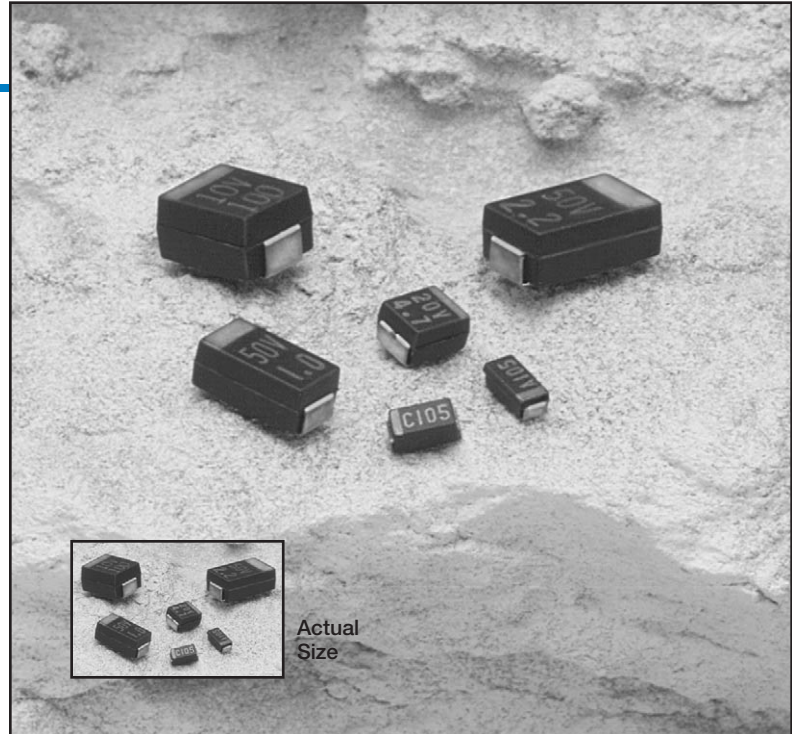


MCM Series



- Tantalum Chip
- Surface Mount
- Smallest Size
- General Purpose
- +125°C
Maximum
Temperature



The MCM series is the highest CV tantalum chip capacitor series from UCC/NCC. These CV ratings allow for the smallest case sizes for a given value. The MCM series is available with a $\pm 20\%$ tolerance and has the highest capacitance values of all our tantalum chip capacitors. These general purpose tantalum chips are ideal for use in computers and cellular phones, where very small case sizes are required.

Refer to the Mini-Glossary at the end of the tantalum chip capacitors section for additional technical information and specifications.

Summary of Specifications

- Surface mount terminals.
- Capacitance range: 0.68 to 220 μ F.
- Voltage range: 4 to 35VDC.
- Operating temperature range: -55°C to $+125^{\circ}\text{C}$.
- Standard capacitance tolerance: $\pm 20\%$
- Nominal case size (L \times W \times H): 3.2 \times 1.6 \times 1.2mm to 7.3 \times 4.3 \times 2.8mm.
- Rated lifetime: 1,000 hours at $+85^{\circ}\text{C}$.

