

# International IOR Rectifier

30ETH06  
30ETH06S  
30ETH06-1

## Hyperfast Rectifier

### Features

- Hyperfast Recovery Time
- Low Forward Voltage Drop
- Low Leakage Current
- 175°C Operating Junction Temperature
- Dual Diode Center Tap

$t_{rr} = 28\text{ns typ.}$   
 $I_{F(AV)} = 30\text{Amp}$   
 $V_R = 600\text{V}$

### Description/ Applications

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

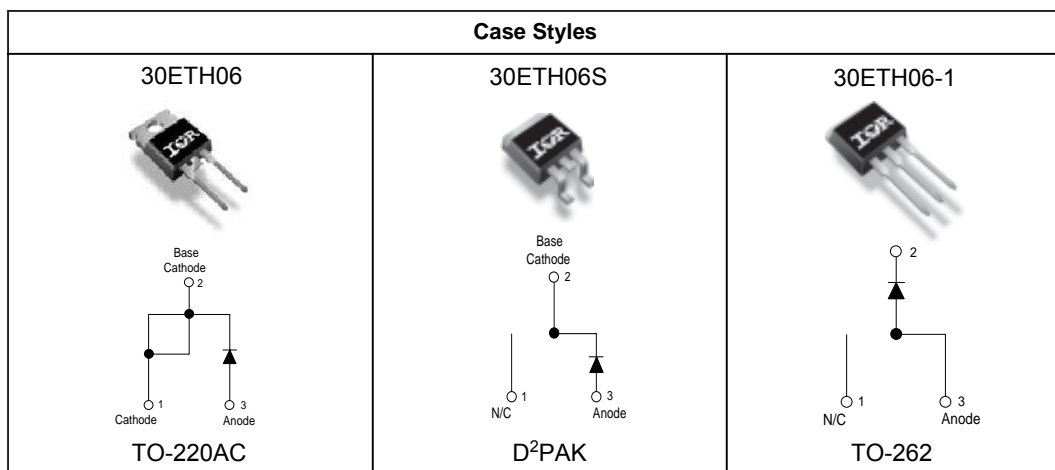
The planar structure and the platinum doped life time control guarantee the best overall performance, ruggedness and reliability characteristics.

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	
$T_J, T_{STG}$ Operating Junction and Storage Temperatures	- 65 to 175	$^\circ\text{C}$



**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	2.6	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  I <sub>F</sub> = 30A V <sub>R</sub> = 200V di <sub>F</sub> /dt = 200A/μs	
	-	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	-	175	°C
T <sub>Stg</sub> Max. Storage Temperature Range	- 65	-	175	
R <sub>thJC</sub> Thermal Resistance, Junction to Case Per Leg	-	0.7	1.1	°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	-	
Wt 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

