

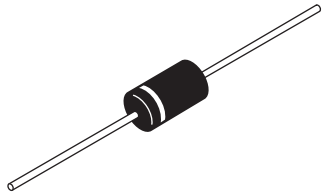


# THE DATASHEET OF VS-31DQ04





## 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
$V_R$	30 V, 40 V
$V_F$ at $I_F$	See Electrical table
$I_{RM}$ max.	20 mA at 125 °C
$T_J$ max.	150 °C
Diode variation	Single die
$E_{AS}$	6.0 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
$V_{RRM}$		30/40	V
$I_{FSM}$	$t_p = 5 \mu s$ sine	450	A
$V_F$	3 Apk, $T_J = 25 \text{ }^\circ\text{C}$	0.57	V
$T_J$		- 40 to 150	°C

VOLTAGE RATINGS						
PARAMETER	SYMBOL	VS-31DQ03	VS-31DQ03-M3	VS-31DQ04	VS-31DQ04-M3	UNITS
Maximum DC reverse voltage	$V_R$	30	30	40	40	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 $T_L = 117 \text{ }^\circ\text{C}$ , 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	450	
		10 ms sine or 6 ms rect. pulse		90	
Non-repetitive avalanche energy	$E_{AS}$	$T_J = 25 \text{ }^\circ\text{C}$ , $I_{AS} = 1.0 \text{ A}$ , $L = 12 \text{ mH}$		6.0	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		1.0	A

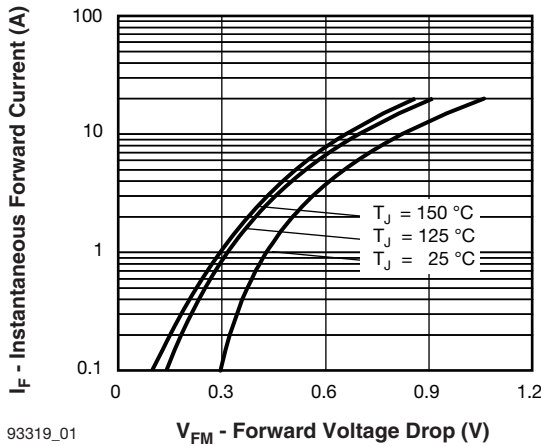


<b>ELECTRICAL SPECIFICATIONS</b>					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum forward voltage drop See fig. 1	$V_{FM}^{(1)}$	3 A	$T_J = 25\text{ }^\circ\text{C}$	0.57	V
		6 A		0.71	
		3 A	$T_J = 125\text{ }^\circ\text{C}$	0.51	
		6 A		0.62	
Maximum reverse leakage current See fig. 4	$I_{RM}^{(1)}$	$T_J = 25\text{ }^\circ\text{C}$	$V_R = \text{Rated } V_R$	1	mA
		$T_J = 125\text{ }^\circ\text{C}$		20	
Typical junction capacitance	$C_T$	$V_R = 5 V_{DC}$ (test signal range 100 kHz to 1 MHz) $25\text{ }^\circ\text{C}$		190	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/ $\mu\text{s}$

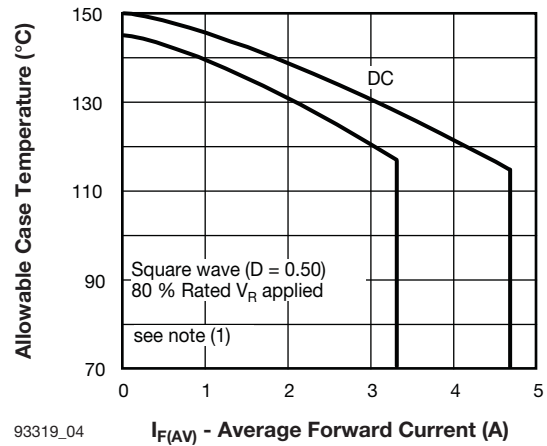
**Note**(1) Pulse width < 300  $\mu\text{s}$ , duty cycle < 2 %

<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	$R_{thJL}$	With fin 20 mm x 20 mm (0.79" x 0.79") 1.0 mm (0.04") thickness		15	
Approximate weight				1.2	g
				0.042	oz.
Marking device		Case style C-16		31DQ03	
				31DQ04	

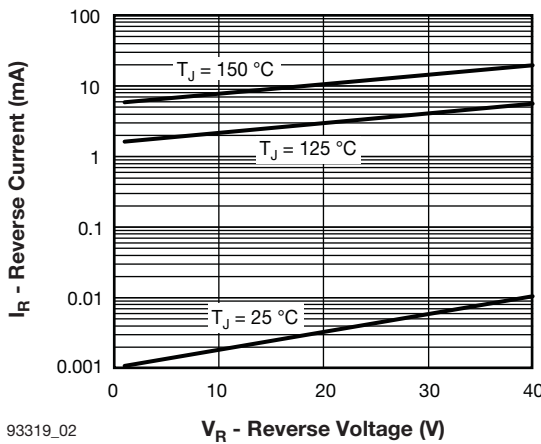
**Note**(1)  $\frac{dP_{tot}}{dT_J} < \frac{1}{R_{thJA}}$  thermal runaway condition for a diode on its own heatsink



