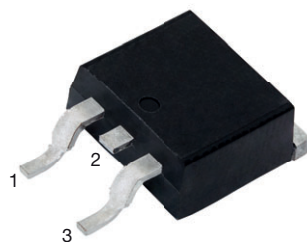
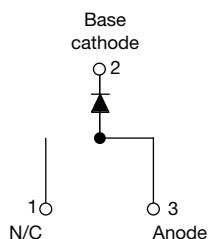


# High Performance Schottky Rectifier, 20 A


**D<sup>2</sup>PAK (TO-263AB)**


## FEATURES

- 125 °C  $T_J$  operation ( $V_R < 5$  V)
- Single diode configuration
- Optimized for OR-ing applications
- Ultralow forward voltage drop
- Guard ring for enhanced ruggedness and long term reliability
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Meets MSL level 1, per J-STD-020, LF maximum peak of 245 °C
- 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

The Schottky rectifier module has been optimized for ultra low forward voltage drop specifically for the OR-ing of parallel power supplies. The proprietary barrier 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.

## PRIMARY CHARACTERISTICS

$I_{F(AV)}$	20 A
$V_R$	15 V
$V_F$ at $I_F$	0.33 V
$I_{RM}$ max.	600 mA at 100 °C
$T_J$ max.	125 °C
$E_{AS}$	10 mJ
Package	D <sup>2</sup> PAK (TO-263AB)
Circuit configuration	Single

## MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Rectangular waveform	20	A
$V_{RRM}$		15	V
$I_{FSM}$	$t_p = 5 \mu s$ sine	700	A
$V_F$	19 A <sub>pk</sub> , $T_J = 125$ °C (typical)	0.25	V
$T_J$	Range	-55 to +125	°C

## VOLTAGE RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VS-20L15TS-M3	UNITS
Maximum DC reverse voltage	$V_R$	$T_J = 100$ °C	15	V
Maximum working peak reverse voltage	$V_{RWM}$			

## ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current See fig. 5	$I_{F(AV)}$	50 % duty cycle at $T_C = 85$ °C, rectangular waveform	20	A
Maximum peak one cycle non-repetitive surge current See fig. 7	$I_{FSM}$	5 $\mu s$ sine or 3 $\mu s$ rect. pulse	700	
		10 ms sine or 6 ms rect. pulse	330	
Non-repetitive avalanche energy	$E_{AS}$	$T_J = 25$ °C, $I_{AS} = 2$ A, $L = 6$ mH	10	mJ
Repetitive avalanche current	$I_{AR}$	Current decaying linearly to zero in 1 $\mu s$ Frequency limited by $T_J$ maximum $V_A = 1.5 \times V_R$ typical	2	A

**ELECTRICAL SPECIFICATIONS**

PARAMETER	SYMBOL	TEST CONDITIONS	TYP.	MAX.	UNITS
Forward voltage drop See fig. 1	$V_{FM}^{(1)}$	19 A	-	0.41	V
		40 A		0.52	
		19 A	0.25	0.33	
		40 A		0.50	
Reverse leakage current See fig. 2	$I_{RM}^{(1)}$	$T_J = 25\text{ }^{\circ}\text{C}$	-	10	mA
		$T_J = 100\text{ }^{\circ}\text{C}$	-	600	
Threshold voltage	$V_{F(TO)}$	$T_J = T_J \text{ maximum}$	0.182		V
Forward slope resistance	$r_t$		7.6		m $\Omega$
Maximum junction capacitance	$C_T$	$V_R = 5\text{ V}_{DC}$ , (test signal range 100 kHz to 1 MHz), $25\text{ }^{\circ}\text{C}$	-	2000	pF
Typical series inductance	$L_S$	Measured lead to lead 5 mm from package body	8	-	nH
Maximum voltage rate of change	$dV/dt$	Rated $V_R$	10 000		V/ $\mu\text{s}$

