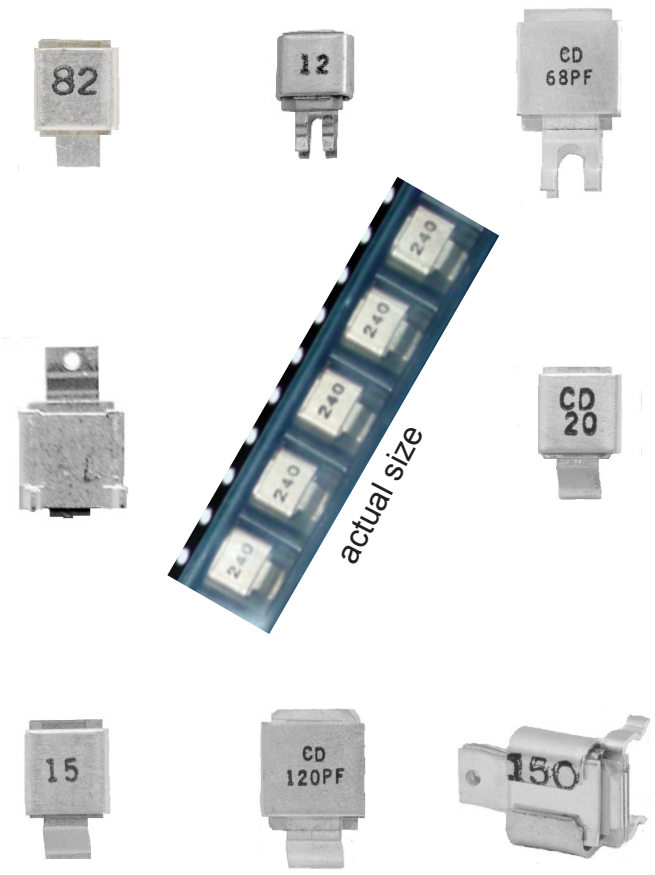
# Types MCM and MIN SMT Clad RF Capacitors

## 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 ºC 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 ºC rated with no voltage derating
- Wave solderable
- No cracking or delaminating
- CTE ≈ 18 ppm/ºC compatible with FR4 PCBs
- Highly thermal conductive package
- Gull-wing terminal minimizes stress
- Typical 100 pF ESR, <11 mΩ @ 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 ±0.25 pF
- RoHS Compliant

## Specifications

RoHS Compliant

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).

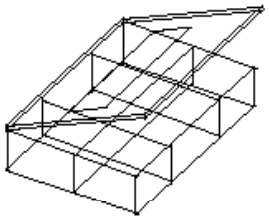
| | MCM | MIN |
|---|---|---|
| **Capacitance Range:** | 1 to 1500 pF | 1 to 350 pF |
| **Voltage Ratings:** | 300 to 1000 Vdc | 300 Vdc |
| **Temperature Range:** | –55 ºC to +200 ºC with no voltage derating | |
| **Capacitance Tolerance:** | ±0.25pF, ±0.5 pF, ±1 pF, ±0.5%, ±1%, ±2%, ±5% | |
| **Dielectric Strength:** | 200% of rated voltage for 5 seconds | |
| **Insulation Resistance:** | 1000 MΩ•µF Need not exceed 100,000 MΩ at 25 ºC | |
| **Aging Rate:** | None | |
| **Marking:** | **MIN** - Capacitance in pF and ID letters CD<br>**MCM** - Capacitance, ID letters CD and voltage if other than 500 when space permits<br>RoHS Compliant - marked in green ink | |

## 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**



## Applications

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

# Types MCM and MIN SMT Clad RF Capacitors

## Ratings Available

| Capacitance (pF) | Voltage Ratings (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 or MIN02 Type | — "dash" | 001 Terminal Configuration | C Temperature Coefficient * (mica only) | D Rated Voltages (Vdc) | 101 Capacitance (pF) | J Capacitance Tolerance* ( pF or %) | — | T Packaging | F RoHS 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 | | | |

| MCM01 | MIN02 |
|---|---|
| ▲001[2] | ▲002[1] |
| ▲009[1,2] | |
| ▲010 | |

▲ Most Popular Series, other's available, consult factory
[1] Surface mount and T&R
[2] 1kV

