



8ETH06  
8ETH06S  
8ETH06-1  
8ETH06FP

## Hyperfast Rectifier

### Features

- Hyperfast Recovery Time
- Low Forward Voltage Drop
- Low Leakage Current
- 175°C Operating Junction Temperature
- 2500V insulation voltage ③
- UL E78996 approved

$t_{rr} = 18\text{ns typ.}$   
 $I_{F(AV)} = 8\text{Amp}$   
 $V_R = 600\text{V}$

### 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 Rectified Forward Current@ $T_C = 144^\circ\text{C}$ @ $T_C = 108^\circ\text{C}$ (FULLPACK)	8	A
$I_{FSM}$ Non Repetitive Peak Surge Current @ $T_J = 25^\circ\text{C}$ (FULLPACK)	90 100	
$I_{FM}$ Peak Repetitive Forward Current	16	
$T_J, T_{STG}$ Operating Junction and Storage Temperatures	- 65 to 175	$^\circ\text{C}$

### Case Styles

8ETH06	8ETH06S	8ETH06-1	8ETH06FP
 Base Cathode 2 Cathode 1 Anode 3	 Base Cathode 2 N/C 1 Anode 3	 2 N/C 1 Anode 3	 Cathode 1 Anode 3
TO-220AC	D <sup>2</sup> PAK	TO-262	TO-220 FULLPACK

**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	600	-	-	V	I <sub>R</sub> = 100μA
V <sub>F</sub> Forward Voltage	-	2.0	2.4	V	I <sub>F</sub> = 8A, T <sub>J</sub> = 25°C
	-	1.3	1.8	V	I <sub>F</sub> = 8A, 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
	-	55	500	μA	T <sub>J</sub> = 150°C, V <sub>R</sub> = V <sub>R</sub> Rated
C <sub>T</sub> Junction Capacitance	-	17	-	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>C</sub> = 25°C (unless otherwise specified)**

Parameters	Min	Typ	Max	Units	Test Conditions
t <sub>rr</sub> Reverse Recovery Time	-	18	22	ns	I <sub>F</sub> = 1A, di <sub>F</sub> /dt = 100A/μs, V <sub>R</sub> = 30V
	-	20	25		I <sub>F</sub> = 8A, di <sub>F</sub> /dt = 100A/μs, V <sub>R</sub> = 30V
	-	25	-		T <sub>J</sub> = 25°C
	-	40	-		T <sub>J</sub> = 125°C
I <sub>RRM</sub> Peak Recovery Current	-	2.4	-	A	T <sub>J</sub> = 25°C
	-	4.8	-		T <sub>J</sub> = 125°C
Q <sub>rr</sub> Reverse Recovery Charge	-	25	-	nC	T <sub>J</sub> = 25°C
	-	120	-		T <sub>J</sub> = 125°C
t <sub>rr</sub> Reverse Recovery Time	-	33	-	ns	T <sub>J</sub> = 125°C I <sub>F</sub> = 8A di <sub>F</sub> /dt = 600A/μs V <sub>R</sub> = 390V
I <sub>RRM</sub> Peak Recovery Current	-	12	-	A	
Q <sub>rr</sub> Reverse Recovery Charge	-	220	-	nC	

**Thermal - Mechanical Characteristics**

Parameters	Min	Typ	Max	Units
T <sub>J</sub> Max. Junction Temperature Range	-	-	175	°C
T <sub>Stg</sub> Max. Storage Temperature Range	- 65	-	175	
R <sub>thJC</sub> Thermal Resistance, Junction to Case	-	Per Leg	1.4	°C/W
		(Fullpack) Per Leg	3.4	
R <sub>thJA</sub> ① Thermal Resistance, Junction to Ambient	-	-	70	°C/W
R <sub>thCS</sub> ② Thermal Resistance, Case to Heatsink	-	0.5	-	
Weight	-	2.0	-	g
	-	0.07	-	(oz)
Mounting Torque	6.0	-	12	Kg-cm
	5.0	-	10	lbf.in

