Printed Circuit Board Mount Power Film Capacitors

C4AQ, Radial, 2 or 4 Leads, 500 - 1,500 VDC, for DC Link (Automotive Grade)

Overview

C4AQ capacitors are polypropylene metallized film with rectangular plastic box-type design, filled with resin (white and grey color) and 2 or 4 tinned copper wires.

Automotive grade devices meet the demanding Automotive Electronics Council’s AEC–Q200 qualification requirements.

Benefits

• Self-healing
• Low losses
• High ripple current
• High capacitance density
• High contact reliability
• Suitable for high frequency applications
• Automotive grades (AEC–Q200)

Applications

Typical applications include DC filtering, DC link, power electronics, IGBT snubbers, energy storage, renewable energy grid interface, motor drives, and automotive applications.

Part Number System

<table>
<thead>
<tr>
<th>C4</th>
<th>A</th>
<th>Q</th>
<th>U</th>
<th>B</th>
<th>W</th>
<th>5270</th>
<th>A</th>
<th>3</th>
<th>N</th>
<th>J</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Series Type Application Rated Voltage (VDC) Case Terminals Code Capacitance Code (pF) C-Spec Lead Diameter (mm) Size Code: B x H x L (mm) Tolerance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C4</td>
<td>MKP</td>
<td>Power Capacitors</td>
<td>A = Box, wire terminals Q = DC Link Automotive Grade</td>
<td>L = 500 C = 650 I = 800 Q = 1,100 U = 1,300 S = 1,500</td>
<td>B = Box, plastic case E = Extended box, plastic case</td>
<td>U = 2 pins W = 4 pins</td>
<td>Digits two - four indicate the first three digits of the capacitance value. First digit indicates the number of zeros to be added.</td>
<td>A = Standard B - Z = Special</td>
<td>1 = 0.8 2 = 1.0 3 = 1.2</td>
<td>Digit 6 = B W = 11 x 20 x 31.5 X = 13 x 25 x 31.5 Y = 14 x 28 x 31.5 1 = 19 x 29 x 31.5 2 = 22 x 37 x 31.5 F = 20 x 40 x 42 J = 28 x 37 x 42 L = 30 x 45 x 42 O = 35 x 50 x 42 M = 30 x 45 x 57.5 N = 35 x 50 x 57.5</td>
</tr>
</tbody>
</table>

