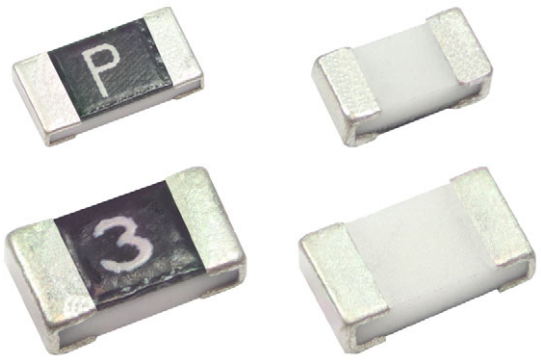
Fast Acting Thin Film Chip Fuses



FEATURES

- 3 sizes: 0402, 0603, and 1206
- Maximal protection as fuses are designed to open in **t < 1 min at 200 % overload**
- UL 248-14 compliant
- From 0.315 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

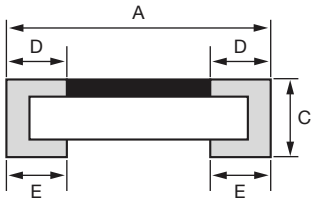
LINKS TO ADDITIONAL RESOURCES

3D Models

S2F 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. For very fast acting see S3F datasheet.

TECHNICAL SPECIFICATIONS			
DESCRIPTION	**S2F0402**	**S2F0603**	**S2F1206**
Imperial size	0402	0603	1206
Rated current I_N range	0.315 A to 4.00 A	0.40 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 $I \leq 0.1 \times I_N$	12 mΩ to 690 mΩ	11 mΩ to 496 mΩ	7.5 mΩ to 517 mΩ
Fusing time	Open within 1 min 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		

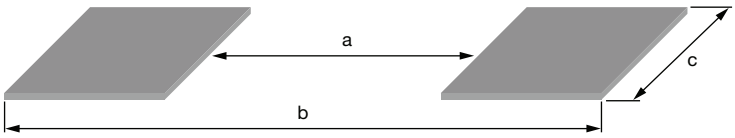
DIMENSIONS



DIMENSIONS AND TOLERANCES in millimeters (inches)					
TYPE	**A**	**B**	**C**	**D**	**E**
S2F0402	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)
S2F0603	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)
S2F1206	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)

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**
S2F0402	0.55 to 065 (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)
S2F0603	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)
S2F1206	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)

S2F0402 RATING

PART DESIGNATION	MARKING	RATED CURRENT (A)	FUSING TIME	RESISTANCE [1] (mΩ), TOLERANCE: ± 25 %	RATED VOLTAGE (V_{DC})	BREAKING CAPACITY
S2F040232VA315TT	D	0.315	Open within 1 min at 200 % rated current	690	32	32 V_{DC}, 35 A
S2F040232VA500TT	F	0.500		340		
S2F040232VA750TT	V	0.750		140		
S2F040232VA800TT	K	0.800		100		
S2F040232V1A00TT	L	1.000		95		
S2F040232V1A25TT	M	1.250		57		
S2F040232V1A50TT	P	1.500		45		
S2F040232V1A60TT	N	1.600		44		
S2F040232V2A00TT	S	2.000		33		
S2F040232V2A50TT	T	2.500		25		
S2F040232V3A00TT	3	3.000		19		
S2F040232V3A15TT	U	3.150		18		
S2F040232V4A00TT	W	4.000		12		

Note

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

S2F0603 RATING						
PART DESIGNATION	MARKING	RATED CURRENT (A)	FUSING TIME	RESISTANCE [1] (mΩ), TOLERANCE: ± 25 %	RATED VOLTAGE (V_{DC})	BREAKING CAPACITY
S2F060350VA400TT	E	0.40	Open within 1 min at 200 % rated current	496	50	50 V_{DC}, 50 A
S2F060350VA500TT	F	0.50		290		
S2F060332VA630TT	I	0.63		205	32	32 V_{DC}, 50 A
S2F060332VA800TT	K	0.80		132		
S2F060332V1A00TT	L	1.00		84		
S2F060332V1A25TT	M	1.25		63		
S2F060332V1A50TT	P	1.50		50.5		
S2F060332V1A60TT	N	1.60		45		
S2F060332V2A00TT	S	2.00		34		
S2F060332V2A50TT	T	2.50		24.5		
S2F060332V3A00TT	3	3.00		20		
S2F060332V3A15TT	U	3.15		19		
S2F060332V4A00TT	W	4.00		13		
S2F060332V5A00TT	Y	5.00		11		

