

FAST RECOVERY DIODES

Stud Version

Features

- High power FAST recovery diode series
- 4.5 μ 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
- Compression bonded encapsulation
- Stud version case style B-8
- Maximum junction temperature 125°C
- RoHS Compliant

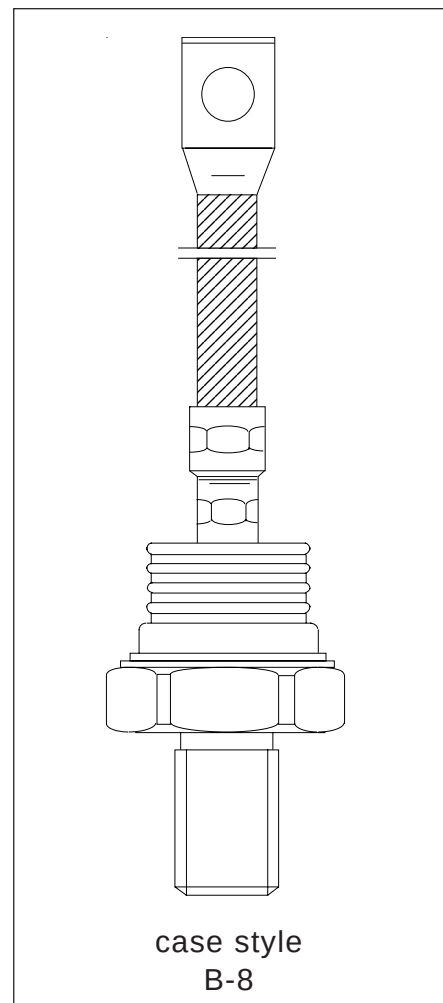
235A

Typical Applications

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

Major Ratings and Characteristics

Parameters	SD233N/R	Units
$I_{F(AV)}$	235	A
@ T_C	60	°C
$I_{F(RMS)}$	370	A
I_{FSM} @ 50Hz	5500	A
@ 60Hz	5760	A
I^2t @ 50Hz	151	KA ² s
@ 60Hz	138	KA ² s
V_{RRM} range	3000 to 4500	V
t_{rr}	4.5	μ s
@ T_J	125	°C
T_J	-40 to 125	°C



ELECTRICAL SPECIFICATIONS

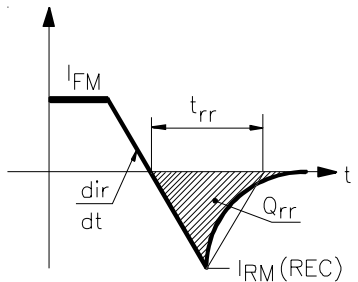
Voltage Ratings

Type number	Voltage Code	V_{RRM} max. repetitive peak and off-state voltage V	V_{RSM} , maximum non-repetitive peak voltage V	I_{RRM} max. $T_J = 125^\circ\text{C}$ mA
SD233N/R	30	3000	3100	50
	36	3600	3700	
	40	4000	4100	
	45	4500	4600	

Forward Conduction

Parameter	SD233N/R	Units	Conditions
$I_{F(AV)}$ Max. average forward current @ Case temperature	235	A	180° conduction, half sine wave.
	60	$^\circ\text{C}$	
$I_{F(RMS)}$ Max. RMS current	370	A	@ 45°C case temperature
I_{FSM} Max. peak, one-cycle non-repetitive forward current	5500	A	t = 10ms No voltage
	5760		t = 8.3ms reappplied
	4630		t = 10ms 50% V_{RRM}
	4840		t = 8.3ms reappplied
I^2t Maximum I^2t for fusing	151	KA^2s	t = 10ms No voltage
	138		t = 8.3ms reappplied
	107		t = 10ms 50% V_{RRM}
	98		t = 8.3ms reappplied
$I^2\sqrt{t}$ Maximum $I^2\sqrt{t}$ for fusing	1510	$\text{KA}^2\sqrt{\text{s}}$	t = 0.1 to 10ms, no voltage reappplied
$V_{F(TO)1}$ Low level of threshold voltage	1.56	V	$(16.7\% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)})$, $T_J = T_J \text{ max.}$
$V_{F(TO)2}$ High level of threshold voltage	1.68		$(I > \pi \times I_{F(AV)})$, $T_J = T_J \text{ max.}$
r_{f1} Low level of forward slope resistance	1.64	$\text{m}\Omega$	$(16.7\% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)})$, $T_J = T_J \text{ max.}$
r_{f2} High level of forward slope resistance	1.53		$(I > \pi \times I_{F(AV)})$, $T_J = T_J \text{ max.}$
V_{FM} Max. forward voltage	3.2	V	$I_{pk} = 1000\text{A}$, $T_J = 125^\circ\text{C}$, $t_p = 400 \mu\text{s}$ square pulse

