DISCRETE POWER DIODES and THYRISTORS

DATA BOOK

International
IOR Rectifier

SD253N/R SERIES

FAST RECOVERY DIODES

Stud Version

250A

Features

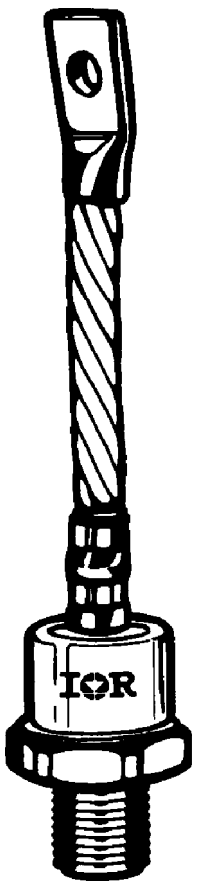
- High power FAST recovery diode series
- 1.5 to 2.0 µs recovery time
- High voltage ratings up to 1600V
- High current capability
- Optimized turn on and turn off characteristics
- Low forward recovery
- Fast and soft reverse recovery
- Compression bonded encapsulation
- Stud version JEDEC DO-205AB (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		SD253N/R	Units
$I_{F(AV)}$		250	A
	@ T_C	85	°C
$I_{F(RMS)}$		392	A
I_{FSM}	@ 50Hz	5350	A
	@ 60Hz	5600	A
I^2t	@ 50Hz	143	KA^2s
	@ 60Hz	130	KA^2s
V_{RRM} range		400 to 1600	V
t_{rr} range		1.5 to 2.0	µs
	@ T_J	25	°C
T_J		- 40 to 125	°C



case style
DO-205AB (DO-9)

ELECTRICAL SPECIFICATIONS

Voltage Ratings

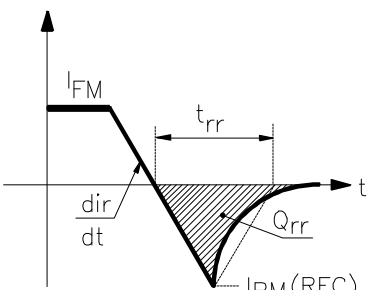
Type number	Voltage Code	V_{RRM} max. repetitive peak and off-state voltage V	V_{RSM}, maximum non-repetitive peak voltage V	I_{RRM} max. T_J = 125°C mA
SD253N/R..S15	04	400	500	35
	08	800	900	
	10	1000	1100	
SD253N/R..S20	12	1200	1300	
	14	1400	1500	
	16	1600	1700	

Forward Conduction

	Parameter	SD253N/R	Units	Conditions		
$I_{F(AV)}$	Max. average forward current	250	A	180° conduction, half sine wave.		
	@ Case temperature	85	°C			
$I_{F(RMS)}$	Max. RMS current	392	A	DC @ 74°C case temperature		
I_{FSM}	Max. peak, one-cycle non-repetitive forward current	5350	A	t = 10ms	No voltage reapplied	Sinusoidal half wave, Initial $T_J = T_J$ max.
		5600		t = 8.3ms		
		4500		t = 10ms	100% V_{RRM} reapplied	
		4710		t = 8.3ms		
I^2t	Maximum I^2t for fusing	143	KA^2s	t = 10ms	No voltage reapplied	
		130		t = 8.3ms		
		101		t = 10ms	100% V_{RRM} reapplied	
		92		t = 8.3ms		
$I^2\sqrt{t}$	Maximum $I^2\sqrt{t}$ for fusing	1430	$KA^2\sqrt{s}$	t = 0.1 to 10ms, no voltage reapplied		
$V_{F(TO)1}$	Low level of threshold voltage	0.87	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	1.17		(I > π x $I_{F(AV)}$), $T_J = T_J$ max.		
r_{f1}	Low level of forward slope resistance	0.62	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	0.29		(I > π x $I_{F(AV)}$), $T_J = T_J$ max.		
V_{FM}	Max. forward voltage	1.38	V	I_{pk}= 785A, 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)
S15	1.5	750	25	-30	2.9	90	44
S20	2.0				3.2	107	46



