



# Fast Recovery Diodes (Hockey PUK Version), 350 A



A-PUK (DO-200AA)

### FEATURES

- High power fast recovery diode series
- 1.0  $\mu$ s to 2.0  $\mu$ s recovery time
- High voltage ratings up to 2500 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® A-PUK (DO-200AA)
- Maximum junction temperature 125 °C
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



RoHS  
COMPLIANT

| PRIMARY CHARACTERISTICS |                  |
|-------------------------|------------------|
| $I_{F(AV)}$             | 350 A            |
| Package                 | A-PUK (DO-200AA) |
| Circuit configuration   | Single           |

### TYPICAL APPLICATIONS

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

| MAJOR RATINGS AND CHARACTERISTICS |                 |              |              |              |                   |
|-----------------------------------|-----------------|--------------|--------------|--------------|-------------------|
| PARAMETER                         | TEST CONDITIONS | VS-SD303C..C |              |              | UNITS             |
|                                   |                 | S10          | S15          | S20          |                   |
| $I_{F(AV)}$                       |                 | 350          | 350          | 350          | A                 |
|                                   | $T_{hs}$        | 55           | 55           | 55           | °C                |
| $I_{F(RMS)}$                      |                 | 550          | 550          | 550          | A                 |
|                                   | $T_{hs}$        | 25           | 25           | 25           | °C                |
| $I_{FSM}$                         | 50 Hz           | 5770         | 5770         | 5770         | A                 |
|                                   | 60 Hz           | 6040         | 6040         | 6040         |                   |
| $I^2t$                            | 50 Hz           | 166          | 166          | 166          | kA <sup>2</sup> s |
|                                   | 60 Hz           | 152          | 152          | 152          |                   |
| $V_{RRM}$                         | Range           | 400 to 1000  | 1200 to 1600 | 2000 to 2500 | V                 |
| $t_{rr}$                          |                 | 1.0          | 1.5          | 2.0          | $\mu$ s           |
|                                   | $T_J$           | 25           | 25           | 25           | °C                |
| $T_J$                             |                 | -40 to +125  | -40 to +125  | -40 to +125  |                   |

### ELECTRICAL SPECIFICATIONS

| VOLTAGE RATINGS |              |  |  |   |
|-----------------|--------------|--|--|---|
| TYPE NUMBER     | VOLTAGE CODE | $V_{RRM}$ , MAXIMUM REPETITIVE PEAK AND OFF-STATE VOLTAGE<br>V | $V_{RSM}$ , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE<br>V | $I_{RRM}$ MAXIMUM AT $T_J = 125$ °C<br>mA |
| VS-SD303C..S10C | 04           | 400  | 500  | 35  |
|                 | 08           | 800  | 900  |   |
|                 | 10           | 1000   | 1100   |   |
| VS-SD303C..S15C | 12           | 1200   | 1300   |   |
|                 | 14           | 1400   | 1500   |   |
|                 | 16           | 1600   | 1700   |   |
| VS-SD303C..S20C | 20           | 2000   | 2100   |   |
|                 | 25           | 2500   | 2600   |   |



