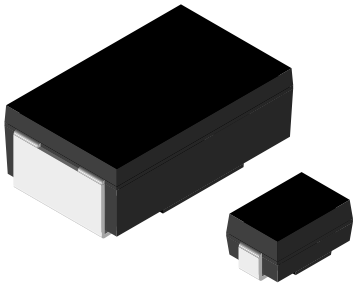
Metal Film Resistors, Power, Surface Mount



Note

* This datasheet provides information about parts that are RoHS-compliant and / or parts that are non RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS-compliant. Please see the information / tables in this datasheet for details

FEATURES

- Molded encapsulation
- Wraparound compliant terminations eliminate risk of solder fillet cracking
- Solderable terminations
- Excellent stability at different environmental conditions
- High power ratings (up to 2 W)
- AEC-Q200 qualified (1)
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Note

(1) Flame retardance test may not be applicable to some resistor technologies

AUTOMOTIVE GRADE Available

Pb-free Available

e3

RoHS* Available

HALOGEN FREE Available

GREEN (5-2008) Available

STANDARD ELECTRICAL SPECIFICATIONS

GLOBAL MODEL	SIZE INCH	POWER RATING $P_{70\,°C}$ W	TOLERANCE ± %	RESISTANCE RANGE Ω	TEMPERATURE COEFFICIENT (2) ± ppm/°C	ENCAPSULATION
WSF2012	2012	0.5	0.5, 1, 5	5.0 to 1.43K (1)	100	Epoxy
WSF2515	2515	1.0	0.5, 1, 5	10 to 10K	100	Thermoplastic
WSF4527	4527	2.0 (3)	0.5, 1, 5	10 to 100K	100	Thermoplastic

Notes

- WSF2012 has been obsoleted; PTN-DR-00013-2018 Rev. 0 - July 20, 2018. WSF2515 and WSF4527 sizes are **not** affected

(1) E96 values only
(2) ± 50 ppm/°C and ± 25 ppm/°C available
(3) Resistance values above 31.25 kΩ are limited to 250 V maximum working voltage

TECHNICAL SPECIFICATIONS

PARAMETER	UNIT	WSF2012	WSF2515	WSF4527
Dielectric withstanding voltage	V_{AC}	> 500	> 500	> 500
Insulation resistance	Ω		$> 10^9$	
Operating temperature range	°C	-65 / +175	-65 / +175	-65 / +150
Maximum working voltage	V	$(P \times R)^{1/2}$	$(P \times R)^{1/2}$	$(P \times R)^{1/2}$ (1)
Weight/1000 pieces (typical)	g	90	165	760

Notes

- Part marking: 1/2 W - DALE, value; 1 W - model, value, tolerance, date code; 2 W - DALE, model, value, tolerance, date code

(1) Resistance values above 31.25 kΩ are limited to 250 V maximum working voltage

GLOBAL PART NUMBER INFORMATION

Global Part Numbering example: WSF25151K500JKTA (preferred numbering format)

W	S	F	2	5	1	5	1	K	5	0	0	J	K	T	A		

GLOBAL MODEL	VALUE	TOLERANCE	TCR	PACKAGING	SPECIAL
WSF2515 **WSF4527**	**R** = decimal **K** = thousand **100R0** = 100 Ω **1K000** = 1 kΩ	**D** = ± 0.5 % **F** = ± 1.0 % **G** = ± 2.0 % **H** = ± 3.0 % **J** = ± 5.0 % **K** = ± 10 %	**E** = ± 25 ppm/°C **H** = ± 50 ppm/°C **K** = ± 100 ppm/°C	**EA** = lead (Pb)-free, tape / reel **EK** = lead (Pb)-free, bulk **TA** = tin / lead, tape / reel (R86) **BA** = tin / lead, tape / reel, bulk (B43)	(dash number) (up to 2 digits) from **1 to 99** as applicable

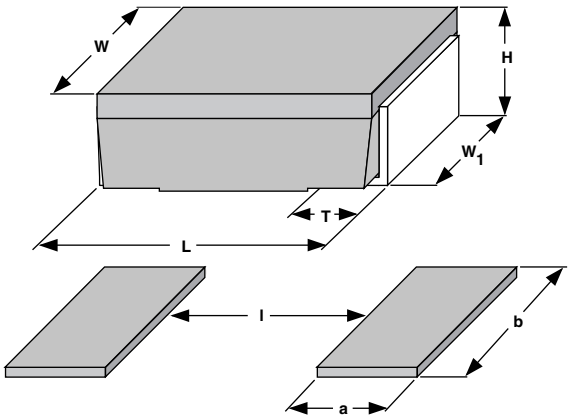
Historical Part Numbering example: WSF2515 1.5 kΩ 5 % 100 ppm/°C R86 (will continue to be accepted for tin/lead product only)