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	4.5	680	240	

(*) $di/dt = 25\text{A}/\mu\text{s}$ @ $T_J = 25^\circ\text{C}$

Thermal and Mechanical Specification

Parameter	SD233N/R	Units	Conditions
T_J Max. operating temperature range	-40 to 125	°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 $\pm 10\%$	50	N m	Not lubricated threads
wt Approximate weight	454	g	
Case style	B-8		See Outline Table

ΔR_{thJC} Conduction

(The following table shows the increment of thermal resistance R_{thJC} when devices operate at different conduction angles than DC)

Conduction angle	Sinusoidal conduction	Rectangular conduction	Units	Conditions
180°	0.010	0.008	K/W	$T_J = T_J \text{ max.}$
120°	0.013	0.014		
90°	0.017	0.018		
60°	0.025	0.026		
30°	0.041	0.042		

Ordering Information Table

Device Code								
SD	23	3	N	45	S50	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) T = Threaded Top Terminal 3/8" 24UNF-2A None = Not isolated lead							
9	- C = Ceramic housing							

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CERAMIC HOUSING

Technical drawing of Case Style B-8 ceramic housing. The drawing shows a side view and a cross-sectional view. Key dimensions include:

- Top diameter: 26 (1.023) MAX.
- Top hole diameter: 10.5 (0.41) DIA.
- Top hole position: 12 (0.47) MIN.
- Top hole diameter tolerance: 5(0.20) ± 0.3(0.01)
- Top hole material: C.S. 70mm²
- Overall height: 245 (9.645)
- Height to top of housing: 255 (10.04)
- Height to top of nut: 115 (4.52) MIN.
- Height to top of nut: 38 (1.5) DIA. MAX.
- Height to top of nut: 21 (0.83) MAX.
- Height to top of nut: 47 (1.85) MAX.
- Height to top of nut: 80 (3.15) MAX.
- Height to top of nut: 27.5 (1.08) MAX.
- Bottom hole diameter: 3/4"-16UNF-2A *
- Bottom hole material: SW 45

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

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

CERAMIC HOUSING

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

Technical drawing of Case Style B-8 with top thread terminal 3/8". The drawing shows a side view and a cross-sectional view. Key dimensions include:

- Top diameter: 17 (0.67) DIA.
- Top thread: 3/8"-24UNF-2A
- Overall height: 25 (0.98)
- Height to top of housing: 77.5 (3.05)
- Height to top of housing: 80.5 (3.17)
- Height to top of nut: 38 (1.5) DIA. MAX.
- Height to top of nut: 21 (0.83) MAX.
- Height to top of nut: 47 (1.85) MAX.
- Height to top of nut: 27.5 (1.08) MAX.
- Bottom hole diameter: 3/4"-16UNF-2A *
- Bottom hole material: SW 45

