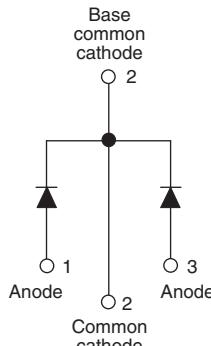


## High Performance Schottky Rectifier, 2 x 40 A



### PRIMARY CHARACTERISTICS

$I_{F(AV)}$	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
$E_{AS}$	27 mJ
Package	TO-247AC 3L
Circuit configuration	Common cathode

### 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
- 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

### 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.

### 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 A <sub>pk</sub> , $T_J = 150$ °C (per leg)	0.32	V
$T_J$	Range	-55 to +150	°C

### VOLTAGE RATINGS

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

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current per leg	$I_{F(AV)}$	50 % duty cycle at $T_C = 138$ °C, rectangular waveform	40	A
per device			80	
Maximum peak one cycle non-repetitive surge current per leg	$I_{FSM}$	5 $\mu s$ sine or 3 $\mu s$ rect. pulse	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 $\mu s$ 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 <sub>FM</sub> <sup>(1)</sup>	40 A	T <sub>J</sub> = 25 °C	0.46	V	
		80 A		0.55		
		40 A	T <sub>J</sub> = 125 °C	0.36		
		80 A		0.46		
		40 A	T <sub>J</sub> = 150 °C	0.32		
		80 A		0.43		
Maximum reverse leakage current per leg	I <sub>RM</sub> <sup>(1)</sup>	T <sub>J</sub> = 125 °C	V <sub>R</sub> = 5 V	110	mA	
		T <sub>J</sub> = 150 °C	V <sub>R</sub> = 10 V	600		
		T <sub>J</sub> = 25 °C	V <sub>R</sub> = Rated V <sub>R</sub>	5.5		
		T <sub>J</sub> = 125 °C		1100		
Threshold voltage	V <sub>F(TO)</sub>	T <sub>J</sub> = T <sub>J</sub> maximum		0.185	V	
Maximum junction capacitance per leg	C <sub>T</sub>	V <sub>R</sub> = 5 V <sub>DC</sub> (test signal range 100 kHz to 1 MHz) 25 °C		6500	pF	
Typical series inductance per leg	L <sub>S</sub>	Measured lead to lead 5 mm from package body		7.5	nH	
Maximum voltage rate of change	dV/dt	Rated V <sub>R</sub>		10 000	V/μs	

**Note**
<sup>(1)</sup> Pulse width < 300 μs, duty cycle < 2 %

**THERMAL - MECHANICAL SPECIFICATIONS**

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum junction and storage temperature range	T <sub>J</sub> , T <sub>Stg</sub>			-55 to 150	°C
Maximum thermal resistance, junction to case per leg	R <sub>thJC</sub>	DC operation		0.6	°C/W
Maximum thermal resistance, junction to case per package				0.3	
Typical thermal resistance, case to heatsink	R <sub>thCS</sub>	Mounting surface, smooth and greased		0.25	
Approximate weight				6	g
				0.21	oz.
Mounting torque	minimum maximum			6 (5)	kgf · cm (lbf · in)
				12 (10)	
Marking device		Case style TO-247AC 3L		80CPQ020	

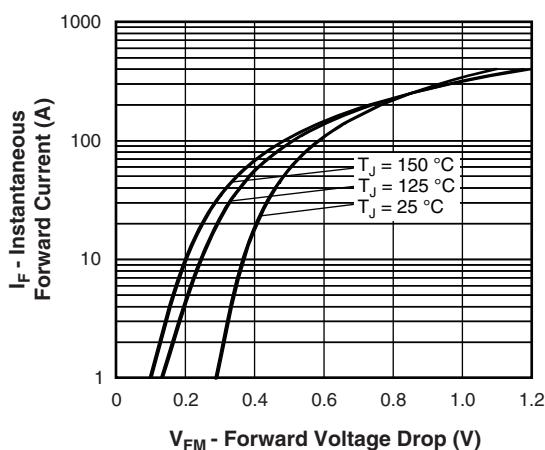


Fig. 1 - Maximum Forward Voltage Drop Characteristics  
(Per Leg)

