Bulletin I2076 rev. B 10/06

International
IOR Rectifier

SD453N/R SERIES

FAST RECOVERY DIODES

Stud Version

400A
450A

Features

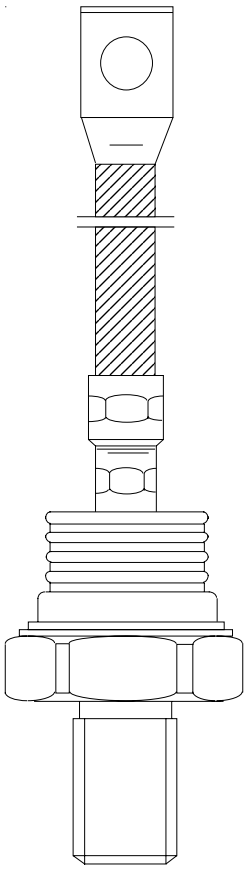
- High power FAST recovery diode series
- 2.0 to 3.0 µs recovery time
- High voltage ratings up to 2500V
- High current capability
- Optimized turn on and turn off characteristics
- Low forward recovery
- Fast and soft reverse recovery
- Compression bonded encapsulation
- Stud version case style B-8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

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

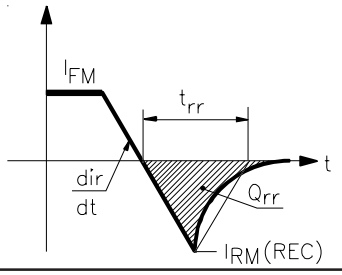
Type number	Voltage Code	V_{RRM}, maximum repetitive peak reverse voltage V	V_{RSM}, maximum non-repetitive peak rev. voltage V	I_{RRM} max. @ $T_J = T_J$ max. mA
SD453N/R	12	1200	1300	50
	16	1600	1700	
	20	2000	2100	
	25	2500	2600	

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	$(16.7\% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)})$, $T_J = T_J$ max.		
$V_{F(TO)2}$	High level value of threshold voltage	1.09	1.04		$(I > \pi \times I_{F(AV)})$, $T_J = T_J$ max.		
r_{f1}	Low level value of forward slope resistance	0.80	0.60	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	0.74	0.54		$(I > \pi \times I_{F(AV)})$, $T_J = T_J$ 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)

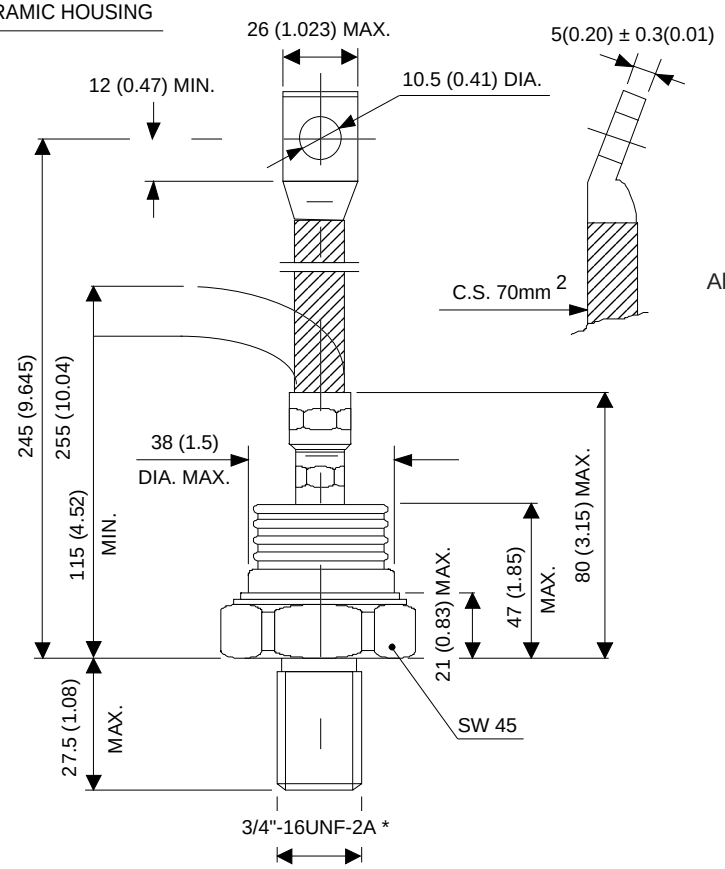
None = Not isolated lead

T = Threaded Top Terminal 3/8" 24UNF-2A

9 - C = Ceramic housing

Outlines Table

CERAMIC HOUSING

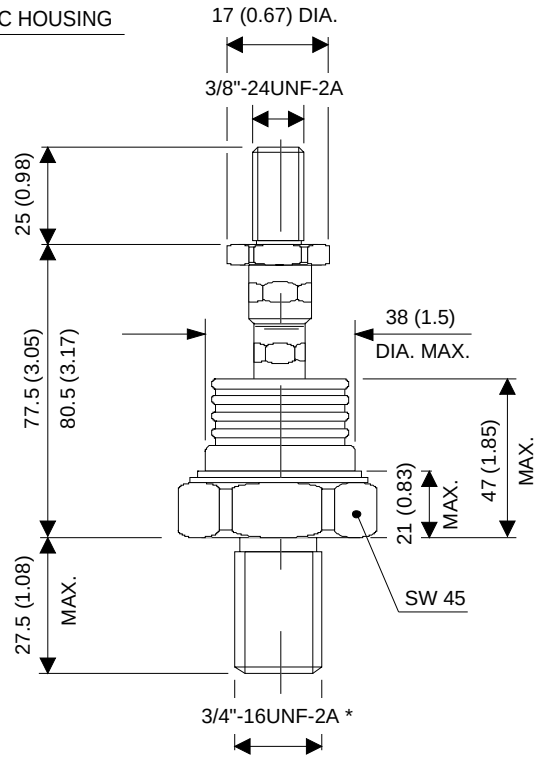


Case Style B-8
All dimensions in millimeters (inches)

