

## Fast Recovery Diodes (Stud Version), 6/12/16 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
- RoHS compliant



**RoHS**  
COMPLIANT

### TYPICAL APPLICATIONS

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

### PRODUCT SUMMARY

$I_{F(AV)}$

6/12/16 A

### MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	1N3879. TO 1N3883.	1N3889. TO 1N3893.	6FL..	12FL..	16FL..	UNITS
$I_{F(AV)}$	$T_C = 100\text{ }^\circ\text{C}$	6 <sup>(1)</sup>	12 <sup>(1)</sup>	6	12	16	A
$I_{F(RMS)}$		9.5	19	9.5	19	25	A
$I_{FSM}$	50 Hz	72	145	110	145	180	A
	60 Hz	75 <sup>(1)</sup>	150 <sup>(1)</sup>	115	150	190	
$I^2t$	50 Hz	26	103	60	103	160	A <sup>2</sup> s
	60 Hz	23	94	55	94	150	
$I^2\sqrt{t}$		363	856	1452	1452	2290	$I^2\sqrt{s}$
$V_{RRM}$	Range	50 to 400 <sup>(1)</sup>		50 to 1000			V
$t_{rr}$		See Recovery Characteristics table					ns
$T_J$	Range	- 65 to 150					$^\circ\text{C}$

#### Note

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

# 1N3879(R), 1N3889(R), 6/12/16FL(R) Series



Vishay High Power Products Fast Recovery Diodes  
(Stud Version), 6/12/16 A

## 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.	-	50	75	15 <sup>(1)</sup>	1.0 <sup>(1)</sup>	3.0 <sup>(1)</sup>
1N3880.		100	150			
1N3881.		200	250			
1N3882.		300	350			
1N3883.		400	450			
1N3889.	-	50	75	25 <sup>(1)</sup>	3.0 <sup>(1)</sup>	5.0 <sup>(1)</sup>
1N3890.		100	150			
1N3891.		200	250			
1N3892.		300	350			
1N3893.		400	450			
6FL..	5	50	75	50	-	6.0
12FL..	10	100	150			
16FL..	20	200	275			
	40	400	500			
	60	600	725			
	80	800	950			
	100	1000	1250			

### Note

(1) JEDEC registered values

FORWARD CONDUCTION									
PARAMETER	SYMBOL	TEST CONDITIONS		1N3879. 1N3883.	6FL..	1N3889. 1N3893. 12FL..	16FL..	UNITS	
Maximum average forward current at case temperature	I <sub>F(AV)</sub>	180° conduction, half sine wave DC		6 <sup>(1)</sup>	6	12 <sup>(1)</sup>	16	A	
				100	100	100	100	°C	
Maximum RMS current	I <sub>F(RMS)</sub>			9.5	9.5	19	25	A	
Maximum peak, one-cycle non-repetitive forward current	I <sub>FSM</sub>	t = 10 ms	No voltage reappplied	Sinusoidal half wave, initial T <sub>J</sub> = 150 °C	85	130	170		215
		t = 8.3 ms			90	135	180		225
		t = 10 ms	100 % V <sub>RRM</sub> reappplied		72	110	145		180
		t = 8.3 ms			75 <sup>(1)</sup>	115	150 <sup>(1)</sup>		190
Maximum I <sup>2</sup> t for fusing	I <sup>2</sup> t	t = 10 ms	No voltage reappplied		36	86	145	230	
		t = 8.3 ms			33	78	130	210	
		t = 10 ms	100 % V <sub>RRM</sub> reappplied		26	60	103	160	
		t = 8.3 ms			23	55	94	150	
Maximum I <sup>2</sup> √t for fusing	I <sup>2</sup> √t	t = 0.1 to 10 ms, no voltage reappplied		363	856	1452	2290	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	1.4 <sup>(1)</sup>	1.4	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	1.5 <sup>(1)</sup>	1.5	V	

### Note

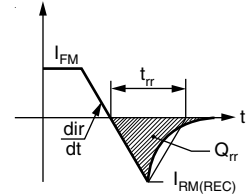
(1) JEDEC registered values



# 1N3879(R), 1N3889(R), 6/12/16FL(R) Series

Fast Recovery Diodes Vishay High Power Products  
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RECOVERY CHARACTERISTICS							
PARAMETER	SYMBOL	TEST CONDITIONS	1N3879. 1N3883.	1N3889. 1N3893.	6FL.. 12FL.. 16FL..		UNITS
					S02	S05	
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 (1)	300 (1)	200	500	
Maximum peak recovery current	$I_{RM(REC)}$	$I_{FM} = \pi \times \text{rated } I_{F(AV)}$	4 (1)	5 (1)	-		-
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**

(1) JEDEC registered values

THERMAL AND MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	1N3879. 1N3883. 6FL..	1N3889. 1N3893. 12FL..	16FL..	UNITS
Maximum junction operating temperature range	$T_J$		- 65 to 150			$^\circ\text{C}$
Maximum storage temperature range	$T_{Stg}$		- 65 to 175			
Maximum thermal resistance, junction to case	$R_{thJC}$	DC operation	2.5	2.0	1.6	$^\circ\text{C}/\text{W}$
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)			

