Bulletin I2062 rev. B 12/96

International
IOR Rectifier

SD103N/R SERIES

FAST RECOVERY DIODES **Stud Version**

110A

Features

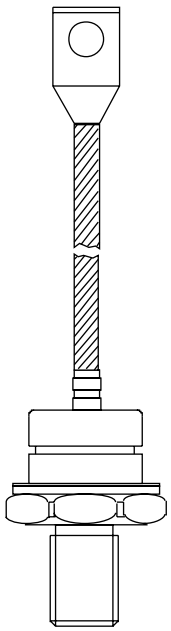
- High power FAST recovery diode series
- 1.0 to 2.0 µs recovery time
- High voltage ratings up to 2500V
- High current capability
- Optimized turn on and turn off characteristics
- Low forward recovery
- Fast and soft reverse recovery
- Compression bonded encapsulation
- Stud version JEDEC DO-30
- Maximum junction temperature 125°C

Typical Applications

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

Major Ratings and Characteristics

Parameters		SD103N/R	Units
$I_{F(AV)}$		110	A
	@ T_C	85	°C
$I_{F(RMS)}$		173	A
I_{FSM}	@ 50Hz	3570	A
	@ 60Hz	3730	A
I^2t	@ 50Hz	64	KA^2s
	@ 60Hz	58	KA^2s
V_{RRM} range		400 to 2500	V
t_{rr} range		1.0 to 2.0	µs
	@ T_J	25	°C
T_J		- 40 to 125	°C



case style
DO-205AC (DO-30)

ELECTRICAL SPECIFICATIONS

Voltage Ratings

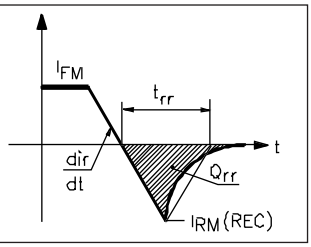
Type number	Voltage Code	V_{RRM} max. repetitive peak and off-state voltage V	V_{RSM}, maximum non-repetitive peak voltage V	I_{RRM} max. T_J = 125°C mA
SD103N/R..S10	04	400	500	35
	08	800	900	
	10	1000	1100	
SD103N/R..S15	12	1200	1300	
	14	1400	1500	
	16	1600	1700	
SD103N/R..S20	20	2000	2100	
	25	2500	2600	

Forward Conduction

Parameter		SD103N/R	Units	Conditions		
$I_{F(AV)}$	Max. average forward current	110	A	180° conduction, half sine wave.		
	@ Case temperature	85	°C			
$I_{F(RMS)}$	Max. RMS current	173	A	DC @ 75°C case temperature		
I_{FSM}	Max. peak, one-cycle	3570	A	t = 10ms	No voltage	Sinusoidal half wave, Initial T_J = T_J max.
	non-repetitive forward current	3730		t = 8.3ms	reapplied	
		3000		t = 10ms	100% V_{RRM}	
		3140		t = 8.3ms	reapplied	
I^2t	Maximum I^2t for fusing	64	KA^2s	t = 10ms	No voltage	
		58		t = 8.3ms	reapplied	
		45		t = 10ms	100% V_{RRM}	
		41		t = 8.3ms	reapplied	
$I^2\sqrt{t}$	Maximum $I^2\sqrt{t}$ for fusing	636	$KA^2\sqrt{s}$	t = 0.1 to 10ms, no voltage reapplied		
$V_{F(TO)1}$	Low level of threshold voltage	1.36	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	1.94		(I > π x $I_{F(AV)}$), T_J = T_J max.		
r_{f1}	Low level of forward slope resistance	2.55	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	1.11		(I > π x $I_{F(AV)}$), T_J = T_J max.		
V_{FM}	Max. forward voltage	2.23	V	I_{pk}= 345A, T_J = 25°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)
S10	1.0	350	25	-30	1.6	21	27
S15	1.5				2.3	61	37
S20	2.0				3.2	75	39



