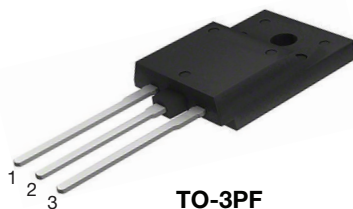
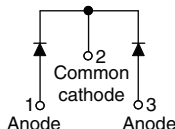


# Hyperfast Rectifier, 2 x 15 A FRED Pt® G5



TO-3PF



## 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 chip for high reliability standard
- Fully isolated package ( $V_{INS} = 2500 V_{RMS}$ )
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

## LINKS TO ADDITIONAL RESOURCES



3D Models



Application Notes

## PRIMARY CHARACTERISTICS

$I_{F(AV)}$	2 x 15 A
$V_R$	600 V
$V_F$ at $I_F$ at 125 °C	1.3 V
$t_{rr}$ (typ.)	19 ns
$T_J$ max.	175 °C
Package	TO-3PF
Circuit configuration	Common cathode

## 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-3PF

Molding compound meets UL 94 V-0 flammability rating

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

## ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Repetitive peak reverse voltage	$V_{RRM}$		600	V
Average rectified forward current in DC, per leg	$I_{F(AV)}$	$T_C = 110\text{ °C}$ , DC	15	A
Non-repetitive peak surge current, per leg	$I_{FSM}$	$T_C = 25\text{ °C}$ , $t_p = 10\text{ ms}$ , sine wave	205	
Operating junction and storage temperature	$T_J, T_{Stg}$		-55 to +175	°C

## ELECTRICAL SPECIFICATIONS ( $T_J = 25\text{ °C}$ unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Breakdown voltage, blocking voltage	$V_{BR}, V_R$	$I_R = 100\text{ }\mu\text{A}$	600	-	-	V
Forward voltage, per leg	$V_F$	$I_F = 15\text{ A}$	-	1.6	2.1	
		$I_F = 15\text{ A}$ , $T_J = 125\text{ °C}$	-	1.3	-	
Reverse leakage current, per leg	$I_R$	$V_R = V_R$ rated	-	-	10	$\mu\text{A}$
		$T_J = 125\text{ °C}$ , $V_R = V_R$ rated	-	-	500	
Junction capacitance, per leg	$C_T$	$V_R = 600\text{ V}$	-	19	-	pF

**DYNAMIC RECOVERY CHARACTERISTICS** ( $T_J = 25\text{ }^{\circ}\text{C}$  unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse recovery time, per leg	$t_{rr}$	$I_F = 1.0\text{ A}$ , $di_F/dt = 100\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$	-	19	-	ns
		$T_J = 25\text{ }^{\circ}\text{C}$	-	23	-	
		$T_J = 125\text{ }^{\circ}\text{C}$	-	36	-	
Peak recovery current, per leg	$I_{RRM}$	$T_J = 25\text{ }^{\circ}\text{C}$	-	12	-	A
		$T_J = 125\text{ }^{\circ}\text{C}$	-	20	-	
Reverse recovery charge, per leg	$Q_{rr}$	$T_J = 25\text{ }^{\circ}\text{C}$	-	180	-	nC
		$T_J = 125\text{ }^{\circ}\text{C}$	-	472	-	
Reverse recovery time, per leg	$t_{rr}$	$T_J = 25\text{ }^{\circ}\text{C}$	-	33	-	ns
		$T_J = 125\text{ }^{\circ}\text{C}$	-	44	-	
Peak recovery current, per leg	$I_{RRM}$	$T_J = 25\text{ }^{\circ}\text{C}$	-	13	-	A
		$T_J = 125\text{ }^{\circ}\text{C}$	-	21	-	
Reverse recovery charge, per leg	$Q_{rr}$	$T_J = 25\text{ }^{\circ}\text{C}$	-	220	-	nC
		$T_J = 125\text{ }^{\circ}\text{C}$	-	578	-	

**THERMAL - MECHANICAL SPECIFICATIONS**

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Thermal resistance, junction-to-case, per leg	$R_{thJC}$		-	-	3.1	$^{\circ}\text{C}/\text{W}$
Weight			-	2.0	-	g
Mounting torque			4 (3.5)	-	6 (5.3)	kgf · cm (lbf · in)
Maximum junction and storage temperature range	$T_J$ , $T_{Stg}$		-55	-	175	$^{\circ}\text{C}$
Marking device		Case style TO-3PF	C5ZX3006FP			

