THE DATASHEET OF

SD453N16S20PC

Bulletin I2076 rev. A 09/94

International
IOR Rectifier

SD453N/R SERIES

FAST RECOVERY DIODES **Stud Version**

400A
450A

Features

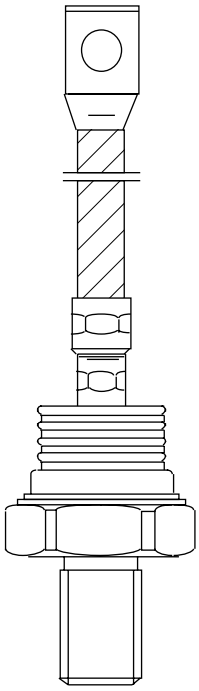
- High power FAST recovery diode series
- 2.0 to 3.0 µs recovery time
- High voltage ratings up to 2500V
- High current capability
- Optimized turn on and turn off characteristics
- Low forward recovery
- Fast and soft reverse recovery
- Compression bonded encapsulation
- Stud version case style B-8
- Maximum junction temperature 150°C

Typical Applications

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

Major Ratings and Characteristics

Parameters		SD453N/R		Units
		S20	S30	
$I_{F(AV)}$		400	450	A
	@ T_C	70	70	°C
$I_{F(RMS)}$		630	710	A
I_{FSM}	@ 50Hz	9300	9600	A
	@ 60Hz	9730	10050	A
V_{RRM} range		1200 to 2500	1200 to 2500	V
t_{rr}		2.0	3.0	µs
	@ T_J	25	25	°C
T_J		- 40 to 150		°C



case style
B-8

ELECTRICAL SPECIFICATIONS

Voltage Ratings

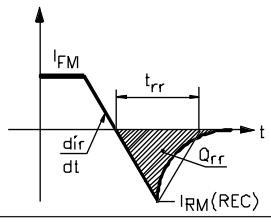
Type number	Voltage Code	V_{RRM}, maximum repetitive peak reverse voltage V	V_{RSM}, maximum non-repetitive peak rev. voltage V	I_{RRM} max. @ $T_J = T_J$ max. mA
SD453N/R	12	1200	1300	50
	16	1600	1700	
	20	2000	2100	
	25	2500	2600	

Forward Conduction

	Parameter	SD453N/R S20	SD453N/R S30	Units	Conditions		
$I_{F(AV)}$	Max. average forward current	400	450	A	180° conduction, half sine wave		
	@ case temperature	70	70	°C			
$I_{F(RMS)}$	Max. RMS forward current	630	710	A			
	@ case temperature	55	52	°C			
I_{FSM}	Max. peak, one-cycle forward, non-repetitive surge current	9300	9600	A	t = 10ms	No voltage reapplied	Sinusoidal half wave, Initial $T_J = T_J$ max.
		9730	10050		t = 8.3ms		
		7820	8070		t = 10ms	100% V_{RRM} reapplied	
		8190	8450		t = 8.3ms		
I^2t	Maximum I^2t for fusing	432	460	KA^2s	t = 10ms	No voltage reapplied	
		395	420		t = 8.3ms		
		306	326		t = 10ms	100% V_{RRM} reapplied	
		279	297		t = 8.3ms		
$I^2\sqrt{t}$	Maximum $I^2\sqrt{t}$ for fusing	4320	4600	$KA^2\sqrt{s}$	t = 0.1 to 10ms, no voltage reapplied		
$V_{F(TO)1}$	Low level value of threshold voltage	1.00	0.95	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	1.09	1.04		(I > π x $I_{F(AV)}$), $T_J = T_J$ max.		
r_{f1}	Low level value of forward slope resistance	0.80	0.60	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	0.74	0.54		(I > π x $I_{F(AV)}$), $T_J = T_J$ max.		
V_{FM}	Max. forward voltage drop	2.20	1.85	V	I_{pk}= 1500A, $T_J = T_J$ max, t_p = 10ms sinusoidal wave		

Recovery Characteristics

Code	T_J= 25 °C typical t_{rr} @ 25% I_{RRM} (µs)	Test conditions I_{pk} Square Pulse (A)	di/dt (A/µs)	V_r (V)	Max. values @ T_J= 150 °C t_{rr} @ 25% I_{RRM} (µs)	Q_{rr} (µC)	I_{rr} (A)
S20	2.0	1000	50	- 50	3.5	250	120
S30	3.0	1000	50	- 50	5.0	380	150



