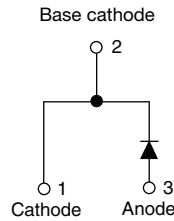




**THE DATASHEET OF  
VS-30ETU12-M3**



## Ultrafast Rectifier, 30 A FRED Pt®



### FEATURES

- Ultrafast and soft recovery
- Optimized forward voltage drop
- 175 °C maximum operating junction temperature
- Polyimide passivation
- Rugged design
- Good thermal performance
- Meets JESD 201 class 1A whisker test
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



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

### PRIMARY CHARACTERISTICS

$I_{F(AV)}$	30 A
$V_R$	1200 V
$V_F$ at $I_F$ at 125 °C	2.05 V
$t_{rr}$	49 ns
$T_J$ max.	175 °C
Package	TO-220AC 2L
Circuit configuration	Single

### DESCRIPTION / APPLICATIONS

Ultrafast recovery rectifiers designed with optimized performance of forward voltage drop, recovery time, and soft recovery. Polyimide passivated, planar structure, and the platinum doped life time control guarantee, ruggedness, reliability characteristics, and solid value proposition for efficiency and thermal performance.

These devices are intended for use in boost stage in the AC/DC section of SMPS, high frequency output rectification of battery charger, inverters for solar inverters, or as freewheeling diodes in motor drive.

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Repetitive peak reverse voltage	$V_{RRM}$		1200	V
Average rectified forward current	$I_{F(AV)}$	$T_C = 100\text{ °C}$ , $D = 0.50$	30	A
Repetitive peak forward current	$I_{FRM}$		60	A
Non-repetitive peak surge current	$I_{FSM}$	$T_C = 25\text{ °C}$ , $t_p = 10\text{ ms}$ , sine wave	240	A
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	$V_{BR}$ , $V_R$	$I_R = 500\text{ }\mu\text{A}$	1200	-	-	V
Forward voltage	$V_F$	$I_F = 30\text{ A}$ $I_F = 30\text{ A}$ , $T_J = 125\text{ °C}$	-	2.15 2.05	2.68 2.45	
Reverse leakage current	$I_R$	$V_R = V_R$ rated $T_J = 125\text{ °C}$ , $V_R = V_R$ rated	-	-	145 320	$\mu\text{A}$
Junction capacitance	$C_T$	$V_R = 200\text{ V}$	-	29	-	pF
Series inductance	$L_S$	Measured to lead 5 mm from package body	-	8	-	nH



<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	$t_{rr}$	$I_F = 1.0\text{ A}$ , $di_F/dt = 100\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$	-	49	-	ns
		$T_J = 25\text{ }^\circ\text{C}$	-	220	-	
		$T_J = 125\text{ }^\circ\text{C}$	-	356	-	
Peak recovery current	$I_{RRM}$	$T_J = 25\text{ }^\circ\text{C}$	-	8.2	-	A
		$T_J = 125\text{ }^\circ\text{C}$	-	13.3	-	
		$I_F = 30\text{ A}$ $di_F/dt = 100\text{ A}/\mu\text{s}$ $V_R = 390\text{ V}$	-	900	-	
Reverse recovery charge	$Q_{rr}$	$T_J = 25\text{ }^\circ\text{C}$	-	2388	-	nC
		$T_J = 125\text{ }^\circ\text{C}$	-	-	-	

<b>THERMAL - MECHANICAL SPECIFICATIONS</b>						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Thermal resistance, junction to case	$R_{thJC}$		-	-	0.8	$^\circ\text{C}/\text{W}$
Thermal resistance, junction to ambient	$R_{thJA}$	Typical socket mount	-	-	54	
Thermal resistance, case to heatsink	$R_{thCS}$	Mounting surface, flat, smooth, and greased	-	-	0.4	
Weight			-	2	-	g
Mounting torque			6.0 (5.0)	-	12 (10)	kgf · cm (lbf · in)
Maximum junction and storage temperature range	$T_J, T_{Stg}$		-55	-	175	$^\circ\text{C}$
Marking device		Case style: TO-220AC 2L	30ETU12			

