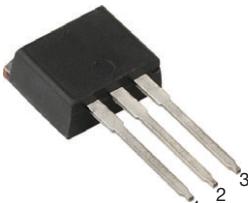
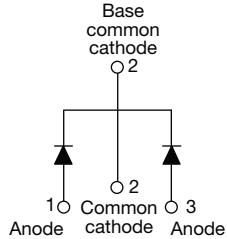
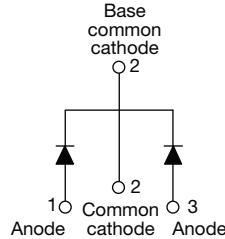


## High Performance Schottky Rectifier, 2 x 20 A


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

**TO-262AA**

**VS-MBRB4045CTHM3**

**VS-MBR4045CT-1HM3**

### FEATURES

- 150 °C T<sub>J</sub> operation
- Low forward voltage drop
- High frequency operation
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Guard ring for enhanced ruggedness and long term reliability
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified, meets JESD 201 class 1A whisker test
- 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 center tap Schottky rectifier has been optimized for low reverse leakage at high temperature. The proprietary barrier technology allows for reliable operation up to 150 °C junction temperature. Typical applications are in switching power supplies, converters, freewheeling diodes, and reverse battery protection.

### PRIMARY CHARACTERISTICS

I <sub>F(AV)</sub>	2 x 20 A
V <sub>R</sub>	45 V
V <sub>F</sub> at I <sub>F</sub>	0.58 V
I <sub>RM</sub> max.	95 mA at 125 °C
T <sub>J</sub> max.	150 °C
Package	D <sup>2</sup> PAK (TO-263AB), TO-262AA
Circuit configuration	Common cathode
E <sub>AS</sub>	20 mJ

### MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
I <sub>F(AV)</sub>	Rectangular waveform (per device)	40	A
I <sub>FRM</sub>		40	
V <sub>RRM</sub>		45	V
I <sub>FSM</sub>	t <sub>p</sub> = 5 μs sine	900	A
V <sub>F</sub>	20 A <sub>pk</sub> , T <sub>J</sub> = 125 °C	0.58	V
T <sub>J</sub>	Range	-65 to +150	°C

### VOLTAGE RATINGS

PARAMETER	SYMBOL	VS-MBRB4045CTHM3, VS-MBR4045CT-1HM3	UNITS
Maximum DC reverse voltage	V <sub>R</sub>	45	V
Maximum working peak reverse voltage	V <sub>RWM</sub>		

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current per leg	I <sub>F(AV)</sub>	T <sub>C</sub> = 118 °C, rated V <sub>R</sub>	20	A
per device			40	
Peak repetitive forward current per leg	I <sub>FRM</sub>	Rated V <sub>R</sub> , square wave, 20 kHz, T <sub>C</sub> = 117 °C	40	A
Maximum peak one cycle non-repetitive peak surge current per leg	I <sub>FSM</sub>	5 μs sine or 3 μs rect. pulse	900	
		10 ms sine or 6 ms rect. pulse	210	
Non-repetitive avalanche energy per leg	E <sub>AS</sub>	T <sub>J</sub> = 25 °C, I <sub>AS</sub> = 3 A, L = 4.4 mH	20	mJ
Repetitive avalanche current per leg	I <sub>AR</sub>	Current decaying linearly to zero in 1 μs Frequency limited by T <sub>J</sub> maximum V <sub>A</sub> = 1.5 x V <sub>R</sub> typical	3	A

<b>ELECTRICAL SPECIFICATIONS</b>						
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS	
Maximum forward voltage drop	V <sub>FM</sub> <sup>(1)</sup>	20 A	T <sub>J</sub> = 25 °C	0.60	V	
		40 A		0.80		
		20 A	T <sub>J</sub> = 125 °C	0.58		
		40 A		0.80		
Maximum instantaneous reverse current	I <sub>RM</sub> <sup>(1)</sup>	T <sub>J</sub> = 25 °C	Rated DC voltage	1	mA	
		T <sub>J</sub> = 100 °C		50		
		T <sub>J</sub> = 125 °C		95		
Maximum junction capacitance	C <sub>T</sub>	V <sub>R</sub> = 5 V <sub>DC</sub> (test signal range 100 kHz to 1 MHz), 25 °C		900	pF	
Typical series inductance	L <sub>S</sub>	Measured from top of terminal to mounting plane		8.0	nH	
Maximum voltage rate of change	dV/dt	Rated V <sub>R</sub>		10 000	V/μs	

