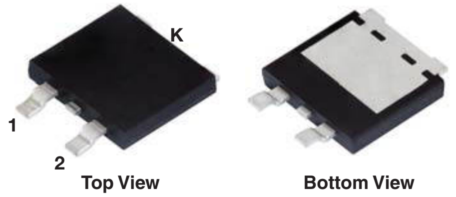
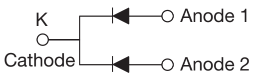
Hyperfast Rectifier, 2 x 5 A FRED Pt®



TO-263AC (SMPD)



FEATURES

- Hyperfast 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
- AEC-Q101 qualified, meets JESD 201 class 2 whisker test
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS
COMPLIANT
HALOGEN
FREE

DESCRIPTION / APPLICATIONS

State of the art hyperfast recovery rectifiers designed with optimized performance of forward voltage drop, hyperfast recovery time, and soft 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, in the AC/DC section of SMPS, freewheeling and clamp diodes.

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

PRODUCT SUMMARY

Package	TO-263AC (SMPD)
$I_{F(AV)}$	2 x 5 A
V_R	600 V
V_F at I_F	1 V
t_{rr}	35 ns
T_J max.	175 °C
Diode variation	Dual die

ABSOLUTE MAXIMUM RATINGS

PARAMETER		SYMBOL	TEST CONDITIONS	VALUES	UNITS
Peak repetitive reverse voltage		V_{RRM}		600	V
Average rectified forward current	per device	$I_{F(AV)}$	$T_{solder\ pad}$ = 153 °C	10	A
	per diode			5	
Non-repetitive peak surge current	per device	I_{FSM}	T_J = 25 °C, 6 ms square pulse	110	
	per diode			60	

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	600	-	-	V
Forward voltage, per diode	V_F	I_F = 5 A	-	1.2	1.5	
		I_F = 5 A, T_J = 150 °C	-	1	1.25	
Reverse leakage current, per diode	I_R	V_R = V_R rated	-	-	3	μA
		T_J = 150 °C, V_R = V_R rated	-	15	150	
Junction capacitance, per diode	C_T	V_R = 600 V	-	6	-	pF

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DYNAMIC RECOVERY CHARACTERISTICS (T_J = 25 °C unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
Reverse recovery time	t_{rr}	I_F = 1 A, dI_F/dt = 50 A/µs, V_R = 30 V		-	35	-	ns
		I_F = 0.5 A, I_R = 1 A, I_{rr} = 0.25 A		-	-	35	
		T_J = 25 °C	I_F = 5 A, dI_F/dt = 500 A/µs, V_R = 400 V	-	45	-	
		T_J = 125 °C		-	70	-	
Peak recovery current	I_{RRM}	T_J = 25 °C		-	7	-	A
		T_J = 125 °C		-	10	-	
Reverse recovery charge	Q_{rr}	T_J = 25 °C		-	160	-	nC
		T_J = 125 °C		-	370	-	

THERMAL - MECHANICAL SPECIFICATIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Maximum junction and storage temperature range	T_J, T_{Stg}		-55	-	+175	°C
Thermal resistance, per diode junction to solder pad	R_{thJ-Sp}		-	2.4	3.3	°C/W
Approximate weight			0.55			g
			0.02			oz.
Marking device		Case style TO-263AC (SMPD)	10CDH06			