# 1N3879(R), 1N3889(R), 6/12/16FL(R) Series



Vishay High Power Products Fast Recovery Diodes  
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$\Delta R_{thJC}$ CONDUCTION								
CONDUCTION ANGLE	1N3879. 1N3883. 6FL..	1N3889. 1N3893. 12FL..	16FL..	1N3879. 1N3883. 6FL..	1N3889. 1N3893. 12FL..	16FL..	TEST CONDITIONS	UNITS
	SINUSOIDAL CONDUCTION			RECTANGULAR CONDUCTION				
180°	0.58	0.46	0.37	0.33	0.26	0.21	$T_J = 150\text{ }^\circ\text{C}$	K/W
120°	0.60	0.48	0.39	0.58	0.46	0.37		
60°	1.28	1.02	0.82	1.28	1.02	0.82		
30°	2.20	1.76	1.41	2.20	1.76	1.41		

**Note**

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

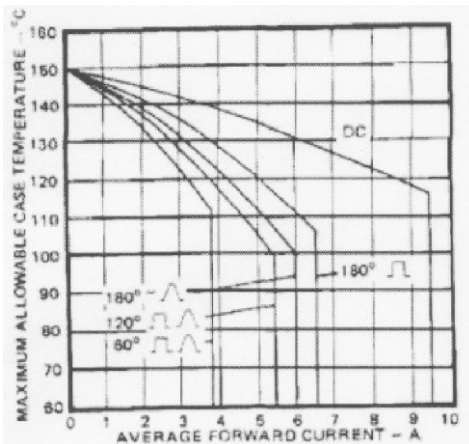


Fig. 1 - Average Forward Current vs. Maximum Allowable Case Temperature, 1N3879 and 6FL Series

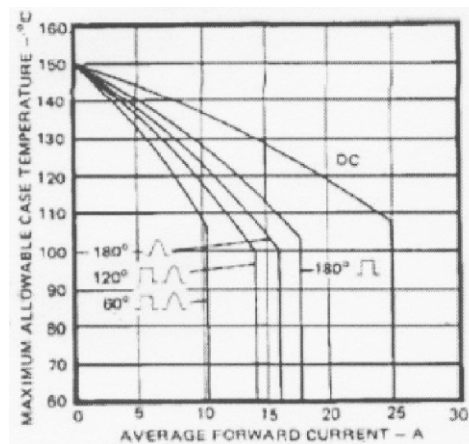


Fig. 3 - Average Forward Current vs. Maximum Allowable Case Temperature, 16FL Series

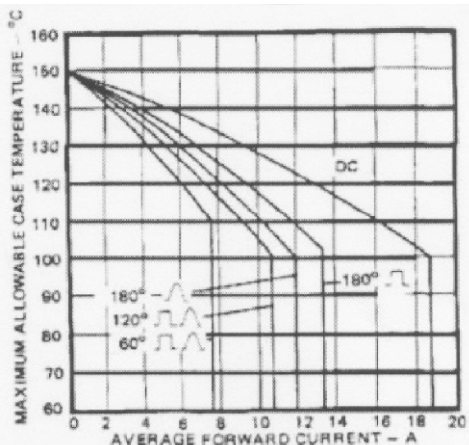


Fig. 2 - Average Forward Current vs. Maximum Allowable Case Temperature, 1N3889 and 12FL Series

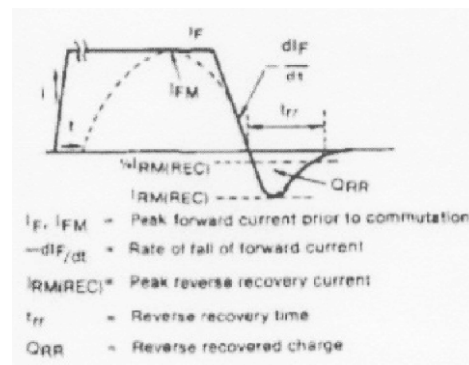


Fig. 4 - Reverse Recovery Time Test Waveform



# 1N3879(R), 1N3889(R), 6/12/16FL(R) Series

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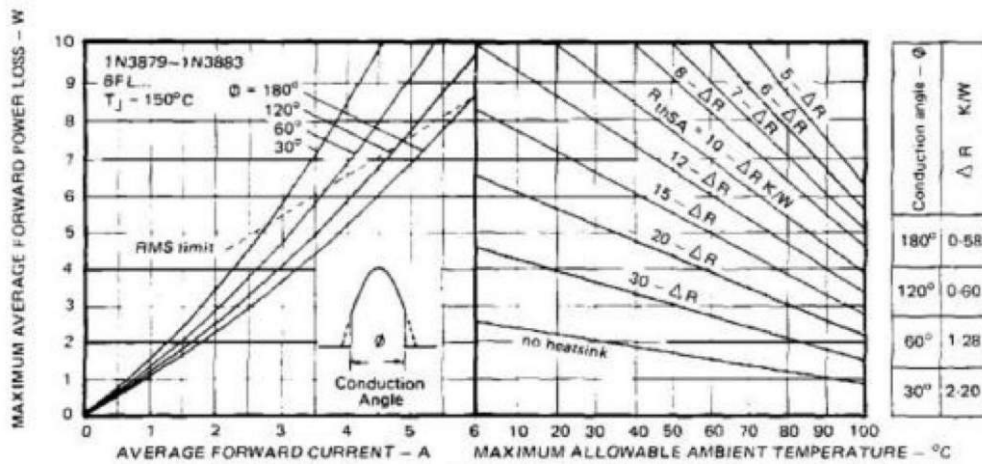