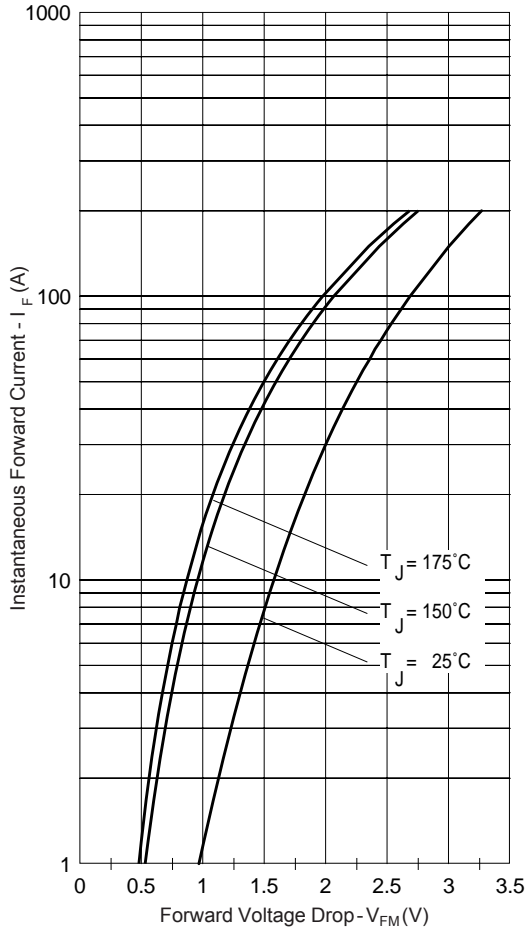


Fig. 1 - Typical Forward Voltage Drop Characteristics

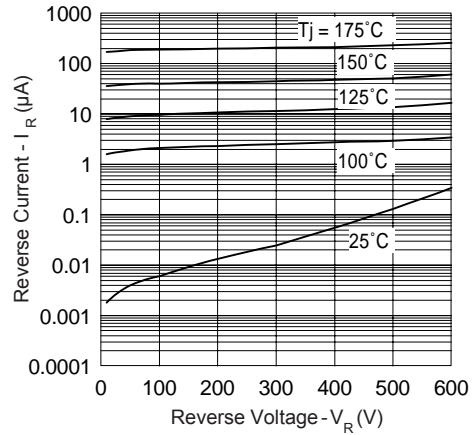


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage

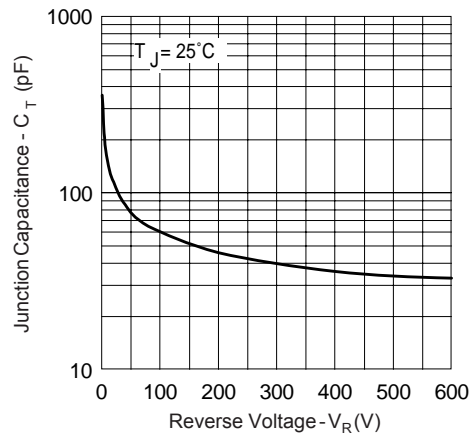


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

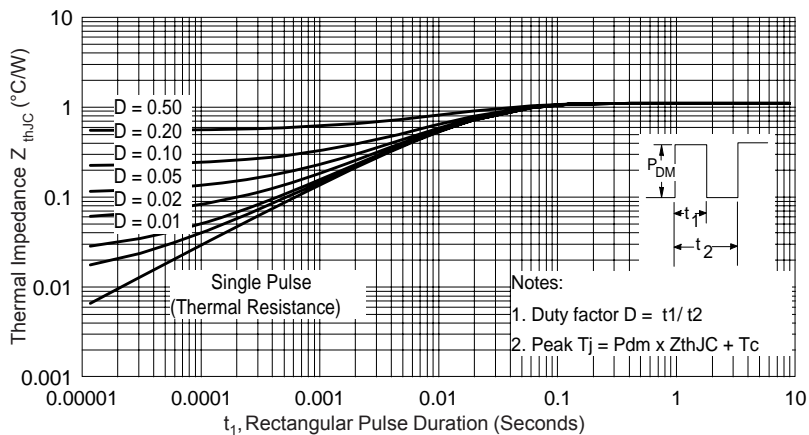
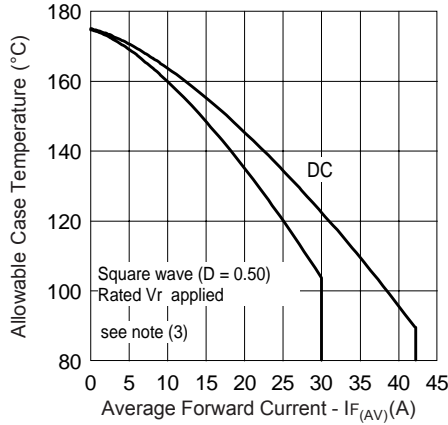
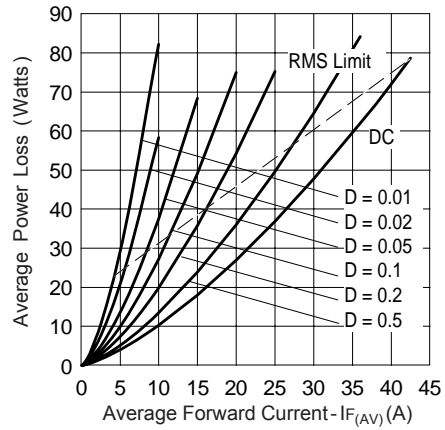


