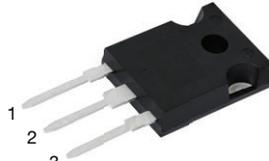
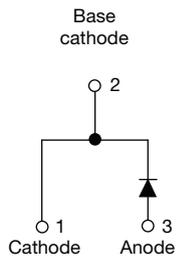
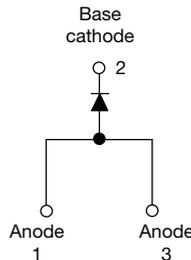


## Fast Soft Recovery Rectifier Diode, 60 A


**TO-247AC 2L**

**TO-247AC 3L**

**VS-60EPF1...**

**VS-60APF1...**

### FEATURES

- Glass passivated pellet chip junction
- 150 °C max. operating junction temperature
- Low forward voltage drop and short reverse recovery time
- Designed and qualified according to JEDEC®-JESD 47
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



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

### APPLICATIONS

These devices are intended for use in output rectification and freewheeling in inverters, choppers and converters as well as in input rectification where severe restrictions on conducted EMI should be met.

### DESCRIPTION

The VS-65EPF12-M3 and VS-65APF12-M3 soft recovery rectifier series has been optimized for combined short reverse recovery time and low forward voltage drop.

The glass passivation ensures stable reliable operation in the most severe temperature and power cycling conditions.

### PRIMARY CHARACTERISTICS

$I_{F(AV)}$	60 A
$V_R$	1000 V, 1200 V
$V_F$ at $I_F$	1.4 V
$I_{FSM}$	830 A
$t_{rr}$	95 ns
$T_J$ max.	150 °C
Package	TO-247AC 2L, TO-247AC 3L
Circuit configuration	Single
Snap factor	0.6

### MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
$V_{RRM}$		1000 to 1200	V
$I_{F(AV)}$	Sinusoidal waveform	60	A
$I_{FSM}$		830	
$t_{rr}$	1 A, - 100 A/ $\mu$ s	95	ns
$V_F$	30 A, $T_J = 25$ °C	1.2	V
$T_J$	Range	-40 to +150	°C

### VOLTAGE RATINGS

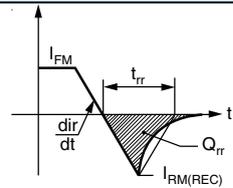
PART NUMBER	$V_{RRM}$ , MAXIMUM PEAK REVERSE VOLTAGE V	$V_{RSM}$ , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V	$I_{RRM}$ AT 150 °C mA
VS-60EPF10-M3, VS-60APF10-M3	1000	1100	12
VS-60EPF12-M3, VS-60APF12-M3	1200	1300	



ABSOLUTE MAXIMUM RATINGS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current	$I_{F(AV)}$	$T_C = 103\text{ }^\circ\text{C}$ , 180° conduction half sine wave	60	A
Maximum peak one cycle non-repetitive surge current	$I_{FSM}$	10 ms sine pulse, rated $V_{RRM}$ applied	700	
		10 ms sine pulse, no voltage reapplied	830	
Maximum $I^2t$ for fusing	$I^2t$	10 ms sine pulse, rated $V_{RRM}$ applied	2450	$A^2s$
		10 ms sine pulse, no voltage reapplied	3460	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	$t = 0.1\text{ ms to }10\text{ ms}$ , no voltage reapplied	34 600	$A^2\sqrt{s}$

ELECTRICAL SPECIFICATIONS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum forward voltage drop	$V_{FM}$	60 A, $T_J = 25\text{ }^\circ\text{C}$	1.4	V
Forward slope resistance	$r_t$	$T_J = 150\text{ }^\circ\text{C}$	4.6	$m\Omega$
Threshold voltage	$V_{F(TO)}$		0.9	V
Maximum reverse leakage current	$I_{RM}$	$T_J = 25\text{ }^\circ\text{C}$	0.1	mA
		$T_J = 150\text{ }^\circ\text{C}$	12	