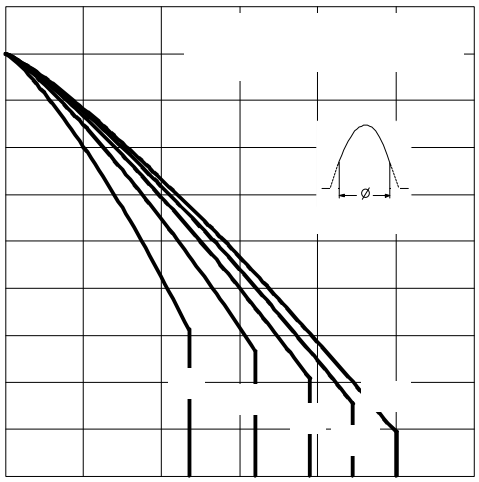


Fig. 1 - Current Ratings Characteristics

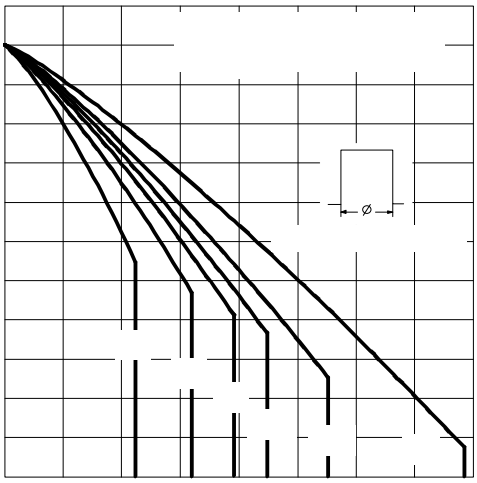


Fig. 2 - Current Ratings Characteristics

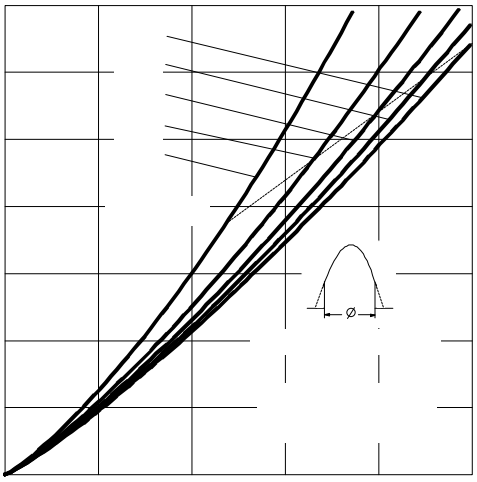


Fig. 3 - Forward Power Loss Characteristics

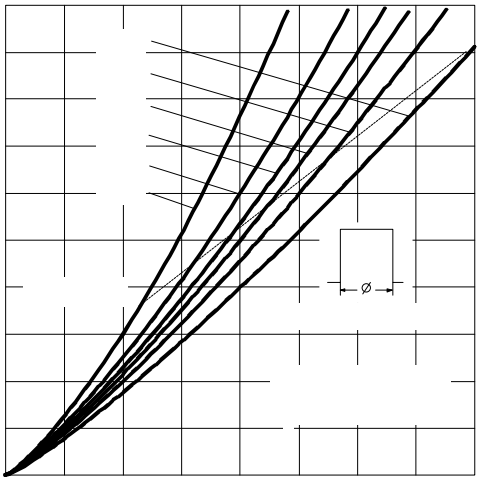
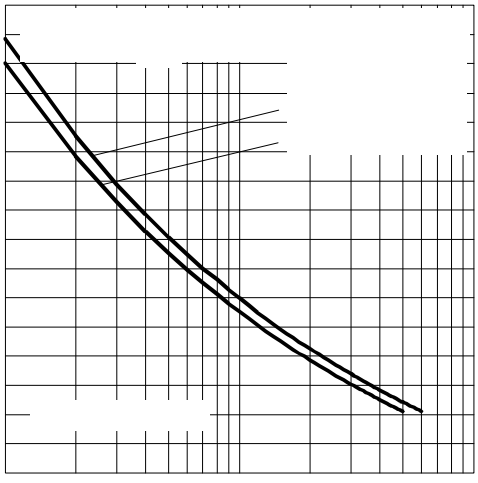
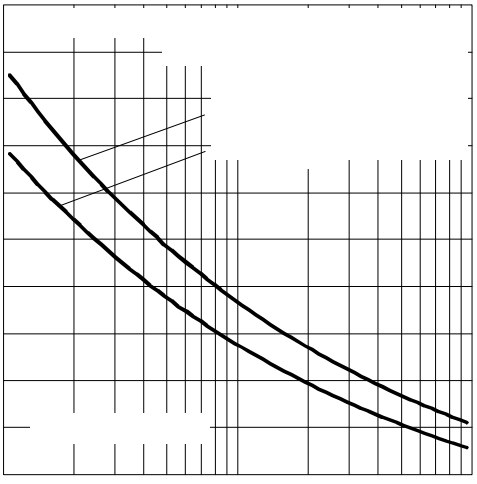


