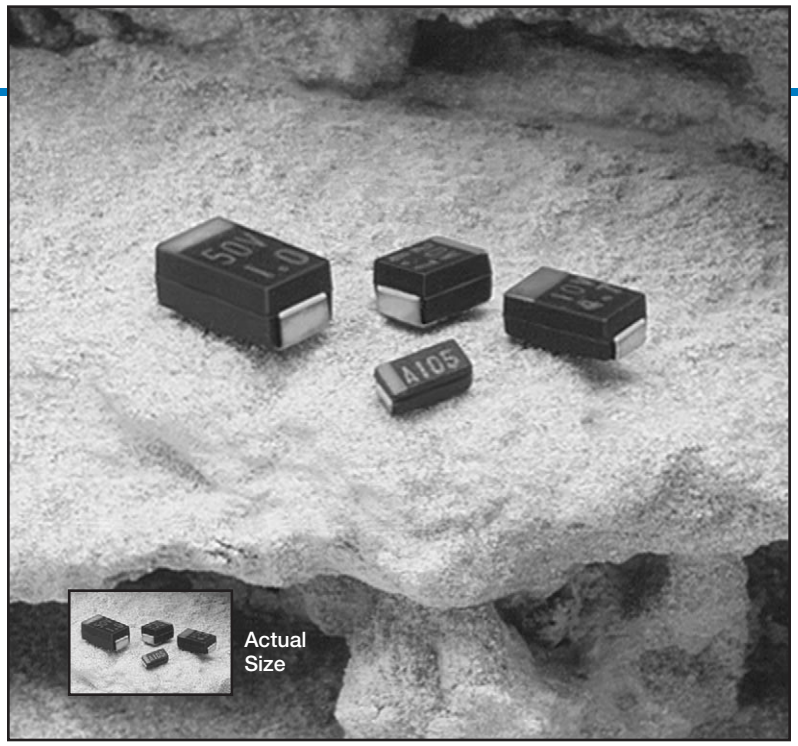
MCH Series

- Tantalum Chip
- Surface Mount
- Automotive Use
- +125°C Maximum Temperature



The MCH series capacitors are the standard tantalum chip capacitors from UCC/NCC that are designed for automotive use. These surface mount capacitors are designed for high reliability and have excellent resistance against moisture and thermal shock. The MCH capacitors are available with either a ±20% or ±10% tolerance.

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: 0.1 to 22µF.**
- **Voltage range: 4 to 35VDC.**
- **Operating temperature range: −55°C to +125°C.**
- **Standard capacitance tolerance: ±20% or ±10%**
- **Nominal case size (L×W×H): 3.2×1.6×1.6mm to 6.0×3.2×2.5mm.**
- **Rated lifetime: 2,000 hours at +85°C.**

MCH Series

MCH Specifications

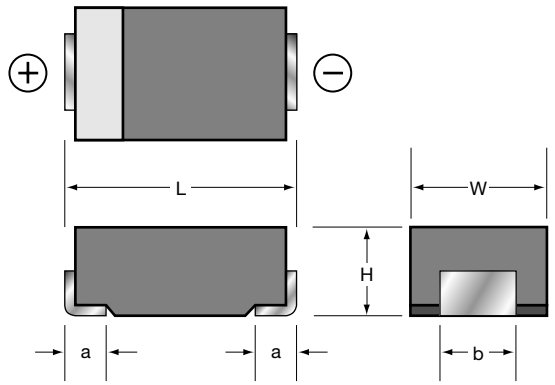
<table>
<tr><th>Item</th><th>Characteristics</th></tr>
<tr><td>Operating Temperature Range</td><td>−55 to +85°C without voltage derating; −55 to +125°C with voltage derating.</td></tr>
<tr><td>Rated Voltage Range</td><td>4 to 35VDC</td></tr>
<tr><td>Capacitance Range</td><td>0.1 to 22μF</td></tr>
<tr><td>Capacitance Tolerance</td><td>±20% (M) or ±10% (K) at +20°C, 120Hz</td></tr>
<tr><td>Leakage Current</td><td>I = 0.005CV or 0.25μA, 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)</td></tr>
<tr><td>Dissipation Factor (Tan δ)</td><td>At +20°C, 120Hz
<table>
<tr><td>Capacitance (μF)</td><td>≤ 4.7μF</td><td>≥ 6.8μF</td></tr>
<tr><td>Max. Tan δ (DF)</td><td>4%</td><td>6%</td></tr>
</table></td></tr>
<tr><td>Low and High Temperature Characteristics</td><td>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>
<tr><td colspan="2">Temperature (°C)</td><td>−55°C</td><td>+85°C</td><td>+125°C</td></tr>
<tr><td colspan="2">Max. Capacitance Change</td><td>±10%</td><td>±10%</td><td>±15%</td></tr>
<tr><td rowspan="2">Max. Tan δ (DF)</td><td>≤ 4.7μF</td><td>6%</td><td>4%</td><td>4%</td></tr>
<tr><td>≥ 6.8μF</td><td>8%</td><td>6%</td><td>6%</td></tr>
<tr><td colspan="2">Max. Leakage Current</td><td>—</td><td>≤ 0.1CV or 5μA, whichever is greater</td><td>≤ 0.125CV or 6.25μA, whichever is greater</td></tr>
</table></td></tr>
<tr><td>Temperature Cycle Test</td><td>In accordance with JIS-C-5102 test conditions, the following specifications shall be satisfied when the capacitors are restored to +20°C after subjecting them to 500 cycles (1 cycle = 30 minutes at −55°C, 30 minutes at +125°C) without voltage applied.
Capacitance change : ≤ ±5% of initial measured value
Tan δ (DF) : shall not exceed initial specified DF value above
Leakage current : shall not exceed 200% of initial specified LC value above</td></tr>
<tr><td>Surge Voltage Test</td><td>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 : ≤ ±5% 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</td></tr>
<tr><td>Soldering Heat Resistance</td><td>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 : ≤ ±5% 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
Appearance : no abnormality</td></tr>
<tr><td>Humidity Load Life Test</td><td>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, 85% RH.
Capacitance change : ≤ ±5% of initial measured value
Tan δ (DF) : shall not exceed 150% of initial specified DF value above
Leakage current : ≤ 0.1CV or 5μA, whichever is greater</td></tr>
<tr><td>Load Life Test</td><td>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 2,000 hours at +85°C.
Capacitance change : ≤ ±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</td></tr>
<tr><td>Failure Rate</td><td>1% per 1,000 hours after applying the DC rated voltage through a 1Ω/V resistor at +85°C.</td></tr>
<tr><td>Standard</td><td>Satisfies characteristic SB of JIS-C-5143</td></tr>
</table>

