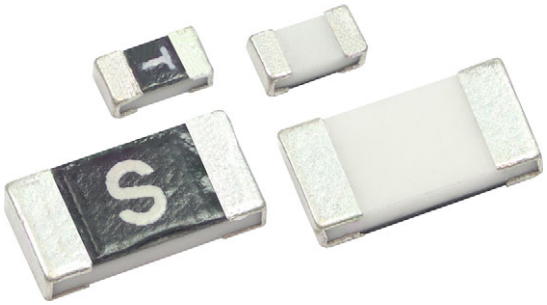
Very Fast Acting Thin Film Chip Fuses



FEATURES

- 3 sizes: 0402, 0603, and 1206
- Maximal protection as fuses are designed to open in **t < 5 s at 200 % overload**
- UL 248-14 compliant
- From 0.5 A to 7 A
- Low resistance
- Body temperature rising < 75 °C at 100 % rated current
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

RoHS COMPLIANT

HALOGEN FREE

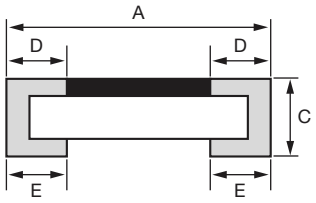
LINKS TO ADDITIONAL RESOURCES

3D Models

S3F thin film chip fuses are designed to ensure circuit continuity with minimal resistance and reliable interruption under overload condition. Particularly adapted to be compatible with numerous applications in the sector of electronics. They comply with industrial and government standards, as well as Vishay quality and reliability requirements.

TECHNICAL SPECIFICATIONS			
DESCRIPTION	**S3F0402**	**S3F0603**	**S3F1206**
Imperial size	0402	0603	1206
Rated current I_N range	0.50 A to 4.00 A	0.50 A to 5.00 A	0.50 A to 7.00 A
Rated voltage $U_{max.}$ DC	32 V	32 V and 50 V	32 V and 63 V
Cold resistance at $I \leq 0.1 \times I_N$	16 mΩ to 380 mΩ	10 mΩ to 260 mΩ	9 mΩ to 527.5 mΩ
Fusing time	Open within 5 s at 200 % rated power		
Body temperature rise	< 75 °C at 100 % rated current		
Operating temperature range	-25 °C to 125 °C with proper derating factor		
Approved UL 248-14 recognition file	E548286		

DIMENSIONS

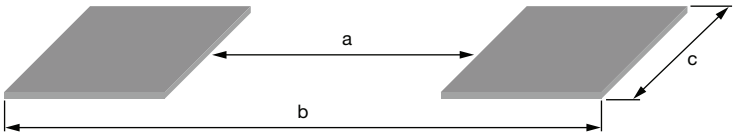


DIMENSIONS AND TOLERANCES in millimeters (inches)					
TYPE	**A**	**B**	**C**	**D**	**E**
S3F0402	1.00 ± 0.10 (0.039 ± 0.004)	0.52 ± 0.05 (0.020 ± 0.002)	0.35 ± 0.05 (0.014 ± 0.002)	0.20 ± 0.10 (0.008 ± 0.004)	0.25 ± 0.10 (0.010 ± 0.004)
S3F0603	1.60 ± 0.10 (0.063 ± 0.004)	0.80 ± 0.10 (0.031 ± 0.004)	0.45 ± 0.10 (0.018 ± 0.004)	0.30 ± 0.20 (0.012 ± 0.008)	0.35 ± 0.20 (0.014 ± 0.008)
S3F1206	3.10 ± 0.10 (0.122 ± 0.004)	1.55 ± 0.10 (0.061 ± 0.004)	0.60 ± 0.10 (0.024 ± 0.004)	0.50 ± 0.30 (0.020 ± 0.012)	0.50 ± 0.20 (0.020 ± 0.008)

For technical questions, contact: sferthinfilm@vishay.com

MECHANICAL SPECIFICATIONS	
Substrate	Ceramic
Technology	Thin film
Termination	Cu / Ni plating

