# Fast Recovery Diodes (Hockey PUK Version), 990 A



K-PUK (DO-200AC)

## FEATURES

- High power fast recovery diode series
- 5.0 µs recovery time
- High voltage ratings up to 4500 V
- High current capability
- Optimized turn-on and turn-off characteristics
- Low forward recovery
- Fast and soft reverse recovery
- Press PUK encapsulation
- Case style conform to JEDEC® K-PUK (DO-200AC)
- Maximum junction temperature 125 °C
- Designed and qualified for industrial level
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

RoHS COMPLIANT

| PRIMARY CHARACTERISTICS | |
|---|---|
| $I_{F(AV)}$ | 990 A |
| Package | K-PUK (DO-200AC) |
| Circuit configuration | Single |

## TYPICAL APPLICATIONS

- Snubber diode for GTO
- High voltage freewheeling diode
- Fast recovery rectifier applications

| MAJOR RATINGS AND CHARACTERISTICS | | | |
|---|---|---|---|
| PARAMETER | TEST CONDITIONS | VALUES | UNITS |
| $I_{F(AV)}$ | | 990 | A |
| | $T_{hs}$ | 55 | °C |
| $I_{F(RMS)}$ | | 1800 | A |
| | $T_{hs}$ | 25 | °C |
| $I_{FSM}$ | 50 Hz | 19 000 | A |
| | 60 Hz | 19 900 | |
| $I^2t$ | 50 Hz | 1810 | $kA^2s$ |
| | 60 Hz | 1652 | |
| $V_{RRM}$ | Range | 3000 to 4500 | V |
| $t_{rr}$ | | 5.0 | µs |
| | $T_J$ | 25 | °C |
| $T_J$ | | -40 to +125 | |

## ELECTRICAL SPECIFICATIONS

| VOLTAGE RATINGS | | | | |
|---|---|---|---|---|
| TYPE NUMBER | VOLTAGE CODE | $V_{RRM}$, MAXIMUM REPETITIVE PEAK REVERSE VOLTAGE V | $V_{RSM}$, MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V | $I_{RRM}$ MAXIMUM AT $T_J$ = 125 °C mA |
| VS-SD853C..S50K | 30 | 3000 | 3100 | 100 |
| | 36 | 3600 | 3700 | |
| | 40 | 4000 | 4100 | |
| | 45 | 4500 | 4600 | |



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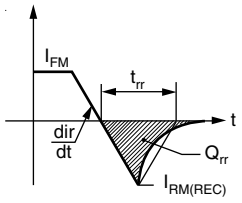
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## FORWARD CONDUCTION

| PARAMETER | SYMBOL | TEST CONDITIONS | | | VALUES | UNITS |
|---|---|---|---|---|---|---|
| Maximum average forward current at heatsink temperature | $I_{F(AV)}$ | 180° conduction, half sine wave Double side (single side) cooled | | | 990 (420) | A |
| | | | | | 55 (85) | °C |
| Maximum RMS forward current | $I_{F(RMS)}$ | 25 °C heatsink temperature double side cooled | | | 1800 | A |
| Maximum peak, one-cycle forward, non-repetitive surge current | $I_{FSM}$ | t = 10 ms | No voltage reapplied | Sinusoidal half wave, initial $T_J = T_J$ maximum | 19 000 | |
| | | t = 8.3 ms | | | 19 900 | |
| | | t = 10 ms | 50 % $V_{RRM}$ reapplied | | 16 000 | |
| | | t = 8.3 ms | | | 16 750 | |
| Maximum $I^2t$ for fusing | $I^2t$ | t = 10 ms | No voltage reapplied | | 1805 | $kA^2s$ |
| | | t = 8.3 ms | | | 1645 | |
| | | t = 10 ms | 50 % $V_{RRM}$ reapplied | | 1280 | |
| | | t = 8.3 ms | | | 1165 | |
| Maximum $I^2\sqrt{t}$ for fusing | $I^2\sqrt{t}$ | t = 0.1 to 10 ms, no voltage reapplied | | | 18 050 | $kA^2\sqrt{s}$ |
| Low level value of threshold voltage | $V_{F(TO)1}$ | (16.7 % x π x $I_{F(AV)}$ < I < π x $I_{F(AV)}$), $T_J = T_J$ maximum | | | 1.50 | V |
| High level value of threshold voltage | $V_{F(TO)2}$ | (I > π x $I_{F(AV)}$), $T_J = T_J$ maximum | | | 1.67 | |
| Low level value of forward slope resistance | $r_{f1}$ | (16.7 % x π x $I_{F(AV)}$ < I < π x $I_{F(AV)}$), $T_J = T_J$ maximum | | | 0.70 | mW |
| High level value of forward slope resistance | $r_{f2}$ | (I > π x $I_{F(AV)}$), $T_J = T_J$ maximum | | | 0.65 | |
| Maximum forward voltage drop | $V_{FM}$ | $I_{pk}$ = 2000 A, $T_J$ = 125 °C; $t_p$ = 10 ms sinusoidal wave | | | 2.90 | V |

