

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

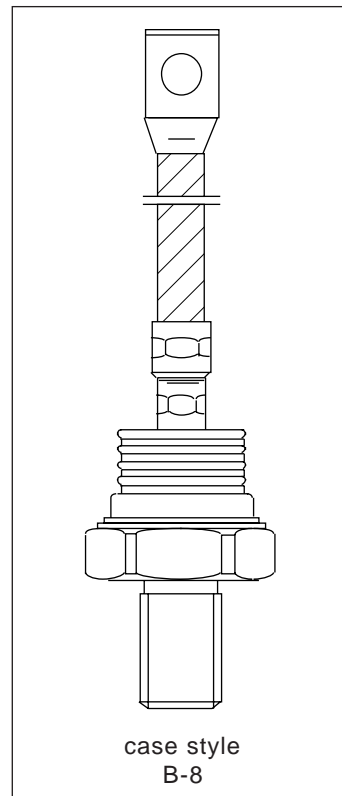
235A

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 reappplied
	5760		t = 8.3ms
	4630		t = 10ms 50% V _{RRM} reappplied
	4840		t = 8.3ms
I ² t Maximum I ² t for fusing	151	KA ² s	t = 10ms No voltage reappplied
	138		t = 8.3ms
	107		t = 10ms 50% V _{RRM} reappplied
	98		t = 8.3ms
I ² √t Maximum I ² √t for fusing	1510	KA ² √s	t = 0.1 to 10ms, no voltage reappplied
V _{F(TO)1} Low level of threshold voltage	1.56	V	(16.7% × π × I _{F(AV)}) < I < π × I _{F(AV)} , T _J = T _J max.
V _{F(TO)2} High level of threshold voltage	1.68		(I > π × I _{F(AV)}), T _J = T _J max.
r _{f1} Low level of forward slope resistance	1.64	mΩ	(16.7% × π × I _{F(AV)}) < I < π × I _{F(AV)} , T _J = T _J max.
r _{f2} High level of forward slope resistance	1.53		(I > π × 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	Nm	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

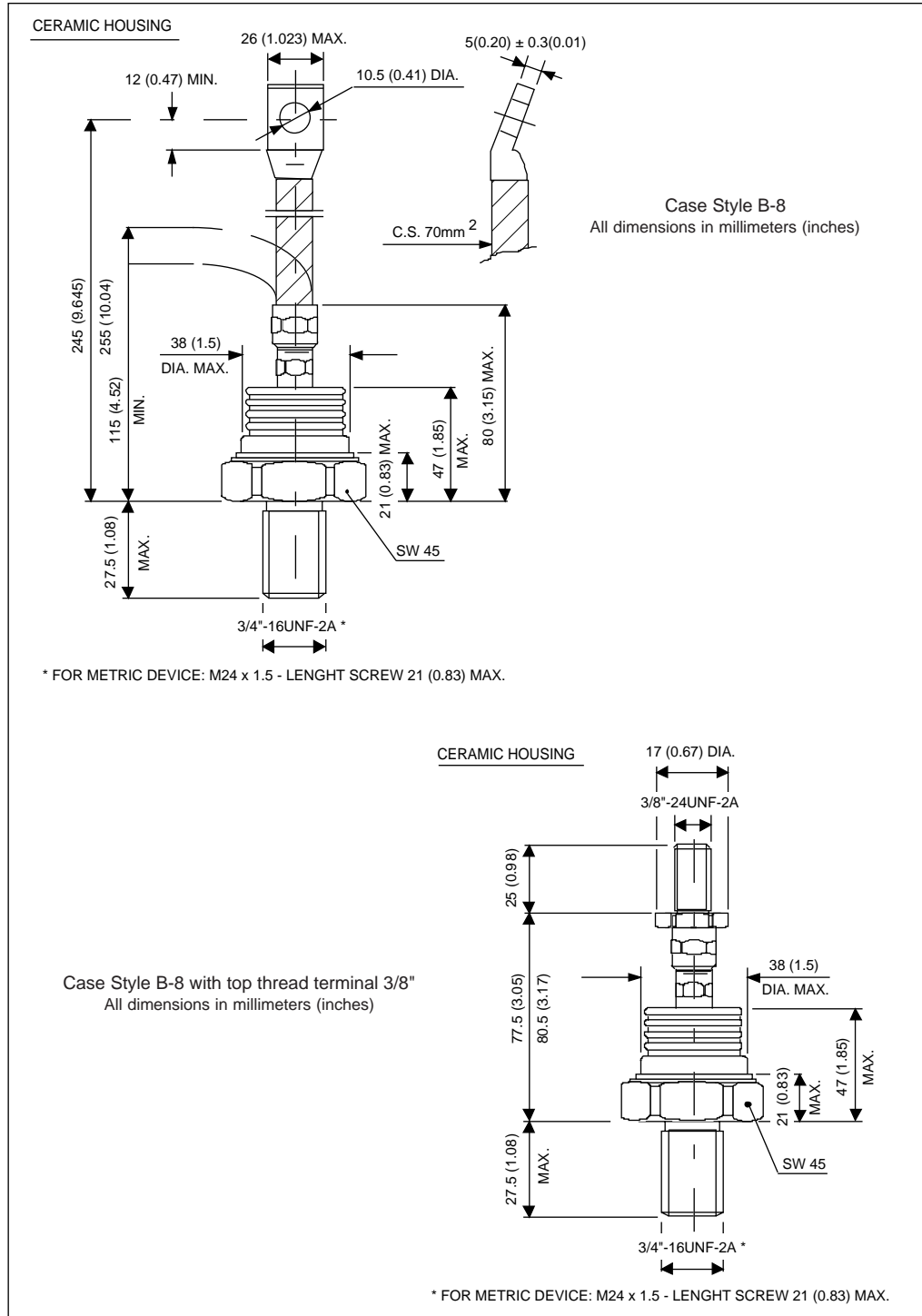
SD	23	3	N	45	S50	P	S	C
1	2	3	4	5	6	7	8	9