**Note**(1) Pulse width < 300  $\mu\text{s}$ , duty cycle < 2 %**THERMAL - MECHANICAL SPECIFICATIONS**

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum junction temperature range	T <sub>J</sub>		-55 to +125	°C
Maximum storage temperature range	T <sub>Stg</sub>		-55 to +150	
Maximum thermal resistance, junction to case	R <sub>thJC</sub>	DC operation See fig. 4	1.5	°C/W
Typical thermal resistance, case to heatsink	R <sub>thCS</sub>	Mounting surface, smooth and greased (For TO-220)	0.50	
Maximum thermal resistance, junction to ambient	R <sub>thJA</sub>	DC operation	40	
Approximate weight			2	g
			0.07	oz.
Mounting torque	minimum	Non-lubricated threads	6 (5)	kgf · cm (lbf · in)
	maximum		12 (10)	
Marking device		Case style D <sup>2</sup> PAK (TO-263AB)	20L15TS	

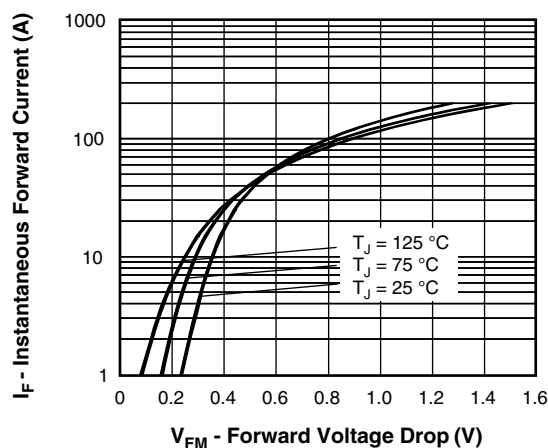


Fig. 1 - Maximum Forward Voltage Drop Characteristics

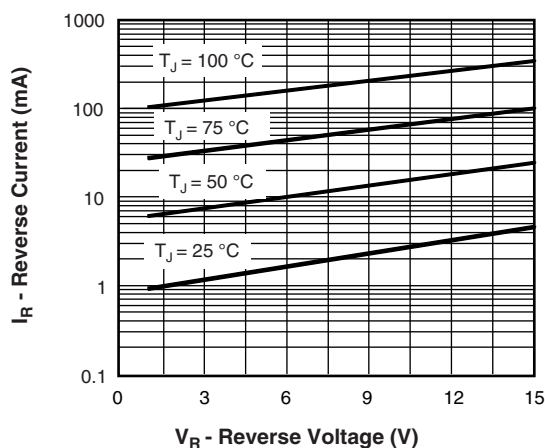


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

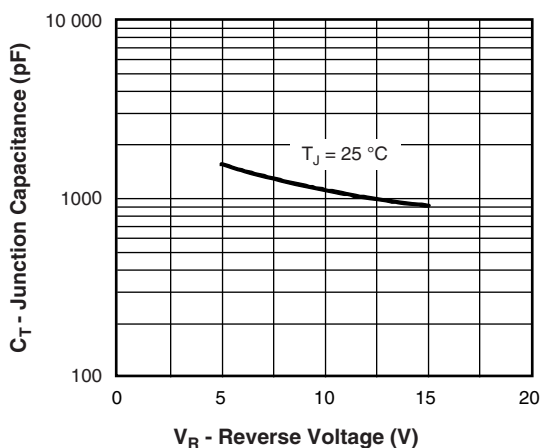


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

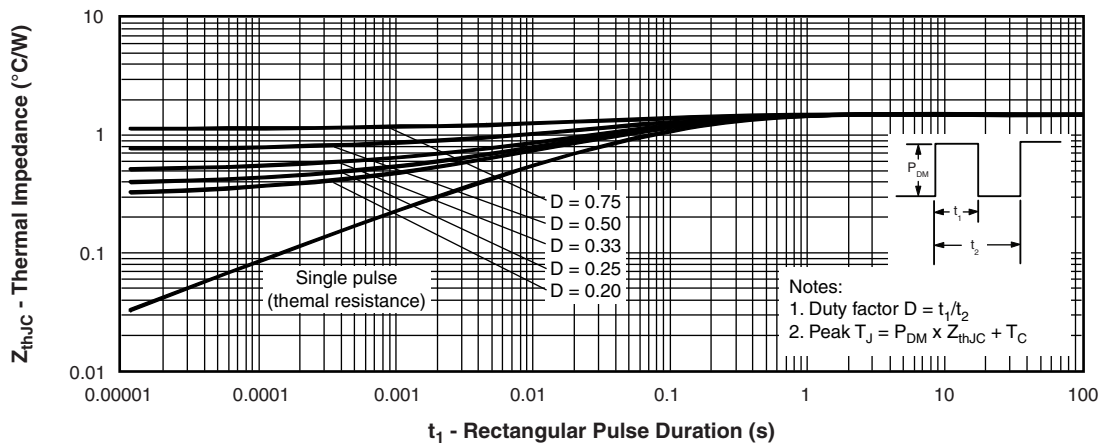
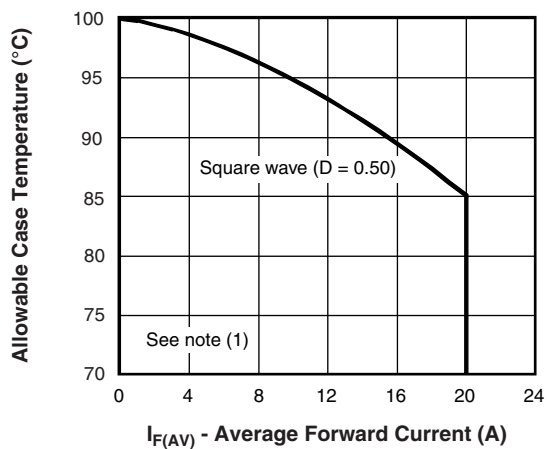

Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics


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

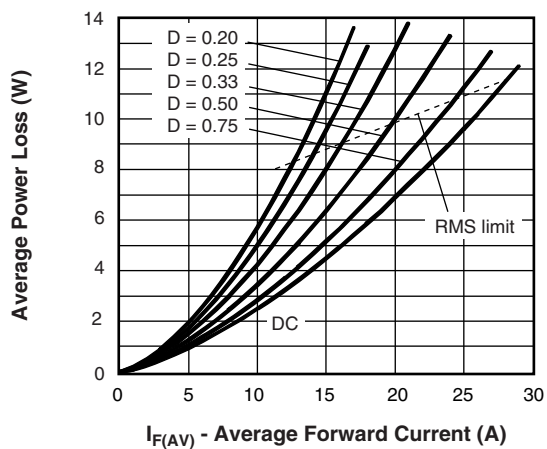


Fig. 6 - Forward Power Loss Characteristics

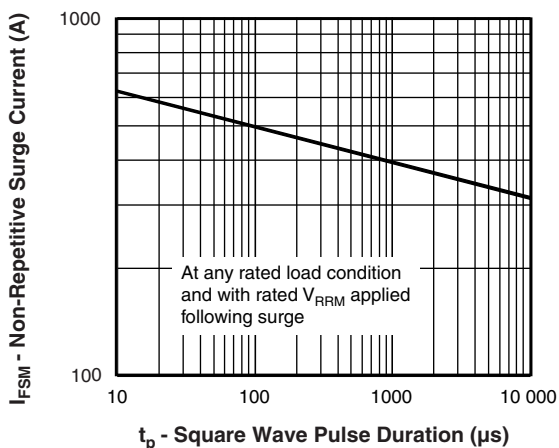


Fig. 7 - Maximum Non-Repetitive Surge Current

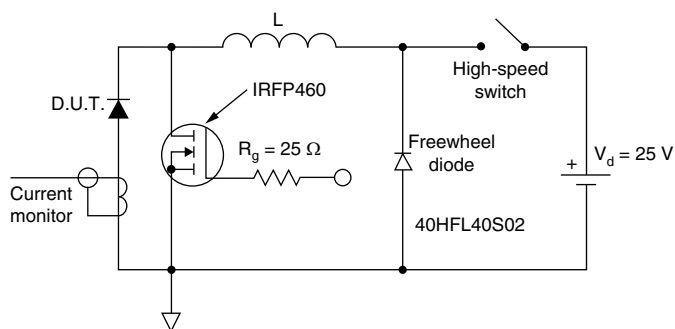


Fig. 8 - Unclamped Inductive Test Circuit

**Note**

- (1) Formula used:  $T_C = T_J - (P_d + P_{dREV}) \times R_{thJC}$ ;  
 $P_d$  = forward power loss =  $I_{F(AV)} \times V_{FM}$  at  $(I_{F(AV)}/D)$  (see fig. 6);  
 $P_{dREV}$  = inverse power loss =  $V_{R1} \times I_R (1 - D)$ ;  $I_R$  at  $V_{R1} = 80\%$  rated  $V_R$

**ORDERING INFORMATION TABLE**

Device code	VS-	20	L	15	T	S	TRL	-M3
	1	2	3	4	5	6	7	8
1	- Vishay Semiconductors product							
2	- Current rating (20 A)							
3	- L = Low $V_F$							
4	- Voltage rating (15 = 15 V)							
5	- T = Schottky series							
6	- S = D <sup>2</sup> PAK (TO-263AB)							
7	- • None = tube • TRL = tape and reel (left oriented) • TRR = tape and reel (right oriented)							
8	- -M3 = halogen-free, RoHS-compliant and termination lead (Pb)-free							

**ORDERING INFORMATION** (Example)

PREFERRED P/N	BASE QUANTITY	PACKAGING DESCRIPTION
VS-20L15TS-M3	50	Antistatic plastic tubes
VS-20L15TSTRL-M3	800	13" diameter plastic tape and reel
VS-20L15TSTRR-M3	800	13" diameter plastic tape and reel

**LINKS TO RELATED DOCUMENTS**

Dimensions	<a href="http://www.vishay.com/doc?96164">www.vishay.com/doc?96164</a>
