

# Fast Recovery Diodes (Stud Version), 6 A, 12 A



DO-4 (DO-203AA)

## FEATURES

- Short reverse recovery time
- Low stored charge
- Wide current range
- Excellent surge capabilities
- Standard JEDEC® types
- Stud cathode and stud anode versions
- Fully characterized reverse recovery conditions
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


RoHS  
COMPLIANT

## TYPICAL APPLICATIONS

- DC power supplies
- Inverters
- Converters
- Choppers
- Ultrasonic systems
- Freewheeling diodes

## PRIMARY CHARACTERISTICS

$I_{F(AV)}$	6 A, 12 A
Package	DO-4 (DO-203AA)
Circuit configuration	Single

## MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	TEST CONDITIONS	1N3879(R) TO 1N3883(R)	1N3889(R) TO 1N3893(R)	UNITS
$I_{F(AV)}$		6 <sup>(1)</sup>	12 <sup>(1)</sup>	A
	$T_C$ maximum	100	100	°C
$I_{F(RMS)}$		9.5	19	A
$I_{FSM}$	50 Hz	72	145	A
	60 Hz	75 <sup>(1)</sup>	150 <sup>(1)</sup>	
$I^2t$	50 Hz	26	103	A <sup>2</sup> s
	60 Hz	23	94	
$I^2\sqrt{t}$		363	856	I <sup>2</sup> √s
$V_{RRM}$	Range	50 to 400 <sup>(1)</sup>	50 to 400 <sup>(1)</sup>	V
$t_{rr}$		See Recovery Characteristics table	See Recovery Characteristics table	ns
$T_J$	Range	-65 to +150	-65 to +150	°C

### Note

<sup>(1)</sup> JEDEC® registered values



## ELECTRICAL SPECIFICATIONS

VOLTAGE RATINGS						
TYPE NUMBER	VOLTAGE CODE	V <sub>RRM</sub> , MAXIMUM REPETITIVE PEAK AND OFF-STATE VOLTAGE V	V <sub>RSM</sub> , MAXIMUM NON-REPETITIVE PEAK VOLTAGE V	I <sub>RRM</sub> MAXIMUM AT T <sub>J</sub> = 25 °C μA	I <sub>RRM</sub> MAXIMUM AT T <sub>J</sub> = 100 °C mA	I <sub>RRM</sub> MAXIMUM AT T <sub>J</sub> = 150 °C mA
1N3879(R)	-	50	75	15 <sup>(1)</sup>	1.0 <sup>(1)</sup>	3.0 <sup>(1)</sup>
1N3880(R)		100	150			
1N3881(R)		200	250			
1N3882(R)		300	350			
1N3883(R)		400	450			
1N3889(R)	-	50	75	25 <sup>(1)</sup>	3.0 <sup>(1)</sup>	5.0 <sup>(1)</sup>
1N3890(R)		100	150			
1N3891(R)		200	250			
1N3892(R)		300	350			
1N3893(R)		400	450			

