# Fast Recovery Diodes (Hockey PUK Version), 600 A



B-43

## FEATURES

- High power fast recovery diode series
- 1.0 µs to 2.0 µs recovery time
- High voltage ratings up to 2200 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® 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

Pb-free

RoHS COMPLIANT

## TYPICAL APPLICATIONS

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

| PRIMARY CHARACTERISTICS | |
|---|---|
| $I_{F(AV)}$ | 600 A |
| Package | B-43 |
| Circuit configuration | Single |

| MAJOR RATINGS AND CHARACTERISTICS | | | | | |
|---|---|---|---|---|---|
| PARAMETER | TEST CONDITIONS | VS-SD603C..C | | | UNITS |
| | | S10 | S15 | S20 | |
| $I_{F(AV)}$ | | 600 | 600 | 600 | A |
| | $T_{hs}$ | 55 | 55 | 55 | °C |
| $I_{F(RMS)}$ | | 942 | 942 | 942 | A |
| | $T_{hs}$ | 25 | 25 | 25 | °C |
| $I_{FSM}$ | 50 Hz | 8320 | 8320 | 8320 | A |
| | 60 Hz | 8715 | 8715 | 8715 | |
| $I^2t$ | 50 Hz | 346 | 346 | 346 | $kA^2s$ |
| | 60 Hz | 316 | 316 | 316 | |
| $V_{RRM}$ | Range | 400 to 1000 | 1200 to 1600 | 2000 to 2200 | V |
| $t_{rr}$ | | 1.0 | 1.5 | 2.0 | µs |
| | $T_J$ | 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 V | $V_{RSM}$, MAXIMUM NON-REPETITIVE PEAK VOLTAGE V | $I_{RRM}$ MAXIMUM AT $T_J$ = 125 °C mA |
| VS-SD603C..S10C | 04 | 400 | 500 | 45 |
| | 08 | 800 | 900 | |
| | 10 | 1000 | 1100 | |
| VS-SD603C..S15C | 12 | 1200 | 1300 | |
| | 14 | 1400 | 1500 | |
| | 16 | 1600 | 1700 | |
| VS-SD603C..S20C | 20 | 2000 | 2100 | |
| | 22 | 2200 | 2300 | |



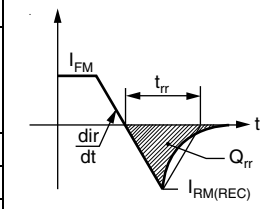
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## FORWARD CONDUCTION

| 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 | | | 600 (300) | A |
| | | | | | 55 (75) | °C |
| Maximum RMS current | $I_{F(RMS)}$ | 25 °C heatsink temperature double side cooled | | | 942 | A |
| Maximum peak, one-cycle non-repetitive forward current | $I_{FSM}$ | t = 10 ms | No voltage reapplied | Sinusoidal half wave, initial $T_J = T_J$ maximum | 8320 | |
| | | t = 8.3 ms | | | 8715 | |
| | | t = 10 ms | 100 % $V_{RRM}$ reapplied | | 7000 | |
| | | t = 8.3 ms | | | 7330 | |
| Maximum $I^2t$ for fusing | $I^2t$ | t = 10 ms | No voltage reapplied | | 346 | $kA^2s$ |
| | | t = 8.3 ms | | | 316 | |
| | | t = 10 ms | 100 % $V_{RRM}$ reapplied | | 245 | |
| | | t = 8.3 ms | | | 224 | |
| Maximum $I^2\sqrt{t}$ for fusing | $I^2\sqrt{t}$ | t = 0.1 to 10 ms, no voltage reapplied | | | 3460 | $kA^2\sqrt{s}$ |
| 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 | | | 1.36 | V |
| High level value of threshold voltage | $V_{F(TO)2}$ | (I > π x $I_{F(AV)}$), $T_J = T_J$ maximum | | | 1.81 | |
| Low level 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 | | | 0.87 | mW |
| High level of forward slope resistance | $r_{f2}$ | (I > π x $I_{F(AV)}$), $T_J = T_J$ maximum | | | 0.67 | |
| Maximum forward voltage drop | $V_{FM}$ | $I_{pk}$ = 1885 A, $T_J$ = 25 °C; $t_p$ = 10 ms sinusoidal wave | | | 2.97 | 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 | 25 | -30 | 2.0 | 45 | 34 |  |
| S15 | 1.5 | | | | 3.2 | 87 | 51 | |
| S20 | 2.0 | | | | 3.5 | 97 | 55 | |



