

## Fast Recovery Diodes (Hockey PUK Version), 845 A


**B-43**

**RoHS  
COMPLIANT**
**FEATURES**

- High power fast recovery diode series
- 1.0  $\mu$ s to 1.5  $\mu$ s recovery time
- High voltage ratings up to 1600 V
- High current capability
- Optimized turn-on and turn-off characteristics
- Low forward recovery
- Fast and soft reverse recovery
- Press PUK encapsulation
- Hockey PUK version case style B-43
- Maximum junction temperature 125 °C
- Designed and qualified for industrial level
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

**TYPICAL APPLICATIONS**

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

**PRIMARY CHARACTERISTICS**

|                       |        |
|-----------------------|--------|
| $I_{F(AV)}$           | 845 A  |
| Package               | B-43   |
| Circuit configuration | Single |

**MAJOR RATINGS AND CHARACTERISTICS**

| PARAMETER    | TEST CONDITIONS | VS-SD803C..C |              | UNITS   |
|--------------|-----------------|--------------|--------------|---------|
|              |                 | S10          | S15          |         |
| $I_{F(AV)}$  |                 | 845          | 845          | A       |
|              | $T_{hs}$        | 55           | 55           | °C      |
| $I_{F(RMS)}$ |                 | 1326         | 1326         | A       |
|              | $T_{hs}$        | 25           | 25           | °C      |
| $I_{FSM}$    | 50 Hz           | 11 295       | 11 295       | A       |
|              | 60 Hz           | 11 830       | 11 830       |         |
| $I^2t$       | 50 Hz           | 640          | 640          | A       |
|              | 60 Hz           | 583          | 583          |         |
| $V_{RRM}$    | Range           | 400 to 1000  | 1200 to 1600 | V       |
| $t_{rr}$     |                 | 1.0          | 1.5          | $\mu$ s |
|              | $T_J$           | 25           | 25           | °C      |
| $T_J$        |                 | -40 to +125  | -40 to +125  |         |

**ELECTRICAL SPECIFICATIONS**
**VOLTAGE RATINGS**

| TYPE NUMBER     | VOLTAGE CODE | $V_{RRM}$ , MAXIMUM REPETITIVE PEAK REVERSE VOLTAGE<br>V | $V_{RSM}$ , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE<br>V | $I_{RRM}$ MAXIMUM AT $T_J = 125$ °C<br>mA |
|-----------------|--------------|--|--|---|
| VS-SD803C..S10C | 04           | 400  | 500  | 45  |
|                 | 08           | 800  | 900  |   |
|                 | 10           | 1000   | 1100   |   |
| VS-SD803C..S15C | 12           | 1200   | 1300   |   |
|                 | 14           | 1400   | 1500   |   |
|                 | 16           | 1600   | 1700   |   |



| 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                     |            | 845 (420)                 | A                  |                   |
|   |               |   |            | 55 (75)                   | °C                 |                   |
| Maximum RMS forward current                             | $I_{F(RMS)}$  | 25 °C heatsink temperature double side cooled   |            | 1326                      |                    |                   |
| Maximum peak, one-cycle forward, non-repetitive current | $I_{FSM}$     | Sinusoidal half wave, initial $T_J = T_J$ maximum                                       | t = 10 ms  | No voltage reapplied      | 11 295             | A                 |
|   |               |   | t = 8.3 ms |                           | 11 830             |                   |
|   |               |   | t = 10 ms  | 100 % $V_{RRM}$ reapplied | 9500               |                   |
|   |               |   | t = 8.3 ms |                           | 9945               |                   |
| Maximum $I^2t$ for fusing                               | $I^2t$        |   | t = 10 ms  | No voltage reapplied      | 640                | kA <sup>2</sup> s |
|   |               |   | t = 8.3 ms |                           | 583                |                   |
|   |               |   | t = 10 ms  | 100 % $V_{RRM}$ reapplied | 451                |                   |
|   |               |   | t = 8.3 ms |                           | 412                |                   |
| Maximum $I^2\sqrt{t}$ for fusing                        | $I^2\sqrt{t}$ | t = 0.1 to 10 ms, no voltage reapplied  |            | 6400                      | kA <sup>2</sup> √s |                   |
| Low level 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) |            | 1.02                      | V                  |                   |
| High level of threshold voltage                         | $V_{F(TO)2}$  | (I > $\pi \times I_{F(AV)}$ , $T_J = T_J$ maximum)                                      |            | 1.32                      |                    |                   |
| 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) |            | 0.38                      | mW                 |                   |
| High level of forward slope resistance                  | $r_{f2}$      | (I > $\pi \times I_{F(AV)}$ , $T_J = T_J$ maximum)                                      |            | 0.28                      |                    |                   |
| Maximum forward voltage drop                            | $V_{FM}$      | $I_{pk} = 2655$ A, $T_J = T_J$ maximum $t_p = 10$ ms sinusoidal wave                    |            | 1.89                      | 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                             | 1000                      | 50           | -30       | 2.0                              | 45            | 34           |  |
| S15                      | 1.5                             |                           |              |           | 3.2                              | 87            | 51           |  |