Thermal and Mechanical Specifications

	Parameter	SD453N/R		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_{thJC}	Max. thermal resistance, junction to case	0.1		K/W	DC operation
R_{thCS}	Max. thermal resistance, case to heatsink	0.04			Mounting surface, smooth, flat and greased
T	Mounting torque, ± 10%	50		Nm	Not lubricated threads
wt	Approximate weight	454		g	
	Case style	B-8			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
	S20	S30	S20	S30		
180°	0.010	0.010	0.008	0.008	K/W	$T_J = T_J$ max.
120°	0.014	0.014	0.014	0.014		
90°	0.017	0.017	0.019	0.019		
60°	0.025	0.025	0.026	0.026		
30°	0.042	0.042	0.042	0.042		

Ordering Information Table

Device Code

SD	45	3	N	25	S30	P	S	C
1	2	3	4	5	6	7	8	9

1 - Diode

2 - Essential part number

3 - 3 = Fast recovery

4 - N = Stud Normal Polarity (Cathode to Stud)
R = Stud Reverse Polarity (Anode to Stud)

5 - Voltage code: Code x 100 = V_{RRM} (see Voltage Ratings table)

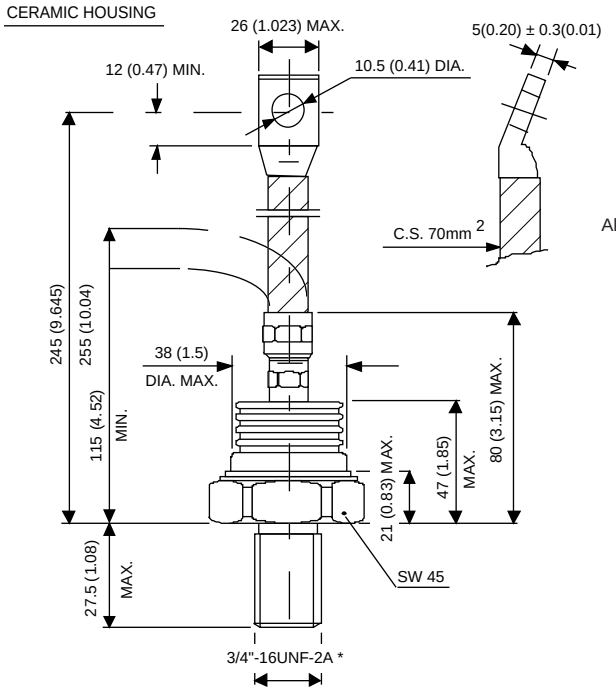
6 - t_{rr} code (see Recovery Characteristics table)

7 - P = Stud base B-8 3/4" 16UNF-2A
M = Stud base B-8 M24 X 1.5

8 - S = Isolated lead with silicone sleeve
(Red = Reverse Polarity; Blue = Normal Polarity)
None = Not isolated lead
T = Threaded Top Terminal 3/8" 24UNF-2A

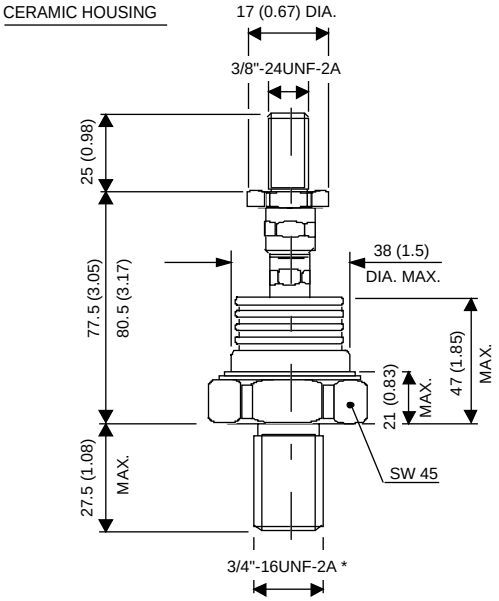
9 - C = Ceramic housing

Outlines Table



Case Style B-8
All dimensions in millimeters (inches)

* FOR METRIC DEVICE: M24 x 1.5 - LENGHT SCREW 21 (0.83) MAX.



Case Style B-8 with top thread terminal 3/8"
All dimensions in millimeters (inches)

* FOR METRIC DEVICE: M24 x 1.5 - LENGHT SCREW 21 (0.83) MAX.