LAND PATTERN DIMENSIONS



SUGGESTED LAND PATTERN DIMENSIONS in millimeters (inches)			
TYPE	**a**	**b**	**c**
S3F0402	0.55 to 0.65 (0.022 to 0.026)	1.40 to 1.60 (0.055 to 0.063)	0.74 to 0.94 (0.029 to 0.037)
S3F0603	0.85 to 0.95 (0.033 to 0.037)	2.00 to 2.20 (0.079 to 0.087)	1.50 to 1.70 (0.059 to 0.067)
S3F1206	0.95 to 1.05 (0.037 to 0.041)	4.40 to 5.00 (0.173 to 0.197)	2.30 to 2.50 (0.091 to 0.098)

S3F0402 RATING							
PART DESIGNATION	**MARKING**	**RATED CURRENT (A)**	**FUSING TIME**	**RESISTANCE [1] (mΩ), TOLERANCE: ± 25 %**	**RATED VOLTAGE**	**BREAKING CAPACITY**	**BODY TEMPERATURE RISING**
S3F040232VA500TT	F	0.50	Open within 5 s at 200 % rated current	380	32 V_{DC}	32 V_{DC}, 35 A	< 75 °C at 100 % rated current
S3F040232VA800TT	K	0.80		120			
S3F040232V1A00TT	L	1.00		95			
S3F040232V1A25TT	M	1.25		67			
S3F040232V1A50TT	P	1.50		51			
S3F040232V1A60TT	N	1.60		46			
S3F040232V2A00TT	S	2.00		33			
S3F040232V2A50TT	T	2.50		22.5			
S3F040232V3A00TT	3	3.00		20			
S3F040232V3A15TT	U	3.15		19			
S3F040232V4A00TT	W	4.00		16			

Note

[1] Resistance value was measured with less than 10 % of rated current

S3F0603 RATING							
PART DESIGNATION	MARKING	RATED CURRENT (A)	FUSING TIME	RESISTANCE [1] (mΩ), TOLERANCE: ± 25 %	RATED VOLTAGE	BREAKING CAPACITY	BODY TEMPERATURE RISING
S3F060350VA500TT	F	0.50	Open within 5 s at 200 % rated current	260	50 V_{DC}	50 V_{DC}, 50 A	< 75 °C at 100 % rated current
S3F060332VA630TT	I	0.63		218	32 $V_{AC/DC}$	32 $V_{AC/DC}$, 50 A	
S3F060332VA800TT	K	0.80		132			
S3F060332V1A00TT	L	1.00		84.5			
S3F060332V1A25TT	M	1.25		63			
S3F060332V1A50TT	P	1.50		50.5			
S3F060332V1A60TT	N	1.60		46			
S3F060332V2A00TT	S	2.00		32			
S3F060332V2A50TT	T	2.50		25.5			
S3F060332V3A00TT	3	3.00		20			
S3F060332V3A15TT	U	3.15		19			
S3F060332V4A00TT	W	4.00		13			
S3F060332V5A00TT	Y	5.00		10			

S3F1206 RATING							
PART DESIGNATION	MARKING	RATED CURRENT (A)	FUSING TIME	RESISTANCE [1] (mΩ), TOLERANCE: ± 25 %	RATED VOLTAGE	BREAKING CAPACITY	BODY TEMPERATURE RISING
S3F120663VA500TT	F	0.50	Open within 5 s at 200 % rated current	527.5	63 V_{DC}	63 V_{DC}, 50 A	< 75 °C at 100 % rated current
S3F120663VA800TT	K	0.80		211			
S3F120663V1A00TT	L	1.00		145.5			
S3F120663V1A25TT	M	1.25		90			
S3F120663V1A50TT	P	1.50		83			
S3F120663V2A00TT	S	2.00		57			
S3F120632V2A50TT	T	2.50		37	32 V_{DC}	32 V_{DC}, 50 A	
S3F120632V3A00TT	3	3.00		26			
S3F120632V4A00TT	W	4.00		18			
S3F120632V5A00TT	Y	5.00		13			
S3F120632V7A00TT	Z	7.00		9			