| 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 125  |        |
| Maximum thermal resistance, case junction to heatsink | $R_{thJ-hs}$ | DC operation single side cooled               | 0.076       | K/W    |
|   |              | DC operation double side cooled               | 0.038       |        |
| Mounting force, ± 10 %                                |              |   | 9800 (1000) | N (kg) |
| Approximate weight                                    |              |   | 83          | g      |
| Case style  |              | See dimensions - link at the end of datasheet | B-43        |        |

| $\Delta R_{thJ-hs}$ CONDUCTION |                       |             |                        |             |                     |       |
|--------------------------------|-----------------------|-------------|------------------------|-------------|---------------------|-------|
| CONDUCTION ANGLE               | SINUSOIDAL CONDUCTION |             | RECTANGULAR CONDUCTION |             | TEST CONDITIONS     | UNITS |
|                                | SINGLE SIDE           | DOUBLE SIDE | SINGLE SIDE            | DOUBLE SIDE |                     |       |
| 180°                           | 0.006                 | 0.007       | 0.005                  | 0.005       | $T_J = T_J$ maximum | K/W   |
| 120°                           | 0.008                 | 0.008       | 0.008                  | 0.008       |                     |       |
| 90°                            | 0.010                 | 0.010       | 0.011                  | 0.011       |                     |       |
| 60°                            | 0.015                 | 0.015       | 0.016                  | 0.016       |                     |       |
| 30°                            | 0.026                 | 0.026       | 0.026                  | 0.026       |                     |       |

