

# SPF SERIES SOLAR FUSES

1000 VDC • 1-30 Amperes



## Description

The SPF Solar Protection Fuse series has been specifically designed for the protection of photovoltaic (PV) systems. This family of Midget style fuses (10 x 38 mm) can safely protect PV modules and conductors from reverse-overcurrent conditions.

As PV systems have grown in size, so have the corresponding voltage requirements. This increase in system voltage has typically been intended to minimize power loss associated with long conductor runs. Standard circuit protection devices are not designed to completely protect photovoltaic panels. However, the SPF series is UL Listed to safely interrupt faulted circuits up to this demanding voltage level.

Littelfuse offers 13 ampere ratings to match specific requirements in a variety of applications.

## Features/Benefits

- Designed to both UL and IEC photovoltaic specifications
- UL 2579 Listed 1000 VDC maximum
- 1-30 A ratings available
- 20,000 A Interrupting Rating
- Both PCB mount and dead-front holder options available

## Recommended Fuseholders

LPHV Series

## Applications

- Combiner boxes
- Inverters
- Battery charge controllers

## Specifications

<b>Voltage Rating:</b>	1000 VDC
<b>Amperage Rating:</b>	1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 25, 30
<b>Max. Interrupting Rating:</b>	20 kA; Time Constant less than 2ms
<b>Min. Interrupting Rating:</b>	1.35x Current Rating
<b>Material:</b>	Body: Melamine Caps: Copper Alloy
<b>Operating Temperature:</b>	See Rating Curve
<b>Approvals:</b>	UL 2579 Listed (File No. E339112) 1-25 A IEC 60269-6 (VDE Approved to Certification No. 40033098)
<b>Environmental:</b>	RoHS Compliant
<b>Country of Origin:</b>	Mexico

## Ordering Information

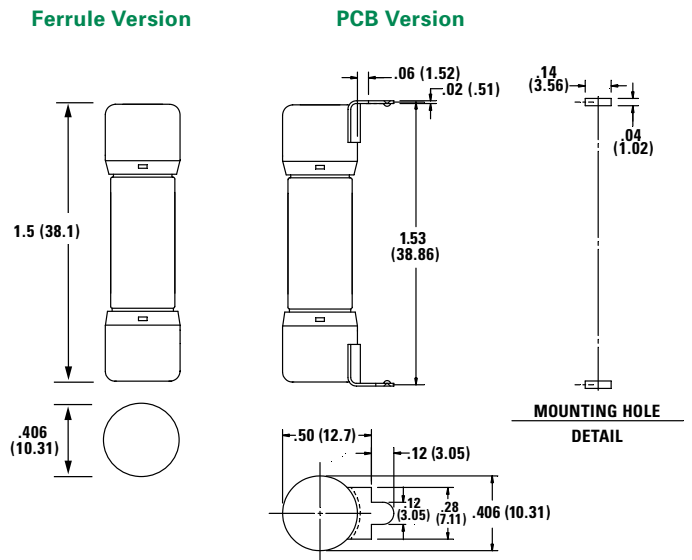
AMPERAGE	CATALOG NUMBER	SYSTEM NUMBER
2	SPF002	SPF002.T
8	SPF008	SPF008.T
30	SPF030	SPF030.T
30 (WITH PCB TABS)	SPF030R	SPF030.HXR

## Web Resources

Downloadable CAD drawings and other technical information: [www.littelfuse.com/spf](http://www.littelfuse.com/spf)

For a comprehensive overview of solar market solutions, please visit: [www.littelfuse.com/solar](http://www.littelfuse.com/solar)

## Dimensions in inches (mm)



Look for this logo to indicate products that are used in solar applications. Visit our website [www.littelfuse.com/solar](http://www.littelfuse.com/solar) for the latest updates on approvals, certifications, codes and standards.