- 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

SD233N/R Series

Bulletin I2094 rev. A 09/94

Outlines Table



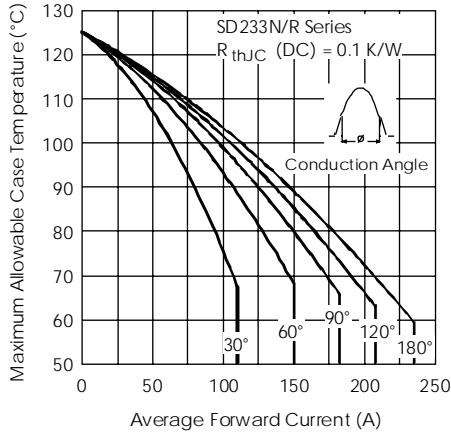


Fig. 1 - Current Ratings Characteristics

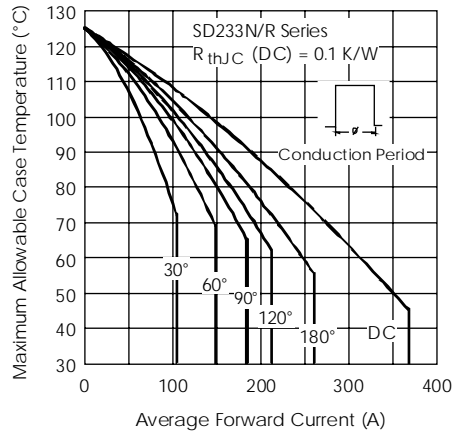


Fig. 2 - Current Ratings Characteristics

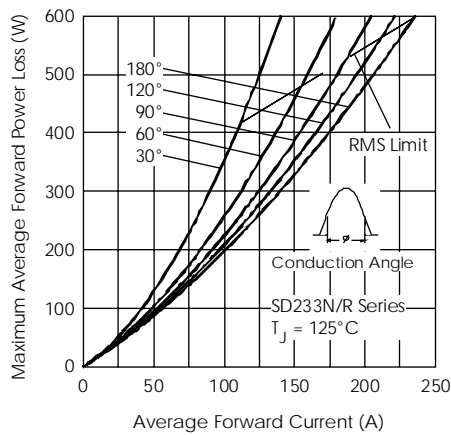


Fig. 3 - Forward Power Loss Characteristics

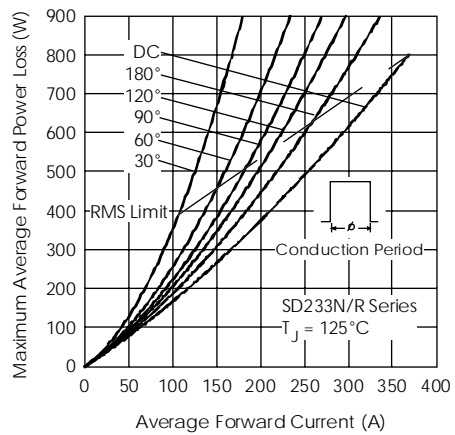


