

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



DO-203AA (DO-4)

### 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

### PRODUCT SUMMARY

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

### 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	$I^2\sqrt{s}$
$V_{RRM}$	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	A
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	
		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 × 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	$t_{rr}$	$T_J = 25\text{ }^\circ\text{C}$ , $I_F = 1\text{ A}$ to $V_R = 30\text{ V}$ , $di_F/dt = 100\text{ A}/\mu\text{s}$	150	150	ns
		$T_J = 25\text{ }^\circ\text{C}$ , $di_F/dt = 25\text{ A}/\mu\text{s}$ , $I_{FM} = \pi \times \text{rated } I_{F(AV)}$	300 <sup>(1)</sup>	300 <sup>(1)</sup>	
Maximum peak recovery current	$I_{RM(REC)}$	$I_{FM} = \pi \times \text{rated } I_{F(AV)}$	4 <sup>(1)</sup>	5 <sup>(1)</sup>	-
Maximum reverse recovery charge	$Q_{rr}$	$T_J = 25\text{ }^\circ\text{C}$ , $I_F = 1\text{ A}$ to $V_R = 30\text{ V}$ , $di_F/dt = 100\text{ A}/\mu\text{s}$	400	350	nC
		$T_J = 25\text{ }^\circ\text{C}$ , $di_F/dt = 25\text{ A}/\mu\text{s}$ , $I_{FM} = \pi \times \text{rated } I_{F(AV)}$	400	400	



**Note**

<sup>(1)</sup> 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	$T_J$		-65 to +150		°C
Maximum storage temperature range	$T_{Stg}$		-65 to +175		
Maximum thermal resistance, junction to case	$R_{thJC}$	DC operation	2.5	2.0	°C/W
Maximum thermal resistance, case to heatsink	$R_{thCS}$	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-203AA (DO-4)		

$\Delta R_{thJC}$ 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	0.26	$T_J = 150\text{ }^\circ\text{C}$	K/W
120°	0.60	0.48	0.58	0.46		
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



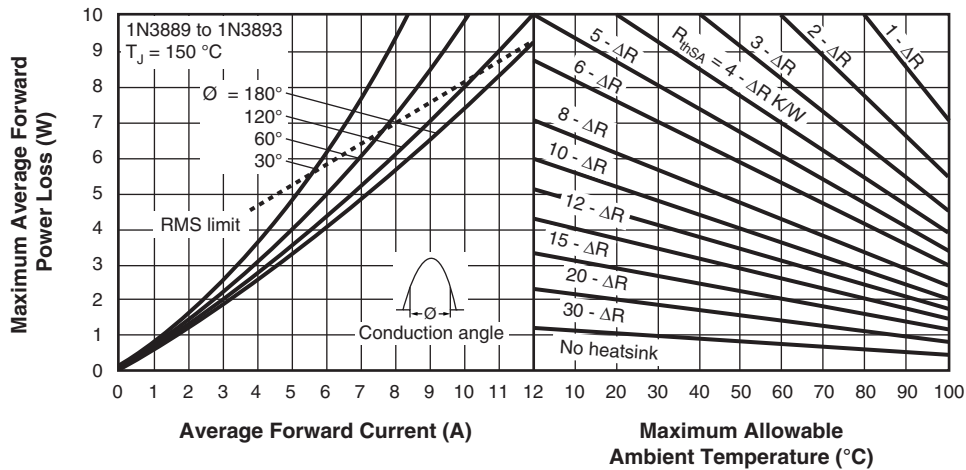
Conduction angle - $\phi$	$\Delta R - K/W$
180°	0.58
120°	0.60
60°	1.28
30°	2.20

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



Conduction angle - $\Phi$	$\Delta R$ - KW
DC	0
180°	0.33
120°	0.58
60°	1.28
30°	2.20

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



Conduction angle - $\Phi$	$\Delta R$ - KW
180°	0.46
120°	0.48
60°	1.02
30°	1.76

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



Conduction angle - $\Phi$	$\Delta R$ - KW
DC	0
180°	0.26
120°	0.46
60°	1.02
30°	1.76

