

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

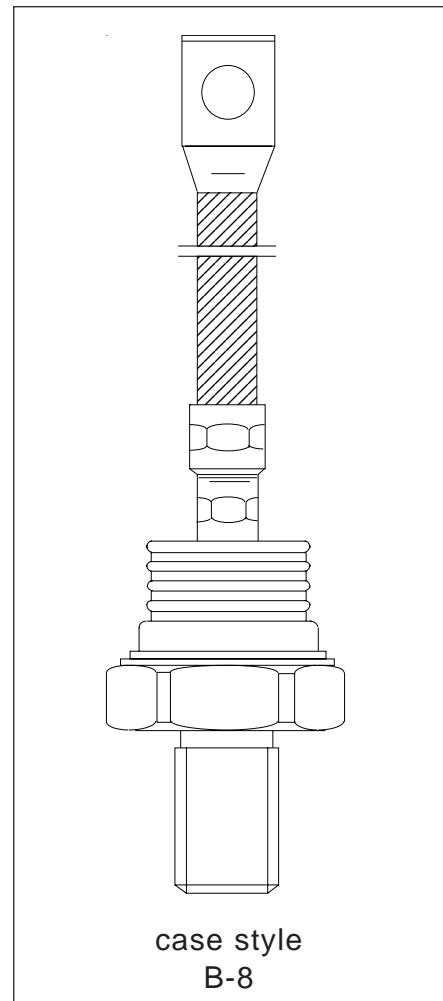
235A

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°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	°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 reapplied
	4630		t = 10ms 50% V _{RRM}
	4840		t = 8.3ms reapplied
I ² t Maximum I ² t for fusing	151	KA ² s	t = 10ms No voltage
	138		t = 8.3ms reapplied
	107		t = 10ms 50% V _{RRM}
	98		t = 8.3ms reapplied
I ² √t Maximum I ² √t for fusing	1510	KA ² √s	t = 0.1 to 10ms, no voltage reapplied
V _{F(TO)1} Low level of threshold voltage	1.56	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 of threshold voltage	1.68		(I > π x I _{F(AV)}), T _J = T _J max.
r _{f1} Low level of forward slope resistance	1.64	mΩ	(16.7% x π x I _{F(AV)} < I < π x I _{F(AV)}), T _J = T _J max.
r _{f2} High level of forward slope resistance	1.53		(I > π x I _{F(AV)}), T _J = T _J max.
V _{FM} Max. forward voltage	3.2	V	I _{pk} = 1000A, T _J = 125°C, t _p = 400 μs square pulse

Recovery Characteristics

Code	T _J = 25°C typical t _{rr} @ 25% I _{RRM} (μs)	Test conditions			Max. values @ T _J = 125°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 = 25A/μs @ T_J = 25°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 ± 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 max.
120°	0.013	0.014		
90°	0.017	0.018		
60°	0.025	0.026		
30°	0.041	0.042		