RECOVERY CHARACTERISTICS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Reverse recovery time	$t_{rr}$	$I_F$ at 60 A <sub>pk</sub> 25 A/ $\mu$ s 25 °C	480	ns
Reverse recovery current	$I_{rr}$		8	A
Reverse recovery charge	$Q_{rr}$		2.7	$\mu$ C
Snap factor	S		0.6	



THERMAL - MECHANICAL SPECIFICATIONS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum junction and storage temperature range	$T_J, T_{Stg}$		-40 to +150	$^\circ\text{C}$
Maximum thermal resistance, junction to case	$R_{thJC}$	DC operation	0.4	$^\circ\text{C/W}$
Maximum thermal resistance, junction to ambient	$R_{thJA}$		40	
Typical thermal resistance, case to heatsink	$R_{thCS}$	Mounting surface, smooth and greased	0.2	
Approximate weight			6	g
			0.21	oz.
Mounting torque	minimum		6 (5)	kgf · cm (lbf · in)
	maximum		12 (10)	
Marking device		Case style TO-247AC 2L	60EPF10	
			60EPF12	
		Case style TO-247AC 3L	60APF10	
			60APF12	

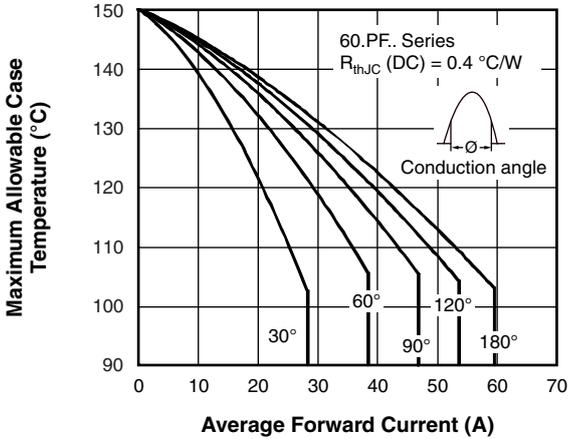


Fig. 1 - Current Rating Characteristics

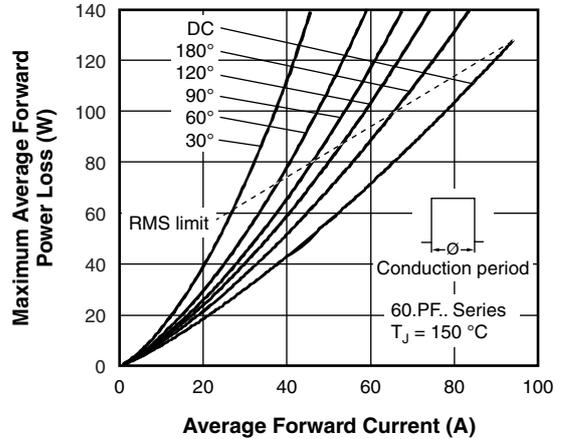


Fig. 4 - Forward Power Loss Characteristics

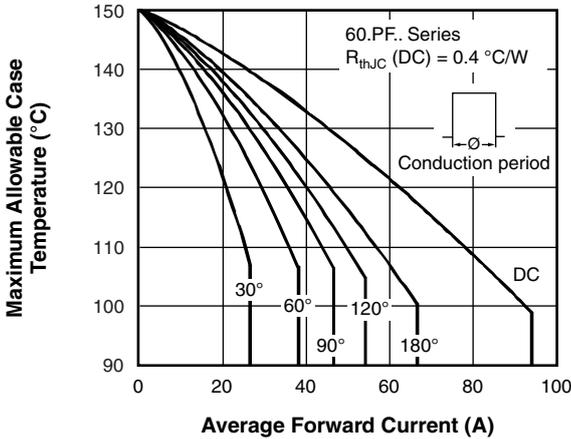


Fig. 2 - Current Rating Characteristics

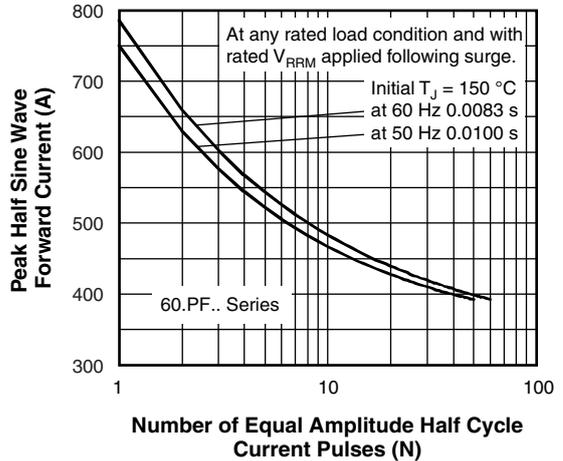


Fig. 5 - Maximum Non-Repetitive Surge Current

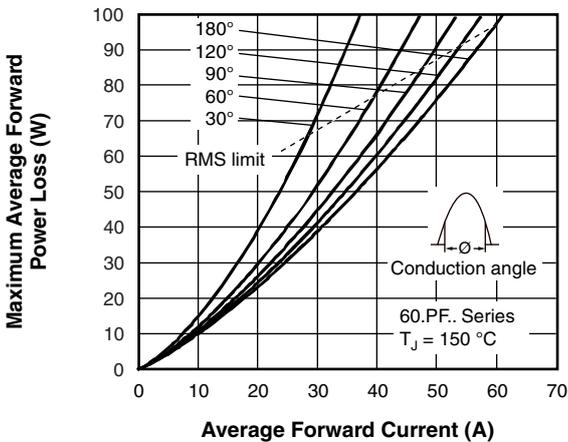


Fig. 3 - Forward Power Loss Characteristics

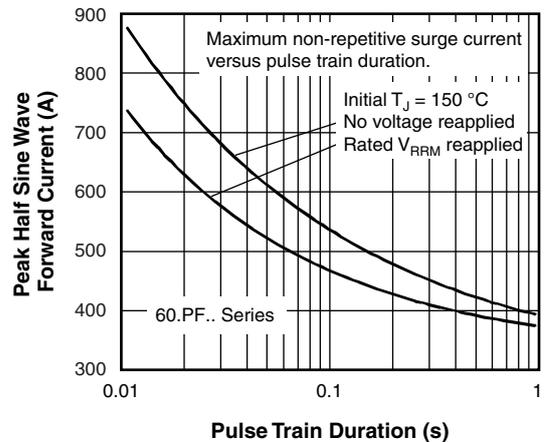


Fig. 6 - Maximum Non-Repetitive Surge Current

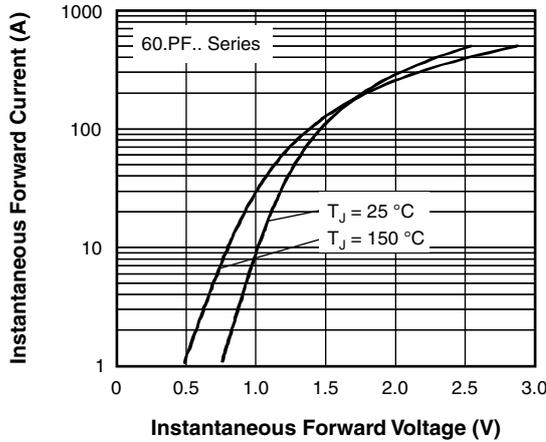


Fig. 7 - Forward Voltage Drop Characteristics

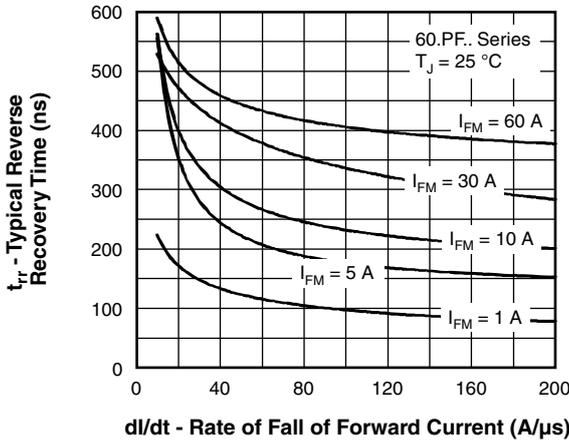


Fig. 8 - Recovery Time Characteristics,  $T_J = 25\text{ °C}$

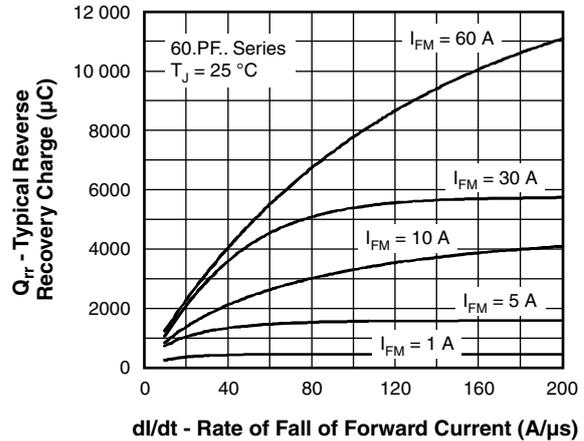


Fig. 10 - Recovery Charge Characteristics,  $T_J = 25\text{ °C}$