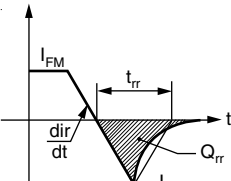
## Note

(1) JEDEC® registered values

FORWARD CONDUCTION							
PARAMETER	SYMBOL	TEST CONDITIONS			1N3879(R) TO 1N3883(R)	1N3889(R) TO 1N3893(R)	UNITS
Maximum average forward current at case temperature	I <sub>F(AV)</sub>	180° conduction, half sine wave DC			6 <sup>(1)</sup>	12 <sup>(1)</sup>	A
					100	100	°C
Maximum RMS current	I <sub>F(RMS)</sub>				9.5	19	
Maximum peak, one-cycle non-repetitive forward current	I <sub>FSM</sub>	t = 10 ms	No voltage reapplied	Sinusoidal half wave, initial T <sub>J</sub> = 150 °C	85	170	A
		t = 8.3 ms			90	180	
		t = 10 ms	100 % V <sub>RRM</sub> reapplied		72	145	
		t = 8.3 ms			75 <sup>(1)</sup>	150 <sup>(1)</sup>	
Maximum I <sup>2</sup> t for fusing	I <sup>2</sup> t	t = 10 ms	No voltage reapplied		36	145	A <sup>2</sup> s
		t = 8.3 ms			33	130	
		t = 10 ms	100 % V <sub>RRM</sub> reapplied		26	103	
		t = 8.3 ms			23	94	
Maximum I <sup>2</sup> √t for fusing	I <sup>2</sup> √t	t = 0.1 ms to 10 ms, no voltage reapplied			363	1452	A <sup>2</sup> √s
Maximum forward voltage drop	V <sub>FM</sub>	T <sub>J</sub> = 25 °C; I <sub>F</sub> = Rated I <sub>F(AV)</sub> (DC)			1.4 <sup>(1)</sup>	1.4 <sup>(1)</sup>	V
		T <sub>C</sub> = 100 °C; I <sub>FM</sub> = π x rated I <sub>F(AV)</sub>			1.5 <sup>(1)</sup>	1.5 <sup>(1)</sup>	

## Note

(1) JEDEC® registered values

RECOVERY CHARACTERISTICS						
PARAMETER	SYMBOL	TEST CONDITIONS	1N3879(R) TO 1N3883(R)	1N3889(R) TO 1N3893(R)	UNITS	
Maximum reverse recovery time	t <sub>rr</sub>	T <sub>J</sub> = 25 °C, I <sub>F</sub> = 1 A to V <sub>R</sub> = 30 V, dI <sub>F</sub> /dt = 100 A/μs	150	150	ns	
		T <sub>J</sub> = 25 °C, dI <sub>F</sub> /dt = 25 A/μs, I <sub>FM</sub> = π x rated I <sub>F(AV)</sub>	300 <sup>(1)</sup>	300 <sup>(1)</sup>		
Maximum peak recovery current	I <sub>RM(REC)</sub>	I <sub>FM</sub> = π x rated I <sub>F(AV)</sub>	4 <sup>(1)</sup>	5 <sup>(1)</sup>	-	
Maximum reverse recovery charge	Q <sub>rr</sub>	T <sub>J</sub> = 25 °C, I <sub>F</sub> = 1 A to V <sub>R</sub> = 30 V, dI <sub>F</sub> /dt = 100 A/μs	400	350	nC	
		T <sub>J</sub> = 25 °C, dI <sub>F</sub> /dt = 25 A/μs, I <sub>FM</sub> = π x rated I <sub>F(AV)</sub>	400	400		

## Note

(1) JEDEC® registered values

**THERMAL AND MECHANICAL SPECIFICATIONS**

PARAMETER	SYMBOL	TEST CONDITIONS	1N3879(R) TO 1N3883(R)	1N3889(R) TO 1N3893(R)	UNITS
Maximum junction operating temperature range	T <sub>J</sub>		-65 to +150		°C
Maximum storage temperature range	T <sub>Stg</sub>		-65 to +175		
Maximum thermal resistance, junction to case	R <sub>thJC</sub>	DC operation	2.5	2.0	°C/W
Maximum thermal resistance, case to heatsink	R <sub>thCS</sub>	Mounting surface, smooth, flat and greased	0.5		
Allowable mounting torque		Not lubricated threads	1.5 + 0 - 10 % (13)		N · m (lbf · in)
		Lubricated threads	1.2 + 0 - 10 % (10)		
Approximate weight			7		g
			0.25		oz.
Case style		JEDEC®	DO-4 (DO-203AA)		

 **$\Delta R_{thJC}$  CONDUCTION**

CONDUCTION ANGLE	1N3879(R) TO 1N3883(R)	1N3889(R) TO 1N3893(R)	1N3879(R) TO 1N3883(R)	1N3889(R) TO 1N3893(R)	TEST CONDITIONS	UNITS
	SINUSOIDAL CONDUCTION		RECTANGULAR CONDUCTION			
	180°	0.58	0.46	0.33		
120°	0.60	0.48	0.58	0.46	T <sub>J</sub> = 150 °C	K/W
60°	1.28	1.02	1.28	1.02		
30°	2.20	1.76	2.20	1.76		

