Bulletin I2091 rev. B 04/00

International
IOR Rectifier

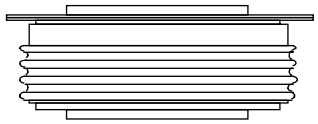
SD1553C..K SERIES

FAST RECOVERY DIODES **Hockey Puk Version**

1825A
1650A

Features

- High power FAST recovery diode series
- 2.0 to 3.0 µs recovery time
- High voltage ratings up to 3000V
- 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 150°C



case style DO-200AC (K-PUK)

Typical Applications

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

Major Ratings and Characteristics

Parameters		SD1553C..K		Units
		S20	S30	
$I_{F(AV)}$		1825	1650	A
	@ T_{hs}	55	55	°C
$I_{F(RMS)}$		3100	2800	A
I_{FSM}	@ 50Hz	25000	22000	A
	@ 60Hz	26180	23000	A
V_{RRM} range		1800 to 2500	1800 to 3000	V
t_{rr}		2.0	3.0	µs
	@ T_J	25	25	°C
T_J		- 40 to 150		°C

ELECTRICAL SPECIFICATIONS

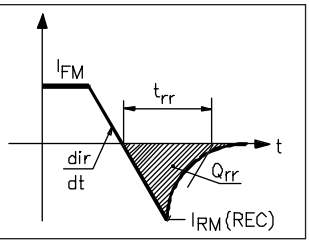
Voltage Ratings

Type number	Voltage Code	V_{RRM}, maximum repetitive peak reverse voltage V	V_{RSM}, maximum non-repetitive peak rev. voltage V	I_{RRM} max. @ $T_J = T_J$ max. mA
SD1553C..S20K	18	1800	1900	75
	22	2200	2300	
	25	2500	2600	
SD1553C..S30K	18	1800	1900	
	22	2200	2300	
	25	2500	2600	
	28	2800	2900	
	30	3000	3100	

Forward Conduction

	Parameter	SD1553C..K S20	SD1553C..K S30	Units	Conditions		
$I_{F(AV)}$	Max. average forward current	1825(865)	1650(790)	A	180° conduction, half sine wave		
	@ heatsink temperature	55 (85)	55 (85)	°C	Double side (single side) cooled		
$I_{F(RMS)}$	Max. RMS forward current	3100	2800	A	@ 25°C heatsink temperature double side cooled		
I_{FSM}	Max. peak, one-cycle forward, non-repetitive surge current	25000	22000	A	t = 10ms	No voltage reapplied	Sinusoidal half wave, Initial $T_J = T_J$ max.
		26180	23000		t = 8.3ms		
		21030	18500		t = 10ms	100% V_{RRM} reapplied	
		22010	19370		t = 8.3ms		
I^2t	Maximum I^2t for fusing	3126	2421	KA^2s	t = 10ms	No voltage reapplied	
		2854	2210		t = 8.3ms		
		2210	1712		t = 10ms	100% V_{RRM} reapplied	
		2018	1563		t = 8.3ms		
$I^2\sqrt{t}$	Maximum $I^2\sqrt{t}$ for fusing	31260	24210	$KA^2\sqrt{s}$	t = 0.1 to 10ms, no voltage reapplied		
$V_{F(TO)1}$	Low level value of threshold voltage	1.15	1.31	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	1.29	1.45		(I > π x $I_{F(AV)}$), $T_J = T_J$ max.		
r_{f1}	Low level value of forward slope resistance	0.27	0.32	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	0.25	0.30		(I > π x $I_{F(AV)}$), $T_J = T_J$ max.		
V_{FM}	Max. forward voltage drop	2.23	2.60	V	I_{pk}= 4000A, $T_J = T_J$ max, t_p = 10ms sinusoidal wave		

Recovery Characteristics

Code	T_J=25°C	Test conditions			Max. values @ T_J=150°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)	
S20	2.0	1000	100	-50	4.5	650	240	
S30	3.0	1000	100	-50	5.0	780	260	

Thermal and Mechanical Specifications

	Parameter	SD1553C..K		Units	Conditions
		S20	S30		
T_J	Max. junction operating temperature range	-40 to 150		°C	
T_{stg}	Max. storage temperature range	-40 to 150			
R_{thJ-hs}	Max. thermal resistance, case 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_{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°	0.0018	0.0019	0.0012	0.0012	K/W	T_J = T_J max.
120°	0.0021	0.0021	0.0021	0.0021		
90°	0.0027	0.0027	0.0029	0.0029		
60°	0.0039	0.0039	0.0041	0.0041		
30°	0.0067	0.0067	0.0068	0.0068		