| FORWARD CONDUCTION                                      |               |   |                       |                         |                    |
|---|---------------|---|-----------------------|-------------------------|--------------------|
| PARAMETER   | SYMBOL        | TEST CONDITIONS   |                       | VALUES                  | UNITS              |
| Maximum average forward current at heatsink temperature | $I_{F(AV)}$   | 180° conduction, half sine wave<br>Double side (single side) cooled                     |                       | 350 (175)               | A                  |
|   |               |   |                       | 55 (75)                 | °C                 |
| Maximum RMS current                                     | $I_{F(RMS)}$  | 25 °C heatsink temperature double side cooled   |                       | 550                     |                    |
| Maximum peak, one-cycle, non-repetitive forward current | $I_{FSM}$     | t = 10 ms<br>t = 8.3 ms   | No voltage reappplied | 5770                    | A                  |
|   |               |   |                       | t = 10 ms<br>t = 8.3 ms |                    |
|   |               | Sinusoidal half wave, initial $T_J = T_J$ maximum                                       | 4850                  |                         |                    |
|   |               |   | 5080                  |                         |                    |
| Maximum $I^2t$ for fusing                               | $I^2t$        | t = 10 ms<br>t = 8.3 ms   | No voltage reappplied | 166                     | kA <sup>2</sup> s  |
|   |               |   |                       | t = 10 ms<br>t = 8.3 ms |                    |
|   |               | 117   |                       |                         |                    |
|   |               | 107   |                       |                         |                    |
| Maximum $I^2\sqrt{t}$ for fusing                        | $I^2\sqrt{t}$ | t = 0.1 to 10 ms, no voltage reappplied   |                       | 1660                    | kA <sup>2</sup> √s |
| Low level value of threshold voltage                    | $V_{F(TO)1}$  | (16.7 % $\times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)}$ ), $T_J = T_J$ maximum |                       | 1.14                    | V                  |
| High level value of threshold voltage                   | $V_{F(TO)2}$  | (I > $\pi \times I_{F(AV)}$ ), $T_J = T_J$ maximum                                      |                       | 1.63                    |                    |
| Low level of forward slope resistance                   | $r_{f1}$      | (16.7 % $\times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)}$ ), $T_J = T_J$ maximum |                       | 1.14                    | mW                 |
| High level of forward slope resistance                  | $r_{f2}$      | (I > $\pi \times I_{F(AV)}$ ), $T_J = T_J$ maximum                                      |                       | 0.77                    |                    |
| Maximum forward voltage drop                            | $V_{FM}$      | $I_{pk} = 1100$ A, $T_J = 25$ °C; $t_p = 10$ ms sinusoidal wave                         |                       | 2.26                    | 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) |  |
| S10                      | 1.0                             | 750                       | 25           | - 30      | 2.4                              | 52            | 33           |  |
| S15                      | 1.5                             |                           |              |           | 2.9                              | 90            | 44           |  |
| S20                      | 2.0                             |                           |              |           | 3.2                              | 107           | 46           |  |

| THERMAL AND MECHANICAL SPECIFICATIONS            |              |   |  |                  |        |
|--|--------------|---|--|------------------|--------|
| PARAMETER  | SYMBOL       | TEST CONDITIONS                               |  | VALUES           | UNITS  |
| Maximum 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               |  | 0.16             | K/W    |
|  |              | DC operation double side cooled               |  | 0.08             |        |
| Mounting force, ± 10 %                           |              |   |  | 4900 (500)       | N (kg) |
| Approximate weight                               |              |   |  | 70               | g      |
| Case style                                       |              | See dimensions - link at the end of datasheet |  | A-PUK (DO-200AA) |        |

| $\Delta R_{thJ-hs}$ CONDUCTION |                       |             |                        |             |                     |       |
|--------------------------------|-----------------------|-------------|------------------------|-------------|---------------------|-------|
| CONDUCTION ANGLE               | SINUSOIDAL CONDUCTION |             | RECTANGULAR CONDUCTION |             | TEST CONDITIONS     | UNITS |
|                                | SINGLE SIDE           | DOUBLE SIDE | SINGLE SIDE            | DOUBLE SIDE |                     |       |
| 180°                           | 0.010                 | 0.011       | 0.008                  | 0.008       | $T_J = T_J$ maximum | K/W   |
| 120°                           | 0.012                 | 0.013       | 0.013                  | 0.013       |                     |       |
| 90°                            | 0.016                 | 0.016       | 0.018                  | 0.018       |                     |       |
| 60°                            | 0.024                 | 0.024       | 0.025                  | 0.025       |                     |       |
| 30°                            | 0.042                 | 0.042       | 0.042                  | 0.042       |                     |       |

