SURFACE MOUNT DEVICE CAPACITORS – FOOTPRINT COMPATIBILITY:

Tantalum chip and Hi CV MLCC have a large degree of overlap in available capacitance ratings in common footprints. As MLCC production increased, many applications converted from tantalum to MLCC for many filtering, bypass, and hold-up applications.

With the increasing demands seen for low voltage digital applications, tantalum electrolytic technologies have become a first choice for MLCC substitution.
Reverse Bias / Non-Polar Operation:
For non-polar operation, connect two electrolytic capacitors in series back-to-back (typically common negative). Two identical capacitors in series will have half the capacitance of a single capacitor, the same voltage rating, but will now be bidirectional (non-polar).

ESR (Equivalent Series Resistance):
The impedance curve of a Hi CV MLCC has a high Q (sharp resonance) and very low ESR. The impedance curve of tantalum and niobium oxide electrolytic capacitors has a broadband characteristic with low ESR, which increases at low temperatures. The impedance curve of polymer electrolytic capacitors also has a broadband characteristic, but with lower ESR than tantalum and niobium oxide electrolytics, and remains low at low temperatures.

SPECIFICATION COMPARISON

Voltage Coefficient:
The capacitance of a Hi CV MLCC will decrease as bias voltage increases. Tantalum, polymer, and niobium oxide show no voltage coefficient effect.

Temperature Coefficient:
The capacitance of a Hi CV MLCC will decrease at both high and low temperatures. Tantalum, polymer, and niobium oxide show no voltage coefficient effect.

Reverse Bias / Non-Polar Operation:
For non-polar operation, connect two electrolytic capacitors in series back-to-back (typically common negative). Two identical capacitors in series will have half the capacitance of a single capacitor, the same voltage rating, but will now be bidirectional (non-polar).

CHECK FOR:
Voltage Coefficient: Cap Loss vs V
Piezo Noise: @ Audio Frequencies
Reverse Voltage: Not Allowed
To Be Considered: Parametric Stability vs DC Bias, Ripple & Temperature

DESIGN PARAMETER
Maximum Available Capacitance by Case Size (6.3V):

<table>
<thead>
<tr>
<th>Case Size</th>
<th>0402</th>
<th>0603</th>
<th>0805</th>
<th>1206</th>
<th>1210</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tantalum</td>
<td>22</td>
<td>100</td>
<td>100</td>
<td>220</td>
<td>220</td>
</tr>
<tr>
<td>Polymer</td>
<td>4.7</td>
<td>47</td>
<td>100</td>
<td>100</td>
<td>330</td>
</tr>
<tr>
<td>NbO</td>
<td>–</td>
<td>–</td>
<td>22</td>
<td>47</td>
<td>100</td>
</tr>
</tbody>
</table>

TECH COMPARISON

Voltage Coefficient:
The capacitance of a Hi CV MLCC will decrease as bias voltage increases. Tantalum, polymer, and niobium oxide show no voltage coefficient effect.

Temperature Coefficient:
The capacitance of a Hi CV MLCC will decrease at both high and low temperatures. Tantalum, polymer, and niobium oxide show no voltage coefficient effect.

Miscellaneous:
- Maximum Available Capacitance by Case Size (6.3V):
  - Tantalum: 22μF, 100μF, 220μF, 220μF
  - Polymer: 4.7μF, 47μF, 100μF, 330μF
  - NbO: –, –, 22μF, 47μF

ECR (Equivalent Series Resistance):
The impedance curve of a Hi CV MLCC has a high Q (sharp resonance) and very low ESR. The impedance curve of tantalum and niobium oxide electrolytic capacitors has a broadband characteristic with low ESR, which increases at low temperatures. The impedance curve of polymer electrolytic capacitors also has a broadband characteristic, but with lower ESR than tantalum and niobium oxide electrolytics, and remains low at low temperatures.