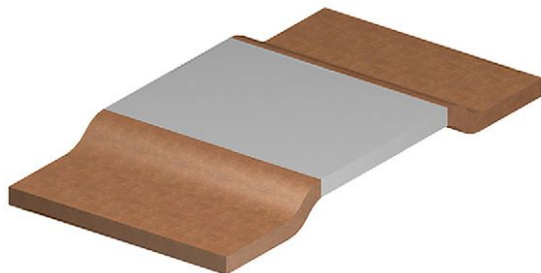


## Power Metal Strip® Resistors, Low Value (down to 0.0002 Ω), Surface Mount



**DESIGN TOOLS** (click logo to get started)



### Notes

- Follow link to Overview of Automotive Grade Products for more details: [www.vishay.com/doc?49924](http://www.vishay.com/doc?49924)

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

### FEATURES

- All welded construction of the Power Metal Strip® resistors are ideal for all types of current sensing, voltage division and pulse applications
- Proprietary processing technique produces extremely low resistance values, down to 0.0002 Ω
- Construction is impervious against a high sulfur environment (ASTM B 809-95 test method)
- Solid metal iron-chrome or manganese-copper alloy resistive element with low TCR (< 20 ppm/°C)
- Very low inductance 0.5 nH to 5 nH
- Low thermal EMF (< 3 μV/°C)
- AEC-Q200 qualified (1)
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

**AUTOMOTIVE  
GRADE**  
Available



**RoHS  
COMPLIANT**

**HALOGEN  
FREE**

**GREEN  
(5-2008)**

### STANDARD ELECTRICAL SPECIFICATIONS

| GLOBAL MODEL | SIZE | POWER RATING<br>$P_{70^{\circ}\text{C}}$<br>W | TOLERANCE<br>% | RESISTANCE<br>VALUE RANGE<br>Ω | RESISTANCE VALUES<br>CURRENTLY AVAILABLE (1)<br>Ω | WEIGHT<br>(typical)<br>g/1000 pieces |
|--------------|------|-----------------------------------------------|----------------|--------------------------------|---------------------------------------------------|--------------------------------------|
| WSL3921      | 3921 | 3.0                                           | 1.0, 5.0       | 0.2m to 4m                     | 0.2m, 0.3m, 0.5m, 0.7m, 1m, 2m, 2.5m, 3m, 4m      | 281                                  |
| WSL5931      | 5931 | 5.0                                           | 1.0, 5.0       | 0.2m to 3m                     | 0.2m, 0.3m, 0.5m, 1m, 2m, 3m                      | 398                                  |

### Note

(1) Other values may be available, contact factory

### TECHNICAL SPECIFICATIONS

| PARAMETER                                                     | UNIT   | RESISTOR CHARACTERISTICS   |                             |
|---------------------------------------------------------------|--------|----------------------------|-----------------------------|
|                                                               |        | WSL3921                    | WSL5931                     |
| Component temperature coefficient<br>(including terminal) (1) | ppm/°C | ± 175 for 0.2 mΩ to 0.7 mΩ | ± 225 for 0.2 mΩ            |
|                                                               |        | ± 75 for 1 mΩ to 4 mΩ      | ± 175 for 0.3 mΩ and 0.5 mΩ |
| Element TCR (2)                                               | ppm/°C | < 20                       |                             |
| Operating temperature range                                   | °C     | -65 to +170                |                             |
| Maximum working voltage (3)                                   | V      | $(P \times R)^{1/2}$       |                             |

### Notes

(1) Component TCR - total TCR that includes the TCR effects of the resistor element and the copper terminal

(2) Element TCR - only applies to the alloy used for the resistor element; refer to item 1 in the construction illustration on the following page

(3) Maximum working voltage - the WSL is not voltage sensitive, but is limited by power / energy dissipation and is also not ESD sensitive

