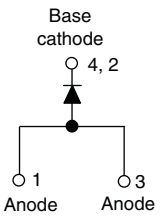
High Performance Schottky Rectifier, 3.5 A

D-PAK (TO-252AA)



FEATURES

- Popular D-PAK outline
- Small foot print, surface mountable
- Low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT

DESCRIPTION

The VS-30WQ04FNPbF surface mount Schottky rectifier 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)
$I_{F(AV)}$	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	Single die
E_{AS}	8 mJ

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Rectangular waveform	3.5	A
V_{RRM}		40	V
I_{FSM}	t_p = 5 µs sine	500	A
V_F	3 A_{pk}, T_J = 125 °C	0.49	V
T_J		-40 to +150	°C

VOLTAGE RATINGS			
PARAMETER	SYMBOL	VS-30WQ04FNPbF	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	$I_{F(AV)}$	50 % duty cycle at T_C = 135 °C, rectangular waveform		3.5	A
Maximum peak one cycle non-repetitive surge current See fig. 7	I_{FSM}	5 µs sine or 3 µs 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	E_{AS}	T_J = 25 °C, I_{AS} = 1 A, L = 16 mH		8.0	mJ
Repetitive avalanche current	I_{AR}	Current decaying linearly to zero in 1 µs Frequency limited by T_J maximum V_A = 1.5 x V_R typical		1.0	A

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ELECTRICAL SPECIFICATIONS

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum forward voltage drop See fig. 1	V_{FM} (1)	3 A	T_J = 25 °C	0.53	V
		6 A		0.67	
		3 A	T_J = 125 °C	0.49	
		6 A		0.62	
Maximum reverse leakage current See fig. 2	I_{RM} (1)	T_J = 25 °C	V_R = Rated V_R	2	mA
		T_J = 125 °C		24	
Threshold voltage	$V_{F(TO)}$	T_J = T_J maximum		0.34	V
Forward slope resistance	r_t			37.33	mΩ
Typical junction capacitance	C_T	V_R = 5 V_{DC} (test signal range 100 kHz to 1 MHz), 25 °C		189	pF
Typical series inductance	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	4.7	°C/W
Approximate weight			0.3	g
			0.01	oz.
Marking device		Case style D-PAK (similar to TO-252AA)	30WQ04FN	

Note

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

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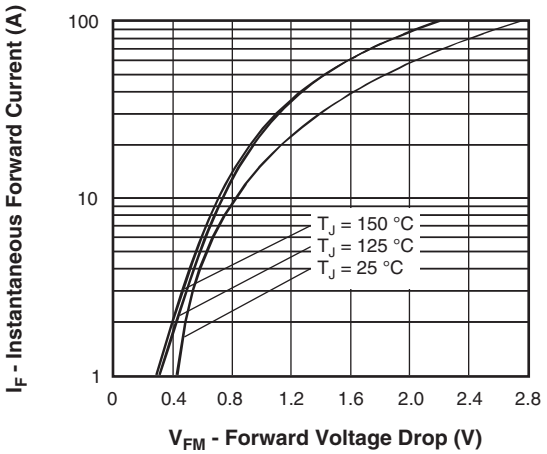