Fig. 4 - Forward Power Loss Characteristics

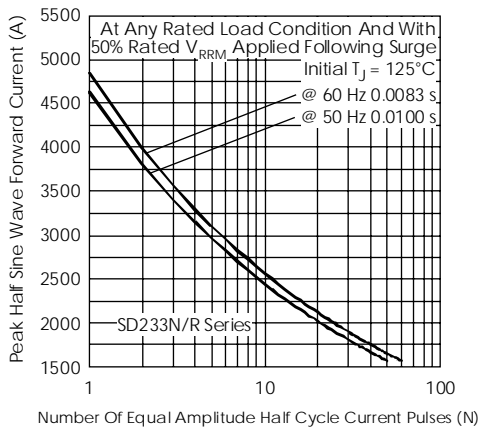


Fig. 5 - Maximum Non-repetitive Surge Current

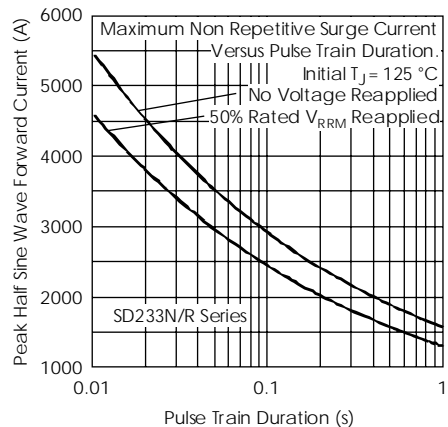


Fig. 6 - Maximum Non-repetitive Surge Current

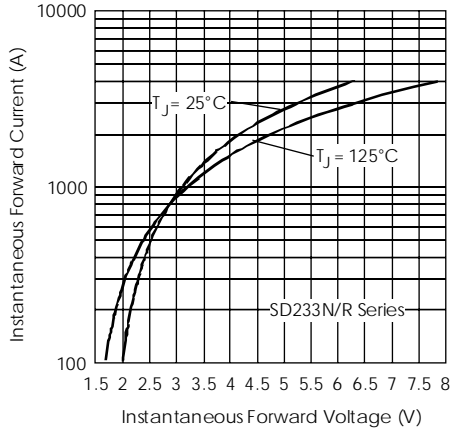


Fig. 7 - Forward Voltage Drop Characteristics

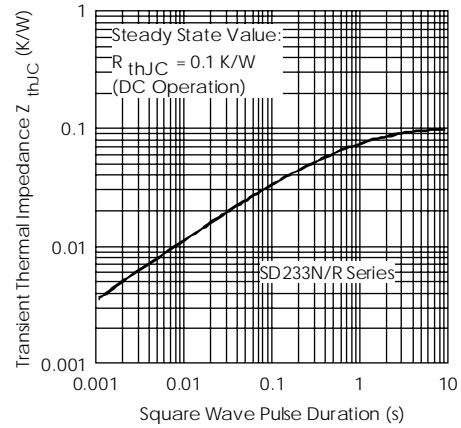


Fig. 8 - Thermal Impedance Z_{thJC} Characteristic

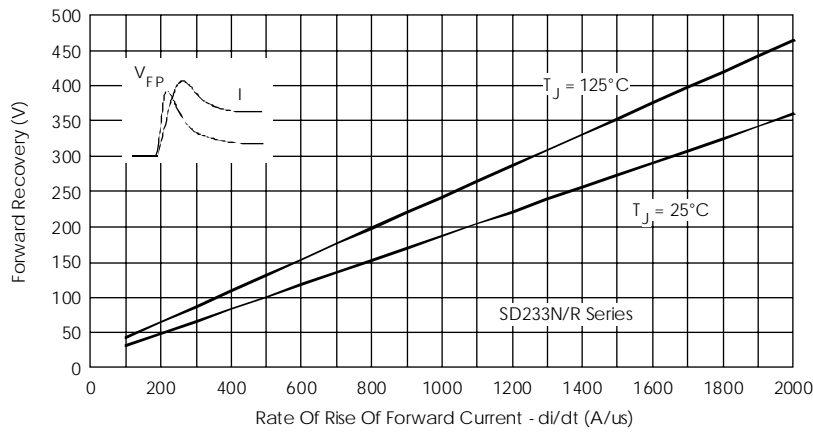


