DISCRETE POWER DIODES and THYRISTORS

DATA BOOK

International
IOR Rectifier

SD553C..S50L SERIES

FAST RECOVERY DIODES **Hockey Puk Version**

560A

Features

- High power FAST recovery diode series
- 6.0 µs 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-200AB (B-PUK)
- Maximum junction temperature 125°C

case style DO-200AB (B-PUK)

Typical Applications

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

Major Ratings and Characteristics

Parameters		SD553C..S50L	Units
$I_{F(AV)}$		560	A
	@ T_{hs}	55	°C
$I_{F(RMS)}$		1120	A
	@ T_{hs}	25	°C
I_{FSM}	@ 50Hz	12000	A
	@ 60Hz	12570	A
I^2t	@ 50Hz	721	KA^2s
	@ 60Hz	658	KA^2s
V_{RRM} range		3000 to 4500	V
t_{rr}		6.0	µs
	@ T_J	125	°C
T_J		- 40 to 125	°C

ELECTRICAL SPECIFICATIONS

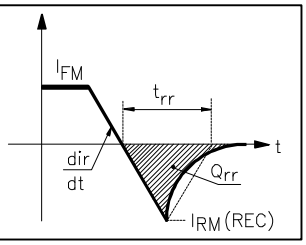
Voltage Ratings

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
SD553C..S50L	30	3000	3100	75
	36	3600	3700	
	40	4000	4100	
	45	4500	4600	

Forward Conduction

Parameter		SD553C..S50L	Units	Conditions		
$I_{F(AV)}$	Max. average forward current	560 (210)	A	180° conduction, half sine wave		
	@ Heatsink temperature	55 (85)	°C	Double side (single side) cooled		
$I_{F(RMS)}$	Max. RMS forward current	1120	A	@ 25°C heatsink temperature double side cooled		
I_{FSM}	Max. peak, one-cycle forward, non-repetitive surge current	12000	A	t = 10ms	No voltage	Sinusoidal half wave, Initial T_J = T_J max.
		12570		t = 8.3ms	reapplied	
		10100		t = 10ms	50% V_{RRM}	
		10570		t = 8.3ms	reapplied	
I^2t	Maximum I^2t for fusing	721	KA^2s	t = 10ms	No voltage	
		658		t = 8.3ms	reapplied	
		510		t = 10ms	50% V_{RRM}	
		466		t = 8.3ms	reapplied	
$I^2\sqrt{t}$	Maximum $I^2\sqrt{t}$ for fusing	7210	$KA^2\sqrt{s}$	t = 0.1 to 10ms, no voltage reapplied		
$V_{F(TO)1}$	Low level value of threshold voltage	1.77	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	1.95		(I > π x $I_{F(AV)}$), T_J = T_J max.		
r_{f1}	Low level value of forward slope resistance	0.98	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	0.89		(I > π x $I_{F(AV)}$), T_J = T_J max.		
V_{FM}	Max. forward voltage drop	3.24	V	I_{pk}= 1500A, T_J = 125°C, t_p = 10ms sinusoidal wave		

Recovery Characteristics

Code	T_J = 25°C	Test conditions			Max. values @ T_J = 125°C			
	Typical t_{rr} @ 25% I_{RRM} (µs)	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	900	250	