① Typical Socket Mount

② Mounting Surface, Flat, Smooth and Greased

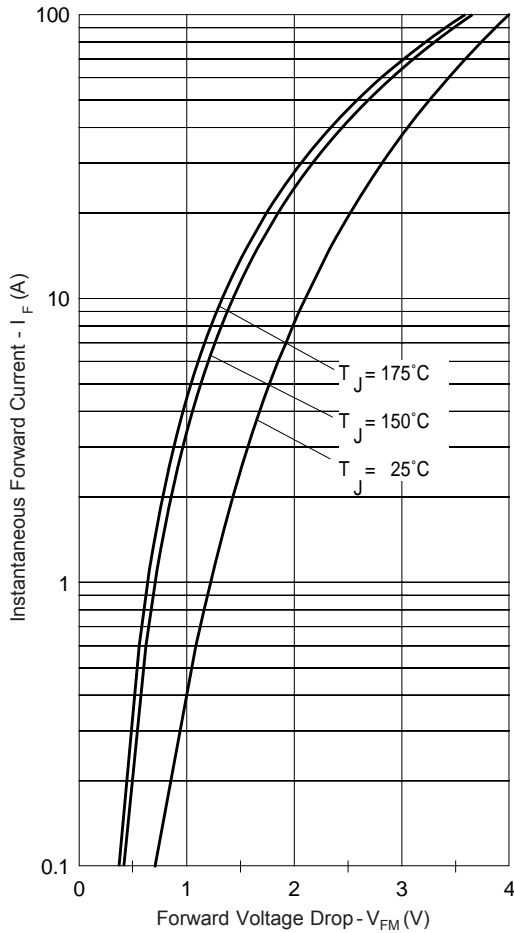


Fig. 1 - Typical Forward Voltage Drop Characteristics

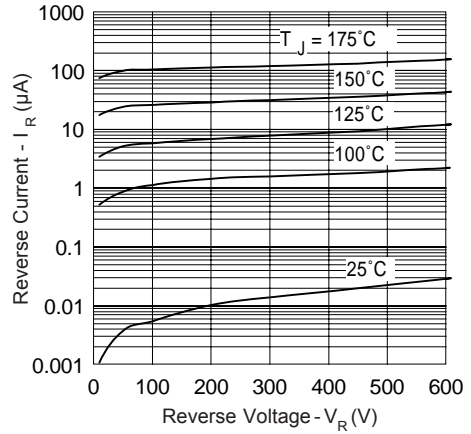


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage

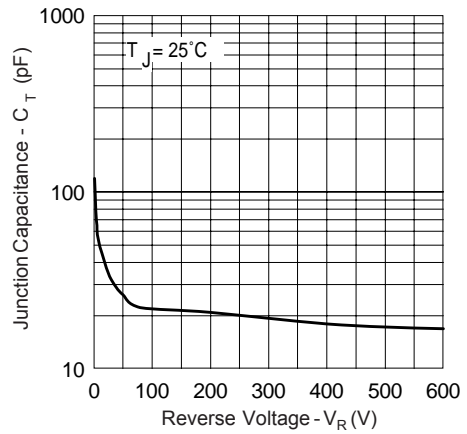


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

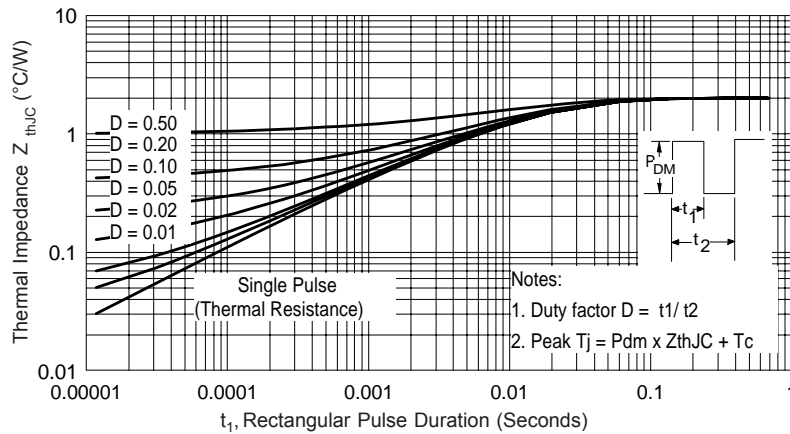


Fig. 4 - Max. Thermal Impedance  $Z_{thJC}$  Characteristics

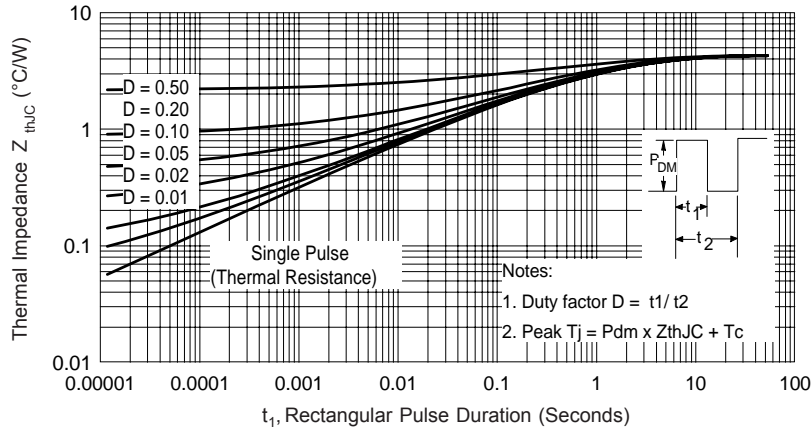