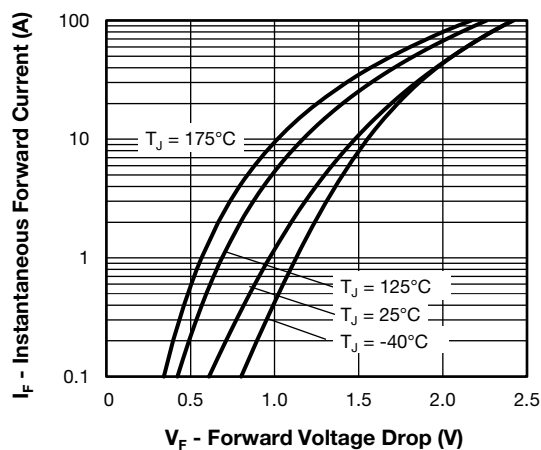


Fig. 1 - Forward Voltage Drop Characteristics, Per Leg

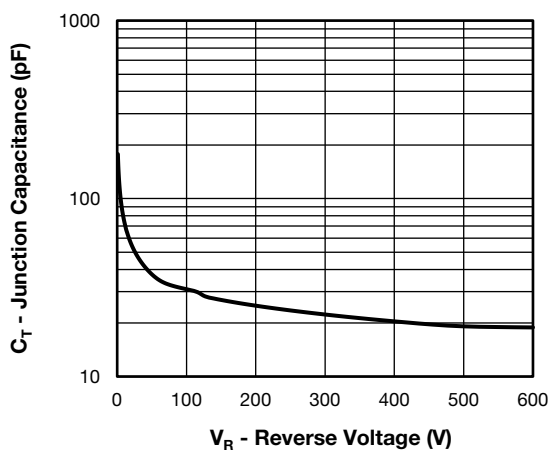


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage, Per Leg

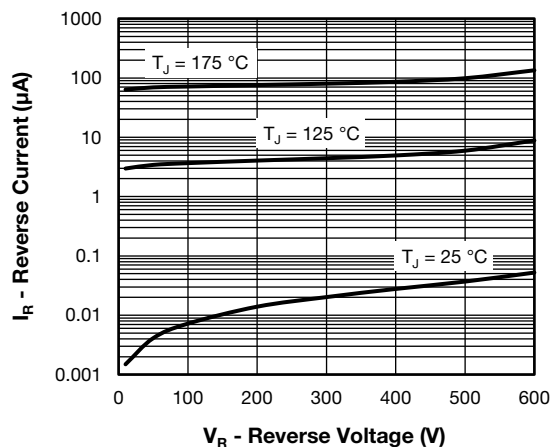


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage, Per Leg

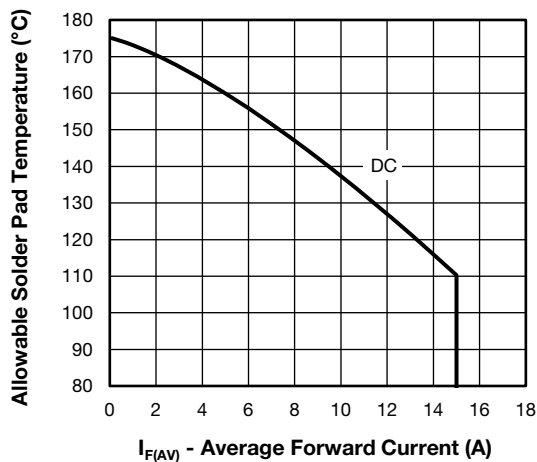


