Thin-Film RF/Microwave Inductor Technology
Accu-L® Series
AEC-Q200 High-Q RF Inductor - L0402 & L0805

ACCU-L® TECHNOLOGY
The L0402 LGA Inductor and the L0805 Accu-L® SMD Inductor are based on thin-film multilayer technology. This technology provides a level of control on the electrical and physical characteristics of the component which gives consistent characteristics within a lot and lot-to-lot. The original design provides small size, excellent high-frequency performance and rugged construction for reliable automatic assembly. The AEC-Q200 Qualified Accu-L® Series is designed to meet the demanding performance specifications in automotive signal and power applications.

FEATURES
• High Q
• RF Power Capability
• High SRF
• Low DC Resistance
• Ultra-Tight Inductance Tolerance
• Standard 0402 and 0805 Chip Sizes
• Low Profile
• Rugged Construction
• Taped and Reeled

APPLICATIONS
• Vehicle to Vehicle Communications
• Infotainment
• Telematics
• GPS
• Radar
• Vehicle Locations Systems
• Keyless Entry
• Filters
• Matching Networks

0402 DIMENSIONS: millimeters (inches)
(Bottom View)

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>1.00±0.10 (0.039±0.004)</td>
</tr>
<tr>
<td>W</td>
<td>0.58±0.07 (0.023±0.003)</td>
</tr>
<tr>
<td>T</td>
<td>0.35±0.10 (0.014±0.004)</td>
</tr>
<tr>
<td>A</td>
<td>0.48±0.05 (0.019±0.002)</td>
</tr>
<tr>
<td>B</td>
<td>0.17±0.05 (0.007±0.002)</td>
</tr>
<tr>
<td>S, H</td>
<td>0.064±0.05 (0.003±0.002)</td>
</tr>
</tbody>
</table>

0805 DIMENSIONS: millimeters (inches)

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>2.11±0.10 (0.083±0.004)</td>
</tr>
<tr>
<td>W</td>
<td>1.5±0.10 (0.059±0.004)</td>
</tr>
<tr>
<td>T</td>
<td>0.9±0.13 (0.036±0.005)</td>
</tr>
<tr>
<td>B</td>
<td>0.25±0.15 (0.010±0.006)</td>
</tr>
</tbody>
</table>

The Important Information/Disclaimer is incorporated in the catalog where these specifications came from or available online at www.avx.com/disclaimer/ by reference and should be reviewed in full before placing any order.
## HOW TO ORDER

<table>
<thead>
<tr>
<th>L</th>
<th>0805</th>
<th>4R7</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product</strong></td>
<td><strong>Inductor</strong></td>
<td><strong>(2) I</strong></td>
</tr>
<tr>
<td><strong>Size</strong></td>
<td><strong>0402</strong></td>
<td><strong>0805</strong></td>
</tr>
</tbody>
</table>

### ELECTRICAL SPECIFICATIONS TABLE FOR ACCU-L® 0402

<table>
<thead>
<tr>
<th>Size</th>
<th>Available Inductance</th>
<th>Test Frequency</th>
<th>-40°C</th>
<th>0°C</th>
<th>70°C</th>
<th>SRF</th>
<th>R&lt;sub&gt;d.c. max. (Ω)</th>
<th>I&lt;sub&gt;d.c. max. (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>500</strong></td>
<td>±0.05 nH</td>
<td>450MHz</td>
<td>40</td>
<td>20</td>
<td>10</td>
<td>0.06</td>
<td>400</td>
<td>0.10</td>
</tr>
<tr>
<td><strong>1 nH</strong></td>
<td>±0.1 nH</td>
<td>900MHz</td>
<td>40</td>
<td>20</td>
<td>10</td>
<td>0.06</td>
<td>400</td>
<td>0.10</td>
</tr>
<tr>
<td><strong>5 nH</strong></td>
<td>±0.5 nH</td>
<td>1900MHz</td>
<td>40</td>
<td>20</td>
<td>10</td>
<td>0.06</td>
<td>400</td>
<td>0.10</td>
</tr>
<tr>
<td><strong>10 nH</strong></td>
<td>±2.0 nH</td>
<td>2400MHz</td>
<td>40</td>
<td>20</td>
<td>10</td>
<td>0.06</td>
<td>400</td>
<td>0.10</td>
</tr>
</tbody>
</table>

Please contact factory for intermediate inductance values within the indicated range.