Fig. 5 - Current Rating Nomogram (Sinusoidal Waveforms), 1N3879 and 6FL Series

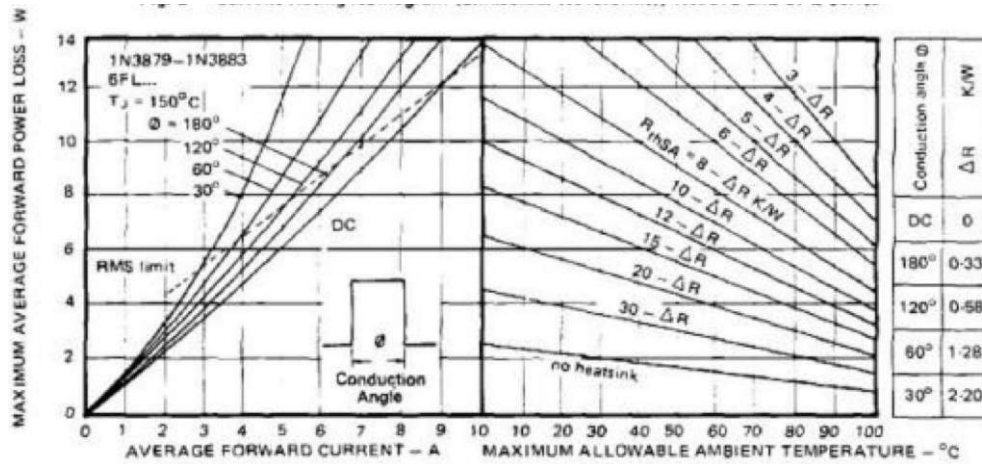


Fig. 6 - Current Rating Nomogram (Rectangular Waveforms), 1N3879 and 6FL Series

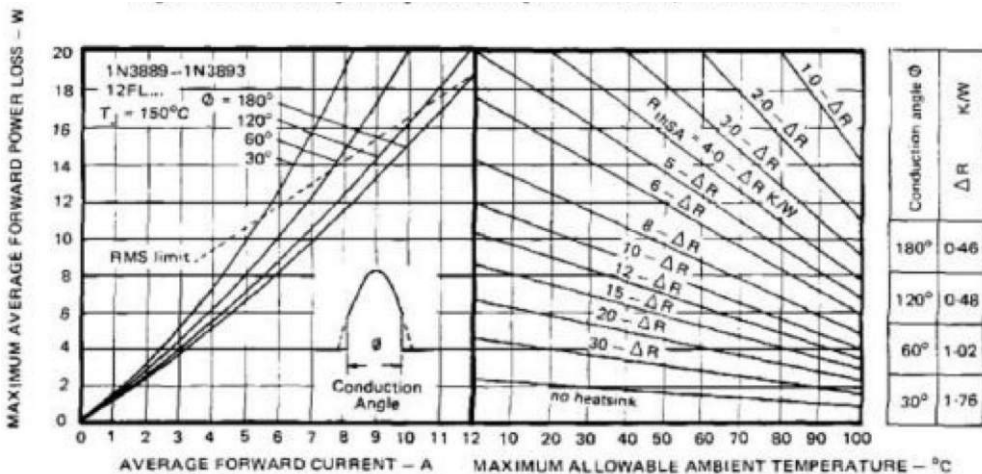


Fig. 7 - Current Rating Nomogram (Sinusoidal Waveforms), 1N3889 and 12FL Series



# 1N3879(R), 1N3889(R), 6/12/16FL(R) Series

Vishay High Power Products Fast Recovery Diodes  
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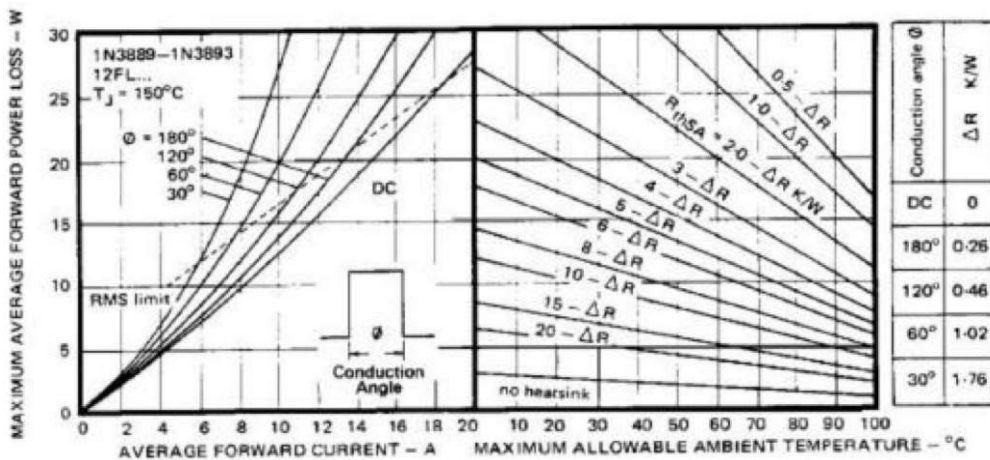