Note

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

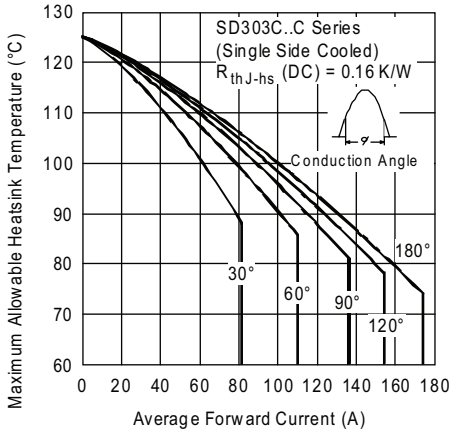


Fig. 1 - Current Ratings Characteristics

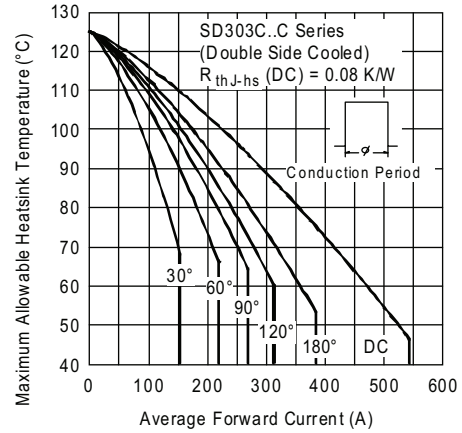


Fig. 4 - Current Ratings Characteristics

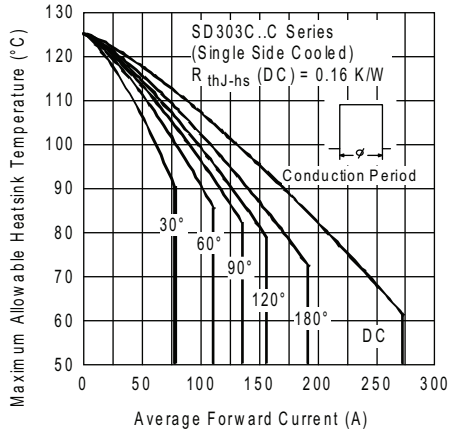


Fig. 2 - Current Ratings Characteristics

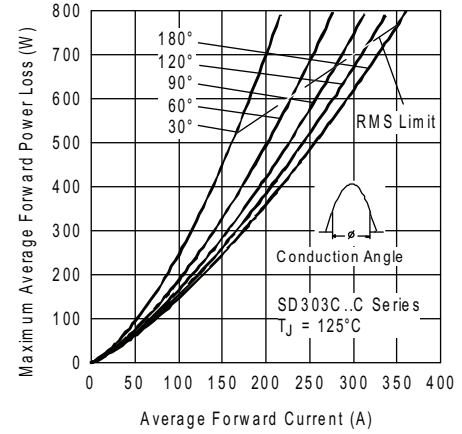


Fig. 5 - Forward Power Loss Characteristics

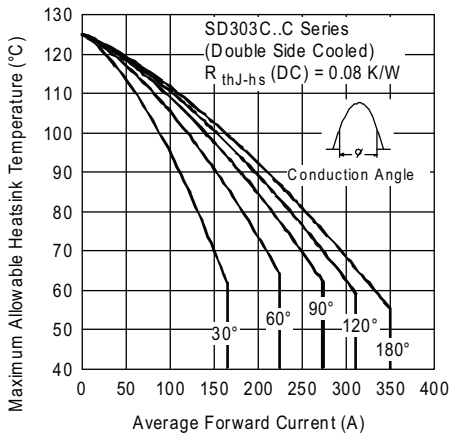


Fig. 3 - Current Ratings Characteristics

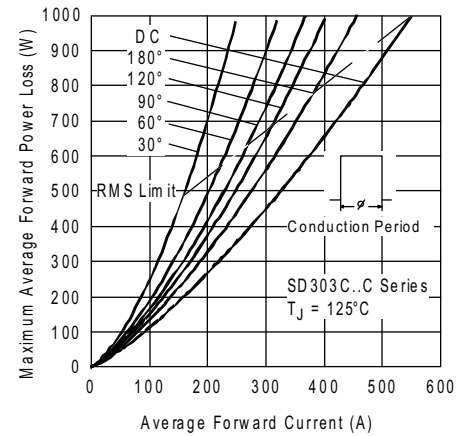


