International IQR Rectifier

SD203N/R SERIES

FAST RECOVERY DIODES

Stud Version

200A

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-205AB (DO-9)
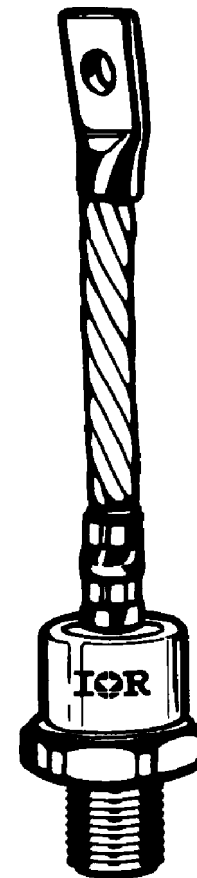■ Maximum junction temperature 125°C

Typical Applications

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

Major Ratings and Characteristics

Parameters		SD203N/R	Units
$I_{F(AV)}$		200	A
	@ T_C	85	°C
$I_{F(RMS)}$		314	A
I_{FSM}	@ 50Hz	4990	A
	@ 60Hz	5230	A
I^2t	@ 50Hz	125	KA^{2}s
	@ 60Hz	114	KA^{2}s
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-205AB (DO-9)

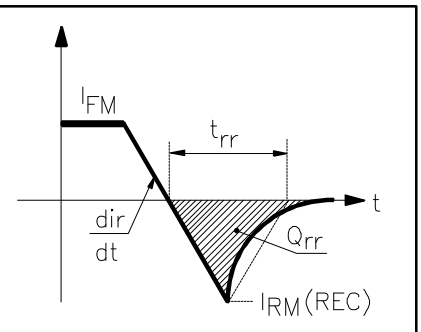## ELECTRICAL SPECIFICATIONS

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
SD203N/R..S10	04	400	500	
	08	800	900	
	10	1000	1100	
SD203N/R..S15	12	1200	1300	35
	14	1400	1500	
	16	1600	1700	
SD203N/R..S20	20	2000	2100	
	25	2500	2600	

Forward Conduction

	Parameter	SD203N/R	Units	Conditions		
$I_{F(AV)}$	Max. average forward current	200	A	180° conduction, half sine wave.		
	@ Case temperature	85	°C			
$I_{F(RMS)}$	Max. RMS current	314	A	DC @ 76°C case temperature		
I_{FSM}	Max. peak, one-cycle	4990	A	t = 10ms	No voltage	Sinusoidal half wave, Initial $T_J = T_J$ max.
	non-repetitive forward current	5230		t = 8.3ms	reapplied	
		4200		t = 10ms	100% V_{RRM}	
		4400		t = 8.3ms	reapplied	
I^2t	Maximum I^2t for fusing	125	KA^2s	t = 10ms	No voltage	
		114		t = 8.3ms	reapplied	
		88		t = 10ms	100% V_{RRM}	
		81		t = 8.3ms	reapplied	
$I^2\sqrt{t}$	Maximum $I^2\sqrt{t}$ for fusing	1250	$KA^2\sqrt{s}$	t = 0.1 to 10ms, no voltage reapplied		
$V_{F(TO)1}$	Low level of threshold voltage	1.00	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	1.47		$(I > \pi \times I_{F(AV)})$, $T_J = T_J$ max.		
r_{f1}	Low level of forward slope resistance	1.10	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	0.46		$(I > \pi \times I_{F(AV)})$, $T_J = T_J$ max.		
V_{FM}	Max. forward voltage	1.65	V	I_{pk}= 628A, $T_J = 25°C$, t_p = 400 µs square pulse		