* 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)

CERAMIC HOUSING



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

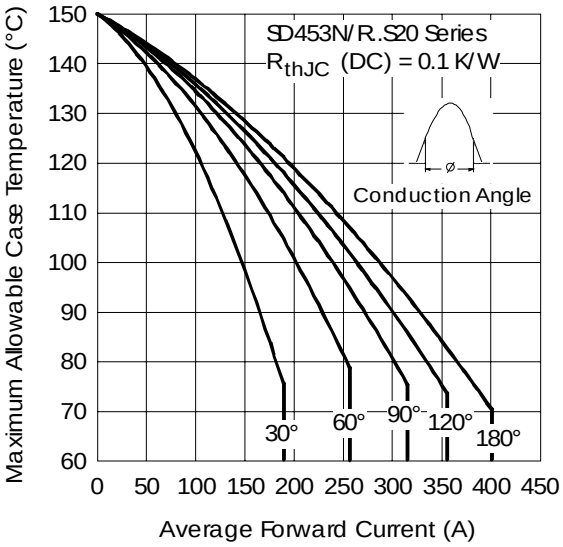


Fig. 1 - Current Ratings Characteristics

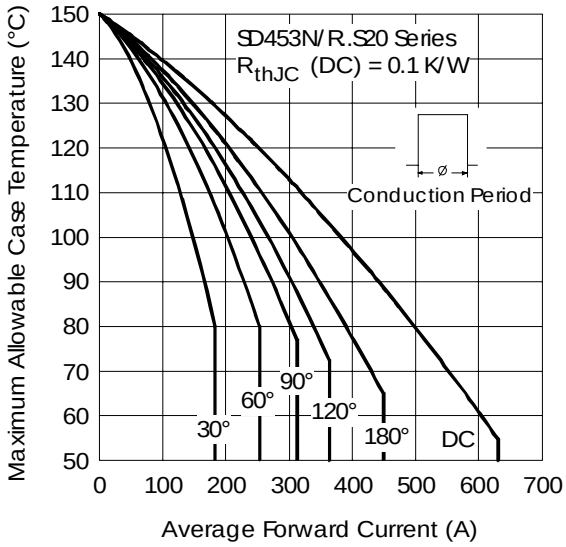


Fig. 2 - Current Ratings Characteristics

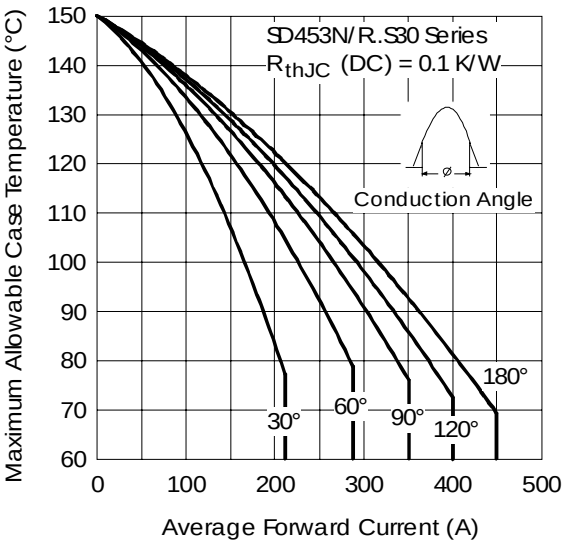


Fig. 3 - Current Ratings Characteristics

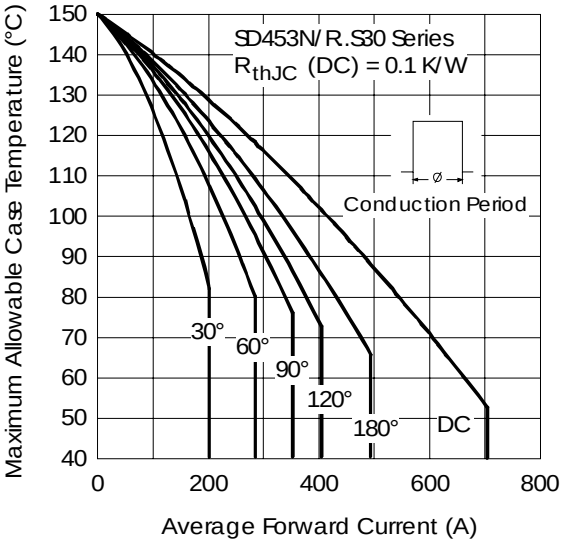


Fig. 4 - Current Ratings Characteristics

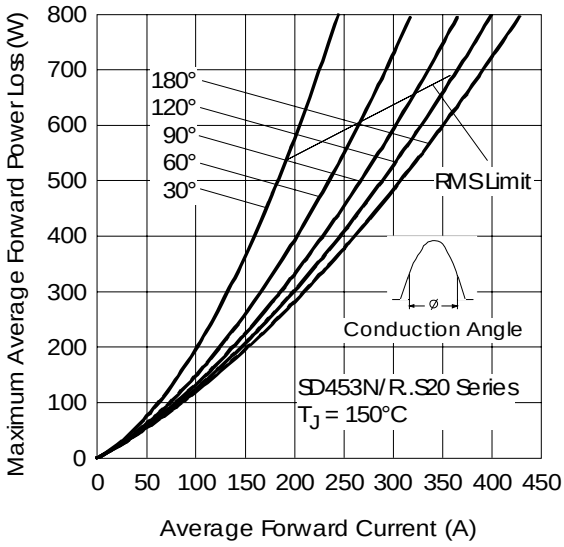


