

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

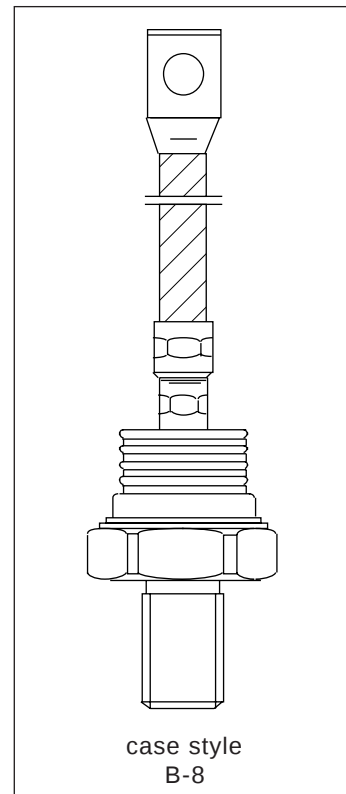
235A

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



SD233N/R Series

Bulletin I2094 rev. A 09/94

International
IR Rectifier

ELECTRICAL SPECIFICATIONS

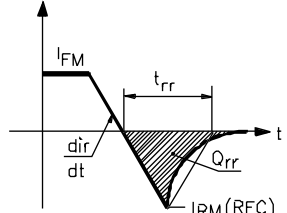
Voltage Ratings

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 60	A °C	180° conduction, half sine wave.
$I_{F(RMS)}$ Max. RMS current	370	A	@ 45°C case temperature
I_{FSM} Max. peak, one-cycle non-repetitive forward current	5500 5760 4630 4840	A	t = 10ms t = 8.3ms No voltage reappplied 50% V_{RRM} reappplied Sinusoidal half wave,
I^2t Maximum I^2t for fusing	151 138 107 98	KA ² s	t = 10ms t = 8.3ms t = 10ms t = 8.3ms No voltage reappplied 50% V_{RRM} reappplied Initial $T_J = T_J$ max.
$I^2\sqrt{t}$ Maximum $I^2\sqrt{t}$ 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	$(16.7\% \times \pi \times I_{F(AV)}) < I < \pi \times I_{F(AV)}$, $T_J = T_J$ max.
$V_{F(TO)2}$ High level of threshold voltage	1.68		$I > \pi \times I_{F(AV)}$, $T_J = T_J$ max.
r_{f1} Low level of forward slope resistance	1.64	mΩ	$(16.7\% \times \pi \times I_{F(AV)}) < I < \pi \times I_{F(AV)}$, $T_J = T_J$ max.
r_{f2} High level of forward slope resistance	1.53		$I > \pi \times I_{F(AV)}$, $T_J = T_J$ 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 °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	

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

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	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	$T_J = T_J \text{ max.}$
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

