

### FAST RECOVERY DIODES

### Hockey Puk Version

#### Features

- High power FAST rectifier diode series
- 5.0  $\mu$ s recovery time
- High voltage ratings up to 4500V
- 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 DO-200AC (K-PUK)
- Maximum junction temperature 125°C

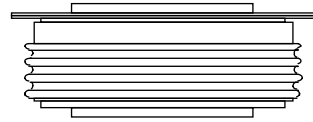
#### Typical Applications

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

#### Major Ratings and Characteristics

| Parameters      | SD853C..S50K | Units   |
|-----------------|--------------|---------|
| $I_{F(AV)}$     | 990          | A       |
| @ $T_{hs}$      | 55           | °C      |
| $I_{F(RMS)}$    | 1800         | A       |
| @ $T_{hs}$      | 25           | °C      |
| $I_{FSM}$       | @ 50Hz       | 19000   |
|                 | @ 60Hz       | 19900   |
| $I^2t$          | @ 50Hz       | 1810    |
|                 | @ 60Hz       | 1652    |
| $V_{RRM}$ range | 3000 to 4500 | V       |
| $t_{rr}$        | 5.0          | $\mu$ s |
| @ $T_J$         | 25           | °C      |
| $T_J$           | - 40 to 125  | °C      |

990A



case style DO-200AC (K-PUK)

## SD853C..S50K Series

Bulletin I2093 rev.C 04/00

International  
**IR** Rectifier

### ELECTRICAL SPECIFICATIONS

#### Voltage Ratings

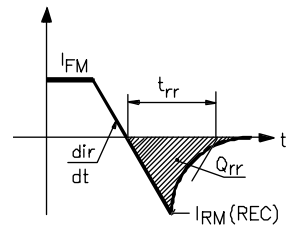
| Type number  | Voltage Code | $V_{RRM}$ , maximum repetitive peak reverse voltage<br>V | $V_{RSM}$ , maximum non-repetitive peak rev. voltage<br>V | $I_{RRM}$ max.<br>@ $T_J = 125^\circ\text{C}$<br>mA |
|--------------|--------------|----------------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------|
| SD853C..S50K | 30           | 3000                                                     | 3100                                                      | 100                                                 |
|              | 36           | 3600                                                     | 3700                                                      |                                                     |
|              | 40           | 4000                                                     | 4100                                                      |                                                     |
|              | 45           | 4500                                                     | 4600                                                      |                                                     |

#### Forward Conduction

| Parameter                                                            | SD853C..S50K | Units              | Conditions                                                                                |
|----------------------------------------------------------------------|--------------|--------------------|-------------------------------------------------------------------------------------------|
| $I_{F(AV)}$ Max. average forward current<br>@ Heatsink temperature   | 990 (420)    | A                  | 180° conduction, half sine wave                                                           |
|                                                                      | 55 (85)      | °C                 | Double side (single side) cooled                                                          |
| $I_{F(RMS)}$ Max. RMS forward current                                | 1800         | A                  | @ 25°C heatsink temperature double side cooled                                            |
| $I_{FSM}$ Max. peak, one-cycle forward, non-repetitive surge current | 19000        | A                  | t = 10ms No voltage                                                                       |
|                                                                      | 19900        |                    | t = 8.3ms reapplied                                                                       |
|                                                                      | 16000        |                    | t = 10ms 50% $V_{RRM}$                                                                    |
|                                                                      | 16750        |                    | t = 8.3ms reapplied                                                                       |
| $I^2t$ Maximum $I^2t$ for fusing                                     | 1805         | KA <sup>2</sup> s  | t = 10ms No voltage                                                                       |
|                                                                      | 1645         |                    | t = 8.3ms reapplied                                                                       |
|                                                                      | 1280         |                    | t = 10ms 50% $V_{RRM}$                                                                    |
|                                                                      | 1165         |                    | t = 8.3ms reapplied                                                                       |
| $I^2/t$ Maximum $I^2/t$ for fusing                                   | 18050        | KA <sup>2</sup> /s | t = 0.1 to 10ms, no voltage reapplied                                                     |
| $V_{F(TO)1}$ Low level value of threshold voltage                    | 1.50         | V                  | $(16.7\% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)}), T_J = T_J \text{ max.}$ |
| $V_{F(TO)2}$ High level value of threshold voltage                   | 1.67         |                    | $(I > \pi \times I_{F(AV)}), T_J = T_J \text{ max.}$                                      |
| $r_{f1}$ Low level value of forward slope resistance                 | 0.70         | mΩ                 | $(16.7\% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)}), T_J = T_J \text{ max.}$ |
| $r_{f2}$ High level value of forward slope resistance                | 0.65         |                    | $(I > \pi \times I_{F(AV)}), T_J = T_J \text{ max.}$                                      |
| $V_{FM}$ Max. forward voltage drop                                   | 2.90         | V                  | $I_{pk} = 2000\text{A}, T_J = 125^\circ\text{C}, t_p = 10\text{ms}$ sinusoidal wave       |