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

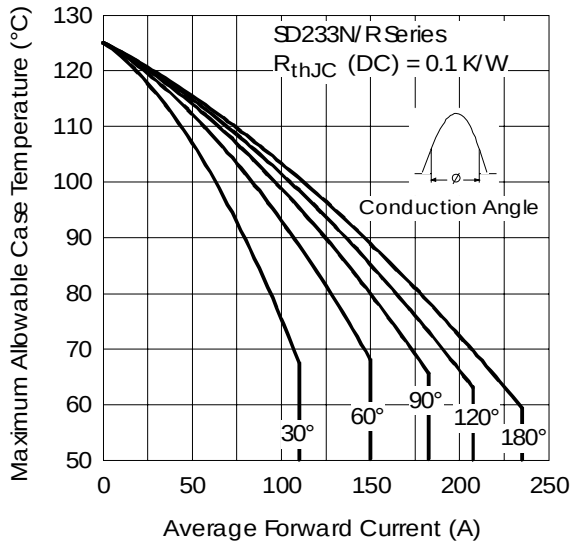


Fig. 1 - Current Ratings Characteristics

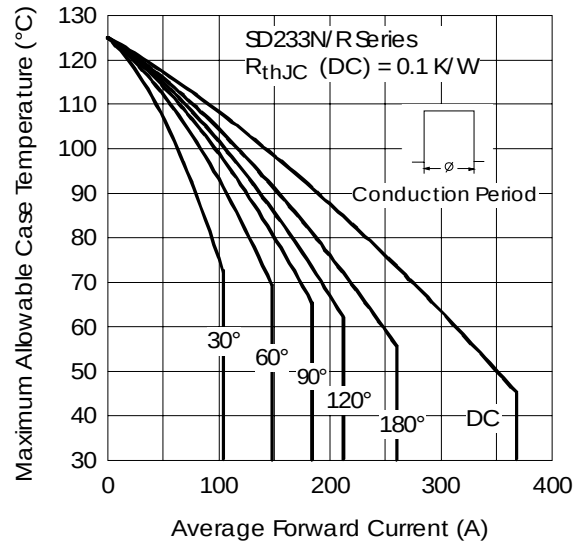


Fig. 2 - Current Ratings Characteristics

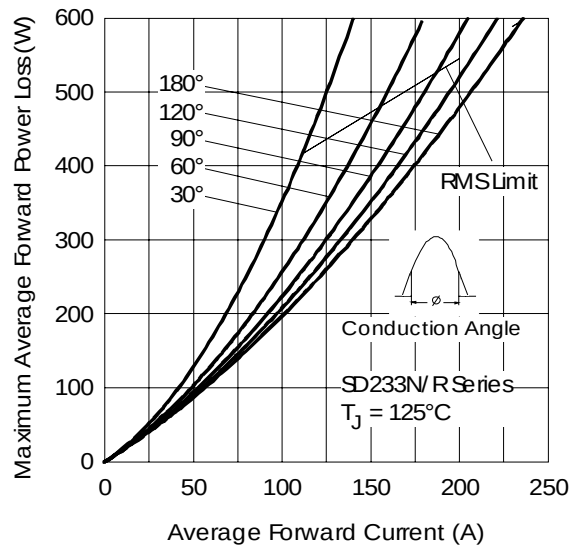


