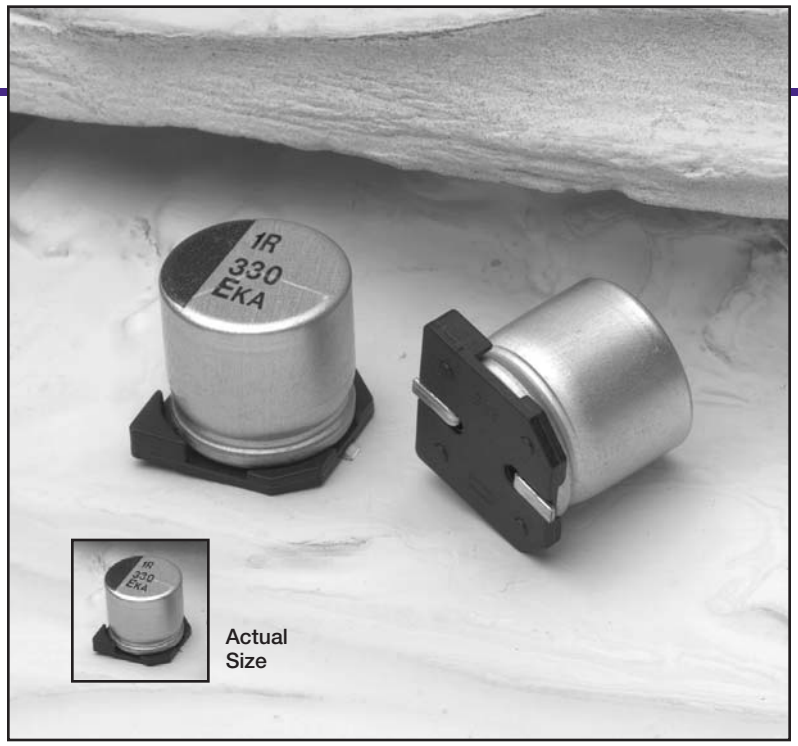
UPGRADE
Engineering Bulletin Oct 03

MKA Series

UNITED CHEMI-CON

- Surface Mount
- Lead-Free High Temperature Reflow Soldering
- Vertical Chip
- Solvent Proof
- +105°C Maximum Temperature



The MKA series is a vertical chip capacitor series from United Chemi-Con designed for lead-free, high temperature reflow soldering. The heavy-duty external materials and special reformulated electrolyte enhance the durability of MKA capacitors to withstand lead-free alloy melting points of 210°C to 230°C during the soldering process. These MKA series capacitors are available in six voltage ratings and have a rated lifetime of 1,000 to 2,000 hours at +105°C depending on case size.

The MKA series capacitors are solvent proof. Refer to the Mini-Glossary for cleaning guidelines and recommended cleaning agents that are compatible with United Chemi-Con products.

Summary of Specifications

- **Surface mount terminals.**
- **Capacitance range: 0.1 to 1,000µF.**
- **Voltage range: 6.3 to 50VDC.**
- **Category temperature range: −40°C to +105°C.**
- **Leakage current: 0.01CV or 3µA, whichever is greater, after 2 minutes at +20°C.**
- **Standard capacitance tolerance: ±20%**
- **Nominal case size (D×L): 4×5.2mm to 10×10mm.**
- **Rated lifetime: 1,000 to 2,000 hours at +105°C depending on case size.**

MKA Specifications

<table>
<tr><th>Item</th><th>Characteristics</th></tr>
<tr><td>Category Temperature Range</td><td>−40 to +105°C</td></tr>
<tr><td>Rated Voltage Range</td><td>6.3 to 50VDC</td></tr>
<tr><td>Capacitance Range</td><td>0.1 to 1,000μF</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 or 3μA, whichever is greater, after 2 minutes at +20°C.
Where I = Max. 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>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td></tr>
<tr><td>Case D55-F55</td><td>0.30</td><td>0.24</td><td>0.20</td><td>0.16</td><td>0.14</td><td>0.12</td></tr>
<tr><td>Case F80-J10</td><td>0.40</td><td>0.30</td><td>0.26</td><td>0.16</td><td>0.14</td><td>0.12</td></tr>
</table></td></tr>
<tr><td>Low Temperature Characteristics</td><td>At 120Hz, impedance (Z) ratio between the −25°C or −40°C value and +20°C value shall not exceed the values given below.
<table>
<tr><td>Rated Voltage (V)</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td></tr>
<tr><td>Z(−25°C)/Z(+20°C)</td><td>4</td><td>3</td><td>2</td><td>2</td><td>2</td><td>2</td></tr>
<tr><td>Z(−40°C)/Z(+20°C)</td><td>10</td><td>8</td><td>6</td><td>4</td><td>3</td><td>3</td></tr>
</table></td></tr>
<tr><td>Endurance (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 the specified test time at +105°C.
<table>
<tr><td>Case Code</td><td>D55-F55</td><td>F80-J10</td></tr>
<tr><td>Test Time</td><td>1,000 Hours</td><td>2,000 Hours</td></tr>
</table>
Case Code D55-F55
Capacitance change:
≤ ±30% of initial measured value
Tan δ (DF):
≤ 300% of initial specified value
Leakage current:
≤ initial specified value

