
DISCRETE POWER DIODES and THYRISTORS
DATA BOOK

FAST RECOVERY DIODES

Stud Version

Features

- High power FAST recovery diode series
- 1.0 to 2.0 μ 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

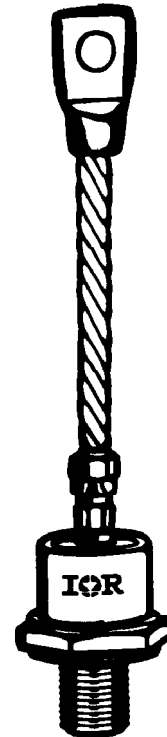
110A

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 ² s
@ 60Hz	58	KA ² s
V_{RRM} range	400 to 2500	V
t_{rr} range	1.0 to 2.0	μ s
@ T_J	25	°C
T_J	- 40 to 125	°C



case style
DO-205AC (DO-30)

ELECTRICAL SPECIFICATIONS**Voltage Ratings**

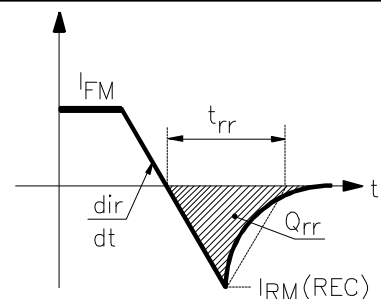
Type number	Voltage Code	V_{RRM} max. repetitive peak and off-state voltage V	V_{RSM} , maximum non-repetitive peak voltage V	I_{RRM} max. $T_J = 125^\circ\text{C}$ mA
SD103N/R..S10	04	400	500	35
	08	800	900	
	10	1000	1100	
SD103N/R..S15	12	1200	1300	
	14	1400	1500	
	16	1600	1700	
SD103N/R..S20	20	2000	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^2s	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	$\text{KA}^2\sqrt{\text{s}}$	t = 0.1 to 10ms, no voltage reapplied
$V_{F(TO)1}$ Low level of threshold voltage	1.36	V	$(16.7\% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)})$, $T_J = T_J \text{ max.}$
$V_{F(TO)2}$ High level of threshold voltage	1.94		$(I > \pi \times I_{F(AV)})$, $T_J = T_J \text{ max.}$
r_{f1} Low level of forward slope resistance	2.55	$\text{m}\Omega$	$(16.7\% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)})$, $T_J = T_J \text{ max.}$
r_{f2} High level of forward slope resistance	1.11		$(I > \pi \times I_{F(AV)})$, $T_J = T_J \text{ max.}$
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