**Note**

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

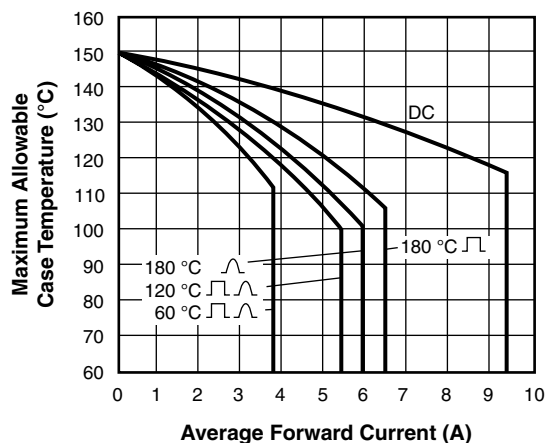


Fig. 1 - Average Forward Current vs. Maximum Allowable Case Temperature, 1N3879 Series

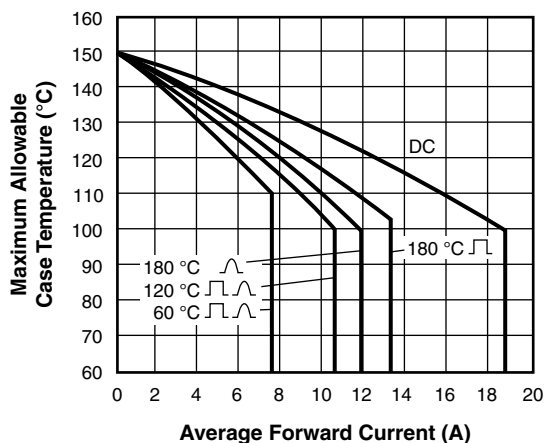
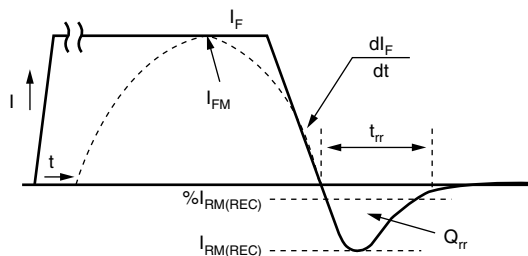
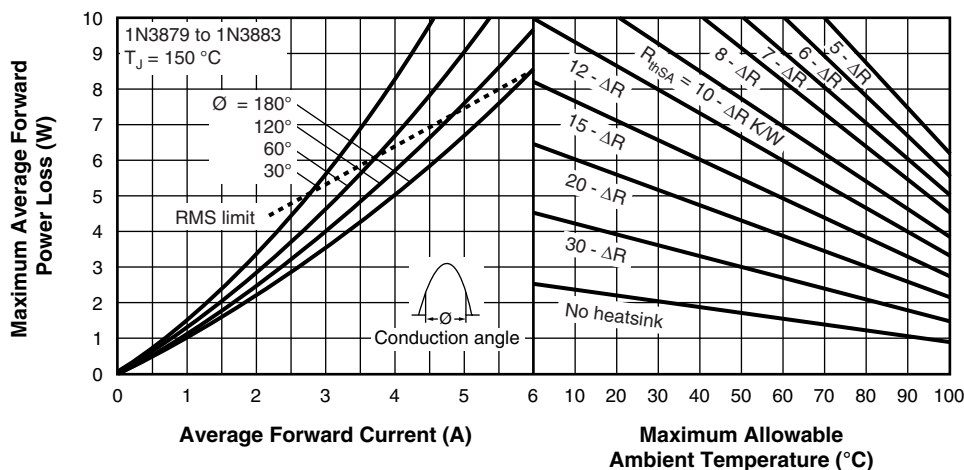


Fig. 2 - Average Forward Current vs. Maximum Allowable Case Temperature, 1N3889 Series