Case Code F80-J10
Capacitance change:
≤ ±20% of initial measured value
Tan δ (DF):
≤ 200% of initial specified value
Leakage current:
≤ initial specified value</td></tr>
<tr><td>Shelf Life</td><td>The following specifications shall be satisfied when the capacitors are restored to +20°C after exposing them for the specified test time at +105°C without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements.
<table>
<tr><td>Case Code</td><td>D55-F55</td><td>F80-J10</td></tr>
<tr><td>Test Time</td><td>1,000 Hours</td><td>2,000 Hours</td></tr>
</table>
Case Code D55-F55
Capacitance change:
≤ ±25% of initial measured value
Tan δ (DF):
≤ 200% of initial specified value
Leakage current:
≤ initial specified value

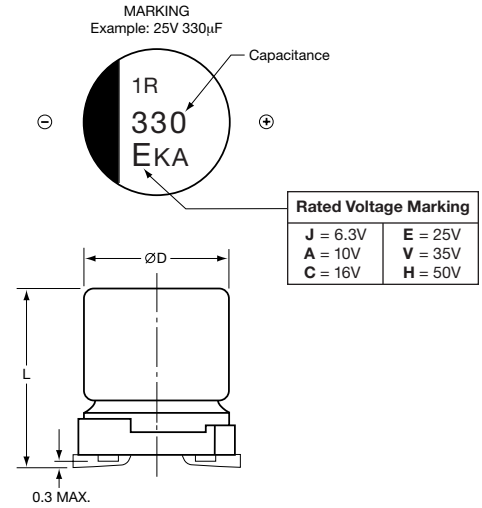
Case Code F80-J10
Capacitance change:
≤ ±20% of initial measured value
Tan δ (DF):
≤ 200% of initial specified value
Leakage current:
≤ initial specified value</td></tr>
</table>

Diagram of Dimensions

Vertical Chip SMD Lead Terminals

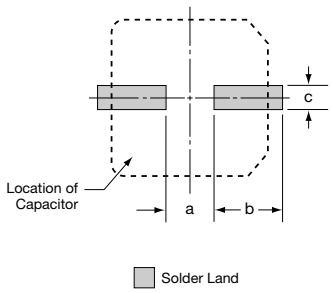
Unit: mm

VC Type



Rated Voltage Marking	
J = 6.3V	**E** = 25V
A = 10V	**V** = 35V
C = 16V	**H** = 50V

Recommended PCB Land Pattern

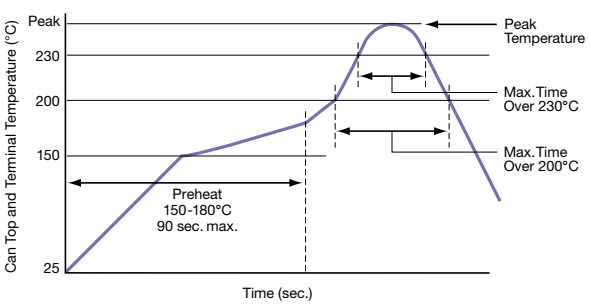


Case and Solder Land Dimensions

Case Code	ØD ±0.5	L	A ±0.2	B ±0.2	C ±0.2	W	P	a	b	c
D55	ø4	5.2±0.3	4.3	4.3	5.1	0.5-0.8	1.0	1.0	2.6	1.6
E55	ø5	5.2±0.3	5.3	5.3	5.9	0.5-0.8	1.4	1.4	3.0	1.6
F55	ø6.3	5.2±0.3	6.6	6.6	7.2	0.5-0.8	1.9	1.9	3.5	1.6
F80	ø6.3	7.7±0.3	6.6	6.6	7.2	0.5-0.8	1.9	1.9	3.5	1.6
H63	ø8	6.3±0.5	8.3	8.3	9.0	0.5-0.8	2.3	2.3	4.5	1.6
H10	ø8	10±0.5	8.3	8.3	9.0	0.7-1.1	3.1	3.1	4.2	2.2
J10	ø10	10±0.5	10.3	10.3	11.0	0.7-1.1	4.5	4.5	4.4	2.2

Recommended Reflow Soldering Conditions

Temperature Profile for Air or Infrared Reflow Soldering Methods



Refer to our web site for additional reflow soldering guidelines and precautions for surface mount capacitors.

