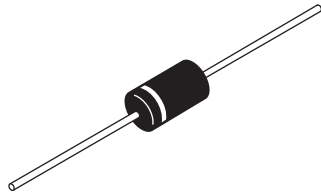


## Schottky Rectifier, 2 A



DO-204AL



### 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-204AL (DO-41) |
| $I_{F(AV)}$     | 2 A              |
| $V_R$           | 60 V             |
| $V_F$ at $I_F$  | 0.55 V           |
| $I_{RM}$ max.   | 10 mA at 125 °C  |
| $T_J$ max.      | 150 °C           |
| Diode variation | Single die       |
| $E_{AS}$        | 4.0 mJ           |

### DESCRIPTION

The VS-21DQ06... 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  | 2           | A     |
| $V_{RRM}$                         |                       | 60          | V     |
| $V_F$                             | 2 Apk, $T_J = 125$ °C | 0.55        |       |
| $T_J$                             | Range                 | - 40 to 150 | °C    |

| VOLTAGE RATINGS                      |           |           |              |       |
|--------------------------------------|-----------|-----------|--------------|-------|
| PARAMETER                            | SYMBOL    | VS-21DQ06 | VS-21DQ06-M3 | UNITS |
| Maximum DC reverse voltage           | $V_R$     | 60        | 60           | V     |
| Maximum working peak reverse voltage | $V_{RWM}$ |           |              |       |

| ABSOLUTE MAXIMUM RATINGS   |             |   |   |        |       |
|--|-------------|---|---|--------|-------|
| PARAMETER  | SYMBOL      | TEST CONDITIONS   |   | VALUES | UNITS |
| Maximum average forward current<br>See fig. 4                        | $I_{F(AV)}$ | 50 % duty cycle at $T_C = 106$ °C, rectangular waveform   |   | 2      | A     |
| Maximum peak one cycle<br>non-repetitive surge current<br>See fig. 6 | $I_{FSM}$   | 5 $\mu$ s sine or 3 $\mu$ s rect. pulse   | Following any rated load<br>condition and with rated<br>$V_{RRM}$ applied | 340    |       |
|  |             | 10 ms sine or 6 ms rect. pulse  |   | 60     |       |
| Non-repetitive avalanche energy                                      | $E_{AS}$    | $T_J = 25$ °C, $I_{AS} = 1$ A, $L = 8$ mH   |   | 4.0    | mJ    |
| Repetitive avalanche current   | $I_{AR}$    | Current decaying linearly to zero in 1 $\mu$ s<br>Frequency limited by $T_J$ maximum $V_A = 1.5 \times V_R$ typical |   | 0.5    | A     |

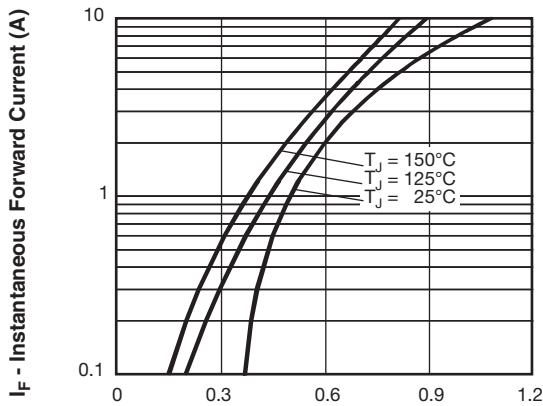


| ELECTRICAL SPECIFICATIONS       |                |   |                                   |        |      |       |
|---------------------------------|----------------|---|-----------------------------------|--------|------|-------|
| PARAMETER                       | SYMBOL         | TEST CONDITIONS   |                                   | VALUES |      | UNITS |
|                                 |                |   |                                   | TYP.   | MAX. |       |
| Maximum forward voltage drop    | $V_{FM}^{(1)}$ | 2 A   | $T_J = 25\text{ }^\circ\text{C}$  | 0.53   | 0.60 | V     |
|                                 |                | 4 A   |                                   | 0.67   | 0.75 |       |
|                                 |                | 2 A   | $T_J = 125\text{ }^\circ\text{C}$ | 0.49   | 0.55 |       |
|                                 |                | 4 A   |                                   | 0.61   | 0.67 |       |
| Maximum reverse leakage current | $I_{RM}^{(1)}$ | $T_J = 25\text{ }^\circ\text{C}$  | $V_R = \text{Rated } V_R$         | 0.02   | 0.50 | mA    |
|                                 |                | $T_J = 125\text{ }^\circ\text{C}$   |                                   | 7.0    | 10   |       |
| Typical junction capacitance    | $C_T$          | $V_R = 5\text{ }V_{DC}$ (test signal range 100 kHz to 1 MHz) $25\text{ }^\circ\text{C}$ |                                   | 120    |      | pF    |
| Typical series inductance       | $L_S$          | Measured lead to lead 5 mm from package body  |                                   | 8.0    |      | nH    |

