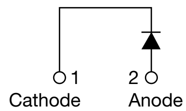
Hyperfast Rectifier, 12 A FRED Pt® G5

TO-220 FullPAK 2L



LINKS TO ADDITIONAL RESOURCES

3D Models
Application Notes

FEATURES

- Best in class forward voltage drop and switching losses trade off
- Optimized for high speed operation
- 175 °C maximum operating junction temperature
- Polyimide passivation
- 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

Featuring a unique combination of low conduction and switching losses, this rectifier is the right choice for soft switched and resonant converters, as well as medium frequency hard switching converters. This device is specifically designed to improve as output rectifier for DC/DC stage in resonant converters and as PFC rectifier for aircon and industrial power supplies.

MECHANICAL DATA

Case: TO-220 FullPAK 2L
Molding compound meets UL 94 V-0 flammability rating

Terminals: matte tin plated leads, solderable per J-STD-002

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	12 A
V_R	600 V
V_F at I_F at 125 °C	1.75 V
t_{rr} (typ.)	16 ns
T_J max.	175 °C
Package	TO-220 FullPAK 2L
Circuit configuration	Single

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Repetitive peak reverse voltage	V_{RRM}		600	V
Average rectified forward current in DC	$I_{F(AV)}$	T_C = 100 °C, DC	12	A
Non-repetitive peak surge current	I_{FSM}	T_C = 25 °C, t_p = 10 ms, sine wave	110	
Operating junction and storage temperature	T_J, T_{Stg}		-55 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 = 12 A	-	2.35	3.35	
		I_F = 12 A, T_J = 125 °C	-	1.75	-	
Reverse leakage current	I_R	V_R = V_R rated	-	-	10	μA
		T_J = 125 °C, V_R = V_R rated	-	-	500	
Junction capacitance	C_T	V_R = 600 V	-	10	-	pF
Series inductance	L_S	Measured to lead 5 mm from package body	-	8	-	nH

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 = 1.0 A, dI_F/dt = 100 A/μs, V_R = 30 V		-	16	-	ns
		T_J = 25 °C	I_F = 8 A dI_F/dt = 1000 A/μs V_R = 400 V	-	25	-	
		T_J = 125 °C		-	30	-	
Peak recovery current	I_{RRM}	T_J = 25 °C		-	7.5	-	A
		T_J = 125 °C		-	13	-	
Reverse recovery charge	Q_{rr}	T_J = 25 °C		-	75	-	nC
		T_J = 125 °C		-	225	-	
Reverse recovery time	t_{rr}	T_J = 25 °C	I_F = 12 A dI_F/dt = 1000 A/μs V_R = 400 V	-	26	-	ns
		T_J = 125 °C		-	32	-	
Peak recovery current	I_{RRM}	T_J = 25 °C		-	9	-	A
		T_J = 125 °C		-	14	-	
Reverse recovery charge	Q_{rr}	T_J = 25 °C		-	90	-	nC
		T_J = 125 °C		-	275	-	

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Thermal resistance, junction-to-case	R_{thJC}		-	-	3.5	°C/W
Weight			-	2.0	-	g
Mounting torque			6.0 (5.0)	-	12 (10)	kgf · cm (lbf · in)
Maximum junction and storage temperature range	T_J, T_{Stg}		-55	-	175	°C
Marking device		Case style TO-220 FullPAK 2L	E5TW1206FP			

