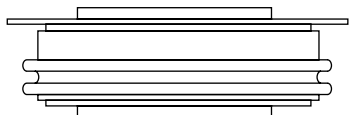


## Fast Recovery Diodes (Hockey PUK Version), 600 A


**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

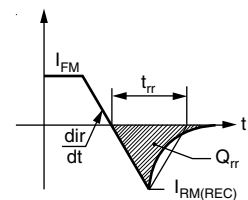
| PARAMETER    | TEST CONDITIONS | VALUES      | UNITS             |
|--------------|-----------------|-------------|-------------------|
| $I_{F(AV)}$  |                 | 600         | A                 |
|              | $T_{hs}$        | 55          | °C                |
| $I_{F(RMS)}$ |                 | 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 | $V_{RRM}$ , MAXIMUM REPETITIVE PEAK AND OFF-STATE VOLTAGE<br>V | $V_{RSM}$ , MAXIMUM NON-REPETITIVE PEAK VOLTAGE<br>V | $I_{RRM}$ MAXIMUM AT $T_J = 125\text{ }^{\circ}\text{C}$<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 | $I_{F(AV)}$   | 180° conduction, half sine wave<br>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      | 8320      |                    |
|                                                         |               | t = 8.3 ms                                                                                           | No voltage reapplied      | 8715      |                    |
|                                                         |               | t = 10 ms                                                                                            | 100 % $V_{RRM}$ reapplied | 7000      |                    |
|                                                         |               | t = 8.3 ms                                                                                           | 100 % $V_{RRM}$ reapplied | 7330      |                    |
| Maximum $I^2t$ for fusing                               | $I^2t$        | t = 10 ms                                                                                            | No voltage reapplied      | 346       | kA <sup>2</sup> s  |
|                                                         |               | t = 8.3 ms                                                                                           | No voltage reapplied      | 316       |                    |
|                                                         |               | t = 10 ms                                                                                            | 100 % $V_{RRM}$ reapplied | 245       |                    |
|                                                         |               | t = 8.3 ms                                                                                           | 100 % $V_{RRM}$ reapplied | 224       |                    |
| Maximum $I^2\sqrt{t}$ for fusing                        | $I^2\sqrt{t}$ | t = 0.1 to 10 ms, no voltage reapplied                                                               |                           | 3460      | 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              |                           | 1.36      | V                  |
| High level value of threshold voltage                   | $V_{F(TO)2}$  | $I > \pi \times I_{F(AV)}$ , $T_J = T_J$ maximum                                                     |                           | 1.81      |                    |
| 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              |                           | 0.87      | mΩ                 |
| High level of forward slope resistance                  | $r_{f2}$      | $I > \pi \times I_{F(AV)}$ , $T_J = T_J$ maximum                                                     |                           | 0.67      |                    |
| Maximum forward voltage drop                            | $V_{FM}$      | $I_{pk} = 1885\text{ A}$ , $T_J = 25\text{ }^{\circ}\text{C}$ ; $t_p = 10\text{ ms}$ sinusoidal wave |                           | 2.97      | V                  |

| RECOVERY CHARACTERISTICS |                                                     |                           |                |           |                                                       |               |              |
|--------------------------|-----------------------------------------------------|---------------------------|----------------|-----------|-------------------------------------------------------|---------------|--------------|
| CODE                     | MAXIMUM VALUE AT $T_J = 25\text{ }^{\circ}\text{C}$ | TEST CONDITIONS           |                |           | TYPICAL VALUES AT $T_J = 125\text{ }^{\circ}\text{C}$ |               |              |
|                          | $t_{rr}$ 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           |





| <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        |        |

| $\Delta R_{thJ-hs}$ 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 <sub>J</sub> = T <sub>J</sub> 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