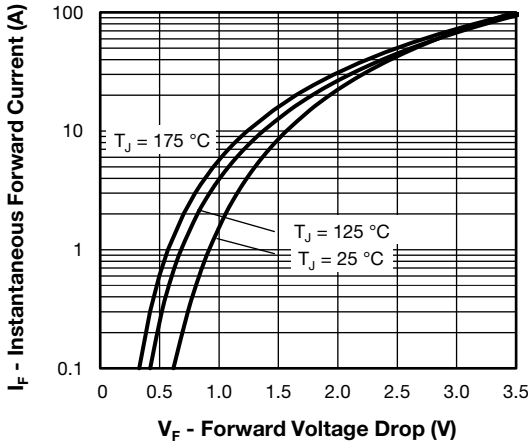


Fig. 1 - Typical Forward Voltage Drop Characteristics

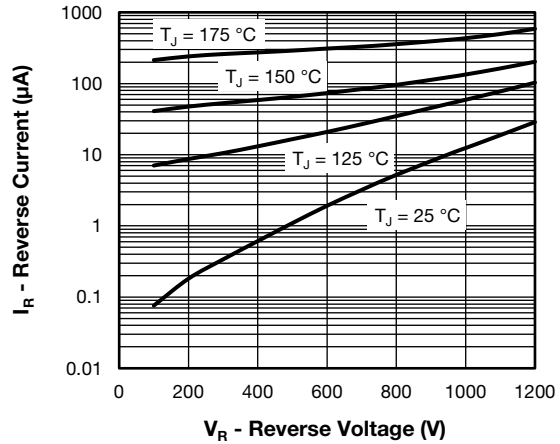


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

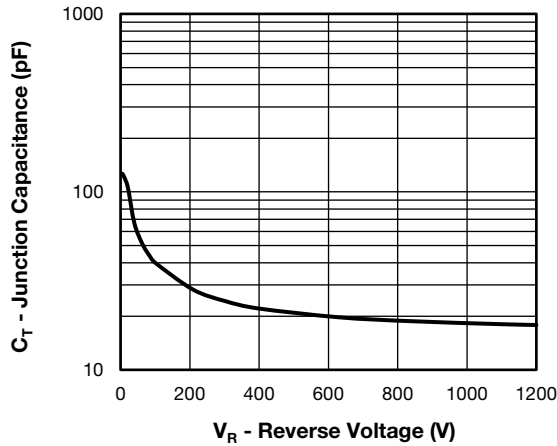


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

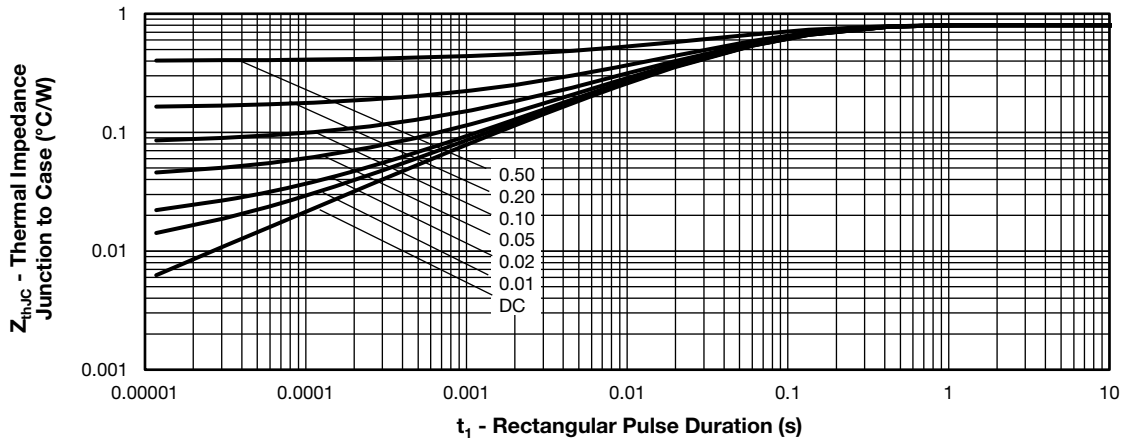


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

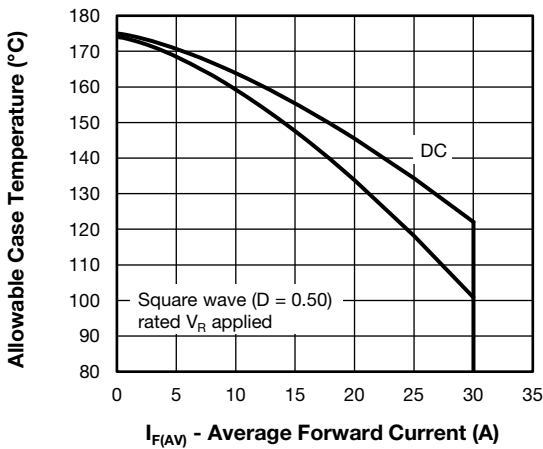


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

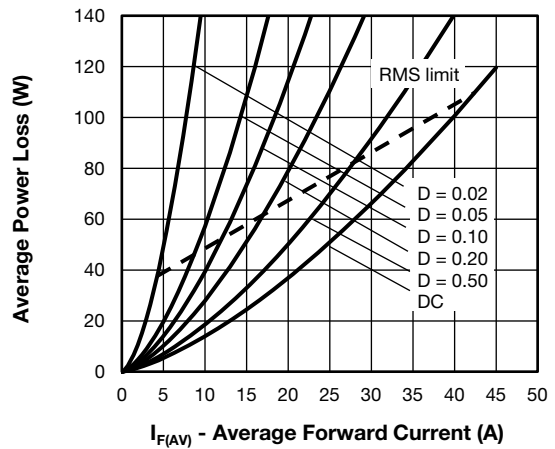


Fig. 6 - Forward Power Loss Characteristics

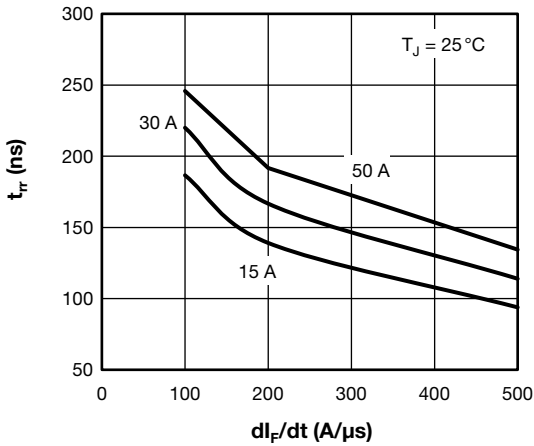


Fig. 7 - Typical Reverse Recovery Time vs.  $dI_F/dt$

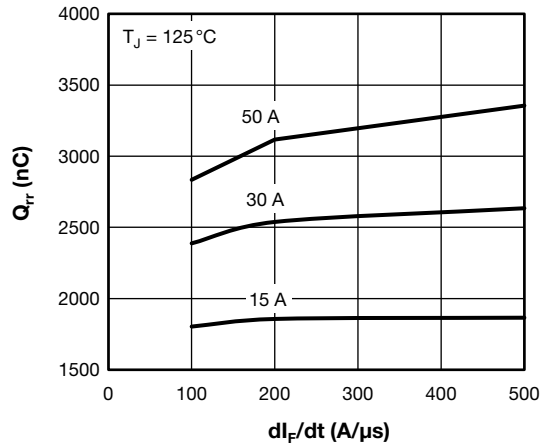