## RECOVERY CHARACTERISTICS

| CODE | MAXIMUM VALUE AT $T_J$ = 25 °C | TEST CONDITIONS | | | TYPICAL VALUES AT $T_J$ = 125 °C | | |
|---|---|---|---|---|---|---|---|
| | $t_{rr}$ at 25 % $I_{RRM}$ (µs) | $I_{pk}$ SQUARE PULSE (A) | dI/dt (A/µs) | $V_r$ (V) | $t_{rr}$ at 25 % $I_{RRM}$ (µs) | $Q_{rr}$ (µC) | $I_{rr}$ (A) |
| S50 | 5.0 | 1000 | 100 | -50 | 6.5 | 1000 | 270 |




## THERMAL AND MECHANICAL SPECIFICATIONS

| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
|---|---|---|---|---|
| Maximum junction operating temperature range | $T_J$ | | -40 to +125 | °C |
| Maximum storage temperature range | $T_{Stg}$ | | -40 to +150 | |
| Maximum thermal resistance, junction to heatsink | $R_{thJ-hs}$ | DC operation single side cooled | 0.04 | K/W |
| | | DC operation double side cooled | 0.02 | |
| Mounting force, ± 10 % | | | 22 250 (2250) | N (kg) |
| Approximate weight | | | 425 | g |
| Case style | | See dimensions - link at the end of datasheet | K-PUK (DO-200AC) | |

## $\Delta R_{thJ-hs}$ CONDUCTION

| CONDUCTION ANGLE | SINUSOIDAL CONDUCTION | | RECTANGULAR CONDUCTION | | TEST CONDITIONS | UNITS |
|---|---|---|---|---|---|---|
| | SINGLE SIDE | DOUBLE SIDE | SINGLE SIDE | DOUBLE SIDE | | |
| 180° | 0.0017 | 0.0019 | 0.0012 | 0.0012 | $T_J = T_J$ maximum | K/W |
| 120° | 0.0021 | 0.0021 | 0.0021 | 0.0021 | | |
| 90° | 0.0026 | 0.0027 | 0.0029 | 0.0029 | | |
| 60° | 0.039 | 0.0039 | 0.0041 | 0.0041 | | |
| 30° | 0.0067 | 0.0067 | 0.0068 | 0.0068 | | |

**Note**

- The table above shows the increment of thermal resistance $R_{thJ-hs}$ when devices operate at different conduction angles than DC