Click image above for interactive 3D content

Open PDF in Adobe Reader for full functionality
Dimensions – Millimeters

<table>
<thead>
<tr>
<th>Size Code</th>
<th>p</th>
<th>p1</th>
<th>B</th>
<th>H</th>
<th>L</th>
<th>LL</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digit 6</td>
<td>Digit 14 Nominal</td>
<td>Tolerance</td>
<td>Nominal</td>
<td>Tolerance</td>
<td>Nominal</td>
<td>Tolerance</td>
<td>Nominal</td>
</tr>
<tr>
<td>B W</td>
<td>27.5 ±0.4</td>
<td>-</td>
<td>11.0</td>
<td>+0.3</td>
<td>20.0</td>
<td>+0.2</td>
<td>31.5</td>
</tr>
<tr>
<td>B X</td>
<td>27.5 ±0.4</td>
<td>-</td>
<td>13.0</td>
<td>+0.3</td>
<td>25.0</td>
<td>+0.2</td>
<td>31.5</td>
</tr>
<tr>
<td>B Y</td>
<td>27.5 ±0.4</td>
<td>-</td>
<td>14.0</td>
<td>+0.3</td>
<td>28.0</td>
<td>+0.2</td>
<td>31.5</td>
</tr>
<tr>
<td>B 1</td>
<td>27.5 ±0.4</td>
<td>-</td>
<td>19.0</td>
<td>+0.3</td>
<td>29.0</td>
<td>+0.2</td>
<td>31.5</td>
</tr>
<tr>
<td>B 2</td>
<td>27.5 ±0.4</td>
<td>-</td>
<td>22.0</td>
<td>+0.3</td>
<td>37.0</td>
<td>+0.2</td>
<td>31.5</td>
</tr>
<tr>
<td>B F</td>
<td>37.5 ±0.4</td>
<td>5.1/10.2</td>
<td>+0.4</td>
<td>20.0</td>
<td>+0.4</td>
<td>40.0</td>
<td>+0.2</td>
</tr>
<tr>
<td>B J</td>
<td>37.5 ±0.4</td>
<td>10.2</td>
<td>+0.4</td>
<td>28.0</td>
<td>+0.4</td>
<td>37.0</td>
<td>+0.2</td>
</tr>
<tr>
<td>B L</td>
<td>37.5 ±0.4</td>
<td>20.3</td>
<td>+0.4</td>
<td>30.0</td>
<td>+0.4</td>
<td>45.0</td>
<td>+0.2</td>
</tr>
<tr>
<td>B O</td>
<td>37.5 ±0.4</td>
<td>20.3</td>
<td>+0.4</td>
<td>35.0</td>
<td>+0.4</td>
<td>50.0</td>
<td>+0.2</td>
</tr>
<tr>
<td>B M</td>
<td>52.5 ±0.4</td>
<td>20.3</td>
<td>+0.4</td>
<td>30.0</td>
<td>+0.5</td>
<td>45.0</td>
<td>+0.3</td>
</tr>
<tr>
<td>B N</td>
<td>52.5 ±0.4</td>
<td>20.3</td>
<td>+0.4</td>
<td>35.0</td>
<td>+0.5</td>
<td>50.0</td>
<td>+0.3</td>
</tr>
<tr>
<td>E A</td>
<td>52.5 ±0.4</td>
<td>20.3</td>
<td>+0.4</td>
<td>45.0</td>
<td>+0.5</td>
<td>56.0</td>
<td>+0.3</td>
</tr>
<tr>
<td>E B</td>
<td>52.5 ±0.4</td>
<td>20.3</td>
<td>+0.4</td>
<td>45.0</td>
<td>+0.5</td>
<td>65.0</td>
<td>+0.3</td>
</tr>
</tbody>
</table>

Qualification

<table>
<thead>
<tr>
<th>Reference Standards</th>
<th>IEC 61071, EN 61071, VDE0560</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climatic Category</td>
<td>55/105/56 according to IEC 60068-1</td>
</tr>
</tbody>
</table>

Automotive grade products meet or exceed the requirements outlined by the Automotive Electronics Council. Details regarding test methods and conditions are referenced in document AEC–Q200, Stress Test Qualification for Passive Components. For additional information regarding the Automotive Electronics Council and AEC–Q200, please visit their website at www.aecouncil.com.
Power and AC Film Capacitors – Printed Circuit Board Mount Power Film Capacitors
C4AQ, Radial, 2 or 4 Leads, 500 - 1,500 VDC, for DC Link (Automotive Grade)

General Technical Data

<table>
<thead>
<tr>
<th>Dielectric</th>
<th>Polypropylene metallized film, non-inductive type, self-healing property</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application</td>
<td>DC filtering, DC link</td>
</tr>
<tr>
<td>Special Features</td>
<td>AEC–Q200 qualified</td>
</tr>
<tr>
<td>Climatic Category</td>
<td>55/105/56 IEC 60068−1</td>
</tr>
<tr>
<td>Maximum Operating</td>
<td>+105°C</td>
</tr>
<tr>
<td>Temperature</td>
<td></td>
</tr>
<tr>
<td>Endurance Test</td>
<td>500 hours + 500 hours at 1.3 x $V_{NDC}$ at 70°C</td>
</tr>
<tr>
<td></td>
<td>500 hours + 500 hours at 1.3 x $V_{OP85}$ at 85°C</td>
</tr>
<tr>
<td></td>
<td>500 hours + 500 hours at 1.3 x $V_{OP105}$ at 105°C</td>
</tr>
<tr>
<td>Standard</td>
<td>IEC 61071, EN 61071, VDE0560, AEC–Q200</td>
</tr>
<tr>
<td>Protection</td>
<td>Solvent resistant plastic case UL 94 V−0 compliant</td>
</tr>
<tr>
<td></td>
<td>Thermosetting resin sealing UL 94 V−0 compliant</td>
</tr>
<tr>
<td>Installation</td>
<td>Any position</td>
</tr>
<tr>
<td>Leads</td>
<td>Tinned copper wires - standard lead wire length 6 (+0/−2) mm</td>
</tr>
<tr>
<td>Packaging</td>
<td>Packed in cardboard trays with protection for the terminals</td>
</tr>
<tr>
<td>RoHS Compliance</td>
<td>Compliant with the restricted substance requirements of Directive 2011/65/EU</td>
</tr>
</tbody>
</table>

