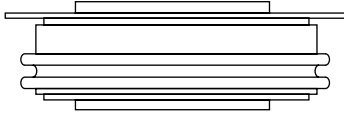


## Fast Recovery Diodes (Hockey PUK Version), 600 A


**B-43**
**FEATURES**

- High power FAST recovery diode series
- 1.0 to 2.0  $\mu$ s 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
- Lead (Pb)-free
- Designed and qualified for industrial level


**RoHS  
COMPLIANT**
**PRODUCT SUMMARY**

|             |       |
|-------------|-------|
| $I_{F(AV)}$ | 600 A |
|-------------|-------|

**TYPICAL APPLICATIONS**

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

**MAJOR RATINGS AND CHARACTERISTICS**

| PARAMETER    | TEST CONDITIONS | VALUES      | UNITS             |
|--------------|-----------------|-------------|-------------------|
| $I_{F(AV)}$  |                 | 600         | A                 |
|              | $T_{hs}$        | 55          | °C                |
| $I_{F(RMS)}$ |                 | 942         | A                 |
|              | $T_{hs}$        | 25          | °C                |
| $I_{FSM}$    | 50 Hz           | 8320        | A                 |
|              | 60 Hz           | 8715        |                   |
| $I^2t$       | 50 Hz           | 346         | kA <sup>2</sup> s |
|              | 60 Hz           | 316         |                   |
| $V_{RRM}$    | Range           | 400 to 2200 | V                 |
| $t_{rr}$     |                 | 1.0 to 2.0  | $\mu$ s           |
|              | $T_J$           | 25          | °C                |
| $T_J$        |                 | - 40 to 125 |                   |

## ELECTRICAL SPECIFICATIONS

| VOLTAGE RATINGS |              |   |   |   |
|-----------------|--------------|---|---|---|
| TYPE NUMBER     | VOLTAGE CODE | V <sub>RRM</sub> , MAXIMUM REPETITIVE PEAK AND OFF-STATE VOLTAGE<br>V | V <sub>RSM</sub> , MAXIMUM NON-REPETITIVE PEAK VOLTAGE<br>V | I <sub>RRM</sub> MAXIMUM AT T <sub>J</sub> = 125 °C<br>mA |
| SD603C..S10C    | 04           | 400   | 500   | 45  |
|                 | 08           | 800   | 900   |   |
|                 | 10           | 1000  | 1100  |   |
| SD603C..S15C    | 12           | 1200  | 1300  |   |
|                 | 14           | 1400  | 1500  |   |
|                 | 16           | 1600  | 1700  |   |
| SD603C..S20C    | 20           | 2000  | 2100  |   |
|                 | 22           | 2200  | 2300  |   |

| FORWARD CONDUCTION                                      |                     |   |                                   |           |                    |
|---|---------------------|---|-----------------------------------|-----------|--------------------|
| PARAMETER   | SYMBOL              | TEST CONDITIONS   |                                   | VALUES    | UNITS              |
| Maximum average forward current at heatsink temperature | I <sub>F(AV)</sub>  | 180° conduction, half sine wave<br>Double side (single side) cooled                                       |                                   | 600 (300) | A                  |
|   |                     |   |                                   | 55 (75)   | °C                 |
| Maximum RMS current                                     | I <sub>F(RMS)</sub> | 25 °C heatsink temperature double side cooled   |                                   | 942       | A                  |
| Maximum peak, one-cycle non-repetitive forward current  | I <sub>FSM</sub>    | t = 10 ms   | No voltage reappplied             | 8320      |                    |
|   |                     | t = 8.3 ms  |                                   | 8715      |                    |
|   |                     | t = 10 ms   | 100 % V <sub>RRM</sub> reappplied | 7000      |                    |
|   |                     | t = 8.3 ms  |                                   | 7330      |                    |
| Maximum I <sup>2</sup> t for fusing                     | I <sup>2</sup> t    | t = 10 ms   | No voltage reappplied             | 346       | kA <sup>2</sup> s  |
|   |                     | t = 8.3 ms  |                                   | 316       |                    |
|   |                     | t = 10 ms   | 100 % V <sub>RRM</sub> reappplied | 245       |                    |
|   |                     | t = 8.3 ms  |                                   | 224       |                    |
| Maximum I <sup>2</sup> √t for fusing                    | I <sup>2</sup> √t   | t = 0.1 to 10 ms, no voltage reappplied   |                                   | 3460      | kA <sup>2</sup> /s |
| Low level value of threshold voltage                    | V <sub>F(TO)1</sub> | (16.7 % × π × I <sub>F(AV)</sub> ) < I < π × I <sub>F(AV)</sub> , T <sub>J</sub> = T <sub>J</sub> maximum |                                   | 1.36      | V                  |
| High level value of threshold voltage                   | V <sub>F(TO)2</sub> | (I > π × I <sub>F(AV)</sub> ), T <sub>J</sub> = T <sub>J</sub> maximum                                    |                                   | 1.81      |                    |
| Low level of forward slope resistance                   | r <sub>f1</sub>     | (16.7 % × π × I <sub>F(AV)</sub> ) < I < π × I <sub>F(AV)</sub> , T <sub>J</sub> = T <sub>J</sub> maximum |                                   | 0.87      | mΩ                 |
| High level of forward slope resistance                  | r <sub>f2</sub>     | (I > π × I <sub>F(AV)</sub> ), T <sub>J</sub> = T <sub>J</sub> maximum                                    |                                   | 0.67      |                    |
| Maximum forward voltage drop                            | V <sub>FM</sub>     | I <sub>pk</sub> = 1885 A, T <sub>J</sub> = 25 °C; t <sub>p</sub> = 10 ms sinusoidal wave                  |                                   | 2.97      | V                  |