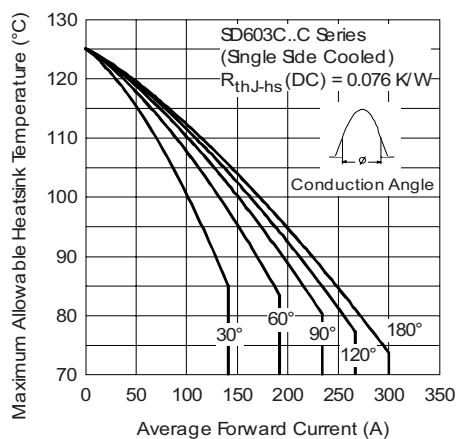


Fig. 1 - Current Ratings Characteristics

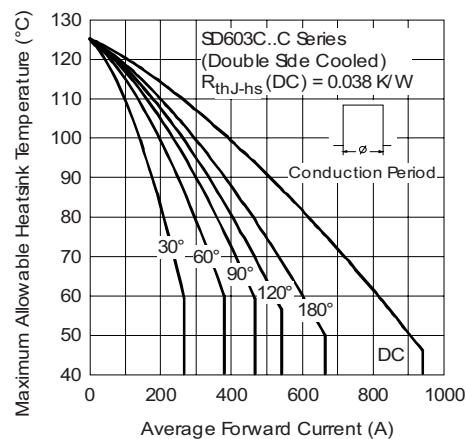


Fig. 4 - Current Ratings Characteristics

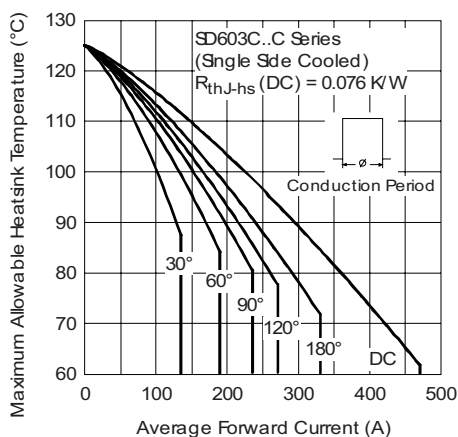


Fig. 2 - Current Ratings Characteristics

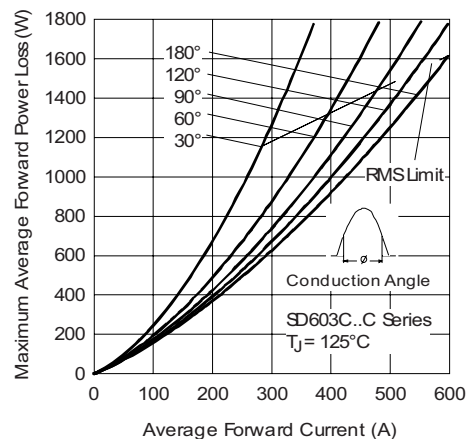


Fig. 5 - Forward Power Loss Characteristics

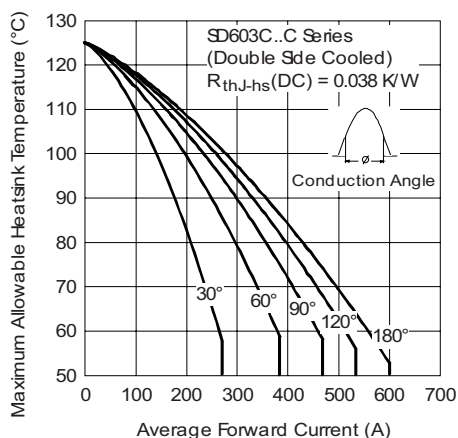


Fig. 3 - Current Ratings Characteristics

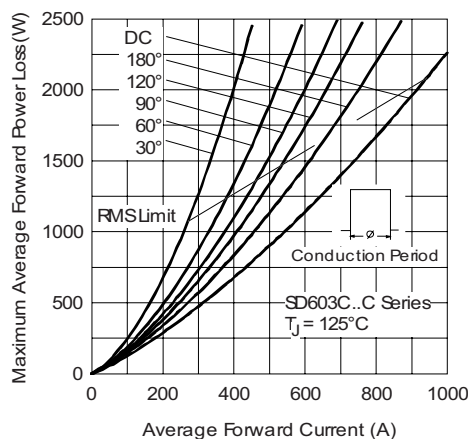


Fig. 6 - Forward Power Loss Characteristics