Electrical Characteristics

<table>
<thead>
<tr>
<th>Rated Capacitance Range</th>
<th>1 to 210 µF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Voltage ($V_{NDC}$) Range</td>
<td>500 to 1,500 VDC</td>
</tr>
<tr>
<td>Capacitance Tolerance</td>
<td>±5% (J) or ±10% (K) measured at $T = +25°C ±5°C$</td>
</tr>
<tr>
<td>Dissipation Factor PP Typical ($tgδ$)</td>
<td>≤ 0.0002 at 10 kHz with $T = 25°C ±5°C$</td>
</tr>
<tr>
<td>Surge Voltage</td>
<td>1.5 * $V_{NDC}$ for maximum 10 times in a lifetime at 25°C ±5°C</td>
</tr>
<tr>
<td>Overvoltage (IEC 61071)</td>
<td>1.15 * $V_{NDC}$ for maximum 30 minutes, once per day</td>
</tr>
<tr>
<td></td>
<td>1.3 * $V_{NDC}$ for maximum 1 minute, once per day</td>
</tr>
<tr>
<td>Peak Non-Repetitive Current</td>
<td>1.5 * $I_{PKR}$ for maximum 1,000 times in a lifetime</td>
</tr>
<tr>
<td>Insulation Resistance</td>
<td>IR x C ≥ 30.000 seconds at 100 VDC 1 minute at $T = +25°C ±5°C$</td>
</tr>
<tr>
<td>Capacitance Deviation in Operation</td>
<td>±2.0% maximum on capacitance value measured at $T = +25°C ±5°C$</td>
</tr>
<tr>
<td>Temperature Storage</td>
<td>−40 to +80°C</td>
</tr>
<tr>
<td>Storage time</td>
<td>≤ 36 months from the date marked on the label glued to the package</td>
</tr>
<tr>
<td>Permissible Relative Humidity - Storage</td>
<td>Annual average ≤ 70%, 85% on 30 days/year randomly distributed throughout year. Dewing not admissible.</td>
</tr>
</tbody>
</table>
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Life Expectancy

<table>
<thead>
<tr>
<th>Life Expectancy</th>
<th>100,000 hours at $V_{NDC}$ at hot spot temperature $T_{HS} = +70^°C$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100,000 hours at $V_{OP85}$ at hot spot temperature $T_{HS} = +85^°C$</td>
</tr>
<tr>
<td></td>
<td>10,000 hours at $V_{OP105}$ at hot spot temperature $T_{HS} = +105^°C$</td>
</tr>
<tr>
<td>Capacitance Drop at End of Life</td>
<td>$-5%$ (typical)</td>
</tr>
<tr>
<td>Failure Rate IEC 61709</td>
<td>$\leq 300$ FIT at $V_{OP85}$ at hot spot temperature $T_{HS} = +85^°C$</td>
</tr>
<tr>
<td></td>
<td>$\leq 200$ FIT at $V_{NDC}$ at hot spot temperature $T_{HS} = +70^°C$</td>
</tr>
</tbody>
</table>