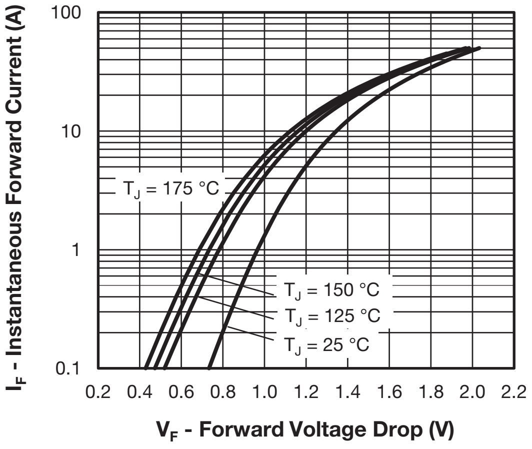

Fig. 1 - Typical Forward Voltage Drop Characteristics

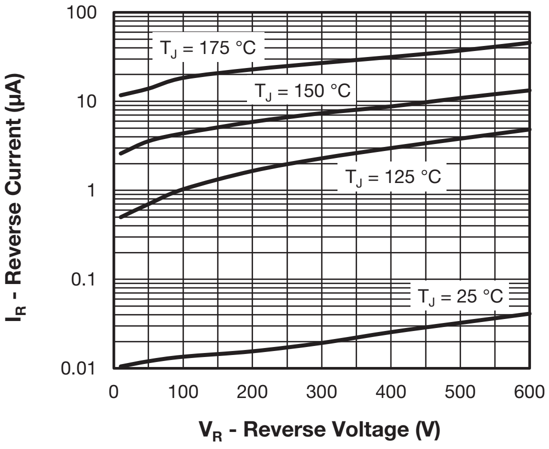

Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

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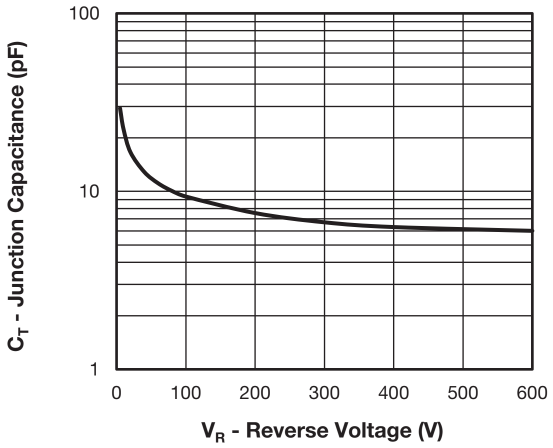

Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

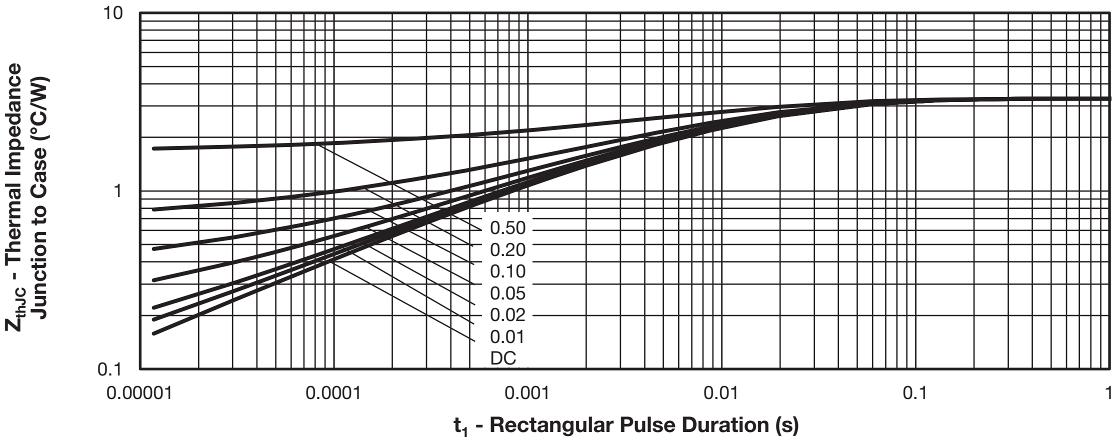

Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

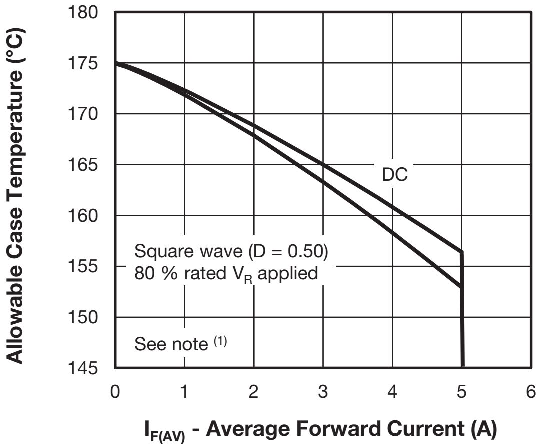

Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

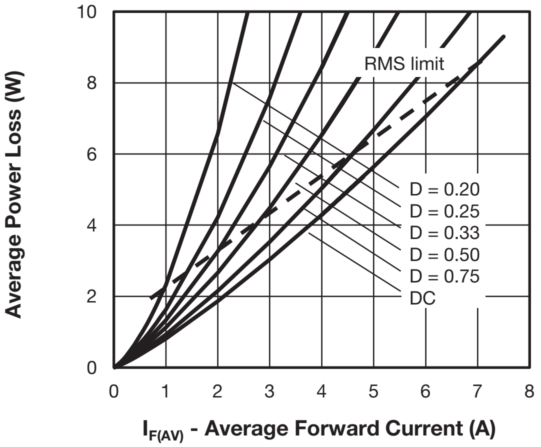

Fig. 6 - Forward Power Loss Characteristics

Note

[1] Formula used: $T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}$;
Pd = Forward power loss = $I_{F(AV)} \times V_{FM}$ at $(I_{F(AV)}/D)$ (see fig. 5);
Pd_{REV} = Inverse power loss = $V_{R1} \times I_R$ $(1 - D)$; I_R at V_{R1} = rated V_R

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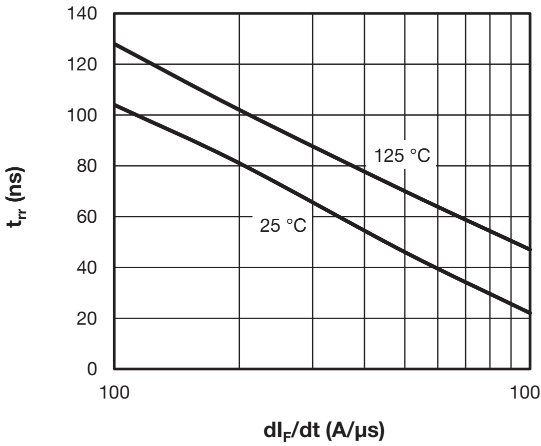


Fig. 7 - Typical Reverse Recovery Time vs. dI_F/dt

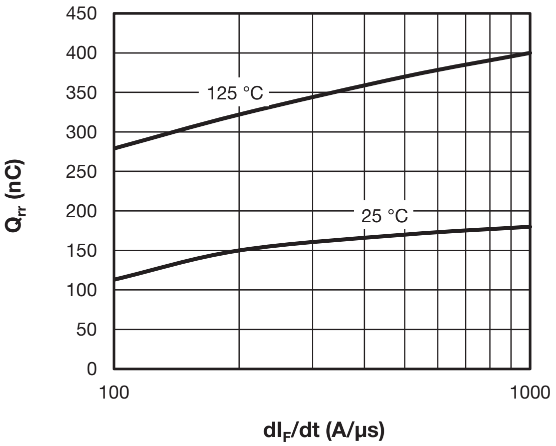
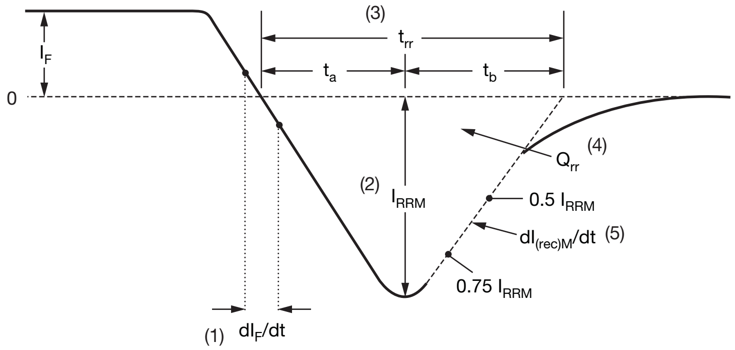


