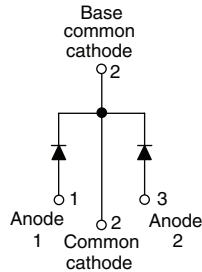


## Ultrafast Rectifier, 2 x 35 A FRED Pt™


**TO-218**


### FEATURES

- Two common-cathode diodes
- Ultrafast reverse recovery
- Ultrafast reverse recovery current shape
- Low forward voltage drop
- Low leakage current
- Optimized for power conversion: welding and industrial SMPS applications
- Up to 175 °C operating junction temperature
- Designed and qualified for industrial level

### DESCRIPTION

The 70CRU02 integrates two state of the art Vishay HPP ultrafast recovery rectifiers in the common-cathode configuration. The planar structure of the diodes, and the platinum doping life-time control, provide a ultrasoft recovery current shape, together with the best overall performance, ruggedness and reliability characteristics. These devices are thus intended for high frequency applications in which the switching energy is designed not to be predominant portion of the total energy, such as in the output rectification stage of welding machines, SMPS, dc-to-dc converters. Their extremely optimized stored charge and low recovery current reduce both over-dissipation in the switching elements (and snubbers) and EMI/RFI.

### PRODUCT SUMMARY

$I_{F(AV)}$ at $T_C = 145\text{ °C}$	2 x 35 A
$V_R$	200 V
$t_{rr}$	28 ns

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Continuous forward current per diode	$I_{F(AV)}$	$T_C = 145\text{ °C}$	35	A
Cathode to anode voltage	$V_R$		200	V
Single pulse forward current per diode	$I_{FSM}$	$T_C = 25\text{ °C}$	300	A
Maximum power dissipation per module	$P_D$	$T_C = 100\text{ °C}$	67	W
Operating junction and storage temperatures	$T_J, T_{Stg}$		- 55 to 175	°C

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Breakdown voltage, blocking voltage	$V_{BR}, V_R$	$I_R = 60\text{ }\mu\text{A}$	200	-	-	V
Forward voltage	$V_F$	$I_F = 35\text{ A}$	-	0.95	1.09	
		$I_F = 35\text{ A}, T_J = 125\text{ °C}$	-	0.9	1.0	
		$I_F = 35\text{ A}, T_J = 175\text{ °C}$	-	0.85	0.9	
Reverse leakage current	$I_R$	$V_R = V_R\text{ rated}$	-	-	60	$\mu\text{A}$
		$T_J = 150\text{ °C}, V_R = V_R\text{ rated}$	-	-	2	mA
Junction capacitance	$C_T$	$V_R = 200\text{ V}$	-	50	-	pF
Series inductance	$L_S$	Measured from A-lead to K-lead 5 mm from package body	-	10	-	nH



<b>DYNAMIC RECOVERY CHARACTERISTICS PER DIODE</b> ( $T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
Reverse recovery time	$t_{rr}$	$T_J = 25\text{ }^\circ\text{C}$	$I_F = 1\text{ A}$ $V_R = 30\text{ V}$ $di_F/dt = 200\text{ A}/\mu\text{s}$	-	-	28	ns
		$T_J = 125\text{ }^\circ\text{C}$		-	34	-	
		$T_J = 25\text{ }^\circ\text{C}$	$I_F = 35\text{ A}$ $V_{RR} = 100\text{ V}$ $di_F/dt = 200\text{ A}/\mu\text{s}$	-	26	-	
		$T_J = 125\text{ }^\circ\text{C}$		-	49	-	
Peak recovery current	$I_{RRM}$	$T_J = 25\text{ }^\circ\text{C}$	$I_F = 35\text{ A}$ $V_{RR} = 100\text{ V}$ $di_F/dt = 200\text{ A}/\mu\text{s}$	-	3.7	-	A
		$T_J = 125\text{ }^\circ\text{C}$		-	8.2	-	
Reverse recovery charge	$Q_{rr}$	$T_J = 25\text{ }^\circ\text{C}$	$I_F = 35\text{ A}$ $V_{RR} = 100\text{ V}$ $di_F/dt = 200\text{ A}/\mu\text{s}$	-	48.7	-	$\mu\text{C}$
		$T_J = 125\text{ }^\circ\text{C}$		-	202	-	

<b>THERMAL - MECHANICAL SPECIFICATIONS</b>							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
Thermal resistance, junction to case	$R_{thJC}$	per diode		-	0.8	0.9	K/W
		both legs		-	-	0.45	
Thermal resistance, case to heatsink	$R_{thCS}$	Mounting surface, flat, smooth and greased		-	0.2	-	
Weight				-	5.5	-	g
				-	0.2	-	oz.
Mounting torque				1.2 (10)	-	2.4 (20)	N · m (lbf · in)
Marking device		Case style TO-218		70CRU02			