Test Method

<table>
<thead>
<tr>
<th>Test Voltage Between Terminals and Case</th>
<th>$1.5 \times V_{NDC}$ for 10 seconds or $1.65 \times V_{NDC}$ for 2 seconds, at $T = +25^°C \pm 5^°C$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Damp Heat IEC 60068-2-78</td>
<td>3.2 k VAC 50 Hz for 2 seconds</td>
</tr>
<tr>
<td>Change of Temperature IEC 60068-2-14</td>
<td></td>
</tr>
</tbody>
</table>
| Biased Humidity Test 40°C/93% R.H. at $V_{NDC}$ - 1,000 hours | $|\Delta C/C| \leq 5\%$  
$|\Delta DF/DF| \leq 200\%$ (at 10 kHz)  
IR $\geq 50\%$ of initial limit |
| Biased Humidity Test 60°C/95% R.H. at $V_{NDC}$ - 1,000 hours | $|\Delta C/C| \leq 5\%$  
$|\Delta DF/DF| \leq 200\%$ (at 10 kHz)  
IR $\geq 100$ MΩ |

Operative Voltage Derating

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Voltage (VDC)</th>
<th>Life Expectancy (Hours)</th>
</tr>
</thead>
</table>
| $V_{NDC}$ | 500  
650  
800  
1,100  
1,300  
1,500 | 100,000 |
| $V_{OP85}$ | 450  
600  
700  
900  
1,100  
1,200 | 100,000 |
| $V_{OP105}$ | 350  
450  
550  
700  
850  
900 | 10,000 |
Life Expectancy/Failure Quota Graphs

Lifetime Curve & FIT at Hot Spot Temperature - $V_{NDC} = 500 \text{ VDC}$

![Graph](image1)

Lifetime Curve & FIT at Hot Spot Temperature - $V_{NDC} = 650 \text{ VDC}$

![Graph](image2)

Notes:

$T_{HS} = T_{AMB} + \Delta T$

$\Delta T = ESR \times I_{\text{rms}}^2 \times R_{th}$

$I_{\text{rms}}$ should be limited to values granting $\Delta T \leq 30^\circ\text{C}$
Life Expectancy/Failure Quota Graphs cont’d.

Lifetime Curve & FIT at Hot Spot Temperature - $V_{NDC} = 800$ VDC

![Graph 1](image1)

Lifetime Curve & FIT at Hot Spot Temperature - $V_{NDC} = 1,100$ VDC

![Graph 2](image2)

Notes:

$T_{THS} = T_{AMB} + \Delta T$

$\Delta T = ESR \times I_{rms}^2 \times Rth$

$I_{rms}$ should be limited to values granting $\Delta T \leq 30^\circ C$
Life Expectancy/Failure Quota Graphs cont’d.

Lifetime Curve & FIT at Hot Spot Temperature - $V_{NDC} = 1,300$ VDC

![Graph showing lifetime expectancy and FIT at hot spot temperature for $V_{NDC} = 1,300$ VDC.]

Lifetime Curve & FIT at Hot Spot Temperature - $V_{NDC} = 1,500$ VDC

![Graph showing lifetime expectancy and FIT at hot spot temperature for $V_{NDC} = 1,500$ VDC.]

Notes:
- $T_{HS} = T_{AMB} + \Delta T$
- $\Delta T = ESR \times I_{rms}^2 \times Rth$
- $I_{rms}$ should be limited to values granting $\Delta T \leq 30^\circ C$
Environmental Compliance

As an environmentally conscious company, KEMET is working continuously to improve the environmental effects of both our capacitors and their production.

In Europe, due to the RoHS Directive, and in some other geographical areas such as China, legislation has been put in place to prevent the use of some hazardous materials, including lead (Pb) in electronic equipment. All products in this catalog are produced to help our customers' obligations to guarantee their products to fulfill these legislative requirements. The only material of concern in our products has been lead (Pb), which has been removed from all designs to fulfill the requirement of containing less than 0.1% of lead in any homogeneous material.