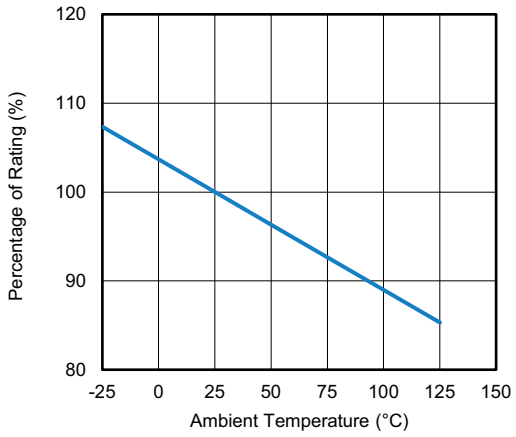
Note

[1] Resistance value was measured with less than 10 % of rated current

TEMPERATURE DERATING

Normal ambient temperature: 25 °C

Operating temperature range: -25 °C to 125 °C, with proper derating factor as below:



Chip Fuse Temperature

PERFORMANCES		
TESTS	**CONDITIONS**	**REQUIREMENTS PERMISSIBLE CHANGES**
Carrying capacity	Rated current, 4 h	No fusing
Fusing time	200 % of its rated current	Within 5 s
Interrupting ability	After the fuse is interrupted, rated voltage applied for 30 s again	No mechanical damages
Bending test	Distance between holding points: 90 mm Bending: 3 mm, 1 time, 30 s	No mechanical damages
Resistance to solder heat	260 °C ± 5 °C, 10 s ± 1 s	± 20 %
Solderability	235 °C ± 5 °C, 2 s ± 0.5 s 245 °C ± 5 °C, 2 s ± 0.5 s (lead (Pb)-free)	95 % coverage minimum
Temperature rise	100 % of its rated current, measurement of surface temperature	< 75 °C
Resistance to dry heat	105 °C ± 5 °C, 1000 h	± 20 %
Resistance to solvent	23 °C ± 5 °C in isopropyl alcohol, 90 s	No evident damages on protective coating and marking
Residual resistance	DC measurement after fusing	10 kΩ and more
Thermal shock	-25 °C / 25 °C / 125 °C / 25 °C, 10 cycles	$\frac{\Delta R}{R} < 10\ \%$

PACKAGING				
SIZE	**MOQ**	**TAPE WIDTH**	**TAPE PITCH**	**PACKAGING DIMENSIONS**
0402	10 000	8 mm	2 mm	Ø 180 mm / 7"
0603	5000		4 mm	Ø 180 mm / 7"
1206	5000		4 mm	Ø 180 mm / 7"

Note

- Packaging is compliant to EIA-481 Rev. D (IEC 60286, part 3) standard

SOLDERING / MOUNTING PARAMETERS

Please see the application note (www.vishay.com/doc?52029). The recommended reflow solder process parameters are displayed in pages 4 and 5.