Fig. 8 - Typical Stored Charge vs. dI_F/dt



(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}

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

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

Fig. 9 - Reverse Recovery Waveform and Definitions

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ORDERING INFORMATION TABLE

Device code	VS-	10	C	D	H	06	H	M3
	①	②	③	④	⑤	⑥	⑦	⑧

1 - Vishay Semiconductors product
2 - Current rating (10 A)
3 - Circuit configuration:
C = common cathode
4 - D = SMPD package
5 - Process type,
H = hyperfast recovery
6 - Voltage code (06 = 600 V)
7 - H = AEC-Q101 qualified
8 - 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-10CDH06HM3/I	2000	2000	13" diameter plastic tape and reel

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95604
Part marking information	www.vishay.com/doc?95566
Packaging information	www.vishay.com/doc?88869

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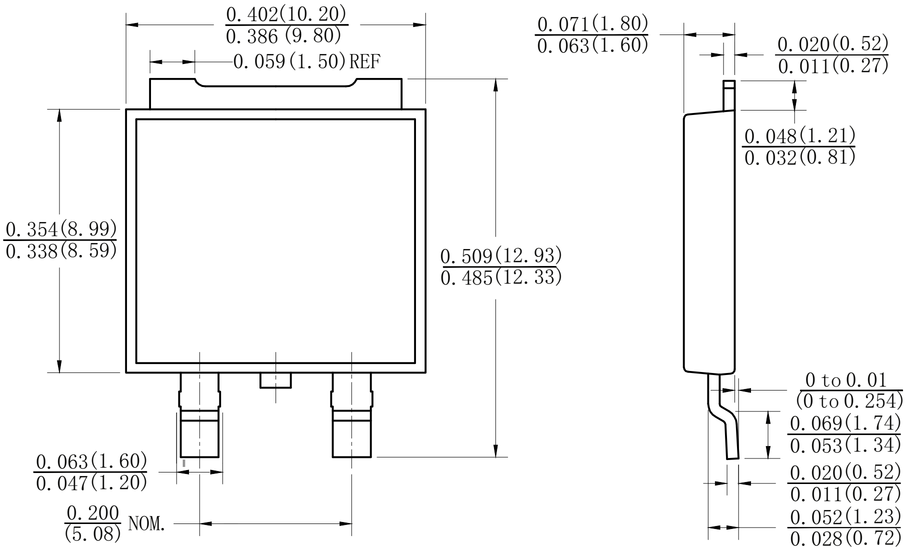
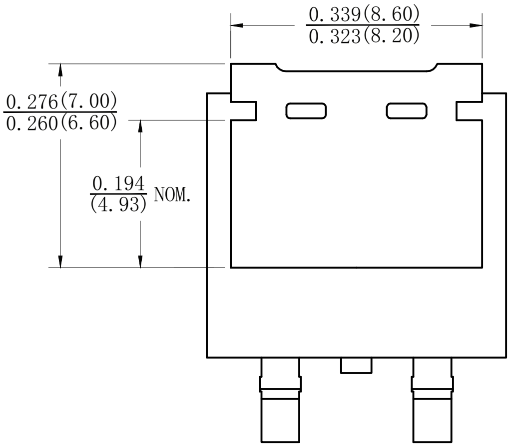
TO-263AC (SMPD)

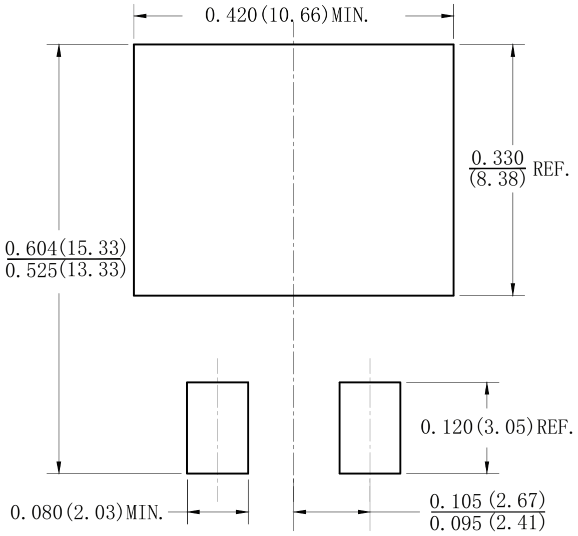
DIMENSIONS in inches (millimeters)

TO-263AC (SMPD)





Mounting Pad Layout



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