WSF2515	1.5 kΩ	5 %	100 ppm/°C	R86
HISTORICAL MODEL	RESISTANCE VALUE	TOLERANCE CODE	TEMPERATURE COEFFICIENT	PACKAGING

Note

- WSF2012 has been obsoleted; PTN-DR-00013-2018 Rev. 0 - July 20, 2018. WSF2515 and WSF4527 sizes are **not** affected

DIMENSIONS

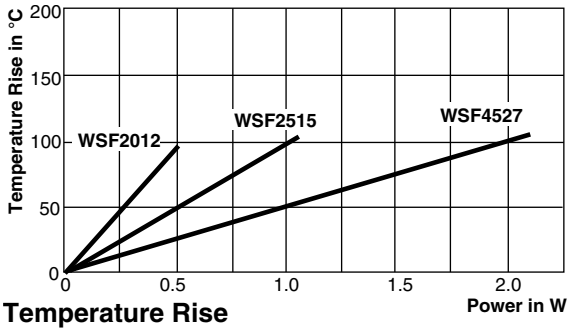


MODEL	DIMENSIONS in inches (millimeters)				
	L	H	T	W	W_1
WSF2515	0.250 ± 0.020 (6.35 ± 0.508)	0.110 ± 0.015 (2.79 ± 0.381)	0.045 ± 0.010 (1.14 ± 0.254)	0.150 ± 0.005 (3.81 ± 0.127)	0.098 ± 0.005 (2.49 ± 0.127)
WSF4527	0.455 ± 0.020 (11.56 ± 0.508)	0.167 ± 0.010 (4.24 ± 0.254)	0.100 ± 0.010 (2.54 ± 0.254)	0.275 ± 0.005 (6.98 ± 0.127)	0.215 ± 0.005 (5.46 ± 0.127)

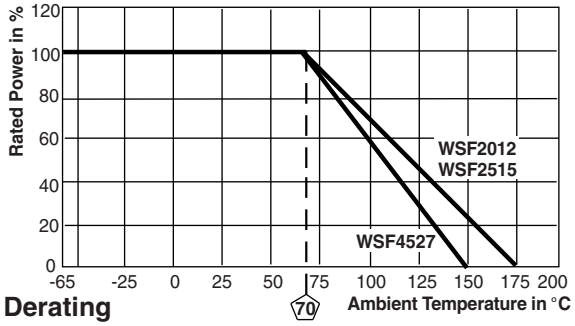
MODEL	SOLDER PAD DIMENSIONS in inches (millimeters)		
	a	b	l
WSF2012	0.085 (2.16)	0.070 (1.78)	0.080 (2.03)
WSF2515	0.090 (2.29)	0.115 (2.92)	0.120 (3.05)
WSF4527	0.155 (3.94)	0.230 (5.94)	0.205 (5.21)

Note

- WSF2012 has been obsoleted; PTN-DR-00013-2018 Rev. 0 - July 20, 2018. WSF2515 and WSF4527 sizes are **not** affected



Temperature Rise



Derating

PERFORMANCE		
TEST	**CONDITIONS OF TEST**	**TEST LIMITS**
Thermal shock	-55 °C to +150 °C, 1000 cycles, 15 min at each extreme	± (1.0 % + 0.05 Ω) Δ*R*
Short time overload	5 x rated power for 5 s	± (0.5 % + 0.05 Ω) Δ*R*
Low temperature storage	-65 °C for 24 h	± (0.5 % + 0.05 Ω) Δ*R*
High temperature exposure	1000 h at +175 °C (150 °C for WSF4527)	± (1.0 % + 0.05 Ω) Δ*R*
Bias humidity	+85 °C, 85 % RH, 10 % bias, 1000 h	± (0.5 % + 0.05 Ω) Δ*R*
Moisture resistance	MIL-STD-202 method 106, 0 % power, 7a and 7b not required	± (0.5 % + 0.05 Ω) Δ*R*
Mechanical shock	100 *g*'s for 6 ms, 5 pulses	± (0.5 % + 0.05 Ω) Δ*R*
Vibration	Frequency varied 10 Hz to 500 Hz in one min, 3 directions, 9 h	± (0.5 % + 0.05 Ω) Δ*R*
Load life	1000 h at rated power, +70 °C, 1.5 h "ON", 0.5 h "OFF"	± (1.0 % + 0.05 Ω) Δ*R*
Resistance to solder heat	+260 °C solder, 10 s to 12 s dwell, 25 mm/s emergence	± (0.5 % + 0.05 Ω) Δ*R*