Fig. 4 - Maximum Allowable Case Temperature vs. Average Forward Current, Per Leg

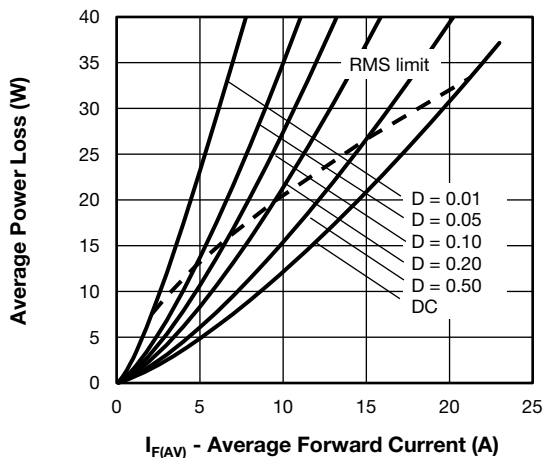


Fig. 5 - Forward Power Loss Characteristics, Per Leg

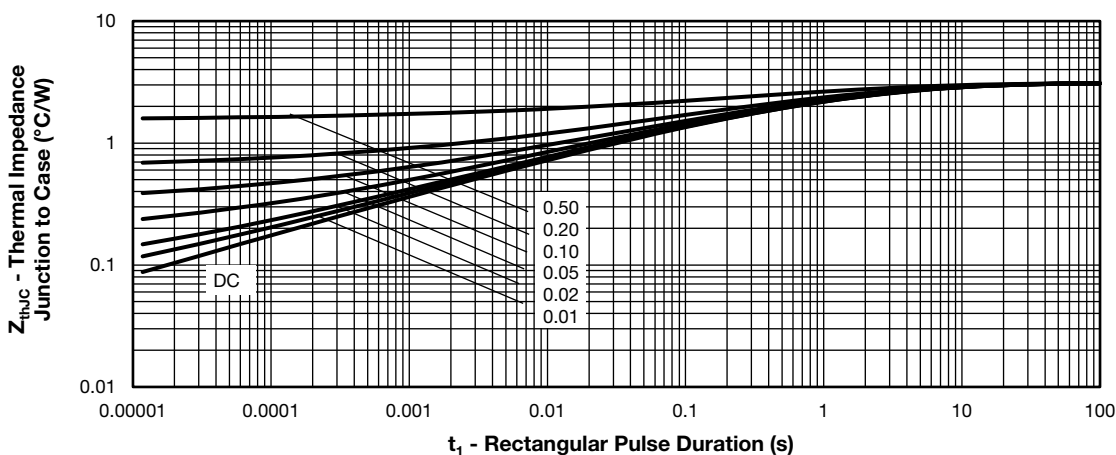
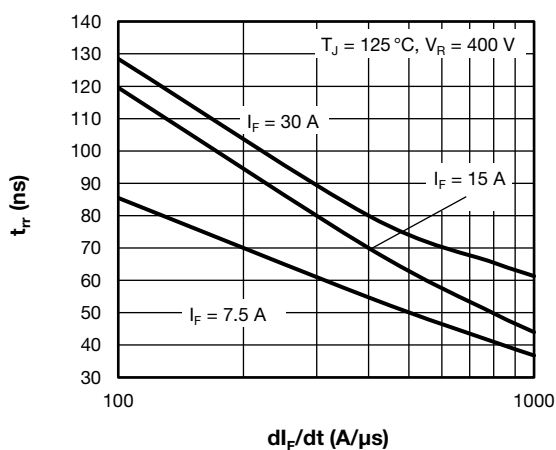
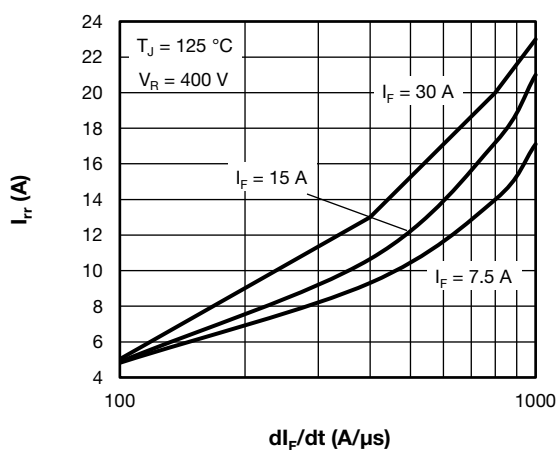
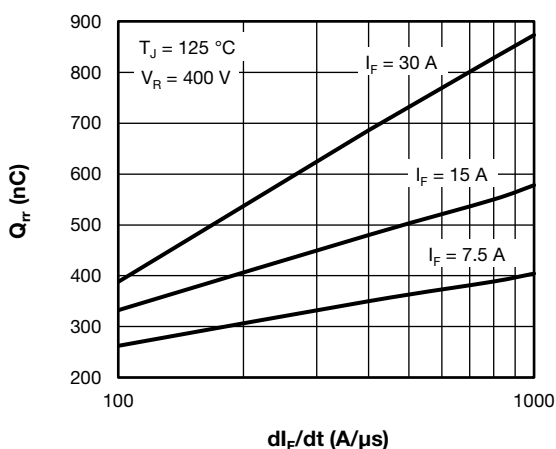
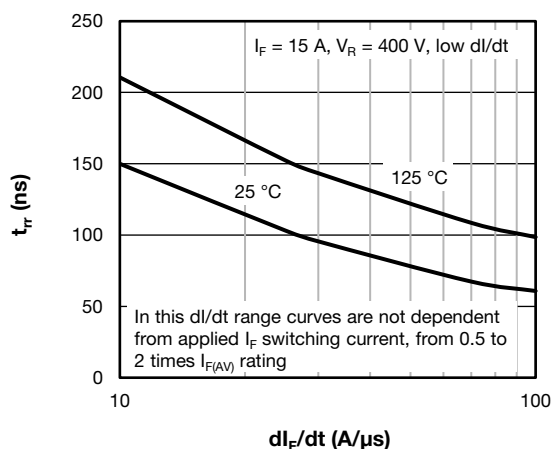


