



15ETH06PbF
15ETH06FPPbF

Hyperfast Rectifier

Features

- Hyperfast Recovery Time
- Low Forward Voltage Drop
- Low Leakage Current
- 175°C Operating Junction Temperature
- Single Die Center Tap Module
- UL E78996 approved 
- Lead-Free ("PbF")

$t_{rr} = 22\text{ns typ.}$
 $I_{F(AV)} = 15\text{Amp}$
 $V_R = 600\text{V}$

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.

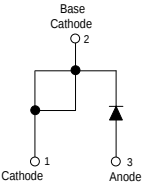
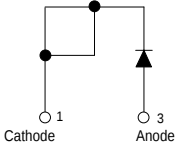
These devices are intended for use in PFC Boost stage in the AC-DC section of SMPS, inverters or as freewheeling diodes.

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 @ $T_C = 140^\circ\text{C}$ @ $T_C = 80^\circ\text{C}$ (FULLPACK)	15	A
I_{FSM} Non Repetitive Peak Surge Current @ $T_J = 25^\circ\text{C}$ (FULLPACK)	120 180	
I_{FM} Peak Repetitive Forward Current	30	
T_J, T_{STG} Operating Junction and Storage Temperatures	- 65 to 175	$^\circ\text{C}$

Case Styles

15ETH06PbF   TO-220AC	15ETH06FPPbF   TO-220 FULLPACK
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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	600	-	-	V	$I_R = 100\mu\text{A}$
V_F Forward Voltage	-	1.8	2.2	V	$I_F = 15\text{A}, T_J = 25^\circ\text{C}$
	-	1.3	1.6	V	$I_F = 15\text{A}, T_J = 150^\circ\text{C}$
I_R Reverse Leakage Current	-	0.2	50	μA	$V_R = V_R$ Rated
	-	30	500	μA	$T_J = 150^\circ\text{C}, V_R = V_R$ Rated
C_T Junction Capacitance	-	20	-	pF	$V_R = 600\text{V}$
L_S Series Inductance	-	8.0	-	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	-	22	30	ns	$I_F = 1\text{A}, di_F/dt = 100\text{A}/\mu\text{s}, V_R = 30\text{V}$
	-	28	35		$I_F = 15\text{A}, di_F/dt = 100\text{A}/\mu\text{s}, V_R = 30\text{V}$
		29	-	-	$T_J = 25^\circ\text{C}$
	-	75	-		$T_J = 125^\circ\text{C}$
I_{RRM} Peak Recovery Current	-	3.5	-	A	$T_J = 25^\circ\text{C}$
	-	7	-		$T_J = 125^\circ\text{C}$
Q_{rr} Reverse Recovery Charge	-	57	-	nC	$T_J = 25^\circ\text{C}$
	-	300	-		$T_J = 125^\circ\text{C}$
t_{rr} Reverse Recovery Time	-	51	-	ns	$I_F = 15\text{A}$ $di_F/dt = 200\text{A}/\mu\text{s}$ $V_R = 390\text{V}$
I_{RRM} Peak Recovery Current	-	20	-	A	
Q_{rr} Reverse Recovery Charge	-	580	-	nC	

Thermal - Mechanical Characteristics

Parameters	Min	Typ	Max	Units
T_J Max. Junction Temperature Range	-	-	175	$^\circ\text{C}$
T_{Stg} Max. Storage Temperature Range	- 65	-	175	
R_{thJC} Thermal Resistance, Junction to Case Per Leg	-	1.0	1.3	$^\circ\text{C}/\text{W}$
	(Fullpack) Per Leg	3.0	3.5	
R_{thJA} ① Thermal Resistance, Junction to Ambient Per Leg	-	-	70	
R_{thCS} ② Thermal Resistance, Case to Heatsink	-	0.5	-	g
Weight	-	2.0	-	
Mounting Torque	-	0.07	-	(oz)
	6.0	-	12	Kg-cm
	5.0	-	10	lbf.in

