

## Fast Recovery Diodes (Stud Version) 200 A



DO-9 (DO-205AB)

### FEATURES

- High power fast recovery diode series
- 1.0  $\mu$ s to 2.0  $\mu$ s recovery time
- High voltage ratings up to 2500 V
- 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-9 (DO-205AB)
- Maximum junction temperature 125 °C
- Designed and qualified for industrial level
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS  
COMPLIANT**

### PRIMARY CHARACTERISTICS

$I_{F(AV)}$	200 A
Package	DO-9 (DO-205AB)
Circuit configuration	Single

### TYPICAL APPLICATIONS

- Snubber diode for GTO
- High voltage freewheeling diode
- Fast recovery rectifier applications

### MAJOR RATINGS AND CHARACTERISTICS

PARAMETER	TEST CONDITIONS	VALUES	UNITS
$I_{F(AV)}$		200	A
	$T_C$	85	°C
$I_{F(RMS)}$		314	A
$I_{FSM}$	50 Hz	4990	
	60 Hz	5230	
$I^2t$	50 Hz	125	kA <sup>2</sup> s
	60 Hz	114	
$V_{RRM}$	Range	400 to 2500	V
$t_{rr}$	Range	1.0 to 2.0	$\mu$ s
	$T_J$	25	°C
$T_J$		-40 to +125	

### ELECTRICAL SPECIFICATIONS

#### VOLTAGE RATINGS

TYPE NUMBER	VOLTAGE CODE	$V_{RRM}$ , MAXIMUM REPETITIVE PEAK AND OFF-STATE VOLTAGE V	$V_{RSM}$ , MAXIMUM NON-REPETITIVE PEAK VOLTAGE V	$I_{RRM}$ MAXIMUM $T_J = 125$ °C mA
VS-SD203N/R..S10	04	400	500	35
	08	800	900	
	10	1000	1100	
VS-SD203N/R..S15	12	1200	1300	
	14	1400	1500	
	16	1600	1700	
VS-SD203N/R..S20	20	2000	2100	
	25	2500	2600	



FORWARD CONDUCTION					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum average forward current at case temperature	$I_{F(AV)}$	180° conduction, half sine wave		200	A
				85	°C
Maximum RMS current	$I_{F(RMS)}$	DC at 76 °C case temperature		314	A
Maximum peak, one-cycle non-repetitive forward current	$I_{FSM}$	t = 10 ms	No voltage reapplied	4990	
		t = 8.3 ms		5230	
		t = 10 ms	100 % $V_{RRM}$ reapplied	4200	
		t = 8.3 ms		4400	
Maximum $I^2t$ for fusing	$I^2t$	t = 10 ms	No voltage reapplied	125	kA <sup>2</sup> s
		t = 8.3 ms		114	
		t = 10 ms	100 % $V_{RRM}$ reapplied	88	
		t = 8.3 ms		81	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 to 10 ms, no voltage reapplied		1250	kA <sup>2</sup> √s
Low level value of threshold voltage	$V_{F(TO)1}$	(16.7 % $\times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)}$ , $T_J = T_J$ maximum)		1.00	V
High level value of threshold voltage	$V_{F(TO)2}$	(I > $\pi \times I_{F(AV)}$ , $T_J = T_J$ maximum)		1.47	
Low level value of forward slope resistance	$r_{f1}$	(16.7 % $\times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)}$ , $T_J = T_J$ maximum)		1.10	mW
High level value of forward slope resistance	$r_{f2}$	(I > $\pi \times I_{F(AV)}$ , $T_J = T_J$ maximum)		0.46	
Maximum forward voltage drop	$V_{FM}$	$I_{pk} = 628$ A, $T_J = 25$ °C, $t_p = 400$ μs square pulse		1.65	V

