

# International IOR Rectifier

## 15ETH03SPbF 15ETH03-1PbF

### Ultrafast Rectifier

#### Features

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

$$t_{rr} = 40\text{ns}$$

$$I_{F(AV)} = 15\text{Amp}$$

$$V_R = 300\text{V}$$

#### Description/ Applications

International Rectifier's 300V series are the state of the art Ultrafast recovery rectifiers designed with optimized performance of forward voltage drop and Ultrafast recovery time.

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

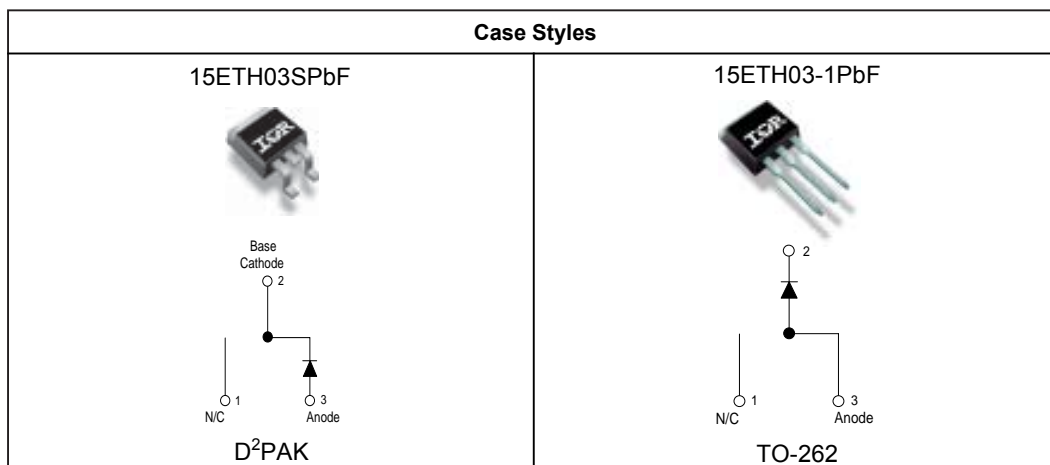
These devices are intended for use in the output rectification stage of SMPS, UPS, DC-DC converters as well as freewheeling diodes in low voltage inverters and chopper motor drives.

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
$V_{RRM}$ Repetitive Peak Reverse Voltage	300	V
$I_{F(AV)}$ Average Rectified Forward Current @ $T_C = 142^\circ\text{C}$	15	A
$I_{FSM}$ Non Repetitive Peak Surge Current @ $T_J = 25^\circ\text{C}$	140	
$T_J, T_{STG}$ Operating Junction and Storage Temperatures	- 65 to 175	$^\circ\text{C}$

#### Case Styles



**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> = 15A, T <sub>J</sub> = 25°C
	-	0.85	1.00	V	I <sub>F</sub> = 15A, T <sub>J</sub> = 125°C
I <sub>R</sub> Reverse Leakage Current	-	0.05	40	μA	V <sub>R</sub> = V <sub>R</sub> Rated
	-	12	400	μA	T <sub>J</sub> = 125°C, V <sub>R</sub> = V <sub>R</sub> Rated
C <sub>T</sub> Junction Capacitance	-	45	-	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>J</sub> = 25°C (unless otherwise specified)**

Parameters	Min	Typ	Max	Units	Test Conditions
t <sub>rr</sub> Reverse Recovery Time	-	-	40	ns	I <sub>F</sub> = 1.0A, di <sub>F</sub> /dt = 50A/μs, V <sub>R</sub> = 30V T <sub>J</sub> = 25°C T <sub>J</sub> = 125°C
	-	32	-		
	-	45	-		
I <sub>RRM</sub> Peak Recovery Current	-	2.4	-	A	I <sub>F</sub> = 15A di <sub>F</sub> /dt = -200A/μs V <sub>R</sub> = 200V T <sub>J</sub> = 25°C T <sub>J</sub> = 125°C
	-	6.1	-		
Q <sub>rr</sub> Reverse Recovery Charge	-	38	-	nC	T <sub>J</sub> = 25°C T <sub>J</sub> = 125°C
	-	137	-		