Thermal and Mechanical Specification

	Parameter	SD103N/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	0.16	K/W	DC operation
R_{thCS}	Max. thermal resistance, case to heatsink	0.10		Mounting surface, smooth, flat and greased
T	Mounting torque ± 10%	15.5	Nm	Not lubricated threads
		13.5		Lubricated threads
wt	Approximate weight	120	g	
	Case style	DO-205AC(DO-30)		See Outline Table

ΔR_{thJC} Conduction

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

Conduction angle	Sinusoidal conduction	Rectangular conduction	Units	Conditions
180°	0.011	0.012	K/W	$T_J = T_J$ max.
120°	0.016	0.019		
90°	0.021	0.023		
60°	0.029	0.030		
30°	0.041	0.041		

Ordering Information Table

Device Code

SD	10	3	R	25	S20	P	B	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)

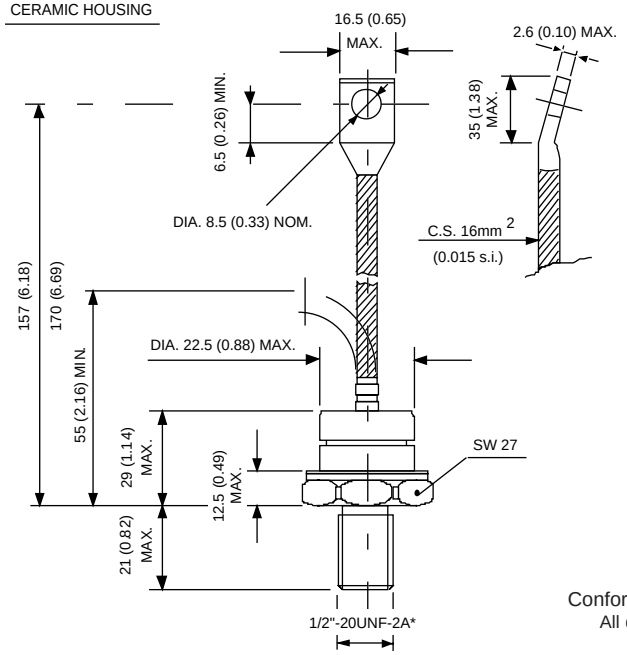
7 - P = Stud base DO-205AC (DO-30) 1/2" 20UNF-2A
M = Stud base DO-205AC (DO-30) M12 X 1.75

8 - B = Flag top terminals (for Cathode/ Anode Leads)
S = Isolated lead with silicone sleeve
(Red = Reverse Polarity; Blue = Normal Polarity)
None = Not isolated lead

9 - C = Ceramic housing (over 1600V)
V = Glass-metal seal (only up to 1600V)

Outline Table

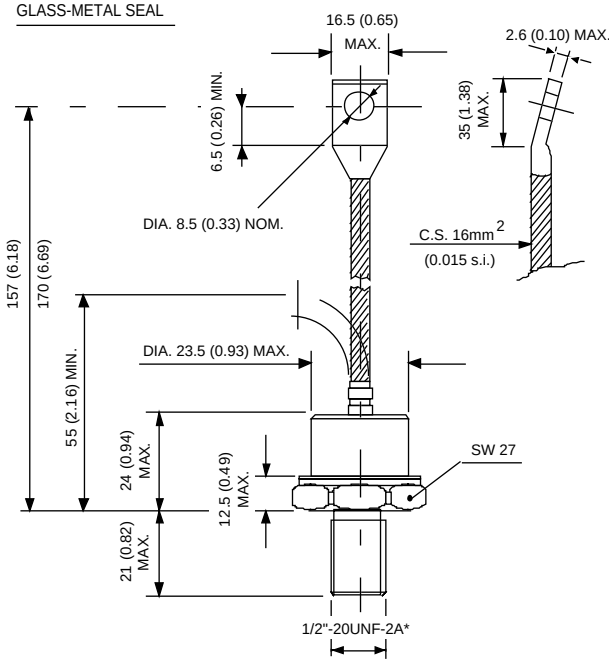
CERAMIC HOUSING



Conforms to JEDEC DO-205AC (DO-30)
All dimensions in millimeters (inches)

