

Bulletin PD-21070 07/05

International IOR Rectifier

20CTH03SPbF
20CTH03-1PbF

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.

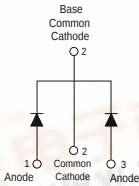
Their extremely optimized stored charge and low recovery current minimize the switching losses and reduce over dissipation in the switching element and snubbers.

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 Per Device	10	A
		20	
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	$^\circ\text{C}$

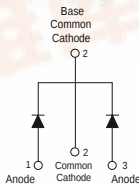
Case Styles

20CTH03SPbF



D²PAK

20CTH03-1PbF



TO-262



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	-		$T_J = 125^\circ\text{C}$

$I_F = 10\text{A}$
 $di_F/dt = 200\text{A}/\mu\text{s}$
 $V_R = 200\text{V}$

Thermal - Mechanical Characteristics

Parameters	Min	Typ	Max	Units
T_J Max. Junction Temperature Range	- 65	-	175	$^\circ\text{C}$
T_{Stg} Max. Storage Temperature Range	- 65	-	175	
R_{thJC} Thermal Resistance, Junction to Case Per Diode	-	-	1.5	$^\circ\text{C}/\text{W}$
Weight	-	2.0	-	g
	-	0.07	-	(oz)
Mounting Torque	6.0	-	12	Kg-cm
	5.0	-	10	lbf.in
Marking Device	20CTH03S		Case style D ² Pak	
	20CTH03-1		Case style TO-262	