#### Recovery Characteristics

| Code | $T_J = 25^\circ\text{C}$<br>typical $t_{rr}$<br>@ 25% $I_{RRM}$<br>(μs) | Test conditions                 |                       |              | 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) |
| S50  | 5.0                                                                     | 1000                            | 100                   | -50          | 6.5                                     | 1000             | 270             |



### Thermal and Mechanical Specifications

| Parameter                                                  | SD853C..S50K     | Units     | Conditions                                                         |
|------------------------------------------------------------|------------------|-----------|--------------------------------------------------------------------|
| $T_J$ Max. junction operating temperature range            | -40 to 125       | °C        |                                                                    |
| $T_{stg}$ Max. storage temperature range                   | -40 to 150       |           |                                                                    |
| $R_{thJ-hs}$ Max. thermal resistance, junction to heatsink | 0.04<br>0.02     | K/W       | DC operation single side cooled<br>DC operation double side cooled |
| F Mounting force, $\pm 10\%$                               | 22250<br>(2250)  | N<br>(Kg) |                                                                    |
| wt Approximate weight                                      | 425              | g         |                                                                    |
| Case style                                                 | DO-200AC (K-PUK) |           | See outline table                                                  |

### $\Delta R_{thJ-hs}$ Conduction

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

| Conduction angle | Sinusoidal conduction |             | Rectangular conduction |             | Units | Conditions                 |
|------------------|-----------------------|-------------|------------------------|-------------|-------|----------------------------|
|                  | Single Side           | Double Side | Single Side            | Double Side |       |                            |
| 180°             | 0.0017                | 0.0019      | 0.0012                 | 0.0012      | K/W   | $T_J = T_{J \text{ max.}}$ |
| 120°             | 0.0021                | 0.0021      | 0.0021                 | 0.0021      |       |                            |
| 90°              | 0.0026                | 0.0027      | 0.0029                 | 0.0029      |       |                            |
| 60°              | 0.0039                | 0.0039      | 0.0041                 | 0.0041      |       |                            |
| 30°              | 0.0067                | 0.0067      | 0.0068                 | 0.0068      |       |                            |

### Ordering Information Table

| Device Code |                                                                    |     |     |     |     |         |
|-------------|--------------------------------------------------------------------|-----|-----|-----|-----|---------|
|             | SD                                                                 | 85  | 3   | C   | 45  | S50 K   |
|             | (1)                                                                | (2) | (3) | (4) | (5) | (6) (7) |
| <b>1</b>    | - Diode                                                            |     |     |     |     |         |
| <b>2</b>    | - Essential part number                                            |     |     |     |     |         |
| <b>3</b>    | - 3 = Fast recovery                                                |     |     |     |     |         |
| <b>4</b>    | - C = Ceramic Puk                                                  |     |     |     |     |         |
| <b>5</b>    | - Voltage code: Code x 100 = $V_{RRM}$ (See Voltage Ratings table) |     |     |     |     |         |
| <b>6</b>    | - $t_{rr}$ code                                                    |     |     |     |     |         |
| <b>7</b>    | - K = Puk Case DO-200AC (K-PUK)                                    |     |     |     |     |         |

