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)

t_{rr} = 40ns
$I_{F(AV)}$ = 15Amp
V_R = 300V

Description/ Applications

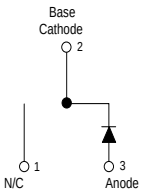
International Rectifier's 300V series are the state of the art Ultrafast recovery rectifiers designed with optimized performance of forward voltage drop and Ultrafast recovery time.
The planar structure and the platinum doped life time control guarantee the best overall performance, ruggedness and reliability 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°C	15	A
I_{FSM}	Non Repetitive Peak Surge Current	@ T_J = 25°C	140	
T_J, T_{STG}	Operating Junction and Storage Temperatures		- 65 to 175	°C

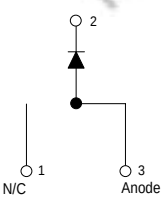
Case Styles

15ETH03SPbF



D^2PAK

15ETH03-1PbF



TO-262

Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

	Parameters	Min	Typ	Max	Units	Test Conditions
V_{BR}, V_r	Breakdown Voltage, Blocking Voltage	300	-	-	V	I_R = 100µA
V_F	Forward Voltage	-	1.05	1.25	V	I_F = 15A, T_J = 25°C
		-	0.85	1.00	V	I_F = 15A, T_J = 125°C
I_R	Reverse Leakage Current	-	0.05	40	µA	V_R = V_R Rated
		-	12	400	µA	T_J = 125°C, V_R = V_R Rated
C_T	Junction Capacitance	-	45	-	pF	V_R = 300V
L_S	Series Inductance	-	8	-	nH	Measured lead to lead 5mm from package body

Dynamic Recovery Characteristics @ T_J = 25°C (unless otherwise specified)

	Parameters	Min	Typ	Max	Units	Test Conditions	
t_{rr}	Reverse Recovery Time	-	-	40	ns	I_F = 1.0A, di_F/dt = 50A/µs, V_R = 30V	
		-	32	-		T_J = 25°C	I_F = 15A di_F/dt = -200A/µs V_R = 200V
			45	-		T_J = 125°C	
I_{RRM}	Peak Recovery Current	-	2.4	-	A	T_J = 25°C	
		-	6.1	-		T_J = 125°C	
Q_{rr}	Reverse Recovery Charge	-	38	-	nC	T_J = 25°C	
		-	137	-		T_J = 125°C	

Thermal - Mechanical Characteristics

	Parameters		Min	Typ	Max	Units
T_J	Max. Junction Temperature Range		- 65	-	175	°C
T_{Stg}	Max. Storage Temperature Range		- 65	-	175	
R_{thJC}	Thermal Resistance, Junction to Case	Per Leg	-	1.02	2.0	°C/W
R_{thJA} ①	Thermal Resistance, Junction to Ambient	Per Leg	-	-	70	
R_{thCS} ②	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^2Pak	
			15ETH03-1		Case style TO-262	

