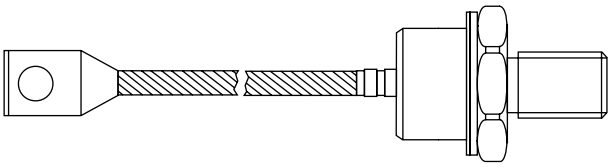
Fast Recovery Diodes (Stud Version), 200 A



DO-205AB (DO-9)

FEATURES

- High power fast recovery diode series
- 1.0 to 2.0 µs 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-205AB (DO-9)
- Maximum junction temperature 125 °C
- RoHS compliant
- Lead (Pb)-free
- Designed and qualified for industrial level

Pb-free
RoHS COMPLIANT

PRODUCT SUMMARY	
$I_{F(AV)}$	200 A

TYPICAL APPLICATIONS

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

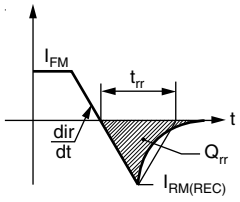
MAJOR RATINGS AND CHARACTERISTICS			
PARAMETER	**TEST CONDITIONS**	**VALUES**	**UNITS**
$I_{F(AV)}$		200	A
	T_C	85	°C
$I_{F(RMS)}$		314	A
I_{FSM}	50 Hz	4990	
	60 Hz	5230	
I^2t	50 Hz	125	kA^2s
	60 Hz	114	
V_{RRM}	Range	400 to 2500	V
t_{rr}	Range	1.0 to 2.0	µs
	T_J	25	°C
T_J		- 40 to 125	

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
SD203N/R..S10	04	400	500	35
	08	800	900	
	10	1000	1100	
SD203N/R..S15	12	1200	1300	
	14	1400	1500	
	16	1600	1700	
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	Sinusoidal half wave, initial $T_J = T_J$ maximum	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^2s
		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	$kA^2\sqrt{s}$
Low level value of threshold voltage	$V_{F(TO)1}$	(16.7 % x π x $I_{F(AV)}$ < I < π x $I_{F(AV)}$), $T_J = T_J$ maximum			1.00	V
High level value of threshold voltage	$V_{F(TO)2}$	(I > π x $I_{F(AV)}$), $T_J = T_J$ maximum			1.47	
Low level value of forward slope resistance	r_{f1}	(16.7 % x π x $I_{F(AV)}$ < I < π x $I_{F(AV)}$), $T_J = T_J$ maximum			1.10	mΩ
High level value of forward slope resistance	r_{f2}	(I > π x $I_{F(AV)}$), $T_J = T_J$ 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-205AB (DO-9)	

ΔR_{thJC} CONDUCTION

CONDUCTION ANGLE	SINUSOIDAL CONDUCTION	RECTANGULAR CONDUCTION	TEST CONDITIONS	UNITS
180°	0.010	0.008	$T_J = T_J$ 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

