



**THE DATASHEET OF  
SD103R16S15PV**



### FAST RECOVERY DIODES

Stud Version

#### Features

- High power FAST recovery diode series
- 1.0 to 2.0  $\mu\text{s}$  recovery time
- High voltage ratings up to 2500V
- High current capability
- Optimized turn on and turn off characteristics
- Low forward recovery
- Fast and soft reverse recovery
- Compression bonded encapsulation
- Stud version JEDEC DO-30
- Maximum junction temperature 125°C
- RoHS Compliant

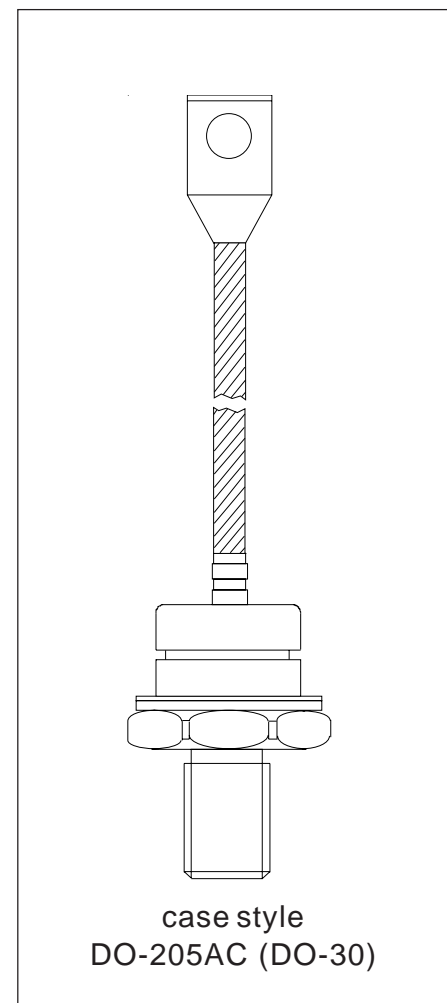
110A

#### Typical Applications

- Snubber diode for GTO
- High voltage free-wheeling diode
- Fast recovery rectifier applications

#### Major Ratings and Characteristics

| Parameters       | SD103N/R    | Units             |
|------------------|-------------|-------------------|
| $I_{F(AV)}$      | 110         | A                 |
| @ $T_C$          | 85          | °C                |
| $I_{F(RMS)}$     | 173         | A                 |
| $I_{FSM}$ @ 50Hz | 3570        | A                 |
| @ 60Hz           | 3730        | A                 |
| $I^2t$ @ 50Hz    | 64          | KA <sup>2</sup> s |
| @ 60Hz           | 58          | KA <sup>2</sup> s |
| $V_{RRM}$ range  | 400 to 2500 | V                 |
| $t_{rr}$ range   | 1.0 to 2.0  | $\mu\text{s}$     |
| @ $T_J$          | 25          | °C                |
| $T_J$            | - 40 to 125 | °C                |



**ELECTRICAL SPECIFICATIONS**

Voltage Ratings

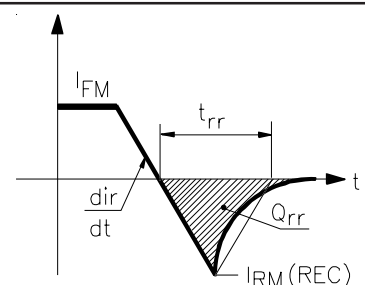
| Type number   | Voltage Code | $V_{RRM}$ max. repetitive peak and off-state voltage<br>V | $V_{RSM}$ , maximum non-repetitive peak voltage<br>V | $I_{RRM}$ max.<br>$T_J = 125^\circ\text{C}$<br>mA |
|---------------|--------------|---|--|---|
| SD103N/R..S10 | 04           | 400   | 500  | 35  |
|               | 08           | 800   | 900  |   |
|               | 10           | 1000  | 1100   |   |
| SD103N/R..S15 | 12           | 1200  | 1300   |   |
|               | 14           | 1400  | 1500   |   |
|               | 16           | 1600  | 1700   |   |
| SD103N/R..S20 | 20           | 2000  | 2100   |   |
|               | 25           | 2500  | 2600   |   |

Forward Conduction

| Parameter   | SD103N/R | Units              | Conditions   |
|---|----------|--------------------|--|
| $I_{F(AV)}$ Max. average forward current @ Case temperature   | 110      | A                  | 180° conduction, half sine wave.   |
|   | 85       | °C                 |  |
| $I_{F(RMS)}$ Max. RMS current                                 | 173      | A                  | DC @ 75°C case temperature   |
| $I_{FSM}$ Max. peak, one-cycle non-repetitive forward current | 3570     | A                  | t = 10ms No voltage reappplied   |
|   | 3730     |                    | t = 8.3ms reappplied   |
|   | 3000     |                    | t = 10ms 100% $V_{RRM}$ reappplied   |
|   | 3140     |                    | t = 8.3ms reappplied   |
| $I^2t$ Maximum $I^2t$ for fusing                              | 64       | KA <sup>2</sup> s  | t = 10ms No voltage reappplied   |
|   | 58       |                    | t = 8.3ms reappplied   |
|   | 45       |                    | t = 10ms 100% $V_{RRM}$ reappplied   |
|   | 41       |                    | t = 8.3ms reappplied   |
| $I^2\sqrt{t}$ Maximum $I^2\sqrt{t}$ for fusing                | 636      | KA <sup>2</sup> √s | t = 0.1 to 10ms, no voltage reappplied   |
| $V_{F(TO)1}$ Low level of threshold voltage                   | 1.36     | V                  | (16.7% x $\pi$ x $I_{F(AV)} < I < \pi$ x $I_{F(AV)}$ ), $T_J = T_J$ max.                 |
| $V_{F(TO)2}$ High level of threshold voltage                  | 1.94     |                    | ( $I > \pi$ x $I_{F(AV)}$ ), $T_J = T_J$ max.  |
| $r_{f1}$ Low level of forward slope resistance                | 2.55     | mΩ                 | (16.7% x $\pi$ x $I_{F(AV)} < I < \pi$ x $I_{F(AV)}$ ), $T_J = T_J$ max.                 |
| $r_{f2}$ High level of forward slope resistance               | 1.11     |                    | ( $I > \pi$ x $I_{F(AV)}$ ), $T_J = T_J$ max.  |
| $V_{FM}$ Max. forward voltage                                 | 2.23     | V                  | $I_{pk} = 345\text{A}$ , $T_J = 25^\circ\text{C}$ , $t_p = 400 \mu\text{s}$ square pulse |

