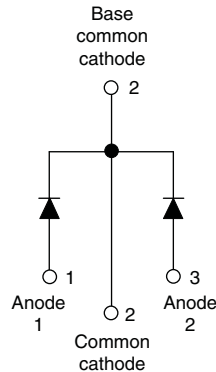


Ultrafast Rectifier, 2 x 40 A FRED Pt®


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
- Designed and qualified according to JEDEC-JESD47
- Halogen-free according to IEC 61249-2-21 definition (-N3 only)



DESCRIPTIONS/APPLICATIONS

VS-80CPU02... 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

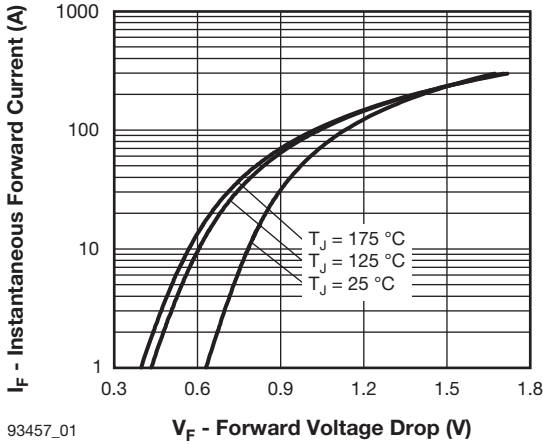
ABSOLUTE MAXIMUM RATINGS				
PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Repetitive peak reverse voltage	V_{RRM}		200	V
Average rectified forward current per leg total device	$I_{F(AV)}$	$T_C = 145\text{ °C}$	40 80	A
Non-repetitive peak surge current per leg	I_{FSM}	$T_J = 25\text{ °C}$	330	
Operating 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	$I_R = 100\ \mu A$	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



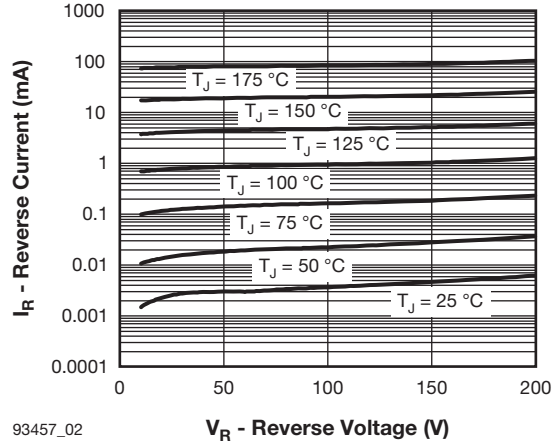
DYNAMIC RECOVERY CHARACTERISTICS ($T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified)							
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS	
Reverse recovery time	t_{rr}	$I_F = 1.0\text{ A}$, $di_F/dt = 100\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$	-	34	-	ns	
		$T_J = 25\text{ }^\circ\text{C}$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

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Maximum junction and storage temperature range	T_J , T_{Stg}		- 65	-	175	$^\circ\text{C}$
Thermal resistance, junction to case per leg	R_{thJC}		-	0.46	0.70	$^\circ\text{C}/\text{W}$
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			



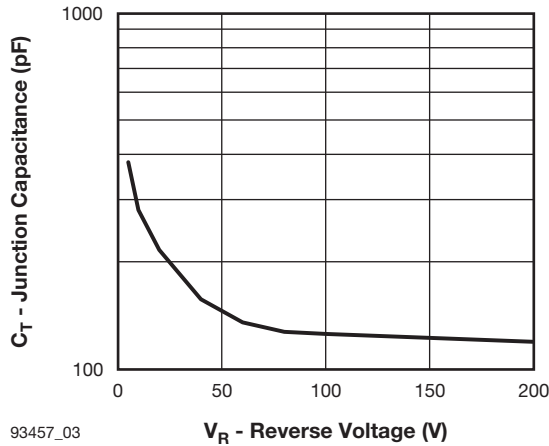
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Fig. 1 - Typical Forward Voltage Drop Characteristics



