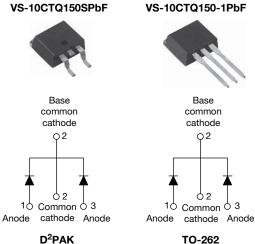


**Vishay Semiconductors** 

# High Performance Schottky Rectifier, 2 x 5 A



TO-262

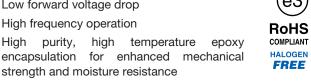
PRODUCT SUMMARY				
Package	D <sup>2</sup> PAK, TO-262			
I <sub>F(AV)</sub>	2 x 5 A			
V <sub>R</sub>	150 V			
V <sub>F</sub> at I <sub>F</sub>	0.93 V			
I <sub>RM</sub>	7 mA at 125 °C			
T <sub>J</sub> max.	175 °C			
Diode variation	Common cathode			
E <sub>AS</sub>	5 mJ			

#### **FEATURES**

- 175 °C T<sub>J</sub> operation
- · Center tap configuration
- · Low forward voltage drop
- High frequency operation

• High purity, high temperature

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
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

### DESCRIPTION

This center tap Schottky rectifier has been optimized for low reverse leakage at high temperature. The proprietary barrier technology allows for reliable operation up to 175 °C junction temperature. Typical applications are in switching power supplies, converters, freewheeling diodes, and reverse battery protection.

MAJOR RATINGS AND CHARACTERISTICS								
SYMBOL CHARACTERISTICS VALUES UNITS								
I <sub>F(AV)</sub>	Rectangular waveform	10	A					
V <sub>RRM</sub>		150	V					
I <sub>FSM</sub>	t <sub>p</sub> = 5 μs sine	620	A					
V <sub>F</sub>	5 $A_{pk}$ , $T_J$ = 125 °C (per leg)	0.73	V					
TJ	Range	-55 to +175	°C					

VOLTAGE RATINGS						
PARAMETER	SYMBOL	VS-10CTQ150SPbF VS-10CTQ150-1PbF	UNITS			
Maximum DC reverse voltage	V <sub>R</sub>	150	V			
Maximum working peak reverse voltage	V <sub>RWM</sub>	150	V			

ABSOLUTE MAXIMUM RATINGS							
PARAMETER	SYMBOL	TEST COND	ITIONS	VALUES	UNITS		
Maximum average per leg		50% duty cycle at T = 155 °C	raatangular wayafarm	5	Δ		
forward current, see fig. 5 per device	IF(AV)	50 % duty cycle at $T_{C}$ = 155 °C, rectangular waveform		10	A		
Maximum peak one cycle non-repetitive		5 μs sine or 3 μs rect. pulse         Following any rated load           I <sub>FSM</sub> 10 ms sine or 6 ms rect. pulse         Following any rated load	620				
surge current per leg, see fig. 7	I <sub>FSM</sub>			115	A		
Non-repetitive avalanche energy per leg	Non-repetitive avalanche energy per leg $E_{AS}$ $T_J = 25 \text{ °C}, I_{AS} = 1 \text{ A}, L = 10 \text{ mH}$		5	mJ			
Repetitive avalanche current per leg	I <sub>AR</sub>	Current decaying linearly to zero Frequency limited by T <sub>J</sub> maximu		1	А		

Revision: 20-May-14

Document Number: 94116

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**Vishay Semiconductors** 

ELECTRICAL	SPECIFICATIONS
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SYMBOL	TEST CO	TEST CONDITIONS					
	5 A	T _ 25 °C	0.93	V			
V (1)	10 A	1j=25 0	1.10				
VFM (*)	5 A	T _ 105 °C	0.73	v			
	10 A	$I_{\rm J} = 125 {}^{\circ}{\rm C}$	0.86				
1 (1)	T <sub>J</sub> = 25 °C		0.05				
IRM (")	T <sub>J</sub> = 125 °C	$v_{\rm R}$ = Raled $v_{\rm R}$	7	mA			
V <sub>F(TO)</sub>			0.468	V			
r <sub>t</sub>	$I_{\rm J} = I_{\rm J}$ maximum		28	mΩ			
CT	V <sub>R</sub> = 5 V <sub>DC</sub> (test signal range 100 kHz to 1 MHz), 25 °C		200	pF			
LS	Measured lead to lead 5 mm from package body		8.0	nH			
dV/dt	Rated V <sub>R</sub>		10 000	V/µs			
	SYMBOL           V <sub>FM</sub> <sup>(1)</sup> I <sub>RM</sub> <sup>(1)</sup> V <sub>F(TO)</sub> r <sub>t</sub> C <sub>T</sub> L <sub>S</sub>	$\begin{tabular}{ c c c c c } \hline SYMBOL & TEST CO \\ \hline & 5 A \\ \hline & 10 A \\ \hline & 5 A \\ \hline & 10 A \\ \hline & 5 A \\ \hline & 10 A \\ \hline & & T_J = 25 \ ^{\circ}C \\ \hline & T_J = 125 \ ^{\circ}C \\ \hline & T_J = 125 \ ^{\circ}C \\ \hline & V_{F(TO)} \\ \hline & & T_J = T_J \ maximum \\ \hline & & C_T & V_R = 5 \ V_{DC} \ (test \ signal \ range \\ \hline & L_S & Measured \ lead \ to \ lead \ 5 \ maximum \\ \hline \end{tabular}$	$\begin{tabular}{ c c c c } \hline SYMBOL & TEST CONDITIONS \\ \hline & & & \\ \hline V_{FM}{}^{(1)} & \hline & & \\ \hline & & & \\ \hline \hline \\$	$\begin{tabular}{ c c c c c } \hline SYMBOL & TEST CONDITIONS & VALUES \\ \hline SYMBOL & TEST CONDITIONS & VALUES \\ \hline & & & & & & & & & & & & & & & & & &$			