| 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 |

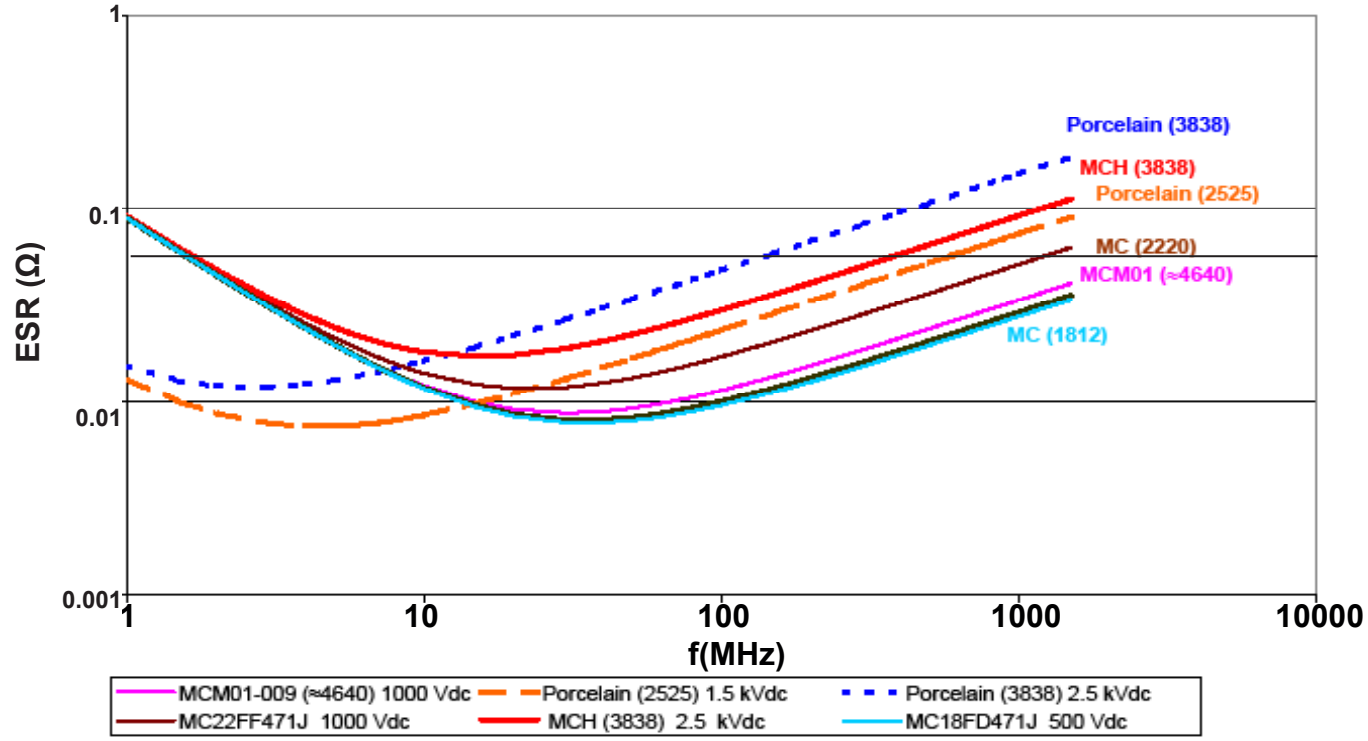
*TC code letter is left blank for PTFE items