MCH Series

Diagram of Dimensions

Tantalum Chips

Unit: mm



Case Dimensions

UCC Case Code	EIA Case Code	L	W	H	a	b
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
B	–	4.7±0.2	2.6±0.2	1.8±0.2	0.9±0.3	1.8±0.2
C	C	6.0±0.2	3.2±0.2	2.5±0.2	1.3±0.3	2.2±0.2

Part Numbering System for MCH Series

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

10 MCH 475 M B2 TER

- TER: Taping Code: TER = standard polarity orientation on 7" reel. TEL = optional polarity orientation on 7" reel.
- B2: Case Code: Refer to diagram of dimensions for standard case sizes.
- M: Capacitance Tolerance: M = ±20%; K = ±10%
- 475: 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. 475 = 4,700,000pF = 4.7μF).
- MCH: Series Name: Indicates Basic Capacitor Design.
- 10: Voltage Code: 10 = 10VDC (decimals are dropped for part numbering code).

Standard Voltage Ratings - Tantalum Chips

Rated Voltage (WVDC)	Capacitance (μF)	Catalog Part Number†	UCC Case Code*	EIA Case Code*
4 Volts 5 Volts Surge	2.2	4MCH225MATER	A	A
	3.3	4MCH335MATER	A	A
	6.8	4MCH685MBTER	B	–
	10	4MCH106MBTER	B	–
	10	4MCH106MB2TER	B2	B
	22	4MCH226MCTER	C	C
6.3 Volts 8 Volts Surge	1.5	6MCH155MATER	A	A
	2.2	6MCH225MATER	A	A
	4.7	6MCH475MBTER	B	–
	6.8	6MCH685MBTER	B	–
	6.8	6MCH685MB2TER	B2	B
	15	6MCH156MCTER	C	C
10 Volts 13 Volts Surge	1.0	10MCH105MATER	A	A
	1.5	10MCH155MATER	A	A
	3.3	10MCH335MBTER	B	–
	4.7	10MCH475MBTER	B	–
	4.7	10MCH475MB2TER	B2	B
	10	10MCH106MCTER	C	C

† M = ±20% tolerance. Substitute code letter K in part number for ±10% tolerance.
TER = standard taping code. TEL = optional taping code. Refer to taping specifications.
* Refer to diagram of dimensions for actual case sizes.

MCH Series

Standard Voltage Ratings - Tantalum Chips

Rated Voltage (WVDC)	Capacitance (µF)	Catalog Part Number†	UCC Case Code*	EIA Case Code*
16 Volts 20 Volts Surge	0.68	16MCH684MATER	A	A
	1.0	16MCH105MATER	A	A
	2.2	16MCH225MBTER	B	–
	3.3	16MCH335MBTER	B	–
	3.3	16MCH335MB2TER	B2	B
	6.8	16MCH685MCTER	C	C
20 Volts 25 Volts Surge	0.47	20MCH474MATER	A	A
	0.68	20MCH684MATER	A	A
	2.2	20MCH225MBTER	B	–
	2.2	20MCH225MB2TER	B2	B
	4.7	20MCH475MCTER	C	C
25 Volts 32 Volts Surge	0.33	25MCH334MATER	A	A
	0.47	25MCH474MATER	A	A
	1.5	25MCH155MBTER	B	–
	1.5	25MCH155MB2TER	B2	B
	3.3	25MCH335MCTER	C	C
35 Volts 44 Volts Surge	0.1	35MCH104MATER	A	A
	0.15	35MCH154MATER	A	A
	0.22	35MCH224MATER	A	A
	0.33	35MCH334MATER	A	A
	0.47	35MCH474MBTER	B	–
	0.47	35MCH474MB2TER	B2	B
	0.68	35MCH684MBTER	B	–
	0.68	35MCH684MB2TER	B2	B
	1.0	35MCH105MBTER	B	–
	1.0	35MCH105MB2TER	B2	B
	1.5	35MCH155MCTER	C	C
	2.2	35MCH225MCTER	C	C