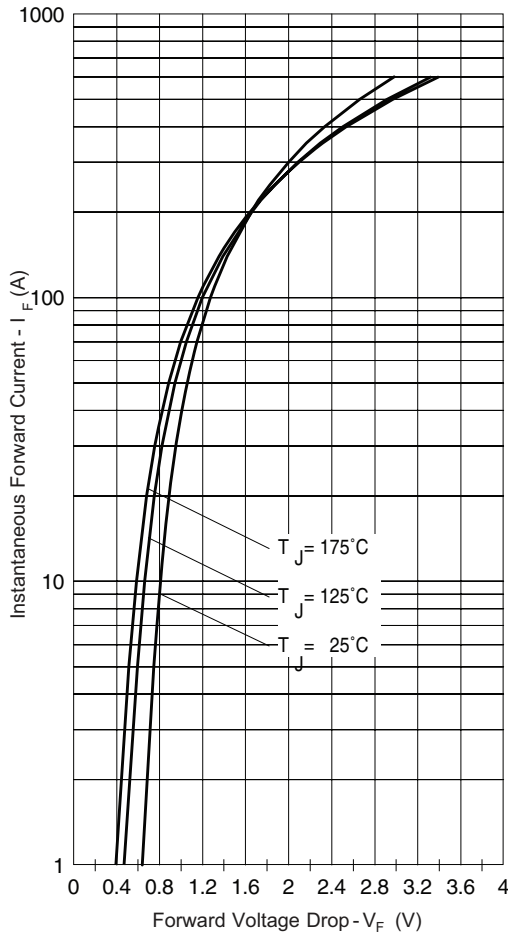


Fig. 1 - Typical Forward Voltage Drop Characteristics (Per Diode)

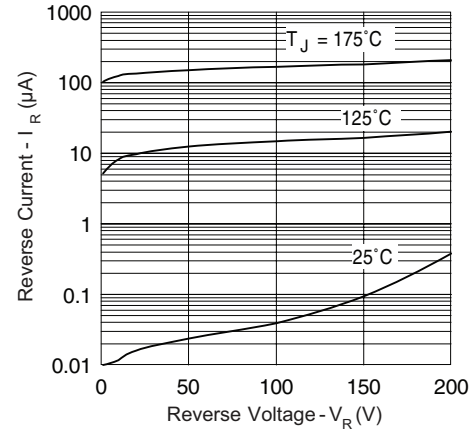


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

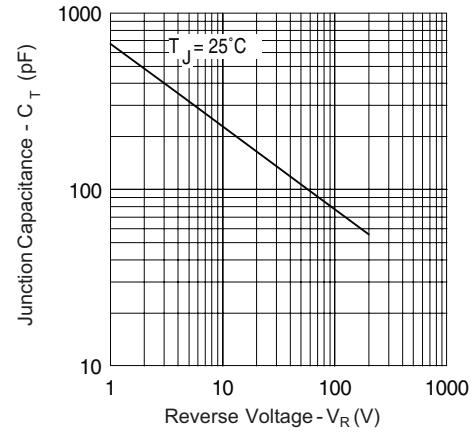
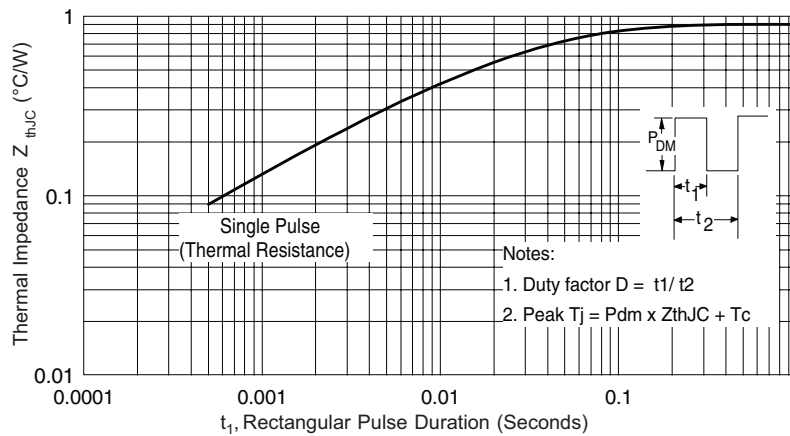


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage


 Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics (Per Diode)

