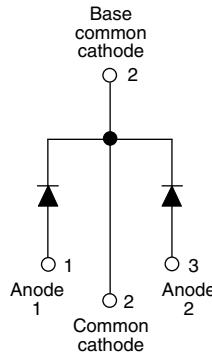


Schottky Rectifier, 2 x 40 A



TO-247AC



RoHS
COMPLIANT
HALOGEN
FREE
Available

FEATURES

- 150 °C T_J operation
- Optimized for 3.3 V application
- Ultralow forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- 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)

DESCRIPTION

This center tap Schottky rectifier has been optimized for ultralow forward voltage drop specifically for 3.3 V output power supplies. The proprietary barrier technology allows for reliable operation up to 150 °C junction temperature. Typical applications are in parallel switching power supplies, converters, reverse battery protection, and redundant power subsystems.

PRODUCT SUMMARY	
Package	TO-247AC
$I_{F(AV)}$	2 x 40 A
V_R	20 V
V_F at I_F	0.36 V
I_{RM} max.	1100 mA at 125 °C
T_J max.	150 °C
Diode variation	Common cathode
E_{AS}	27 mJ

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Rectangular waveform	80	A
V_{RRM}		20	V
I_{FSM}	$t_p = 5 \mu s$ sine	2200	A
V_F	40 Apk, $T_J = 150$ °C (per leg)	0.32	V
T_J	Range	- 55 to 150	°C

VOLTAGE RATINGS				
PARAMETER	SYMBOL	VS-80CPQ020PbF	VS-80CPQ020-N3	UNITS
Maximum DC reverse voltage	V_R	20	20	V
Maximum working peak reverse voltage	V_{RWM}			

ABSOLUTE MAXIMUM RATINGS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum average forward current per leg per device	$I_{F(AV)}$	50 % duty cycle at $T_C = 138$ °C, rectangular waveform		40	A
				80	
Maximum peak one cycle non-repetitive surge current per leg	I_{FSM}	5 μs sine or 3 μs rect. pulse	Following any rated load condition and with rated V_{RRM} applied	2200	
		10 ms sine or 6 ms rect. pulse		500	
Non-repetitive avalanche energy per leg	E_{AS}	$T_J = 25$ °C, $I_{AS} = 6$ A, $L = 1.5$ mH		27	mJ
Repetitive avalanche current per leg	I_{AR}	Current decaying linearly to zero in 1 μs Frequency limited by T_J maximum $V_A = 1.5 \times V_R$ typical		6	A

ELECTRICAL SPECIFICATIONS

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS	
Maximum forward voltage drop per leg	$V_{FM}^{(1)}$	40 A	$T_J = 25 \text{ }^\circ\text{C}$	0.46	V	
		80 A		0.55		
		40 A	$T_J = 125 \text{ }^\circ\text{C}$	0.36		
		80 A		0.46		
		40 A	$T_J = 150 \text{ }^\circ\text{C}$	0.32		
		80 A		0.43		
Maximum reverse leakage current per leg	$I_{RM}^{(1)}$	$T_J = 125 \text{ }^\circ\text{C}$	$V_R = 5 \text{ V}$	110	mA	
		$T_J = 150 \text{ }^\circ\text{C}$	$V_R = 10 \text{ V}$	600		
		$T_J = 25 \text{ }^\circ\text{C}$	$V_R = \text{Rated } V_R$	5.5		
		$T_J = 125 \text{ }^\circ\text{C}$		1100		
Threshold voltage	$V_{F(TO)}$	$T_J = T_J \text{ maximum}$		0.185	V	
Maximum junction capacitance per leg	C_T	$V_R = 5 \text{ V}_{DC}$ (test signal range 100 kHz to 1 MHz) $25 \text{ }^\circ\text{C}$		6500	pF	
Typical series inductance per leg	L_S	Measured lead to lead 5 mm from package body		7.5	nH	
Maximum voltage rate of change	dV/dt	Rated V_R		10 000	V/ μ s	

Note

⁽¹⁾ Pulse width < 300 μ s, duty cycle < 2 %

THERMAL - MECHANICAL SPECIFICATIONS

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum junction and storage temperature range	T_J, T_{Stg}			- 55 to 150	$^\circ\text{C}$
Maximum thermal resistance, junction to case per leg	R_{thJC}	DC operation		0.6	$^\circ\text{C}/\text{W}$
Maximum thermal resistance, junction to case per package				0.3	
Typical thermal resistance, case to heatsink	R_{thCS}	Mounting surface, smooth and greased		0.25	
Approximate weight				6	g
				0.21	oz.
Mounting torque	minimum maximum			6 (5)	$\text{kgf} \cdot \text{cm}$ (lbf · in)
				12 (10)	
Marking device		Case style TO-247AC (JEDEC)		80CPQ020	

