

# Ultrafast Rectifier, 4 A FRED Pt®


**DO-214AA (SMB)**


## FEATURES

- Ultrafast recovery time, reduced  $Q_{rr}$  and soft recovery
- 175 °C maximum operating junction temperature
- For PFC CRM/CCM, snubber operation
- Low forward voltage drop
- Low leakage current
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Designed and qualified according to JEDEC®-JESD 47
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?999912](http://www.vishay.com/doc?999912)



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

## PRODUCT SUMMARY

Package	DO-214AA (SMB)
$I_{F(AV)}$	4 A
$V_R$	600 V
$V_F$ at $I_F$	0.94 V
$t_{rr}$ typ.	45 ns
$T_J$ max.	175 °C
Diode variation	Single die

## DESCRIPTION / APPLICATIONS

State of the art ultrafast recovery rectifiers designed with optimized performance of forward voltage drop, ultrafast recovery time, and fast recovery.

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 PFC boost stage in the AC/DC section of SMPS, inverters or as freewheeling diodes.

Their extremely optimized stored charge and low recovery current minimize the switching losses and reduce power dissipation in the switching element and snubbers.

## ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Peak repetitive reverse voltage	$V_{RRM}$		600	V
Average rectified forward current	$I_{F(AV)}$	$T_L = 103\text{ °C}^{(1)}$	4	
Non-repetitive peak surge current	$I_{FSM}$	$T_J = 25\text{ °C}$	100	A
Operating junction and storage temperatures	$T_J, T_{Stg}$		-55 to +175	°C

### Note

<sup>(1)</sup> Mounted on PCB with minimum pad size

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Breakdown voltage, blocking voltage	$V_{BR}, V_R$	$I_R = 100\text{ }\mu\text{A}$	600	-	-	V
Forward voltage	$V_F$	$I_F = 4\text{ A}$	-	1.12	1.3	
		$I_F = 4\text{ A}, T_J = 150\text{ °C}$	-	0.94	1.15	
Reverse leakage current	$I_R$	$V_R = V_R$ rated	-	-	3	$\mu\text{A}$
		$T_J = 150\text{ °C}, V_R = V_R$ rated	-	-	100	
Junction capacitance	$C_T$	$V_R = 600\text{ V}$	-	6.8	-	pF

<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	$t_{rr}$	$I_F = 1.0\text{ A}$ , $dI_F/dt = 100\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$	-	45	-	ns
		$I_F = 1.0\text{ A}$ , $dI_F/dt = 50\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$	-	50	-	
		$I_F = 0.5\text{ A}$ , $I_R = 1\text{ A}$ , $I_{rr} = 0.25\text{ A}$	-	-	65	
		$T_J = 25\text{ }^{\circ}\text{C}$	-	39	-	
		$T_J = 125\text{ }^{\circ}\text{C}$	-	61	-	
Peak recovery current	$I_{RRM}$	$T_J = 25\text{ }^{\circ}\text{C}$	-	5.8	-	A
		$T_J = 125\text{ }^{\circ}\text{C}$	-	7.7	-	
Reverse recovery charge	$Q_{rr}$	$T_J = 25\text{ }^{\circ}\text{C}$	-	119	-	nC
		$T_J = 125\text{ }^{\circ}\text{C}$	-	251	-	

<b>THERMAL - MECHANICAL SPECIFICATIONS</b>						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Maximum junction and storage temperature range	$T_J, T_{Stg}$		-55	-	+175	$^{\circ}\text{C}$
Thermal resistance, junction to case	$R_{thJC}^{(1)}$		-	-	18	$^{\circ}\text{C}/\text{W}$
Thermal resistance, junction to ambient	$R_{thJA}^{(1)}$		-	-	90	
Approximate Weight			0.1			g
			0.003			oz.
Marking device		Case style DO-214AA (SMB)	4U6			

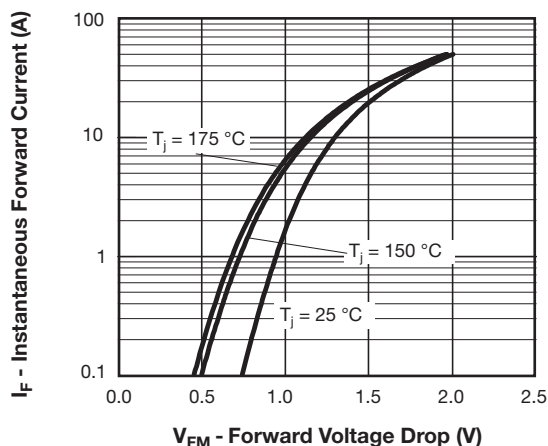
**Note**
<sup>(1)</sup> Mounted on PCB with minimum pad size


