

Bulletin PD-20031 07/05

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)

$$\begin{aligned}t_{rr} &= 40\text{ns} \\ I_{F(AV)} &= 15\text{Amp} \\ V_R &= 300\text{V}\end{aligned}$$

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

15ETH03SPbF  Base Cathode 2 1 N/C 3 Anode D²PAK	15ETH03-1PbF  2 1 N/C 3 Anode TO-262
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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_f Breakdown Voltage, Blocking Voltage	300	-	-	V	$I_R = 100\mu\text{A}$
V_F Forward Voltage	-	1.05	1.25	V	$I_F = 15\text{A}$, $T_J = 25^\circ\text{C}$
	-	0.85	1.00	V	$I_F = 15\text{A}$, $T_J = 125^\circ\text{C}$
I_R Reverse Leakage Current	-	0.05	40	μA	$V_R = V_R$ Rated
	-	12	400	μA	$T_J = 125^\circ\text{C}$, $V_R = V_R$ Rated
C_T Junction Capacitance	-	45	-	pF	$V_R = 300\text{V}$
L_S Series Inductance	-	8	-	nH	Measured lead to lead 5mm from package body

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

Parameters	Min	Typ	Max	Units	Test Conditions
t_{rr} Reverse Recovery Time	-	-	40	ns	$I_F = 1.0\text{A}$, $di_F/dt = 50\text{A}/\mu\text{s}$, $V_R = 30\text{V}$
	-	32	-		$T_J = 25^\circ\text{C}$
	-	45	-		$T_J = 125^\circ\text{C}$
I_{RRM} Peak Recovery Current	-	2.4	-	A	$T_J = 25^\circ\text{C}$
	-	6.1	-		$T_J = 125^\circ\text{C}$
Q_{rr} Reverse Recovery Charge	-	38	-	nC	$T_J = 25^\circ\text{C}$
	-	137	-		$T_J = 125^\circ\text{C}$

$I_F = 15\text{A}$
 $di_F/dt = -200\text{A}/\mu\text{s}$
 $V_R = 200\text{V}$

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	$^\circ\text{C}$
R_{thJC} Thermal Resistance, Junction to Case Per Leg	-	1.02	2.0	$^\circ\text{C}/\text{W}$
R_{thJA} ① Thermal Resistance, Junction to Ambient Per Leg	-	-	70	$^\circ\text{C}/\text{W}$
R_{thCS} ② Thermal Resistance, Case to Heatsink	-	0.2	-	$^\circ\text{C}/\text{W}$
Weight	-	2.0	-	g
	-	0.07	-	(oz)
Mounting Torque	6.0	-	12	Kg-cm
	5.0	-	10	lbf.in
Marking Device	15ETH03S		Case style D ² Pak	
	15ETH03-1		Case style TO-262	