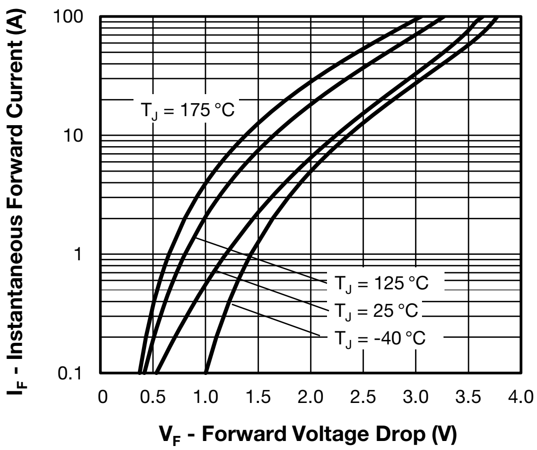


Fig. 1 - Forward Voltage Drop Characteristics

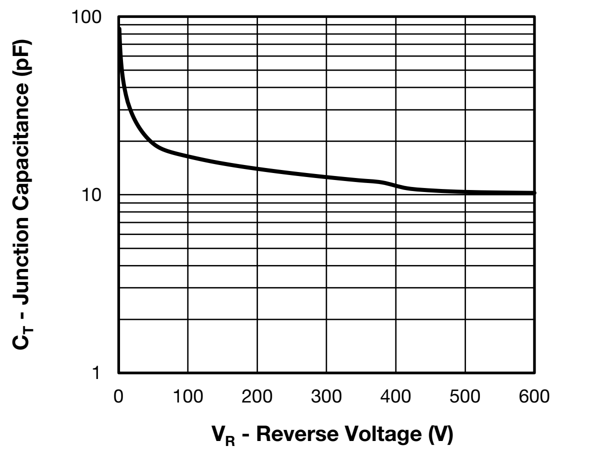


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

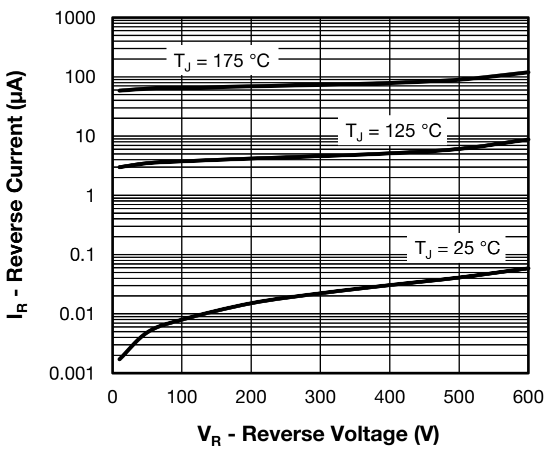


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

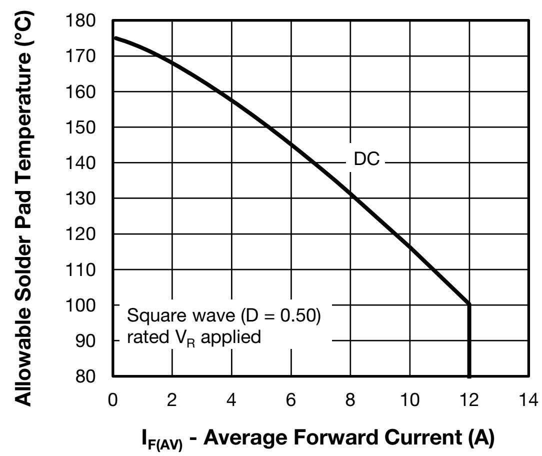


Fig. 4 - Maximum Allowable Case Temperature vs. Average Forward Current

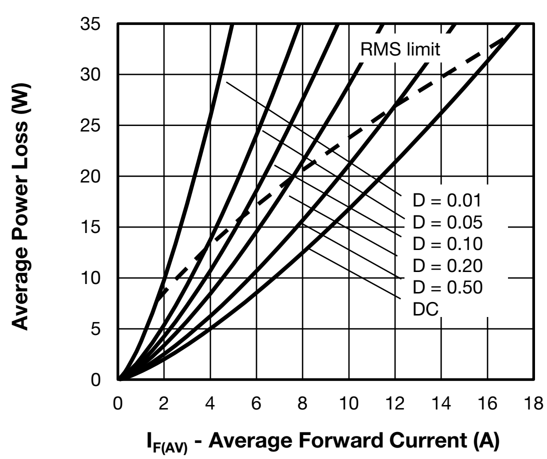


Fig. 5 - Forward Power Loss Characteristics

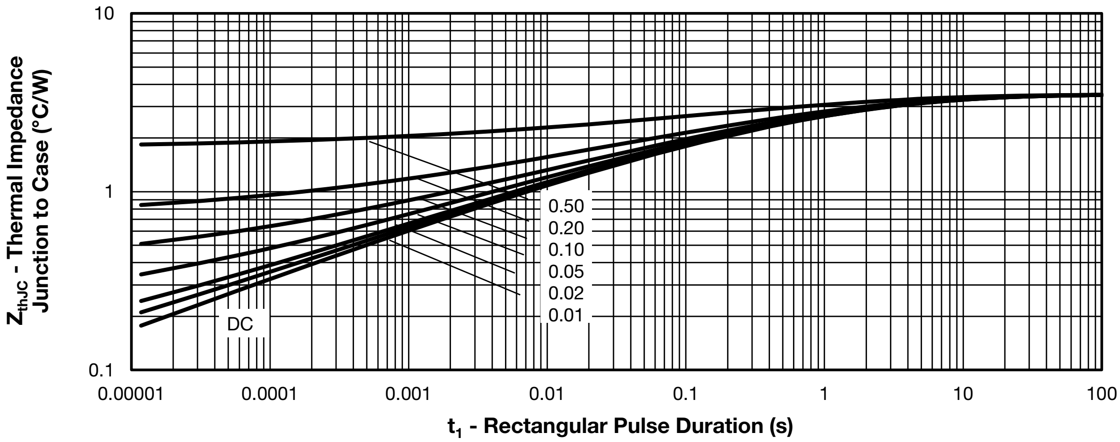