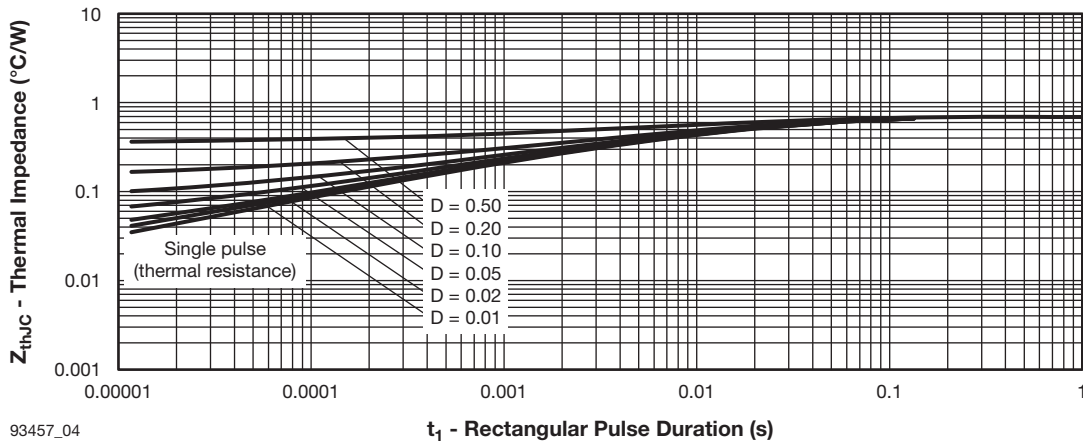
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Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage



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Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage



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

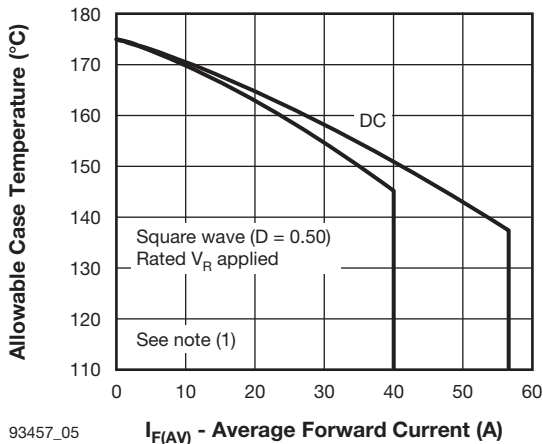


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

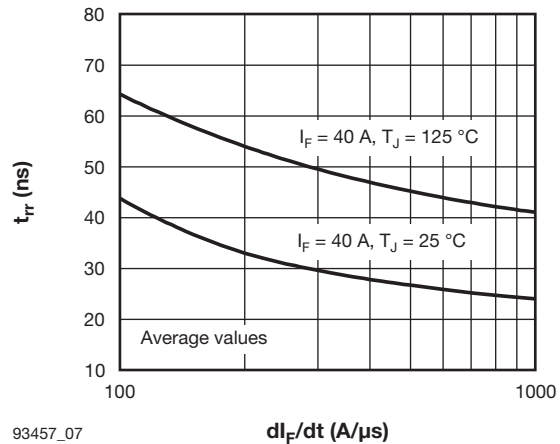


Fig. 7 - Typical Reverse Recovery Time vs. di_F/dt

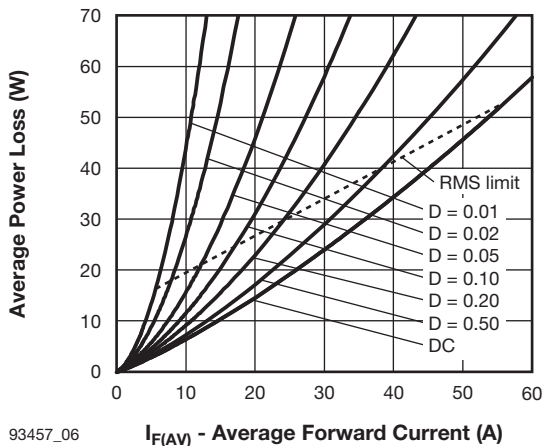


Fig. 6 - Forward Power Loss Characteristics

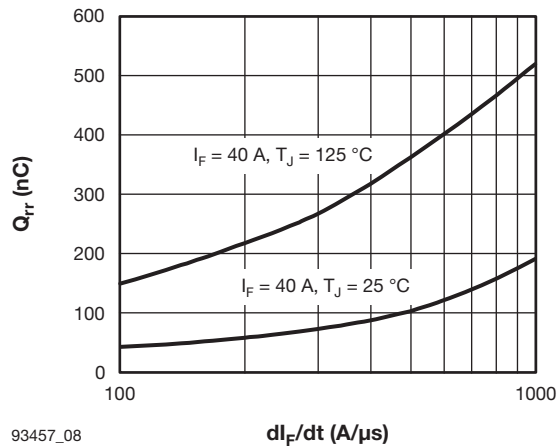


Fig. 8 - Typical Stored Charge vs. di_F/dt

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. 6);
- Pd_{REV} = Inverse power loss = $V_{R1} \times I_R (1 - D)$; I_R at V_{R1} = Rated V_R

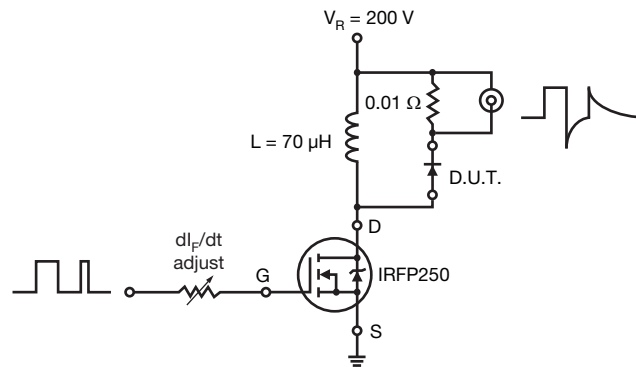


Fig. 9 - Reverse Recovery Parameter Test Circuit

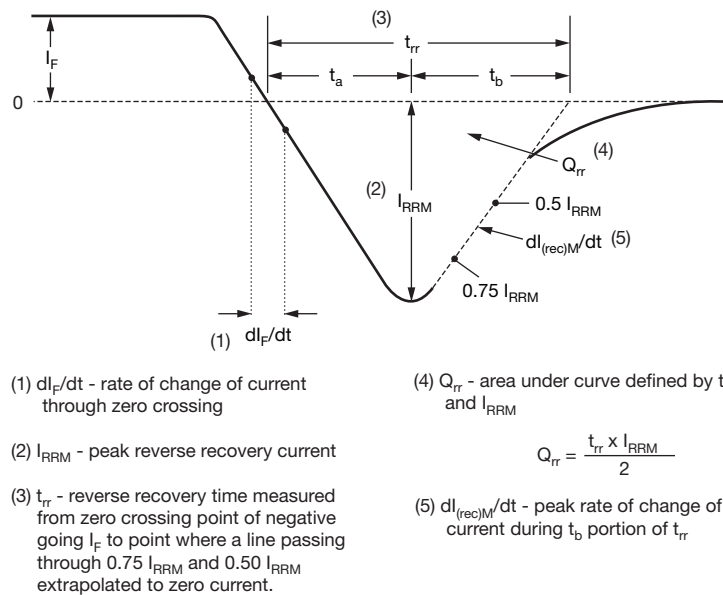
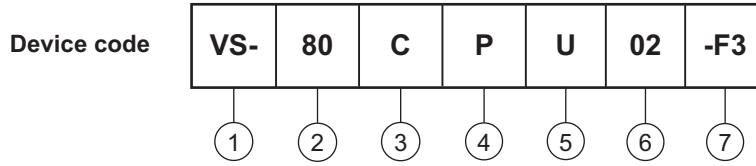


Fig. 9 - Reverse Recovery Waveform and Definitions



ORDERING INFORMATION TABLE



- 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
-N3 = Halogen-free, 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	500	Antistatic plastic tube
VS-80CPU02-N3	25	500	Antistatic plastic tube

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



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