Recovery Characteristics

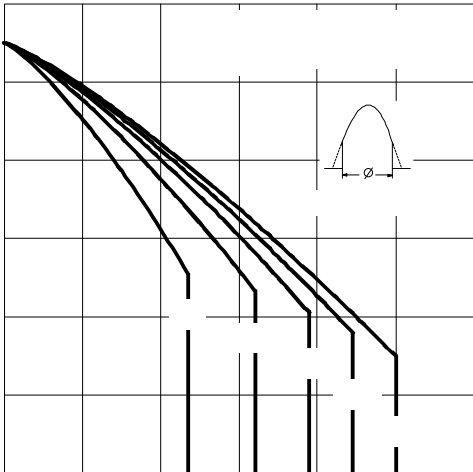| Code	$T_J = 25°C$ typical t_{rr} @ 25% I_{RRM} (µs)	Test conditions			Max. values @ $T_J = 125°C$			
		I_{pk} Square Pulse (A)	di/dt (A/µs)	V_r (V)	t_{rr} @ 25% I_{RRM} (µs)	Q_{rr} (µC)	I_{rr} (A)	
S10	1.0				2.4	52	33	
S15	1.5	750	25	- 30	2.9	90	44	
S20	2.0				3.2	107	46	

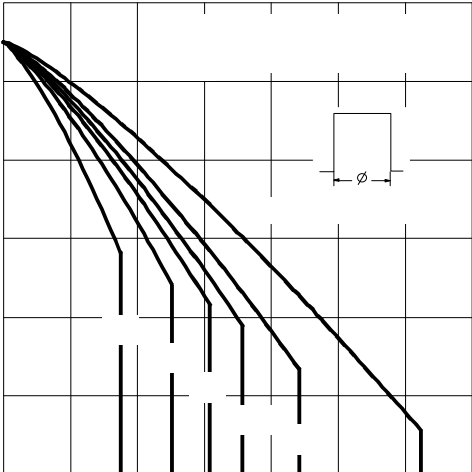Fig. 1 - Current Ratings Characteristics
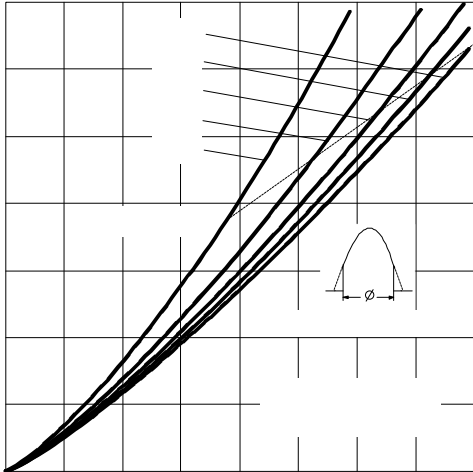

Fig. 2 - Current Ratings Characteristics

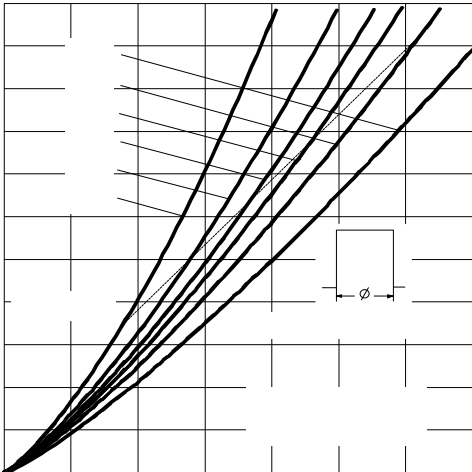Fig. 3 - Forward Power Loss Characteristics
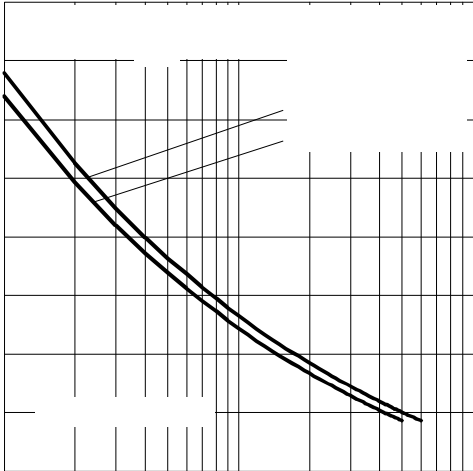

