15ETX06
15ETX06S
15ETX06-1
15ETX06FP

International
IOR Rectifier

Hyperfast Rectifier

Features

- Benchmark Ultra-low Forward Voltage Drop
- Hyperfast Recovery Time
- Low Leakage Current
- 175°C Operating Junction Temperature
- Fully Isolated package (V_{INS} = 2500 V_{RMS})

t_{rr} = 18 ns

$I_{F(AV)}$ = 15Amp

V_R = 600V

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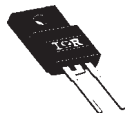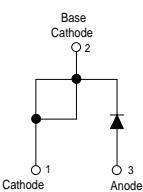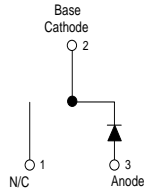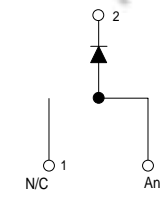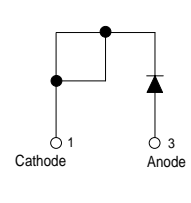
These devices are intended for use in PFC Boost stage in the AC-DC section of SMPS, inverters or as freewheeling diodes.

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 = 133°C	15	A
	@ T_C = 62°C (FULLPACK)		
I_{FSM}	Non Repetitive Peak Surge Current @ T_J = 25°C	170	
I_{FM}	Peak Repetitive Forward Current	30	
T_J, T_{STG}	Operating Junction and Storage Temperatures	- 65 to 175	°C

Case Styles

15ETX06	15ETX06S	15ETX06-1	15ETX06FP
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	D²PAK	TO-262	TO-220 FULLPACK

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Electrical Characteristics @ T$_J$ = 25°C (unless otherwise specified)

	Parameters	Min	Typ	Max	Units	Test Conditions
V$_{BR}$, V$_r$	Breakdown Voltage, Blocking Voltage	600	-	-	V	I$_R$ = 100µA
V$_F$	Forward Voltage	-	2.3	3.2	V	I$_F$ = 15A, T$_J$ = 25°C
		-	1.5	1.8	V	I$_F$ = 15A, T$_J$ = 150°C
I$_R$	Reverse Leakage Current	-	0.1	50	µA	V$_R$ = V$_R$ Rated
		-	40	300	µA	T$_J$ = 150°C, V$_R$ = V$_R$ Rated
C$_T$	Junction Capacitance	-	20	-	pF	V$_R$ = 600V
L$_S$	Series Inductance	-	8.0	-	nH	Measured lead to lead 5mm from package body

Dynamic Recovery Characteristics @ T$_C$ = 25°C (unless otherwise specified)

	Parameters	Min	Typ	Max	Units	Test Conditions	
t$_{rr}$	Reverse Recovery Time	-	18	22	ns	I$_F$ = 1A, di$_F$/dt = 100A/µs, V$_R$ = 30V	
		-	20	32		I$_F$ = 15A, di$_F$/dt = 100A/µs, V$_R$ = 30V	
		-	22	-		T$_J$ = 25°C	I$_F$ = 15A di$_F$ /dt = 200A/µs V$_R$ = 390V
		-	52	-		T$_J$ = 125°C	
I$_{RRM}$	Peak Recovery Current	-	2.4	-	A	T$_J$ = 25°C	
		-	5.1	-		T$_J$ = 125°C	
Q$_{rr}$	Reverse Recovery Charge	-	25	-	nC	T$_J$ = 25°C	
		-	150	-		T$_J$ = 125°C	
t$_{rr}$	Reverse Recovery Time	-	37	-	ns	T$_J$ = 125°C	I$_F$ = 15A di$_F$ /dt = 800A/µs V$_R$ = 390V
I$_{RRM}$	Peak Recovery Current	-	16	-	A	T$_J$ = 125°C	
Q$_{rr}$	Reverse Recovery Charge	-	350	-	nC	T$_J$ = 125°C	