## ELECTRICAL SPECIFICATIONS TABLE FOR ACCU-L® 0805

<table>
<thead>
<tr>
<th>Test Frequency</th>
<th>-40°C</th>
<th>0°C</th>
<th>70°C</th>
<th>SRF</th>
<th>R&lt;sub&gt;d.c. max. (Ω)</th>
<th>I&lt;sub&gt;d.c. max. (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>450MHz</strong></td>
<td>±0.05 nH</td>
<td>450MHz</td>
<td>40</td>
<td>20</td>
<td>10</td>
<td>0.06</td>
</tr>
<tr>
<td><strong>900MHz</strong></td>
<td>±0.1 nH</td>
<td>900MHz</td>
<td>40</td>
<td>20</td>
<td>10</td>
<td>0.06</td>
</tr>
<tr>
<td><strong>1900MHz</strong></td>
<td>±0.5 nH</td>
<td>1900MHz</td>
<td>40</td>
<td>20</td>
<td>10</td>
<td>0.06</td>
</tr>
<tr>
<td><strong>2400MHz</strong></td>
<td>±2.0 nH</td>
<td>2400MHz</td>
<td>40</td>
<td>20</td>
<td>10</td>
<td>0.06</td>
</tr>
</tbody>
</table>

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1. L, Q, SRF measured on HP 4291A, Boonton 34A and Wiltron 360 Vector Analyzer, RDC measured on Keithley 580 micro-ohmmeter.

2. L, Q, SRF measured on HP 4291A, Boonton 34A and Wiltron 360 Vector Analyzer, RDC measured on Keithley 580 micro-ohmmeter.
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**Typical Q vs. Frequency**

L0805

![Graph showing typical Q vs. frequency for L0805.](image)

Measured on HP4291A and Boonton 34A Coaxial Line

**Typical Inductance vs. Frequency**

L0805

![Graph showing typical inductance vs. frequency for L0805.](image)

Measured on HP4291A and Wiltron 360 Vector Analyzer

**Maximum Temperature Rise**

at 25°C ambient temperature (on FR-4)

L0805

![Graph showing maximum temperature rise.](image)

Temperature rise will typically be no higher than shown by the graph.
The basis of these designs is:

- Both wave and reflow soldering.
- Component movement during soldering.

Component pads must be designed to achieve good joints and minimize defects. Pad designs are given below for different circuit board materials:

- **Pad extension about 0.8mm for wave soldering.**
- **Pad extension about 0.3mm for reflow.**
- **Pad overlap about 0.3mm.**

However, it is not advisable to go below this. It is recommended to decrease this to as low as 85% of component width, but it is not advisable to go below this.

**Storage**

- Components must be stored in an environmental chamber -55°C to +125°C.
- Components placed in environmental chamber -55°C to +125°C. No visible damage.
- Components mounted to a substrate. A force of 5N applied normal to the line joining the terminations and in a line parallel to the substrate. No visible damage.

**Bend Strength**

- Component placed in environmental chamber -55°C to +125°C. Tested as shown in diagram. No visible damage.
- Bend strength is measured using a universal testing machine.

**Temperature Coefficient of Inductance (TCL)**

- Component placed in environmental chamber -55°C to +125°C. The temperature coefficient is measured using a spectrometer.

- The temperature coefficient is calculated using the formula:
  \[ \text{TCL} = \frac{L2-L1}{L1(T2-T1)} \times 10^n \]

- TCL = Temperature Coefficient of Inductance (°C/°C).