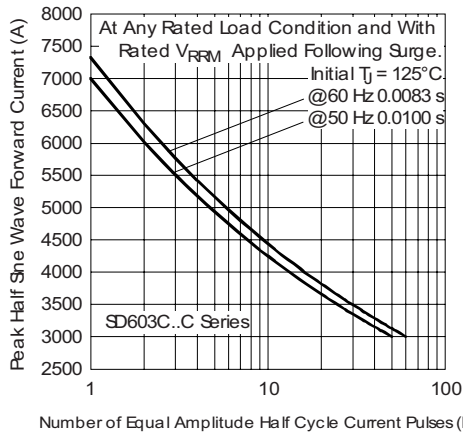


Fig. 7 - Maximum Non-Repetitive Surge Current Single and Double Side Cooled

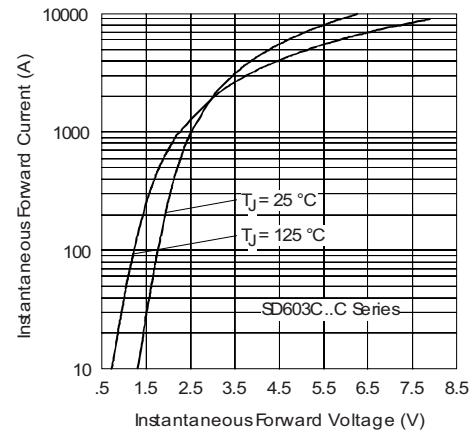


Fig. 9 - Forward Voltage Drop Characteristics

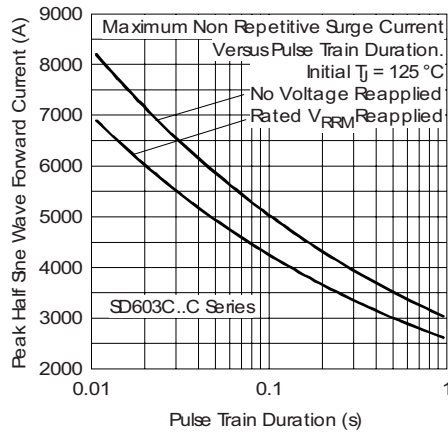


Fig. 8 - Maximum Non-Repetitive Surge Current Single and Double Side Cooled

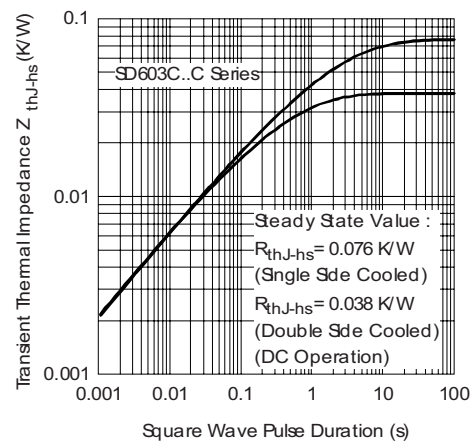


Fig. 10 - Thermal Impedance  $Z_{thJ-hs}$  Characteristics

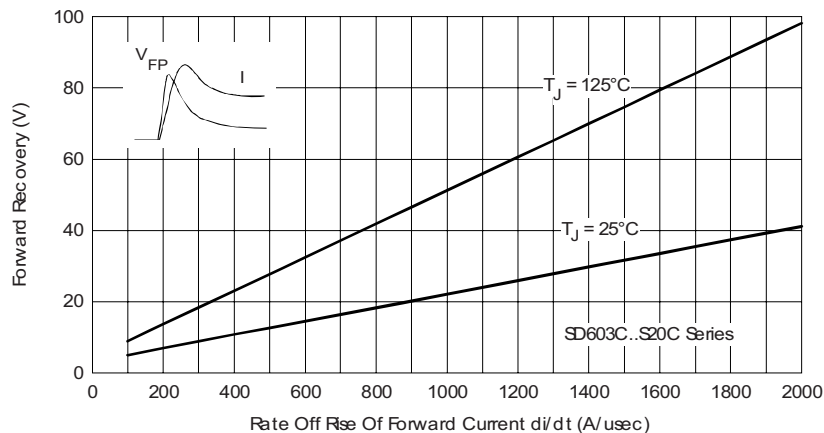
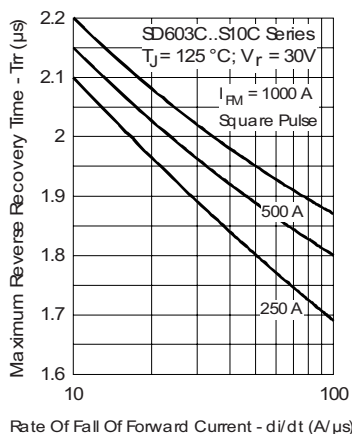
