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

<table>
<thead>
<tr>
<th>Capacitance Range &amp; Rated Voltage</th>
<th>10 – 220 pF at 4kVdc and 270 – 1000 pF at 2500 Vdc (other ratings available)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacitance Tolerance</td>
<td>±5% standard (+2% available)</td>
</tr>
<tr>
<td>Operating Temperature Range</td>
<td>–55 °C to +125 °C (with no voltage derating)</td>
</tr>
<tr>
<td>Case Size</td>
<td>3838 (9.7 x 9.7 mm)</td>
</tr>
<tr>
<td>Temperature Characteristics</td>
<td><img src="image1.png" alt="Image" /></td>
</tr>
</tbody>
</table>

#### 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

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Outline Drawing

Part Numbering System

- **MCH** = Standard Type
- **MCHN** = Nonmagnetic Type

<table>
<thead>
<tr>
<th>Part Number*</th>
<th>Voltage (Vdc)</th>
<th>Length (Inches (mm))</th>
<th>Width (Inches (mm))</th>
<th>T max (Inches (mm))</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCH38FM100D-Y</td>
<td>4000 Vdc</td>
<td>0.380</td>
<td>+0.025 / -0</td>
<td>0.080 (2.03 mm)</td>
</tr>
<tr>
<td>MCH38FM120J-Y</td>
<td>2500 Vdc</td>
<td>0.380</td>
<td>+0.025 / -0</td>
<td>0.120 (3.05 mm)</td>
</tr>
<tr>
<td>MCH38FM150J-Y</td>
<td>2500 Vdc</td>
<td>0.380</td>
<td>+0.025 / -0</td>
<td>0.160 (4.06 mm)</td>
</tr>
<tr>
<td>MCH38FM270J-Y</td>
<td>2500 Vdc</td>
<td>0.380</td>
<td>+0.025 / -0</td>
<td>0.240 (6.10 mm)</td>
</tr>
<tr>
<td>MCH38FM330J-Y</td>
<td>2500 Vdc</td>
<td>0.380</td>
<td>+0.025 / -0</td>
<td>0.240 (6.10 mm)</td>
</tr>
<tr>
<td>MCH38FM560J-Y</td>
<td>2500 Vdc</td>
<td>0.380</td>
<td>+0.025 / -0</td>
<td>0.270 (6.86 mm)</td>
</tr>
</tbody>
</table>

*For nonmagnetic version change P/N prefix to MCHN
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Typical Performance Data

**ESR vs. Frequency for 470 pF**

- **Porcelain (3838)**
  - ESR vs. Frequency
- **MCH (3838)**
  - ESR vs. Frequency

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

- **Porcelain (3838)**
  - Current Rating
- **MCH (3838)**
  - Current Rating

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Typical Performance Data

Q vs. Frequency 470 pF @ 25 ºC

Impedance vs. Frequency for 470 pF @ 25 ºC
**Types MCH and MCHN**  Multilayer High RF Power Capacitors

**Typical Performance Data**

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

- 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%

**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**
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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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10-10-2007
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