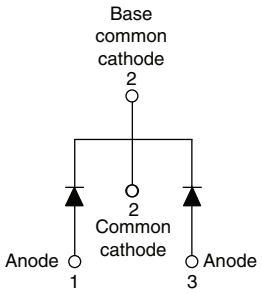
Ultrafast Rectifier, 16 A FRED Pt™

TO-220AB



FEATURES

- Ultrafast recovery time
- Low forward voltage drop
- Low leakage current
- 175 °C operating junction temperature
- Lead (Pb)-free ("PbF" suffix)
- Designed and qualified for industrial level

Pb-free Available

RoHS* COMPLIANT

DESCRIPTION/APPLICATIONS

FRED Pt™ series are the state of the art ultrafast recovery rectifiers specifically designed with opmized performance of forward voltage drop and ultrafast recovery time.
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 the output rectification stage of SMPS, UPS, dc-to-dc converters as well as freewheeling diode in low voltage inverters and chopper motor drives.
Their extremely optimized stored charge and low recovery current minimize the switching losses and reduce over dissipation in the switching element and snubbers.

PRODUCT SUMMARY	
t_{rr}	60 ns
$I_{F(AV)}$	16 A
V_R	400 V

ABSOLUTE MAXIMUM RATINGS						
PARAMETER			SYMBOL	TEST CONDITIONS	VALUES	UNITS
Peak repetitive reverse voltage			V_{RRM}		400	V
Average rectified forward current	per leg		$I_{F(AV)}$		8	A
	total device			T_C = 155 °C, rated V_R	16	
Non-repetitive peak surge current			I_{FSM}	T_C = 25 °C	100	
Peak repetitive forward current			I_{FRM}	T_C = 155 °C, rated V_R, square wave, 20 kHz	16	
Operating junction and storage temperatures			T_J, T_{Stg}		- 65 to 175	°C

ELECTRICAL SPECIFICATIONS PER LEG (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	400	-	-	V
Forward voltage	V_F	I_F = 8 A	-	1.19	1.3	
		I_F = 8 A, T_J = 150 °C	-	0.94	1.0	
Reverse leakage current	I_R	V_R = V_R rated	-	0.2	10	µA
		T_J = 150 °C, V_R = V_R rated	-	20	500	
Junction capacitance	C_T	V_R = 400 V	-	14	-	pF
Series inductance	L_S	Measured lead to lead 5 mm from package body	-	8.0	-	nH

* Pb containing terminations are not RoHS compliant, exemptions may apply

DYNAMIC RECOVERY CHARACTERISTICS PER LEG (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 = 50 A/µA, V_R = 30 V		-	35	60	ns
		T_J = 25 °C	I_F = 8 A dI_F/dt = 200 A/µs V_R = 200 V	-	43	-	
		T_J = 125 °C		-	67	-	
Peak recovery current	I_{RRM}	T_J = 25 °C		-	2.8	-	A
		T_J = 125 °C		-	6.3	-	
Reverse recovery charge	Q_{rr}	T_J = 25 °C		-	60	-	nC
		T_J = 125 °C		-	-	210	

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}		-	1.8	2	°C/W
Thermal resistance, junction to ambient	R_{thJA}	Typical socket mount	-	-	50	
Thermal resistance, case to heatsink	R_{thCS}	Mounting surface, flat, smooth and greased	-	0.5	-	
Weight			-	2.0	-	g
			-	0.07	-	oz.
Mounting torque			6.0 (5.0)	-	12 (10)	kgf · cm (lbf · in)
Marking device		Case style TO-220AB	16CTU04			