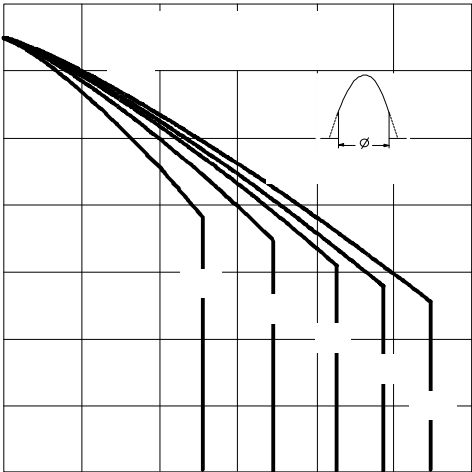


Fig. 1 - Current Ratings Characteristics

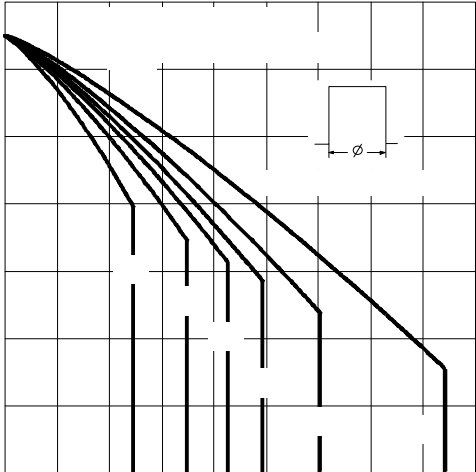


Fig. 2 - Current Ratings Characteristics

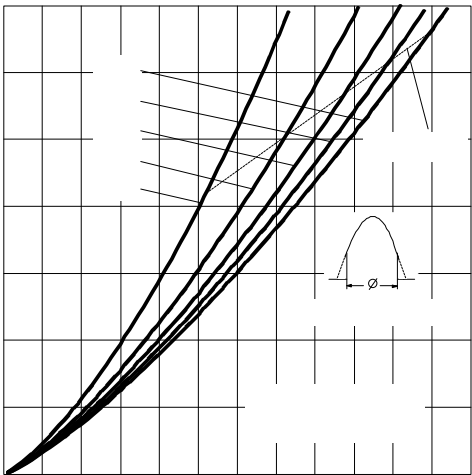


Fig. 3 - Forward Power Loss Characteristics

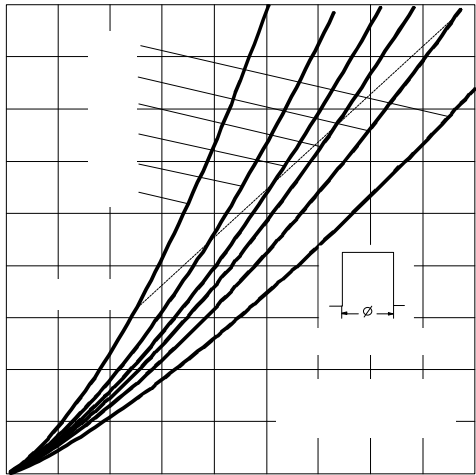


Fig. 4 - Forward Power Loss Characteristics

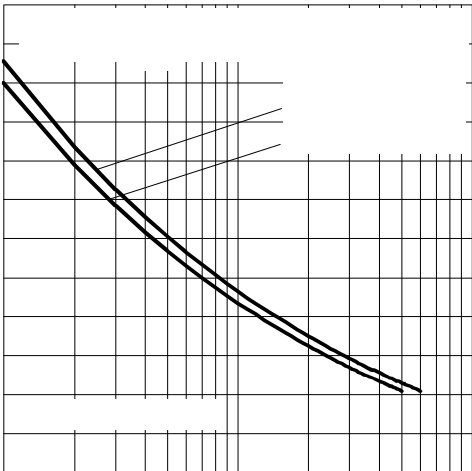


