



## Schottky Rectifier, 3.3 A



C-16



### FEATURES

- Low profile, axial leaded outline
- High frequency operation
- Very low forward voltage drop
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Guard ring for enhanced ruggedness and long term reliability
- Compliant to RoHS Directive 2002/95/EC
- Designed and qualified for commercial level
- Halogen-free according to IEC 61249-2-21 definition (-M3 only)



PRODUCT SUMMARY	
Package	DO-201AD (C-16)
$I_{F(AV)}$	3.3 A
$V_R$	90 V, 100 V
$V_F$ at $I_F$	See Electrical table
$I_{RM}$ max.	3.0 mA at 125 °C
$T_J$ max.	150 °C
Diode variation	Single die
$E_{AS}$	3.0 mJ

### DESCRIPTION

The VS-31DQ... axial leaded Schottky rectifier has been optimized for very low forward voltage drop, with moderate leakage. Typical applications are in switching power supplies, converters, freewheeling diodes, and reverse battery protection

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Rectangular waveform	3.3	A
$V_{RRM}$		90/100	V
$I_{FSM}$	$t_p = 5 \mu s$ sine	210	A
$V_F$	3 Apk, $T_J = 25 \text{ }^\circ\text{C}$	0.85	V
$T_J$		- 40 to 150	°C

VOLTAGE RATINGS						
PARAMETER	SYMBOL	VS-31DQ09	VS-31DQ09-M3	VS-31DQ10	VS-31DQ10-M3	UNITS
Maximum DC reverse voltage	$V_R$	90	90	100	100	V
Maximum working peak reverse voltage	$V_{RWM}$					

ABSOLUTE MAXIMUM RATINGS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum average forward current See fig. 4	$I_{F(AV)}$	50 % duty cycle at $T_L = 108 \text{ }^\circ\text{C}$ , rectangular waveform		3.3	A
Maximum peak one cycle non-repetitive surge current See fig. 6	$I_{FSM}$	5 $\mu s$ sine or 3 $\mu s$ rect. pulse	Following any rated load condition and with rated $V_{RRM}$ applied	210	
		10 ms sine or 6 ms rect. pulse		34	
Non-repetitive avalanche energy	$E_{AS}$	$T_J = 25 \text{ }^\circ\text{C}$ , $I_{AS} = 1 \text{ A}$ , $L = 6 \text{ mH}$		3.0	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		0.5	A

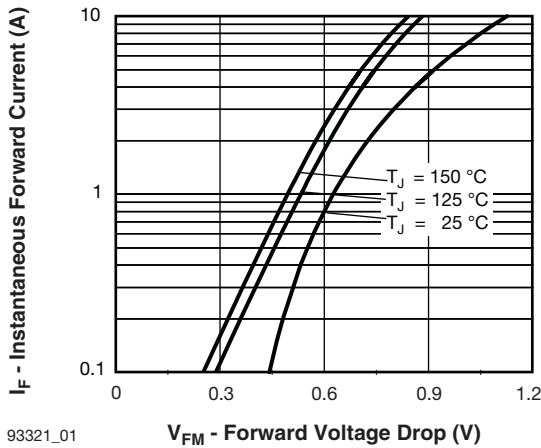


<b>ELECTRICAL SPECIFICATIONS</b>					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum forward voltage drop See fig. 1	$V_{FM}^{(1)}$	3 A	$T_J = 25\text{ }^\circ\text{C}$	0.85	V
		6 A		0.97	
		3 A	$T_J = 125\text{ }^\circ\text{C}$	0.69	
		6 A		0.80	
Maximum reverse leakage current See fig. 4	$I_{RM}^{(1)}$	$T_J = 25\text{ }^\circ\text{C}$	$V_R = \text{Rated } V_R$	1	mA
		$T_J = 125\text{ }^\circ\text{C}$		3	
Typical junction capacitance	$C_T$	$V_R = 5 V_{DC}$ (test signal range 100 kHz to 1 MHz) $25\text{ }^\circ\text{C}$		110	pF
Typical series inductance	$L_S$	Measured lead to lead 5 mm from package body		9.0	nH
Maximum voltage rate of charge	dV/dt	Rated $V_R$		10 000	V/ $\mu\text{s}$