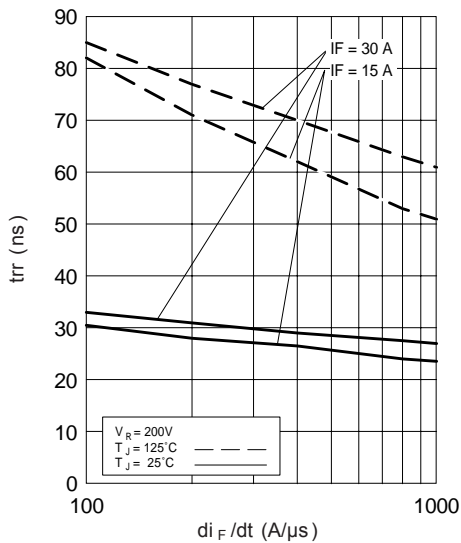
Fig. 4 - Max. Thermal Impedance  $Z_{thJC}$  Characteristics



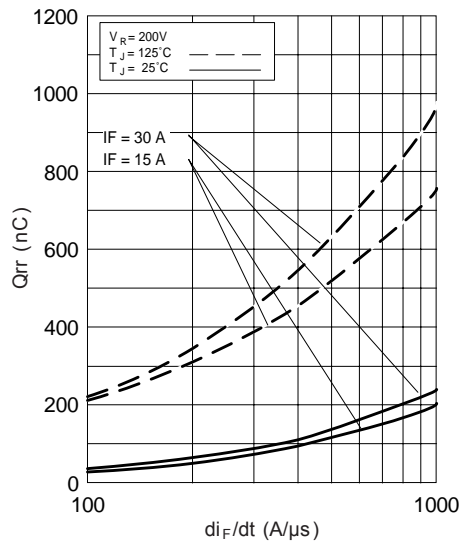
**Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current**