SD853C..S50K Series

Bulletin I2093 rev.C 04/00

Outline Table

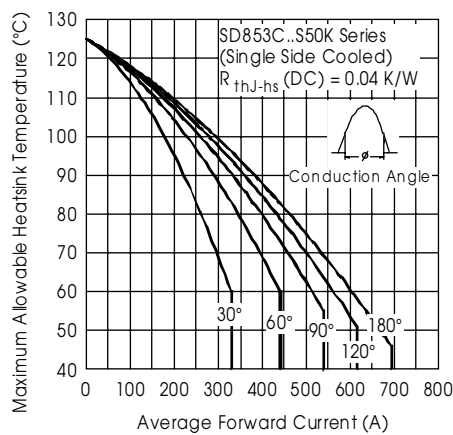
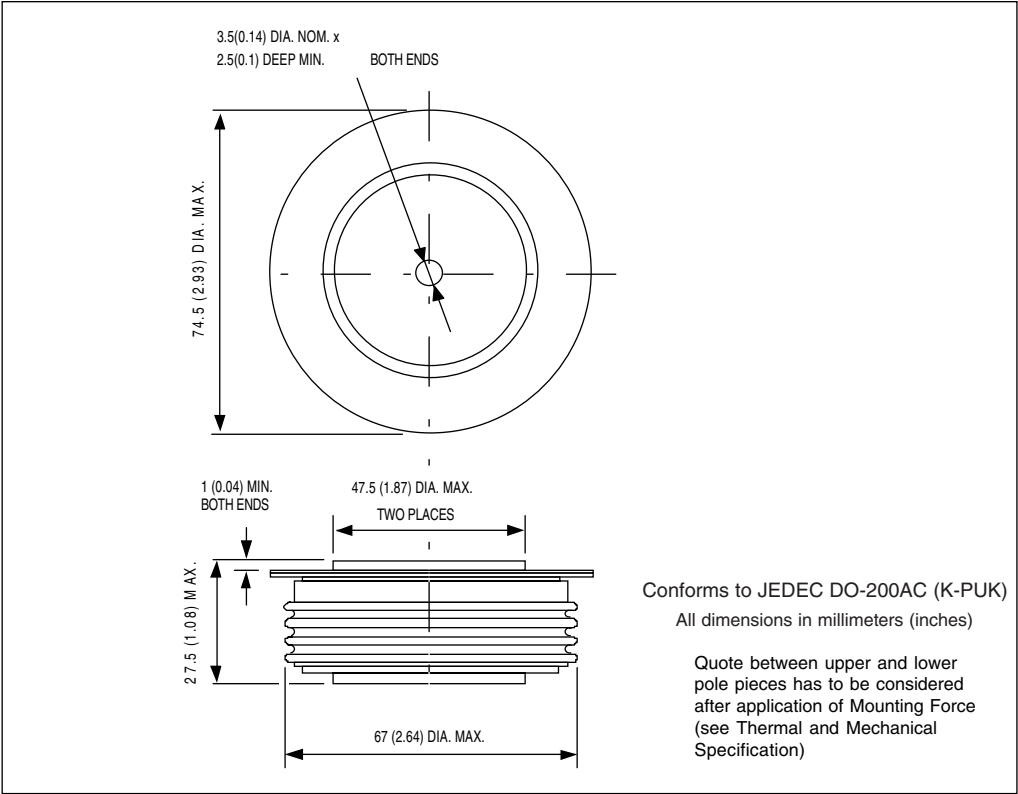