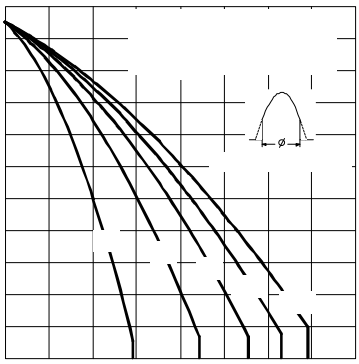


Fig. 3 - Current Ratings Characteristics

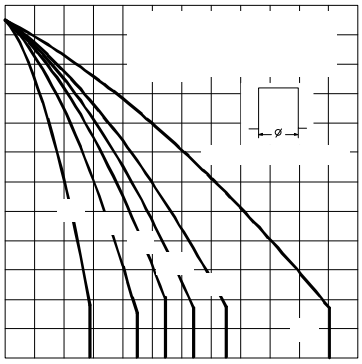


Fig. 4 - Current Ratings Characteristics

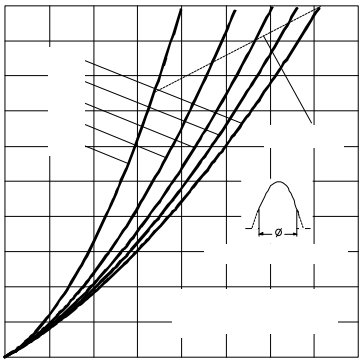


Fig. 5 - Forward Power Loss Characteristics

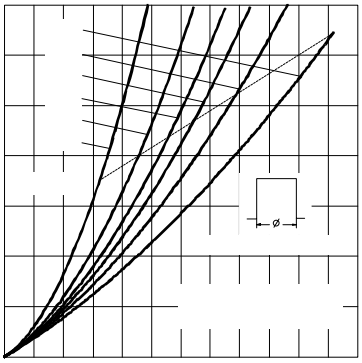


Fig. 6 - Forward Power Loss Characteristics

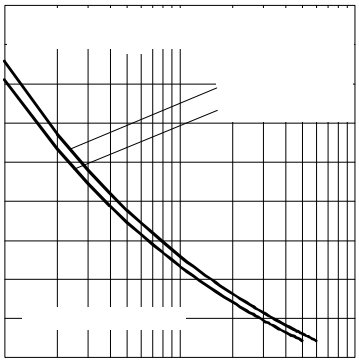


Fig. 7 - Maximum Non-repetitive Surge Current
Single and Double Side Cooled

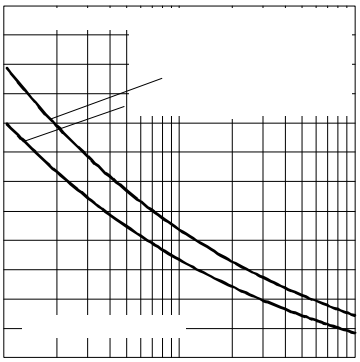


Fig. 8 - Maximum Non-repetitive Surge Current
Single and Double Side Cooled

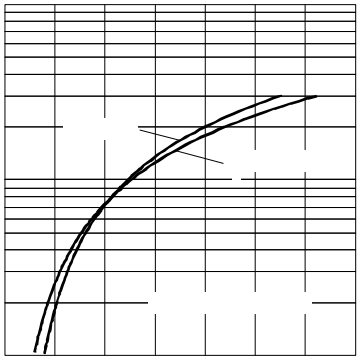


Fig. 9 - Forward Voltage Drop Characteristics

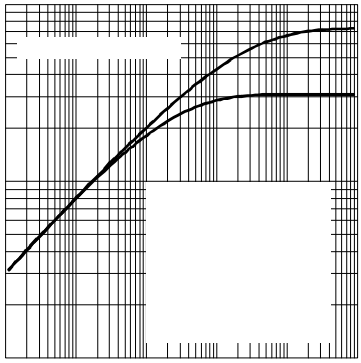


Fig. 10 - Thermal Impedance Z_{thJ-hs} Characteristic

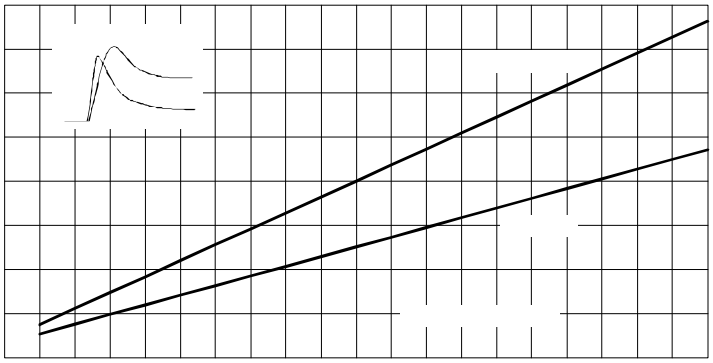


Fig. 11 - Typical Forward Recovery Characteristics

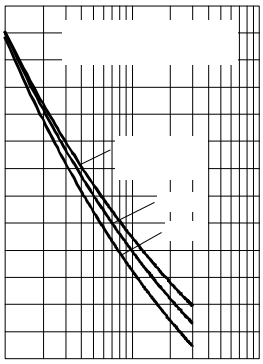


Fig. 12 - Recovery Time Characteristics

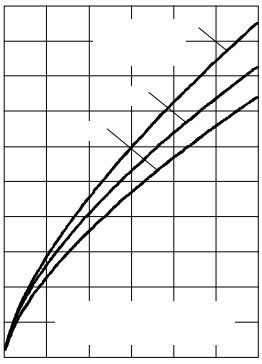


