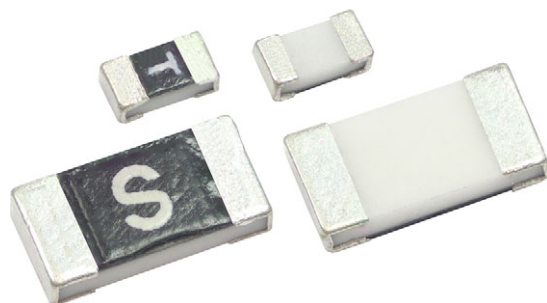


## Very Fast Acting Thin Film Chip Fuses



### FEATURES

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



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

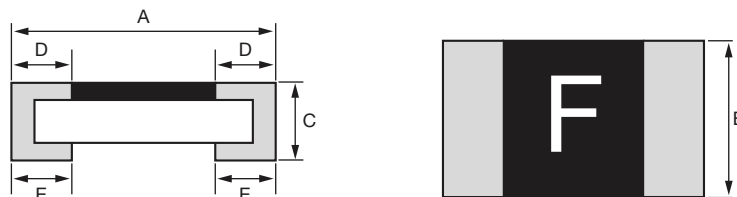
### LINKS TO ADDITIONAL RESOURCES



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 $U_{\text{max}}$ DC	32 V	32 V and 50 V	32 V and 63 V
Cold resistance at $I \leq 0.1 \times I_N$	16 m $\Omega$ to 380 m $\Omega$	10 m $\Omega$ to 260 m $\Omega$	9 m $\Omega$ to 527.5 m $\Omega$
Fusing time	Open within 5 s at 200 % rated power		
Body temperature rise	$< 75\text{ }^{\circ}\text{C}$ at 100 % rated current		
Operating temperature range	$-25\text{ }^{\circ}\text{C}$ to $125\text{ }^{\circ}\text{C}$ with proper derating factor		
Approved UL 248-14 recognition file	E548286		

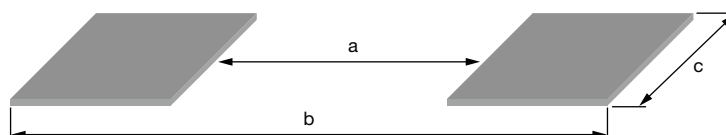
### DIMENSIONS



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

**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 <sup>(1)</sup> (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 <sub>DC</sub>	32 V <sub>DC</sub> , 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**
<sup>(1)</sup> Resistance value was measured with less than 10 % of rated current

**S3F0603 RATING**

PART DESIGNATION	MARKING	RATED CURRENT (A)	FUSING TIME	RESISTANCE <sup>(1)</sup> (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 <sub>DC</sub>	50 V <sub>DC</sub> , 50 A	< 75 °C at 100 % rated current
S3F060332VA630TT	I	0.63		218	32 V <sub>AC/DC</sub>	32 V <sub>AC/DC</sub> , 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**

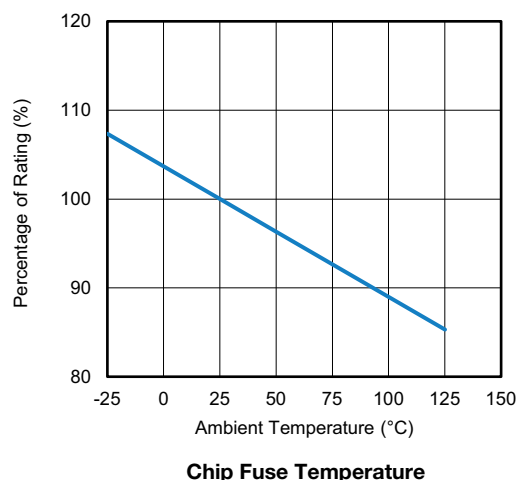
PART DESIGNATION	MARKING	RATED CURRENT (A)	FUSING TIME	RESISTANCE <sup>(1)</sup> (mΩ), TOLERANCE: ± 25 %	RATED VOLTAGE	BREAKING CAPACITY	BODY TEMPERATURE RISING
S3F120663VA500TT	F	0.50	Open within 5 s at 200 % rated current	527.5	63 V <sub>DC</sub>	63 V <sub>DC</sub> , 50 A	< 75 °C at 100 % rated current
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	32 V <sub>DC</sub>	32 V <sub>DC</sub> , 50 A	
S3F120632V2A50TT	T	2.50		37			
S3F120632V3A00TT	3	3.00		26			
S3F120632V4A00TT	W	4.00		18			
S3F120632V5A00TT	Y	5.00		13			
S3F120632V7A00TT	Z	7.00		9			

