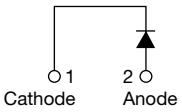
Hyperfast Rectifier, 15 A FRED Pt®



TO-220 FullPAK 2L



FEATURES

- Hyperfast recovery time, extremely low Q_{rr}
- Low forward voltage drop
- 175 °C operating junction temperature
- Low leakage current
- Fully isolated package (V_{INS} = 2500 V_{RMS})
- True 2 pin package
- Designed and qualified according to JEDEC®-JESD 47
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

RoHS COMPLIANT

HALOGEN FREE

DESCRIPTION / APPLICATIONS

State of the art hyperfast recovery rectifiers designed with optimized performance of forward voltage drop, hyperfast recovery 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 extremely optimized stored charge and low recovery current minimize the switching losses and reduce over dissipation in the switching element and snubbers.

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	15 A
V_R	600 V
V_F at I_F	1.55 V
t_{rr} (typ.)	18 ns
T_J max.	175 °C
Package	TO-220 FullPAK 2L
Circuit configuration	Single

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Peak repetitive reverse voltage	V_{RRM}		600	V
Average rectified forward current in DC	$I_{F(AV)}$	T_C = 71 °C	15	A
Non-repetitive peak surge current	I_{FSM}	T_J = 25 °C	120	
Operating junction and storage temperatures	T_J, T_{Stg}		-65 to +175	°C

ELECTRICAL SPECIFICATIONS (T_J = 25 °C unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Breakdown voltage, blocking voltage	V_{BR}, V_R	I_R = 100 µA	600	-	-	V
Forward voltage	V_F	I_F = 15 A	-	2.5	3.4	V
		I_F = 15 A, T_J = 150 °C	-	1.55	2	
Reverse leakage current	I_R	V_R = V_R rated	-	0.02	36	µA
		T_J = 150 °C, V_R = V_R rated	-	40	250	
Junction capacitance	C_T	V_R = 600 V	-	12	-	pF
Series inductance	L_S	Measured lead to lead 5 mm from package body	-	8	-	nH

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DYNAMIC RECOVERY CHARACTERISTICS (T_J = 25 °C unless otherwise specified)							
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**MIN.**	**TYP.**	**MAX.**	**UNITS**
Reverse recovery time	t_{rr}	I_F = 1 A, dI_F/dt = 100 A/µs, V_R = 30 V		-	17	23	ns
		I_F = 15 A, dI_F/dt = 100 A/µs, V_R = 30 V		-	18	30	
		T_J = 25 °C	I_F = 15 A, dI_F/dt = 200 A/µs, V_R = 390 V	-	20	-	
		T_J = 125 °C		-	45	-	
Peak recovery current	I_{RRM}	T_J = 25 °C		-	2.7	-	A
		T_J = 125 °C		-	5.5	-	
Reverse recovery charge	Q_{rr}	T_J = 25 °C		-	26	-	nC
		T_J = 125 °C		-	130	-	
Reverse recovery time	t_{rr}	T_J = 125 °C	I_F = 15 A, dI_F/dt = 800 A/µs, V_R = 390 V	-	32	-	ns
Peak recovery current	I_{RRM}			-	17	-	A
Reverse recovery charge	Q_{rr}			-	290	-	nC

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Maximum junction and storage temperature range	T_J, T_{Stg}		-65	-	175	°C
Thermal resistance, junction-to-case	R_{thJC}		-	3.7	4.3	°C/W
Thermal resistance, junction-to-ambient	R_{thJA}	Typical socket mount	-	-	70	
Typical thermal resistance, case-to-heatsink	R_{thCS}	Mounting surface, flat, smooth, and greased	-	0.5	-	
Weight			-	2	-	g
			-	0.07	-	oz.
Mounting torque			6 (5)	-	12 (10)	kgf · cm (lbf · in)
Marking device		Case style TO-220 FullPAK 2L	ETX1506FP			

