

### FAST RECOVERY DIODES

Stud Version

#### Features

- High power FAST recovery diode series
- 1.0 to 2.0  $\mu$ s 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

110A

#### 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 <sup>2</sup> s
	@ 60Hz 58	KA <sup>2</sup> s
$V_{RRM}$ range	400 to 2500	V
$t_{rr}$ range	1.0 to 2.0	$\mu$ s
	@ $T_J$ 25	°C
$T_J$	- 40 to 125	°C



case style  
DO-205AC (DO-30)

# SD103N/R Series

## ELECTRICAL SPECIFICATIONS

### Voltage Ratings

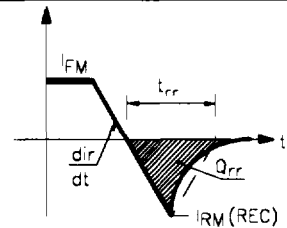
Type number	Voltage Code	$V_{RRM}$ max. repetitive peak and off-state voltage V	$V_{RSM}$ , maximum non-repetitive peak voltage V	$I_{RRM}$ max. $T_J = 125^\circ\text{C}$ mA
SD103N/R..S10	04	400	500	35
	08	800	900	
	10	1000	1100	
SD103N/R..S15	12	1200	1300	
	14	1400	1500	
	16	1600	1700	
SD103N/R..S20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

### Forward Conduction

Parameter	SD103N/R	Units	Conditions
$I_{F(AV)}$ Max. average forward current @ Case temperature	110	A	180° conduction, half sine wave.
	85	°C	
$I_{F(RMS)}$ Max. RMS current	173	A	DC @ 75°C case temperature
$I_{FSM}$ Max. peak, one-cycle non-repetitive forward current	3570	A	t = 10ms No voltage
	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 <sup>2</sup> s	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 <sup>2</sup> √s	t = 0.1 to 10ms, no voltage reapplied
$V_{F(TO)1}$ Low level of threshold voltage	1.36	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	1.94		$I > \pi \times I_{F(AV)}$ , $T_J = T_J$ max.
$r_{\theta 1}$ Low level of forward slope resistance	2.55	mΩ	$(16.7\% \times \pi \times I_{F(AV)}) < I < \pi \times I_{F(AV)}$ , $T_J = T_J$ max.
$r_{\theta 2}$ High level of forward slope resistance	1.11		$I > \pi \times I_{F(AV)}$ , $T_J = T_J$ max.
$V_{FM}$ Max. forward voltage	2.23	V	$I_{pk} = 345\text{A}$ , $T_J = 25^\circ\text{C}$ , $t_p = 400\ \mu\text{s}$ 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)
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 $\pm 10\%$	15.5	Nm	Not lubricated threads
	13.5		Lubricated threads
wt Approximate weight	120	g	
Case style	DO-205AC(DO-30)		See Outline Table

$\Delta R_{thJC}$  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°	0.011	0.012	K/W	$T_J = T_{J \text{ max.}}$
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**