Fig. 5 - Forward Power Loss Characteristics

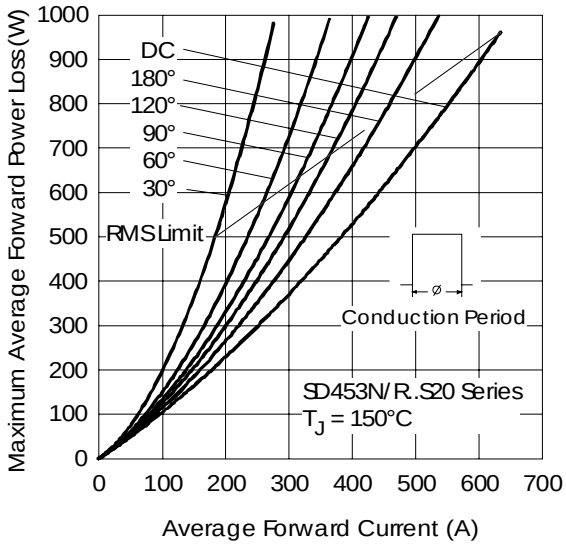


Fig. 6 - Forward Power Loss Characteristics

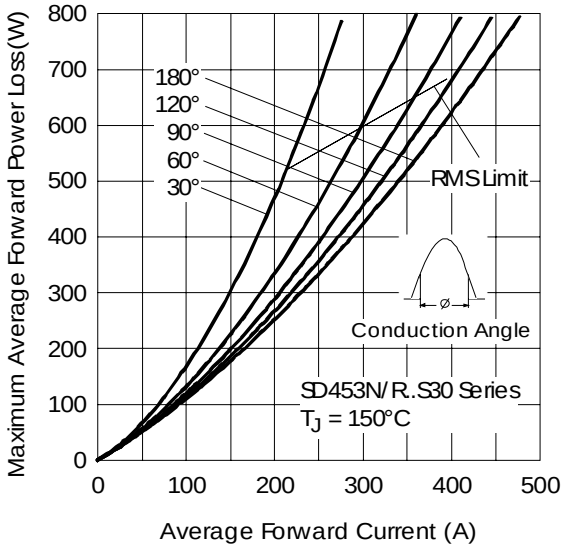


Fig. 7 - Forward Power Loss Characteristics

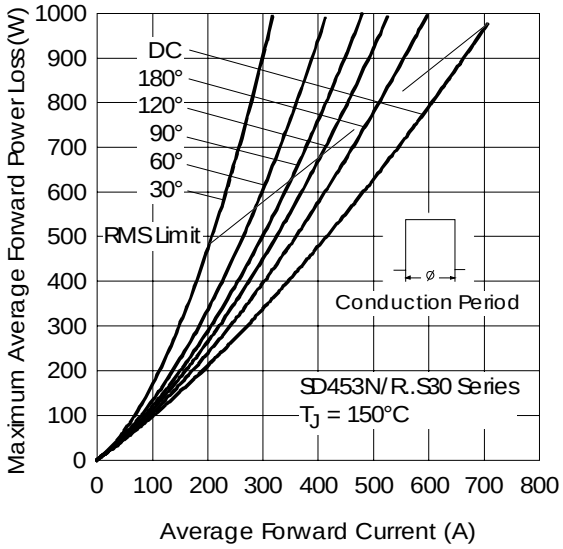


Fig. 8 - Forward Power Loss Characteristics

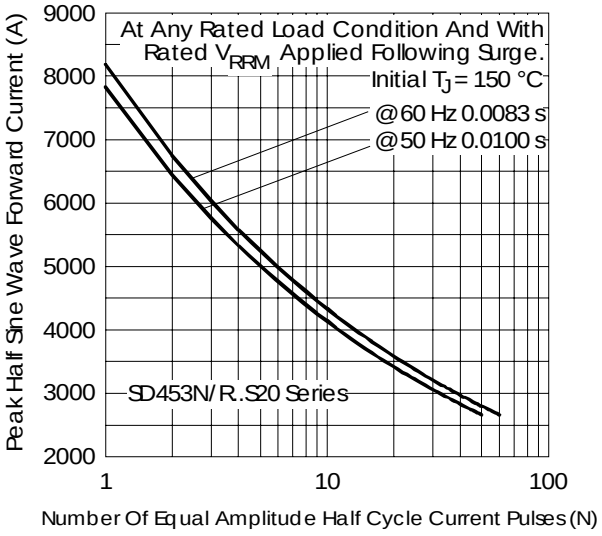


Fig. 9 - Maximum Non-repetitive Surge Current

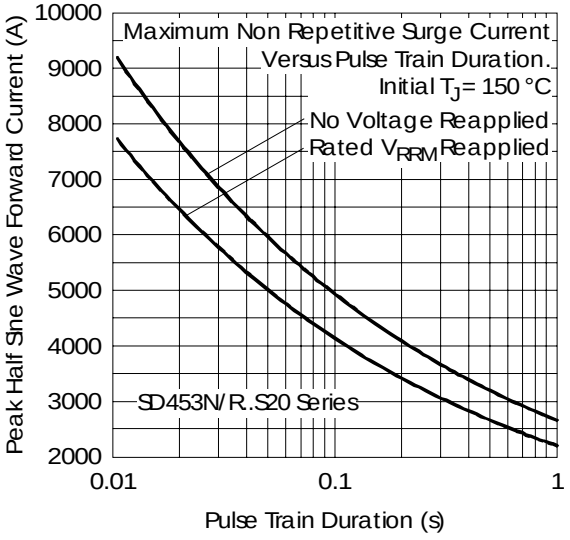


Fig. 10 - Maximum Non-repetitive Surge Current