Fig. 8 - Current Rating Nomogram (Rectangular Waveforms), 1N3889 and 12FL Series

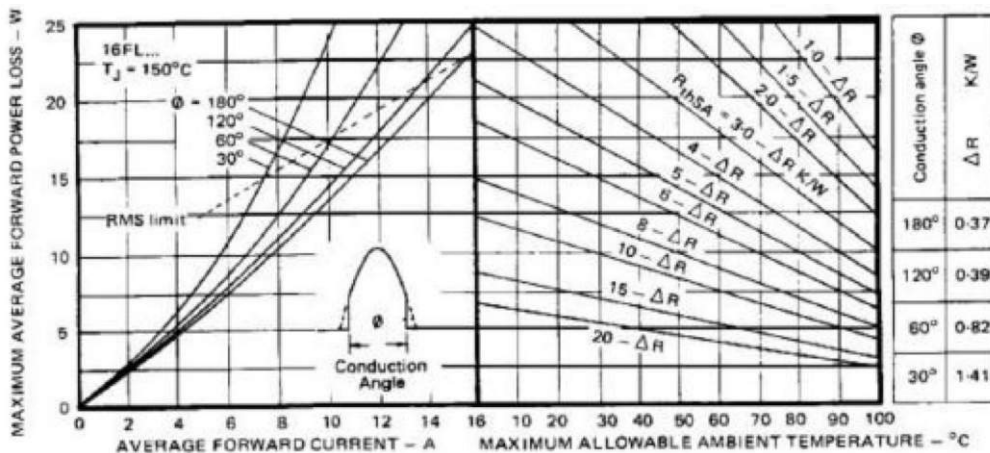


Fig. 9 - Current Rating Nomogram (Sinusoidal Waveforms), 16FL Series

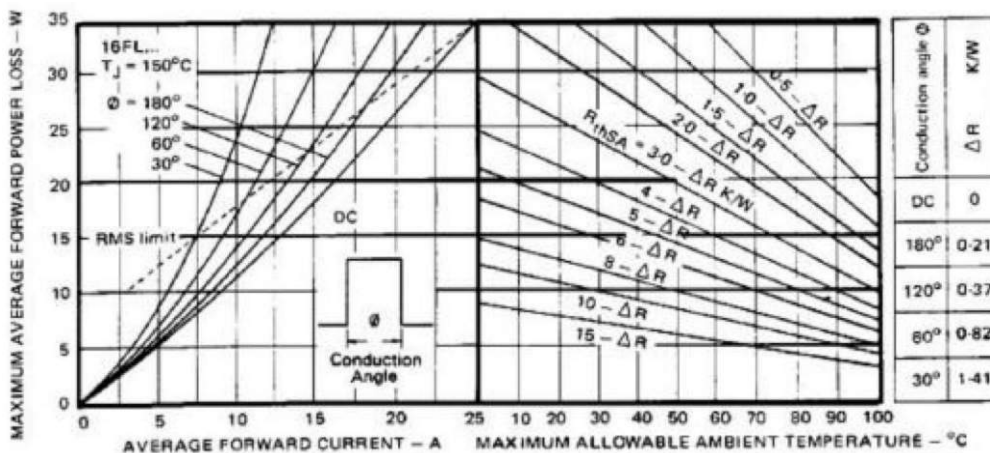


Fig. 10 - Current Rating Nomogram (Rectangular Waveforms), 16FL Series



# 1N3879(R), 1N3889(R), 6/12/16FL(R) Series

Fast Recovery Diodes  
(Stud Version), 6/12/16 A

Vishay High Power Products

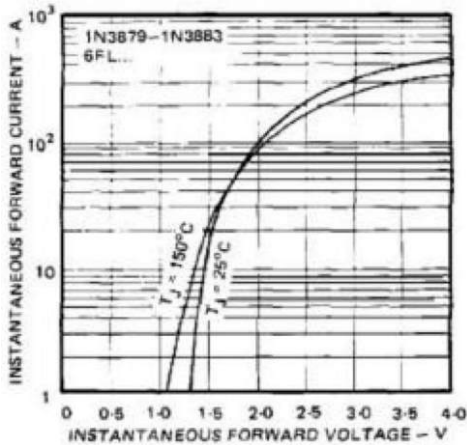


Fig. 11 - Maximum Forward Voltage vs. Forward Current, 1N3879 and 6FL Series

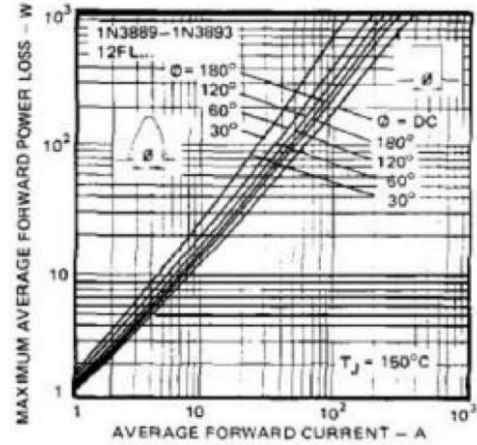


Fig. 14 - Maximum High Level Forward Power Loss vs. Average Forward Current, 1N3889 and 12FL Series

