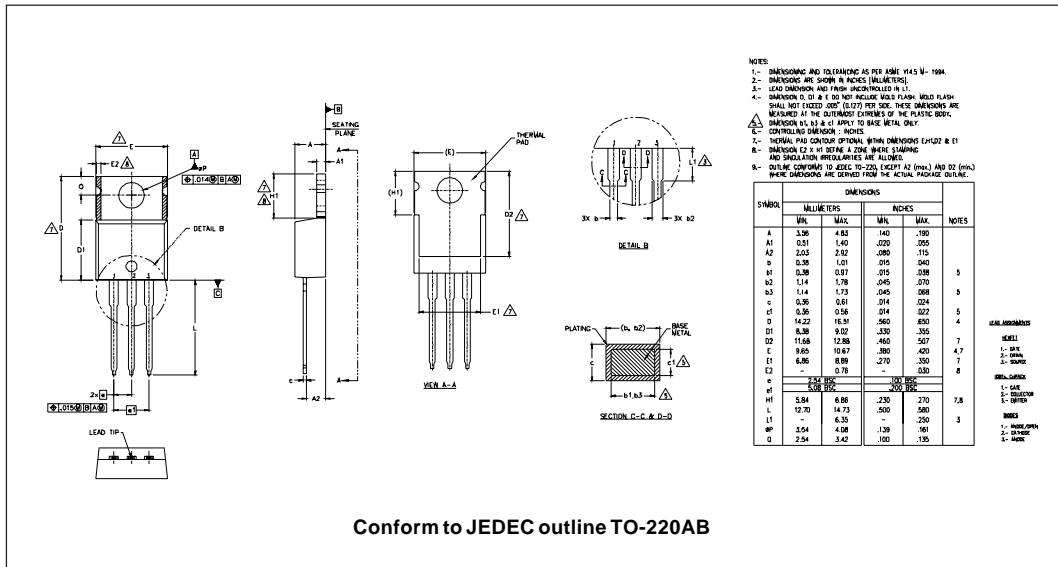
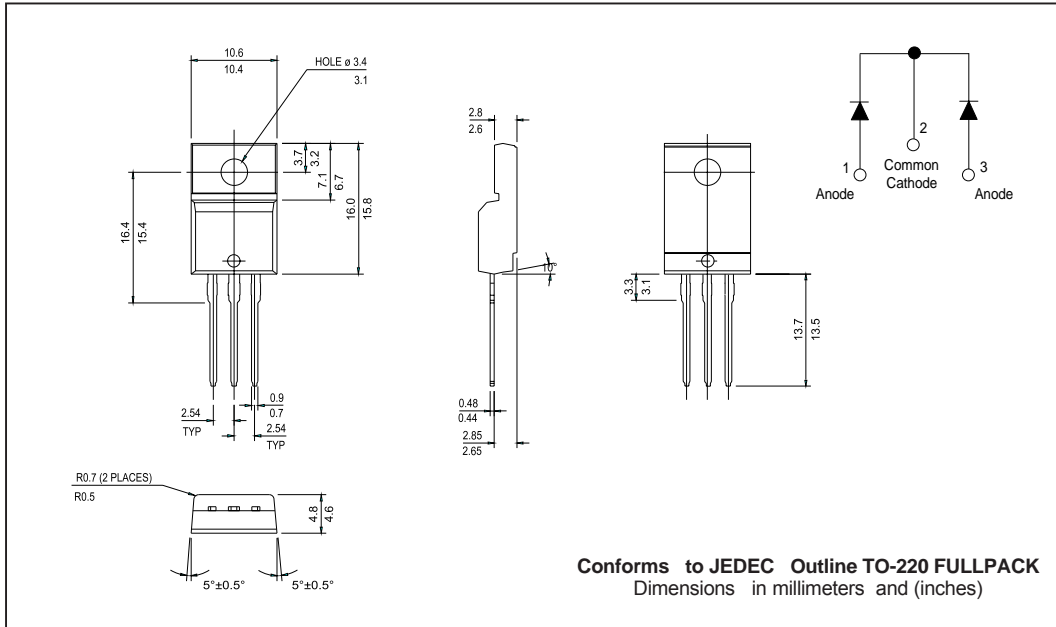


Fig. 13 - Reverse Recovery Waveform and Definitions

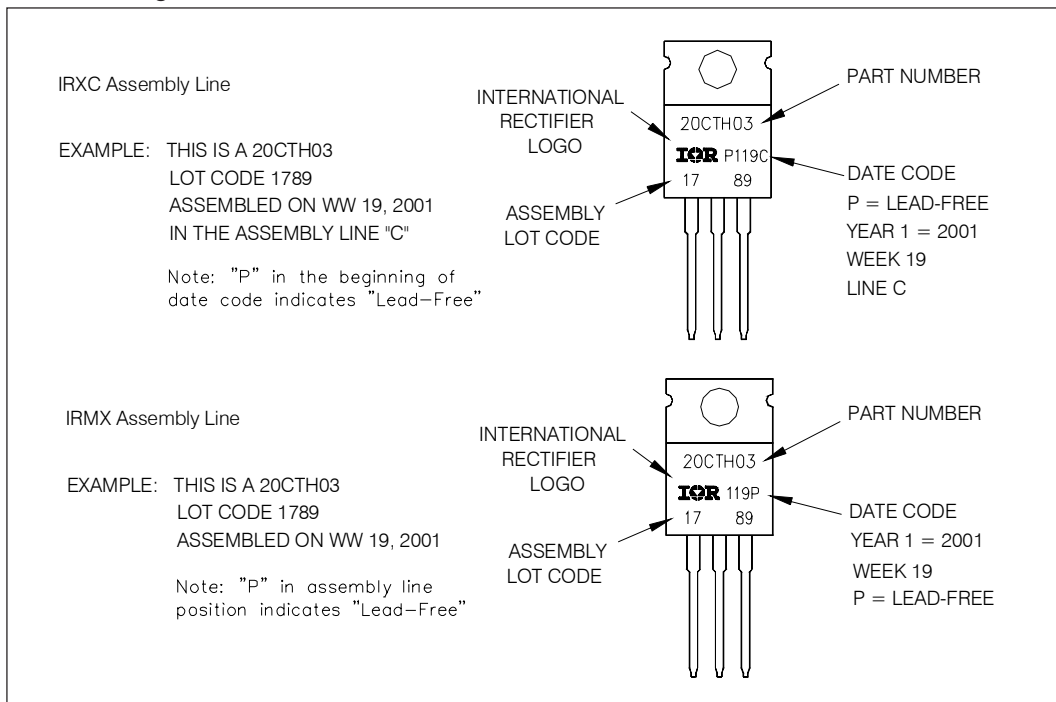
Outline Table



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Part Marking Information



Marking Information

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

INTERNATIONAL RECTIFIER LOGO

PART NUMBER

DATE CODE  
YEAR 7 = 2001  
WEEK 19  
LINE C

ASSEMBLY LOT CODE

Ordering Information Table

**Device Code**

<b>20</b>	<b>C</b>	<b>T</b>	<b>H</b>	<b>03</b>	<b>FP</b>	<b>PbF</b>
①	②	③	④	⑤	⑥	⑦

- 1** - Current Rating (20 = 20A)
- 2** - C = Common Cathode
- 3** - T = TO-220, D<sup>2</sup>Pak
- 4** - H = HyperFast Recovery
- 5** - Voltage Rating (03 = 300V)
- 6** -
  - none = TO-220AB
  - FP = TO-220 FULLPACK
- 7** -
  - 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.