| RECOVERY CHARACTERISTICS |   |                                  |              |                    |   |                      |                     |  |
|--------------------------|---|----------------------------------|--------------|--------------------|---|----------------------|---------------------|--|
| CODE                     | MAXIMUM VALUE AT T <sub>J</sub> = 25 °C       | TEST CONDITIONS                  |              |                    | TYPICAL VALUES AT T <sub>J</sub> = 125 °C     |                      |                     |  |
|                          | t <sub>rr</sub> AT 25 % I <sub>RRM</sub> (μs) | I <sub>pk</sub> SQUARE PULSE (A) | di/dt (A/μs) | V <sub>r</sub> (V) | t <sub>rr</sub> AT 25 % I <sub>RRM</sub> (μs) | Q <sub>rr</sub> (μC) | I <sub>rr</sub> (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                  |  |



| <b>THERMAL AND MECHANICAL SPECIFICATIONS</b>     |              |   |             |        |
|--|--------------|---|-------------|--------|
| 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, $\pm 10\%$                       |              |   | 9800 (1000) | N (kg) |
| Approximate weight                               |              |   | 83          | g      |
| Case style                                       |              | See dimensions - link at the end of datasheet | B-43        |        |

| <b><math>\Delta R_{thJ-hs}</math> CONDUCTION</b> |                       |             |                        |             |                     |       |
|--|-----------------------|-------------|------------------------|-------------|---------------------|-------|
| 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