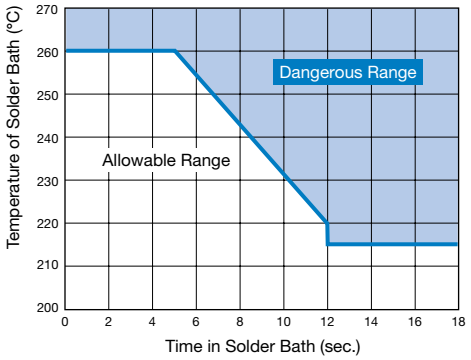
† M = ±20% tolerance. Substitute code letter K in part number for ±10% tolerance.
TER = standard taping code. TEL = optional taping code. Refer to taping specifications.
*** Refer to diagram of dimensions for actual case sizes.**

Soldering Conditions

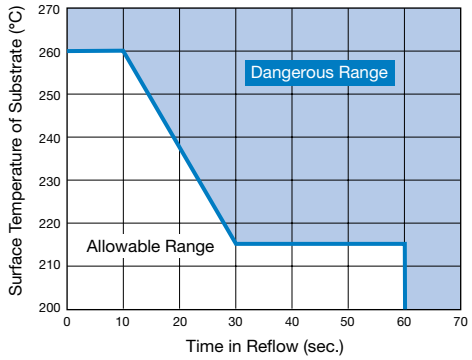
Soldering Guidelines
Pre-heat tantalum chip capacitors. Do not exceed +150°C for more than 5 minutes. The recommended soldering temperature profiles for the capacitors are shown below. Be sure to stay within the allowable range to avoid capacitor damage.

Recommended Soldering Temperature Profiles

Immersion Soldering Profile



Reflow Soldering Profile

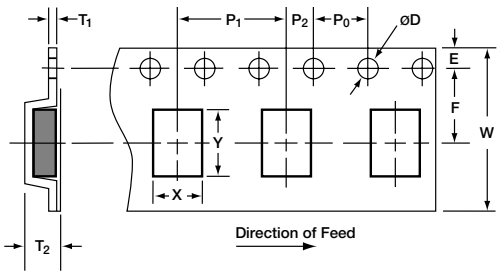


Tape and Reel Specifications

Tantalum Chips

Unit: mm

Taping

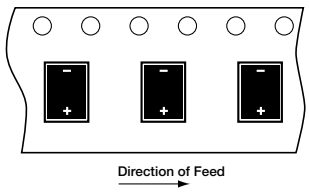


Taping Dimensions

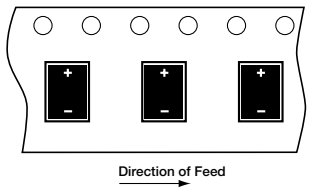
Case Code (EIA Code)	A (A)	B2 (B)	B	C (C)
X±0.1	1.9	3.1	3.0	3.7
Y±0.1	3.5	3.8	5.2	6.4
W±0.3	8.0	8.0	12.0	12.0
F±0.05	3.5	3.5	5.65	5.5
E±0.1	1.75	1.75	1.5	1.75
P_1±0.1	4.0	4.0	4.0	8.0
P_2±0.05	2.0	2.0	2.0	2.0
P_0±0.1	4.0	4.0	4.0	4.0
øD+0.1,−0	1.5	1.5	1.5	1.5
T_1	0.3	0.3	0.3	0.3
T_2 ±0.2	2.0 max.	2.1	2.6	3.0

Orientation of Component Polarity

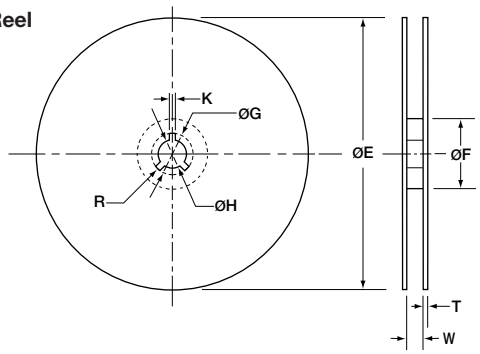
Taping Code: TER (standard)



Taping Code: TEL (optional)



Reel



Reel Dimensions and Quantity Per Reel

Case Code (EIA Code)	A (A)	B2 (B)	B	C (C)
øE±2	178	178	178	178
øF min.	50	50	50	50
øG±0.5	13	13	13	13
øH±0.8	21	21	21	21
K±0.5	2	2	2	2
W±1.5	10	10	14	14
T±0.5	2	2	2	2
R	1.0	1.0	1.0	1.0
Pieces Per Reel	2,000	2,000	2,000	600