## THERMAL AND MECHANICAL SPECIFICATIONS

| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
|---|---|---|---|---|
| Maximum operating junction 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 | 0.076 | 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 | 0.015 | | |
| 30° | 0.026 | 0.025 | 0.026 | 0.025 | | |

**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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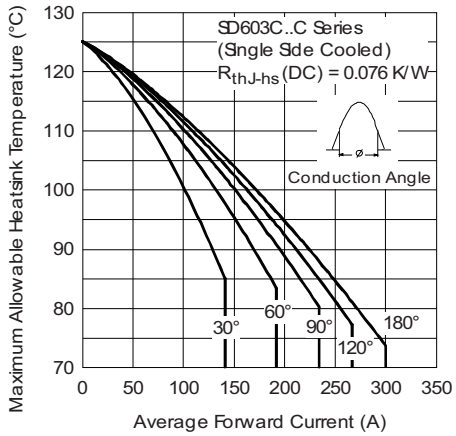



Fig. 1 - Current Ratings Characteristics

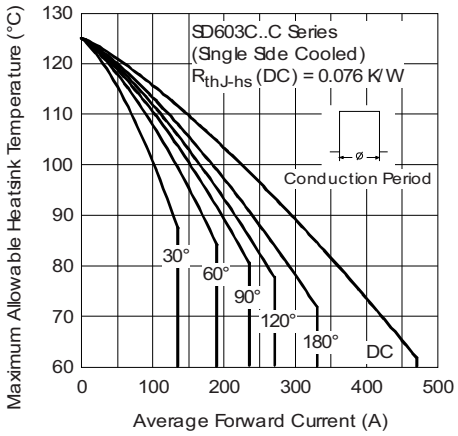



Fig. 2 - Current Ratings Characteristics

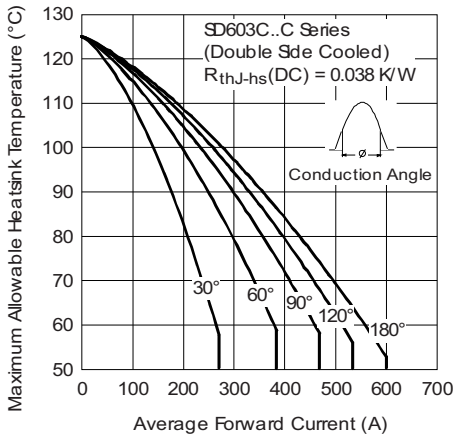



Fig. 3 - Current Ratings Characteristics

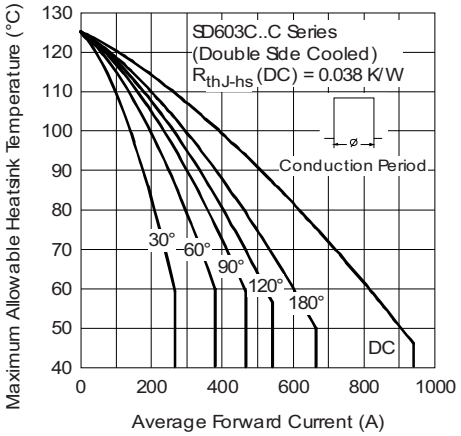



Fig. 4 - Current Ratings Characteristics

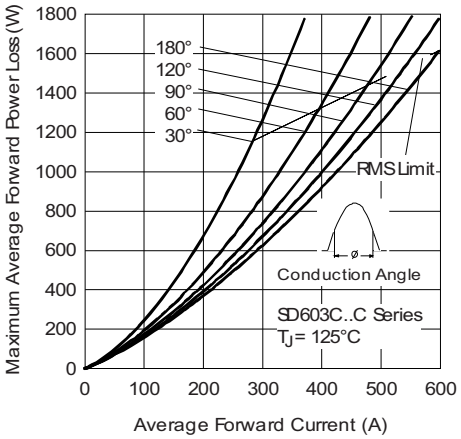



Fig. 5 - Forward Power Loss Characteristics

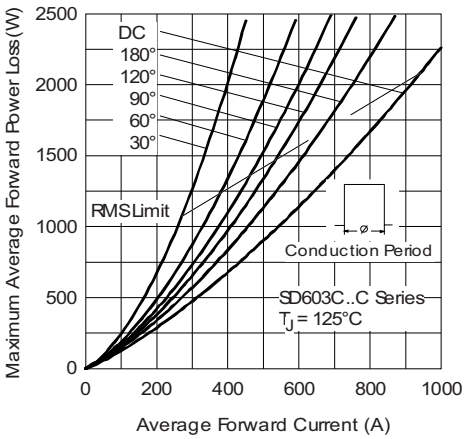



Fig. 6 - Forward Power Loss Characteristics


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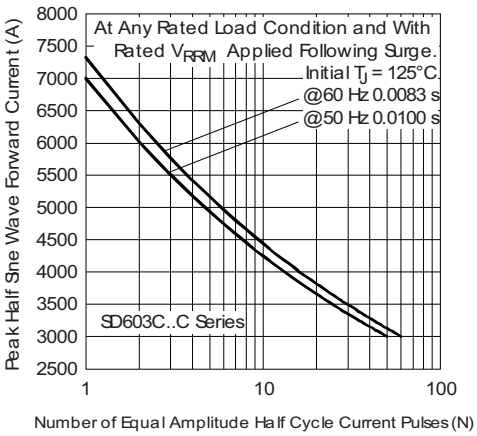



