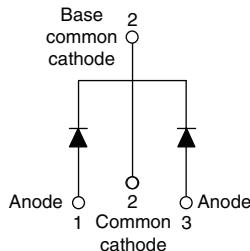


## Ultrafast Rectifier, 2 x 10 A FRED Pt®


**TO-220AB**

**RoHS\***  
COMPLIANT

### FEATURES

- Ultrafast recovery time
- Low forward voltage drop
- Low leakage current
- 175 °C operating junction temperature
- Compliant to RoHS directive 2002/95/EC
- Designed and qualified for industrial level

### DESCRIPTION/APPLICATIONS

MUR.. 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	
$t_{rr}$	25 ns
$I_{F(AV)}$	2 x 10 A
$V_R$	200 V

ABSOLUTE MAXIMUM RATINGS						
PARAMETER	SYMBOL	TEST CONDITIONS			MAX.	UNITS
Peak repetitive reverse voltage	$V_{RRM}$				200	V
Average rectified forward current per leg	$I_{F(AV)}$				10	A
		Rated $V_R$ , $T_C = 145$ °C			20	
					100	
Non-repetitive peak surge current per leg	$I_{FSM}$				20	
Peak repetitive forward current per leg	$I_{FM}$	Rated $V_R$ , square wave, 20 kHz, $T_C = 145$ °C			- 65 to 175	°C
Operating junction and storage temperatures	$T_J, T_{Stg}$					

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		200	-	-	V
Forward voltage	$V_F$	$I_F = 8$ A, $T_J = 125$ °C		-	-	0.85	
		$I_F = 16$ A		-	-	1.15	
		$I_F = 16$ A, $T_J = 125$ °C		-	-	1.05	
Reverse leakage current	$I_R$	$V_R = V_R$ rated		-	-	15	µA
		$T_J = 150$ °C, $V_R = V_R$ rated		-	-	250	
Junction capacitance	$C_T$	$V_R = 200$ V		-	55	-	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

# MUR2020CTPbF

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Ultrafast Rectifier,  
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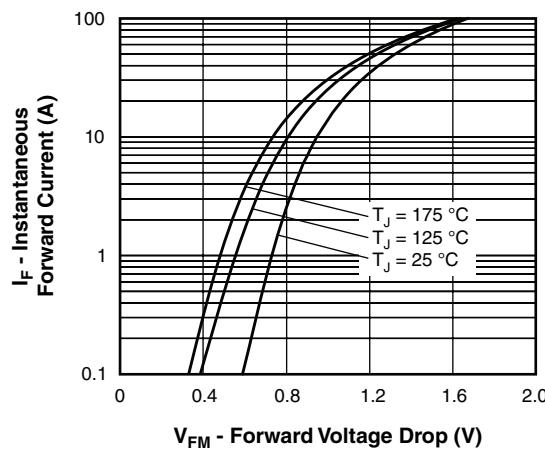
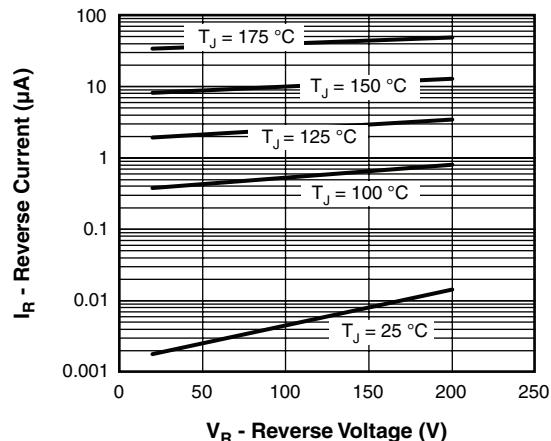
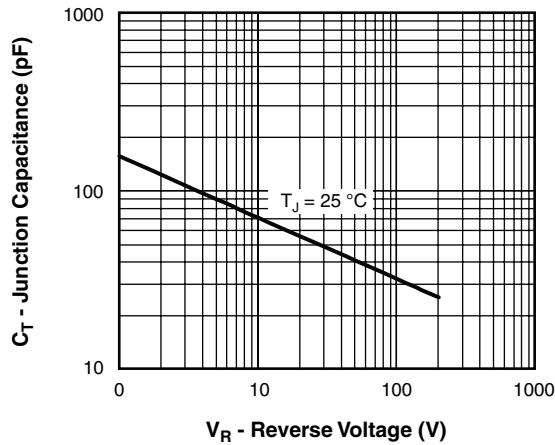
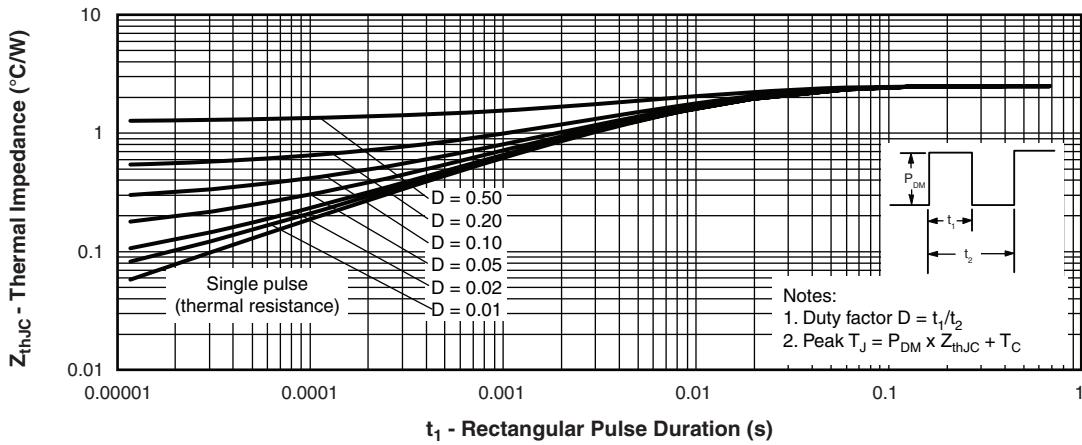