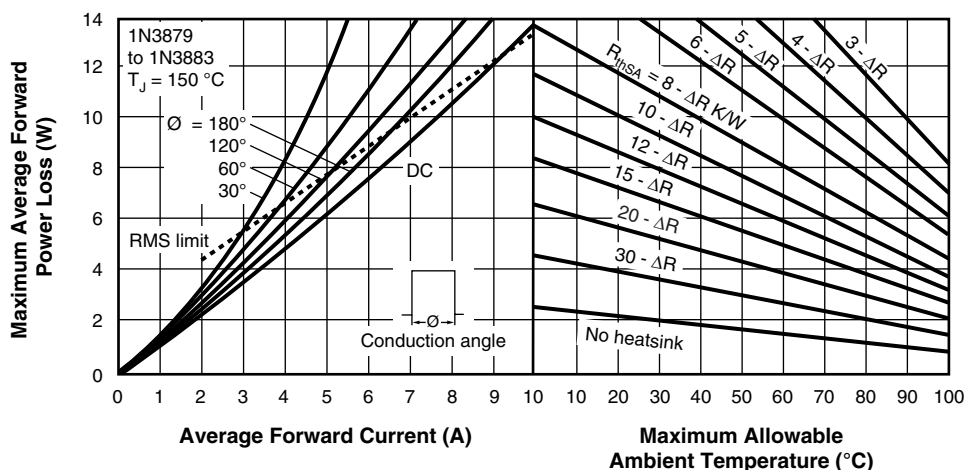
$I_F$ ,  $I_{FM}$  - Peak forward current prior to commutation  
 $-dI_F/dt$  - Rate of fall of forward current  
 $I_{RM(REC)}$  - Peak reverse recovery current  
 $t_{rr}$  - Reverse recovery time  
 $Q_{rr}$  - Reverse recovered charge

Fig. 3 - Reverse Recovery Time Test Waveform



Conduction angle - $\phi$	$\Delta R$ - K/W
180°	0.58
120°	0.60
60°	1.28
30°	2.20

Fig. 4 - Current Rating Nomogram (Sinusoidal Waveforms), 1N3879 Series



Conduction angle - $\phi$	$\Delta R$ - K/W
DC	0
180°	0.33
120°	0.58
60°	1.28
30°	2.20