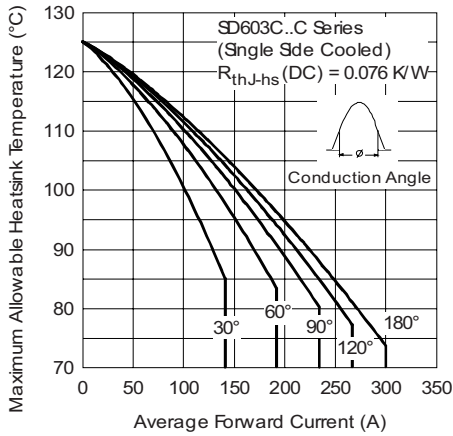


Fig. 1 - Current Ratings Characteristics

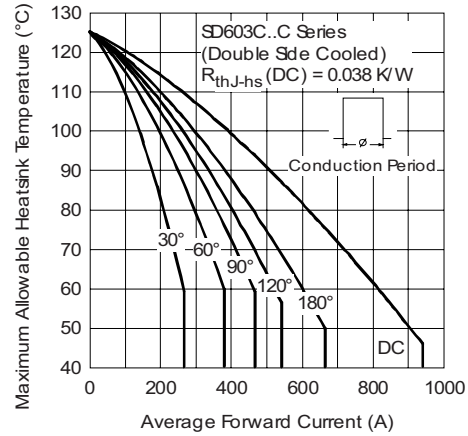


Fig. 4 - Current Ratings Characteristics

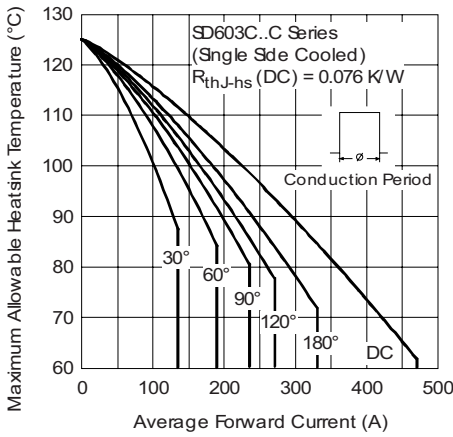


Fig. 2 - Current Ratings Characteristics

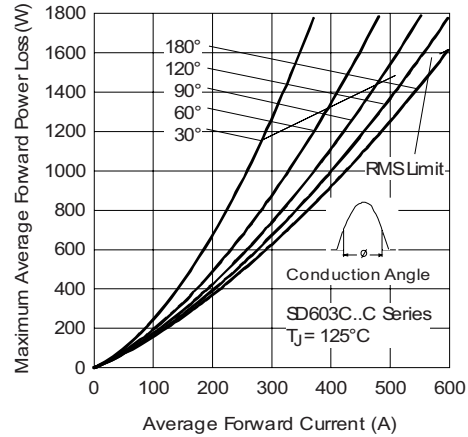


Fig. 5 - Forward Power Loss Characteristics

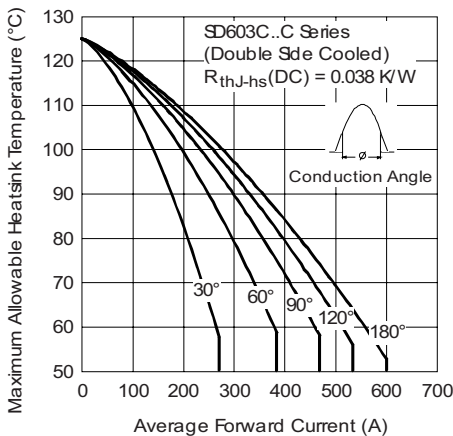


Fig. 3 - Current Ratings Characteristics

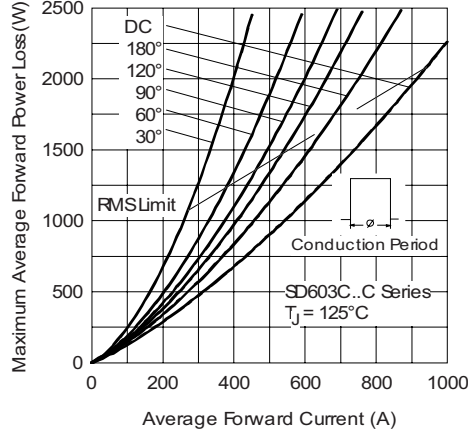
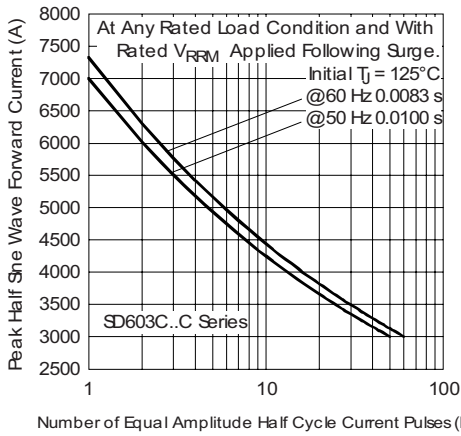


Fig. 6 - Forward Power Loss Characteristics



Number of Equal Amplitude Half Cycle Current Pulses (N)