**Note**

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

<b>THERMAL - MECHANICAL SPECIFICATIONS</b>					
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS	
Maximum junction temperature range	T <sub>J</sub>		-65 to +150	°C	
Maximum storage temperature range	T <sub>Stg</sub>		-65 to +175		
Maximum thermal resistance, junction to case per leg	R <sub>thJC</sub>	DC operation	1.5	°C/W	
Typical thermal resistance, case to heatsink	R <sub>thCS</sub>	Mounting surface, smooth and greased (only for TO-220)	0.50		
Maximum thermal resistance, junction to ambient	R <sub>thJA</sub>	DC operation (for D <sup>2</sup> PAK (TO-263AB) and TO-262AA)	50	°C/W	
Approximate weight			2	g	
			0.07		
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)	MBRB4045CTH		
		Case style TO-262AA	MBR4045CT-1H		

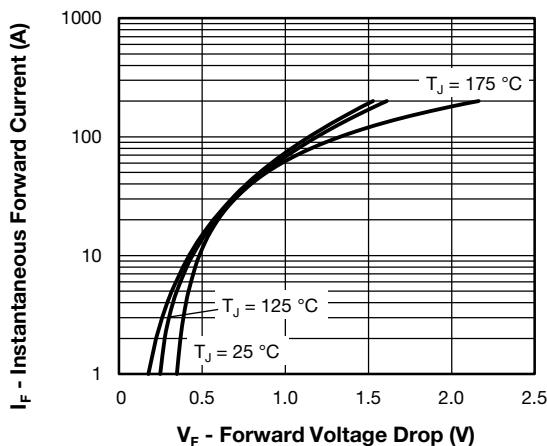


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

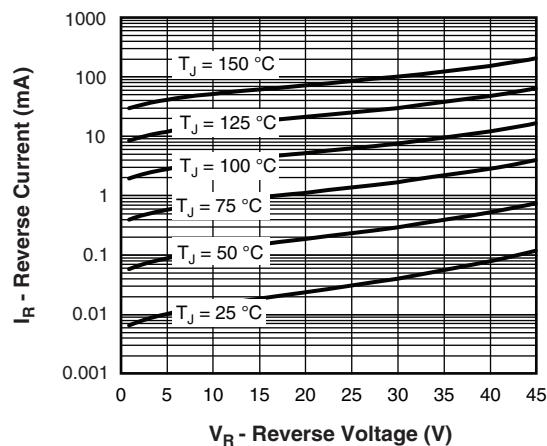


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

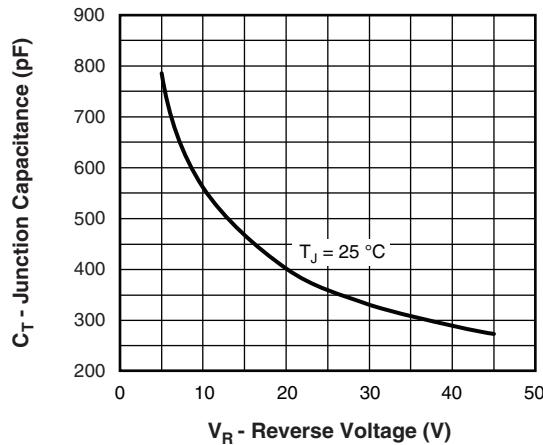


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

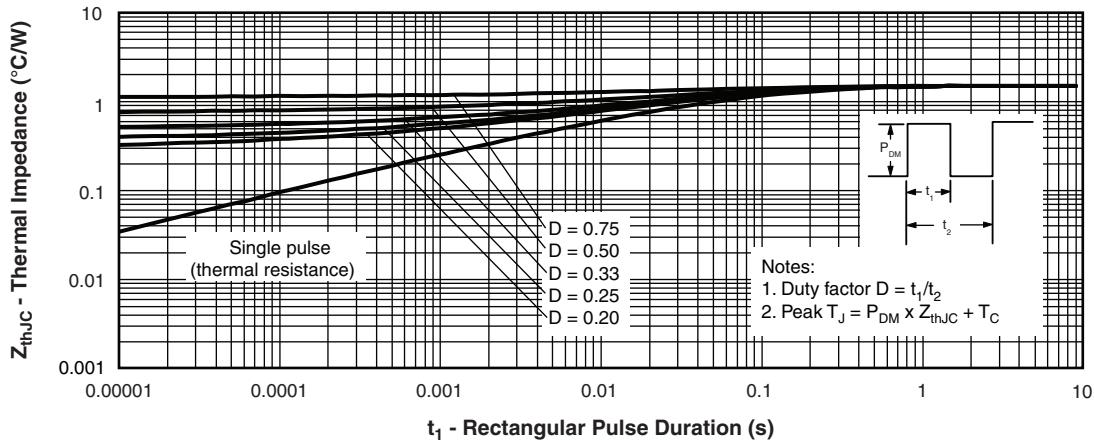


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