① Typical Socket Mount

② Mounting Surface, Flat, Smooth and Greased

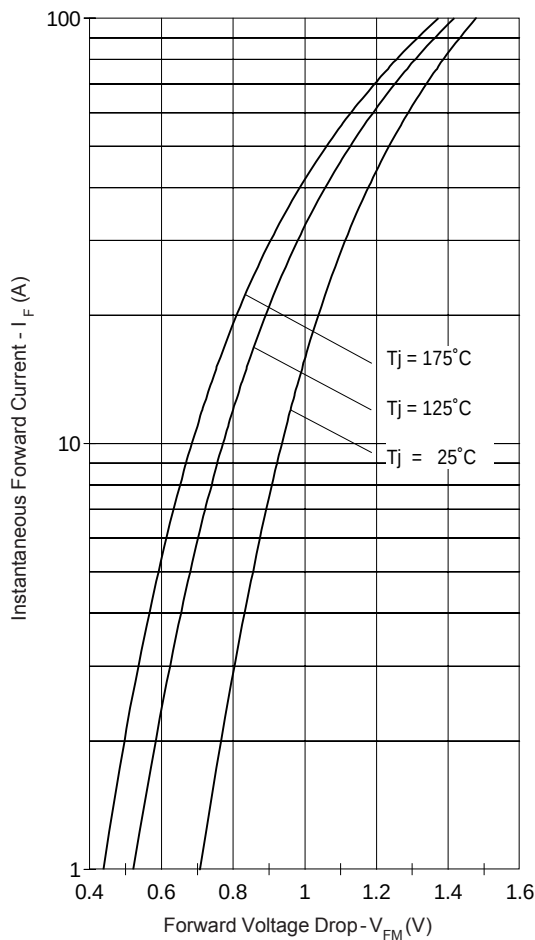


Fig. 1 - Typical Forward Voltage Drop Characteristics

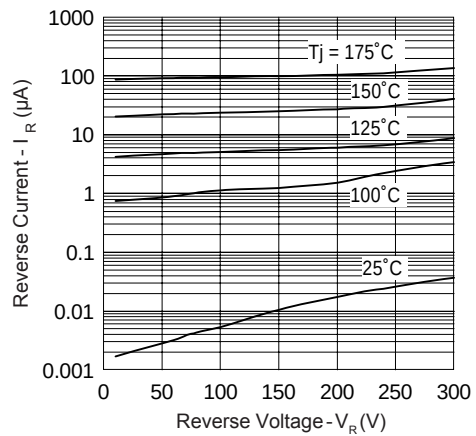


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage

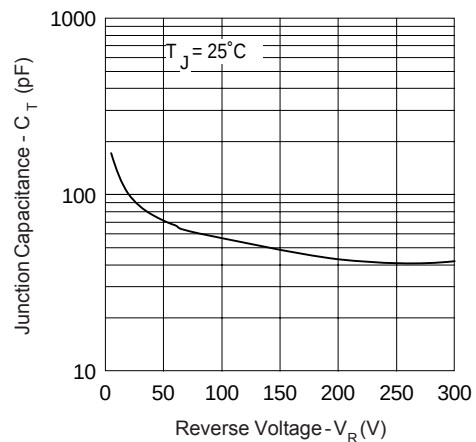