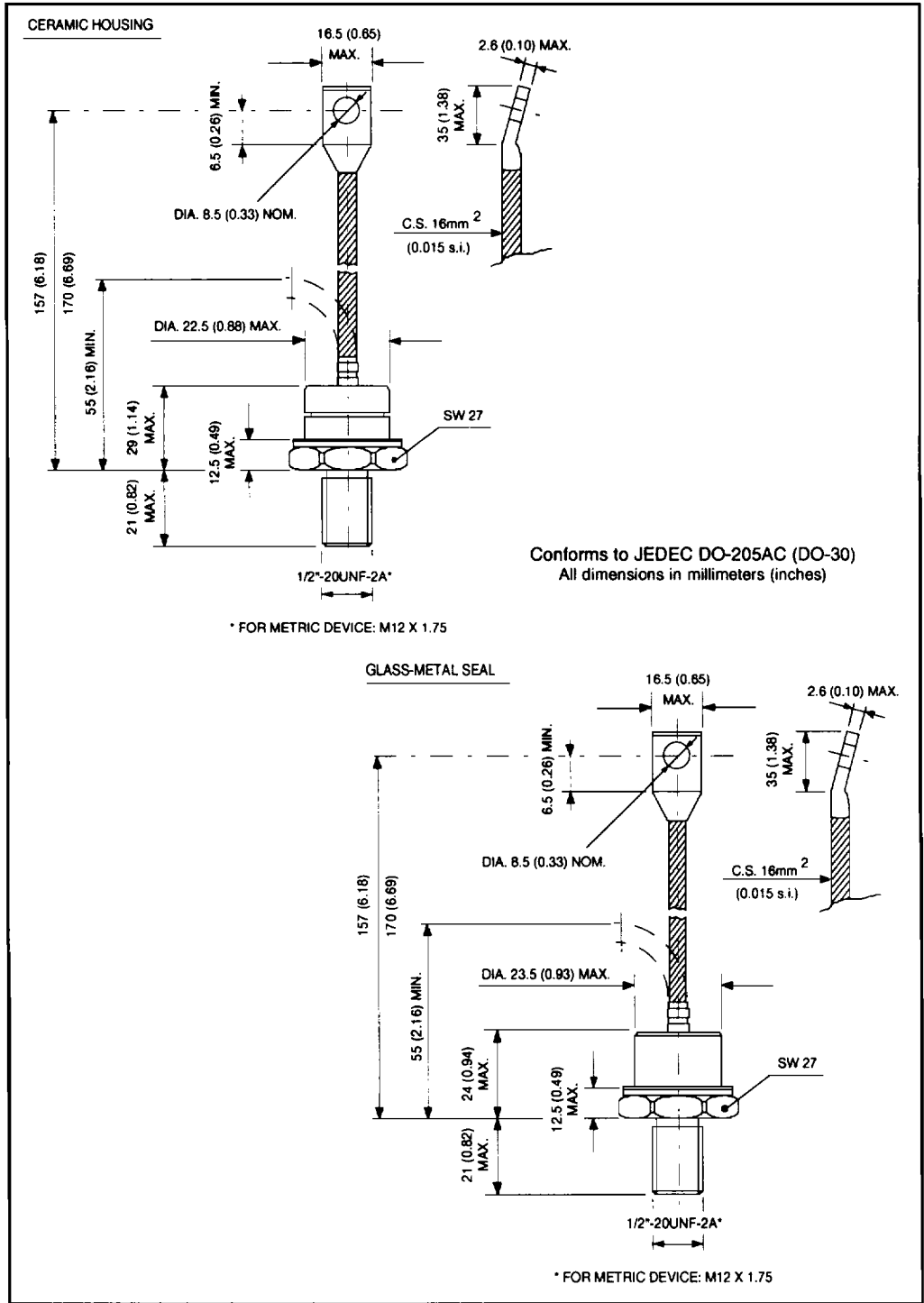
SD	10	3	R	25	S20	P	B	C
①	②	③	④	⑤	⑥	⑦	⑧	⑨

- 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)