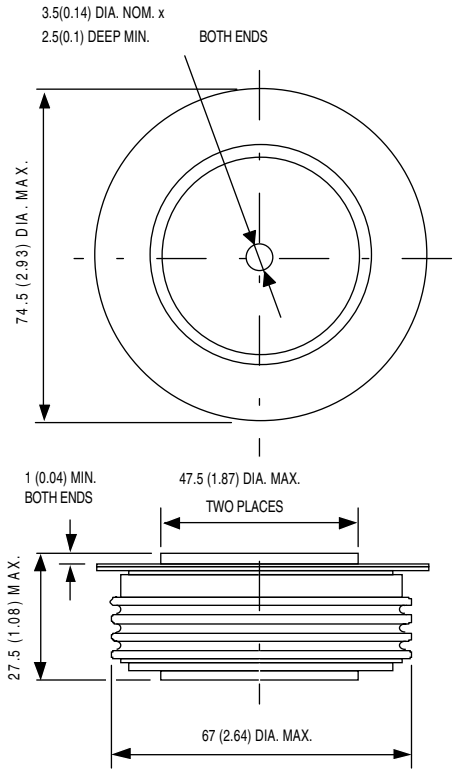
Ordering Information Table

Device Code

SD	155	3	C	30	S30	K
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_{RRM} (See Voltage Ratings table)
- **6** - t_{rr} code
- **7** - K = Puk Case DO-200AC (K-PUK)

Outline Table



Case Style DO-200AC (K-PUK)

All dimensions in millimeters (inches)

Quote between upper and lower pole pieces has to be considered after application of Mounting Force (see Thermal and Mechanical Specification)

