

# International IOR Rectifier

## 30ETH06SPbF 30ETH06-1PbF

### Hyperfast Rectifier

#### Features

- Hyperfast Recovery Time
- Low Forward Voltage Drop
- Low Leakage Current
- 125°C Operating Junction Temperature
- Dual Diode Center Tap
- Lead-Free ("PbF" suffix)

$$t_{rr} = 28\text{ns typ.}$$

$$I_{F(AV)} = 30\text{Amp}$$

$$V_R = 600\text{V}$$

#### Description/ Applications

State of the art Hyperfast recovery rectifiers designed with optimized performance of forward voltage drop, Hyperfast recover time, and soft recovery.

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 PFC Boost stage in the AC-DC section of SMPS, inverters or as freewheeling diodes.

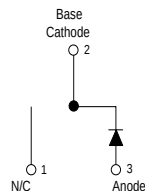
The IR extremely optimized stored charge and low recovery current minimize the switching losses and reduce over dissipation in the switching element and snubbers.

#### Absolute Maximum Ratings

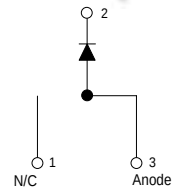
| Parameters                                                                | Max         | Units            |
|---------------------------------------------------------------------------|-------------|------------------|
| $V_{RRM}$ Peak Repetitive Reverse Voltage                                 | 600         | V                |
| $I_{F(AV)}$ Average Rectifier Forward Current @ $T_C = 103^\circ\text{C}$ | 30          | A                |
| $I_{FSM}$ Non Repetitive Peak Surge Current @ $T_J = 25^\circ\text{C}$    | 200         |                  |
| $T_J$ Operating Junction Temperature                                      | - 65 to 125 | $^\circ\text{C}$ |
| $T_{STG}$ Operating Storage Temperature                                   | - 65 to 150 |                  |

#### Case Styles

30ETH06SPbF

D<sup>2</sup>PAK

30ETH06-1PbF



TO-262

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

| Parameters                                                           | Min | Typ  | Max  | Units | Test Conditions                                               |
|----------------------------------------------------------------------|-----|------|------|-------|---------------------------------------------------------------|
| V <sub>BR</sub> , V <sub>r</sub> Breakdown Voltage, Blocking Voltage | 600 | -    | -    | V     | I <sub>R</sub> = 100μA                                        |
| V <sub>F</sub> Forward Voltage                                       | -   | 2.0  | 2.6  | V     | I <sub>F</sub> = 30A, T <sub>J</sub> = 25°C                   |
|                                                                      | -   | 1.34 | 1.75 | V     | I <sub>F</sub> = 30A, T <sub>J</sub> = 150°C                  |
| I <sub>R</sub> Reverse Leakage Current                               | -   | 0.3  | 50   | μA    | V <sub>R</sub> = V <sub>R</sub> Rated                         |
|                                                                      | -   | 60   | 500  | μA    | T <sub>J</sub> = 150°C, V <sub>R</sub> = V <sub>R</sub> Rated |
| C <sub>T</sub> Junction Capacitance                                  | -   | 33   | -    | pF    | V <sub>R</sub> = 600V                                         |
| L <sub>S</sub> Series Inductance                                     | -   | 8.0  | -    | 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   | -   | 28  | 35  | ns    | I <sub>F</sub> = 1.0A, di <sub>F</sub> /dt = 50A/μs, V <sub>R</sub> = 30V |
|                                         | -   | 31  | -   |       | T <sub>J</sub> = 25°C                                                     |
|                                         | -   | 77  | -   |       | T <sub>J</sub> = 125°C                                                    |
| I <sub>RRM</sub> Peak Recovery Current  | -   | 3.5 | -   | A     | T <sub>J</sub> = 25°C                                                     |
|                                         | -   | 7.7 | -   |       | T <sub>J</sub> = 125°C                                                    |
| Q <sub>rr</sub> Reverse Recovery Charge | -   | 65  | -   | nC    | T <sub>J</sub> = 25°C                                                     |
|                                         | -   | 345 | -   |       | T <sub>J</sub> = 125°C                                                    |