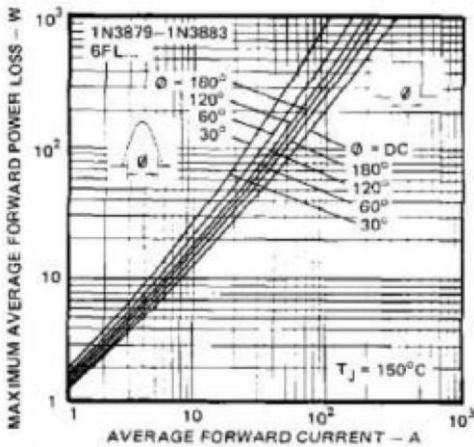


Fig. 12 - Maximum High Level Forward Power Loss vs. Average Forward Current, 1N3879 and 6FL Series

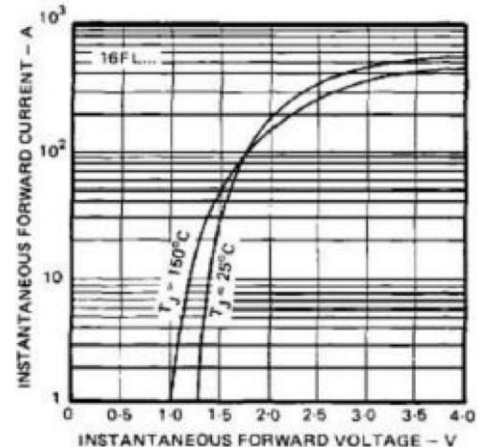


Fig. 15 - Maximum Forward Voltage vs. Forward Current, 16FL Series

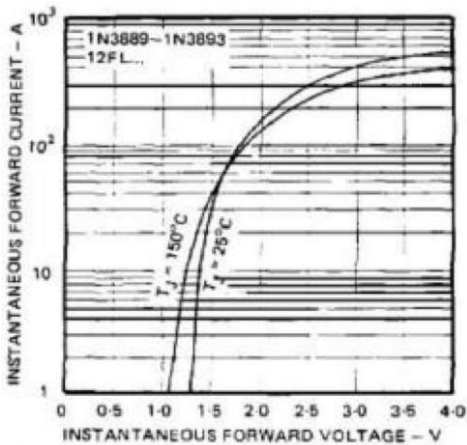


Fig. 13 - Maximum Forward Voltage vs. Forward Current, 1N3889 and 12FL Series

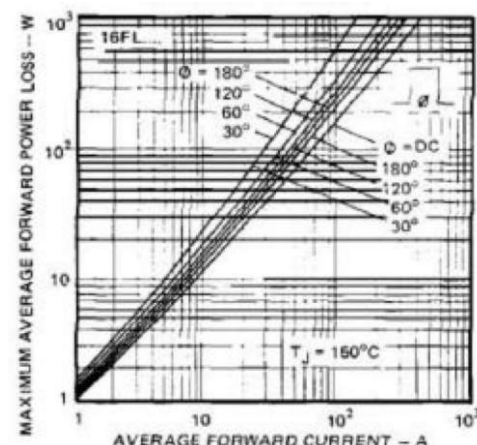


Fig. 16 - Maximum High Level Forward Power Loss vs. Average Forward Current, 16FL Series



# 1N3879(R), 1N3889(R), 6/12/16FL(R) Series



Vishay High Power Products Fast Recovery Diodes  
(Stud Version), 6/12/16 A

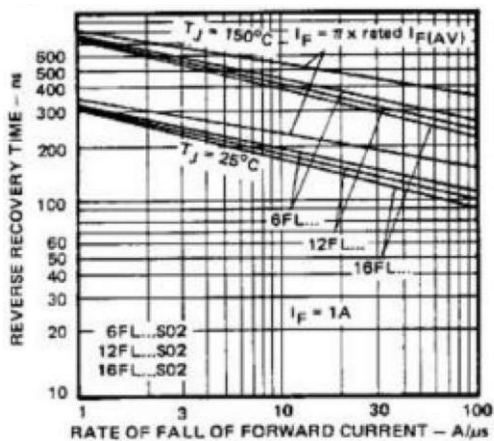


Fig. 17a - Typical Reverse Recovery Time vs. Rate of Fall of Forward Current, All Series ...S02

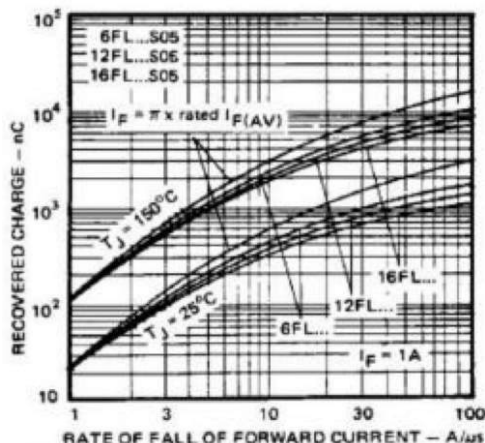


Fig. 18b - Typical Recovered Charge vs. Rate of Fall of Forward Current, All Series ...S05

