



# 30CTH02SPbF 30CTH02-1PbF

## Hyperfast Rectifier

### Features

- Hyperfast Recovery Time
- Low Forward Voltage Drop
- Low Leakage Current
- 175°C Operating Junction Temperature
- Lead-Free ("PbF" suffix)

$t_{rr} = 30\text{ns max.}$   
 $I_{F(AV)} = 30\text{Amp}$   
 $V_R = 200\text{V}$

### Description/ Applications

International Rectifier's 200V series are the state of the art Hyperfast recovery rectifiers specifically designed with optimized performance of forward voltage drop and hyperfast recovery time.


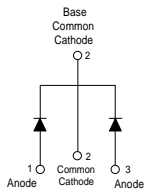

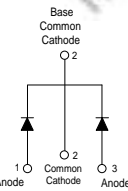
The planar structure and the platinum doped life time control, guarantee the best overall performance, ruggedness and reliability characteristics.

These devices are intended for use in the output rectification stage of SMPS, UPS, DC-DC converters as well as free-wheeling diode 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
$V_{RRM}$ Peak Repetitive Reverse Voltage	200	V
$I_{F(AV)}$ Average Rectified Forward Current @ $T_C = 159^\circ\text{C}$ Per Diode	15	A
Per Device	30	
$I_{FSM}$ Non Repetitive Peak Surge Current @ $T_J = 25^\circ\text{C}$	200	
$T_J, T_{STG}$ Operating Junction and Storage Temperatures	- 65 to 175	$^\circ\text{C}$

Case Styles	
<p><b>30CTH02SPbF</b></p>  <p>Base Common Cathode O 2</p>  <p>1 O Anode    O 2 Common Cathode    O 3 Anode</p> <p><b>D<sup>2</sup>PAK</b></p>	<p><b>30CTH02-1PbF</b></p>  <p>Base Common Cathode O 2</p>  <p>1 O Anode    O 2 Common Cathode    O 3 Anode</p> <p><b>TO-262</b></p>

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

Parameters	Min	Typ	Max	Units	Test Conditions
$V_{BR}, V_R$ Breakdown Voltage, Blocking Voltage	200	-	-	V	$I_R = 100\mu\text{A}$
$V_F$ Forward Voltage	-	0.92	1.05	V	$I_F = 15\text{A}, T_J = 25^\circ\text{C}$
	-	0.78	0.85	V	$I_F = 15\text{A}, T_J = 125^\circ\text{C}$
$I_R$ Reverse Leakage Current	-	-	10	$\mu\text{A}$	$V_R = V_R$ Rated
	-	5	300	$\mu\text{A}$	$T_J = 125^\circ\text{C}, V_R = V_R$ Rated
$C_T$ Junction Capacitance	-	57	-	pF	$V_R = 200\text{V}$
$L_S$ Series Inductance	-	8	-	nH	Measured lead to lead 5mm from package body

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

Parameters	Min	Typ	Max	Units	Test Conditions	
$t_{rr}$ Reverse Recovery Time	-	-	35	ns	$I_F = 1\text{A}, di_F/dt = 50\text{A}/\mu\text{s}, V_R = 30\text{V}$	
	-	-	30			$I_F = 1\text{A}, di_F/dt = 100\text{A}/\mu\text{s}, V_R = 30\text{V}$
	-	26	-		$T_J = 25^\circ\text{C}$	$I_F = 15\text{A}$ $di_F/dt = 200\text{A}/\mu\text{s}$ $V_R = 160\text{V}$
	-	40	-		$T_J = 125^\circ\text{C}$	
$I_{RRM}$ Peak Recovery Current	-	2.8	-	A	$T_J = 25^\circ\text{C}$	
	-	6.0	-		$T_J = 125^\circ\text{C}$	
$Q_{rr}$ Reverse Recovery Charge	-	37	-	nC	$T_J = 25^\circ\text{C}$	
	-	120	-		$T_J = 125^\circ\text{C}$	

