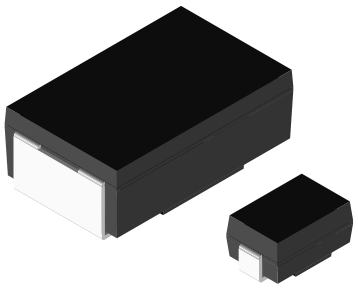
Metal Film Resistors, High Precision, High Stability, Surface Mount



FEATURES

- Extremely low temperature coefficient of resistance
- Molded encapsulation
- Wraparound compliant terminations eliminate the risk of solder fillet cracking
- Solderable terminations
- Excellent stability at different environmental conditions
- For axial-leaded product, see Vishay Dale's PTF datasheet
- Compliant to RoHS directive 2002/95/EC

Pb-free Available

e3

RoHS* COMPLIANT

STANDARD ELECTRICAL SPECIFICATIONS

GLOBAL MODEL	SIZE INCH	POWER RATING $P_{85\,°C}$ W	MAXIMUM WORKING VOLTAGE (1) V_{DC}	TEMPERATURE COEFFICIENT ± ppm/°C	TOLERANCE ± %	RESISTANCE RANGE Ω	ENCAPSULATION
PSF2012	2012	0.125	200	5, 10, 15, 25	0.01, 0.02, 0.05, 0.1, 0.25, 0.5, 1	15 to 100K	Epoxy
PSF4527	4527	0.25	300	5, 10, 15, 25	0.01, 0.02, 0.05, 0.1, 0.25, 0.5, 1	15 to 500K	Thermoplastic

Notes

- Marking: Print-marked-model, value, tolerance, TC, date code.
- DSCC has created a drawing to support the need for a precision 2012-sized product. Vishay Dale is listed as a resource on this drawing as follows:

DSCC DRAWING NUMBER	VISHAY DALE MODEL	POWER RATING $P_{85\,°C}$ W	RESISTANCE RANGE Ω	TOLERANCE ± %	TEMPERATURE COEFFICIENT ± ppm/°C	MAX. WORKING VOLTAGE (1) V_{DC}
02001	PSF2012..1	0.125	15 to 100 K	0.01, 0.02, 0.05, 0.1, 0.25, 0.5, 1	5, 10	200

This drawing can be reviewed at: www.dscc.dla.mil/Programs/MilSpec/listDwgs.asp?DocType=DSCCdwg.

(1) Continuous working voltage shall be $\sqrt{P \times R}$ or maximum working voltage, whichever is less.

TECHNICAL SPECIFICATIONS

PARAMETER	UNIT	PSF2012	PSF4527
Rated dissipation at 85 °C	W	0.125	0.25
Limiting element voltage	V≅	200	300
Insulation voltage (1 min)	V_{eff}	> 500	
Thermal resistance	K/W	< 1300	< 520
Insulation resistance	Ω	≥ 10^{11}	
Category temperature range	°C	- 55 to + 150	
Failure rate	10^{-9}/h	< 1	
Weight/1000 pieces (typical)	g	90	760

GLOBAL PART NUMBER INFORMATION

New Global Part Numbering: PSF201220K50BYTA (preferred part number format)

P	S	F	2	0	1	2	2	0	K	5	0	B	Y	T	A		

GLOBAL MODEL	RESISTANCE VALUE	TOLERANCE CODE	TEMP. COEFFICIENT	PACKAGING	SPECIAL
PSF2012 **PSF4527**	R = Ω K = kΩ **15R00** = 15 Ω **1K000** = 1 kΩ **500K0** = 500 kΩ	**T** = ± 0.01 % **Q** = ± 0.02 % **A** = ± 0.05 % **B** = ± 0.1 % **C** = ± 0.25 % **D** = ± 0.5 % **F** = ± 1 %	**Z** = ± 5 ppm/°C **Y** = ± 10 ppm/°C **X** = ± 15 ppm/°C **E** = ± 25 ppm/°C **0** = Special	**EK** = Lead (Pb)-free, bulk **EA** = Lead (Pb)-free, T/R **BA** = Tin/lead, bulk **TA** = Tin/lead, T/R (full)	Blank = Standard (Dash number) (Up to 2 digits) From **1 to 99** as applicable

