

### 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

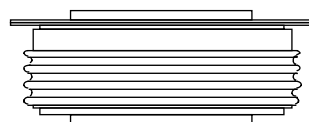
#### Typical Applications

- 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	A
	@ 60Hz	19900	A
$I^2t$	@ 50Hz	1810	KA <sup>2</sup> s
	@ 60Hz	1652	KA <sup>2</sup> s
$V_{RRM}$ 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

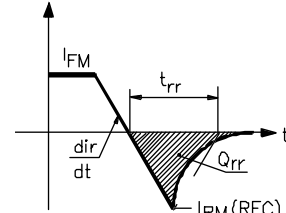
#### Voltage Ratings

Type number	Voltage Code	$V_{RRM}$ , maximum repetitive peak reverse voltage V	$V_{RSM}$ , maximum non-repetitive peak rev. voltage V	$I_{RRM}$ max. @ $T_J = 125^\circ\text{C}$ 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 @ 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	$(16.7\% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)})$ , $T_J = T_J$ max.
$V_{F(TO)2}$ High level value of threshold voltage	1.67		$(I > \pi \times I_{F(AV)})$ , $T_J = T_J$ max.
$r_{f1}$ Low level value of forward slope resistance	0.70	mΩ	$(16.7\% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)})$ , $T_J = T_J$ max.
$r_{f2}$ High level value of forward slope resistance	0.65		$(I > \pi \times I_{F(AV)})$ , $T_J = T_J$ 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	$T_J = 25^\circ\text{C}$ typical $t_{rr}$ @ 25% $I_{RRM}$ (μs)	Test conditions			Max. values @ $T_J = 125^\circ\text{C}$			
		$I_{pk}$ 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	6.5	1000	270	

**Thermal and Mechanical Specifications**

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

**ΔR<sub>thJ-hs</sub> Conduction**

(The following table shows the increment of thermal resistance R<sub>thJ-hs</sub> 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 <sub>J</sub> = T <sub>J</sub> 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**

<b>SD</b>	<b>85</b>	<b>3</b>	<b>C</b>	<b>45</b>	<b>S50</b>	<b>K</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: Code x 100 = V<sub>RRM</sub> (See Voltage Ratings table)
- 6** - t<sub>rr</sub> code
- 7** - K = Puk Case DO-200AC (K-PUK)

# SD853C..S50K Series

Bulletin I2093 rev. C 04/00

International  
**IRF** Rectifier

## Outline Table

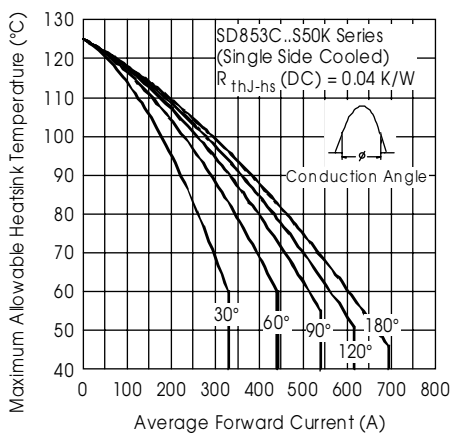
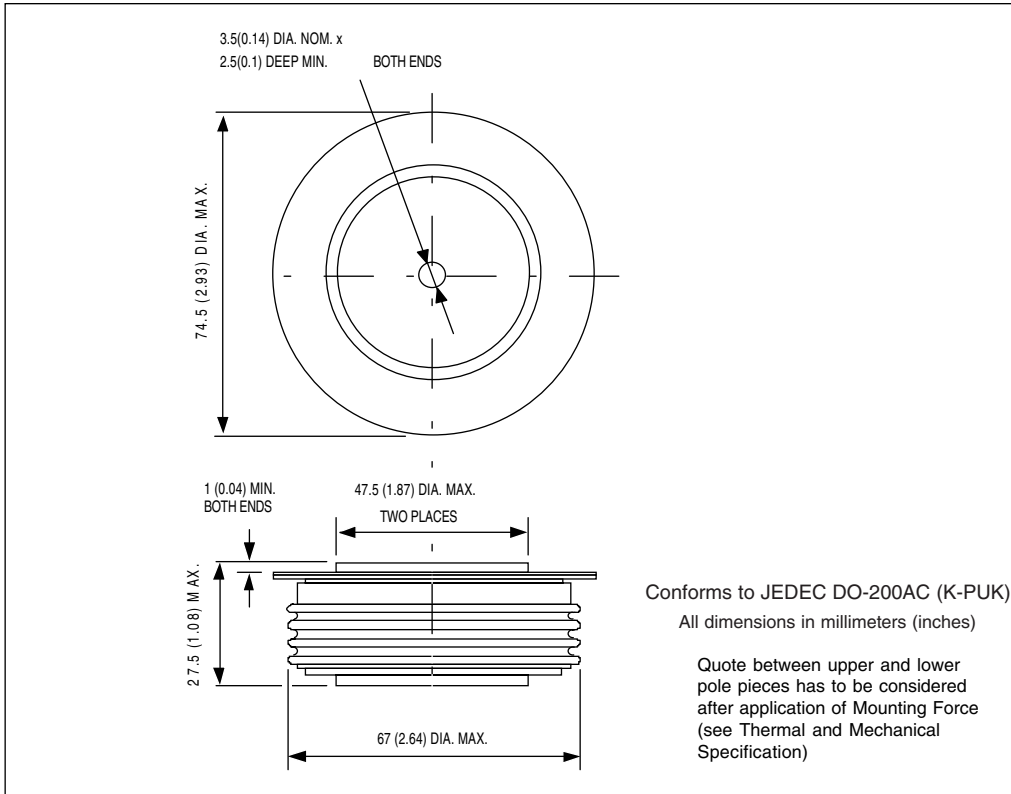


