

---

***DISCRETE POWER DIODES and THYRISTORS***  
***DATA BOOK***

---

## FAST RECOVERY DIODES

## Stud Version

### Features

- High power FAST recovery diode series
- 1.0 to 1.5  $\mu$ s 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-30
- Maximum junction temperature 125°C

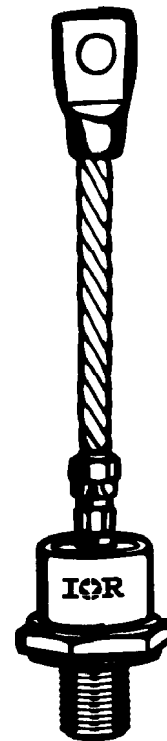
150A

### Typical Applications

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

### Major Ratings and Characteristics

Parameters	SD153N/R	Units
$I_{F(AV)}$	150	A
@ $T_C$	85	°C
$I_{F(RMS)}$	235	A
$I_{FSM}$ @ 50Hz	4280	A
@ 60Hz	4480	A
$I^2t$ @ 50Hz	92	KA <sup>2</sup> s
@ 60Hz	84	KA <sup>2</sup> s
$V_{RRM}$ range	400 to 1600	V
$t_{rr}$ range	1.0 to 1.5	$\mu$ 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
SD153N/R..S10	04	400	500	35
	08	800	900	
	10	1000	1100	
SD153N/R..S15	12	1200	1300	
	14	1400	1500	
	16	1600	1700	

Forward Conduction

Parameter	SD153N/R	Units	Conditions
$I_{F(AV)}$ Max. average forward current @ Case temperature	150	A	180° conduction, half sine wave.
	85	°C	
$I_{F(RMS)}$ Max. RMS current	235	A	DC @ 74°C case temperature
$I_{FSM}$ Max. peak, one-cycle non-repetitive forward current	4280	A	t = 10ms No voltage reappplied
	4480		t = 8.3ms
	3600		t = 10ms 100% $V_{RRM}$ reappplied
	3770		t = 8.3ms
$I^2t$ Maximum $I^2t$ for fusing	92	KA <sup>2</sup> s	t = 10ms No voltage reappplied
	84		t = 8.3ms
	65		t = 10ms 100% $V_{RRM}$ reappplied
	59		t = 8.3ms
$I^2\sqrt{t}$ Maximum $I^2\sqrt{t}$ for fusing	916	KA <sup>2</sup> √s	t = 0.1 to 10ms, no voltage reappplied
$V_{F(TO)1}$ Low level of threshold voltage	1.00	V	$(16.7\% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)})$ , $T_J = T_J \text{ max.}$
$V_{F(TO)2}$ High level of threshold voltage	1.46		$(I > \pi \times I_{F(AV)})$ , $T_J = T_J \text{ max.}$
$r_{f1}$ Low level of forward slope resistance	1.35	mΩ	$(16.7\% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)})$ , $T_J = T_J \text{ max.}$
$r_{f2}$ High level of forward slope resistance	0.52		$(I > \pi \times I_{F(AV)})$ , $T_J = T_J \text{ max.}$
$V_{FM}$ Max. forward voltage	1.55	V	$I_{pk} = 470 \text{ A}$ , $T_J = 25^\circ\text{C}$ , $t_p = 400 \mu\text{s}$ 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	