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

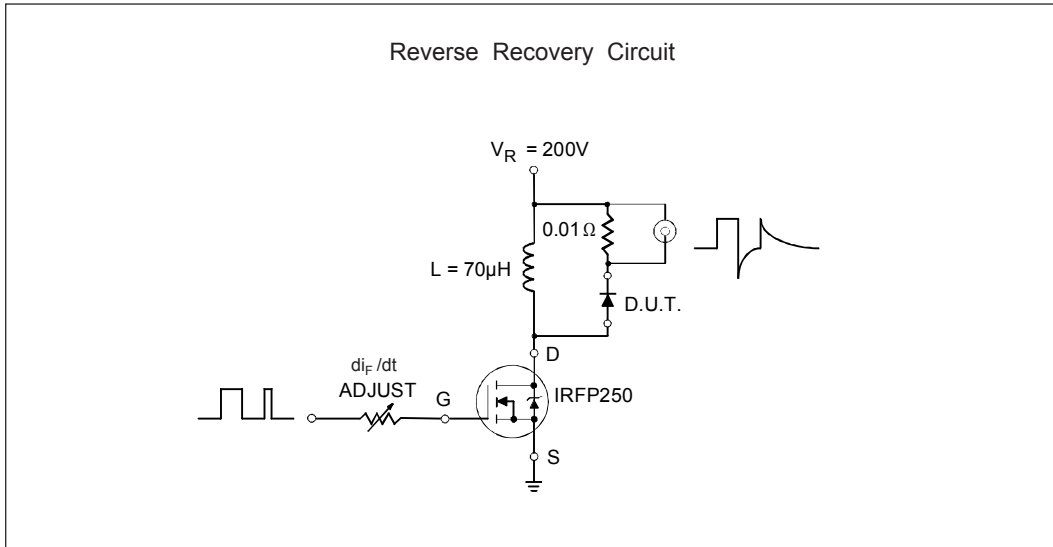