**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	
$R_{thJC}$ Thermal Resistance, Junction to Case Per Diode	-	-	1.1	$^\circ\text{C}/\text{W}$
Weight	-	2.0	-	g
	-	0.07	-	(oz)
Mounting Torque	6.0	-	12	Kg-cm
	5.0	-	10	lbf.in
Marking Device	30CTH02S		Case style D <sup>2</sup> Pak	
	30CTH02-1		Case style TO-262	

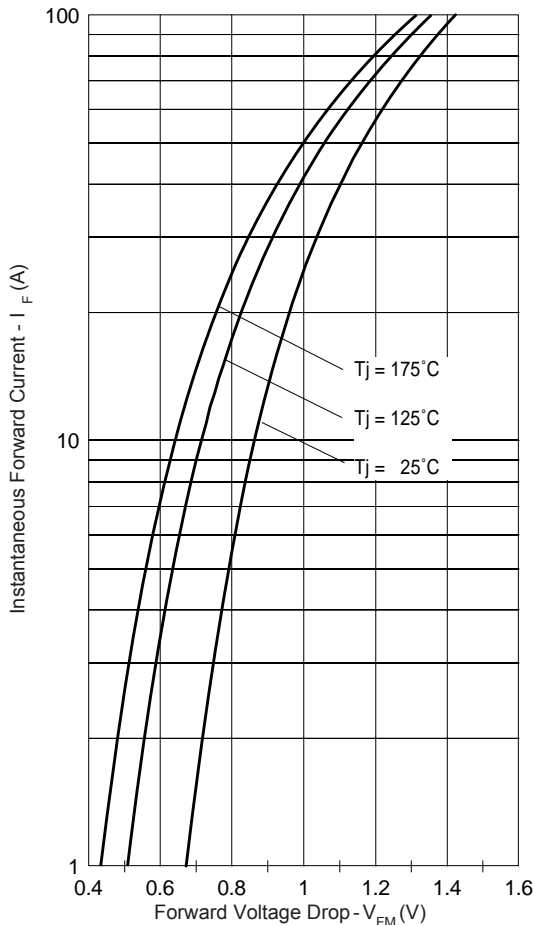


Fig. 1 - Typical Forward Voltage Drop Characteristics

