

## Metal Foil Current Sense Resistors, Very High Power (to 2 W)



### FEATURES

- Ultra low sensing resistance minimizes power dissipation, improving efficiency
- Wide side terminal construction (0508 and 0612) for lower ESL
- High power to foot print size ratio (2 W in 0612 and 0.5 W in 0508)
- Sulfur resistant
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
**GREEN**  
(5-2008)

### APPLICATIONS

- Switching power supply
- Voltage regulation module
- DC/DC converter, adaptor, battery pack, charger
- Pad and cell phone
- Power management

### STANDARD ELECTRICAL SPECIFICATIONS

GLOBAL MODEL	SIZE	POWER RATING W	TOLERANCE %	RESISTANCE VALUE RANGE $\Omega$	WEIGHT (typical) g/1000 pieces
WFCP0402	0402	0.25	$\pm 1, \pm 2, \pm 5$	0.0025 to 0.05	1.1
WFCP0508	0508	0.5	$\pm 1, \pm 2, \pm 5$	0.005 to 0.03	6.8
	0508	1.0	$\pm 1, \pm 2, \pm 5$	0.001 to 0.004	6.8
WFCP0603	0603	0.5	$\pm 1, \pm 2, \pm 5$	0.002 to 0.04	3.3
WFCP0612	0612	1.0	$\pm 1, \pm 2, \pm 5$	0.0051 to 0.03	14.7
	0612	2.0	$\pm 1, \pm 2, \pm 5$	0.001 to 0.005	14.7

### GLOBAL PART NUMBER INFORMATION

Global Part Numbering Example: WFCP1206R0100FE66

W	F	C	P	1	2	0	6	R	0	1	0	0	F	E	6	6
GLOBAL MODEL (4 digits)				CASE SIZE (EIA) (4 digits)				RESISTANCE VALUE (5 digits) <sup>(1)</sup>				TOLERANCE CODE (1 digit)		PACKAGING CODE (3 digits)		
WFCP				0402 0508 0603 0612				L = m $\Omega$ <sup>(2)</sup> R = decimal 5L000 = 0.005 $\Omega$ R0100 = 0.01 $\Omega$				F = $\pm 1.0\%$ G = $\pm 2.0\%$ J = $\pm 5.0\%$		E66 = lead (Pb)-free 7" tape/reel		

### Notes

<sup>(1)</sup> Resistance values are available per E12 and E24 decades; [www.vishay.com/doc?28372](http://www.vishay.com/doc?28372)

<sup>(2)</sup> Use "L" for resistance values < 0.01  $\Omega$

TECHNICAL SPECIFICATIONS					
PARAMETER	UNIT	RESISTOR CHARACTERISTICS			
		WFCP0402	WFCP0508	WFCP0603	WFCP0612
Temperature coefficient	ppm/°C	± 100 for 5.1 mΩ to 50 mΩ	± 75 for 5 mΩ to 30 mΩ	± 75 for 10 mΩ to 40 mΩ	± 75 for 5.1 mΩ to 30 mΩ
		± 150 for 2.5 mΩ to 5 mΩ	± 150 for 1 mΩ to 4 mΩ	± 100 for 2 mΩ to 9 mΩ	± 100 for 1 mΩ to 5 mΩ
Operating temperature range	°C	-55 to +170			
Maximum working voltage	V	$(P \times R)^{1/2}$			
Maximum element temperature	°C	170			