Fig. 5 - Maximum Non-repetitive Surge Current

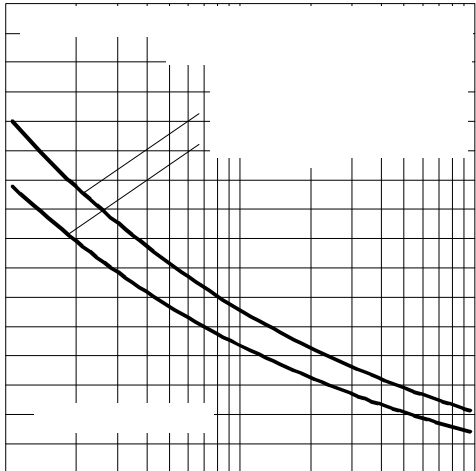


Fig. 6 - Maximum Non-repetitive Surge Current

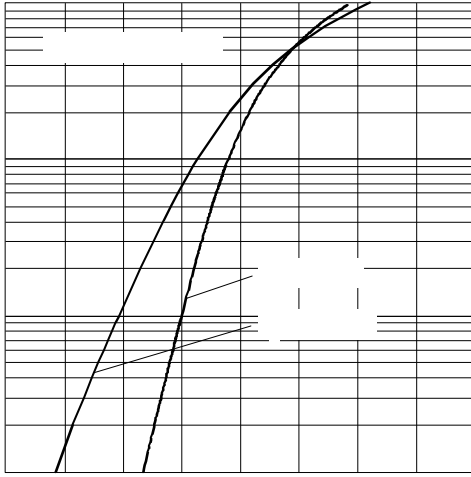


Fig. 7 - Forward Voltage Drop Characteristics

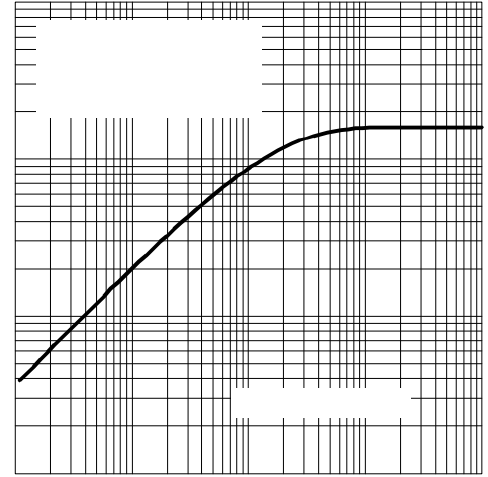
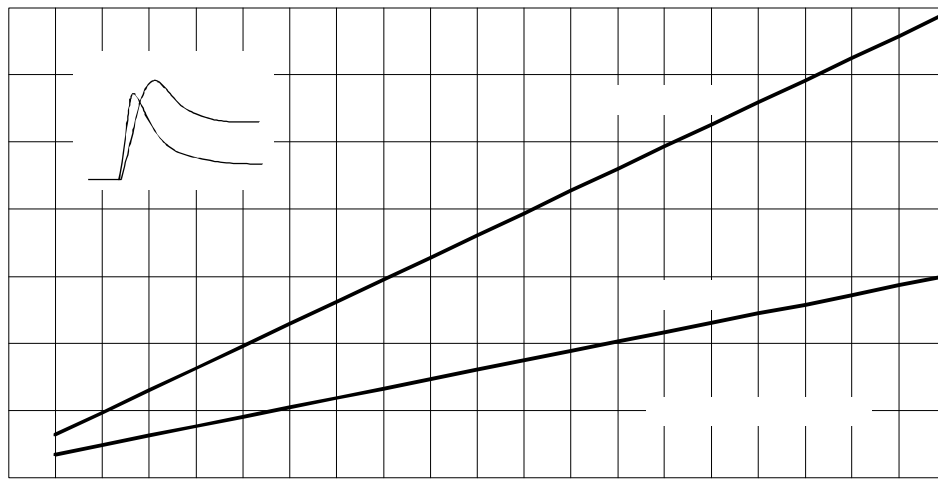
Fig. 8 - Thermal Impedance Z_{thJC} Characteristic