Fig. 3 - Forward Power Loss Characteristics

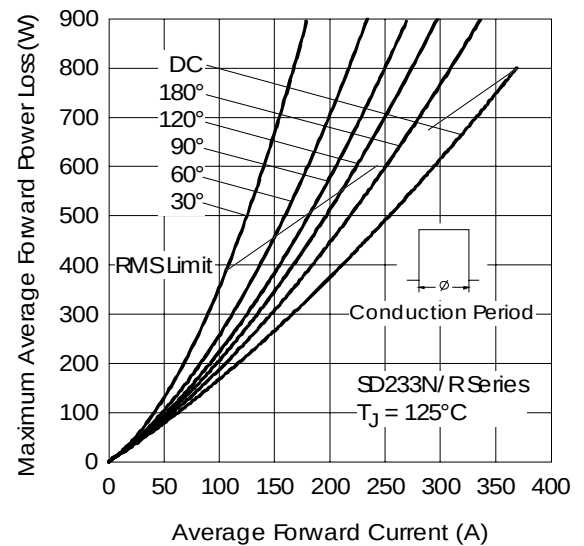


Fig. 4 - Forward Power Loss Characteristics

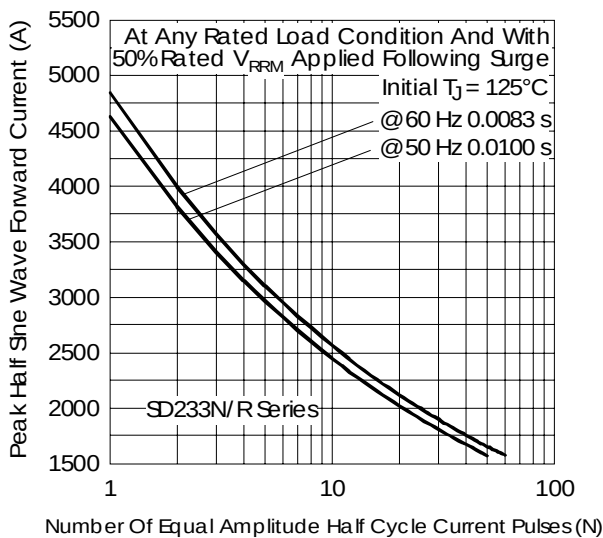


Fig. 5 - Maximum Non-repetitive Surge Current

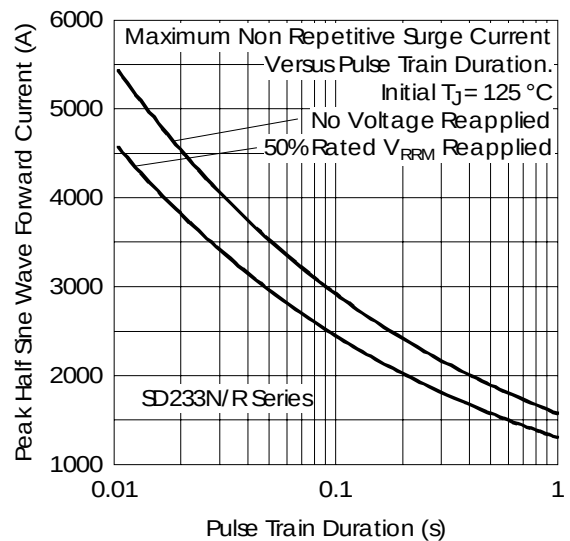


