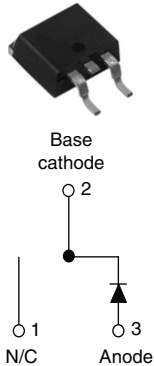
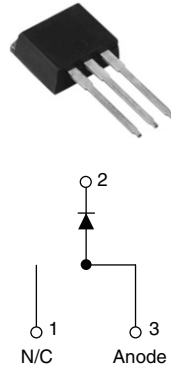


## Ultrafast Rectifier, 8 A FRED P<sub>t</sub><sup>TM</sup>

**8ETU04SPbF**

**D<sup>2</sup>PAK**
**8ETU04-1PbF**

**TO-262**
**FEATURES**

- Ultrafast recovery time
- Low forward voltage drop
- Low leakage current
- 175 °C operating junction temperature
- Lead (Pb)-free
- Designed and qualified for Q101 level


 Available  
**RoHS\***  
 COMPLIANT

**DESCRIPTION/APPLICATIONS**

FRED P<sub>t</sub><sup>TM</sup> series are the state of the art ultrafast recovery rectifiers specifically designed with optimized 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
$I_{F(AV)}$	8 A
$V_R$	400 V

**ABSOLUTE MAXIMUM RATINGS**

PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Repetitive peak reverse voltage	$V_{RRM}$		400	V
Average rectified forward current	$I_{F(AV)}$	$T_C = 155\text{ °C}$	8	A
Non-repetitive peak surge current	$I_{FSM}$	$T_C = 25\text{ °C}$	100	
Repetitive peak forward current	$I_{FRM}$		16	
Operating junction and storage temperatures	$T_J, T_{Stg}$		- 65 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	$V_{BR}, V_R$	$I_R = 100\ \mu\text{A}$	400	-	-	V
		$I_F = 8\text{ A}$	-	1.19	1.3	
Forward voltage	$V_F$	$I_F = 8\text{ A}, T_J = 150\text{ °C}$	-	0.94	1.0	μA
		$V_R = V_R\text{ rated}$	-	0.2	10	
Reverse leakage current	$I_R$	$T_J = 150\text{ °C}, V_R = V_R\text{ rated}$	-	20	500	pF
		$V_R = 400\text{ V}$	-	14	-	
Junction capacitance	$C_T$	$V_R = 400\text{ V}$	-	14	-	nH
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

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<b>DYNAMIC RECOVERY CHARACTERISTICS</b> ( $T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse recovery time	$t_{rr}$	$I_F = 1.0\text{ A}$ , $di_F/dt = 50\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$	-	35	60	ns
		$T_J = 25\text{ }^\circ\text{C}$	-	43	-	
		$T_J = 125\text{ }^\circ\text{C}$	-	67	-	
Peak recovery current	$I_{RRM}$	$T_J = 25\text{ }^\circ\text{C}$	-	2.8	-	A
		$T_J = 125\text{ }^\circ\text{C}$	-	6.3	-	
Reverse recovery charge	$Q_{rr}$	$T_J = 25\text{ }^\circ\text{C}$	-	60	-	nC
		$T_J = 125\text{ }^\circ\text{C}$	-	210	-	

<b>THERMAL - MECHANICAL SPECIFICATIONS</b>						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Maximum junction and storage temperature range	$T_J$ , $T_{Stg}$		- 65	-	175	$^\circ\text{C}$
Thermal resistance, junction to case	$R_{thJC}$		-	1.8	2.0	$^\circ\text{C}/\text{W}$
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 D <sup>2</sup> PAK	8ETU04S			
		Case style TO-262	8ETU04-1			