KEMET will closely follow any changes in legislation on a global basis and make any necessary changes to its products whenever needed.

Some customer segments including medical, defense and automotive electronics may still require the use of lead in electrode coatings. To clarify the situation and distinguish products, the following symbols are used on the packaging labels for RoHS compliant and Pb-free capacitors.

Due to customer requirements, additional markings such as lead-free (LF) or lead-free wires (LFW) may appear on the packaging label.

Materials & Environment

The selection of materials used by KEMET for the production of capacitors is the result of extensive experience and constant attention to environmental protection. KEMET selects its suppliers according to ISO 9001 standards and carries out statistical analysis on the materials purchased before the acceptance. All the materials, to the company's present knowledge, are non-toxic and free from cadmium, mercury, chrome and compounds, polychlorine triphenyl (PCB), bromide and chlorine dioxins bromurate clorurate, CFC and HCFC, and asbestos.

All KEMET power film products are RoHS compliant.

Insulation Resistance

As the capacitor temperature increases, the insulation resistance decreases. This is due to the increased electron activity. Low insulation resistance can also be the result of moisture trapped in the windings, caused by a prolonged exposure to excessive humidity.
Dissipation Factor

Dissipation factor is a complex function involved with the inefficiency of the capacitor. The $\tan \delta$ may change up and down with increased temperature. For more information, please refer to Performance Characteristics.

Sealing

Hermetically Sealed Capacitors
As the temperature increases, the pressure inside the capacitor increases. If the internal pressure is high enough, it can cause a breach in the capacitor, which can result in leakage, impregnation, filling fluid or moisture susceptibility.

Resin Encased/Wrap & Fill Capacitors
The resin seals on resin-encased and wrap-and-fill capacitors will withstand short-term exposure to high humidity environments without degradation. Resins and plastic tapes will form a pseudo-impervious barrier to humidity and chemicals. These case materials are somewhat porous and through osmosis can cause contaminants to enter the capacitor. The second area of contaminated absorption is the lead-wire/resin interface. Since resins cannot bond 100% to tinned wires, there can be a path formed up to the lead wire into the capacitor section. Aqueous cleaning of circuit boards can aggravate this condition.

Barometric Pressure
The altitude at which hermetically sealed capacitors are operated, controls the voltage rating of the capacitor. As the barometric pressure decreases, the susceptibility to terminal arc-over increases. Non-hermetic capacitors can be affected by internal stresses due to pressure changes. This can be in the form of capacitance changes, or dielectric arc-over, as well as low insulation resistance. Heat transfer can also be affected by altitude operation. Heat, generated in an operation, cannot be dissipated properly and can result in high $R I^2$ losses and eventual failure.