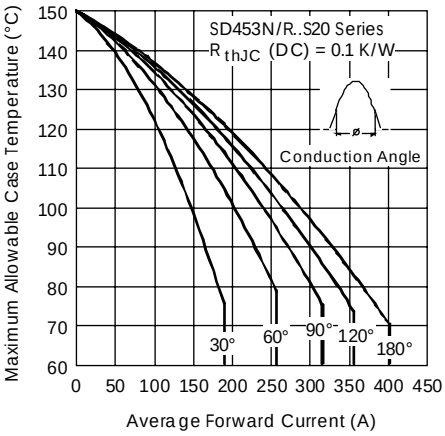


Fig. 1 - Current Ratings Characteristics

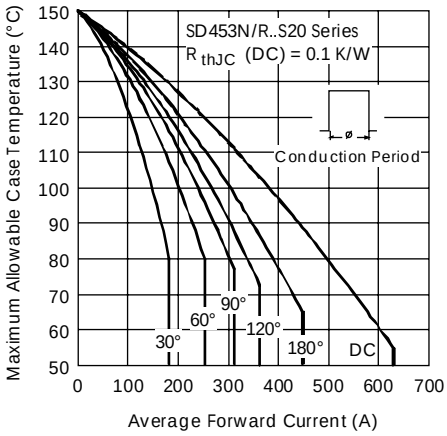


Fig. 2 - Current Ratings Characteristics

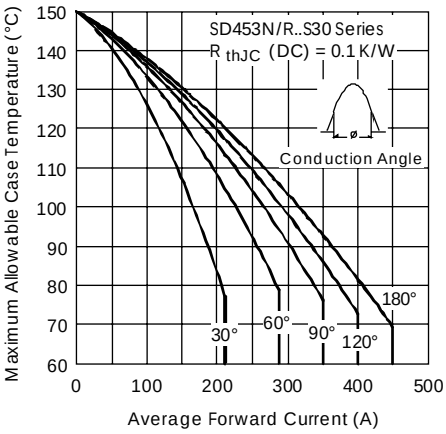


Fig. 3 - Current Ratings Characteristics

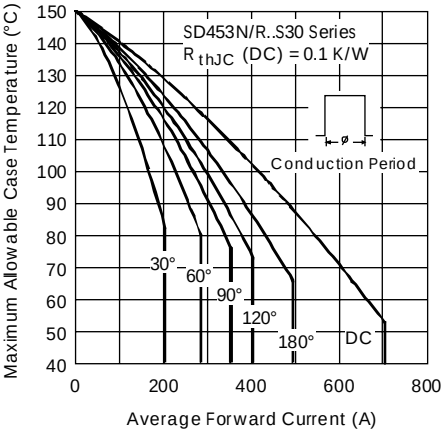


Fig. 4 - Current Ratings Characteristics

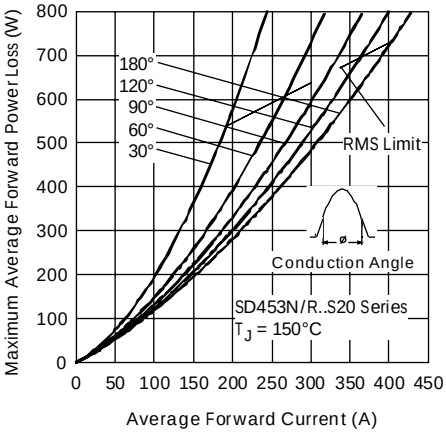


Fig. 5 - Forward Power Loss Characteristics

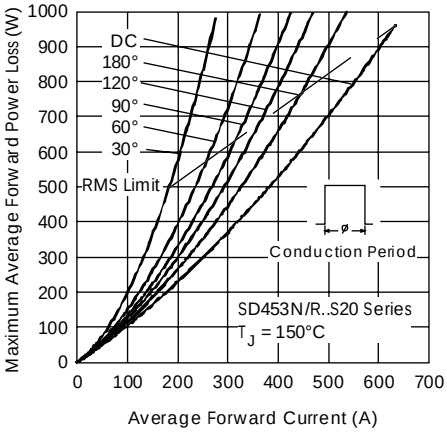


Fig. 6 - Forward Power Loss Characteristics