Fig. 6 - Forward Power Loss Characteristics

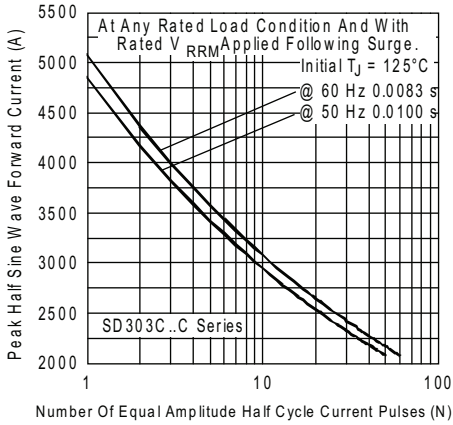


Fig. 7 - Maximum Non-Repetitive Surge Current Single and Double Side Cooled

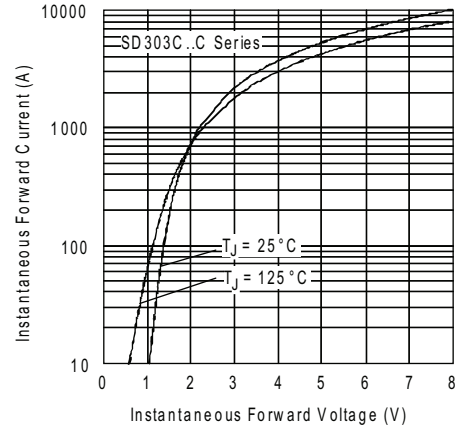


Fig. 9 - Forward Voltage Drop Characteristics

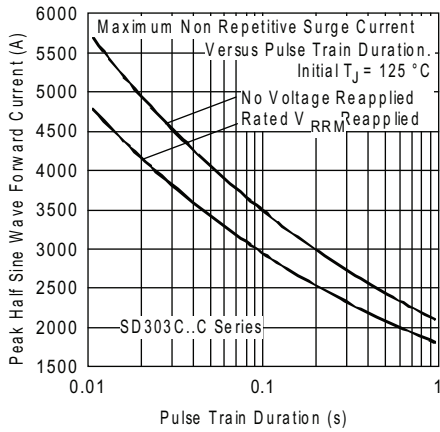


Fig. 8 - Maximum Non-Repetitive Surge Current Single and Double Side Cooled

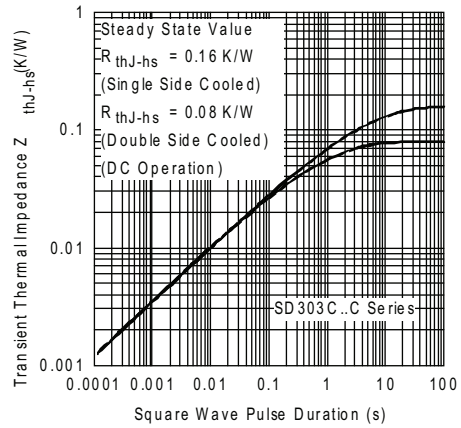


Fig. 10 - Thermal Impedance  $Z_{thj-hs}$  Characteristic

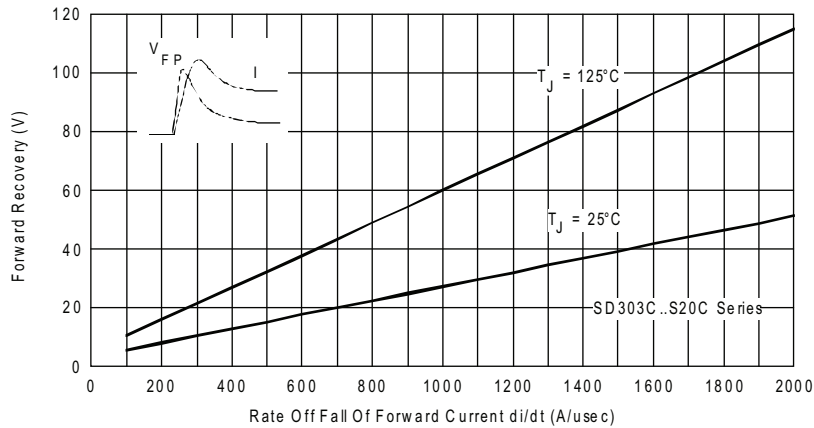