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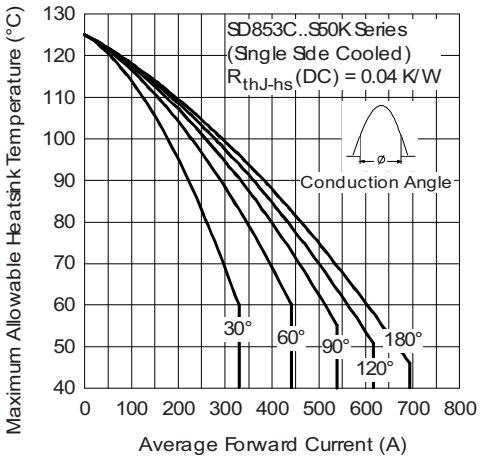



Fig. 1 - Current Ratings Characteristics

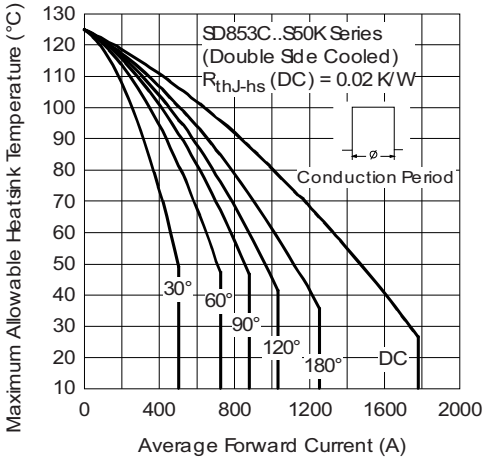



Fig. 4 - Current Ratings Characteristics

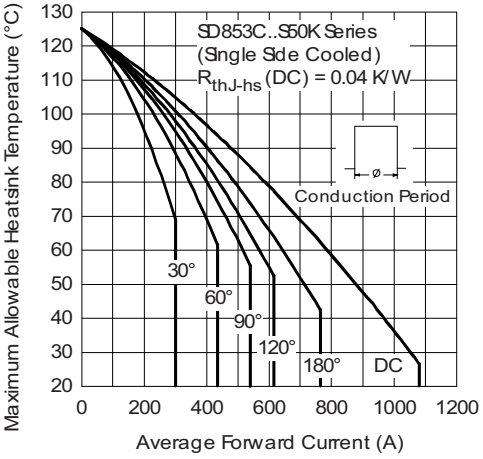



Fig. 2 - Current Ratings Characteristics

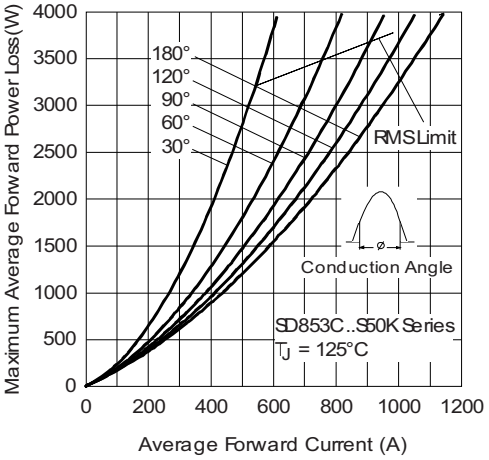