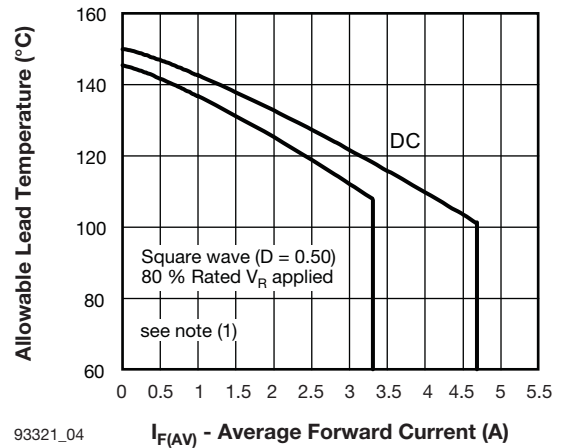
**Note**(1) Pulse width < 300  $\mu\text{s}$ , duty cycle < 2 %

<b>THERMAL - MECHANICAL SPECIFICATIONS</b>					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum junction and storage temperature range	$T_J^{(1)}, T_{Stg}$			- 40 to 150	$^\circ\text{C}$
Maximum thermal resistance, junction to ambient	$R_{thJA}$	DC operation Without cooling fin		80	$^\circ\text{C/W}$
Typical thermal resistance, junction to lead	$R_{thJL}$	DC operation		15	
Approximate weight				1.2	g
				0.042	oz.
Marking device		Case style C-16		31DQ09	
				31DQ10	

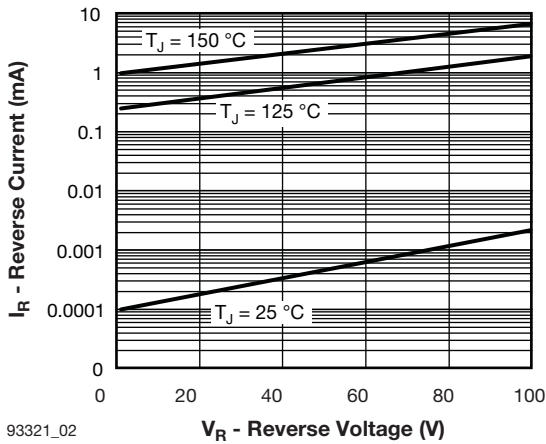
**Note**(1)  $\frac{dP_{tot}}{dT_J} < \frac{1}{R_{thJA}}$  thermal runaway condition for a diode on its own heatsink



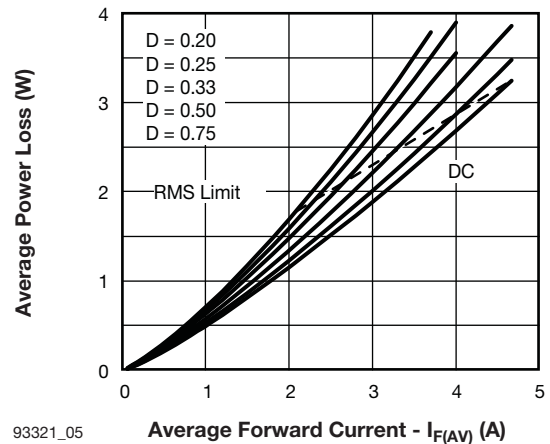
93321\_01 **V<sub>FM</sub> - Forward Voltage Drop (V)**  
Fig. 1 - Maximum Forward Voltage Drop Characteristics



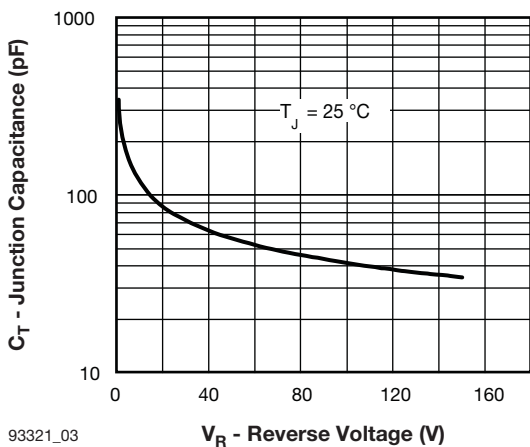
93321\_04 **I<sub>F(AV)</sub> - Average Forward Current (A)**  
Fig. 4 - Maximum Allowable Lead Temperature vs. Average Forward Current