### GLOBAL PART NUMBER INFORMATION

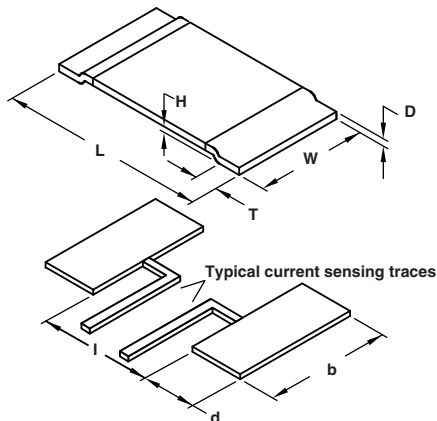
**GLOBAL PART NUMBERING: WSL3921L5000FEA (WSL3921, 0.0005 Ω, ± 1 %)**  
(visit [www.vishay.net](http://www.vishay.net) Vishay Dale parts numbering manual for all options)

|                    |   |   |                            |   |   |                            |   |   |                                                             |   |   |                                                                 |   |   |  |  |
|--------------------|---|---|----------------------------|---|---|----------------------------|---|---|-------------------------------------------------------------|---|---|-----------------------------------------------------------------|---|---|--|--|
| W                  | S | L | 3                          | 9 | 2 | 1                          | L | 5 | 0                                                           | 0 | 0 | F                                                               | E | A |  |  |
| GLOBAL MODEL       |   |   | RESISTANCE VALUE           |   |   | TOLERANCE CODE             |   |   | PACKAGING CODE <sup>(1)</sup>                               |   |   | SPECIAL                                                         |   |   |  |  |
| WSL3921<br>WSL5931 |   |   | L = mΩ<br>L5000 = 0.0005 Ω |   |   | F = ± 1.0 %<br>J = ± 5.0 % |   |   | EA = lead (Pb)-free, tape/reel<br>EK = lead (Pb)-free, bulk |   |   | (dash number)<br>(up to 2 digits)<br>from 1 to 99 as applicable |   |   |  |  |

### Note

(1) Packaging code: EB (lead (Pb)-free) and TB (tin / lead) are non-standard packaging codes designating 1000 piece reels. These non-standard packaging codes are identical to our standard EA (lead (Pb)-free) and TA (tin / lead), except that they have a package quantity of 1000 pieces

## DIMENSIONS



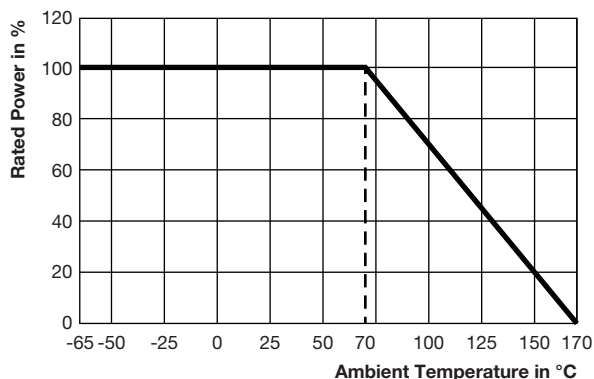
| MODEL   | DIMENSIONS in inches (millimeters) |                                 |                |                                 |
|---------|------------------------------------|---------------------------------|----------------|---------------------------------|
|         | L                                  | W                               | H              | T                               |
| WSL3921 | 0.394 ± 0.010<br>(10.0 ± 0.254)    | 0.205 ± 0.010<br>(5.20 ± 0.254) | 0.020<br>(0.5) | 0.080 ± 0.010<br>(2.00 ± 0.254) |
| WSL5931 | 0.591 ± 0.010<br>(15.0 ± 0.254)    | 0.305 ± 0.010<br>(7.75 ± 0.254) | 0.020<br>(0.5) | 0.157 ± 0.010<br>(4.00 ± 0.254) |

| MODEL   | SOLDER PAD DIMENSIONS in inches (millimeters) |                                 |                                |
|---------|-----------------------------------------------|---------------------------------|--------------------------------|
|         | d                                             | b                               | l                              |
| WSL3921 | 0.106 ± 0.010<br>(2.70 ± 0.254)               | 0.244 ± 0.010<br>(6.20 ± 0.254) | 0.220 ± 0.005<br>(5.60 ± 0.13) |
| WSL5931 | 0.205 ± 0.010<br>(5.20 ± 0.254)               | 0.344 ± 0.010<br>(8.75 ± 0.254) | 0.220 ± 0.005<br>(5.60 ± 0.13) |

