

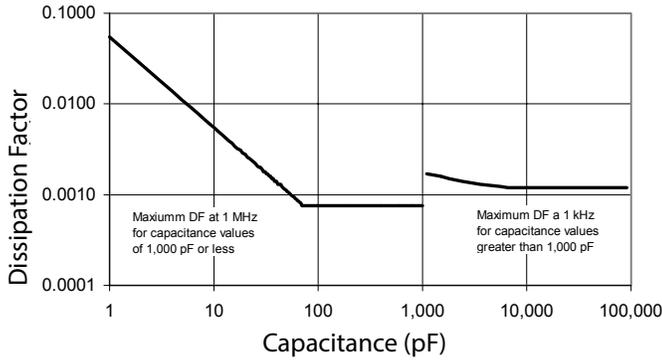
# Application Guide Radial-Leaded Dipped Mica Capacitors

**Capacitance** is within tolerance when measured at these frequencies:

- 1–1000 pF @ 1MHz
- > 1000 pF @ 1 kHz

**Dissipation Factor** limits are below. Dissipation factor is equal to  $DF=2\pi fRC$ , where  $f$  is the test frequency,  $R$  is the equivalent series resistance, and  $C$  is the capacitance. For other capacitance values, see below.

**DF vs. Capacitance**

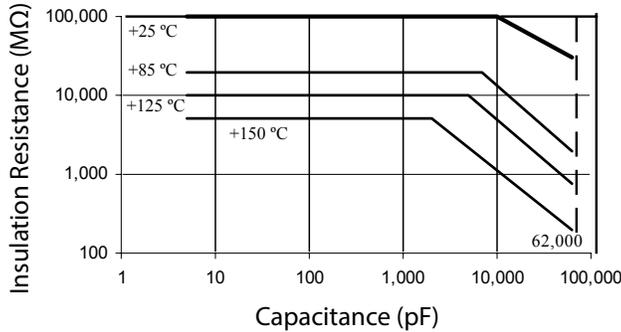


Capacitance	Dissipation Factor
75–1,000 pF	0.00075 max at 1 MHz
1,100–3,300 pF	0.0014 max at 1 kHz
3,600–9,100 pF	0.0013 max at 1 kHz
10,000 pF	0.0012 max at 1 kHz

**Quality Factor (Q)** is the reciprocal of dissipation factor.

**Insulation Resistance** for capacitances up to 10,000 pF is greater than 100 GΩ at 25 °C and greater than 10 GΩ at 125 °C. For other capacitance values and temperatures, see below.

**IR vs. Capacitance**



**Withstanding Voltage** is 2 times the rated voltage, and can be applied up to 5 seconds without damage.

**Temperature Coefficient and Capacitance Drift:** Measure the capacitors' capacitance at 25 °C, –55 °C, 25 °C, 125 °C (or 150 °C) and at 25 °C after stabilizing at each temperature. The capacitance will meet the limits of the Characteristic table shown in Ordering Information.

**Solderability:** After an eight hour steam aging, coat leads with rosin flux (R) and immerse in molten 245 °C ±5 °C 60/40 tin/lead solder. Solder coverage will be no less than 95% when examined at 10X magnification.

**Surge Voltage:** Standard dipped capacitors will withstand 500 Vdc max peak transients above rated voltage. For example, in flyback regulators with less than 500 Vdc bias, you may use 500 Vdc-rated capacitors provided that the switching transient peaks are less than 1,000 V.

**Voltage Coefficient:** The change in capacitance from 0 volts to rated voltage is less than 0.1%.

**Pulse Handling:** Standard dipped capacitors will withstand an unlimited number of pulses with a  $dV/dt$  of 100,000V/μs tested per IEC 384-1. Smaller capacitance ratings can withstand even faster  $dV/dt$ —ratings have been tested one million discharges at rated voltage into a 4.7 Ω resistor with no change in capacitance. For a 100 pF, 500 Vdc unit, that's a peak  $dV/dt$  in excess of 1,000,000 V/μs. The  $dV/dt$  is expressed by this relationship:

$$dV/dt = V / (R_d C)$$

- $V$  = rated voltage, Vdc
  - $R_d$  = minimum discharge resistor, Ω
  - $C$  = rated capacitance, μF
- This is the initial rate of discharge into  $R_d$ .

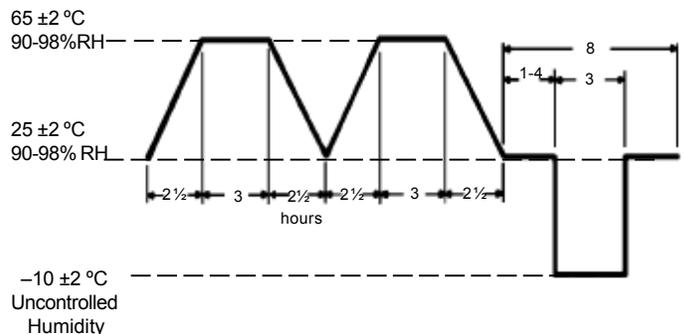
**Marking** is in accordance with EIA RS153B and includes "CDM" as our manufacturer's symbol, nominal capacitance in pF, capacitance tolerance, and dc working voltage followed by V, if other than 500 Vdc.