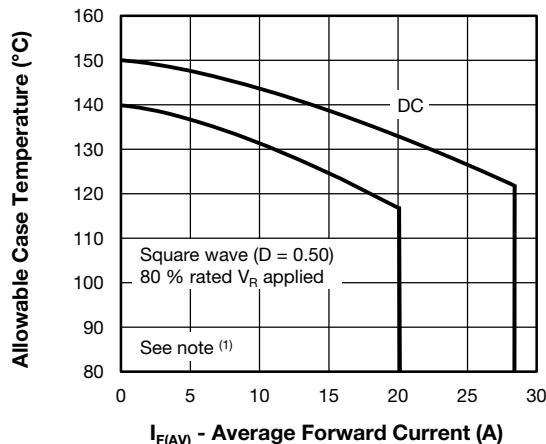


Fig. 5 - Maximum Allowable Case Temperature vs.  
Average Forward Current

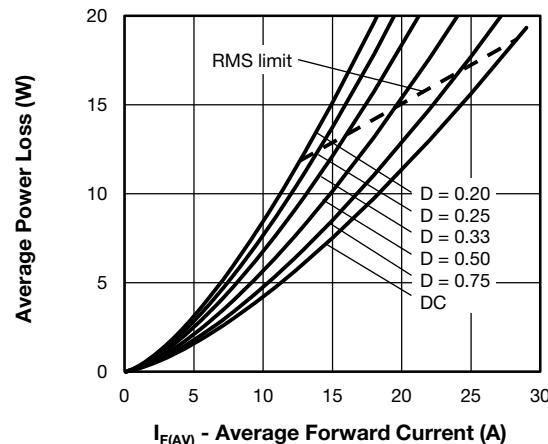


Fig. 6 - Forward Power Loss Characteristics

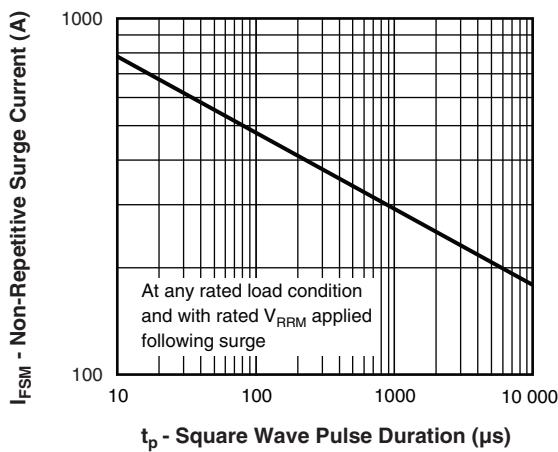


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

#### 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  $V_{R1} = \text{rated } V_R$

**ORDERING INFORMATION TABLE**

Device code	VS-	MBR	B	40	45	CT	-1	RL	H	M3
	1	2	3	4	5	6	7	8	9	10

1	- Vishay Semiconductors product
2	- Essential part number
3	<ul style="list-style-type: none"> <li>B = D<sup>2</sup>PAK      7 = None</li> <li>None = TO-262      7 = -1</li> </ul>
4	- Current rating (40 = 40 A)
5	- Voltage rating (45 = 45 V)
6	- CT = Essential part number
7	<ul style="list-style-type: none"> <li>None = D<sup>2</sup>PAK      3 = B</li> <li>-1 = TO-262      3 = None</li> </ul>
8	<ul style="list-style-type: none"> <li>None = Tube</li> <li>L = Tape and reel (left oriented - for D<sup>2</sup>PAK only)</li> <li>R = Tape and reel (right oriented - for D<sup>2</sup>PAK only)</li> </ul>
9	- H = AEC-Q101 qualified
10	- Environmental digit: M3 = Halogen-free, RoHS-compliant and termination lead (Pb)-free