**Thermal - Mechanical Characteristics**

Parameters	Min	Typ	Max	Units
T <sub>J</sub> Max. Junction Temperature Range	- 65	-	175	°C
T <sub>Stg</sub> Max. Storage Temperature Range	- 65	-	175	
R <sub>thJC</sub> Thermal Resistance, Junction to Case Per Leg	-	1.02	2.0	°C/W
R <sub>thJA</sub> <sup>①</sup> Thermal Resistance, Junction to Ambient Per Leg	-	-	70	
R <sub>thCS</sub> <sup>②</sup> Thermal Resistance, Case to Heatsink	-	0.2	-	
Weight	-	2.0	-	g
	-	0.07	-	(oz)
Mounting Torque	6.0	-	12	Kg-cm
	5.0	-	10	lbf.in
Marking Device	15ETH03S		Case style D <sup>2</sup> Pak	
	15ETH03-1		Case style TO-262	

① Typical Socket Mount

② Mounting Surface, Flat, Smooth and Greased

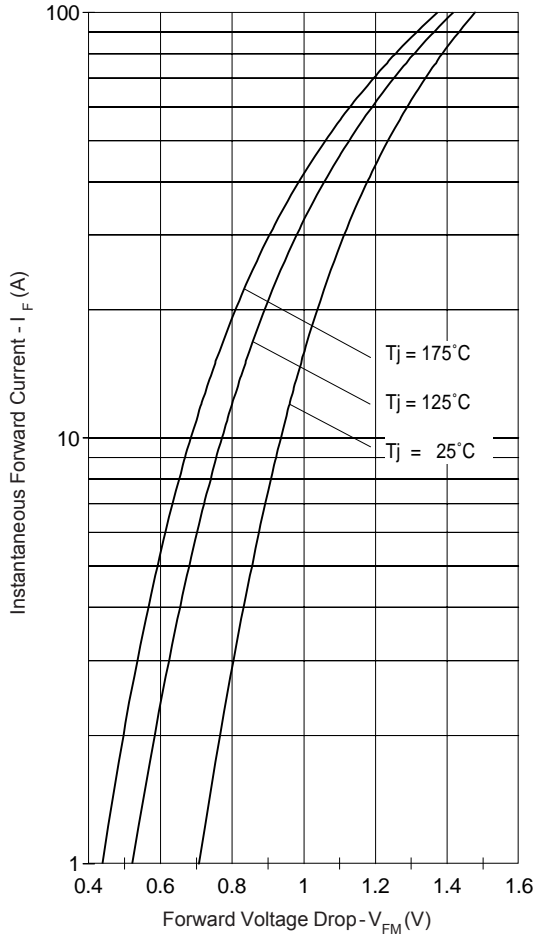


Fig. 1 - Typical Forward Voltage Drop Characteristics

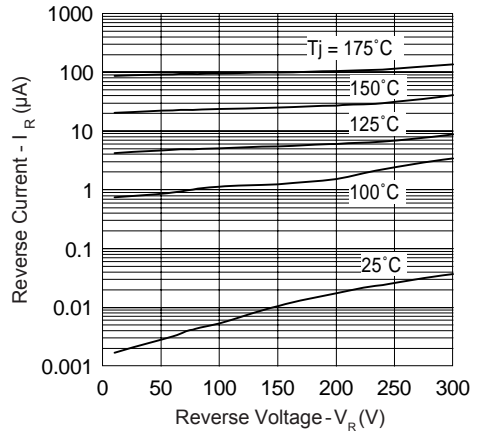


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage

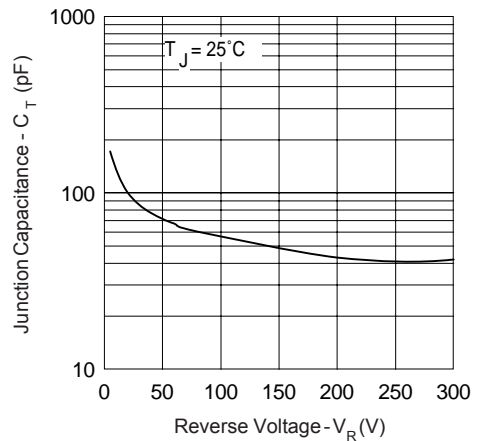


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

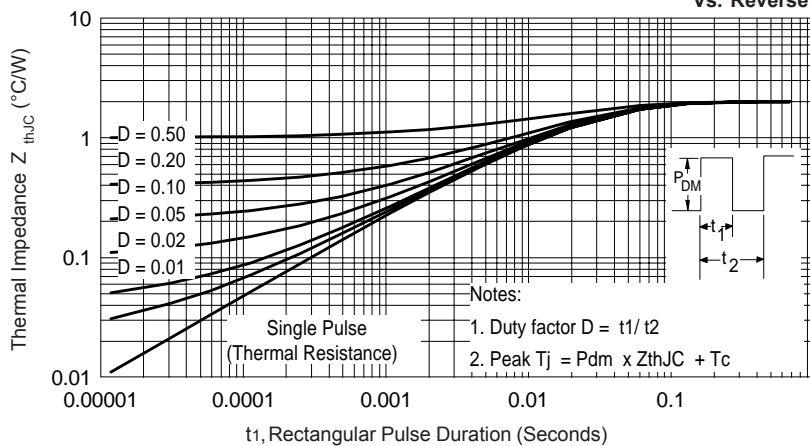
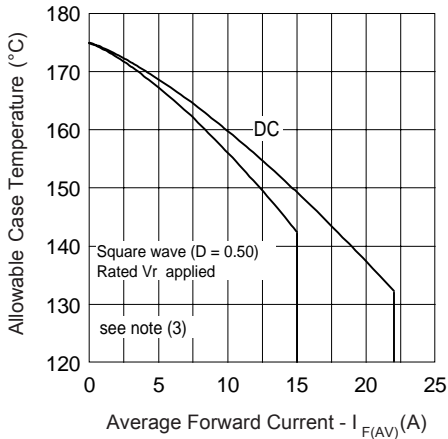
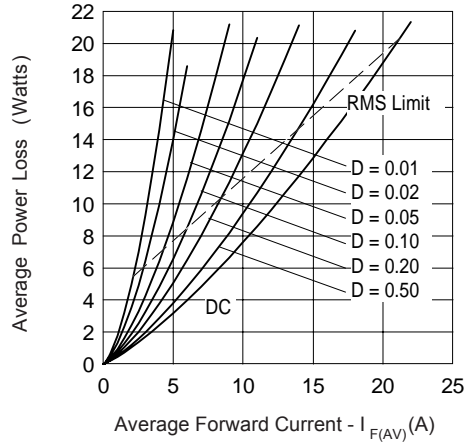


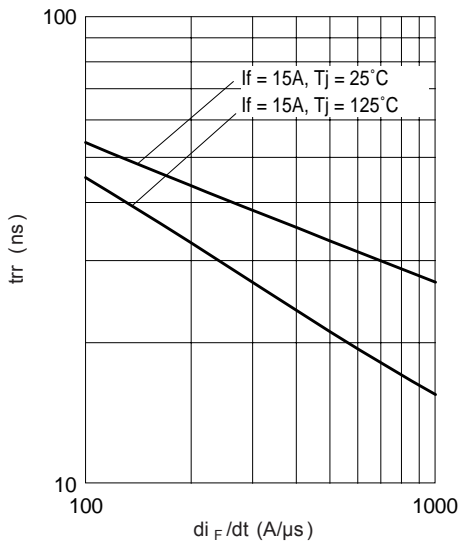
Fig. 4 - Max. Thermal Impedance  $Z_{thJC}$  Characteristics