Thermal - Mechanical Characteristics

	Parameters		Min	Typ	Max	Units
T$_J$	Max. Junction Temperature Range		-	-	175	°C
T$_{Stg}$	Max. Storage Temperature Range		- 65	-	175	
R$_{thJC}$	Thermal Resistance, Junction to Case	Per Leg	-	1.0	1.3	°C/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	-	
	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

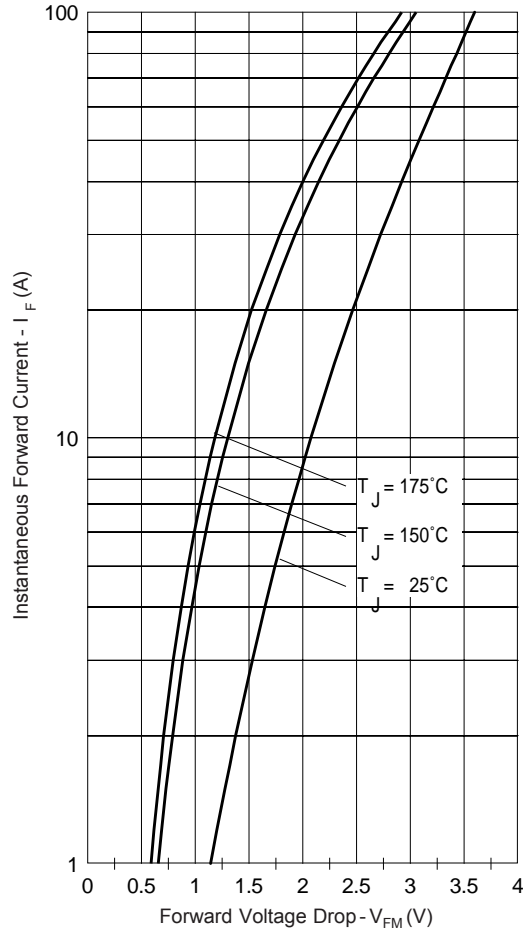International
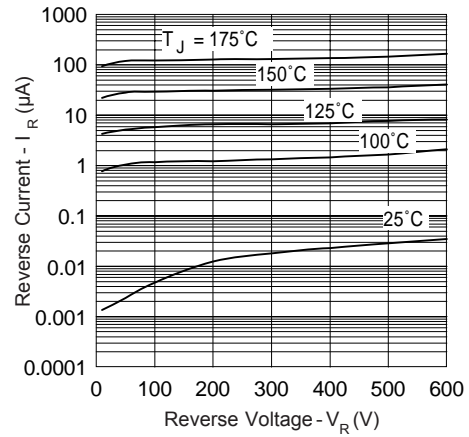**IGR** Rectifier

Fig. 1 - Typical Forward Voltage Drop Characteristics

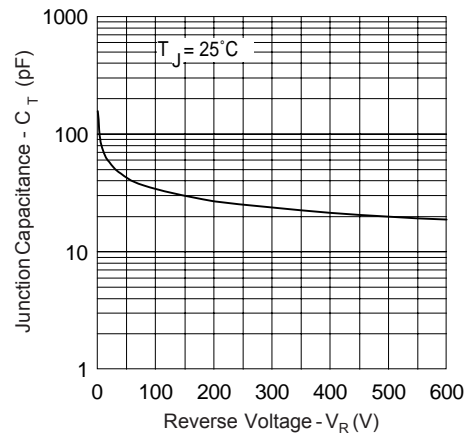Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage

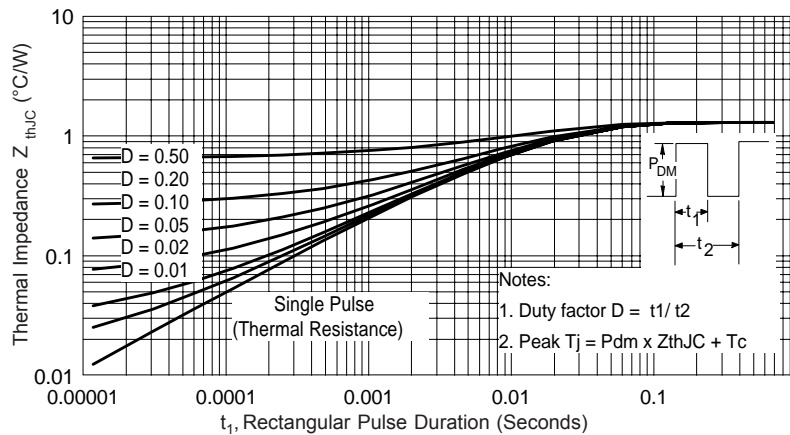Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

Notes:
1. Duty factor D = t1/ t2
2. Peak Tj = Pdm x ZthJC + Tc

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

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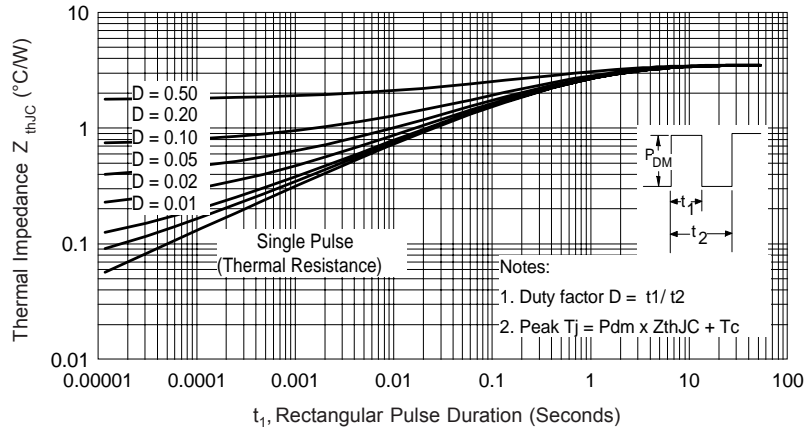International
IΩR Rectifier

Fig. 5 - Max. Thermal Impedance Z_{thJC} Characteristics (FULLPACK)
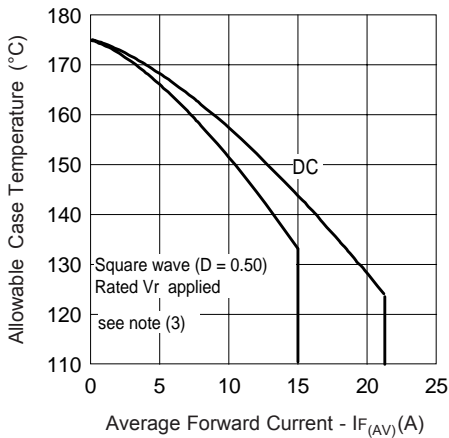
Fig. 6 - Max. Allowable Case Temperature Vs. Average Forward Current
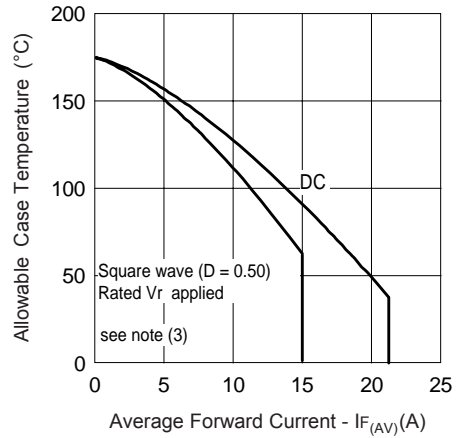
Fig. 7 - Max. Allowable Case Temperature Vs. Average Forward Current (FULLPACK)
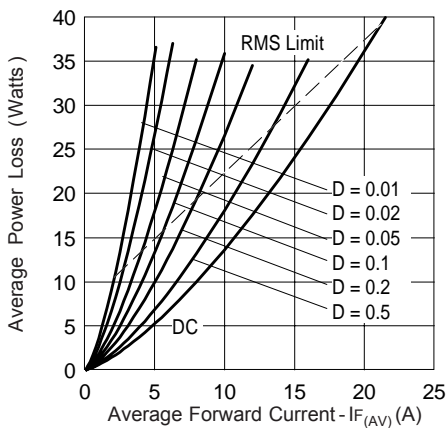
Fig. 8 - Forward Power Loss Characteristics