* FOR METRIC DEVICE: M12 X 1.75

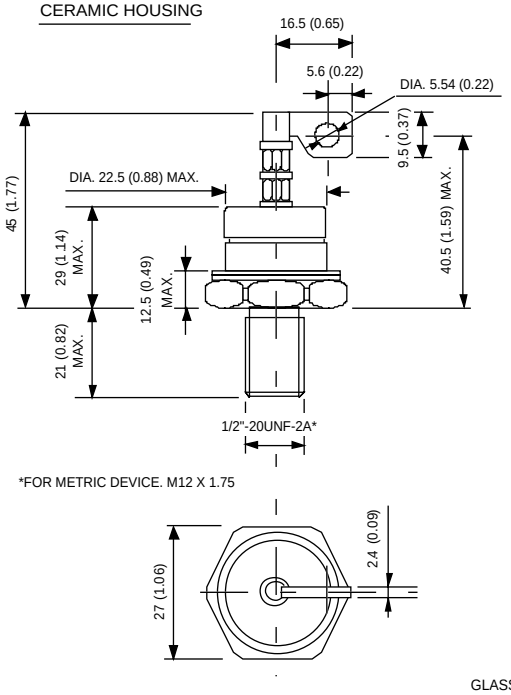
GLASS-METAL SEAL



* FOR METRIC DEVICE: M12 X 1.75

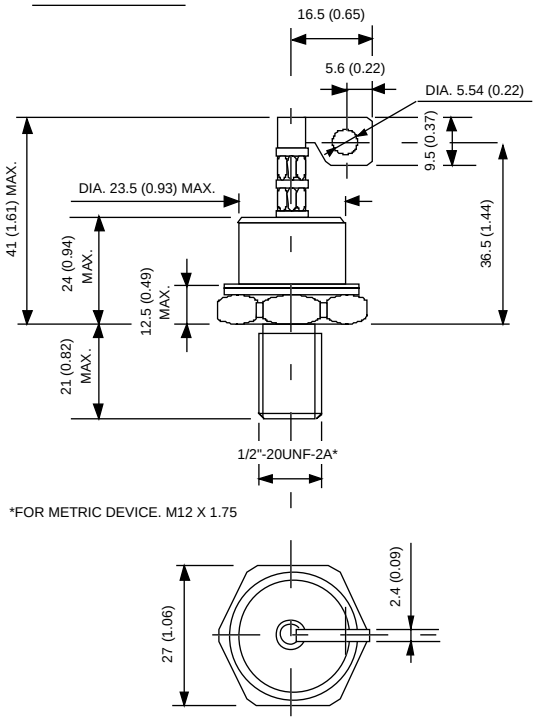
Outline Table

CERAMIC HOUSING



DO-205AC (DO-30) Flag
All dimensions in millimeters (inches)