#### Note

 $^{(1)}\,$  Pulse width < 300  $\mu s,$  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 +175	°C	
Maximum thermal resistance, junction to case per leg		D	DC operation	3.50		
Maximum thermal resistance, junction to case per package		– R <sub>thJC</sub>	Do operation	1.75	°C/W	
Typical thermal resistance, case to heatsink (only for TO-220)		R <sub>thCS</sub>	Mounting surface, smooth and greased	0.50		
Approvimate weight				2	g	
Approximate weight				0.07	oz.	
Mounting torque minimum maximum				6 (5)	kgf · cm	
				12 (10)	(lbf · in)	
Marking davias			Case style D <sup>2</sup> PAK	10CTQ1	50S	
Warking device	Marking device		Case style TO-262	10CTQ1	50-1	



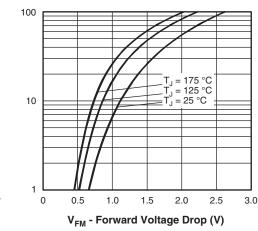
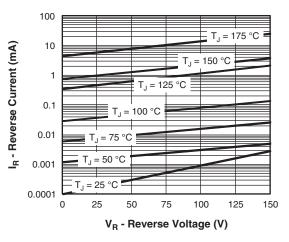
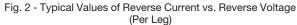


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)





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## VS-10CTQ150SPbF, VS-10CTQ150-1PbF

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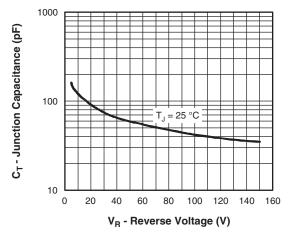


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

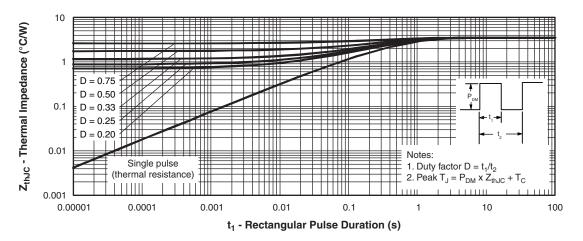


Fig. 4 - Maximum Thermal Impedance Z<sub>thJC</sub> Characteristics (Per Leg)

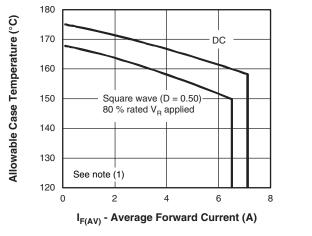


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

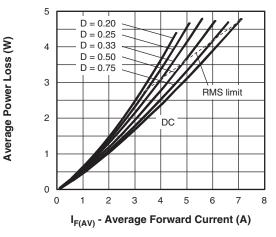


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

Revision: 20-May-14

3

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# VS-10CTQ150SPbF, VS-10CTQ150-1PbF

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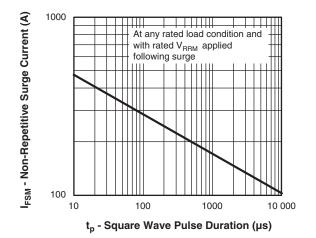


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

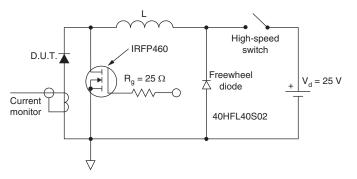


Fig. 8 - Unclamped Inductive Test Circuit

#### Note

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

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150

S

Q

1 - Vishay Semiconductors product

С

10

- Current rating (10 A)

Т

- Circuit configuration: C = common cathode
- **4** T = TO-220
  - Schottky "Q" series
  - Voltage rating (150 = 150 V)
  - • S = D<sup>2</sup>PAK
  - -1 = TO-262
    - None = tube (50 pieces)
      - TRL = tape and reel (left oriented for D<sup>2</sup>PAK only)
      - TRR = tape and reel (right oriented for D<sup>2</sup>PAK only)
  - PbF = lead (Pb)-free