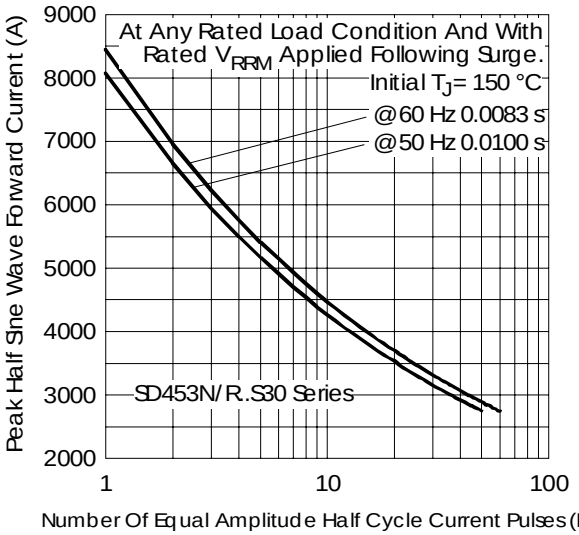


Fig.11 - Maximum Non-repetitive Surge Current

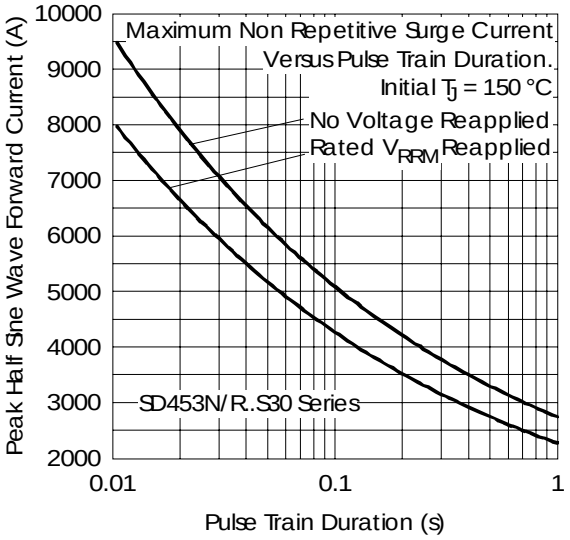


Fig.12 - Maximum Non-repetitive Surge Current

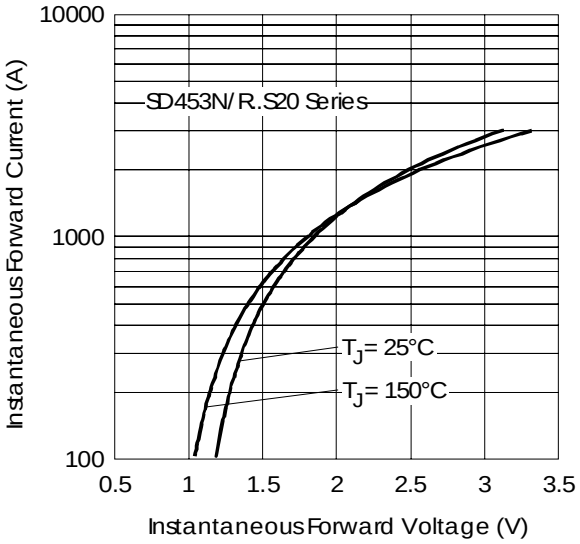


Fig. 13 - Forward Voltage Drop Characteristics

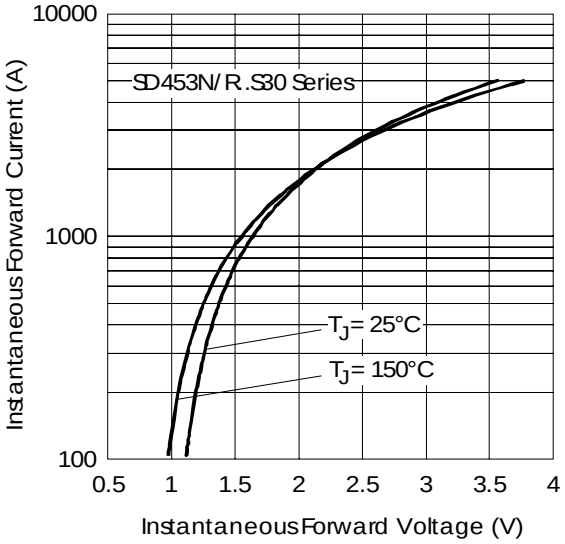


Fig. 14 - Forward Voltage Drop Characteristics

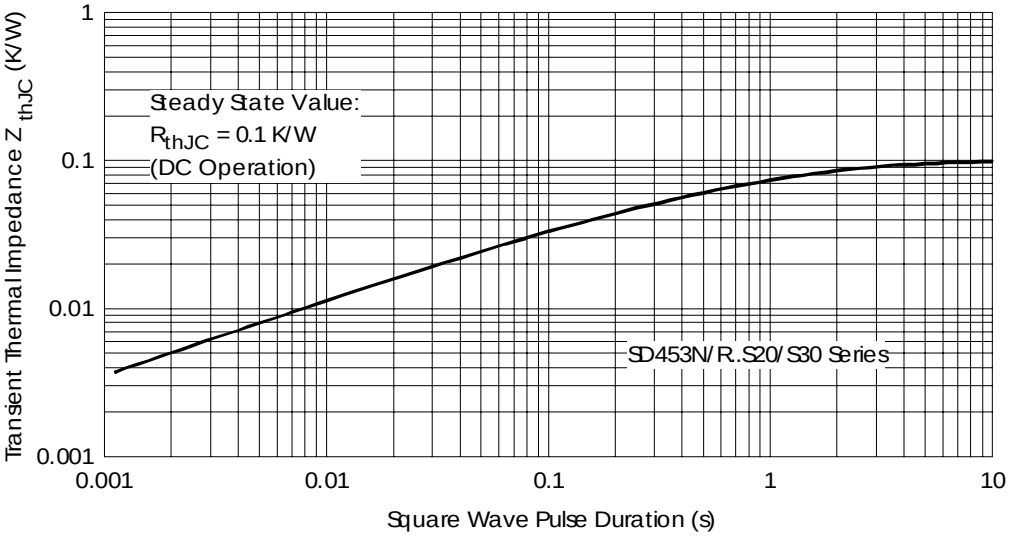


Fig. 15 - Thermal Impedance Z_{thJC} Characteristic

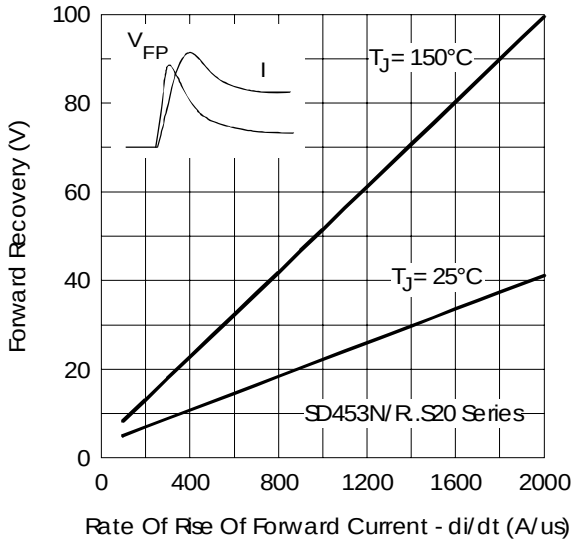