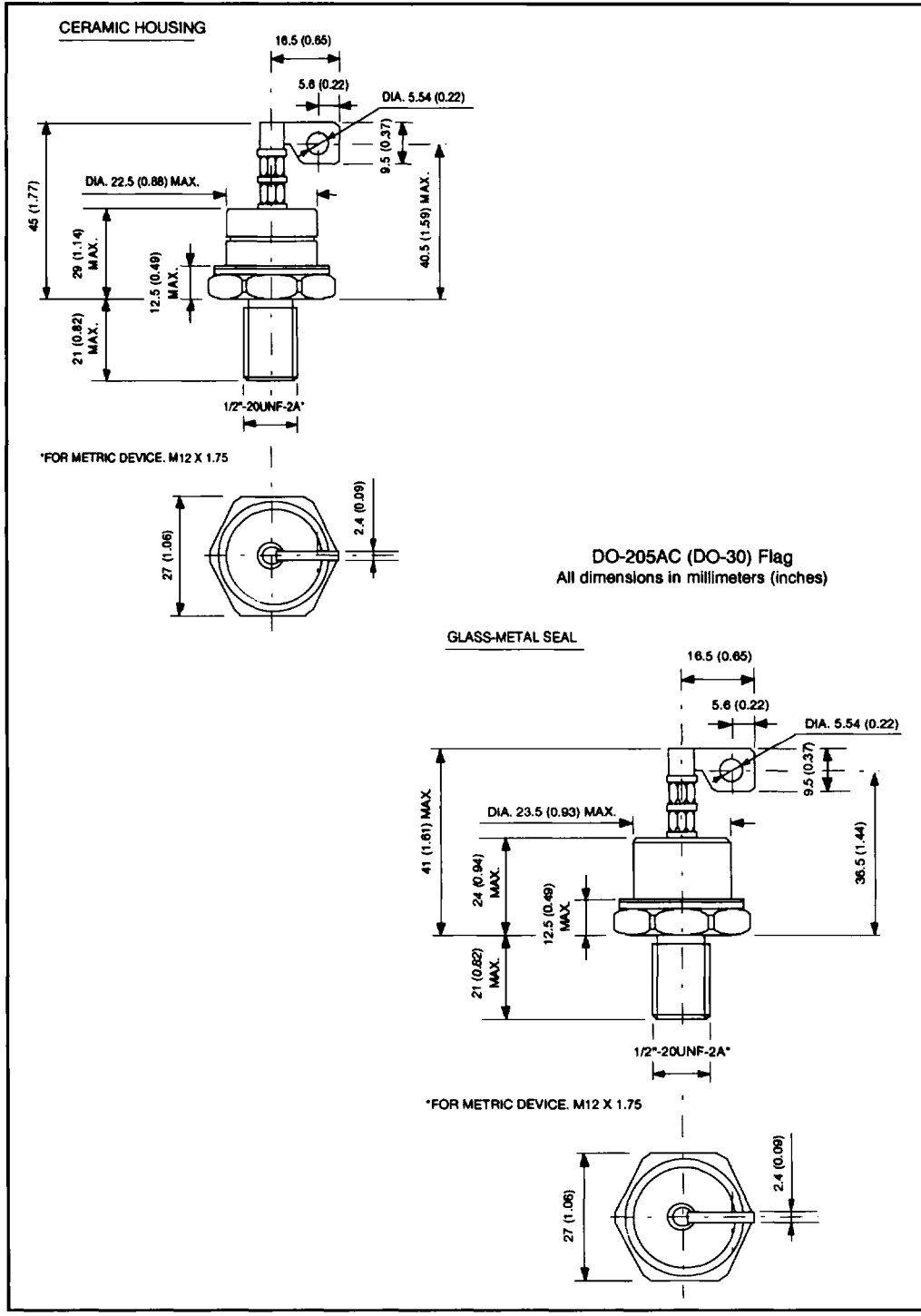
FAST REC  
DIODE  
STUD MTD

# SD103N/R Series

## Outline Table



Outline Table



FAST REC  
DIODE  
STUD MTD

# SD103N/R Series

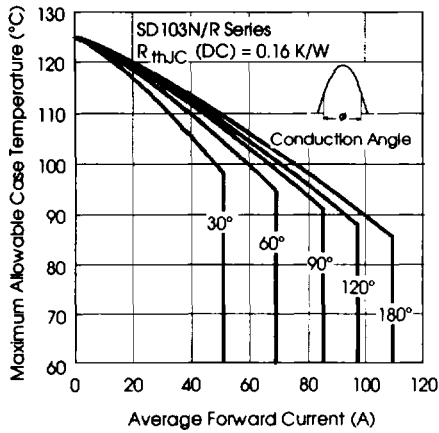


Fig. 1 - Current Ratings Characteristics

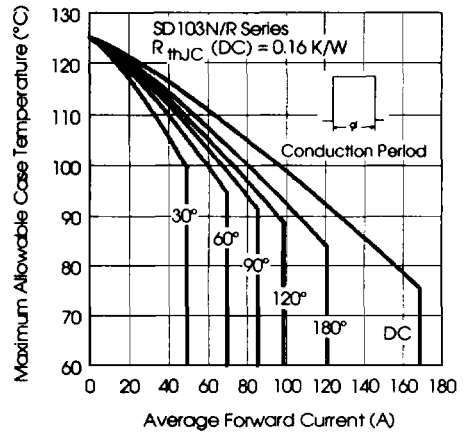


Fig. 2 - Current Ratings Characteristics

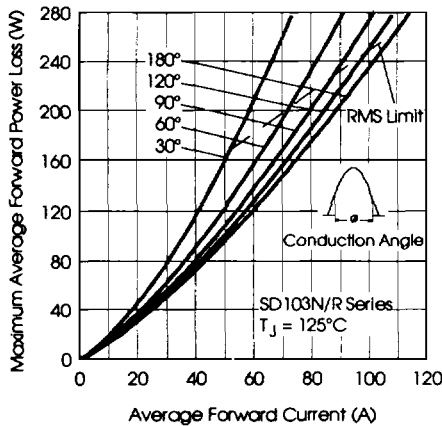


Fig. 3 - Forward Power Loss Characteristics