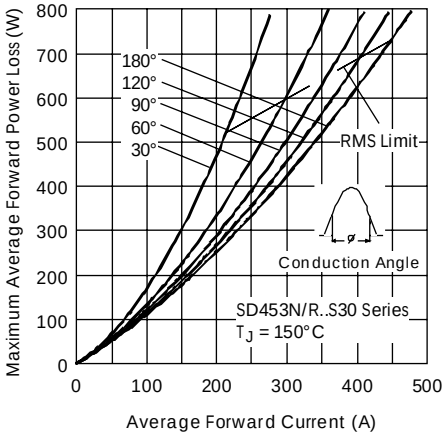


Fig. 7 - Forward Power Loss Characteristics

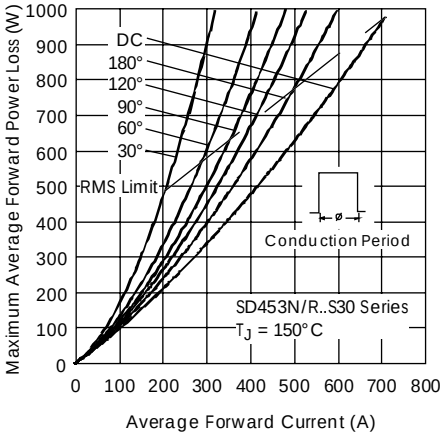


Fig. 8 - Forward Power Loss Characteristics

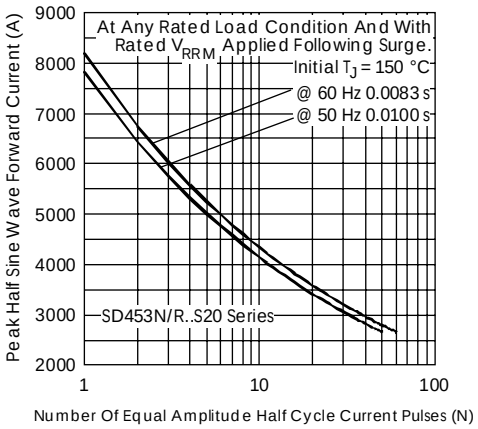


Fig. 9 - Maximum Non-repetitive Surge Current

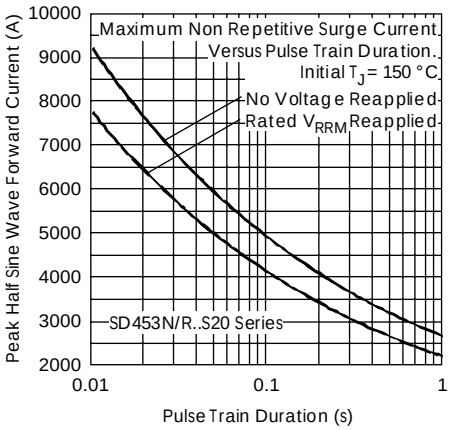


Fig. 10 - Maximum Non-repetitive Surge Current

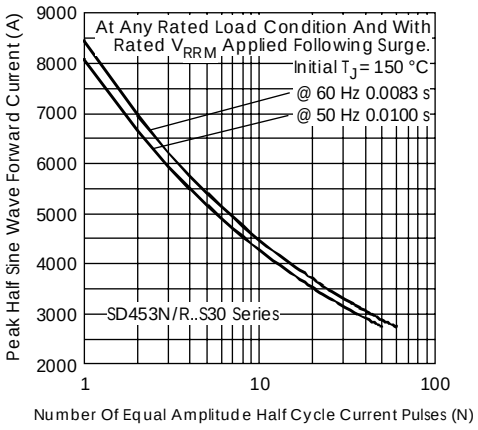


Fig.11 - Maximum Non-repetitive Surge Current

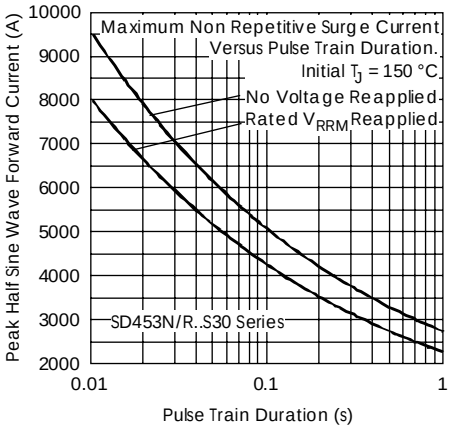


Fig.12 - Maximum Non-repetitive Surge Current