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## Electrical Specifications 10 x 38 mm Solar Midget Fuses

### Ferrule Version

ORDERING NUMBER	AMP RATING	DC-RATED VOLTAGE	INTERRUPTING RATING		UPC	NOM COLD RESISTANCE (Ohm)	WATTS LOSS AT 100% RATED CURRENT (W)	WATTS LOSS AT 80% RATED CURRENT (W)	TOTAL CLEARING I <sup>2</sup> T (A <sup>2</sup> SEC) 10 kA	TOTAL CLEARING I <sup>2</sup> T (A <sup>2</sup> SEC) 20 kA	AGENCY APPROVALS			
			DC	AC							DC	UL	VDE	CE
OSPF001.T	1	1000	-	20 kA	07945816907	0.645	1.059	0.699	0.289	3.420	•	•	•	•*
OSPF002.T	2	1000	-	20 kA	07945816910	0.237	1.586	0.851	1.175	4.755	•	•	•	•*
OSPF003.T	3	1000	-	20 kA	07945816913	0.11	1.504	0.824	5.007	7.882	•	•	•	•*
OSPF004.T	4	1000	-	20 kA	07945816916	0.06127	1.491	0.839	23.031	23.031	•	•	•	•*
OSPF005.T	5	1000	-	20 kA	07945816919	0.04086	1.465	0.859	42.600	42.600	•	•	•	•*
OSPF006.T	6	1000	-	20 kA	07945816922	0.0281	1.348	0.769	76.270	80.254	•	•	•	•*
OSPF008.T	8	1000	-	20 kA	07945816925	0.0178	1.610	0.914	193.323	198.960	•	•	•	•*
OSPF010.T	10	1000	-	20 kA	07945816928	0.0125	1.760	1.000	395.556	401.208	•	•	•	•*
OSPF012.T	12	1000	-	20 kA	07945816931	0.00993	1.965	1.109	599.198	641.940	•	•	•	•*
OSPF015.T	15	1000	-	20 kA	07945816934	0.00799	2.282	1.382	457.740	504.770	•	•	•	•*
OSPF020.T	20	1000	-	20 kA	07945816937	0.0045	2.810	1.574	1173.990	1312.850	•	•	•	•*
OSPF025.T	25	1000	-	20 kA	07945817595	0.00353	2.981	1.745	1937.430	2371.140	•	•	•	•*
OSPF030.T	30	1000	-	20 kA	07945817598	0.00284	3.923	2.125	2209.480	2678.750	•			

\*In Approval Process.

### PCB Version

ORDERING NUMBER	AMP RATING	DC-RATED VOLTAGE	INTERRUPTING RATING		UPC	NOM COLD RESISTANCE (Ohm)	WATTS LOSS AT 100% RATED CURRENT (W)	WATTS LOSS AT 80% RATED CURRENT (W)	TOTAL CLEARING I <sup>2</sup> T (A <sup>2</sup> SEC) 10 kA	TOTAL CLEARING I <sup>2</sup> T (A <sup>2</sup> SEC) 20 kA	AGENCY APPROVALS			
			DC	AC							DC	UL	VDE	CE
OSPF001.HXR	1	1000	-	20 kA	07945816909	0.645	1.059	0.699	0.289	3.420	•	•	•	•*
OSPF002.HXR	2	1000	-	20 kA	07945816912	0.237	1.586	0.851	1.175	4.755	•	•	•	•*
OSPF003.HXR	3	1000	-	20 kA	07945816915	0.11	1.504	0.824	5.007	7.882	•	•	•	•*
OSPF004.HXR	4	1000	-	20 kA	07945816918	0.06127	1.491	0.839	23.031	23.031	•	•	•	•*
OSPF005.HXR	5	1000	-	20 kA	07945816921	0.04086	1.465	0.859	42.600	42.600	•	•	•	•*
OSPF006.HXR	6	1000	-	20 kA	07945816924	0.0281	1.348	0.769	76.270	80.254	•	•	•	•*
OSPF008.HXR	8	1000	-	20 kA	07945816927	0.0178	1.610	0.914	193.323	198.960	•	•	•	•*
OSPF010.HXR	10	1000	-	20 kA	07945816930	0.0125	1.760	1.000	395.556	401.208	•	•	•	•*
OSPF012.HXR	12	1000	-	20 kA	07945816933	0.00993	1.965	1.109	599.198	641.940	•	•	•	•*
OSPF015.HXR	15	1000	-	20 kA	07945816936	0.00799	2.282	1.382	457.740	504.770	•	•	•	•*
OSPF020.HXR	20	1000	-	20 kA	07945817594	0.0045	2.810	1.574	1173.990	1312.850	•	•	•	•*
OSPF025.HXR	25	1000	-	20 kA	07945817597	0.00353	2.981	1.745	1937.430	2371.140	•	•	•	•*
OSPF030.HXR	30	1000	-	20 kA	07945817600	0.00284	3.923	2.125	2209.480	2678.750	•			