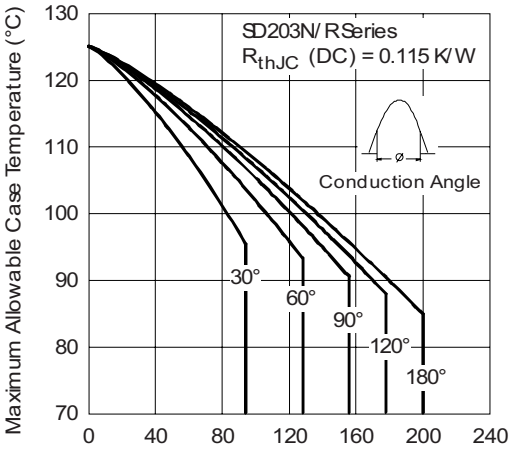


Fig. 1 - Current Ratings Characteristics

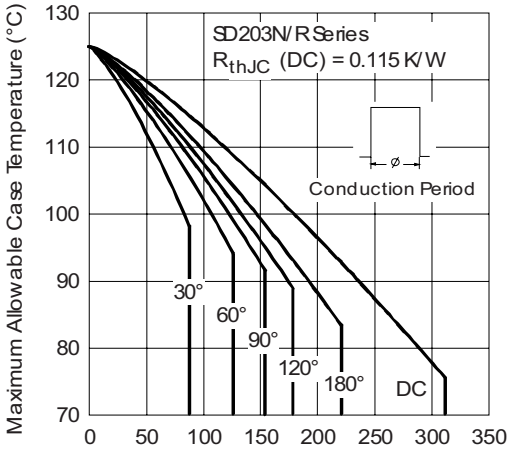


Fig. 2 - Current Ratings Characteristics

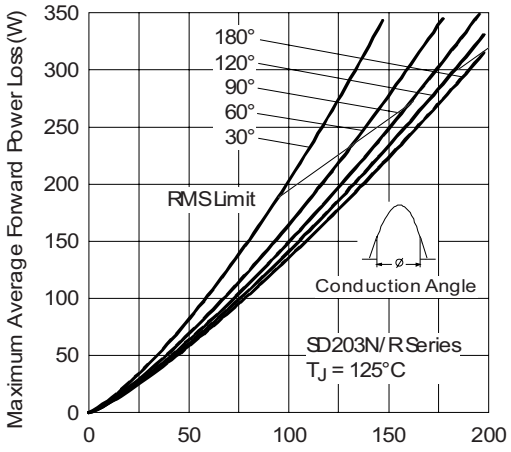


Fig. 3 - Forward Power Loss Characteristics

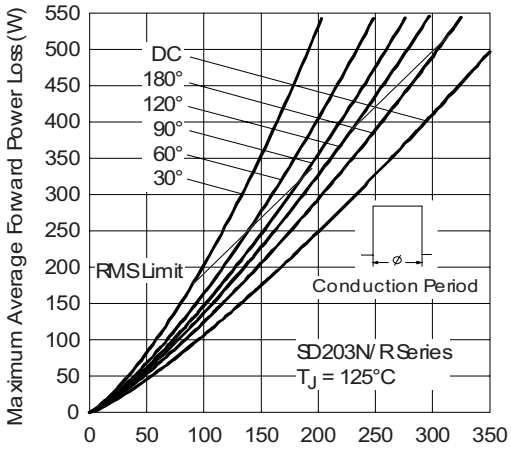


Fig. 4 - Forward Power Loss Characteristics

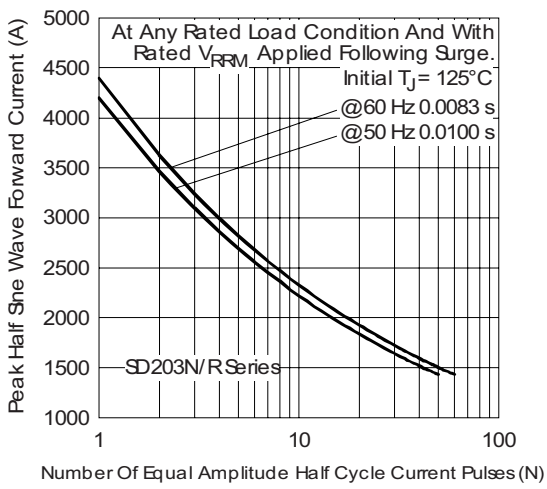


Fig. 5 - Maximum Non-Repetitive Surge Current