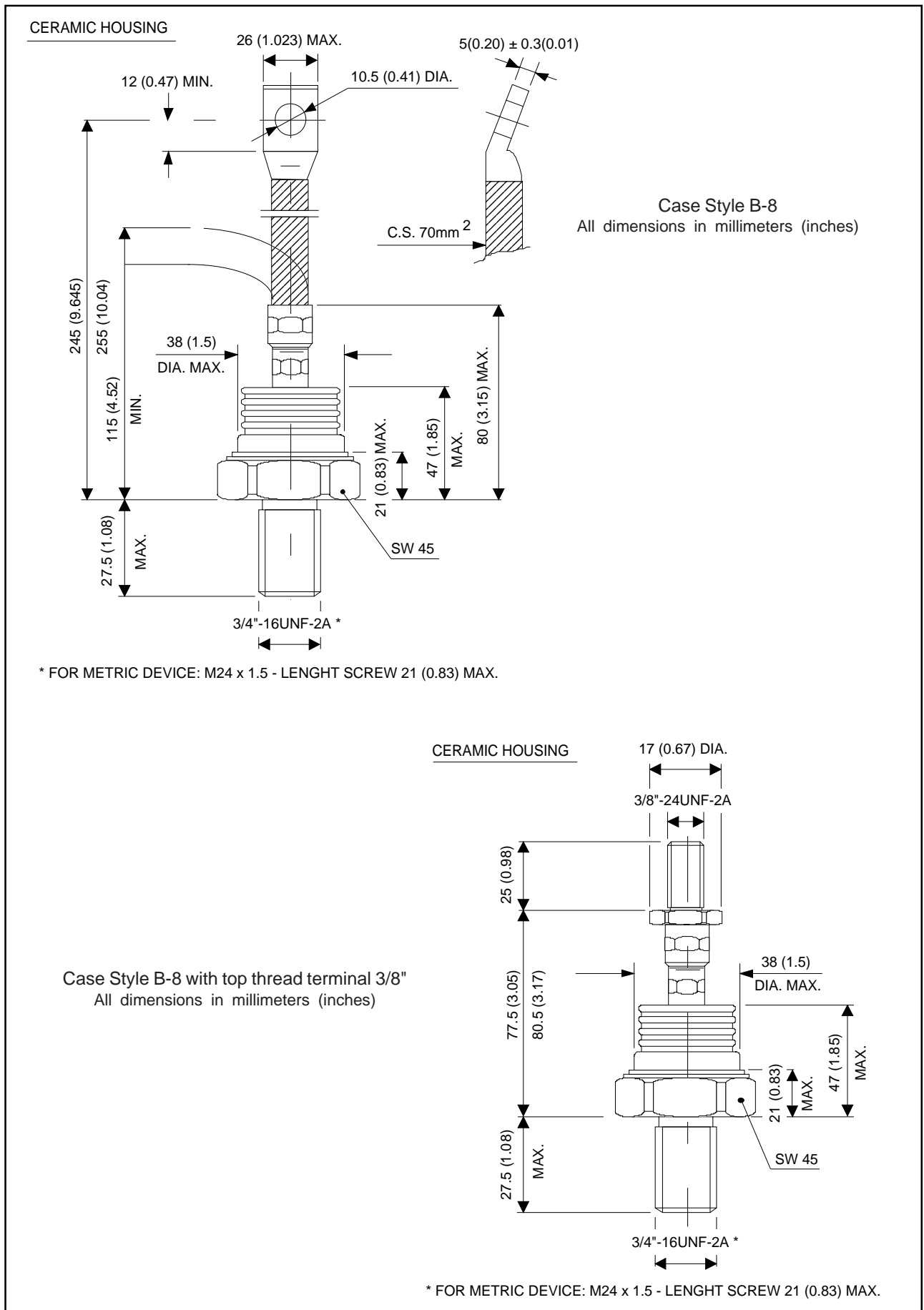
Ordering Information Table

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

Outlines Table



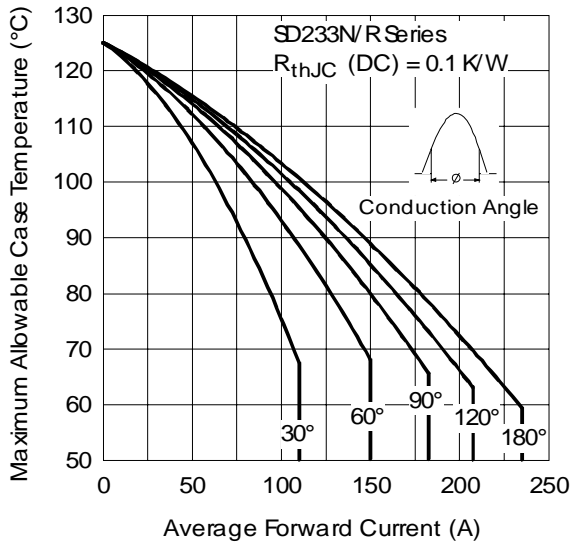


Fig. 1 - Current Ratings Characteristics

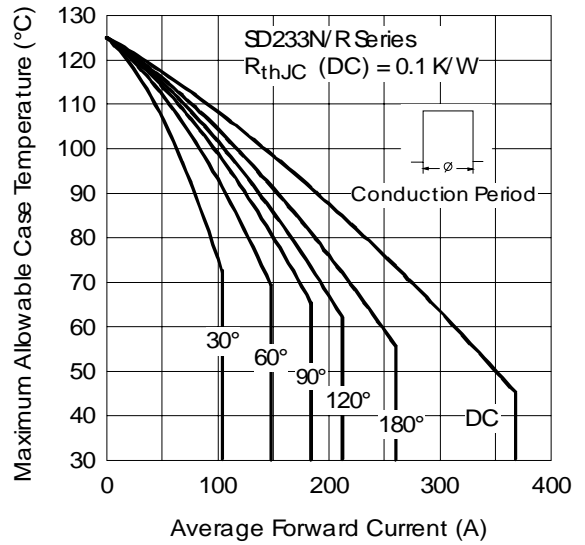


Fig. 2 - Current Ratings Characteristics