## DIMENSIONS in inches (millimeters)

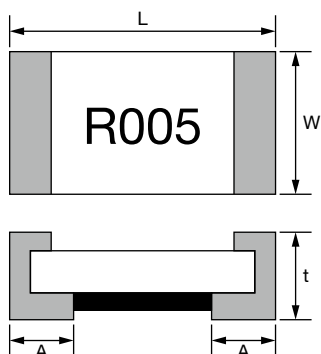


Fig. 1

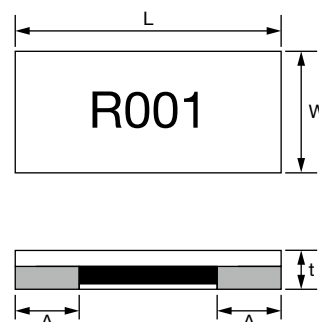


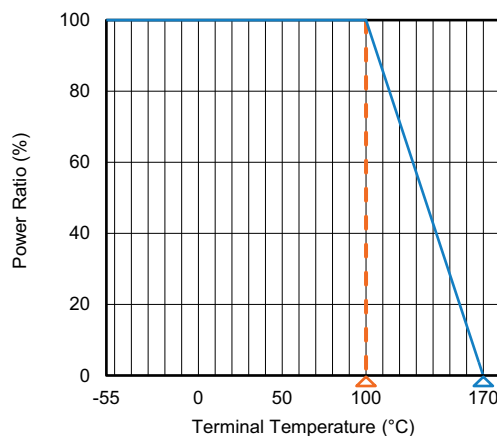
Fig. 2

TYPE (INCH SIZE)	RESISTANCE RANGE (mΩ)	DIMENSIONS (in millimeters)				DIMENSIONS FIG.
		L	W	t	A	
WFCP0402	2.5 to 5	1.00 ± 0.1	0.55 ± 0.1	0.45 ± 0.10	0.45 ± 0.1	1
	5 to 7				0.35 ± 0.1	1
	8 to 50				0.25 ± 0.1	1
WFCP0508	1 to 4	1.35 ± 0.3	2.00 ± 0.2	0.45 ± 0.15	0.40 ± 0.25	2
	5 to 30	1.30 ± 0.2	2.00 ± 0.2	0.60 ± 0.20	0.30 ± 0.2	1
WFCP0603	2 to 40	1.60 ± 0.1	0.80 ± 0.1	0.55 ± 0.15	0.30 ± 0.2	1
WFCP0612	1 to 5	1.60 ± 0.2	3.20 ± 0.20	0.75 ± 0.25	0.30 ± 0.2	2
	5 to 30			0.60 ± 0.20		1

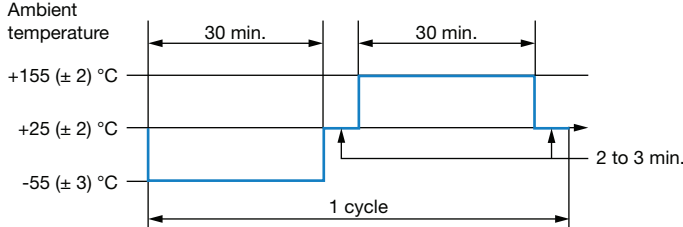
## Note

- 0402 has no marking; 0508, 0603, and 0612 marking shows two digits for resistance

