

# Types MCM and MIN SMT Clad RF Capacitors

## Multilayer High Power, High Temperature Mica and PTFE Capacitors



Types MCM and MIN SMT clad PTFE and mica capacitors are top performers for high power applications requiring low inductance at high frequencies and can operate at temperatures up to 200 °C and voltages to 1000 Vdc. Choosing from 16 different configurations offers easy mounting with options for surface mount as well as through-hole and mechanical assembly. To assure high current capability in the smallest capacitors, low-capacitance ratings use polytetrafluorethylene (PTFE) that has ultra-low dielectric absorption - better than polypropylene, polystyrene and NPO ceramic.

### Highlights

- 200 °C rated with no voltage derating
- Wave solderable
- No cracking or delaminating
- CTE  $\approx$  18 ppm/°C compatible with FR4 PCBs
- Highly thermal conductive package
- Gull-wing terminal minimizes stress
- Typical 100 pF ESR, <11 m $\Omega$  @ 100 MHz
- Nonmagnetic for minimal RF loss
- Very low ESL for excellent by-pass action
- Ultra stable: no change with (t), (V) and (f)
- Exact capacitance with tolerances from  $\pm 0.25$  pF
- RoHS Compliant

### Specifications



Complies with the EU Directive 2002/95/EC requirement restricting the use of Lead (Pb), Mercury (Hg), Cadmium (Cd), Hexavalent chromium (Cr(VI)), PolyBrominated Biphenyls (PBB) and PolyBrominated Diphenyl Ethers (PBDE).

**Capacitance Range:**  
**Voltage Ratings:**  
**Temperature Range:**  
**Capacitance Tolerance:**  
**Dielectric Strength:**  
**Insulation Resistance:**  
**Aging Rate:**  
**Marking:**

### Design Kits for Engineers

**MIN300VKIT1** 300 Vdc  
5 pieces each  
13 ratings 3.3 – 150 pF

**MCM500VKIT2**  
Nonmagnetic to 500 Vdc  
5 pieces each  
10 ratings 10 – 1000 pF

**MCM1000VKIT3** 1 kVdc  
5 pieces each  
7 ratings 100 – 750 pF



| MCM                                                                                      | MIN         |
|------------------------------------------------------------------------------------------|-------------|
| 1 to 1500 pF                                                                             | 1 to 350 pF |
| 300 to 1000 Vdc                                                                          | 300 Vdc     |
| –55 °C to +200 °C with no voltage derating                                               |             |
| $\pm 0.25$ pF, $\pm 0.5$ pF, $\pm 1$ pF, $\pm 0.5\%$ , $\pm 1\%$ , $\pm 2\%$ , $\pm 5\%$ |             |
| 200% of rated voltage for 5 seconds                                                      |             |
| 1000 M $\Omega$ · $\mu$ F Need not exceed 100,000 M $\Omega$ at 25 °C                    |             |
| None                                                                                     |             |
| <b>MIN</b> - Capacitance in pF and ID letters CD                                         |             |
| <b>MCM</b> - Capacitance, ID letters CD and voltage if other than 500 when space permits |             |
| RoHS Compliant - marked in green ink                                                     |             |

### Applications

RF Power Amplifiers  
Lasers  
Mobile Radio  
Plasma generators  
MRI Coils  
RF Medical Equipment  
Land Mobile antennas 27 to 900 MHz

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## Ratings Available

| Capacitance<br>(pF) | Voltage<br>Ratings<br>(Vdc) |     |       | Dielectric   |
|---------------------|-----------------------------|-----|-------|--------------|
|                     | 300                         | 500 | *1000 |              |
| MIN02               |                             |     |       |              |
| 1 - 2.9             | X                           |     |       | PTFE         |
| 3 - 9.9             | X                           |     |       | PTFE or Mica |
| 10 - 60             | X                           |     |       | Mica         |
| 61 - 120            | X                           |     |       | Mica         |
| 121 - 180           | X                           |     |       | Mica         |
| 181 - 240           | X                           |     |       | Mica         |
| 241 - 300           | X                           |     |       | Mica         |
| 301 - 350           | X                           |     |       | Mica         |
| MCM01               |                             |     |       |              |
| 1 - 7               |                             | X   | X     | PTFE         |
| 8 - 32              |                             | X   | X     | PTFE or Mica |
| 33 - 250            |                             | X   | X     | Mica         |
| 251 - 500           |                             | X   | X     | Mica         |
| 501 - 750           |                             | X   | X     | Mica         |
| 751 - 1000          |                             | X   |       | Mica         |
| 1001 - 1280         |                             | X   |       | Mica         |
| 1281 - 1500         | X                           |     |       | Mica         |

