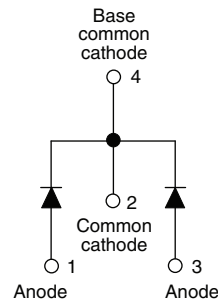


## Schottky Rectifier, 2 x 3.5 A


**D-PAK (TO-252AA)**


### FEATURES

- Popular D-PAK outline
- Center tap configuration
- Small foot print, surface mountable
- Low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability
- Compliant to RoHS Directive 2002/95/EC
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C



### DESCRIPTION

The VS-6CWQ04FNPbF surface mount, center tap, Schottky rectifier series has been designed for applications requiring low forward drop and small foot prints on PC board. Typical applications are in disk drives, switching power supplies, converters, freewheeling diodes, battery charging, and reverse battery protection.

PRODUCT SUMMARY	
Package	D-PAK (TO-252AA)
$I_{F(AV)}$	2 x 3.5 A
$V_R$	40 V
$V_F$ at $I_F$	See Electrical table
$I_{RM}$	24 mA at 125 °C
$T_J$ max.	150 °C
Diode variation	Common cathode
$E_{AS}$	8 mJ

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Rectangular waveform	7	A
$V_{RRM}$		40	V
$I_{FSM}$	$t_p = 5 \mu s$ sine	500	A
$V_F$	3 Apk, $T_J = 125 \text{ °C}$ (per leg)	0.49	V
$T_J$	Range	- 40 to 150	°C

VOLTAGE RATINGS			
PARAMETER	SYMBOL	VS-6CWQ04FNPbF	UNITS
Maximum DC reverse voltage	$V_R$	40	V
Maximum working peak reverse voltage	$V_{RWM}$		

ABSOLUTE MAXIMUM RATINGS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum average forward current See fig. 5	$I_{F(AV)}$	per leg	50 % duty cycle at $T_C = 135 \text{ °C}$ , rectangular waveform	3.5	A
		per device		7	
Maximum peak one cycle non-repetitive surge current per leg See fig. 7	$I_{FSM}$	5 $\mu s$ sine or 3 $\mu s$ rect. pulse	Following any rated load condition and with rated $V_{RRM}$ applied	500	
		10 ms sine or 6 ms rect. pulse		80	
Non-repetitive avalanche energy per leg	$E_{AS}$	$T_J = 25 \text{ °C}$ , $I_{AS} = 1 \text{ A}$ , $L = 16 \text{ mH}$		8.0	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		1.0	A

ELECTRICAL SPECIFICATIONS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum forward voltage drop per leg See fig. 1	$V_{FM}^{(1)}$	3 A	$T_J = 25\text{ °C}$	0.53	V
		6 A		0.67	
		3 A	$T_J = 125\text{ °C}$	0.49	
		6 A		0.62	
Maximum reverse leakage current per leg See fig. 2	$I_{RM}^{(1)}$	$T_J = 25\text{ °C}$	$V_R = \text{Rated } V_R$	2	mA
		$T_J = 125\text{ °C}$		24	
Threshold voltage	$V_{F(TO)}$	$T_J = T_J \text{ maximum}$		0.34	V
Forward slope resistance	$r_t$			37.33	mΩ
Typical junction capacitance per leg	$C_T$	$V_R = 5 V_{DC}$ (test signal range 100 kHz to 1 MHz), 25 °C		189	pF
Typical series inductance per leg	$L_S$	Measured lead to lead 5 mm from package body		5.0	nH
Maximum voltage rate of change	dV/dt	Rated $V_R$		10 000	V/μs

**Note**

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

THERMAL - MECHANICAL SPECIFICATIONS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum junction and storage temperature range	$T_J^{(1)}, T_{Stg}$			- 40 to 150	°C
Maximum thermal resistance, junction to case	$R_{thJC}$	DC operation See fig. 4	per leg	4.70	°C/W
			per device	2.35	
Approximate weight				0.3	g
				0.01	oz.
Marking device		Case style D-PAK (similar to TO-252AA)	6CWQ04FN		

**Note**

(1)  $\frac{dP_{tot}}{dT_J} < \frac{1}{R_{thJA}}$  thermal runaway condition for a diode on its own heatsink