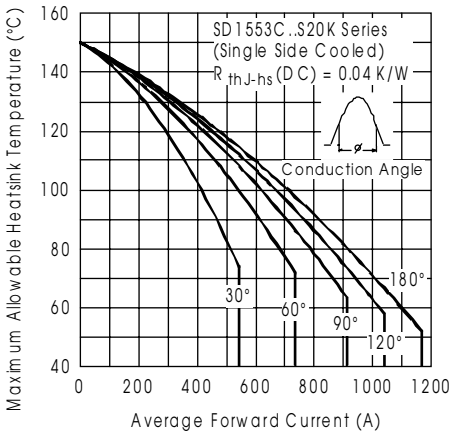


Fig. 1 - Current Ratings Characteristics

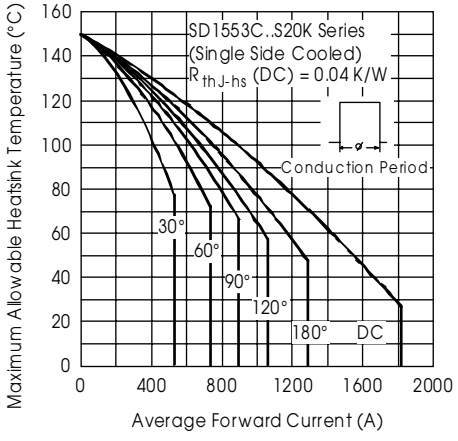


Fig. 2 - Current Ratings Characteristics

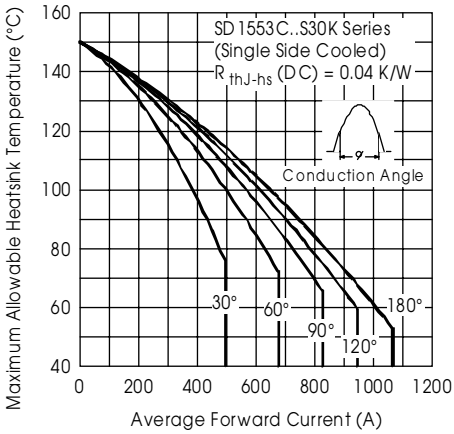


Fig. 3 - Current Ratings Characteristics

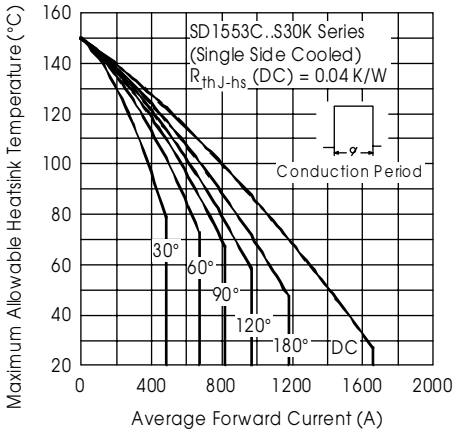


Fig. 4 - Current Ratings Characteristics

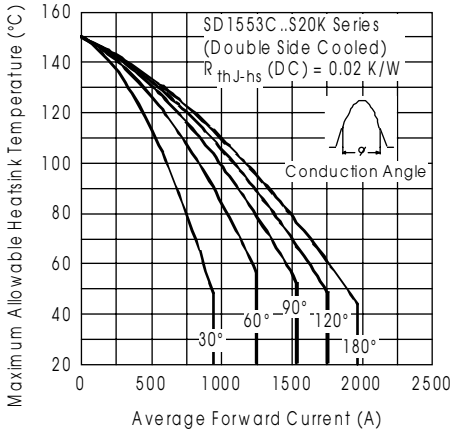


Fig. 5 - Current Ratings Characteristics

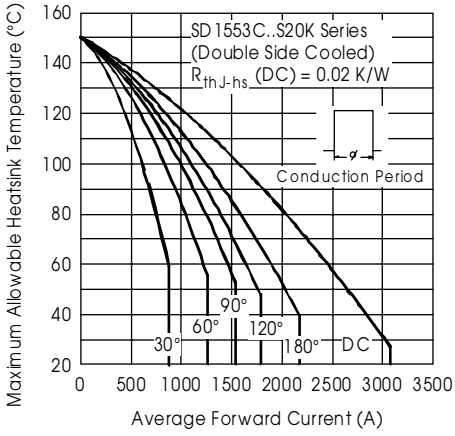


Fig. 6 - Current Ratings Characteristics

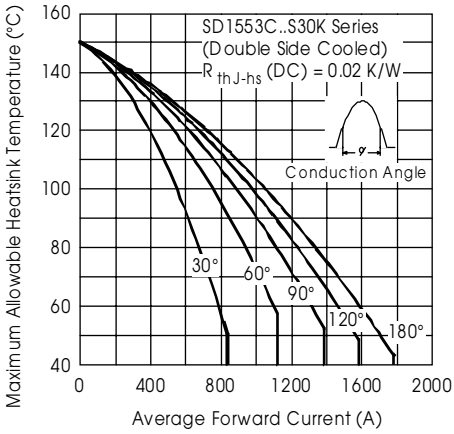


Fig. 7 - Current Ratings Characteristics