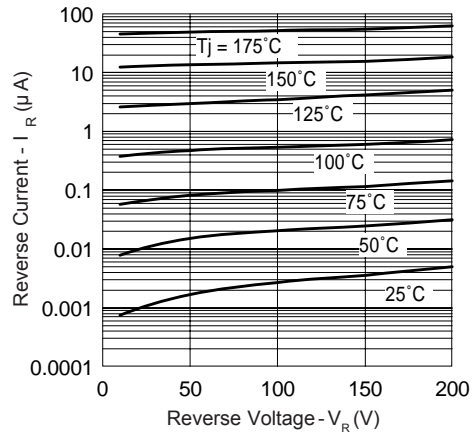


Fig. 2 - Typical Values of Reverse Current Vs. Reverse Voltage

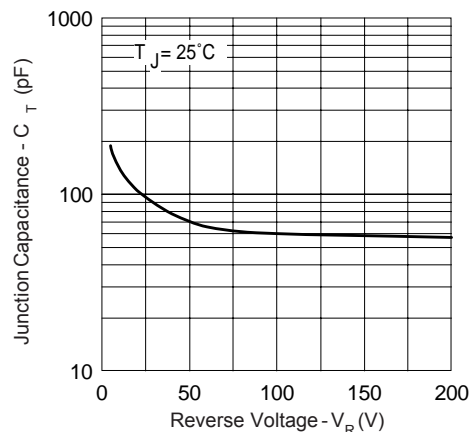


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

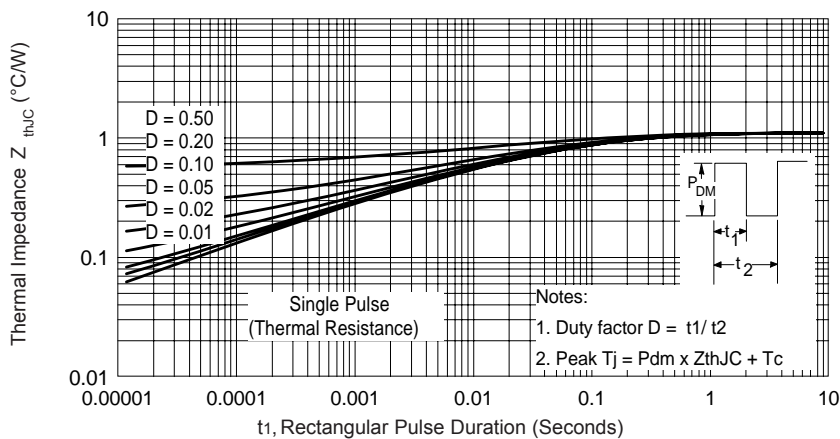
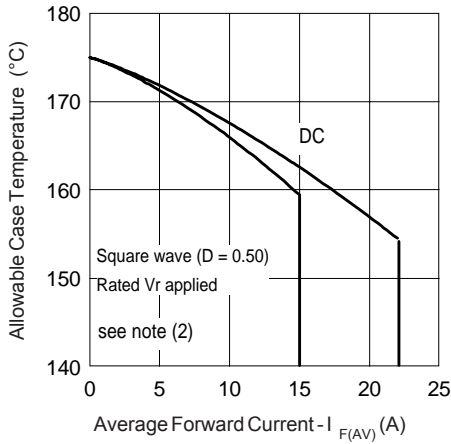
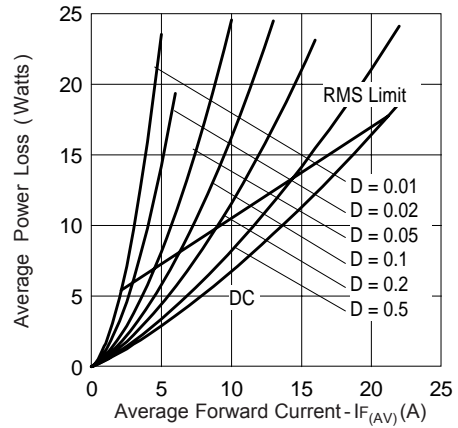


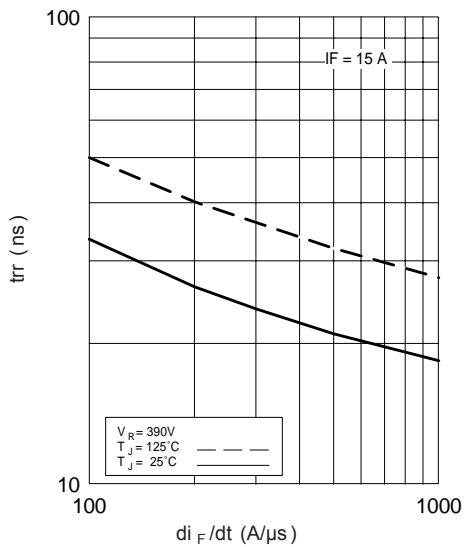
Fig. 4 - Max. Thermal Impedance  $Z_{thJC}$  Characteristics