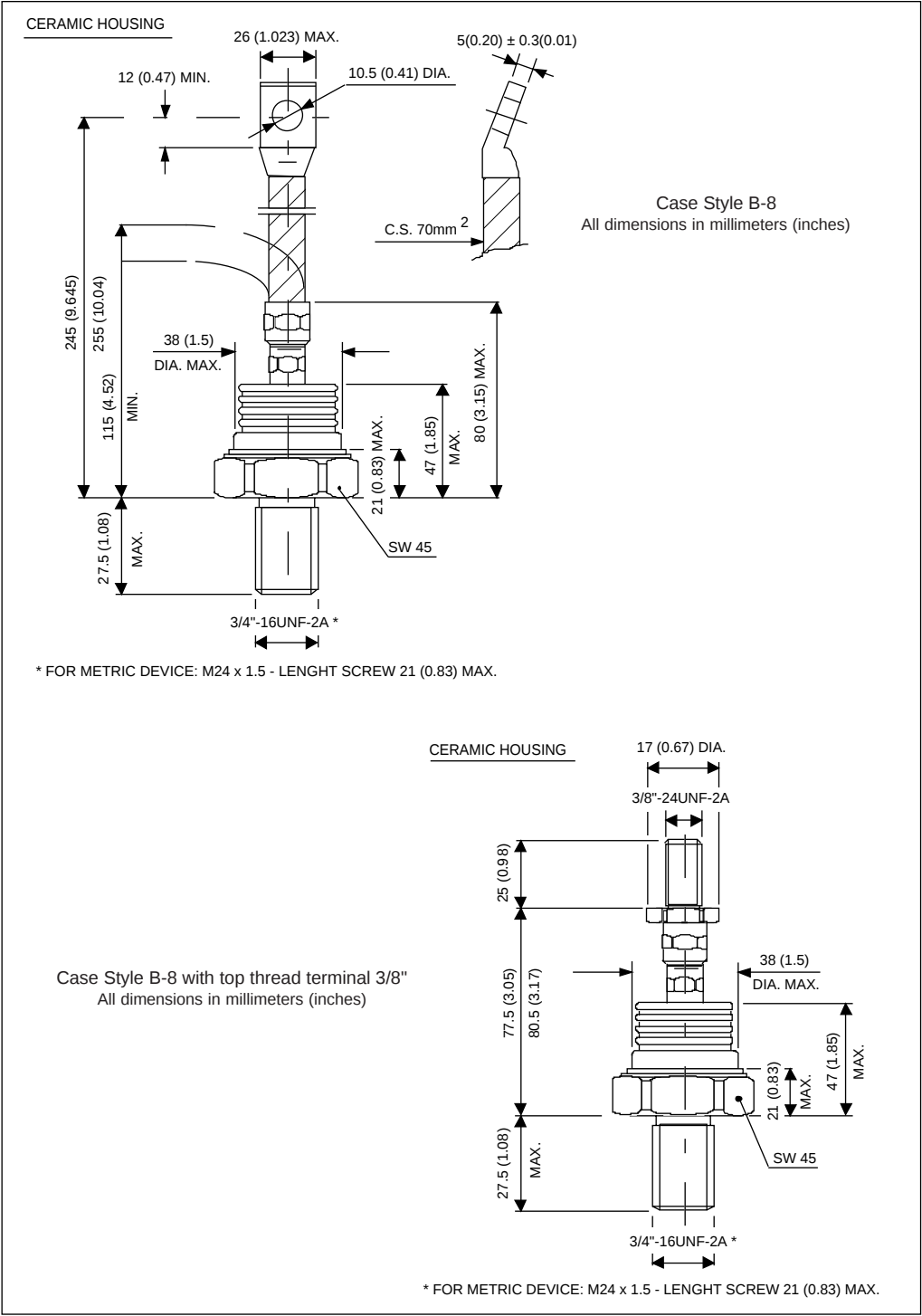
SD	23	3	N	45	S50	P	S	C
①	②	③	④	⑤	⑥	⑦	⑧	⑨