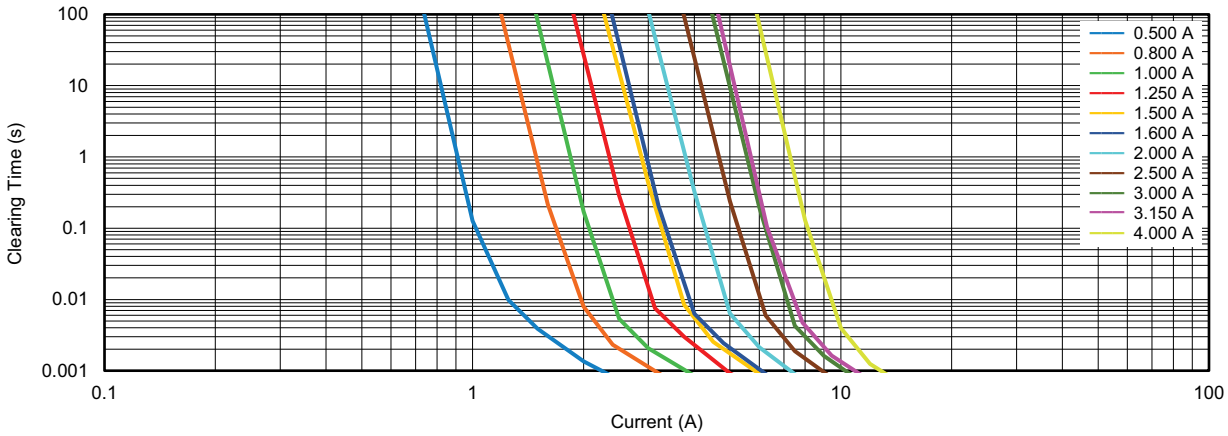
GLOBAL PART NUMBER INFORMATION

Part Number: S3F060350V1A50TT

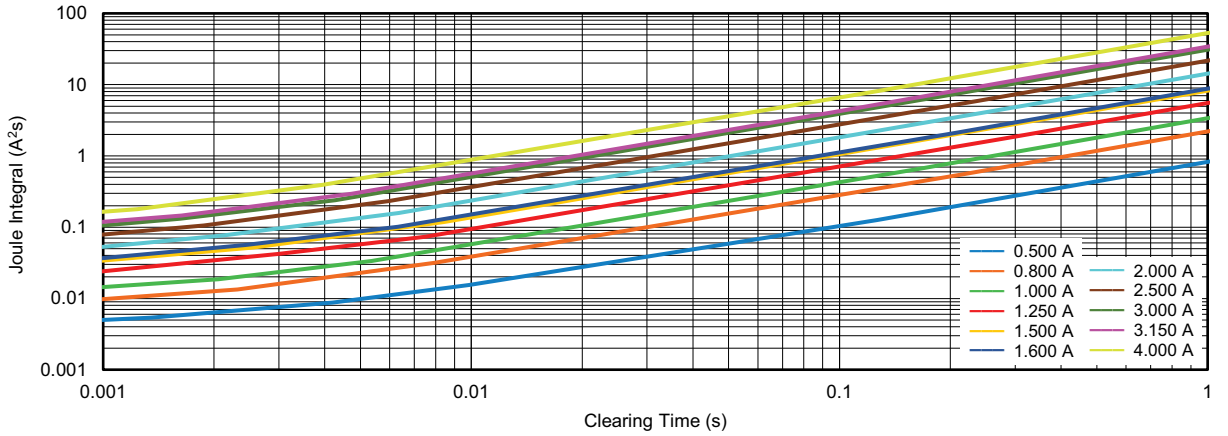
S	3	F	0	6	0	3	5	0	V	1	A	5	0	T	T

MODEL	SIZE	RATING VOLTAGE	RATING CURRENT	TERMINATION	PACKAGING
S3F	**0402** (1005) **0603** (1608) **1206** (3216)	**32 V** **50 V** **63 V**	**A500** = 0.5 A **1A50** = 1.5 A **3A15** = 3.15 A	**T** = Sn	T (tape and reel) = paper tape (5000 / 10 000)