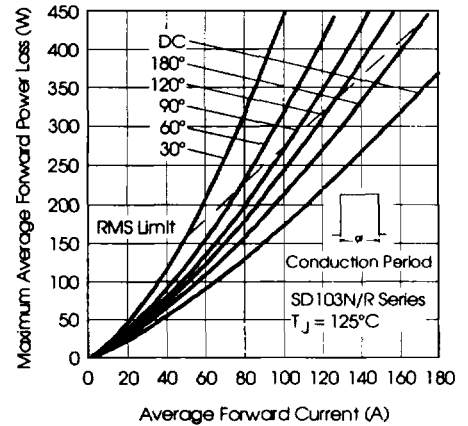


Fig. 4 - Forward Power Loss Characteristics

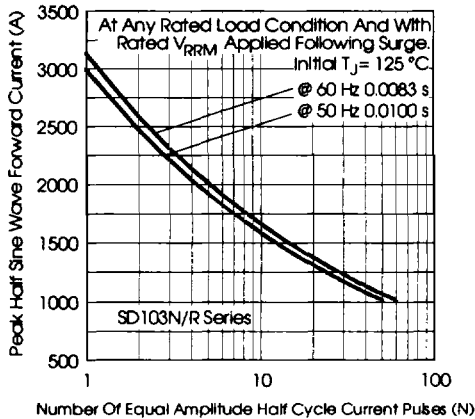


Fig. 5 - Maximum Non-repetitive Surge Current

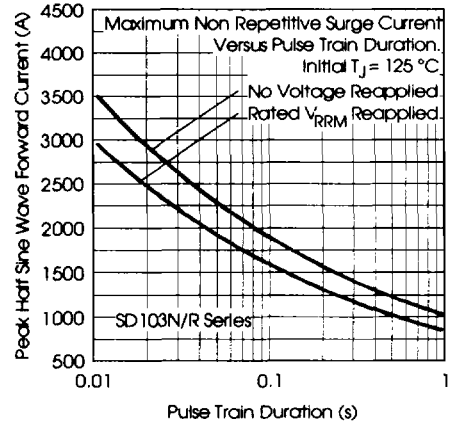


Fig. 6 - Maximum Non-repetitive Surge Current

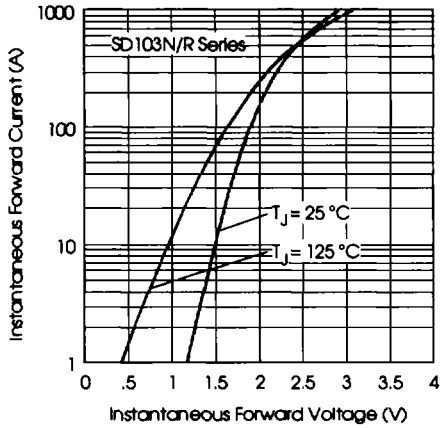


Fig. 7 - Forward Voltage Drop Characteristics

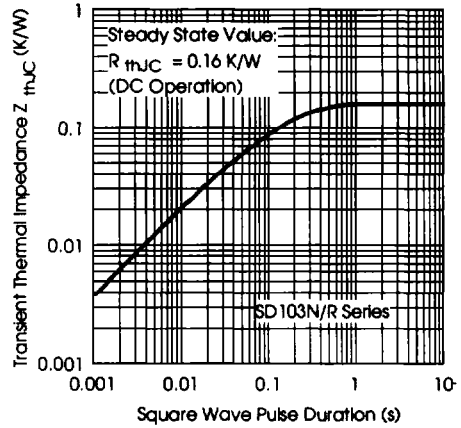