① Typical Socket Mount

② Mounting Surface, Flat, Smooth and Greased

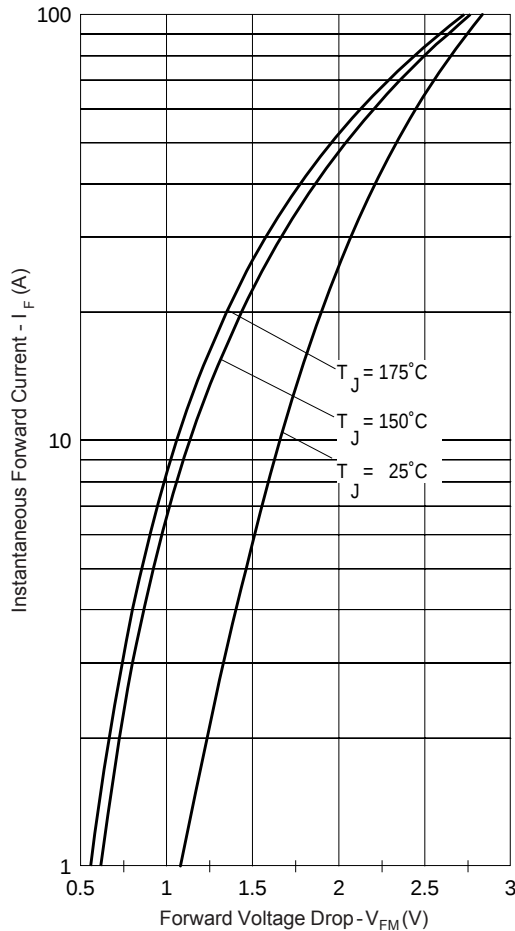


Fig. 1 - Typical Forward Voltage Drop Characteristics

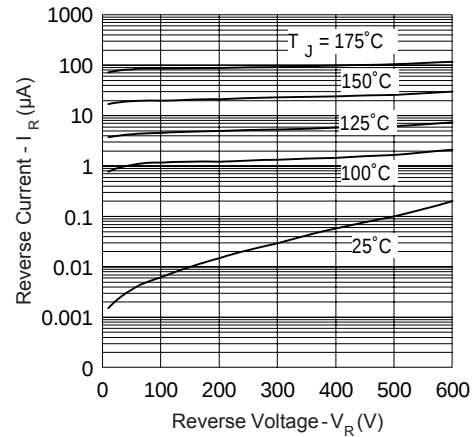


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage

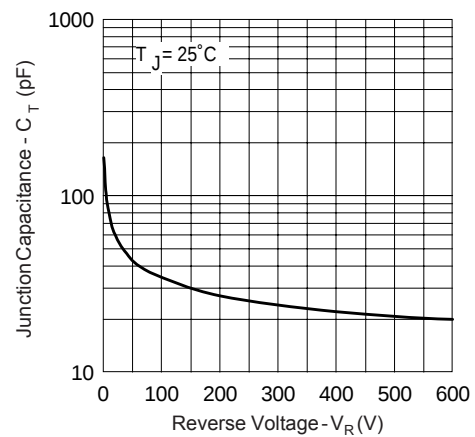


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

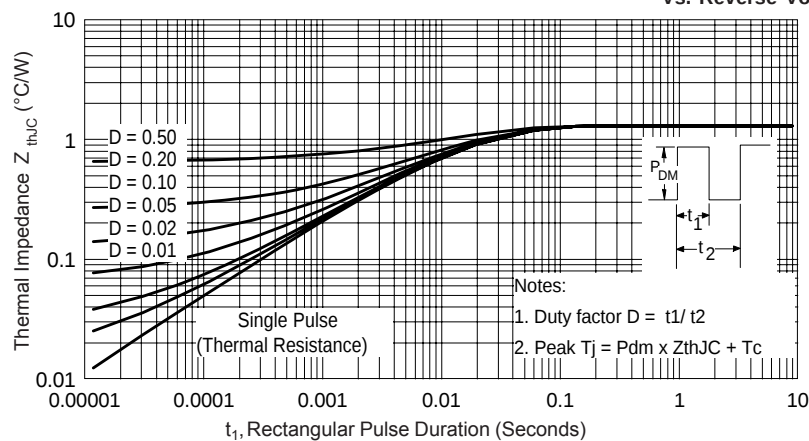