MCM Series

MCM Specifications

Item	Characteristics																													
Operating Temperature Range	-55 to +85°C without voltage derating; -55 to +125°C with voltage derating.																													
Rated Voltage Range	4 to 35VDC																													
Capacitance Range	0.68 to 220 μ F																													
Capacitance Tolerance	\pm 20% (M) at +20°C, 120Hz																													
Leakage Current	$I = 0.01CV$ or $0.5\mu A$, whichever is greater, after applying the DC rated voltage for 5 minutes at +20°C. Where I = Leakage current (μA), C = Nominal capacitance (μF) and V = Rated voltage (VDC)																													
Dissipation Factor (Tan δ)	At +20°C, 120Hz <table border="1"> <thead> <tr> <th>Capacitance (μF)</th> <th>$\leq 1.0\mu F$</th> <th>1.5-10μF</th> <th>15-68μF</th> <th>$\geq 100\mu F$</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Max. Tan δ (DF)</td> <td>$\leq 4V$</td> <td>6%</td> <td>8%</td> <td>8%</td> <td>11%</td> </tr> <tr> <td>$> 4V$</td> <td>4%</td> <td>6%</td> <td>8%</td> <td>10%</td> </tr> </tbody> </table>	Capacitance (μF)	$\leq 1.0\mu F$	1.5-10 μF	15-68 μF	$\geq 100\mu F$	Max. Tan δ (DF)	$\leq 4V$	6%	8%	8%	11%	$> 4V$	4%	6%	8%	10%													
Capacitance (μF)	$\leq 1.0\mu F$	1.5-10 μF	15-68 μF	$\geq 100\mu F$																										
Max. Tan δ (DF)	$\leq 4V$	6%	8%	8%	11%																									
	$> 4V$	4%	6%	8%	10%																									
Low and High Temperature Characteristics	In accordance with JIS-C-5102 test conditions, the measurements for stability of electrical performance of capacitors at -55°C, +85°C and +125°C are shown in the following table. <table border="1"> <thead> <tr> <th>Temperature (°C)</th> <th>-55°C</th> <th>+85°C</th> <th>+125°C</th> </tr> </thead> <tbody> <tr> <td>Max. Capacitance Change</td> <td>\pm10%</td> <td>\pm10%</td> <td>\pm15%</td> </tr> <tr> <td rowspan="4">Max. Tan δ (DF)</td> <td>$\leq 1.0\mu F$</td> <td>6% ($\leq 4V:8\%$)</td> <td>4% ($\leq 4V:6\%$)</td> <td>6% ($\leq 4V:8\%$)</td> </tr> <tr> <td>1.5-10μF</td> <td>8% ($\leq 4V:10\%$)</td> <td>6% ($\leq 4V:8\%$)</td> <td>8% ($\leq 4V:10\%$)</td> </tr> <tr> <td>15-68μF</td> <td>10% ($\leq 4V:10\%$)</td> <td>8% ($\leq 4V:8\%$)</td> <td>10% ($\leq 4V:10\%$)</td> </tr> <tr> <td>$\geq 100\mu F$</td> <td>12% ($\leq 4V:13\%$)</td> <td>10% ($\leq 4V:11\%$)</td> <td>12% ($\leq 4V:13\%$)</td> </tr> <tr> <td>Max. Leakage Current</td> <td>—</td> <td>$\leq 0.1CV$ or $5\mu A$, whichever is greater</td> <td>$\leq 0.125CV$ or $6.25\mu A$, whichever is greater</td> </tr> </tbody> </table>	Temperature (°C)	-55°C	+85°C	+125°C	Max. Capacitance Change	\pm 10%	\pm 10%	\pm 15%	Max. Tan δ (DF)	$\leq 1.0\mu F$	6% ($\leq 4V:8\%$)	4% ($\leq 4V:6\%$)	6% ($\leq 4V:8\%$)	1.5-10 μF	8% ($\leq 4V:10\%$)	6% ($\leq 4V:8\%$)	8% ($\leq 4V:10\%$)	15-68 μF	10% ($\leq 4V:10\%$)	8% ($\leq 4V:8\%$)	10% ($\leq 4V:10\%$)	$\geq 100\mu F$	12% ($\leq 4V:13\%$)	10% ($\leq 4V:11\%$)	12% ($\leq 4V:13\%$)	Max. Leakage Current	—	$\leq 0.1CV$ or $5\mu A$, whichever is greater	$\leq 0.125CV$ or $6.25\mu A$, whichever is greater
Temperature (°C)	-55°C	+85°C	+125°C																											
Max. Capacitance Change	\pm 10%	\pm 10%	\pm 15%																											
Max. Tan δ (DF)	$\leq 1.0\mu F$	6% ($\leq 4V:8\%$)	4% ($\leq 4V:6\%$)	6% ($\leq 4V:8\%$)																										
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Max. Leakage Current	—	$\leq 0.1CV$ or $5\mu A$, whichever is greater	$\leq 0.125CV$ or $6.25\mu A$, whichever is greater																											
Surge Voltage Test	In accordance with JIS-C-5102 test conditions, the following specifications shall be satisfied when the capacitors are restored to +20°C after applying the specified surge voltage for 1,000 cycles (1 cycle = 30 sec. on, 330 sec. off) at +85°C. Capacitance change : $\leq \pm 12\%$ of initial measured value for 4-6.3V : $\leq \pm 8\%$ of initial measured value for 10-16V : $\leq \pm 5\%$ of initial measured value for 20-35V Tan δ (DF) : shall not exceed initial specified DF value above Leakage current : shall not exceed initial specified LC value above																													
Soldering Heat Resistance	In accordance with JIS-C-5143 test conditions, the mounting surface of capacitor terminals shall be dipped in a solder bath of eutectic solder (Sn 60%, Pb 40%) at +260°C for 5 seconds. After cooling and 1-2 hours at room temperature, the following specifications shall be satisfied when the capacitors are tested for electrical performance and appearance at +20°C. Capacitance change : $\leq \pm 8\%$ of initial measured value for 4-10V : $\leq \pm 5\%$ of initial measured value for 16-35V Tan δ (DF) : shall not exceed initial specified DF value above Leakage current : shall not exceed initial specified LC value above Appearance : no abnormality																													
Humidity Load Life Test	In accordance with JIS-C-5102 test conditions, the following specifications shall be satisfied when the capacitors are restored to +20°C after applying the DC rated voltage for 500 hours at +40°C, 90-95% RH. Capacitance change : $\leq \pm 10\%$ of initial measured value Tan δ (DF) : shall not exceed initial specified DF value above Leakage current : shall not exceed initial specified LC value above																													
Load Life Test	In accordance with JIS-C-5102 test conditions, the following specifications shall be satisfied when the capacitors are restored to +20°C after applying the DC rated voltage for 1,000 hours at +85°C. Capacitance change : $\leq \pm 12\%$ of initial measured value for 4-6.3V : $\leq \pm 10\%$ of initial measured value for 10-35V Tan δ (DF) : shall not exceed initial specified DF value above Leakage current : shall not exceed 125% of initial specified LC value above																													
Failure Rate	1% per 1,000 hours after applying the DC rated voltage through a $1\Omega/V$ resistor at +85°C.																													
Standard	Satisfies characteristic LB of JIS-C-5143																													