Fig. 5 - Max. Thermal Impedance  $Z_{thJC}$  Characteristics (FULLPACK)

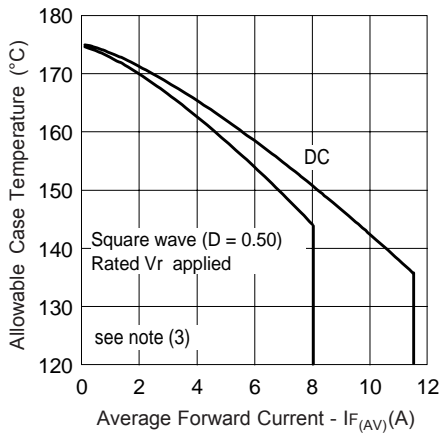


Fig. 6 - Max. Allowable Case Temperature Vs. Average Forward Current

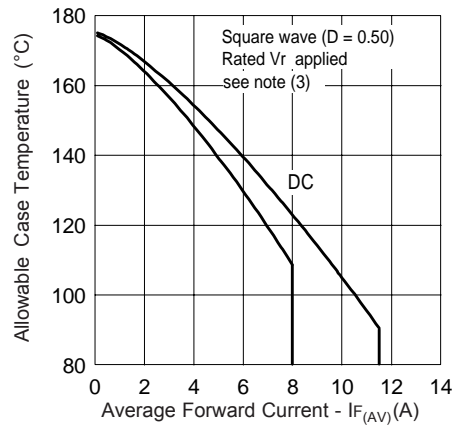


Fig. 7 - Max. Allowable Case Temperature Vs. Average Forward Current (FULLPACK)

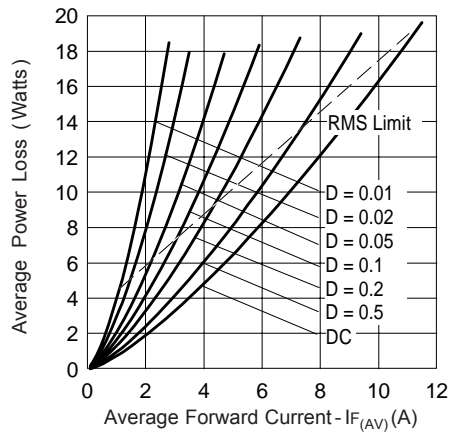


Fig. 8 - Forward Power Loss Characteristics

- (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. 8);  
 $P_{d_{REV}}$  = Inverse Power Loss =  $V_{R1} \times I_R (1 - D)$ ;  
 $I_R @ V_{R1}$  = rated  $V_R$