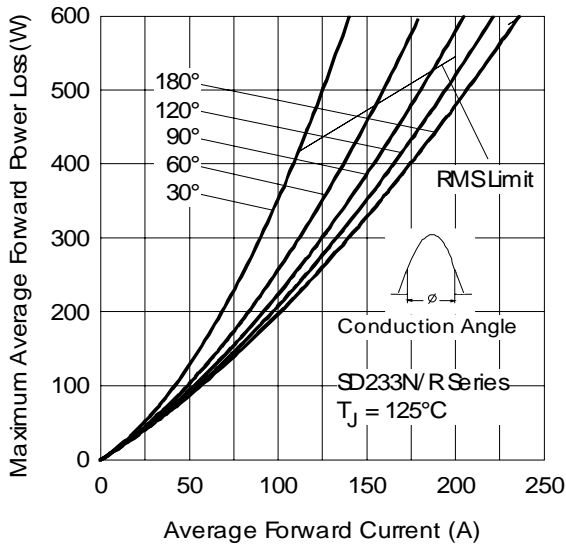


Fig. 3 - Forward Power Loss Characteristics

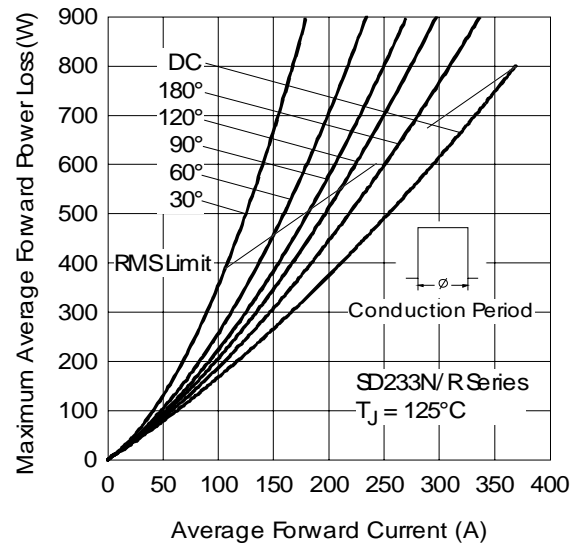


Fig. 4 - Forward Power Loss Characteristics

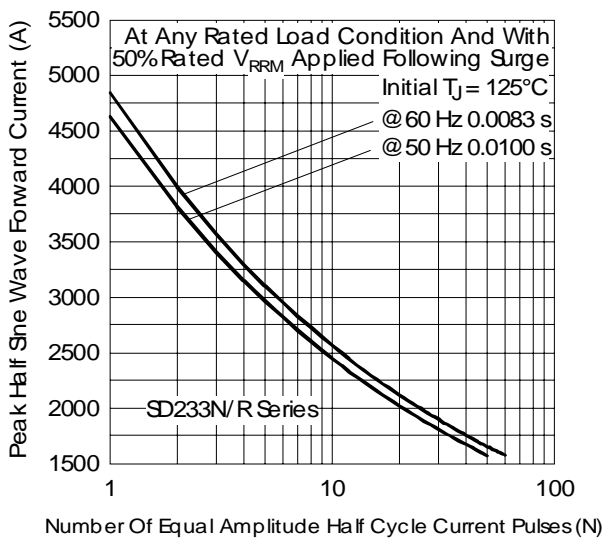


Fig. 5 - Maximum Non-repetitive Surge Current

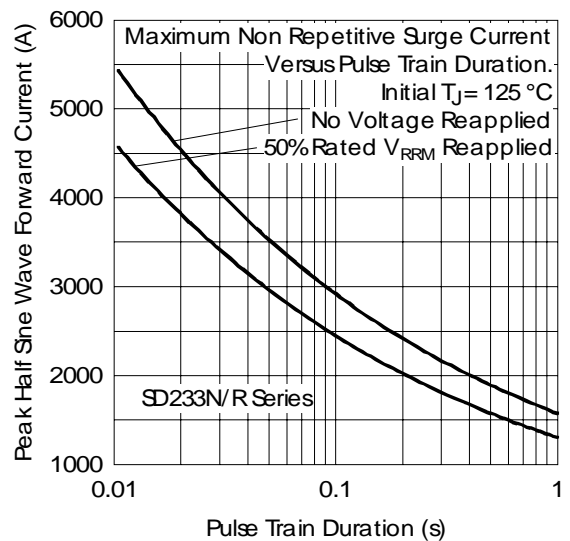


Fig. 6 - Maximum Non-repetitive Surge Current