Fig. 4 - Forward Power Loss Characteristics





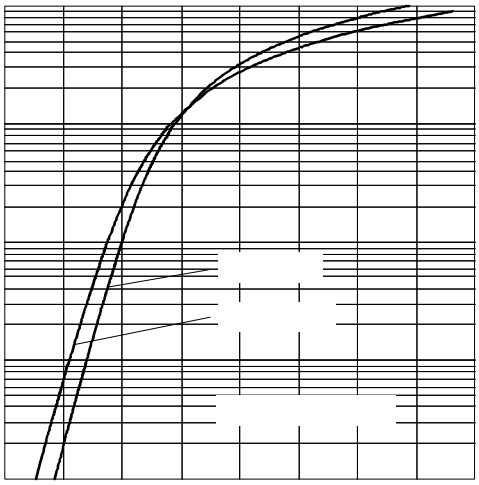


Fig. 7 - Forward Voltage Drop Characteristics

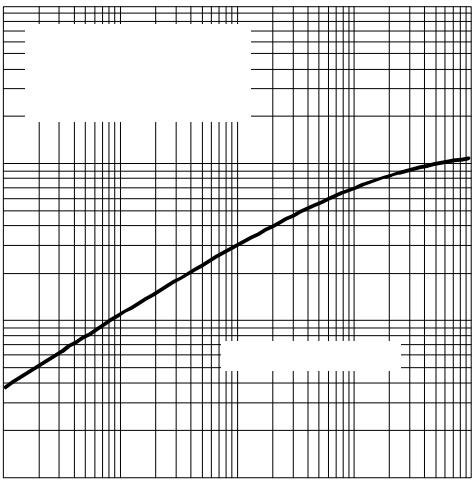


Fig. 8 - Thermal Impedance Z_{thJC} Characteristic

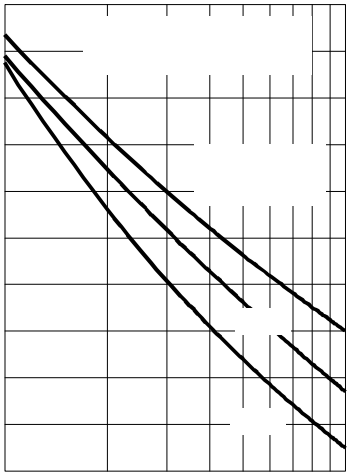