PACKAGING				
MODEL	**REEL**			
	TAPE WIDTH	**DIAMETER**	**PIECES/REEL**	**CODE**
WSF2515	16 mm / embossed plastic	330 mm / 13"	2000	EA/TA
WSF4527	24 mm / embossed plastic	330 mm / 13"	1200	EA/TA

Notes

- Embossed carrier tape per EIA-481
- WSF2012 has been obsoleted; PTN-DR-00013-2018 Rev. 0 - July 20, 2018. WSF2515 and WSF4527 sizes are **not** affected
- Additional packaging details at www.vishay.com/doc?20051

PRODUCT SUMMARY										
SERIES	SIZE / DEVICE STYLE	TCR (± ppm/°C)	TOLERANCE (± %)	RESISTANCE (Ω)		E-SERIES	POWER RATING (W)	TEMP. (°C)	MAX. VOLTAGE (V)	AUTO.
				MIN.	MAX.					
WSF2012	2012	100	0.5	5	1.43K	E96	0.5	-65 to +175	$(P \times R)^{1/2}$	AGP
WSF2515	2515	100	0.5	10	10K	E96	1	-65 to +175	$(P \times R)^{1/2}$	AGP
WSF4527	4527	100	0.5	10	100K	E96	2	-65 to +150	$(P \times R)^{1/2}$	AGP

TAGS	
TYPE	PARAMETER
Mounting technology	SMD
Technology	Metal film
Applications	Automotive, high temperature
Characteristics	-

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WSF452727K40FKBA WSF452751R00JKBA WSF4527270R0FKBA WSF-2515 500 1%T1TR WSF45273K300JKEA WSF4527560R0JKTA WSF4527150R0FKTA WSF452760K40FKTA WSF-2515 511 1%T1R86 WSF-4527 1.21K 1%R86 WSF2515 2.37K 1%T1TR WSF2515 7.32K1%T1R86 WSF2515 68.1 1%T1R86 WSF-2012 10 1%T1R86 WSF-2515 1K 1%T1 WSF-4527 11K 1%T1TR WSF4527121R0FKEA WSF452768R00FKEA WSF-2515 301 1%T1 WSF-2515 649 1%T1 WSF4527 1.47K1%T1R86 WSF-2515 60.4 1%T1 WSF-2515 604 1%T1 WSF2515150R0DKBA WSF4527470R0FKBA WSF4527680R0FKBA WSF4527392R0FKTA WSF4527150R0FKBA WSF45273K920FKBA WSF-2012 121 1%T1TR WSF-2012 1K 1%T1TR WSF-2012 20 1%T1R86 WSF-2012 21.5 1%T1TR WSF-2012 22.11%T1R86 WSF-2012 47.5 1%T1TR WSF-2515 150 1%T1TR WSF-2515 200 1%T1 WSF-2515 220 1%T1R86 WSF-2515 2K 1%T1 WSF2515 4.64K 1%T1TR WSF-2515 47 1%T1 WSF-2515 47 1%T1TR WSF-4527 1.5K 1%TR WSF-4527 10 1%T1R86 WSF-4527 100 1%T1TR WSF-4527 80 5%T1R86 WSF2012100R0FKBA WSF452750R00FKTA WSF-2012 100 1%T1R86 WSF-2515 71.5 1%T1TR WSF20121K000FHEK WSF201210R00FHEK WSF251510K00FHEK WSF2515100R0FHEK WSF-2515 10K 1%T1 WSF-2515 28 1%T1 WSF201210R00FKTB WSF251530R10FKEA WSF2515221R0FKTA WSF201210R00FKEA WSF2012 54.9 1%T1R86 WSF-4527 47.5 1%TR WSF-4527 750 1%TR WSF-4527 127 1%T1R86 WSF2515150R0FKTA WSF251528R00FKBA WSF251547R00FKBA WSF251510K00FKTA WSF201210R00FKTA WSF45271K470FKTA WSF452780R00FKEA WSF251571R50FKTB WSF201254R90FKTA WSF4527100R0FKTA WSF452710R00FKTA WSF25152K000FKBA WSF20121K000FKTB WSF2515301R0FKBA WSF201247R50FKTA WSF2515220R0FKTA WSF452747R50FKTB WSF4527750R0FKTB WSF251560R40FKBA WSF201221R50FKTA WSF251568R10FKTA WSF2515511R0FKTA WSF25151K000FKTA WSF2515200R0FKTA WSF25151K500FKEK WSF251547R00FKTA WSF25157K320FKTA WSF2012100R0FKTA WSF25152K370FKTB WSF201220R00FKTA WSF45271K500FKTB WSF2515649R0FKBA WSF2515604R0FKBA WSF452711K00FKTB WSF201222R10FKTA WSF2012121R0FKTA