

# 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)

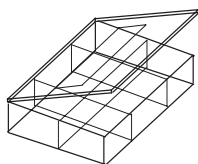
#### Temperature Characteristics:

| 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

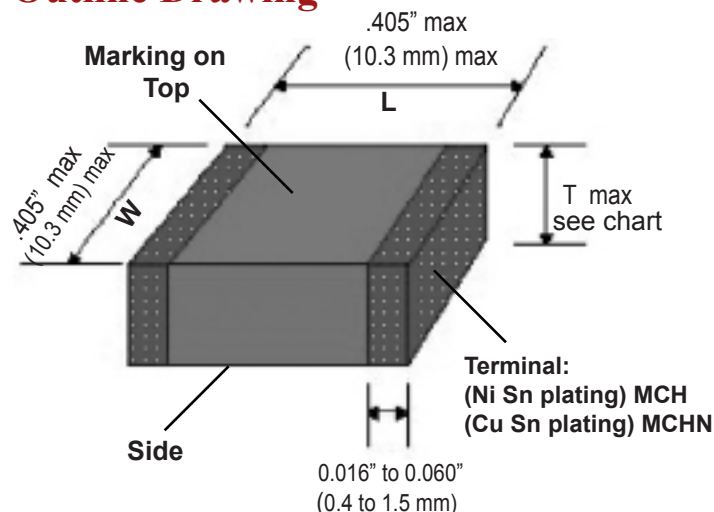
4000 V kits 5 each of 10 values 10 – 220 pF

### High Q, Low ESR Multilayer Construction for RF Power Applications

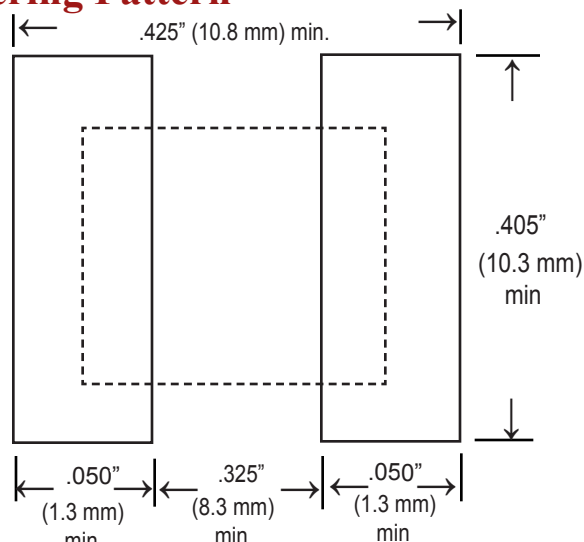


# Types MCH and MCHN Multilayer High RF Power Capacitors

## 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<br>MCHN = Nonmagnetic | 38 = .380x.380 | F=0 to +50 ppm/°C       | K = 2500 Vdc<br>M=4000 Vdc | 100 = 10 pF<br>271 = 270 pF<br>102 = 1000 pF | J = ±5%<br>G = ±2%<br>D = ± 0.5 pF | Blank = Bulk (100 per bag)<br>-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<br>+0.025 / -0<br>(9.65 mm<br>+0.65 / -0) | 0.380<br>+0.025 / -0<br>(9.65 mm<br>+0.65 / -0) | 0.080 (2.03 mm)   |
| 12       | MCH38FM120J-Y        |               |                                                 |                                                 |                   |
| 15       | MCH38FM150J-Y        |               |                                                 |                                                 |                   |
| 18       | MCH38FM180J-Y        |               |                                                 |                                                 |                   |
| 22       | MCH38FM220J-Y        |               |                                                 |                                                 |                   |
| 27       | MCH38FM270J-Y        |               |                                                 |                                                 | 0.120 (3.05 mm)   |
| 33       | MCH38FM330J-Y        |               |                                                 |                                                 |                   |
| 39       | MCH38FM390J-Y        |               |                                                 |                                                 |                   |
| 47       | MCH38FM470J-Y        |               |                                                 |                                                 |                   |
| 56       | MCH38FM560J-Y        |               |                                                 |                                                 |                   |
| 68       | MCH38FM680J-Y        |               |                                                 |                                                 | 0.160 (4.06 mm)   |
| 82       | MCH38FM820J-Y        |               |                                                 |                                                 |                   |
| 100      | MCH38FM101J-Y        |               |                                                 |                                                 |                   |
| 120      | MCH38FM121J-Y        |               |                                                 |                                                 |                   |
| 150      | MCH38FM151J-Y        |               |                                                 |                                                 | 0.240 (6.10 mm)   |
| 180      | MCH38FM181J-Y        |               |                                                 |                                                 |                   |
| 220      | MCH38FM221J-Y        |               |                                                 |                                                 |                   |
| 270      | MCH38FK271J-Y        | 2500 Vdc      | 0.380<br>+0.025 / -0<br>(9.65 mm<br>+0.65 / -0) | 0.380<br>+0.025 / -0<br>(9.65 mm<br>+0.65 / -0) | 0.160 (4.06 mm)   |
| 330      | MCH38FK331J-Y        |               |                                                 |                                                 |                   |
| 390      | MCH38FK391J-Y        |               |                                                 |                                                 |                   |
| 470      | MCH38FK471J-Y        |               |                                                 |                                                 |                   |
| 560      | MCH38FK561J-Y        |               |                                                 |                                                 | 0.240 (6.10 mm)   |
| 680      | MCH38FK681J-Y        |               |                                                 |                                                 |                   |
| 820      | MCH38FK821J-Y        |               |                                                 |                                                 |                   |
| 1000     | MCH38FK102J-Y        |               |                                                 |                                                 |                   |