S2F1206 RATING						
PART DESIGNATION	MARKING	RATED CURRENT (A)	FUSING TIME	RESISTANCE [1] (mΩ), TOLERANCE: ± 25 %	RATED VOLTAGE (V_{DC})	BREAKING CAPACITY
S2F120663VA500TT	F	0.50	Open within 1 min at 200 % rated current	517	63	63 V_{DC}, 50 A
S2F120663VA800TT	K	0.80		211		
S2F120663V1A00TT	L	1.00		132		
S2F120663V1A25TT	M	1.25		95		
S2F120663V1A50TT	P	1.50		76		
S2F120663V2A00TT	S	2.00		40.5		
S2F120632V2A50TT	T	2.50		31.5	32	32 V_{DC}, 50 A
S2F120632V3A00TT	3	3.00		23.25		
S2F120632V4A00TT	W	4.00		16		
S2F120632V5A00TT	Y	5.00		12		
S2F120632V7A00TT	Z	7.00		7.5		

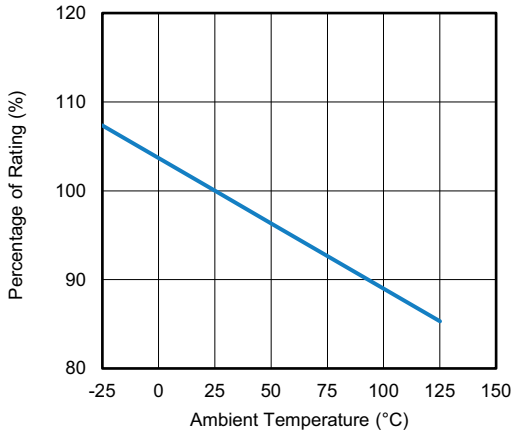
Note

[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.

