F38 Series
Conductive Polymer, Miniature, Undertab Solid Electrolytic Chip Capacitors

FEATURES
• Conductive polymer electrode
• Benign failure mode under recommended use conditions
• Compliant to the RoHS2 directive 2011/65/EU
• SMD facedown
• Small and low profile
• High volumetric efficiency

APPLICATIONS
• Smartphone
• Tablet PC
• Wireless module
• Portable game
• Bulk decoupling of SoC (System on chip)

CASE DIMENSIONS:

<table>
<thead>
<tr>
<th>Code</th>
<th>EIA Code</th>
<th>EIA Metric</th>
<th>L</th>
<th>W</th>
<th>W</th>
<th>H</th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>0603</td>
<td>1608-09</td>
<td>1.60 ±0.30 (0.063±0.012)</td>
<td>0.85 ±0.33 (0.033±0.013)</td>
<td>0.65±0.10 (0.026±0.004)</td>
<td>0.80±0.10 (0.031±0.004)</td>
<td>0.50±0.10 (0.020±0.004)</td>
<td>0.60±0.10 (0.024±0.004)</td>
</tr>
<tr>
<td>S</td>
<td>0805</td>
<td>2012-09</td>
<td>2.00 ±0.91 (0.079±0.036)</td>
<td>1.25 ±0.40 (0.049±0.016)</td>
<td>0.90±0.10 (0.035±0.004)</td>
<td>0.80±0.10 (0.031±0.004)</td>
<td>0.50±0.10 (0.020±0.004)</td>
<td>1.00±0.10 (0.039±0.004)</td>
</tr>
<tr>
<td>U</td>
<td>0402</td>
<td>1106-06</td>
<td>1.10 ±0.05 (0.043±0.002)</td>
<td>0.50±0.05 (0.020±0.002)</td>
<td>0.35±0.05 (0.014±0.002)</td>
<td>0.55±0.05 (0.022±0.002)</td>
<td>0.30±0.05 (0.012±0.002)</td>
<td>0.50±0.05 (0.020±0.002)</td>
</tr>
</tbody>
</table>

* F380J476MMAAXE: 1.0mm Max.

MARKING

U CASE
M CASE
S CASE

HOW TO ORDER

F38 1A 225 M

Type Rated Voltage Capacitance Code
P Code: 1st two digits represent significant figures, 3rd digit represents multiplier (number of zeros to follow)

Tolerance M=±20%

Case Size See table above

Packaging

Reel Dia (g180) Tape Width (mm)
A B

Special Code
AXE = Rated temperature 60°C and H dimension 1.0mm Max.
AXEH3 = Rated temperature 60°C and H dimension 1.0mm Max., Low ESR
LZT = Rated temperature 60°C
LZTH1 = Rated temperature 60°C, Low ESR
AH1, AH2, AH3 = Low ESR

TECHNICAL SPECIFICATIONS

Category Temperature Range: -55 to +105°C
Rated Range: +85°C or +60°C (*2)
Capacitance Tolerance: ±20% at 120Hz
Dissipation Factor: Refer to next page (120Hz)
ESR 100kHz: Refer to next page (120Hz)
Leaking Current: Refer to next page

At 20°C after application of rated voltage for 5 minutes
Provided that:
After 5 minute’s application of rated voltage, leakage current at 105°C
10 times or less than 20°C specified value.

Termination Finish: M, S case: Gold Plating (standard), U case: Sn-3.5Ag Plating (standard)

*2 LZT and AXE: Rated temperature +60°C, Surge and Endurance test temperature +60°C
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CAPACITANCE AND RATED VOLTAGE RANGE
(LETTER DENOTES CASE SIZE)

<table>
<thead>
<tr>
<th>Capacitance</th>
<th>Rated Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>µF</td>
<td>4V (0G) 6.3V 10V (1A) 25V (1E)</td>
</tr>
<tr>
<td>1.0</td>
<td>105</td>
</tr>
<tr>
<td>2.2</td>
<td>225</td>
</tr>
<tr>
<td>4.7</td>
<td>475</td>
</tr>
<tr>
<td>10</td>
<td>106</td>
</tr>
<tr>
<td>22</td>
<td>226</td>
</tr>
<tr>
<td>33</td>
<td>336</td>
</tr>
<tr>
<td>47</td>
<td>476</td>
</tr>
<tr>
<td>60</td>
<td>606</td>
</tr>
<tr>
<td>100</td>
<td>107</td>
</tr>
</tbody>
</table>

Released ratings, (Low ESR) **(AXE) Rated temperature 60ºC and H dimension 1.0mm Max. Please contact AVX when you need detail spec. **(LTZ) Rated temperature 60ºC. Please contact AVX when you need detail spec. Please contact your local AVX sales office when these series are being designed in your application.