Radiation
Radiation capabilities of capacitors must be taken into consideration. Electrical degradation in the form of dielectric embitterment can take place causing shorts or opens.
<table>
<thead>
<tr>
<th>Cap Value (µF)</th>
<th>VDC</th>
<th>Dimensions (mm)</th>
<th>dV/dt</th>
<th>Ipkr</th>
<th>ESR 70°C at 10 kHz</th>
<th>Irms* at 70°C at 10 kHz</th>
<th>Rth (HS/Amb)</th>
<th>Packaging Quantity</th>
<th>PART NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.6</td>
<td>500</td>
<td>11 20 31.5 27.5</td>
<td>\</td>
<td>10</td>
<td>54 25</td>
<td>13.1 4.5</td>
<td>44</td>
<td>256</td>
<td>C4AQLB4560A1WK</td>
</tr>
<tr>
<td>10</td>
<td>500</td>
<td>13 25 31.5 27.5</td>
<td>\</td>
<td>10</td>
<td>96 25</td>
<td>8.1  6.5</td>
<td>36</td>
<td>234</td>
<td>C4QLB5U5100A1XX</td>
</tr>
<tr>
<td>12.5</td>
<td>500</td>
<td>14 28 31.5 27.5</td>
<td>\</td>
<td>10</td>
<td>122 26</td>
<td>6.8  7.5</td>
<td>33</td>
<td>96</td>
<td>C4QLBLS5152A1YK</td>
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<tr>
<td>15</td>
<td>500</td>
<td>19 29 31.5 27.5</td>
<td>\</td>
<td>10</td>
<td>147 26</td>
<td>6   8.5</td>
<td>29</td>
<td>72</td>
<td>C4QLBLS5150A11K</td>
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<tr>
<td>25</td>
<td>500</td>
<td>22 37 31.5 27.5</td>
<td>\</td>
<td>10</td>
<td>245 28</td>
<td>4.5  11.5</td>
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<td>64</td>
<td>C4QLBLS5250A12K</td>
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<tr>
<td>40</td>
<td>500</td>
<td>20 40 42 37.5 10.2</td>
<td>7</td>
<td>262 30</td>
<td>3.5  13.5</td>
<td>20</td>
<td>58</td>
<td>C4QLBW5400A3FK</td>
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<tr>
<td>50</td>
<td>500</td>
<td>28 37 42 37.5 10.2</td>
<td>7</td>
<td>332 30</td>
<td>2.8  16</td>
<td>18</td>
<td>36</td>
<td>C4QLBW5500A3JK</td>
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<tr>
<td>70</td>
<td>500</td>
<td>30 45 42 37.5 20.3</td>
<td>7</td>
<td>464 30</td>
<td>2.1  20.5</td>
<td>15</td>
<td>36</td>
<td>C4QLBW5700A3LK</td>
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<tr>
<td>90</td>
<td>500</td>
<td>35 50 42 37.5 20.3</td>
<td>7</td>
<td>585 35</td>
<td>3.5  26</td>
<td>13</td>
<td>30</td>
<td>C4QLBW5900A3OK</td>
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<tr>
<td>100</td>
<td>500</td>
<td>30 45 57.5 52.5 20.3</td>
<td>4</td>
<td>442 35</td>
<td>3   19</td>
<td>12</td>
<td>27</td>
<td>C4QLBW6100A3MK</td>
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<tr>
<td>130</td>
<td>500</td>
<td>35 50 57.5 52.5 20.3</td>
<td>4</td>
<td>581 35</td>
<td>2.4  23</td>
<td>10</td>
<td>23</td>
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<tr>
<td>170 1</td>
<td>450</td>
<td>45 56 57.5 52.5 20.3</td>
<td>4</td>
<td>780 41</td>
<td>1.8  29.5</td>
<td>8</td>
<td>18</td>
<td>C4LAEW6170A3AK</td>
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<tr>
<td>210 1</td>
<td>450</td>
<td>45 65 57.5 52.5 20.3</td>
<td>4</td>
<td>840 45</td>
<td>1.4  35.5</td>
<td>7</td>
<td>18</td>
<td>C4LAEW6210A3BK</td>
<td></td>
</tr>
</tbody>
</table>

Table 1 – Ratings & Part Number Reference

| VDC at 70°C = 500 VDC, Vref at 85°C = 450 VDC, Vref at 105°C = 350 VDC | Value that leads to a ΔT of ≈ 15°C in the hot spot > T
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>B  H  L  P  P1  V/µs  Apk  nH  mΩ  Arm (°C/W)</td>
<td></td>
</tr>
<tr>
<td>5.6 11 20 31.5 27.5 \</td>
<td>10</td>
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1 Items available for sample.

(*) Irms* value that leads to a ΔT of ≈ 15°C in the hot spot > T

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Fort Lauderdale, FL 33301 USA • 954-766-2800 • www.kemet.com
### Table 1 – Ratings & Part Number Reference cont’d.