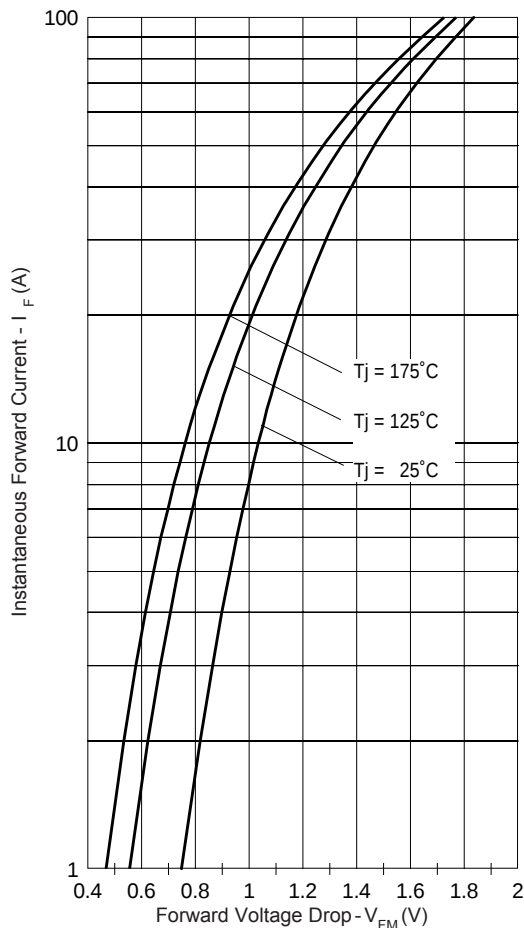


Fig. 1 - Typical Forward Voltage Drop Characteristics

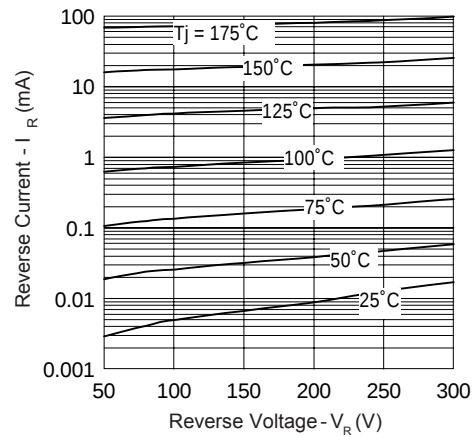


Fig. 2 - Typical Values of Reverse Current Vs. Reverse Voltage

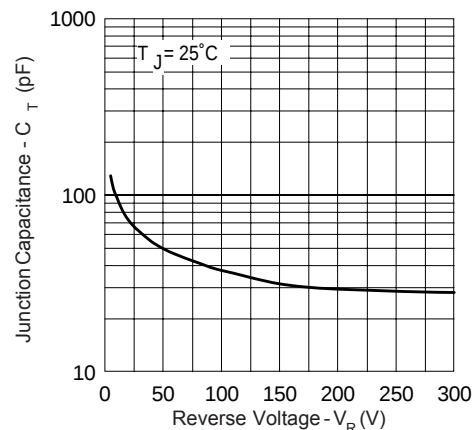


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

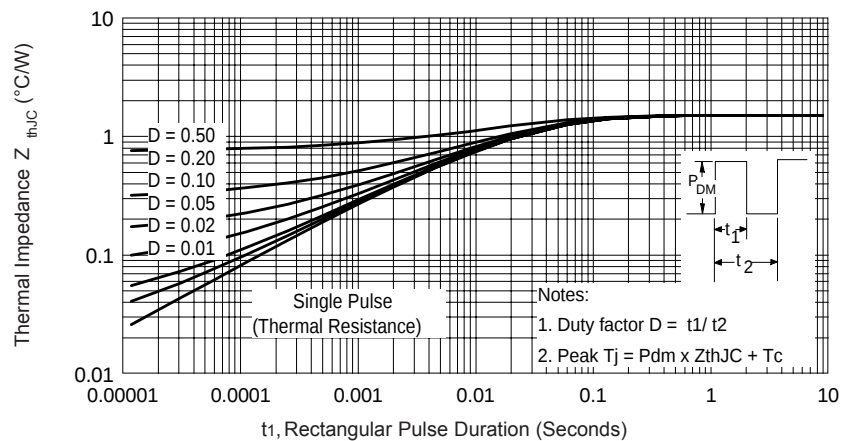


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics

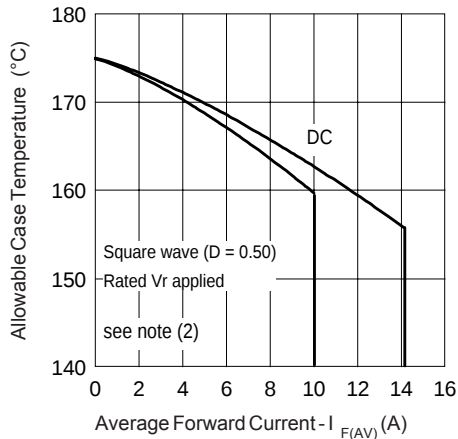


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current

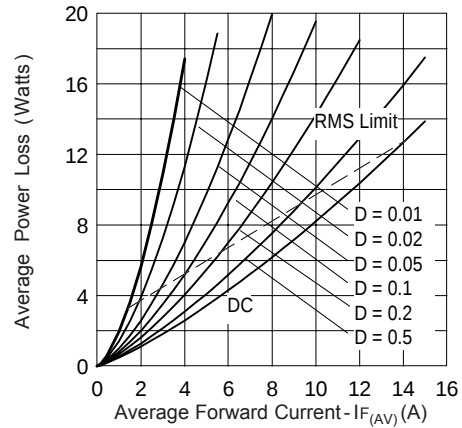


Fig. 6 - Forward Power Loss Characteristics

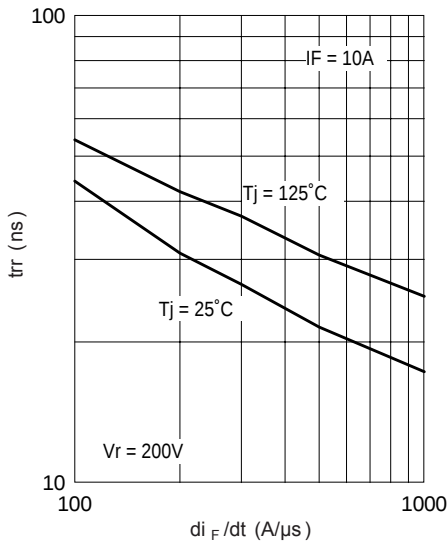


Fig. 7 - Typical Reverse Recovery vs. di_F/dt

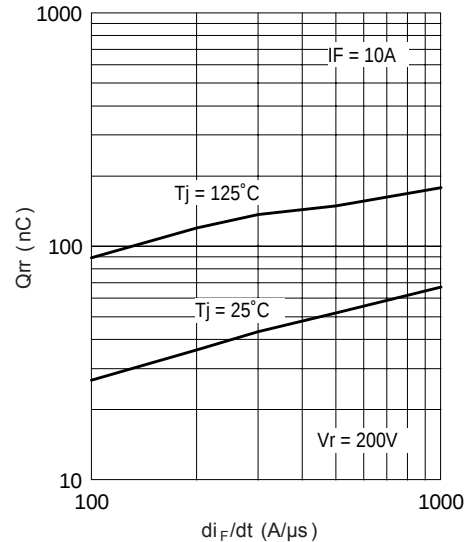