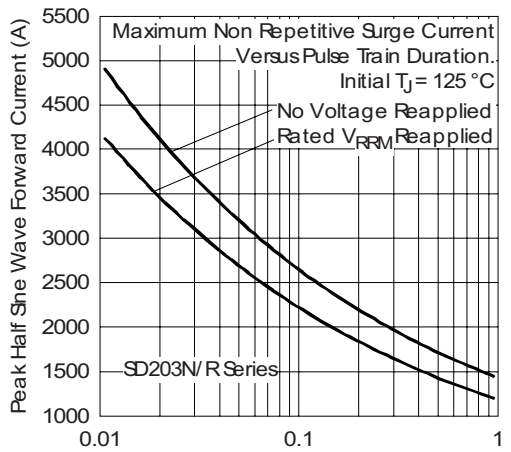


Fig. 6 - Maximum Non-Repetitive Surge Current

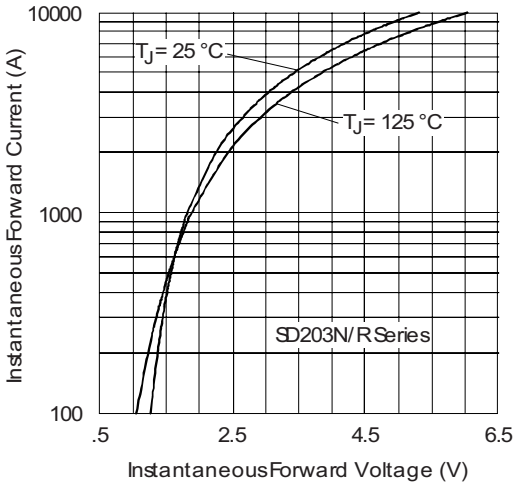


Fig. 7 - Forward Voltage Drop Characteristics

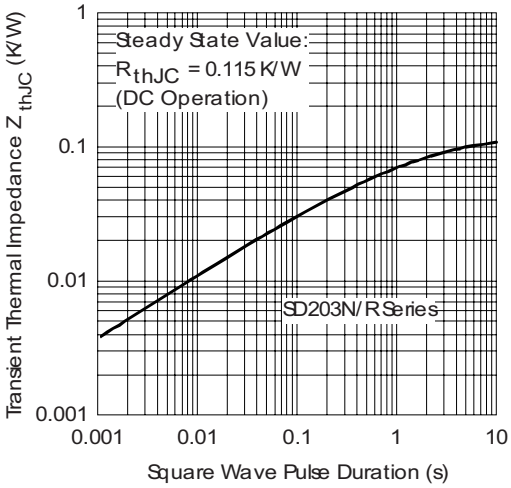


Fig. 8 - Thermal Impedance Z_{thJC} Characteristic

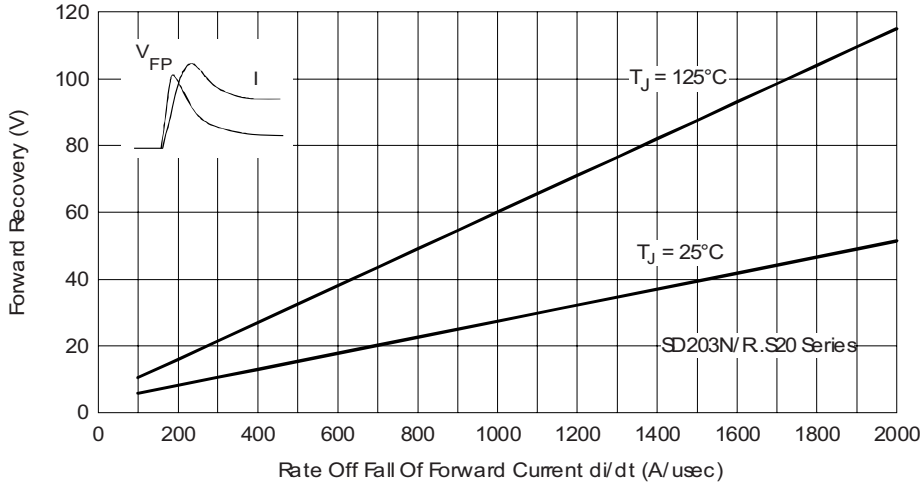


Fig. 9 - Typical Forward Recovery Characteristics

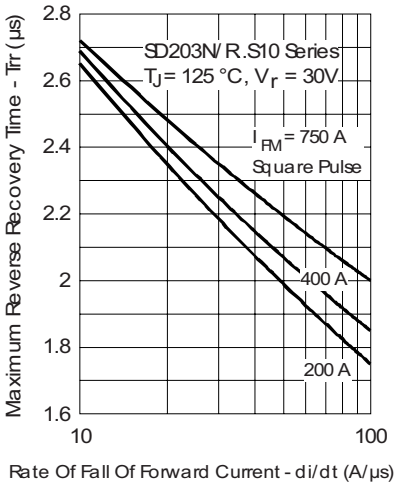


Fig. 10 - Recovery Time Characteristics

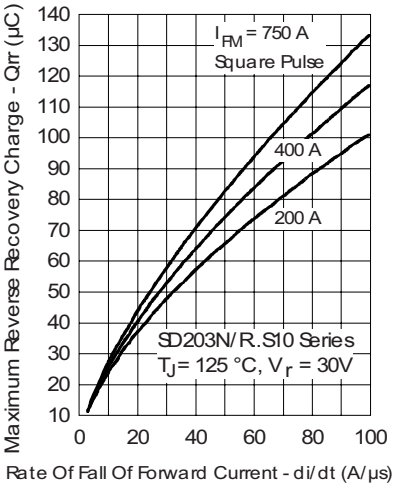