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

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
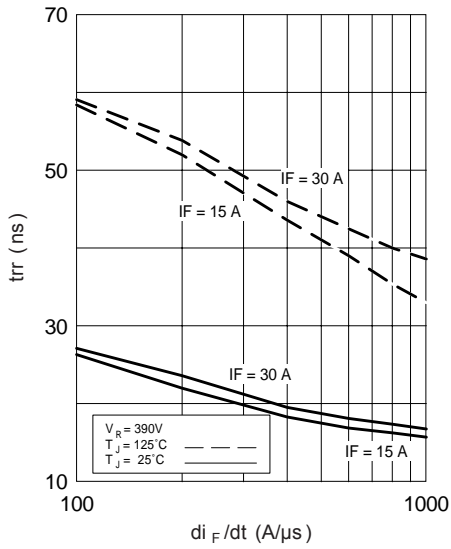
Fig. 9 - **Typical Reverse Recovery vs. di$_F$/dt**
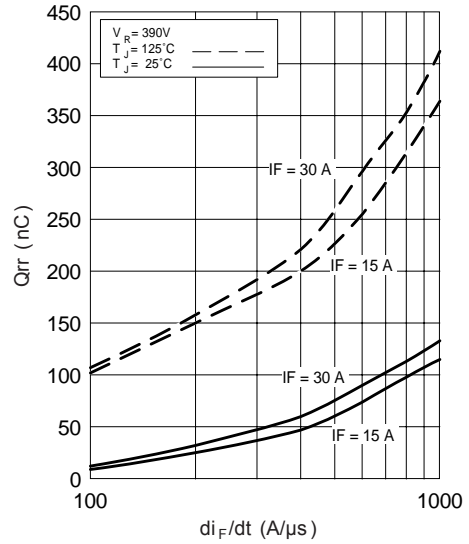
Fig. 10 - **Typical Stored Charge vs. di$_F$/dt**

Reverse Recovery Circuit
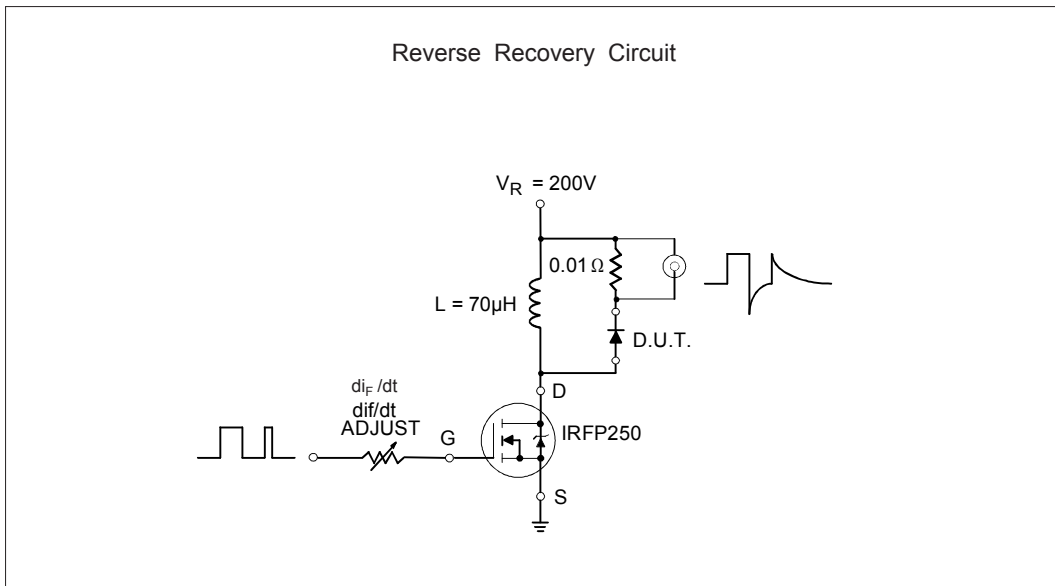
Fig. 11- **Reverse Recovery Parameter Test Circuit**