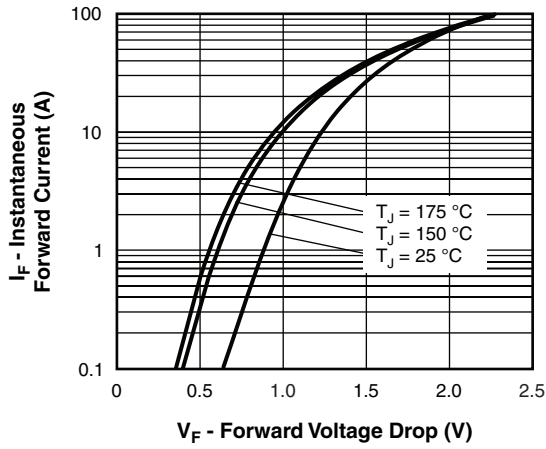


Fig. 1 - Typical Forward Voltage Drop Characteristics

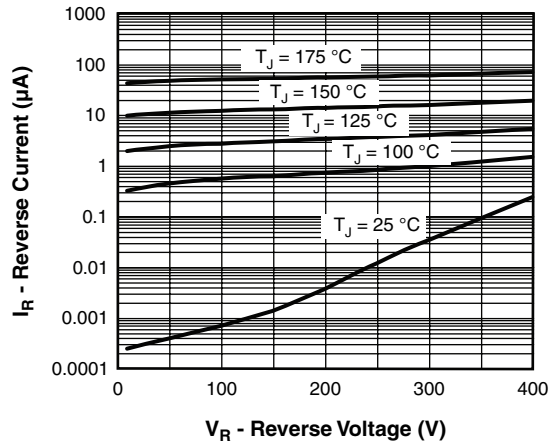


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

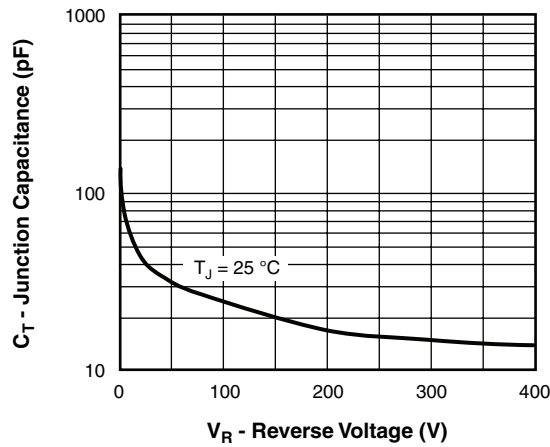


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

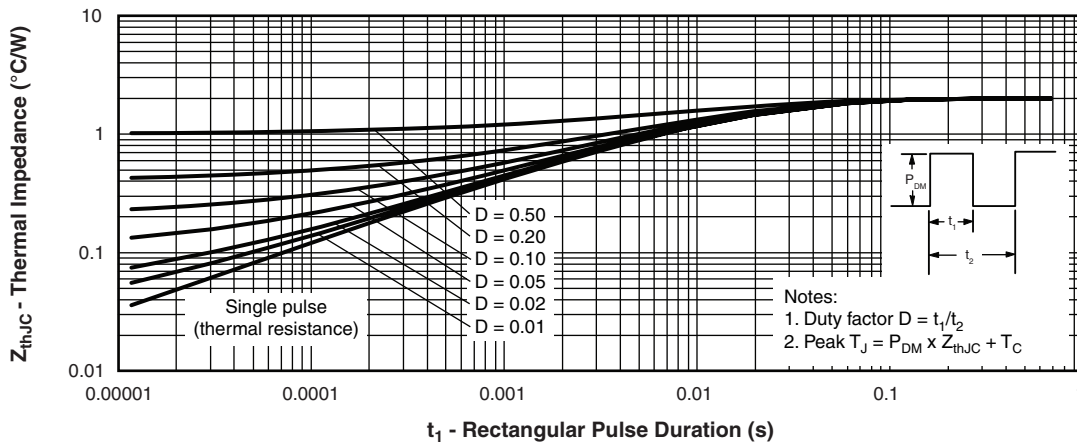


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

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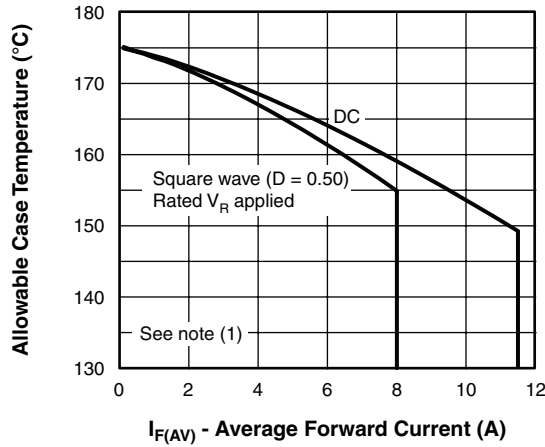