Fig. 9 - Typical Forward Recovery Characteristics

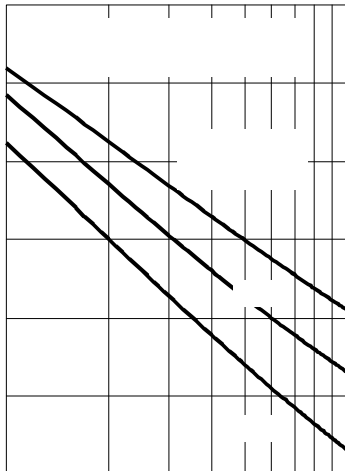


Fig. 10 - Recovery Time Characteristics

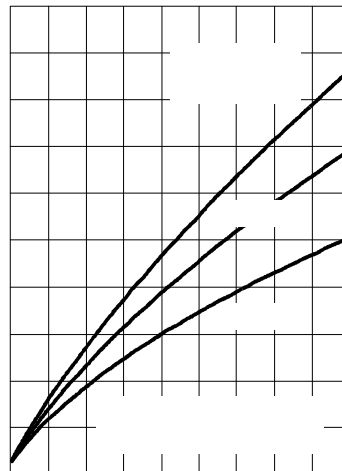


Fig. 11 - Recovery Charge Characteristics

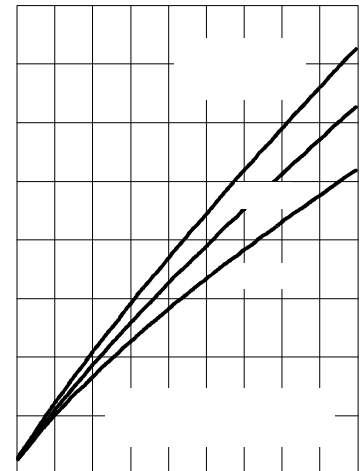


Fig. 12 - Recovery Current Characteristics

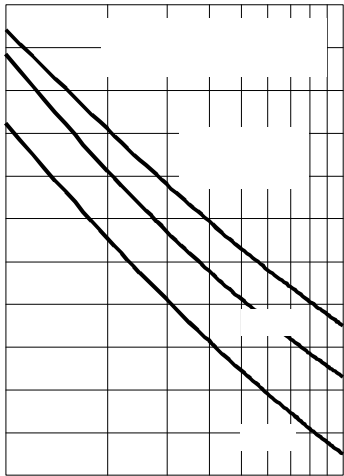


Fig. 13 - Recovery Time Characteristics

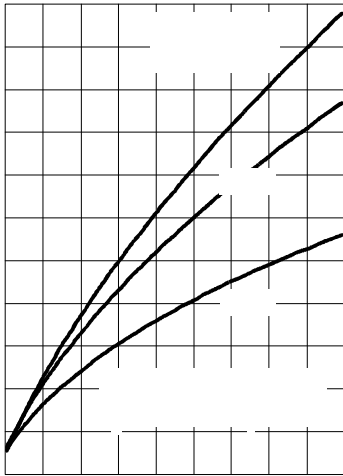