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics

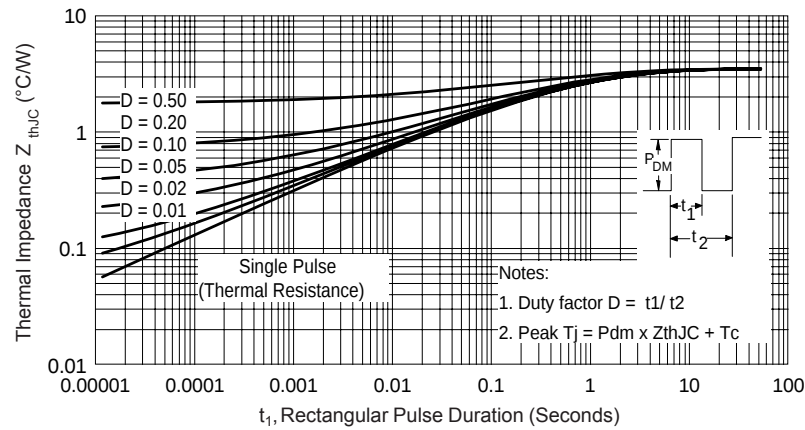
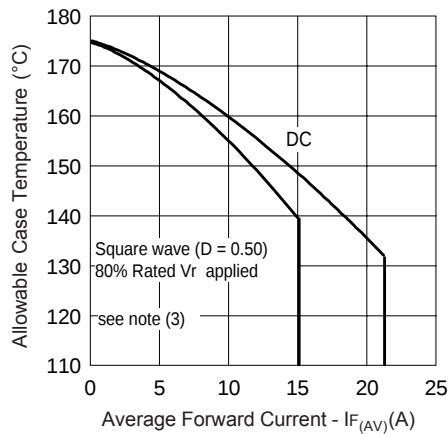
Fig. 5 - Max. Thermal Impedance Z_{thJC} Characteristics (FULLPACK)

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

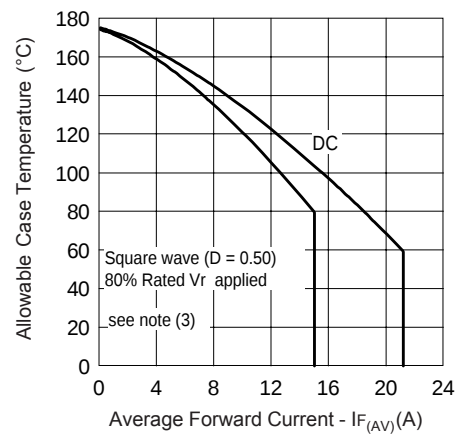


Fig. 7 - Max. Allowable Case Temperature Vs. Average Forward Current (FULLPACK)