**HANDLING**

SMD chips should be handled with care to avoid damage from perspiration and skin oils. The use of plastic tipped tweezers or vacuum pick-ups is strongly recommended for individual components. Bulk handling should ensure that abrasion and mechanical shock are minimized.

**CIRCUIT BOARD TYPE**

- All flexible types of circuit boards may be used (e.g. FR-4, G-10) and also alumina.

For other circuit board materials, please consult factory available online at www.avx.com/disclaimer/ by reference and should be reviewed in full before placing any order.

**ENVIRONMENTAL CHARACTERISTICS**

<table>
<thead>
<tr>
<th>Test</th>
<th>Conditions</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solderability</td>
<td>Components completely immersed in a solder bath at 255 ± 5°C for 2 secs.</td>
<td>Terminations to be well tinned.</td>
</tr>
<tr>
<td>Leach Resistance</td>
<td>Components completely immersed in a solder bath at 260 ±5°C for 60 secs.</td>
<td>Dissolution of termination faces ≤ 15% of area. Dissolution of termination edges ≤ 25% of length.</td>
</tr>
<tr>
<td>Storage</td>
<td>12 months minimum with components stored in &quot;as received&quot; packaging.</td>
<td>Good solderability</td>
</tr>
<tr>
<td>Shear</td>
<td>Components mounted to a substrate. A force of 5N normal to the line joining the terminations and in a line parallel to the substrate.</td>
<td>No visible damage</td>
</tr>
<tr>
<td>Rapid Change of Temperature</td>
<td>Components mounted to a substrate. 5 cycles -55°C to +125°C.</td>
<td>No visible damage</td>
</tr>
<tr>
<td>Bend Strength</td>
<td>Tested as shown in diagram. 1mm deflection 20g/90° 0.5mm 45mm 45mm</td>
<td>No visible damage</td>
</tr>
<tr>
<td>Temperature Coefficient of Inductance (TCL)</td>
<td>Component placed in environmental chamber -55°C to +125°C.</td>
<td>+0 to +125 ppm/°C (typical) TCL = ( \frac{L2-L1}{L1(T2-T1)} \times 10^n )</td>
</tr>
</tbody>
</table>

**CLEANING RECOMMENDATIONS**

Care should be taken to ensure that the devices are thoroughly cleaned of flux residues, especially the space beneath the device. Such residues may otherwise become conductive and effectively offer a lossy bypass to the device. Various recommended cleaning conditions (which must be optimized for the flux system being used) are as follows:

- Cleaning liquids: i-propanol, ethanol, acetylacetone, water, and other standard PCB cleaning liquids.
- Ultrasonic conditions: power – 20w/liter max., frequency – 20kHz to 45kHz.
- Temperature: 80°C maximum (if not otherwise limited by chosen solvent system).
- Time: 5 minutes max.

**STORAGE CONDITIONS**

Recommended storage conditions for Accu-L® prior to use are as follows:

- Temperature: 15°C to 35°C
- Humidity: ≤ 65%
- Air Pressure: 860mbar to 1060mbar

**RECOMMENDED SOLDERING PROFILE**

**PREHEAT & SOLDERING**

The rate of preheat in production should not exceed 4°C/second. It is recommended not to exceed 2°C/second.

Temperature differential from preheat to soldering should not exceed 150°C.

For further specific application or process advice, please consult AVX.

**HAND SOLDERING & REWORK**

Hand soldering is permissible. Preheat of the PCB to 100°C is required.

The most preferable technique is to use hot air soldering tools. Where a soldering iron is used, a temperature controlled model not exceeding 30 watts should be used and set to not more than 260°C. Max i mum allowed time at temperature is 1 minute. When hand soldering, the base side (white side) must be soldered to the board.

**COOLING**

After soldering, the assembly should preferably be allowed to cool naturally. In the event of assisted cooling, similar conditions to those recommended for preheating should be used.

**RECOMMENDED SOLDERING PROFILE**

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For automatic equipment, taped and reeled product is the ideal medium for handling should ensure that abrasion and mechanical shock are minimized.

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