Fig. 1 - Current Ratings Characteristics

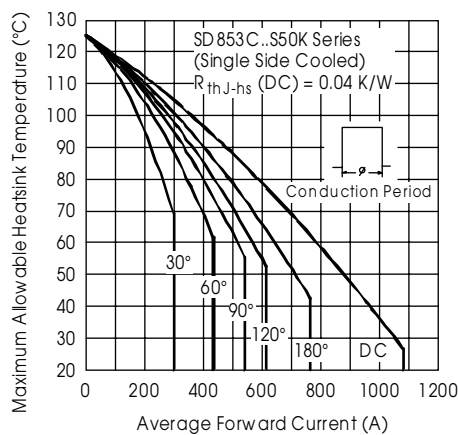


Fig. 2 - Current Ratings Characteristics

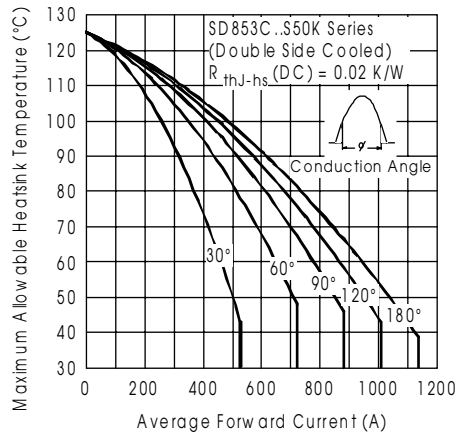


Fig. 3 - Current Ratings Characteristics

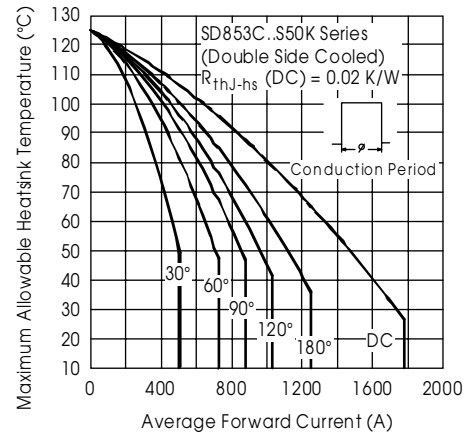


Fig. 4 - Current Ratings Characteristics

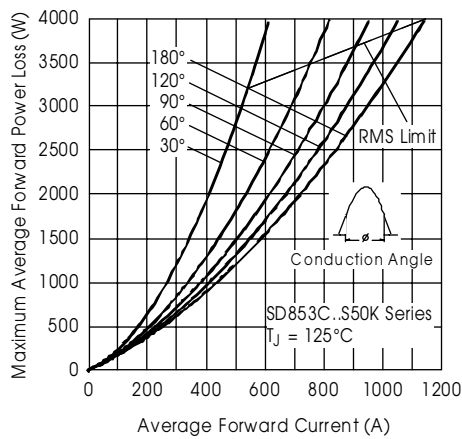


Fig. 5 - Forward Power Loss Characteristics

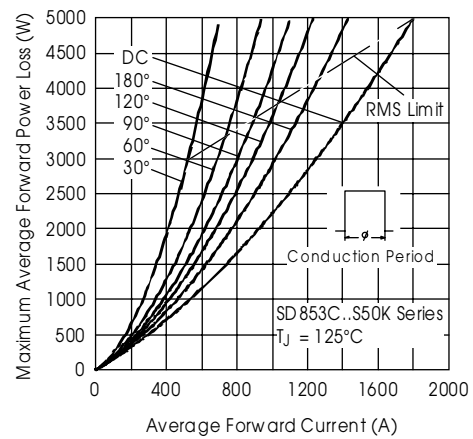


Fig. 6 - Forward Power Loss Characteristics

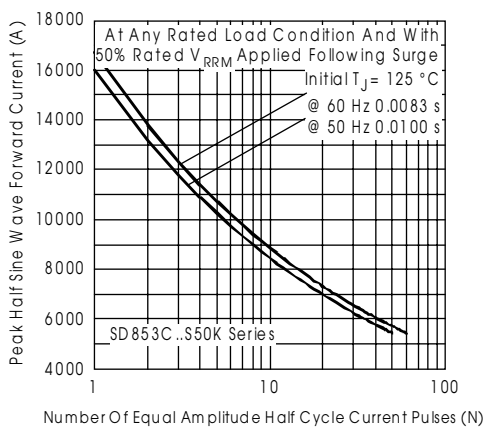


Fig. 7 - Maximum Non-repetitive Surge Current  
Single and Double Side Cooled

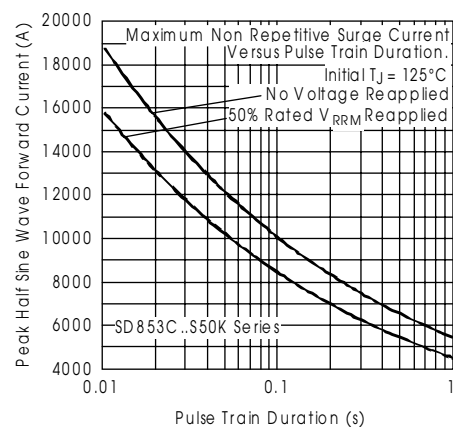