- 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

SD233N/R Series

Bulletin I2094 rev. A 09/94

Outlines Table



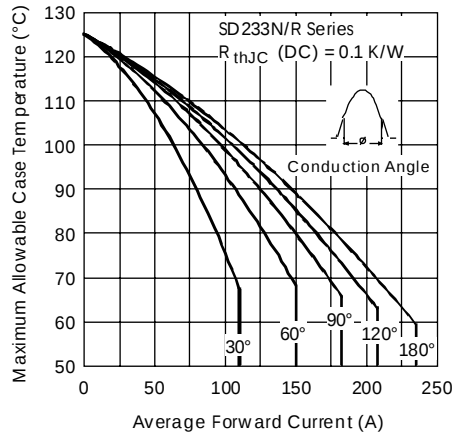


Fig. 1 - Current Ratings Characteristics

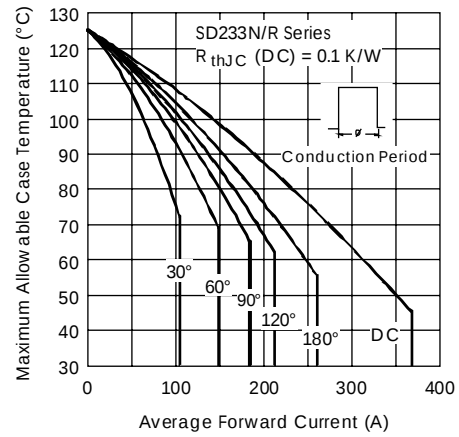


Fig. 2 - Current Ratings Characteristics

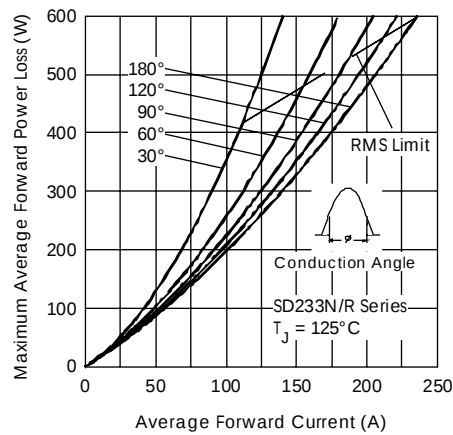


Fig. 3 - Forward Power Loss Characteristics

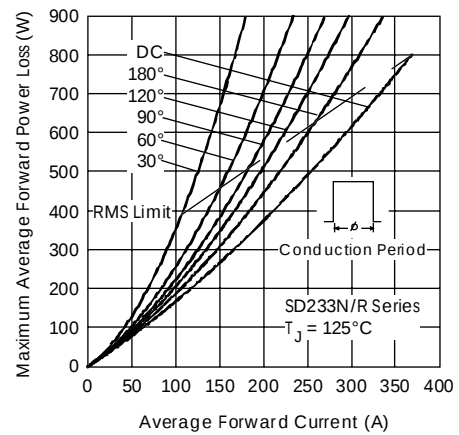


Fig. 4 - Forward Power Loss Characteristics

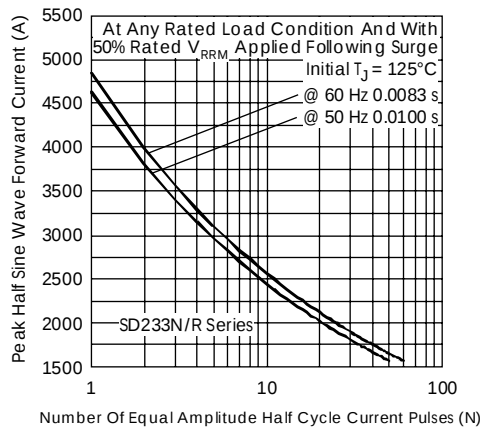


Fig. 5 - Maximum Non-repetitive Surge Current

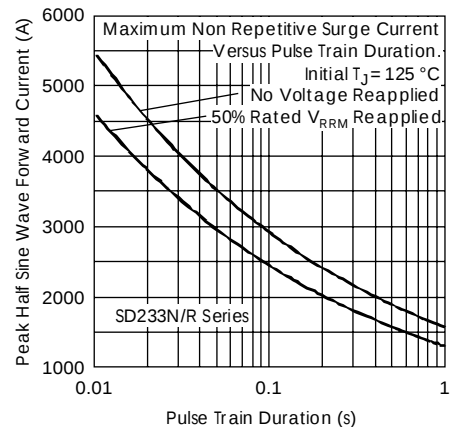