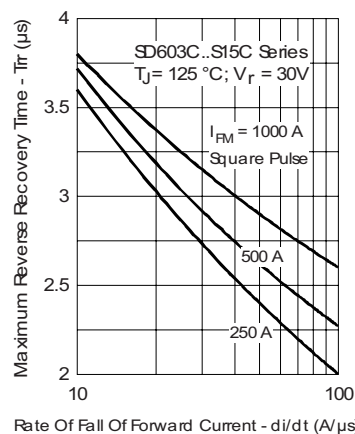


Fig. 11 - Typical Forward Recovery Characteristics



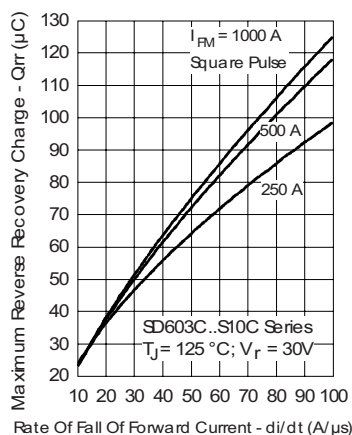
Rate Of Fall Of Forward Current -  $di/dt$  (A/ $\mu\text{s}$ )

Fig. 12 - Recovery Time Characteristics



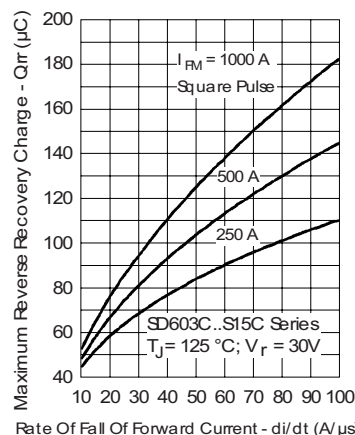
Rate Of Fall Of Forward Current -  $di/dt$  (A/ $\mu\text{s}$ )

Fig. 15 - Recovery Time Characteristics



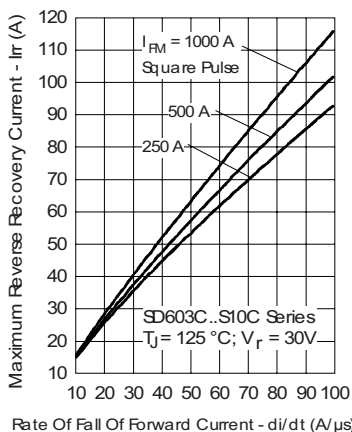
Rate Of Fall Of Forward Current -  $di/dt$  (A/ $\mu\text{s}$ )