Fig. 1 - Typical Forward Voltage Drop Characteristics

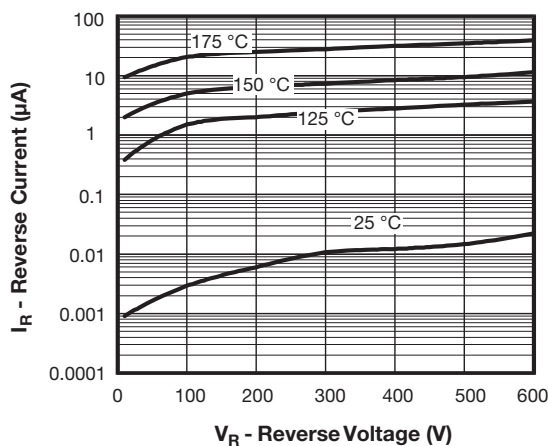


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

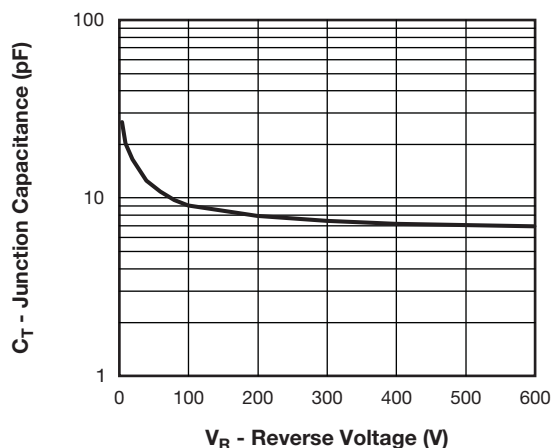


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

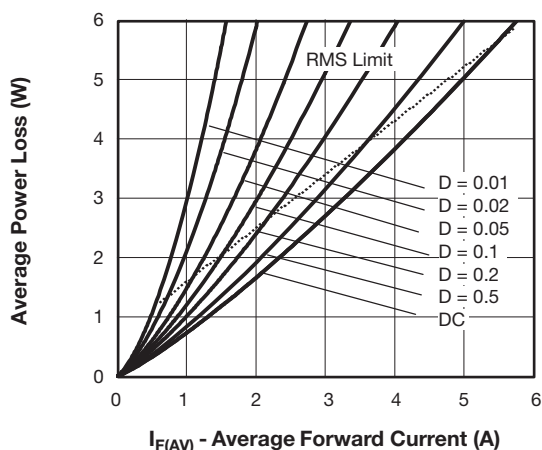


Fig. 5 - Forward Power Loss Characteristics

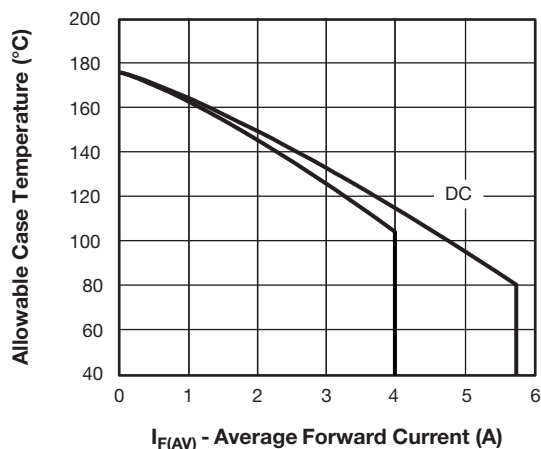
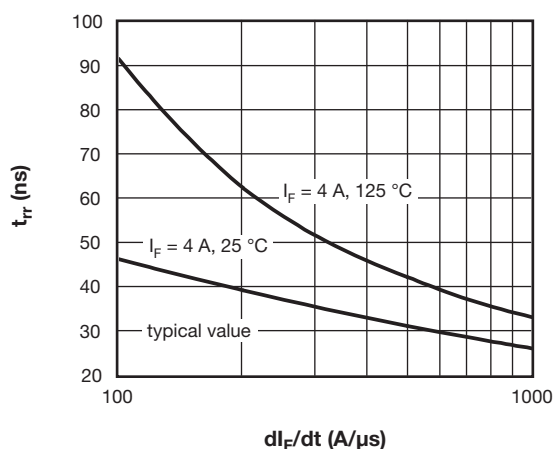
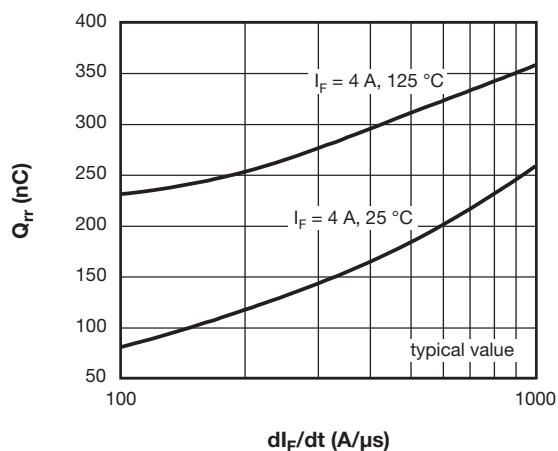
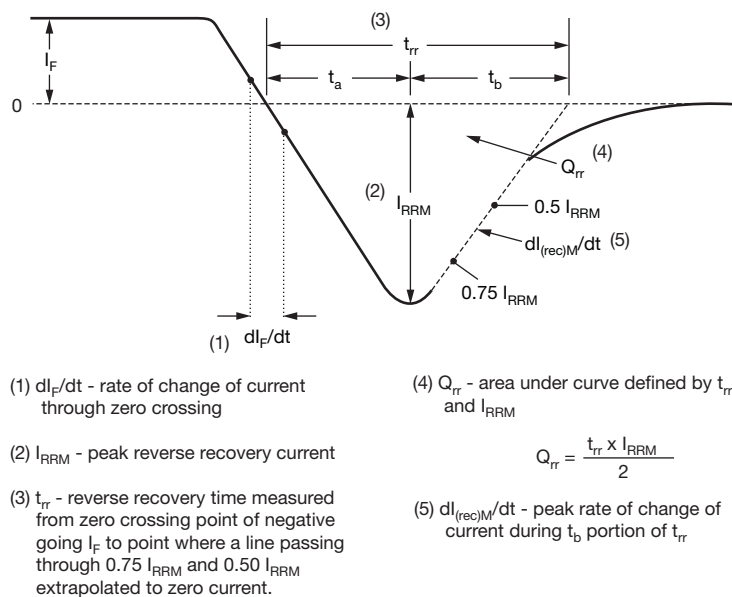