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<th>nH</th>
<th>mΩ</th>
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*V_{ESC} at 70°C = 1,100 VDC; V_{ESP} at 85°C = 900 VDC; V_{ESP} at 105°C = 700 VDC

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*V_{ESC} at 70°C = 1,300 VDC; V_{ESP} at 85°C = 1,100 VDC; V_{ESP} at 105°C = 850 VDC

1 Items available for sample.

(*) Irms* value that leads to a ΔT of ≈ 15°C in the hot spot > T_{HS} = T_{AMBIENT} + ΔT = 70°C + 15°C = 85°C
Soldering Process

The implementation of the RoHS directive has resulted in the selection of SnAgCu (SAC) alloys or SnCu alloys as primary solder. This has increased the liquidus temperature from that of 183°C for SnPb eutectic alloy to 217 – 221°C for the new alloys. As a result, the heat stress to the components, even in wave soldering, has increased considerably due to higher pre-heat and wave temperatures. Polypropylene capacitors are especially sensitive to heat (the melting point of polypropylene is 160 – 170°C). Wave soldering can be destructive, especially for mechanically small polypropylene capacitors (with lead spacing of 5 mm to 15 mm), and great care has to be taken during soldering. The recommended solder profiles from KEMET should be used. Please consult KEMET with any questions. In general, the wave soldering curve from IEC Publication 61760-1 Edition 2 serves as a solid guideline for successful soldering. Please see Figure 1.

Reflow soldering is not recommended for through-hole film capacitors. Exposing capacitors to a soldering profile in excess of the above the recommended limits may result to degradation or permanent damage to the capacitors.

Do not place the polypropylene capacitor through an adhesive curing oven to cure resin for surface mount components. Insert through-hole parts after the curing of surface mount parts. Consult KEMET to discuss the actual temperature profile in the oven, if through-hole components must pass through the adhesive curing process. A maximum two soldering cycles is recommended. Please allow time for the capacitor surface temperature to return to a normal temperature before the second soldering cycle.

Manual Soldering Recommendations

Following is the recommendation for manual soldering with a soldering iron.

The soldering iron tip temperature should be set at 350°C (+10°C maximum) with the soldering duration not to exceed more than 3 seconds.

Wave Soldering Recommendations

The soldering iron tip temperature should be set at 350°C (+10°C maximum) with the soldering duration not to exceed more than 3 seconds.
Soldering Process cont'd

Wave Soldering Recommendations cont'd

1. The table indicates the maximum set-up temperature of the soldering process.

Figure 1

<table>
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<th>Dielectric Film Material</th>
<th>Maximum Preheat Temperature</th>
<th>Maximum Peak Soldering Temperature</th>
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<td>150°C</td>
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2. The maximum temperature measured inside the capacitor:

Set the temperature so that inside the element the maximum temperature is below the limit:

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Temperature monitored inside the capacitor.

Selective Soldering Recommendations

Selective dip soldering is a variation of reflow soldering. In this method, the printed circuit board with through-hole components to be soldered is preheated and transported over the solder bath as in normal flow soldering without touching the solder. When the board is over the bath, it is stopped and pre-designed solder pots are lifted from the bath with molten solder only at the places of the selected components, and pressed against the lower surface of the board to solder the components.

The temperature profile for selective soldering is similar to the double wave flow soldering outlined in this document, however, instead of two baths, there is only one bath with a time from 3 to 10 seconds. In selective soldering, the risk of overheating is greater than in double wave flow soldering, and great care must be taken so that the parts are not overheated.
Construction

**Detailed Cross Section**

- Molded Plastic Case
- Single-sided Metallized Polypropylene Film (First Layer)
- Margin
- Metal Contact Layer
- Leads
- Single-sided Metallized Polypropylene Film (Second Layer)
- Margin
- Self-Extinguishing Resin

**Winding Scheme**

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Power and AC Film Capacitors – Printed Circuit Board Mount Power Film Capacitors
C4AQ, Radial, 2 or 4 Leads, 500 - 1,500 VDC, for DC Link (Automotive Grade)

Marking

![Image showing the marking of the capacitor]

Manufacturing Date Code (IEC-60062)

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