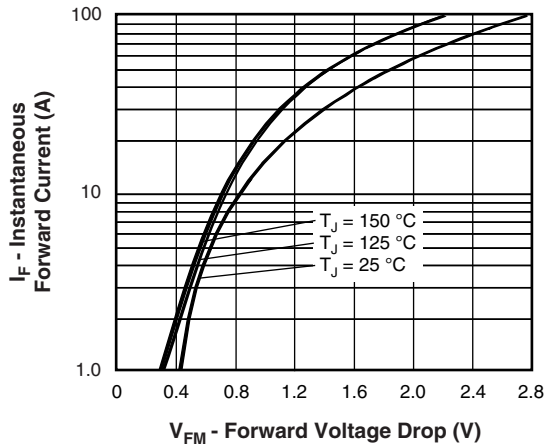


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

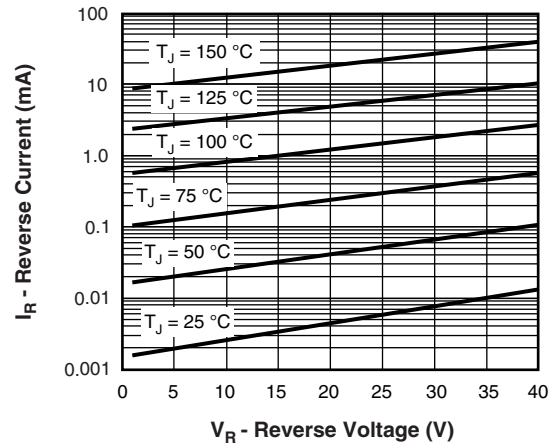


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

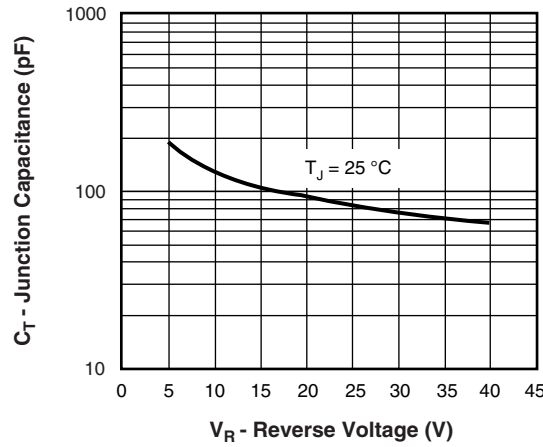


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

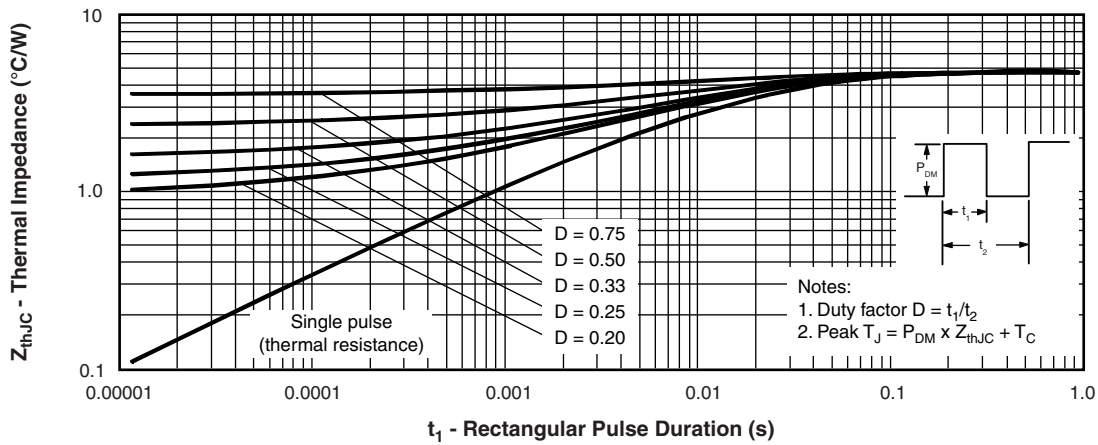


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

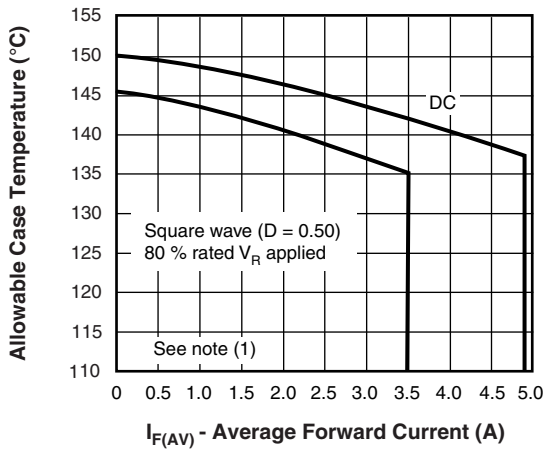


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

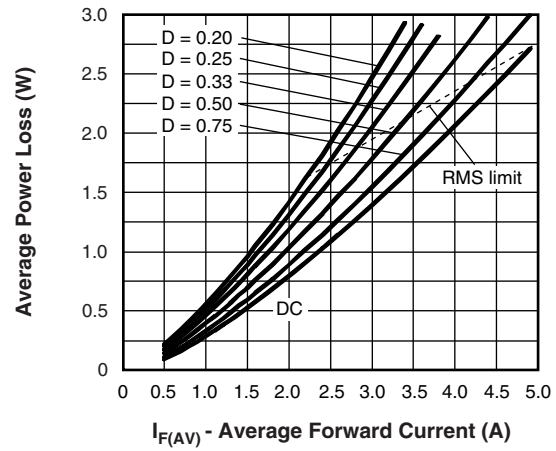


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

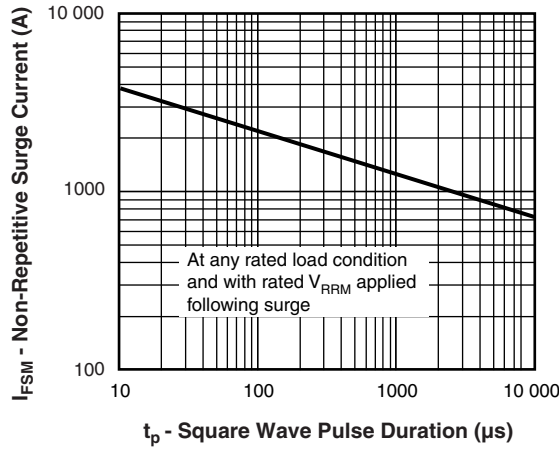


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

**Note**

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



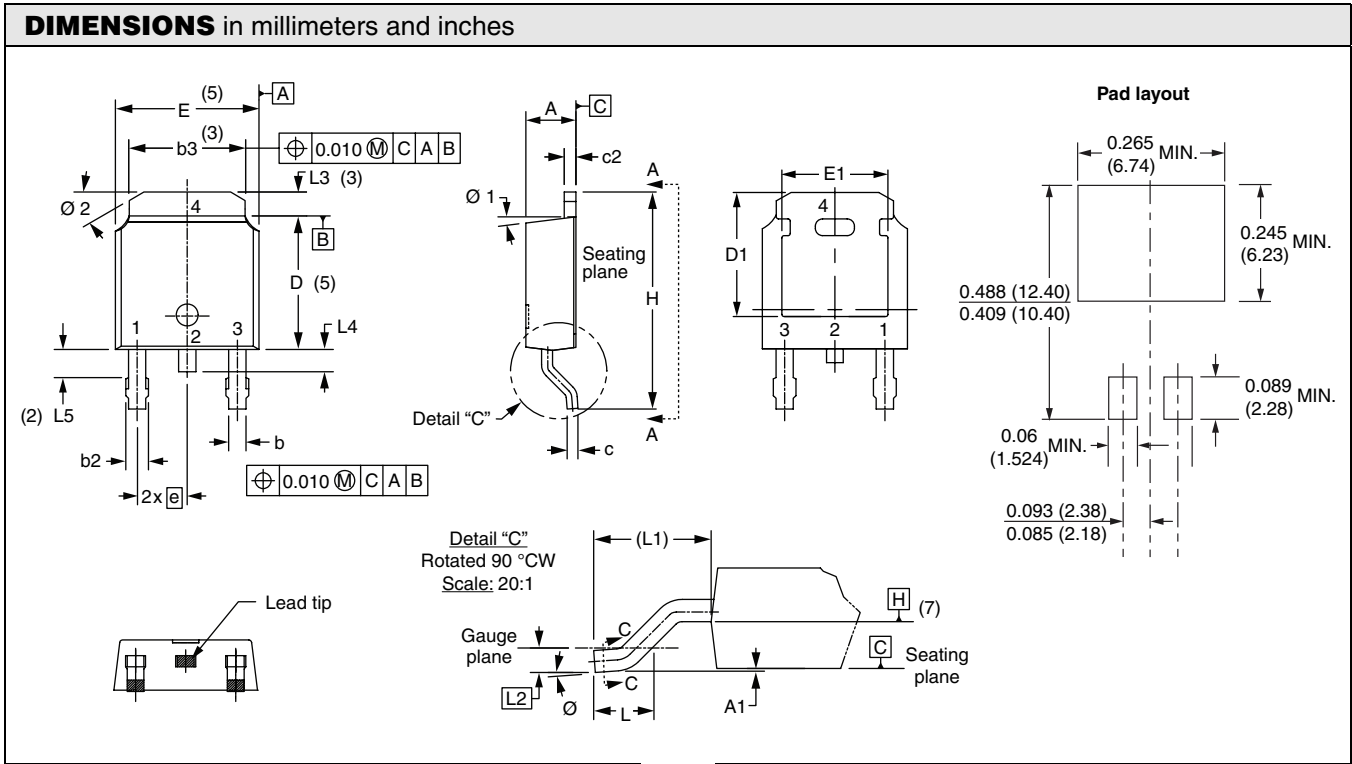
**ORDERING INFORMATION TABLE**

Device code	<b>VS-</b>	<b>6</b>	<b>C</b>	<b>W</b>	<b>Q</b>	<b>04</b>	<b>FN</b>	<b>TRL</b>	<b>PbF</b>
	①	②	③	④	⑤	⑥	⑦	⑧	⑨