Fig. 11 - Typical Forward Recovery Characteristics

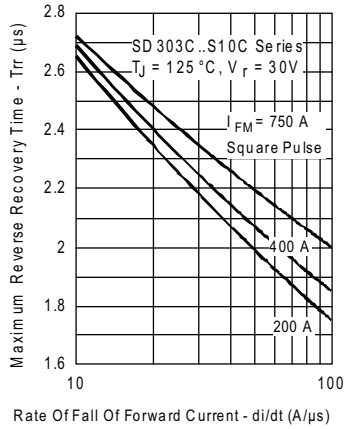


Fig. 12 - Recovery Time Characteristics

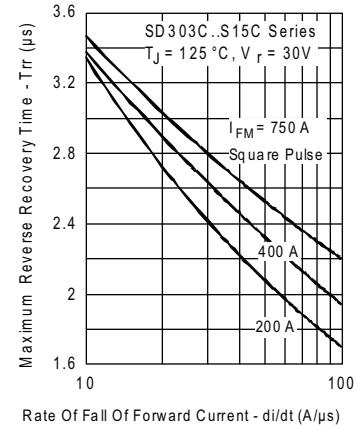


Fig. 15 - Recovery Time Characteristics

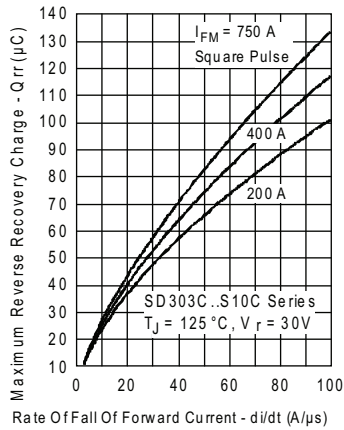


Fig. 13 - Recovery Charge Characteristics

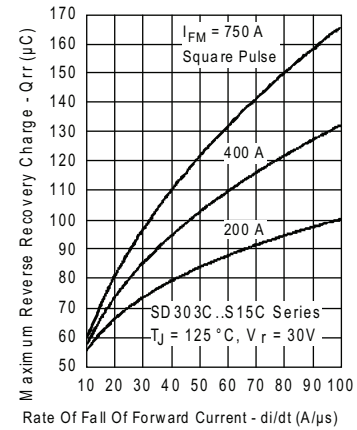


Fig. 16 - Recovery Charge Characteristics

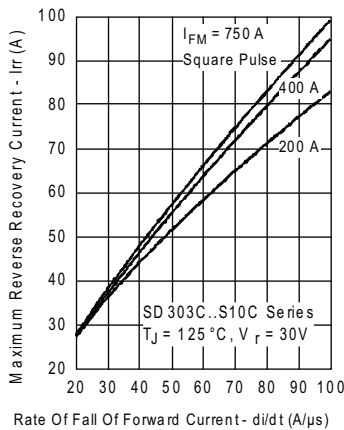


Fig. 14 - Recovery Current Characteristics

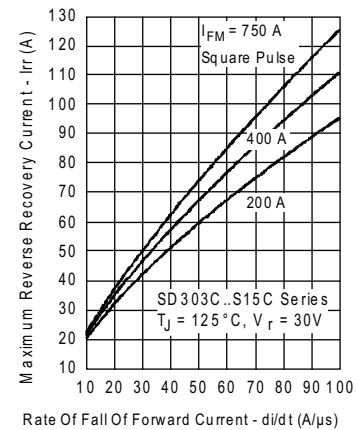