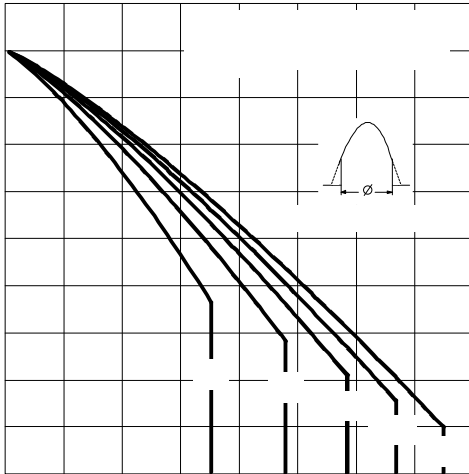


Fig. 1 - Current Ratings Characteristics

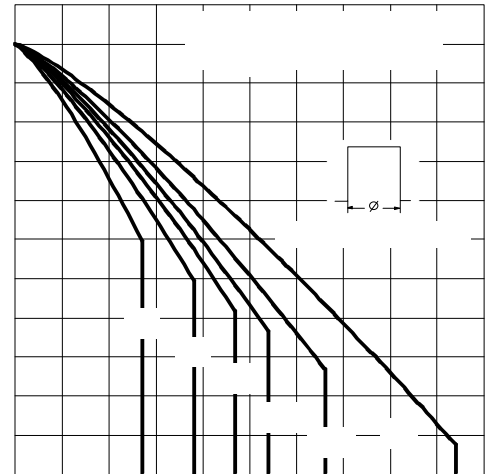


Fig. 2 - Current Ratings Characteristics

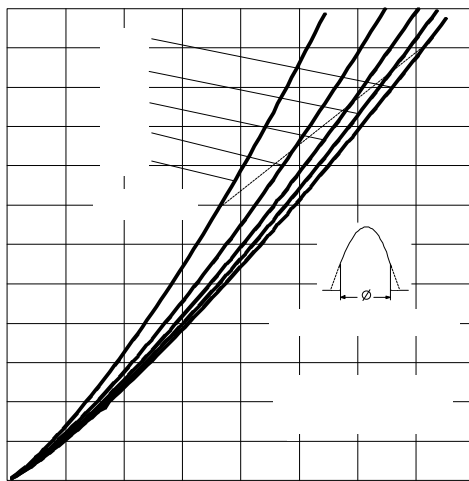


Fig. 3 - Forward Power Loss Characteristics

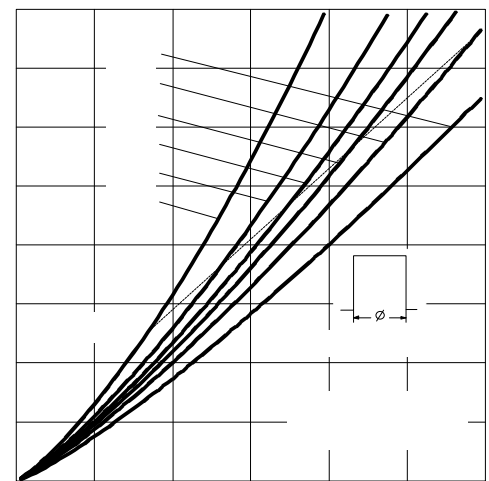


Fig. 4 - Forward Power Loss Characteristics

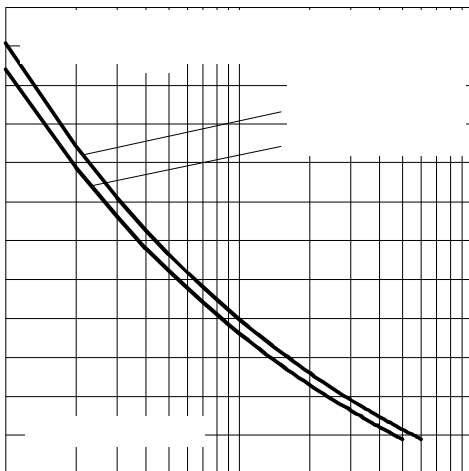


Fig. 5 - Maximum Non-repetitive Surge Current

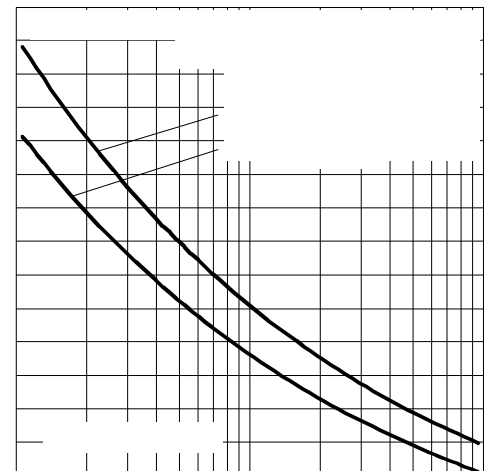