Fig. 4 - Forward Power Loss Characteristics

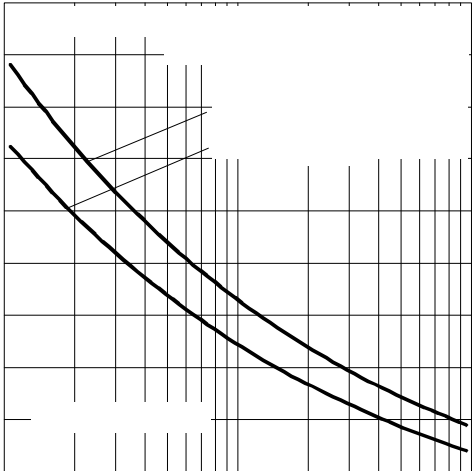Fig. 5 - Maximum Non-repetitive Surge Current

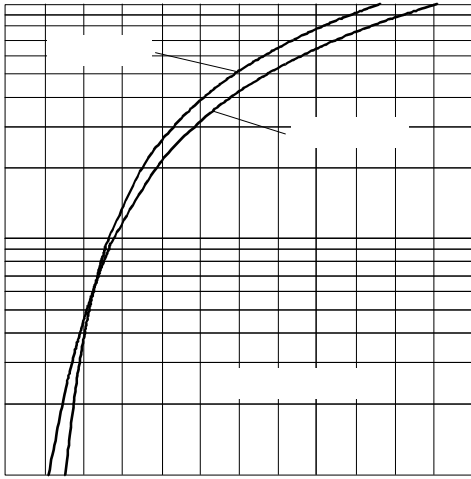Fig. 6 - Maximum Non-repetitive Surge Current
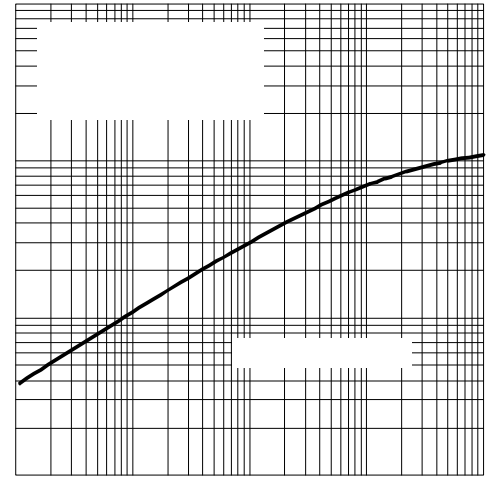
Fig. 7 - Forward Voltage Drop Characteristics
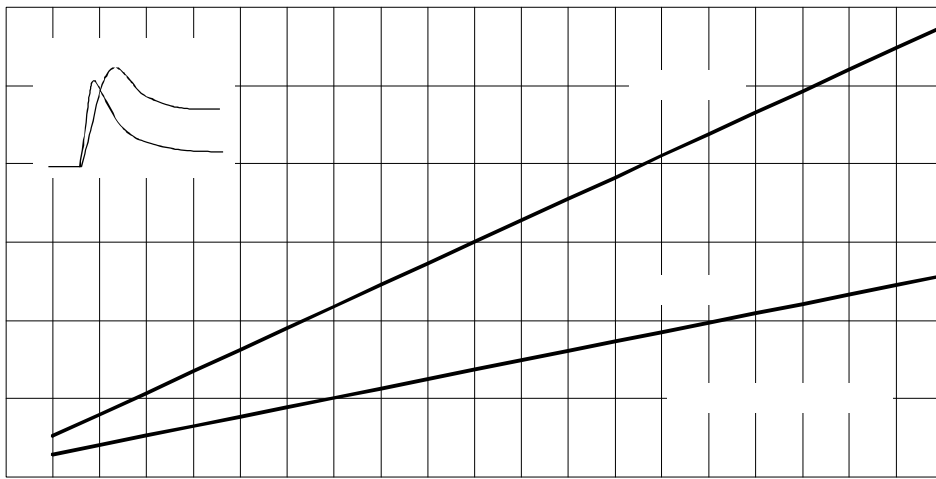
Fig. 8 - Thermal Impedance Z_{thJC} Characteristic
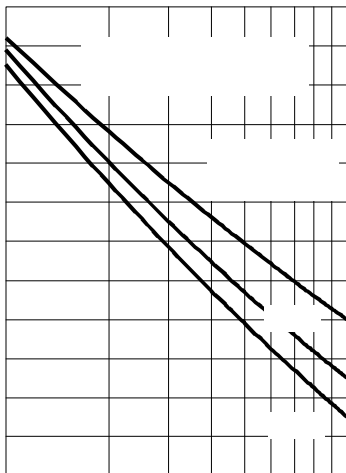