Recovery Characteristics

| Code | $T_J = 25^\circ\text{C}$<br>typical $t_{rr}$<br>@ 25% $I_{RRM}$<br>(μs) | Testconditions                  |                 |              | Max. values @ $T_J = 125^\circ\text{C}$ |                  |                 |
|------|---|---------------------------------|-----------------|--------------|---|------------------|-----------------|
|      |   | $I_{pk}$<br>Square Pulse<br>(A) | di/dt<br>(A/μs) | $V_r$<br>(V) | $t_{rr}$<br>@ 25% $I_{RRM}$<br>(μs)     | $Q_{rr}$<br>(μC) | $I_{rr}$<br>(A) |
| S10  | 1.0   | 350                             | 25              | -30          | 1.6                                     | 21               | 27              |
| S15  | 1.5   |                                 |                 |              | 2.3                                     | 61               | 37              |
| S20  | 2.0   |                                 |                 |              | 3.2                                     | 75               | 39              |



**Thermal and Mechanical Specification**

| Parameter   | SD103N/R        | Units | Conditions                                 |
|---|-----------------|-------|--|
| T <sub>J</sub> Max. operating temperature range             | -40 to 125      | °C    |  |
| T <sub>stg</sub> Max. storage temperature range             | -40 to 150      |       |  |
| R <sub>thJC</sub> Max. thermal resistance, junction to case | 0.16            | K/W   | DC operation                               |
| R <sub>thCS</sub> Max. thermal resistance, case to heatsink | 0.10            |       | Mounting surface, smooth, flat and greased |
| T Mounting torque ± 10%                                     | 15.5            | N m   | Not lubricated threads                     |
|   | 13.5            |       | Lubricated threads                         |
| wt Approximate weight                                       | 120             | g     |  |
| Case style  | DO-205AC(DO-30) |       | See Outline Table                          |

**ΔR<sub>thJC</sub> Conduction**

(The following table shows the increment of thermal resistance R<sub>thJC</sub> when devices operate at different conduction angles than DC)

| Conduction angle | Sinusoidal conduction | Rectangular conduction | Units | Conditions                           |
|------------------|-----------------------|------------------------|-------|--------------------------------------|
| 180°             | 0.011                 | 0.012                  | K/W   | T <sub>J</sub> = T <sub>J</sub> max. |
| 120°             | 0.016                 | 0.019                  |       |                                      |
| 90°              | 0.021                 | 0.023                  |       |                                      |
| 60°              | 0.029                 | 0.030                  |       |                                      |
| 30°              | 0.041                 | 0.041                  |       |                                      |