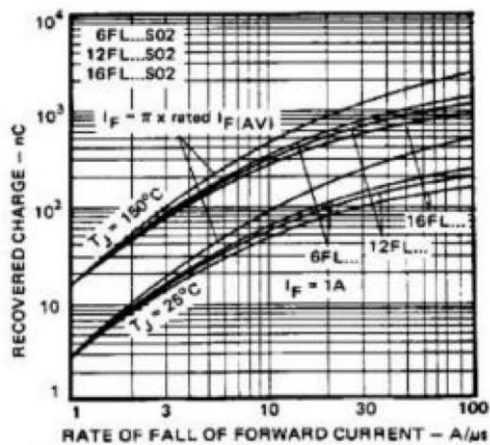


Fig. 17b - Typical Recovered Charge vs. Rate of Fall of Forward Current, All Series ...S02

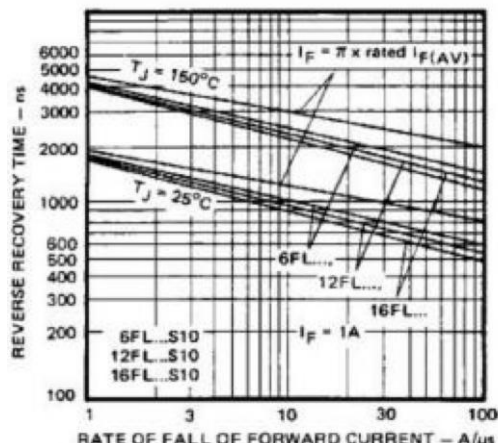


Fig. 19a - Typical Reverse Recovery Time vs. Rate of Fall of Forward Current, All Series ...S10

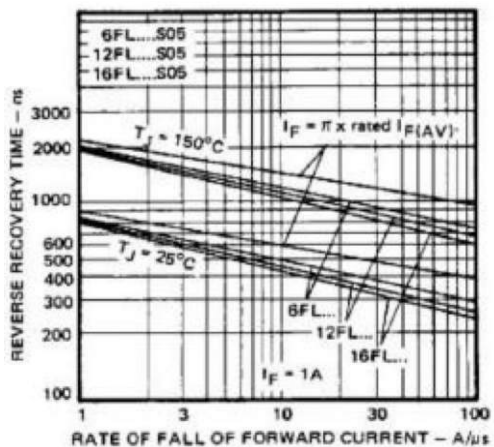


Fig. 18a - Typical Reverse Recovery Time vs. Rate of Fall of Forward Current, All Series ...S05

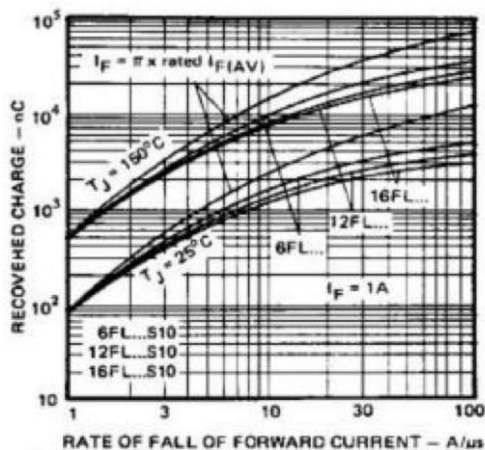


Fig. 19b - Typical Recovered Charge vs. Rate of Fall of Forward Current, All Series ...S10





# 1N3879(R), 1N3889(R), 6/12/16FL(R) Series

Fast Recovery Diodes Vishay High Power Products  
(Stud Version), 6/12/16 A

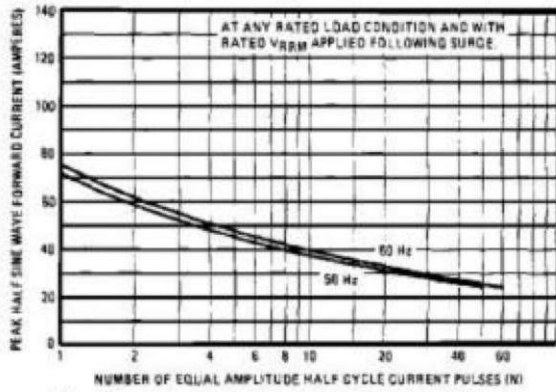


Fig. 20 - Maximum Non-Repetitive Surge Current vs. Number of Current Pulses, 1N3879 Series