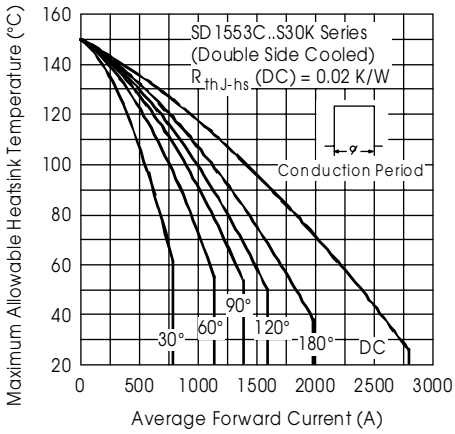


Fig. 8 - Current Ratings Characteristics

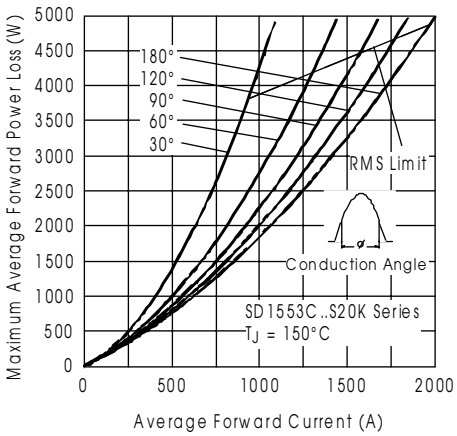


Fig. 9 - Forward Power Loss Characteristics

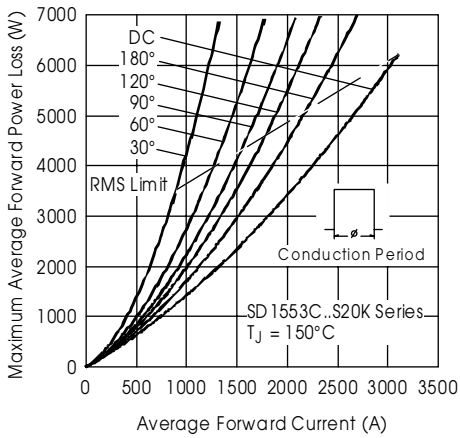


Fig. 10 - Forward Power Loss Characteristics

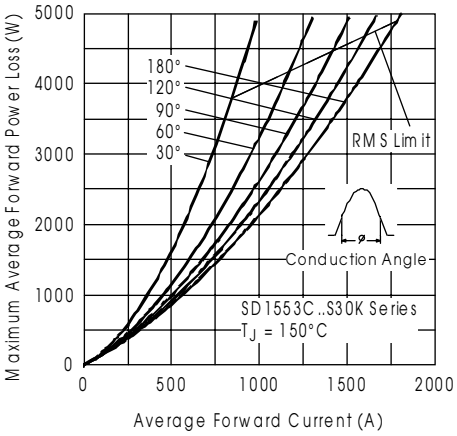


Fig. 11 - Forward Power Loss Characteristics

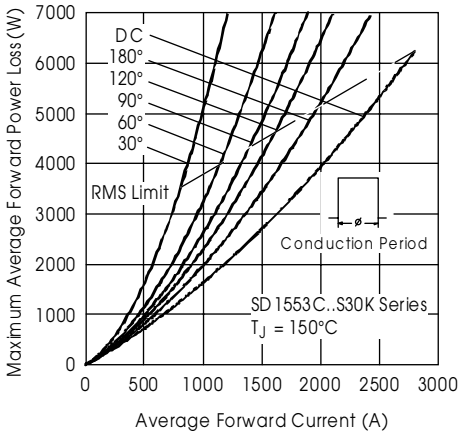


Fig. 12 - Forward Power Loss Characteristics

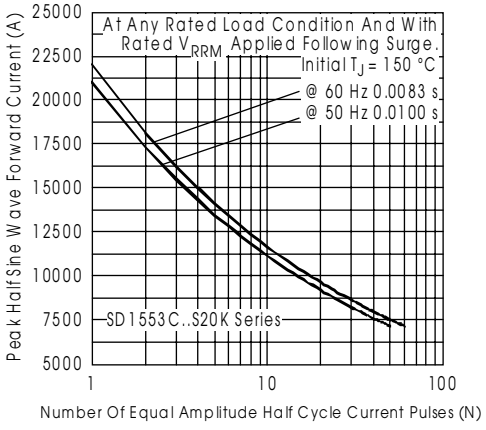


Fig. 13 - Maximum Non-repetitive Surge Current
Single and Double Side Cooled

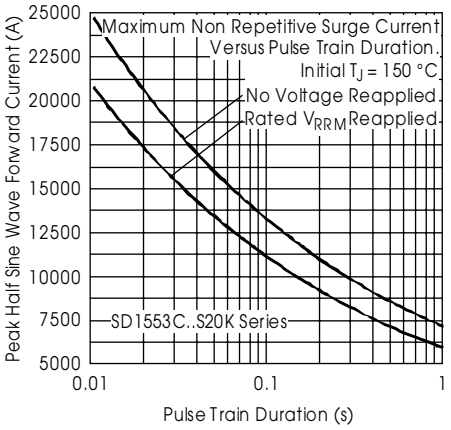