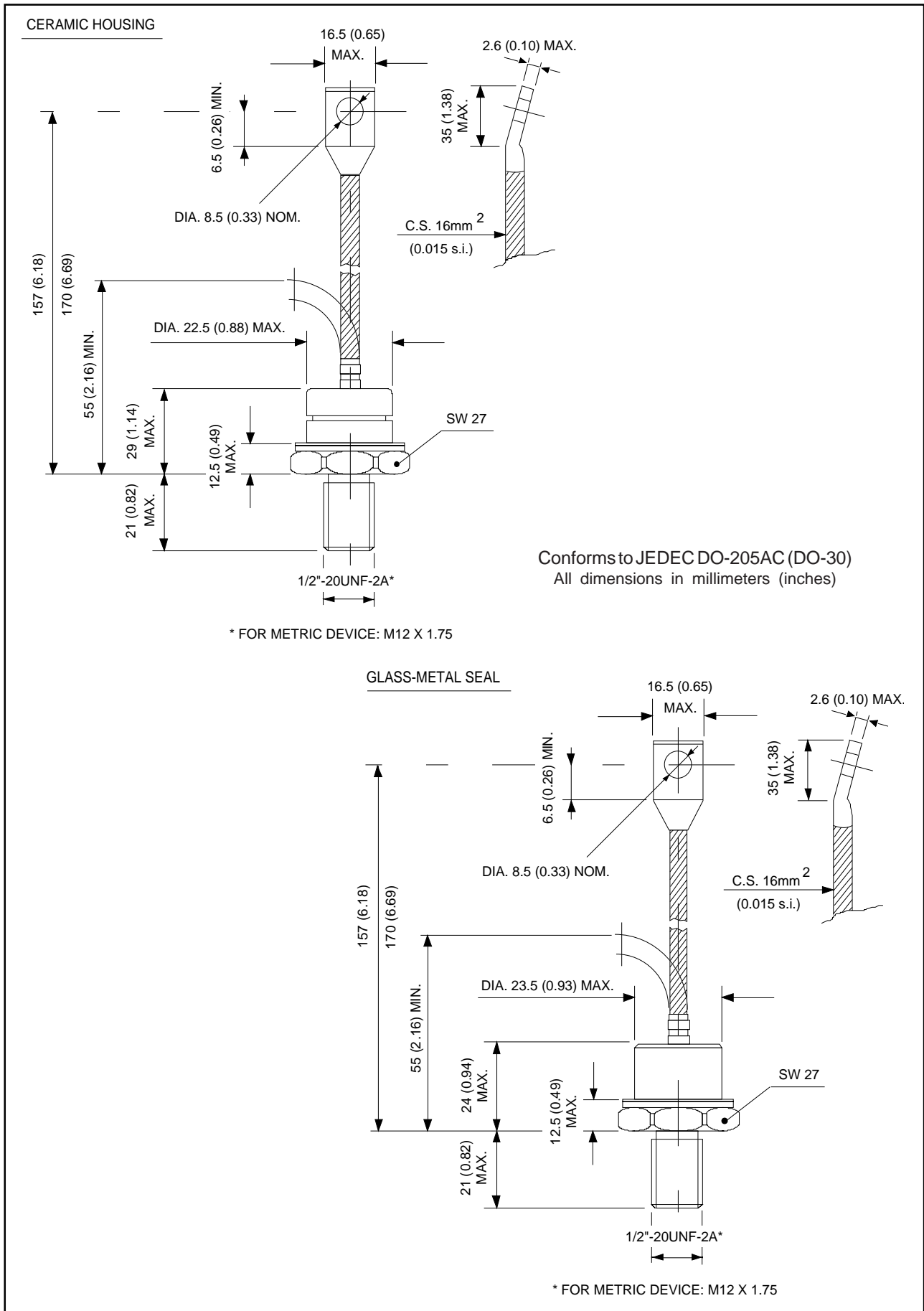
**Ordering Information Table**

**Device Code**

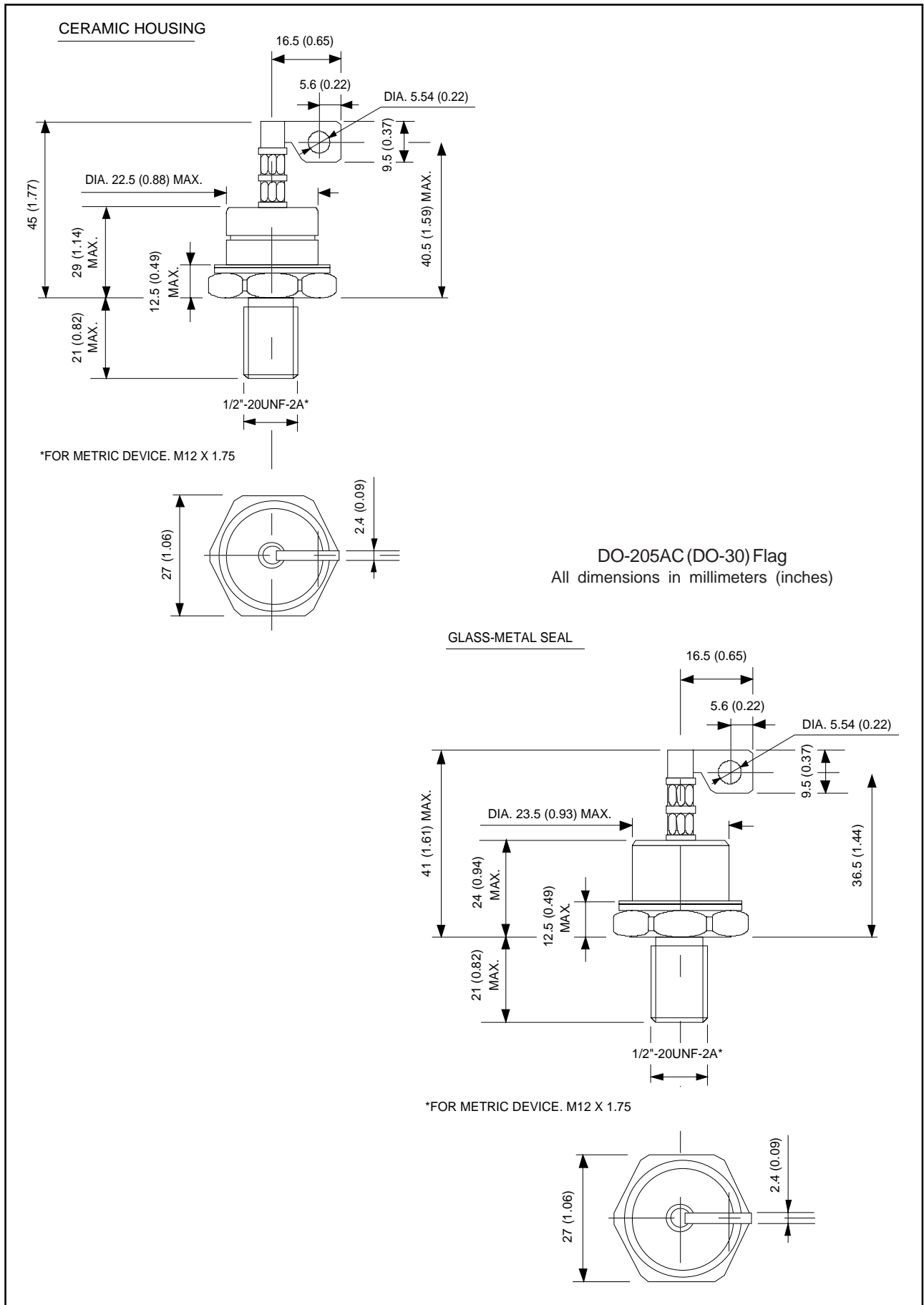
|           |           |          |          |           |            |          |          |          |
|-----------|-----------|----------|----------|-----------|------------|----------|----------|----------|
| <b>SD</b> | <b>10</b> | <b>3</b> | <b>R</b> | <b>25</b> | <b>S20</b> | <b>P</b> | <b>B</b> | <b>C</b> |
| ①         | ②         | ③        | ④        | ⑤         | ⑥          | ⑦        | ⑧        | ⑨        |