Fig. 16 - Typical Forward Recovery Characteristics

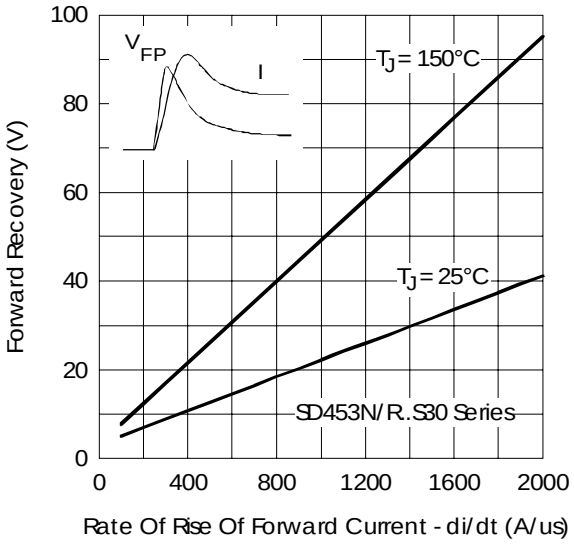


Fig. 17 - Typical Forward Recovery Characteristics

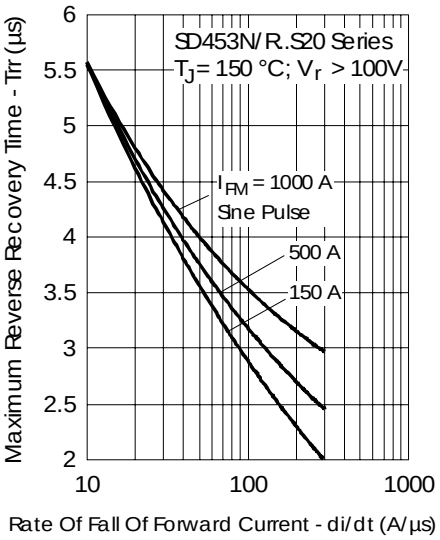


Fig. 18 - Recovery Time Characteristics

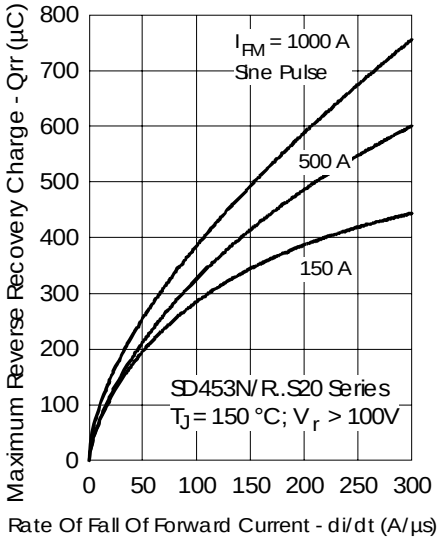


Fig. 19 - Recovery Charge Characteristics

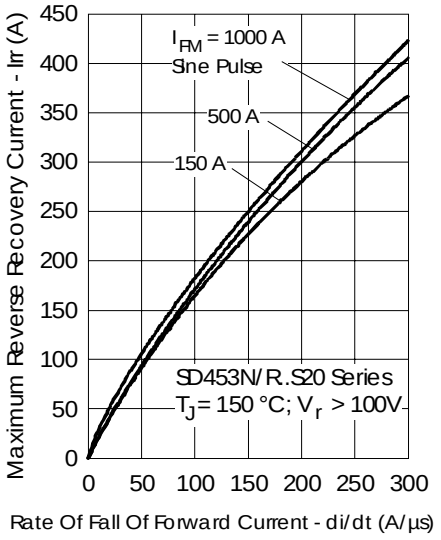


Fig. 20 - Recovery Current Characteristics

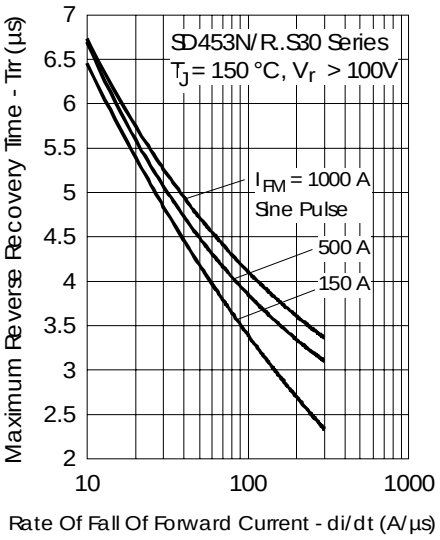


Fig. 21 - Recovery Time Characteristics

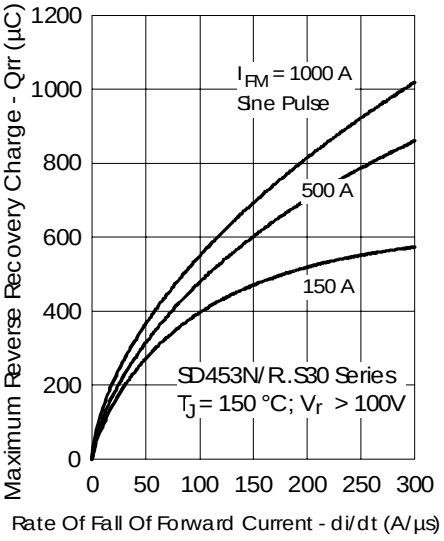