GLASS-METAL SEAL



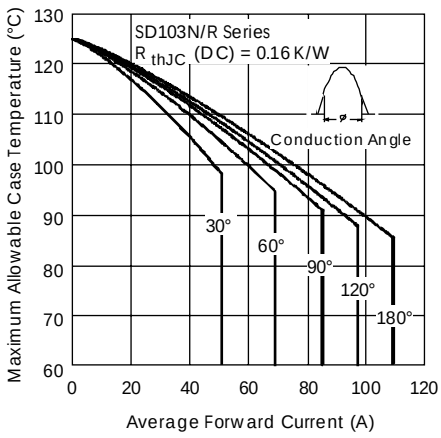


Fig. 1 - Current Ratings Characteristics

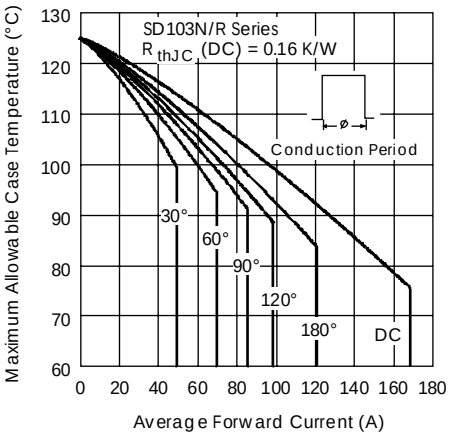


Fig. 2 - Current Ratings Characteristics

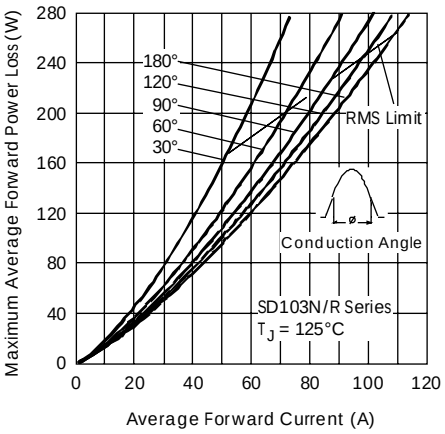


Fig. 3 - Forward Power Loss Characteristics

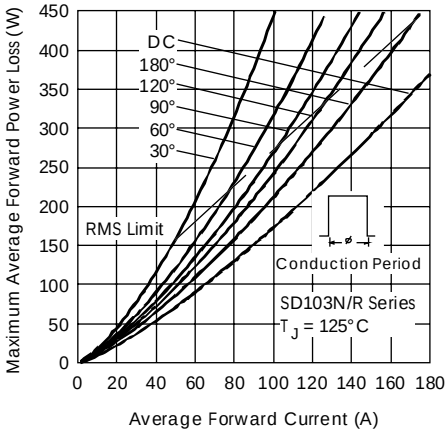


Fig. 4 - Forward Power Loss Characteristics

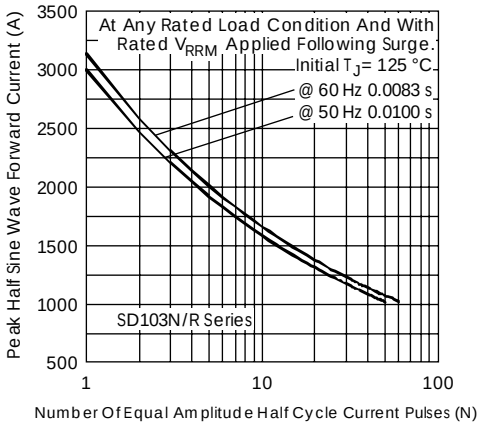


Fig. 5 - Maximum Non-repetitive Surge Current

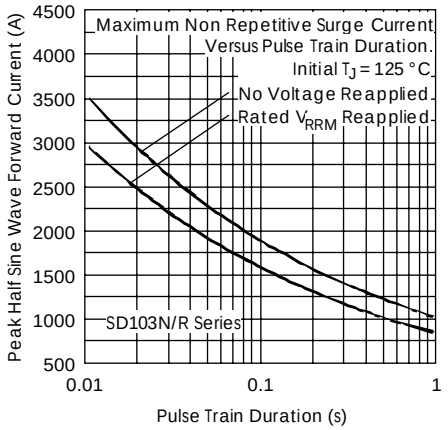