- 1** - Diode
- 2** - Essential part number
- 3** - 3 = Fast recovery
- 4** - N = Stud Normal Polarity (Cathode to Stud)  
R = Stud Reverse Polarity (Anode to Stud)
- 5** - Voltage code: Code x 100 = V<sub>RRM</sub> (see Voltage Ratings table)
- 6** - t<sub>rr</sub> code (see Recovery Characteristics table)
- 7** - P = Stud base DO-205AC (DO-30) 1/2" 20UNF-2A  
M = Stud base DO-205AC (DO-30) M12 X 1.75
- 8** - B = Flag top terminals (for Cathode/ Anode Leads)  
S = Isolated lead with silicone sleeve  
(Red = Reverse Polarity; Blue = Normal Polarity)  
None = Not isolated lead
- 9** - C = Ceramic housing (over 1600V)  
V = Glass-metal seal (only up to 1600V)

Outline Table



Outline Table



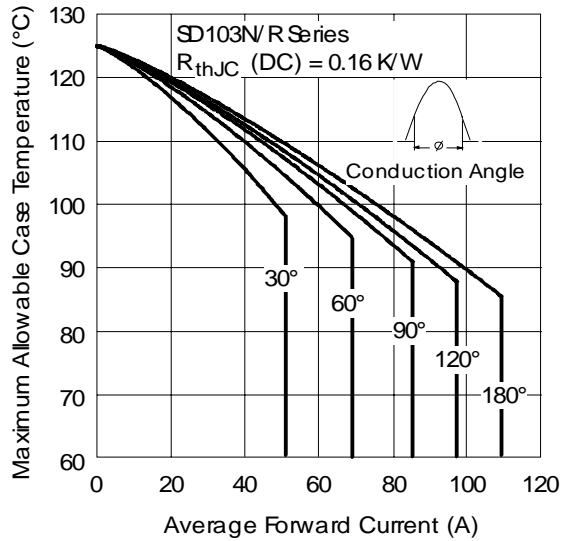


Fig. 1 - Current Ratings Characteristics

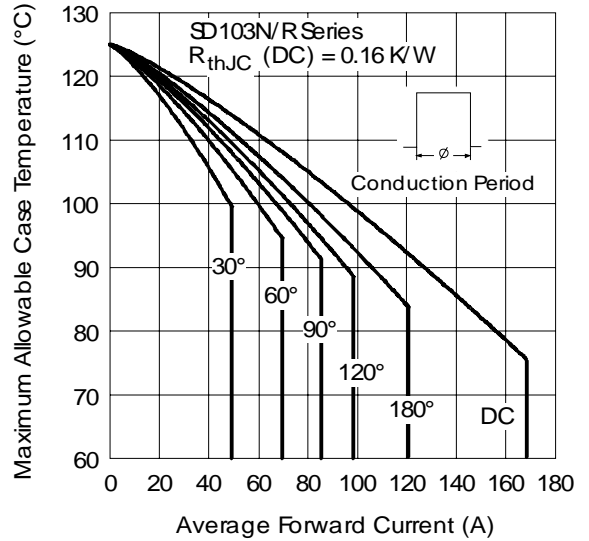


Fig. 2 - Current Ratings Characteristics

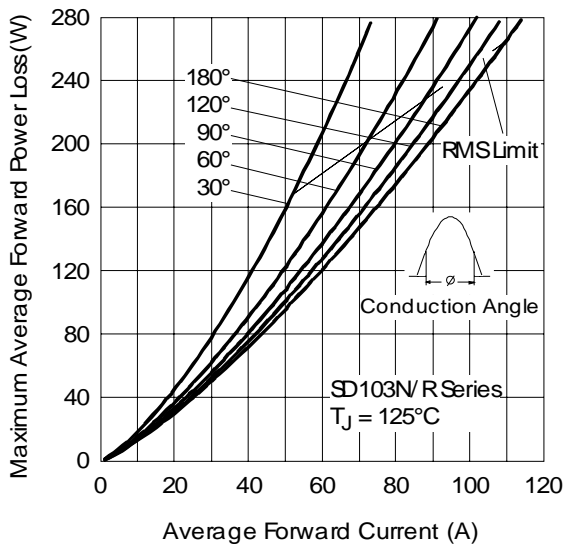


Fig. 3 - Forward Power Loss Characteristics

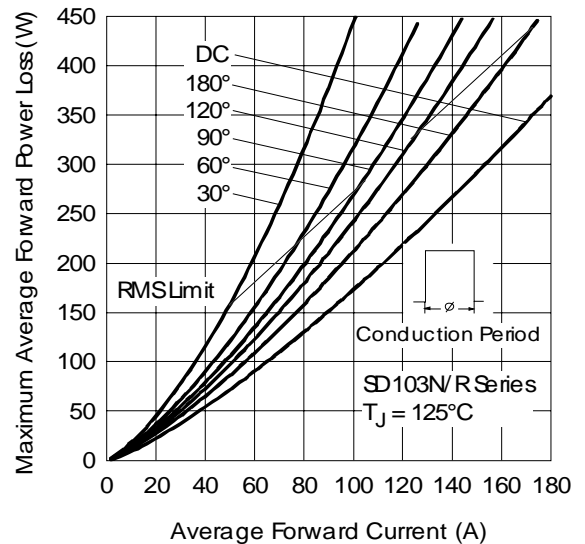


Fig. 4 - Forward Power Loss Characteristics

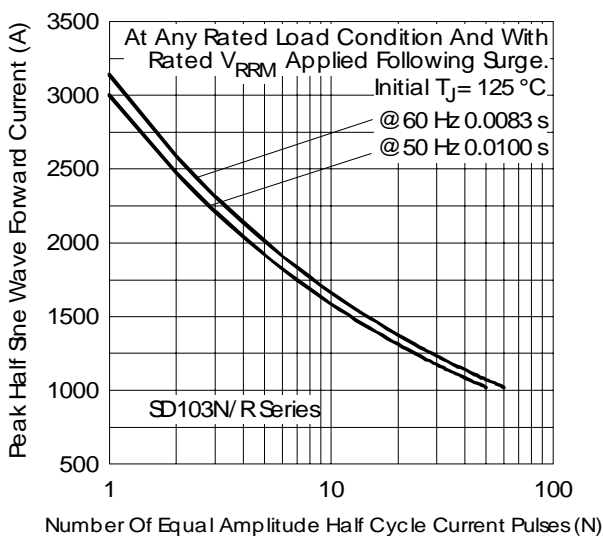


Fig. 5 - Maximum Non-repetitive Surge Current

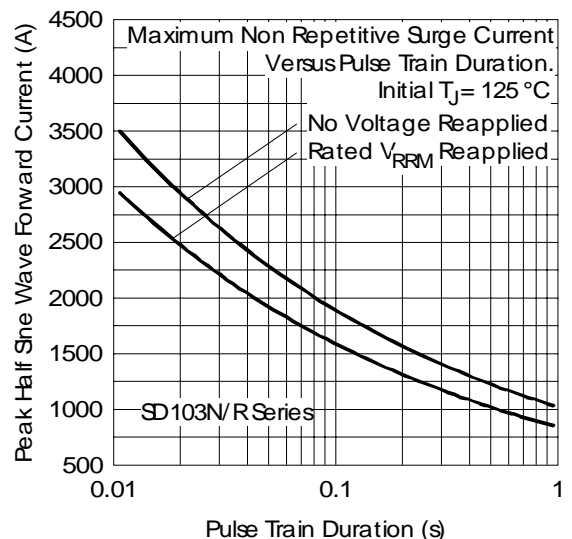