Fig. 14 - Maximum Non-repetitive Surge Current
Single and Double Side Cooled

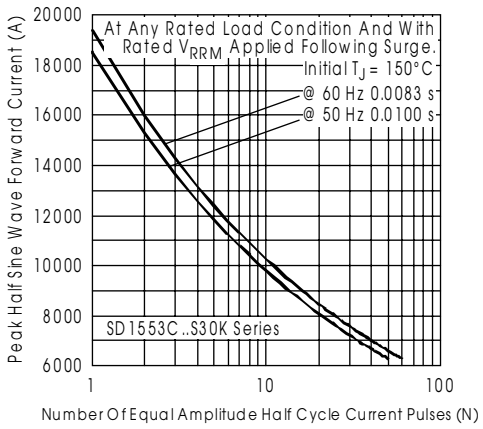


Fig. 15 - Maximum Non-repetitive Surge Current
Single and Double Side Cooled

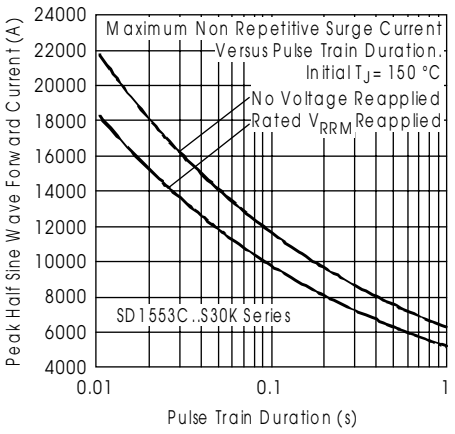


Fig. 16 - Maximum Non-repetitive Surge Current
Single and Double Side Cooled

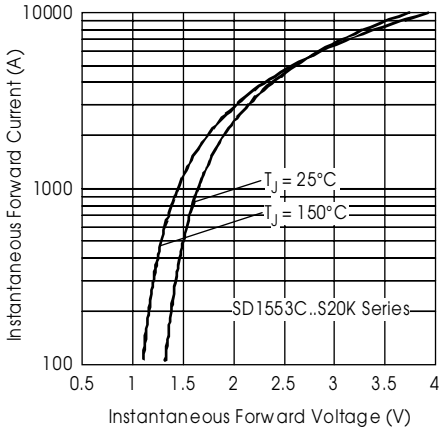


Fig. 17 - Forward Voltage Drop Characteristics

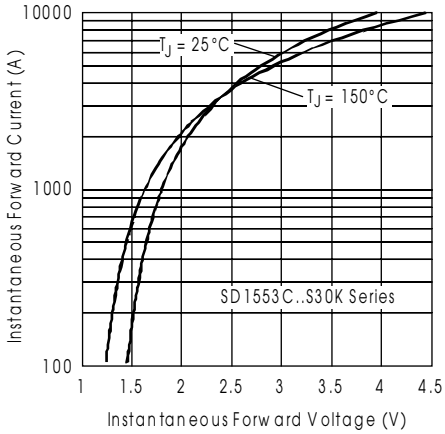


Fig. 18 - Forward Voltage Drop Characteristics

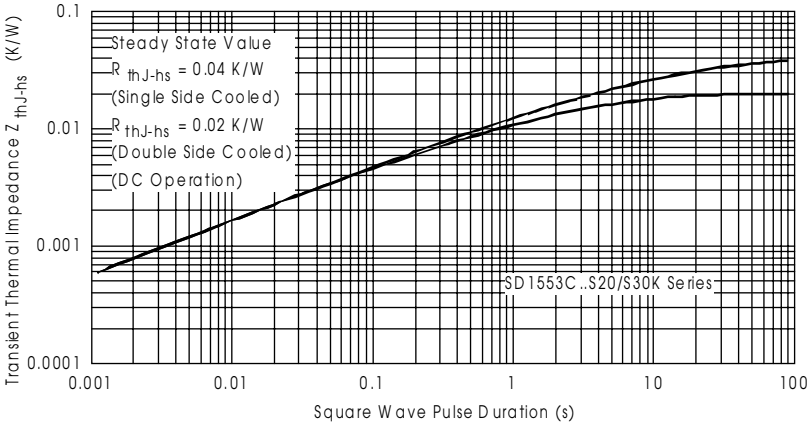


Fig. 19 - Thermal Impedance Z_{thJ-hs} Characteristic