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

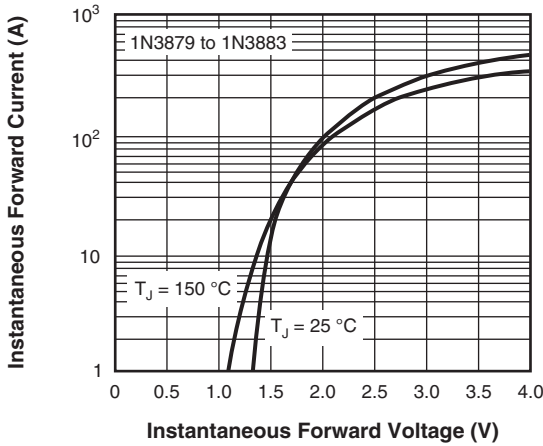


Fig. 8 - Maximum Forward Voltage vs. Forward Current, 1N3879 Series

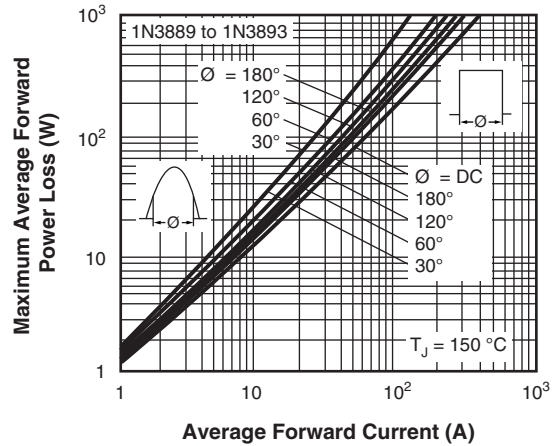


Fig. 11 - Maximum High Level Forward Power Loss vs. Average Forward Current, 1N3889 Series

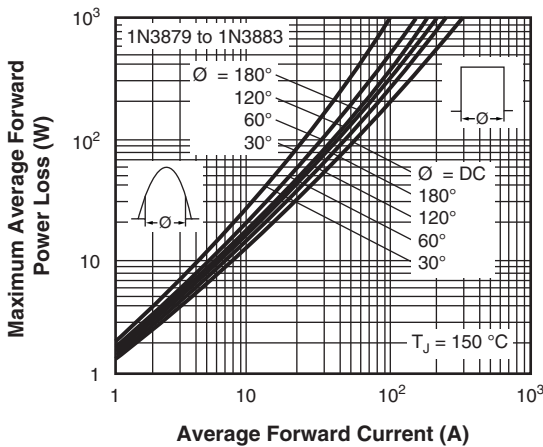


Fig. 9 - Maximum High Level Forward Power Loss vs. Average Forward Current, 1N3879 Series

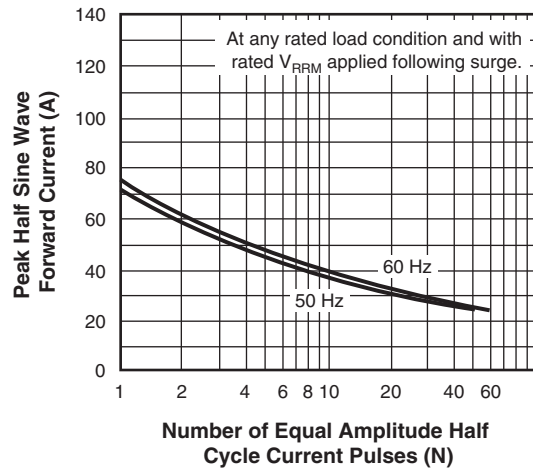


Fig. 12 - Maximum Non-Repetitive Surge Current vs. Number of Current Pulses, 1N3879 Series

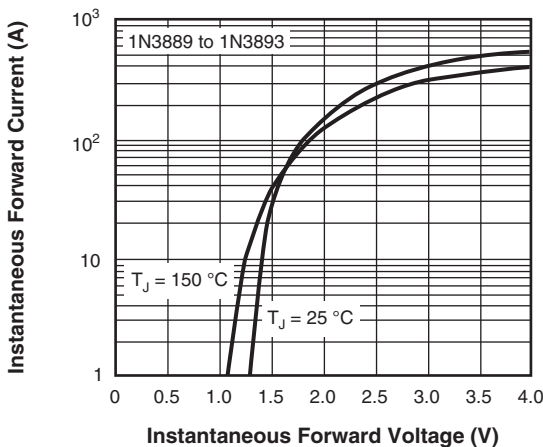


Fig. 10 - Maximum Forward Voltage vs. Forward Current, 1N3889 Series

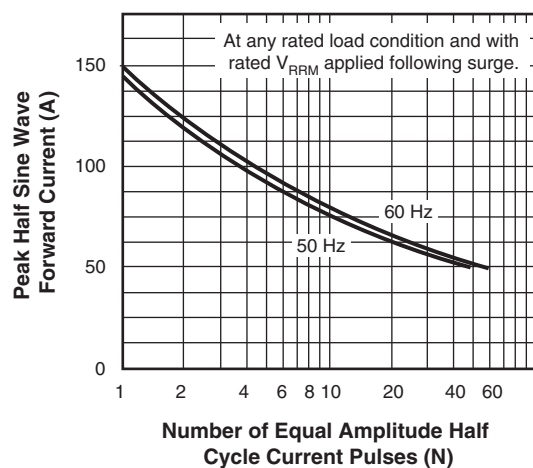


Fig. 13 - Maximum Non-Repetitive Surge Current vs. Number of Current Pulses, 1N3889 Series