Fig. 6 - Transient Thermal Impedance, Junction to Case

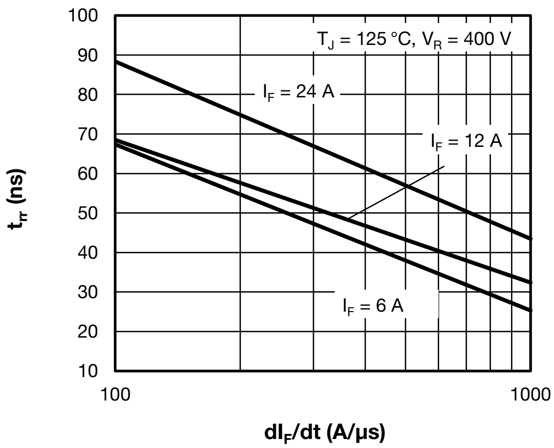


Fig. 7 - Typical Reverse Recovery Time vs. dI_F/dt

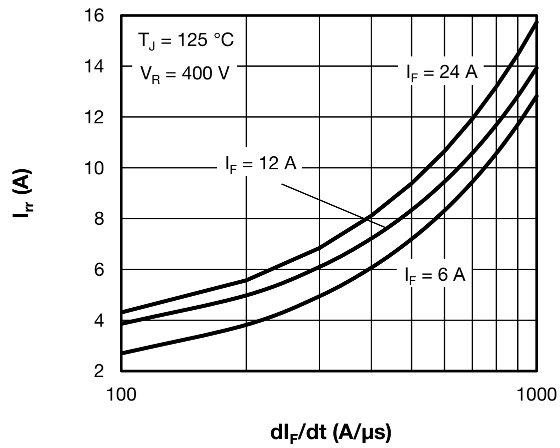


Fig. 9 - Typical Reverse Recovery Current vs. dI_F/dt

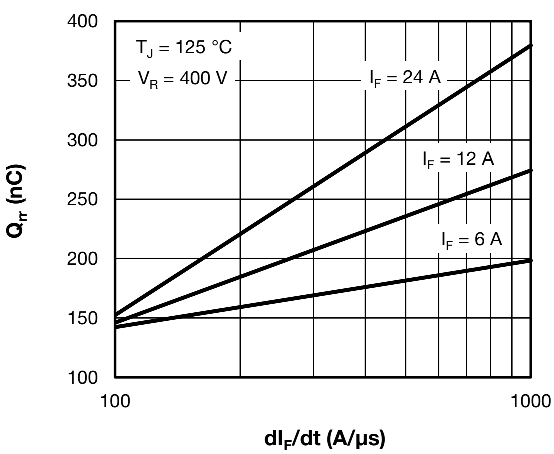


Fig. 8 - Typical Reverse Recovery Charge vs. dI_F/dt

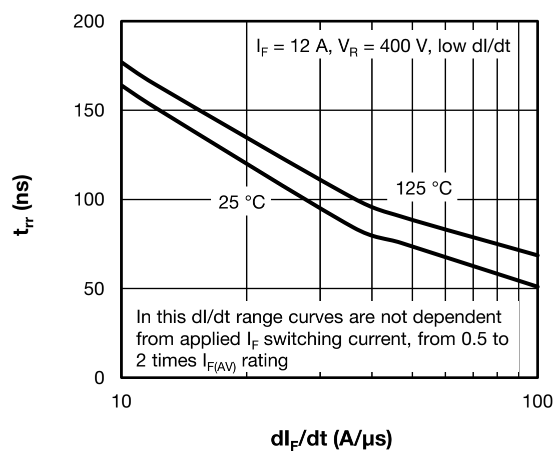


Fig. 10 - Typical Reverse Recovery Time vs. dI_F/dt

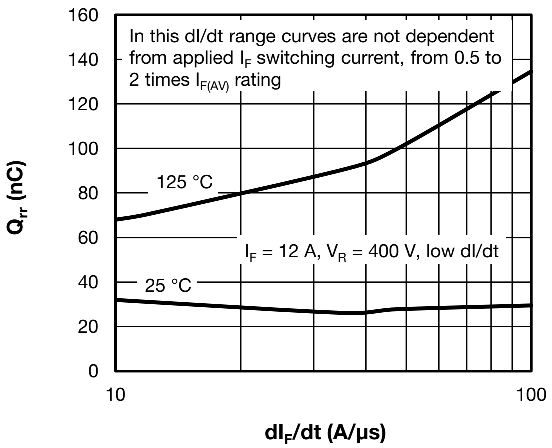


Fig. 11 - Typical Reverse Recovery Charge vs. dI_F/dt