① Typical Socket Mount
② Mounting Surface, Flat, Smooth and Greased

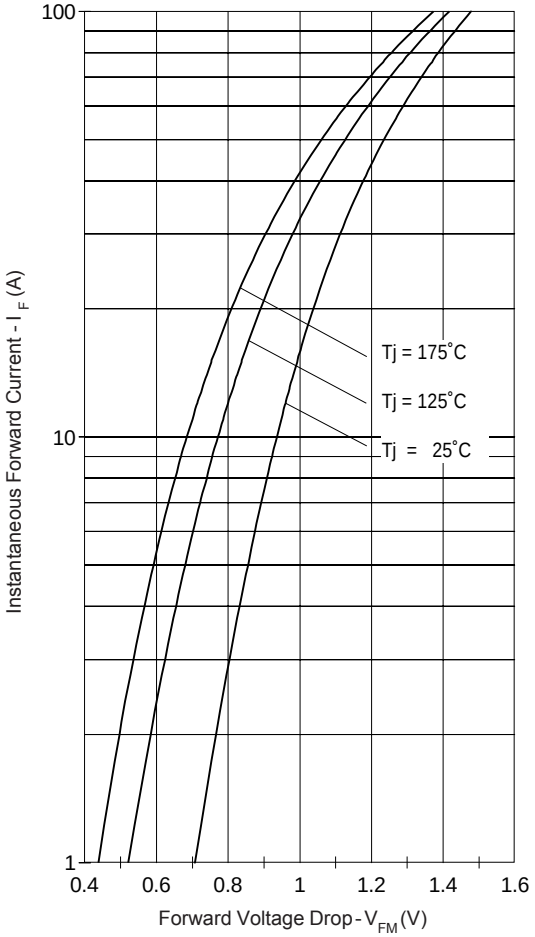


Fig. 1 - Typical Forward Voltage Drop Characteristics

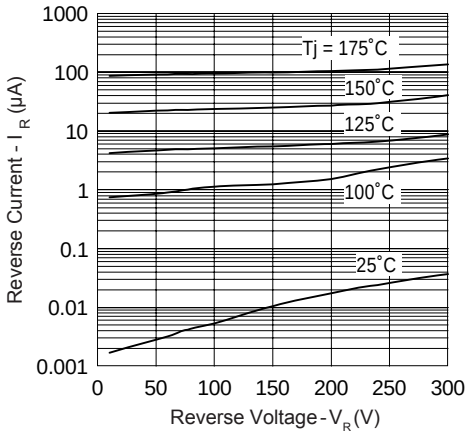


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage

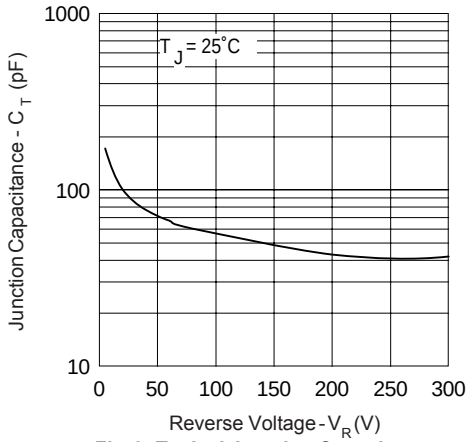


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

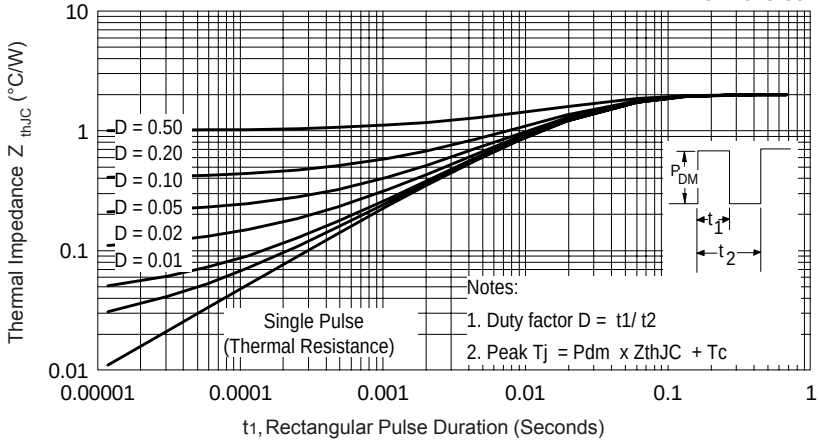


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics

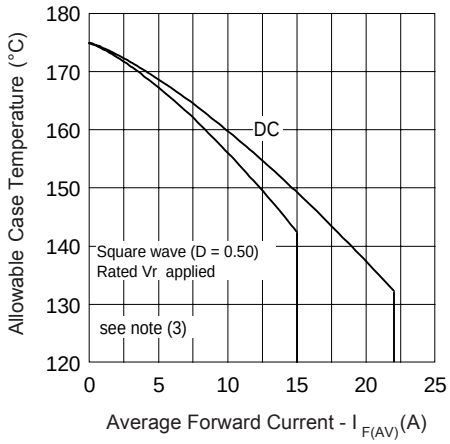


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current

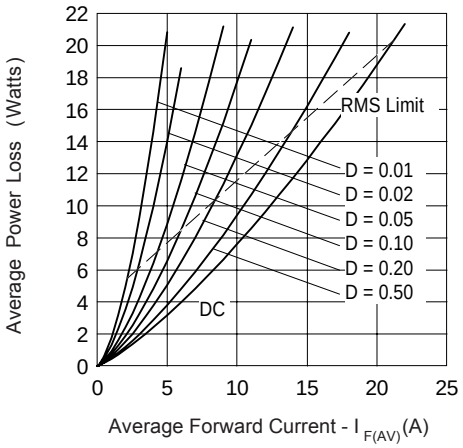


Fig. 6 - Forward Power Loss Characteristics

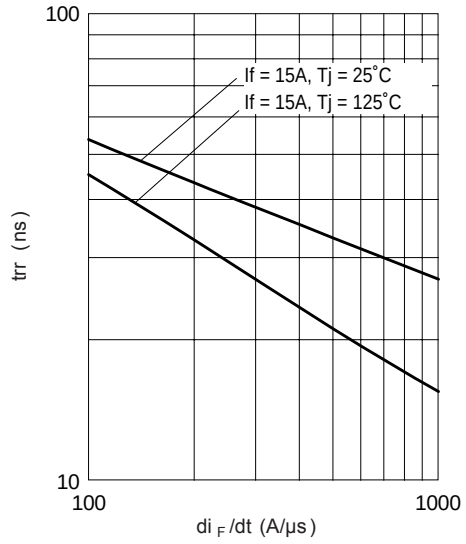


Fig. 7 - Typical Reverse Recovery vs. di_F/dt

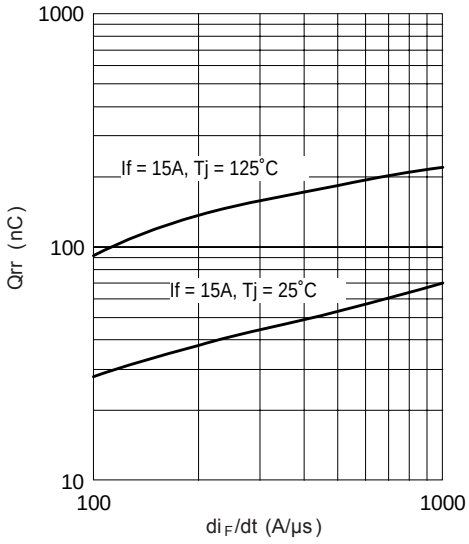


Fig. 8 - Typical Stored Charge vs. di_F/dt

(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 = $V_{R1} \times I_R (1 - D)$; $I_R @ V_{R1}$ = rated V_R