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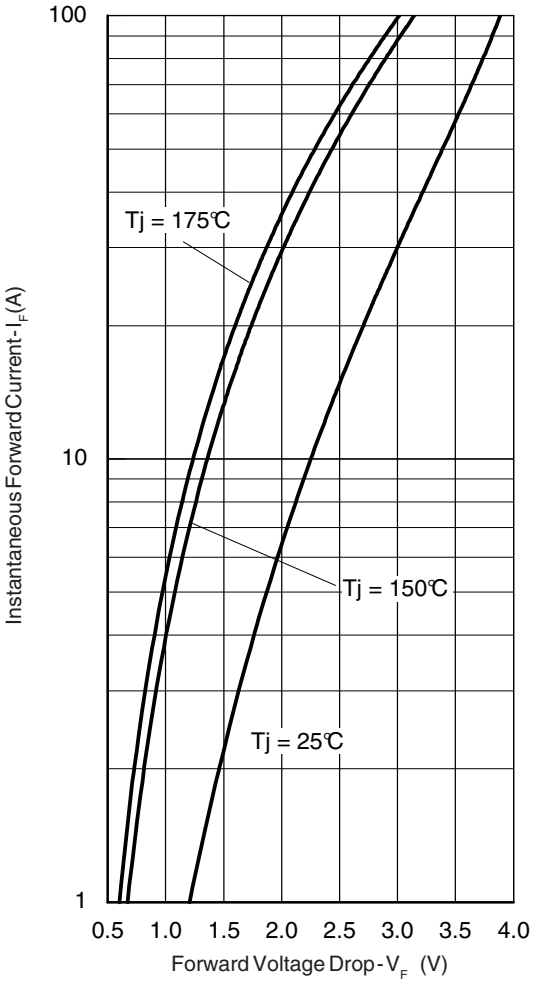

