TIN WHISKER FAMILY QUALIFICATION – CLASS 2
ALL SERIES-E, SERIES-L & SERIES-S HIGH-Q MULTILAYER CERAMIC CAPACITORS
PRODUCED BY JOHANSON TECHNOLOGY INC.

RESULTS:

All Johanson Series-E (S42E, S48E, S58E), Series-L (R05L) & Series-S (R07S, R14S, R15S) High-Q Multilayer Ceramic Capacitors are qualified by similarity based on the test results herein.

Three (3) separate, representative, Johanson High-Q Multilayer Ceramic Capacitors all plated on the same Johanson plating line, completed and meet all requirements of:

- JEDEC JESD201 Environmental Acceptance Requirements for Tin Whisker Susceptibility of Tin and Tin Alloy Surface Finishes for Class 2 products
- JEDEC JESD22-A121A Test Method for Measuring Whisker Growth on Tin & Tin Alloy Surface Finishes

All samples exhibited no (zero) tin whisker growth during both specified storage tests, and <= 43 micron tin whisker growth during temperature cycling, therefore meeting the 45 micron specified maximum. This qualifies all Johanson High-Q Multilayer Ceramic Capacitors by similarity.

DETAILS: Johanson High-Q Multilayer Ceramic Capacitors tested:

<table>
<thead>
<tr>
<th>JTI Part Number</th>
<th>Part Description</th>
<th>EIA Size</th>
<th>Manufacturing Order Number</th>
<th>Lot Number</th>
<th>Test ID</th>
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<tbody>
<tr>
<td>_R07S100_V</td>
<td>MLCC, S-Series, High-Q</td>
<td>0402</td>
<td>523539-03</td>
<td>513-6123</td>
<td>C1</td>
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<td>_R14S150_V</td>
<td>MLCC, S-Series, High-Q</td>
<td>0603</td>
<td>526468-04</td>
<td>514-6127</td>
<td>C2</td>
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<td>_R15S161_V</td>
<td>MLCC, S-Series, High-Q</td>
<td>0805</td>
<td>426191-05</td>
<td>421-6081</td>
<td>C3</td>
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</tbody>
</table>

Nine (9) samples of each part number were tested in each of the three (3) Tin Whisker tests conducted in parallel and described in Figure 1. All three (3) tests were run as specified for Class 2 products, i.e., 1500 temperature cycles, and 4000 hours for each of the storage tests.
*Class 2 products* are business critical applications such as Telecom Infrastructure equipment, High-end Servers, Automotive, etc., requiring long product lifetimes and minimal downtime.

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