Fig. 9 - Typical Forward Recovery Characteristics
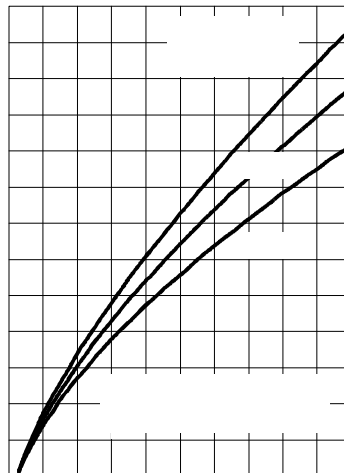
Fig. 10 - Recovery Time Characteristics   Fig. 11 - Recovery Charge Characteristics   Fig. 12 - Recovery Current Characteristics
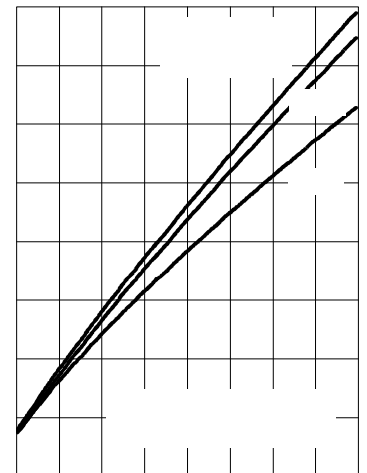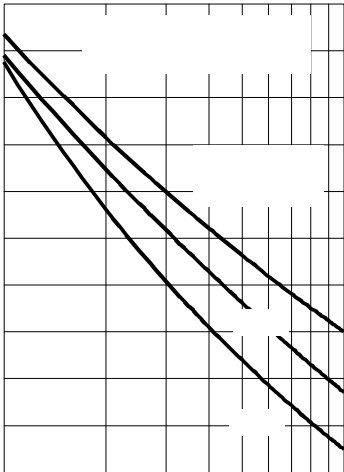
Fig.13 - Recovery Time Characteristics   Fig. 14 - Recovery Charge Characteristics   Fig. 15 - Recovery Current Characteristics