Fig. 9 - Recovery Time Characteristics

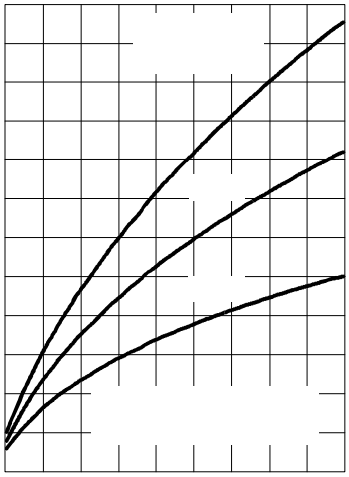


Fig. 10 - Recovery Charge Characteristics

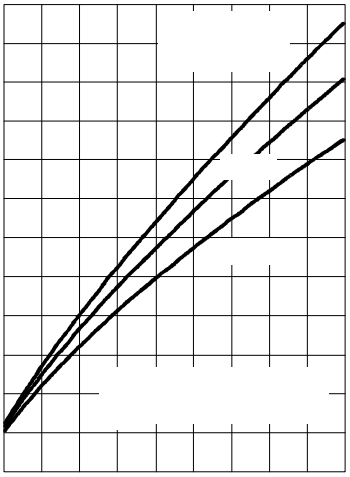
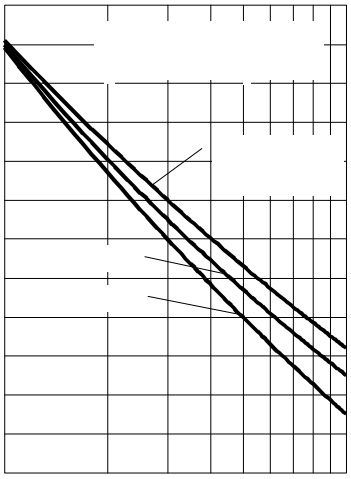
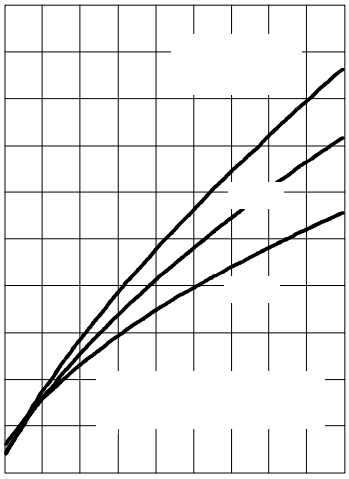
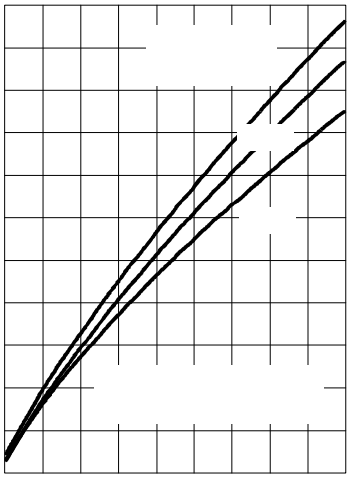