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1. di_F/dt - Rate of change of current through zero crossing

2. I_RRM - Peak reverse recovery current

3. t_rr - Reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through 0.75 I_RRM and 0.50 I_RRM extrapolated to zero current

4. Q_rr - Area under curve defined by t_rr and I_RRM

$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

5. di_{(rec)M}/dt - Peak rate of change of current during t_b portion of t_rr

Fig. 12 - Reverse Recovery Waveform and Definitions

Outline Table

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

Outline Table

10.16 (0.40) REF.

15.49 (0.61)
14.73 (0.58)

93°

6.47 (0.25)
6.18 (0.24)

2.61 (0.10)
2.32 (0.09)

8.89 (0.35) REF.

3X 1.40 (0.055)
1.14 (0.045)

2X 0.93 (0.37)
0.69 (0.27)

1   3
2

4.57 (0.18)
4.32 (0.17)

0.61 (0.02) MAX.
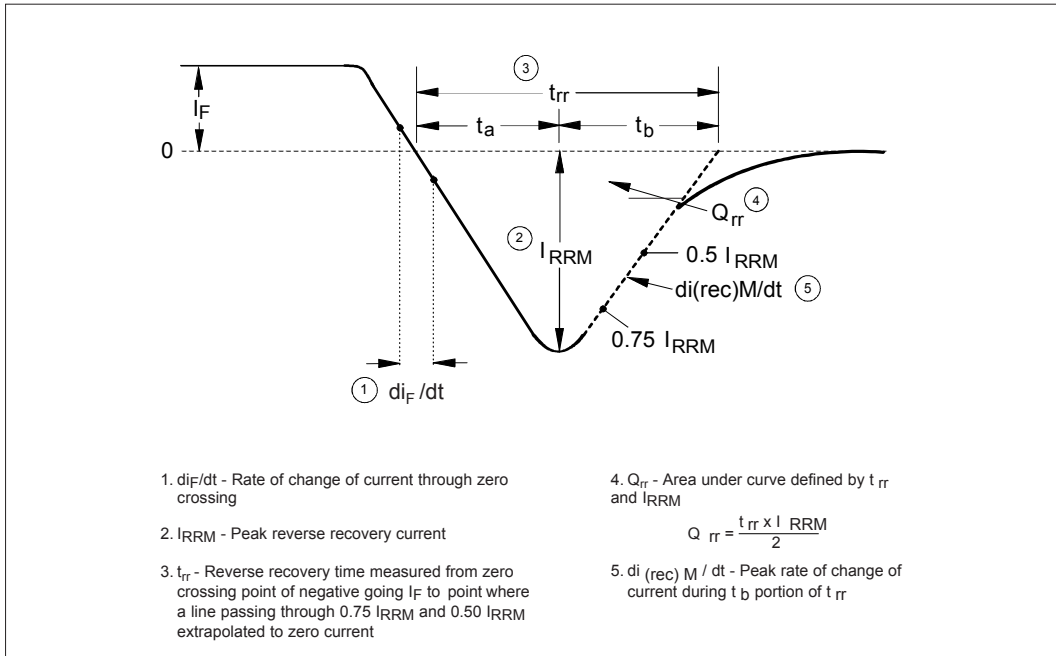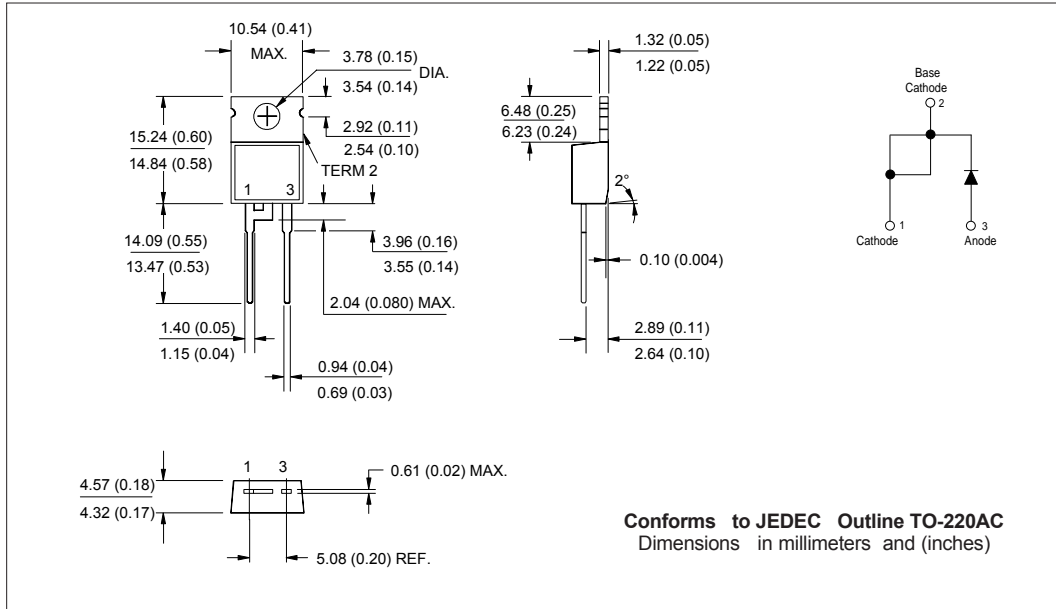
5.08 (0.20) REF.

