

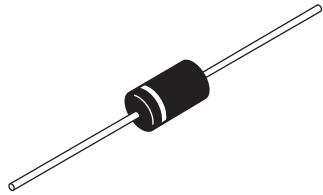


**THE DATASHEET OF
VS-31DQ05**





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 | 50 V, 60 V |
| V_F at I_F | See Electrical table |
| I_{RM} max. | 15 mA at 125 °C |
| T_J max. | 150 °C |
| Diode variation | Single die |
| E_{AS} | 5.0 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} | | 50/60 | V |
| I_{FSM} | $t_p = 5 \mu s$ sine | 340 | A |
| V_F | 3 Apk, $T_J = 25 \text{ }^\circ\text{C}$ | 0.62 | V |
| T_J | | - 40 to 150 | °C |

| VOLTAGE RATINGS | | | | | | |
|--------------------------------------|-----------|-----------|--------------|-----------|--------------|-------|
| PARAMETER | SYMBOL | VS-31DQ05 | VS-31DQ05-M3 | VS-31DQ06 | VS-31DQ06-M3 | UNITS |
| Maximum DC reverse voltage | V_R | 50 | 50 | 60 | 60 | 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 $T_L = 105 \text{ }^\circ\text{C}$, rectangular waveform | | 3.3 | A |
| Maximum peak one cycle non-repetitive surge current See fig. 6 | I_{FSM} | 5 μs sine or 3 μs rect. pulse | Following any rated load condition and with rated V_{RRM} applied | 340 | |
| | | 10 ms sine or 6 ms rect. pulse | | 55 | |
| Non-repetitive avalanche energy | E_{AS} | $T_J = 25 \text{ }^\circ\text{C}$, $I_{AS} = 1 \text{ A}$, $L = 10 \text{ mH}$ | | 5.0 | mJ |
| Repetitive avalanche current | I_{AR} | Current decaying linearly to zero in 1 μs Frequency limited by T_J maximum $V_A = 1.5 \times V_R$ typical | | 1.0 | A |

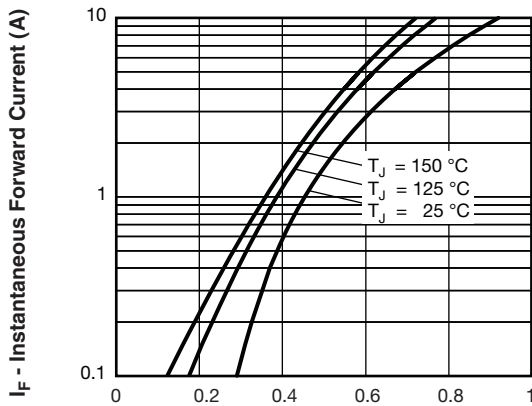


| ELECTRICAL SPECIFICATIONS | | | | | |
|---|----------------|--|-----------------------------------|--------|------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | UNITS |
| Maximum forward voltage drop See fig. 1 | $V_{FM}^{(1)}$ | 3 A | $T_J = 25\text{ }^\circ\text{C}$ | 0.62 | V |
| | | 6 A | | 0.78 | |
| | | 3 A | $T_J = 125\text{ }^\circ\text{C}$ | 0.54 | |
| | | 6 A | | 0.65 | |
| Maximum reverse leakage current See fig. 4 | $I_{RM}^{(1)}$ | $T_J = 25\text{ }^\circ\text{C}$ | $V_R = \text{Rated } V_R$ | 2 | mA |
| | | $T_J = 125\text{ }^\circ\text{C}$ | | 15 | |
| Typical junction capacitance | C_T | $V_R = 5 V_{DC}$ (test signal range 100 kHz to 1 MHz) $25\text{ }^\circ\text{C}$ | | 160 | 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/ μ s |