Fig. 11 - Recovery Current Characteristics







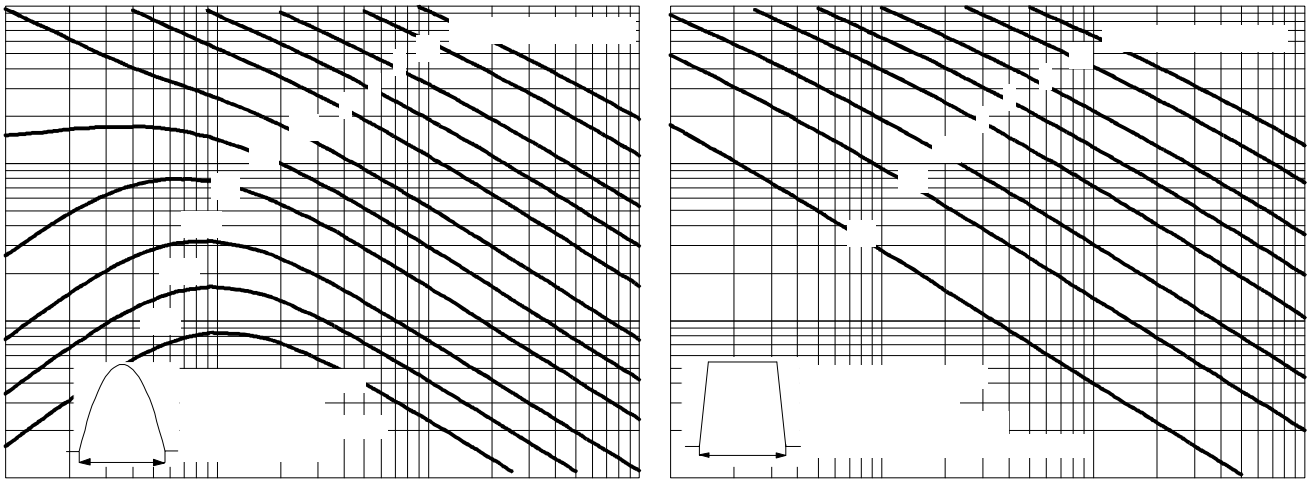


Fig. 15 - Maximum Total Energy Loss Per Pulse Characteristics

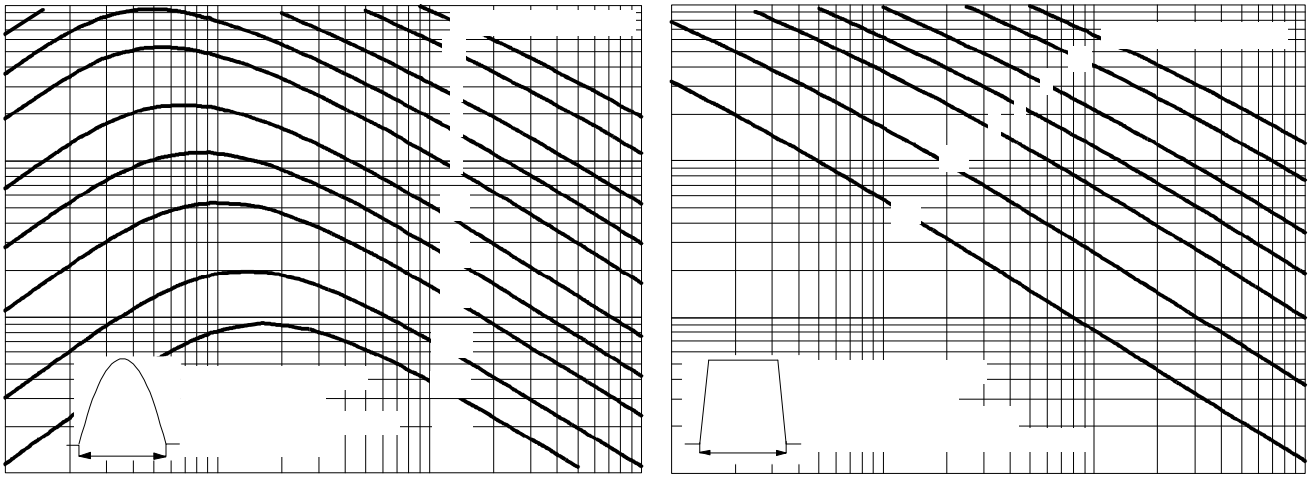


Fig. 16 - Maximum Total Energy Loss Per Pulse Characteristics

Thermal and Mechanical Specification

Parameter		SD253N/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

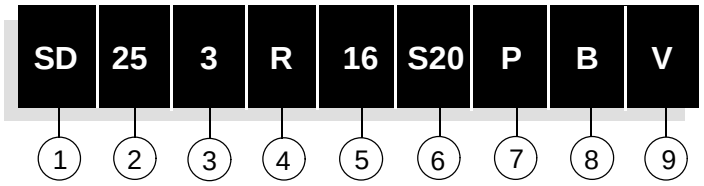
ΔR_{thJC} Conduction

(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	K/W	$T_J = T_J$ max.
120°	0.013	0.014		
90°	0.017	0.019		
60°	0.025	0.027		
30°	0.044	0.044		

Ordering Information Table

Device Code



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)