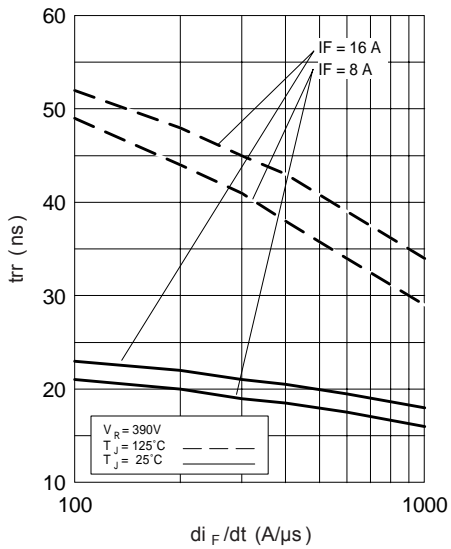


Fig. 9 - Typical Reverse Recovery vs.  $di_F/dt$

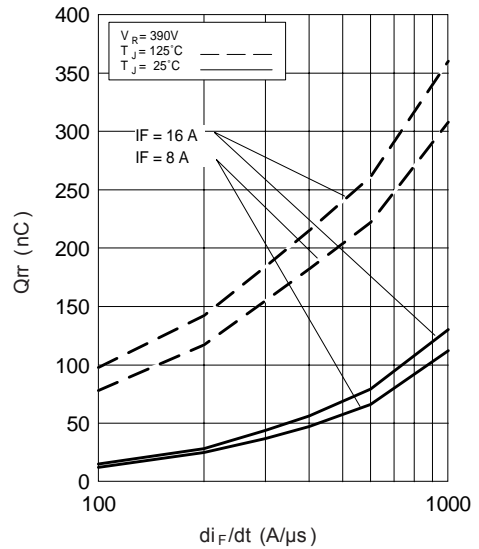