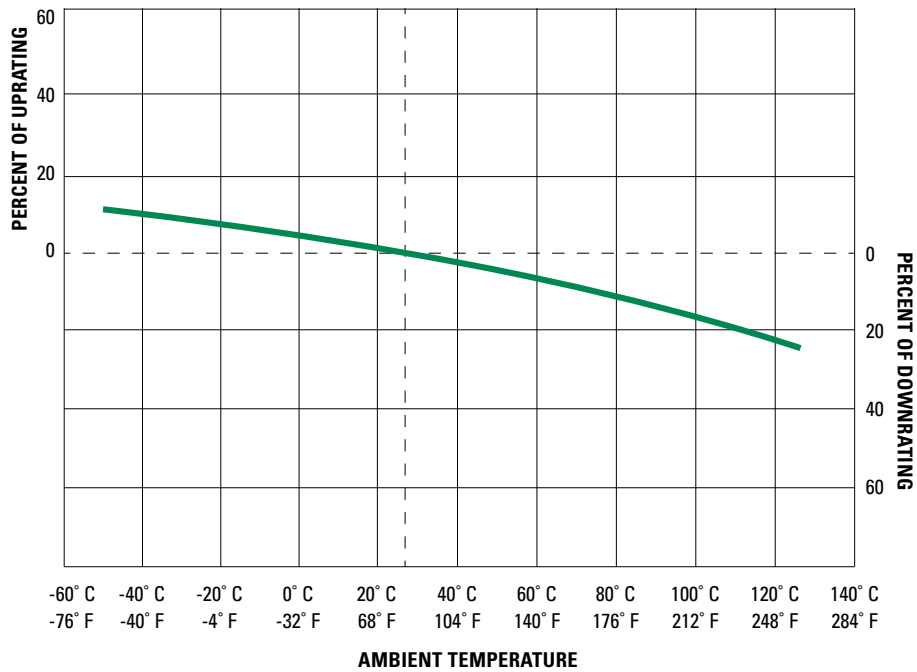
\*In Approval Process.

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## Electrical Characteristics for Series

