International
IOR Rectifier

# SD2053C..S50R SERIES

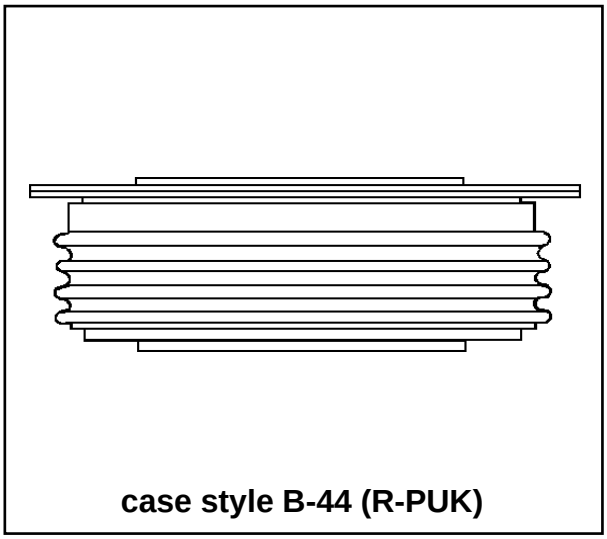
## FAST RECOVERY DIODES

**Hockey Puk Version**

2000 A

### Features

- High power FAST rectifier diode series
- 5.0 µs recovery time
- High voltage ratings up to 4500 V
- High current capability
- Optimized turn on and turn off characteristics
- Low forward recovery
- Fast and soft reverse recovery
- Press-puk encapsulation
- Case style B-44 (R-PUK)
- Maximum junction temperature 125°C



**case style B-44 (R-PUK)**

### Typical Applications

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

### Major Ratings and Characteristics

| Parameters | | SD2053C..S50R | Units |
|---|---|---|---|
| $I_{F(AV)}$ | | 2000 | A |
| | @ $T_{hs}$ | 55 | °C |
| $I_{F(RMS)}$ | | 4000 | A |
| | @ $T_{hs}$ | 25 | °C |
| $I_{FSM}$ | @ 50Hz | 30 | KA |
| | @ 60Hz | 31.8 | KA |
| $I^2t$ | @ 50Hz | 4500 | $KA^2s$ |
| | @ 60Hz | 4197 | $KA^2s$ |
| $I^2\sqrt{t}$ | | 45000 | $KA^2\sqrt{s}$ |
| $V_{DRM}/V_{RRM}$ | range | 3200 to 4500 | V |
| $t_{rr}$ | | 5.0 | µs |
| | @ $T_J$ | 25 | °C |
| $T_J$ | range | -40 to 125 | °C |

## ELECTRICAL SPECIFICATIONS

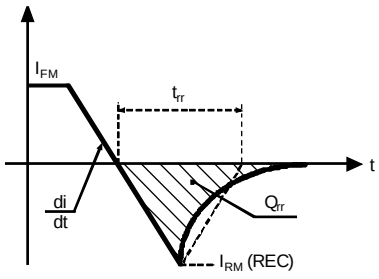
### Voltage Ratings

| Type number | Voltage Code | $V_{RRM}$, maximum repetitive peak reverse voltage V | $V_{RSM}$, maximum non-repetitive peak rev. voltage V | $I_{RRM}$ max. @ $T_J$ = 125°c mA |
|---|---|---|---|---|
| SD2053C..S50R | 32 | 3200 | 3300 | 100 |
| | 36 | 3600 | 3700 | |
| | 40 | 4000 | 4100 | |
| | 45 | 4500 | 4600 | |