**Note**

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

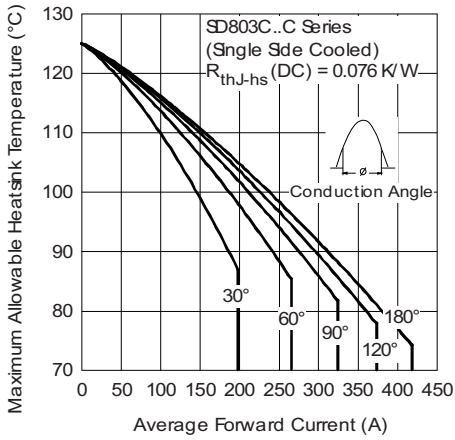


Fig. 1 - Current Ratings Characteristics

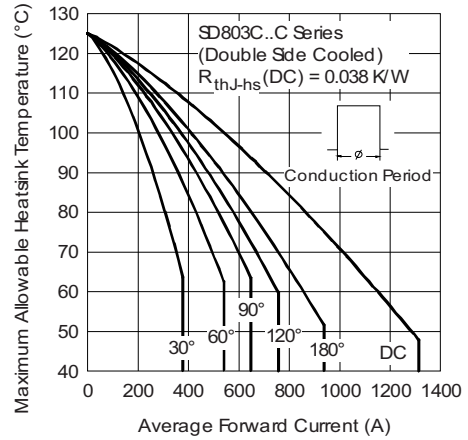


Fig. 4 - Current Ratings Characteristics

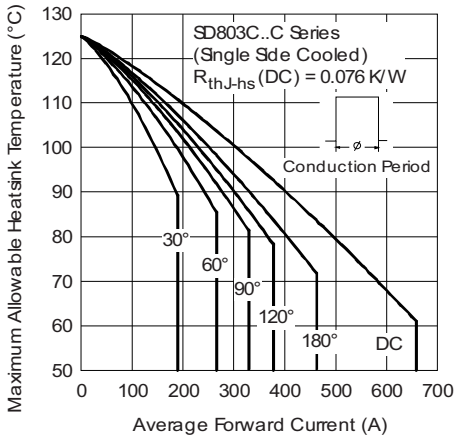


Fig. 2 - Current Ratings Characteristics

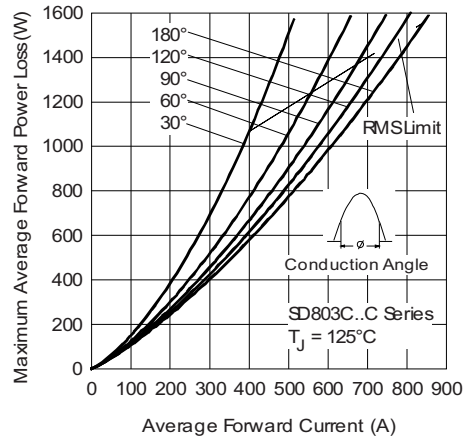


Fig. 5 - Forward Power Loss Characteristics

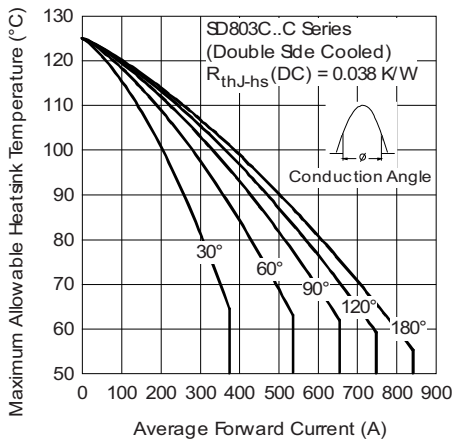


Fig. 3 - Current Ratings Characteristics

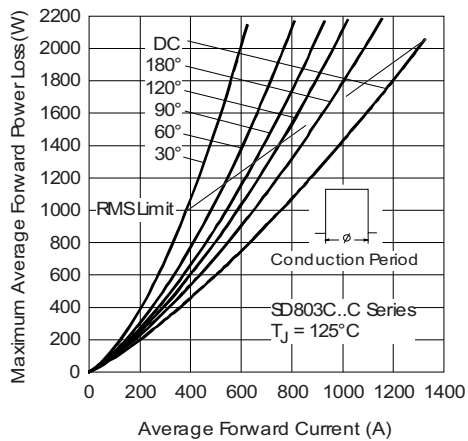