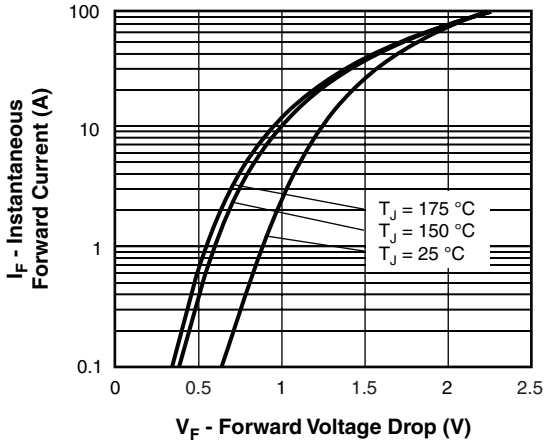


Fig. 1 - Typical Forward Voltage Drop Characteristics

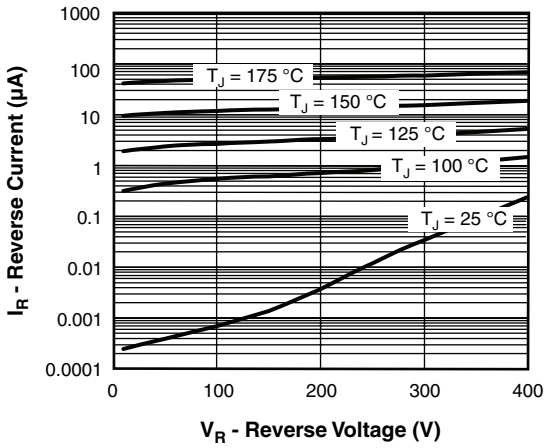


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

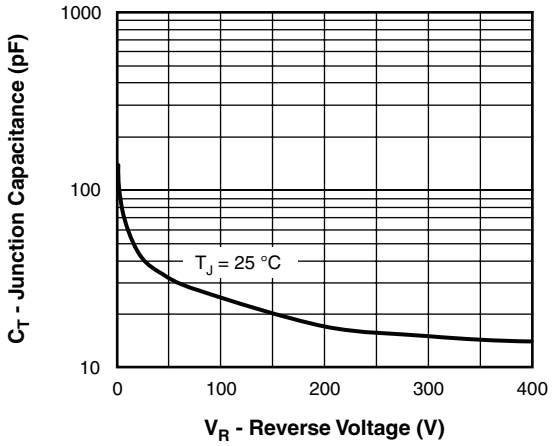


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

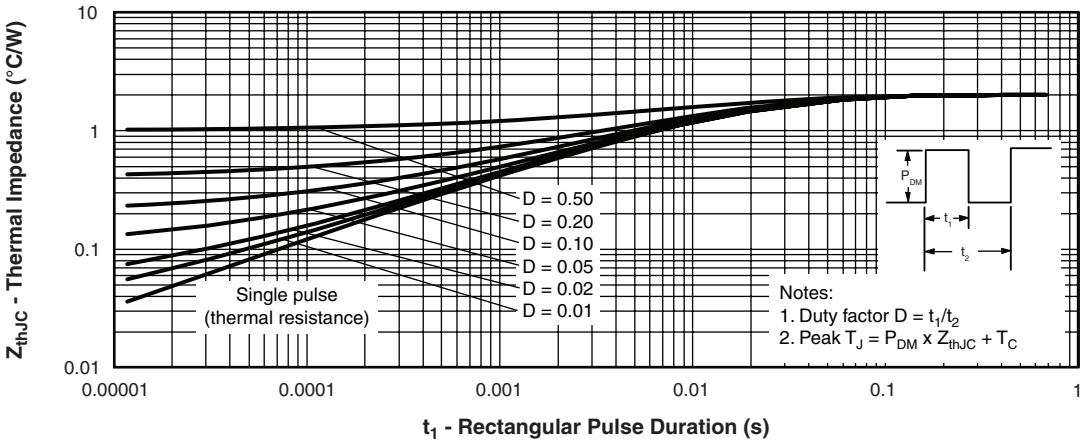


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

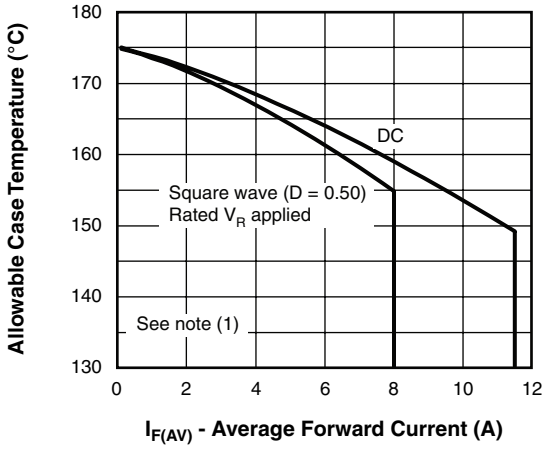


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

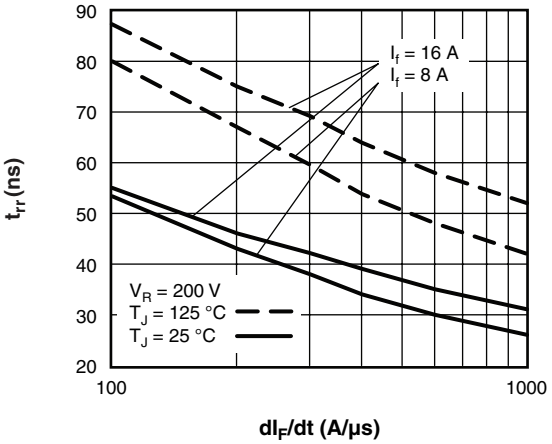


Fig. 7 - Typical Reverse Recovery Time vs. dI_F/dt

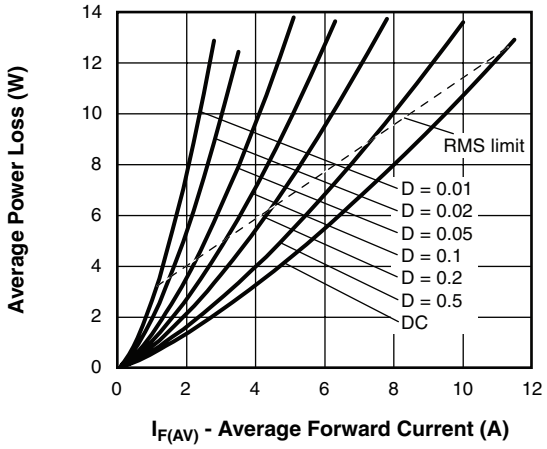


Fig. 6 - Forward Power Loss Characteristics

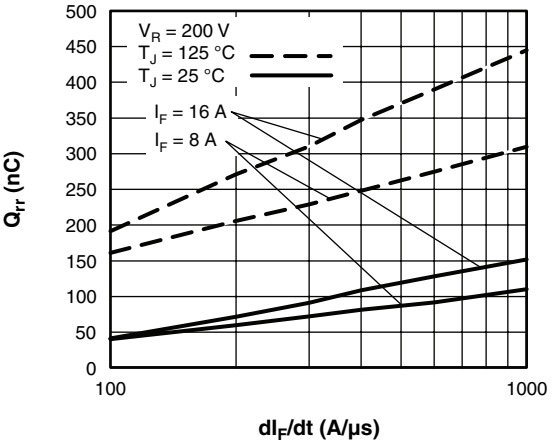


Fig. 8 - Typical Stored Charge vs. dI_F/dt

Note

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