Fig. 8 - Thermal Impedance  $Z_{thJC}$  Characteristic

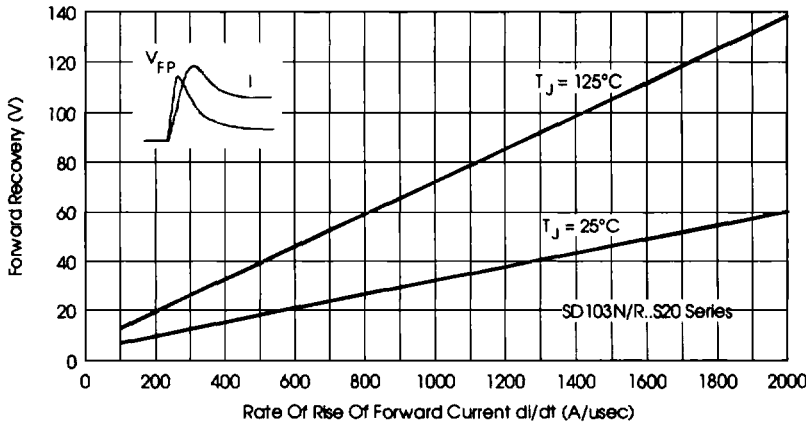


Fig. 9 - Typical Forward Recovery Characteristics

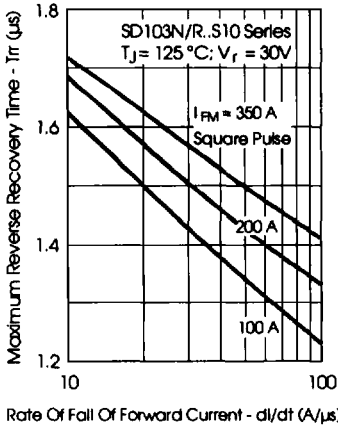


Fig. 10 - Recovery Time Characteristics

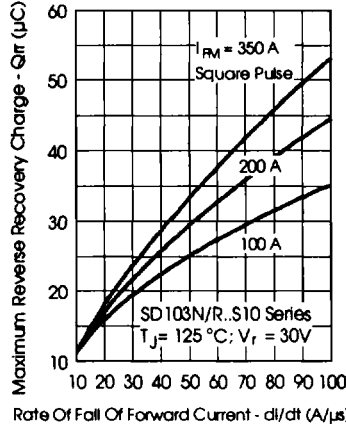


Fig. 11 - Recovery Charge Characteristics

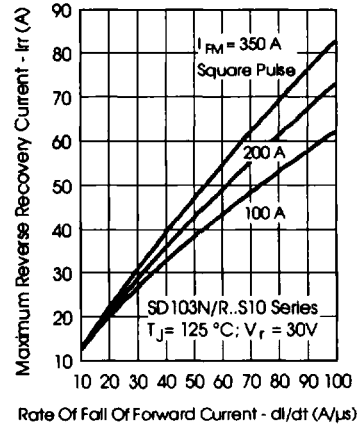
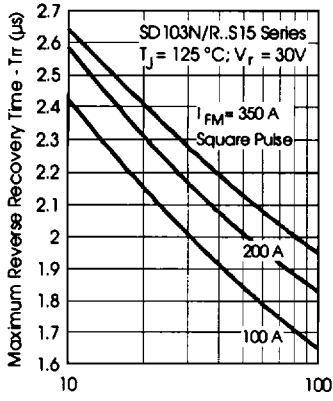