Fig. 8 - Maximum Non-repetitive Surge Current  
Single and Double Side Cooled

## SD853C..S50K Series

Bulletin I2093 rev. C 04/00

International  
**IR** Rectifier

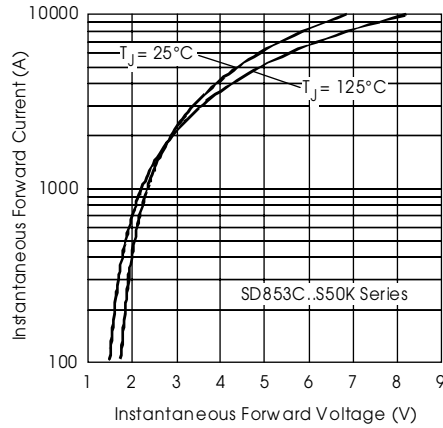


Fig. 9 - Forward Voltage Drop Characteristics

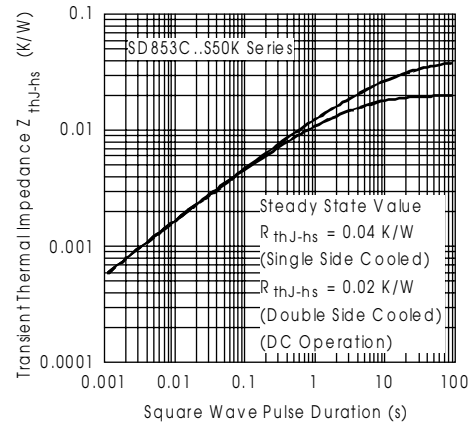


Fig. 10 - Thermal Impedance  $Z_{thJ-hs}$  Characteristic

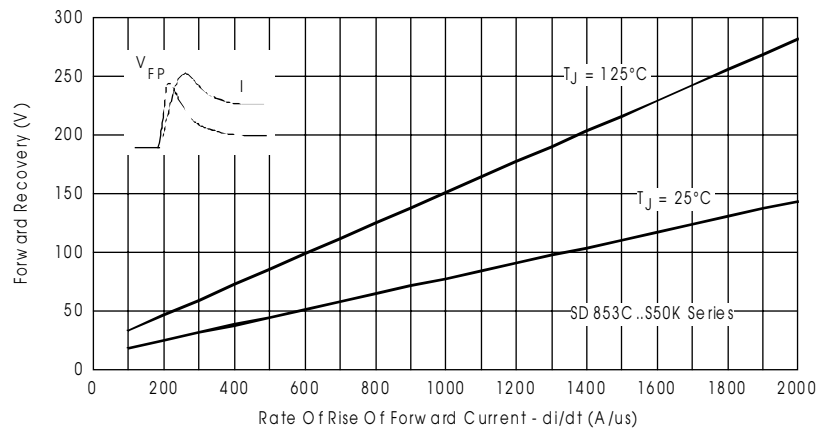


Fig. 11 - Typical Forward Recovery Characteristics

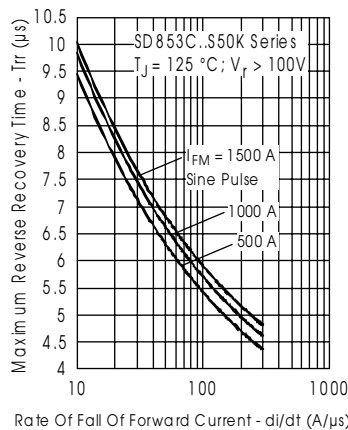


Fig. 12 - Recovery Time Characteristics

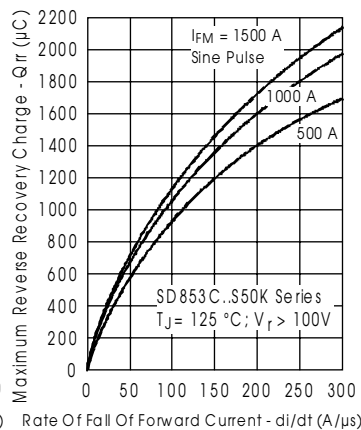


Fig. 13 - Recovery Charge Characteristics