Fig. 1 - Current Ratings Characteristics

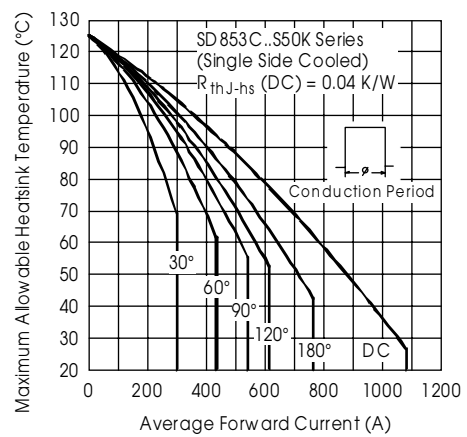


Fig. 2 - Current Ratings Characteristics

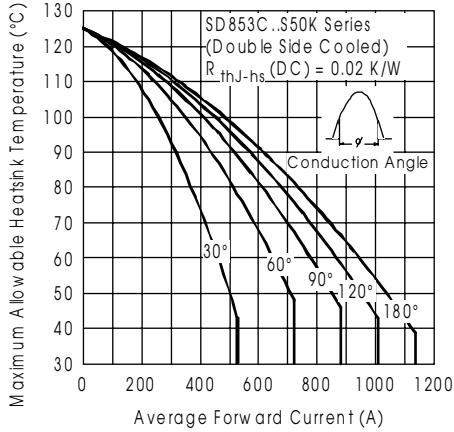


Fig. 3 - Current Ratings Characteristics

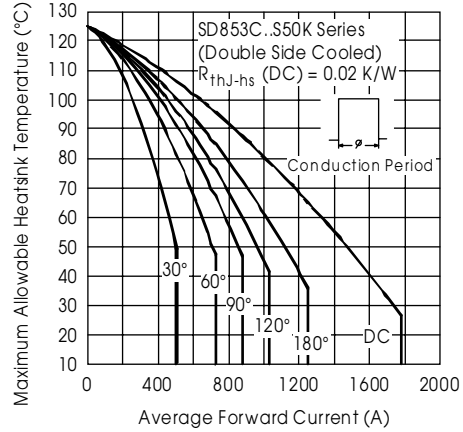


Fig. 4 - Current Ratings Characteristics

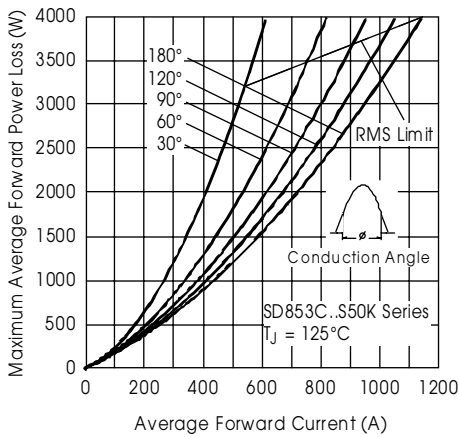


Fig. 5 - Forward Power Loss Characteristics

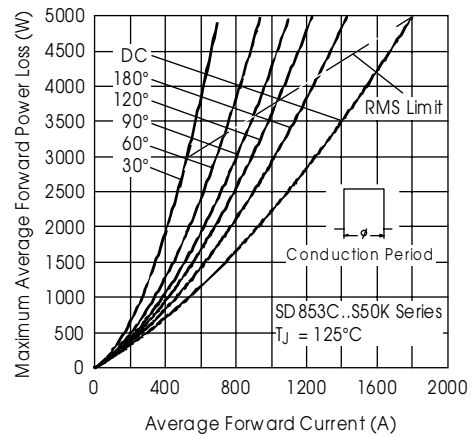


Fig. 6 - Forward Power Loss Characteristics