\*For nonmagnetic version change P/N prefix to MCHN

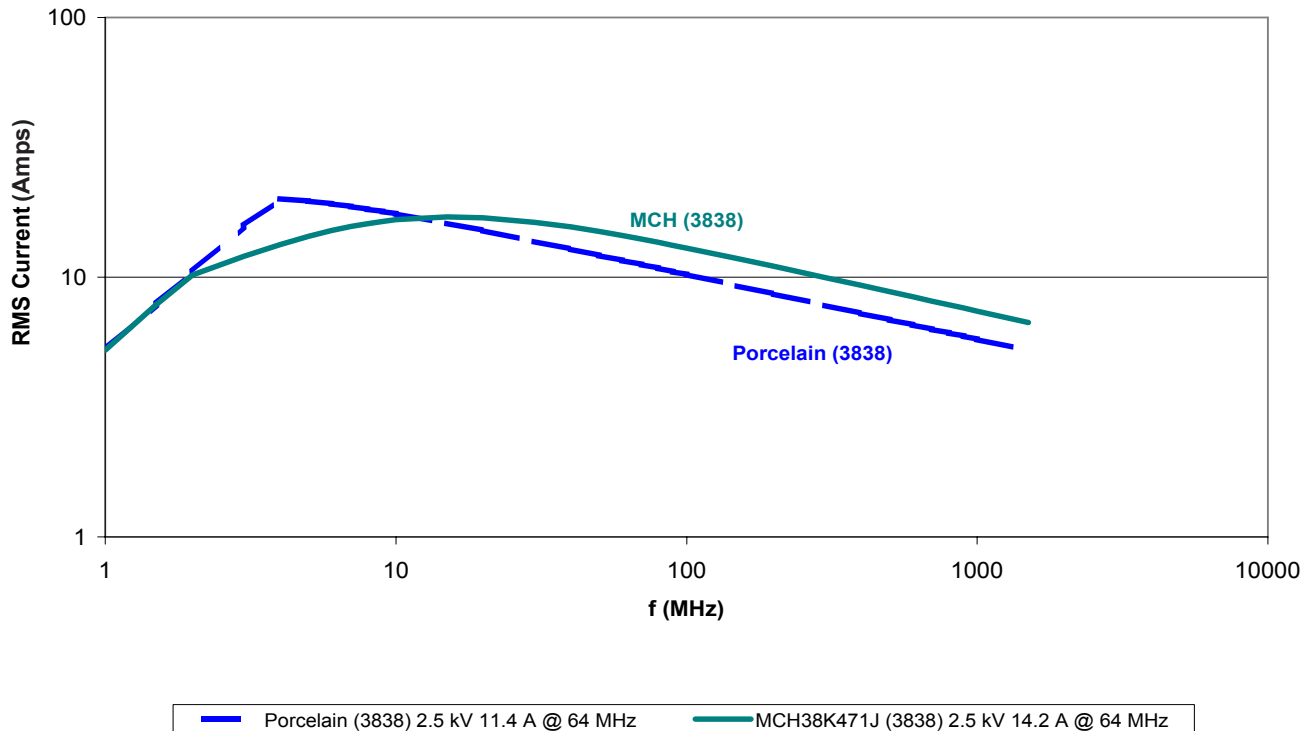
# Types MCH and MCHN Multilayer High RF Power Capacitors