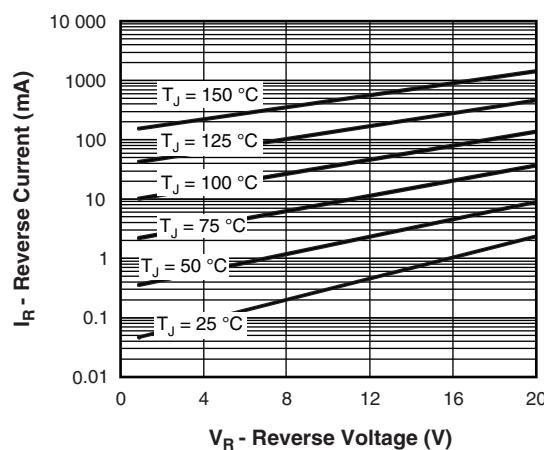


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage  
(Per Leg)

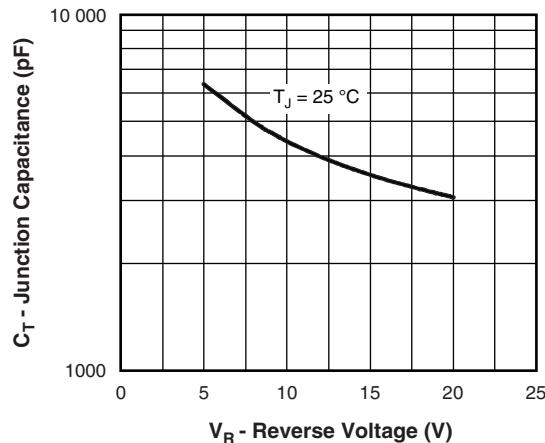


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

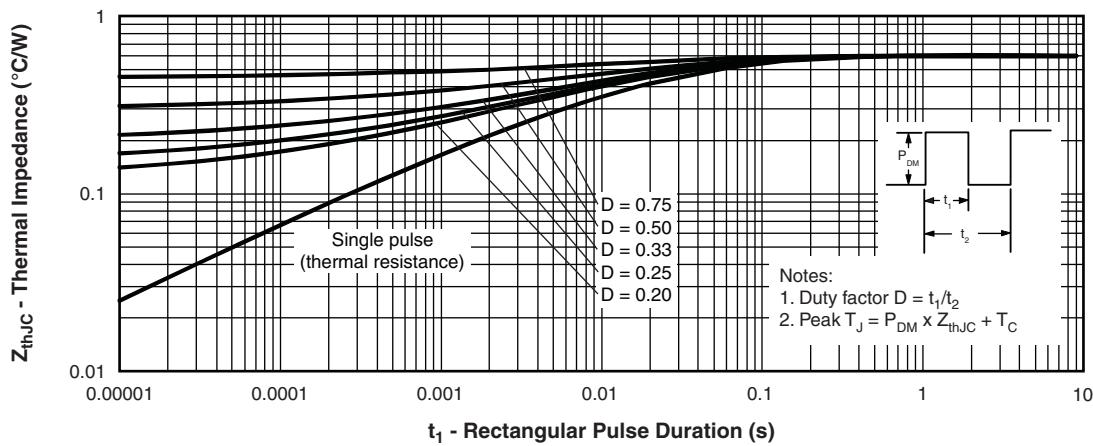


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

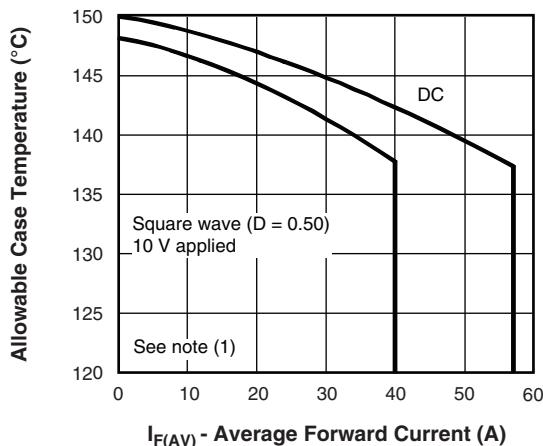


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

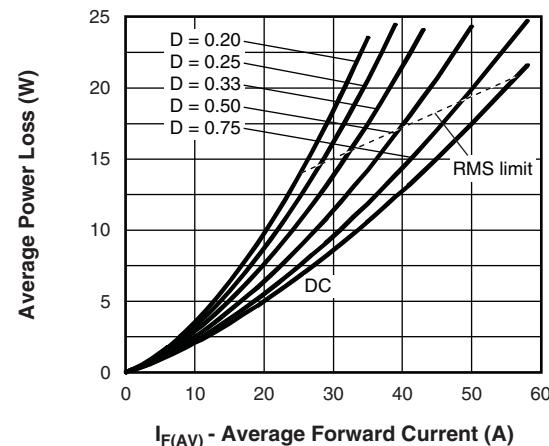


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

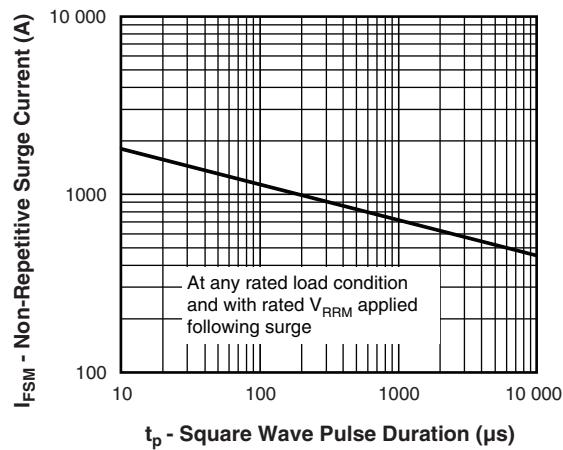


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

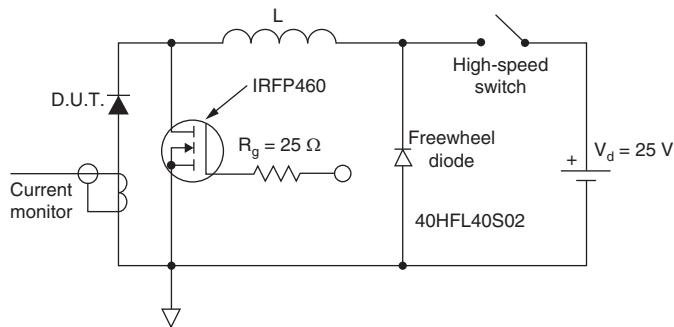


Fig. 8 - Unclamped Inductive Test Circuit

#### 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	-N3
	(1)	(2)	(3)	(4)	(5)	(6)	(7)