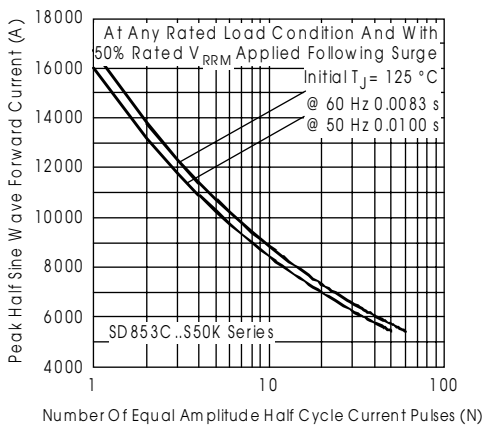


Fig. 7 - Maximum Non-repetitive Surge Current  
Single and Double Side Cooled

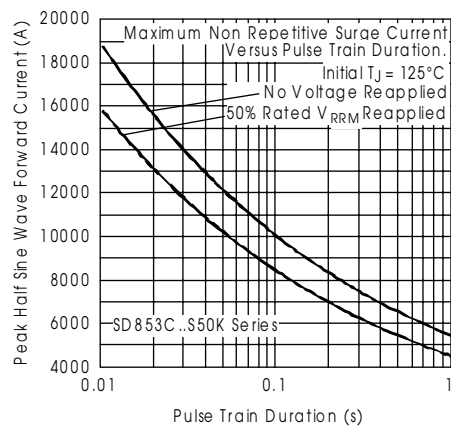


Fig. 8 - Maximum Non-repetitive Surge Current  
Single and Double Side Cooled

# SD853C..S50K Series

Bulletin I2093 rev. C 04/00

International  
**IRF** Rectifier

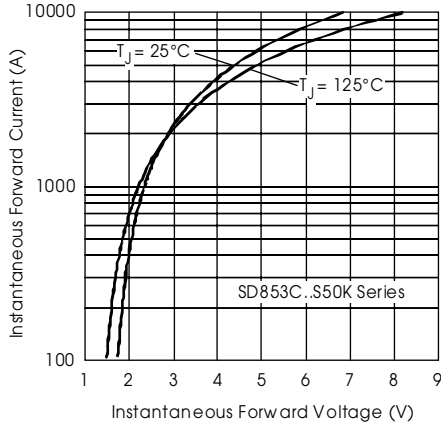


Fig. 9 - Forward Voltage Drop Characteristics

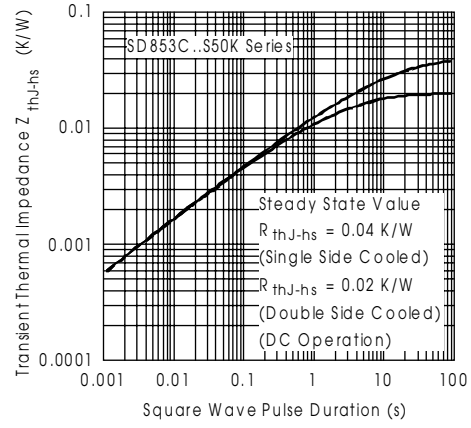


Fig. 10 - Thermal Impedance  $Z_{thj-hs}$  Characteristic