Fig. 1 - Typical Forward Voltage Drop Characteristics

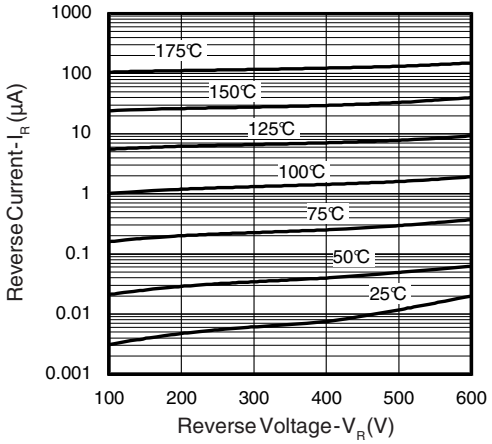

Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

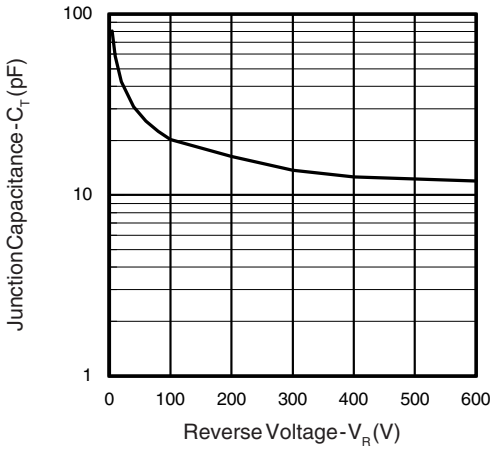

Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

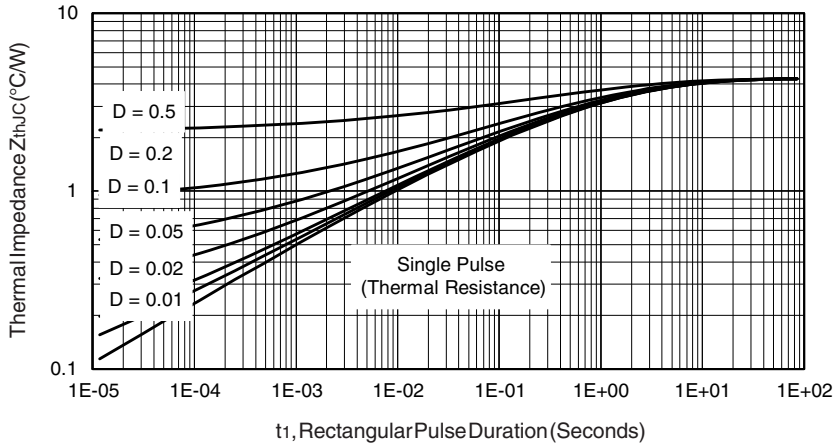

Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

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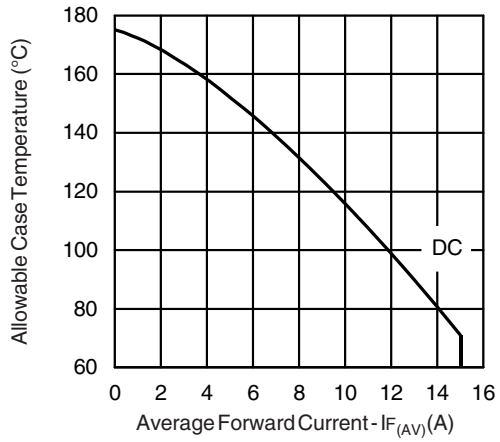

Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

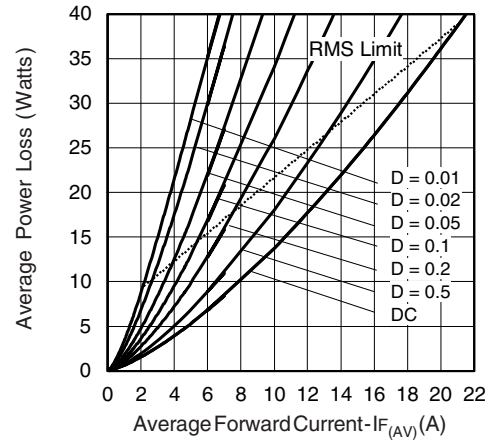

Fig. 6 - Forward Power Loss Characteristics

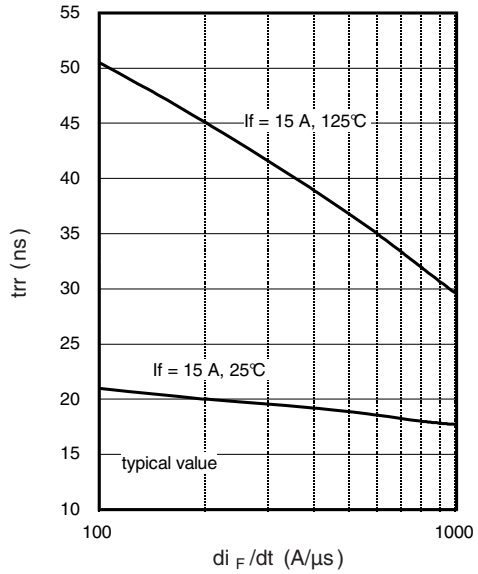

Fig. 7 - Typical Reverse Recovery vs. dI_F/dt

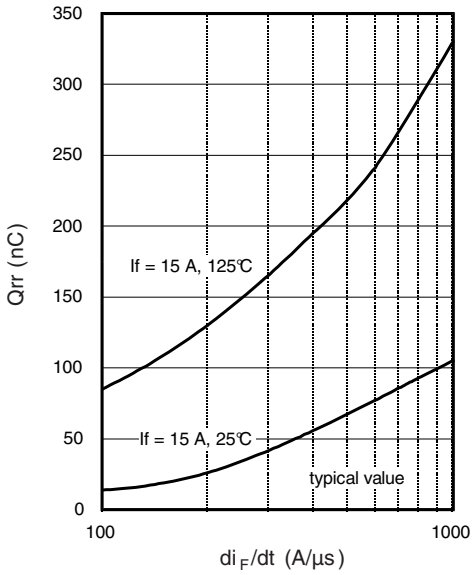

Fig. 8 - Typical Stored Charge vs. dI_F/dt

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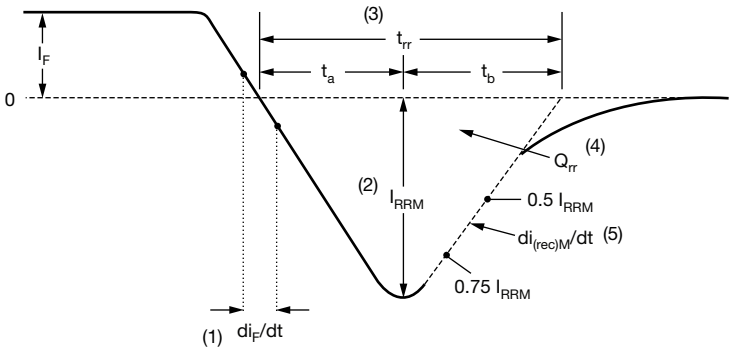

(1) di_F/dt - rate of change of current through zero crossing

(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. 9 - Reverse Recovery Waveform and Definitions

ORDERING INFORMATION TABLE

Device code

VS-	E	T	X	15	06	FP	-M3
1	2	3	4	5	6	7	8

1 - Vishay Semiconductors product

2 - Circuit configuration:
E = single

3 - T = TO-220

4 - X = hyperfast recovery time

5 - Current code: 15 = 15 A

6 - Voltage code: 06 = 600 V

7 - FP = TO-220 FullPAK 2L

8 - Environmental digit:
-M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

ORDERING INFORMATION (Example)			
PREFERRED P/N	**QUANTITY PER TUBE**	**MINIMUM ORDER QUANTITY**	**PACKAGING DESCRIPTION**
VS-ETX1506FP-M3	50	1000	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?96157
Part marking information	www.vishay.com/doc?95392

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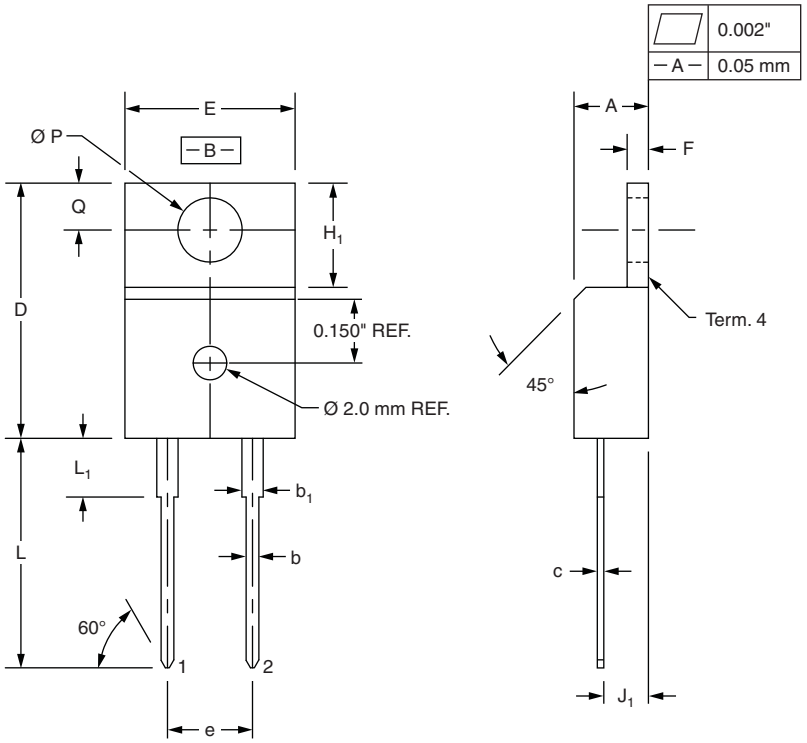
True 2 Pin TO-220