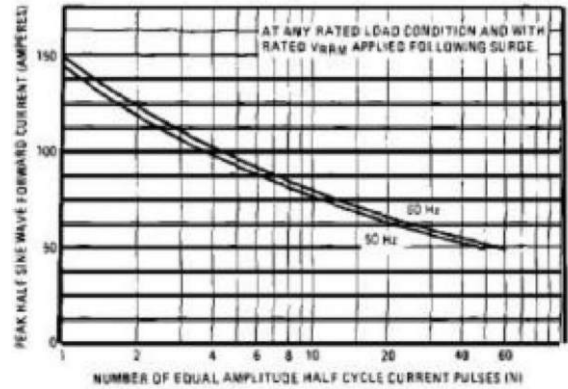


Fig. 22 - Maximum Non-Repetitive Surge Current vs. Number of Current Pulses, 1N3889 and 12FL Series

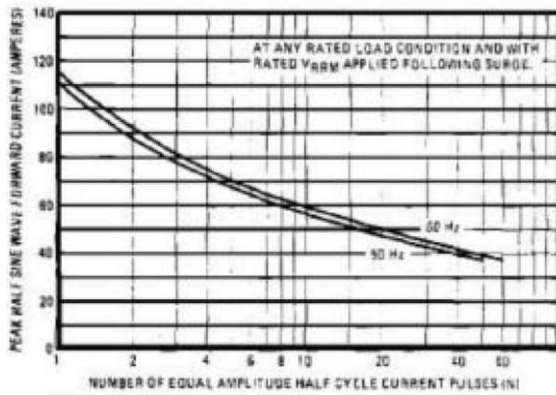


Fig. 21 - Maximum Non-Repetitive Surge Current vs. Number of Current Pulses, 6FL Series

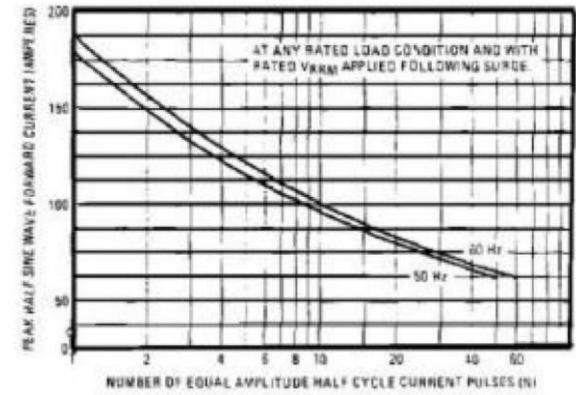


Fig. 23 - Maximum Non-Repetitive Surge Current vs. Number of Current Pulses, 16FL Series

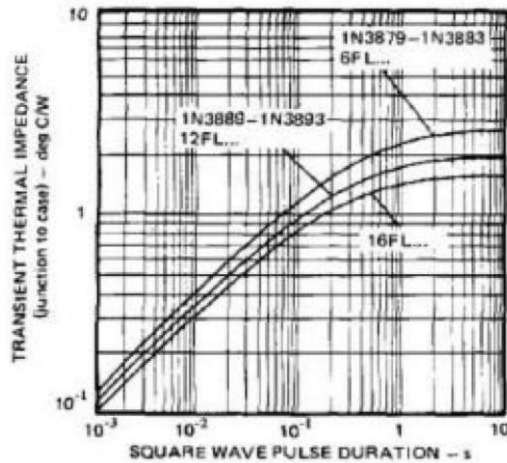


Fig. 24 - Maximum Transient Thermal Impedance, Junction to Case vs. Pulse Duration, All Series