MCM Series

Diagram of Dimensions

Tantalum Chips Unit: mm

Case Dimensions

UCC Case Code	EIA Case Code	L	W	H	a	b
A2	-	3.2±0.2	1.6±0.2	1.2 max.	0.8±0.3	1.2±0.2
A	A	3.2±0.2	1.6±0.2	1.6±0.2	0.8±0.3	1.2±0.2
B2	B	3.5±0.2	2.8±0.2	1.9±0.2	0.8±0.3	2.2±0.2
C	C	6.0±0.2	3.2±0.2	2.5±0.2	1.3±0.3	2.2±0.2
D2	-	5.8±0.2	4.6±0.2	3.2±0.2	1.3±0.3	2.4±0.2
D	D	7.3±0.2	4.3±0.2	2.8±0.2	1.3±0.3	2.4±0.2

Part Numbering System for MCM Series When ordering, always specify complete catalog number for MCM Series.

6 MCM 476 M B2 TER

- 6: Voltage Code: 6 = 6.3VDC (decimals are dropped for part numbering code).
- MCM: Series Name: Indicates Basic Capacitor Design.
- 476: Capacitance Value: Expressed in picofarads. The first two digits are significant figures, and the third digit indicates the number of zeros following these figures (e.g. 476 = 47,000,000pF = 47μF).
- M: Capacitance Tolerance: M = ±20%
- B2: Case Code: Refer to diagram of dimensions for standard case sizes.
- TER: Taping Code: TER = standard polarity orientation on 7" reel.
TEL = optional polarity orientation on 7" reel.