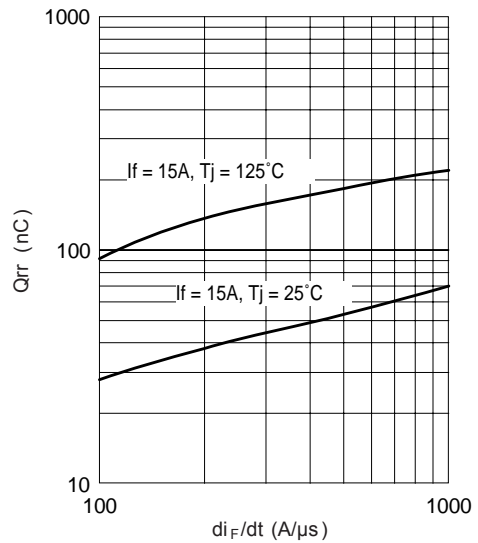
**Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current**



**Fig. 6 - Forward Power Loss Characteristics**



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



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

(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. 6);

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

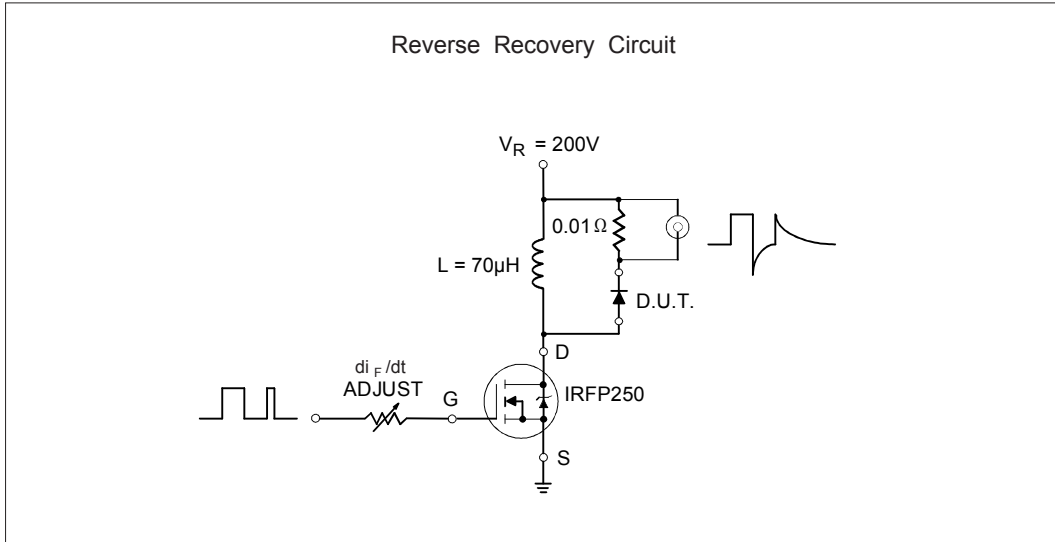


Fig. 9 - Reverse Recovery Parameter Test Circuit

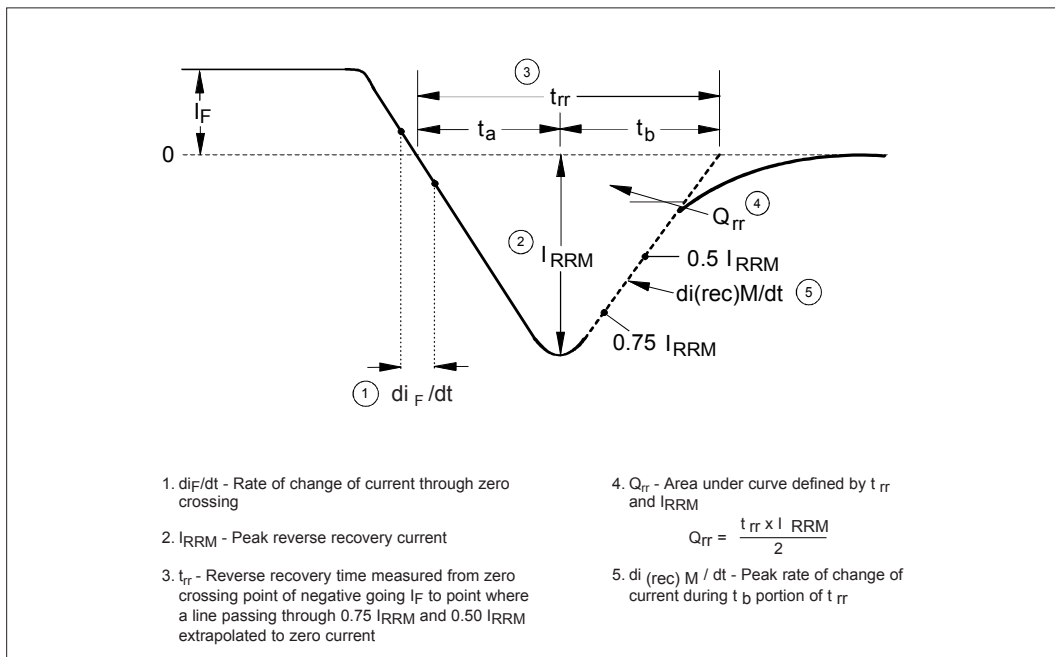
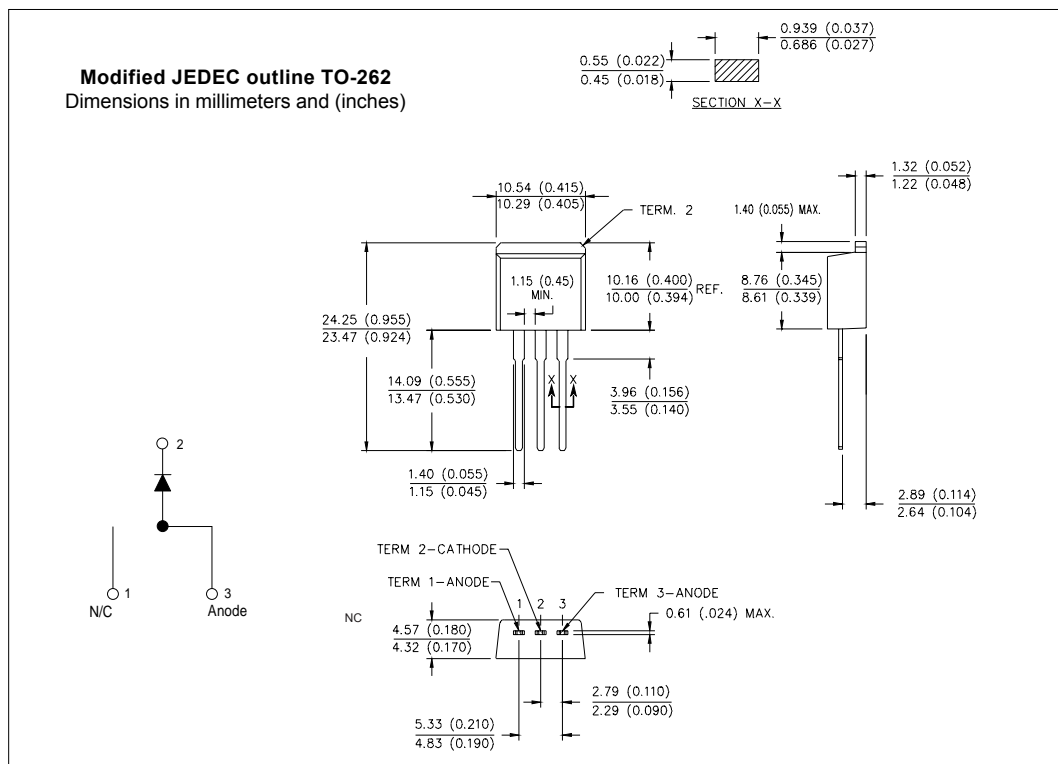
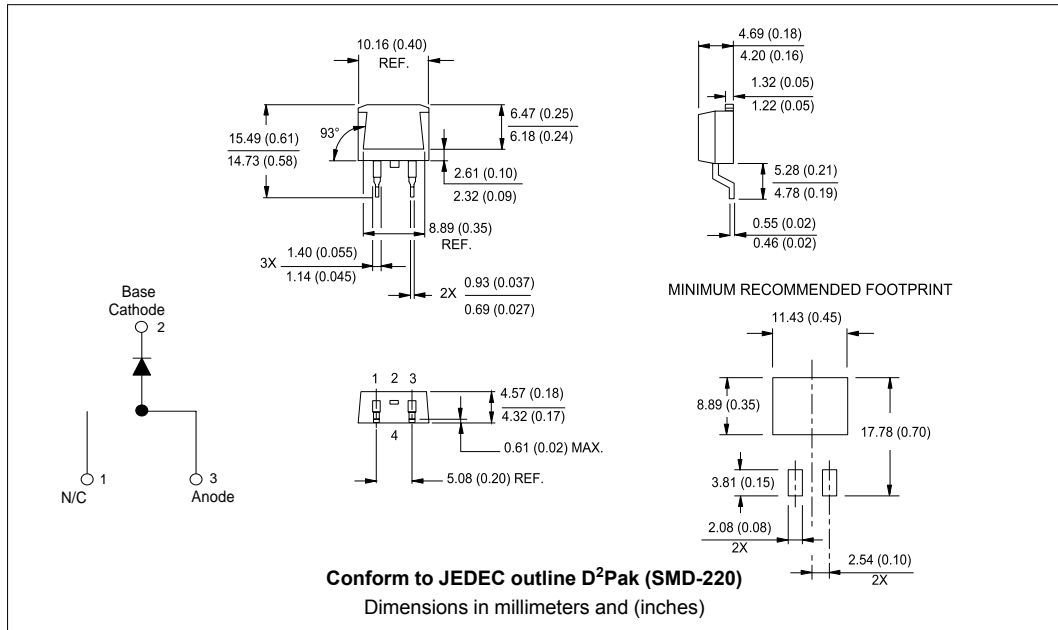