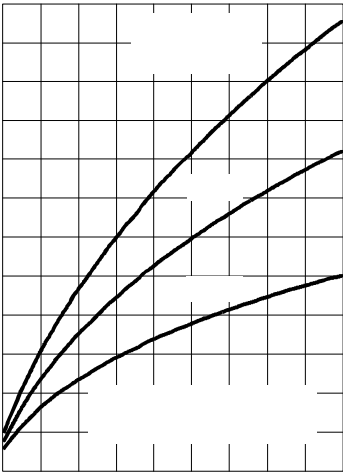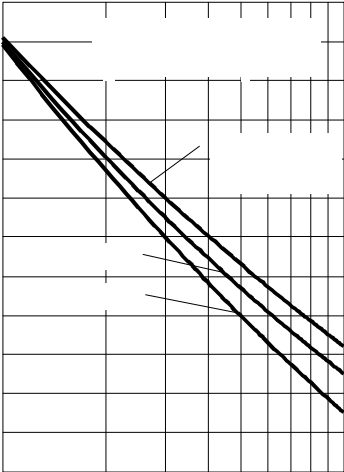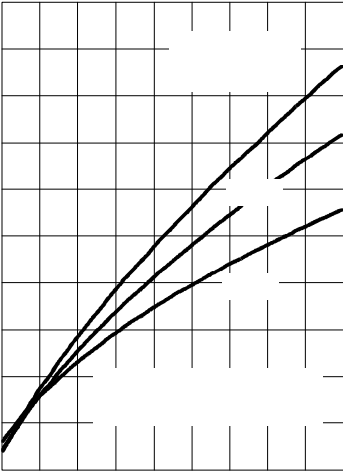
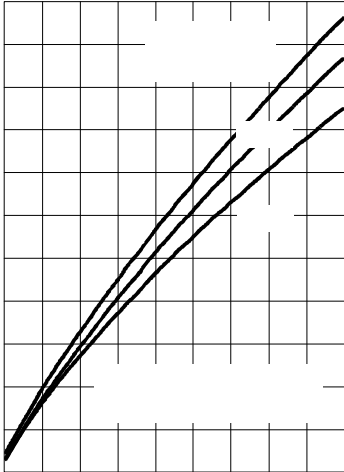Fig.16 - Recovery Time Characteristics   Fig. 17 - Recovery Charge Characteristics   Fig. 18 - Recovery Current Characteristics
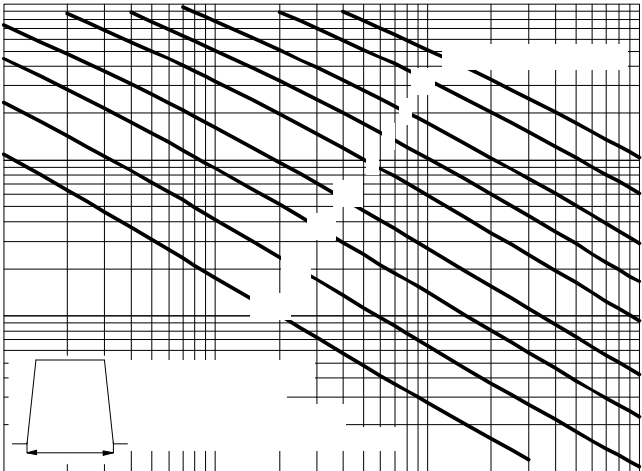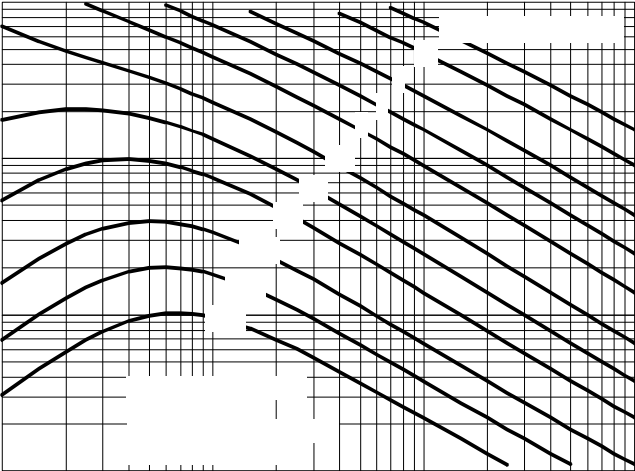
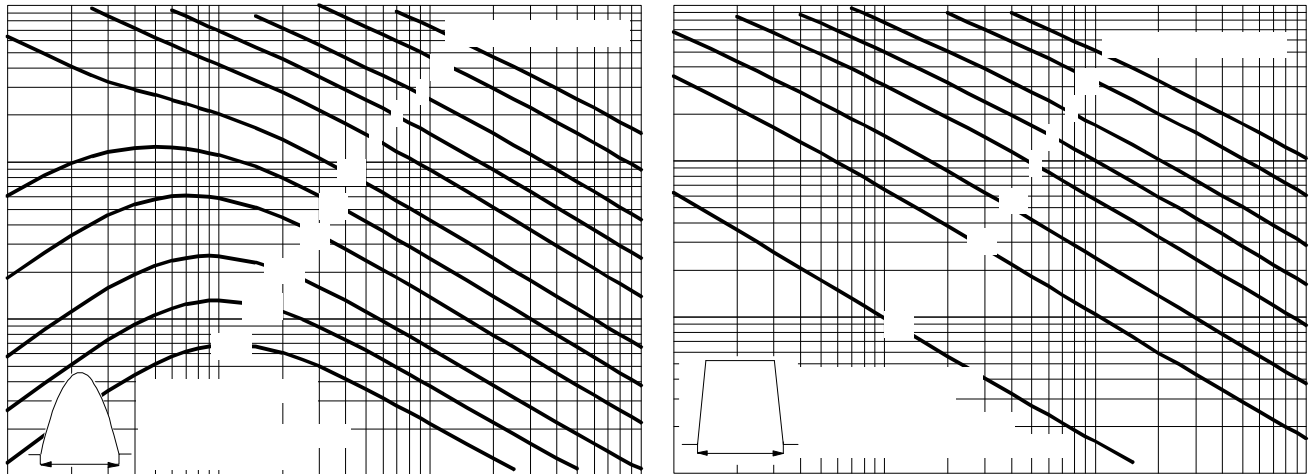Fig. 19 - Maximum Total Energy Loss Per Pulse Characteristics