Fig. 17 - Recovery Current Characteristics

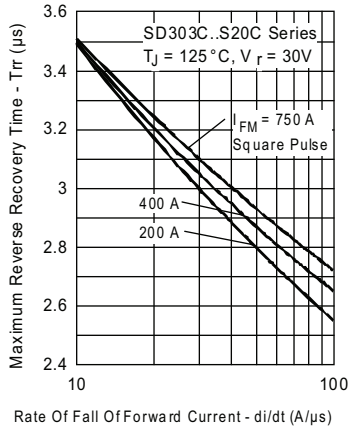


Fig. 18 - Recovery Time Characteristics

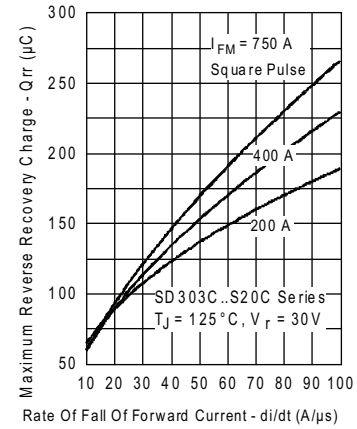


Fig. 19 - Recovery Charge Characteristics

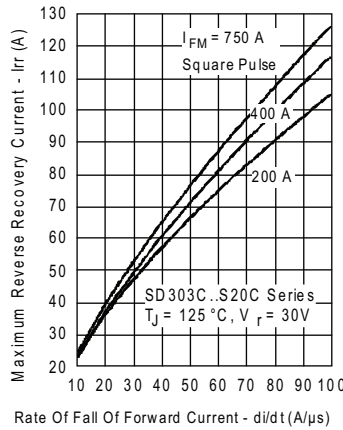


Fig. 20 - Recovery Current Characteristics

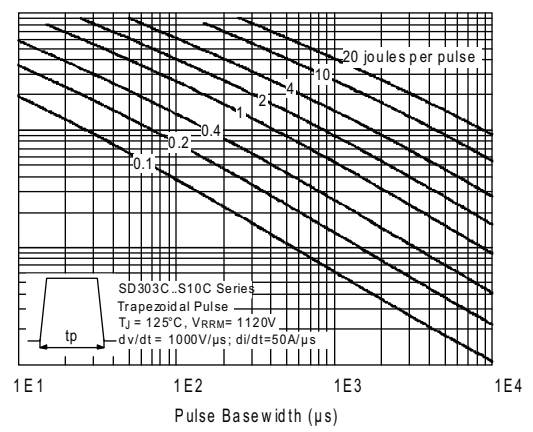
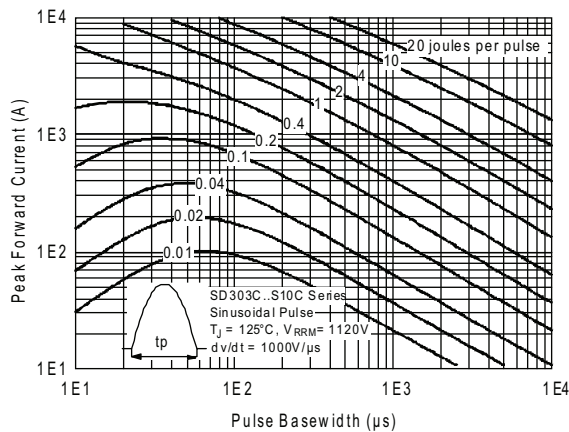


Fig. 21 - Maximum Total Energy Loss Per Pulse Characteristics

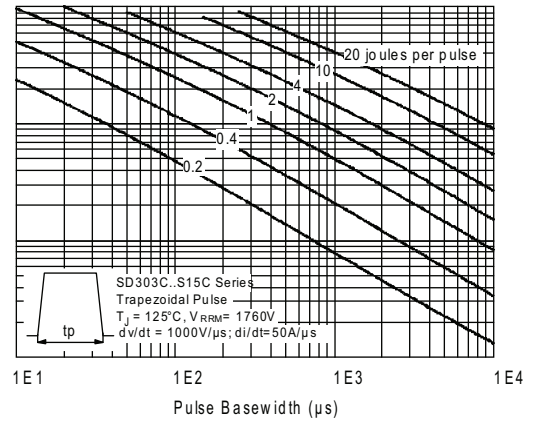
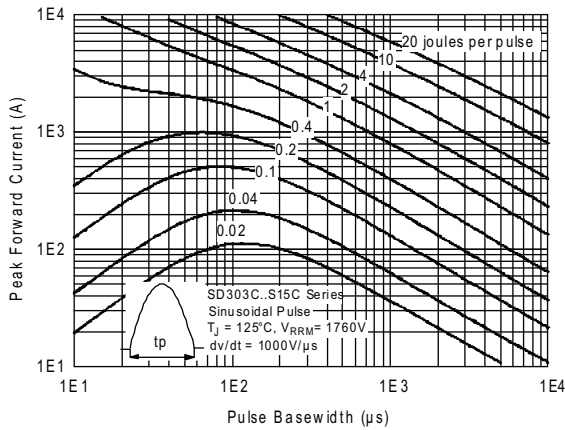