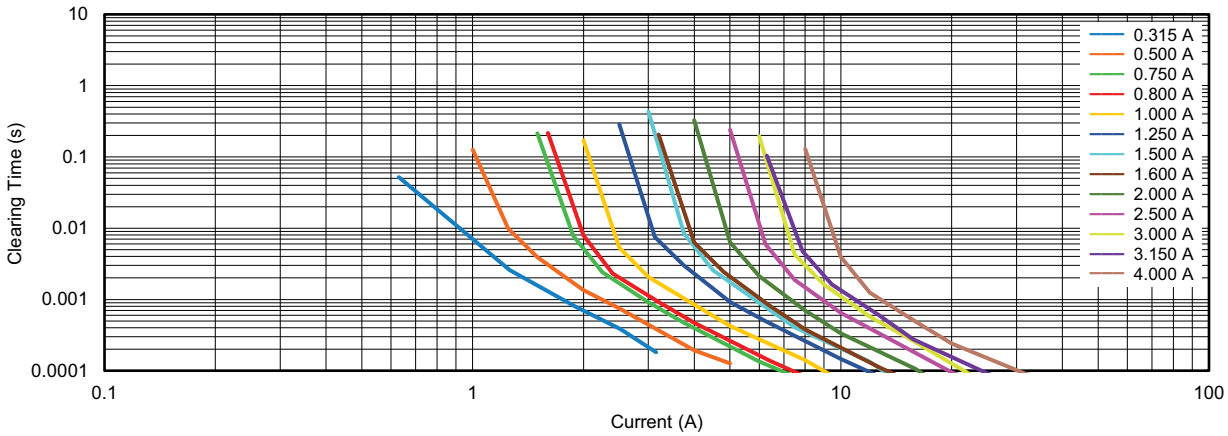
GLOBAL PART NUMBER INFORMATION

Part Number: S2F060332V1A50TT

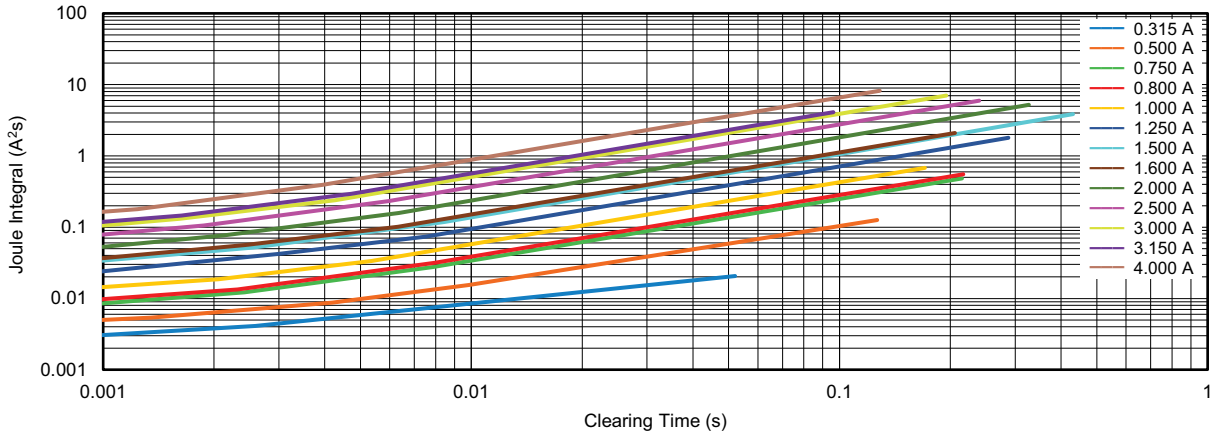
S	2	F	0	6	0	3	3	2	V	1	A	5	0	T	T

MODEL	SIZE	RATING VOLTAGE	RATING CURRENT	TERMINATION	PACKAGING
S2F	**0402** (1005) **0603** (1608) **1206** (3216)	**32V** **50V** **63V**	**A400** = 0.4 A **1A50** = 1.5 A **3A15** = 3.15 A	**T** = Sn	T (tape and reel) = paper tape (5000 / 10 000)