Fig. 12 - Recovery Current Characteristics

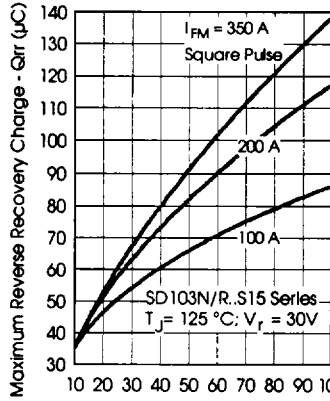
FAST RECOVERY  
DIODE  
STUD. M10

# SD103N/R Series



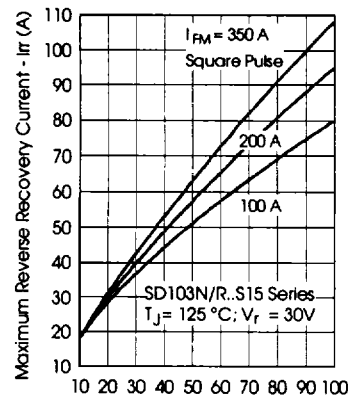
Rate Of Fall Of Forward Current - di/dt (A/μs)

Fig. 13 - Recovery Time Characteristics



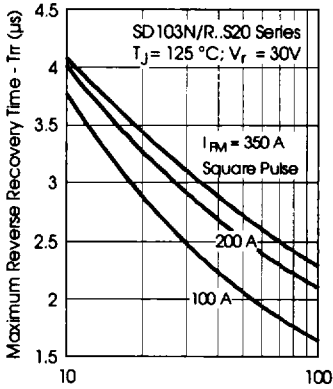
Rate Of Fall Of Forward Current - di/dt (A/μs)

Fig. 14 - Recovery Charge Characteristics



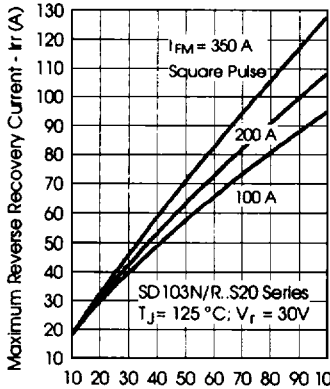
Rate Of Fall Of Forward Current - di/dt (A/μs)

Fig. 15 - Recovery Current Characteristics



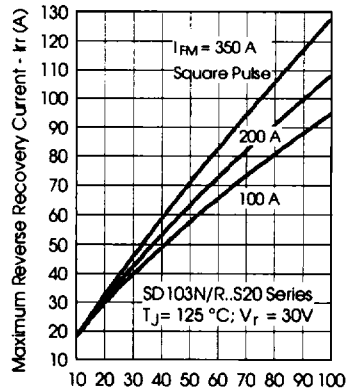
Rate Of Fall Of Forward Current - di/dt (A/μs)

Fig. 16 - Recovery Time Characteristics



Rate Of Fall Of Forward Current - di/dt (A/μs)

Fig. 17 - Recovery Charge Characteristics



Rate Of Fall Of Forward Current - di/dt (A/μs)

Fig. 18 - Recovery Current Characteristics

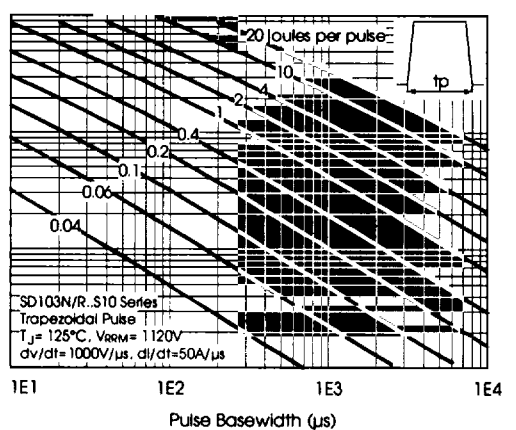
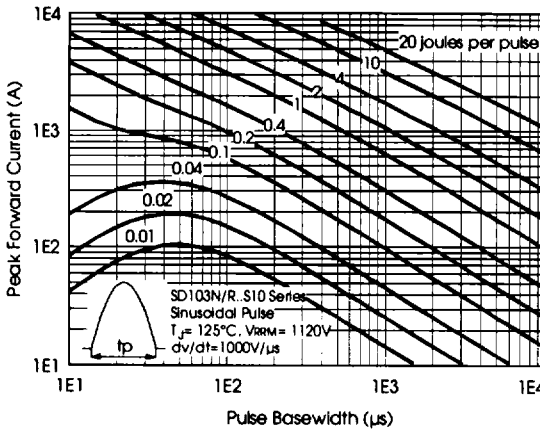