Fig. 14 - Recovery Charge Characteristics

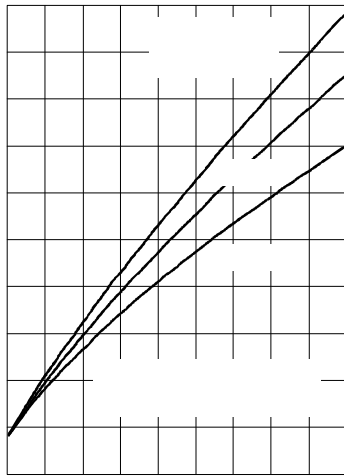


Fig. 15 - Recovery Current Characteristics

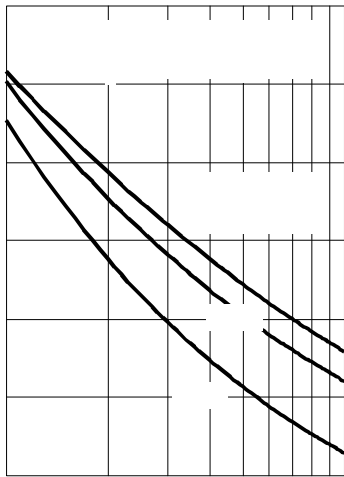


Fig. 16 - Recovery Time Characteristics

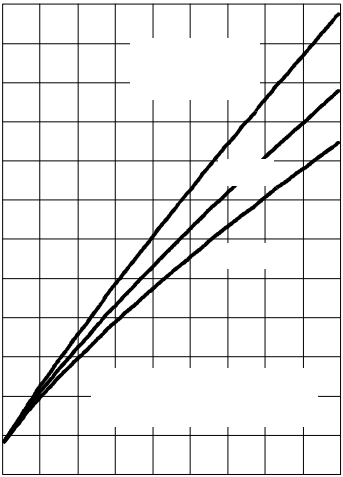


Fig. 17 - Recovery Charge Characteristics

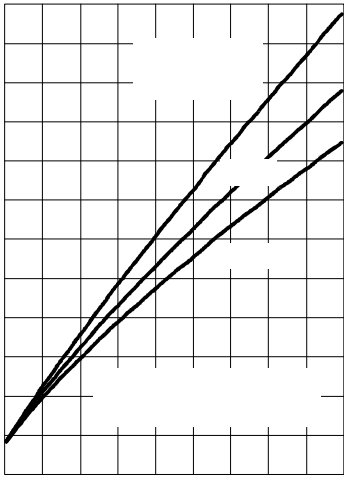


Fig. 18 - Recovery Current Characteristics

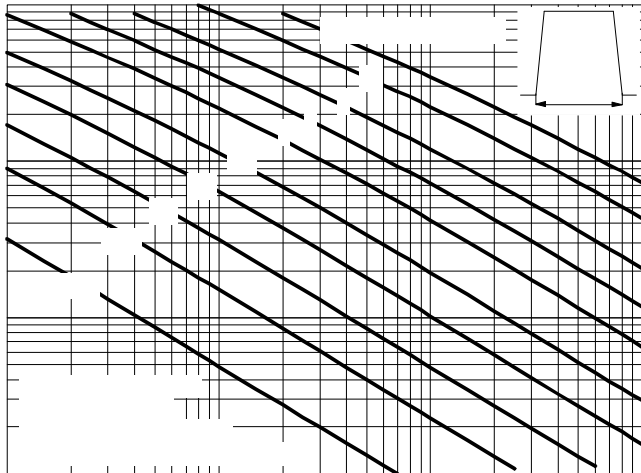
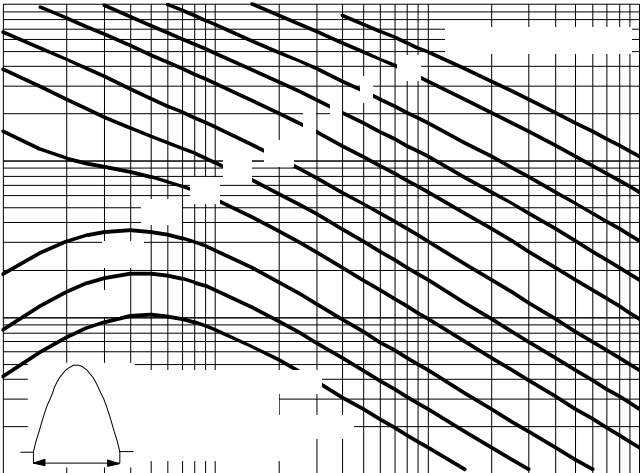