**Note**
<sup>(1)</sup> 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:



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

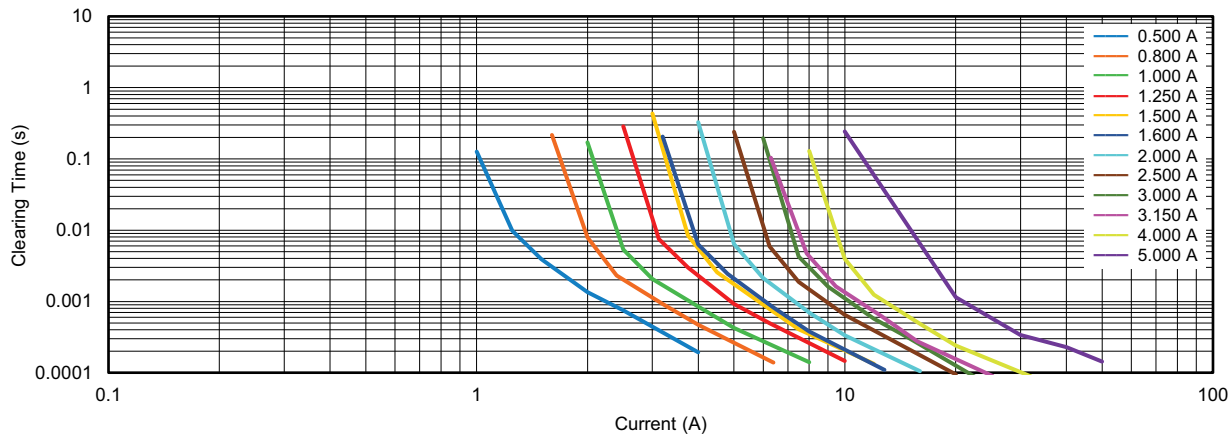
**SOLDERING / MOUNTING PARAMETERS**

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

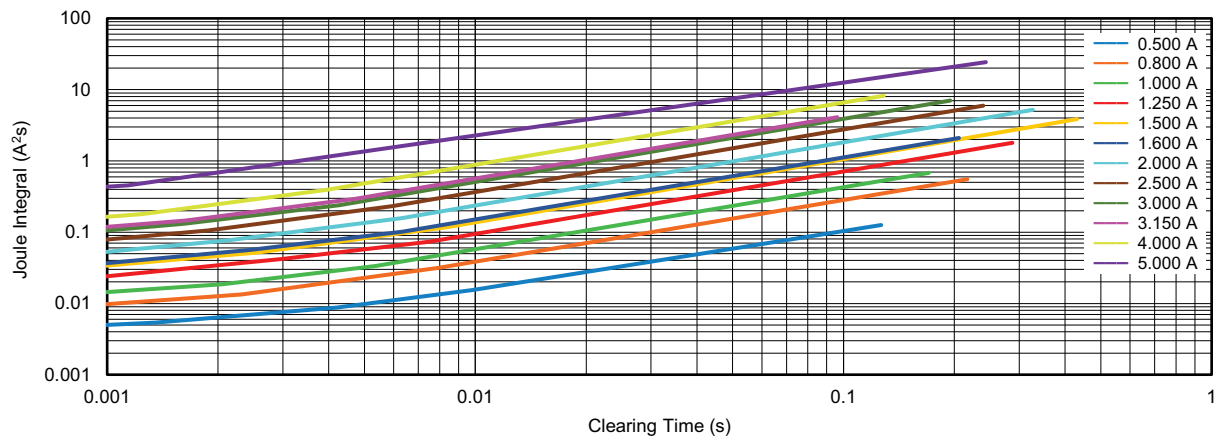
GLOBAL PART NUMBER INFORMATION															
Part Number: S3F060350V1A50TT															
S	3	F	0	6	0	3	5	0	V	1	A	5	0	T	T
MODEL		SIZE			RATING VOLTAGE		RATING CURRENT		TERMINATION			PACKAGING			
S3F		0402 (1005) 0603 (1608) 1206 (3216)			32 V 50 V 63 V		A500 = 0.5 A 1A50 = 1.5 A 3A15 = 3.15 A		T = Sn			T (tape and reel) = paper tape (5000 / 10 000)			