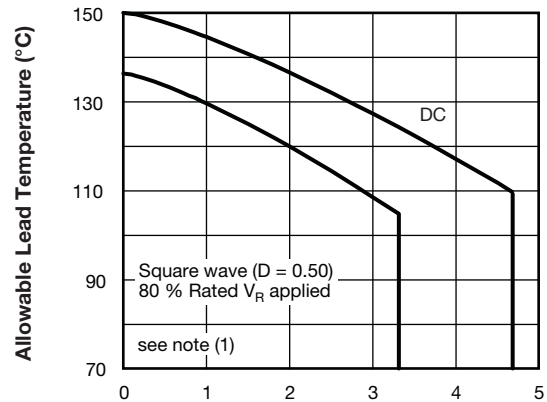
Note(1) Pulse width < 300 μ s, duty cycle < 2 %

| THERMAL - MECHANICAL SPECIFICATIONS | | | | | |
|---|----------------------|-------------------------------------|--|-------------|--------------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | UNITS |
| Maximum junction and storage temperature range | $T_J^{(1)}, T_{Stg}$ | | | - 40 to 150 | $^\circ\text{C}$ |
| 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 | | 31DQ05 | |
| | | | | 31DQ06 | |

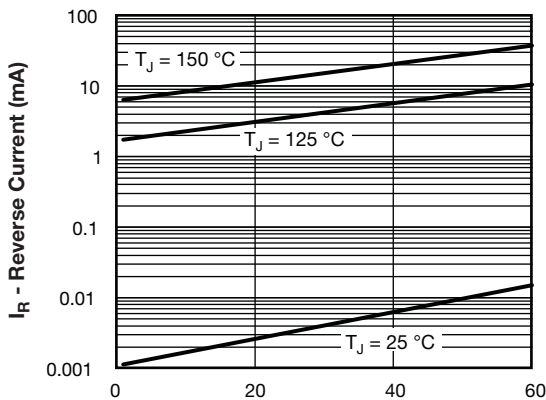
Note(1) $\frac{dP_{tot}}{dT_J} < \frac{1}{R_{thJA}}$ thermal runaway condition for a diode on its own heatsink



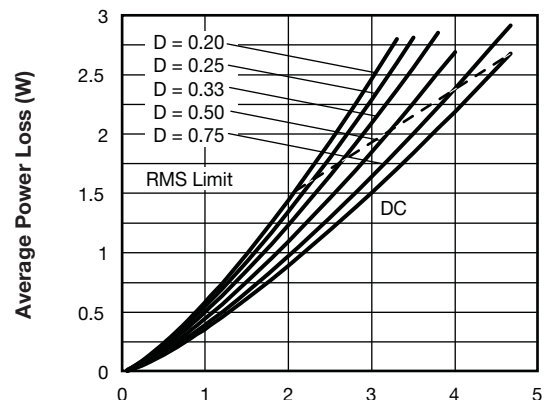
93320_01 **V_{FM} - Forward Voltage Drop (V)**
Fig. 1 - Maximum Forward Voltage Drop Characteristics



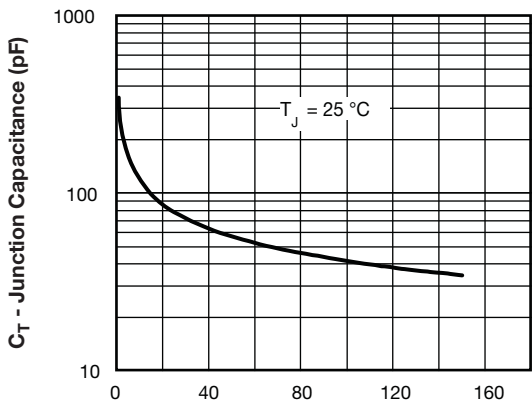
93320_04 **I_{F(AV)} - Average Forward Current (A)**
Fig. 4 - Maximum Allowable Lead Temperature vs. Average Forward Current



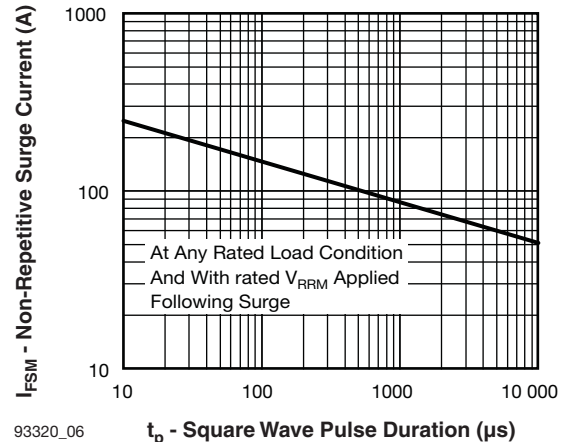
93320_02 **V_R - Reverse Voltage (V)**
Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage



93320_05 **Average Forward Current - I_{F(AV)} (A)**
Fig. 5 - Forward Power Loss Characteristics



93320_03 **V_R - Reverse Voltage (V)**
Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage



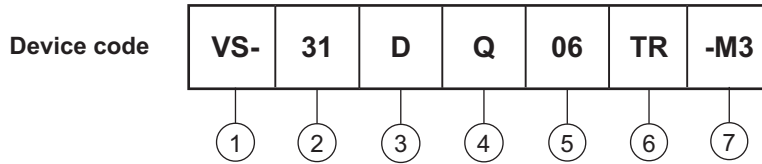
93320_06 **t_p - Square Wave Pulse Duration (μs)**
Fig. 6 - Maximum Non-Repetitive Surge Current

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



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** - 06 = Voltage ratings 05 = 50 V
06 = 60 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

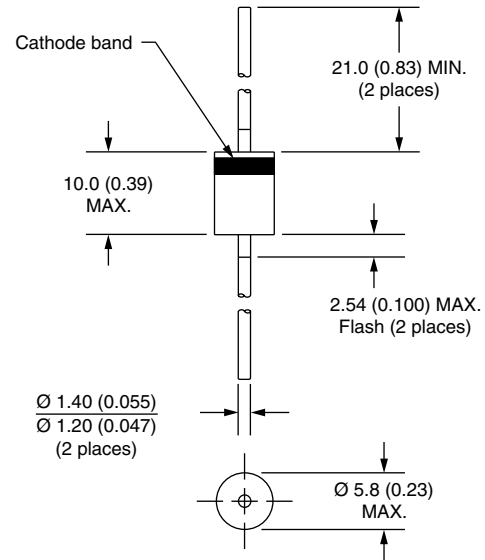
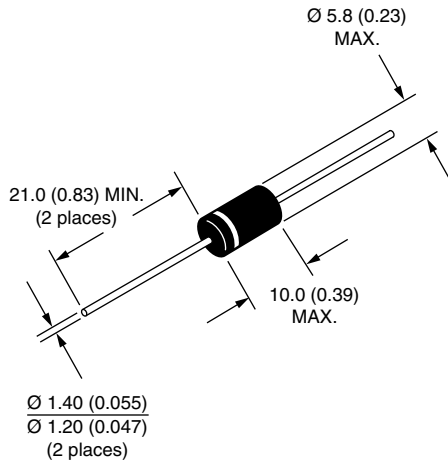
| ORDERING INFORMATION (Example) | | | |
|--------------------------------|------------------|------------------------|-----------------------|
| PREFERRED P/N | QUANTITY PER T/R | MINIMUM ORDER QUANTITY | PACKAGING DESCRIPTION |
| VS-31DQ05 | 500 | 500 | Bulk |
| VS-31DQ05TR | 1200 | 1200 | Tape and reel |
| VS-31DQ05-M3 | 500 | 500 | Bulk |
| VS-31DQ05TR-M3 | 1200 | 1200 | Tape and reel |
| VS-31DQ06 | 500 | 500 | Bulk |
| VS-31DQ06TR | 1200 | 1200 | Tape and reel |
| VS-31DQ06-M3 | 500 | 500 | Bulk |
| VS-31DQ06TR-M3 | 1200 | 1200 | Tape and reel |

| LINKS TO RELATED DOCUMENTS | |
|----------------------------|--|
| Dimensions | www.vishay.com/doc?95242 |
| Part marking information | www.vishay.com/doc?95304 |
| Packaging information | www.vishay.com/doc?95338 |



Axial DO-201AD (C-16)

DIMENSIONS in millimeters (inches)





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