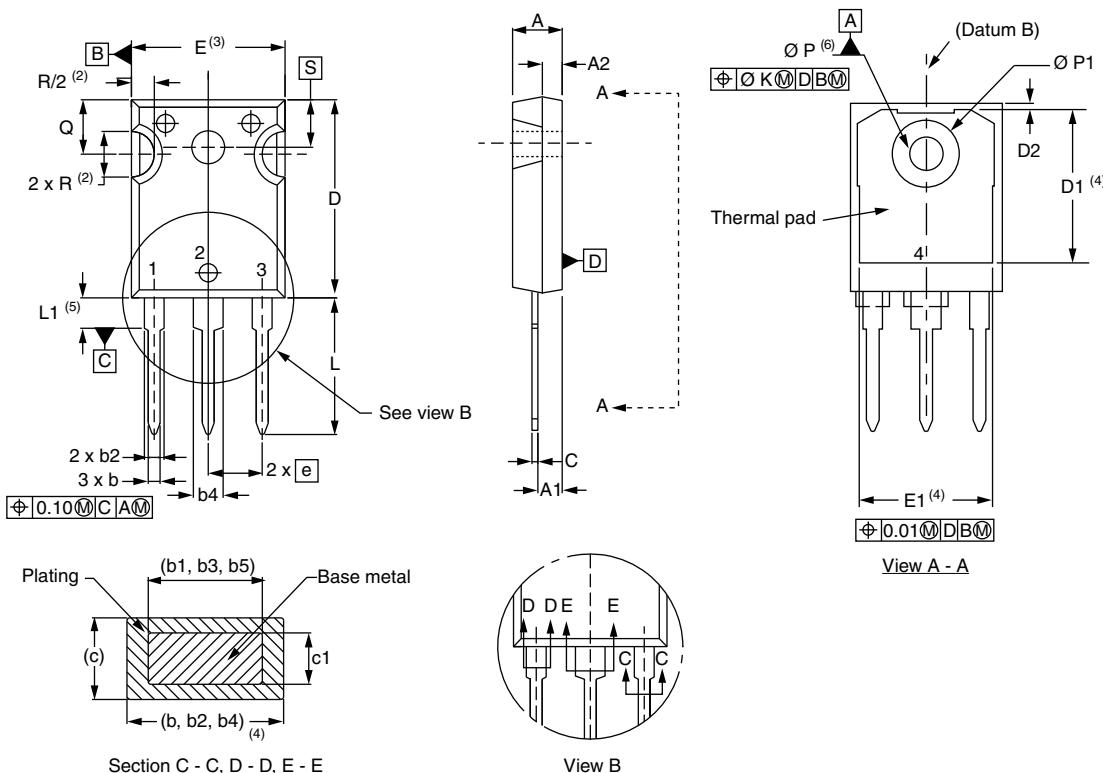
- 1** - Vishay Semiconductors product
- 2** - Current rating (80 = 80 A)
- 3** - Circuit configuration:  
C = common cathode
- 4** - Package:  
P = TO-247
- 5** - Schottky "Q" series
- 6** - Voltage code (020 = 20 V)
- 7** - Environmental digit  
-N3 = halogen-free, RoHS-compliant, and totally lead (Pb)-free

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

<b>LINKS TO RELATED DOCUMENTS</b>	
Dimensions	<a href="http://www.vishay.com/doc?96138">www.vishay.com/doc?96138</a>
Part marking information	<a href="http://www.vishay.com/doc?95007">www.vishay.com/doc?95007</a>
SPICE model	<a href="http://www.vishay.com/doc?95289">www.vishay.com/doc?95289</a>

# TO-247AC 3L

**DIMENSIONS** in millimeters and inches



SYMBOL	MILLIMETERS		INCHES		NOTES	View A - A	SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.				MIN.	MAX.	MIN.	MAX.	
A	4.65	5.31	0.183	0.209			D2	0.51	1.35	0.020	0.053	
A1	2.21	2.59	0.087	0.102			E	15.29	15.87	0.602	0.625	3
A2	1.17	1.37	0.046	0.054			E1	13.46	-	0.53	-	
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			Ø K	0.254		0.010		
b2	1.65	2.39	0.065	0.094			L	14.20	16.10	0.559	0.634	
b3	1.65	2.34	0.065	0.092			L1	3.71	4.29	0.146	0.169	
b4	2.59	3.43	0.102	0.135			Ø P	3.56	3.66	0.14	0.144	
b5	2.59	3.38	0.102	0.133			Ø P1	-	7.39	-	0.291	
c	0.38	0.89	0.015	0.035			Q	5.31	5.69	0.209	0.224	
c1	0.38	0.84	0.015	0.033			R	4.52	5.49	0.178	0.216	
D	19.71	20.70	0.776	0.815	3		S	5.51 BSC		0.217 BSC		
D1	13.08	-	0.515	-	4							

**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 Q

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