Fig. 8 - Typical Stored Charge vs. di_F/dt

(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

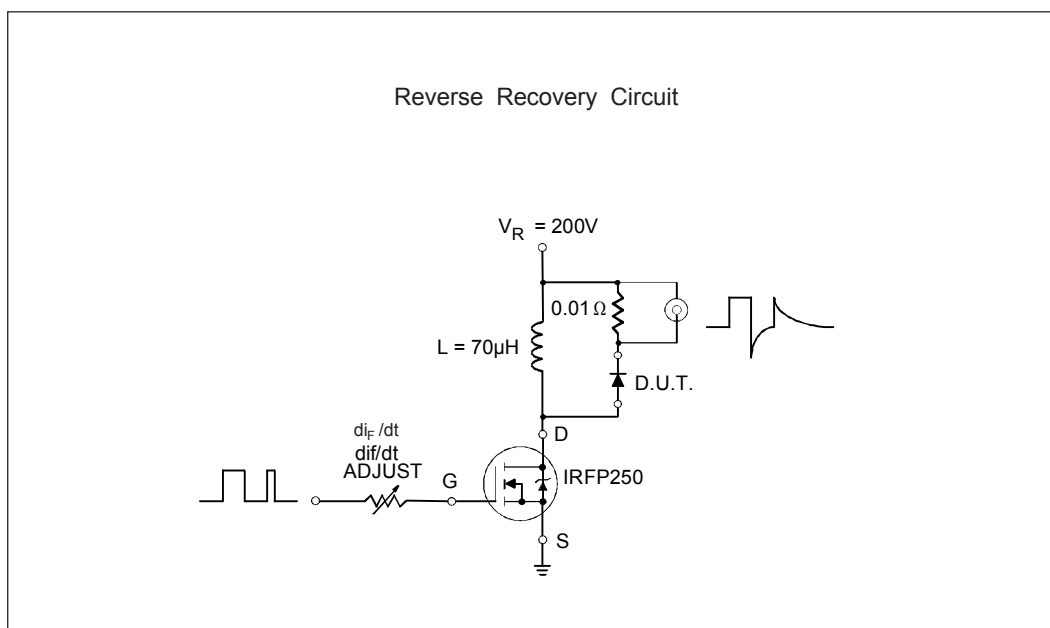


Fig. 9- Reverse Recovery Parameter Test Circuit

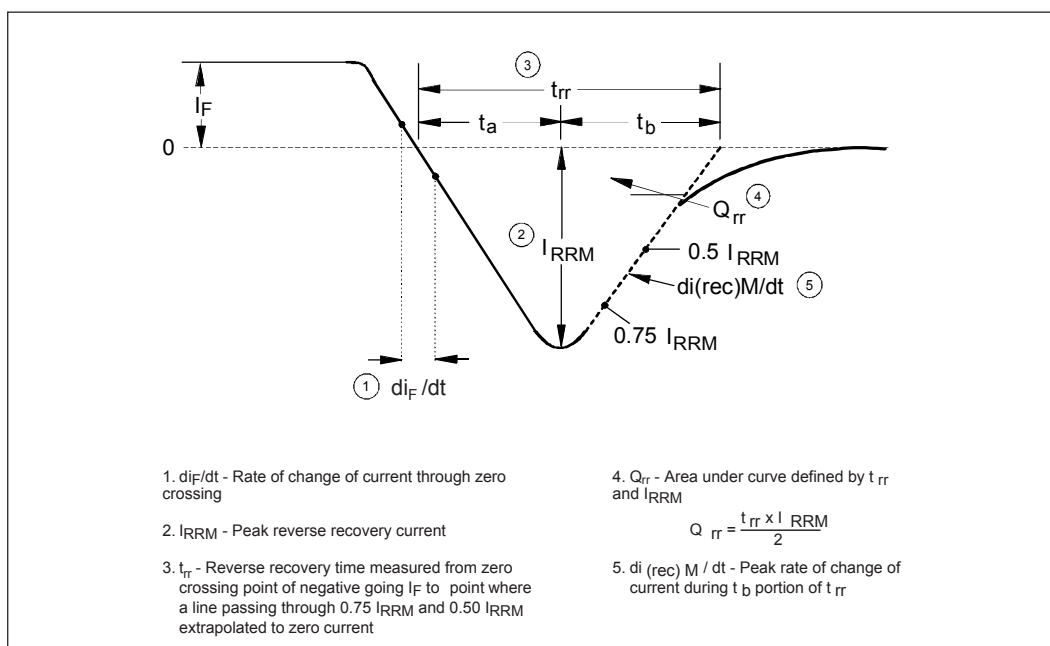


Fig. 11 - Reverse Recovery Waveform and Definitions

The image shows the mechanical specifications for the JEDEC Outline D²PAK package. It includes three views: a top view, a side view, and a minimum recommended footprint.

Top View Dimensions:

- Overall width: 10.16 (0.40)
- Reference width: REF.
- Distance from top edge to center of pins: 15.49 (0.61)
- Distance from bottom edge to center of pins: 14.73 (0.58)
- Pin pitch: 2.61 (0.10)
- Pin width: 2.32 (0.09)
- Distance from center of pins to mounting hole center: 8.89 (0.35)
- Reference distance: REF.
- Distance from mounting hole center to pin center: 1.40 (0.055)
- Distance from mounting hole center to pin center: 1.14 (0.045)
- Pin diameter: 0.93 (0.37)
- Reference distance: 0.69 (0.27)

Side View Dimensions:

- Package height: 4.69 (0.18)
- Reference height: 4.20 (0.16)
- Distance from top edge to mounting hole center: 1.32 (0.05)
- Distance from mounting hole center to pin center: 1.22 (0.05)
- Distance from pin center to bottom edge: 5.28 (0.21)
- Distance from pin center to bottom edge: 4.78 (0.19)
- Distance from pin center to bottom edge: 0.55 (0.02)
- Distance from pin center to bottom edge: 0.46 (0.02)

Minimum Recommended Footprint Dimensions:

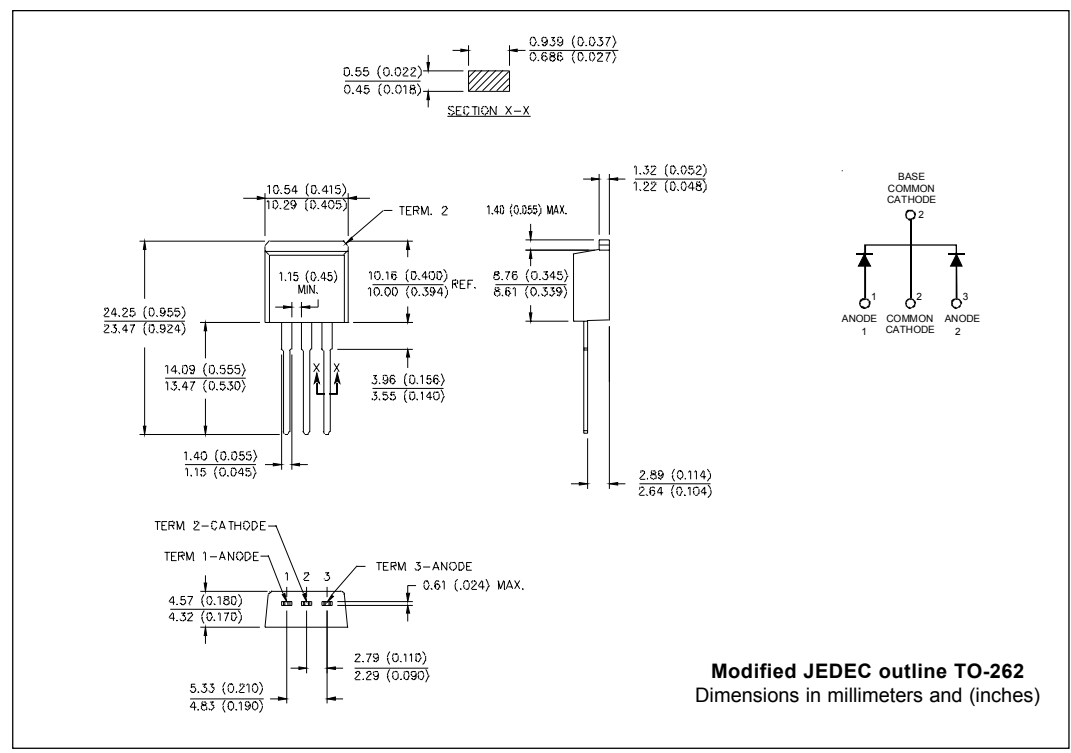
- Overall width: 11.43 (0.45)
- Distance from top edge to center of pins: 8.89 (0.35)
- Distance from bottom edge to center of pins: 17.78 (0.70)
- Pin pitch: 3.81 (0.15)
- Pin width: 2.08 (0.08)
- Distance from center of pins to mounting hole center: 2.54 (0.10)
- Reference distance: 2X

Symbolic Diagram:

The symbolic diagram shows the package with pins labeled 1, 2, and 3. Pin 1 is the ANODE, Pin 2 is the COMMON CATHODE, and Pin 3 is the ANODE. The package is labeled D²PAK.

Conforms to JEDEC Outline D²PAK

Dimensions in millimeters and (inches)

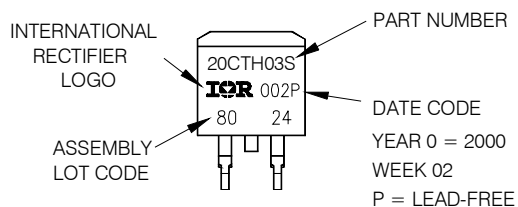


Part Marking Information

D²PAK

EXAMPLE: THIS IS A 20CTH03S
LOT CODE 8024
ASSEMBLED ON WW 02, 2000

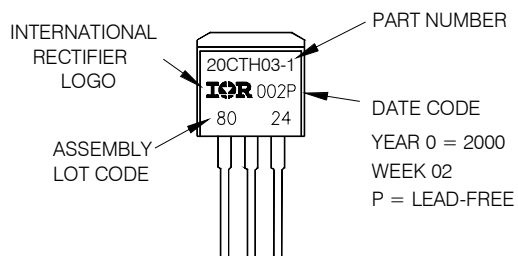
Note: "P" in assembly line
position indicates "Lead-Free"