Fig. 6 - Forward Power Loss Characteristics

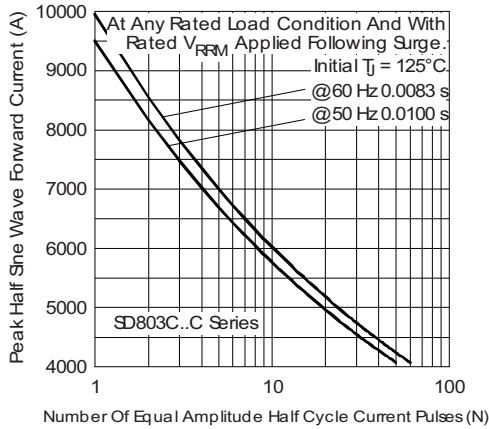


Fig. 7 - Maximum Non-Repetitive Surge Current Single and Double-Side Cooled

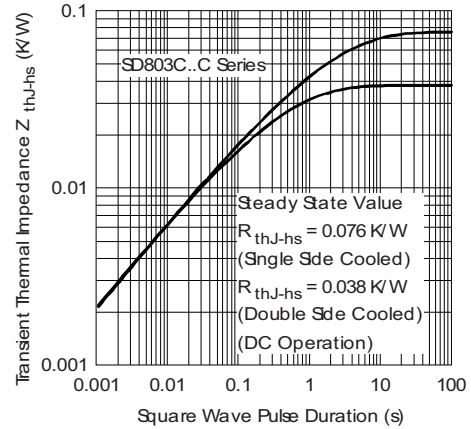


Fig. 10 - Thermal Impedance  $Z_{thJ-hs}$  Characteristics

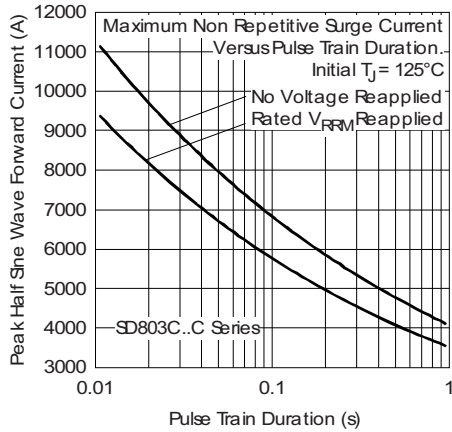


Fig. 8 - Maximum Non-Repetitive Surge Current Single and Double-Side Cooled

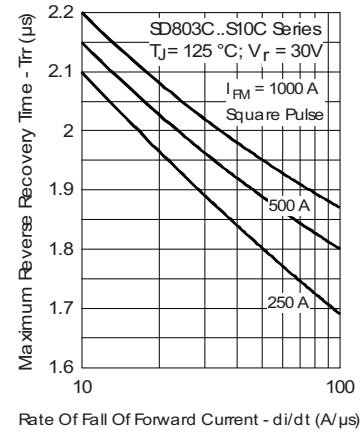


Fig. 11 - Recovery Time Characteristics

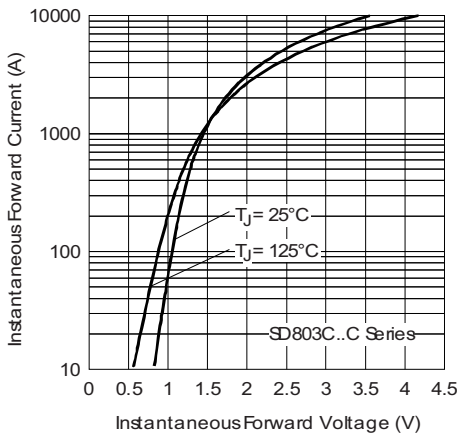


Fig. 9 - Forward Voltage Drop Characteristics