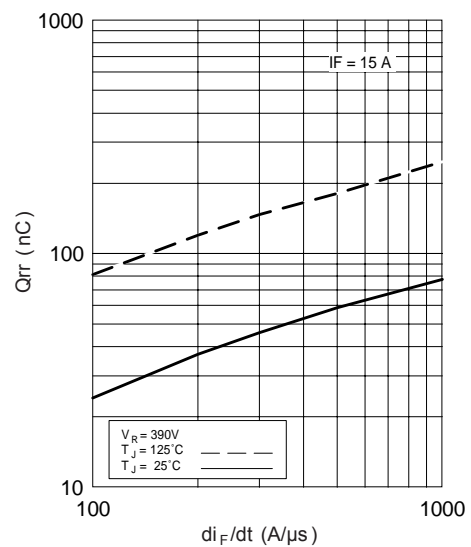
**Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current**



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



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



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

(2) 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. 8);  
 $Pd_{REV}$  = Inverse Power Loss =  $V_{R1} \times I_R (1-D)$ ;  $I_R @ V_{R1}$  = rated  $V_R$

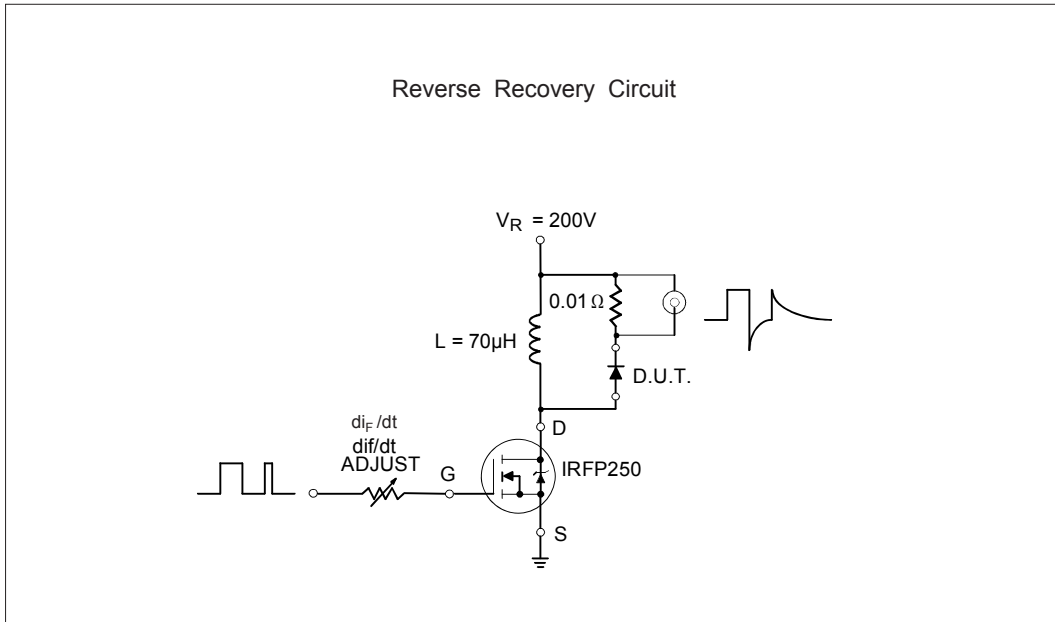


Fig. 9- Reverse Recovery Parameter Test Circuit

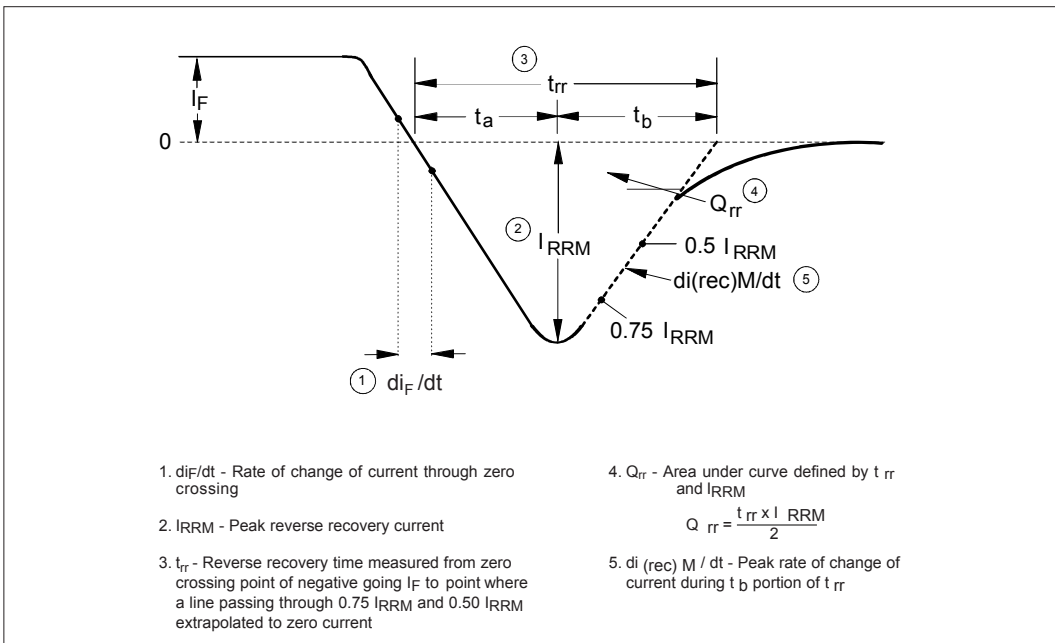
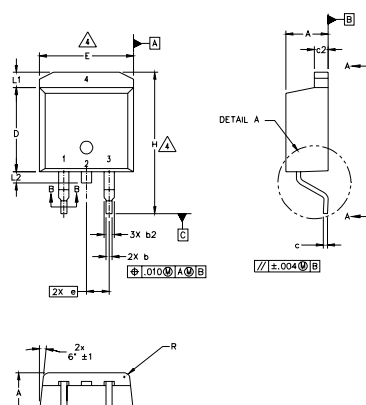


Fig. 10 - Reverse Recovery Waveform and Definitions

Outline Table



NOTES:  
 1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994  
 2. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].  