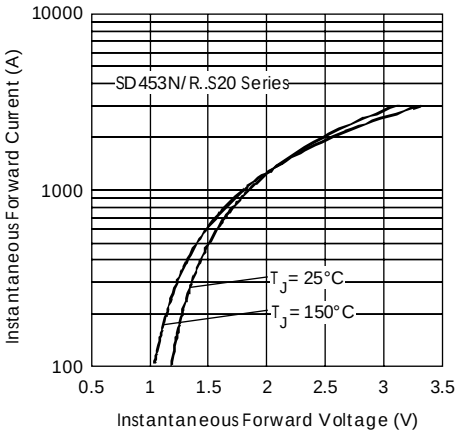


Fig. 13 - Forward Voltage Drop Characteristics

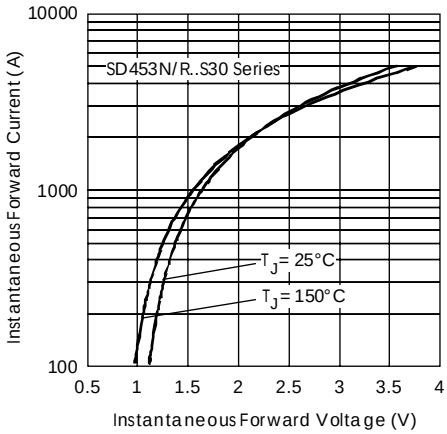


Fig. 14 - Forward Voltage Drop Characteristics

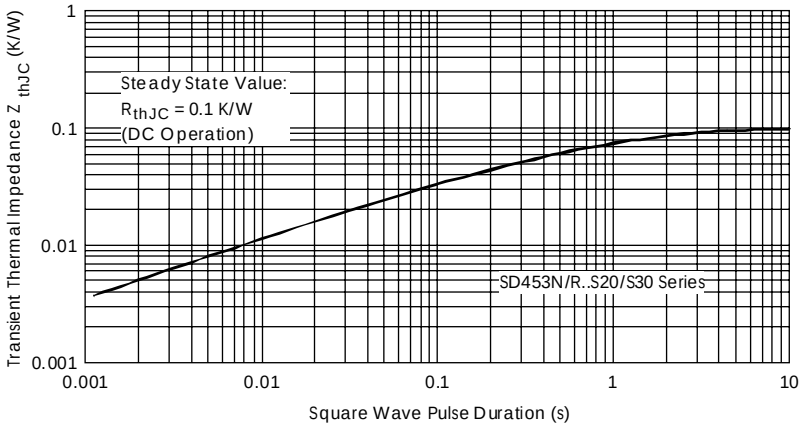


Fig. 15 - Thermal Impedance Z_{thJC} Characteristic

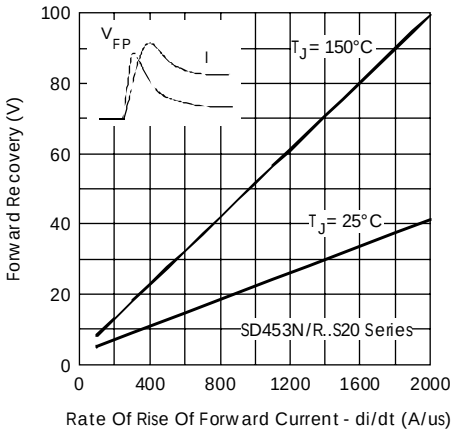


Fig. 16 - Typical Forward Recovery Characteristics

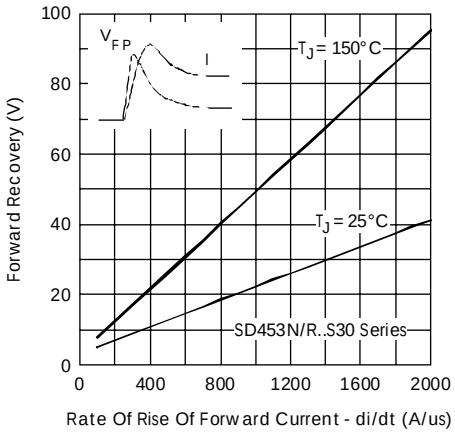


Fig. 17 - Typical Forward Recovery Characteristics

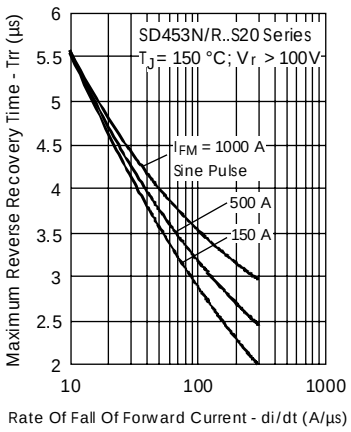


Fig. 18 - Recovery Time Characteristics