Fig. 5 - Current Rating Nomogram (Rectangular Waveforms), 1N3879 Series

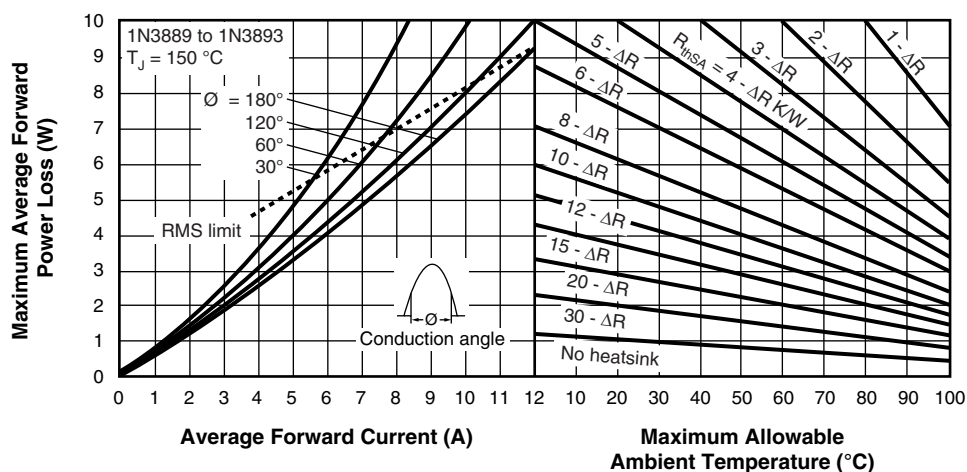


Fig. 6 - Current Rating Nomogram (Sinusoidal Waveforms), 1N3889 Series

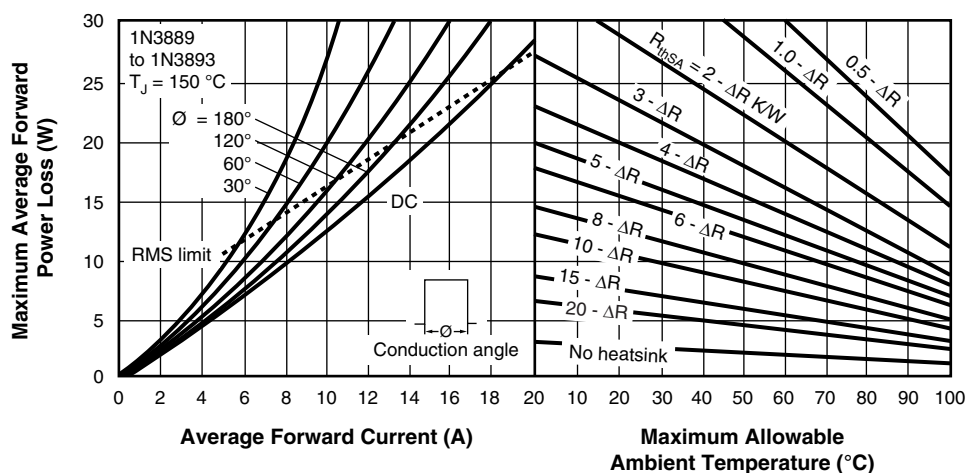


Fig. 7 - Current Rating Nomogram (Rectangular Waveforms), 1N3889 Series

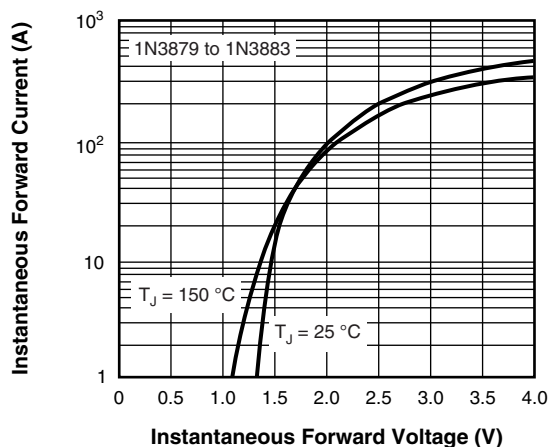


Fig. 8 - Maximum Forward Voltage vs. Forward Current, 1N3879 Series

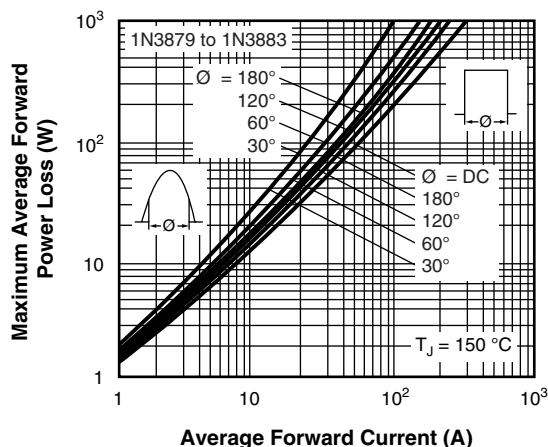


Fig. 9 - Maximum High Level Forward Power Loss vs. Average Forward Current, 1N3879 Series

