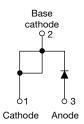


## Vishay Semiconductors

## Schottky Rectifier, 20 A

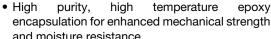


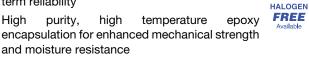


PRODUCT SUMMARY					
Package	TO-220AC				
I <sub>F(AV)</sub>	20 A				
$V_R$	15 V				
V <sub>F</sub> at I <sub>F</sub>	See Electrical table				
I <sub>RM</sub> max.	600 mA at 100 °C				
T <sub>J</sub> max.	125 °C				
Diode variation	Single die				
E <sub>AS</sub>	10 mJ				

#### **FEATURES**

- 125 °C T<sub>J</sub> operation (V<sub>R</sub> < 5 V)</li>
- · Single diode configuration
- · Optimized for OR-ing applications
- Ultra low forward voltage drop
- Guard ring for enhanced ruggedness and long term reliability





- 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**

The Schottky rectifier module has been optimized for ultra low forward voltage drop specifically for the OR-ing of parallel power supplies. The proprietary technology allows for reliable operation up to 125 °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 <sub>F(AV)</sub>	Rectangular waveform	20	А			
V <sub>RRM</sub>		15	V			
I <sub>FSM</sub>	t <sub>p</sub> = 5 μs sine	700	Α			
V <sub>F</sub>	19 A <sub>pk</sub> , T <sub>J</sub> = 125 °C (typical)	0.25	V			
T <sub>J</sub>	Range	- 55 to 125	°C			

VOLTAGE RATINGS						
PARAMETER	SYMBOL	VS-20L15TPbF	VS-20L15T-N3	UNITS		
Maximum DC reverse voltage	V <sub>R</sub>	15	15	V		
Maximum working peak reverse voltage	$V_{RWM}$	15	15	V		

ABSOLUTE MAXIMUM RATINGS						
PARAMETER	SYMBOL	TEST COND	ITIONS	VALUES	UNITS	
Maximum average forward current See fig. 5	I <sub>F(AV)</sub>	50 % duty cycle at T <sub>C</sub> = 85 °C, rectangular waveform		20		
Maximum peak one cycle non-repetitive surge current		5 μs sine or 3 μs rect. pulse Following any rated load condition and with rated		700	Α	
See fig. 7	IFSM	10 ms sine or 6 ms rect. pulse	V <sub>RRM</sub> applied	330		
Non-repetitive avalanche energy	E <sub>AS</sub>	T <sub>J</sub> = 25 °C, I <sub>AS</sub> = 2 A, L = 6 mH		10	mJ	
Repetitive avalanche current	I <sub>AR</sub>	Current decaying linearly to zero in 1 $\mu$ s Frequency limited by $T_J$ maximum $V_A = 1.5 \times V_R$ typical		2	Α	



# **VS-20L15TPbF, VS-20L15T-N3**

# Vishay Semiconductors

ELECTRICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS			MAX.	UNITS
		19 A	T 05 00	-	0.41	V
Forward voltage drop	V <sub>FM</sub> <sup>(1)</sup>	40 A	- T <sub>J</sub> = 25 °C	-	0.52	
See fig. 1	VFM (1)	19 A	T 105 °C	0.25	0.33	
		40 A	- T <sub>J</sub> = 125 °C	0.37	0.50	
Reverse leakage current	. (1)	T <sub>J</sub> = 25 °C		-	10	A
See fig. 2	I <sub>RM</sub> <sup>(1)</sup>	T <sub>J</sub> = 100 °C	V <sub>R</sub> = Rated V <sub>R</sub>	-	600	mA
Threshold voltage	V <sub>F(TO)</sub>	T T		0.1	82	V
Forward slope resistance	r <sub>t</sub>	ıj=ıjmax.	$T_J = T_J \text{ max.}$			mΩ
Maximum junction capacitance	C <sub>T</sub>	V <sub>R</sub> = 5 V <sub>DC</sub> , (test signal rar	-	2000	pF	
Typical series inductance	L <sub>S</sub>	Measured lead to lead 5 m	8	-	nH	
Maximum voltage rate of change	dV/dt	Rated V <sub>R</sub>	10	000	V/µs	