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

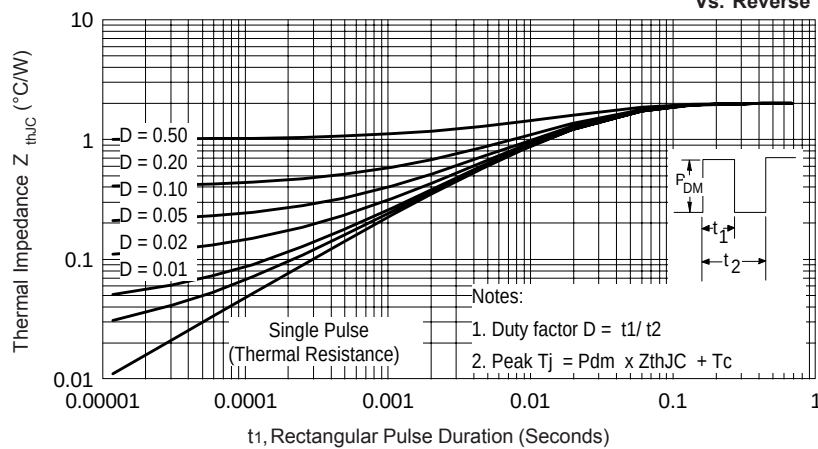


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics

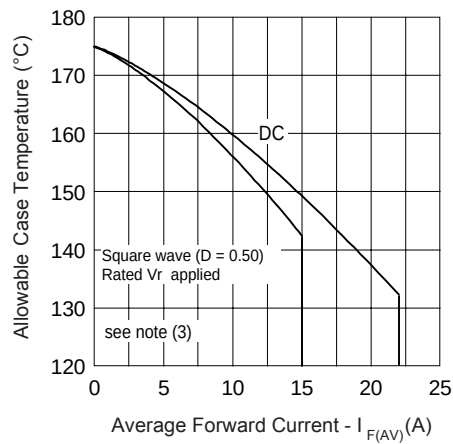


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current