**ORDERING INFORMATION (Example)**

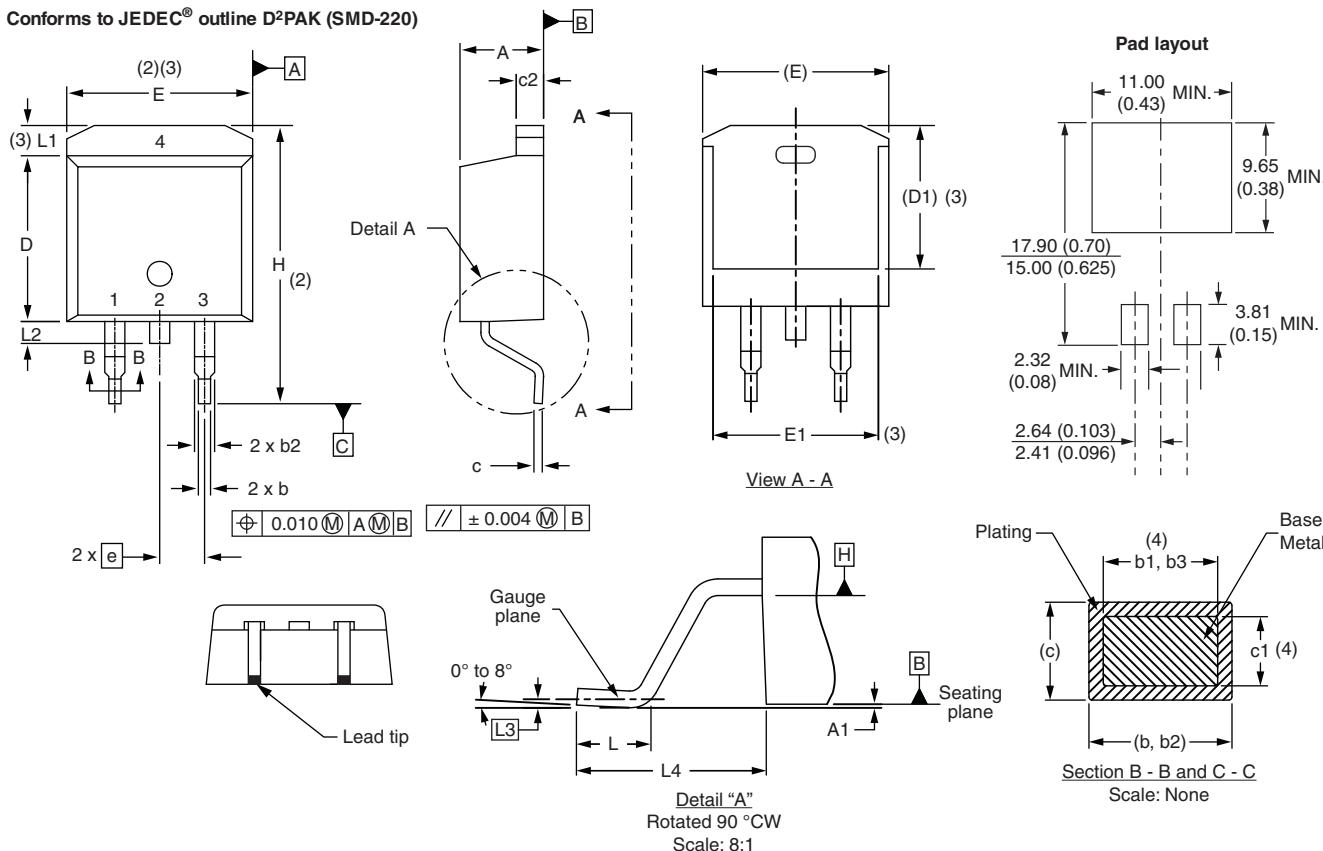
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-MRB4045CTHM3	50	1000	Antistatic plastic tube
VS-MRB4045CT-1HM3	50	1000	Antistatic plastic tube
VS-MRB4045CTLHM3	800	800	13" diameter reel
VS-MRB4045CTRHM3	800	800	13" diameter reel