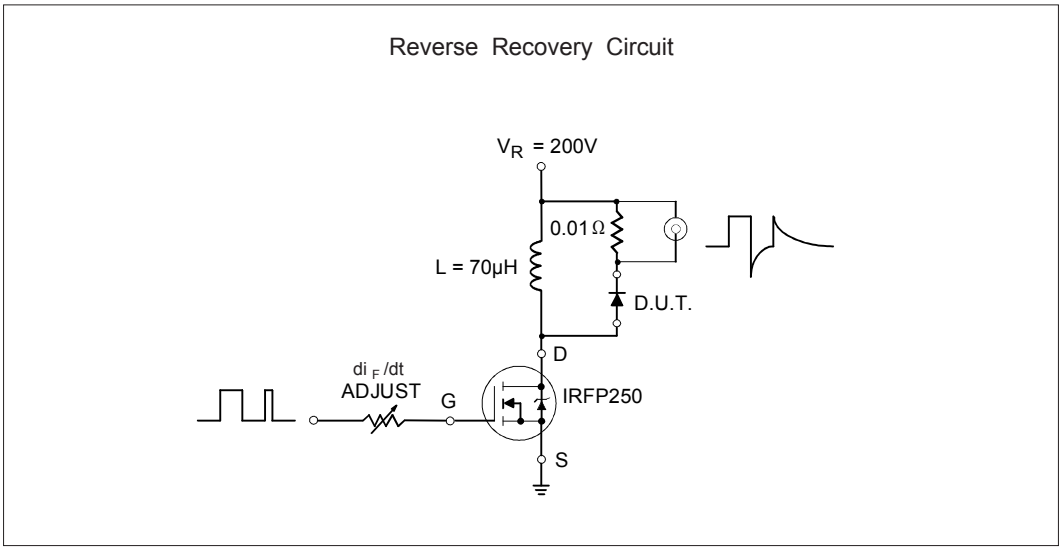
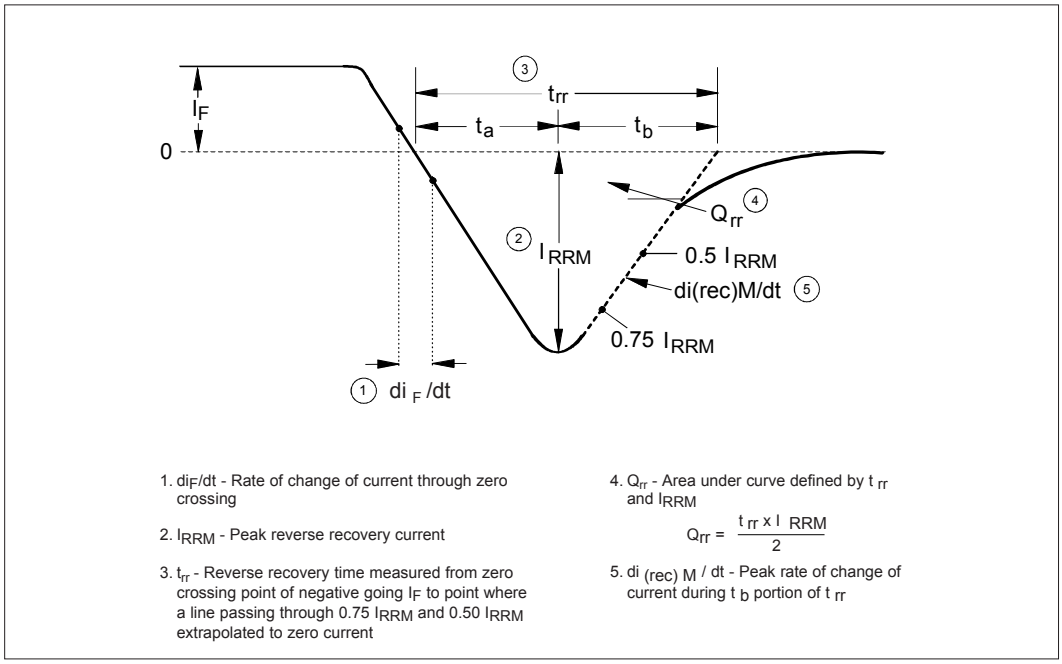


Fig. 9 - Reverse Recovery Parameter Test Circuit



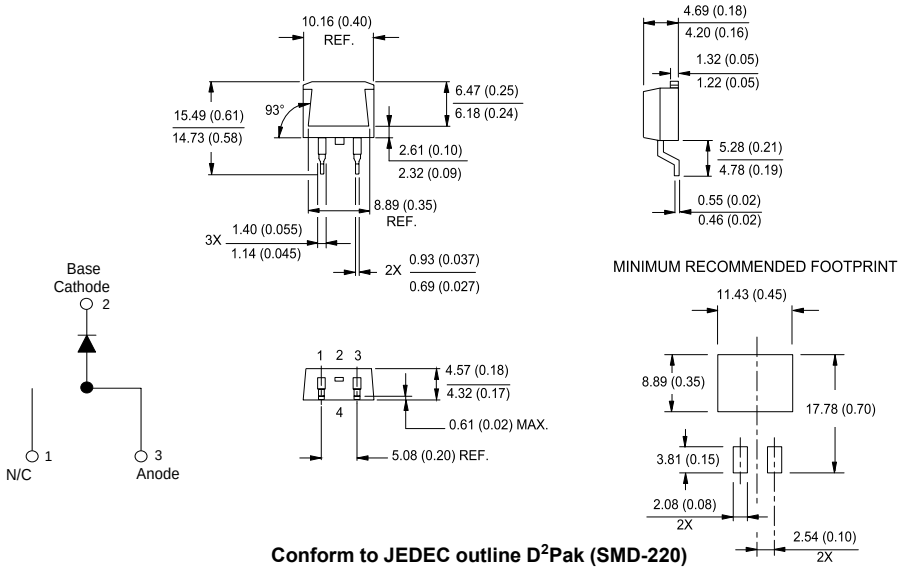
1. di_F/dt - Rate of change of current through zero crossing
2. I_{RRM} - Peak reverse recovery current
3. t_{rr} - Reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through 0.75 I_{RRM} and 0.50 I_{RRM} extrapolated to zero current
4. Q_{rr} - Area under curve defined by t_{rr} and I_{RRM}