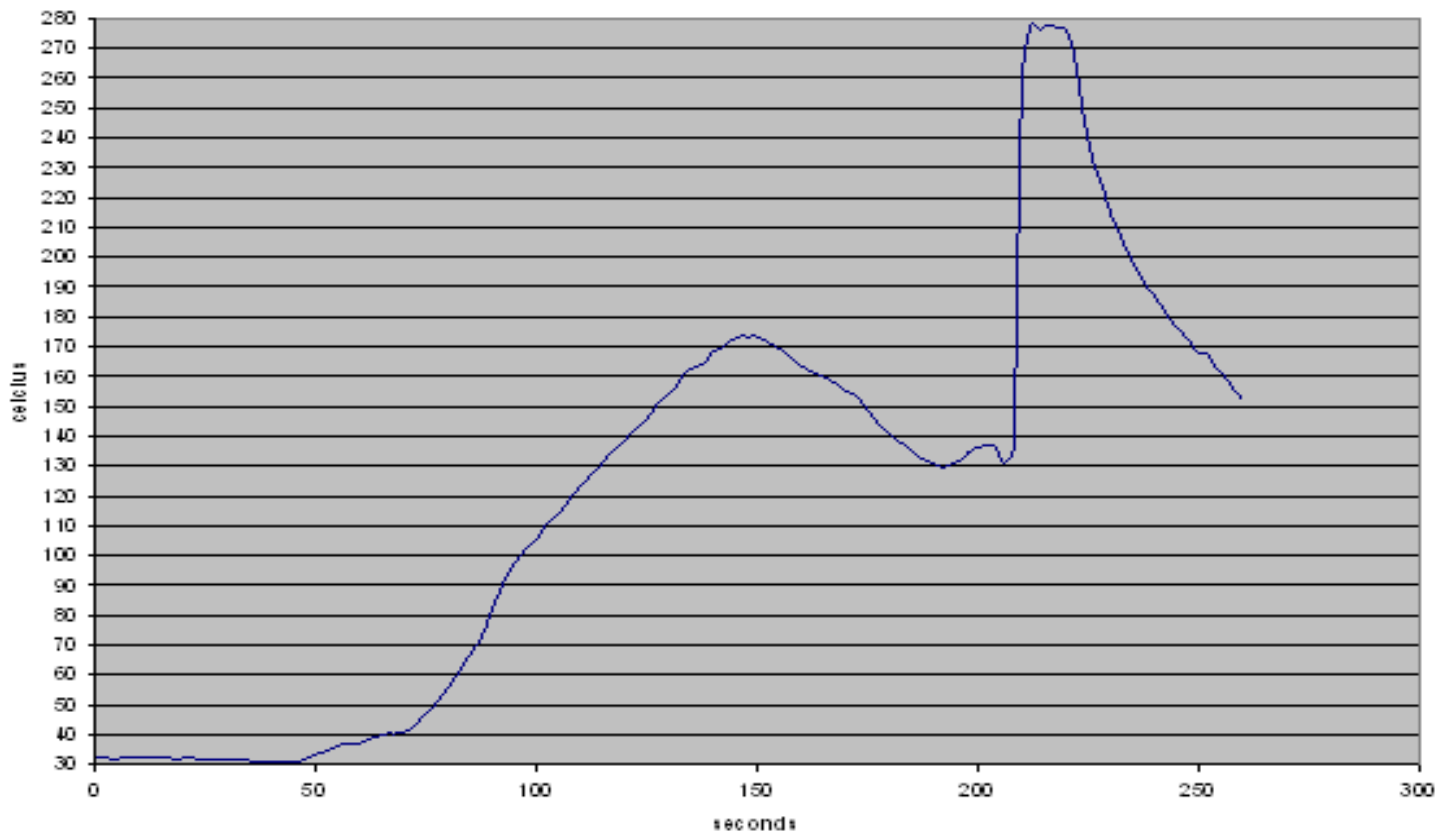
% OF AMP RATING	AMP RATING	OPENING TIME (MINUTES)	PER
100%	1-30 A	60 Min	UL
113%	1-30 A	60 Min	IEC
135%	1-30 A	60 Max	UL
145%	1-30 A	60 Max	IEC
200%	1-30 A	4 Max	UL