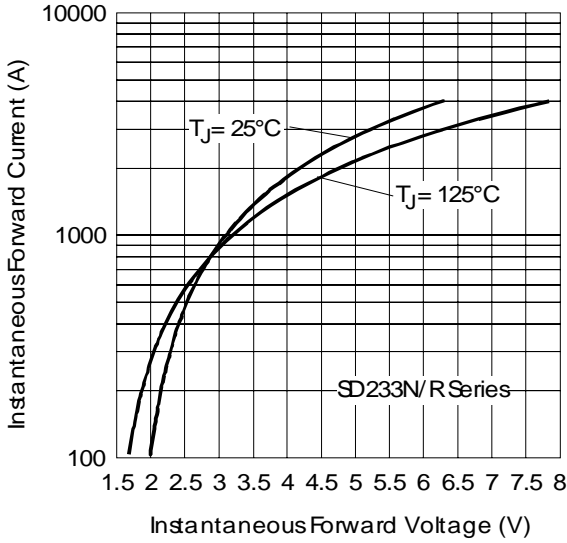


Fig. 7 - Forward Voltage Drop Characteristics

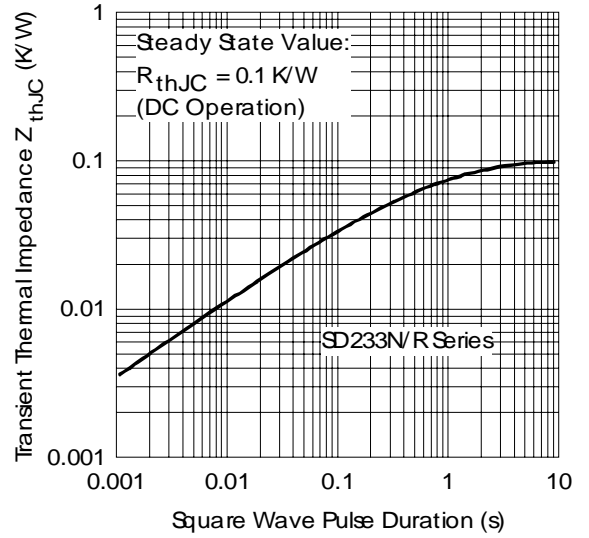


Fig. 8 - Thermal Impedance Z_{thJC} Characteristic

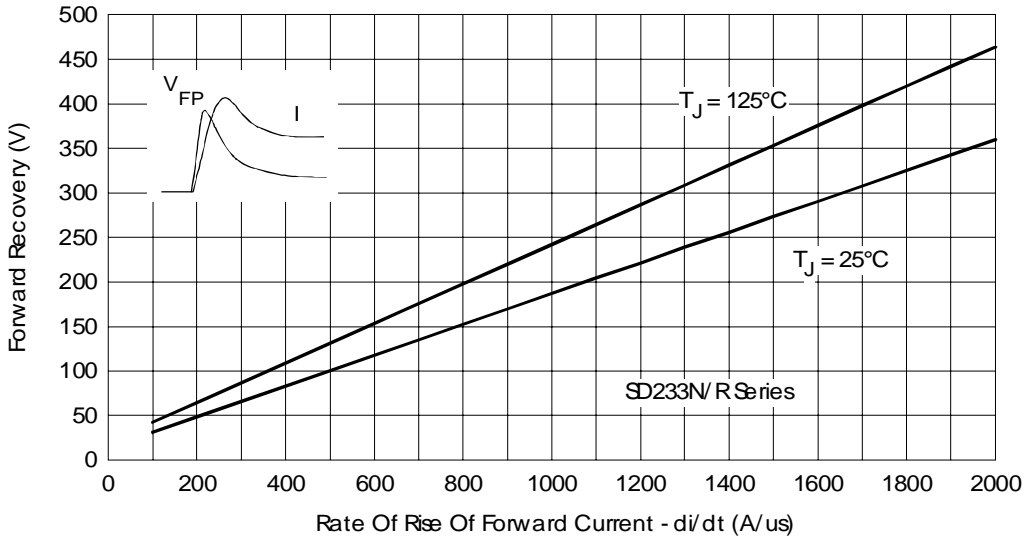


Fig. 9 - Typical Forward Recovery Characteristics

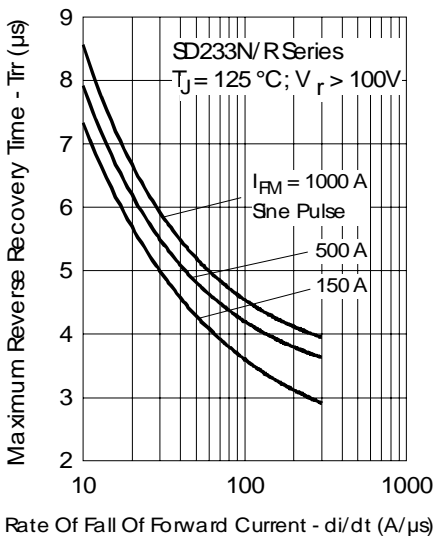