Fig. 13 - Recovery Charge Characteristics



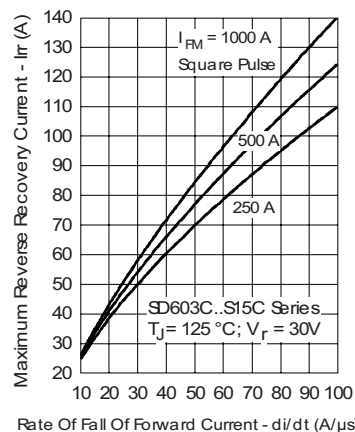
Rate Of Fall Of Forward Current -  $di/dt$  (A/ $\mu\text{s}$ )

Fig. 16 - Recovery Charge Characteristics



Rate Of Fall Of Forward Current -  $di/dt$  (A/ $\mu\text{s}$ )

Fig. 14 - Recovery Current Characteristics



Rate Of Fall Of Forward Current -  $di/dt$  (A/ $\mu\text{s}$ )

Fig. 17 - Recovery Current Characteristics

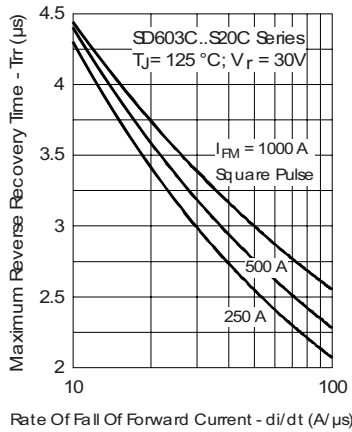


Fig. 18 - Recovery Time Characteristics

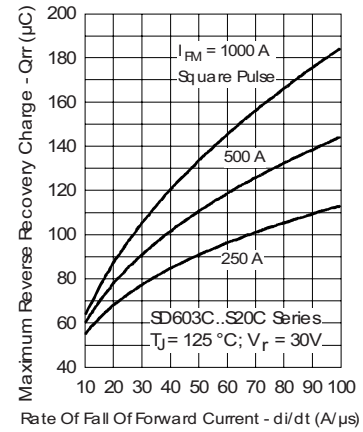


Fig. 19 - Recovery Charge Characteristics

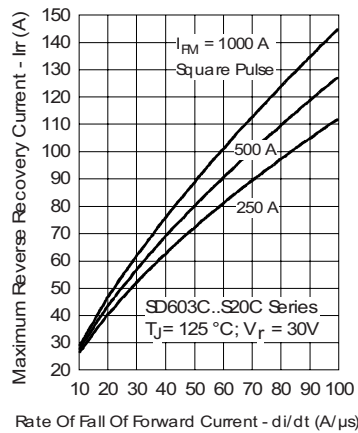


Fig. 20 - Recovery Current Characteristics

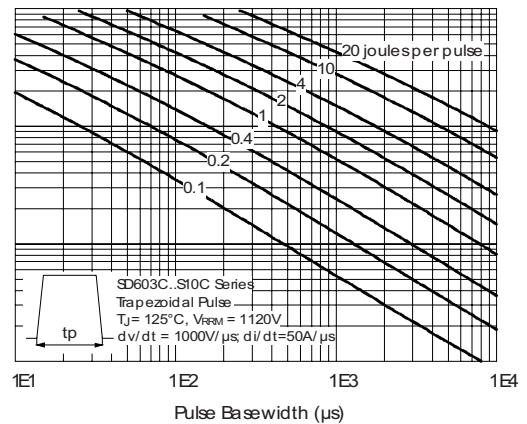
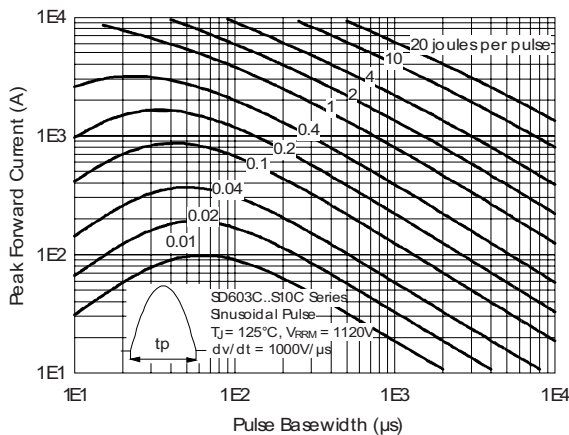