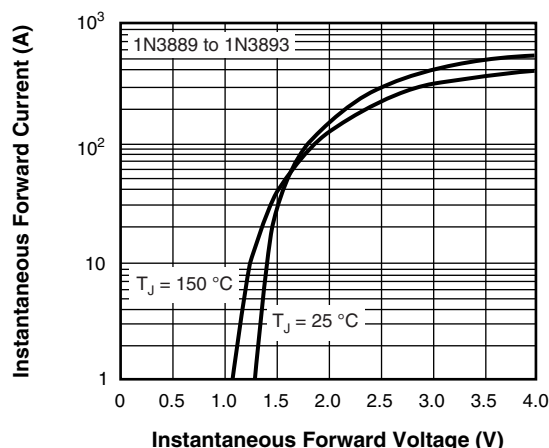


Fig. 10 - Maximum Forward Voltage vs. Forward Current, 1N3889 Series

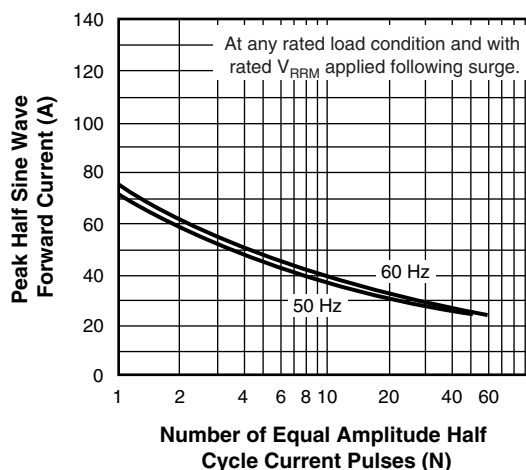


Fig. 12 - Maximum Non-Repetitive Surge Current vs. Number of Current Pulses, 1N3879 Series

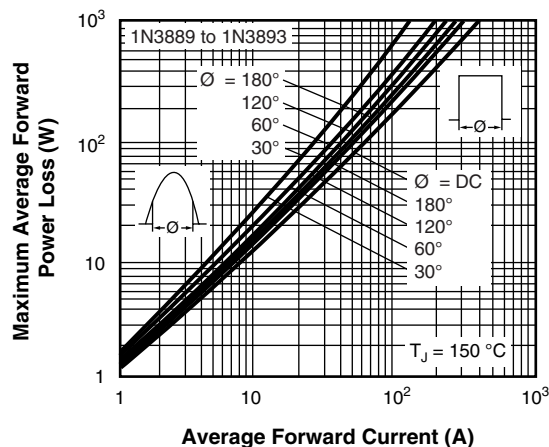


Fig. 11 - Maximum High Level Forward Power Loss vs. Average Forward Current, 1N3889 Series

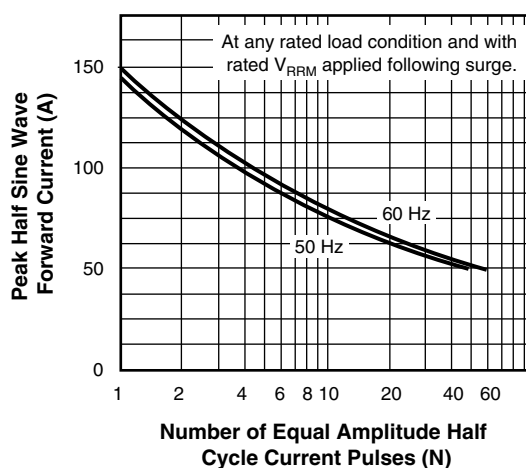


Fig. 13 - Maximum Non-Repetitive Surge Current vs. Number of Current Pulses, 1N3889 Series

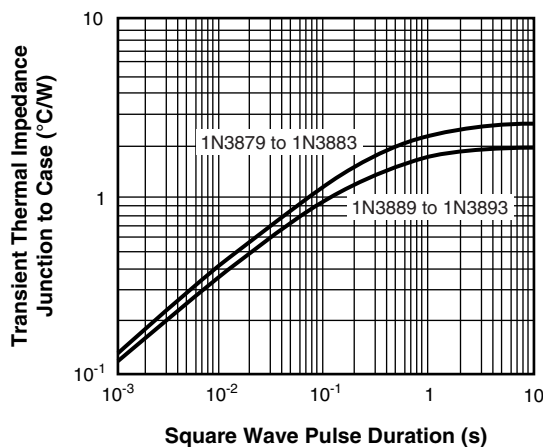


Fig. 14 - Maximum Transient Thermal Impedance, Junction to Case vs. Pulse Duration, All Series