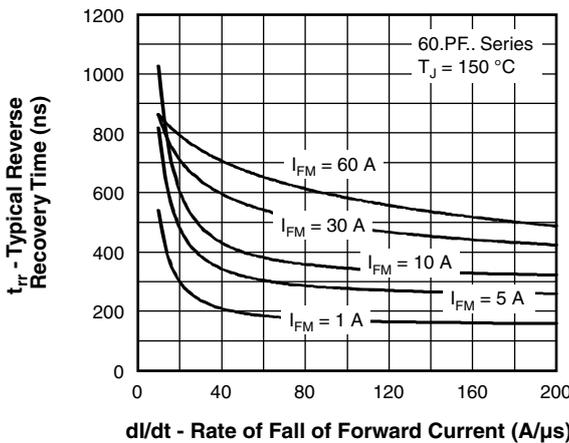


Fig. 9 - Recovery Time Characteristics,  $T_J = 150\text{ °C}$

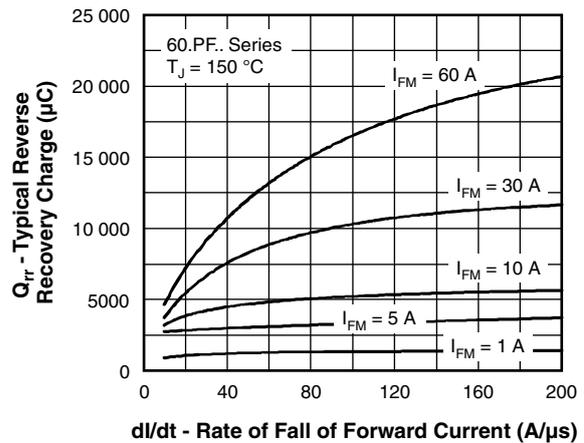


Fig. 11 - Recovery Charge Characteristics,  $T_J = 150\text{ °C}$

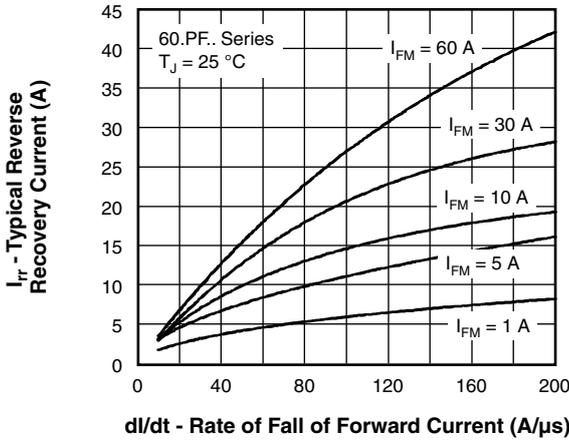


Fig. 12 - Recovery Current Characteristics,  $T_J = 25\text{ }^\circ\text{C}$

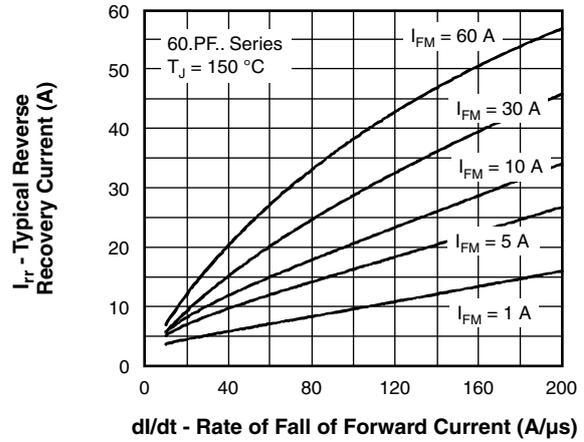


Fig. 13 - Recovery Current Characteristics,  $T_J = 150\text{ }^\circ\text{C}$

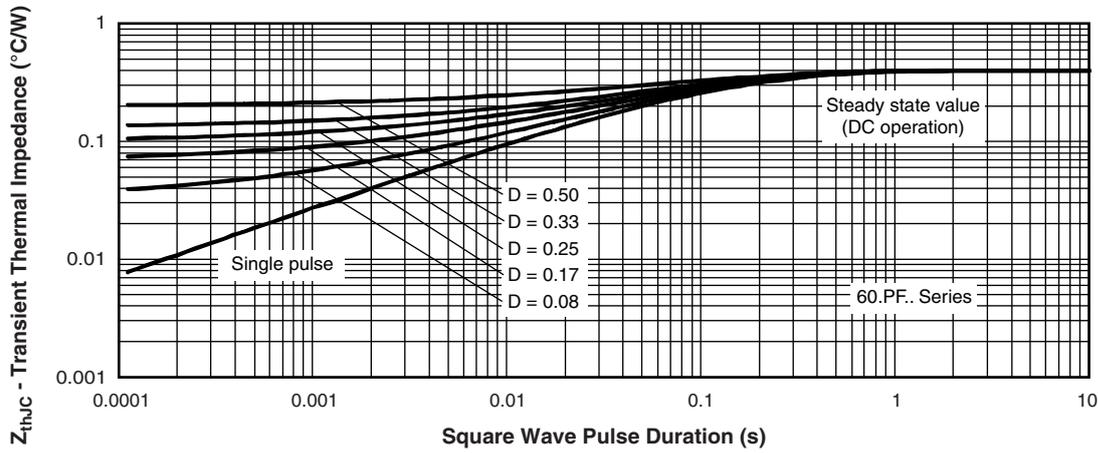


Fig. 14 - Thermal Impedance  $Z_{thJC}$  Characteristics



## ORDERING INFORMATION TABLE

Device code	<b>VS-</b>	<b>60</b>	<b>E</b>	<b>P</b>	<b>F</b>	<b>12</b>	<b>-M3</b>
	①	②	③	④	⑤	⑥	⑦

- 1** - Vishay Semiconductors product
- 2** - Current rating (60 = 60 A)
- 3** - Circuit configuration:  
E = single diode, 2 pins  
A = single diode, 3 pins
- 4** - Package:  
P = TO-247AC 3L /TO-247AC 2L
- 5** - Type of silicon:  
F = fast recovery
- 6** - Voltage code x 100 =  $V_{RRM}$ 

10 = 1000 V
12 = 1200 V
- 7** - Environmental digit:  
-M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-60EPF10-M3	25	500	Antistatic plastic tubes
VS-60APF10-M3	25	500	Antistatic plastic tubes
VS-60EPF12-M3	25	500	Antistatic plastic tubes
VS-60APF12-M3	25	500	Antistatic plastic tubes

LINKS TO RELATED DOCUMENTS		
Dimensions	TO-247AC 2L	<a href="http://www.vishay.com/doc?96144">www.vishay.com/doc?96144</a>
	TO-247AC 3L	<a href="http://www.vishay.com/doc?96138">www.vishay.com/doc?96138</a>
Part marking information	TO-247AC 2L	<a href="http://www.vishay.com/doc?95648">www.vishay.com/doc?95648</a>
	TO-247AC 3L	<a href="http://www.vishay.com/doc?95007">www.vishay.com/doc?95007</a>



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