Fig. 9 - Typical Forward Recovery Characteristics

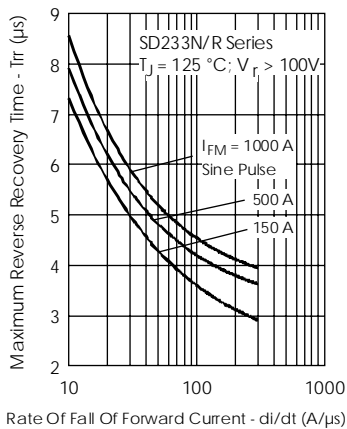


Fig. 10 - Recovery Time Characteristics

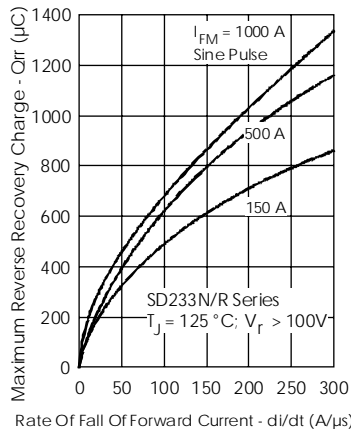


Fig. 11 - Recovery Charge Characteristics

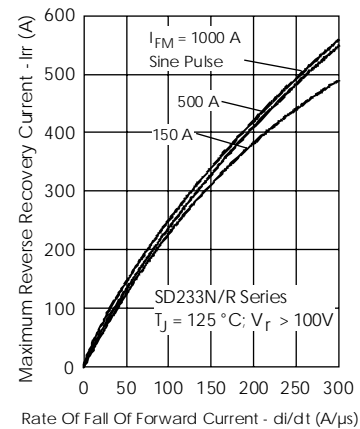


Fig. 12 - Recovery Current Characteristics

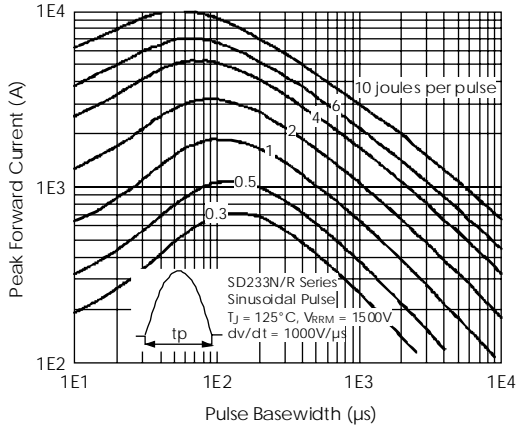


Fig. 13 - Maximum Total Energy Loss Per Pulse Characteristics