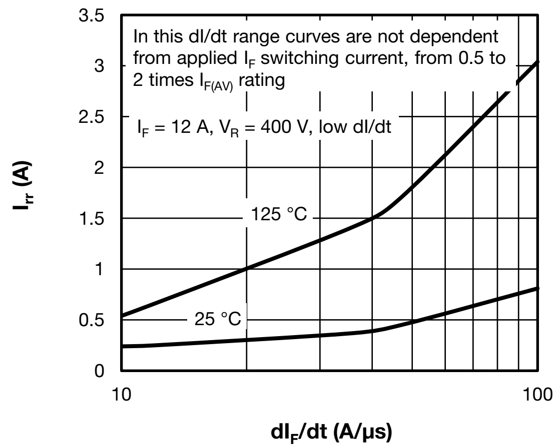


Fig. 12 - Typical Reverse Recovery Current vs. dI_F/dt

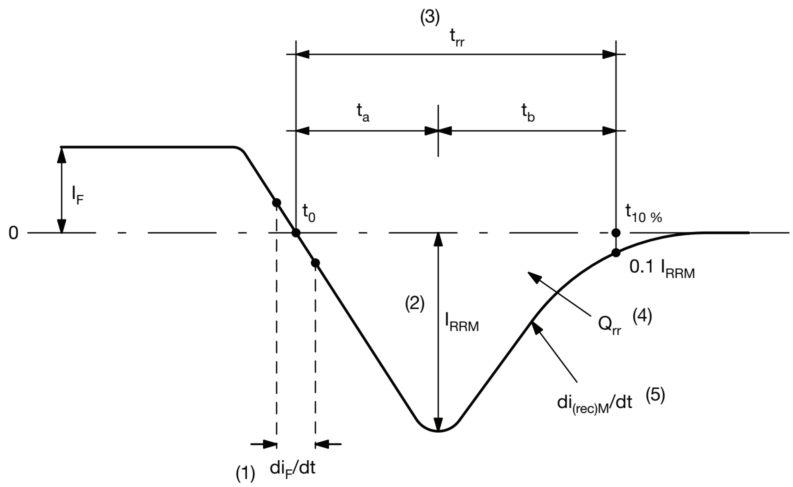


Fig. 13 - Reverse Recovery Waveform and Definitions

Notes

(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 t_0, crossing point of negative going I_F, to point $t_{10\%}$, 0.1 I_{RRM}

(4) Q_{rr} - area under curve defined by t_0 and $t_{10\,\%}$

$$Q_{rr} = \int_{t_0}^{t_{10\,\%}} I(t)dt$$

(5) $di_{(rec)}M/dt$ - peak rate of change of current during t_b portion of t_{rr}