### Note

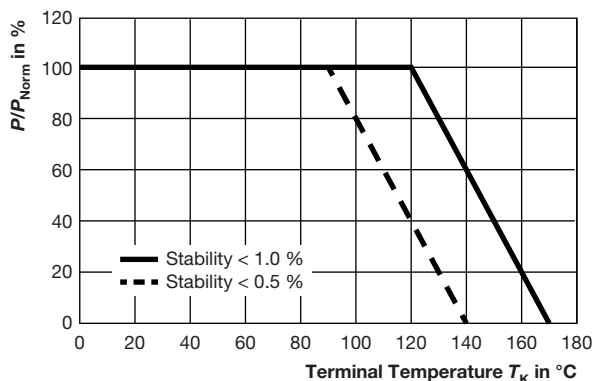
- 3D models available:  
3921 model [www.vishay.com/doc?30310](http://www.vishay.com/doc?30310)  
5931 model [www.vishay.com/doc?30312](http://www.vishay.com/doc?30312)

## DERATING - AMBIENT TEMPERATURE

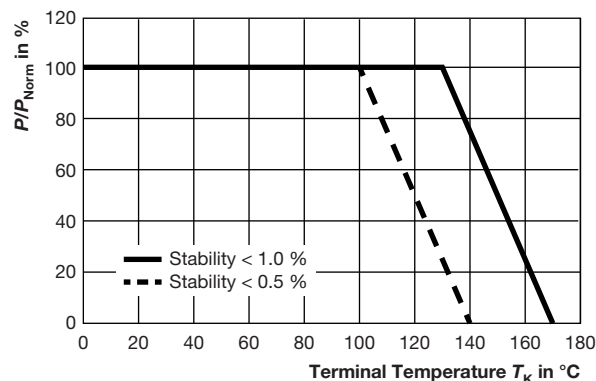


| GLOBAL MODEL | RESISTANCE VALUE (mΩ) | "D" THICKNESS (Inches) | ELEMENT MATERIAL |
|--------------|-----------------------|------------------------|------------------|
| WSL3921      | 0.2                   | 0.0560                 | Mn-Cu            |
| WSL3921      | 0.3                   | 0.0510                 | Mn-Cu            |
| WSL3921      | 0.5                   | 0.0300                 | Mn-Cu            |
| WSL3921      | 1.0                   | 0.0150                 | Mn-Cu            |
| WSL3921      | 2.0                   | 0.0270                 | Fe-Cr            |
| WSL3921      | 3.0                   | 0.0170                 | Fe-Cr            |
| WSL3921      | 4.0                   | 0.0130                 | Fe-Cr            |
| WSL5931      | 0.2                   | 0.0485                 | Mn-Cu            |
| WSL5931      | 0.3                   | 0.0300                 | Mn-Cu            |
| WSL5931      | 0.5                   | 0.0180                 | Mn-Cu            |
| WSL5931      | 1.0                   | 0.0330                 | Fe-Cr            |
| WSL5931      | 2.0                   | 0.0155                 | Fe-Cr            |
| WSL5931      | 3.0                   | 0.0105                 | Fe-Cr            |