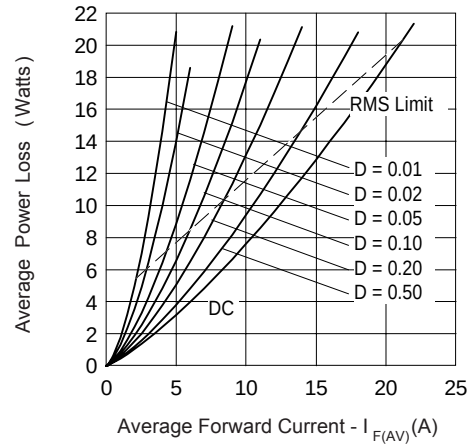


Fig. 6 - Forward Power Loss Characteristics

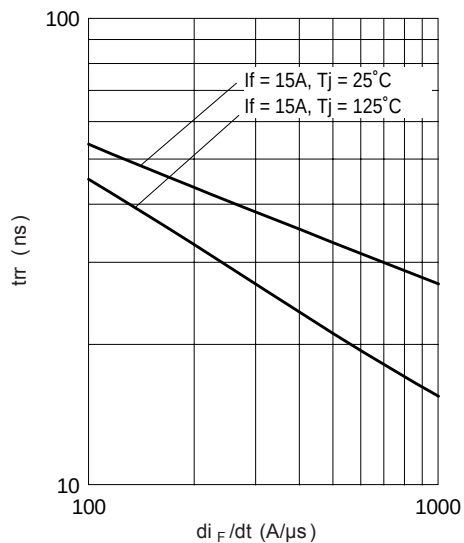


Fig. 7 - Typical Reverse Recovery vs. di_F/dt

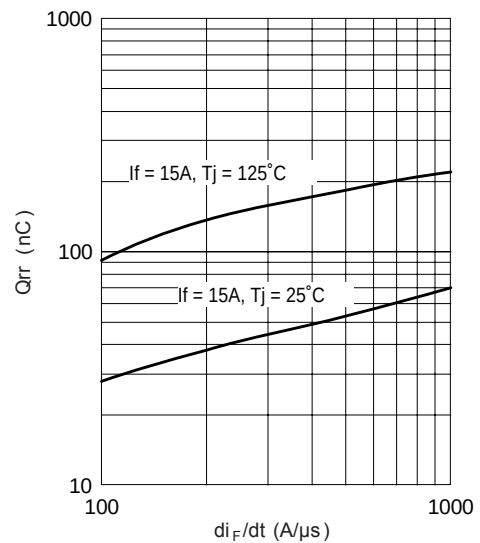
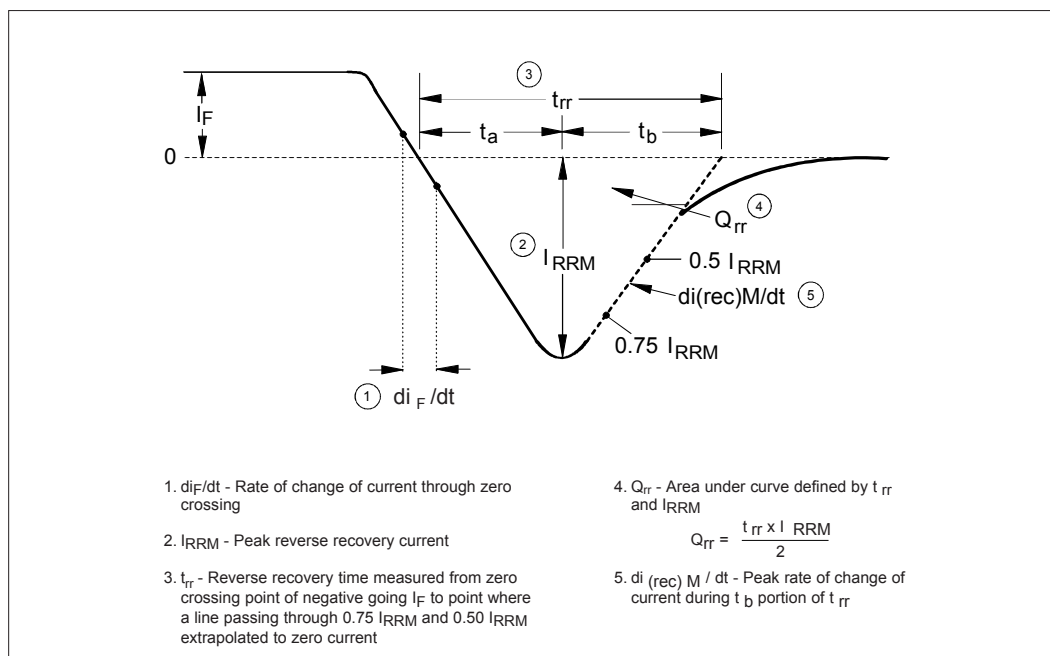
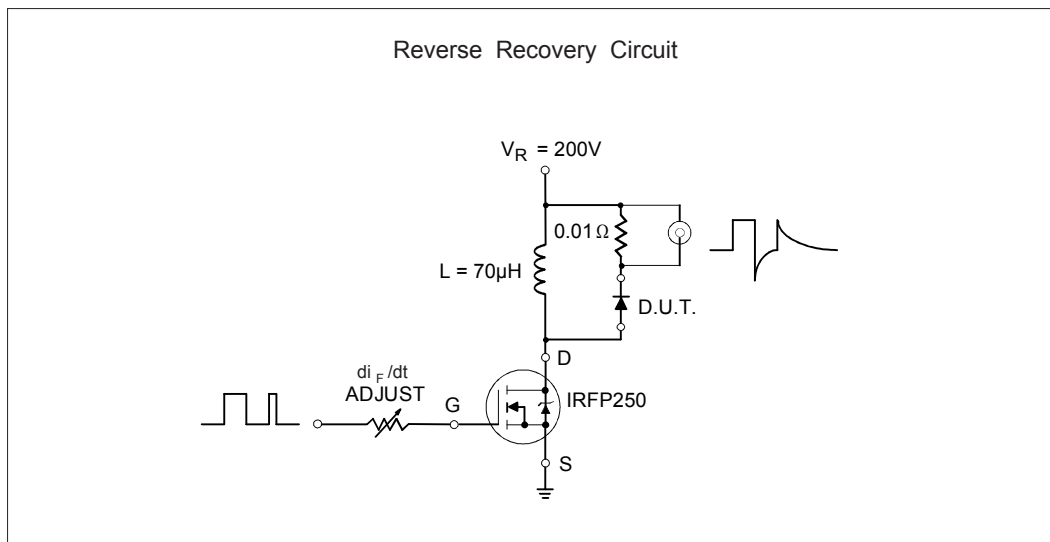