Fig. 21 - Maximum Total Energy Loss Per Pulse Characteristics

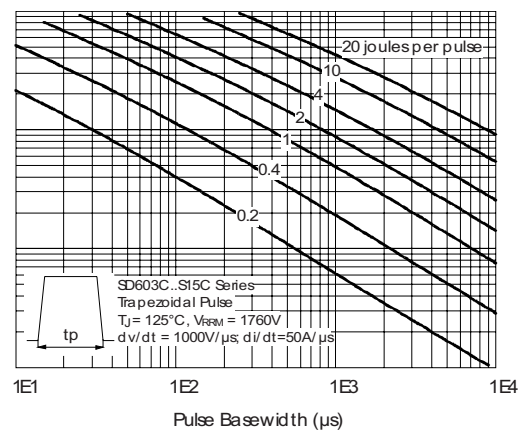
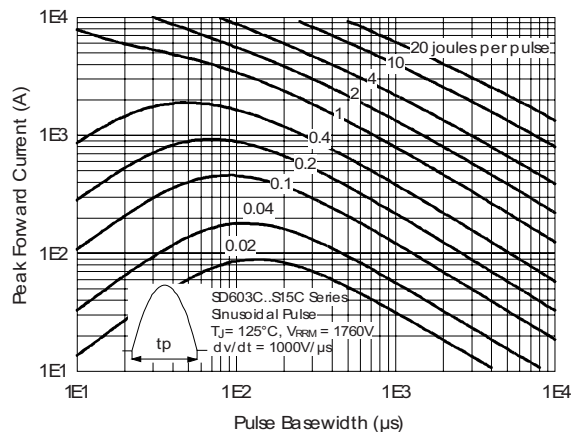


Fig. 22 - Maximum Total Energy Loss Per Pulse Characteristics

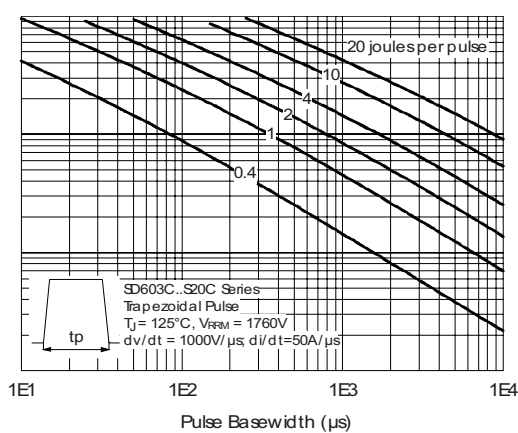
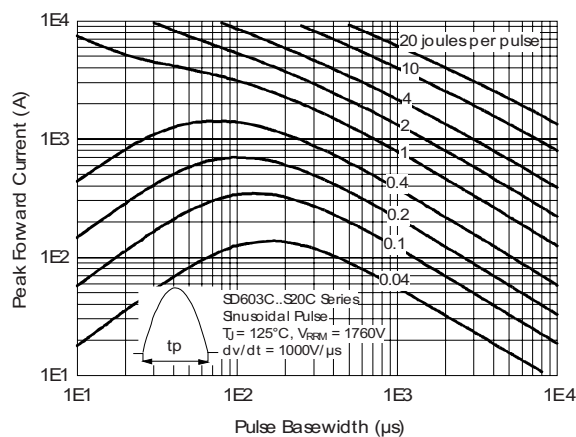


Fig. 23 - Maximum Total Energy Loss Per Pulse Characteristics



## ORDERING INFORMATION TABLE

|             |    |    |   |   |    |     |   |
|-------------|----|----|---|---|----|-----|---|
| Device code | SD | 60 | 3 | C | 22 | S20 | C |
|             | 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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