Fig. 6 - Maximum Non-repetitive Surge Current

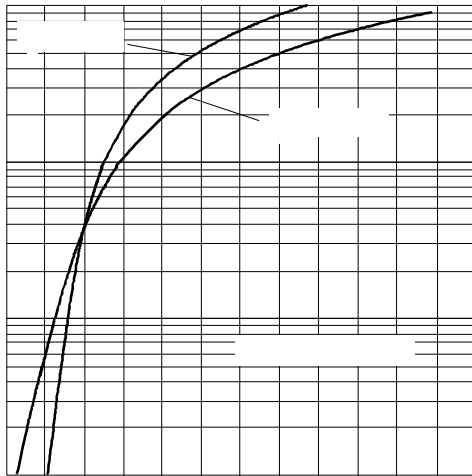


Fig. 7 - Forward Voltage Drop Characteristics

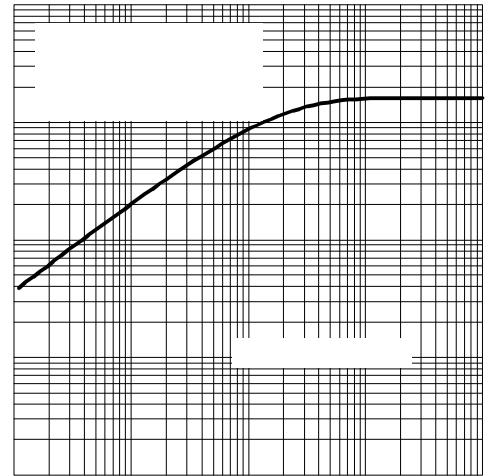


Fig. 8 - Thermal Impedance Z<sub>thJC</sub> Characteristic

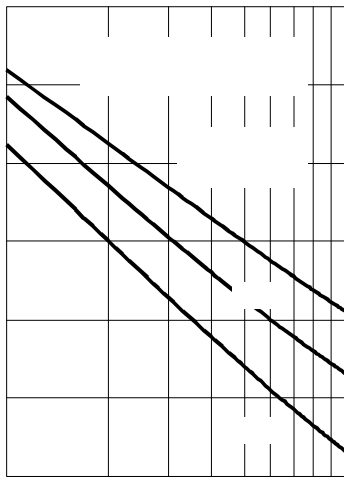


Fig. 9 - Recovery Time Characteristics

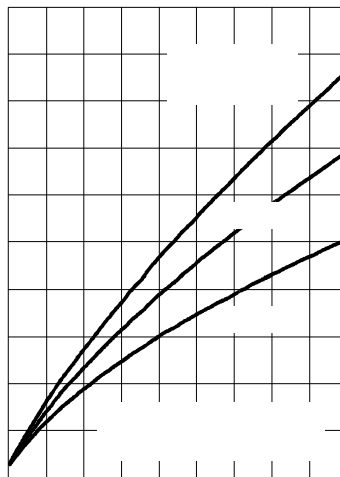


Fig. 10 - Recovery Charge Characteristics

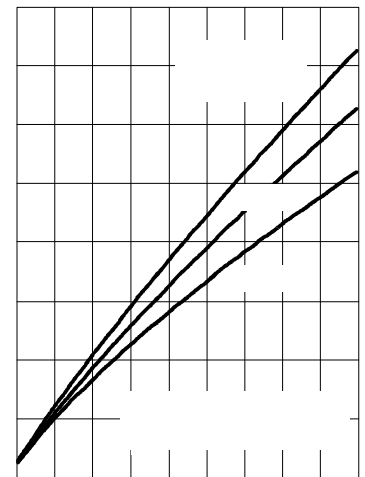