Fig. 10 - Recovery Time Characteristics

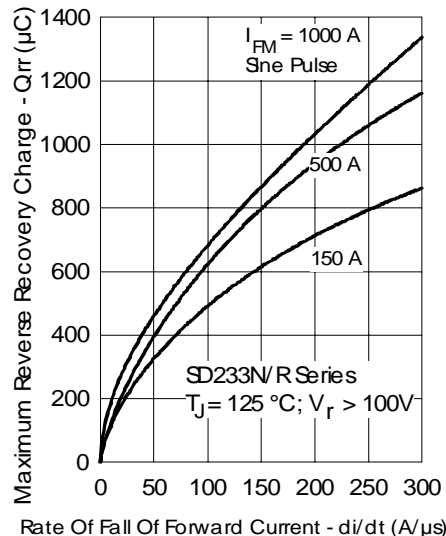


Fig. 11 - Recovery Charge Characteristics

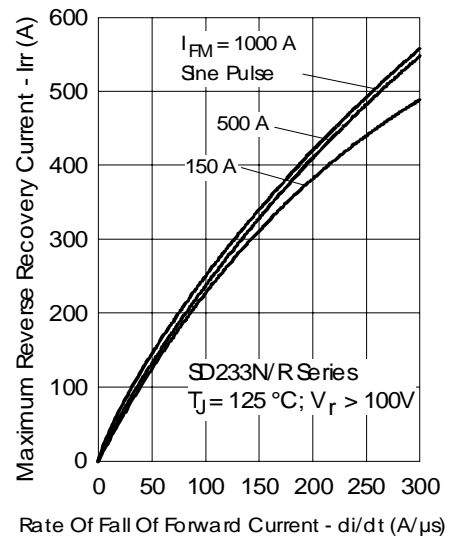


Fig. 12 - Recovery Current Characteristics

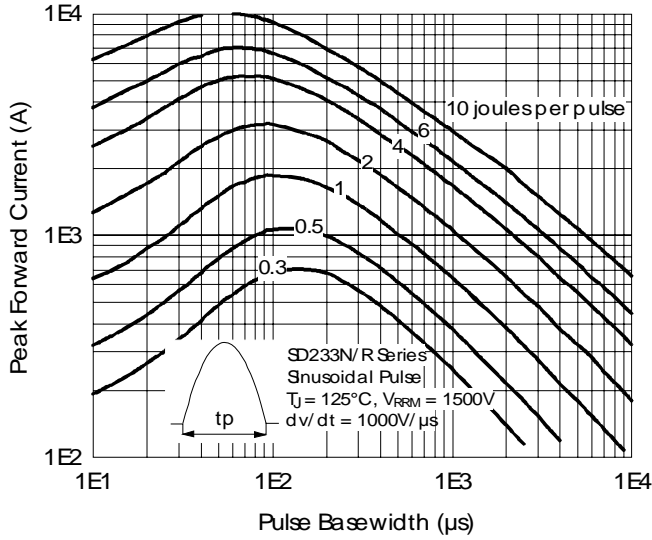


Fig. 13 - Maximum Total Energy Loss Per Pulse Characteristics