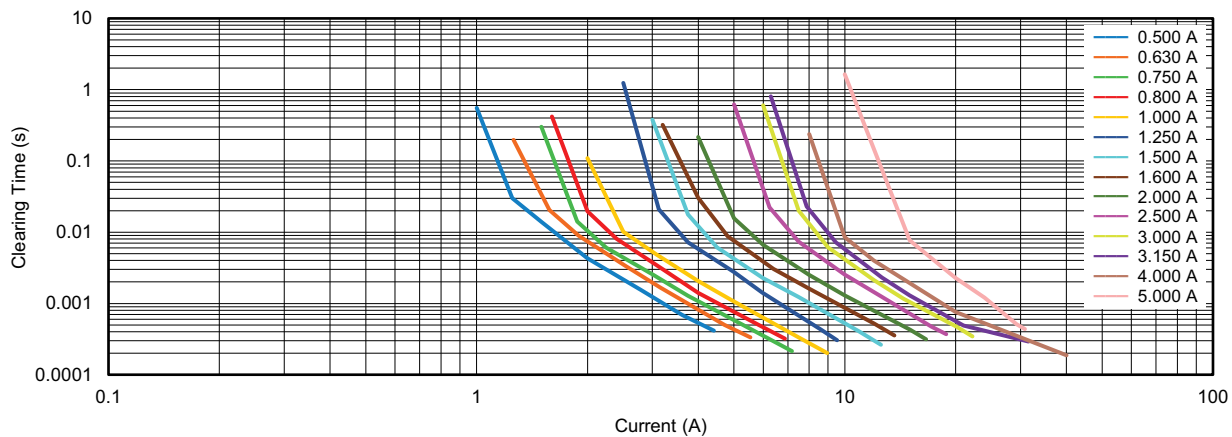
FUNCTIONAL PERFORMANCE



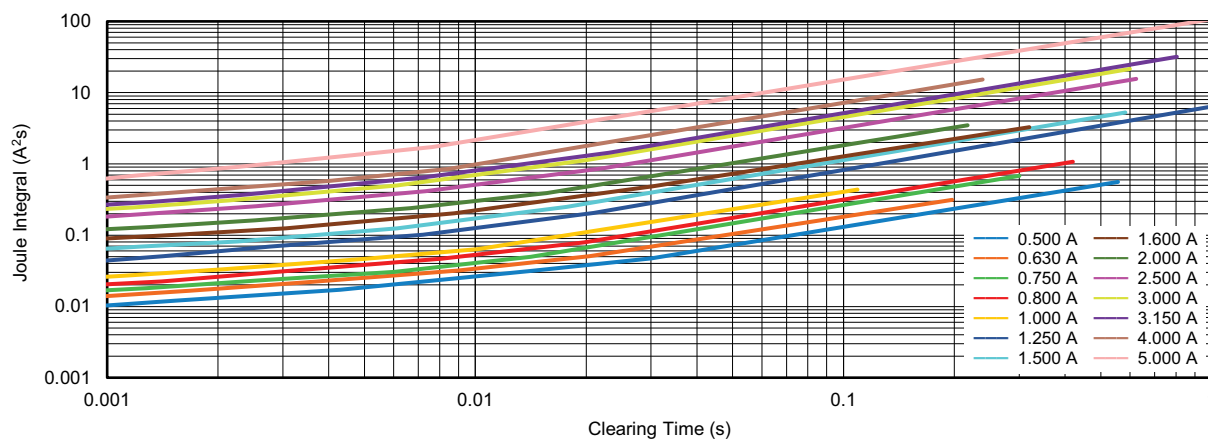
S3F04 (0402 Size) Chip Fuse  $I-t$  Curve