Fig. 1 - Maximum Forward Voltage Drop Characteristics

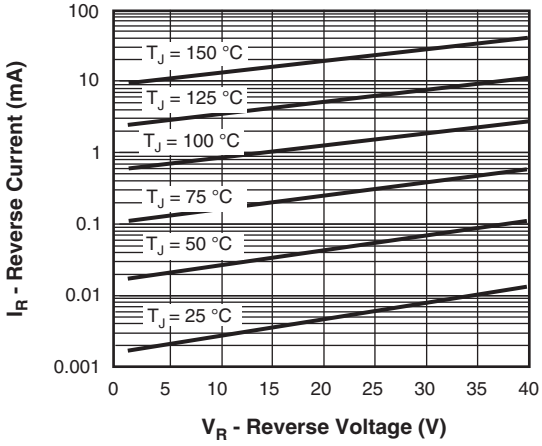

Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

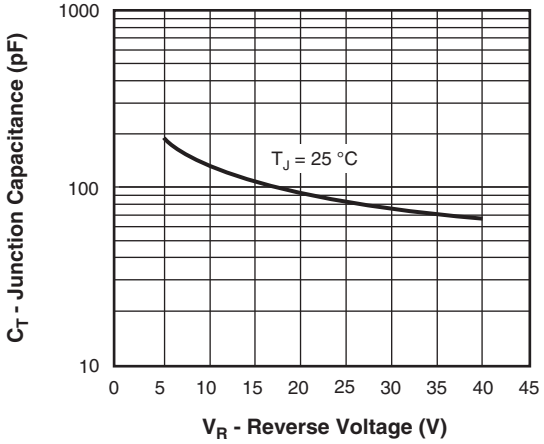

Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

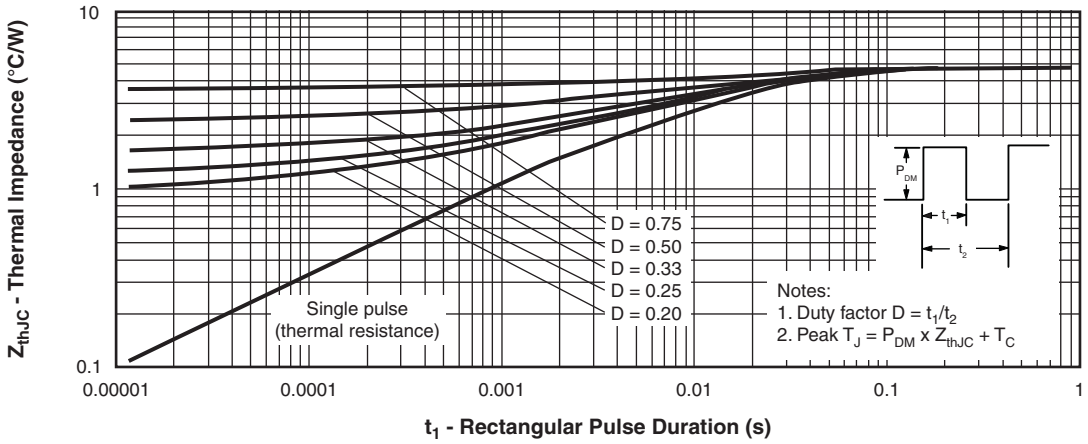

Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

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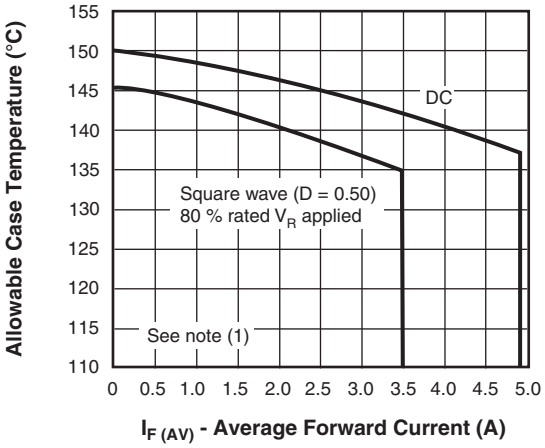

Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

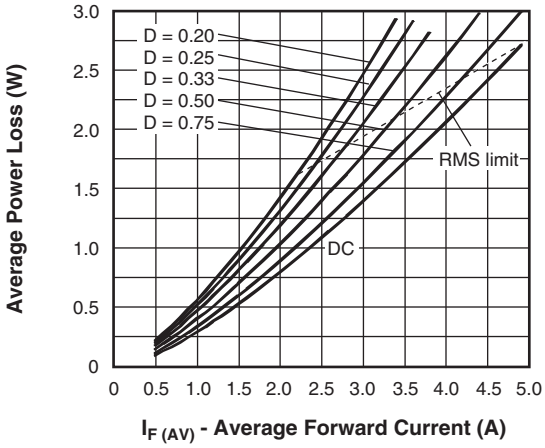

Fig. 6 - Forward Power Loss Characteristics

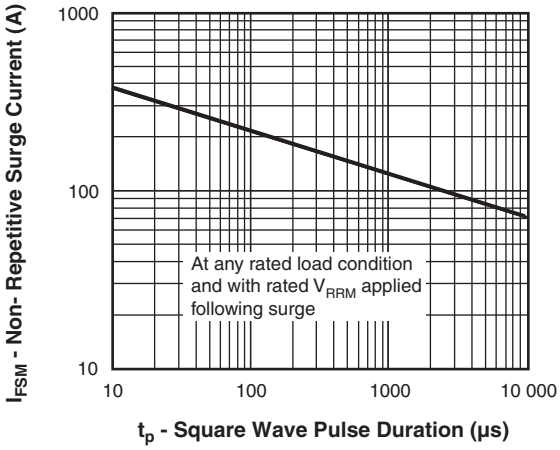

Fig. 7 - Maximum Non-Repetitive Surge Current

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} = 80 % rated V_R

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ORDERING INFORMATION TABLE

Device code

VS-	30	W	Q	04	FN	TRL	PbF
1	2	3	4	5	6	7	8

1 - Vishay Semiconductors product

2 - Current rating (3.5 A)

3 - Package identifier:
W = D-PAK

4 - Schottky “Q” series

5 - Voltage rating (04 = 40 V)

6 - FN = TO-252AA (D-PAK)

7 - • None = Tube (50 pieces)
• TR = Tape and reel
• TRL = Tape and reel (left oriented)
• TRR = Tape and reel (right oriented)

8 - PbF = Lead (Pb)-free

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95016
Part marking information	www.vishay.com/doc?95059
Packaging information	www.vishay.com/doc?95033
SPICE model	www.vishay.com/doc?95288
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