RECOVERY CHARACTERISTICS								
CODE	MAXIMUM VALUE AT $T_J = 25$ °C	TEST CONDITIONS			TYPICAL VALUES AT $T_J = 125$ °C			
	$t_{rr}$ at 25 % $I_{RRM}$ (μs)	$I_{pk}$ SQUARE PULSE (A)	dI/dt (A/μs)	$V_r$ (V)	$t_{rr}$ at 25 % $I_{RRM}$ (μs)	$Q_{rr}$ (μC)	$I_{rr}$ (A)	
S10	1.0	750	25	-30	2.4	52	33	
S15	1.5				2.9	90	44	
S20	2.0				3.2	107	46	

THERMAL AND MECHANICAL SPECIFICATIONS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum operating temperature range	$T_J$		-40 to 125	°C
Maximum storage temperature range	$T_{Stg}$		-40 to 150	
Maximum thermal resistance, junction to case	$R_{thJC}$	DC operation	0.115	K/W
Maximum thermal resistance, case to heatsink	$R_{thCS}$	Mounting surface, smooth, flat and greased	0.08	
Mounting torque ± 10 %		Not-lubricated threads	31	Nm
		Lubricated threads	24.5	
Approximate weight			250	g
Case style		See dimensions (link at the end of datasheet)	DO-9 (DO-205AB)	



$\Delta R_{thJC}$ CONDUCTION				
CONDUCTION ANGLE	SINUSOIDAL CONDUCTION	RECTANGULAR CONDUCTION	TEST CONDITIONS	UNITS
180°	0.010	0.008	$T_J = T_{J \text{ maximum}}$	K/W
120°	0.013	0.014		
90°	0.017	0.019		
60°	0.025	0.027		
30°	0.044	0.044		

**Note**

- The table above shows the increment of thermal resistance  $R_{thJC}$  when devices operate at different conduction angles than DC