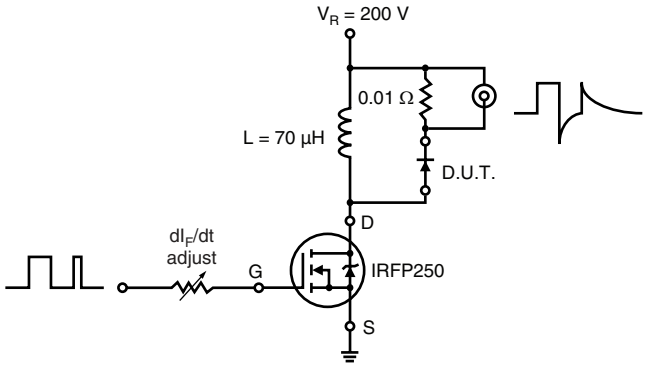
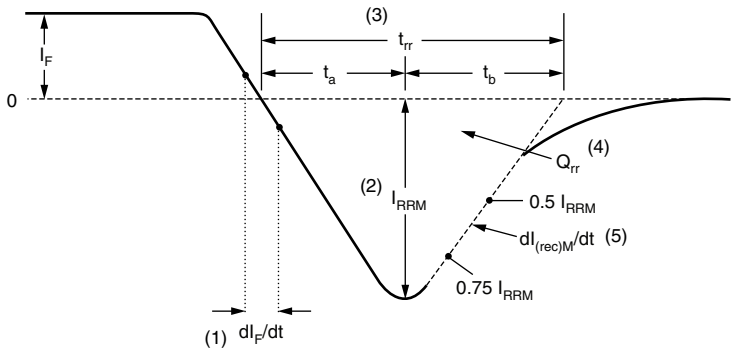


Fig. 9 - Reverse Recovery Parameter Test Circuit



(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}

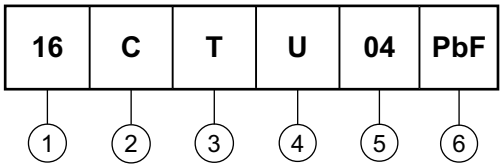
$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

(5) $dI_{(rec)M}/dt$ - 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



1 - Current rating (16 = 16 A)

2 - Circuit configuration:
C = Common cathode

3 - Package:
T = TO-220

4 - Ultrafast recovery

5 - Voltage rating (04 = 400 A)

6 - • None = Standard production
• PbF = Lead (Pb)-free

Tube standard pack quantity: 50 pieces

LINKS TO RELATED DOCUMENTS	
Dimensions	http://www.vishay.com/doc?95222
Part marking information	http://www.vishay.com/doc?95225

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