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

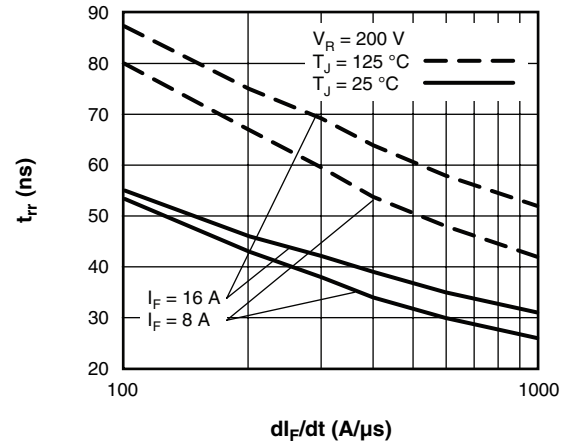


Fig. 7 - Typical Reverse Recovery Time vs.  $di_F/dt$

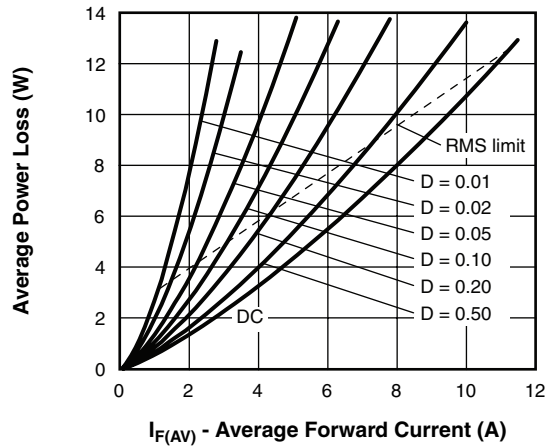


Fig. 6 - Forward Power Loss Characteristics

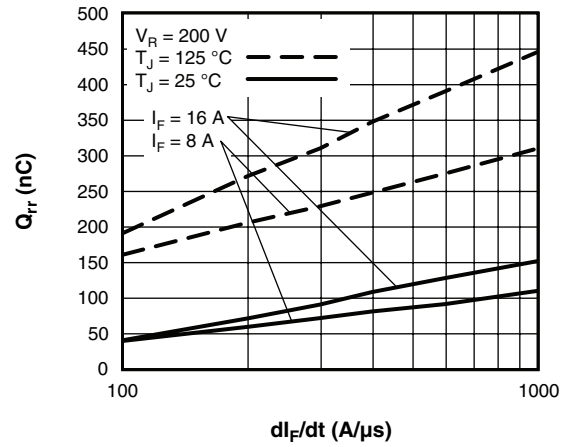


Fig. 8 - Typical Stored Charge vs.  $di_F/dt$

**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

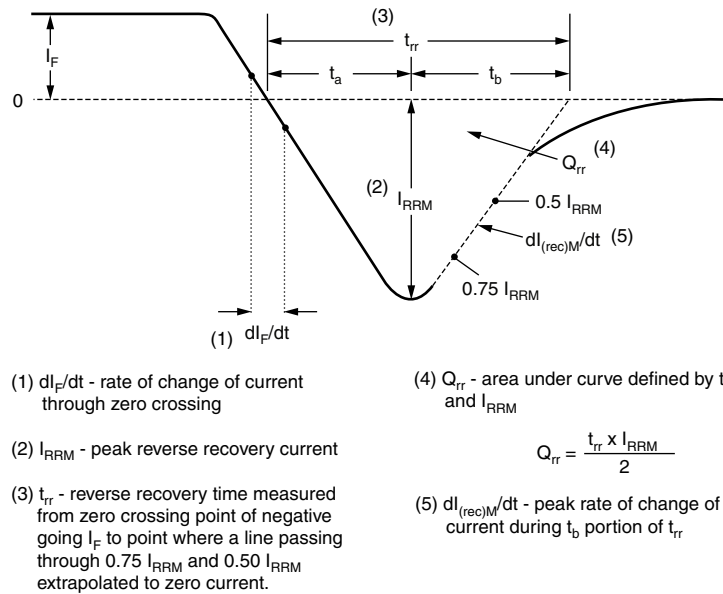


Fig. 10 - Reverse Recovery Waveform and Definitions

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## ORDERING INFORMATION TABLE

Device code	<b>8</b>	<b>E</b>	<b>T</b>	<b>U</b>	<b>04</b>	<b>S</b>	<b>TRL</b>	<b>PbF</b>
	①	②	③	④	⑤	⑥	⑦	⑧

- 1** - Current rating (8 A)
- 2** - E = Single diode
- 3** - T = TO-220, D<sup>2</sup>PAK
- 4** - U = Ultrafast recovery
- 5** - Voltage rating (04 = 400 V)
- 6** -
  - S = D<sup>2</sup>PAK
  - -1 = TO-262
- 7** -
  - None = Tube (50 pieces)
  - TRL = Tape and reel (left oriented, for D<sup>2</sup>PAK package)
  - TRR = Tape and reel (right oriented, for D<sup>2</sup>PAK package)
- 8** -
  - None = Standard production
  - PbF = Lead (Pb)-free

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95014">http://www.vishay.com/doc?95014</a>
Part marking information	<a href="http://www.vishay.com/doc?95008">http://www.vishay.com/doc?95008</a>
Packaging information	<a href="http://www.vishay.com/doc?95032">http://www.vishay.com/doc?95032</a>



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