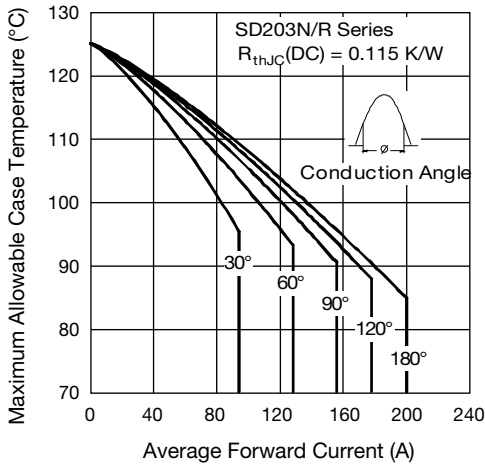


Fig. 1 - Current Ratings Characteristics

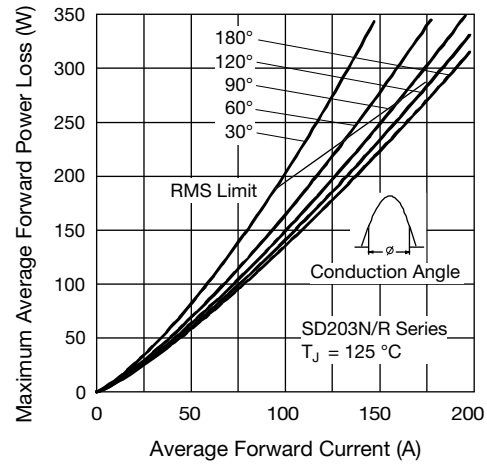


Fig. 3 - Forward Power Loss Characteristics

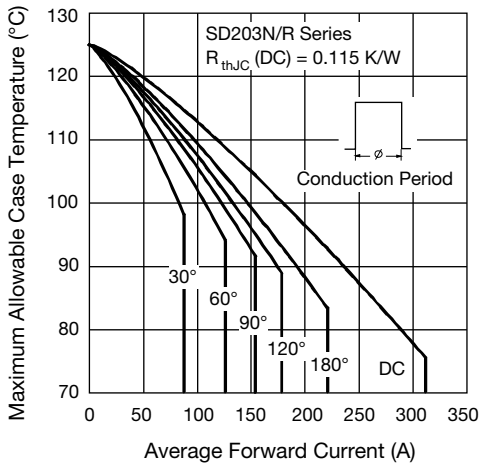


Fig. 2 - Current Ratings Characteristics

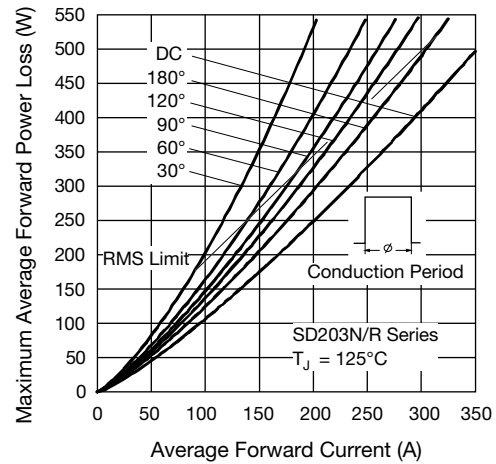


Fig. 4 - Forward Power Loss Characteristics

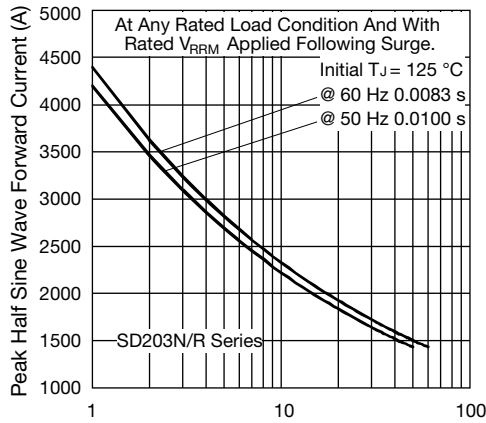


Fig. 5 - Maximum Non-Repetitive Surge Current