Fig. 22 - Maximum Total Energy Loss Per Pulse Characteristics

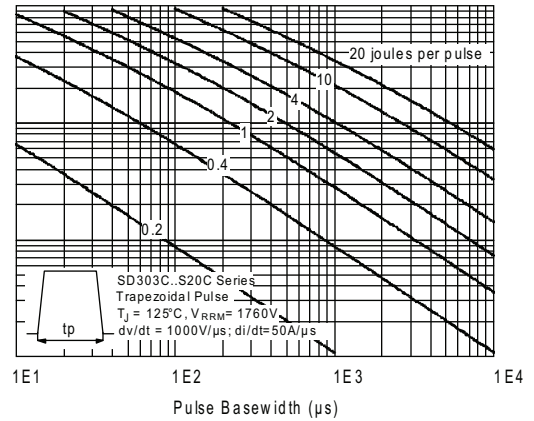
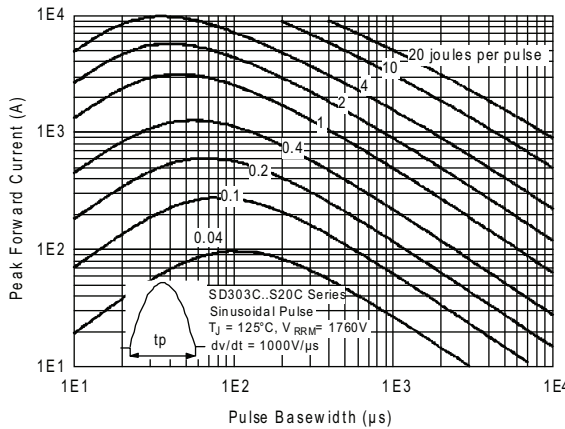


Fig. 23 - Maximum Total Energy Loss Per Pulse Characteristics

## ORDERING INFORMATION TABLE

|             |            |           |           |          |          |           |            |          |
|-------------|------------|-----------|-----------|----------|----------|-----------|------------|----------|
| Device code | <b>VS-</b> | <b>SD</b> | <b>30</b> | <b>3</b> | <b>C</b> | <b>25</b> | <b>S20</b> | <b>C</b> |
|-------------|------------|-----------|-----------|----------|----------|-----------|------------|----------|



- 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 (see Recovery Characteristics table)
- 8** - C = PUK case A-PUK (DO-200AA)

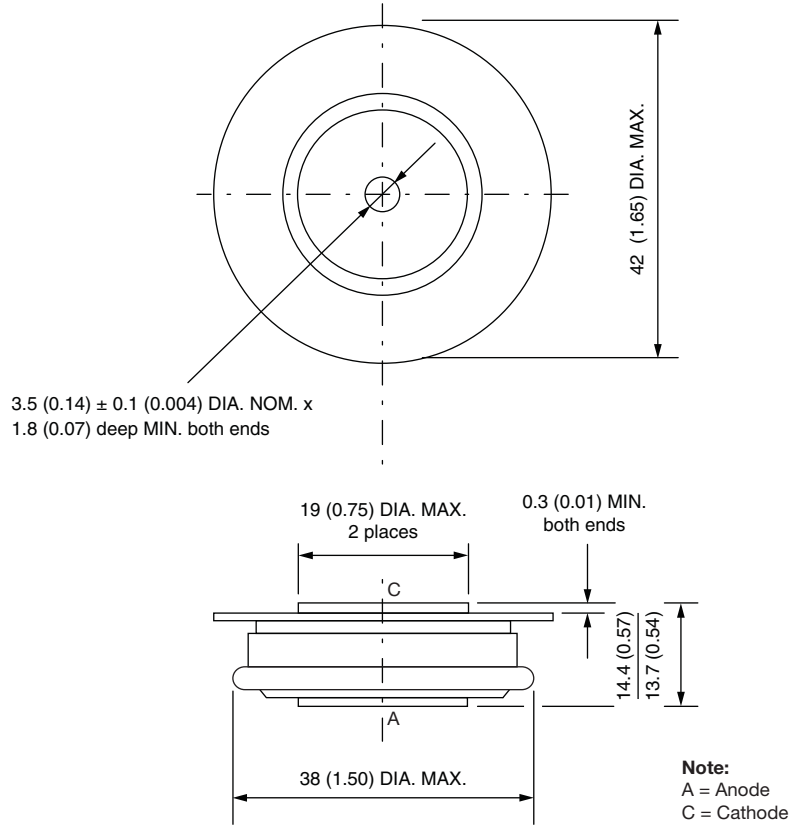
### LINKS TO RELATED DOCUMENTS

|            |  |
|------------|--|
| Dimensions | <a href="http://www.vishay.com/doc?95248">www.vishay.com/doc?95248</a> |
|------------|--|



## DO-200AA

**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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