Measured at 1 MHz for ≤1000 pF and 1 kHz for >1000 pF

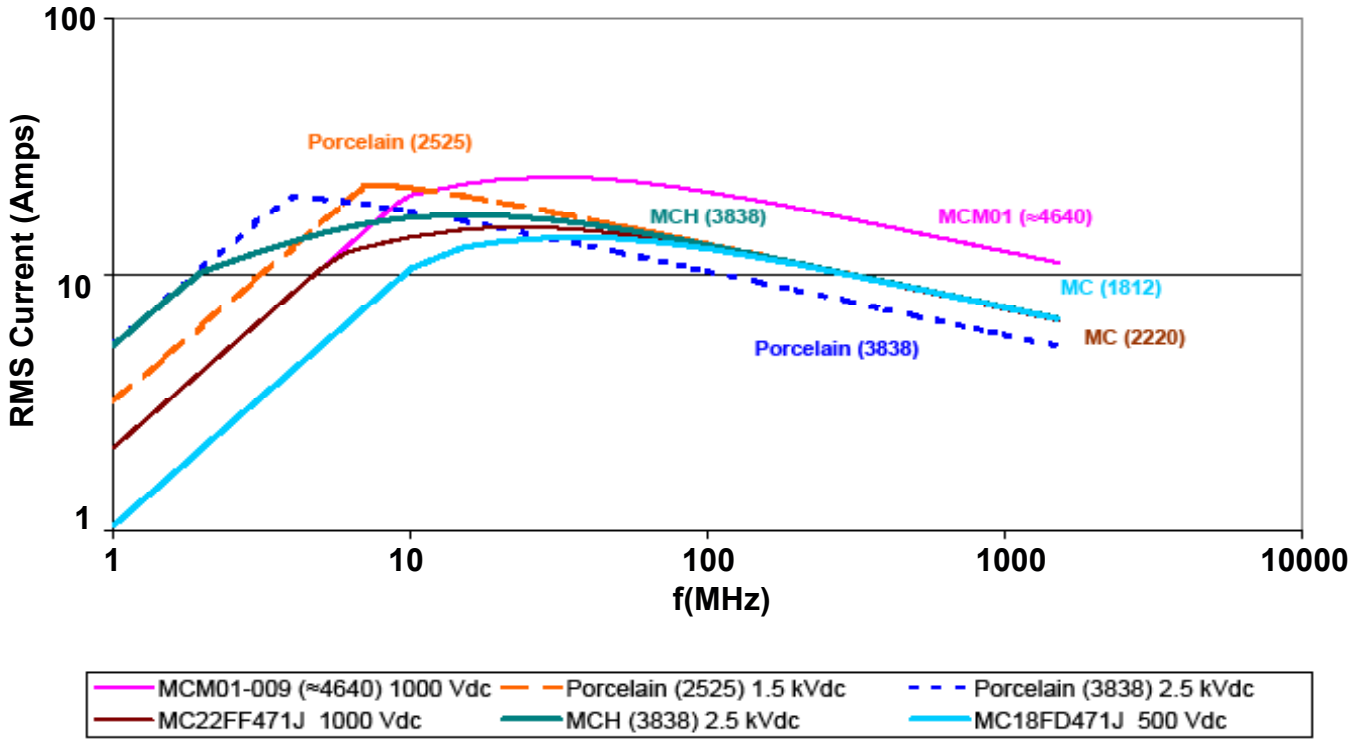
## Typical Performance Data

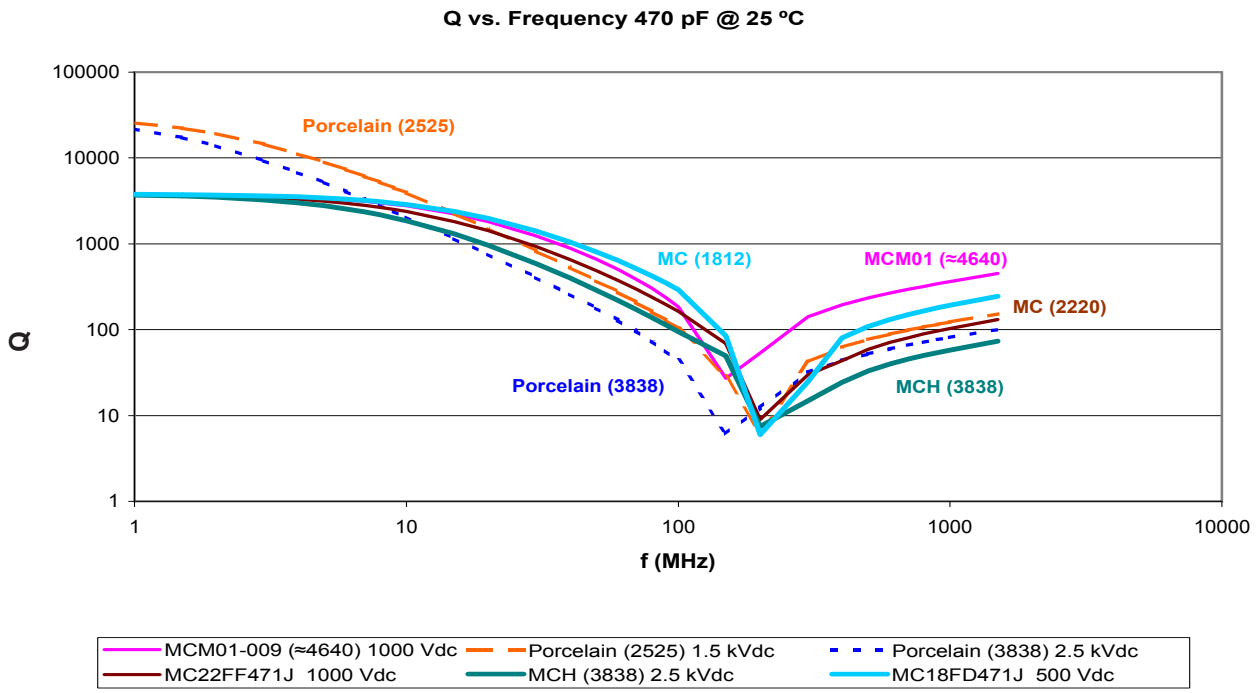
click here to see additional rating charts