Fig. 6 - Maximum Non-repetitive Surge Current

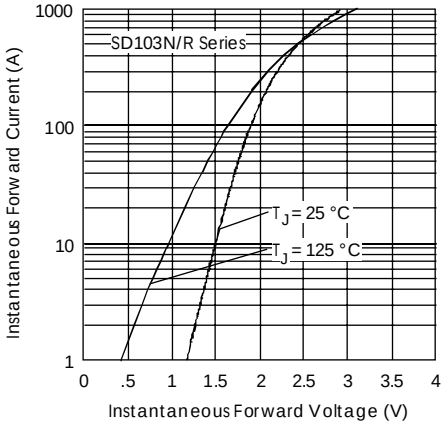


Fig. 7 - Forward Voltage Drop Characteristics

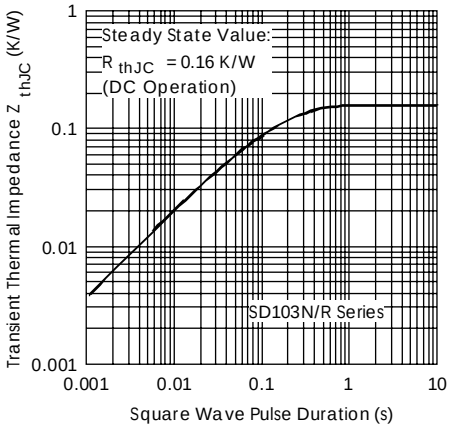


Fig. 8 - Thermal Impedance Z_{thJC} Characteristic

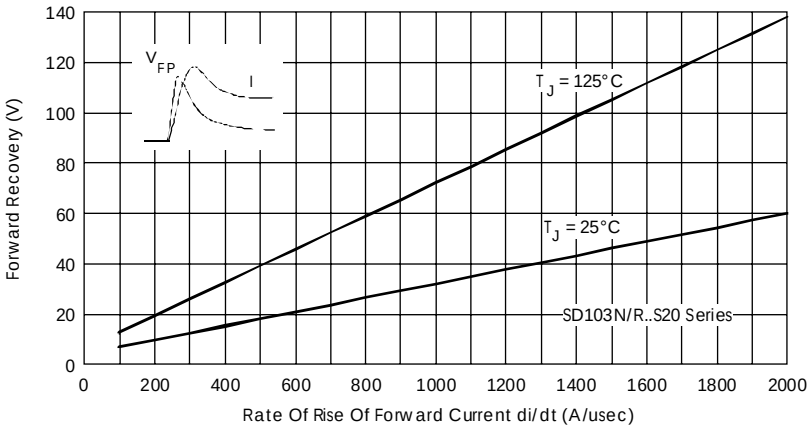


Fig. 9 - Typical Forward Recovery Characteristics

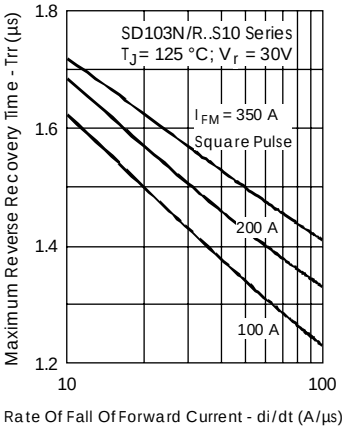


Fig. 10 - Recovery Time Characteristics

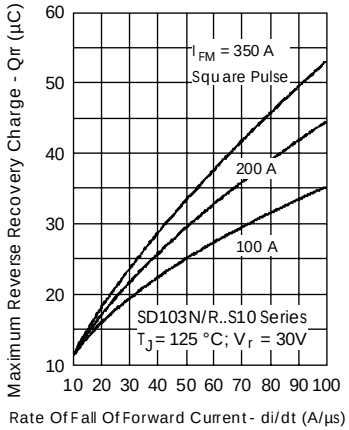