Fig. 19 - Maximum Total Energy Loss Per Pulse Characteristics



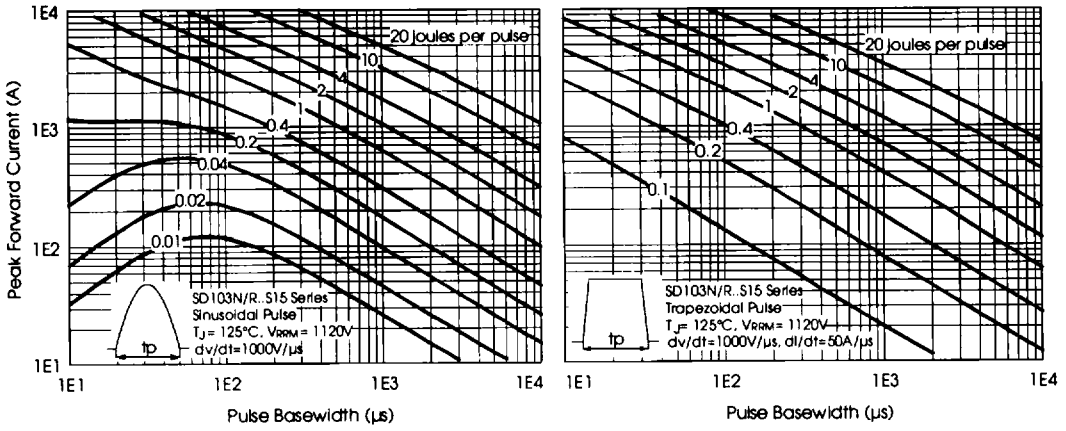


Fig. 20 - Maximum Total Energy Loss Per Pulse Characteristics

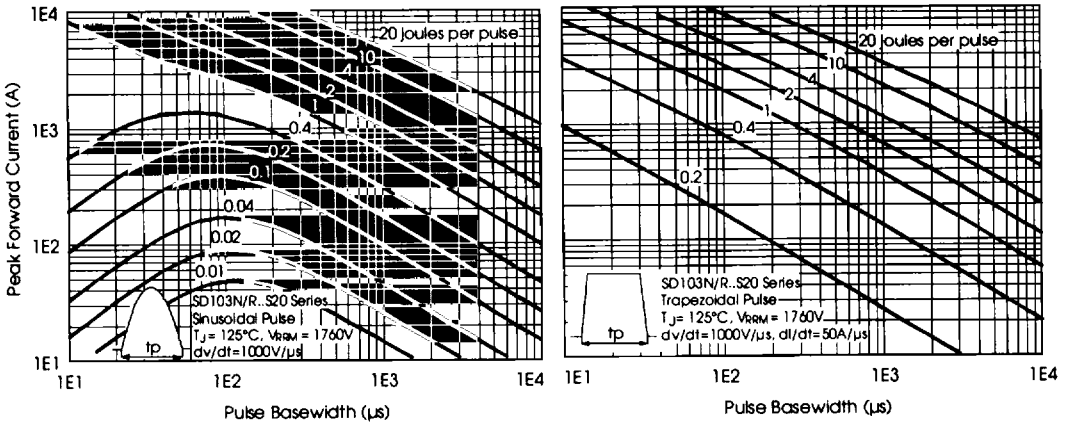


Fig. 21 - Maximum Total Energy Loss Per Pulse Characteristics

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