$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

5. $di_{(rec)M}/dt$ - Peak rate of change of current during t_b portion of t_{rr}

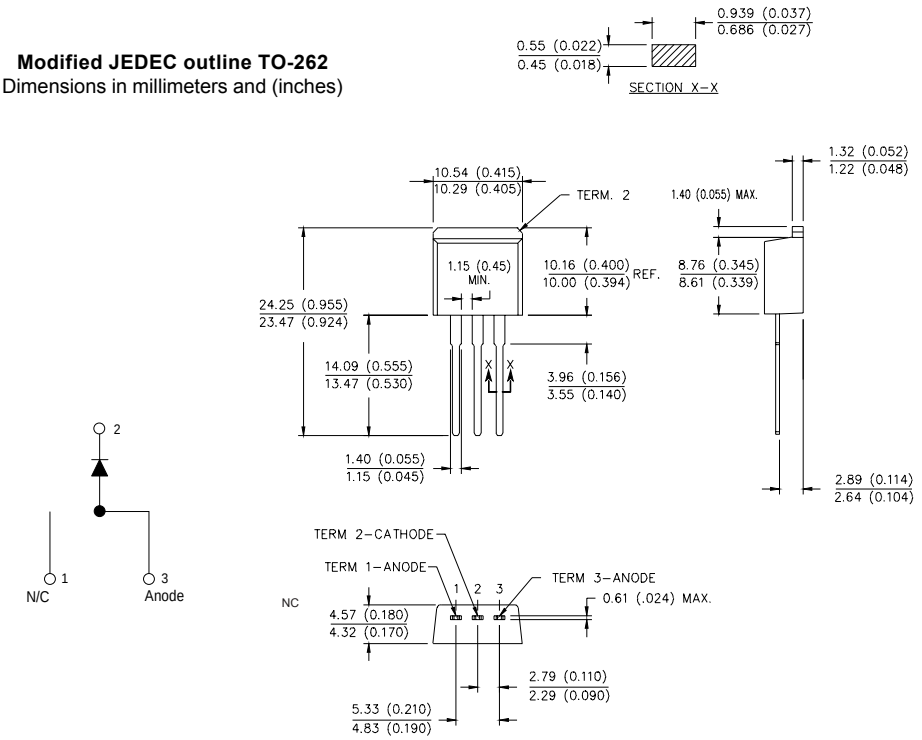
Fig. 10 - Reverse Recovery Waveform and Definitions

Outlines Table



Conform to JEDEC outline D^{2}Pak (SMD-220)
Dimensions in millimeters and (inches)

Modified JEDEC outline TO-262
Dimensions in millimeters and (inches)

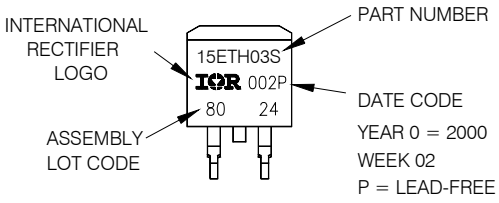


Part Marking Information

D²PAK

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

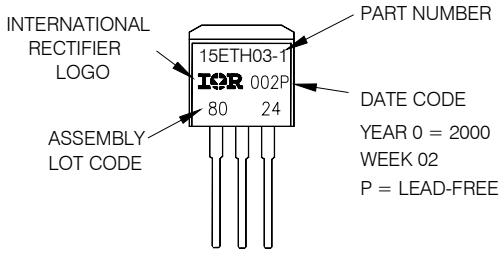
Note: "P" in assembly line position indicates "Lead-Free"