Fig. 9- Reverse Recovery Parameter Test Circuit

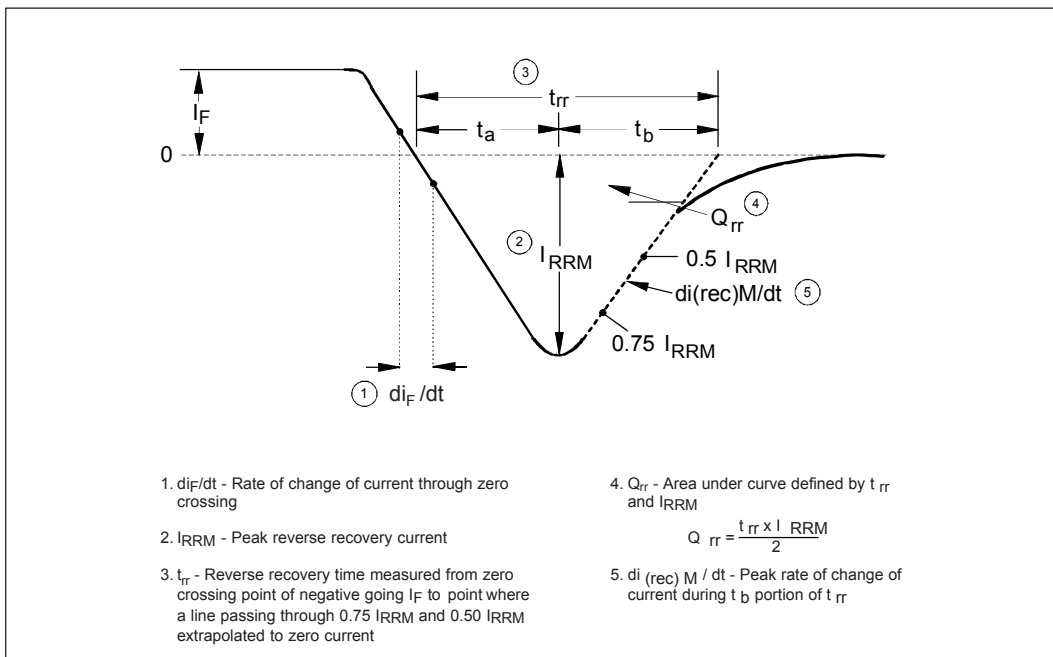
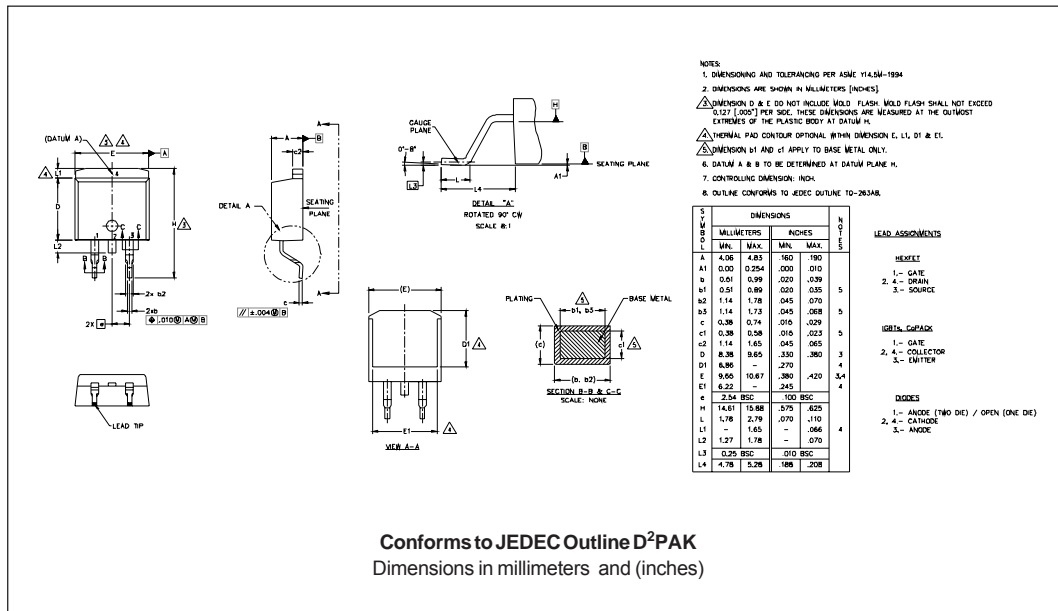