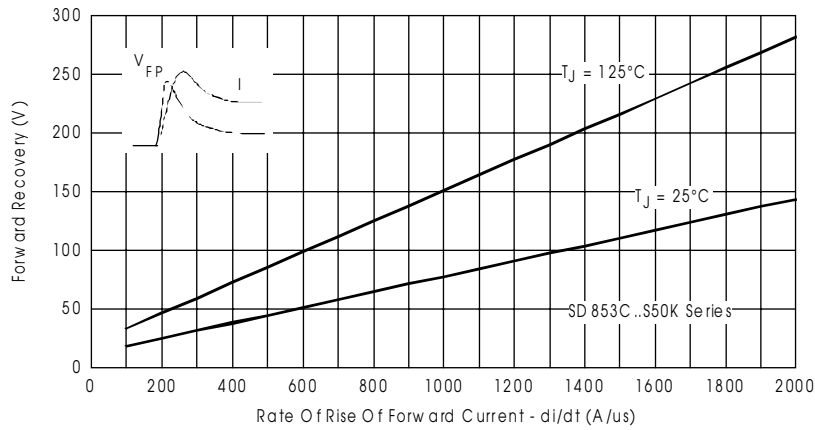


Fig. 11 - Typical Forward Recovery Characteristics

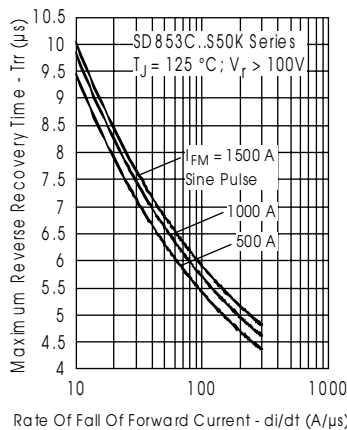


Fig. 12 - Recovery Time Characteristics

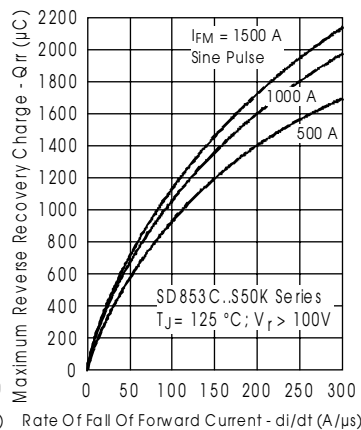


Fig. 13 - Recovery Charge Characteristics

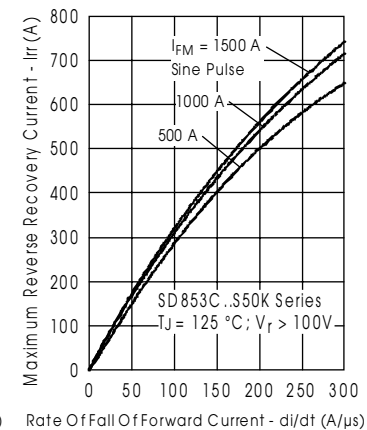


Fig. 14 - Recovery Current Characteristics

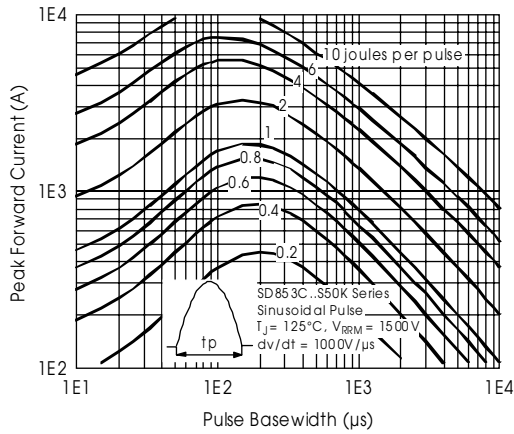


Fig. 15 - Maximum Total Energy Loss Per Pulse Characteristics