## DYNAMIC RECOVERY CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ unless otherwise specified)

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	ns
		$I_F = 0.5 \text{ A}$ , $I_R = 1.0 \text{ A}$ , $I_{REC} = 0.25 \text{ A}$	-	-	25	
		$T_J = 25^\circ\text{C}$	-	21	-	
		$T_J = 125^\circ\text{C}$	-	35	-	
Peak recovery current	$I_{RRM}$	$T_J = 25^\circ\text{C}$	-	1.9	-	A
		$T_J = 125^\circ\text{C}$	-	4.8	-	
Reverse recovery charge	$Q_{rr}$	$T_J = 25^\circ\text{C}$	-	25	-	nC
		$T_J = 125^\circ\text{C}$	-	78	-	

## 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, per leg junction to case	$R_{thJC}$		-	-	2.5	°C/W
			-	-	1.25	
Thermal resistance, junction to ambient per leg	$R_{thJA}$		-	-	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)	$\text{kgf} \cdot \text{cm}$ (lbf · in)
Marking device		Case style TO-220AB	MUR2020CT			

**Ultrafast Rectifier,  
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**Vishay High Power Products**

**Fig. 1 - Maximum 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**

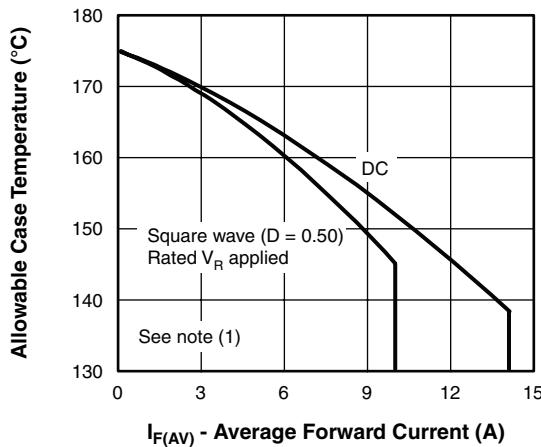


Fig. 5 - Maximum Allowable Case Temperature vs.  
Average Forward Current

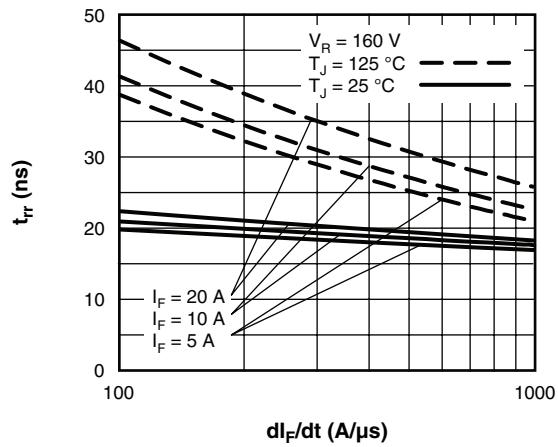


Fig. 7 - Typical Reverse Recovery Time vs.  $dI_F/dt$

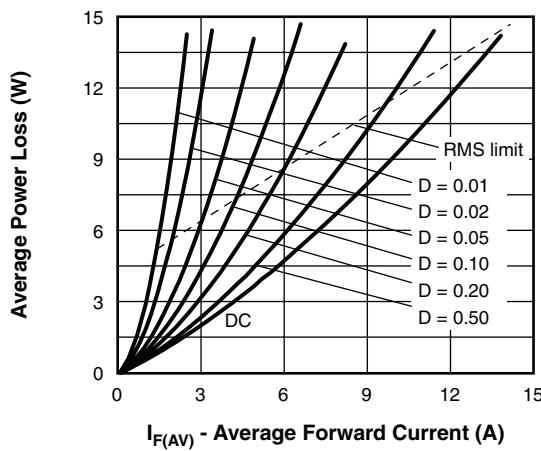