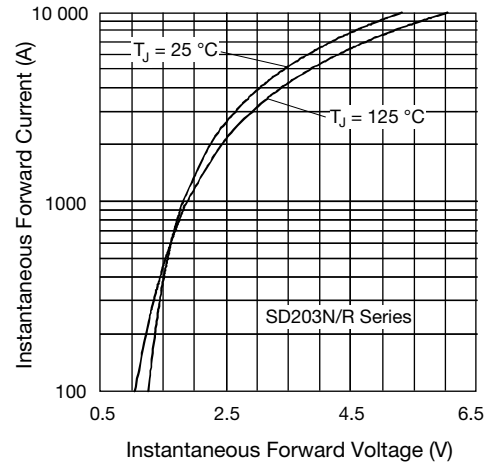


Fig. 7 - Forward Voltage Drop Characteristics

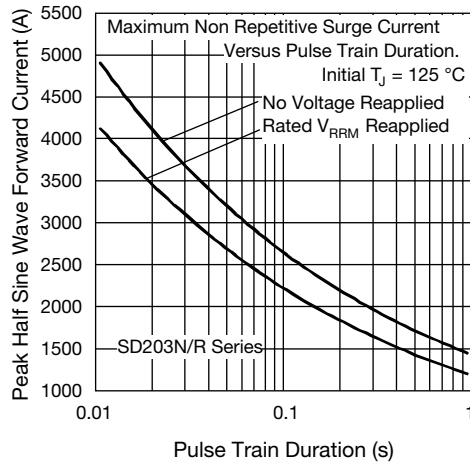


Fig. 6 - Maximum Non-Repetitive Surge Current

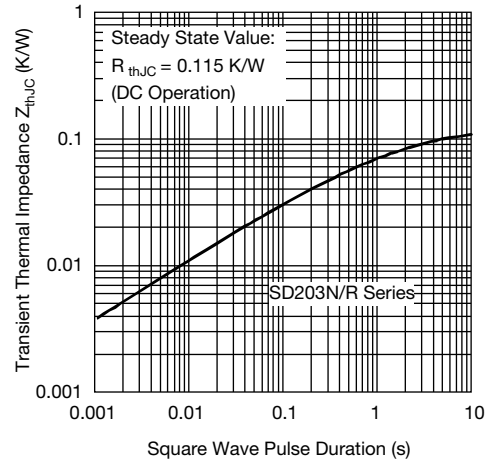


Fig. 8 - Thermal Impedance  $Z_{thJC}$  Characteristic

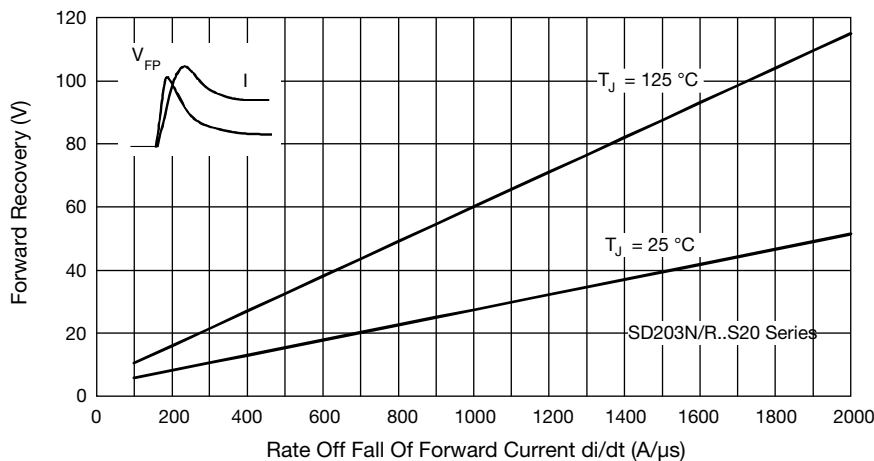


Fig. 9 - Typical Forward Recovery Characteristics

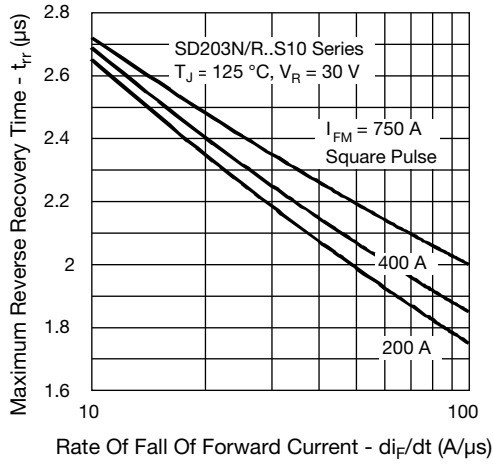