Fig. 6 - Maximum Non-repetitive Surge Current

SD233N/R Series

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International
IR Rectifier

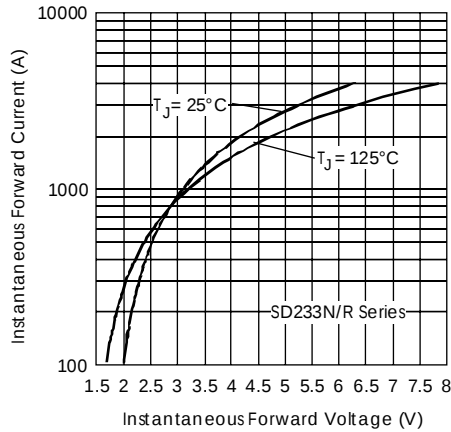


Fig. 7 - Forward Voltage Drop Characteristics

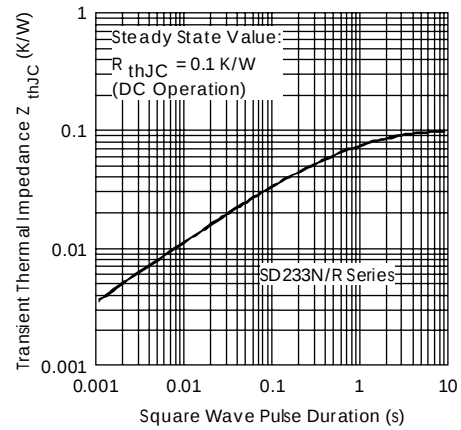


Fig. 8 - Thermal Impedance Z_{thJC} Characteristic

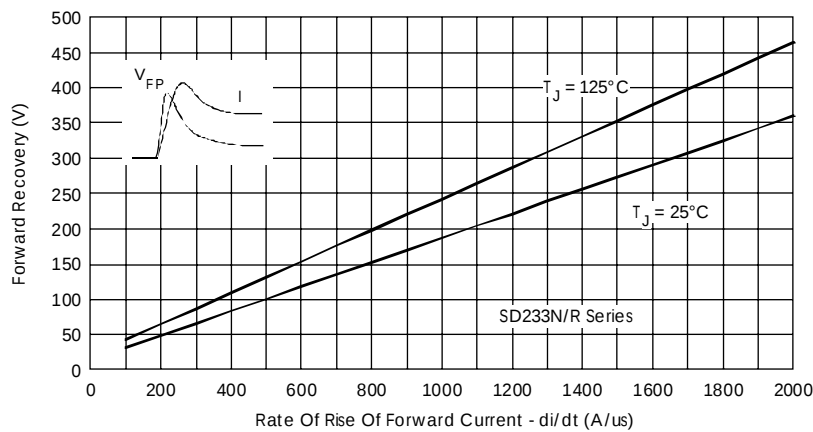


Fig. 9 - Typical Forward Recovery Characteristics

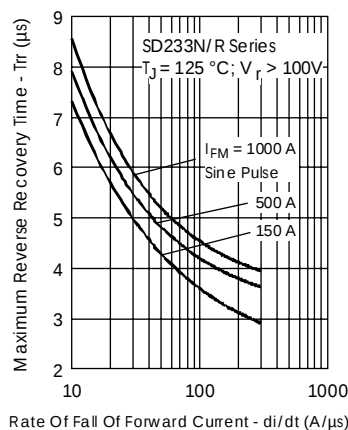


Fig. 10 - Recovery Time Characteristics

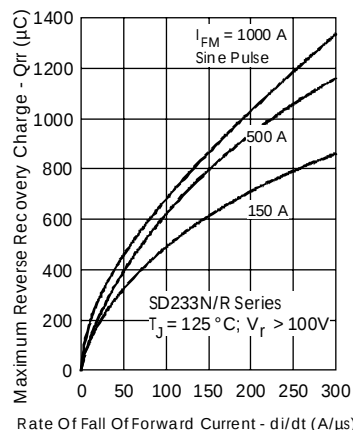


Fig. 11 - Recovery Charge Characteristics

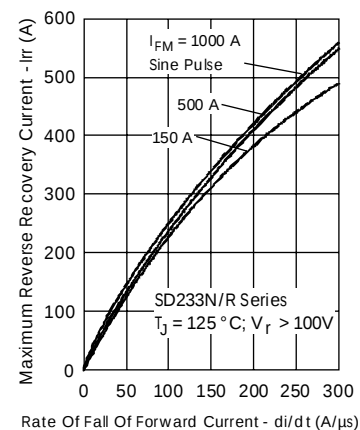