Fig. 19 - Maximum Total Energy Loss Per Pulse Characteristics

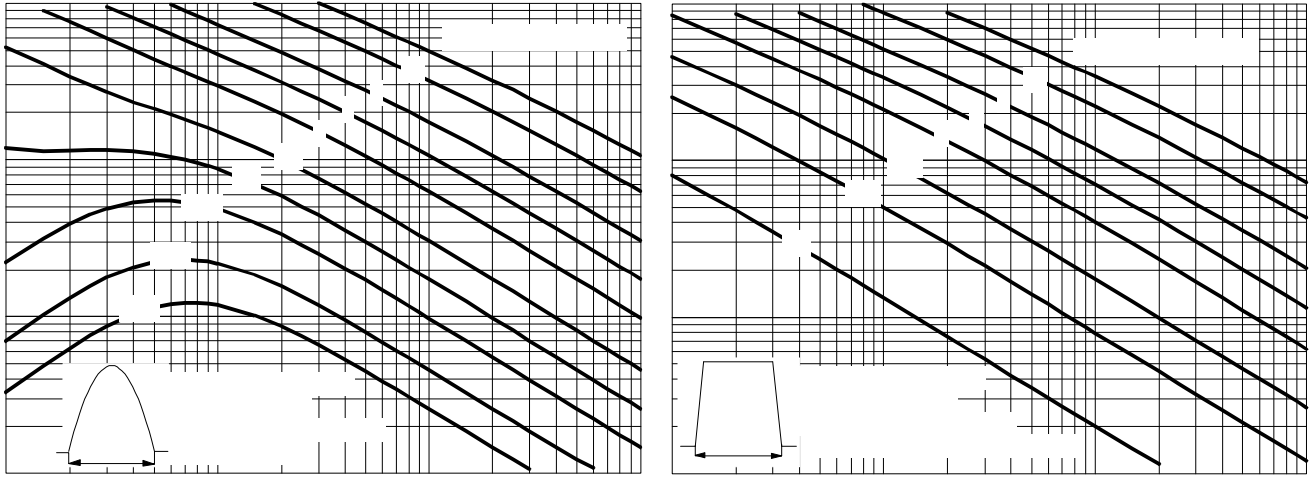


Fig. 20 - Maximum Total Energy Loss Per Pulse Characteristics

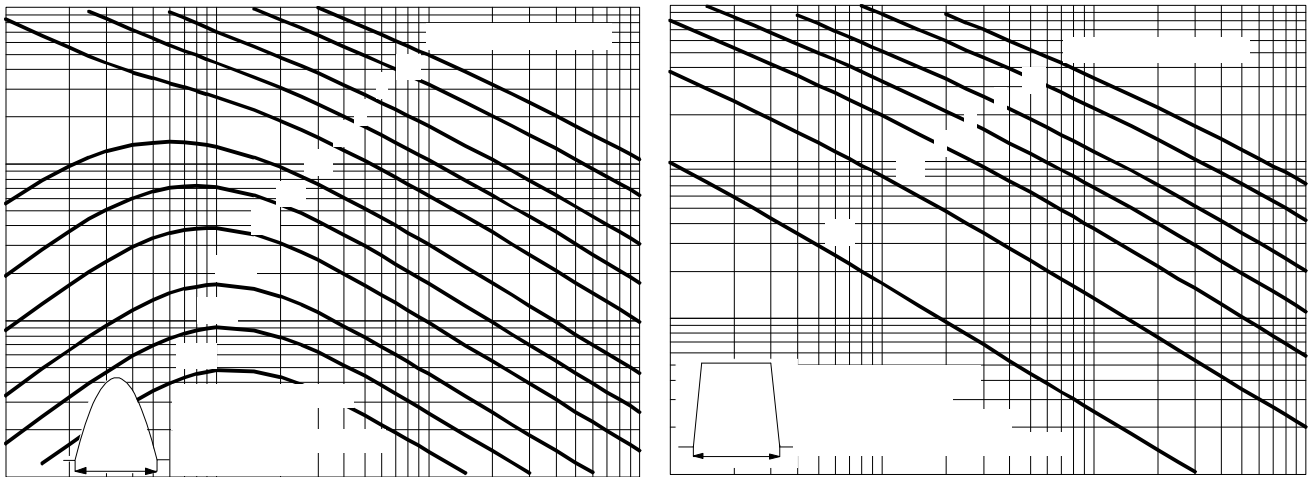


Fig. 21 - Maximum Total Energy Loss Per Pulse Characteristics

Thermal and Mechanical Specification

Parameter	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

 ΔR_{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 $\times 100 = V_{RRM}$ (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)

Outline Table

[illegible]

* FOR METRIC DEVICE: M12 X 1.75

GLASS-METAL SEAL

157 (6.18) MIN.

170 (6.69) MIN.

55 (2.16) MIN.

24 (0.94) MAX.

21 (0.82) MAX.

12.5 (0.49) MAX.