Fig. 13 - Recovery Charge Characteristics

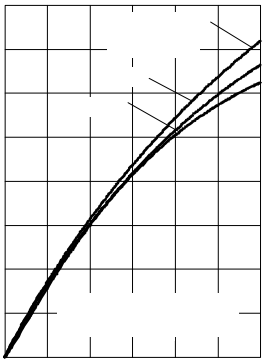


Fig. 14 - Recovery Current Characteristics

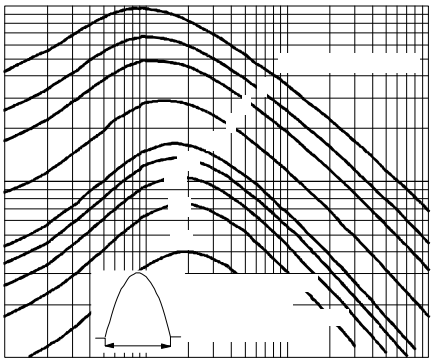


Fig. 15 - Maximum Total Energy Loss Per Pulse Characteristics

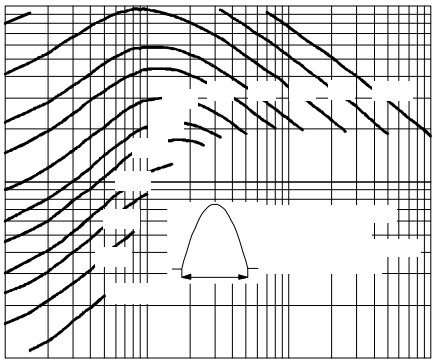


Fig. 16 - Frequency Characteristics

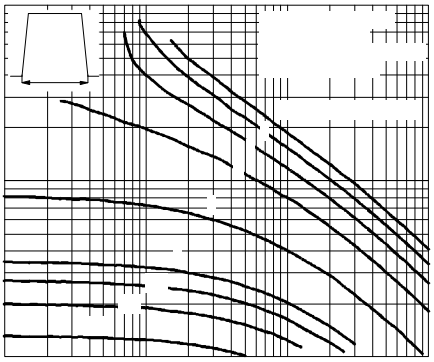


Fig. 17 - Maximum Total Energy Loss Per Pulse Characteristics

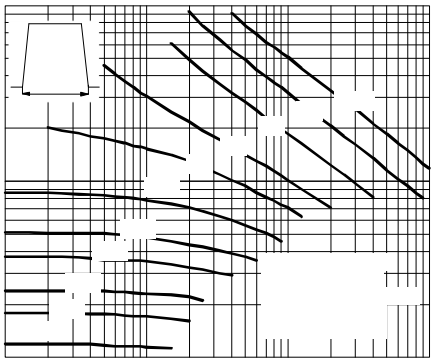


Fig. 18 - Frequency Characteristics

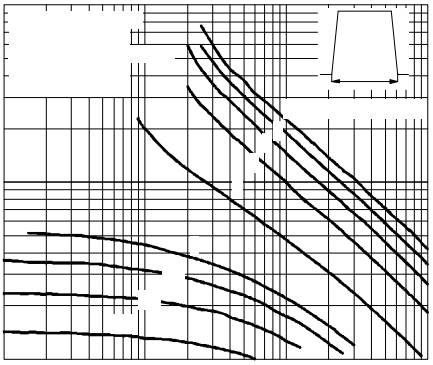


Fig. 19 - Maximum Total Energy Loss Per Pulse Characteristics

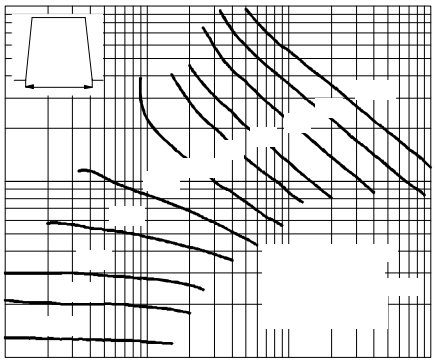


Fig. 20 - Frequency Characteristics

Thermal and Mechanical Specifications

	Parameter	SD553C..S50L	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,	0.073	K/W	DC operation single side cooled
	junction to heatsink	0.031		DC operation double side cooled
F	Mounting force, ± 10%	14700	N	
		(1500)	(Kg)	
wt	Approximate weight	255	g	
	Case style	DO-200AB (B-PUK)		Conforms to JEDEC