LINKS TO RELATED DOCUMENTS			
Dimensions	www.vishay.com/doc?95014		
Part marking information	www.vishay.com/doc?95008		
Packaging information	www.vishay.com/doc?95032		

### Vishay Semiconductors

PbF

TRL



Device code

VS-

2

3

5

6

7

8

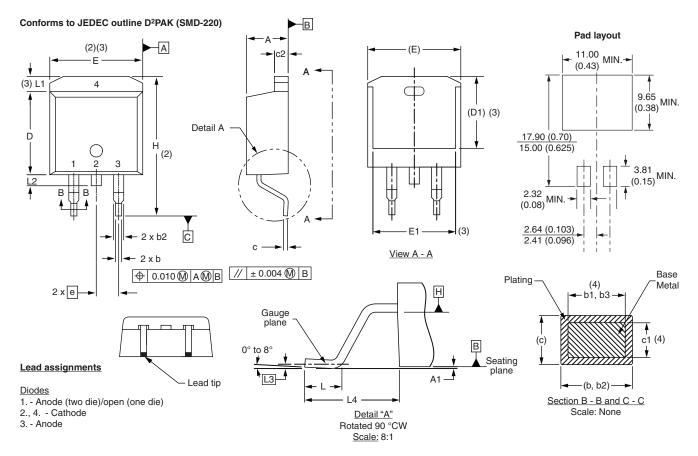
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**ORDERING INFORMATION TABLE** 

**Vishay Semiconductors** 

# D<sup>2</sup>PAK, TO-262



#### DIMENSIONS - D<sup>2</sup>PAK in millimeters and inches

SHA

SYMBOL	MILLIN	IETERS	INC	HES	NOTES
STIVIDUL	MIN.	MAX.	MIN.	MAX.	NOTES
А	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
С	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

- <sup>(1)</sup> 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
- <sup>(3)</sup> Thermal pad contour optional within dimension E, L1, D1 and E1
- <sup>(4)</sup> Dimension b1 and c1 apply to base metal only
- <sup>(5)</sup> Datum A and B to be determined at datum plane H
- <sup>(6)</sup> Controlling dimension: inch

SYMBOL	MILLIM	IETERS	INC	HES	NOTES
STMBOL	MIN.	MAX.	MIN.	MAX.	NUTES
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
е	2.54 BSC		0.100 BSC		
Н	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	

(7) Outline conforms to JEDEC outline TO-263AB

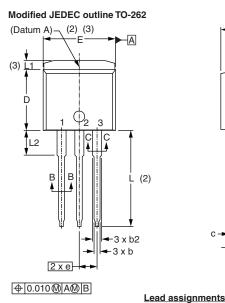
# **Outline Dimensions**

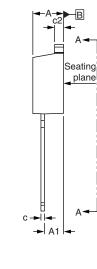
### **Vishay Semiconductors**

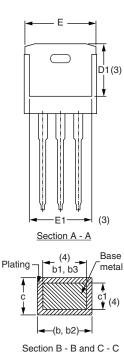
D<sup>2</sup>PAK, TO-262



#### **DIMENSIONS - TO-262** in millimeters and inches







Section B - B and C - C

(6) Outline conform to JEDEC TO-262 except A1 (maximum), b

(minimum) and D1 (minimum) where dimensions derived the

Lead tip Scale: None MILLIMETERS INCHES SYMBOL NOTES MIN. MAX. MIN. MAX. 4.06 4.83 0.160 0.190 А A1 2.03 3.02 0.080 0.119 b 0.51 0.99 0.020 0.039 0.51 0.89 0.020 0.035 4 b1 h2 1.14 1.78 0.045 0.070 b3 1.14 1.73 0.045 0.068 4 0.38 0.74 0.015 0.029 С 0.38 0.58 0.015 0.023 4 c1 1.14 0.045 0.065 c2 1.65 D 8.51 9.65 0.335 0.380 2 0.270 D1 6.86 8.00 0.315 3 Е 9.65 10.67 0.380 0.420 2, 3 E1 7.90 8.80 0.311 0.346 3 е 2.54 BSC 0.100 BSC L 13.46 14.10 0.530 0.555 L1 1.65 0.065 \_ 3 L2 3.56 3.71 0.140 0.146

1. - Anode (two die)/open (one die)

Diodes

3. - Anode

2., 4. - Cathode

#### Notes

- <sup>(1)</sup> Dimensioning and tolerancing as per ASME Y14.5M-1994
- <sup>(2)</sup> 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
- <sup>(3)</sup> Thermal pad contour optional within dimension E, L1, D1 and E1

<sup>(4)</sup> Dimension b1 and c1 apply to base metal only

<sup>(5)</sup> Controlling dimension: inches

actual package outline

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2



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