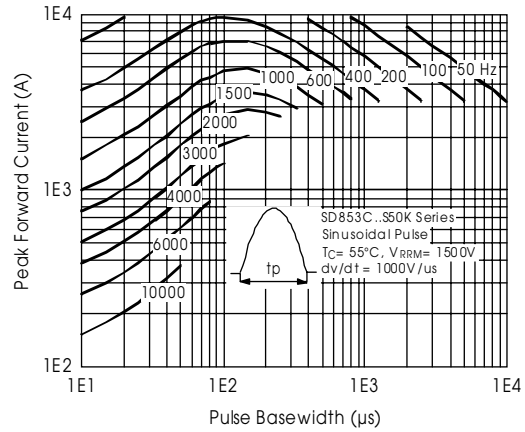


Fig. 16 - Frequency Characteristics

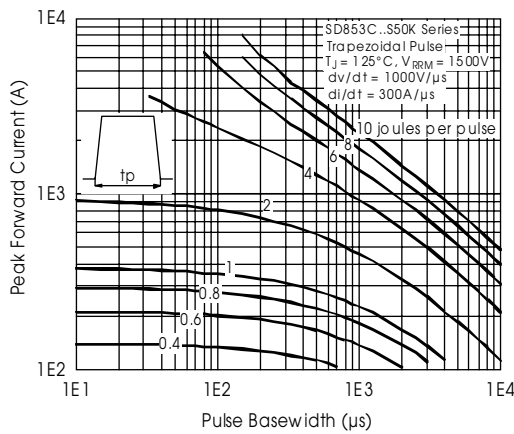


Fig. 17 - Maximum Total Energy Loss Per Pulse Characteristics

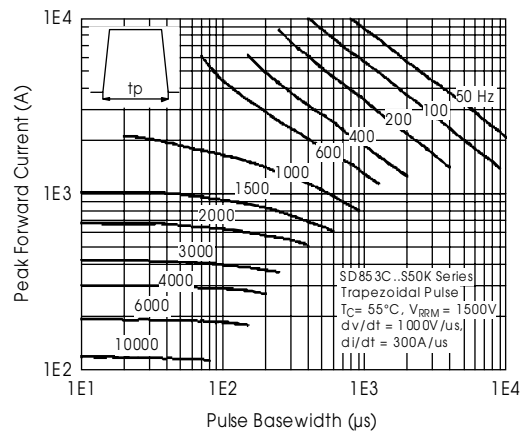


Fig. 18 - Frequency Characteristics

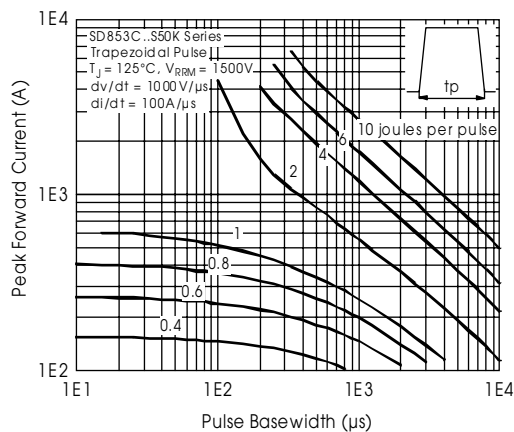


Fig. 19 - Maximum Total Energy Loss Per Pulse Characteristics

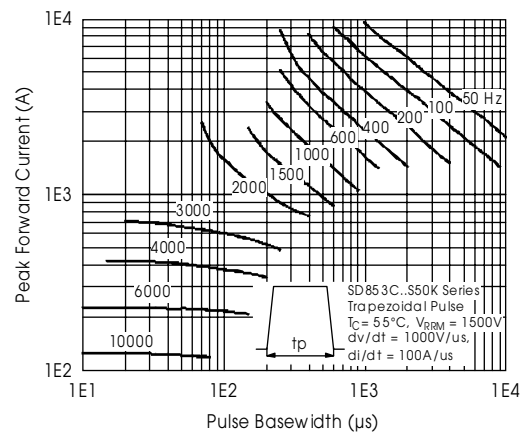


Fig. 20 - Frequency Characteristics

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