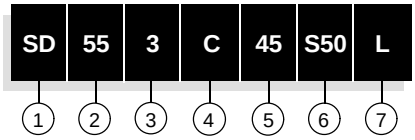
ΔR_{thJ-hs} Conduction

(The following table shows the increment of thermal resistence 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°	0.009	0.009	0.006	0.006	K/W	$T_J = T_J$ max.
120°	0.011	0.011	0.011	0.011		
90°	0.014	0.014	0.015	0.015		
60°	0.020	0.020	0.021	0.021		
30°	0.036	0.036	0.036	0.036		

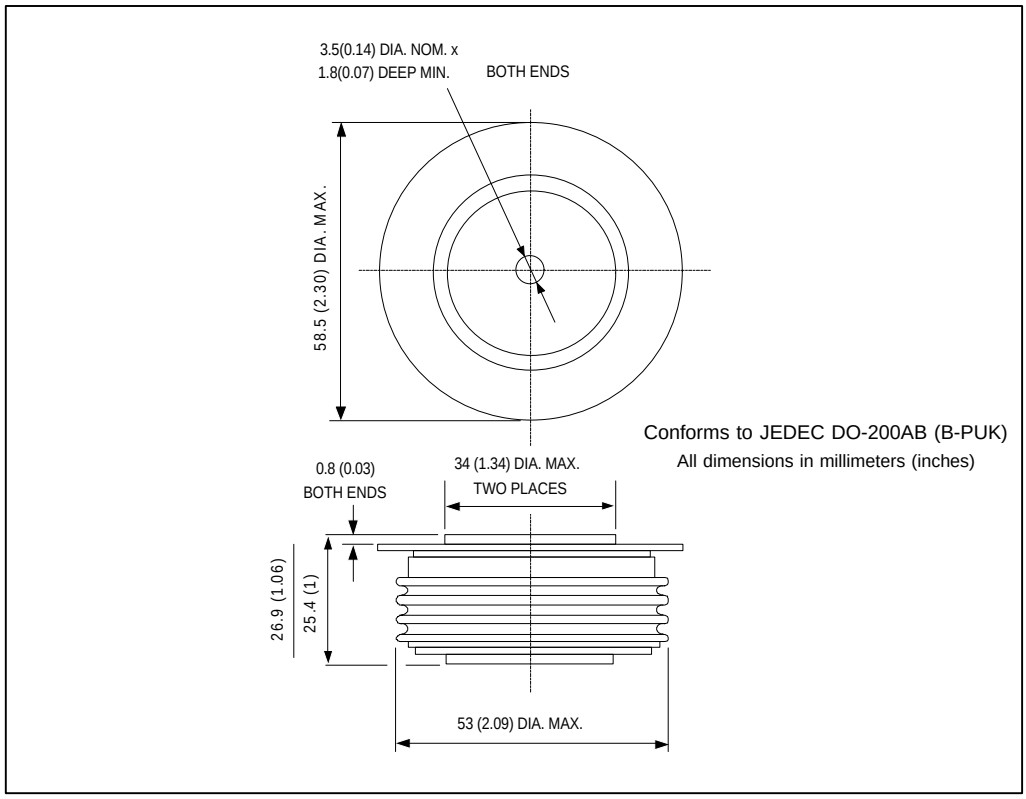
Ordering Information Table

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
7 - L = Puk Case DO-200AB (B-PUK)

Outline Table



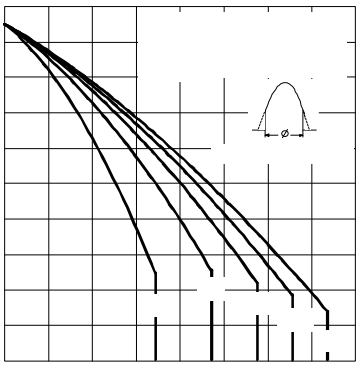


Fig. 1 - Current Ratings Characteristics

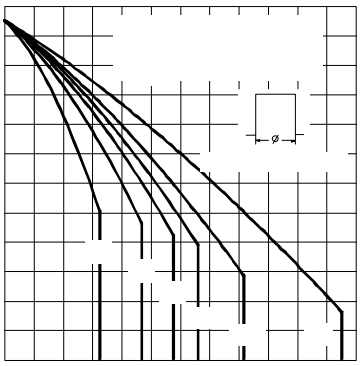


Fig. 2 - Current Ratings Characteristics