DIA. 23.5 (0.93) MAX.

DIA. 8.5 (0.33) NOM.

16.5 (0.65) MAX.

6.5 (0.26) MIN.

2.6 (0.10) MAX.

35 (1.38) MAX.

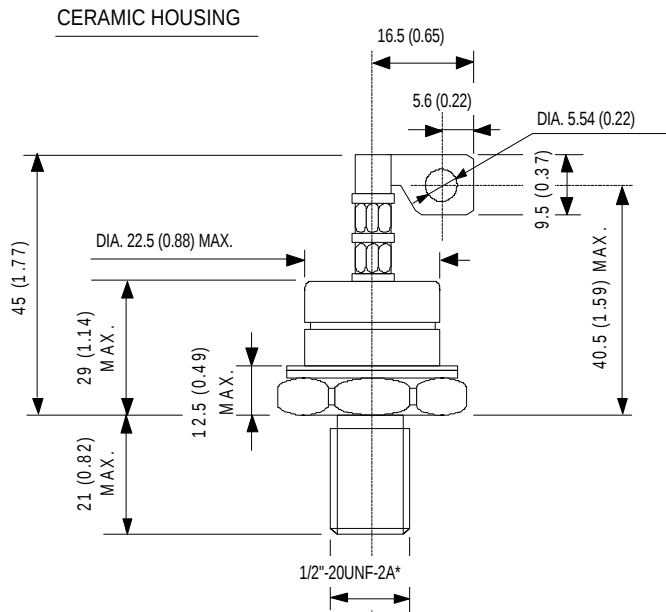
C.S. 16mm (0.015 s.i.)

SW 27

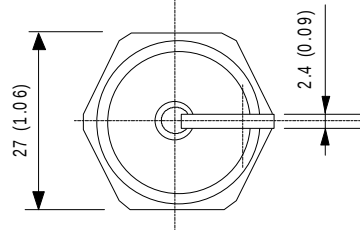
1/2"-20UNF-2A*

* FOR METRIC DEVICE: M12 X 1.75

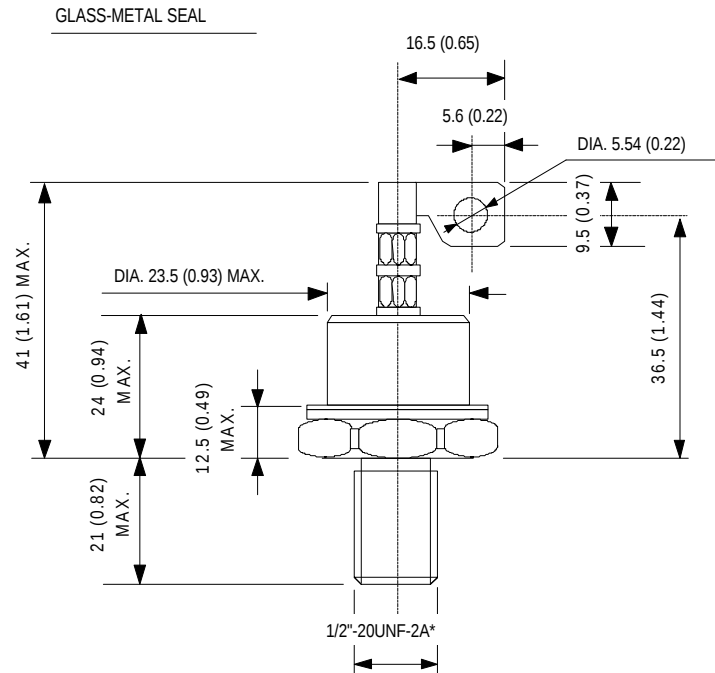
Outline Table



*FOR METRIC DEVICE. M12 X 1.75



DO-205AC (DO-30) Flag
All dimensions in millimeters (inches)



*FOR METRIC DEVICE. M12 X 1.75