Standard Voltage Ratings - Tantalum Chips

Rated Voltage (WVDC)	Capacitance (μF)	Catalog Part Number †	UCC Case Code*	EIA Case Code*
4 Volts 5 Volts Surge	6.8	4MCM685MA2TER	A2	-
	15	4MCM156MATER	A	A
	22	4MCM226MATER	A	A
	33	4MCM336MB2TER	B2	B
	47	4MCM476MB2TER	B2	B
	68	4MCM686MB2TER	B2	B
	100	4MCM107MCTER	C	C
	220	4MCM227MDTER	D	D
6.3 Volts 8 Volts Surge	220	4MCM227MD2TER	D2	-
	4.7	6MCM475MA2TER	A2	-
	10	6MCM106MATER	A	A
	15	6MCM156MATER	A	A
	22	6MCM226MB2TER	B2	B
	33	6MCM336MB2TER	B2	B
47	6MCM476MB2TER	B2	B	

† TER = standard taping code. TEL = optional taping code. Refer to taping specifications.

* Refer to diagram of dimensions for actual case sizes.

MCM Series

Standard Voltage Ratings - Tantalum Chips

Rated Voltage (WVDC)	Capacitance (μF)	Catalog Part Number †	UCC Case Code*	EIA Case Code*
6.3 Volts 8 Volts Surge	68	6MCM686MCTER	C	C
	150	6MCM157MDTER	D	D
	150	6MCM157MD2TER	D2	-
10 Volts 13 Volts Surge	3.3	10MCM335MA2TER	A2	-
	6.8	10MCM685MATER	A	A
	10	10MCM106MATER	A	A
	15	10MCM156MB2TER	B2	B
	22	10MCM226MB2TER	B2	B
	33	10MCM336MB2TER	B2	B
	47	10MCM476MCTER	C	C
	100	10MCM107MDTER	D	D
	100	10MCM107MD2TER	D2	-
16 Volts 20 Volts Surge	2.2	16MCM225MA2TER	A2	-
	4.7	16MCM475MATER	A	A
	10	16MCM106MB2TER	B2	B
	15	16MCM156MB2TER	B2	B
	22	16MCM226MCTER	C	C
	33	16MCM336MCTER	C	C
	47	16MCM476MDTER	D	D
	47	16MCM476MD2TER	D2	-
20 Volts 25 Volts Surge	1.5	20MCM155MA2TER	A2	-
	2.2	20MCM225MATER	A	A
	3.3	20MCM335MATER	A	A
	6.8	20MCM685MB2TER	B2	B
	10	20MCM106MB2TER	B2	B
	15	20MCM156MCTER	C	C
	22	20MCM226MCTER	C	C
	33	20MCM336MDTER	D	D
	33	20MCM336MD2TER	D2	-
25 Volts 32 Volts Surge	1.5	25MCM155MATER	A	A
	10	25MCM106MCTER	C	C
35 Volts 44 Volts Surge	0.68	35MCM684MATER	A	A
	1.0	35MCM105MATER	A	A
	2.2	35MCM225MB2TER	B2	B
	6.8	35MCM685MCTER	C	C

† TER = standard taping code. TEL = optional taping code. Refer to taping specifications.

* Refer to diagram of dimensions for actual case sizes.

MCM Series

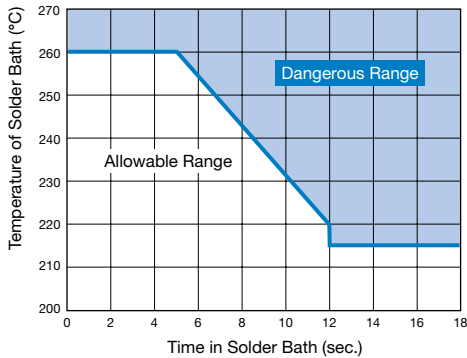
Soldering Conditions

Soldering Guidelines

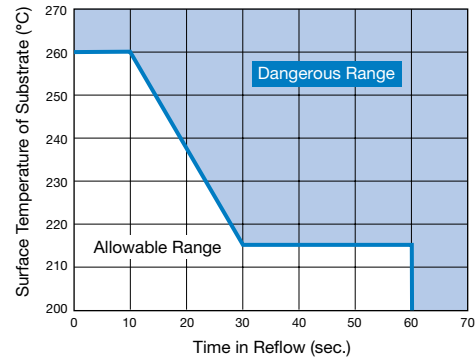
Pre-heat tantalum chip capacitors. Do not exceed +150°C for more than 5 minutes. The recommended soldering temperature profiles for the capacitors are shown below. Be sure to stay within the allowable range to avoid capacitor damage.