Fig. 10 - Typical Stored Charge vs.  $di_F/dt$

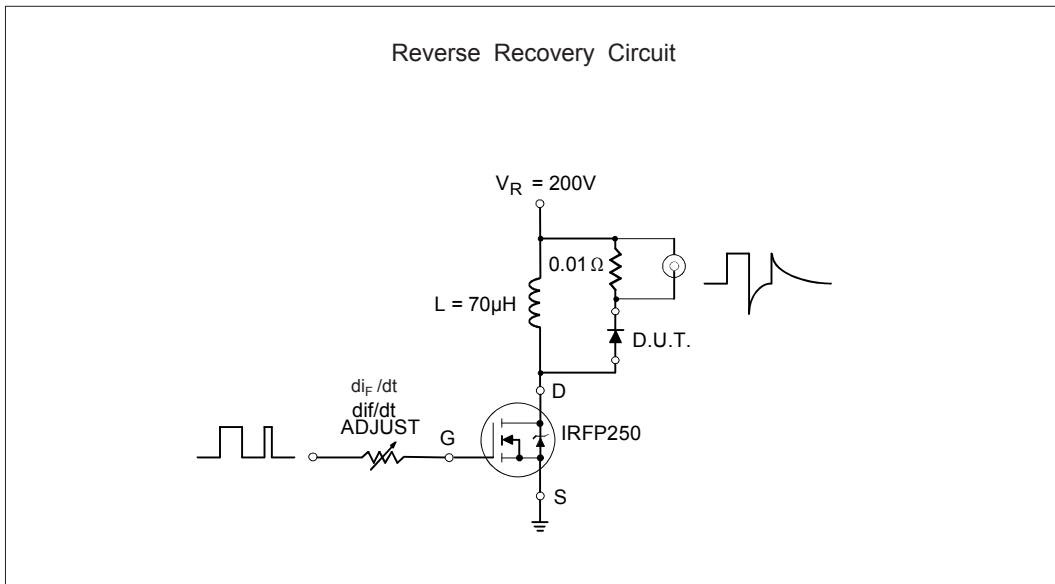


Fig. 11 - Reverse Recovery Parameter Test Circuit