Fig. 4 - Maximum Allowable Case Temperature vs. Average Forward Current


Fig. 6 - Typical Reverse Recovery Time vs.  $dI_F/dt$ 

Fig. 7 - Typical Stored Charge vs.  $dI_F/dt$



### Fig. 8 - Reverse Recovery Waveform and Definitions

## ORDERING INFORMATION TABLE

Device code	<b>VS-</b>	<b>4</b>	<b>E</b>	<b>G</b>	<b>U</b>	<b>06</b>	<b>-M3</b>
	1	2	3	4	5	6	7

- 1 - Vishay Semiconductors product
- 2 - Current rating (4 = 4 A)
- 3 - Circuit configuration:  
E = single diode
- 4 - G = SMB package
- 5 - Process type,  
U = ultrafast recovery
- 6 - Voltage code (06 = 600 V)
- 7 - M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

### ORDERING INFORMATION (Example)

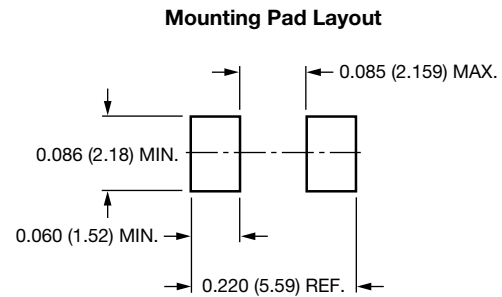
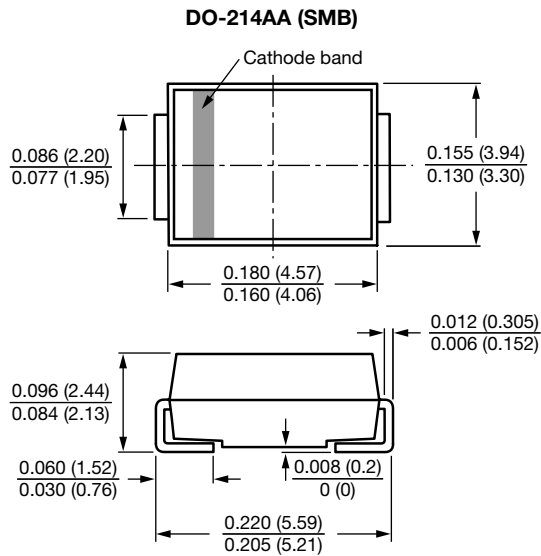
PREFERRED P/N	QUANTITY PER TUBE	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-4EGU06-M3/5BT	5BT	3200	13" diameter plastic tape and reel

## LINKS TO RELATED DOCUMENTS

Dimensions	<a href="http://www.vishay.com/doc?95401">www.vishay.com/doc?95401</a>
Part marking information	<a href="http://www.vishay.com/doc?95472">www.vishay.com/doc?95472</a>
Packaging information	<a href="http://www.vishay.com/doc?95404">www.vishay.com/doc?95404</a>

## SMB

**DIMENSIONS** in inches (millimeters)





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