Fig. 5 - Forward Power Loss Characteristics

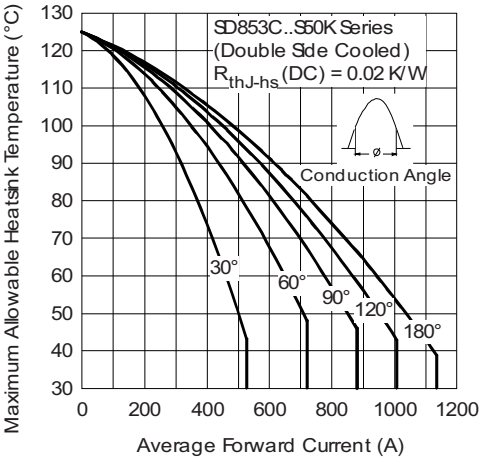



Fig. 3 - Current Ratings Characteristics

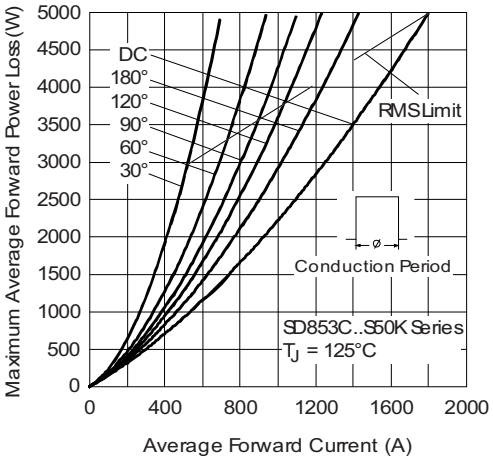



Fig. 6 - Forward Power Loss Characteristics


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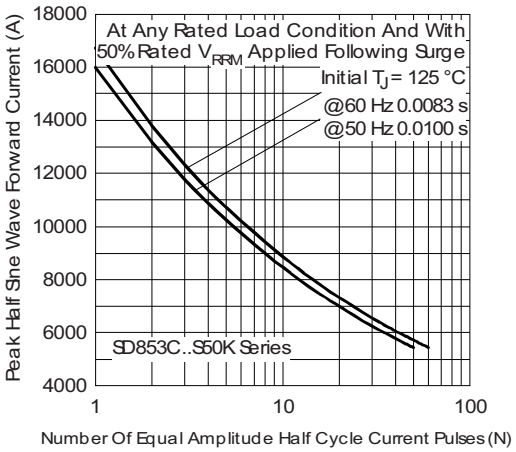