## Temperature Derating Curve



# SPF SERIES SOLAR FUSES

## Soldering Parameters

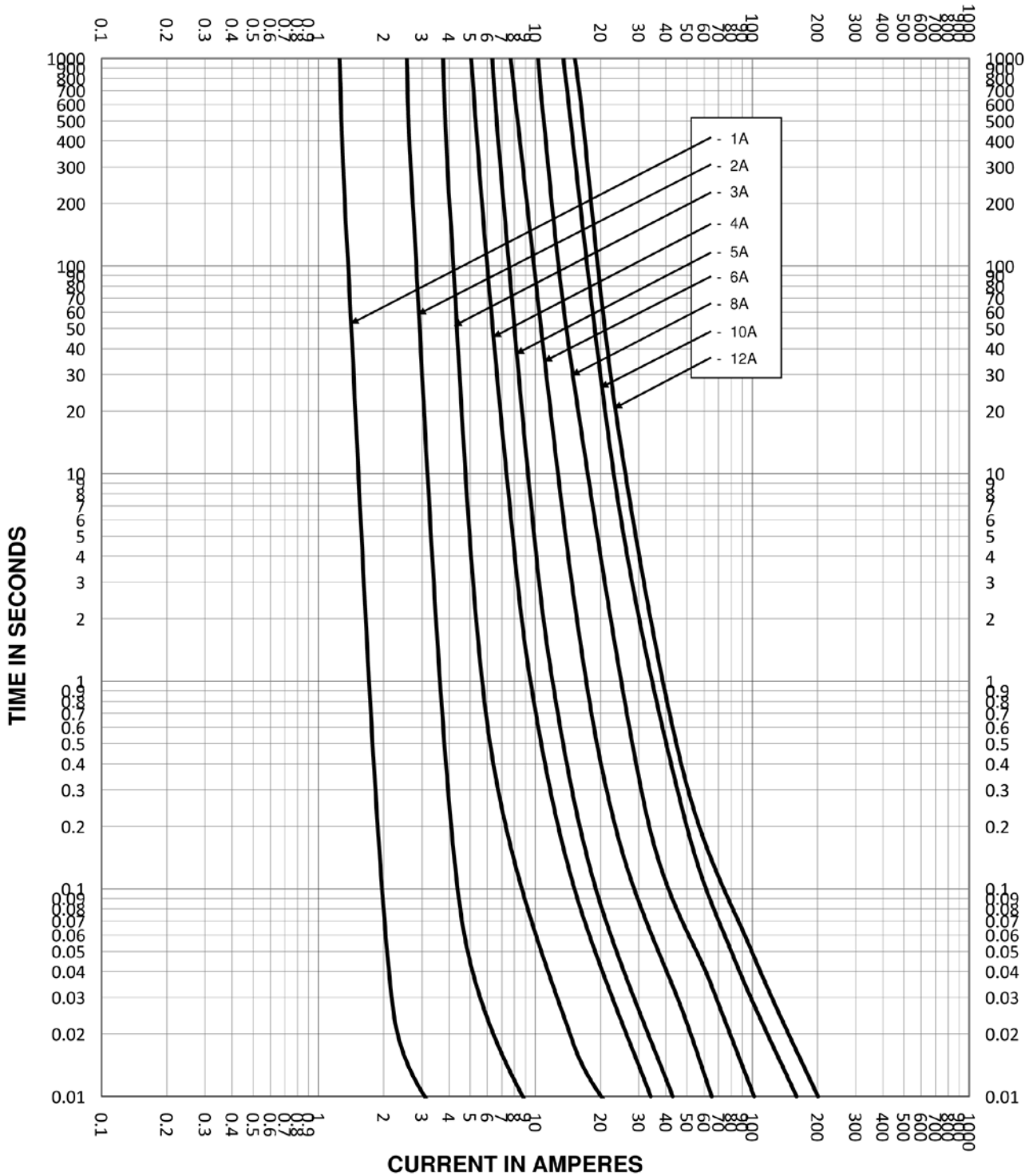


## Recommended Process Parameters

WAVE PARAMETER	LEAD FREE RECOMMENDATION
PREHEAT:	(Typical Industry Recommendation)
TEMPERATURE MINIMUM:	130° C
TEMPERATURE MAXIMUM:	
PRE-HEAT TIME	75 Seconds Maximum
SOLDER POT TEMPERATURE	280° C Maximum
SOLDER DWELL TIME	270° C for 8 Seconds Maximum
COMPLETE CYCLE TIME	250 Seconds Maximum