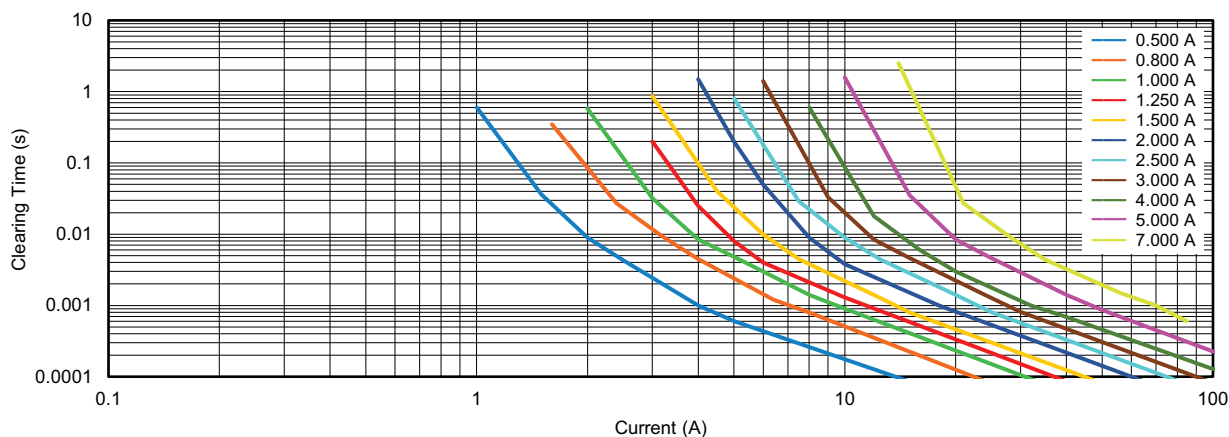
S3F04 (0402 Size) Chip Fuse  $t-I^2t$  Curve



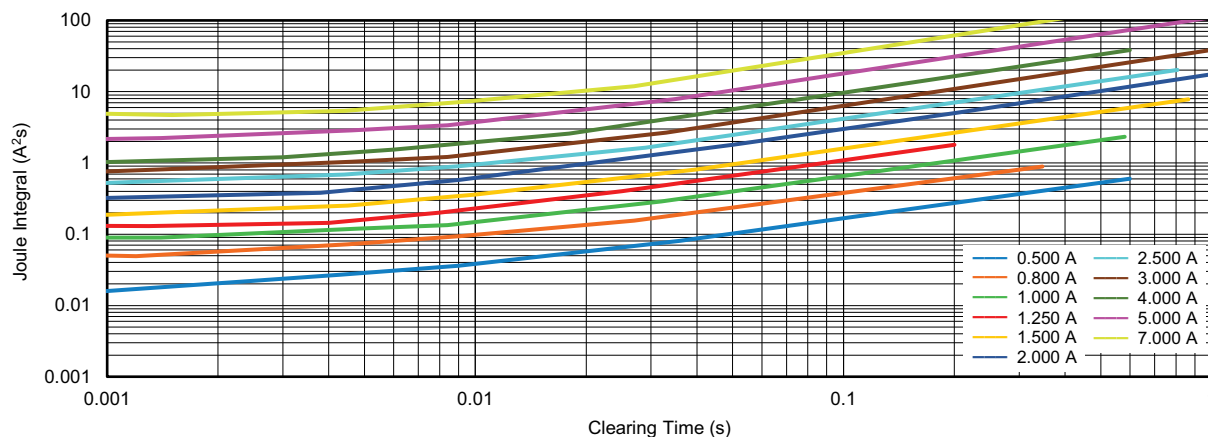
S3F06 (0603 Size) Chip Fuse  $I-t$  Curve



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



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



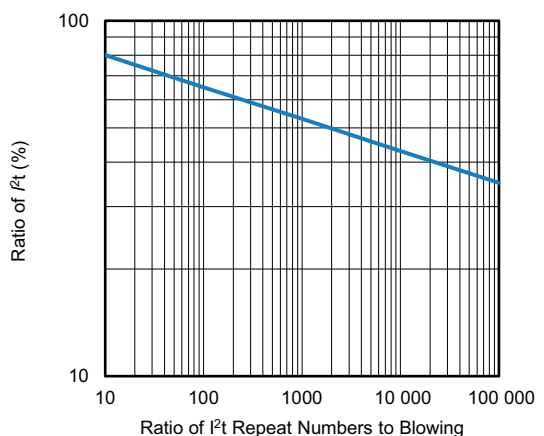
S3F12 (1206 Size) Chip Fuse  $t-I^2t$  Curve



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

<b>S3F FUSE <math>I^2t</math> (A<sup>2</sup>s)</b>					
<b>PART NUMBER</b>	<b>TYPICAL <math>I^2t</math> (A<sup>2</sup>s)</b>	<b>PART NUMBER</b>	<b>TYPICAL <math>I^2t</math> (A<sup>2</sup>s)</b>	<b>PART NUMBER</b>	<b>TYPICAL <math>I^2t</math> (A<sup>2</sup>s)</b>
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**



## Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Vishay products are not designed for use in life-saving or life-sustaining applications or any application in which the failure of the Vishay product could result in personal injury or death unless specifically qualified in writing by Vishay. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.