Fig. 7 - Maximum Non-Repetitive Surge Current
Single and Double Side Cooled

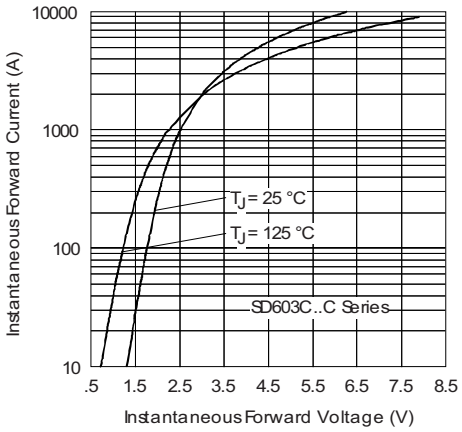



Fig. 9 - Forward Voltage Drop Characteristics

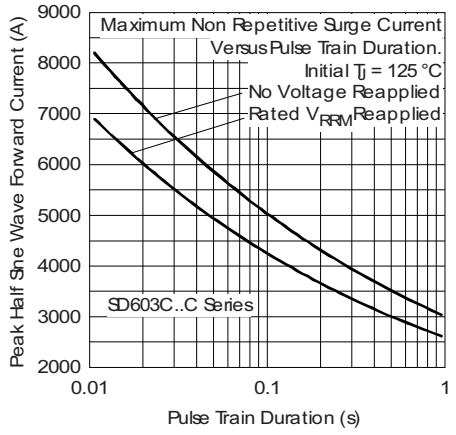



Fig. 8 - Maximum Non-Repetitive Surge Current
Single and Double Side Cooled

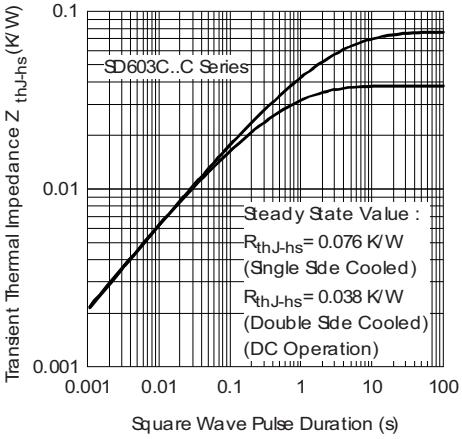



Fig. 10 - Thermal Impedance $Z_{thJ-hs}$ Characteristics

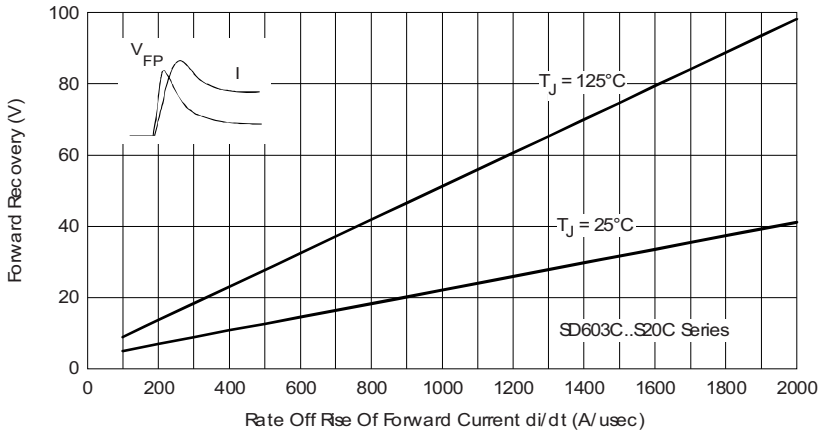



Fig. 11 - Typical Forward Recovery Characteristics


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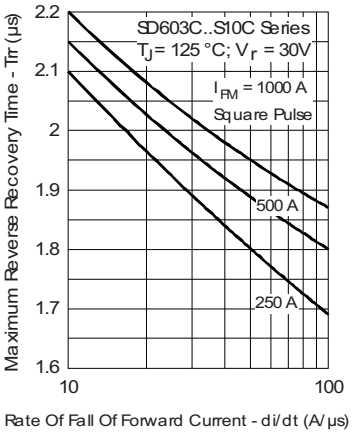