#### Note

 $^{(1)}\,$  Pulse width < 300  $\mu s,$  duty cycle < 2 %

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS		
Maximum junction temperature range	TJ		- 55 to 125	°C		
Maximum storage temperature range	T <sub>Stg</sub>		- 50 to 150	C		
Maximum thermal resistance, junction to case	R <sub>thJC</sub>	R <sub>thJC</sub> DC operation See fig. 4				
Typical thermal resistance, case to heatsink	R <sub>thCS</sub>	Mounting surface, smooth and greased (for TO-220)	0.50	°C/W		
Maximum thermal resistance, junction to ambient	R <sub>thJA</sub>	DC operation (for D <sup>2</sup> PAK)	40			
Approximate weight			2	g		
Approximate weight			0.07	OZ.		
Mounting torque minimum		Non-lubricated threads	6 (5)	kgf · cm		
Mounting torque — maximum		Non-iublicated tilleaus	12 (10)	(lbf · in)		
Marking device	Case style TO-220AC 20L15T		15T			

## Vishay Semiconductors

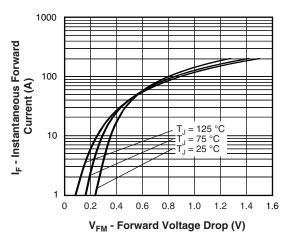


Fig. 1 - Maximum Forward Voltage Drop Characteristics

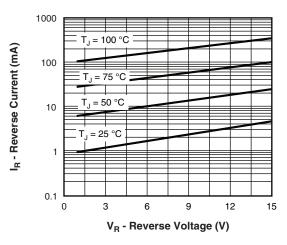


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

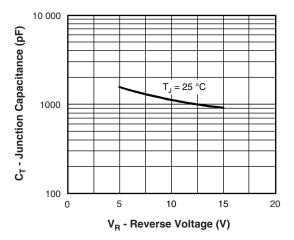


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

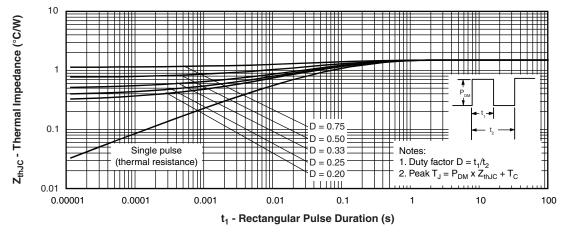


Fig. 4 - Maximum Thermal Impedance Z<sub>thJC</sub> Characteristics

### www.vishay.com

## Vishay Semiconductors

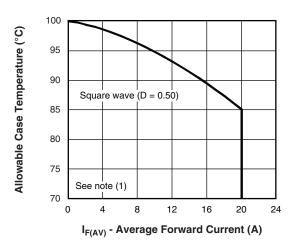


Fig. 5 - Maximum Allowable Case Temperature vs.
Average Forward Current

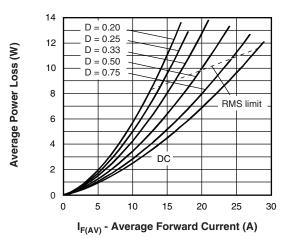


Fig. 6 - Forward Power Loss Characteristics

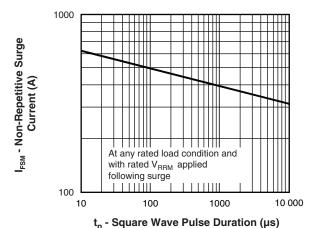


Fig. 7 - Maximum Non-Repetitive Surge Current

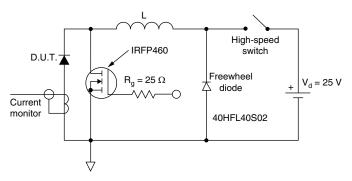


Fig. 8 - Unclamped Inductive Test Circuit

### Note

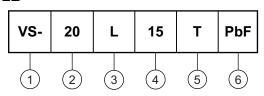
 $^{(1)}$  Formula used: T<sub>C</sub> = T<sub>J</sub> - (Pd + Pd<sub>REV</sub>) x R<sub>thJC</sub>; Pd = Forward power loss = I<sub>F(AV)</sub> x V<sub>FM</sub> at (I<sub>F(AV)</sub>/D) (see fig. 6); Pd<sub>REV</sub> = Inverse power loss = V<sub>R1</sub> x I<sub>R</sub> (1 - D); I<sub>R</sub> at V<sub>R1</sub> = 80 % rated V<sub>R</sub>