Time and Temperature Ranges

Reflow Conditions		Case Code D55~F80	Case Code H63~J10
Preheat	Max. Time	90 seconds	90 seconds
	Temperature Range	150~180°C	150~180°C
Reflow	Max. Time Over 200°C	70 seconds	50 seconds
	Max. Time Over 230°C	40 seconds	20 seconds
	Max. Peak Temperature	250°C	240°C

MKA Series

Part Numbering System for MKA Series

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

MKA 25 VC 331 M J10 TP

- TP: Packaging: TP = Standard Taping. Refer to our web site for taping and reel specifications.
- J10: Case Code: See Case Sizes in Tables.
- M: Capacitance Tolerance: M = ±20%
- 331: 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. R33 = .33µF; 3R3 = 3.3µF; 33R = 33µF; 331 = 330µF; 332 = 3,300µF; 333 = 33,000µF).
- VC: Lead Configuration: VC = Vertical Chip, 2 SMD Terminals.
- 25: DC Rated Voltage: Expressed in Volts (e.g. 25 = 25WVDC).
- MKA: Series Name: Indicates Basic Capacitor Design.

Standard Voltage Ratings - Surface Mount

Rated Voltage (WVDC)	Capacitance† (µF)	Catalog Part Number	Nominal Case Size* D×L (mm)	Case Code†	Rated Ripple Current (mA rms) at +105°C, 120Hz
6.3 Volts 8 Volts Surge	22	MKA6.3VC22RMD55TP	4 × 5.2	D55	21
	47	MKA6.3VC47RME55TP	5 × 5.2	E55	36
	100	MKA6.3VC101MF55TP	6.3 × 5.2	F55	56
	330	MKA6.3VC331MH10TP	8 × 10	H10	290
	1,000	MKA6.3VC102MJ10TP	10 × 10	J10	410
10 Volts 13 Volts Surge	33	MKA10VC33RME55TP	5 × 5.2	E55	34
	100	MKA10VC101MF80TP	6.3 × 7.7	F80	90
	(100)	MKA10VC101MH63TP	8 × 6.3	(H63)	90
	220	MKA10VC221MH10TP	8 × 10	H10	180
16 Volts 20 Volts Surge	10	MKA16VC10RMD55TP	4 × 5.2	D55	16
	22	MKA16VC22RME55TP	5 × 5.2	E55	30
	47	MKA16VC47RMF55TP	6.3 × 5.2	F55	48
	470	MKA16VC471MJ10TP	10 × 10	J10	460
25 Volts 32 Volts Surge	33	MKA25VC33RMF55TP	6.3 × 5.2	F55	45
	47	MKA25VC47RMF80TP	6.3 × 7.7	F80	80
	(47)	MKA25VC47RMH63TP	8 × 6.3	(H63)	80
	100	MKA25VC101MH10TP	8 × 10	H10	180
	330	MKA25VC331MJ10TP	10 × 10	J10	450
35 Volts 42 Volts Surge	4.7	MKA35VC4R7MD55TP	4 × 5.2	D55	15
	10	MKA35VC10RME55TP	5 × 5.2	E55	25
	22	MKA35VC22RMF55TP	6.3 × 5.2	F55	40
	33	MKA35VC33RMF80TP	6.3 × 7.7	F80	80
	(33)	MKA35VC33RMH63TP	8 × 6.3	(H63)	80
	220	MKA35VC221MJ10TP	10 × 10	J10	375
50 Volts 63 Volts Surge	0.10	MKA50VCR10MD55TP	4 × 5.2	D55	1.3
	0.22	MKA50VCR22MD55TP	4 × 5.2	D55	2.6
	0.33	MKA50VCR33MD55TP	4 × 5.2	D55	3.2
	0.47	MKA50VCR47MD55TP	4 × 5.2	D55	3.8
	1.0	MKA50VC1R0MD55TP	4 × 5.2	D55	5.6
	2.2	MKA50VC2R2MD55TP	4 × 5.2	D55	10
	3.3	MKA50VC3R3MD55TP	4 × 5.2	D55	14
	4.7	MKA50VC4R7ME55TP	5 × 5.2	E55	19
	10	MKA50VC10RMF55TP	6.3 × 5.2	F55	29

***Refer to diagrams for detailed case size dimensions. † Parentheses ( ) indicate special order products.**

Standard Voltage Ratings - Surface Mount

Rated Voltage (WVDC)	Capacitance† (µF)	Catalog Part Number	Nominal Case Size* D×L (mm)	Case Code	Rated Ripple Current (mA rms) at +105°C, 120Hz
50 Volts 63 Volts Surge	22	MKA50VC22RMF80TP	6.3 × 7.7	F80	70
	(22)	MKA50VC22RMH63TP	8 × 6.3	(H63)	70
	33	MKA50VC33RMH10TP	8 × 10	H10	140
	47	MKA50VC47RMH10TP	8 × 10	H10	170
	100	MKA50VC101MJ10TP	10 × 10	J10	310

***Refer to diagrams for detailed case size dimensions. † Parentheses ( ) indicate special order products.**

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