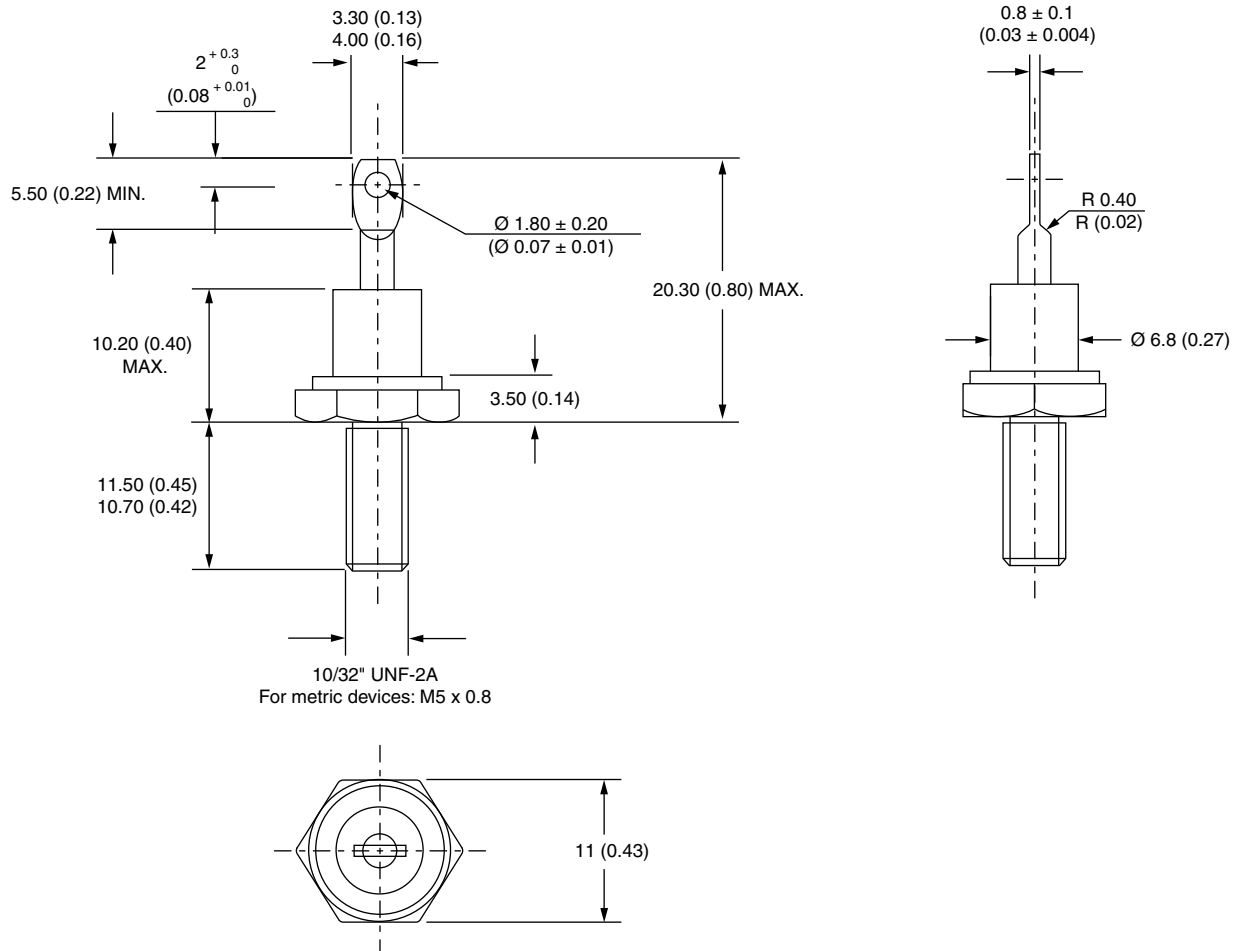


Fig. 14 - Maximum Transient Thermal Impedance, Junction to Case vs. Pulse Duration, All Series

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95311">www.vishay.com/doc?95311</a>

## DO-203AA (DO-4)

**DIMENSIONS** in millimeters (inches)







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