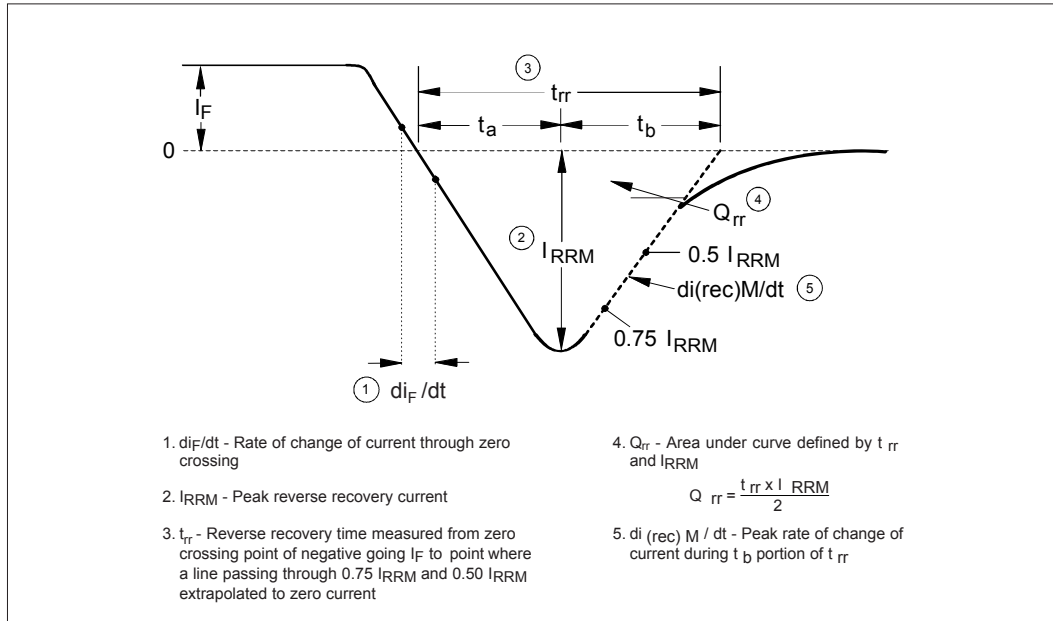
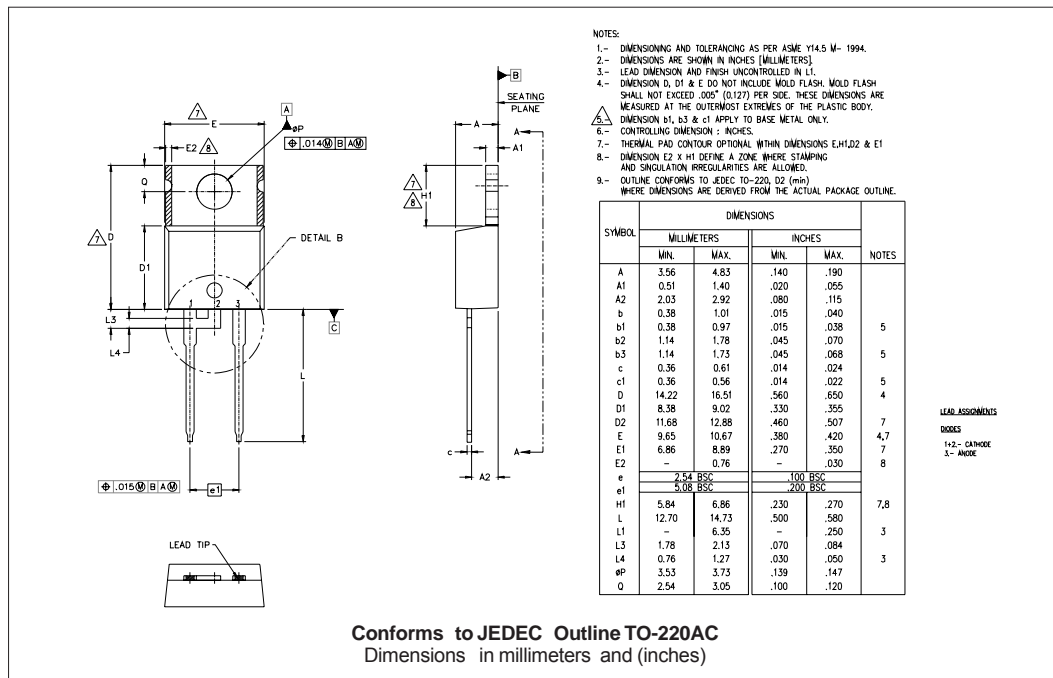
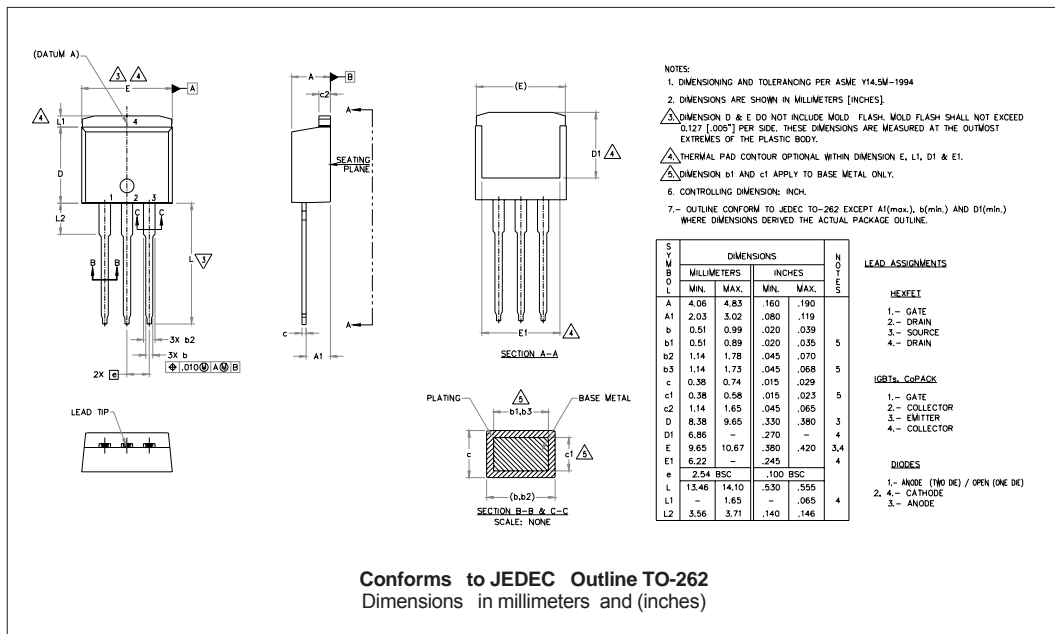
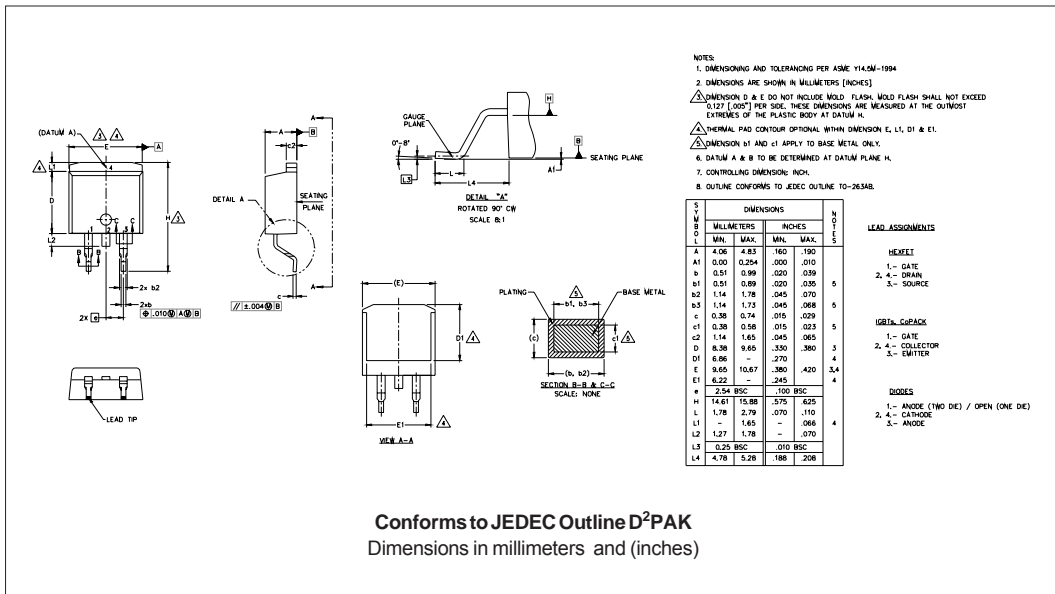