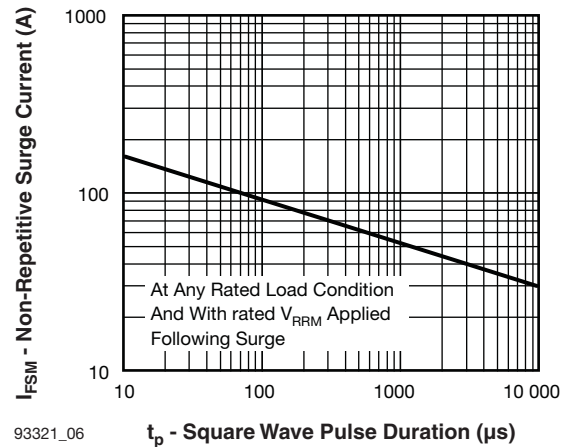
93321\_02 **V<sub>R</sub> - Reverse Voltage (V)**  
Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage



93321\_05 **Average Forward Current - I<sub>F(AV)</sub> (A)**  
Fig. 5 - Forward Power Loss Characteristics



93321\_03 **V<sub>R</sub> - Reverse Voltage (V)**  
Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage



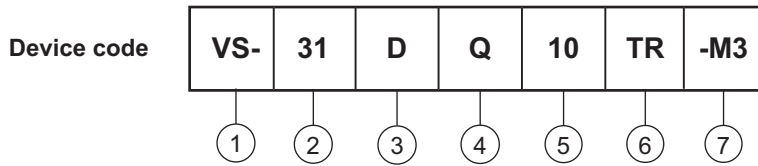
93321\_06 **t<sub>p</sub> - Square Wave Pulse Duration (μs)**  
Fig. 6 - Maximum Non-Repetitive Surge Current

**Note**

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



## ORDERING INFORMATION TABLE



- 1** - Vishay Semiconductors product
- 2** - 31 = Current Rating, 3.3 A
- 3** - D = DO-201 package
- 4** - Q = Schottky Q.. series
- 5** - 10 = Voltage ratings 09 = 90 V  
10 = 100 V
- 6** -
  - TR = Tape and reel package
  - None = Bulk package
- 7** - Environmental digit
  - None = Lead (Pb)-free and RoHS compliant
  - -M3 = Halogen-free, RoHS compliant, and terminations lead (Pb)-free

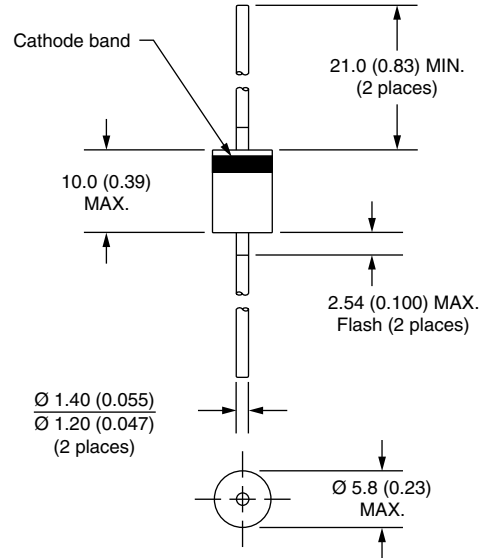
ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-31DQ09	500	500	Bulk
VS-31DQ09TR	1200	1200	Tape and reel
VS-31DQ09-M3	500	500	Bulk
VS-31DQ09TR-M3	1200	1200	Tape and reel
VS-31DQ10	500	500	Bulk
VS-31DQ10TR	1200	1200	Tape and reel
VS-31DQ10-M3	500	500	Bulk
VS-31DQ10TR-M3	1200	1200	Tape and reel

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95242">www.vishay.com/doc?95242</a>
Part marking information	<a href="http://www.vishay.com/doc?95304">www.vishay.com/doc?95304</a>
Packaging information	<a href="http://www.vishay.com/doc?95338">www.vishay.com/doc?95338</a>
SPICE model	<a href="http://www.vishay.com/doc?95300">www.vishay.com/doc?95300</a>



## Axial DO-201AD (C-16)

**DIMENSIONS** in millimeters (inches)





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