 3. DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.127 [.005"] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY.  
 4. DIMENSION b1 AND c1 APPLY TO BASE METAL ONLY.  
 5. CONTROLLING DIMENSION: INCH.

SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	.160	.190	4
A1	0.00	0.254	.000	.010	
b	0.51	0.99	.020	.039	
b1	0.51	0.89	.020	.035	
b2	1.14	1.78	.045	.070	4
c	0.38	0.74	.015	.029	
c1	0.38	0.58	.015	.025	4
c2	1.14	1.65	.045	.065	
D	8.51	9.65	.335	.380	3
D1	6.86		.270		3
E	9.65	10.67	.380	.420	
E1	6.22		.245		3
e	2.54 BSC		.100 BSC		
H	14.61	15.88	.575	.625	4
L	1.78	2.79	.070	.110	
L1		1.65		.065	4
L2	1.27	1.78	.050	.070	
L3	0.25 BSC		.010 BSC		4
L4	4.78	5.28	.188	.208	
m	17.78		.700		4
m1	8.99		.350		
n	11.43		.450		4
o	2.08		.082		
p	3.81		.150		4
R	0.51	0.71	.020	.028	
θ	90°	93°	90°	93°	

**LEAD ASSIGNMENTS**

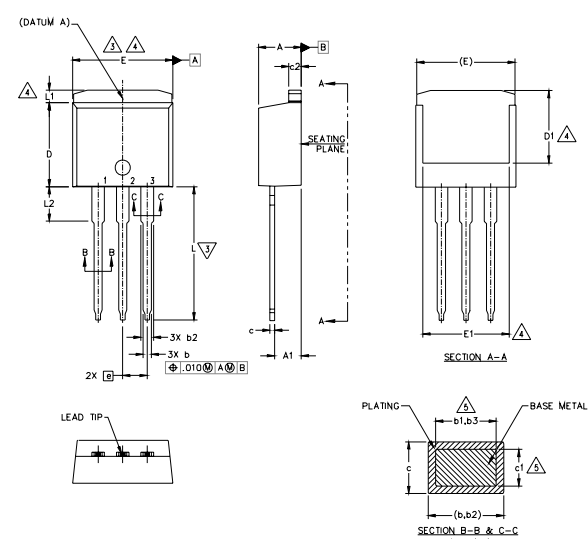
**HEXFET**  
 1.- GATE  
 2.- DRAIN  
 3.- SOURCE

