

Types MCH and MCHN Multilayer High RF Power Capacitors

2500 & 4000 Volt RF Capacitors for Medical Imaging Coils, Plasma Generators, VHF/UHF Power Amplifiers and Antenna Tuning with Nonmagnetic Option



The flexible aluminum silicate dielectric eliminates cracking and permits soldering to 260 °C. These high voltage, RF capacitors need no voltage derating at temperatures up to 125 °C and voltages to 4000 Vdc. Exceptionally low ESR and superior thermal qualities set the MCH/MCHN chip capacitors apart from ordinary RF capacitors.

Highlights

- No thermal cracking
- FR4 compatible and wave solderable
- Extremely high Q above 50 MHz
- Nonmagnetic option available
- Ultra stable: no change with (t), (V) and (f)
- Excellent for tuning and impedance matching
- High flashover level
- Withstands 2 mm bend test
- Better than porcelain

Applications

- MRI Coils
- RF Ablation Systems
- Transmitters
- RF Generators
- Antenna Tuning
- Lasers
- RF Power Amplifiers
- MRI Generators

Specifications

RoHS Compliant

Capacitance and Voltage Ratings:

10 – 220 pF at 4kVdc and 270 – 1000 pF at 2500 Vdc (other ratings available)

Capacitance Tolerance:

±5% standard (±2% available)

Temperature Range:

–55 °C to +125 °C (with no voltage derating)

Case Size:

3838 (9.7 x 9.7 mm)

Temperature Characteristics:

| Temp. Coefficient | Cap Drift |
|-------------------|-----------------|
| 0 to +50 ppm/°C | ±(0.05%+0.1 pF) |

Engineering Design Kits

MCH2500VKIT8, MCH4000VKIT10

Nonmagnetic MCHN2500VKIT9, MCHN4000VKIT11



2500 V kits 5 each of 8 values 270 to 1000 pF

4000 V kits 5 each of 10 values 10 – 220 pF

High Q, Low ESR Multilayer Construction for RF Power Applications



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Outline Drawing



Soldering Pattern



Part Numbering System

| | | | | | | |
|--------------------------------------|----------------|-------------------------|----------------------------|--|------------------------------------|---|
| MCH | 38 | F | K | 271 | J | -Y |
| Type | Case Code | Temperature Coefficient | Voltage | Capacitance | Tolerance | Package |
| MCH = Standard MCHN = Nonmagnetic | 38 = .380x.380 | F=0 to +50 ppm/°C | K = 2500 Vdc M=4000 Vdc | 100 = 10 pF 271 = 270 pF 102 = 1000 pF | J = ±5% G = ±2% D = ± 0.5 pF | Blank = Bulk (100 per bag) -Y = Tray pack (100 per tray) |

Ratings (additional ratings available)

RoHS Compliant

| Cap (pF) | Catalog Part Number* | Voltage (Vdc) | Length Inches (mm) | Width Inches (mm) | T max Inches (mm) |
|----------|----------------------|---------------|--|---|-------------------|
| 10 | MCH38FM100D-Y | 4000 Vdc | 0.380 +0.025 / -0 (9.65 mm +0.65 / - 0) | 0.380 +0.025 / -0 (9.65 mm +0.65 / -0) | 0.080 (2.03 mm) |
| 12 | MCH38FM120J-Y | | | | |
| 15 | MCH38FM150J-Y | | | | |
| 18 | MCH38FM180J-Y | | | | |
| 22 | MCH38FM220J-Y | | | | |
| 27 | MCH38FM270J-Y | | | | |
| 33 | MCH38FM330J-Y | | | | |
| 39 | MCH38FM390J-Y | | | | |
| 47 | MCH38FM470J-Y | | | | |
| 56 | MCH38FM560J-Y | | | | |
| 68 | MCH38FM680J-Y | | | | |
| 82 | MCH38FM820J-Y | | | | |
| 100 | MCH38FM101J-Y | | | | |
| 120 | MCH38FM121J-Y | | | | |
| 150 | MCH38FM151J-Y | | | | |
| 180 | MCH38FM181J-Y | | | | |
| 220 | MCH38FM221J-Y | | | | |
| 270 | MCH38FK271J-Y | 2500 Vdc | | | 0.160 (4.06 mm) |
| 330 | MCH38FK331J-Y | | | | |
| 390 | MCH38FK391J-Y | | | | |
| 470 | MCH38FK471J-Y | | | | |
| 560 | MCH38FK561J-Y | | | | |
| 680 | MCH38FK681J-Y | | | | |
| 820 | MCH38FK821J-Y | | | | |
| 1000 | MCH38FK102J-Y | | | | |

