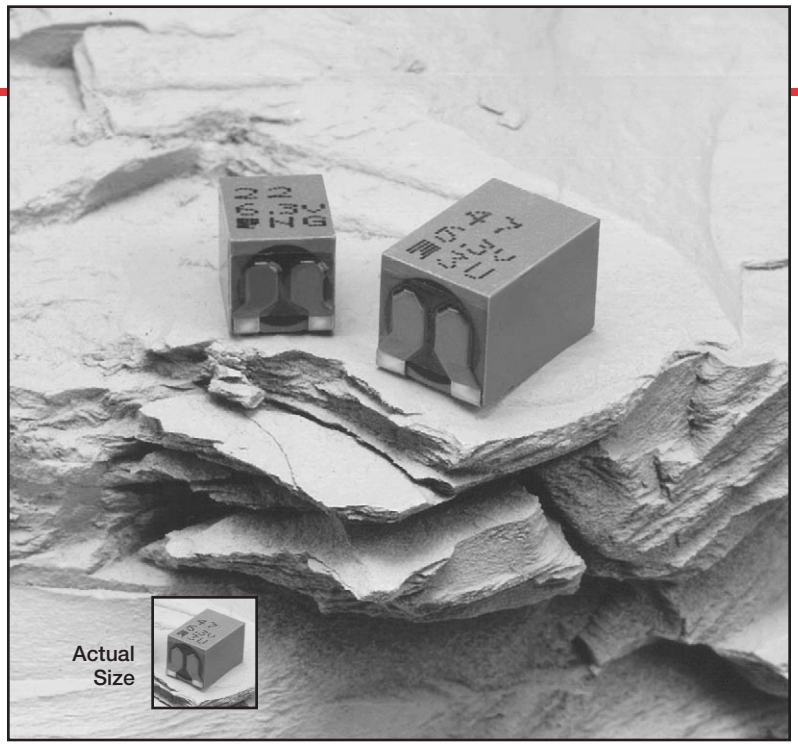
MFZ Series

UNITED CHEMI-CON

- Surface Mount
- Solid Electrolyte
- Low Profile Horizontal Chip
- Solvent Proof
- High CV
- +105°C Max. Temperature



The MFZ series aluminum capacitors have a solid electrolyte in lieu of the normal liquid electrolyte. This allows for many improved characteristics. These include a high heat resistance, a capacitance value that is more stable over the temperature range with a bias voltage, and lower potential of catching fire when exposed to abnormal conditions such as over-voltage or reverse voltage. The small size of the MFZ series along with a high capacitance make these capacitors ideal for output filtering in lightweight and downsized electronic devices.

The MFZ series capacitors were developed to withstand HCFC cleaning agents for five minutes by ultrasonic, vapor or immersion. This solvent proof design allows all circuit board components to be cleaned together, at the same time, without resorting to more expensive epoxy end-sealed capacitors. Refer to the Mini-Glossary for recommended cleaning conditions.

Summary of Specifications

- **Surface mount lead terminals.**
- **Capacitance range: 3.3 to 56µF.**
- **Voltage range: 4 to 20VDC.**
- **Operating temperature range: −55°C to +105°C.**
- **Leakage current: 0.01CV after 2 minutes at +20°C.**
- **Standard capacitance tolerance: ±20%**
- **Nominal case size (H×L): 4.6×6.4mm to 5.7×8.4mm.**
- **Rated lifetime: 1,000 hours at +105°C.**