Fig. 6 - Maximum Non-repetitive Surge Current

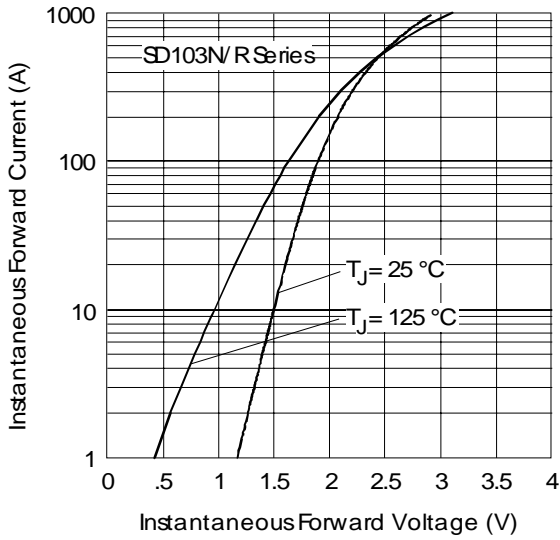


Fig. 7 - Forward Voltage Drop Characteristics

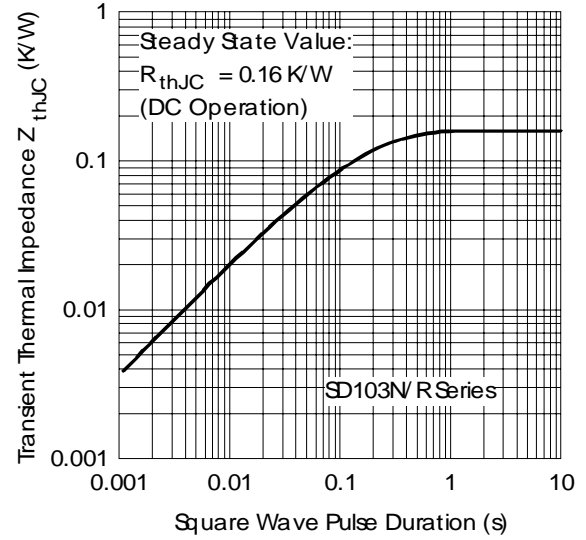


Fig. 8 - Thermal Impedance  $Z_{thJC}$  Characteristic

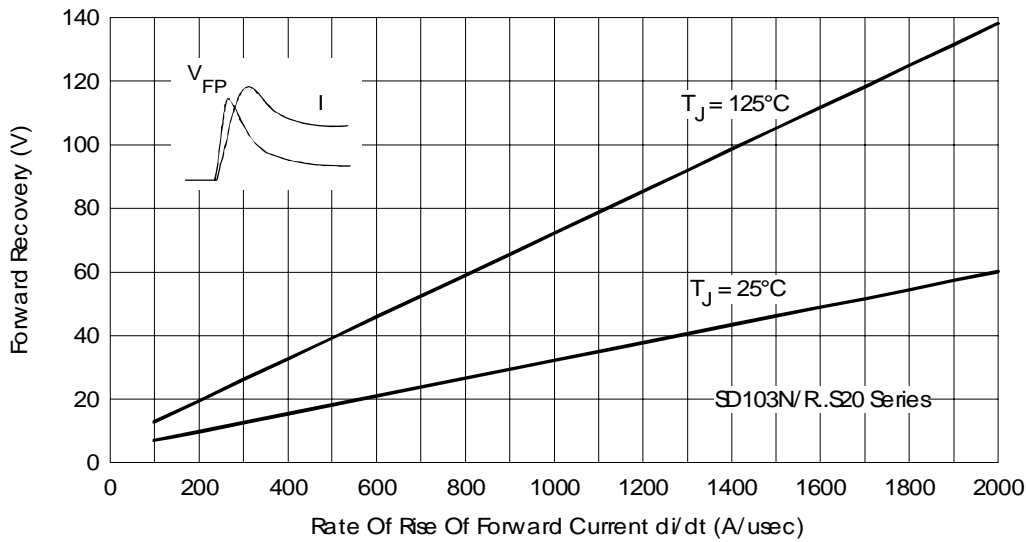


Fig. 9 - Typical Forward Recovery Characteristics

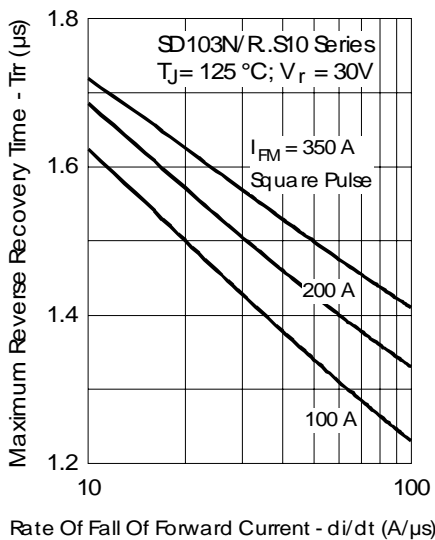


Fig. 10 - Recovery Time Characteristics

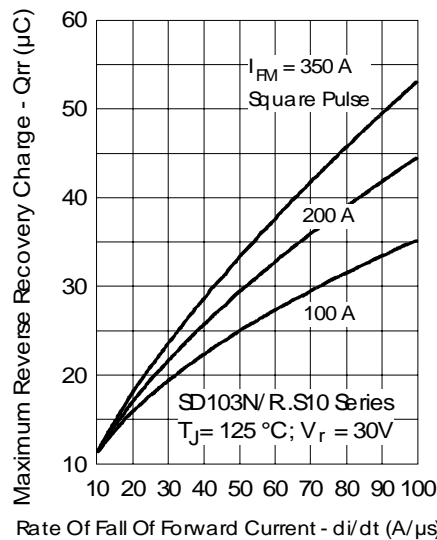


Fig. 11 - Recovery Charge Characteristics

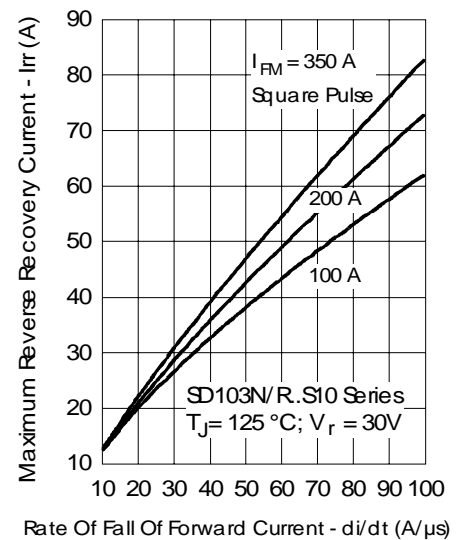


Fig. 12 - Recovery Current Characteristics