# 1N3879(R), 1N3889(R), 6/12/16FL(R) Series



Vishay High Power Products Fast Recovery Diodes  
(Stud Version), 6/12/16 A

## ORDERING INFORMATION TABLE

Device code	16	F	L	R	60	M	S02
	①	②	③	④	⑤	⑥	⑦

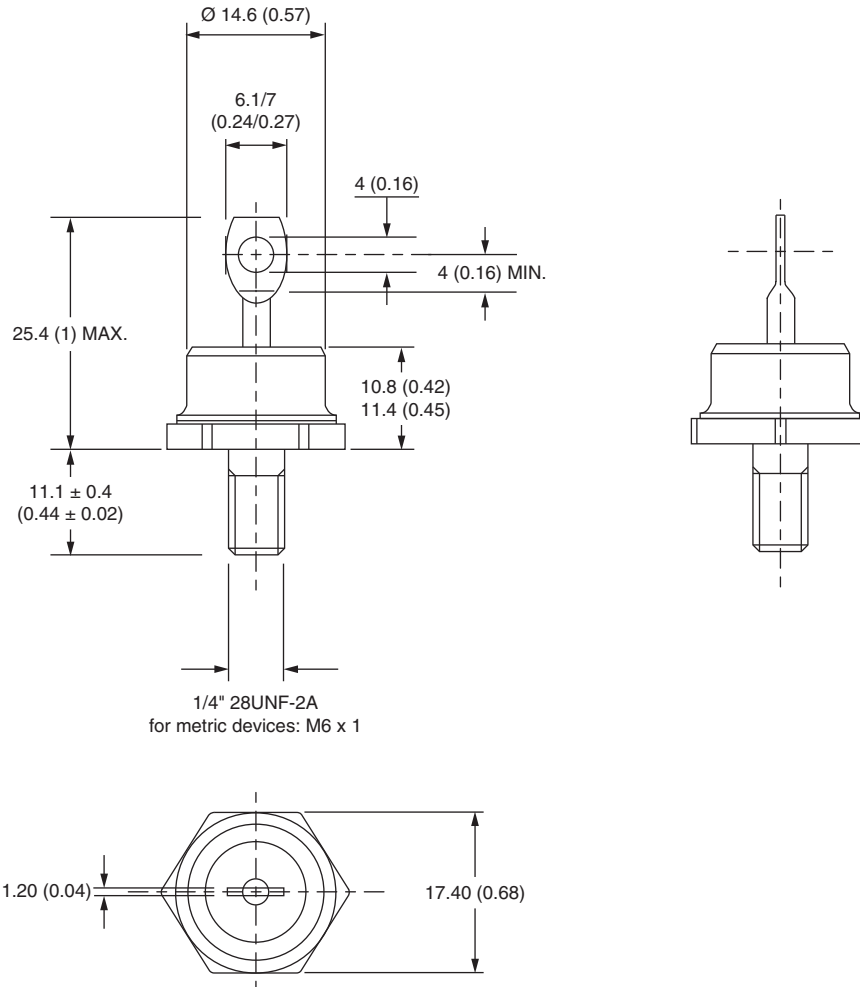
- 1** - Current code  $I_{(AVG)}$  = Exact current rating
- 2** - F = Diode
- 3** - Omit = Standard recovery diode  
L = Only for fast diode
- 4** - Omit = Stud forward polarity  
R = Stud reverse polarity
- 5** - Voltage code x 10 =  $V_{RRM}$  (see Voltage Ratings table)
- 6** - Outlines:  
Omit = Stud base UNF thread  
M = Stud base metric thread
- 7** -  $t_{rr}$  code only for fast diode (see Recovery Characteristics table)

### LINKS TO RELATED DOCUMENTS

Dimensions	<a href="http://www.vishay.com/doc?95311">http://www.vishay.com/doc?95311</a>
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## DO-203AB (DO-5) for 40HFL, 70HFL and 85HFL

### DIMENSIONS FOR 40HFL/70HFL in millimeters (inches)



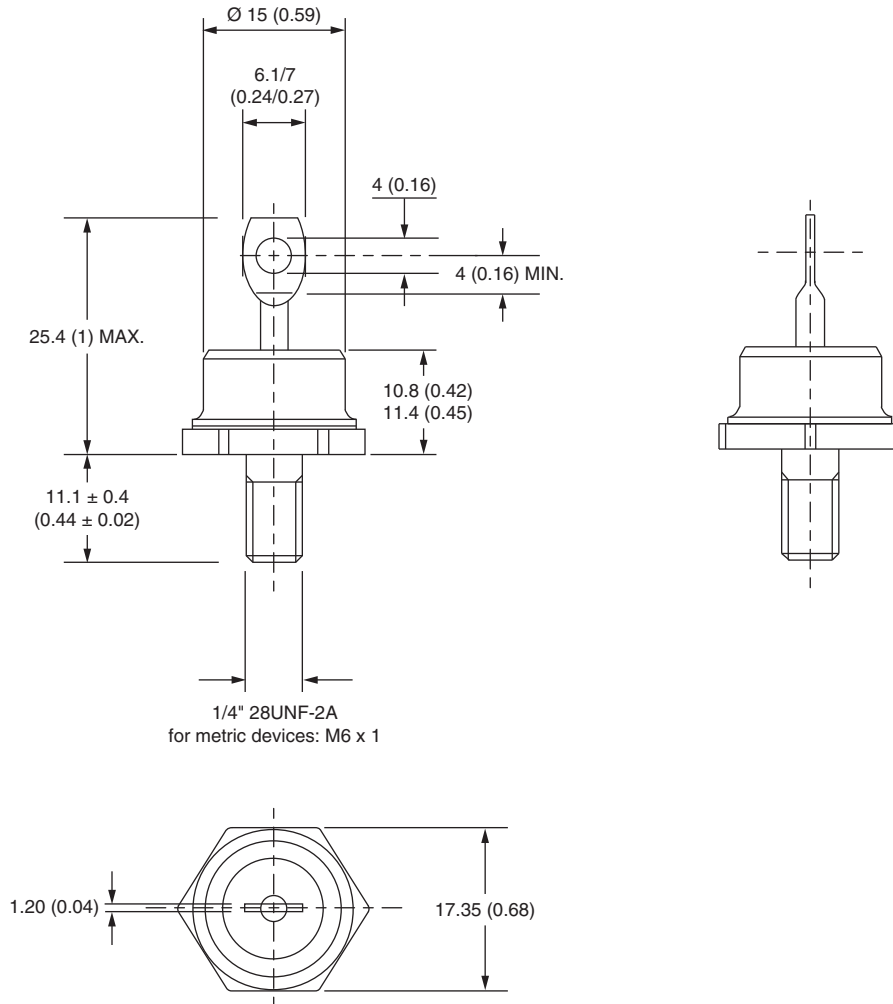
# Outline Dimensions

Vishay Semiconductors

DO-203AB (DO-5) for  
40HFL, 70HFL and 85HFL



## DIMENSIONS FOR 85HFL in millimeters (inches)







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