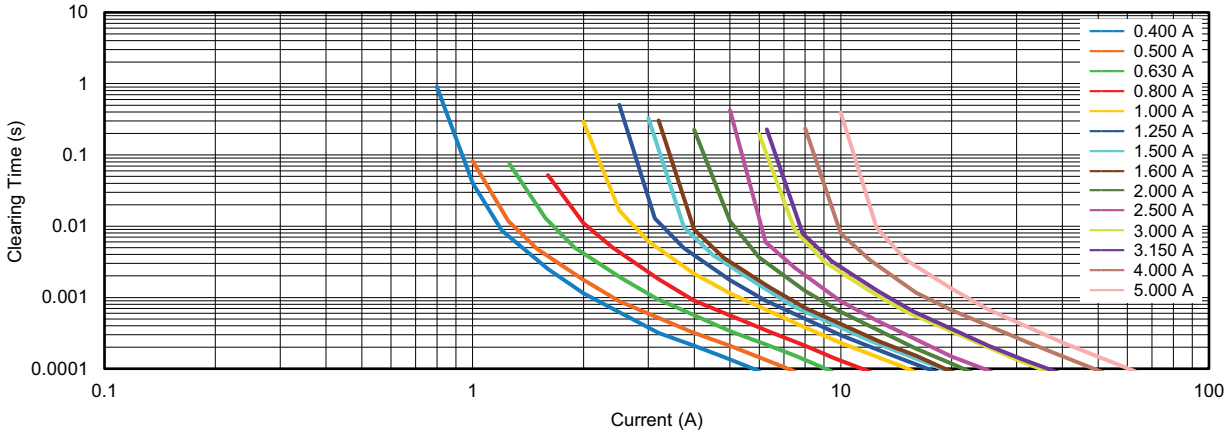
FUNCTIONAL PERFORMANCE



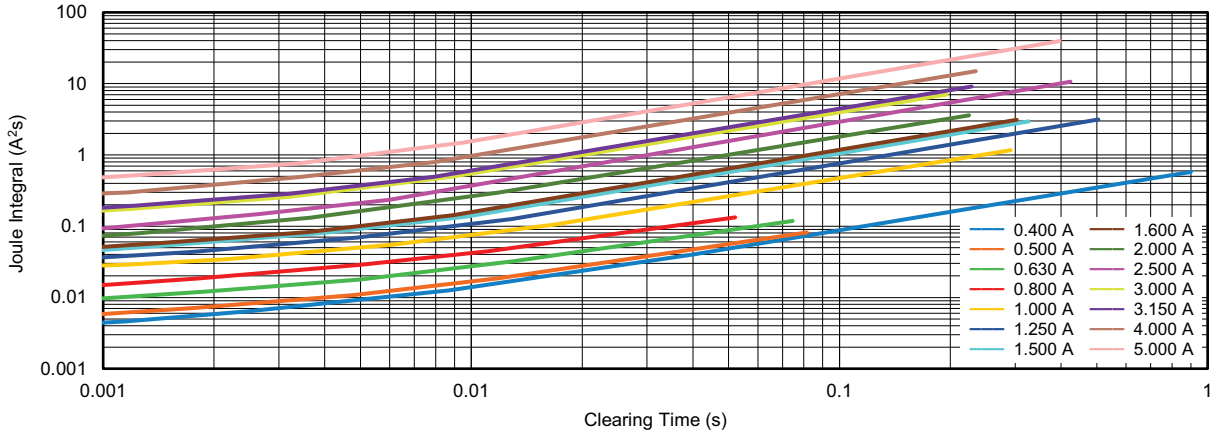
S2F04 (0402 Size) Chip Fuse *I*-t Curve



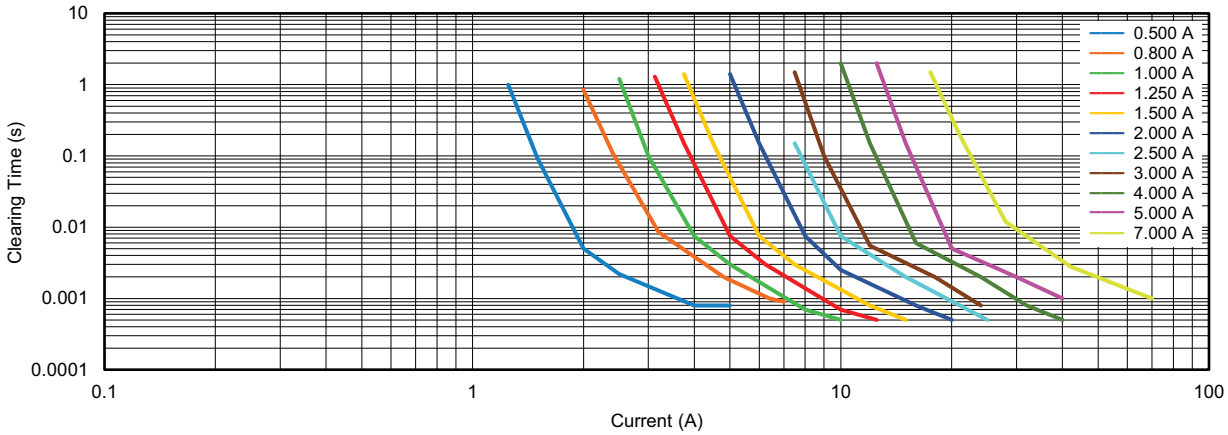
S2F04 (0402 Size) Chip Fuse t-I^2t Curve