Fig. 6 - Maximum Non-repetitive Surge Current

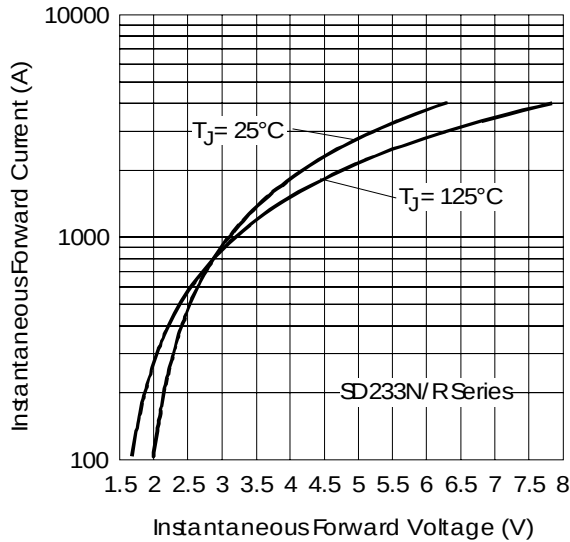


Fig. 7 - Forward Voltage Drop Characteristics

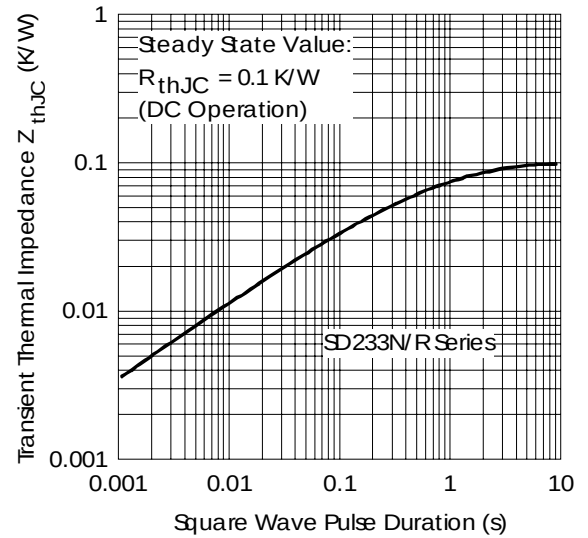
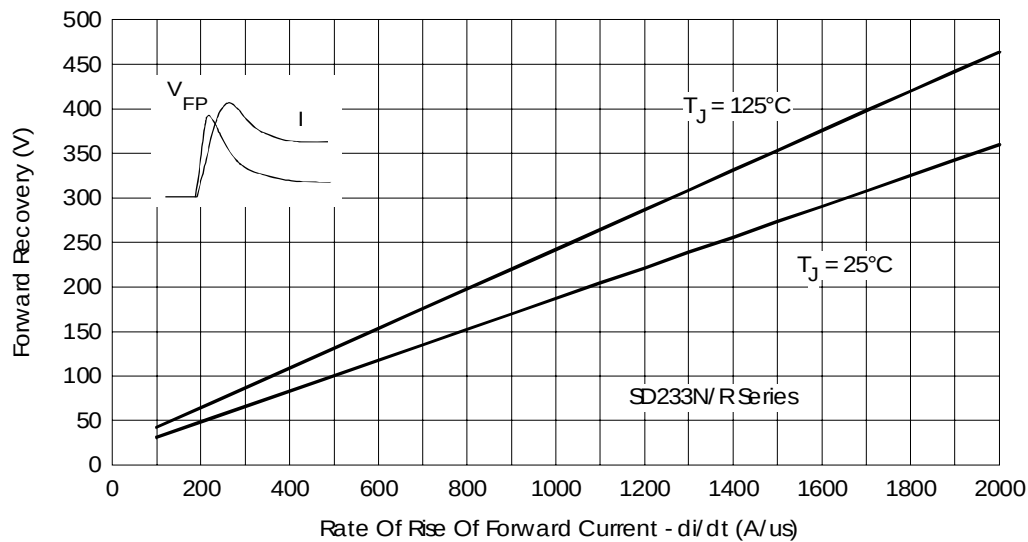
Fig. 8 - Thermal Impedance Z_{thJC} Characteristic