### Forward Conduction

| Parameter | | SD2053C..R | Units | Conditions | | |
|---|---|---|---|---|---|---|
| $I_{F(AV)}$ | Maximum average forward current | 2000 (1300) | A | 180° conduction, half sine wave | | |
| | @ Heatsink temperature | 55 (85) | °C | Double side (single side) cooled | | |
| $I_{F(RMS)}$ | Maximum RMS forward current | 4000 | A | @ 25°C heatsink temp. double side cooled | | |
| $I_{FSM}$ | Maximum peak, one-cycle forward, non-repetitive surge current | 30 | KA | t = 10ms | No voltage reapplied | Sinusoidal half wave, Initial $T_J = T_J$ max. |
| | | 31.8 | | t = 8.3ms | | |
| | | 25.6 | | t = 10ms | 50% $V_{RRM}$ reapplied | |
| | | 27.1 | | t = 8.3ms | | |
| $I^2t$ | Maximum $I^2t$ for fusing | 4500 | $KA^2s$ | t = 10ms | No voltage reapplied | |
| | | 4197 | | t = 8.3ms | | |
| | | 3277 | | t = 10ms | 50% $V_{RRM}$ reapplied | |
| | | 3048 | | t = 8.3ms | | |
| $I^2\sqrt{t}$ | Maximum $I^2\sqrt{t}$ for fusing | 45000 | $KA^2\sqrt{s}$ | t = 0.1 to 10ms, no voltage reapplied | | |
| $V_{F(TO)1}$ | Low level value of threshold voltage | 1.453 | V | (16.7% x π x $I_{F(AV)}$ < I < π x $I_{F(AV)}$), $T_J = T_J$ max. | | |
| $V_{F(TO)2}$ | High level value of threshold voltage | 1.600 | | (π x $I_{F(AV)}$ < I < 20 x π x $I_{F(AV)}$), $T_J = T_J$ max. | | |
| $r_{f1}$ | Low level value of forward slope resistance | 0.341 | mΩ | (16.7% x π x $I_{F(AV)}$ < I < π x $I_{F(AV)}$), $T_J = T_J$ max. | | |
| $r_{f2}$ | High level value of forward slope resistance | 0.318 | | (π x $I_{F(AV)}$ < I < 20 x π x $I_{F(AV)}$), $T_J = T_J$ max. | | |
| $V_{FM}$ | Maximum forward voltage drop | 3.50 | V | $T_J$ = 125°C, $I_{FM}$ = 6000A | | |

### Recovery Characteristics

| Code | $T_J$ =25°C Typical $T_{rr}$ @25% $I_{RRM}$ (µs) | Test Conditions | | | Max. values @ $T_J$ = 125°C | | |  |
|---|---|---|---|---|---|---|---|---|
| | | $I_{pk}$ Square Pulse (A) | di/dt (A/µs) | $V_r$ (V) | $t_{rr}$ @25% $I_{RRM}$ (µs) | $Q_{rr}$ (µC) | $I_{rr}$ (A) | |
| S50 | 5.0 | 1000 | 100 | -50 | 6.0 | 1000 | 350 | |

## Thermal and Mechanical Specifications

| | Parameter | SD2053C..R | 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 | 0.02 | K/W | DC operation single side cooled |
| | | 0.01 | | DC operation double side cooled |
| F | Mounting force, ± 10% | 39200 (4000) | N (Kg) | |
| wt | Approximate weight | 1590 | g | |
| | Case style | B-44 (R-PUK) | | See outline table |

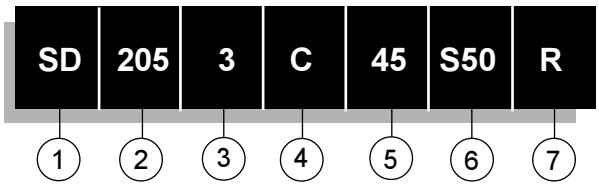
## $\Delta R_{thJC}$ Conduction

(The following table shows the increment of thermal resistance $R_{thJC}$ 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° | 0.0009 | 0.0010 | 0.0006 | 0.0006 | K/W | $T_J = T_J$ max. |
| 120° | 0.0010 | 0.0011 | 0.0010 | 0.0010 | | |
| 90° | 0.0013 | 0.0013 | 0.0014 | 0.0014 | | |
| 60° | 0.0019 | 0.0019 | 0.0020 | 0.0020 | | |
| 30° | 0.0033 | 0.0033 | 0.0034 | 0.0034 | | |