MFZ Series

MFZ Specifications

<table>
<tr><th>Item</th><th>Characteristics</th></tr>
<tr><td>Operating Temperature Range</td><td>−55 to +105°C</td></tr>
<tr><td>Rated Voltage Range</td><td>4 to 20VDC</td></tr>
<tr><td>Maximum Operating Voltage</td><td>At +85°C and +105°C, the maximum operating voltage and surge voltage shall not exceed the values given in the following table.
<table>
<tr><td colspan="3">Rated Voltage (V)</td><td>4</td><td>6.3</td><td>10</td><td>16</td><td>20</td></tr>
<tr><td rowspan="4">Maximum Operating Voltage (V)</td><td rowspan="2">≤+85°C</td><td>Maximum</td><td>4</td><td>6.3</td><td>10</td><td>16</td><td>20</td></tr>
<tr><td>Rated Surge</td><td>5</td><td>8</td><td>13</td><td>20</td><td>25</td></tr>
<tr><td rowspan="2">+105°C</td><td>Maximum</td><td>3.2</td><td>5</td><td>8</td><td>13</td><td>16</td></tr>
<tr><td>Rated Surge</td><td>4</td><td>6.3</td><td>10</td><td>16</td><td>20</td></tr>
</table></td></tr>
<tr><td>Capacitance Range</td><td>3.3 to 56μF</td></tr>
<tr><td>Capacitance Tolerance</td><td>±20% (M) at +20°C, 120Hz</td></tr>
<tr><td>Leakage Current</td><td>I = 0.01CV after 2 minutes at +20°C.
Where I = Leakage current (μA), C = Nominal capacitance (μF) and V = Rated voltage (V)</td></tr>
<tr><td>Dissipation Factor (Tan δ)</td><td>At +20°C, 120Hz
<table>
<tr><td>Rated Voltage (V)</td><td>4-20</td></tr>
<tr><td>Tan δ (DF)</td><td>0.12</td></tr>
</table></td></tr>
<tr><td>Low Temperature Characteristics</td><td>At 500kHz, impedance (Z) ratio between the −25°C or −55°C value and +20°C value shall not exceed the values given below.
<table>
<tr><td>Rated Voltage (V)</td><td>4-20</td></tr>
<tr><td>Z(−25°C)/Z(+20°C)</td><td>≤ 1.5</td></tr>
<tr><td>Z(−55°C)/Z(+20°C)</td><td>≤ 2.0</td></tr>
</table></td></tr>
<tr><td>Load Life</td><td>The following specifications shall be satisfied when the capacitors are restored to +20°C after subjecting them to the DC rated voltage for 1,000 hours at +85°C or the maximum operating voltage at +105°C. The sum of DC voltage and peak AC voltage must not exceed the full rated voltage of the capacitors.
Capacitance change: ≤ ±10% of the initial measured value
Tan δ (DF) : ≤ 150% of the initial specified value
Leakage current : ≤ initial specified value
ESR : ≤ 150% of the initial specified value</td></tr>
<tr><td>Bias Humidity Test</td><td>The following specifications shall be satisfied when the capacitors are restored to +20°C after subjecting them to the DC rated voltage for 500 hours at +60°C, 90-95%RH.
Capacitance change: ≤ ±10% of the initial measured value
Tan δ (DF) : ≤ 150% of the initial specified value
Leakage current : ≤ initial specified value
ESR : ≤ 150% of the initial specified value</td></tr>
<tr><td>Surge Voltage Test</td><td>The following specifications shall be satisfied when the capacitors are restored to +20°C after the surge voltage at +85°C, or the maximum surge voltage at +105°C, is applied at a cycling of 30 seconds on, 4.5 minutes off for 1,000 cycles at the respective temperatures through a series resistance of 1,000 ohms. (Failure rate specification is not applied to this test.)
Capacitance change: ≤ ±5% of the initial measured value
Tan δ (DF) : ≤ initial specified value
Leakage current : ≤ initial specified value
ESR : ≤ initial specified value</td></tr>
<tr><td>Reverse Voltage Test</td><td>There shall be no significant capacitor damage when the capacitors are restored to +20°C after 15% of the rated voltage at +85°C, or the maximum operating voltage at +105°C, is applied to the capacitors in the reverse polarity direction for 125 hours and for another 125 hours in the forward polarity direction. (Failure rate specification is not applied to this test.)</td></tr>
<tr><td>Thermal Shock Test</td><td>After the capacitors are subjected to −55°C for 30 minutes and +125°C for 30 minutes for 5 cycles, the specifications stated above for the surge voltage test shall be satisfied when the capacitors are restored to +20°C.</td></tr>
<tr><td>Failure Rate</td><td>1% maximum per 1,000 hours. (Confidence level 60%)</td></tr>
<tr><td>Others</td><td>IEC 384-18-1 (Fixed Aluminum Electrolytic Chip Capacitors With Solid Electrolyte)</td></tr>
</table>