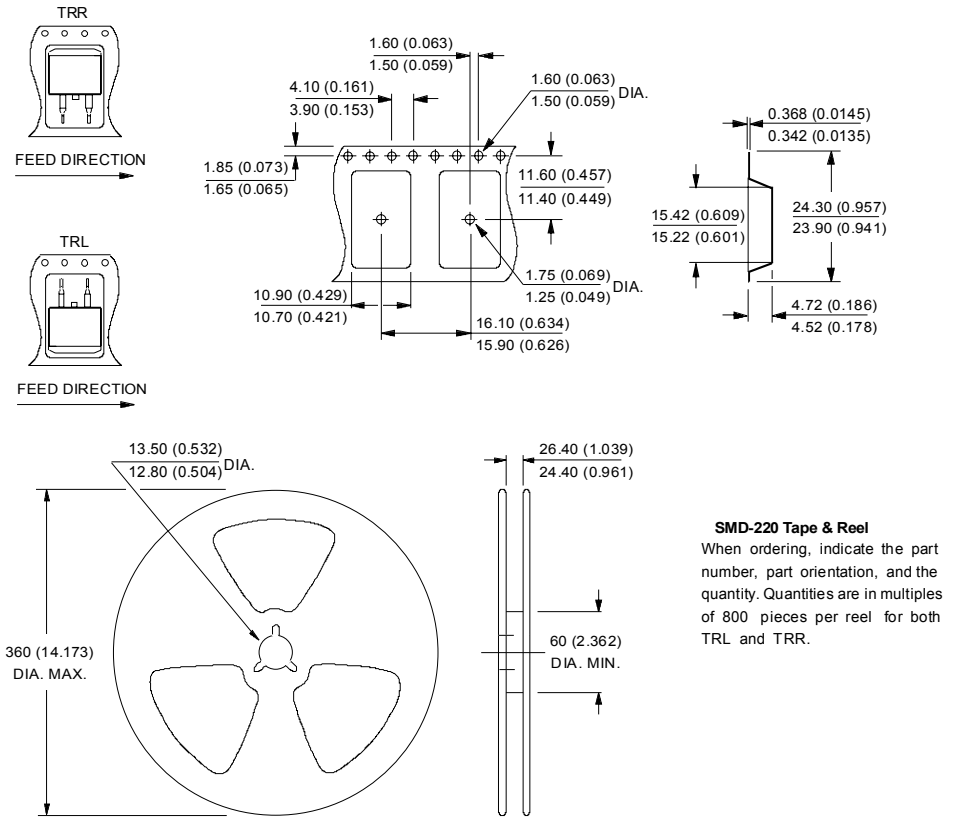
TO-262

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

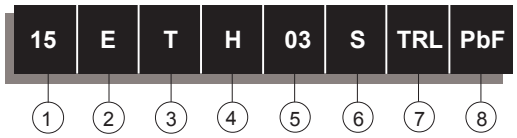


SMD-220 Tape & Reel
When ordering, indicate the part number, part orientation, and the quantity. Quantities are in multiples of 800 pieces per reel for both TRL and TRR.

Dimensions in millimeters and (inches)

Ordering Information Table

Device Code



1	-	Current Rating (15 = 15A)
2	-	E = Single Diode
3	-	T = TO-220, D^2Pak
4	-	H = HyperFast Recovery
5	-	Voltage Rating (03 = 300V)
6	-	• S = D^2Pak
		• -1 = TO-262
7	-	• none = Tube (50 pieces)
		• TRL = Tape & Reel (Left Oriented, for D^2PAk package)
		• TRR = Tape & Reel (Right Oriented, for D^2PAk 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
IOR Rectifier

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