Fig. 6 - Transient Thermal Impedance, Junction to Case, Per Leg


Fig. 7 - Typical Reverse Recovery Time vs.  $dI_F/dt$ , Per Leg

Fig. 9 - Typical Reverse Recovery Current vs.  $dI_F/dt$ , Per Leg

Fig. 8 - Typical Reverse Recovery Charge vs.  $dI_F/dt$ , Per Leg

Fig. 10 - Typical Reverse Recovery Time vs.  $dI_F/dt$ , Per Leg

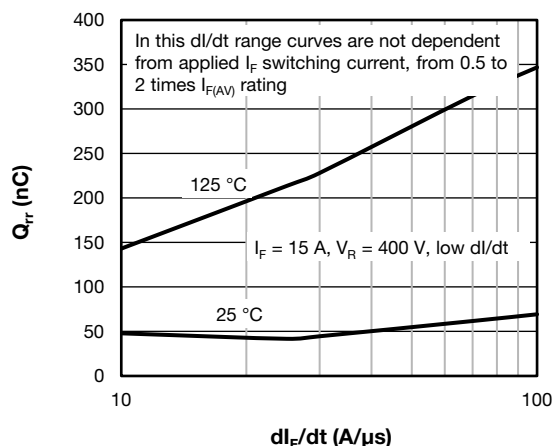
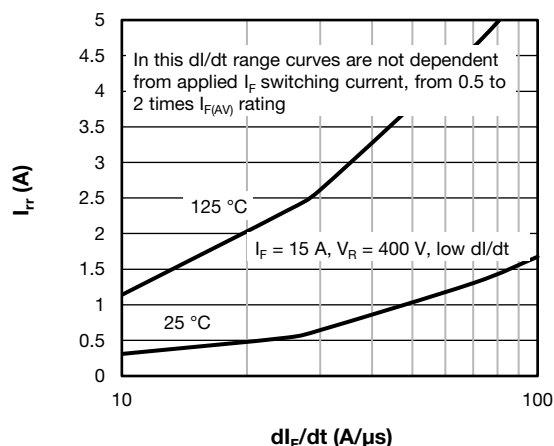
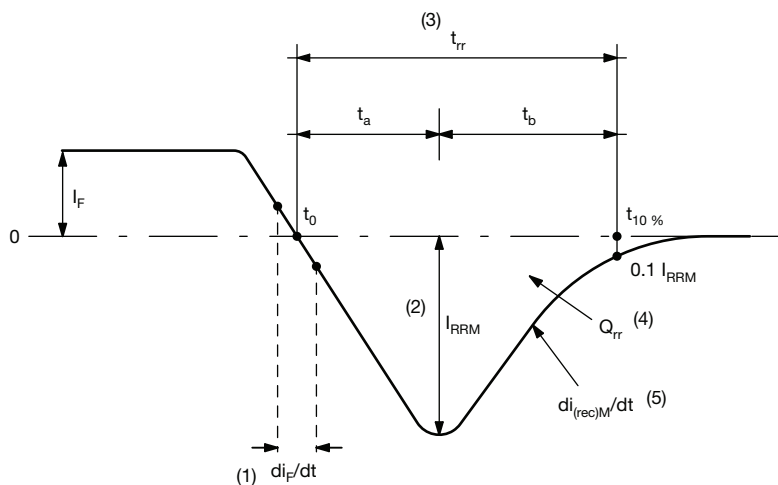