Fig. 8 - Typical Stored Charge vs. di_F/dt

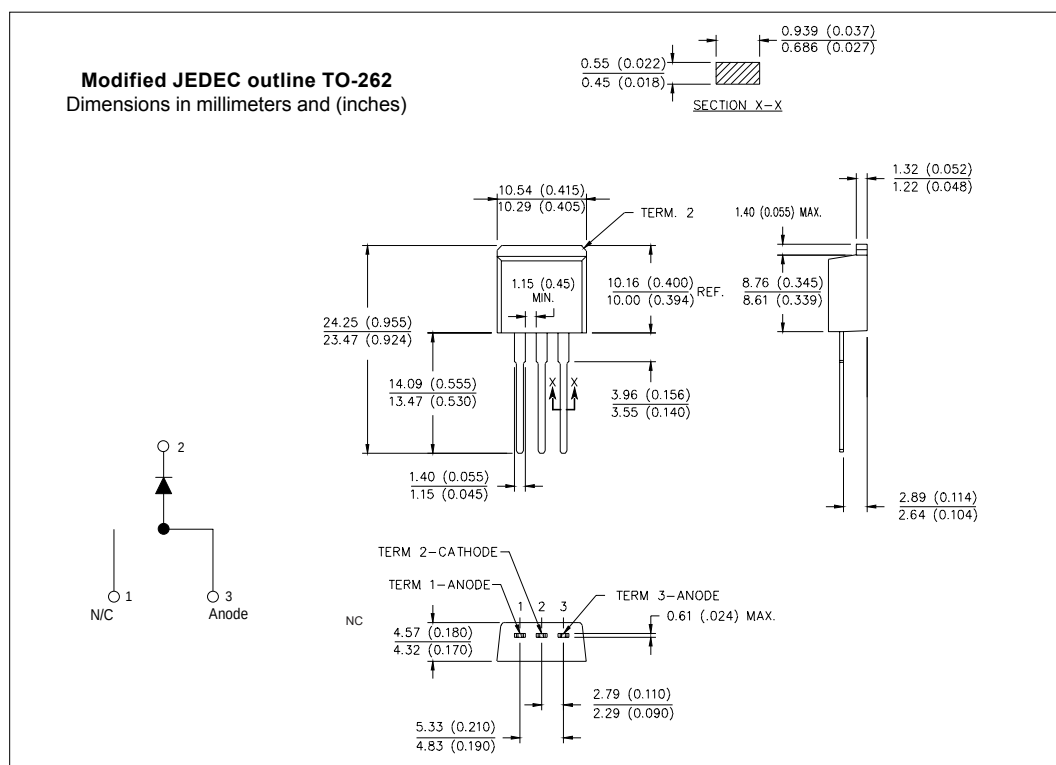
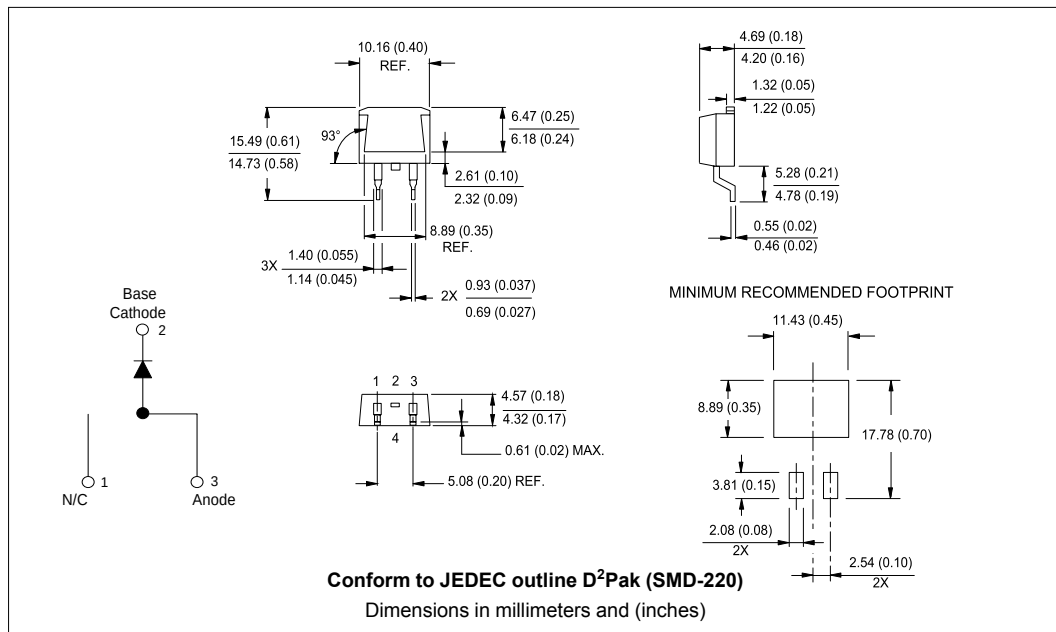
(3) Formula used: $T_C = T_J - (P_d + P_{d_{REV}}) \times R_{thJC}$;

P_d = Forward Power Loss = $I_{F(AV)} \times V_{FM} @ (I_{F(AV)}/D)$ (see Fig. 6);

$P_{d_{REV}}$ = Inverse Power Loss = $V_{R1} \times I_R (1-D)$; $I_R @ V_{R1}$ = rated V_R



Outlines Table

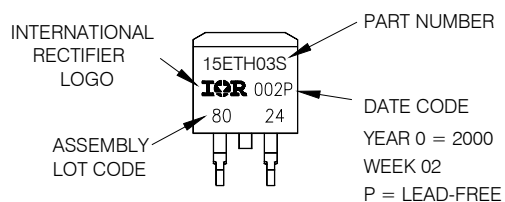


Part Marking Information

D²PAK

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

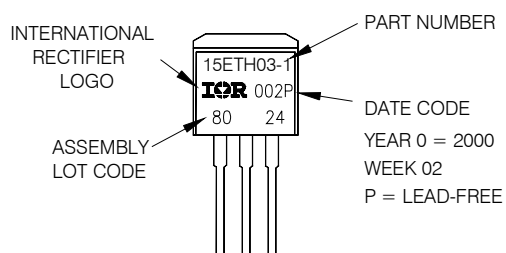
Note: "P" in assembly line
position indicates "Lead-Free"