Fig. 22 - Recovery Charge Characteristics

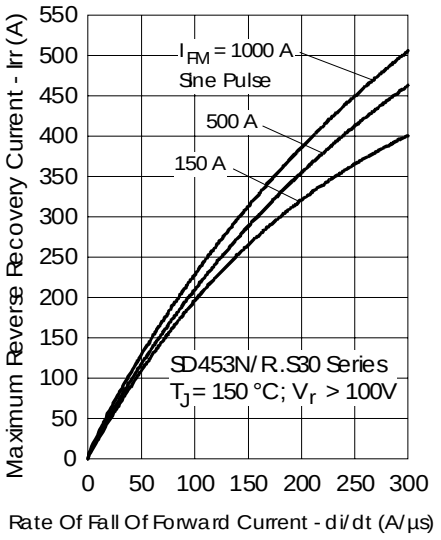


Fig. 23 - Recovery Current Characteristics

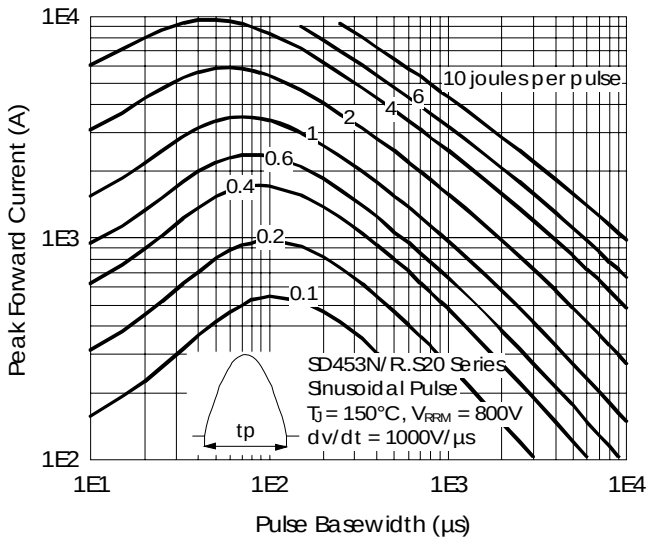


Fig. 24 - Maximum Total Energy Loss Per Pulse Characteristics

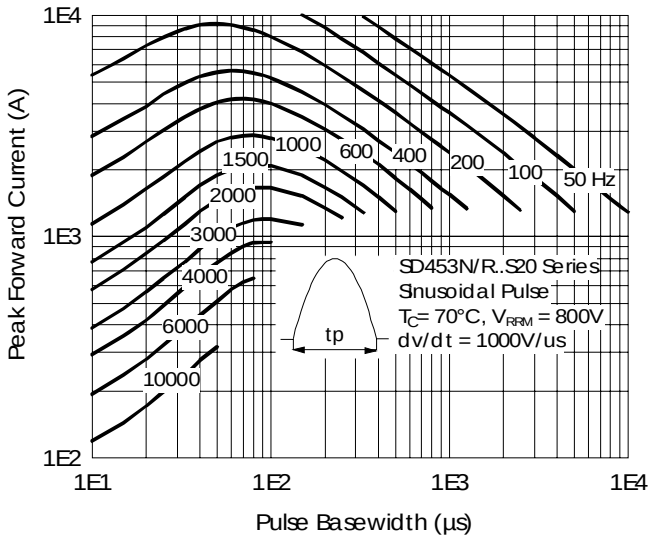


Fig. 25 - Frequency Characteristics

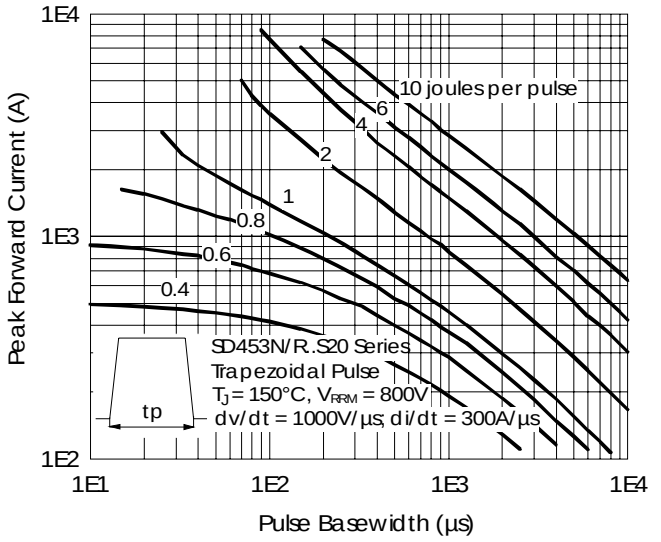


Fig. 26 - Maximum Total Energy Loss Per Pulse Characteristics

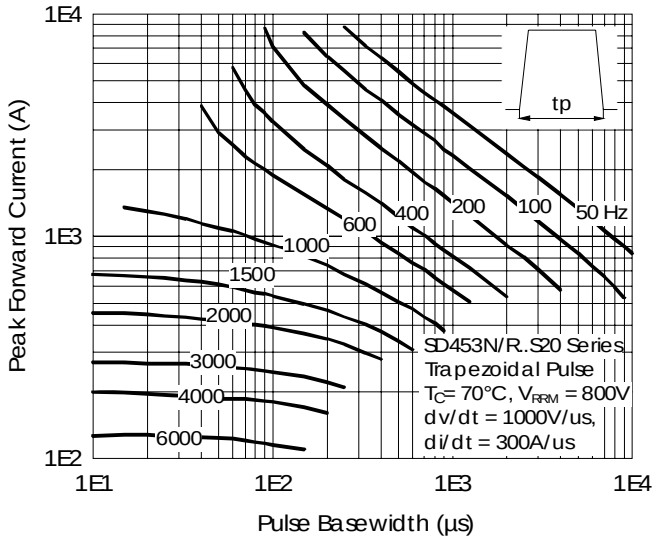


Fig. 27 - Frequency Characteristics