Fig. 12 - Reverse Recovery Waveform and Definitions

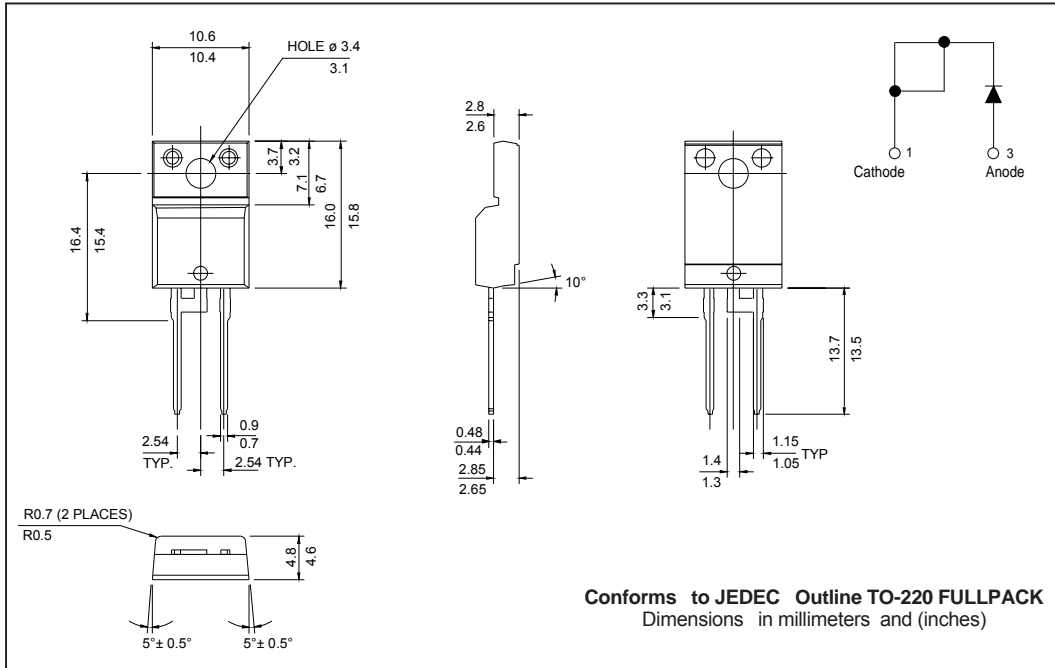
Outline Table



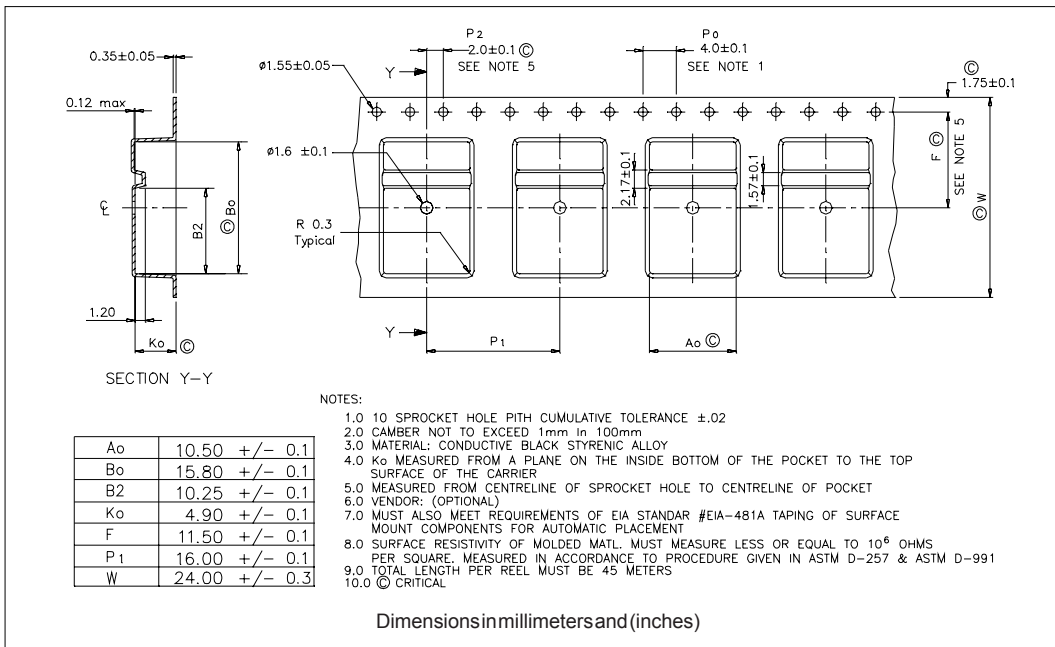
Outline Table



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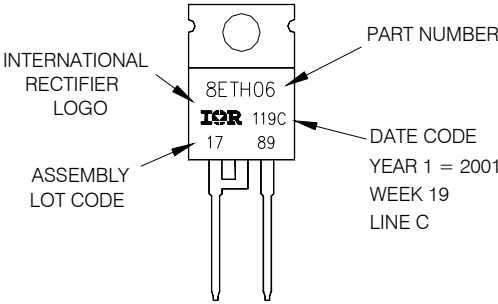
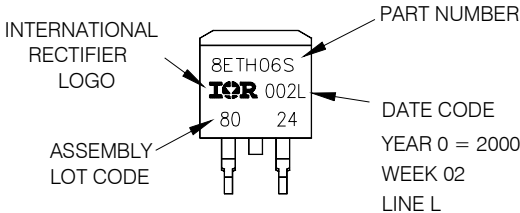
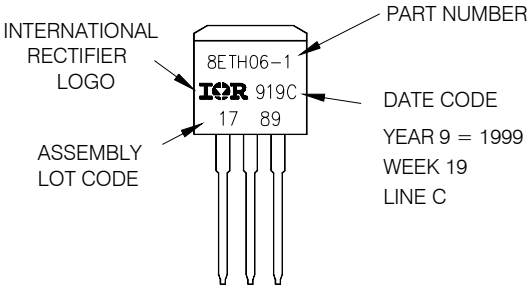
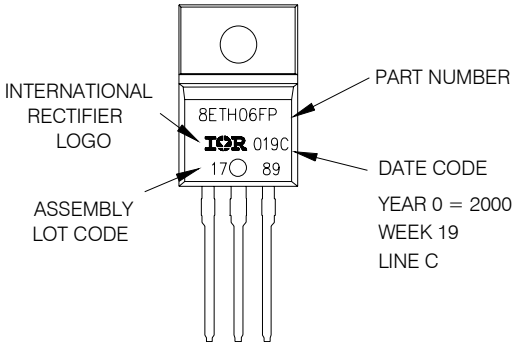


Tape & Reel Information





Part Marking Information

<p>TO-220AC</p>	<p>EXAMPLE: THIS IS A 8ETH06            LOT CODE 1789            ASSEMBLED ON WW 19, 2001            IN THE ASSEMBLY LINE "C"</p>	
<p>D<sup>2</sup>PAK</p>	<p>EXAMPLE: THIS IS A 8ETH06S            LOT CODE 8024            ASSEMBLED ON WW 02, 2000            IN THE ASSEMBLY LINE "L"</p>	
<p>TO-262</p>	<p>EXAMPLE: THIS IS A 8ETH06-1            LOT CODE 1789            ASSEMBLED ON WW 19, 1999            IN THE ASSEMBLY LINE "C"</p>	
<p>FULLPACK</p>	<p>EXAMPLE: THIS IS A 8ETH06FP            LOT CODE 1789            ASSEMBLED ON WW 19, 2000            IN THE ASSEMBLY LINE "C"</p>	

Ordering Information Table

Device Code																	