Fig. 12 - Recovery Time Characteristics

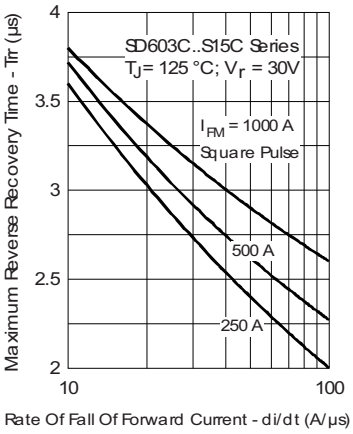



Fig. 15 - Recovery Time Characteristics

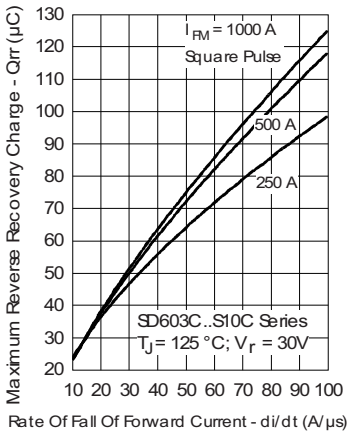



Fig. 13 - Recovery Charge Characteristics

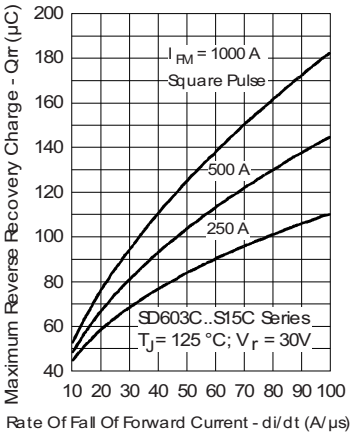



Fig. 16 - Recovery Charge Characteristics

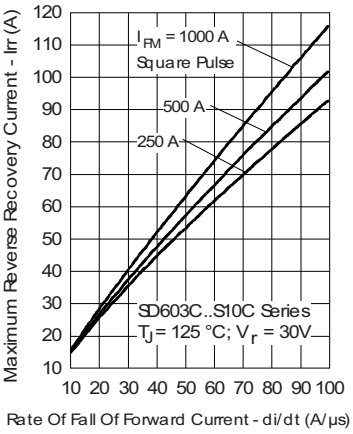



Fig. 14 - Recovery Current Characteristics

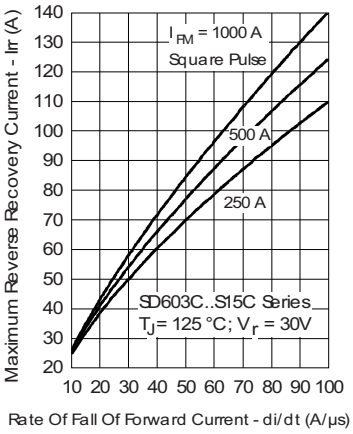



Fig. 17 - Recovery Current Characteristics


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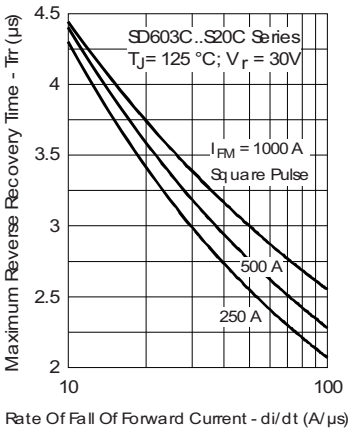