## **VS-20L15TPbF, VS-20L15T-N3**

## Vishay Semiconductors

### **ORDERING INFORMATION TABLE**

**Device code** 



Vishay Semiconductors product

2 - Current rating (20 = 20 A)

3 - Schottky "L" series

4 - Voltage code (15 = 15 V)

5 - Package

T = TO-220

6 - 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-20L15TPbF	50	1000	Antistatic plastic tube			
VS-20L15T-N3	50	1000	Antistatic plastic tube			

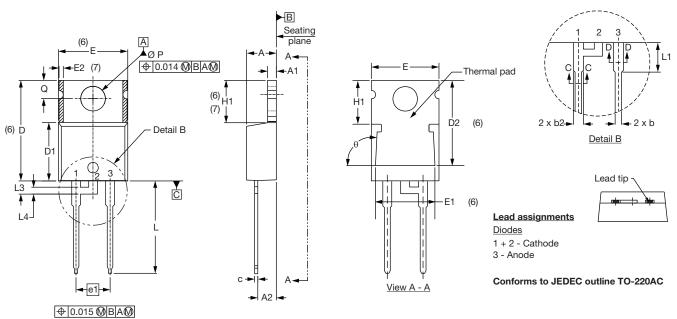
LINKS TO RELATED DOCUMENTS					
Dimensions <u>www.vishay.com/doc?95221</u>					
Dort marking information	TO-220AC PbF	www.vishay.com/doc?95224			
Part marking information	TO-220AC -N3	www.vishay.com/doc?95068			



## Vishay Semiconductors

### **TO-220AC**

### **DIMENSIONS** in millimeters and inches



SYMBOL	MILLIM	IETERS	INCHES		NOTES
STIVIBUL	MIN.	MAX.	MIN.	MAX.	NOTES
Α	4.25	4.65	0.167	0.183	
A1	1.14	1.40	0.045	0.055	
A2	2.56	2.92	0.101	0.115	
b	0.69	1.01	0.027	0.040	
b1	0.38	0.97	0.015	0.038	4
b2	1.20	1.73	0.047	0.068	
b3	1.14	1.73	0.045	0.068	4
С	0.36	0.61	0.014	0.024	
c1	0.36	0.56	0.014	0.022	4
D	14.85	15.25	0.585	0.600	3
D1	8.38	9.02	0.330	0.355	
D2	11.68	12.88	0.460	0.507	6
Е	10.11	10.51	0.398	0.414	3, 6

SYMBOL	MILLIM	IETERS	INCHES		NOTES
STINIBUL	MIN.	MAX.	MIN.	MAX.	NOTES
E1	6.86	8.89	0.270	0.350	6
E2	-	0.76	-	0.030	7
е	2.41	2.67	0.095	0.105	
e1	4.88	5.28	0.192	0.208	
H1	6.09	6.48	0.240	0.255	6, 7
L	13.52	14.02	0.532	0.552	
L1	3.32	3.82	0.131	0.150	2
L3	1.78	2.13	0.070	0.084	
L4	0.76	1.27	0.030	0.050	2
ØΡ	3.54	3.73	0.139	0.147	
Q	2.60	3.00	0.102	0.118	
θ	90° t	o 93°	90° t	o 93°	

#### Notes

- (1) Dimensioning and tolerancing as per ASME Y14.5M-1994
- (2) Lead dimension and finish uncontrolled in L1
- (3) Dimension D, D1 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) Dimension b1, b3 and c1 apply to base metal only
- (5) Controlling dimension: inches
- (6) Thermal pad contour optional within dimensions E, H1, D2 and E1
- (7) Dimension E2 x H1 define a zone where stamping and singulation irregularities are allowed
- (8) Outline conforms to JEDEC TO-220, D2 (minimum) where dimensions are derived from the actual package outline



## **Legal Disclaimer Notice**

Vishay

### **Disclaimer**

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk and agree to fully indemnify and hold Vishay and its distributors harmless from and against any and all claims, liabilities, expenses and damages arising or resulting in connection with such use or sale, including attorneys fees, even if such claim alleges that Vishay or its distributor was negligent regarding the design or manufacture of the part. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.

## **Material Category Policy**

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.

Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.