\*1000 V available in MCM01-001 and -009 style

## Part Numbering System

|                              |        |                           |                                             |                            |                     |                                        |   |              |                   |
|------------------------------|--------|---------------------------|---------------------------------------------|----------------------------|---------------------|----------------------------------------|---|--------------|-------------------|
| MCM01<br>or<br>MIN02<br>Type | —      | 001                       | C                                           | D                          | 101                 | J                                      | — | T            | F                 |
|                              | "dash" | Terminal<br>Configuration | Temperature<br>Coefficient *<br>(mica only) | Rated<br>Voltages<br>(Vdc) | Capacitance<br>(pF) | Capacitance<br>Tolerance*<br>(pF or %) |   | Packaging    | RoHS<br>Compliant |
|                              |        |                           | C                                           | C = 300 Vdc                | 090 = 9             | A = ±1 pF 2 - 200 pF                   |   | -T = Tape    | Blank = Not       |
|                              |        |                           | D                                           | D = 500 Vdc                | 9R2 = 9.2           | B = ±0.25 pF 1 - 50 pF                 |   | Blank = Bulk | specified         |
|                              |        |                           | E                                           | F = 1000 Vdc               | 100 = 10            | D = ±0.5 pF 1 - 100 pF                 |   |              | F = Compliant     |
|                              |        |                           |                                             |                            | 101 = 100           | E = ±0.5 % > 100 pF                    |   |              |                   |
|                              |        |                           |                                             |                            | (751) = 751         | F = ±1 % > 33 pF                       |   |              |                   |
|                              |        |                           |                                             |                            | 102 = 1000          | G = ±2% > 11 pF                        |   |              |                   |
|                              |        |                           |                                             |                            |                     | J = ±5% > 11 pF                        |   |              |                   |
|                              |        |                           |                                             |                            |                     | K = ±10% > 11 pF                       |   |              |                   |

| Style | Capacitance Range | Temperature Characteristic |
|-------|-------------------|----------------------------|
| C     | 1 pF to 20 pF     | ±200 ppm/°C                |
| D     | 21 pF to 56 pF    | ±100 ppm/°C                |
| E     | 57 pF to 1500 pF  | -20 to +100 ppm/°C         |

\*TC code letter is left blank for PTFE items

|                                                                                                                                        |
|----------------------------------------------------------------------------------------------------------------------------------------|
| <p>▲ Most Popular Series, other's available, consult factory</p> <p><sup>1</sup> Surface mount and T&amp;R</p> <p><sup>2</sup> 1kV</p> |
|----------------------------------------------------------------------------------------------------------------------------------------|

|                                                                 |
|-----------------------------------------------------------------|
| <p>Measured at 1 MHz for ≤1000 pF and 1 kHz for &gt;1000 pF</p> |
|-----------------------------------------------------------------|

### ESR vs. Frequency for 470 pF



### Current Rating (IRMS) for 470 pF at 60 °C Rise



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## Outline Drawings for Popular Items

**MIN02-002**



"T" (thickness) depending on capacitance value = .065 to .125 ± .015

**MCM01-001**



"T" (thickness) depending on capacitance value = .110 to .165 ± .015

**MCM01-009**



"T" (thickness) depending on capacitance value = .110 to .165 ± .015

**MCM01-010**



"T" (thickness) depending on capacitance value = .110 to .165 ± .015

"T" varies with capacitance

# Types MCM and MIN SMT Clad RF Capacitors

## Standard Minimum Quantities

**Tape Specifications** Bulk Pack: 100 pieces per bag Reel Pack: 500 pieces per reel



| Tape Dimensions (mm)  |    |      |      |    |     |      |
|-----------------------|----|------|------|----|-----|------|
| Case                  | W  | A    | B    | P1 | F   | t    |
| MIN02-002<br>< 150 pF | 16 | 5.56 | 8.18 | 8  | 7.5 | 2.16 |
| MIN02-002<br>≥ 150 pF | 16 | 5.66 | 8.10 | 8  | 7.5 | 3.20 |

Note: 24 mm tape for MCM01-009 and 32 mm tape for MCM01-004 are available upon request. 1

## Solder Profile

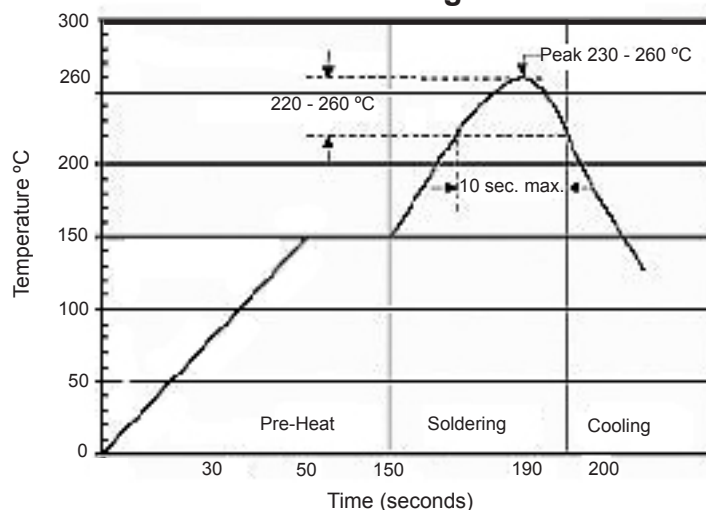
### Specifications:

Lead free finish

### Case and Terminal Material:

Silver plated, copper flashed, brass

### Reflow Soldering Method



### Wave Soldering Method



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Тел: +7 (812) 336 43 04 (многоканальный)

Email: [org@lifeelectronics.ru](mailto:org@lifeelectronics.ru)

[www.lifeelectronics.ru](http://www.lifeelectronics.ru)