Fig. 11 - Typical Reverse Recovery Charge vs.  $di_F/dt$ , Per Leg

Fig. 12 - Typical Reverse Recovery Current vs.  $di_F/dt$ , Per Leg


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

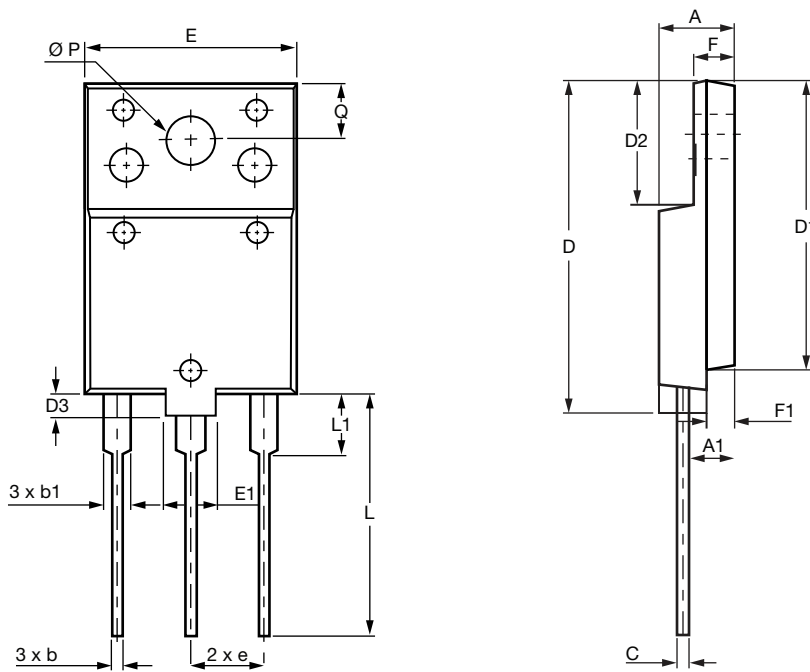
Device code	VS-	C	5	Z	X	30	06	FP	-N3
	1	2	3	4	5	6	7	8	9
1	-	Vishay Semiconductors product							
2	-	C = common cathode							
3	-	5 = FRED generation 5							
4	-	Package: Z = TO-3PF package							
5	-	X = hyperfast recovery							
6	-	Current rating (30 = 30 A)							
7	-	Voltage rating (06 = 600 V)							
8	-	FP = FullPAK							
9	-	Environmental digit: N3 = halogen-free, RoHS-compliant, and totally lead (Pb)-free							

ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER TUBE	BASE QUANTITY	PACKAGING DESCRIPTION
VS-C5ZX3006FP-N3	25	300	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS		
Dimensions	TO-3PF	<a href="http://www.vishay.com/doc?96691">www.vishay.com/doc?96691</a>
Part marking information	TO-3PF	<a href="http://www.vishay.com/doc?96690">www.vishay.com/doc?96690</a>

## TO-3PF

**DIMENSIONS** in millimeters



SYMBOL	MIN.	NOM.	MAX.
A	5.30	5.50	5.70
A1	3.10	3.30	3.50
b	0.65	0.85	0.95
b1	1.80	2.00	2.20
c	0.80	0.90	1.10
D	26.30	26.50	26.70
D1	22.80	23.00	23.20
D2	9.80	10.00	10.20
D3	1.80	2.00	2.20
E	15.30	15.50	15.70
E1	3.80	4.00	4.20
e	5.45 BSC		
F	2.80	3.00	3.20
F1	1.80	2.00	2.20
L	19.10	19.30	19.50
L1	4.20	4.50	5.20
Q	4.30	4.50	4.70
$\varnothing P$	3.40	3.60	3.80



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