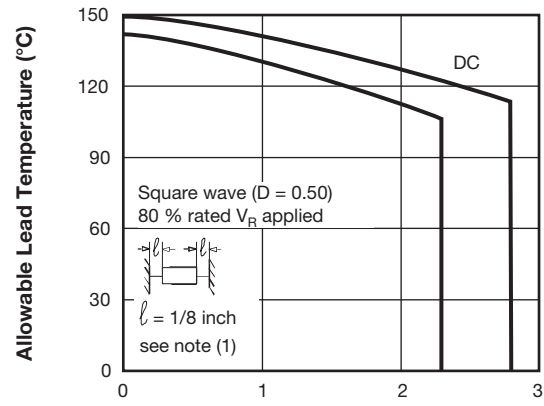
**Note**(1) Pulse width < 300  $\mu\text{s}$ , duty cycle < 2 %

| 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<br>Without cooling fin | 100         | $^\circ\text{C}/\text{W}$ |
| Typical thermal resistance, junction to lead    | $R_{thJL}$           | DC operation<br>See fig. 4          | 25          |                           |
| Approximate weight                              |                      |                                     | 0.33        | g                         |
|   |                      |                                     | 0.012       | oz.                       |
| Marking device                                  |                      | Case style DO-204AL (D-41)          | 21DQ06      |                           |

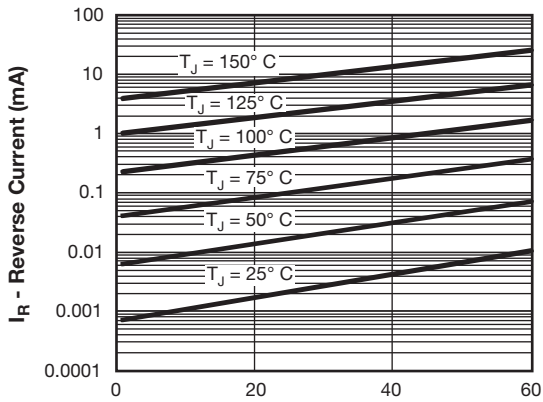
**Note**(1)  $\frac{dP_{tot}}{dT_J} < \frac{1}{R_{thJA}}$  thermal runaway condition for a diode on its own heatsink



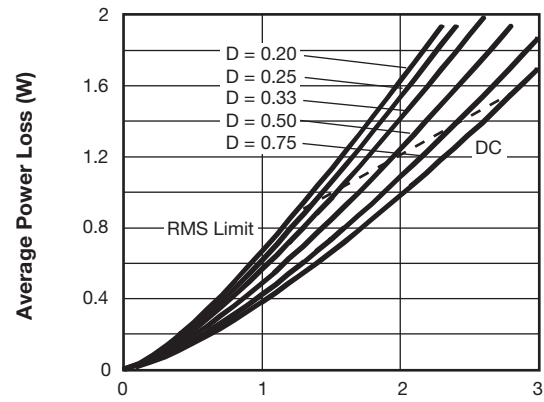
93280\_01 **V<sub>FM</sub> - Forward Voltage Drop (V)**  
Fig. 1 - Maximum Forward Voltage Drop Characteristics



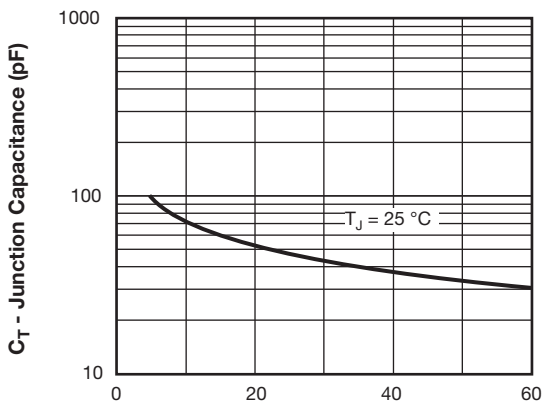
93280\_04 **I<sub>F(AV)</sub> - Average Forward Current (A)**  
Fig. 4 - Maximum Allowable Lead Temperature vs. Average Forward Current