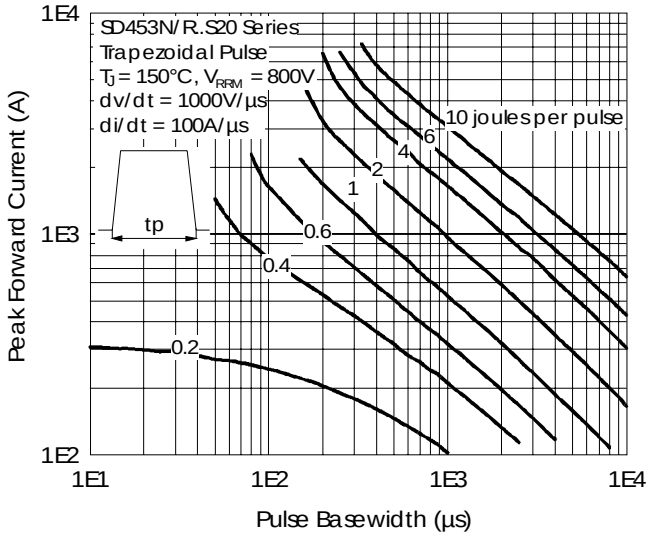


Fig. 28 - Maximum Total Energy Loss Per Pulse Characteristics

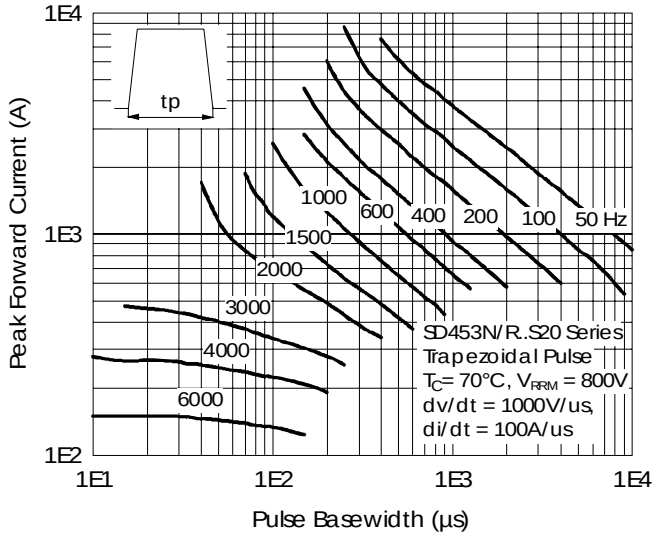


Fig. 29 - Frequency Characteristics

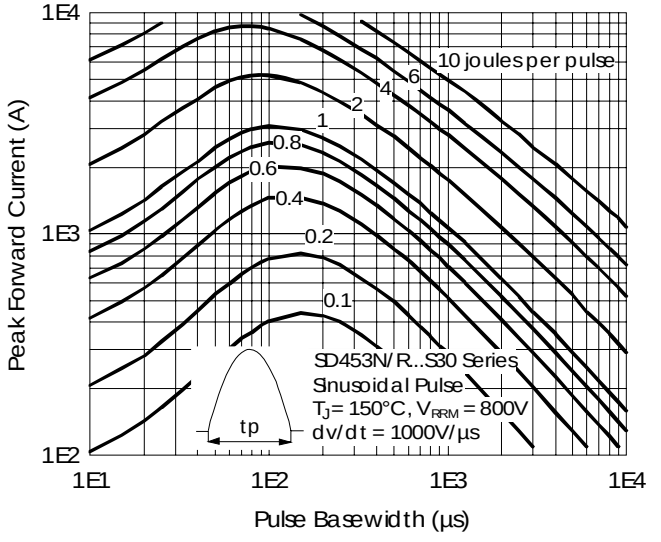


Fig. 30 - Maximum Total Energy Loss Per Pulse Characteristics

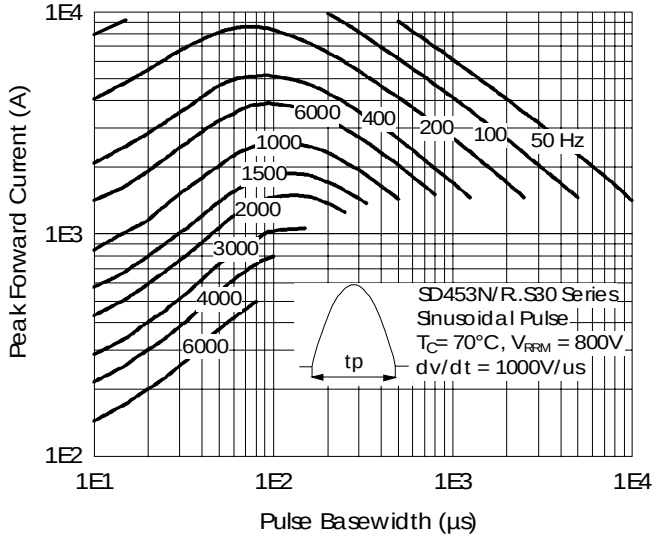


Fig. 31 - Frequency Characteristics

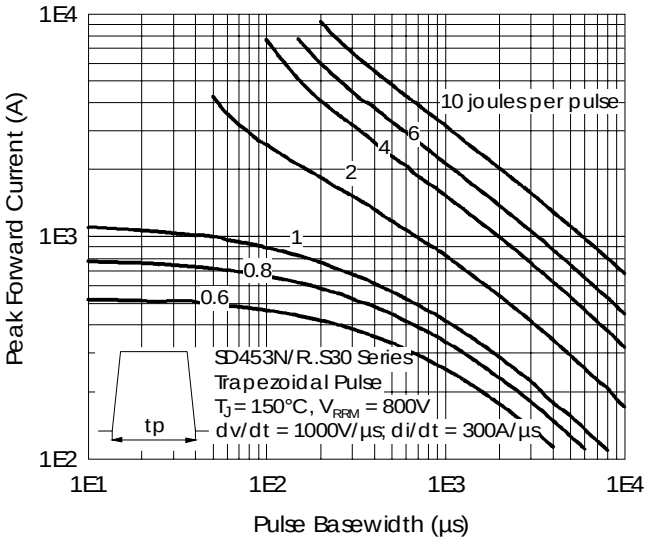


Fig. 32 - Maximum Total Energy Loss Per Pulse Characteristics

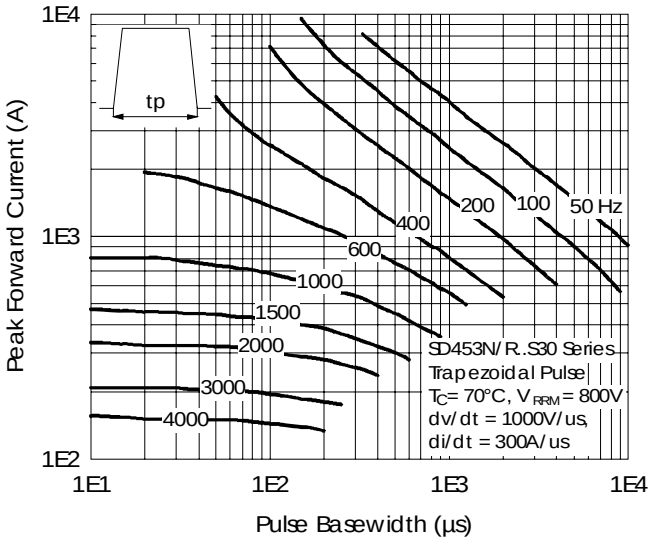