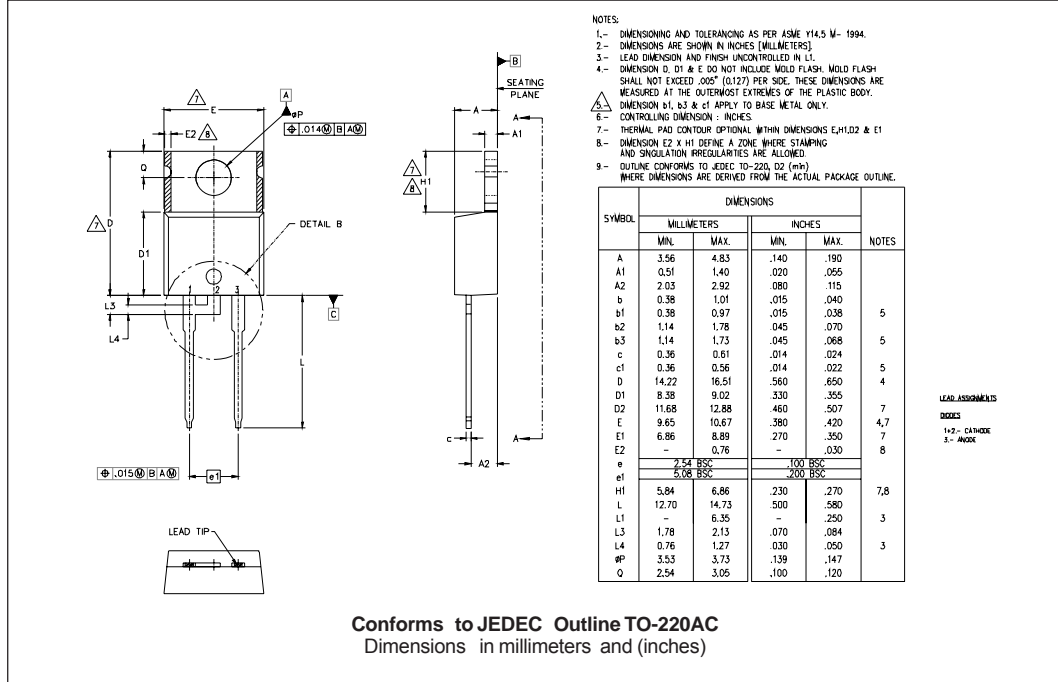
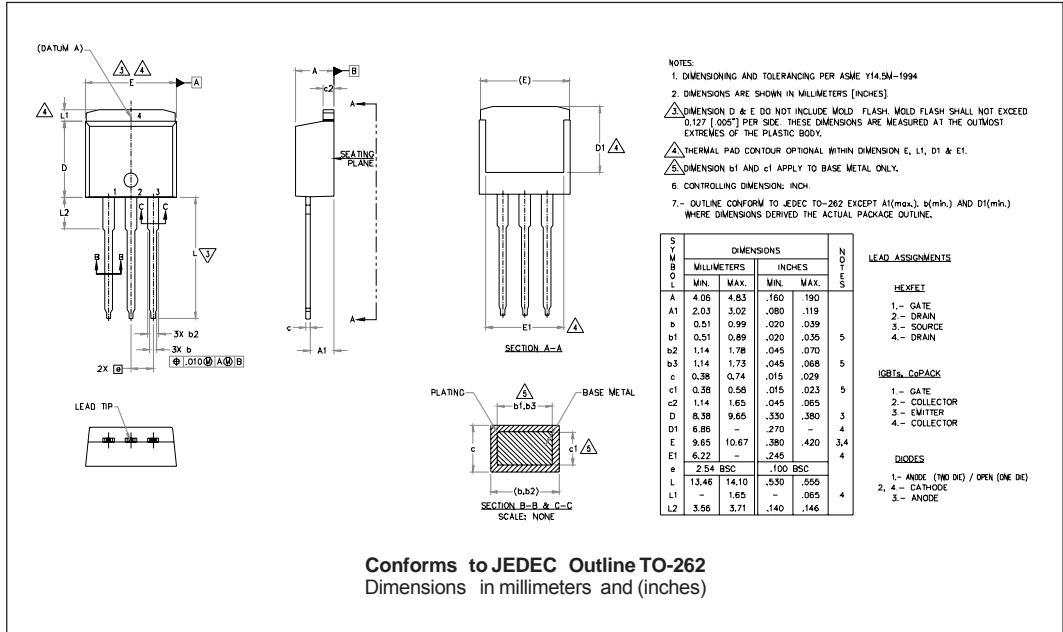