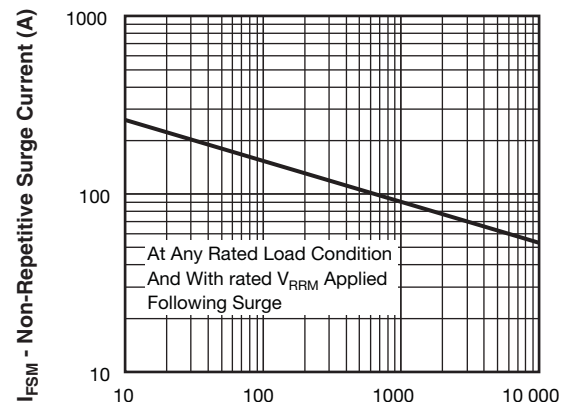
93280\_02 **V<sub>R</sub> - Reverse Voltage (V)**  
Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage



93280\_05 **Average Forward Current - I<sub>F(AV)</sub> (A)**  
Fig. 5 - Forward Power Loss Characteristics



93280\_03 **V<sub>R</sub> - Reverse Voltage (V)**  
Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage



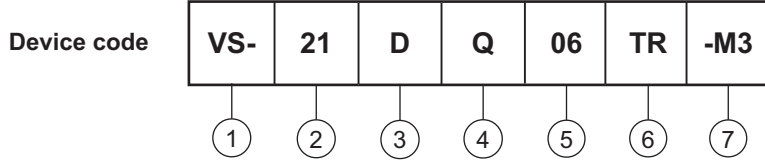
93280\_06 **t<sub>p</sub> - Square Wave Pulse Duration (μs)**  
Fig. 6 - Maximum Non-Repetitive Surge Current

**Note**

(1) Formula used:  $T_L = T_J - (P_d + P_{d_{REV}}) \times R_{thJL}$ ;  
 $P_d$  = Forward power loss =  $I_{F(AV)} \times V_{FM}$  at  $(I_{F(AV)}/D)$  (see fig. 5);  $P_{d_{REV}}$  = Inverse power loss =  $V_{R1} \times I_R (1 - D)$ ;  $I_R$  at  $V_{R1} = 80\%$  rated  $V_R$



ORDERING INFORMATION TABLE



- ① - Vishay Semiconductors product
- ② - 21 = Current Rating, 2 A
- ③ - D = DO-41 package
- ④ - Q = Schottky Q.. series
- ⑤ - 06 = Voltage rating: 60 V
- ⑥ -
  - TR = Tape and reel package
  - TB = Tape and ammo box package
  - None = Bulk package
- ⑦ - Environmental digit
  - None = Lead (Pb)-free and RoHS compliant
  - -M3 = Halogen-free, RoHS compliant, and terminations lead (Pb)-free

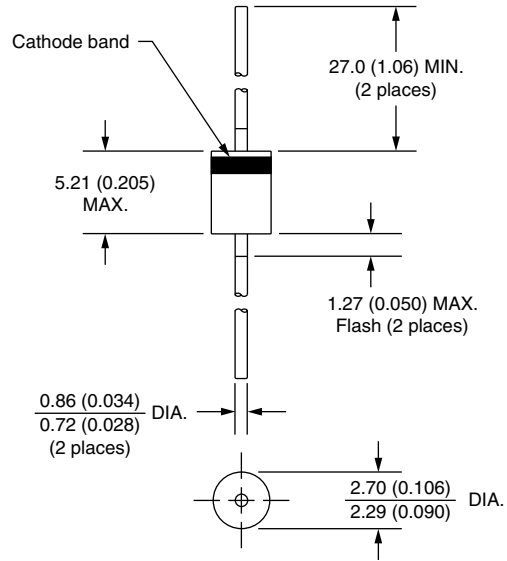
| ORDERING INFORMATION (Example) |                  |                        |                       |
|--------------------------------|------------------|------------------------|-----------------------|
| PREFERRED P/N                  | QUANTITY PER T/R | MINIMUM ORDER QUANTITY | PACKAGING DESCRIPTION |
| VS-21DQ06                      | 1000             | 1000                   | Bulk                  |
| VS-21DQ06TR                    | 5000             | 5000                   | Tape and reel         |
| VS-21DQ06TB                    | 3000             | 3000                   | Tape and ammo box     |
| VS-21DQ06-M3                   | 1000             | 1000                   | Bulk                  |
| VS-21DQ06TR-M3                 | 5000             | 5000                   | Tape and Reel         |
| VS-21DQ06TB-M3                 | 3000             | 3000                   | Tape and ammo box     |

| LINKS TO RELATED DOCUMENTS |  |
|----------------------------|--|
| Dimensions                 | <a href="http://www.vishay.com/doc?95241">www.vishay.com/doc?95241</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-204AL (DO-41)

**DIMENSIONS** in millimeters (inches)





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