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

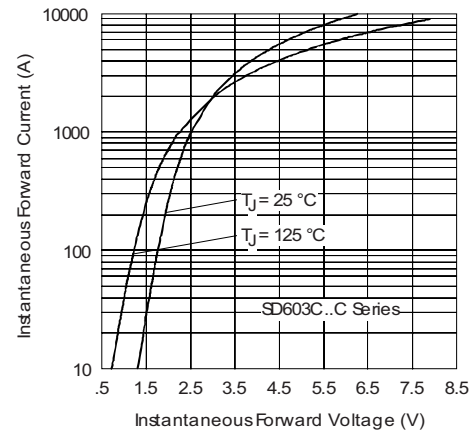


Fig. 9 - Forward Voltage Drop Characteristics

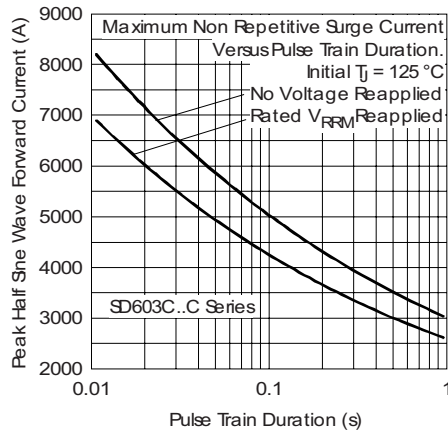


Fig. 8 - Maximum Non-Repetitive Surge Current Single and Double Side Cooled

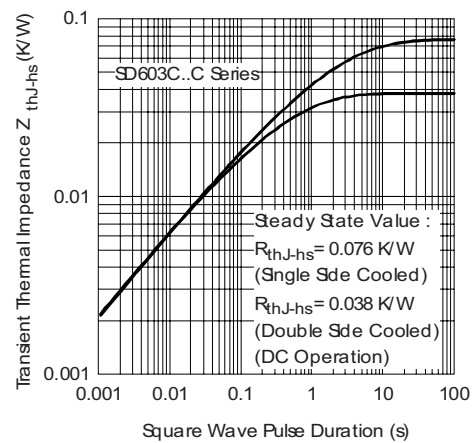


Fig. 10 - Thermal Impedance  $Z_{thJ-hs}$  Characteristics

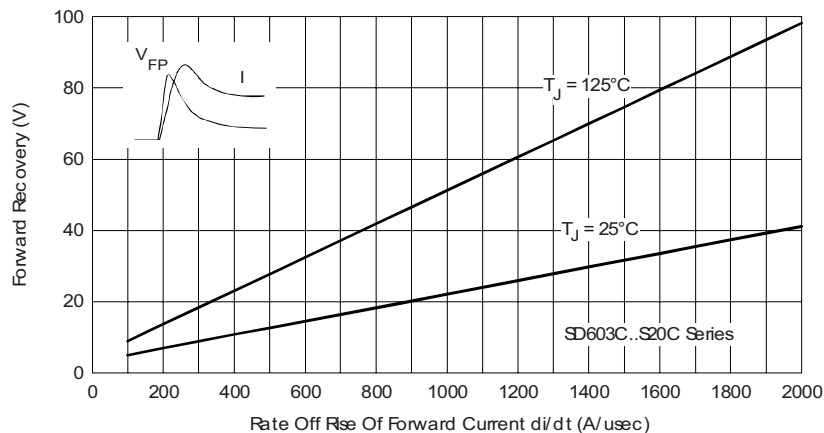


Fig. 11 - Typical Forward Recovery Characteristics

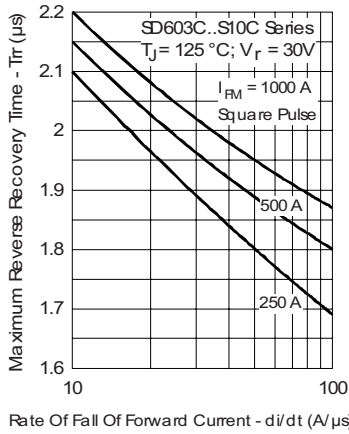


Fig. 12 - Recovery Time Characteristics

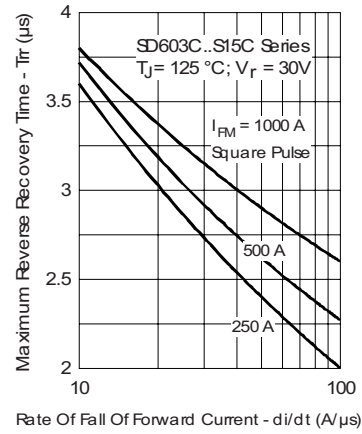


Fig. 15 - Recovery Time Characteristics

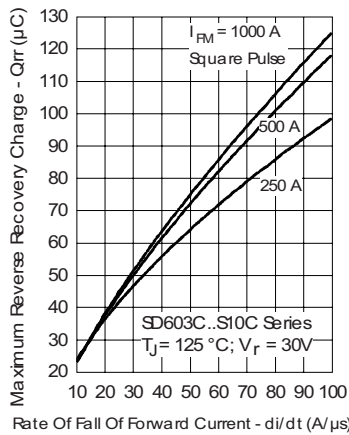