Part marking information	<a href="http://www.vishay.com/doc?95444">www.vishay.com/doc?95444</a>
Packaging information	<a href="http://www.vishay.com/doc?96424">www.vishay.com/doc?96424</a>
SPICE model	<a href="http://www.vishay.com/doc?97117">www.vishay.com/doc?97117</a>



## D<sup>2</sup>PAK

### DIMENSIONS in millimeters and inches

Conforms to JEDEC® outline D<sup>2</sup>PAK (SMD-220)



SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	0.160	0.190	
A1	0.00	0.254	0.000	0.010	
b	0.51	0.99	0.020	0.039	
b1	0.51	0.89	0.020	0.035	4
b2	1.14	1.78	0.045	0.070	
b3	1.14	1.73	0.045	0.068	4
c	0.38	0.74	0.015	0.029	
c1	0.38	0.58	0.015	0.023	4
c2	1.14	1.65	0.045	0.065	
D	8.51	9.65	0.335	0.380	2

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
D1	6.86	8.00	0.270	0.315	3
E	9.65	10.67	0.380	0.420	2, 3
E1	7.90	8.80	0.311	0.346	3
e	2.54 BSC		0.100 BSC		
H	14.61	15.88	0.575	0.625	
L	1.78	2.79	0.070	0.110	
L1	-	1.65	-	0.066	3
L2	1.27	1.78	0.050	0.070	
L3	0.25 BSC		0.010 BSC		
L4	4.78	5.28	0.188	0.208	

#### Notes

- (1) Dimensioning and tolerancing per ASME Y14.5 M-1994
- (2) 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 outmost extremes of the plastic body
- (3) Thermal pad contour optional within dimension E, L1, D1 and E1
- (4) Dimension b1 and c1 apply to base metal only
- (5) Datum A and B to be determined at datum plane H
- (6) Controlling dimension: inch
- (7) Outline conforms to JEDEC® outline TO-263AB



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