Fig. 10 - Recovery Time Characteristics

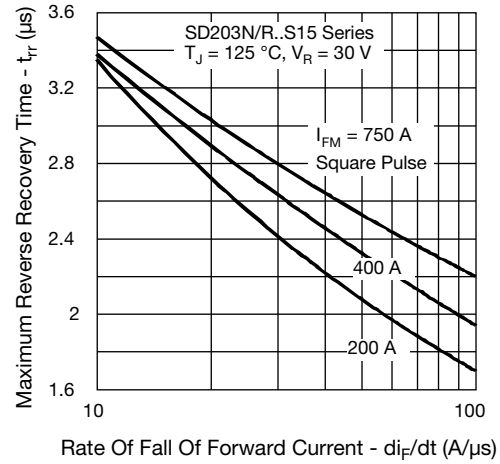


Fig. 13 - Recovery Time Characteristics

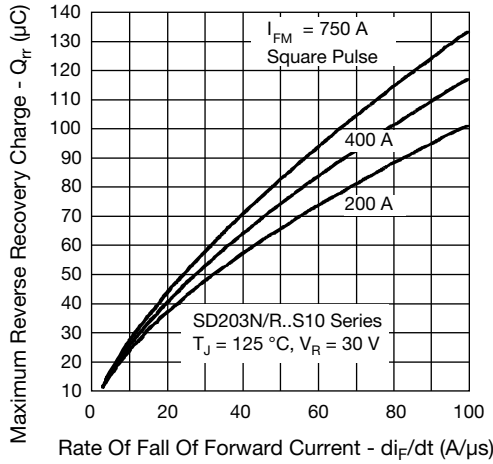


Fig. 11 - Recovery Charge Characteristics

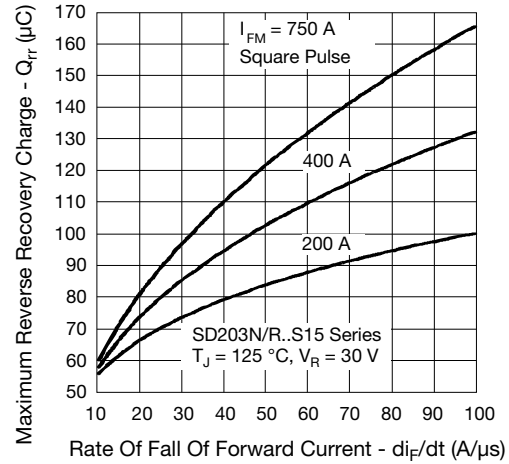


Fig. 14 - Recovery Charge Characteristics

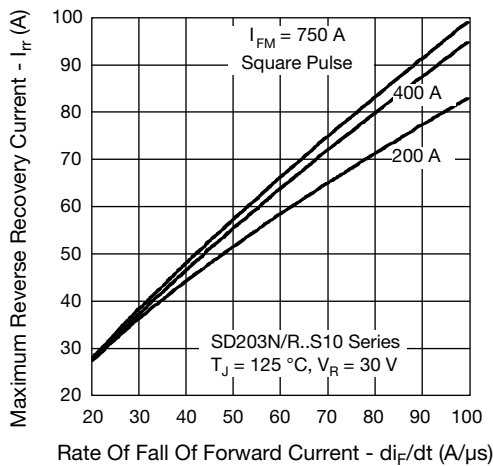


Fig. 12 - Recovery Current Characteristics