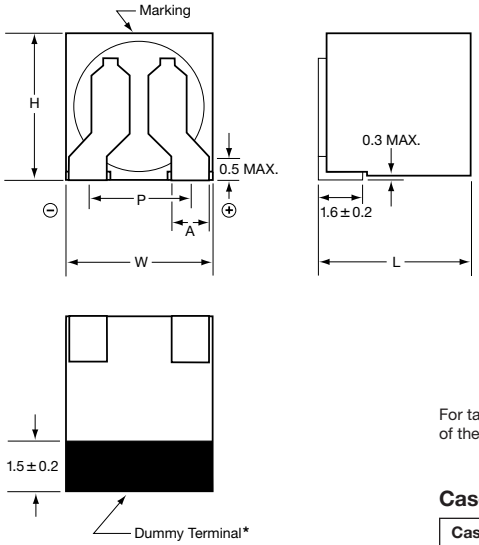
MFZ Series

Diagram of Dimensions

Horizontal Chip Lead Terminals

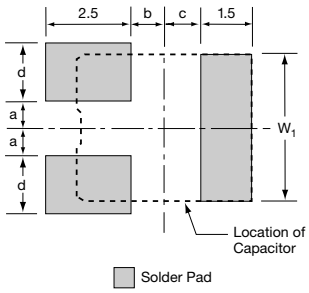
Unit: mm

FD Type



*For mechanical support, copper paste coated and dried.

Recommended Solder Pad on PC Board



For tape and reel packaging and reflow soldering conditions, refer to the beginning of the Surface Mount section.

Case and Solder Pad Dimensions

Case Code	L ±0.2	W ±0.2	H ±0.2	P ±0.1	A ±0.1	W1	a	b	c	d
D6	6.4	4.6	4.6	3.3	1.1	4.6	0.8	1.15	1.7	1.7
E8	8.4	5.7	5.7	4.0	1.5	5.7	0.95	2.15	2.7	2.1

Part Numbering System for MFZ Series

When ordering, always specify complete catalog number for MFZ Series.

MFZ 6.3 FD 22R M D6 TP

- TP — Lead Length: TP is for Standard Taping.
- D6 — Case Code: See Case Sizes in Tables.
- M — Capacitance Tolerance: M = ±20%
- 22R — Capacitance Value: Expressed in Microfarads. The first two digits are significant figures, and the third digit indicates the number of zeros for capacitance of 100µF or more. R indicates the decimal point for capacitance less than 100µF (e.g. R22 = .22µF; 2R2 = 2.2µF; 22R = 22µF; 221 = 220µF; 222 = 2,200µF; 223 = 22,000µF).
- FD — Lead Configuration: FD = 3 Horizontal Chip Lead Terminals.
- 6.3 — DC Rated Voltage: Expressed in Volts (e.g. 6.3 = 6.3WVDC).
- MFZ — Series Name: Indicates Basic Capacitor Design.

MFZ Series

Standard Voltage Ratings - Surface Mount

Rated Voltage (WVDC)	Capacitance (µF)	Catalog Part Number	Nominal Case Size* H×L (mm)	Case Code	Maximum ESR (Ω) at +20°C, 500kHz	Maximum Ripple Current (mA rms) at +105°C		
						500kHz	300kHz	200kHz
4 Volts @ +85°C 5 Volts Surge	27	MFZ4FD27RMD6TP	4 × 6	D6	0.27	320	300	270
3.2 Volts @ +105°C 4 Volts Surge	56	MFZ4FD56RME8TP	5 × 8	E8	0.18	390	370	350
6.3 Volts @ +85°C 8 Volts Surge	22	MFZ6.3FD22RMD6TP	4 × 6	D6	0.27	320	300	270
5 Volts @ +105°C 6.3 Volts Surge	47	MFZ6.3FD47RME8TP	5 × 8	E8	0.18	390	370	350
10 Volts @ +85°C 13 Volts Surge	15	MFZ10FD15RMD6TP	4 × 6	D6	0.27	320	300	270
8 Volts @ +105°C 10 Volts Surge	33	MFZ10FD33RME8TP	5 × 8	E8	0.18	390	370	350
16 Volts @ +85°C 20 Volts Surge	6.8	MFZ16FD6R8MD6TP	4 × 6	D6	0.425	130	110	100
13 Volts @ +105°C 16 Volts Surge	15	MFZ16FD15RME8TP	5 × 8	E8	0.27	320	300	270
20 Volts @ +85°C 25 Volts Surge **16 Volts @ +105°C 20 Volts Surge**	3.3	MFZ20FD3R3ME8TP	5 × 8	E8	0.27	320	300	270

***Refer to diagrams for detailed case size dimensions.**