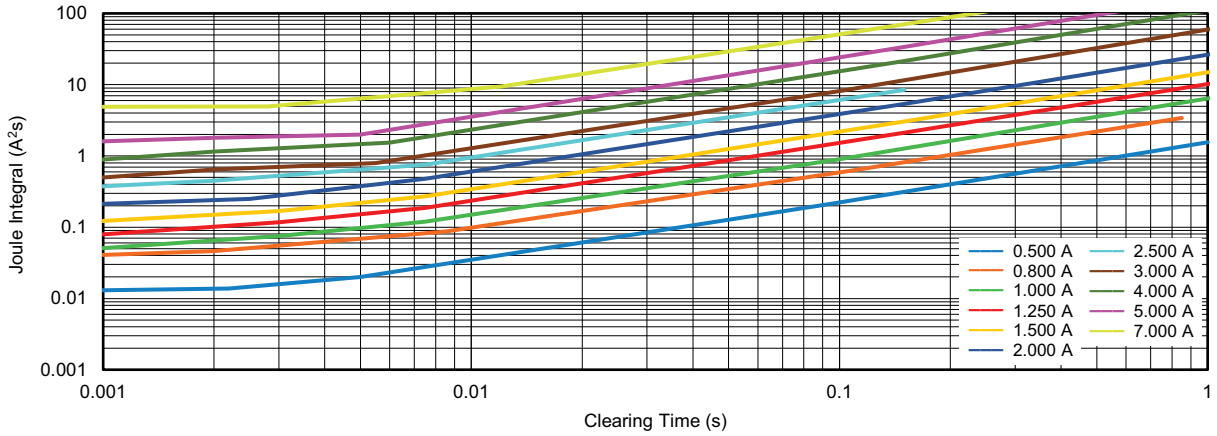
S2F06 (0603 Size) Chip Fuse *I*-t Curve



S2F06 (0603 Size) Chip Fuse t-I^2t Curve



S2F12 (1206 Size) Chip Fuse *I*-t Curve

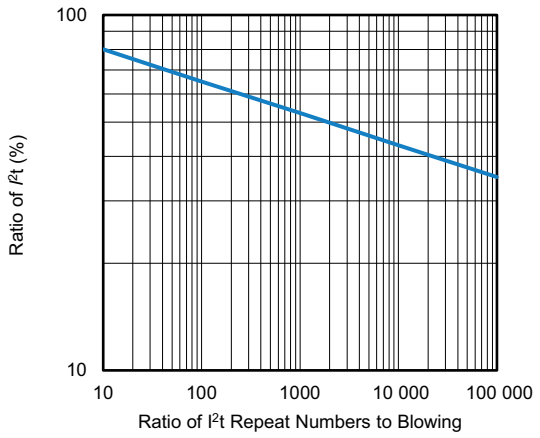


S2F12 (1206 Size) Chip Fuse t-I^2t Curve

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

S2F 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)
S2F040232VA315TT	0.00203	S2F060350VA400TT	0.004	S2F120663VA500TT	0.011
S2F040232VA500TT	0.00317	S2F060350VA500TT	0.005	S2F120663VA800TT	0.031
S2F040232VA750TT	0.00402	S2F060332VA630TT	0.007	S2F120663V1A00TT	0.034
S2F040232VA800TT	0.00532	S2F060332VA800TT	0.014	S2F120663V1A25TT	0.062
S2F040232V1A00TT	0.00724	S2F060332V1A00TT	0.016	S2F120663V1A50TT	0.144
S2F040232V1A25TT	0.01344	S2F060332V1A25TT	0.027	S2F120663V2A00TT	0.181
S2F040232V1A50TT	0.01356	S2F060332V1A50TT	0.037	S2F120632V2A50TT	0.351
S2F040232V1A60TT	0.01672	S2F060332V1A60TT	0.041	S2F120632V3A00TT	0.501
S2F040232V2A00TT	0.01983	S2F060332V2A00TT	0.044	S2F120632V4A00TT	0.954
S2F040232V2A50TT	0.03763	S2F060332V2A50TT	0.055	S2F120632V5A00TT	0.966
S2F040232V3A00TT	0.05427	S2F060332V3A00TT	0.082	S2F120632V7A00TT	3.250
S2F040232V3A15TT	0.06304	S2F060332V3A15TT	0.089		
S2F040232V4A00TT	0.08960	S2F060332V4A00TT	0.239		
		S2F060332V5A00TT	0.433		

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.