## DERATING

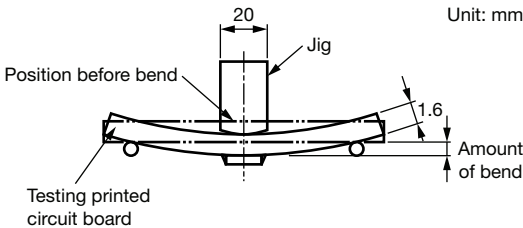


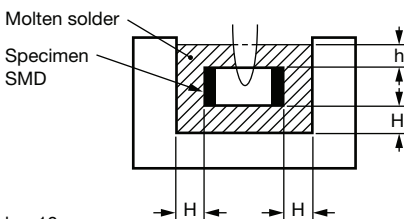
## PERFORMANCES

ENVIRONMENTAL PERFORMANCE			
NO.	ITEM	TEST CONDITION	SPECIFICATION
1 <sup>(1)</sup>	Short time overload	5 times rated power for 5 seconds (JIS-C5202-5.5)	$\Delta R: \pm (1 \% + 0.0005 \Omega)$
2	Temperature coefficient of resistance (TCR)	+25 °C / +125 °C (JIS-C5202-5.2) $\text{TCR (ppm/}^\circ\text{C)} = \frac{\Delta R}{R \times \Delta t} \times 10^6$	Refer to Electrical Specification
3	Damp heat with load	The specimens shall be placed in a chamber and subjected to a relative humidity of 90 % to 95 % and a temperature of 40 °C $\pm$ 2 °C for the period of 1000 hours with applying rated power 1.5 hours ON and 0.5 hour OFF. (MIL-STD-202, method 103)	$\Delta R: \pm (1 \% + 0.0005 \Omega)$
4	High temperature exposure	The chip (mounted on board) is exposed in the heat chamber 125 °C $\pm$ 3 °C for 1000 hours. (JIS-C5202-7.2)	$\Delta R: \pm (1 \% + 0.0005 \Omega)$
5	Load life	Apply rated power at 70 °C $\pm$ 2 °C for 1000 hours with 1.5 hours ON and 0.5 hour OFF. (JIS-C5202-7.10)	$\Delta R: \pm (1 \% + 0.0005 \Omega)$
6	Rapid change of temperature	The chip (mounted on board) is exposed, -55 °C $\pm$ 3 °C (30 min.) / +155 °C $\pm$ 2 °C (30 min.) for 5 cycles. The following conditions as the following figure. (JIS-C5202-7.4)  <div style="text-align: center;">  </div>	$\Delta R: \pm (1 \% + 0.0005 \Omega)$

### Note

<sup>(1)</sup> WFCP0612 short term overload is 3 times for 5 seconds

FUNCTION PERFORMANCE			
NO.	ITEM	TEST CONDITION	SPECIFICATION
1	Bending strength	Mount the chip to test substrate. Apply pressure in direction of arrow unit band width reaches 2 mm (+0.2 / -0 mm) illustrated in the figure below and hold for 10 s $\pm$ 1 s. (JIS-C5202-6.1)  <div style="text-align: center;">  </div>	$\Delta R: \pm (1 \% + 0.0005 \Omega)$
2	Solvent resistance	Complete immersion of specimens in isopropyl alcohol for 3 (+5, -0) min. 25 °C $\pm$ 5 °C. (MIL-STD-202, method 215)	Verify marking permanency. (not required for laser etched parts or parts with no marking)
3	Resistance to solder heat	The specimen chip shall be immersed into the flux specified in the solder bath 260 °C $\pm$ 5 °C for 10 s $\pm$ 1 s. (MIL-STD-202, method 210)	$\Delta R: \pm (1 \% + 0.0005 \Omega)$

FUNCTION PERFORMANCE			
NO.	ITEM	TEST CONDITION	SPECIFICATION
4	Solderability	<p>The specimen chip shall be immersed into the flux specified in the solder bath <math>235^{\circ}\text{C} \pm 5^{\circ}\text{C}</math> for <math>2\text{ s} \pm 0.5\text{ s}</math>. It shall be immersed to a point 10 mm from its root. (Sn96.5 / Ag3.0 / Cu0.5) (JIS-C5 202-6.11)</p>  <p>h = 10 mm H = 10 mm min.</p>	Solder shall be covered 95 % or more of the electrode area.

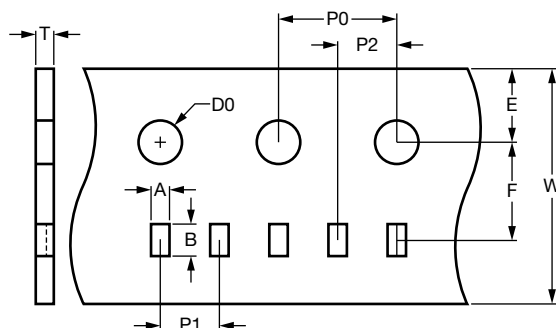
**Notes**

- The surface temperature of component should below  $100^{\circ}\text{C}$
- 0.5 W with total solder pad trace size of  $100\text{ mm}^2$
- 1.0 W with total solder pad trace size of  $150\text{ mm}^2$
- 2.0 W with total solder pad trace size of  $300\text{ mm}^2$
- 3.0 W with total solder pad trace size of  $450\text{ mm}^2$