**IGBTs, CoPACK**  
 1.- GATE  
 2.- COLLECTOR  
 3.- EMITTER

**DIODES**  
 1.- ANODE \*  
 2.- CATHODE  
 3.- ANODE

\* PART DEPENDENT.

**Conform to JEDEC outline D²Pak (SMD-220)**  
 Dimensions in millimeters and (inches)



NOTES:  
 1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994  
 2. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].  
 3. DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.127 [.005"] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY.  
 4. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSION E, L1, D1 & E1.  
 5. DIMENSION b1 AND c1 APPLY TO BASE METAL ONLY.  
 6. CONTROLLING DIMENSION: INCH.  
 7.- OUTLINE CONFORM TO JEDEC TO-262 EXCEPT A1(max.), b(min.) AND D1(min.) WHERE DIMENSIONS DERIVED THE ACTUAL PACKAGE OUTLINE.

SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	.160	.190	5
A1	2.03	3.02	.080	.119	
b	0.51	0.99	.020	.039	
b1	0.51	0.89	.020	.035	
b2	1.14	1.78	.045	.070	5
b3	1.14	1.73	.045	.068	
c	0.38	0.74	.015	.029	5
c1	0.38	0.58	.015	.023	
c2	1.14	1.65	.045	.065	5
D	8.38	9.65	.330	.380	
D1	6.86		.270		4
E	9.65	10.67	.380	.420	3,4
E1	6.22		.245		4
e	2.54 BSC		.100 BSC		4
L	13.46	14.10	.530	.555	
L1		1.65		.065	4
L2	3.56	3.71	.140	.146	