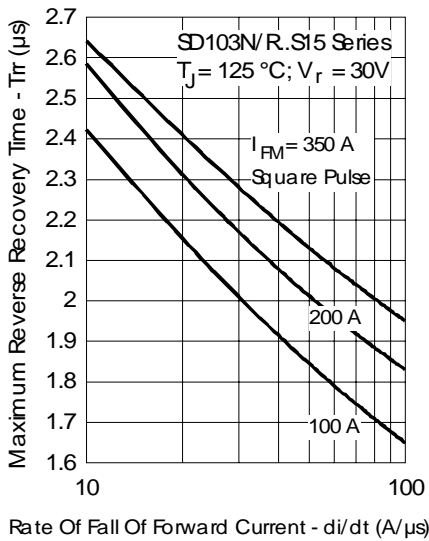


Fig. 13 - Recovery Time Characteristics

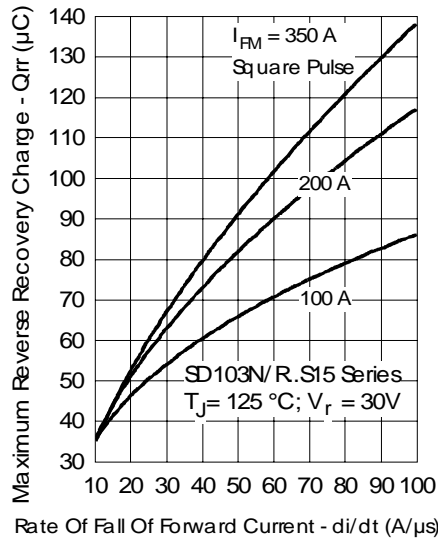


Fig. 14 - Recovery Charge Characteristics

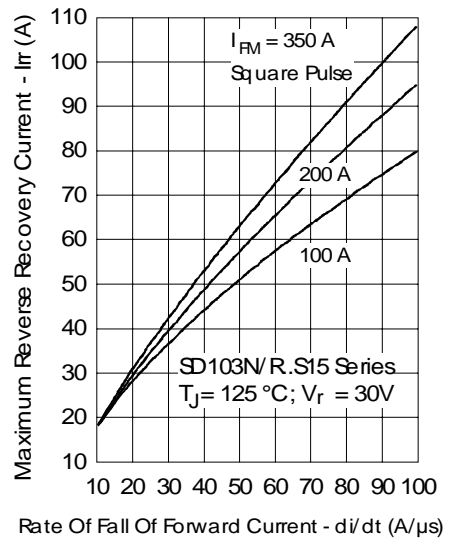


Fig. 15 - Recovery Current Characteristics

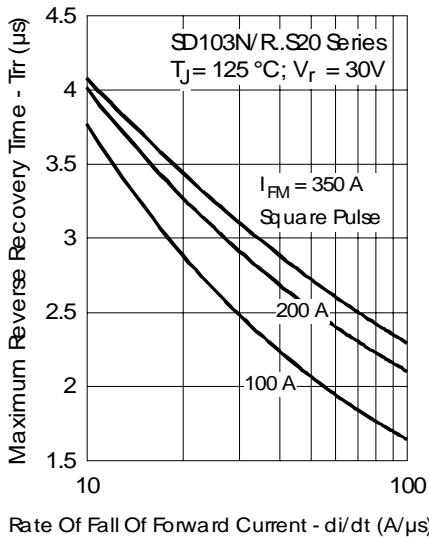


Fig. 16 - Recovery Time Characteristics

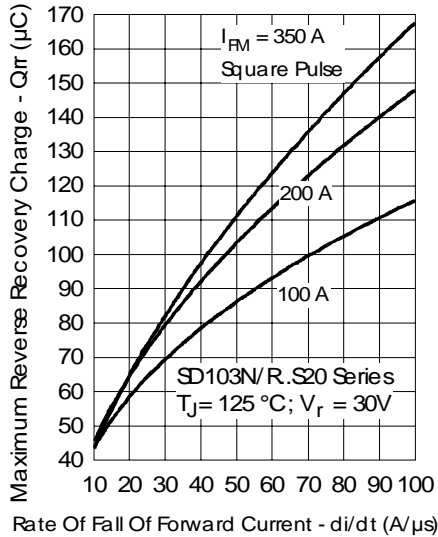


Fig. 17 - Recovery Charge Characteristics

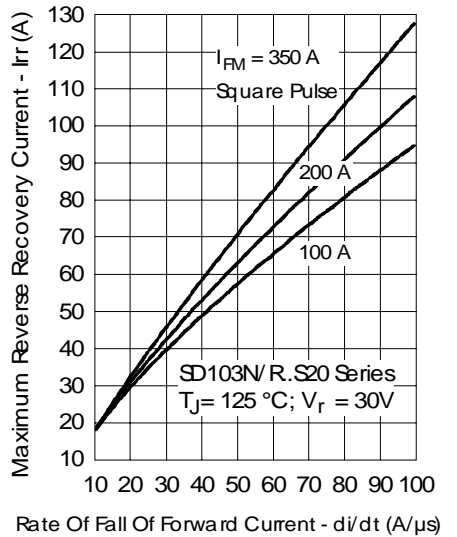


Fig. 18 - Recovery Current Characteristics

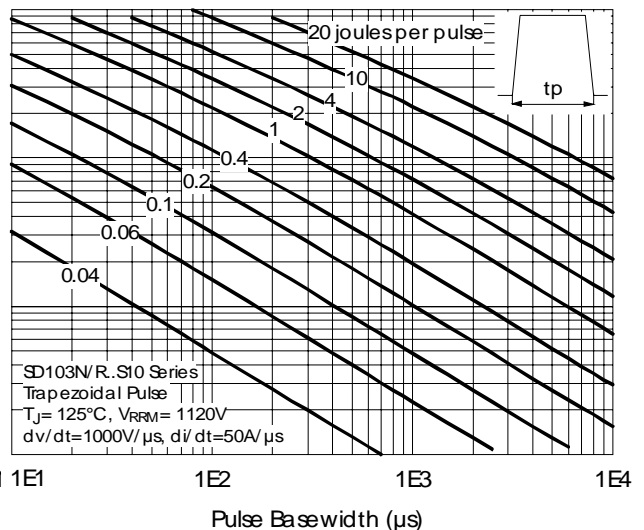
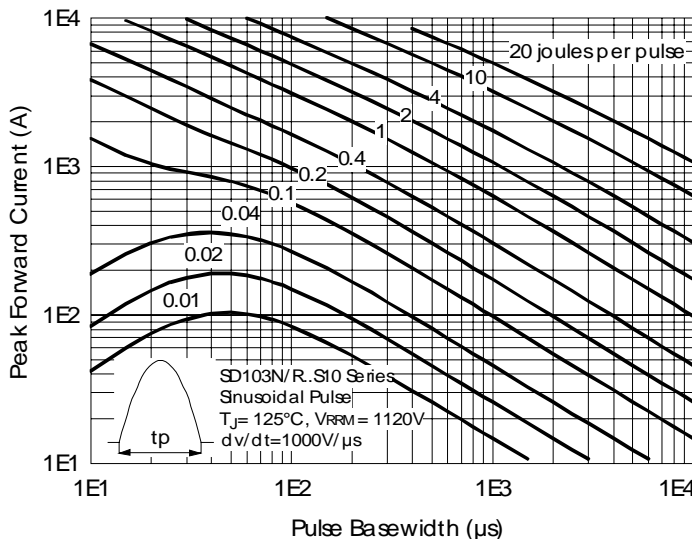