Fig. 11 - Recovery Current Characteristics

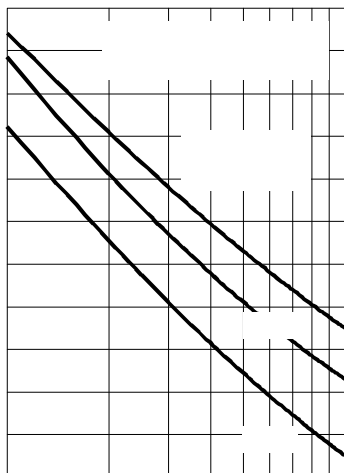


Fig. 12 - Recovery Time Characteristics

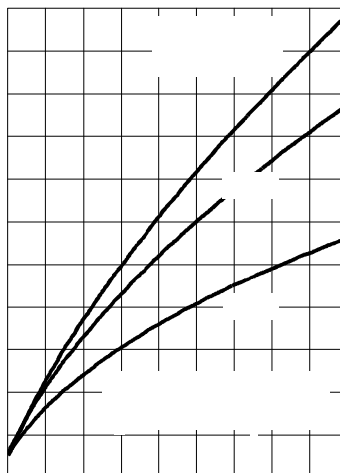


Fig. 13 - Recovery Charge Characteristics

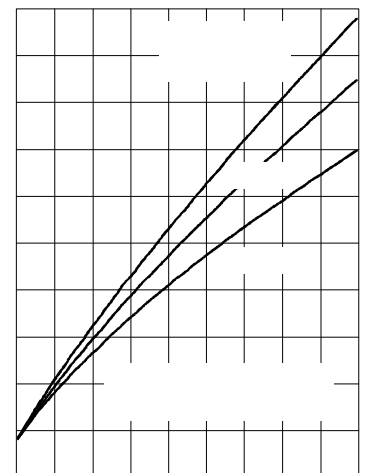


Fig. 14 - Recovery Current Characteristics

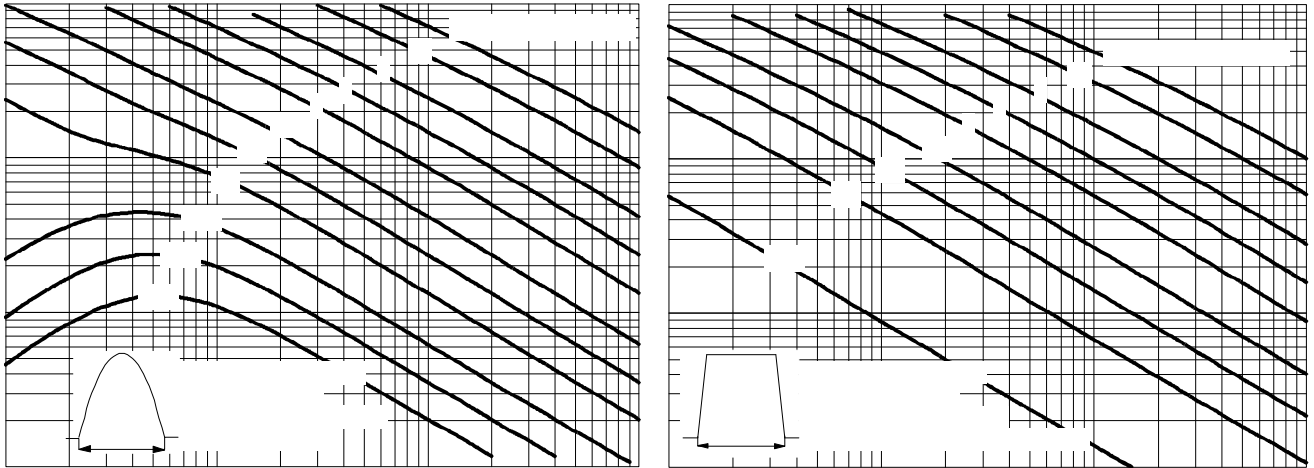


Fig. 15 - Maximum Total Energy Loss Per Pulse Characteristics

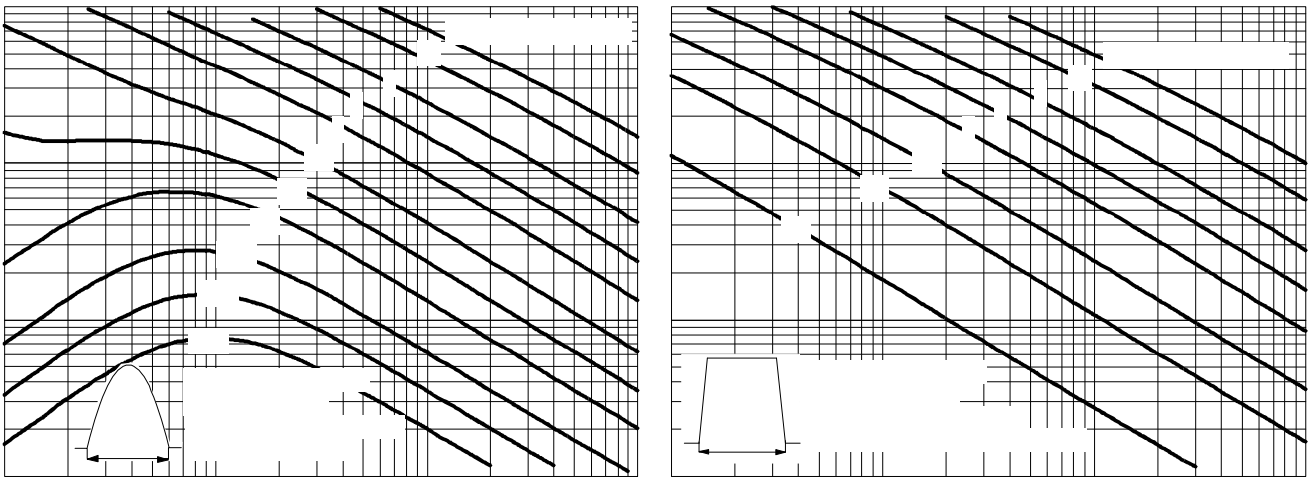


Fig. 16 - Maximum Total Energy Loss Per Pulse Characteristics