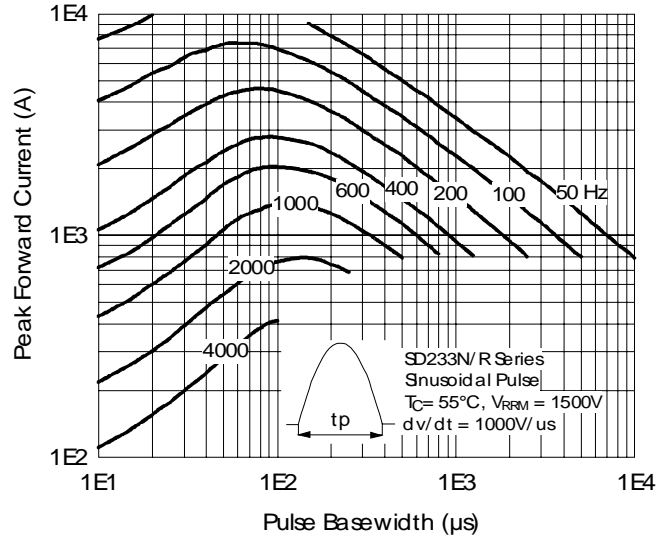


Fig. 14 - Frequency Characteristics

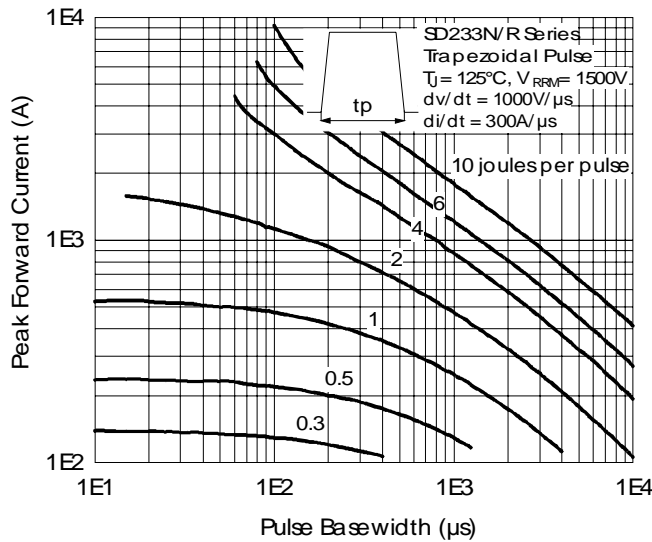


Fig. 15 - Maximum Total Energy Loss Per Pulse Characteristics

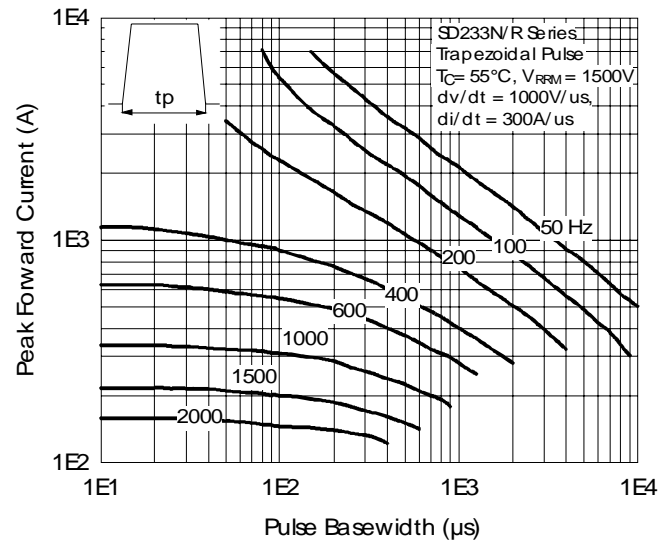


Fig. 16 - Frequency Characteristics

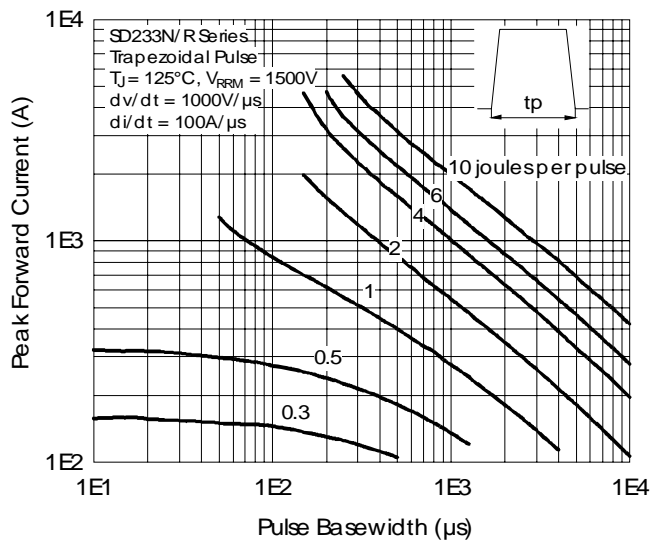