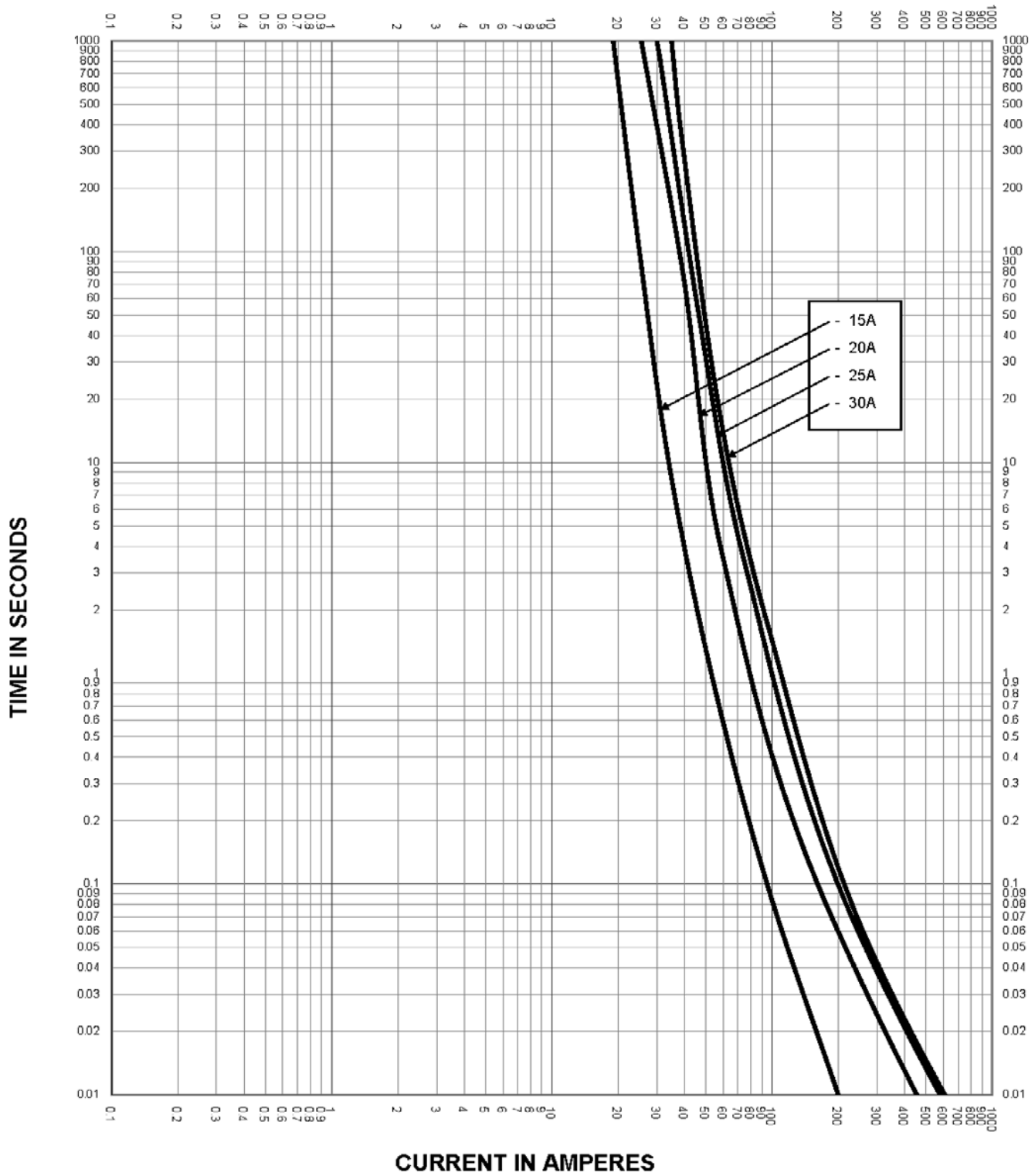
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## Time Current Curve



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## Time Current Curve



## SPF SERIES SOLAR FUSES

## Time Current Curve Data Points

AMP	TIME IN SECONDS	CURRENT	AMP	TIME IN SECONDS	CURRENT	AMP	TIME IN SECONDS	CURRENT
1 A	1000.000	1.260	6 A	1000.000	7.750	15 A	1000.000	19.100
	100.000	1.380		100.000	9.850		100.000	25.200
	10.000	1.540		10.000	12.750		10.000	34.000
	1.000	1.720		1.000	17.300		1.000	53.000
	0.100	1.980		0.100	28.500		0.100	95.000
	0.010	3.070		0.010	65.000		0.010	200.000
2 A	1000.000	2.550	8 A	1000.000	10.400	20 A	1000.000	25.500
	100.000	2.850		100.000	12.800		100.000	38.000
	10.000	3.200		10.000	17.450		10.000	50.000
	1.000	3.650		1.000	24.800		1.000	79.500
	0.100	4.400		0.100	40.800		0.100	162.000
	0.010	8.800		0.010	102.000		0.010	477.000
3 A	1000.000	3.750	10 A	1000.000	13.600	25 A	1000.000	30.250
	100.000	4.200		100.000	17.400		100.000	41.750
	10.000	4.800		10.000	23.100		10.000	60.000
	1.000	5.700		1.000	34.750		1.000	100.000
	0.100	8.700		0.100	61.400		0.100	199.000
	0.010	20.000		0.010	158.000		0.010	580.000
4 A	1000.000	5.050	12 A	1000.000	15.303	30 A	1000.000	35.250
	100.000	6.000		100.000	19.400		100.000	45.300
	10.000	7.400		10.000	26.050		10.000	63.750
	1.000	9.550		1.000	38.700		1.000	110.000
	0.100	15.250		0.100	74.000		0.100	214.000
	0.010	33.750		0.010	201.000		0.010	606.000
5 A	1000.000	6.350						
	100.000	7.550						
	10.000	9.300						
	1.000	12.000						
	0.100	19.000						
	0.010	42.750						