**Thermal - Mechanical Characteristics**

| Parameters                                                          | Min       | Typ  | Max                           | Units  |
|---------------------------------------------------------------------|-----------|------|-------------------------------|--------|
| T <sub>J</sub> Max. Junction Temperature Range                      | - 65      | -    | 125                           | °C     |
| T <sub>Stg</sub> Max. Storage Temperature Range                     | - 65      | -    | 150                           |        |
| R <sub>thJC</sub> Thermal Resistance, Junction to Case Per Leg      | -         | 0.7  | 1.1                           | °C/W   |
| R <sub>thJA</sub> ① Thermal Resistance, Junction to Ambient Per Leg | -         | -    | 70                            |        |
| R <sub>thCS</sub> 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                                                      | 30ETH06S  |      | Case style D <sup>2</sup> Pak |        |
|                                                                     | 30ETH06-1 |      | Case style TO-262             |        |

① Typical Socket Mount

② Mounting Surface, Flat, Smooth and Greased

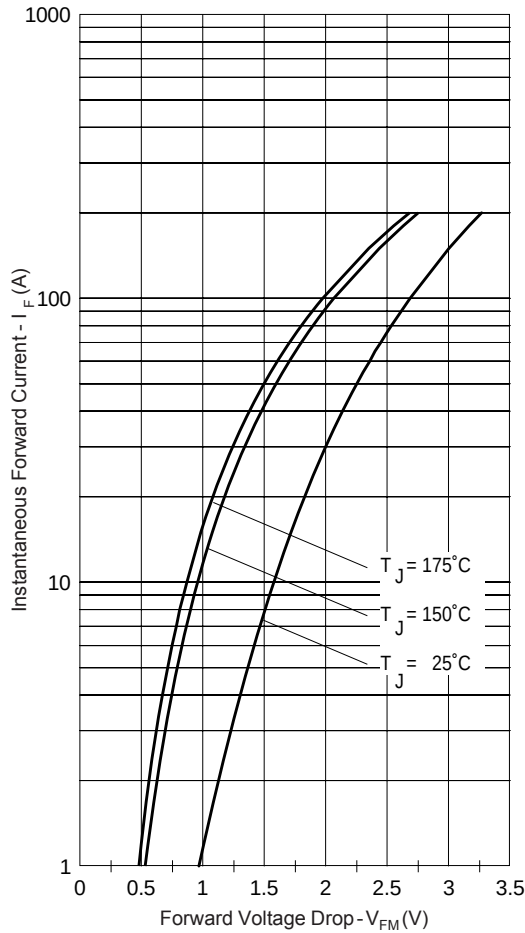


Fig. 1 - Typical Forward Voltage Drop Characteristics

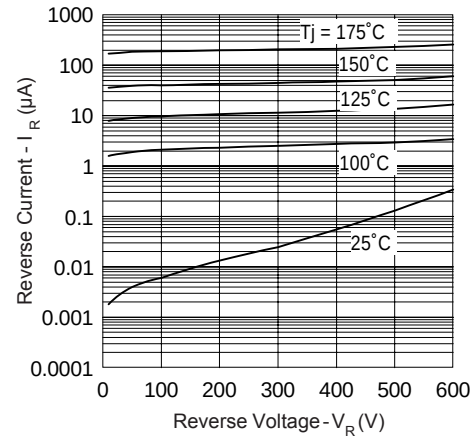


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage

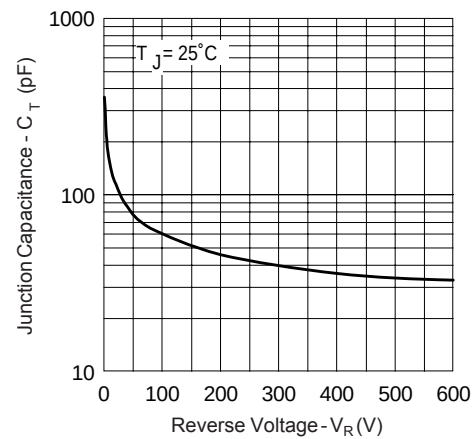


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

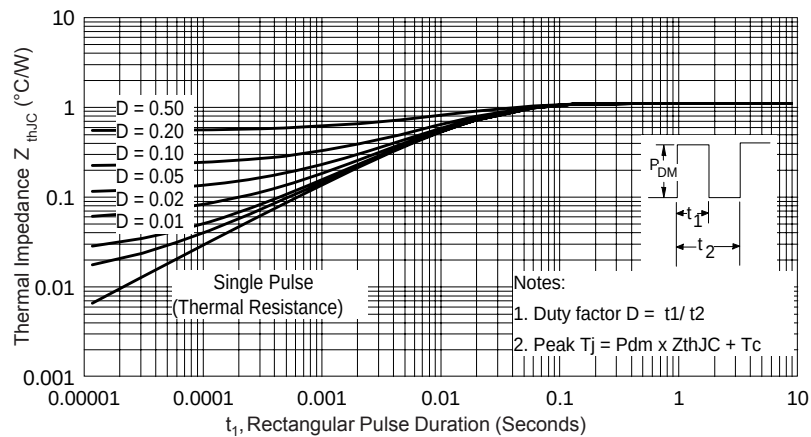
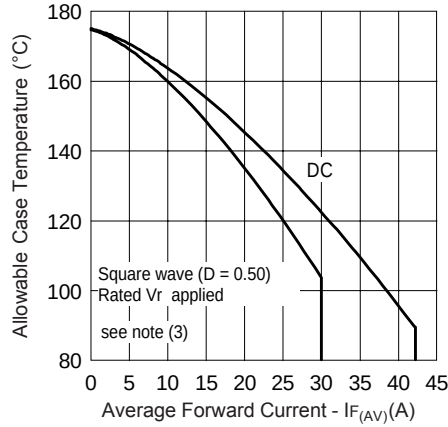
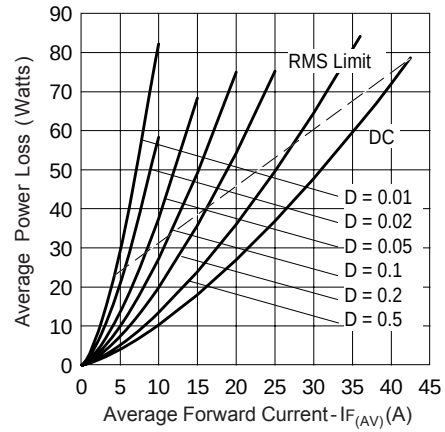


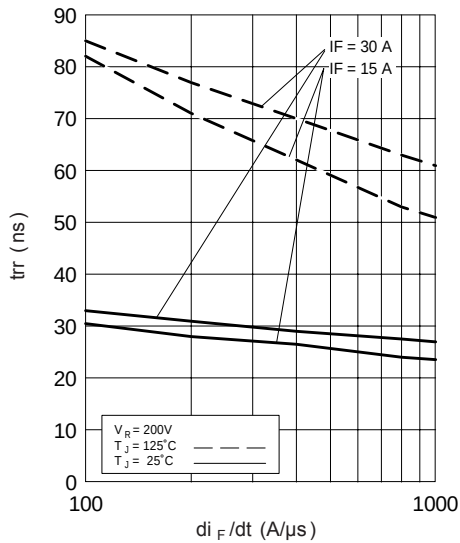
Fig. 4 - Max. Thermal Impedance  $Z_{thJC}$  Characteristics