Fig. 11 - Recovery Charge Characteristics

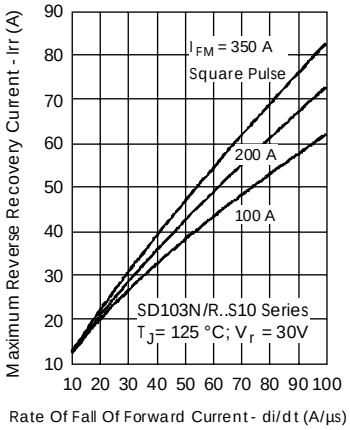


Fig. 12 - Recovery Current Characteristics

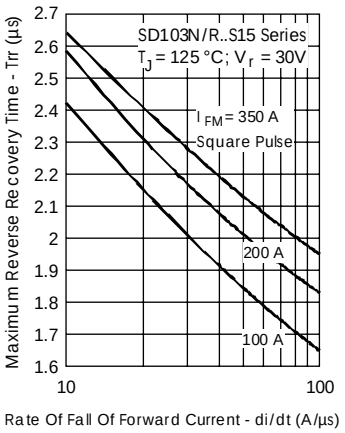


Fig. 13 - Recovery Time Characteristics

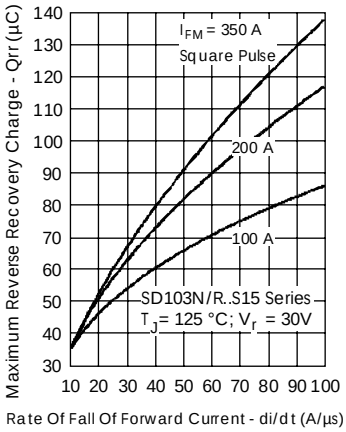


Fig. 14 - Recovery Charge Characteristics

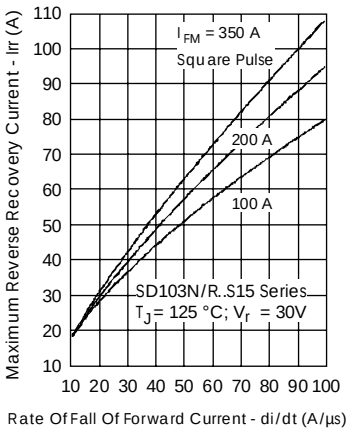


Fig. 15 - Recovery Current Characteristics

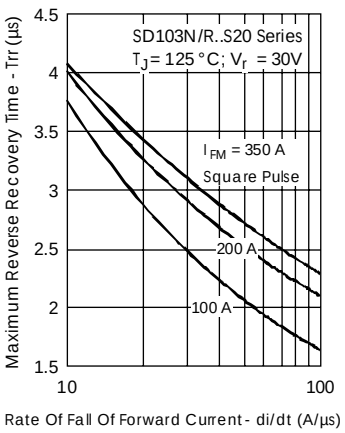


Fig. 16 - Recovery Time Characteristics