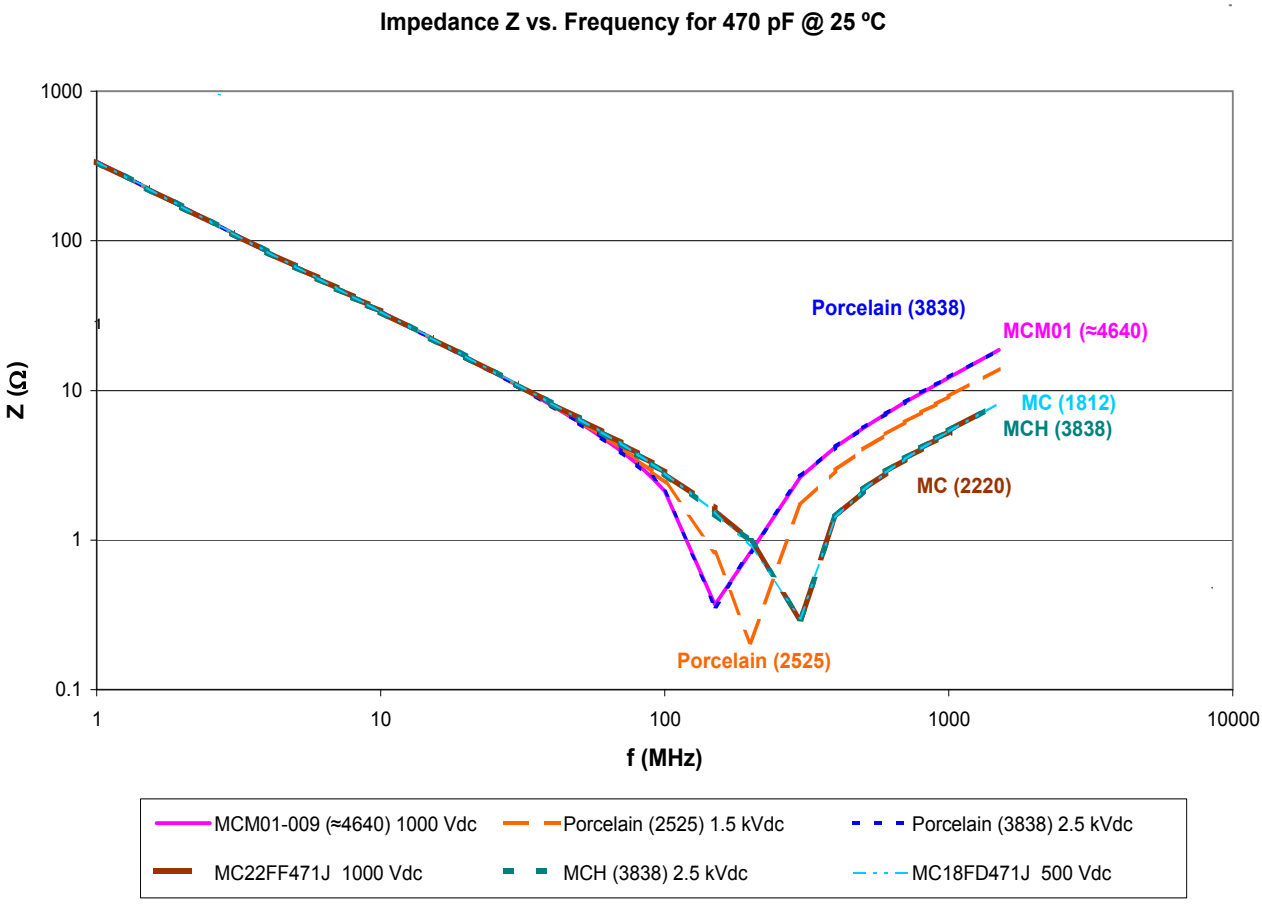
### ESR vs. Frequency for 470 pF




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

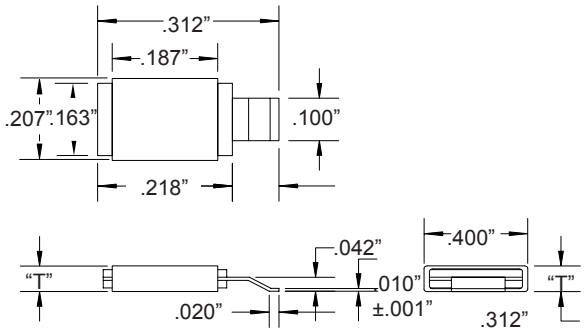



Q vs. Frequency 470 pF @ 25 ºC
Q
f (MHz)
100000
10000
1000
100
10
1
1
10
100
1000
10000
Porcelain (2525)
MC (1812)
MCM01 (≈4640)
MC (2220)
Porcelain (3838)
MCH (3838)
MCM01-009 (≈4640) 1000 Vdc
Porcelain (2525) 1.5 kVdc
Porcelain (3838) 2.5 kVdc
MC22FF471J 1000 Vdc
MCH (3838) 2.5 kVdc
MC18FD471J 500 Vdc


Impedance Z vs. Frequency for 470 pF @ 25 ºC
Z (Ω)
f (MHz)
1000
100
10
1
0.1
1
10
100
1000
10000
Porcelain (3838)
MCM01 (≈4640)
MC (1812)
MCH (3838)
MC (2220)
Porcelain (2525)
MCM01-009 (≈4640) 1000 Vdc
Porcelain (2525) 1.5 kVdc
Porcelain (3838) 2.5 kVdc
MC22FF471J 1000 Vdc
MCH (3838) 2.5 kVdc
MC18FD471J 500 Vdc