Fig. 11 - Recovery Charge Characteristics

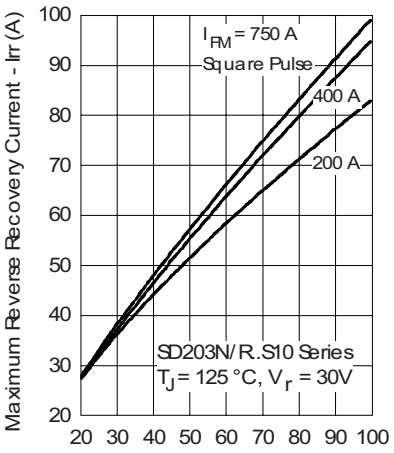


Fig. 12 - Recovery Current Characteristics

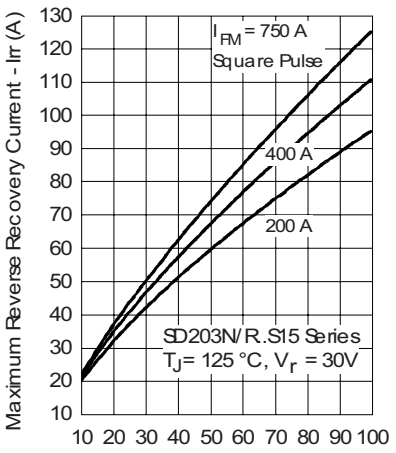


Fig. 15 - Recovery Current Characteristics

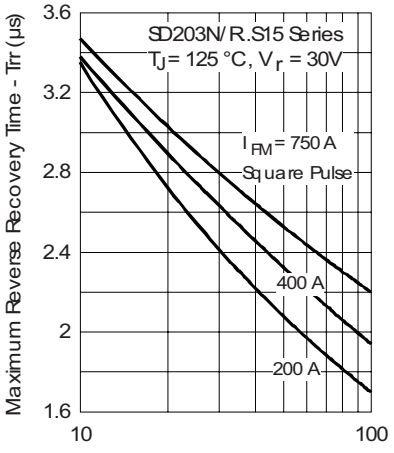


Fig. 13 - Recovery Time Characteristics

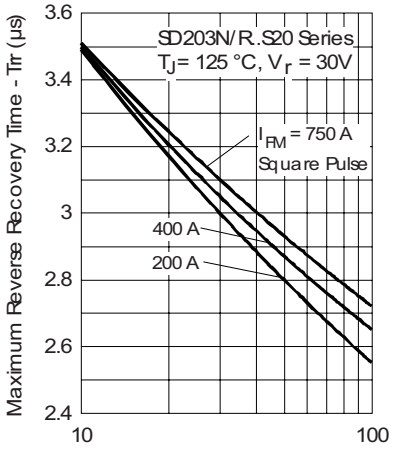


Fig. 16 - Recovery Time Characteristics

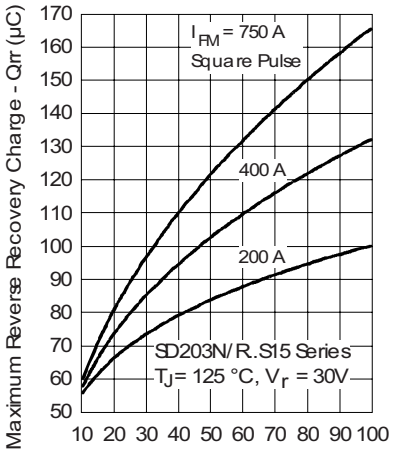