Fig. 7 - Maximum Non-Repetitive Surge Current
Single and Double Side Cooled

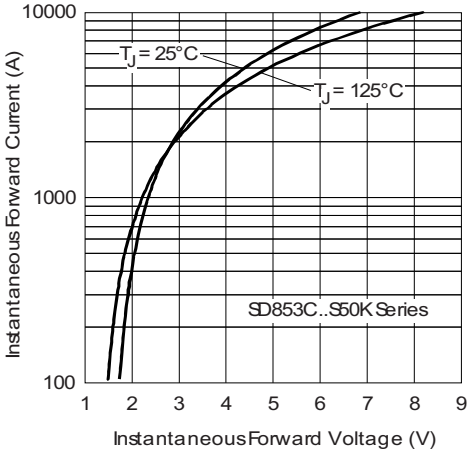



Fig. 9 - Forward Voltage Drop Characteristics

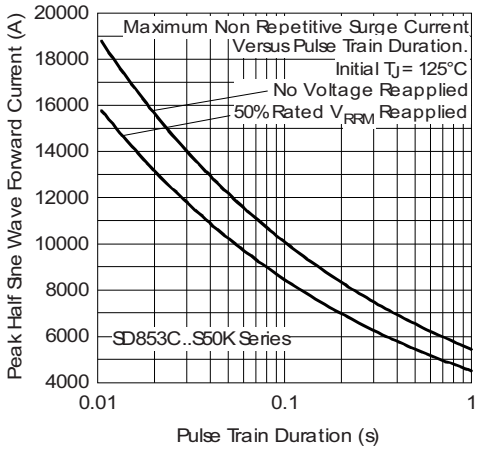



Fig. 8 - Maximum Non-Repetitive Surge Current
Single and Double Side Cooled

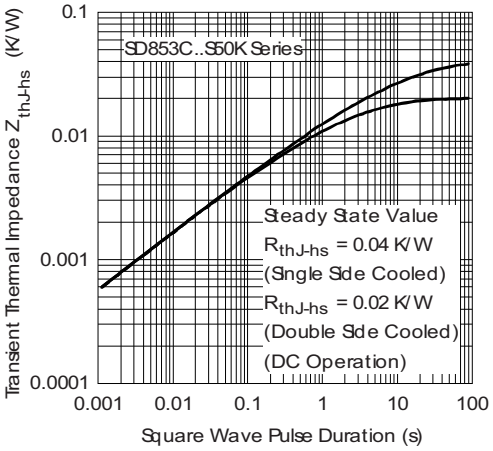



Fig. 10 - Thermal Impedance $Z_{thJ-hs}$ Characteristics

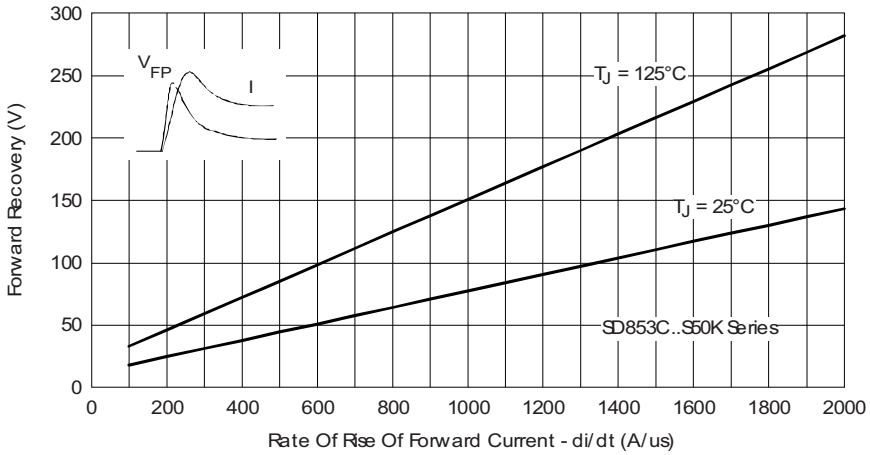



Fig. 11 - Typical Forward Recovery Characteristics


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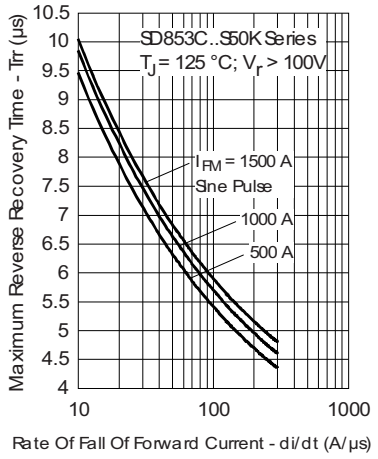