Fig. 18 - Recovery Time Characteristics

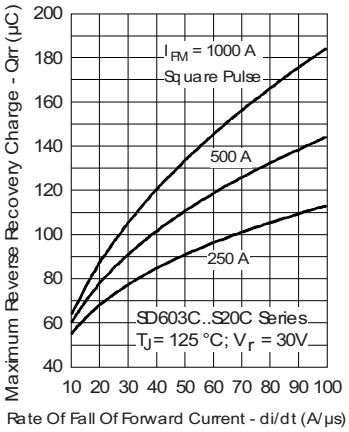



Fig. 19 - Recovery Charge Characteristics

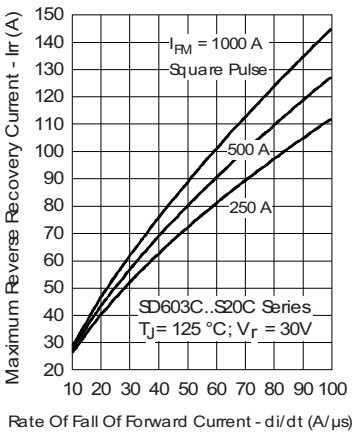



Fig. 20 - Recovery Current Characteristics

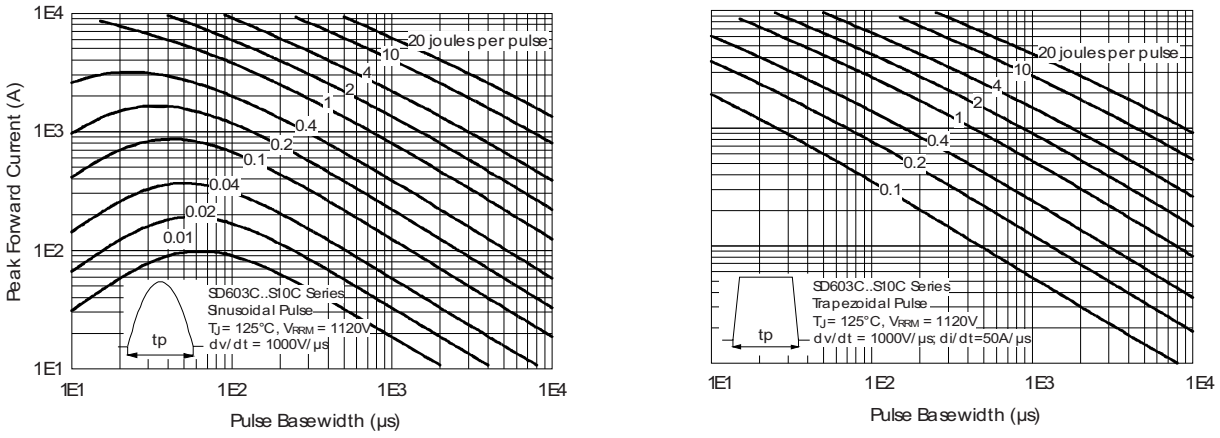



Fig. 21 - Maximum Total Energy Loss Per Pulse Characteristics


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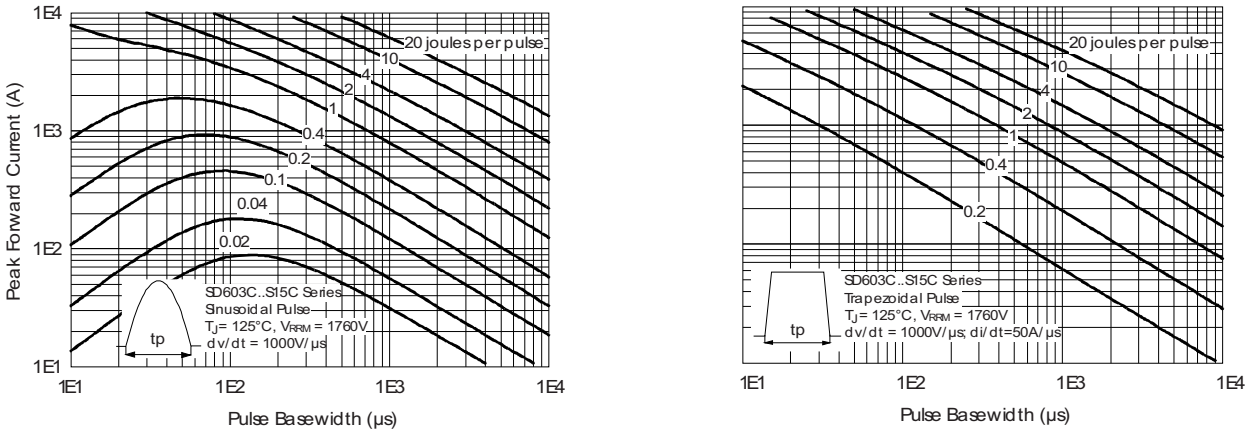