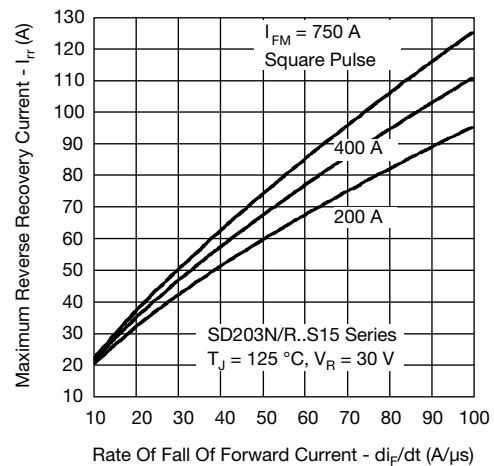


Fig. 15 - Recovery Current Characteristics

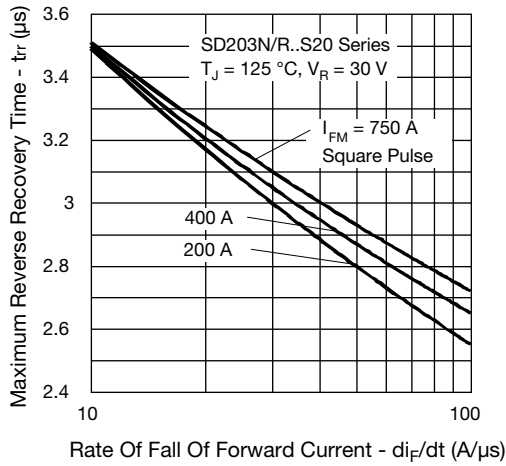


Fig. 16 - Recovery Time Characteristics

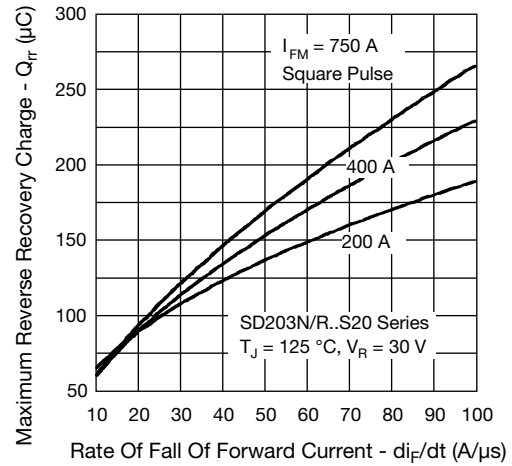


Fig. 17 - Recovery Charge Characteristics

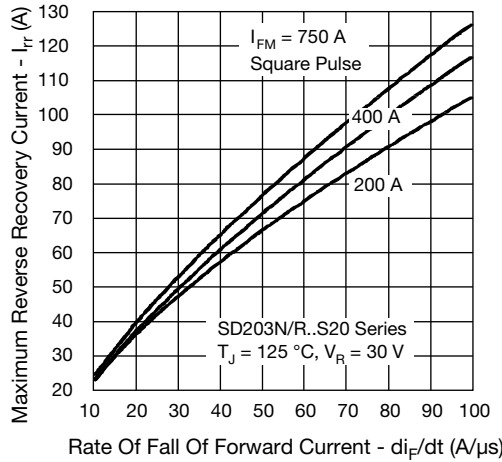


Fig. 18 - Recovery Current Characteristics

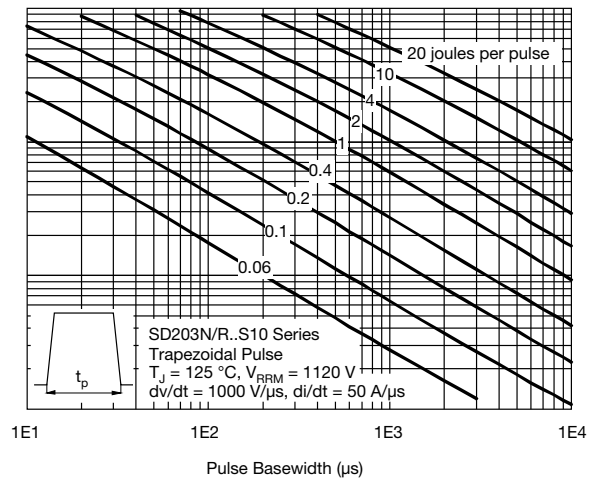
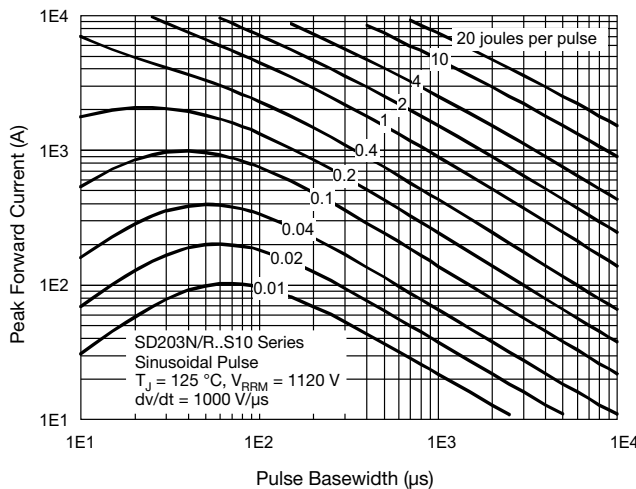