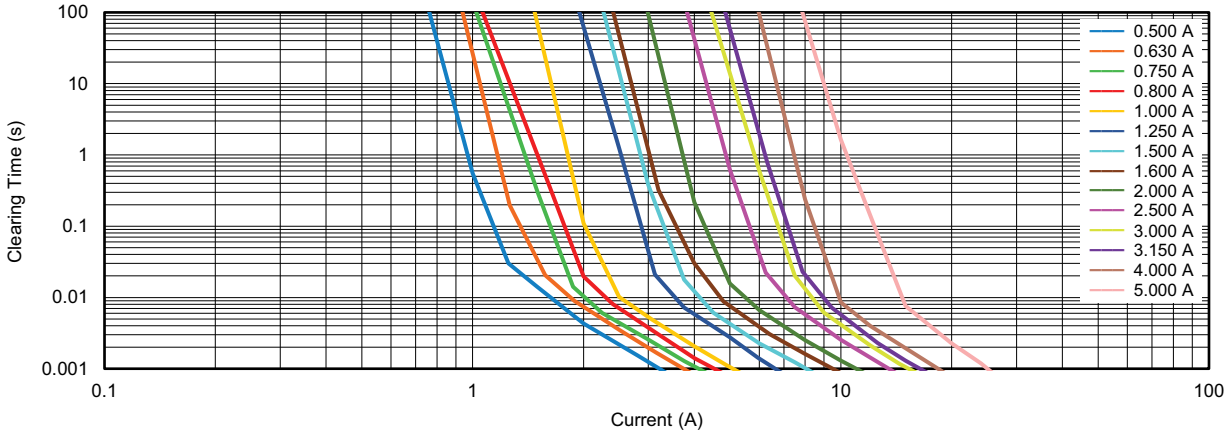
FUNCTIONAL PERFORMANCE



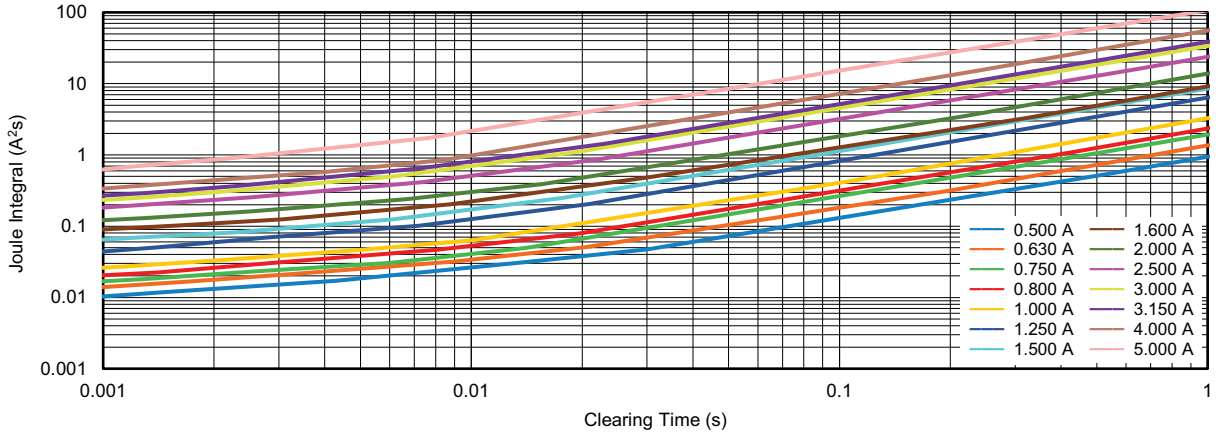
S3F04 (0402 Size) Chip Fuse *I*-t Curve



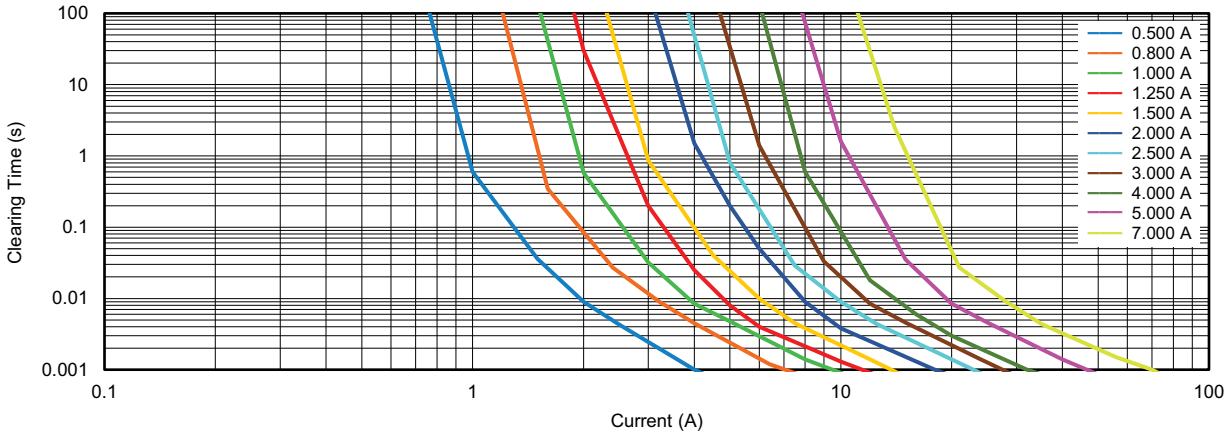
S3F04 (0402 Size) Chip Fuse t-I^2t Curve