Fig. 10 - Typical Stored Charge vs.  $dI_F/dt$

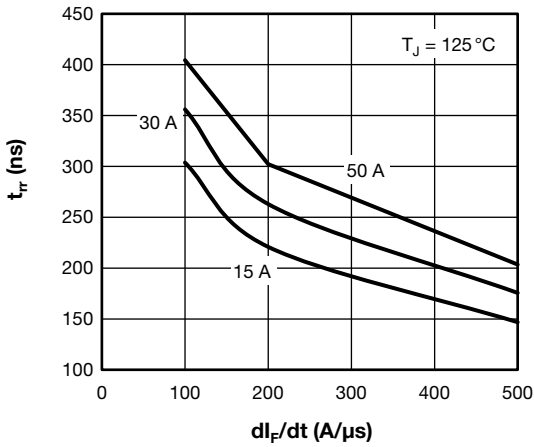


Fig. 8 - Typical Reverse Recovery Time vs.  $dI_F/dt$

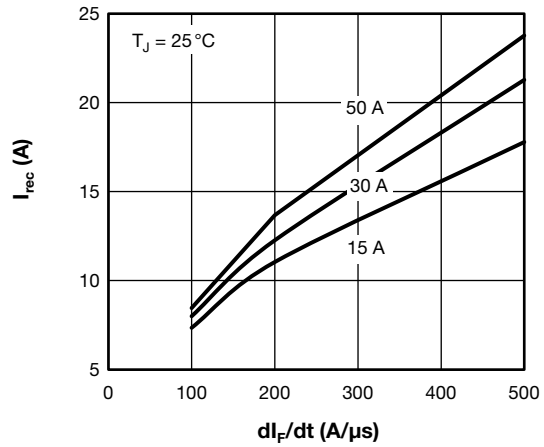


Fig. 11 - Typical Reverse Current vs.  $dI_F/dt$

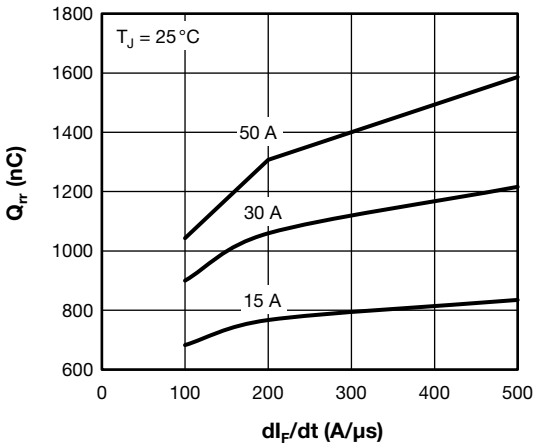


Fig. 9 - Typical Stored Charge vs.  $dI_F/dt$

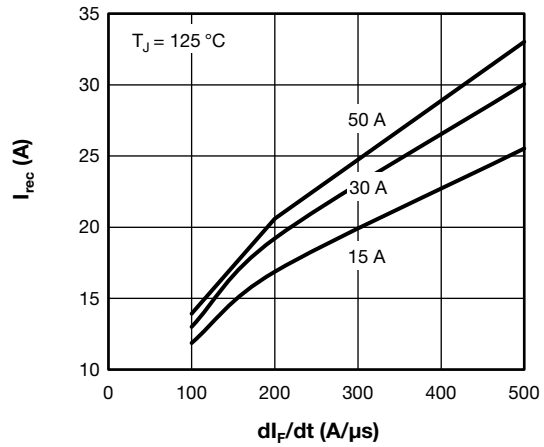
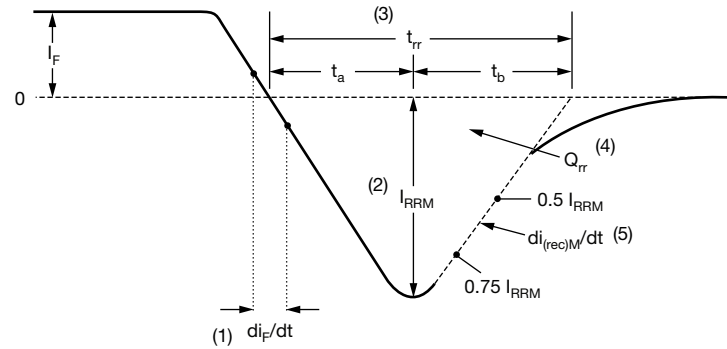


Fig. 12 - Typical Reverse Current vs.  $dI_F/dt$



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

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

Fig. 13 - Reverse Recovery Waveform and Definitions

## ORDERING INFORMATION TABLE

Device code	<b>VS-</b>	<b>30</b>	<b>E</b>	<b>T</b>	<b>U</b>	<b>12</b>	<b>-M3</b>
	①	②	③	④	⑤	⑥	⑦

- 1** - Vishay Semiconductors product
- 2** - Current rating 30 = 30 A
- 3** - E = single diode
- 4** - Package: T = TO-220AC
- 5** - U = ultrafast recovery
- 6** - Voltage rating (12 = 1200 V)
- 7** - Environmental digit:  
-M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

ORDERING INFORMATION (Example)		
PREFERRED P/N	BASE QUANTITY	PACKAGING DESCRIPTION
VS-30ETU12-M3	50	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?96156">www.vishay.com/doc?96156</a>
Part marking information	<a href="http://www.vishay.com/doc?95391">www.vishay.com/doc?95391</a>



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