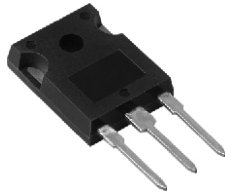
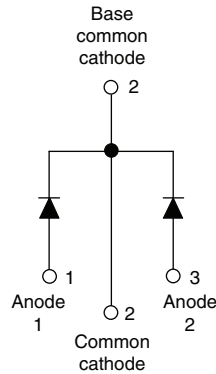


Hyperfast Rectifier, 2 x 40 A FRED Pt®


TO-247AC


FEATURES

- Ultrafast recovery time
- Low forward voltage drop
- Low leakage current
- 175 °C operating junction temperature
- Compliant to RoHS Directive 2002/95/EC


RoHS
COMPLIANT

DESCRIPTIONS/APPLICATIONS

VS-80CPU02-F3 series are the state of the art ultrafast recovery rectifiers designed with optimized performance of forward voltage drop and ultrafast recovery time.

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 the output rectification stage of welding, SMPS, UPS, DC/DC converters as well as freewheeling diodes in low voltage inverters and chopper motor drives.

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

PRODUCT SUMMARY

Package	TO-247AC
$I_{F(AV)}$	2 x 40 A
V_R	200 V
V_F at I_F	1.02 V
t_{rr} (typ.)	34 ns
T_J max.	175 °C
Diode variation	Common cathode

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Repetitive peak reverse voltage	V_{RRM}		200	V
Average rectified forward current	$I_{F(AV)}$	$T_C = 145\text{ °C}$	40	A
per leg			80	
total device				
Non-repetitive peak surge current per leg	I_{FSM}	$T_J = 25\text{ °C}$	330	
Operating junction and storage temperatures	T_J, T_{Stg}		- 65 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	$I_R = 100\ \mu\text{A}$	200	-	-	V
Forward voltage	V_F	$I_F = 40\text{ A}$	-	0.94	1.02	
		$I_F = 40\text{ A}, T_J = 150\text{ °C}$	-	0.80	0.90	
		$I_F = 80\text{ A}$	-	1.07	1.20	
Reverse leakage current	I_R	$V_R = V_R$ rated	-	-	5	μA
		$T_J = 150\text{ °C}, V_R = V_R$ rated	-	-	500	
Junction capacitance	C_T	$V_R = 200\text{ V}$	-	120	-	pF
Series inductance	L_S	Measured lead to lead 5 mm from package body	-	3.5	-	nH

DYNAMIC RECOVERY CHARACTERISTICS ($T_J = 25\text{ °C}$ unless otherwise specified)							
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS	
Reverse recovery time	t_{rr}	$I_F = 1.0\text{ A}$, $di_F/dt = 100\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$	-	34	-	ns	
		$T_J = 25\text{ °C}$	-	33	-		
		$T_J = 125\text{ °C}$	-	54	-		
Peak recovery current	I_{RRM}	$I_F = 40\text{ A}$ $di_F/dt = -200\text{ A}/\mu\text{s}$ $V_R = 200\text{ V}$	$T_J = 25\text{ °C}$	-	3.4	-	A
			$T_J = 125\text{ °C}$	-	8	-	
Reverse recovery charge	Q_{rr}	$I_F = 40\text{ A}$ $di_F/dt = -200\text{ A}/\mu\text{s}$ $V_R = 200\text{ V}$	$T_J = 25\text{ °C}$	-	56	-	nC
			$T_J = 125\text{ °C}$	-	216	-	

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Maximum junction and storage temperature range	T_J, T_{Stg}		- 65	-	175	°C
Thermal resistance, junction to case per leg	R_{thJC}		-	0.46	0.70	°C/W
Thermal resistance, junction to ambient per leg	R_{thJA}	Typical socket mount	-	-	40	
Thermal resistance, case to heatsink	R_{thCS}	Mounting surface, flat, smooth and greased	-	0.3	-	
Weight			-	6.0	-	g
			-	0.21	-	oz.
Mounting torque			6.0 (5.0)	-	12 (10)	kgf · cm (lbf · in)
Marking device		Case style TO-247AC	80CPU02			