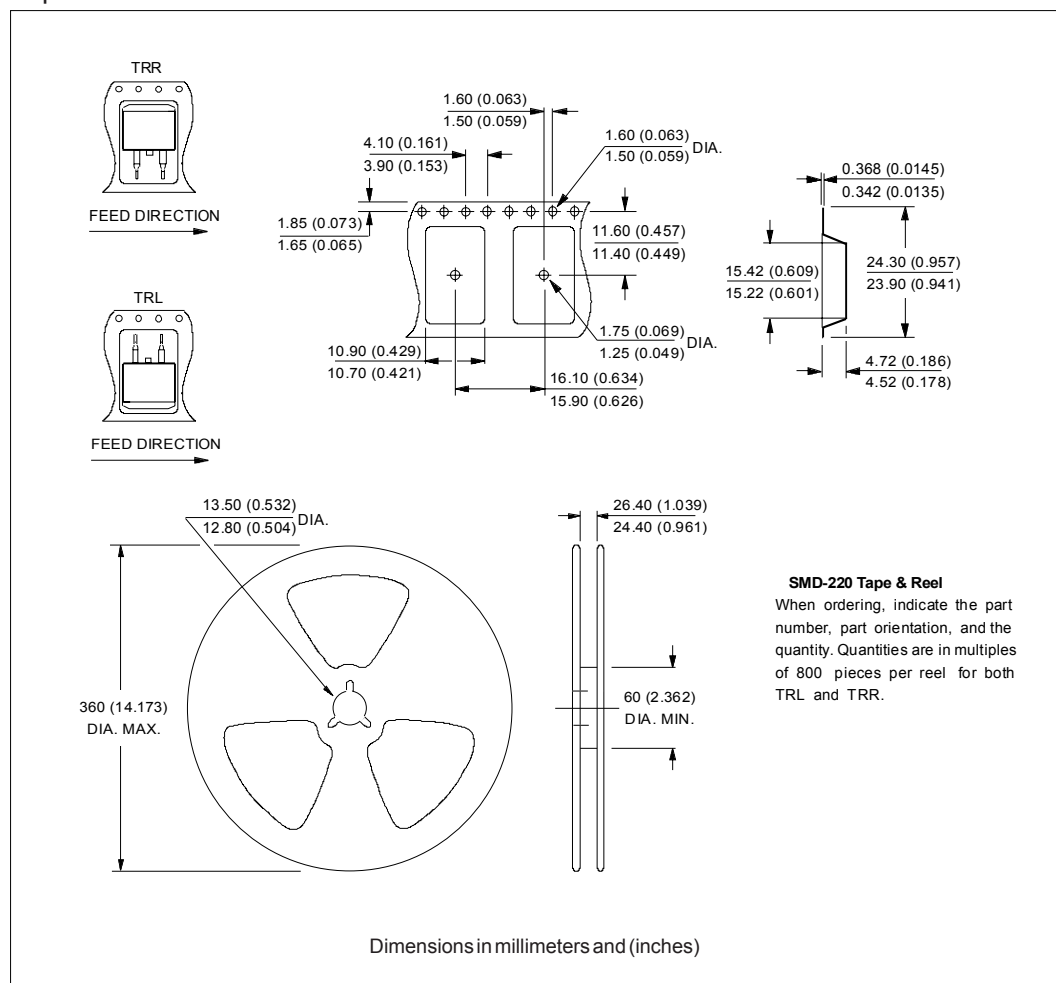
TO-262

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



Ordering Information Table

Device Code		15	E	T	H	03	S	TRL	PbF
		①	②	③	④	⑤	⑥	⑦	⑧
1	-	Current Rating (15 = 15A)							
2	-	E = Single Diode							
3	-	T = TO-220, D ² Pak							
4	-	H = HyperFast Recovery							
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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