## Ordering Information Table

**Device Code**




**1** - Diode

**2** - Essential part number

**3** - 3 = Fast recovery

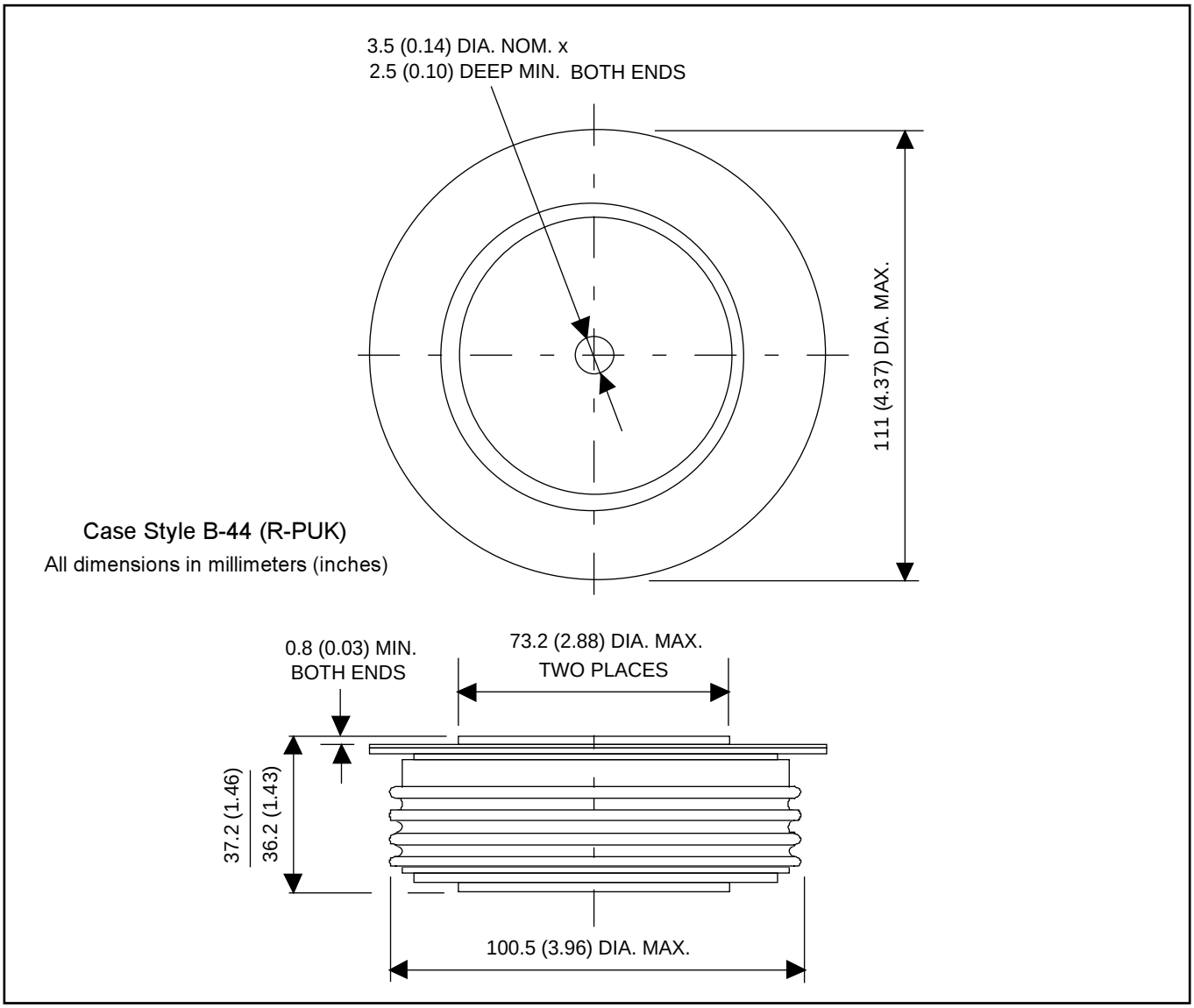
**4** - C = Ceramic Puk

**5** - Voltage code: Code x 100 = $V_{RRM}$ (See Voltage Ratings Table)

**6** - $t_{rr}$ code (See Recovery Characteristics Table)

**7** - K = Puk Case B-44 (R-PUK)

Outline Table

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