Fig. 6 - Forward Power Loss Characteristics

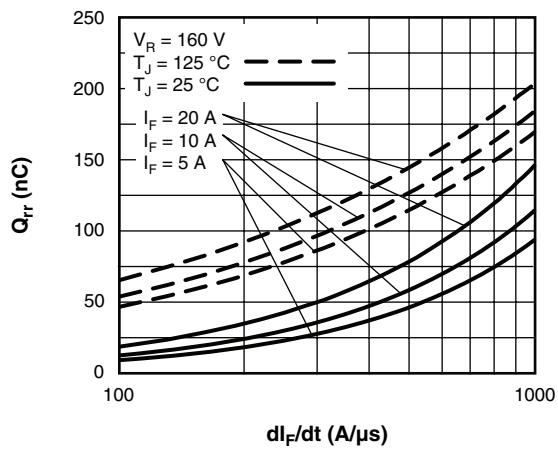


Fig. 8 - Typical Stored Charge vs.  $dI_F/dt$

#### Note

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

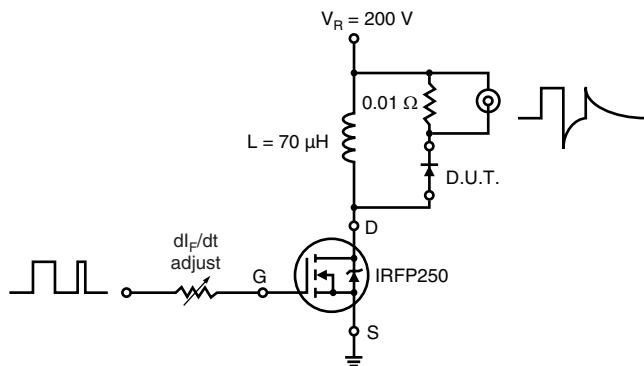
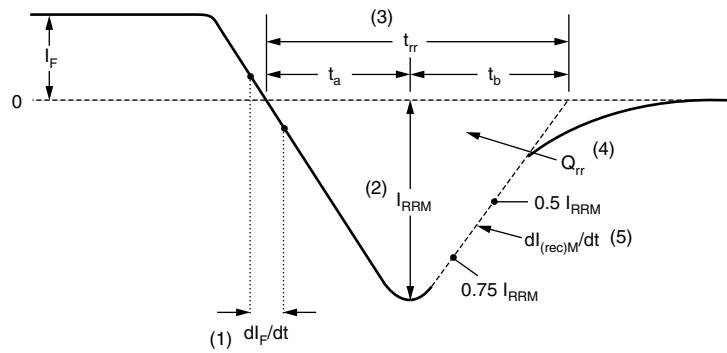


Fig. 9 - Reverse Recovery Parameter Test Circuit



(1)  $dl_F/dt$  - rate of change of current through zero crossing

(4)  $Q_{rr}$  - area under curve defined by  $t_{rr}$  and  $I_{RRM}$

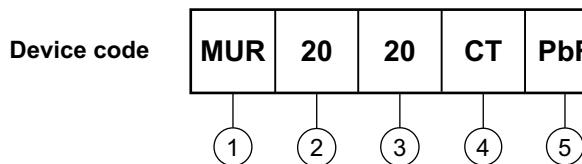
(2)  $I_{RRM}$  - peak reverse recovery current

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

(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.

(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**

- 1** - Ultrafast MUR series
- 2** - Current rating (20 = 20 A)
- 3** - Voltage rating (20 = 200 V)
- 4** - CT = Center tap (dual)
- 5** - • None = Standard production  
• PbF = Lead (Pb)-free

Tube standard pack quantity: 50 pieces

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95222">www.vishay.com/doc?95222</a>
Part marking information	<a href="http://www.vishay.com/doc?95225">www.vishay.com/doc?95225</a>
SPICE model	<a href="http://www.vishay.com/doc?95272">www.vishay.com/doc?95272</a>

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