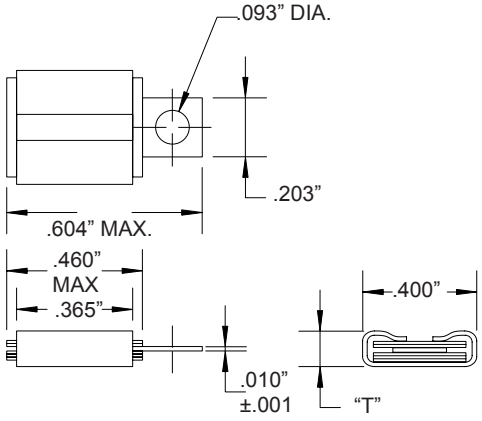
## Outline Drawings for Popular Items

### MIN02-002



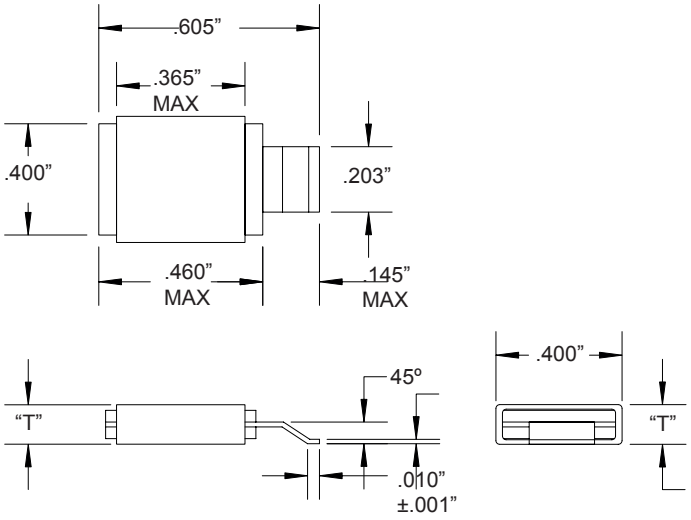

"T" (thickness) depending on capacitance value = .065 to .125±.015

### MCM01-001



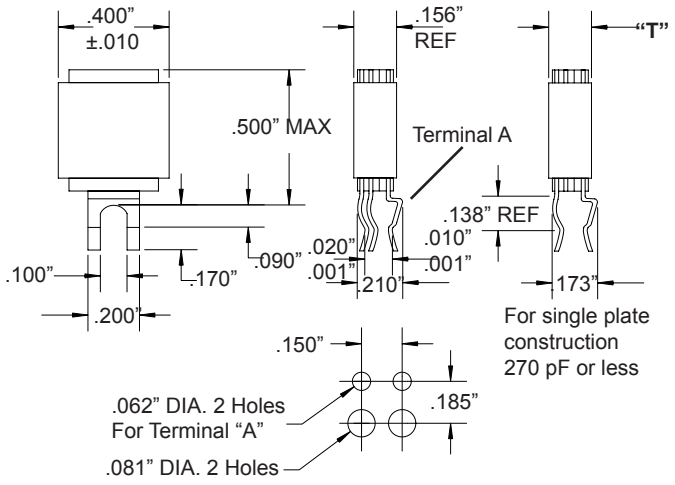

"T" (thickness) depending on capacitance value= .110 to .165±.015

### MCM01-009




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

### MCM01-010



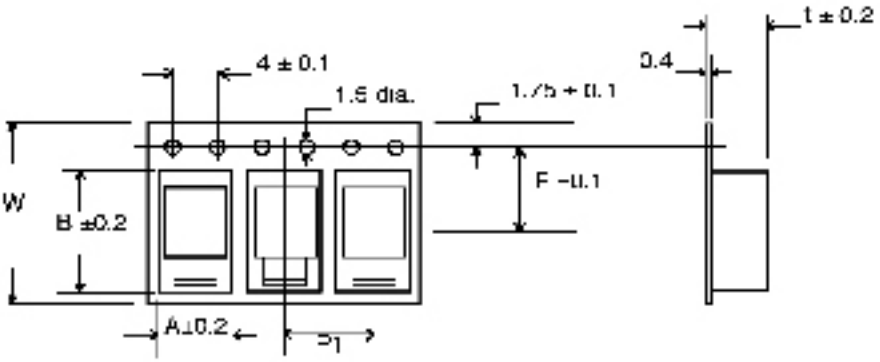

"T" (thickness) depending on capacitance value= .110 to .165±.015