4.69 (0.18)
4.20 (0.16)

1.32 (0.05)
1.22 (0.05)

5.28 (0.21)
4.78 (0.19)

0.55 (0.02)
0.46 (0.02)

MINIMUM RECOMMENDED FOOTPRINT

11.43 (0.45)

8.89 (0.35)

17.78 (0.70)

3.81 (0.15)

2.08 (0.08)
2X

2.54 (0.10)
2X

Base
Cathode
○ 2

○ 1
N/C

○ 3
Anode

Conforms to JEDEC Outline D²PAK
Dimensions in millimeters and (inches)

0.939 (0.037)
0.686 (0.027)

0.55 (0.022)
0.45 (0.018)

SECTION X–X

10.54 (0.415)
10.29 (0.405)

TERM. 2

1.40 (0.055) MAX.

1.32 (0.052)
1.22 (0.048)

1.15 (0.45) MIN.

10.16 (0.400)
10.00 (0.394) REF.

8.76 (0.345)
8.61 (0.339)

24.25 (0.955)
23.47 (0.924)

14.09 (0.555)
13.47 (0.530)

X   X

3.96 (0.156)
3.55 (0.140)

1.40 (0.055)
1.15 (0.045)

2.89 (0.114)
2.64 (0.104)

○ 2

○ 1
N/C

○ 3
Anode

TERM 2–CATHODE
TERM 1–ANODE
NC TERM 3–ANODE

1   2   3

0.61 (.024) MAX.

4.57 (0.180)
4.32 (0.170)

2.79 (0.110)
2.29 (0.090)

5.33 (0.210)
4.83 (0.190)

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

15ETX06, 15ETX06S, 15ETX06-1, 15ETX06FP

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Outline Table

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

Ordering Information Table

1	-	Current Rating (15 = 15A)
2	-	E = Single Diode
3	-	T = TO-220, D^{2}Pak
4	-	X = HyperFast Recovery
5	-	Voltage Rating (06 = 600V)
6	-	"-1" = TO-262 Option
		S = D^{2}Pak
		None = TO-220AC
		FP = TO-220 FULLPACK

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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.

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