R-300-A/B Resistor Series

Tolerant to Processing and Design Variations

Excellent Printing Characteristics

Low TCR’s

High Performance

Low Cost

The ESL R-300-A and R-300-B Resistor Series are economical, high performance materials for the manufacture of hybrid circuits and resistors networks. Features of the ESL R-300-A and R-300-B Series include excellent printability and low sensitivity to processing conditions.

The dependence of resistance and TCR on blending follows the usual curves for resistor materials. Adjacent members of the Series can be blended. The R-300-A Series members can not be blended with members of the R-300-B Series.

The resistors are calibrated with ESL 9693-SA PdAg conductor terminations. Other silver-based and gold-based conductors can be used; however, TCR and resistivity shifts may be observed.
EFFECT OF OVERGLAZING ON R-300-A/B RESISTORS

RESISTANCE CHANGE AFTER OVERGLAZING WITH G-471

Fired at 500°C, 30 minute cycle, 2 minutes at peak temperature

See Caution and Disclaimer on other side.
## R-300-A/B RESISTOR SERIES
### TYPICAL RESISTOR PROPERTIES

<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>RESISTIVITY(^a) (Ω/square)</td>
<td>1</td>
<td>10</td>
<td>100</td>
<td>1 k</td>
<td>10 k</td>
<td>10 k</td>
<td>100 k</td>
<td>1 M</td>
</tr>
<tr>
<td>SHIPPING SPECIFICATION (%)</td>
<td>± 30</td>
<td>± 10</td>
<td>± 10</td>
<td>± 10</td>
<td>± 10</td>
<td>± 10</td>
<td>± 10</td>
<td>± 10</td>
</tr>
<tr>
<td>COEFFICIENT OF VARIATION (%)</td>
<td>&lt; 8</td>
<td>&lt; 8</td>
<td>&lt; 8</td>
<td>&lt; 8</td>
<td>&lt; 7</td>
<td>&lt; 5</td>
<td>&lt; 5</td>
<td>&lt; 8</td>
</tr>
<tr>
<td>VISCOSITY(^b) (Pa·s)</td>
<td></td>
<td></td>
<td></td>
<td>225 ± 25</td>
<td></td>
<td></td>
<td>300 ± 50</td>
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</tr>
<tr>
<td>DRIED THICKNESS (µm)</td>
<td></td>
<td></td>
<td></td>
<td>22.5 ± 2.5</td>
<td></td>
<td></td>
<td>20.0 ± 2.0</td>
<td></td>
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<tr>
<td>THINNER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ESL 401</td>
</tr>
<tr>
<td>TCR(^c) (ppm/°C)</td>
<td>50 ± 100</td>
<td>0 ± 100</td>
<td>0 ± 100</td>
<td>0 ± 50</td>
<td>0 ± 50</td>
<td>0 ± 100</td>
<td>0 ± 100</td>
<td>0 ± 100</td>
</tr>
<tr>
<td>STOL(^d) (V/mm)</td>
<td>1.65</td>
<td>7.38</td>
<td>24.6</td>
<td>76.8</td>
<td>137</td>
<td>150</td>
<td>350</td>
<td>330</td>
</tr>
<tr>
<td>STD. WORKING VOLTAGE(^e) (V/mm)</td>
<td>0.66</td>
<td>2.95</td>
<td>9.84</td>
<td>30.7</td>
<td>54.8</td>
<td>60</td>
<td>140</td>
<td>130</td>
</tr>
<tr>
<td>MAX RATED POWER(^f) (mW/mm(^2)</td>
<td>436</td>
<td>871</td>
<td>968</td>
<td>944</td>
<td>300</td>
<td>360</td>
<td>190</td>
<td>17</td>
</tr>
<tr>
<td>QUAN-TECH NOISE (dB)</td>
<td>NA</td>
<td>NA</td>
<td>≤ -10</td>
<td>≤ -10</td>
<td>≤ -10</td>
<td>≤ 2</td>
<td>≤ 5</td>
<td>NA</td>
</tr>
<tr>
<td>LASER TRIM (%ΔR) (1000 hours at 150°C)</td>
<td>NA</td>
<td>≤ 0.3</td>
<td>≤ 0.3</td>
<td>≤ 0.3</td>
<td>≤ 0.3</td>
<td>≤ 0.3</td>
<td>≤ 0.4</td>
<td>≤ 0.5</td>
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<tr>
<td>TERMINATION OF CALIBRATION</td>
<td>ESL 9693-SA</td>
<td></td>
<td></td>
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</table>

The R-314-B is used as a blending member with R-315-B. For use as a 10 kΩ/sq. resistor, R-314-A is recommended.

\(^a\) CALIBRATION: Resistor size used for tests; A—1.25 mm square; B—1.0 mm square at dried thickness shown.
\(^b\) VISCOSITY: Brookfield RVT, ABZ Spindle, 10 rpm, 25.5°C±0.5°C.
\(^c\) CTCR: -55°C to +25°C. HTCR: +25°C to +125°C.
\(^d\) STOL: Voltage required, 5 second duration, to induce a resistance change of ±0.1% at 25°C. Resistor size as in 1.
\(^e\) STANDARD WORKING VOLTAGE: 0.4 x STOL Voltage.
\(^f\) MAXIMUM RATED POWER: (Standard Working Voltage)\(^2\)/Resistance.
R-300-A/B Resistor Series

RESISTANCE VERSUS LENGTH

- R-310-A
  - Relative Resistivity vs. Resistor Length (mm)
- R-311-A
  - Relative Resistivity vs. Resistor Length (mm)
- R-312-A
  - Relative Resistivity vs. Resistor Length (mm)
- R-313-A
  - Relative Resistivity vs. Resistor Length (mm)
- R-314-A
  - Relative Resistivity vs. Resistor Length (mm)
- R-314-B
  - Relative Resistivity vs. Resistor Length (mm)
- R-315-B
  - Relative Resistivity vs. Resistor Length (mm)
- R-316-B
  - Relative Resistivity vs. Resistor Length (mm)
R-300-A/B Resistor Series

TCR VERSUS PEAK FIRING TEMPERATURE
(10 minutes at peak temperature)
R-300-A/B Resistor Series

TCR VERSUS TIME AT PEAK FIRING TEMPERATURE (850°C)

R-310-A

R-311-A

R-312-A

R-313-A

R-314-A

R-314-B

R-315-B

R-316-B
R-300-A/B Resistor Series

R-300-A SERIES - RELATIVE RESISTIVITY vs. PEAK FIRING TEMPERATURE

![Graph showing R-300-A series relative resistivity vs. peak firing temperature.](image)

Time at peak temperature = 10 minutes.

Relative Resistivity = resistivity at specified peak firing temperature/resistivity at 850°C.

R-300-B SERIES - RELATIVE RESISTIVITY vs. PEAK FIRING TEMPERATURE

![Graph showing R-300-B series relative resistivity vs. peak firing temperature.](image)
Peak temperature = 850°C
Relative Resistivity = resistivity at specified time at peak temperature/resistivity at 10 minutes.