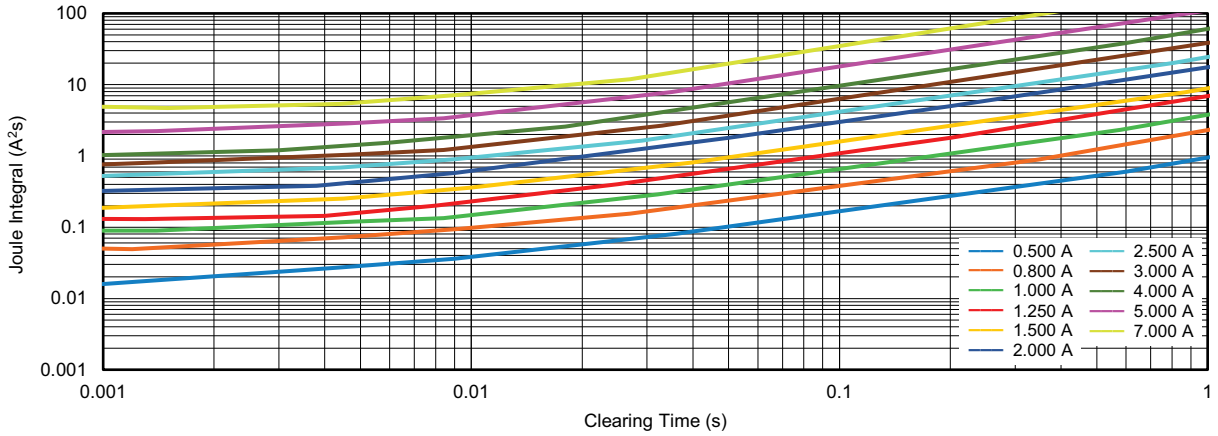
S3F06 (0603 Size) Chip Fuse *I*-t Curve



S3F06 (0603 Size) Chip Fuse t-I^2t Curve



S3F12 (1206 Size) Chip Fuse *I*-t Curve

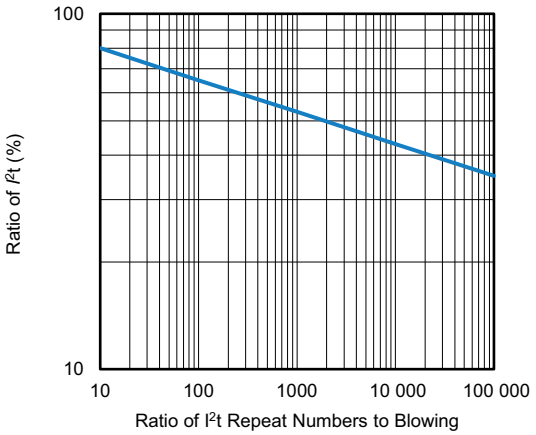


S3F12 (1206 Size) Chip Fuse t-I^2t Curve

Typical Joule integral values ($\int_{t=0}^{t} i^2 .dt$), measured at 10 times rated current, are displayed in the following table:

S3F FUSE I^2t (A^2s)					
PART NUMBER	**TYPICAL I^2t (A^2s)**	**PART NUMBER**	**TYPICAL I^2t (A^2s)**	**PART NUMBER**	**TYPICAL I^2t (A^2s)**
S3F040232VA500TT	0.00317	S3F060350VA500TT	0.0088	S3F120663VA500TT	0.015
S3F040232VA800TT	0.00532	S3F060332VA630TT	0.0125	S3F120663VA800TT	0.040
S3F040232V1A00TT	0.00724	S3F060332VA800TT	0.0206	S3F120663V1A00TT	0.062
S3F040232V1A25TT	0.01344	S3F060332V1A00TT	0.0211	S3F120663V1A25TT	0.094
S3F040232V1A50TT	0.01356	S3F060332V1A25TT	0.0472	S3F120663V1A50TT	0.141
S3F040232V1A60TT	0.01672	S3F060332V1A50TT	0.0623	S3F120663V2A00TT	0.285
S3F040232V2A00TT	0.01983	S3F060332V1A60TT	0.0817	S3F120632V2A50TT	0.445
S3F040232V2A50TT	0.03763	S3F060332V2A00TT	0.1176	S3F120632V3A00TT	0.639
S3F040232V3A00TT	0.05427	S3F060332V2A50TT	0.1807	S3F120632V4A00TT	1.109
S3F040232V3A15TT	0.06304	S3F060332V3A00TT	0.3177	S3F120632V5A00TT	1.710
S3F040232V4A00TT	0.08960	S3F060332V3A15TT	0.3615	S3F120632V7A00TT	3.300
		S3F060332V4A00TT	0.5348		
		S3F060332V5A00TT	0.7726		

Furthermore, for repeated numbers of inrush current, another specific derating must be applied:



Chip Fuse Clearing by Repeated Rush Current

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