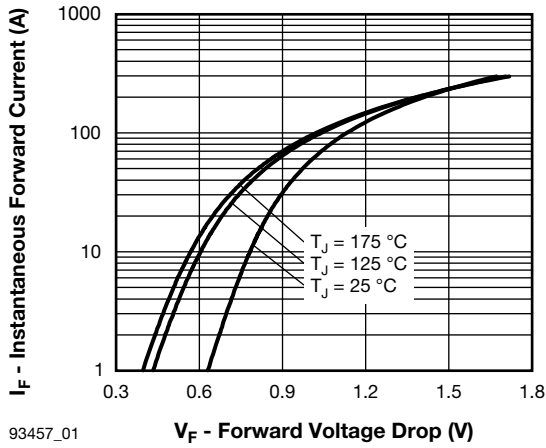


Fig. 1 - Typical Forward Voltage Drop Characteristics

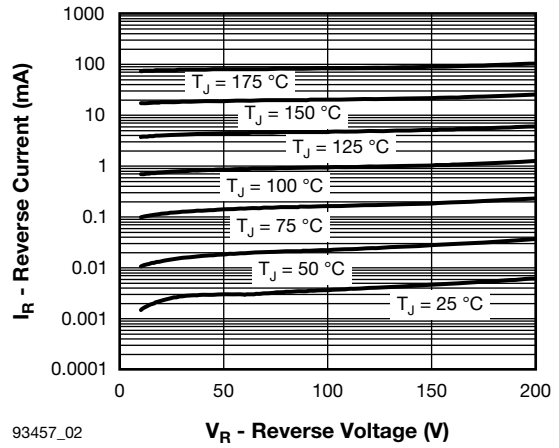


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

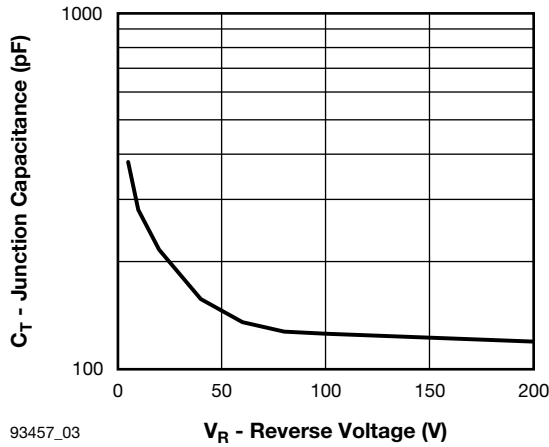
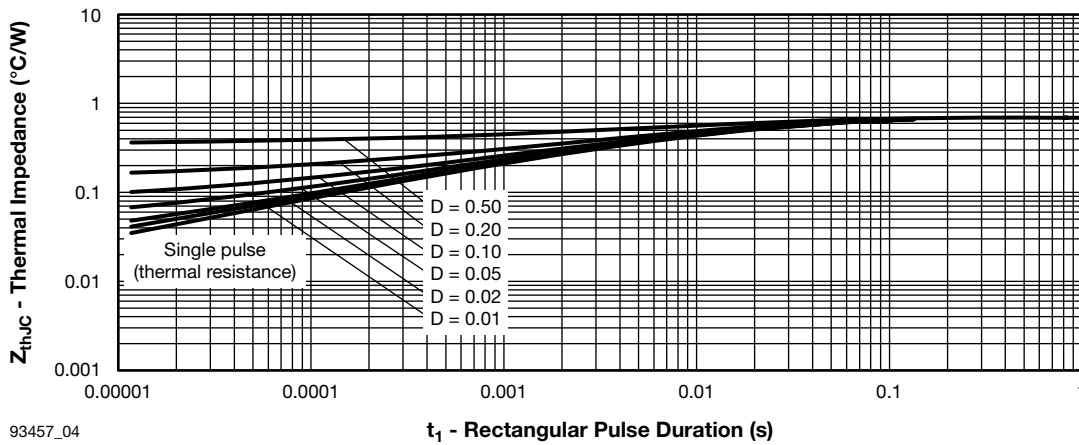
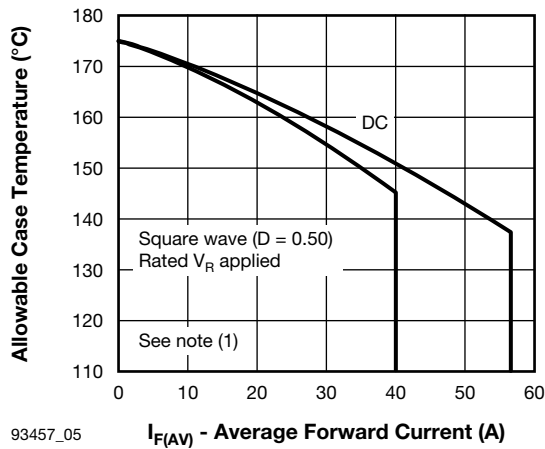


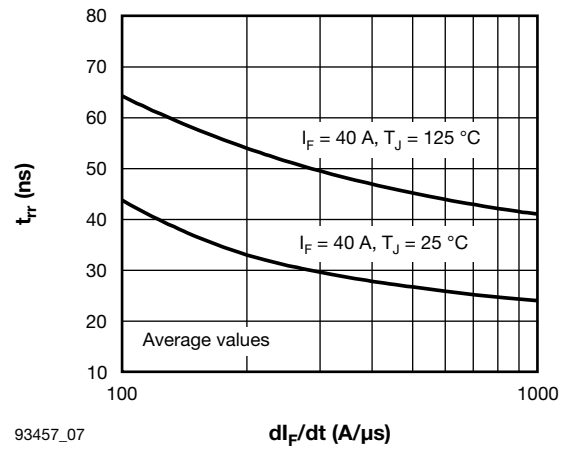
Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage


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



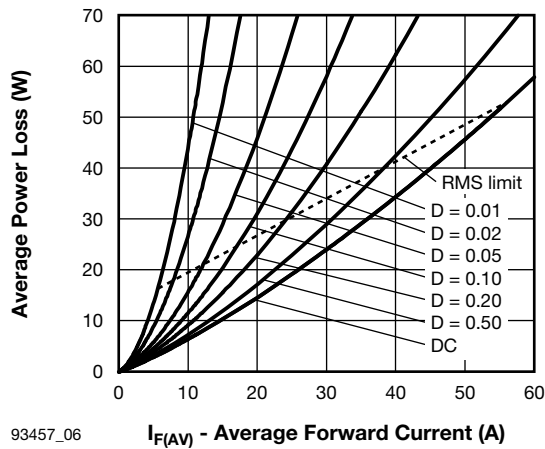
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Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current



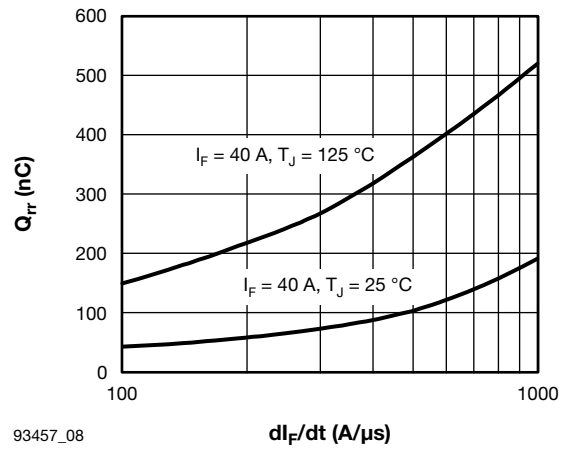
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Fig. 7 - Typical Reverse Recovery Time vs. di_F/dt



93457_06

Fig. 6 - Forward Power Loss Characteristics



93457_08

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

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

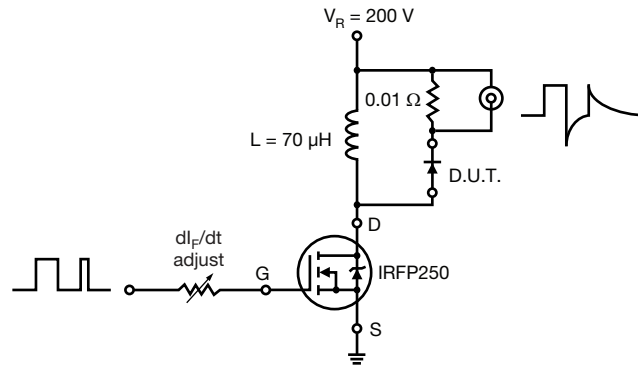
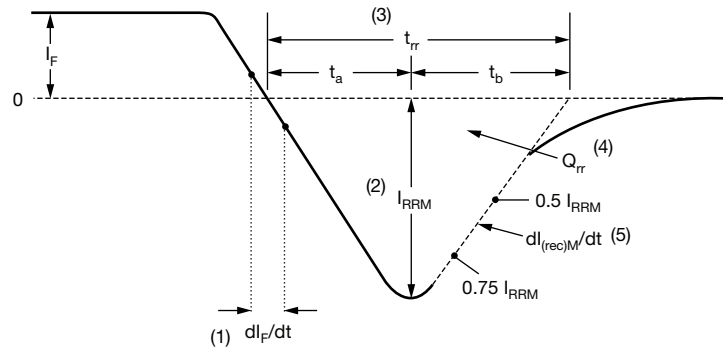


Fig. 9 - Reverse Recovery Parameter Test Circuit



(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

VS-80CPU02-F3

Vishay Semiconductors

Hyperfast Rectifier,
2 x 40 A FRED Pt®



ORDERING INFORMATION TABLE

Device code	VS-	80	C	P	U	02	-F3
	①	②	③	④	⑤	⑥	⑦

- 1** - Vishay Semiconductors product
- 2** - Current rating (80 = 80 A)
- 3** - Circuit configuration:
C = Common cathode
- 4** - P = TO-247AC
- 5** - U = Ultrafast rectifier
- 6** - Voltage rating (02 = 200 V)
- 7** - Environmental digit:
-F3 = RoHS compliant and totally lead (Pb)-free

ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER TUBE	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-80CPU02-F3	25	1000	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95223
Part marking	www.vishay.com/doc?95007



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