**LINKS TO RELATED DOCUMENTS**

Dimensions	D <sup>2</sup> PAK (TO-263AB)	<a href="http://www.vishay.com/doc?95046">www.vishay.com/doc?95046</a>
	TO-262AA	<a href="http://www.vishay.com/doc?95419">www.vishay.com/doc?95419</a>
Part marking information	D <sup>2</sup> PAK (TO-263AB)	<a href="http://www.vishay.com/doc?95444">www.vishay.com/doc?95444</a>
	TO-262AA	<a href="http://www.vishay.com/doc?95443">www.vishay.com/doc?95443</a>
Packaging information	D <sup>2</sup> PAK (TO-263AB)	<a href="http://www.vishay.com/doc?95032">www.vishay.com/doc?95032</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		SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.				MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	0.160	0.190			D1	6.86	8.00	0.270	0.315	3
A1	0.00	0.254	0.000	0.010			E	9.65	10.67	0.380	0.420	2, 3
b	0.51	0.99	0.020	0.039			E1	7.90	8.80	0.311	0.346	3
b1	0.51	0.89	0.020	0.035	4		e	2.54 BSC		0.100 BSC		
b2	1.14	1.78	0.045	0.070			H	14.61	15.88	0.575	0.625	
b3	1.14	1.73	0.045	0.068	4		L	1.78	2.79	0.070	0.110	
c	0.38	0.74	0.015	0.029			L1	-	1.65	-	0.066	3
c1	0.38	0.58	0.015	0.023	4		L2	1.27	1.78	0.050	0.070	
c2	1.14	1.65	0.045	0.065			L3	0.25 BSC		0.010 BSC		
D	8.51	9.65	0.335	0.380	2		L4	4.78	5.28	0.188	0.208	

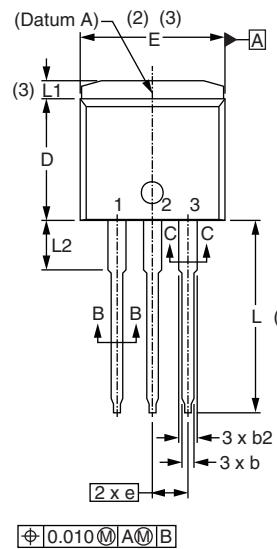
**Notes**

- (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

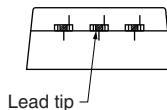
## TO-262

**DIMENSIONS** in millimeters and inches

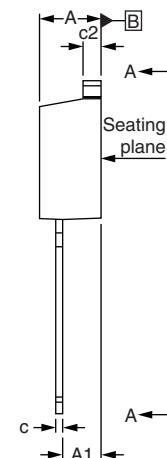
## Modified JEDEC® outline TO-262



## Lead assignments

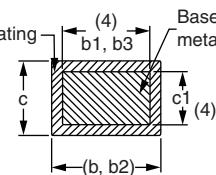


### Diodes



Section A-A view showing lead spacing  $E_1$  and overall width  $E$ . The component has a central body with a top slot and three leads extending downwards. The distance between the centers of the three leads is  $E_1$ , and the total width of the component is  $E$ . A dimension  $D_1(3)$  is also indicated on the right side.

## Section A -



### Section B - B and C - C

Scale: None

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	0.160	0.190	
A1	2.03	3.02	0.080	0.119	
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
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		
L	13.46	14.10	0.530	0.555	
L1	-	1.65	-	0.065	3
L2	3.36	3.71	0.132	0.146	

## Notes

**Notes**

- (1) Dimensioning and tolerancing as per ASME Y14.5M-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) Controlling dimension: inches
- (6) Outline conform to JEDEC TO-262 except A1 (maximum), b (minimum), D1 (minimum) and L2 where dimensions derived the actual package outline

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