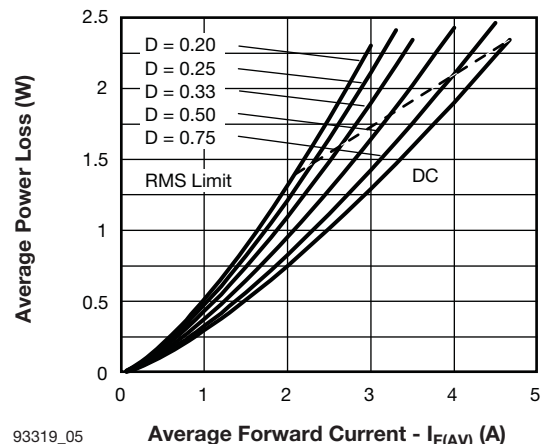
93319\_01 **V<sub>FM</sub> - Forward Voltage Drop (V)**  
Fig. 1 - Maximum Forward Voltage Drop Characteristics



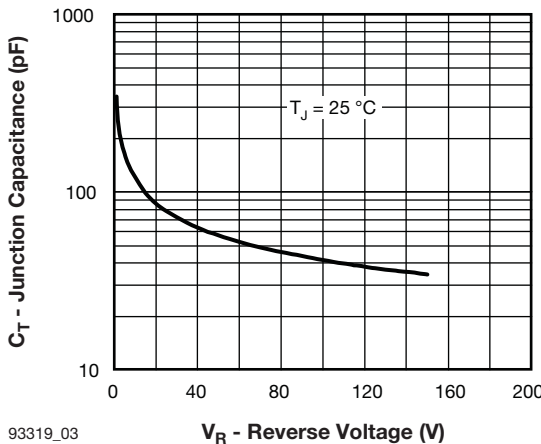
93319\_04 **I<sub>F(AV)</sub> - Average Forward Current (A)**  
Fig. 4 - Maximum Allowable Lead Temperature vs. Average Forward Current



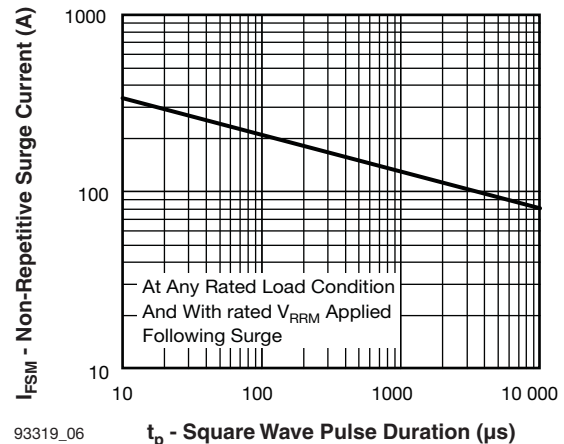
93319\_02 **V<sub>R</sub> - Reverse Voltage (V)**  
Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage



93319\_05 **Average Forward Current - I<sub>F(AV)</sub> (A)**  
Fig. 5 - Forward Power Loss Characteristics



93319\_03 **V<sub>R</sub> - Reverse Voltage (V)**  
Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage



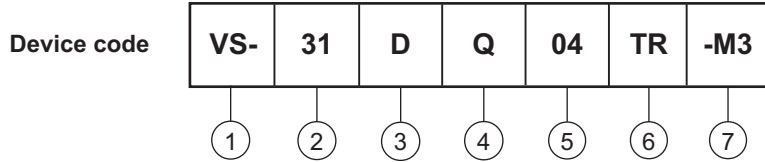
93319\_06 **t<sub>p</sub> - Square Wave Pulse Duration (μs)**  
Fig. 6 - Maximum Non-Repetitive Surge Current

**Note**

(2) Formula used:  $T_C = T_J - (P_d + P_{dREV}) \times R_{thJC}$ ;  
 $P_d$  = Forward power loss =  $I_{F(AV)} \times V_{FM}$  at  $(I_{F(AV)}/D)$  (see fig. 6);  $P_{dREV}$  = 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 - 04 = Voltage ratings 03 = 30 V  
04 = 40 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

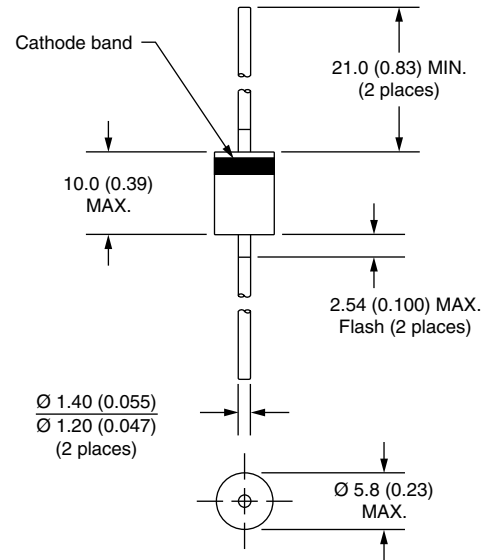
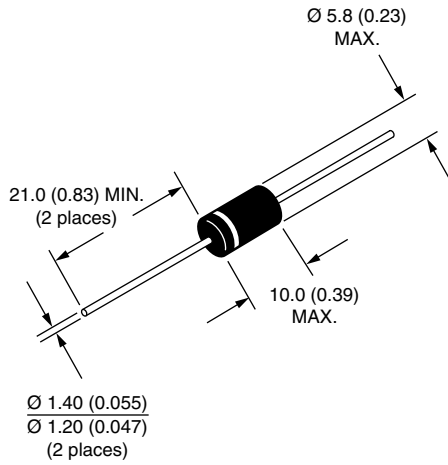
ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-31DQ03	500	500	Bulk
VS-31DQ03TR	1200	1200	Tape and reel
VS-31DQ03-M3	500	500	Bulk
VS-31DQ03TR-M3	1200	1200	Tape and reel
VS-31DQ04	500	500	Bulk
VS-31DQ04TR	1200	1200	Tape and reel
VS-31DQ04-M3	500	500	Bulk
VS-31DQ04TR-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>



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

**DIMENSIONS** in millimeters (inches)





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