Fig. 14 - Recovery Charge Characteristics

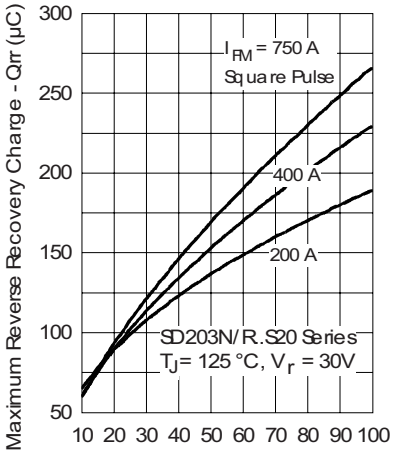


Fig. 17 - Recovery Charge Characteristics

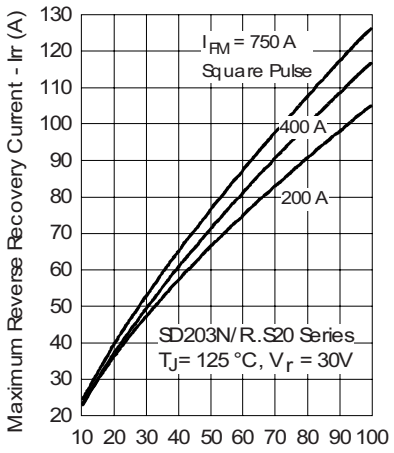


Fig. 18 - Recovery Current Characteristics

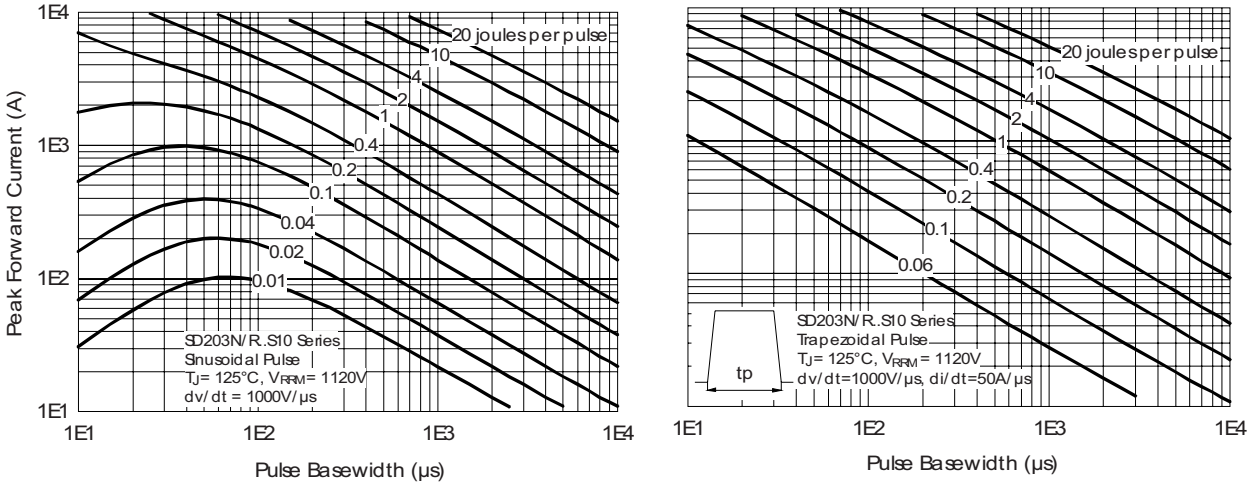


Fig. 19 - Maximum Total Energy Loss Per Pulse Characteristics

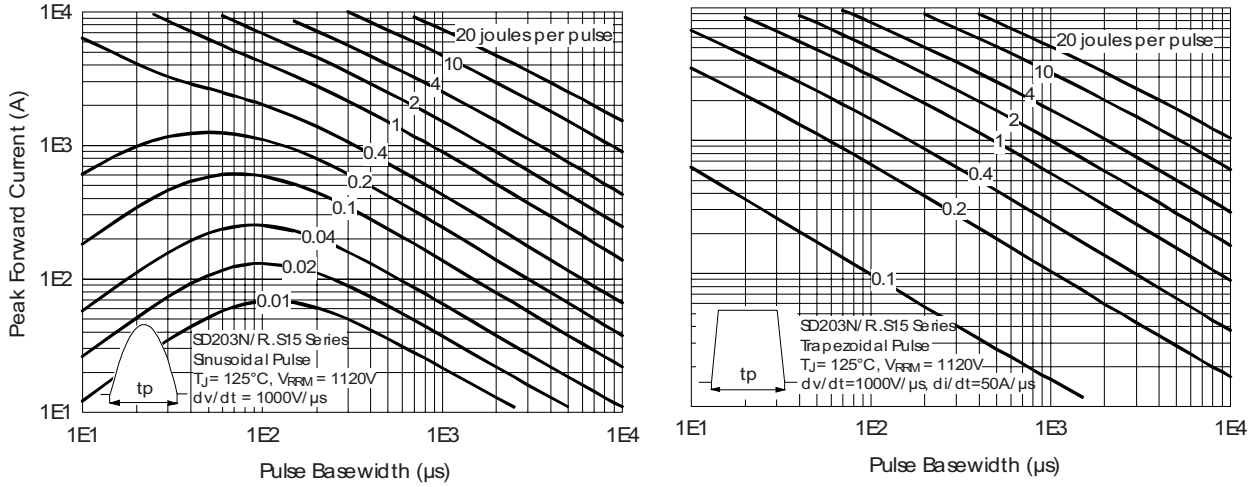


Fig. 20 - Maximum Total Energy Loss Per Pulse Characteristics

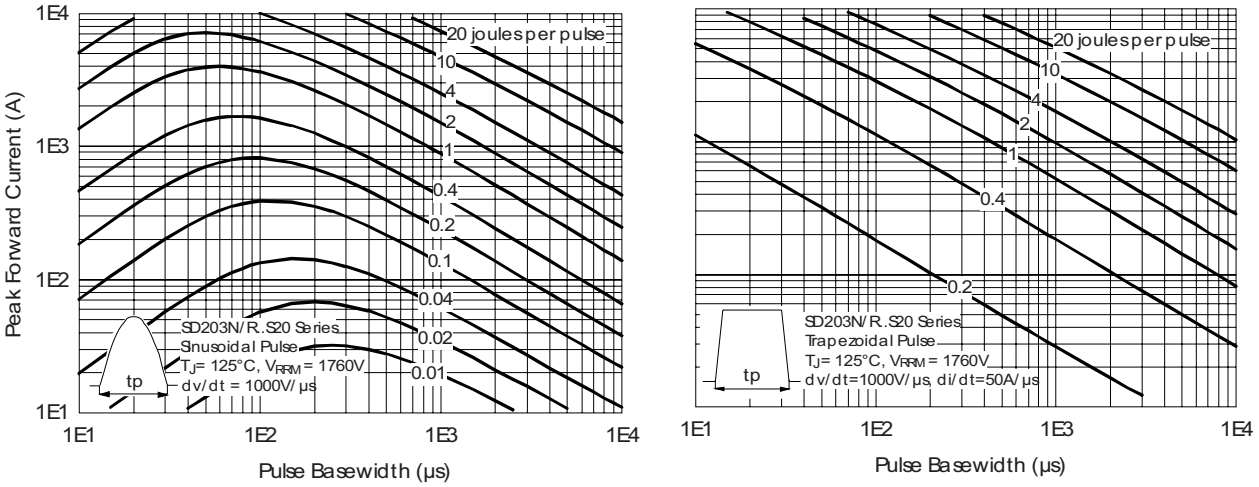