## Typical Performance Data

ESR vs. Frequency for 470 pF

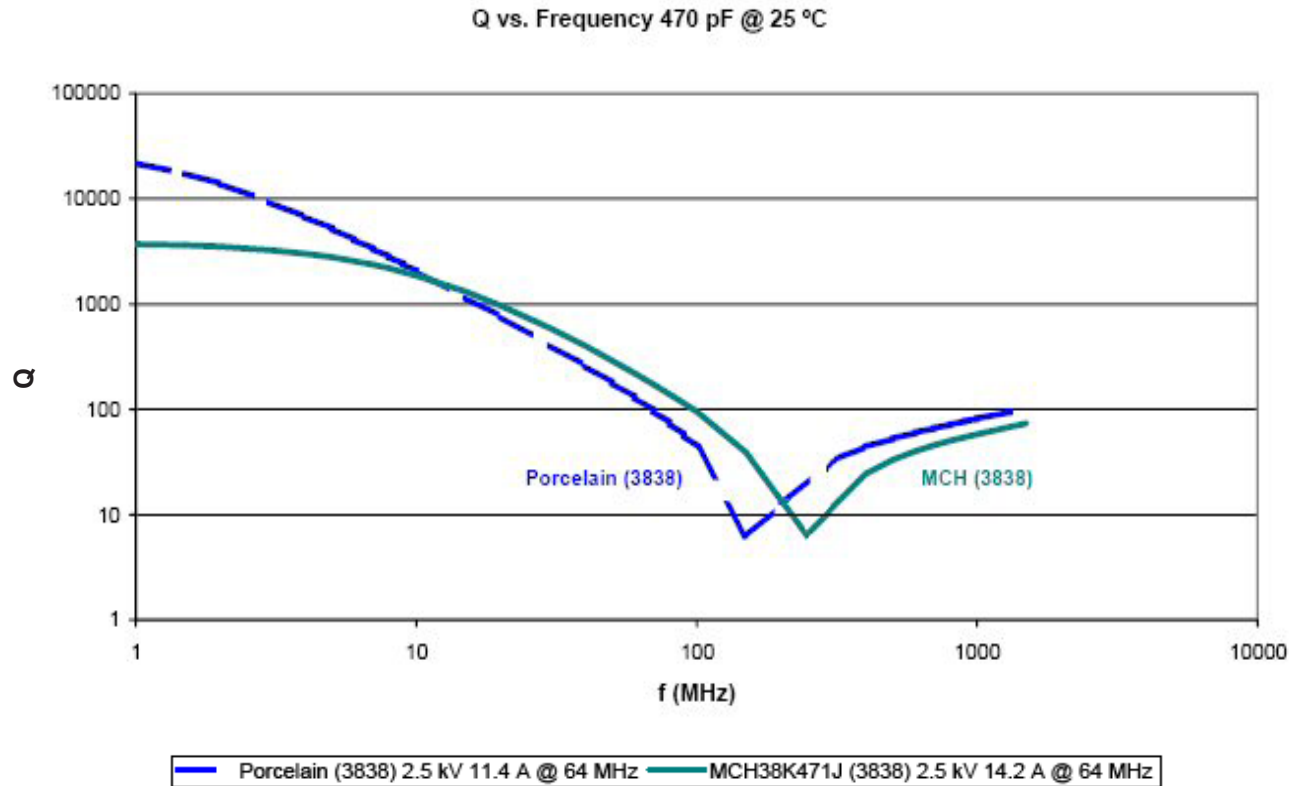


Current Rating (IRMS) for 470 pF at 60 °C Rise



# Types MCH and MCHN Multilayer High RF Power Capacitors

## Typical Performance Data



## Typical Performance Data

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



## Environmental Specifications

**Humidity (No Load):** +40 °C  $\pm$  2 °C @ 90% to 95% RH, 500 hrs.  
Measure after 24 hrs, cap is  $\pm$ 3% of initial, DF  $\leq$ 150% of original, IR  $3 \times 10^4$  M $\Omega$ , no visual damage

**Storage Method:** Store at 0 to +40 °C at  $\leq$ 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):**  $\leq$ 0.1% @ 1 MHz and  $\leq$ 5 Vrms

**Insulation Resistance:** 100K M $\Omega$  minimum @ 500 Vdc  $\pm$ 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

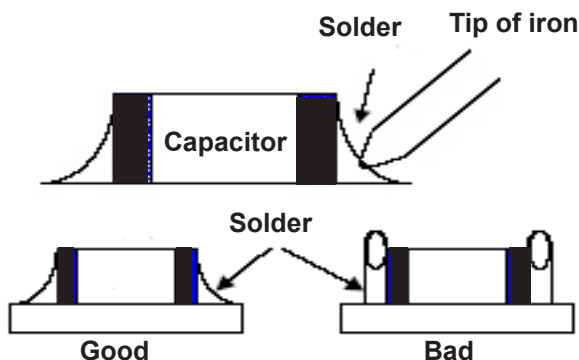


### Wave Solder Profile



### 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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