TAPE PACKAGING SPECIFICATIONS			
MODEL	REEL		
	TAPE WIDTH	DIAMETER	PIECES / REEL
WFCP0402	Embossed paper tape	178 mm / 7"	10 000
WFCP0508 WFCP0603 WFCP0612	Embossed paper tape	178 mm / 7"	5000

**Note**

- Embossed carrier tape per EIA (EIAJ)

**PAPER TAPE SPECIFICATIONS**


TYPE	CARRIER DIMENSIONS (in millimeters)									
	A	B	E	F	W	P0	P1	P2	D0	T
WFCP0402	$0.7 \pm 0.05$	$1.2 \pm 0.05$	$1.75 \pm 0.1$	$3.5 \pm 0.05$	$8.0 \pm 0.2$	$4.0 \pm 0.1$	$2.0 \pm 0.1$	$2.0 \pm 0.05$	$1.55 \pm 0.05$	$0.6 \pm 0.1$
WFCP0508	$1.6 \pm 0.1$	$2.4 \pm 0.1$	$1.75 \pm 0.1$	$3.5 \pm 0.05$	$8.0 \pm 0.2$	$4.0 \pm 0.1$	$4.0 \pm 0.1$	$2.0 \pm 0.05$	$1.55 \pm 0.05$	$0.97 \pm 0.1$
WFCP0603	$1.1 \pm 0.1$	$1.8 \pm 0.1$	$1.75 \pm 0.1$	$3.5 \pm 0.05$	$8.0 \pm 0.2$	$4.0 \pm 0.1$	$4.0 \pm 0.1$	$2.0 \pm 0.05$	$1.55 \pm 0.05$	$0.70 \pm 0.1$
WFCP0612	$2.0 \pm 0.1$	$3.6 \pm 0.1$	$1.75 \pm 0.1$	$3.5 \pm 0.05$	$8.0 \pm 0.2$	$4.0 \pm 0.1$	$4.0 \pm 0.1$	$2.0 \pm 0.05$	$1.55 \pm 0.05$	$0.97 \pm 0.1$

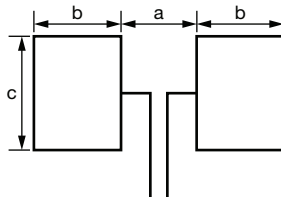
**Notes**

- Embossed carrier tape per EIA (EIAJ)
- Additional packaging details at [www.vishay.com/doc?20051](http://www.vishay.com/doc?20051)

## STORAGE CONDITIONS

Temperature: 5 °C to 35 °C, humidity: 40 % to 75 %

## RECOMMENDED SOLDER PAD LAYOUT



TYPE	PAD LAYOUT DIMENSIONS (in millimeters)		
	a	b	c
0402 (8 mΩ to 50 mΩ)	0.50	0.50	0.60
0402 (2.5 mΩ to 7 mΩ)	0.30	0.60	0.60
0508 (1 mΩ to 30 mΩ)	0.50	1.30	2.60
0603 (2 mΩ to 9 mΩ)	0.60	0.90	1.00
0603 (9.1 mΩ to 40 mΩ)	0.90	0.70	1.00
0612 (5.1 mΩ to 30 mΩ)	0.60	1.30	3.60
0612 (1 mΩ to 5 mΩ)	0.60	1.30	3.80

### Note

- Recommend to use the steel plate which thickness > 100 μm to avoid the insufficient solder height

## SOLDERING RECOMMENDATIONS

- Peak reflow temperatures and durations:
  - IR reflow peak = 260 °C max. for 10 s
  - Wave solder = 260 °C max. for 10 s
- Compatible with lead and lead (Pb)-free solder reflow processes
- Recommended IR reflow profile for surface mount devices: [www.vishay.com/doc?31052](http://www.vishay.com/doc?31052)



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