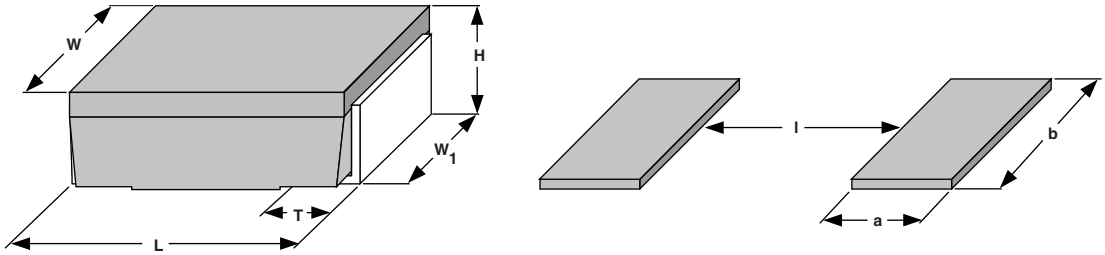
* Pb containing terminations are not RoHS compliant, exemptions may apply

For technical questions, contact: ff2aresistors@vishay.com

Document Number: 30162
Revision: 14-Apr-10

Metal Film Resistors, High Precision, High Stability, Surface Mount

DIMENSIONS in inches (millimeters)

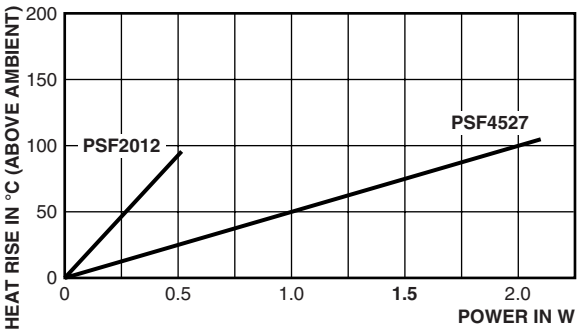


MODEL	L	H	T	W	W_1
PSF2012	0.200 ± 0.020 (5.08 ± 0.508)	0.096 ± 0.015 (2.44 ± 0.381)	0.040 ± 0.010 (1.02 ± 0.254)	0.125 ± 0.005 (3.18 ± 0.127)	0.050 ± 0.005 (1.27 ± 0.127)
PSF4527	0.455 ± 0.020 (11.56 ± 0.508)	0.167 ± 0.010 (4.24 ± 0.254)	0.100 ± 0.010 (2.54 ± 0.254)	0.275 ± 0.005 (6.98 ± 0.127)	0.215 ± 0.005 (5.46 ± 0.127)

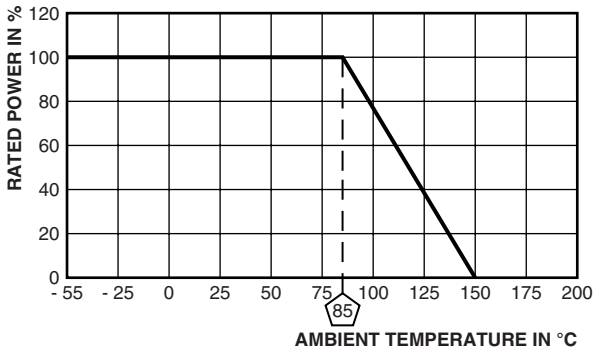
SOLDER PAD DIMENSIONS in inches (millimeters)

MODEL	a	b	l
PSF2012	0.085 (2.16)	0.070 (1.78)	0.080 (2.03)
PSF4527	0.155 (3.94)	0.230 (5.94)	0.205 (5.21)

THERMAL RESISTANCE



DERATING



MATERIAL SPECIFICATIONS

Element	Precision deposited nickel chrome alloy with controlled annealing
Encapsulation	Molded epoxy on the 2012 and molded thermoplastic on the 4527
Core	Fire-cleaned high purity ceramic
Termination	Standard leadframe material is solder-coated copper on the 2012 and solder-coated bronze on the 4527

PACKAGING

MODEL	REEL				
	TAPE WIDTH	DIAMETER	PIECES/REEL	PACKAGING CODE	
				LEAD (Pb)-FREE	LEAD (Pb)-BEARING
PSF2012	12 mm/embossed plastic	330 mm/13"	2000	EA	TA
PSF4527	24 mm/embossed plastic	330 mm/13"	1200	EA	TA

Note

- Embossed carrier tape per EIA-481.