Fig. 12 - Recovery Time Characteristics

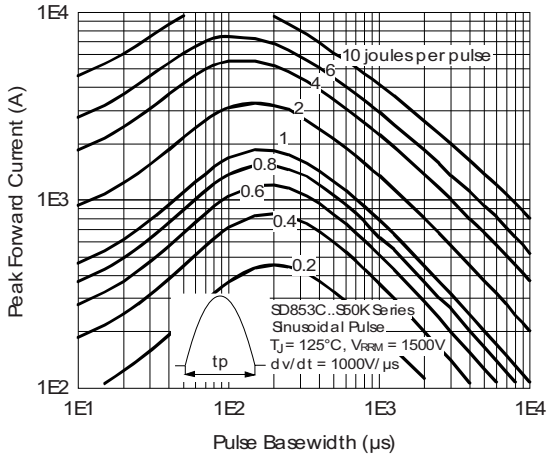



Fig. 15 - Maximum Total Energy Loss Per Pulse Characteristics

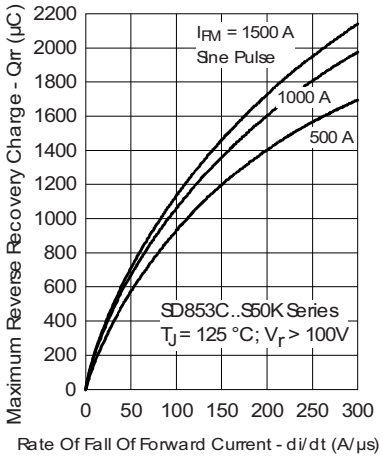



Fig. 13 - Recovery Charge Characteristics

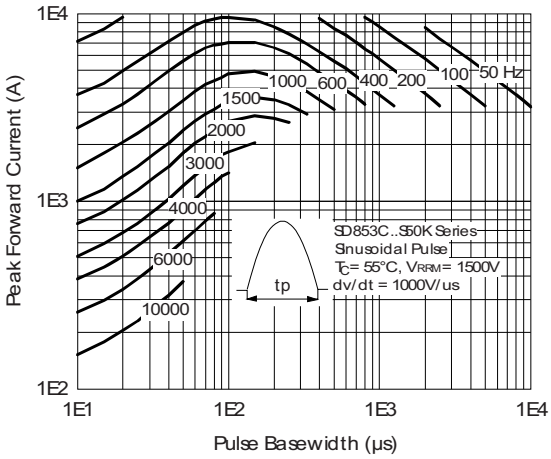



Fig. 16 - Frequency Characteristics

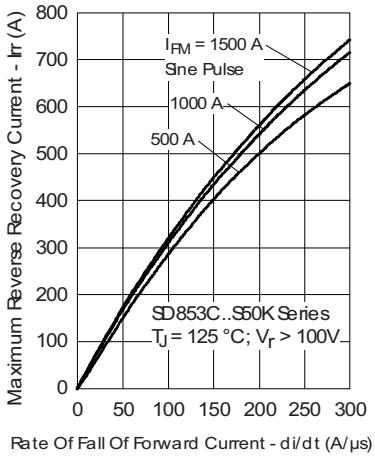



Fig. 14 - Recovery Current Characteristics

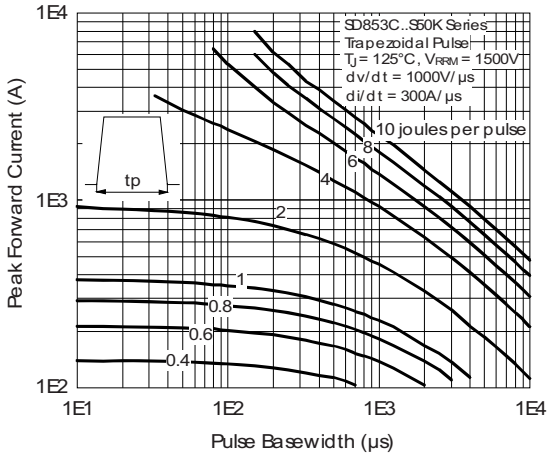



Fig. 17 - Maximum Total Energy Loss Per Pulse Characteristics


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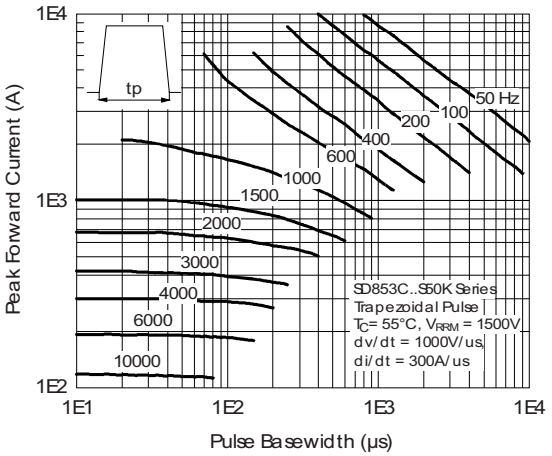