Fig. 33 - Frequency Characteristics

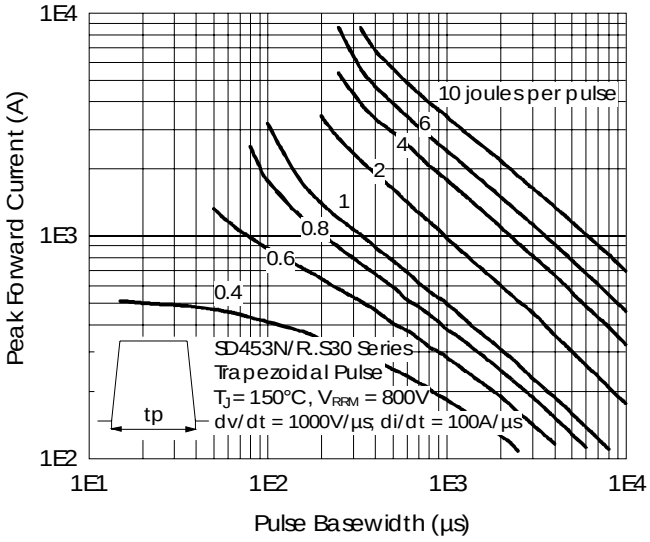


Fig. 34 - Maximum Total Energy Loss Per Pulse Characteristics

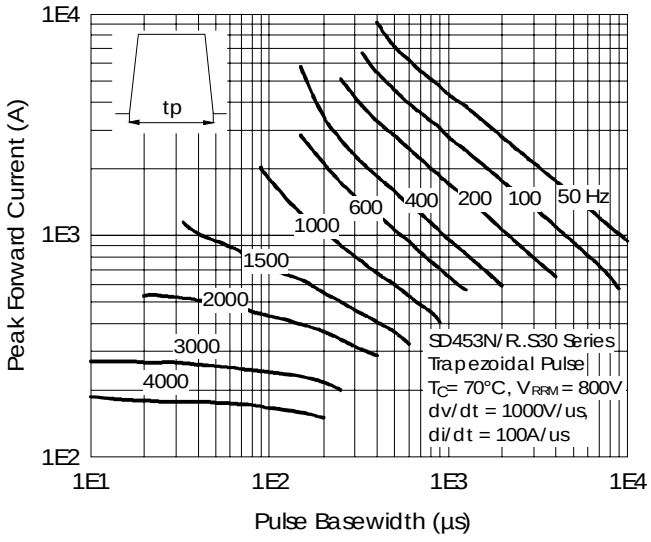


Fig. 35 - Frequency Characteristics

Data and specifications subject to change without notice.
This product has been designed and qualified for Industrial Level.
Qualification Standards can be found on IR's Web site.

International
IOR Rectifier

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