## Thermal and Mechanical Specification

Parameter	SD153N/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

 $\Delta R_{thJC}$  Conduction

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

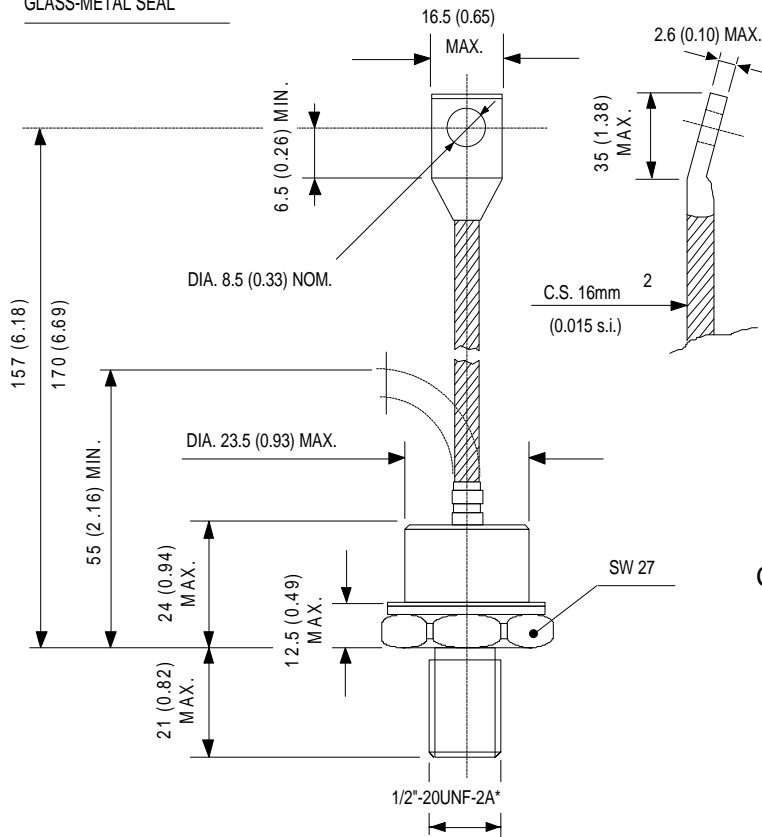
Conduction angle	Sinusoidal conduction	Rectangular conduction	Units	Conditions
180°	0.011	0.012	K/W	$T_J = T_J \text{ max.}$
120°	0.016	0.019		
90°	0.021	0.023		
60°	0.029	0.030		
30°	0.041	0.041		