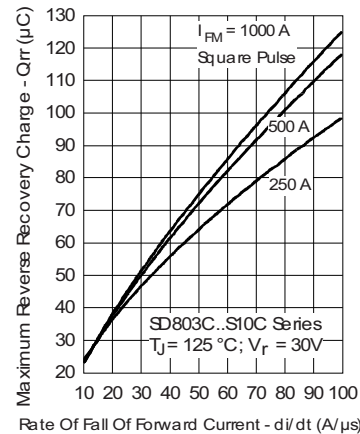


Fig. 12 - Recovery Charge Characteristics

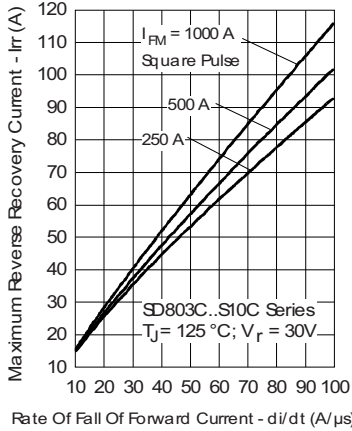


Fig. 13 - Recovery Current Characteristics

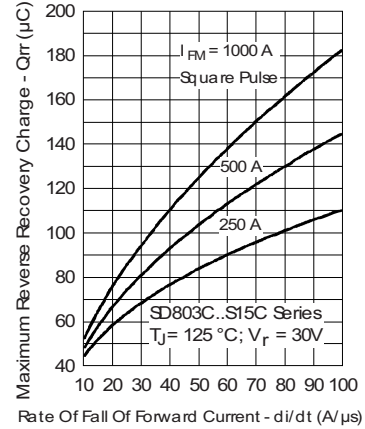


Fig. 15 - Recovery Charge Characteristics

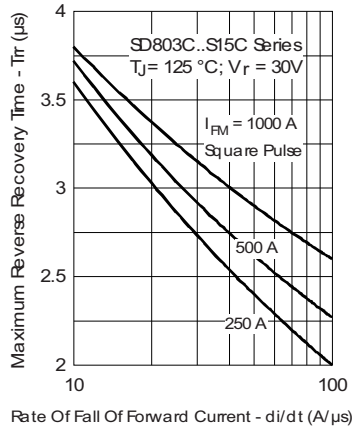


Fig. 14 - Recovery Time Characteristics

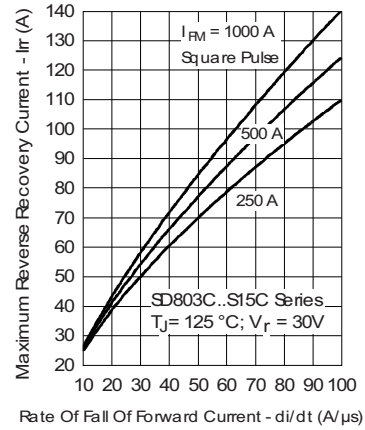


Fig. 16 - Recovery Current Characteristics

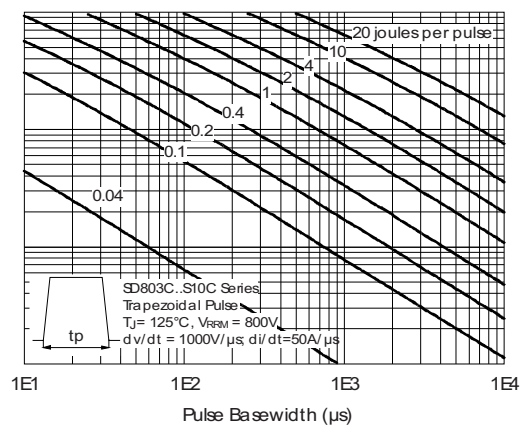
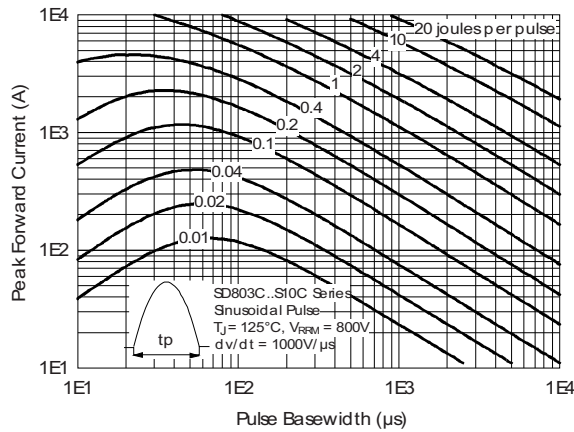