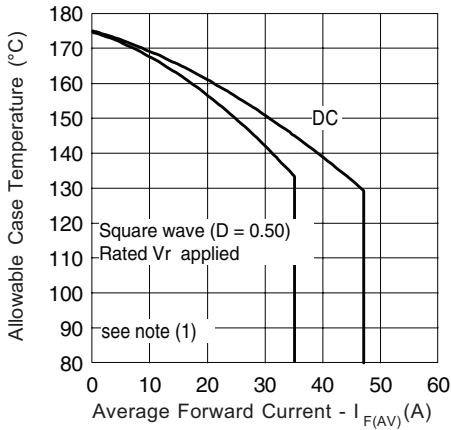


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

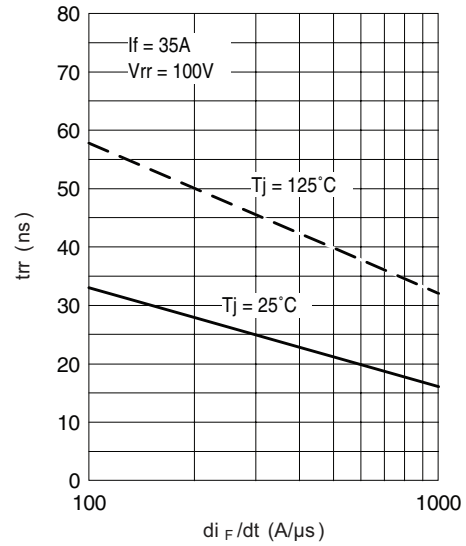


Fig. 7 - Typical Reverse Recovery Time vs.  $di_F/dt$

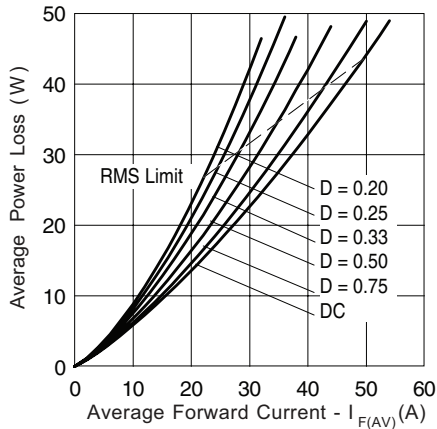


Fig. 6 - Forward Power Loss Characteristics

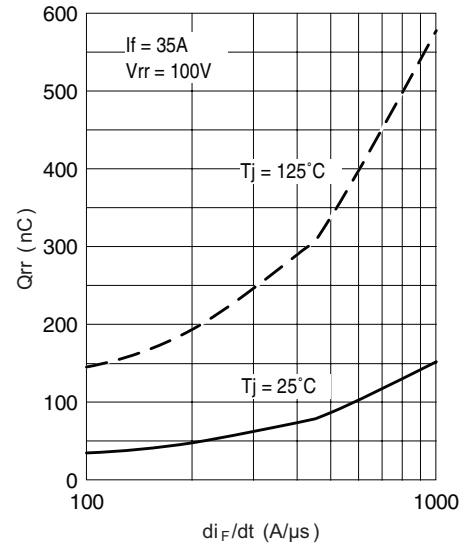


Fig. 8 - Typical Stored Charge vs.  $di_F/dt$

**Note**

- (1) Formula used:  $T_C = T_J - (P_d + P_{d_{REV}}) \times R_{thJC}$ ;  
 $P_d$  = Forward power loss =  $I_{F(AV)} \times V_{FM}$  at  $(I_{F(AV)}/D)$  (see fig. 6);  
 $P_{d_{REV}}$  = Inverse power loss =  $V_{R1} \times I_R (1 - D)$ ;  $I_R$  at  $V_{R1}$  = Rated  $V_R$

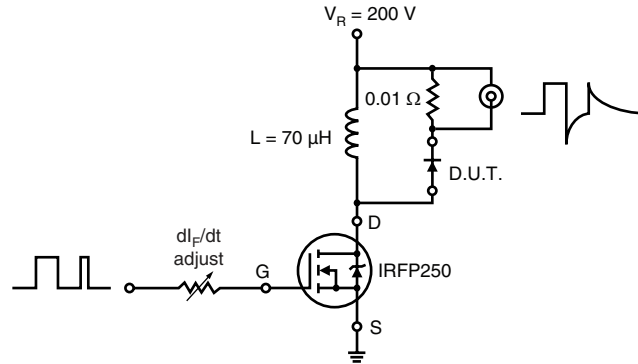
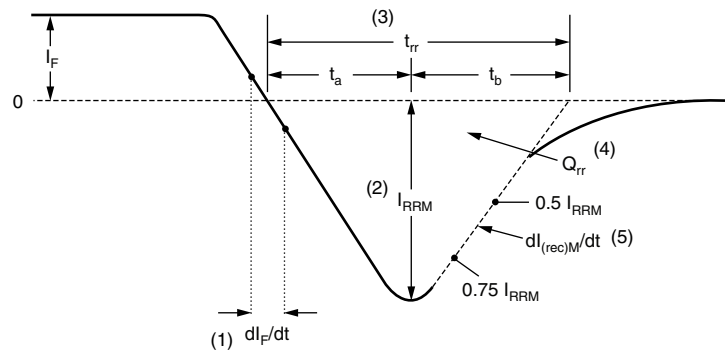


Fig. 9 - Reverse Recovery Parameter Test Circuit



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

Fig. 10 - Reverse Recovery Waveform and Definitions



## ORDERING INFORMATION TABLE

Device code	<b>70</b>	<b>C</b>	<b>R</b>	<b>U</b>	<b>02</b>	<b>-</b>
	①	②	③	④	⑤	⑥

- 1** - Current rating (70 = 70 A)
- 2** - Common cathode
- 3** - TO-218
- 4** - Ultrafast recovery
- 5** - Voltage rating (02 = 200 V)
- 6** -
  - None = Standard production
  - PbF = Lead (Pb)-free

Tube standard pack quantity: 30 pieces

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95214">http://www.vishay.com/doc?95214</a>
Part marking information	<a href="http://www.vishay.com/doc?95219">http://www.vishay.com/doc?95219</a>



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