Fig. 22 - Maximum Total Energy Loss Per Pulse Characteristics

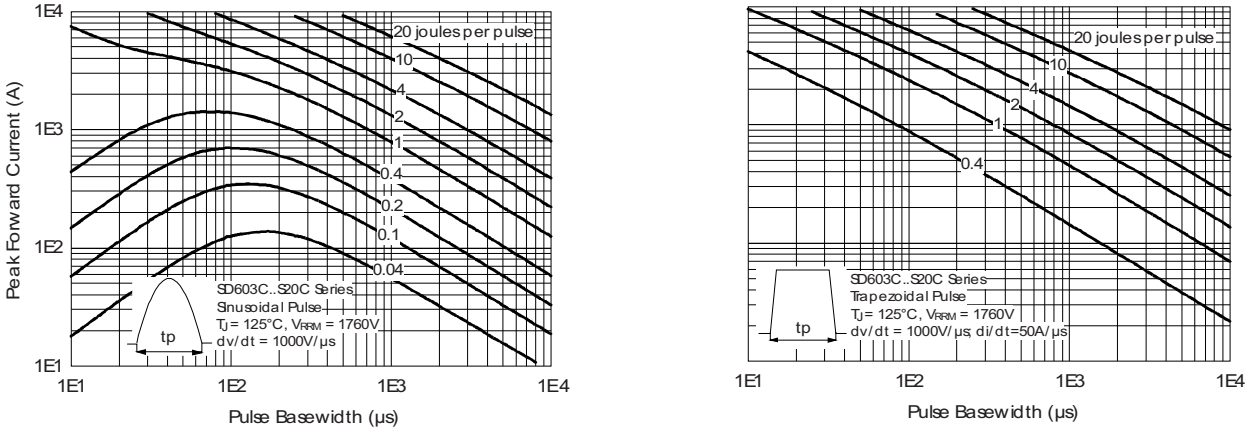



Fig. 23 - Maximum Total Energy Loss Per Pulse Characteristics

## ORDERING INFORMATION TABLE

**Device code**

| VS- | SD | 60 | 3 | C | 22 | S20 | C |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

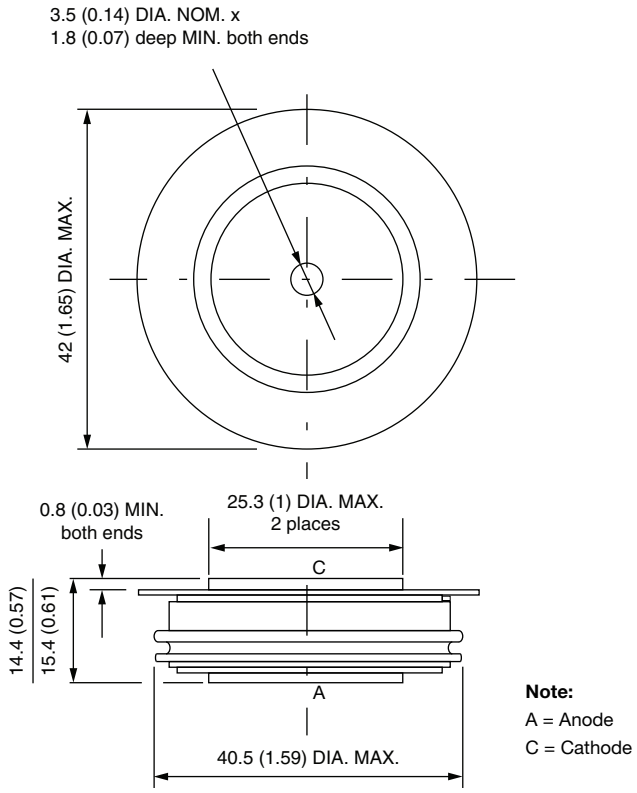
- **1** - Vishay Semiconductors product
- **2** - Diode
- **3** - Essential part number
- **4** - 3 = fast recovery
- **5** - C = ceramic PUK
- **6** - Voltage code x 100 = $V_{RRM}$ (see Voltage Ratings table)
- **7** - $t_{rr}$ code (see Recovery Characteristics table)
- **8** - C = PUK case B-43

| LINKS TO RELATED DOCUMENTS | |
|---|---|
| Dimensions | www.vishay.com/doc?95249 |


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# 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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