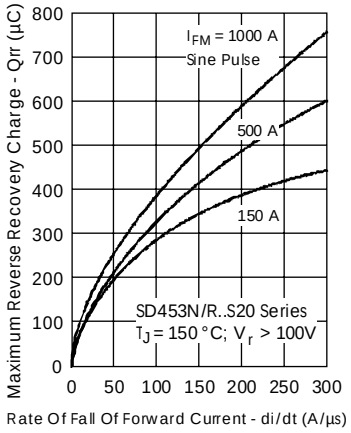


Fig. 19 - Recovery Charge Characteristics

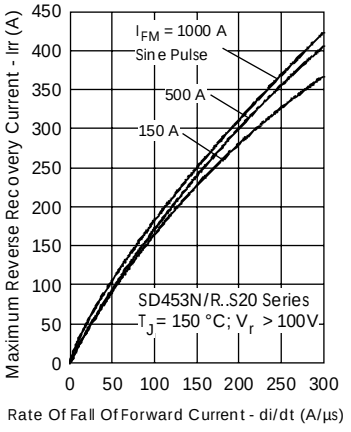


Fig. 20 - Recovery Current Characteristics

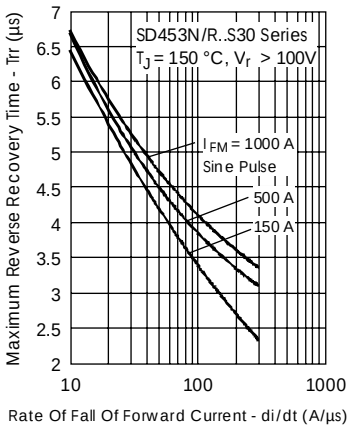


Fig. 21 - Recovery Time Characteristics

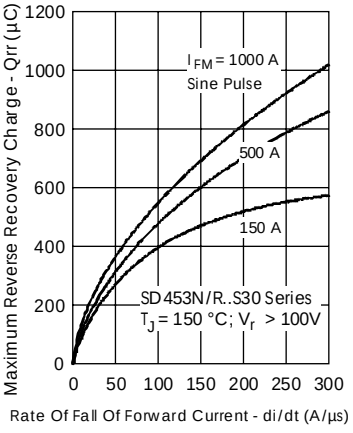


Fig. 22 - Recovery Charge Characteristics

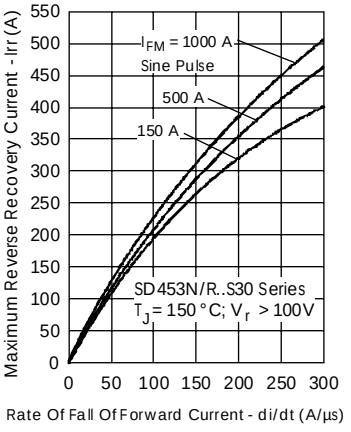


Fig. 23 - Recovery Current Characteristics

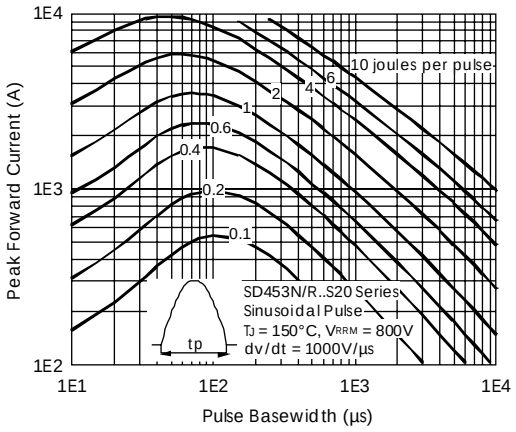


Fig. 24 - Maximum Total Energy Loss Per Pulse Characteristics