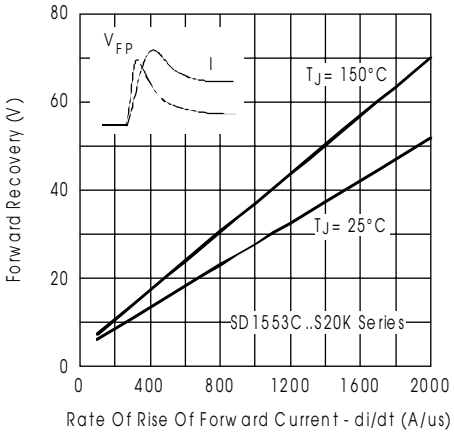


Fig. 20 - Typical Forward Recovery Characteristics

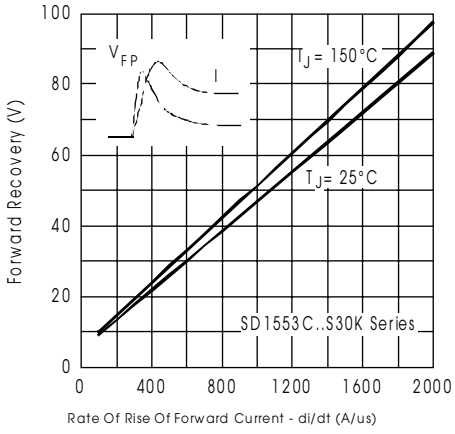


Fig. 21 - Typical Forward Recovery Characteristics

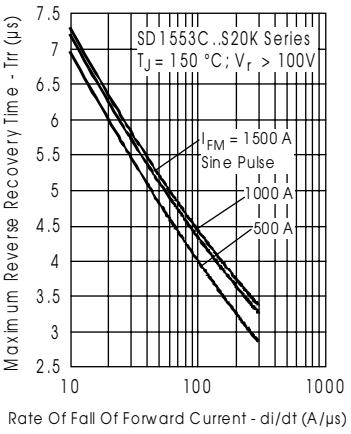


Fig. 22 - Recovery Time Characteristics

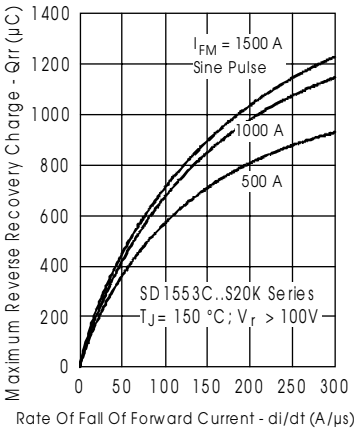


Fig. 23 - Recovery Charge Characteristics

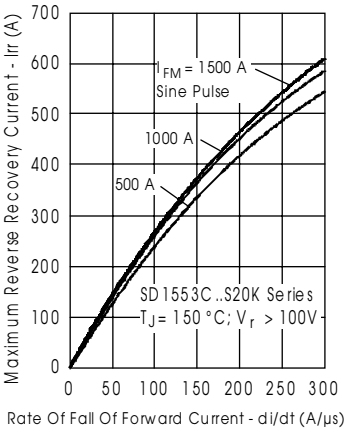


Fig. 24 - Recovery Current Characteristics

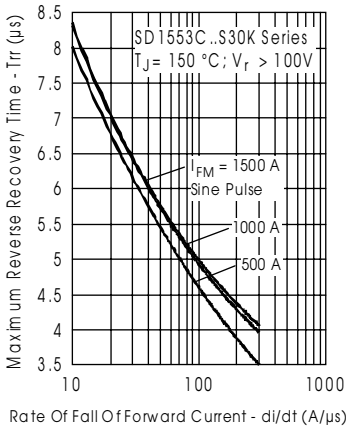


Fig. 25 - Recovery Time Characteristics

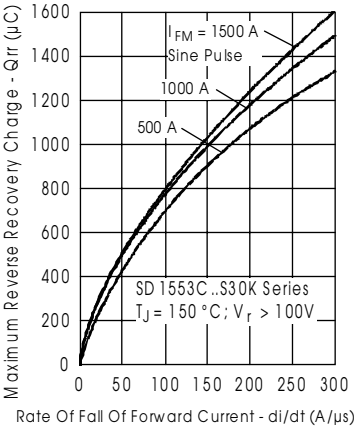


Fig. 26 - Recovery Charge Characteristics