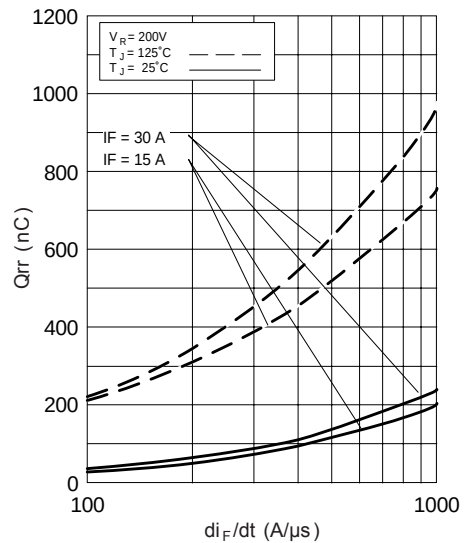
**Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current**



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



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

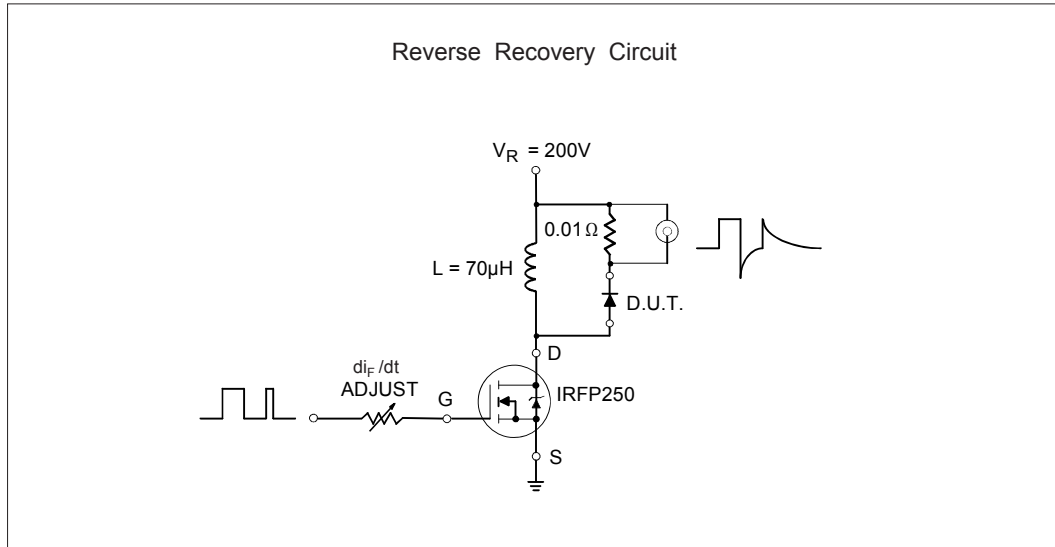


**Fig. 8 - Typical Stored Charge vs.  $di_F/dt$**

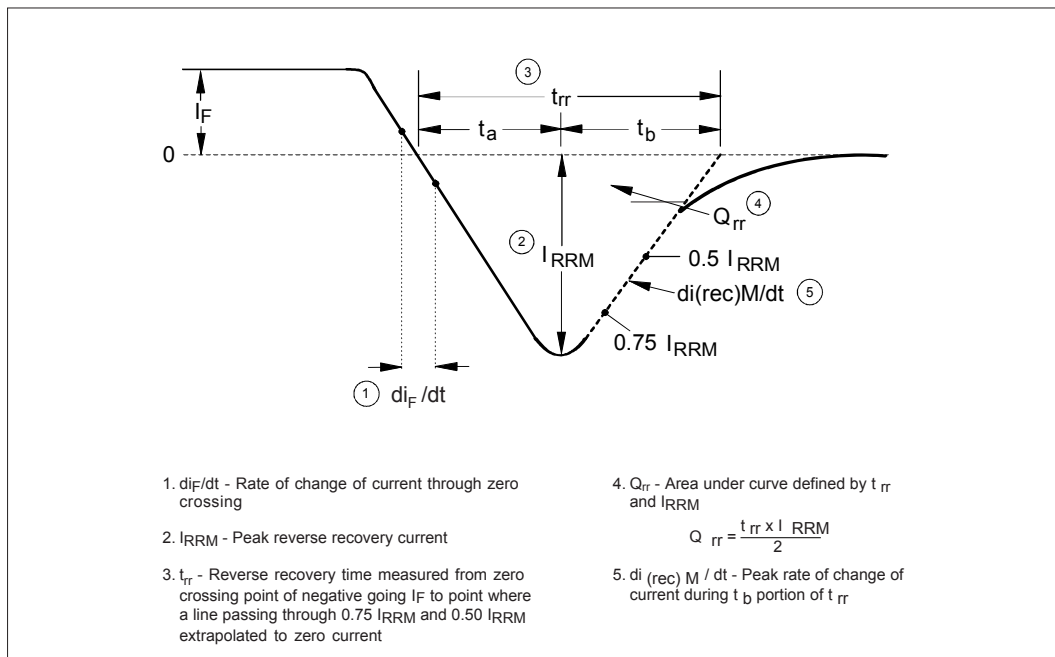
(3) Formula used:  $T_C = T_J - (P_d + P_{d_{REV}}) \times R_{thJC}$ ;

$P_d$  = 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  $V_R$

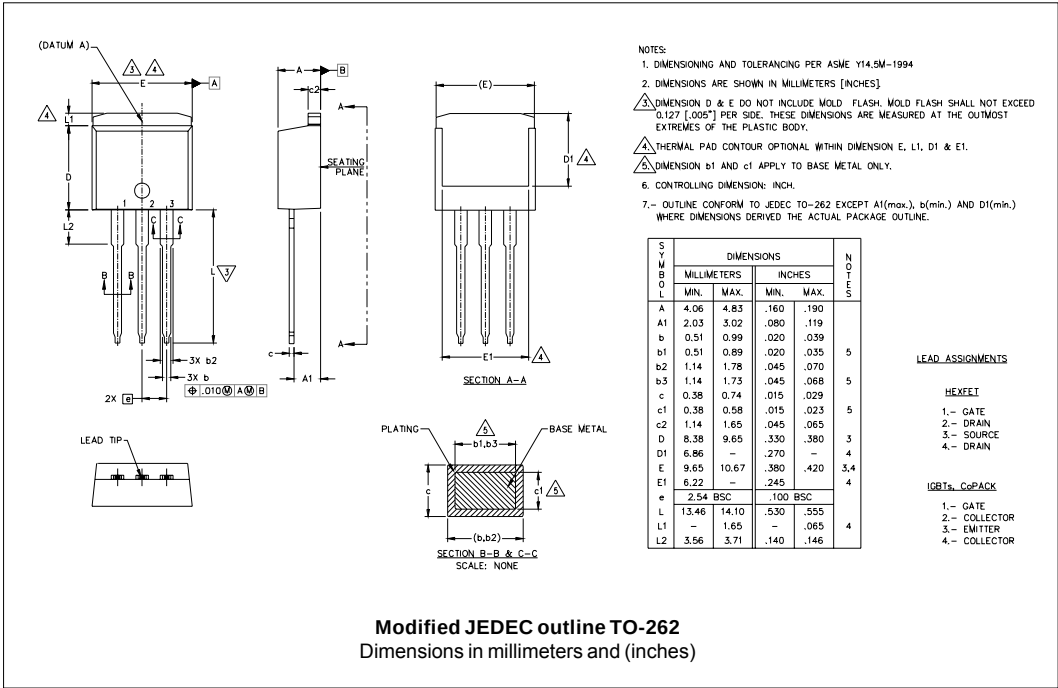
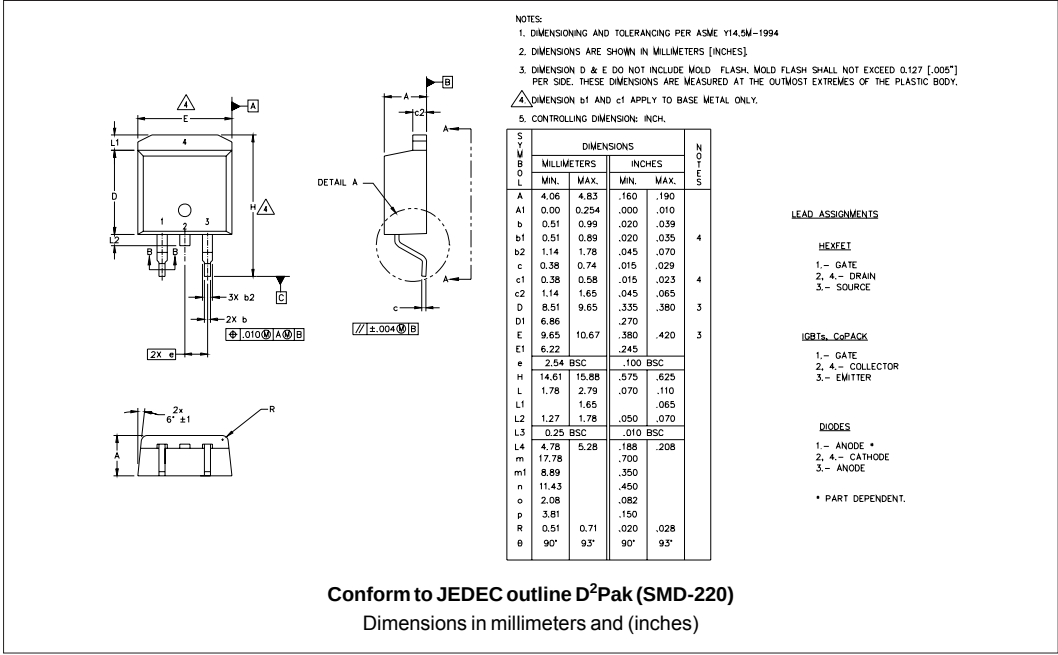