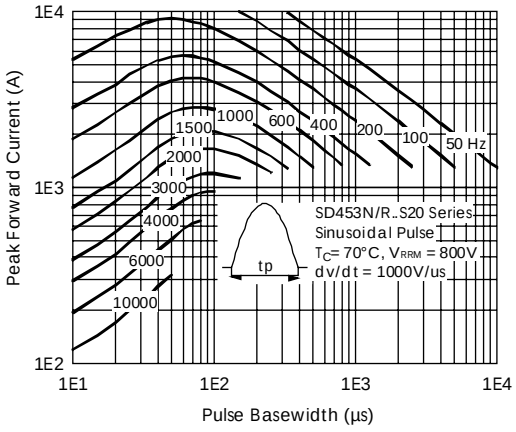


Fig. 25 - Frequency Characteristics

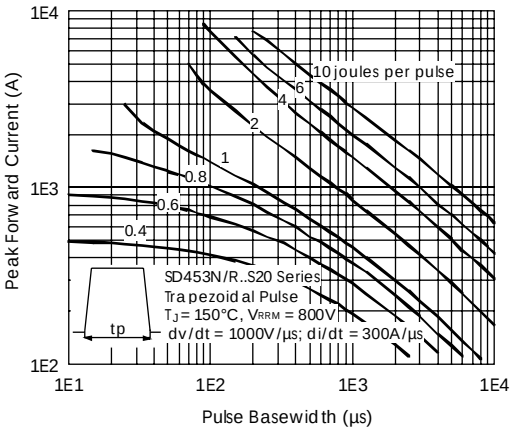


Fig. 26 - Maximum Total Energy Loss Per Pulse Characteristics

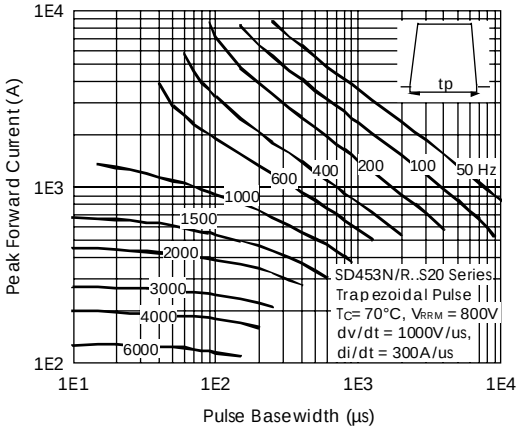


Fig. 27 - Frequency Characteristics

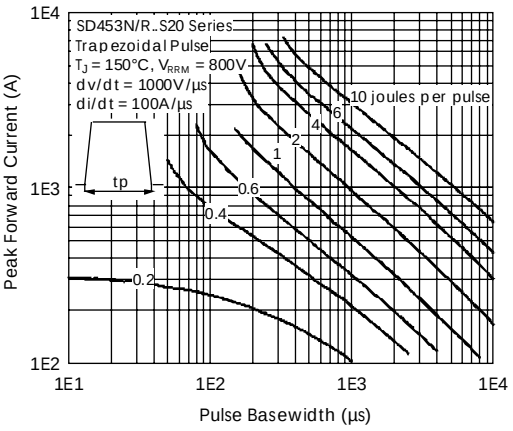


Fig. 28 - Maximum Total Energy Loss Per Pulse Characteristics

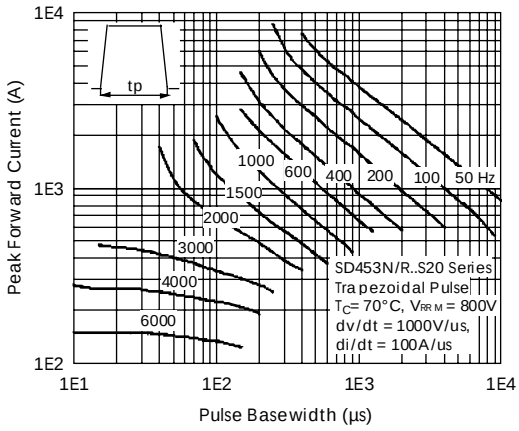


Fig. 29 - Frequency Characteristics

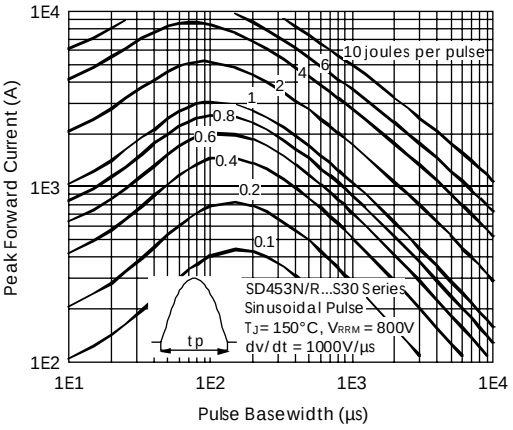


Fig. 30 - Maximum Total Energy Loss Per Pulse Characteristics