Fig. 12 - Recovery Current Characteristics

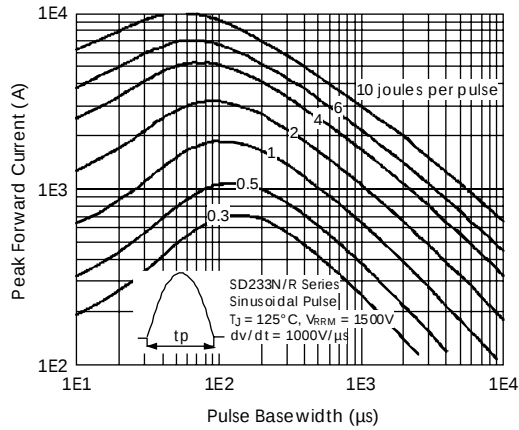


Fig. 13 - Maximum Total Energy Loss Per Pulse Characteristics

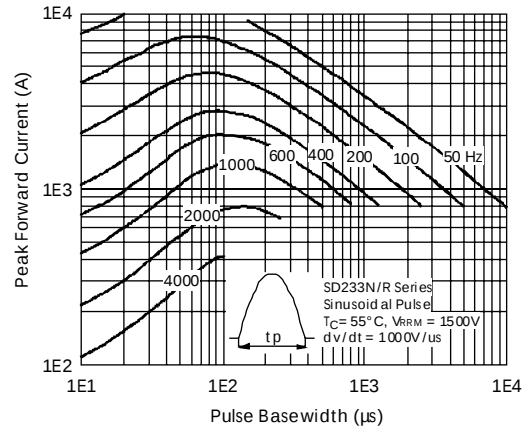


Fig. 14 - Frequency Characteristics

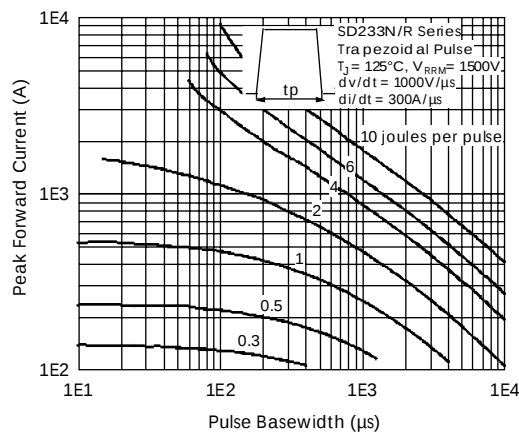


Fig. 15 - Maximum Total Energy Loss Per Pulse Characteristics

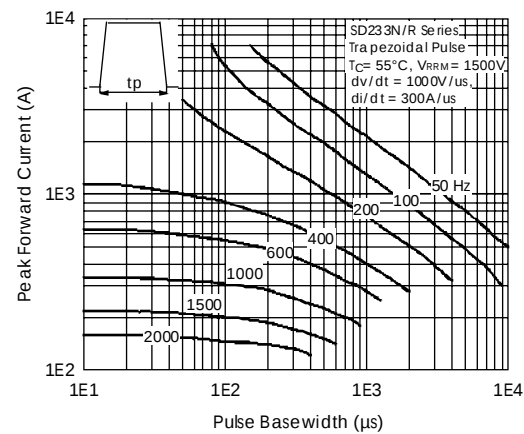


Fig. 16 - Frequency Characteristics

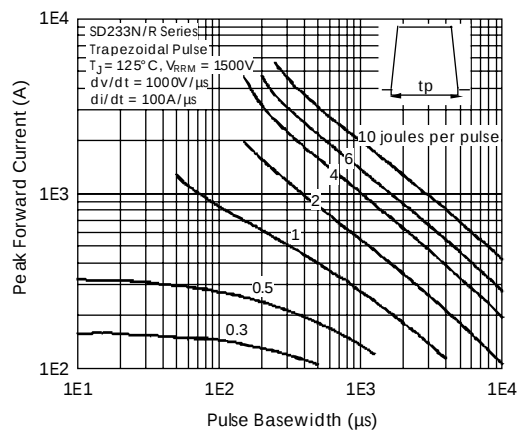


Fig. 17 - Maximum Total Energy Loss Per Pulse Characteristics

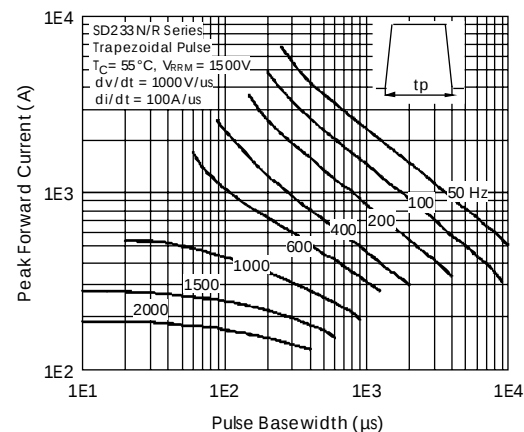


Fig. 18 - Frequency Characteristics