DIMENSIONS in millimeters and inches



SYMBOL	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.32	4.57	0.170	0.180
b	0.71	0.91	0.028	0.036
b_1	1.15	1.39	0.045	0.055
c	0.36	0.53	0.014	0.021
D	14.99	15.49	0.590	0.610
E	10.04	10.41	0.395	0.410
e	5.08 BSC		0.200 BSC	
F	1.22	1.37	0.048	0.054
H_1	5.97	6.47	0.235	0.255
J_1	2.54	2.79	0.100	0.110
L	13.47	13.97	0.530	0.550
L_1 (1)	3.31	3.81	0.130	0.150
Ø P	3.79	3.88	0.149	0.153
Q	2.60	2.84	0.102	0.112

Notes

(1) Lead dimension and finish uncontrolled in L_1

- These dimensions are within allowable dimensions of JEDEC TO-220AB rev. J outline dated 3-24-87
- Controling dimension: Inch

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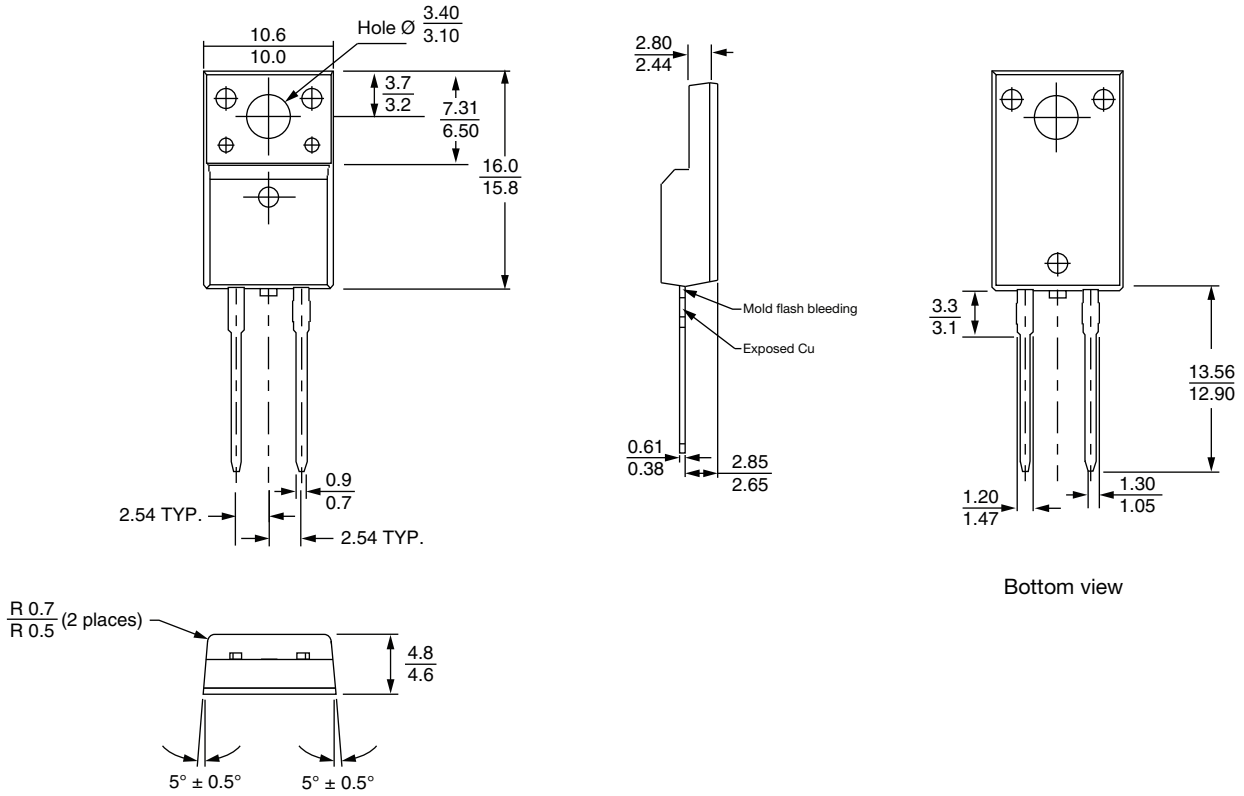
2L TO-220 FullPAK

DIMENSIONS in millimeters



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