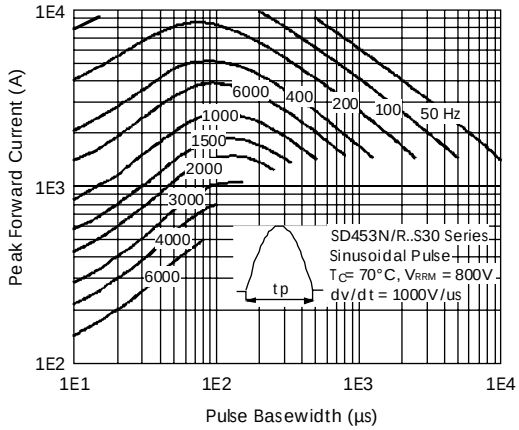


Fig. 31 - Frequency Characteristics

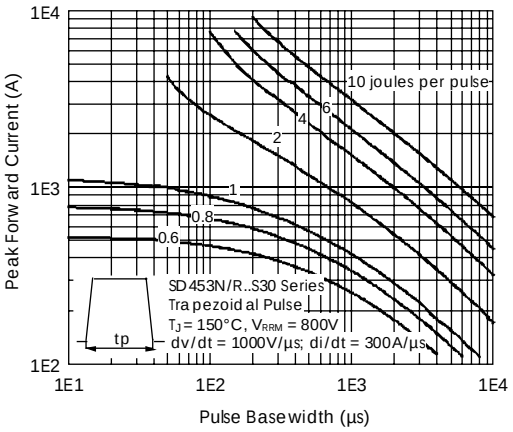


Fig. 32 - Maximum Total Energy Loss Per Pulse Characteristics

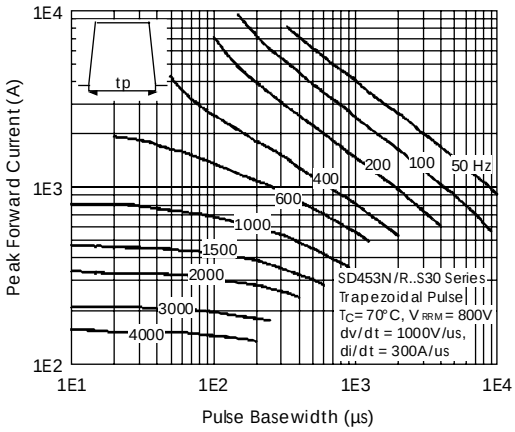


Fig. 33 - Frequency Characteristics

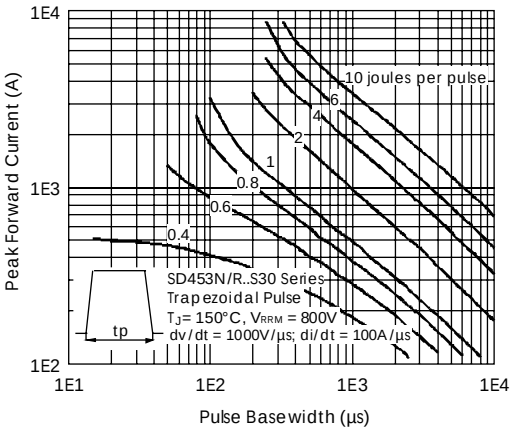


Fig. 34 - Maximum Total Energy Loss Per Pulse Characteristics

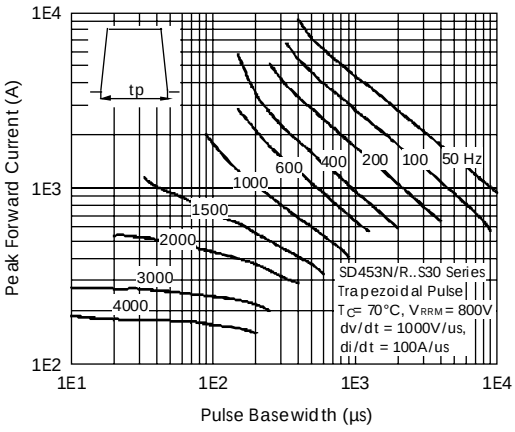


Fig. 35 - Frequency Characteristics

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