Fig. 13 - Recovery Charge Characteristics

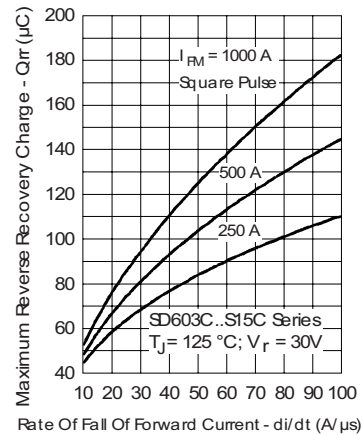


Fig. 16 - Recovery Charge Characteristics

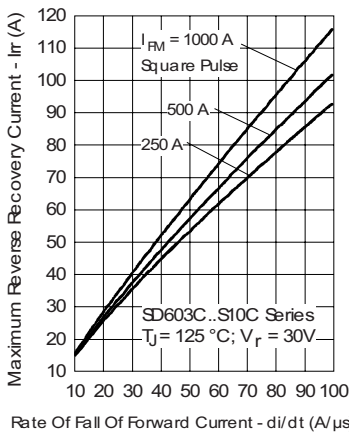


Fig. 14 - Recovery Current Characteristics

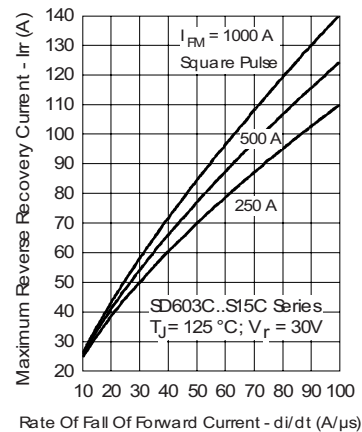


Fig. 17 - Recovery Current Characteristics

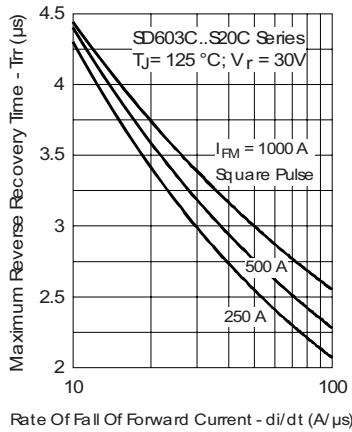


Fig. 18 - Recovery Time Characteristics

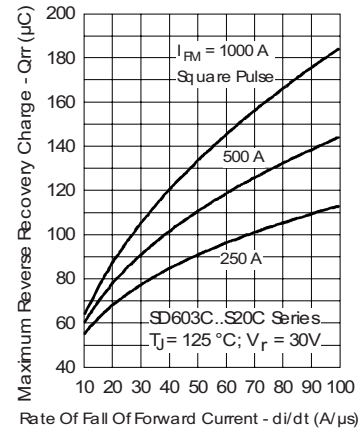


Fig. 19 - Recovery Charge Characteristics

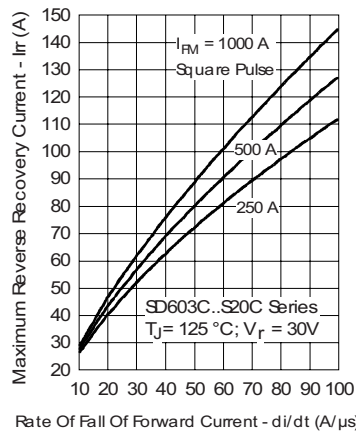


Fig. 20 - Recovery Current Characteristics

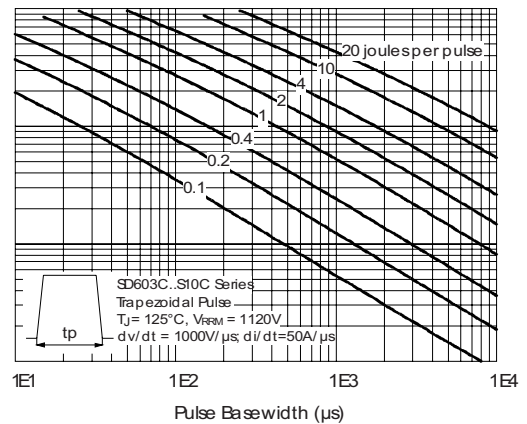
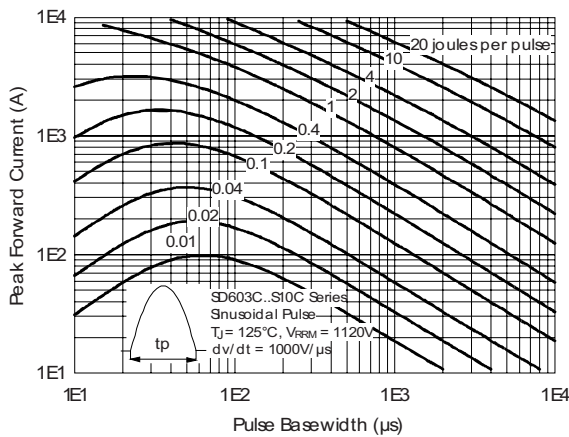