*For nonmagnetic version change P/N prefix to MCHN

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Typical Performance Data

ESR vs. Frequency for 470 pF



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



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Typical Performance Data

Q vs. Frequency 470 pF @ 25 °C



Impedance vs. Frequency for 470 pF @ 25 °C



Typical Performance Data

MCH vs. Porcelain (3838) Breakdown Voltage (BDV)



Environmental Specifications

Humidity (No Load): +40 °C ±2 °C @ 90% to 95% RH, 500 hrs. Measure after 24 hrs, cap is ±3% of initial, DF ≤150% of original, IR 3x10⁴ MΩ, no visual damage

Storage Method: Store at 0 to +40 °C at ≤60% RH, use within 6 months of receipt, if 6 months is exceeded, check solderability

Electrical Specifications

Dielectric Strength: **2500 Vdc:** 1.5 x Rated Voltage for 5 seconds
4000 Vdc: 1.2 x Rated Voltage for 5 seconds

Dissipation Factor (DF): ≤0.1% @ 1 MHz and ≤5 Vrms

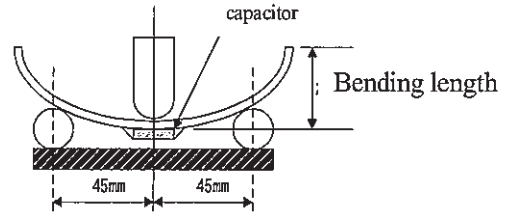
Insulation Resistance: 100K MΩ minimum @ 500 Vdc ±10%

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Mechanical Specifications

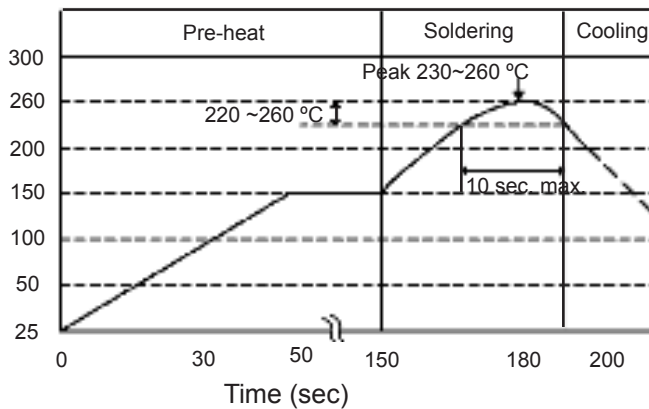
Bending Test:

Mount the capacitor as shown below and press the ram bar until a 2.0 mm deflection is achieved. There will be no visual damage and the capacitors will meet the limits of methods JIS 5102 8.11 and AEC-Q200-005 without cracking or visual damage.

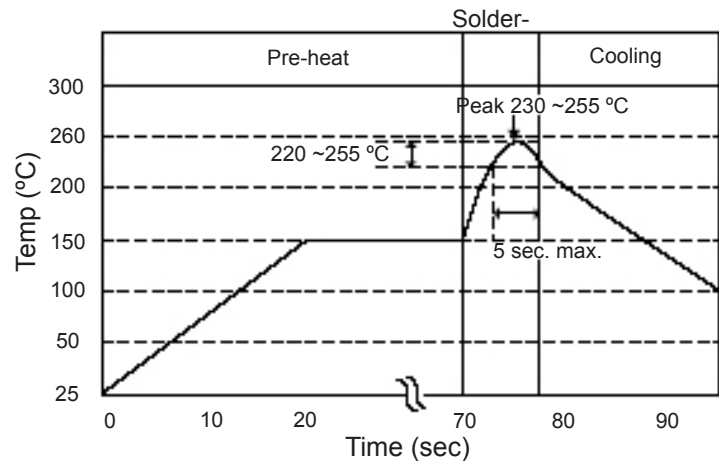


Soldering Specifications

Reflow Solder Profile



Wave Solder Profile



Hand Soldering Method

- SnPb or SnAgCu recommended solder
- Do not use strong acid type flux with RM or RMS
- Soldering iron tip temperature should be 280 °C to 350 °C ≤ 5 sec.
- 80 Watt iron or less
- Iron tip should not touch chip terminals



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JONHON

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