Fig. 10 - Reverse Recovery Waveform and Definitions

Outlines Table

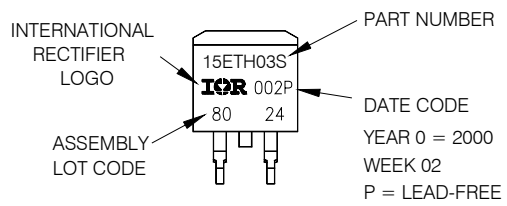


### Part Marking Information

#### D<sup>2</sup>PAK

EXAMPLE: THIS IS A 15ETH03S  
LOT CODE 8024  
ASSEMBLED ON WW 02, 2000

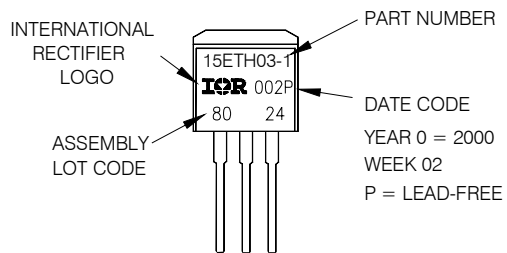
Note: "P" in assembly line  
position indicates "Lead-Free"



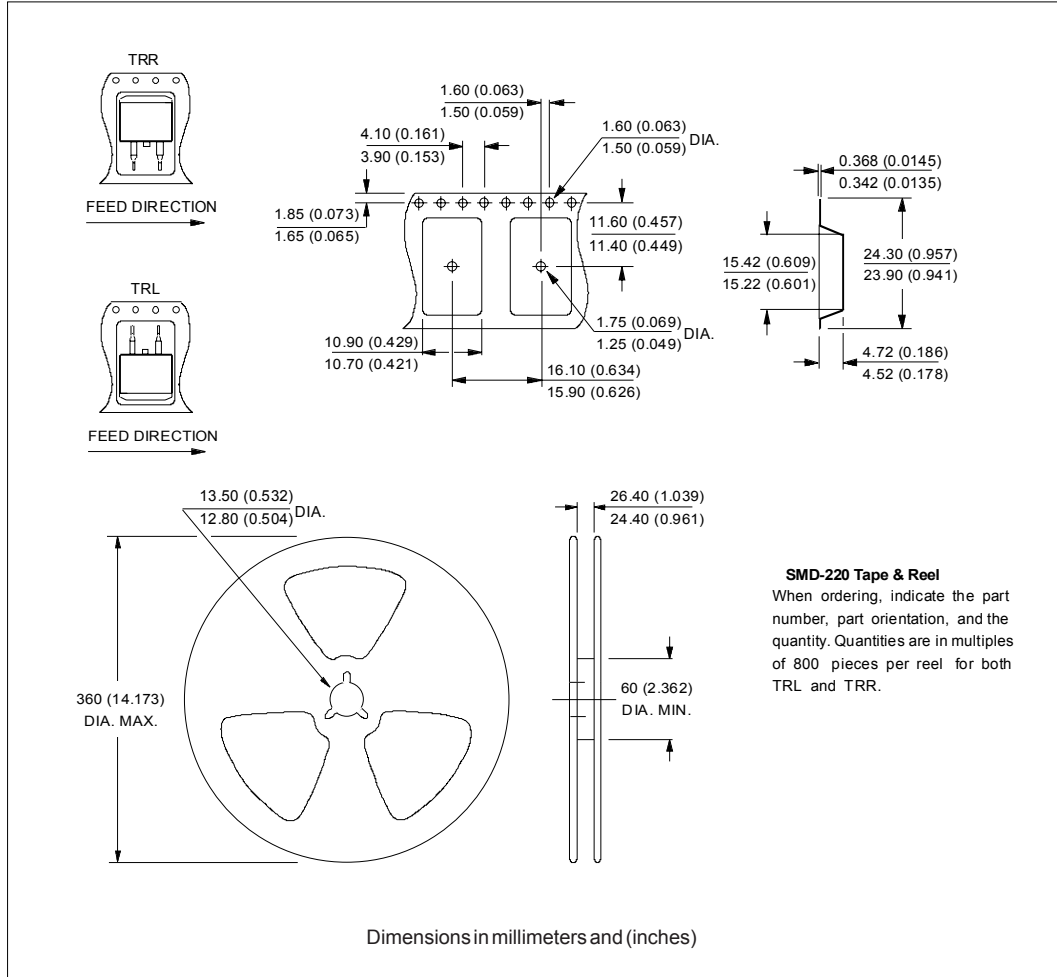
#### TO-262

EXAMPLE: THIS IS A 15ETH03-1  
LOT CODE 8024  
ASSEMBLED ON WW 02, 2000

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



Tape & Reel Information



**SMD-220 Tape & Reel**  
When ordering, indicate the part number, part orientation, and the quantity. Quantities are in multiples of 800 pieces per reel for both TRL and TRR.



Ordering Information Table

Device Code									
	<table border="1" style="margin: auto;"> <tr> <td style="padding: 5px;">15</td> <td style="padding: 5px;">E</td> <td style="padding: 5px;">T</td> <td style="padding: 5px;">H</td> <td style="padding: 5px;">03</td> <td style="padding: 5px;">S</td> <td style="padding: 5px;">TRL</td> <td style="padding: 5px;">PbF</td> </tr> </table>	15	E	T	H	03	S	TRL	PbF
15	E	T	H	03	S	TRL	PbF		
	<table style="margin: auto;"> <tr> <td style="text-align: center;">①</td> <td style="text-align: center;">②</td> <td style="text-align: center;">③</td> <td style="text-align: center;">④</td> <td style="text-align: center;">⑤</td> <td style="text-align: center;">⑥</td> <td style="text-align: center;">⑦</td> <td style="text-align: center;">⑧</td> </tr> </table>	①	②	③	④	⑤	⑥	⑦	⑧
①	②	③	④	⑤	⑥	⑦	⑧		
<b>1</b>	- Current Rating (15 = 15A)								
<b>2</b>	- E = Single Diode								
<b>3</b>	- T = TO-220, D <sup>2</sup> Pak								
<b>4</b>	- H = HyperFast Recovery								
<b>5</b>	- Voltage Rating (03 = 300V)								
<b>6</b>	- • S = D <sup>2</sup> Pak • -1 = TO-262								
<b>7</b>	- • none = Tube (50 pieces) • TRL = Tape & Reel (Left Oriented, for D <sup>2</sup> PAK package) • TRR = Tape & Reel (Right Oriented, for D <sup>2</sup> PAK package)								
<b>8</b>	- • 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.