Recommended Soldering Temperature Profiles

Immersion Soldering Profile



Reflow Soldering Profile

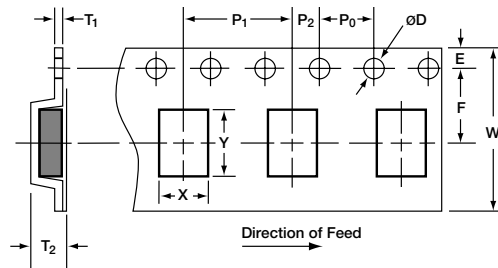


Tape and Reel Specifications

Tantalum Chips

Unit: mm

Taping

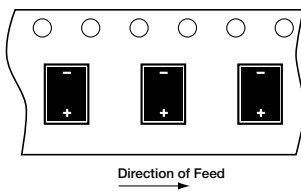


Taping Dimensions

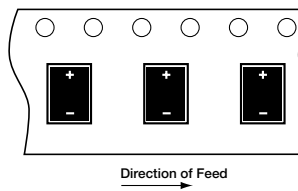
Case Code (EIA Code)	A2	A (A)	B2 (B)	C (C)	D2	D (D)
X ± 0.1	1.9	1.9	3.1	3.7	4.9	4.8 ± 0.2
Y ± 0.1	3.5	3.5	3.8	6.4	6.1	7.7 ± 0.2
W ± 0.3	8.0	8.0	8.0	12.0	12.0	12.0
F ± 0.05	3.5	3.5	3.5	5.5	5.65	5.65
E ± 0.1	1.75	1.75	1.75	1.75	1.5	1.5
P1 ± 0.1	4.0	4.0	4.0	8.0	8.0	8.0
P2 ± 0.05	2.0	2.0	2.0	2.0	2.0	2.0
P0 ± 0.1	4.0	4.0	4.0	4.0	4.0	4.0
ØD ± 0.1, -0	1.5	1.5	1.5	1.5	1.5	1.5
T1	0.3	0.3	0.3	0.3	0.3	0.3
T2 ± 0.2	1.7 max.	2.0 max.	2.1	3.0	3.6	3.6

Orientation of Component Polarity

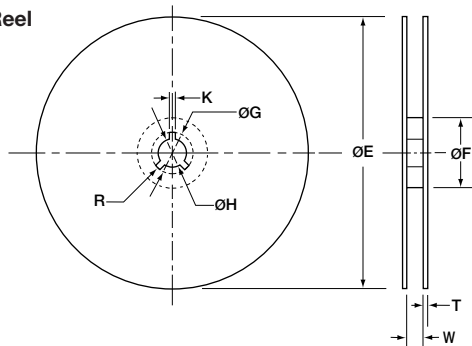
Taping Code: TER (standard)



Taping Code: TEL (optional)



Reel



Reel Dimensions and Quantity Per Reel

Case Code (EIA Code)	A2	A (A)	B2 (B)	C (C)	D2	D (D)
ØE ± 2	178	178	178	178	178	178
ØF min.	50	50	50	50	50	50
ØG ± 0.5	13	13	13	13	13	13
ØH ± 0.8	21	21	21	21	21	21
K ± 0.5	2	2	2	2	2	2
W ± 1.5	10	10	10	14	14	18
T ± 0.5	2	2	2	2	2	2
R	1.0	1.0	1.0	1.0	1.0	1.0
Pieces Per Reel	2,000	2,000	2,000	600	600	600