Fig. 18 - Frequency Characteristics

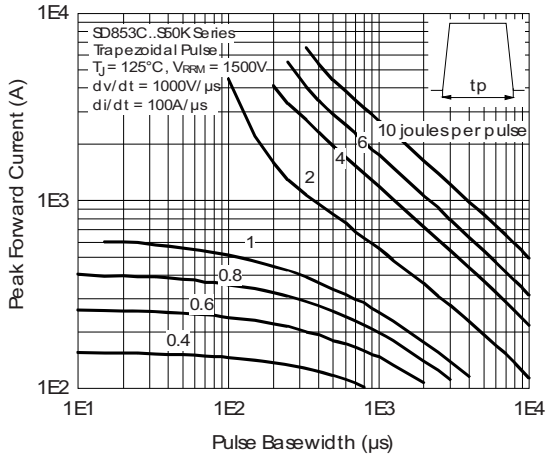



Fig. 19 - Maximum Total Energy Loss Per Pulse Characteristics

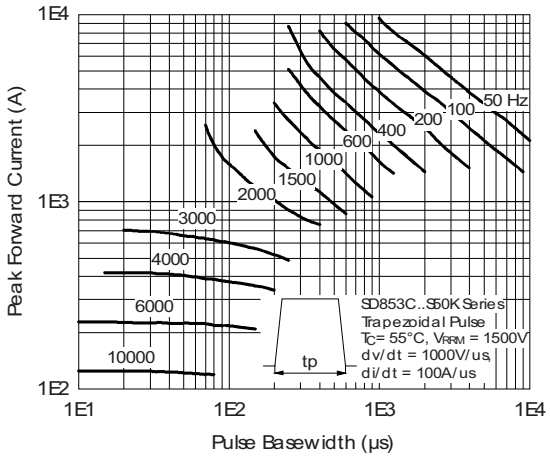



Fig. 20 - Frequency Characteristics

## ORDERING INFORMATION TABLE

**Device code**

| VS- | SD | 85 | 3 | C | 45 | S50 | K |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

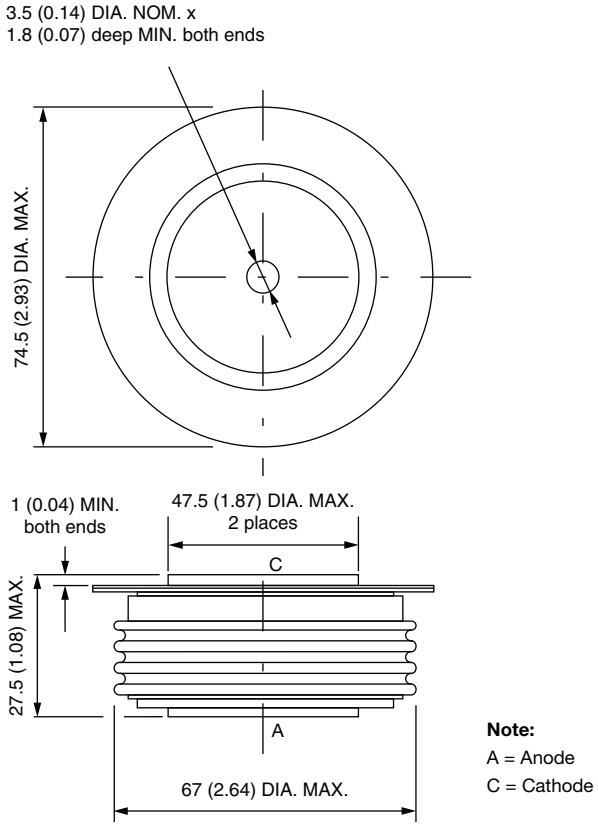
- 1 - Vishay Semiconductors product
- 2 - Diode
- 3 - Essential part number
- 4 - 3 = fast recovery
- 5 - C = ceramic PUK
- 6 - Voltage code x 100 = $V_{RRM}$ (see Voltage Ratings table)
- 7 - $t_{rr}$ code
- 8 - K = PUK case K-PUK (DO-200AC)

| LINKS TO RELATED DOCUMENTS | |
|---|---|
| Dimensions | www.vishay.com/doc?95247 |


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# K-PUK (DO-200AC)

**DIMENSIONS** in millimeters (inches)




Quote between upper and lower pole pieces has to be considered after application of mounting force (see Thermal and Mechanical Specifications)



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