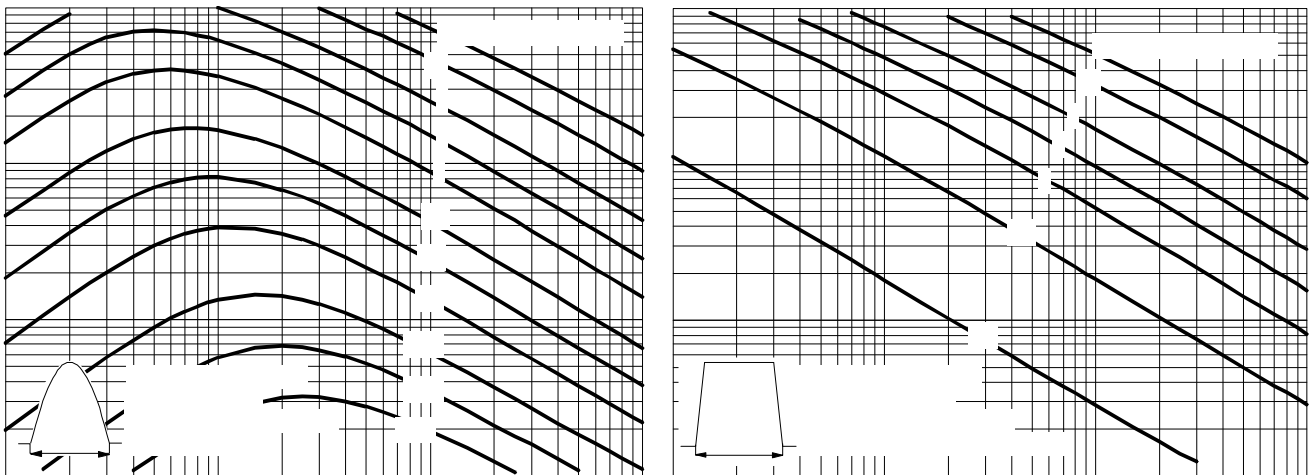Fig. 20 - Maximum Total Energy Loss Per Pulse Characteristics