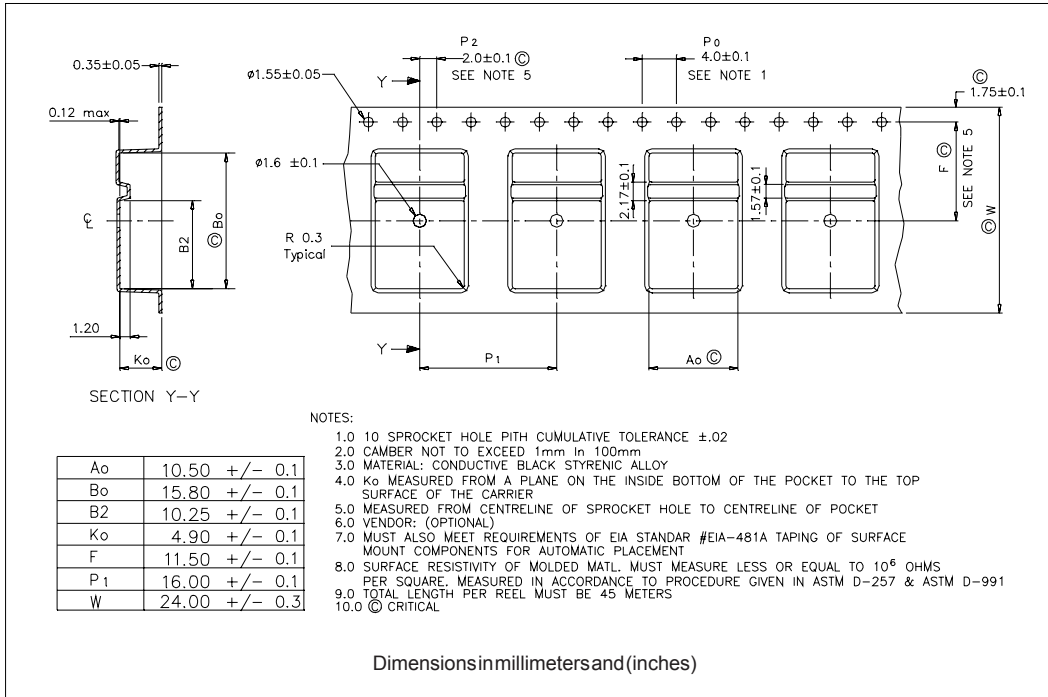
**LEAD ASSIGNMENTS**

**HEXFET**  
 1.- GATE  
 2.- DRAIN  
 3.- SOURCE  
 4.- DRAIN

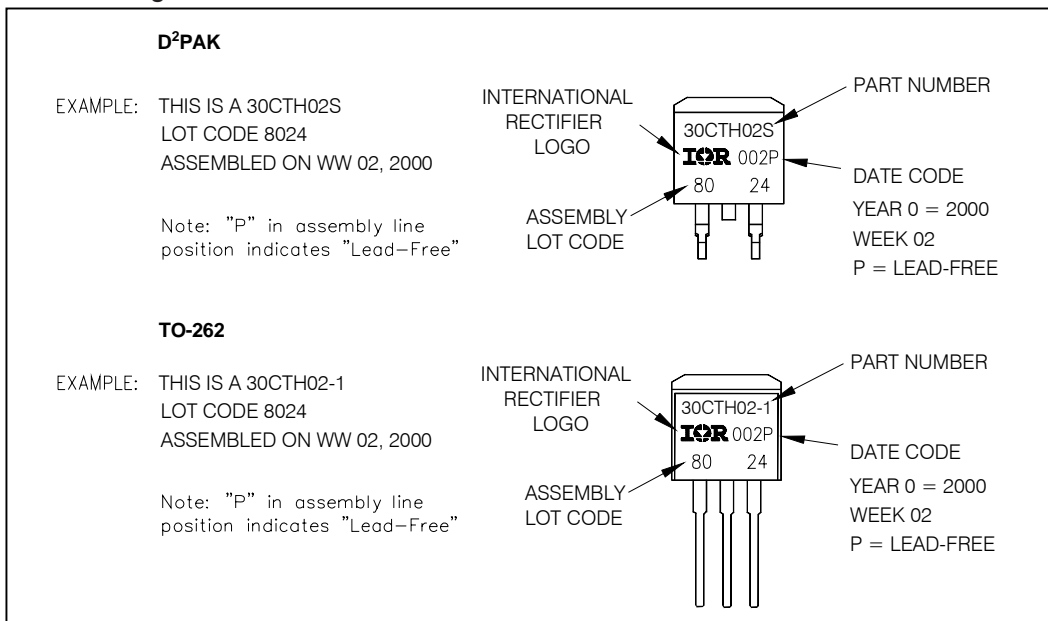
**IGBTs, CoPACK**  
 1.- GATE  
 2.- COLLECTOR  
 3.- EMITTER  
 4.- COLLECTOR

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

**Tape & Reel Information**



**Part Marking Information**



Ordering Information Table

Device Code	30	C	T	H	02	S	TRL	PbF
	①	②	③	④	⑤	⑥	⑦	⑧
<b>1</b>	-	Current Rating (30A)						
<b>2</b>	-	C = Common Cathode						
<b>3</b>	-	T = TO-220, D <sup>2</sup> Pak						
<b>4</b>	-	H = Hyperfast Rectifier						
<b>5</b>	-	Voltage Rating (02 = 200V)						
<b>6</b>	-	• S = D <sup>2</sup> Pak						
		• -1 = TO-262						
<b>7</b>	-	• 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)						
<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 and Lead-Free.  
Qualification Standards can be found on IR's Web site.





## Notice

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