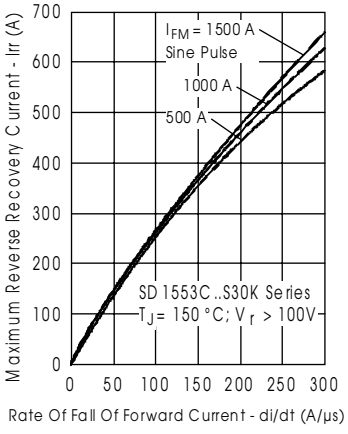


Fig. 27 - Recovery Current Characteristics

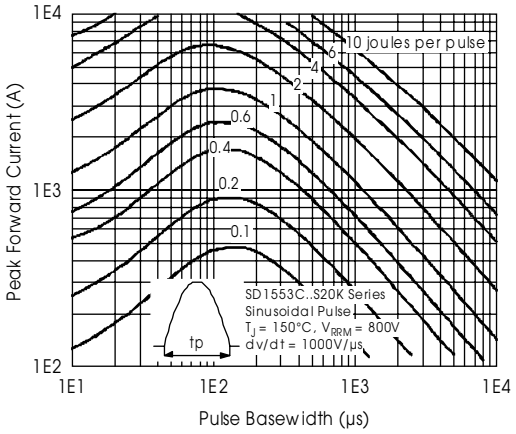


Fig. 28 - Maximum Total Energy Loss Per Pulse Characteristics

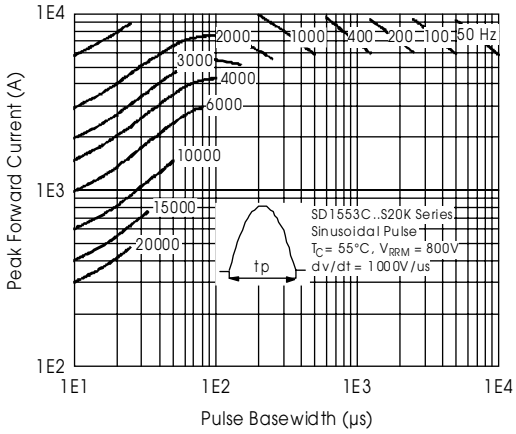


Fig. 29 - Frequency Characteristics

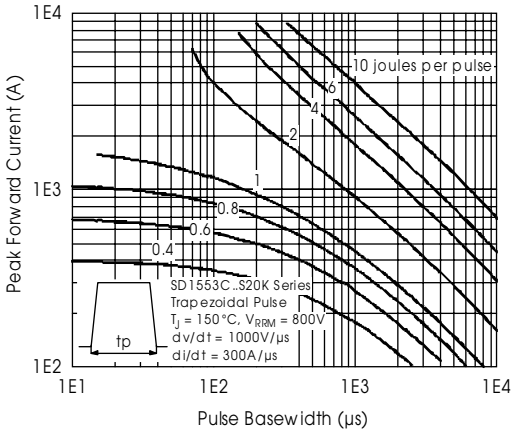


Fig. 30 - Maximum Total Energy Loss Per Pulse Characteristics

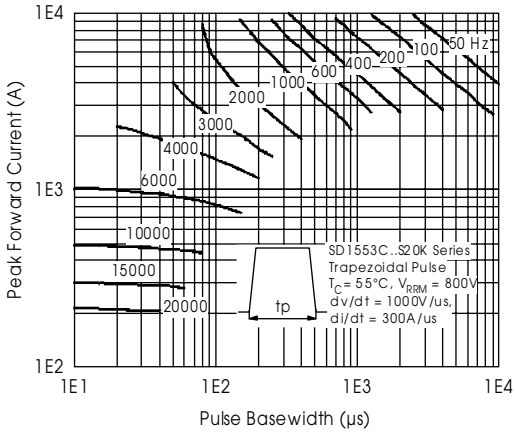


Fig. 31 - Frequency Characteristics

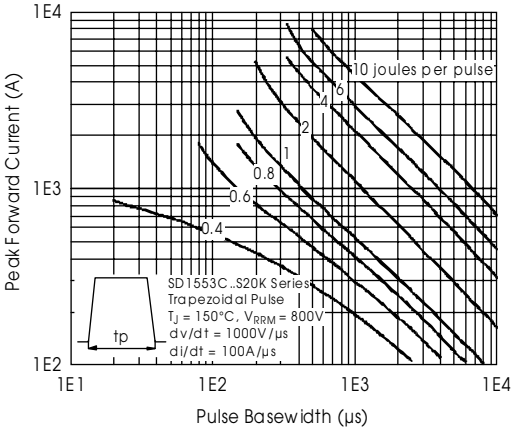


Fig. 32 - Maximum Total Energy Loss Per Pulse Characteristics

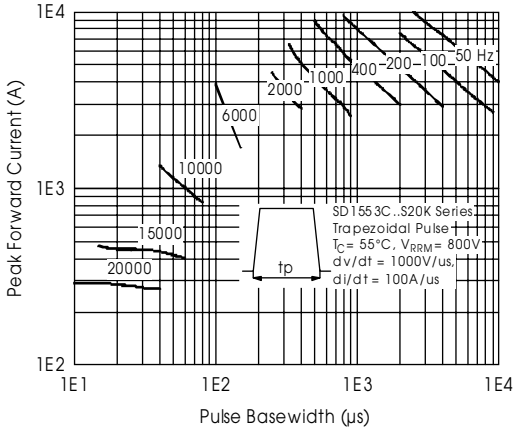