Fig. 19 - Maximum Total Energy Loss Per Pulse Characteristics

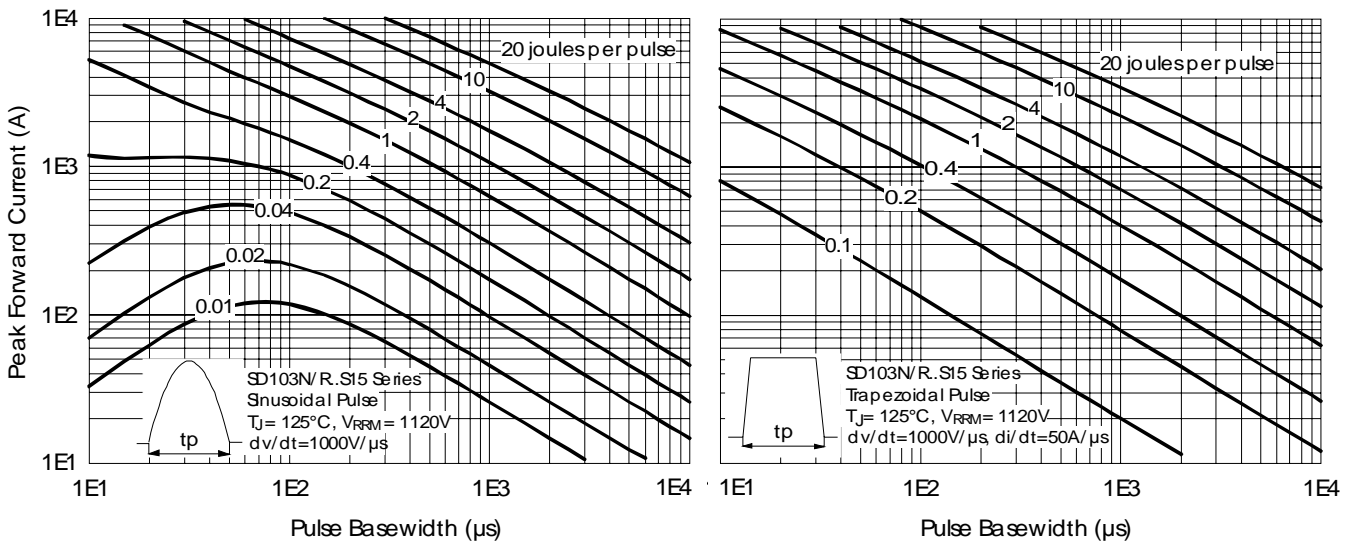


Fig. 20 - Maximum Total Energy Loss Per Pulse Characteristics

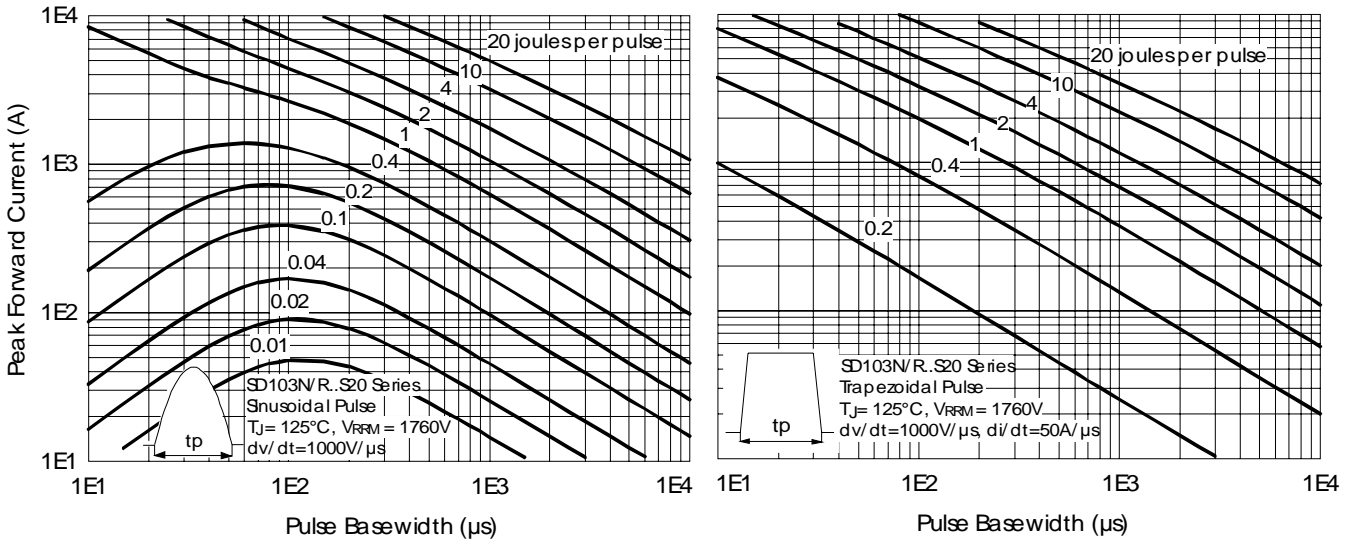


Fig. 21 - Maximum Total Energy Loss Per Pulse Characteristics

Data and specifications subject to change without notice.  
This product has been designed and qualified for Industrial Level.  
Qualification Standards can be found on IR's Web site.

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