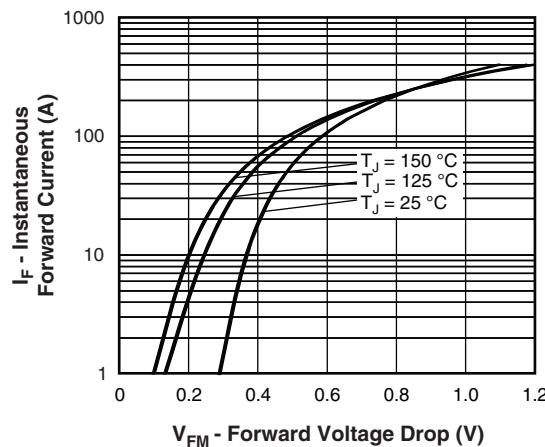


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

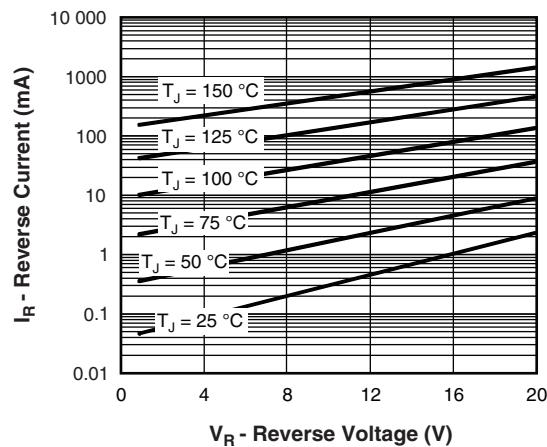


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

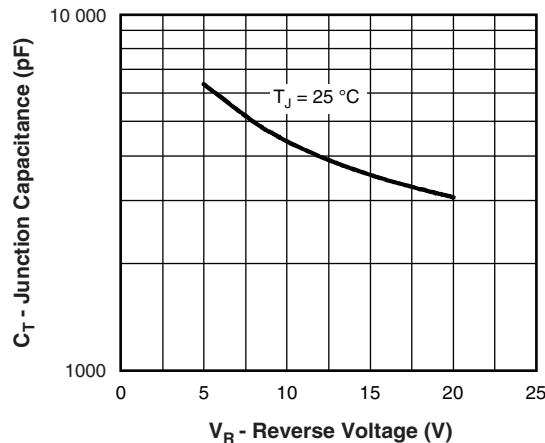


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

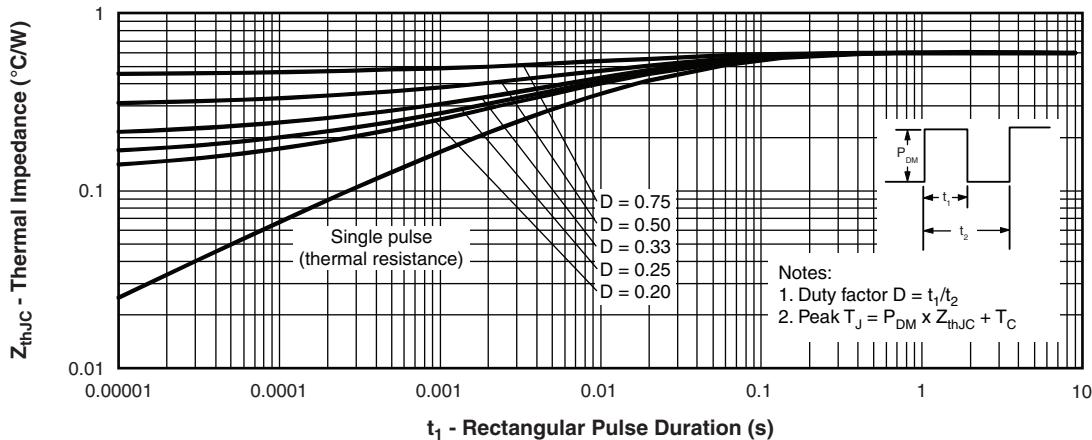


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

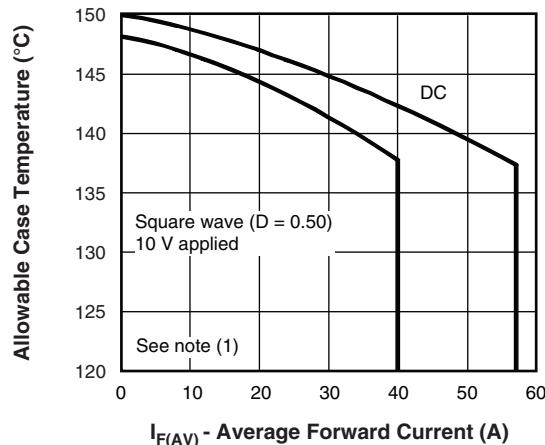


Fig. 5 - Maximum Allowable Case Temperature vs.
Average Forward Current (Per Leg)

