

Ultrafast Rectifier, 3 A FRED Pt[®]

eSMP[®] Series



Top View

Bottom View

SlimSMA (DO-221AC)

Cathode Anode

FEATURES

- Ultrafast recovery time, reduced Q_{rr} , and soft recovery
- 175 °C maximum operating junction temperature
- Low forward voltage drop
- Low leakage current
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


RoHS
COMPLIANT
HALOGEN
FREE

DESCRIPTION / APPLICATIONS

State of the art ultrafast recovery rectifiers designed with optimized performance of forward voltage drop and 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 snubber, output operation, inverters or as freewheeling diodes.

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

MECHANICAL DATA

Case: SlimSMA (DO-221AC)

Molding compound meets UL 94 V-0 flammability rating

Terminals: matte tin plated leads, solderable per J-STD-002

Polarity: color band denotes cathode end

LINKS TO ADDITIONAL RESOURCES



PRIMARY CHARACTERISTICS

$I_{F(AV)}$	3 A
V_R	600 V
V_F at I_F	0.99 V
t_{rr}	50 ns
T_J max.	175 °C
Package	SlimSMA (DO-221AC)
Circuit configuration	Single

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Peak repetitive reverse voltage	V_{RRM}		600	V
Average rectified forward current	$I_{F(AV)}$	$T_C = 117\text{ °C}^{(1)}$	3	A
Non-repetitive peak surge current	I_{FSM}	$T_J = 25\text{ °C}$	43	
Operating junction and storage temperatures	T_J, T_{Stg}		-55 to +175	°C

Note

⁽¹⁾ Device on PCB with 8 mm x 16 mm soldering lands

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	$I_R = 100\ \mu\text{A}$	600	-	-	V
Forward voltage	V_F	$I_F = 3\text{ A}$	-	1.15	1.35	
		$I_F = 3\text{ A}, T_J = 150\text{ °C}$	-	0.99	1.2	
Reverse leakage current	I_R	$V_R = V_R$ rated	-	-	3	μA
		$T_J = 150\text{ °C}, V_R = V_R$ rated	-	-	100	
Junction capacitance	C_T	$V_R = 600\text{ V}$	-	6.2	-	pF

DYNAMIC RECOVERY CHARACTERISTICS ($T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse recovery time	t_{rr}	$I_F = 1.0\text{ A}$, $di_F/dt = 50\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$	-	45	-	ns
		$I_F = 0.5\text{ A}$, $I_R = 1\text{ A}$, $I_{rr} = 0.25\text{ A}$	-	-	50	
		$T_J = 25\text{ }^\circ\text{C}$	-	52	-	
		$T_J = 125\text{ }^\circ\text{C}$	-	82	-	
Peak recovery current	I_{RRM}	$T_J = 25\text{ }^\circ\text{C}$	-	7.3	-	A
		$T_J = 125\text{ }^\circ\text{C}$	-	10	-	
Reverse recovery charge	Q_{rr}	$T_J = 25\text{ }^\circ\text{C}$	-	210	-	nC
		$T_J = 125\text{ }^\circ\text{C}$	-	400	-	

THERMAL - MECHANICAL SPECIFICATIONS						
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 mount	R_{thJM}	Device mounted on PCB with 8 mm x 16 mm soldering lands	-	16	-	$^\circ\text{C}/\text{W}$
Thermal resistance, junction to ambient	R_{thJA}	Device mounted on PCB with 3 mm x 3 mm soldering lands	-	115	-	
Approximate Weight			0.03			g
			0.0011			oz.
Marking device		Case style SlimSMA (DO-221AC)	3U6			