Fig. 21 - Maximum Total Energy Loss Per Pulse Characteristics

ORDERING INFORMATION TABLE

Device code

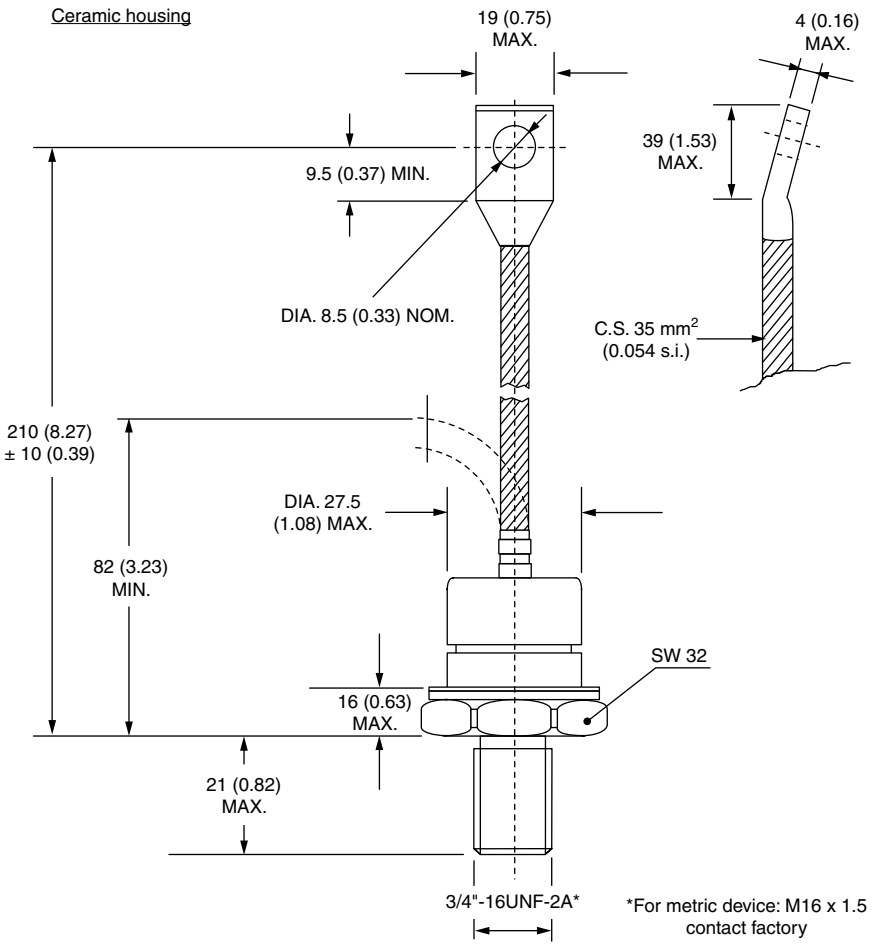
SD	20	3	R	25	S20	P	B	C
1	2	3	4	5	6	7	8	9

- **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 x 100 = V_{RRM} (see Voltage Ratings table)
- **6** - t_{rr} code (see Recovery Characteristics table)
- **7** - • P = Stud base DO-205AB (DO-9) 3/4" 16UNF-2A
  • M = Stud base DO-205AB (DO-9) M16 x 1.5
- **8** - • B = Flag top terminals (for cathode/ anode leads)
  • S = Isolated lead with silicon sleeve
  (red = Reverse polarity; blue = Normal polarity)
  • None = Not isolated lead
- **9** - • C = Ceramic housing (over 1600 V)
  • V = Glass-metal seal (only up to 1600 V)

LINKS TO RELATED DOCUMENTS	
Dimensions	http://www.vishay.com/doc?95301

DO-205AB (DO-9)

DIMENSIONS in millimeters (inches)



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