Fig. 21 - Maximum Total Energy Loss Per Pulse Characteristics

# SD603C..C Series

Vishay High Power Products Fast Recovery Diodes  
(Hockey PUK Version), 600 A

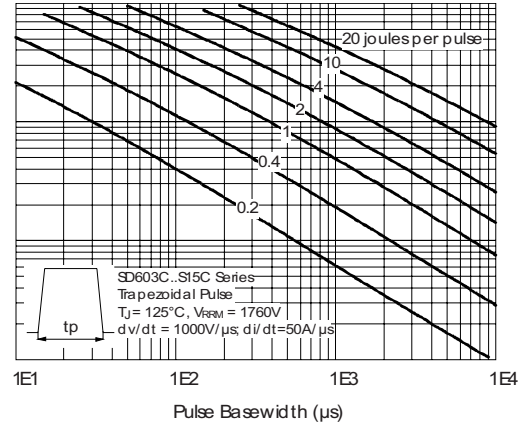
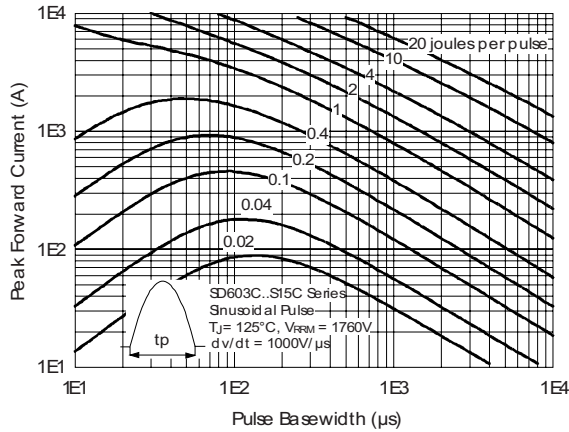


Fig. 22 - Maximum Total Energy Loss Per Pulse Characteristics

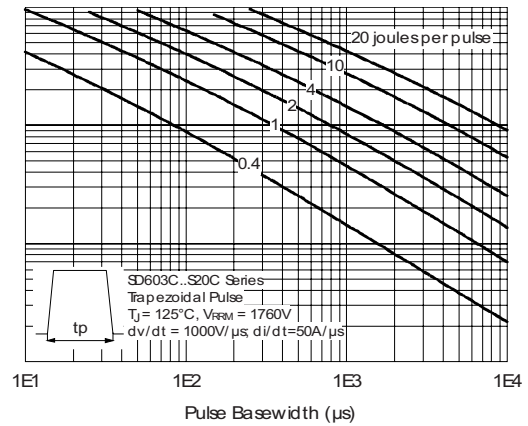
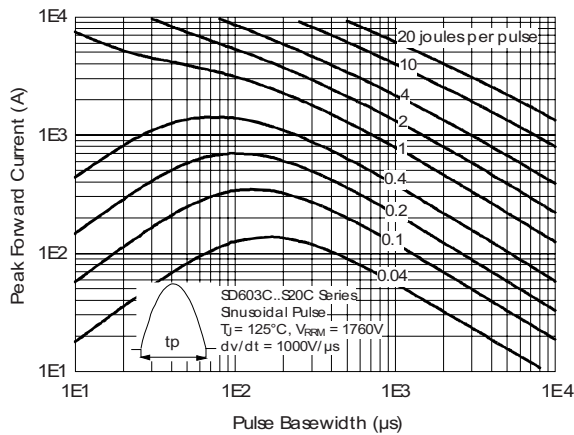


Fig. 23 - Maximum Total Energy Loss Per Pulse Characteristics





## ORDERING INFORMATION TABLE

|             |           |           |          |          |           |            |          |
|-------------|-----------|-----------|----------|----------|-----------|------------|----------|
| Device code | <b>SD</b> | <b>60</b> | <b>3</b> | <b>C</b> | <b>22</b> | <b>S20</b> | <b>C</b> |
|             | ①         | ②         | ③        | ④        | ⑤         | ⑥          | ⑦        |

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

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



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