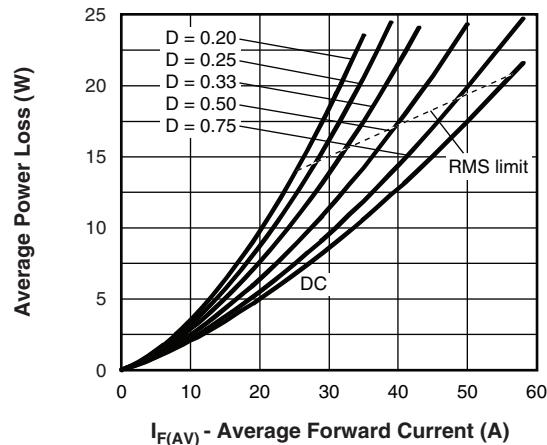


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

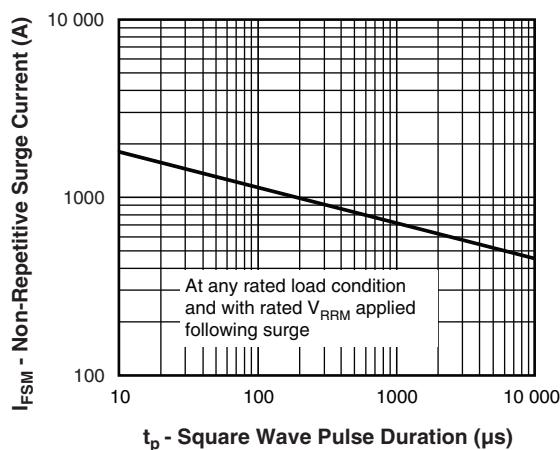


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

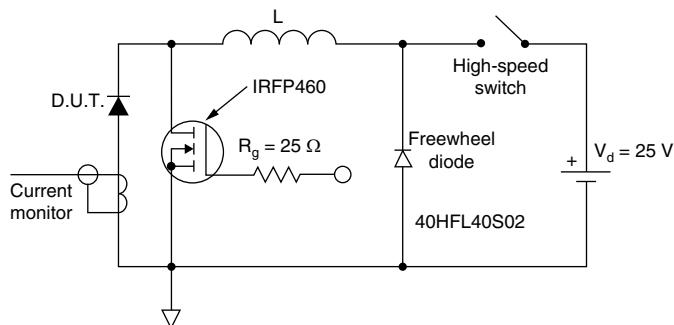


Fig. 8 - Unclamped Inductive Test Circuit

Note

(1) Formula used: $T_C = T_J - (P_d + P_{dREV}) \times R_{thJC}$;
 $P_d = \text{Forward power loss} = I_{F(AV)} \times V_{FM}$ at $(I_{F(AV)}/D)$ (see fig. 6);
 $P_{dREV} = \text{Inverse power loss} = V_{R1} \times I_R (1 - D)$; I_R at $V_{R1} = 10$ V