THE CORRELATIONS AMONG RATED VOLTAGE, SURGE VOLTAGE AND DERATED VOLTAGE

<table>
<thead>
<tr>
<th>Item</th>
<th>All Case (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Damp Heat, steady state</td>
<td>-20 to +30</td>
</tr>
<tr>
<td>Rapid change of temperature</td>
<td>±20</td>
</tr>
<tr>
<td>Resistance soldering heat</td>
<td>±20</td>
</tr>
<tr>
<td>Surge</td>
<td>±20</td>
</tr>
</tbody>
</table>

Moisture Sensitivity Level (MSL) is defined according to J-STD-020
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RECOMMENDED DEREATING FACTOR
Voltage and temperature derating as percentage of Vr

QUALIFICATION TABLE

<table>
<thead>
<tr>
<th>TEST</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Damp Heat (Steady State)</td>
<td>At 40°C, 90 to 95% R.H., 500 hours (No voltage applied)</td>
</tr>
<tr>
<td></td>
<td>Capacitance Change .......... Refer to page 229 (*3)</td>
</tr>
<tr>
<td></td>
<td>Dissipation Factor .......... 200% or less of initial specified value</td>
</tr>
<tr>
<td></td>
<td>Leakage Current ............ 300% or less of initial specified value</td>
</tr>
<tr>
<td>Temperature Cycles</td>
<td>At -55°C / +105°C, 30 minutes each, 5 cycles</td>
</tr>
<tr>
<td></td>
<td>Capacitance Change .......... Refer to page 229 (*3)</td>
</tr>
<tr>
<td></td>
<td>Dissipation Factor .......... 200% or less of initial specified value</td>
</tr>
<tr>
<td></td>
<td>Leakage Current ............ 400% or less of initial specified value</td>
</tr>
<tr>
<td>Resistance to Soldering Heat</td>
<td>5 seconds reflow at 260°C</td>
</tr>
<tr>
<td></td>
<td>Capacitance Change .......... Refer to page 229 (*3)</td>
</tr>
<tr>
<td></td>
<td>Dissipation Factor .......... 200% or less of initial specified value</td>
</tr>
<tr>
<td></td>
<td>Leakage Current ............ 300% or less of initial specified value</td>
</tr>
<tr>
<td>Surge</td>
<td>After application of surge voltage in series with a 1kΩ resistor at the rate of 30 seconds ON, 30 seconds OFF, for 1000 successive test cycles at 85°C or +60°C (*2), capacitors shall meet the characteristic requirements in the table above.</td>
</tr>
<tr>
<td></td>
<td>Capacitance Change .......... Refer to page 229 (*3)</td>
</tr>
<tr>
<td></td>
<td>Dissipation Factor .......... 200% or less of initial specified value</td>
</tr>
<tr>
<td></td>
<td>Leakage Current ............ 300% or less of initial specified value</td>
</tr>
<tr>
<td>Endurance</td>
<td>After 1000 hours' application of rated voltage in series with a 3Ω resistor at 85°C or +60°C (*2), capacitors shall meet the characteristic requirements in the table above.</td>
</tr>
<tr>
<td></td>
<td>Capacitance Change .......... Refer to page 229 (*3)</td>
</tr>
<tr>
<td></td>
<td>Dissipation Factor .......... 200% or less of initial specified value</td>
</tr>
<tr>
<td></td>
<td>Leakage Current ............ 400% or less of initial specified value</td>
</tr>
<tr>
<td>Shear Test</td>
<td>After applying the pressure load of 5N for 101±1 seconds horizontally to the center of capacitor side body which has no electrode and has been soldered beforehand on a substrate, there shall be found neither exfoliation nor its sign at the terminal electrode.</td>
</tr>
<tr>
<td>Terminal Strength</td>
<td>Keeping a capacitor surface-mounted on a substrate upside down and supporting the substrate at both of the opposite bottom points 4mm apart from the center of capacitor, the pressure strength is applied with a specified jig at the center of substrate so that the substrate may bend by 1mm as illustrated. Then, there shall be found no remarkable abnormality on the capacitor terminals.</td>
</tr>
</tbody>
</table>

*2 LZT and AXE: Rated temperature +60°C, Surge and Endurance test temperature +60°C

NOTICE: DESIGN, SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE.
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SOLID ELECTROLYTIC CAPACITOR ROADMAP

CONDUCTIVE POLYMER
TC Series
T Cx
F Series
F38

CONVENTIONAL TANTALUM
T Series
T xx
F Series
F xx

NIOBIUM OXIDE
N Series
N xx

CATHODE
DIELECTRIC
ANODE

CONDUCTIVE polymer
Ta2O5
Tantalum

MnO2

MnO2

Nm2O5

Niobium Oxide

FIVE CAPACITOR CONSTRUCTION STYLES

J = J-lead
Undertab
TACmicrochip®
Conformal
Hermetic

SERIES LINE UP: Conductive Polymer

High Rel. & Special

High Energy

Industrial & Automotive

Standard

Standard Low Profile

TCCH
hermetics
Hermetically sealed

TCB
COTS+

TCQ
AEC-Q200

TCO
high temp

TCM
multianode

TCN
low profile undertab

J-CAP™
low profile undertab

TCJ

TCM
multianode

Lowest ESR