Fig. 21 - Maximum Total Energy Loss Per Pulse Characteristics

Thermal and Mechanical Specification

	Parameter	SD203N/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	0.115	K/W	DC operation
R_{thCS}	Max. thermal resistance, case to heatsink	0.08		Mounting surface, smooth, flat and greased
T	Mounting torque ±10%	31	Nm	Not lubricated threads
		24.5		Lubricated threads
wt	Approximate weight	250	g	
	Case style	DO-205AB (DO-9)		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)
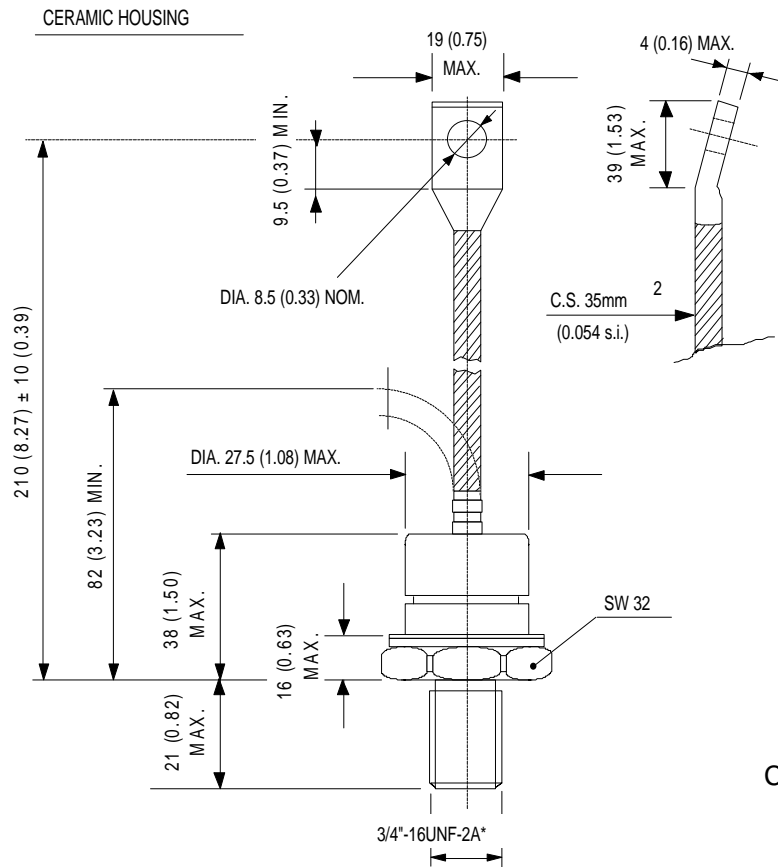
Conduction angle	Sinusoidal conduction	Rectangular conduction	Units	Conditions
180°	0.010	0.008		$T_J = T_J$ max.
120°	0.013	0.014		
90°	0.017	0.019	K/W	
60°	0.025	0.027		
30°	0.044	0.044		

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: 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 silicone sleeve

(Red = Reverse Polarity; Blue = Normal Polarity)

None = Not isolated lead

9 - C = Ceramic housing (over 1600V)

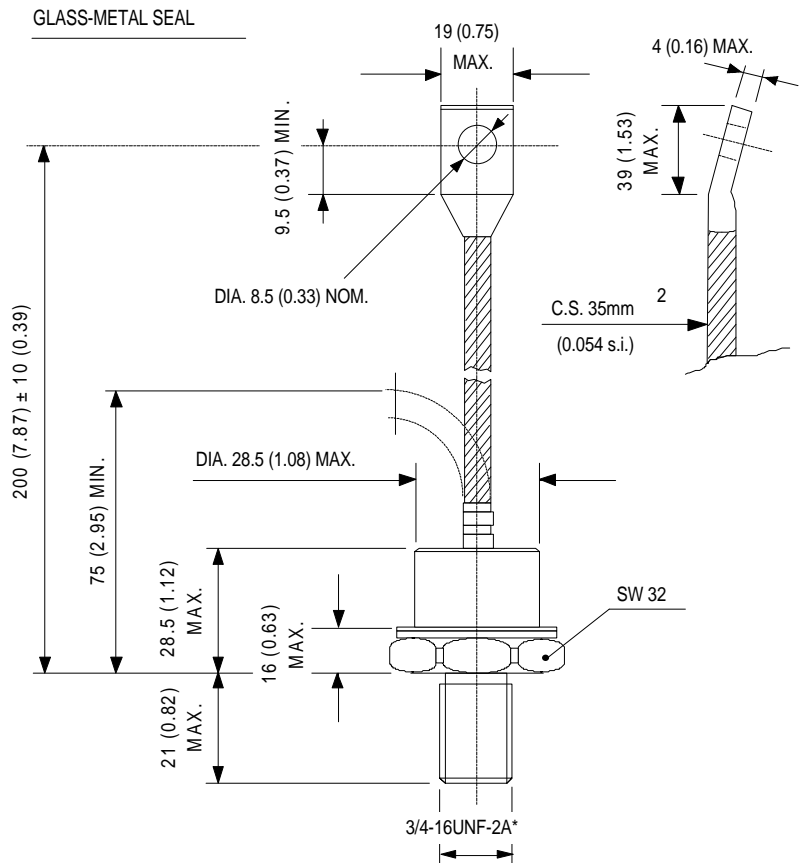V = Glass-metal seal (only up to 1600V)

Outline Table

CERAMIC HOUSING

19 (0.75) MAX.