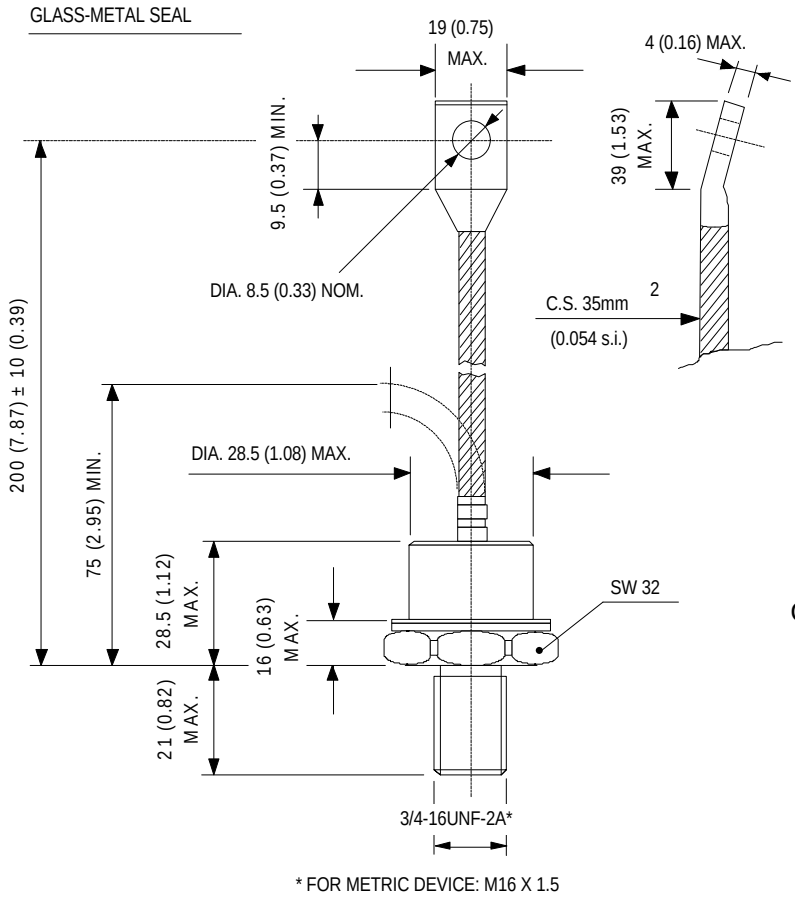
S = Isolated lead with silicone sleeve

(Red = Reverse Polarity; Blue = Normal Polarity)

None = Not isolated lead

9 - V = Glass-metal seal

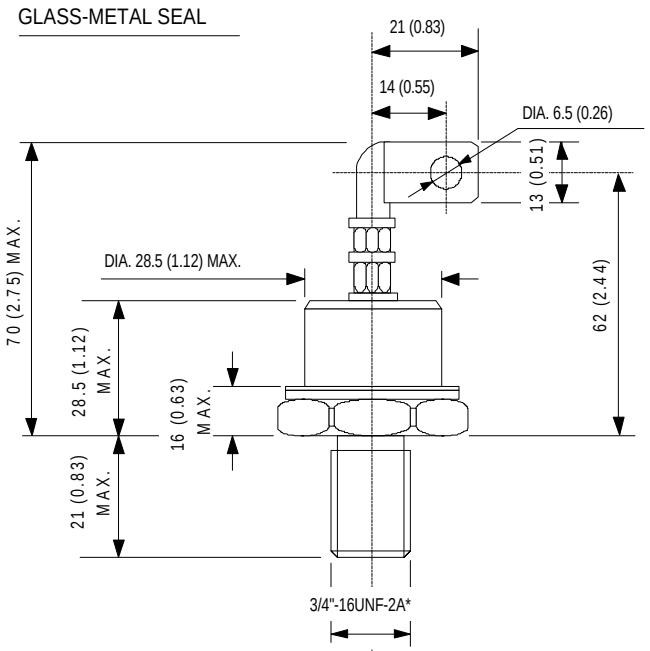
Outline Table



* FOR METRIC DEVICE: M16 X 1.5

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

All dimensions in millimeters (inches)



DO-205AB (DO-9) Flag

All dimensions in millimeters (inches)

*FOR METRIC DEVICE: M16 X 1.5