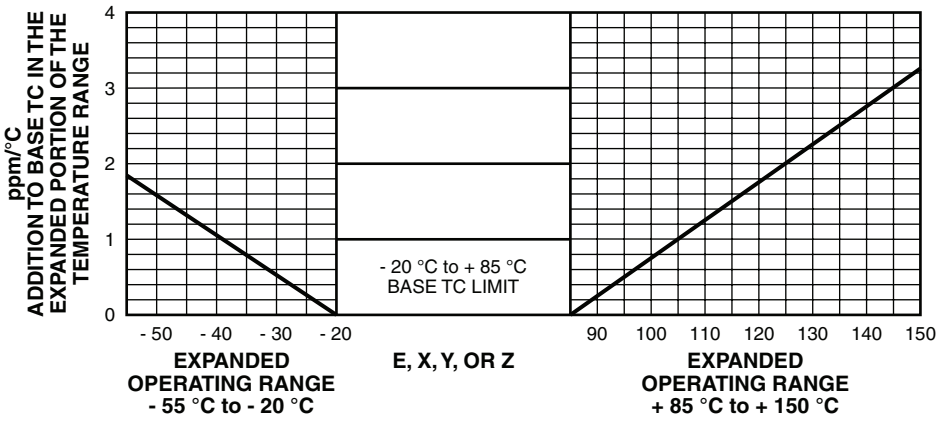
TEMPERATURE COEFFICIENT OF RESISTANCE

Temperature coefficient (TC) of resistance is normally stated as the maximum amount of resistance change from the original + 25 °C value as the ambient temperature increases or decreases. This is most commonly expressed in parts per million per degree centigrade (ppm/°C).

The resistance curve over the operating temperature range is usually a non-linear curve within predictable maximum limits. PSF resistors have a very uniform resistance temperature characteristic when measured over the operating range of - 20 °C to + 85 °C. The standard temperature coefficients available are

E = ± 25 ppm/°C, X = ± 15 ppm/°C, Y = ± 10 ppm/°C, and Z = ± 5 ppm/°C.

Some applications of the PSF require operation beyond the specifications of - 20 °C to + 85 °C. The change in temperature coefficient of resistance is very small (less than ± 0.05 ppm/°C) over the expanded temperature range of - 55 °C to + 150 °C. Therefore, when operating outside the range of - 20 °C to + 85 °C, the designer can plan for a worst case addition of ± 0.05 ppm/°C for each degree centigrade beyond either - 20 °C or + 85 °C as indicated in the graph. This applies to all four temperature coefficient codes.



Example:
Assume the operating characteristics demand a temperature range from - 55 °C to + 125 °C. This requires a ± 35 °C Δ below - 20 °C and a ± 40 °C Δ above + 85 °C. The extreme Δ being ± 40 °C means that the worst case addition to the specified TC limit of ± 0.05 ppm/°C times ± 40 °C or ± 2 ppm/°C. Therefore, a Z which is characterized by a base TC limit of ± 5 ppm/°C over the temperature range of - 20 °C to + 85 °C will exhibit a maximum temperature coefficient of ± 7 ppm/°C over the expanded portion of the temperature range of - 55 °C to 125 °C.

PERFORMANCE

TEST	CONDITIONS OF TEST	TEST RESULTS (TYPICAL TEST LOTS)
Life	MIL-STD-202, method 108, 1000 h rated power at + 85 °C	≤ ± 0.04 %
Short time overload	MIL-PRF-55342, paragraph 4.8.6	≤ ± 0.01 %
Thermal shock	MIL-STD-202, method 107, - 65 °C to + 150 °C	≤ ± 0.02 %
Low temperature operation	MIL-PRF-55342, paragraph 4.8.5	≤ ± 0.02 %
Resistance to bonding exposure	MIL-STD-202, method 210	≤ ± 0.02 %
Moisture resistance	MIL-PRF-55342, paragraph 4.8.9	≤ ± 0.08 %
Solder mounting integrity	MIL-PRF-55342, paragraph 4.8.13, 3 kg for 30 s	No evidence of mechanical damage
Dielectric withstanding voltage	MIL-STD-202, methods 301 and 105	≤ ± 0.01 %
Solderability	MIL-STD-202, method 208	95 % coverage

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.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk and agree to fully indemnify and hold Vishay and its distributors harmless from and against any and all claims, liabilities, expenses and damages arising or resulting in connection with such use or sale, including attorneys fees, even if such claim alleges that Vishay or its distributor was negligent regarding the design or manufacture of the part. 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.

Material Category Policy

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.

Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.