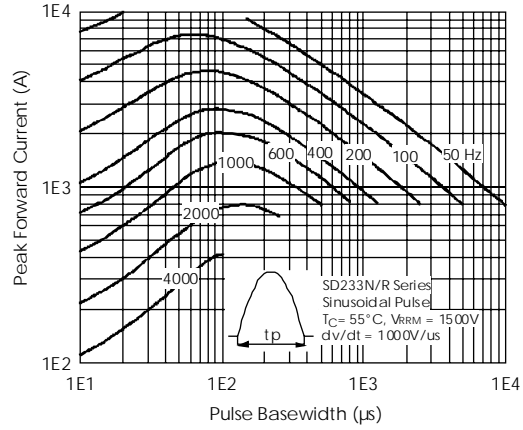


Fig. 14 - Frequency Characteristics

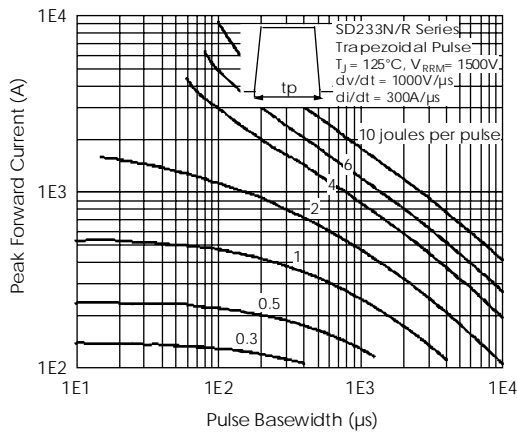


Fig. 15 - Maximum Total Energy Loss Per Pulse Characteristics

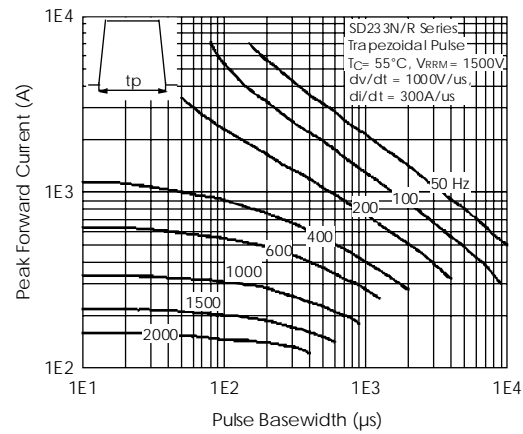


Fig. 16 - Frequency Characteristics

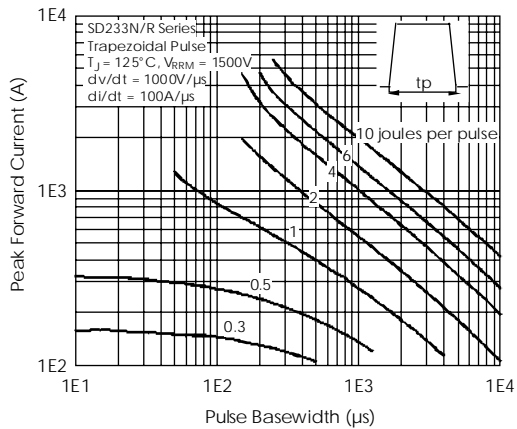


Fig. 17 - Maximum Total Energy Loss Per Pulse Characteristics

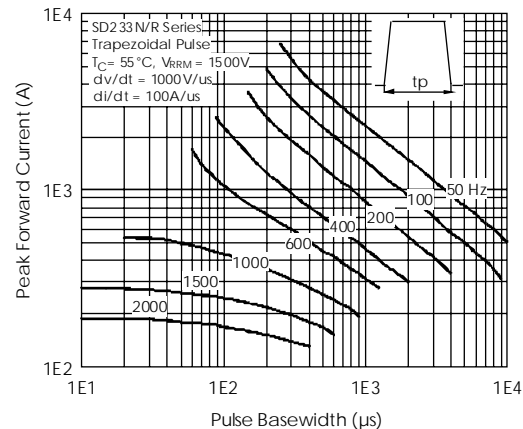


Fig. 18 - Frequency Characteristics