## Ordering Information Table

Device Code	
<b>SD</b>	<b>15 3 R 16 S15 P B V</b>
①	② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨
<b>1</b>	- Diode
<b>2</b>	- Essential part number
<b>3</b>	- 3 = Fast recovery
<b>4</b>	- N = Stud Normal Polarity (Cathode to Stud) R = Stud Reverse Polarity (Anode to Stud)
<b>5</b>	- Voltage code: Code x 100 = $V_{RRM}$ (see Voltage Ratings table)
<b>6</b>	- $t_{rr}$ code (see Recovery Characteristics table)
<b>7</b>	- P = Stud base DO-205AC (DO-30) 1/2" 20UNF-2A M = Stud base DO-205AC (DO-30) M12 X 1.75
<b>8</b>	- B = Flag top terminals (for Cathode/ Anode Leads) S = Isolated lead with silicone sleeve (Red = Reverse Polarity; Blue = Normal Polarity)
	- None = Not isolated lead
<b>9</b>	- V = Glass-metal seal

## Outline Table

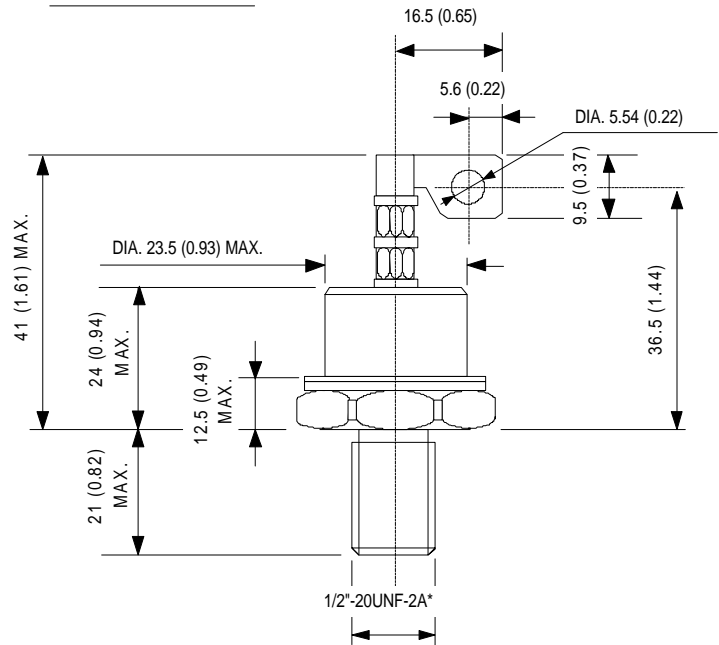
GLASS-METAL SEAL



Conforms to JEDEC DO-205AC (DO-30)  
All dimensions in millimeters (inches)

\* FOR METRIC DEVICE: M12 X 1.75

GLASS-METAL SEAL



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

\*FOR METRIC DEVICE. M12 X 1.75