Fig. 9 - Typical Forward Recovery Characteristics

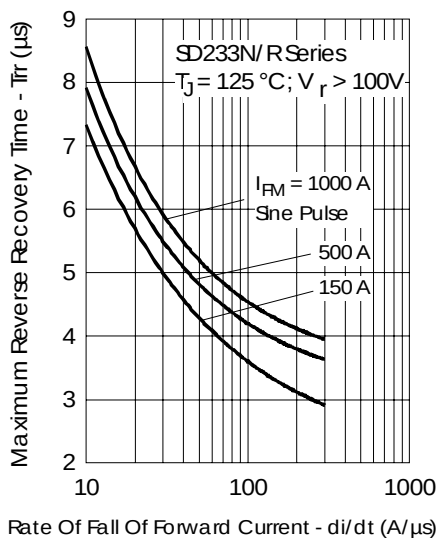


Fig. 10 - Recovery Time Characteristics

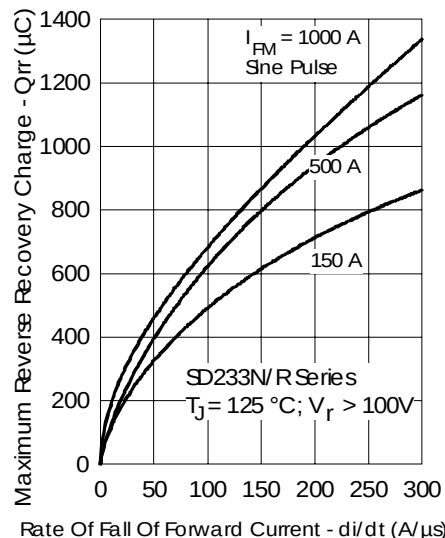


Fig. 11 - Recovery Charge Characteristics

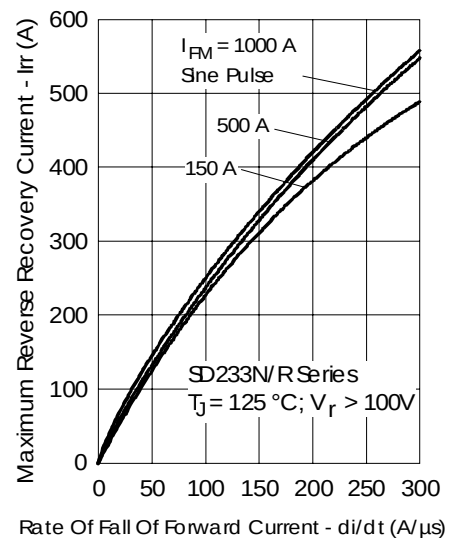


Fig. 12 - Recovery Current Characteristics

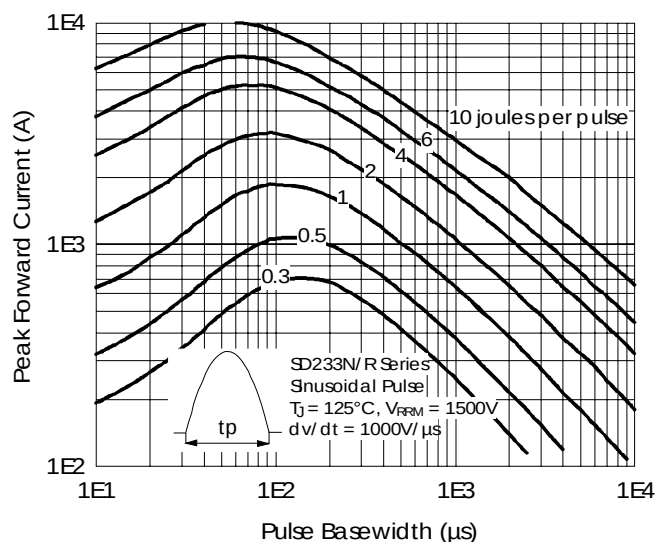


Fig. 13 - Maximum Total Energy Loss Per Pulse Characteristics

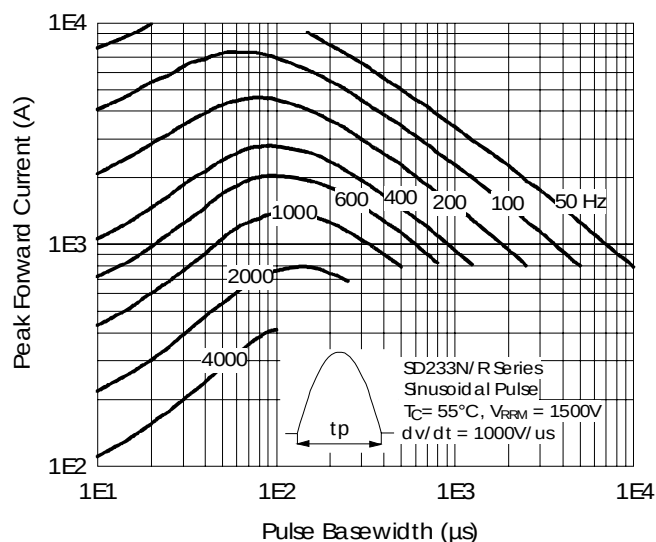


Fig. 14 - Frequency Characteristics