## Moisture Resistance

Capacitors will meet the requirements of MIL-STD-202, Method 106F as outlined here and diagrammed below. Refer to MIL-STD-202 for details.

1. Dry capacitors for 24 hours in a 50 ±2 °C oven and then allow to stabilize at room temperature.
2. Subject the capacitors to 10 24 - hour continuous cycles with relative humidity and temperature as shown.
3. 24 hours after completion of the last cycle, the capacitors will show no visual damage and will meet the after-test limits on the next page.

### 24-Hour Moisture Resistance Cycle



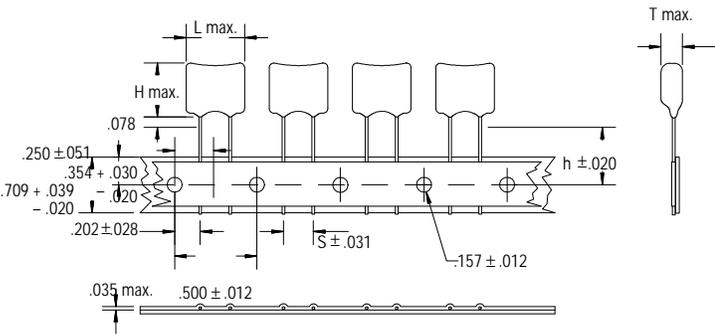
**Life Test:** Subject the capacitors to maximum operating temperature (+125 °C or +150 °C) with 1.5 times rated voltage applied for 2,000 hours. There will be no visual damage and the capacitors will meet the after-test limits below.

### After-Test Limits

Test	Withstand Voltage	Insulation Resistance	Capacitance Change (whichever is greater)	DF	Q
Moisture Resistance	IL	30 GΩ	NV ±1% or ±1 pF	150%	2/3xIL
Life Test	IL	IL	NV ±1% or ±1 pF	150%	2/3xIL

IL = Initial Limit    NV = Nominal Value

### Dipped Mica Capacitors for Auto Insertion



For tape and reel or ammo-packed packaging, specify on the order.

See the table below for available reel-packed types, lead configurations, lead spacing, lead material, pieces per reel and pieces per ammo packs.

Packaging will be in accordance with EIA-468. Dimension “h” will be 16 mm for formed leads or 18 mm for straight leads. 20 mm is available on special request. Specify reel or ammo on your purchase order.

Type Number	Lead Spacing	Lead Material	Capacitance Range	Range of Pieces per Reel	Range of Pieces per Ammo Pack
D10 CD10	0.141	CCS	1 - 249 pF 251 - 470 pF 471 - 1200 pF	1000 - 2500 1000-2000 1000-1500	1000 2000 1000-1500 1000
CD15	0.234	CCS	1 - 330 pF 331 - 470 pF 471 - 1500 pF	1000-2500 1000-2000 1000-1500	1000-2000 1000-1500 1000
CD16 CDV16	0.234	CCS	1 - 330 pF 331 - 470 pF 471 - 1500 pF 1501 - 2000 pF > 2000 pF	1000-2500 1000-2000 1000-1500 800 500	1000-2000 1000-1500 1000 600 600
CD19	0.344	CCS	10-1000 pF 1001-1500 pF 1501-3000 pF 3001-5000 pF	1000 800 600 400	800 800 600 400

CCS = copper clad steel

**Notice and Disclaimer:** All product drawings, descriptions, specifications, statements, information and data (collectively, the “Information”) in this datasheet or other publication are subject to change. The customer is responsible for checking, confirming and verifying the extent to which the Information contained in this datasheet or other publication is applicable to an order at the time the order is placed. All Information given herein is believed to be accurate and reliable, but it is presented without any guarantee, warranty, representation or responsibility of any kind, expressed or implied. Statements of suitability for certain applications are based on the knowledge that the Cornell Dubilier company providing such statements (“Cornell Dubilier”) has of operating conditions that such Cornell Dubilier company regards as typical for such applications, but are not intended to constitute any guarantee, warranty or representation regarding any such matter – and Cornell Dubilier specifically and expressly disclaims any guarantee, warranty or representation concerning the suitability for a specific customer application, use, storage, transportation, or operating environment. The Information is intended for use only by customers who have the requisite experience and capability to determine the correct products for their application. Any technical advice inferred from this Information or otherwise provided by Cornell Dubilier with reference to the use of any Cornell Dubilier products is given gratis (unless otherwise specified by Cornell Dubilier), and Cornell Dubilier assumes no obligation or liability for the advice given or results obtained. Although Cornell Dubilier strives to apply the most stringent quality and safety standards regarding the design and manufacturing of its products, in light of the current state of the art, isolated component failures may still occur. Accordingly, customer applications which require a high degree of reliability or safety should employ suitable designs or other safeguards (such as installation of protective circuitry or redundancies or other appropriate protective measures) in order to ensure that the failure of an electrical component does not result in a risk of personal injury or property damage. Although all product-related warnings, cautions and notes must be observed, the customer should not assume that all safety measures are indicated in such warnings, cautions and notes, or that other safety measures may not be required.