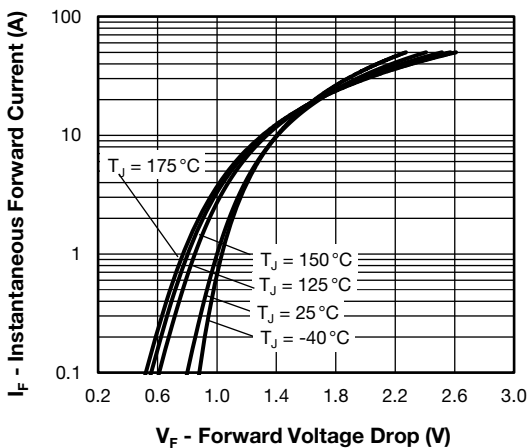


Fig. 1 - Typical Forward Voltage Drop Characteristics

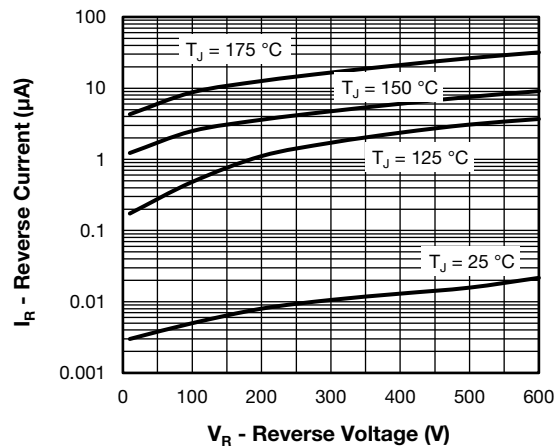


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

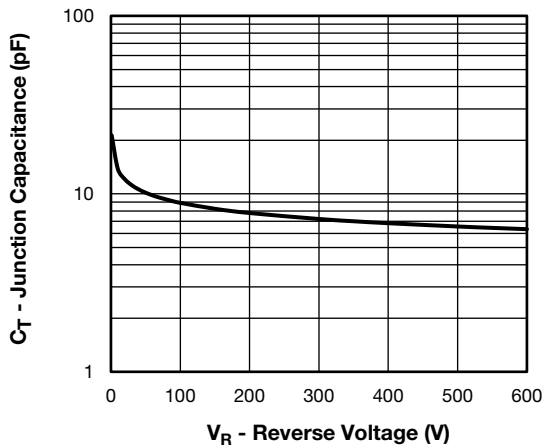


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

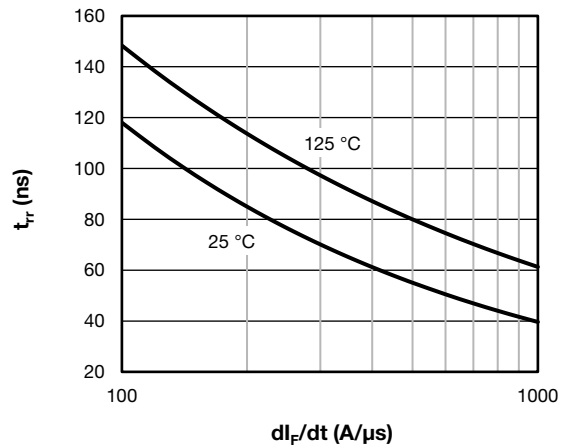


Fig. 6 - Typical Reverse Recovery vs. dI_F/dt

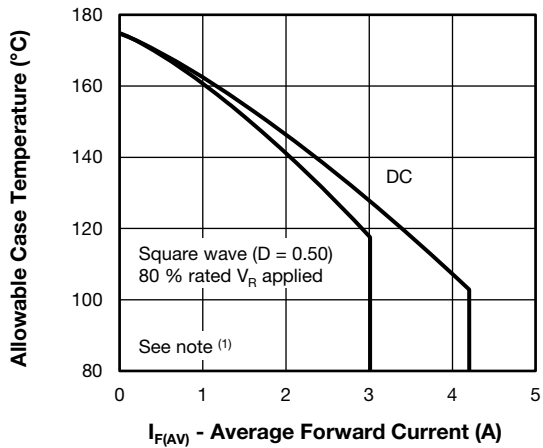


Fig. 4 - Maximum Allowable Case Temperature vs. Average Forward Current

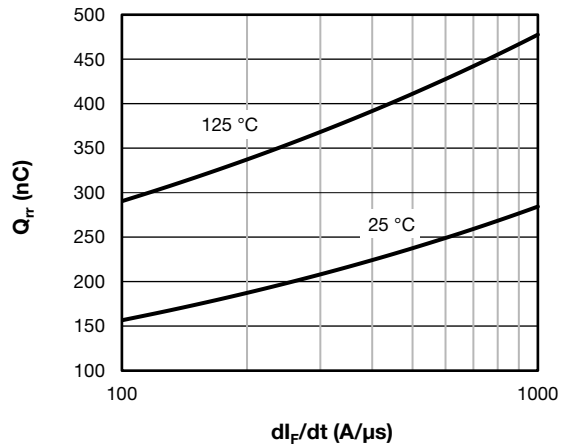


Fig. 7 - Typical Stored Charge vs. dI_F/dt

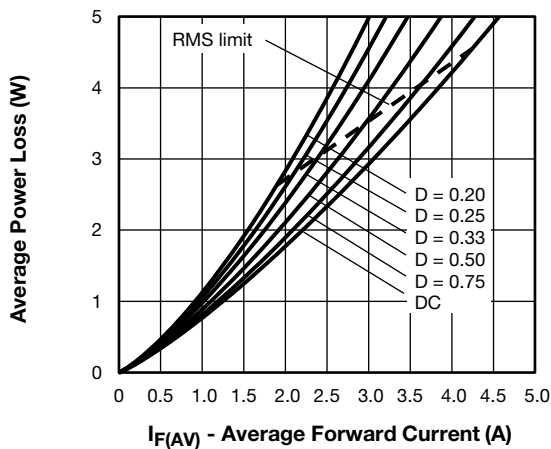


Fig. 5 - Forward Power Loss Characteristic

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

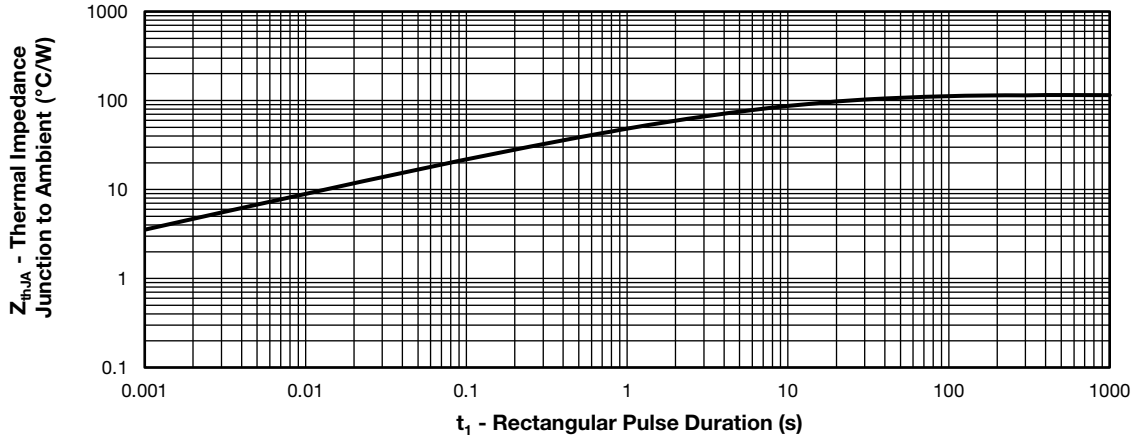
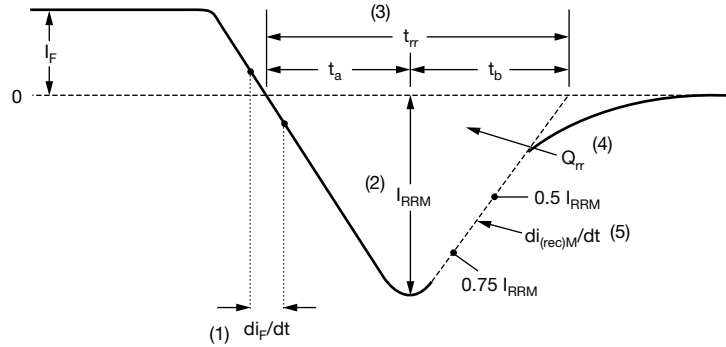


Fig. 8 - Thermal Impedance Z_{thJA}



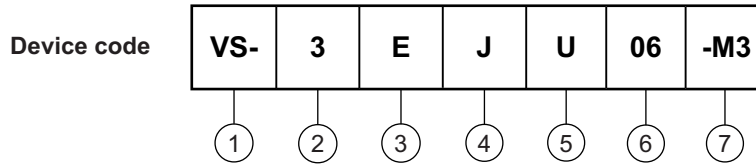
- (1) di_F/dt - rate of change of current through zero crossing
- (2) I_{RRM} - peak reverse recovery current
- (3) t_{rr} - reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through $0.75 I_{RRM}$ and $0.50 I_{RRM}$ extrapolated to zero current.
- (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. 9 - Reverse Recovery Waveform and Definitions



ORDERING INFORMATION TABLE



- 1** - Vishay Semiconductors product
- 2** - Current rating (3 = 3 A)
- 3** - Circuit configuration:
E = single diode
- 4** - J = SlimSMA 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 REEL	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-3EJU06-M3/6A	3500	3500	7" diameter plastic tape and reel
VS-3EJU06-M3/6B	14 000	14 000	13" diameter plastic tape and reel

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95571
Part marking information	www.vishay.com/doc?95562
Packaging information	www.vishay.com/doc?88869
SPICE model	www.vishay.com/doc?96589



DO-221AC (SlimSMA)

DIMENSIONS in inches (millimeters)





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