## DERATING - TERMINAL TEMPERATURE



Example: WSL3921 0.0005 Ω



Example: WSL5931 0.0005 Ω



| <b>PERFORMANCE</b>        |                                                                |                    |
|---------------------------|----------------------------------------------------------------|--------------------|
| <b>TEST</b>               | <b>CONDITIONS OF TEST</b>                                      | <b>TEST LIMITS</b> |
| Thermal shock             | -55 °C to +150 °C, 1000 cycles, 15 min at each extreme         | ± 1.0 %            |
| Short time overload       | 5x rated power for 5 s                                         | ± 0.5 %            |
| Low temperature storage   | -65 °C for 24 h                                                | ± 0.5 %            |
| High temperature exposure | 1000 h at +170 °C                                              | ± 1.0 %            |
| Bias humidity             | +85 °C, 85 % RH, 10 % bias, 1000 h                             | ± 0.5 %            |
| Mechanical shock          | 100 g's for 6 ms, 5 pulses                                     | ± 0.5 %            |
| Vibration                 | Frequency varied 10 Hz to 2000 Hz in 1 min, 3 directions, 12 h | ± 0.5 %            |
| Load life                 | 1000 h at +70 °C, 1.5 h "ON", 0.5 h "OFF"                      | ± 1.0 %            |
| Resistance to solder heat | +260 °C solder, 10 s to 12 s dwell, 25 mm/s emergence          | ± 0.5 %            |
| Moisture resistance       | MIL-STD-202, method 106, 0 % power, 7a and 7b not required     | ± 0.5 %            |

| <b>PACKAGING</b> |                        |                 |                    |             |
|------------------|------------------------|-----------------|--------------------|-------------|
| <b>MODEL</b>     | <b>REEL</b>            |                 |                    |             |
|                  | <b>TAPE WIDTH</b>      | <b>DIAMETER</b> | <b>PIECES/REEL</b> | <b>CODE</b> |
| WSL3921          | 16 mm/embossed plastic | 330 mm/13"      | 3000               | EA          |
| WSL5931          | 24 mm/embossed plastic | 330 mm/13"      | 1500               | EA          |

**Note**

- Embossed carrier tape per EIA-481



## 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. 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.

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Vishay:

|                                        |                                        |                                        |                                        |                                        |
|----------------------------------------|----------------------------------------|----------------------------------------|----------------------------------------|----------------------------------------|
| <a href="#"><u>WSL39212L000FEA</u></a> | <a href="#"><u>WSL39211L000FEA</u></a> | <a href="#"><u>WSL39213L000FEA</u></a> | <a href="#"><u>WSL3921L3000FEA</u></a> | <a href="#"><u>WSL3921L5000FEA</u></a> |
| <a href="#"><u>WSL59311L000FEA</u></a> | <a href="#"><u>WSL59312L000FEA</u></a> | <a href="#"><u>WSL59313L000FEA</u></a> | <a href="#"><u>WSL5931L2000FEA</u></a> | <a href="#"><u>WSL5931L3000FEA</u></a> |
| <a href="#"><u>WSL5931L5000FEA</u></a> | <a href="#"><u>WSL3921L3000FEK</u></a> | <a href="#"><u>WSL39214L000FEA</u></a> | <a href="#"><u>WSL3921L3000FEB</u></a> | <a href="#"><u>WSL3921L5000FEB</u></a> |
| <a href="#"><u>WSL39211L000FEB</u></a> | <a href="#"><u>WSL39212L000FEB</u></a> | <a href="#"><u>WSL39213L000FEB</u></a> | <a href="#"><u>WSL39214L000FEB</u></a> | <a href="#"><u>WSL5931L2000FEB</u></a> |
| <a href="#"><u>WSL5931L3000FEB</u></a> | <a href="#"><u>WSL5931L5000FEB</u></a> | <a href="#"><u>WSL59311L000FEB</u></a> | <a href="#"><u>WSL59312L000FEB</u></a> | <a href="#"><u>WSL59313L000FEB</u></a> |
| <a href="#"><u>WSL39211L000FEK</u></a> | <a href="#"><u>WSL39214L000FEK</u></a> | <a href="#"><u>WSL3921L5000FEK</u></a> | <a href="#"><u>WSL39212L000FEK</u></a> | <a href="#"><u>WSL39213L000FEK</u></a> |
| <a href="#"><u>WSL5931L3000FEK</u></a> | <a href="#"><u>WSL5931L5000FEK</u></a> | <a href="#"><u>WSL59311L000FEK</u></a> | <a href="#"><u>WSL59312L000FEK</u></a> | <a href="#"><u>WSL59313L000FEK</u></a> |
| <a href="#"><u>WSL3921L2000FEA</u></a> | <a href="#"><u>WSL39213L300FEA</u></a> |                                        |                                        |                                        |