	<table border="1" style="margin: auto;"> <tr> <td style="padding: 5px;"><b>8</b></td> <td style="padding: 5px;"><b>E</b></td> <td style="padding: 5px;"><b>T</b></td> <td style="padding: 5px;"><b>H</b></td> <td style="padding: 5px;"><b>06</b></td> <td style="padding: 5px;"><b>-1</b></td> <td style="padding: 5px;"><b>TRL</b></td> <td style="padding: 5px;"><b>-</b></td> </tr> <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>	<b>8</b>	<b>E</b>	<b>T</b>	<b>H</b>	<b>06</b>	<b>-1</b>	<b>TRL</b>	<b>-</b>	①	②	③	④	⑤	⑥	⑦	⑧
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①	②	③	④	⑤	⑥	⑦	⑧										
<b>1</b>	- Current Rating (8 = 8A)																
<b>2</b>	- E = Single Diode																
<b>3</b>	- T = TO-220																
<b>4</b>	- H = HyperFast Recovery																
<b>5</b>	- Voltage Rating (06 = 600V)																
<b>6</b>	- None = TO-220 S = D <sup>2</sup> Pak -1 = TO-262 Option FP = TO-220 FULLPACK																
<b>7</b>	- None = Tube (50 pieces) TRL = Tape & Reel (Left Oriented - for D <sup>2</sup> Pak only) TRR = Tape & Reel (Right Oriented - for D <sup>2</sup> Pak only)																
<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.  
Qualification Standards can be found on IR's Web site.