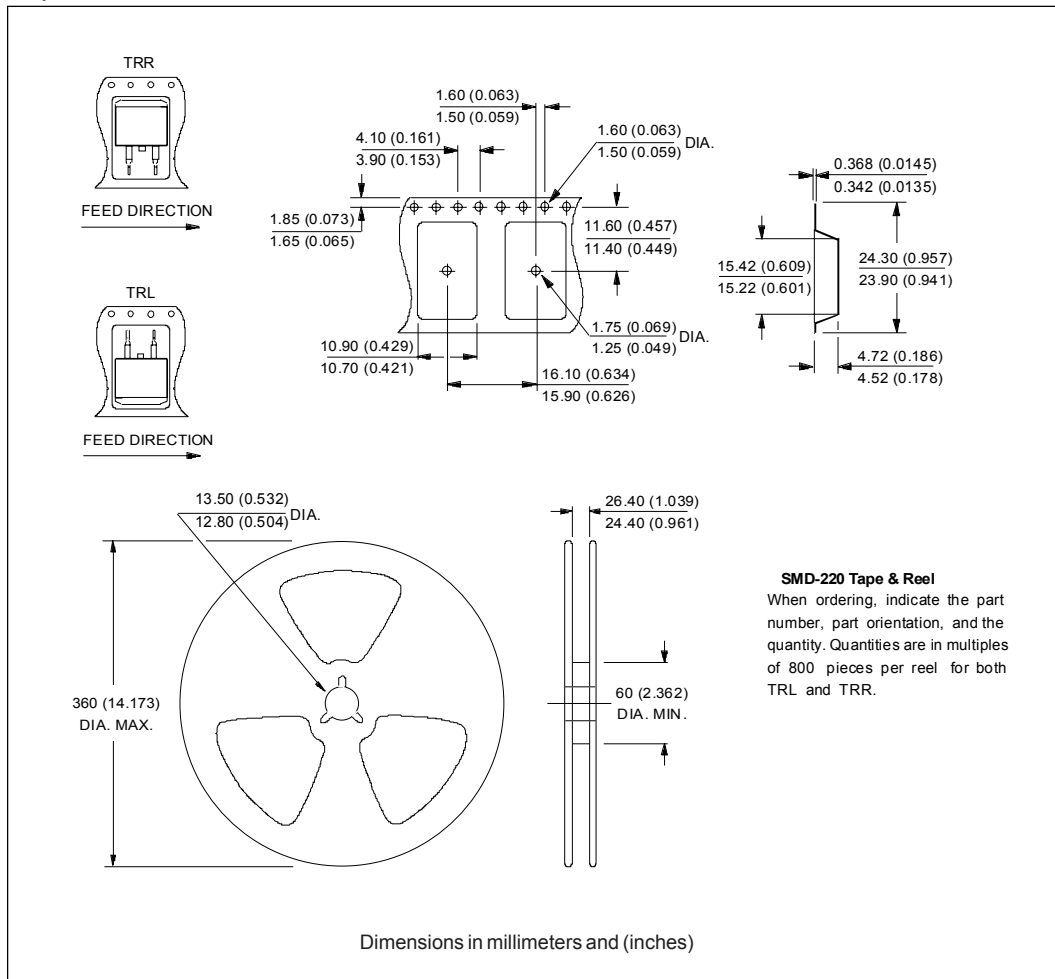
TO-262

EXAMPLE: THIS IS A 20CTH03-1
LOT CODE 8024
ASSEMBLED ON WW 02, 2000

Note: "P" in assembly line
position indicates "Lead-Free"



Tape & Reel Information



Ordering Information Table

Device Code							
	20	C	T	H	03	S	TRL PbF
	①	②	③	④	⑤	⑥	⑦ ⑧
1	-	Current Rating (20A)					
2	-	C = Common Cathode					
3	-	T = TO-220, D ² Pak					
4	-	H = Hyperfast Rectifier					
5	-	Voltage Rating (03 = 300V)					
6	-	- S = D²Pak -1 = TO-262					
7	-	- none = Tube (50 pieces) - TRL = Tape & Reel (Left Oriented, for D²Pak package) - TRR = Tape & Reel (Right Oriented, for D²Pak package)					
8	-	- none = Standard Production - PbF = Lead-Free					

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

International
IR Rectifier

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