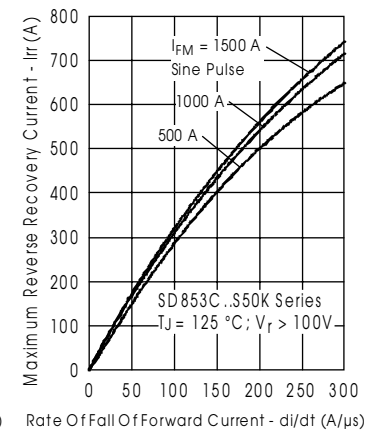


Fig. 14 - Recovery Current Characteristics

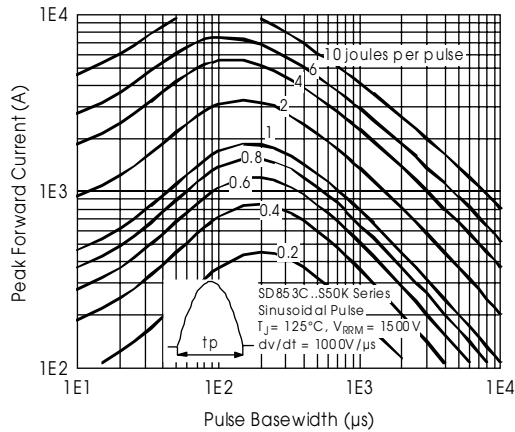


Fig. 15 - Maximum Total Energy Loss Per Pulse Characteristics

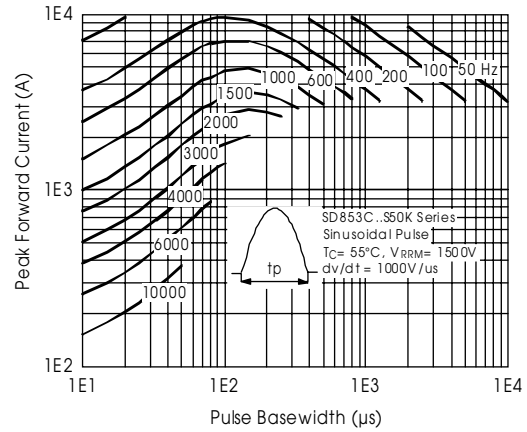


Fig. 16 - Frequency Characteristics

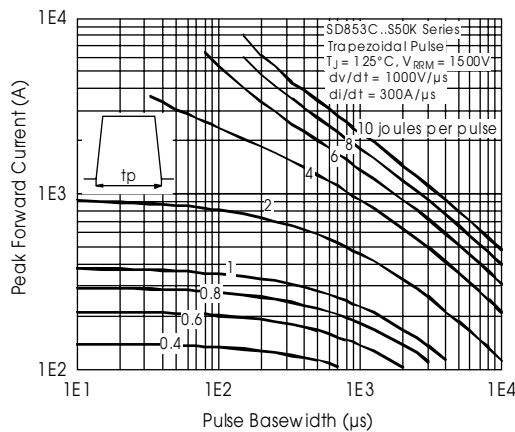


Fig. 17 - Maximum Total Energy Loss Per Pulse Characteristics

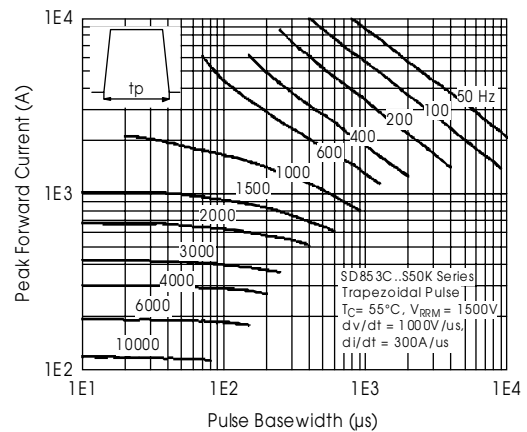


Fig. 18 - Frequency Characteristics

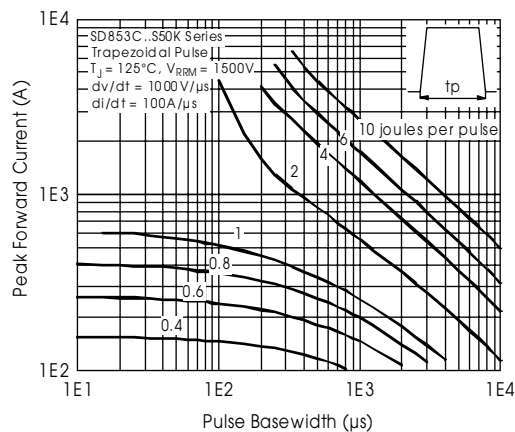


Fig. 19 - Maximum Total Energy Loss Per Pulse Characteristics

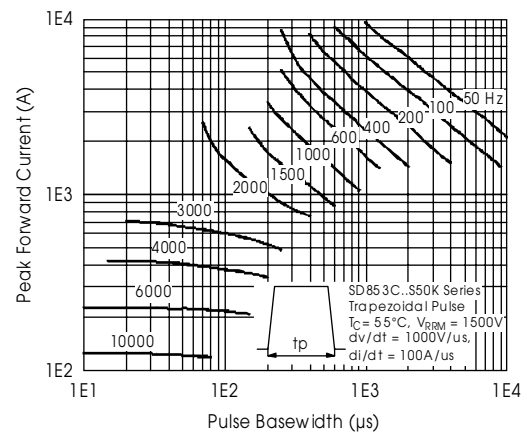


Fig. 20 - Frequency Characteristics