Fig. 17 - Maximum Total Energy Loss Per Pulse Characteristics

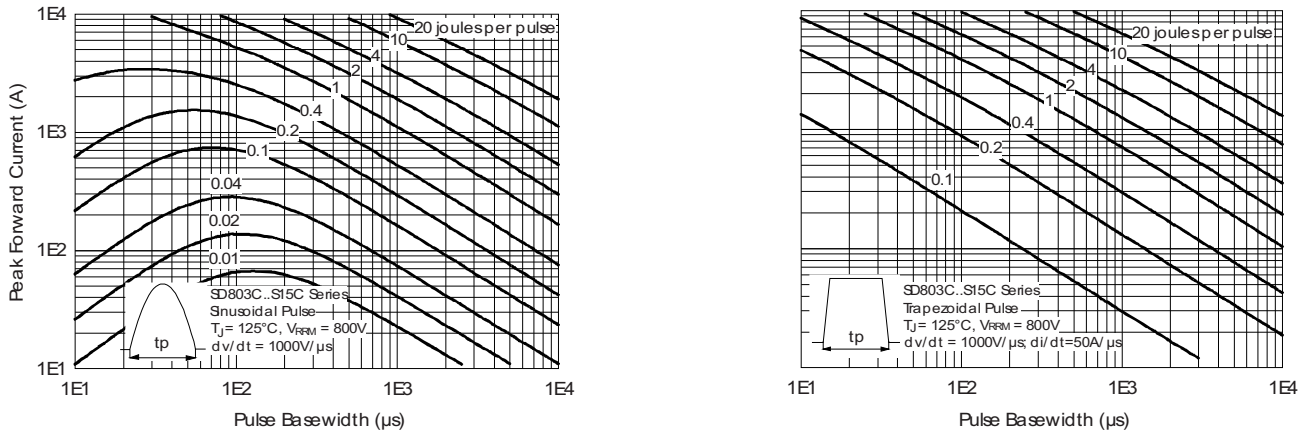


Fig. 18 - Maximum Total Energy Loss Per Pulse Characteristics

**ORDERING INFORMATION TABLE**

|             |            |           |           |          |          |           |            |          |
|-------------|------------|-----------|-----------|----------|----------|-----------|------------|----------|
| Device code | <b>VS-</b> | <b>SD</b> | <b>80</b> | <b>3</b> | <b>C</b> | <b>16</b> | <b>S15</b> | <b>C</b> |
|             | ①          | ②         | ③         | ④        | ⑤        | ⑥         | ⑦          | ⑧        |

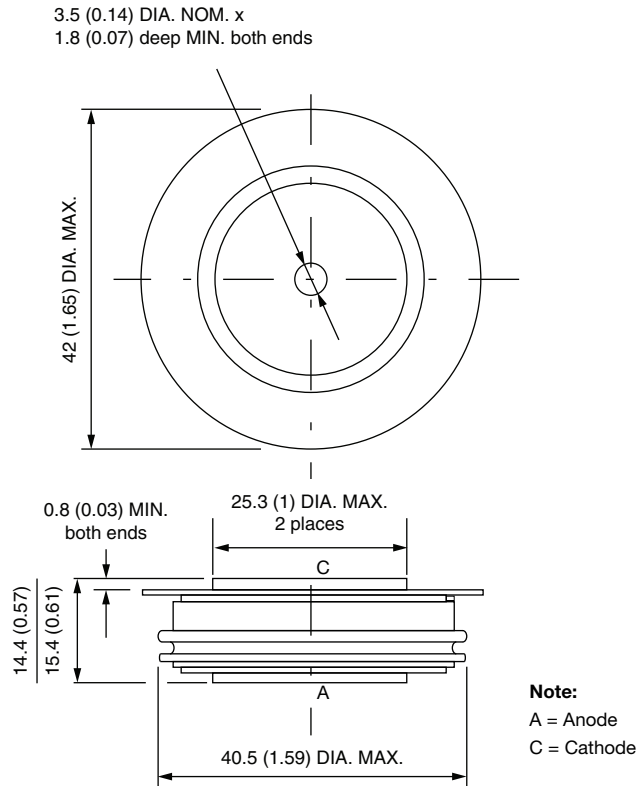
- 1** - Vishay Semiconductors product
- 2** - Diode
- 3** - Essential part number
- 4** - 3 = fast recovery
- 5** - C = ceramic PUK
- 6** - Voltage code x 100 =  $V_{RRM}$  (see Voltage Ratings table)
- 7** -  $t_{rr}$  code (see Recovery Characteristics table)
- 8** - C = PUK case B-43

| LINKS TO RELATED DOCUMENTS |  |
|----------------------------|--|
| Dimensions                 | <a href="http://www.vishay.com/doc?95249">www.vishay.com/doc?95249</a> |



## B-43

**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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