"T" varies with capacitance

## Standard Minimum Quantities

Bulk Pack: 100 pieces per bag  Reel Pack: 500 pieces per reel

## Tape Specifications




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

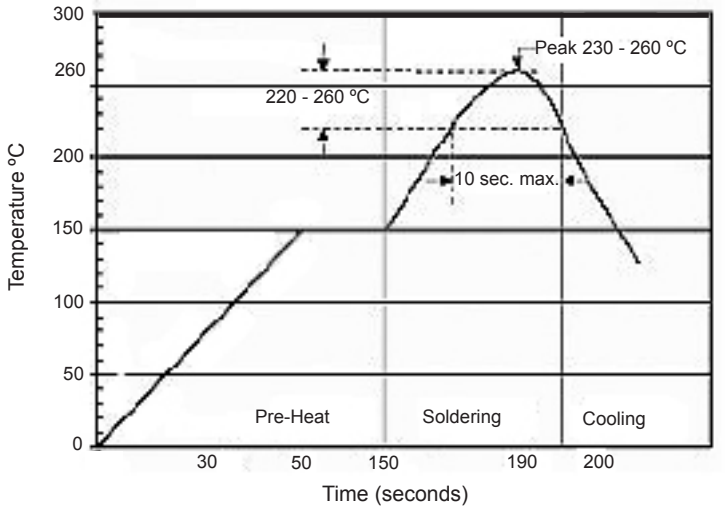
## Solder Profile

**Specifications:**

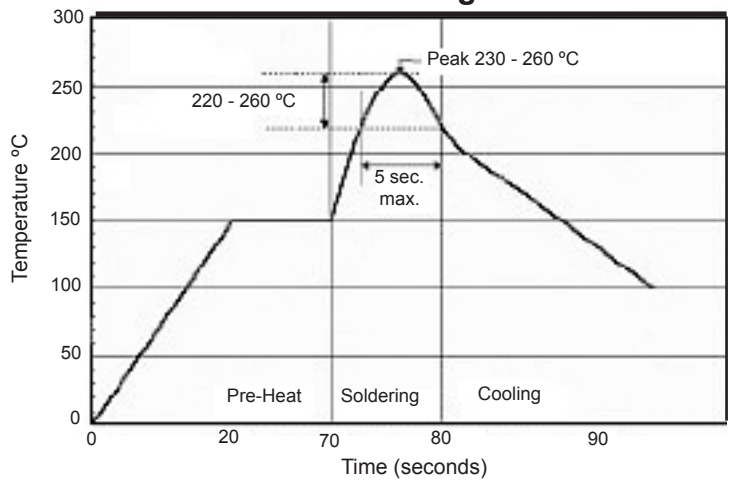
**Lead free finish**

**Case and Terminal Material:**
Silver plated, copper flashed, brass

### Reflow Soldering Method




### Wave Soldering Method



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