Fig. 33 - Frequency Characteristics

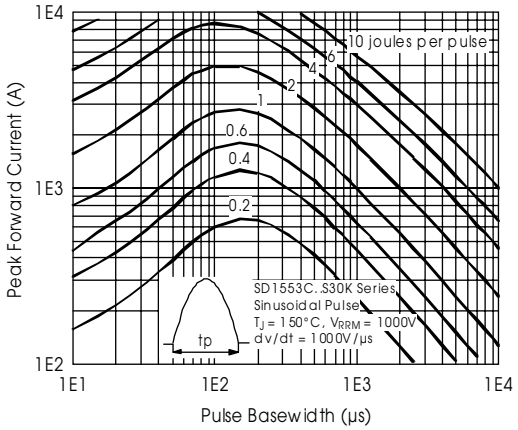


Fig. 34 - Maximum Total Energy Loss Per Pulse Characteristics

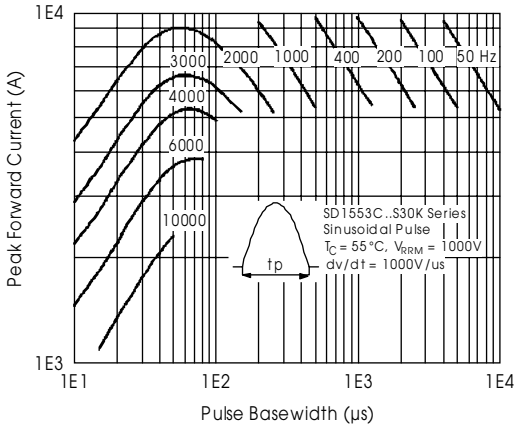


Fig. 35 - Frequency Characteristics

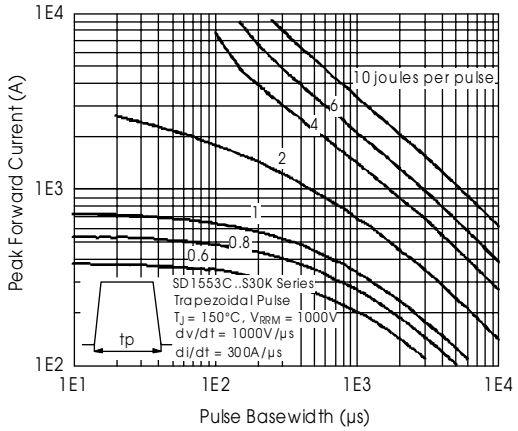


Fig. 36 - Maximum Total Energy Loss Per Pulse Characteristics

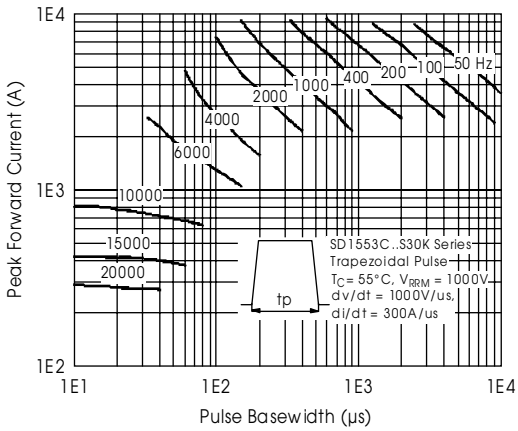


Fig. 37 - Frequency Characteristics

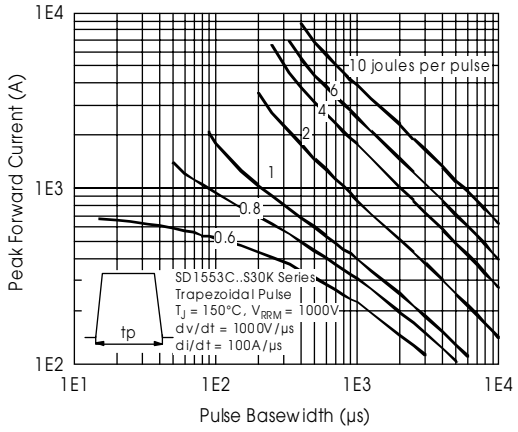


Fig. 38 - Maximum Total Energy Loss Per Pulse Characteristics

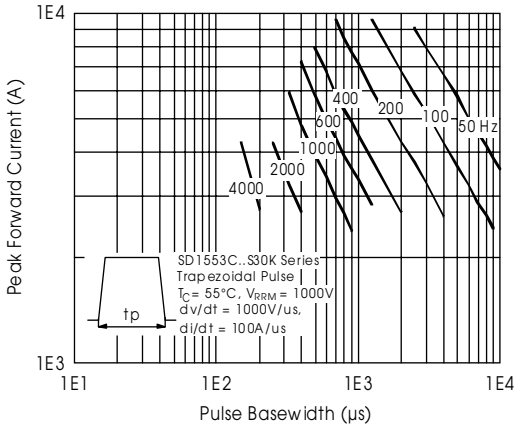


Fig. 39 - Frequency Characteristics