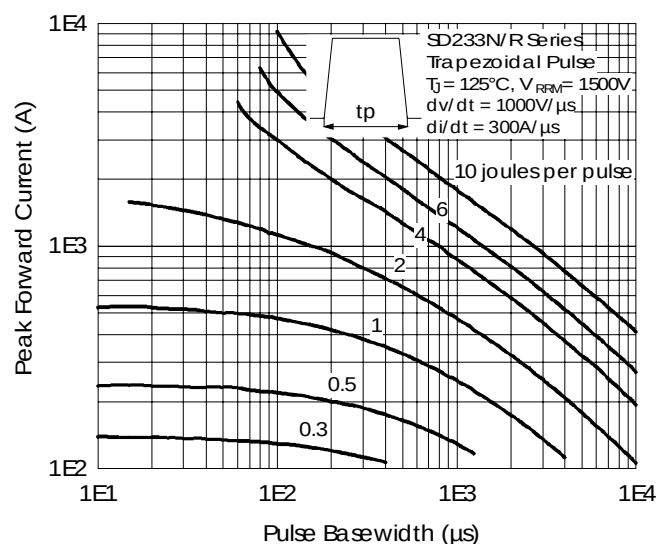


Fig. 15 - Maximum Total Energy Loss Per Pulse Characteristics

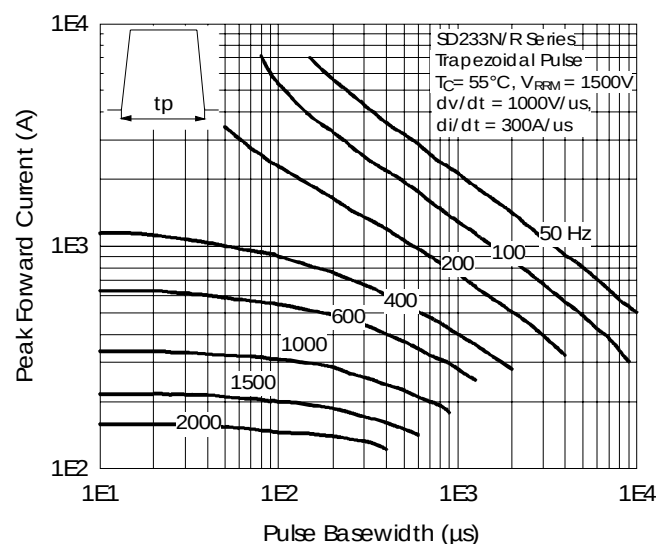


Fig. 16 - Frequency Characteristics

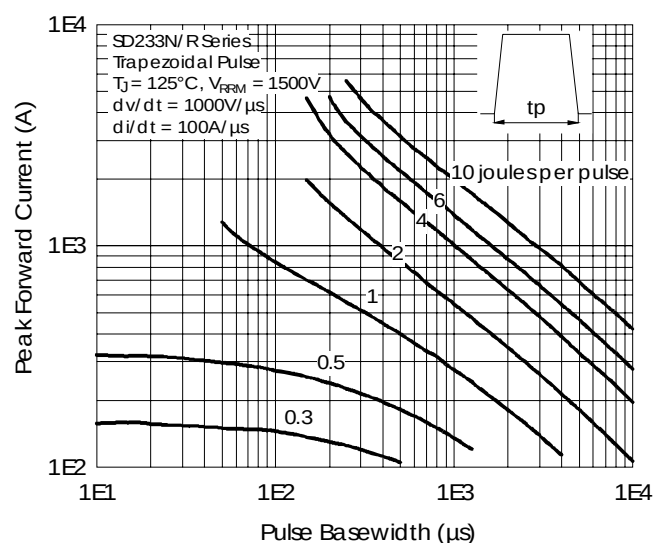


Fig. 17 - Maximum Total Energy Loss Per Pulse Characteristics

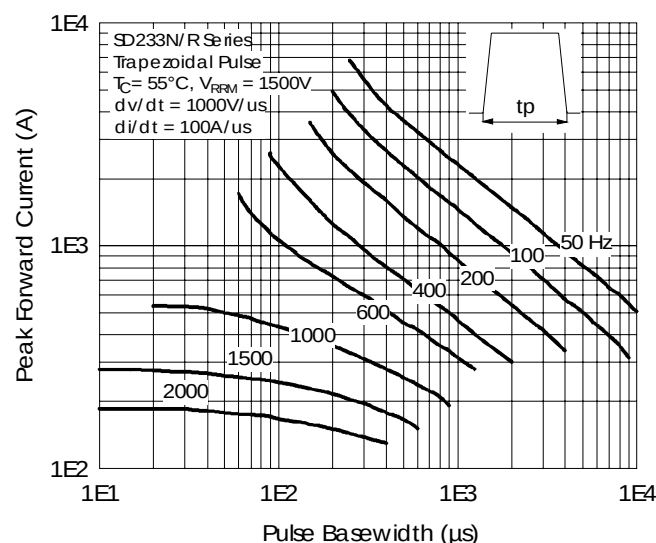


Fig. 18 - Frequency Characteristics

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
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