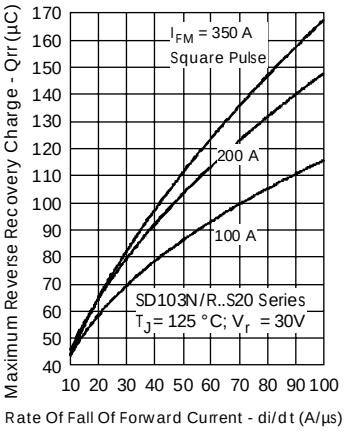


Fig. 17 - Recovery Charge Characteristics

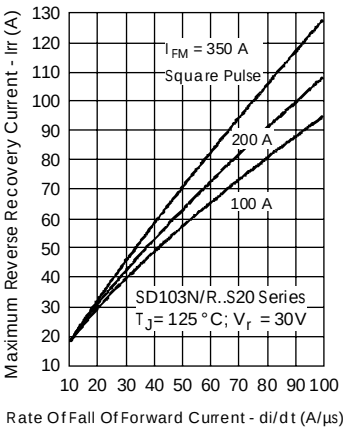


Fig. 18 - Recovery Current Characteristics

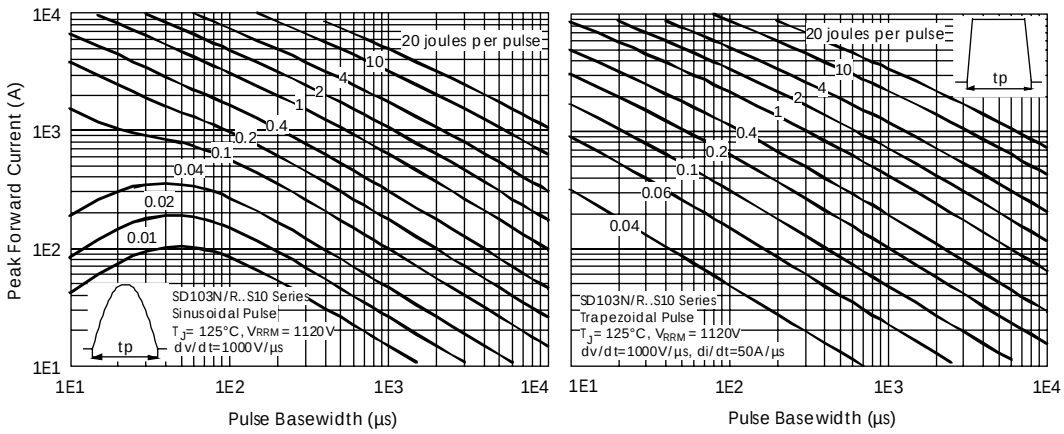


Fig. 19 - Maximum Total Energy Loss Per Pulse Characteristics

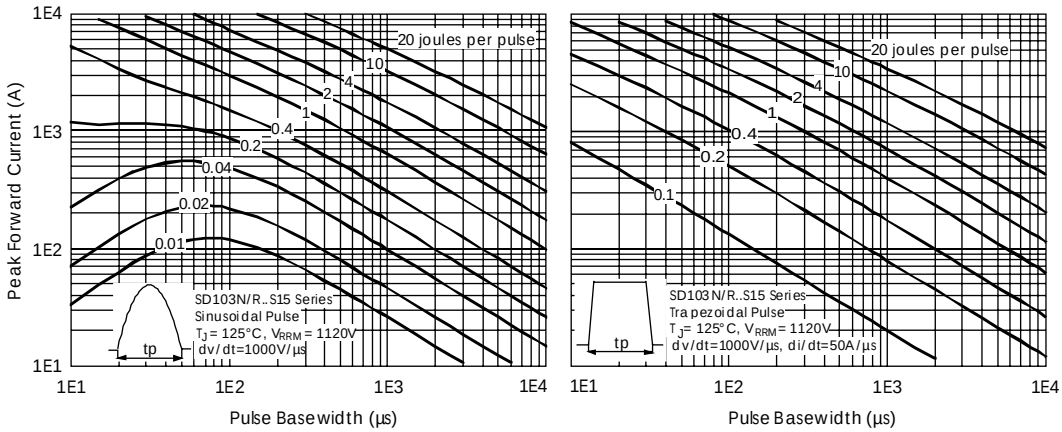


Fig. 20 - Maximum Total Energy Loss Per Pulse Characteristics

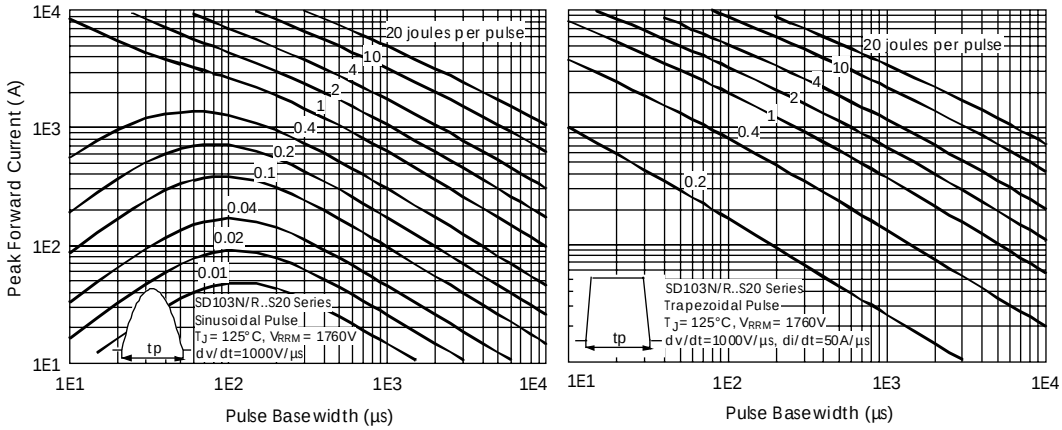


Fig. 21 - Maximum Total Energy Loss Per Pulse Characteristics