Fig. 19 - Maximum Total Energy Loss Per Pulse Characteristics

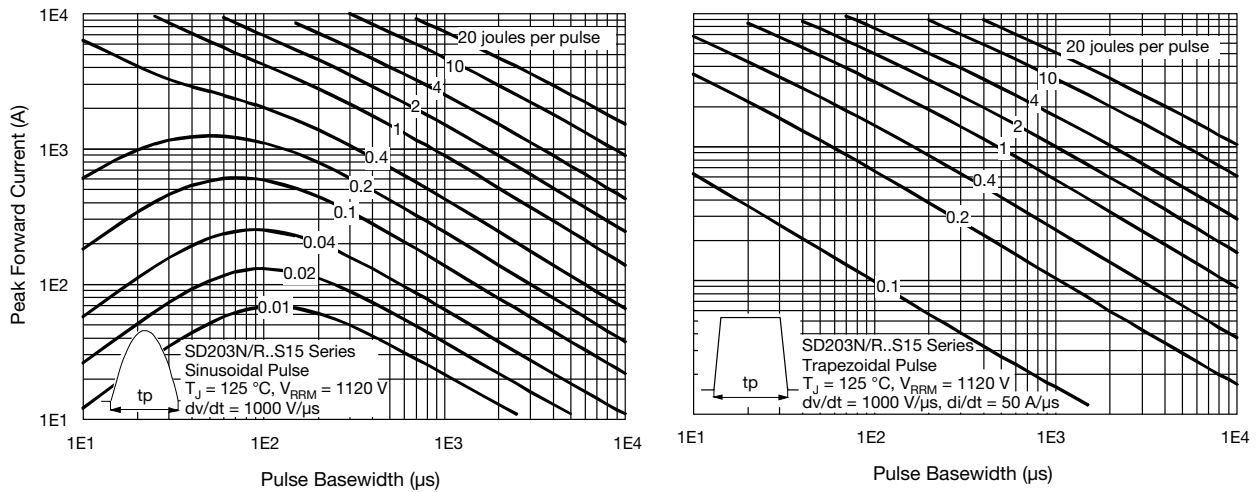


Fig. 20 - Maximum Total Energy Loss Per Pulse Characteristics

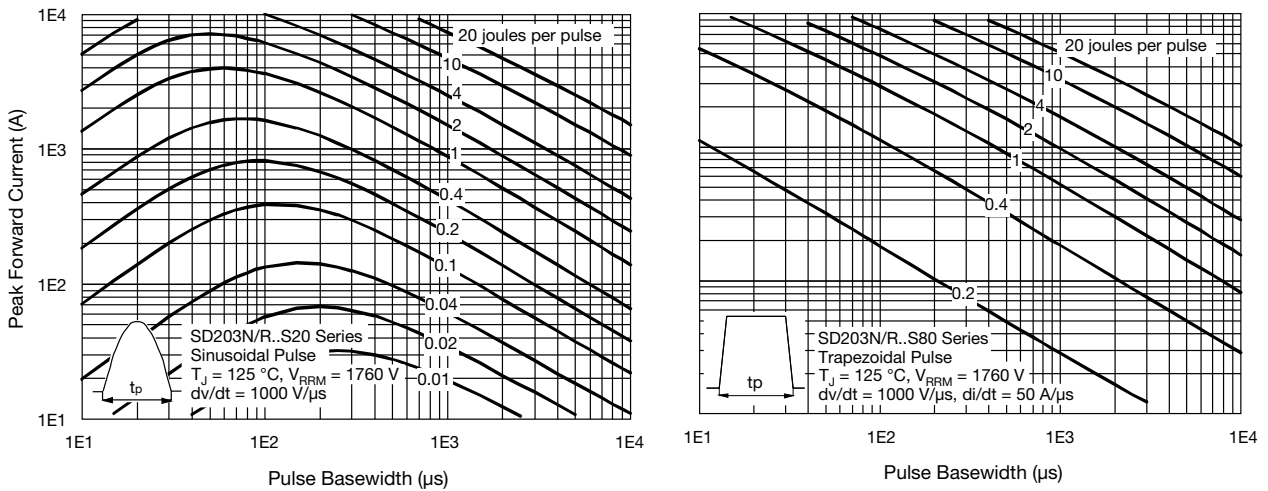


Fig. 21 - Maximum Total Energy Loss Per Pulse Characteristics



## ORDERING INFORMATION TABLE

Device code	<b>VS-</b>	<b>SD</b>	<b>20</b>	<b>3</b>	<b>R</b>	<b>25</b>	<b>S20</b>	<b>P</b>	<b>B</b>	<b>C</b>
	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩

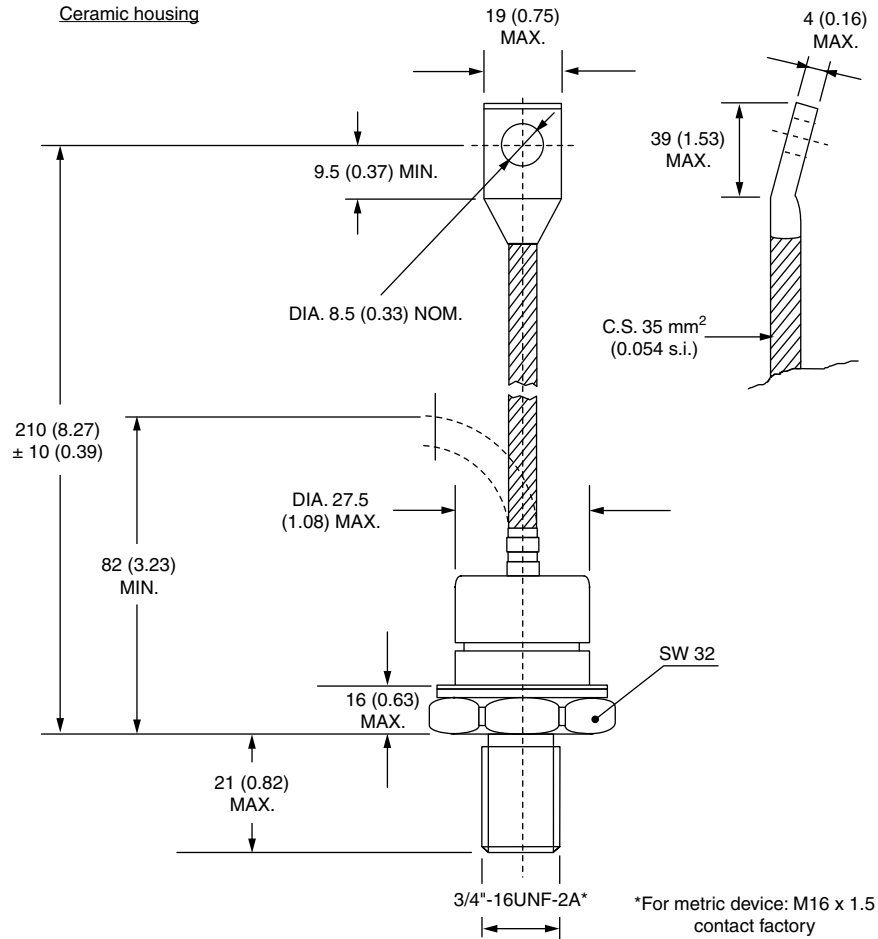
- 1** - Vishay Semiconductors product
- 2** - Diode
- 3** - Essential part number
- 4** - 3 = fast recovery
- 5** -
  - N = stud normal polarity (cathode to stud)
  - R = stud reverse polarity (anode to stud)
- 6** - Voltage code x 100 =  $V_{RRM}$  (see Voltage Ratings table)
- 7** -  $t_{rr}$  code (see Recovery Characteristics table)
- 8** -
  - P = stud base DO-9 (DO-205AB) 3/4" 16UNF-2A
  - M = stud base DO-9 (DO-205AB) M16 x 1.5
- 9** -
  - B = flag top terminals (for cathode / anode leads)
  - S = isolated lead with silicon sleeve  
(red = reverse polarity; blue = normal polarity)
  - None = not isolated lead
- 10** -
  - C = ceramic housing (over 1600 V)
  - V = glass-metal seal (only up to 1600 V)

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95301">www.vishay.com/doc?95301</a>



## DO-205AB (DO-9)

**DIMENSIONS** in millimeters (inches)





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