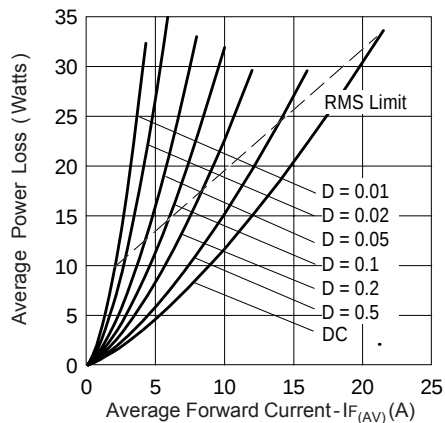


Fig. 8 - Forward Power Loss Characteristics

(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

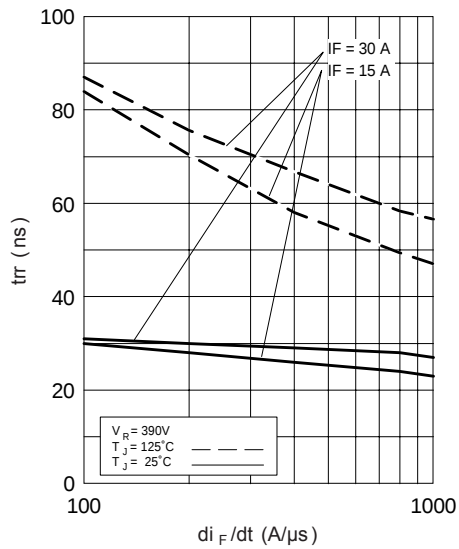


Fig. 7 - Typical Reverse Recovery vs. di_F/dt

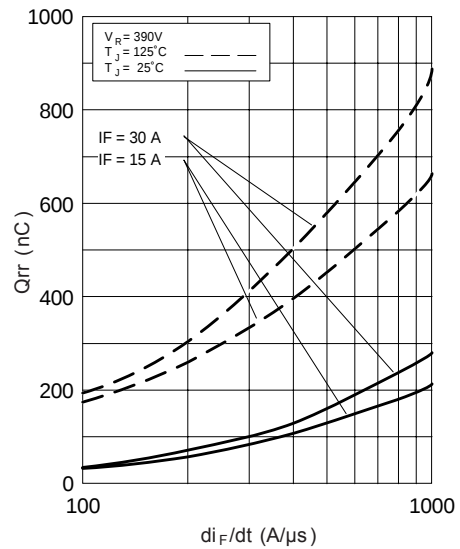


Fig. 8 - Typical Stored Charge vs. di_F/dt

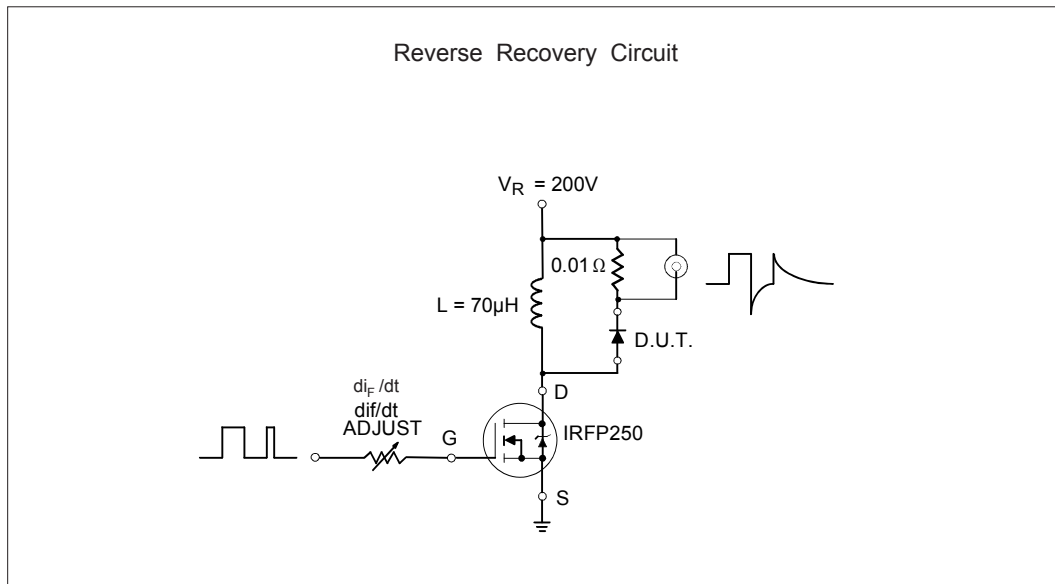


Fig. 11- Reverse Recovery Parameter Test Circuit

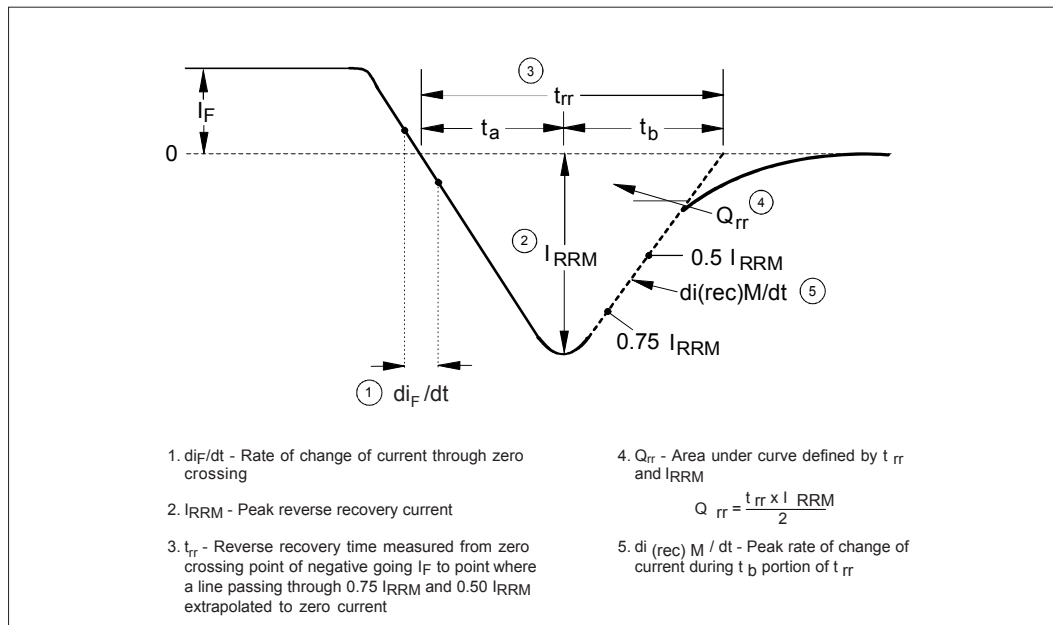
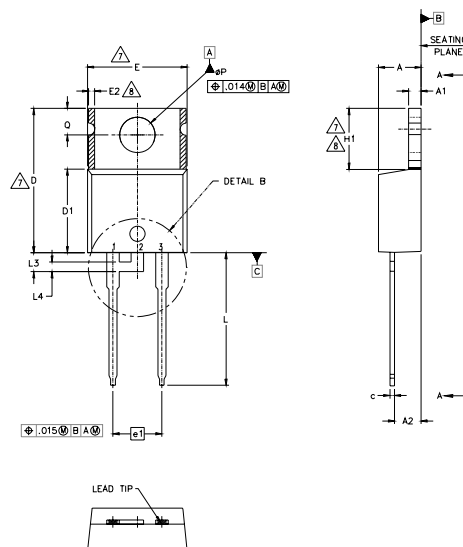


Fig. 12 - Reverse Recovery Waveform and Definitions

Outline Table



- NOTES:
1. DIMENSIONING AND TOLERANCING AS PER ASME Y14.5 M- 1994.
 2. DIMENSIONS ARE SHOWN IN INCHES [MILLIMETERS].
 3. LEAD DIMENSION AND FINISH UNCONTROLLED IN L1.
 4. DIMENSION D, D1 & D2 DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED .0005" (0.127) PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
 5. DIMENSION H1, H3 & C1 APPLY TO BASE METAL ONLY.
 6. CONTROLLING DIMENSION: INCHES.
 7. THERMAL PAD CONTACT ORIENTATION WITHIN DIMENSIONS E1/2D2 & E1
 8. DIMENSION D2/2 H1 DEFINE A ZONE WHERE STAMPING AND REGULATION ROUNDS ARE ALLOWED.
 9. OUTLINE CONFORMS TO JEDEC JO-220, D2 (WH) WHERE DIMENSIONS ARE DERIVED FROM THE ORIGINAL PACKAGE OUTLINE.