- 1** - Vishay Semiconductors product
- 2** - Current rating (7 A)
- 3** - Center tap configuration
- 4** - Package identifier:  
W = D-PAK
- 5** - Schottky "Q" series
- 6** - Voltage rating (04 = 40 V)
- 7** - FN = TO-252AA (D-PAK)
- 8** -
  - None = Tube (50 pieces)
  - TR = Tape and reel
  - TRL = Tape and reel (left oriented)
  - TRR = Tape and reel (right oriented)
- 9** - PbF = Lead (Pb)-free

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95016">www.vishay.com/doc?95016</a>
Part marking information	<a href="http://www.vishay.com/doc?95059">www.vishay.com/doc?95059</a>
Packaging information	<a href="http://www.vishay.com/doc?95033">www.vishay.com/doc?95033</a>

## D-PAK (TO-252AA)



SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	2.18	2.39	0.086	0.094	
A1	-	0.13	-	0.005	
b	0.64	0.89	0.025	0.035	
b2	0.76	1.14	0.030	0.045	
b3	4.95	5.46	0.195	0.215	3
c	0.46	0.61	0.018	0.024	
c2	0.46	0.89	0.018	0.035	
D	5.97	6.22	0.235	0.245	5
D1	5.21	-	0.205	-	3
E	6.35	6.73	0.250	0.265	5
E1	4.32	-	0.170	-	3

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
e	2.29 BSC		0.090 BSC		
H	9.40	10.41	0.370	0.410	
L	1.40	1.78	0.055	0.070	
L1	2.74 BSC		0.108 REF.		
L2	0.51 BSC		0.020 BSC		
L3	0.89	1.27	0.035	0.050	3
L4	-	1.02	-	0.040	
L5	1.14	1.52	0.045	0.060	2
Ø	0°	10°	0°	10°	
Ø1	0°	15°	0°	15°	
Ø2	25°	35°	25°	35°	

### Notes

- (1) Dimensioning and tolerancing as per ASME Y14.5M-1994
- (2) Lead dimension uncontrolled in L5
- (3) Dimension D1, E1, L3 and b3 establish a minimum mounting surface for thermal pad
- (4) Section C - C dimension apply to the flat section of the lead between 0.13 and 0.25 mm (0.005 and 0.10") from the lead tip
- (5) 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
- (6) Dimension b1 and c1 applied to base metal only
- (7) Datum A and B to be determined at datum plane H
- (8) Outline conforms to JEDEC outline TO-252AA



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