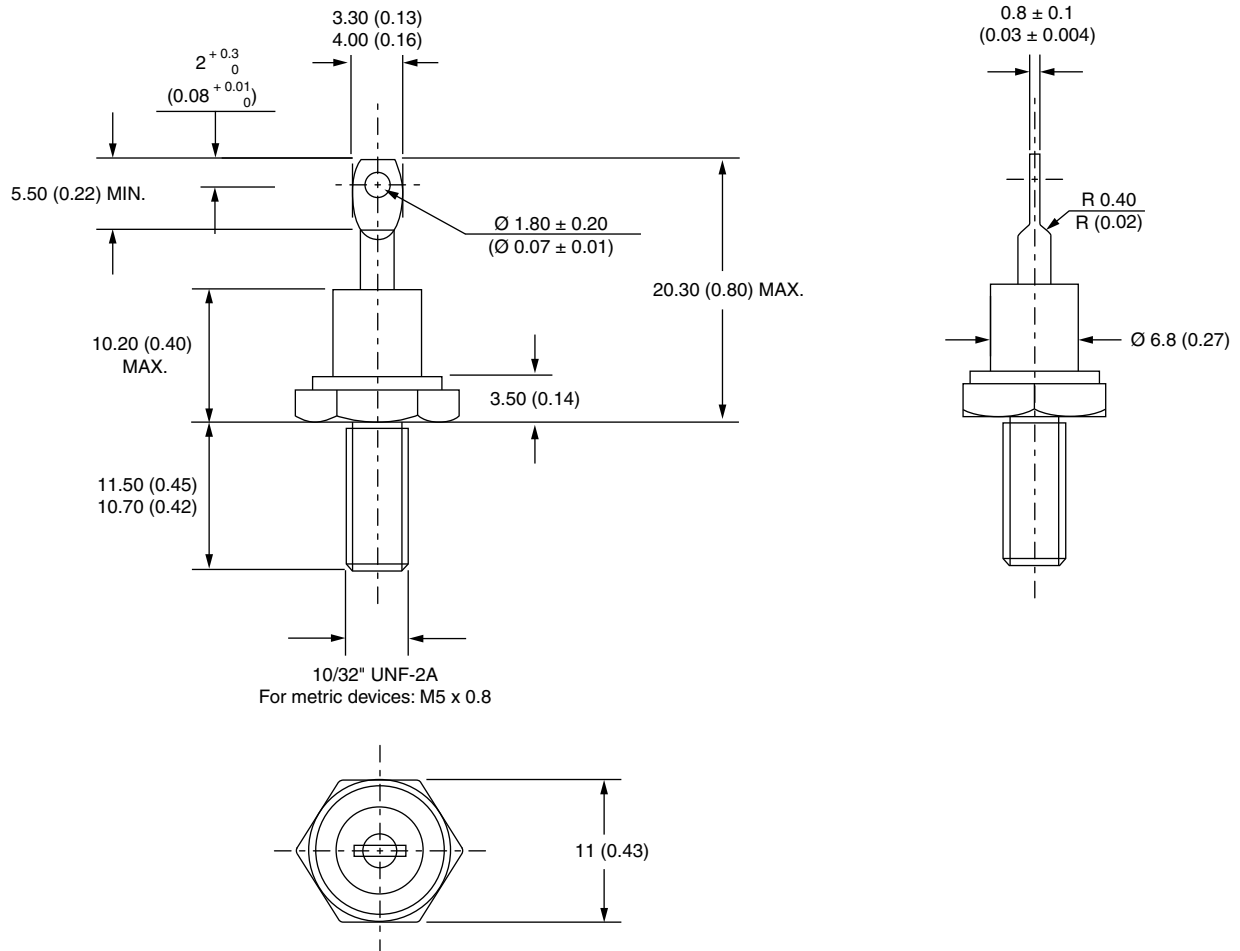
## LINKS TO RELATED DOCUMENTS

Dimensions

[www.vishay.com/doc?95311](http://www.vishay.com/doc?95311)

## DO-203AA (DO-4)

**DIMENSIONS** in millimeters (inches)





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