WHERE DIMENSIONS ARE DERIVED FROM THE ACTUAL PACKAGE OUTLINE					
SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	3.56	4.83	.140	.190	
A1	0.51	1.40	.020	.055	
A2	2.03	2.92	.080	.115	
b	0.38	1.01	.015	.040	
b1	0.38	0.97	.015	.038	5
b2	1.04	1.78	.045	.070	
b3	1.14	1.76	.045	.068	5
c	0.36	0.61	.014	.024	
c1	0.36	0.56	.014	.022	5
D	14.22	16.51	.560	.650	4
D1	8.28	9.02	.330	.355	7
D2	11.68	12.88	.460	.507	
E	9.65	10.67	.380	.420	4, 7
E1	6.86	8.89	.270	.350	7
E2	-	0.76	-	.030	8
e	2.54 BSC	-	.100 BSC	-	
e1	2.00 BSC	-	.078 BSC	-	
H	5.84	6.86	.230	.270	7, 8
HL	12.70	14.73	.500	.580	
L1	-	6.35	-	.250	3
L3	1.78	2.13	.070	.084	
L4	0.76	1.27	.030	.060	3
øP	3.53	3.73	.139	.147	
P	2.54	3.05	.100	.120	

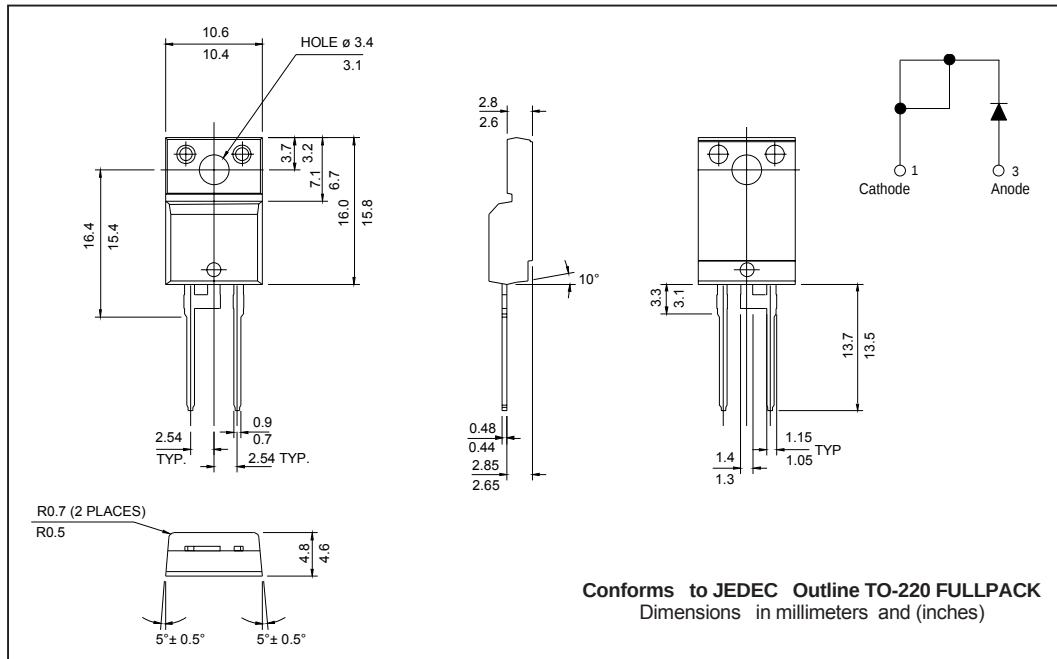
LEAD ASSIGNMENTS

DIGGES

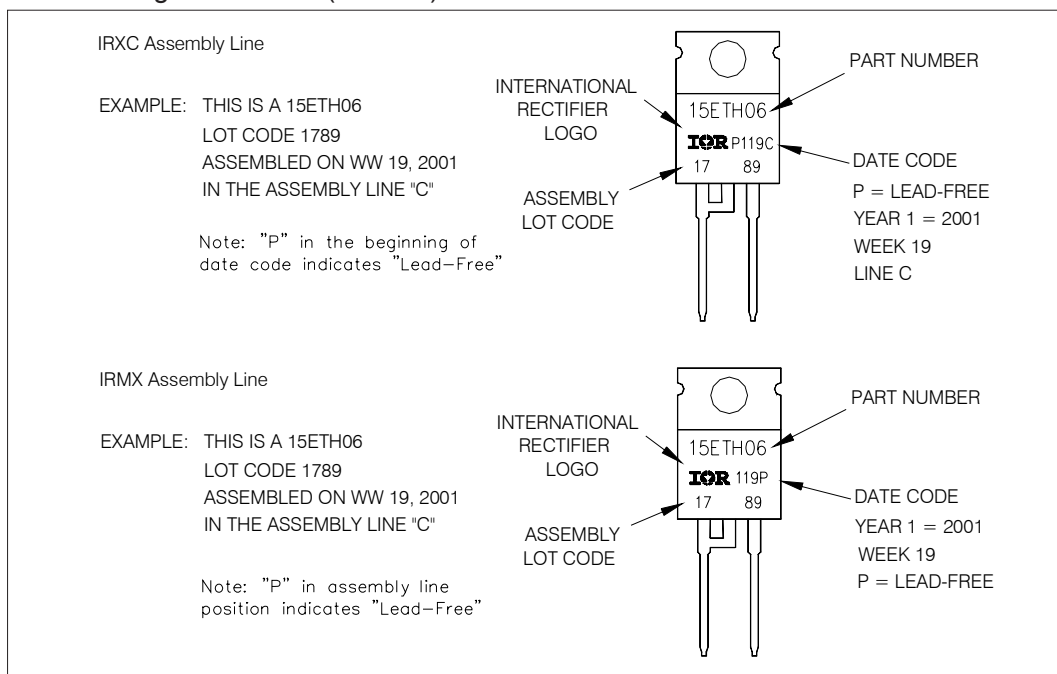
1+2 - CATHODE
3 - ANODE

Conforms to JEDEC Outline TO-220AC
Dimensions in millimeters and (inches)

Outline Table



Part Marking Information (TO-220)



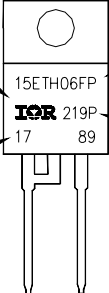
Part Marking Information (TO-220 FULL-PAK)

EXAMPLE: THIS IS A 15ETH06FP
LOT CODE 1789
ASSEMBLED ON WW 19, 2002
IN THE ASSEMBLY LINE "C"

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

INTERNATIONAL
RECTIFIER
LOGO

ASSEMBLY
LOT CODE



PART NUMBER
FP = Fullpack

DATE CODE
YEAR = 2002
WEEK 19
P = Lead-Free

Ordering Information Table

Device Code

15	E	T	H	06	FP	PbF
1	2	3	4	5	6	7

1	-	Current Rating (15 = 15A)
2	-	E = Single Diode
3	-	T = TO-220, D ² Pak
4	-	H = HyperFast Recovery
5	-	Voltage Rating (06 = 600V)
6	-	• none = TO-220AC • FP = TO-220 FULLPACK
7	-	• none = Standard Production • PbF = Lead-Free

Tube Standard Pack Quantity: 50 pieces

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.