9.5 (0.37) MIN.

DIA. 8.5 (0.33) NOM.

4 (0.16) MAX.

39 (1.53) MAX.

C.S. 35mm (0.054 s.i.) 2

210 (8.27) ± 10 (0.39)

82 (3.23) MIN.

DIA. 27.5 (1.08) MAX.

38 (1.50) MAX.

16 (0.63) MAX.

21 (0.82) MAX.

SW 32

Conform to JEDEC DO-205AB (DO-9)

All dimensions in millimeters (inches)

3/4"-16UNF-2A*

* FOR METRIC DEVICE: M16 X 1.5

GLASS-METAL SEAL

19 (0.75) MAX.

9.5 (0.37) MIN.

DIA. 8.5 (0.33) NOM.

4 (0.16) MAX.

39 (1.53) MAX.

C.S. 35mm (0.054 s.i.) 2

200 (7.87) ± 10 (0.39)

75 (2.95) MIN.

DIA. 28.5 (1.08) MAX.

28.5 (1.12) MAX.

16 (0.63) MAX.

21 (0.82) MAX.

SW 32

3/4-16UNF-2A*

* FOR METRIC DEVICE: M16 X 1.5

Outline Table

CERAMIC HOUSING

21 (0.83)

14 (0.55)

DIA. 6.5 (0.25)

13 (0.51)

79 (3.11) MAX.

DIA. 27.5 (1.08) MAX.

72 (2.83)

38 (1.50) MAX.

16 (0.63) MAX.

21 (0.82) MAX.

3/4"-16UNF-2A*

*FOR METRIC DEVICE. M16 X 1.5

3 (0.12)

32 (1.26)
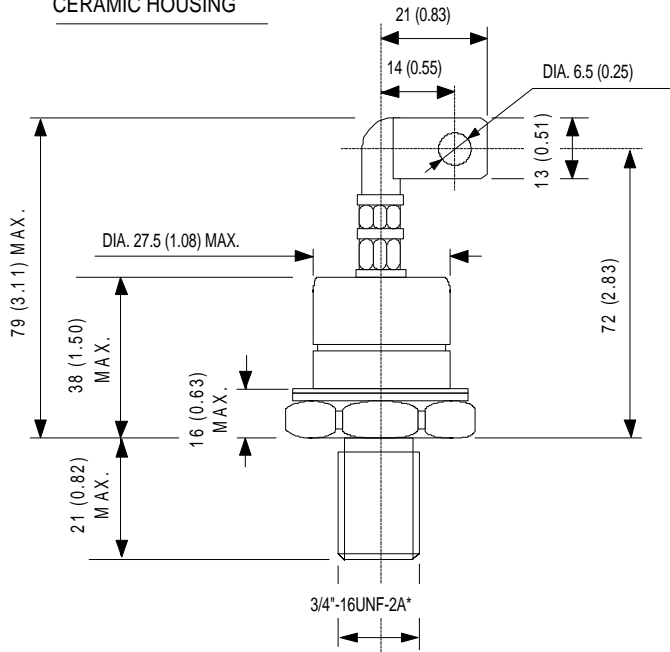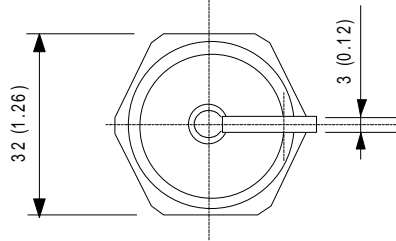
DO-205AB (DO-9) Flag

All dimensions in millimeters (inches)

GLASS-METAL SEAL

21 (0.83)

14 (0.55)

DIA. 6.5 (0.26)

13 (0.51)

70 (2.75) MAX.

DIA. 28.5 (1.12) MAX.

62 (2.44)

28.5 (1.12) MAX.

16 (0.63) MAX.

21 (0.83) MAX.

3/4"-16UNF-2A*

*FOR METRIC DEVICE: M16 X 1.5

3 (0.12)

32 (1.26)