Fig. 10 - Reverse Recovery Waveform and Definitions

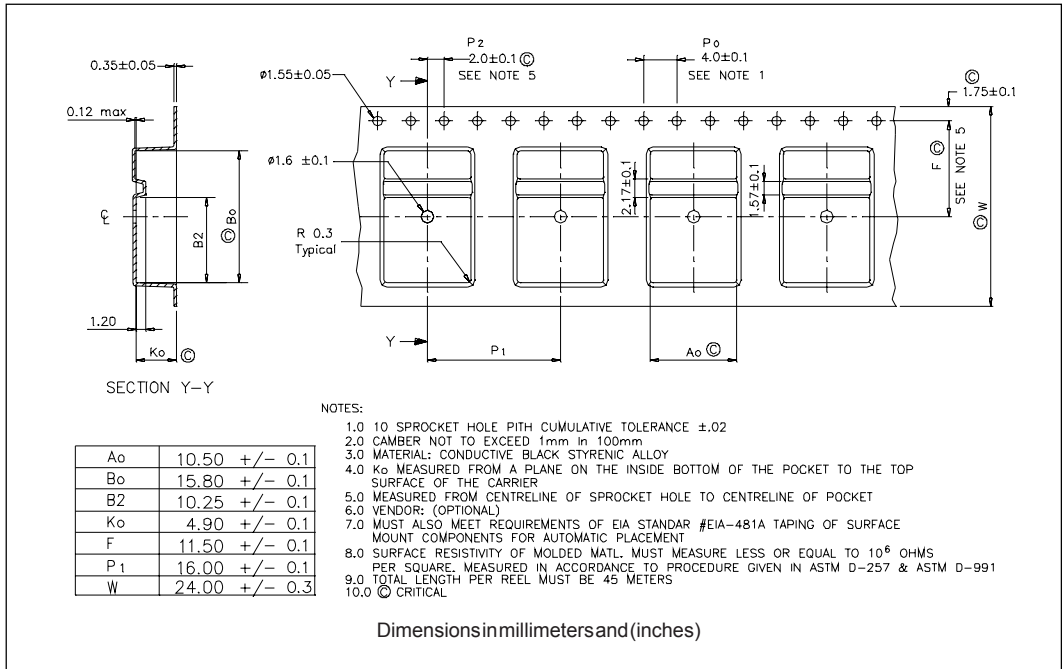
Outline Table



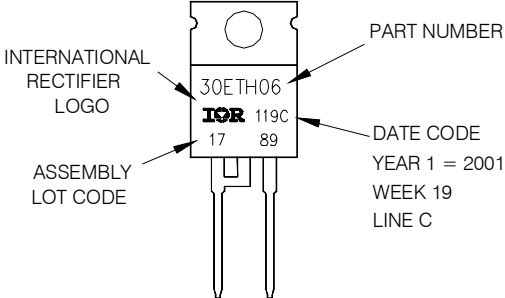
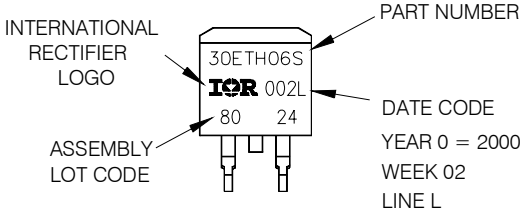
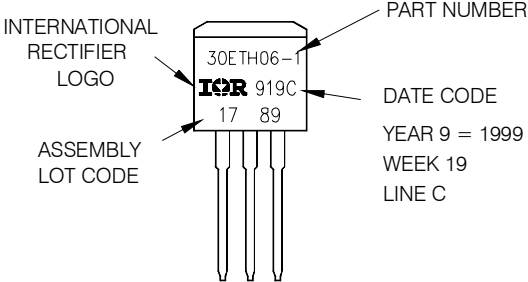
Outline Table



Tape & Reel Information



Part Marking Information

<p>TO-220AC</p>	<p>EXAMPLE: THIS IS A 30ETH06                      LOT CODE 1789                      ASSEMBLED ON WW 19, 2001                      IN THE ASSEMBLY LINE "C"</p>	 <p>INTERNATIONAL RECTIFIER LOGO</p> <p>ASSEMBLY LOT CODE</p> <p>PART NUMBER</p> <p>DATE CODE                      YEAR 1 = 2001                      WEEK 19                      LINE C</p>
<p>D<sup>2</sup>PAK</p>	<p>EXAMPLE: THIS IS A 30ETH06S                      LOT CODE 8024                      ASSEMBLED ON WW 02, 2000                      IN THE ASSEMBLY LINE "L"</p>	 <p>INTERNATIONAL RECTIFIER LOGO</p> <p>ASSEMBLY LOT CODE</p> <p>PART NUMBER</p> <p>DATE CODE                      YEAR 0 = 2000                      WEEK 02                      LINE L</p>
<p>TO-262</p>	<p>EXAMPLE: THIS IS A 30ETH06-1                      LOT CODE 1789                      ASSEMBLED ON WW 19, 1999                      IN THE ASSEMBLY LINE "C"</p>	 <p>INTERNATIONAL RECTIFIER LOGO</p> <p>ASSEMBLY LOT CODE</p> <p>PART NUMBER</p> <p>DATE CODE                      YEAR 9 = 1999                      WEEK 19                      LINE C</p>



Ordering Information Table

Device Code																	
	<table border="1" style="margin: auto;"> <tr> <td style="padding: 5px;">30</td> <td style="padding: 5px;">E</td> <td style="padding: 5px;">T</td> <td style="padding: 5px;">H</td> <td style="padding: 5px;">06</td> <td style="padding: 5px;">-1</td> <td style="padding: 5px;">TRL</td> <td style="padding: 5px;">-</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>	30	E	T	H	06	-1	TRL	-	①	②	③	④	⑤	⑥	⑦	⑧
30	E	T	H	06	-1	TRL	-										
①	②	③	④	⑤	⑥	⑦	⑧										
<b>1</b>	- Current Rating (30 = 30A)																
<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-220AC 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																

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 This product has been designed and qualified for Industrial Level.  
 Qualification Standards can be found on IR's Web site.



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