ORDERING INFORMATION TABLE

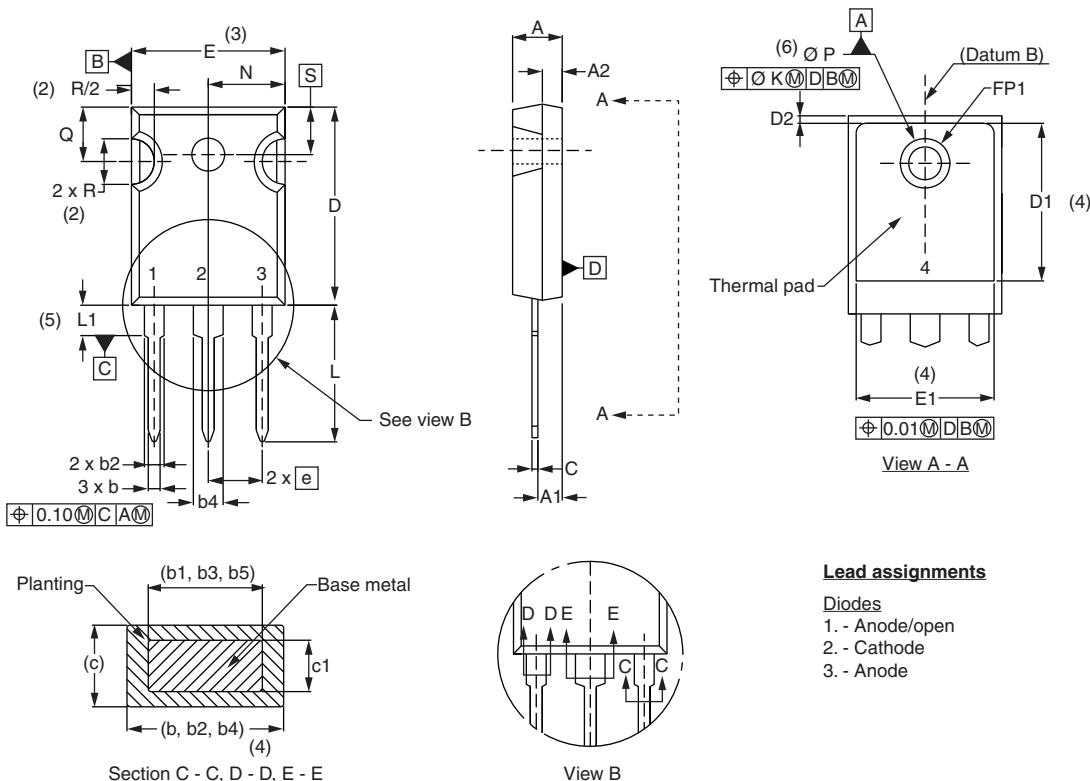
Device code	VS-	80	C	P	Q	020	PbF
	1	2	3	4	5	6	7

- 1** - Vishay Semiconductors product
- 2** - Current rating (80 = 80 A)
- 3** - Circuit configuration:
C = Common cathode
- 4** - Package:
P = TO-247
- 5** - Schottky "Q" series
- 6** - Voltage code (020 = 20 V)
- 7** - Environmental digit
 - PbF = Lead (Pb)-free and RoHS compliant
 - -N3 = Halogen-free, RoHS compliant, and totally lead (Pb)-free

ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-80CPQ020PbF	25	500	Antistatic plastic tube
VS-80CPQ020-N3	25	500	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95223
Part marking information	TO-247AC PbF www.vishay.com/doc?95226
SPICE model	www.vishay.com/doc?95007 www.vishay.com/doc?95289

DIMENSIONS in millimeters and inches



Symbol	Millimeters		Inches		Notes		Symbol	Millimeters		Inches		Notes
	Min.	Max.	Min.	Max.				Min.	Max.	Min.	Max.	
A	4.65	5.31	0.183	0.209			D2	0.51	1.30	0.020	0.051	
A1	2.21	2.59	0.087	0.102			E	15.29	15.87	0.602	0.625	3
A2	1.50	2.49	0.059	0.098			E1	13.72	-	0.540	-	
b	0.99	1.40	0.039	0.055			e	5.46 BSC		0.215 BSC		
b1	0.99	1.35	0.039	0.053			FK	2.54		0.010		
b2	1.65	2.39	0.065	0.094			L	14.20	16.10	0.559	0.634	
b3	1.65	2.37	0.065	0.094			L1	3.71	4.29	0.146	0.169	
b4	2.59	3.43	0.102	0.135			N	7.62 BSC		0.3		
b5	2.59	3.38	0.102	0.133			ΦP	3.56	3.66	0.14	0.144	
c	0.38	0.86	0.015	0.034			ΦP1	-	6.98	-	0.275	
c1	0.38	0.76	0.015	0.030			Q	5.31	5.69	0.209	0.224	
D	19.71	20.70	0.776	0.815	3		R	4.52	5.49	1.78	0.216	
D1	13.08	-	0.515	-	4		S	5.51 BSC		0.217 BSC		

Notes

- (1) Dimensioning and tolerancing per ASME Y14.5M-1994
- (2) Contour of slot optional
- (3) Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outermost extremes of the plastic body
- (4) Thermal pad contour optional with dimensions D1 and E1
- (5) Lead finish uncontrolled in L1
- (6) Ø P to have a maximum draft angle of 1.5 to the top of the part with a maximum hole diameter of 3.91 mm (0.154")
- (7) Outline conforms to JEDEC outline TO-247 with exception of dimension c

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