**Fig. 9- Reverse Recovery Parameter Test Circuit**

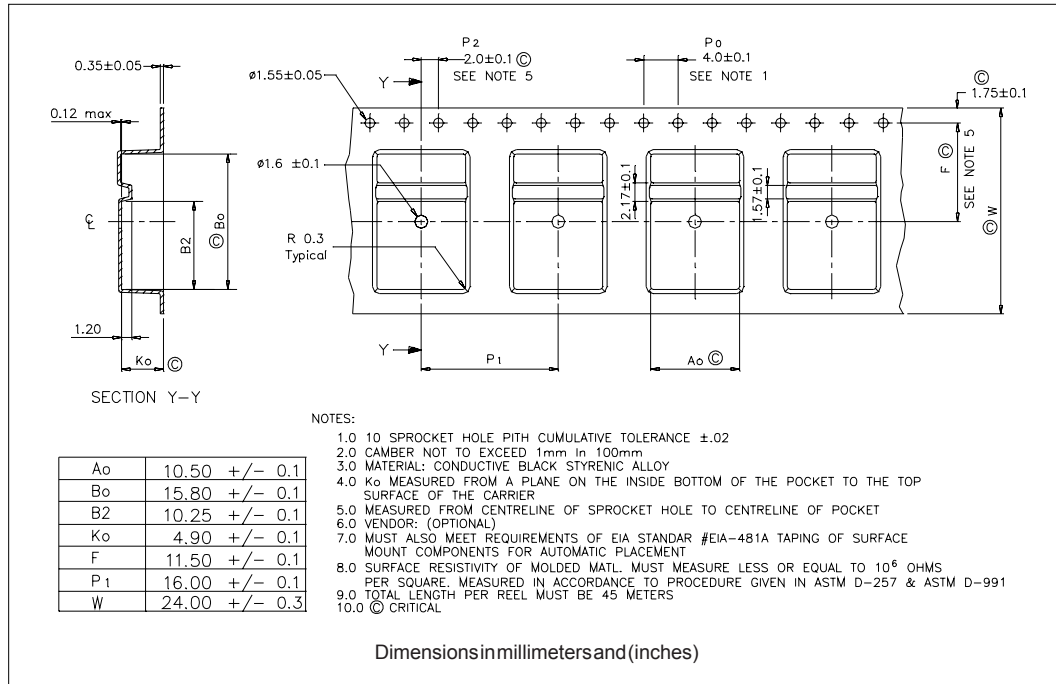


**Fig. 10 - Reverse Recovery Waveform and Definitions**

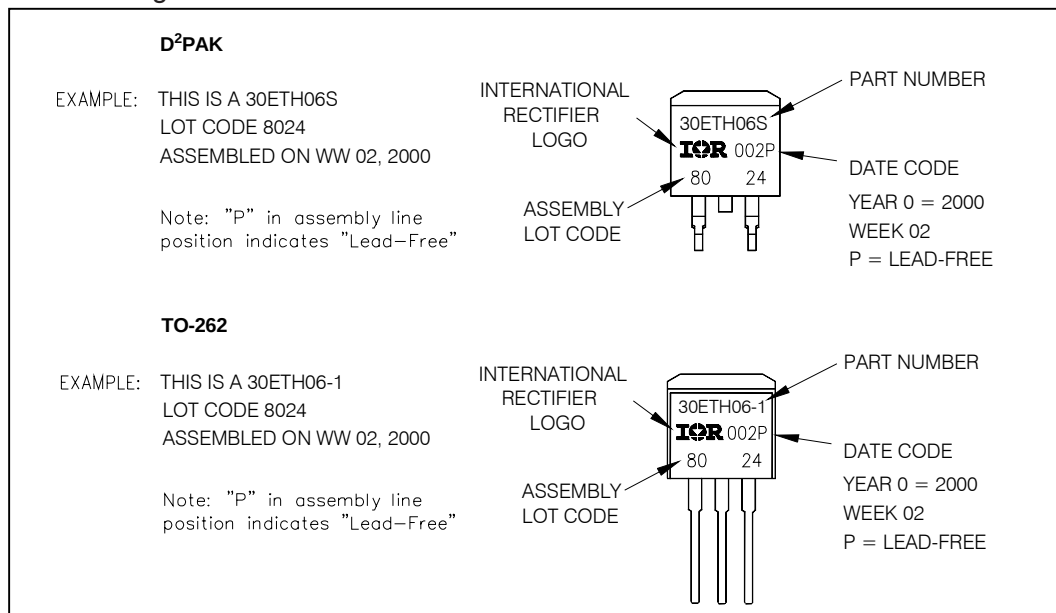
Outline Table



## Tape & Reel Information



## Part Marking Information



Ordering Information Table

|             |    |                                                                      |   |   |    |   |     |     |
|-------------|----|----------------------------------------------------------------------|---|---|----|---|-----|-----|
| Device Code | 30 | E                                                                    | T | H | 06 | S | TRL | PbF |
|             | 1  | 2                                                                    | 3 | 4 | 5  | 6 | 7   | 8   |
| 1           | -  | Current Rating (30 = 30A)                                            |   |   |    |   |     |     |
| 2           | -  | E = Single Diode                                                     |   |   |    |   |     |     |
| 3           | -  | T = TO-220, D <sup>2</sup> Pak                                       |   |   |    |   |     |     |
| 4           | -  | H = HyperFast Recovery                                               |   |   |    |   |     |     |
| 5           | -  | Voltage Rating (06 = 600V)                                           |   |   |    |   |     |     |
| 6           | -  | • S = D <sup>2</sup> Pak                                             |   |   |    |   |     |     |
|             |    | • -1 = TO-262                                                        |   |   |    |   |     |     |
| 7           | -  | • 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) |   |   |    |   |     |     |
| 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.