Fig. 17 - Maximum Total Energy Loss Per Pulse Characteristics

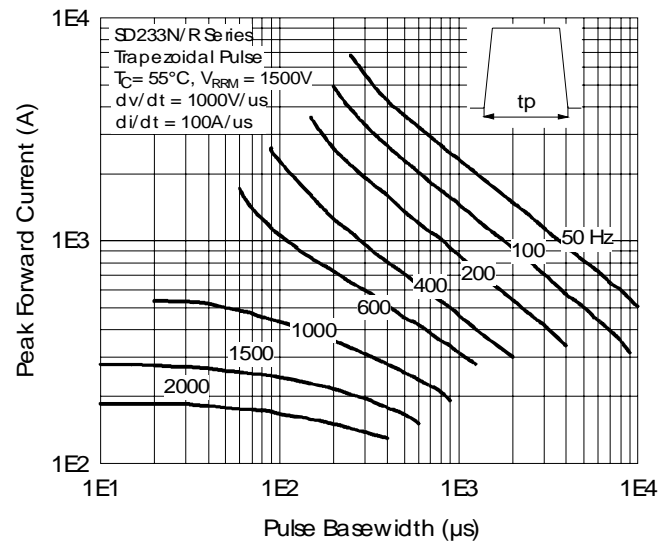


Fig. 18 - Frequency Characteristics

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
IOR Rectifier

IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105
TAC Fax: (310) 252-7309

Visit us at www.irf.com for sales contact information. 10/06