ORDERING INFORMATION TABLE

Device code	VS-	E	5	T	W	12	06	FP	-N3
	1	2	3	4	5	6	7	8	9

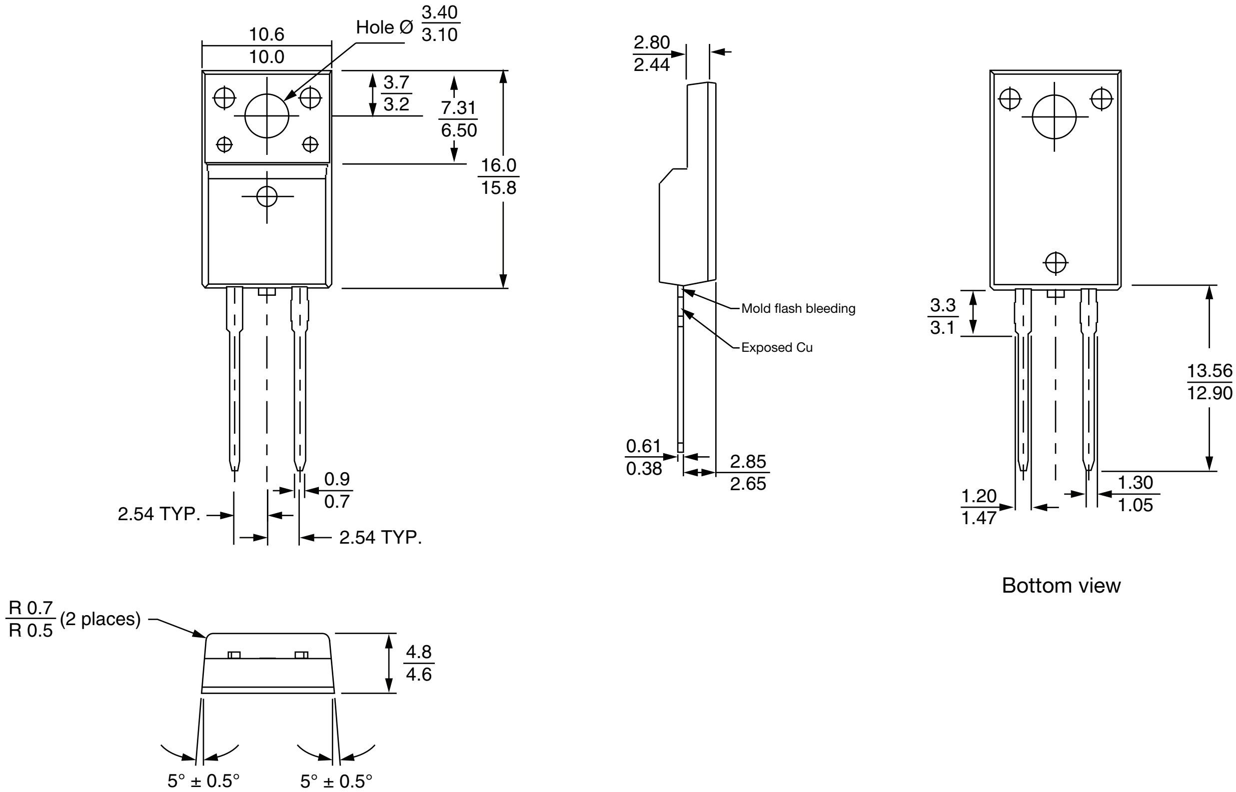
1 - Vishay Semiconductors product
2 - E = single diode
3 - 5 = FRED generation 5
4 - Package:
T = TO-220 package
5 - W = warp hyperfast recovery
6 - Current rating (12 = 12 A)
7 - Voltage rating (06 = 600 V)
8 - FP = TO-220 FullPAK 2L
9 - Environmental digit:
N3 = halogen-free, RoHS-compliant, and totally lead (Pb)-free

ORDERING INFORMATION (Example)			
PREFERRED P/N	**QUANTITY PER TUBE**	**MINIMUM ORDER QUANTITY**	**PACKAGING DESCRIPTION**
VS-E5TW1206FP-N3	50	1000	Antistatic plastic tube

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

2L TO-220 FullPAK

DIMENSIONS in millimeters



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