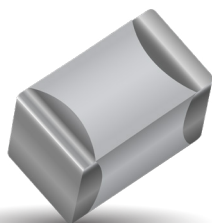
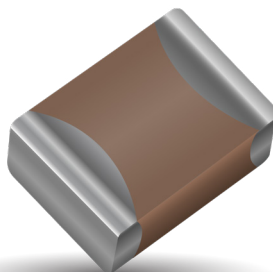




# Film Chip Capacitors



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# FILM CHIP CAPACITORS



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# INTRODUCTION

## Total Quality Policy Film SMD Capacitors



ISO/TS 16949  
TS 95138

### QUALITY

KYOCERA AVX, with Sales and Marketing support, will be recognized by our customers as a “preferred” supplier for the quality and reliability of our products and services.

KYOCERA AVX has adopted a Quality policy based on continuous improvement, the satisfaction of our customers, collaborators, partners and shareholders.

The objectives and measures are:

- To satisfy the customer's needs and requirements by supplying competitive and reliable products with:
  - zero defect, zero claim
  - 100 % on time delivery.
- To control all processes and improve performance:
  - maximize productivity and yield,
  - reduce non quality cost,
  - monitor process indicators.
- To manage this policy, KYOCERA AVX promotes:
  - empowerment and responsibility of all the staff,
  - involvement of our suppliers and partners,
  - a Quality Management System meeting ISO 9001, ISO/TS 16949 standards, customers and KYOCERA AVX requirements

Quality is measured by the level of our customer's satisfaction.

### ENVIRONMENTAL



Protecting the environment is becoming more and more necessary every day. Therefore, this is a duty of the Company to its employees, neighbors customers and the next generations.

AVX Policy is implemented with an environmental management system according to ISO 14001 standard and international standards for the design of the film chips.

### RELIABILITY

The reliability of film chips components is measured by accelerated testing methods which meet international standards such as CECC, CEI AEC Q200 and all customer specifics requirements.

After initial qualification, we perform periodical accelerated tests to assure to our customer and their application the level of reliability required (Failure In Time, lambda).

# INTRODUCTION






## Characteristics of Film SMD Capacitors

|   | PET-HT<br>(MKT) | PEN (MKN)   | PPS (MKN)    | NPO                 | X7R                 | Tantalum       |
|---|-----------------|-------------|--------------|---------------------|---------------------|----------------|
| Operating temperature (°C)                          | -55/125         | -55/125     | -55/125      | -55/125             | -55/125             | -55/125        |
| ΔC/C with temperature (%)                           | -6/8            | -2/3        | ±1.5         | ±1                  | ±15                 | ±10            |
| DC voltage coefficient (%)                          | no.             | no.         | no.          | no.                 | -60                 | no.            |
| ΔC aging rate (%/h dec.)                            | negl.           | negl.       | negl.        | negl.               | 1                   | n.a.           |
| Dissipation factor (%)                              |                 |             |              |                     |                     |                |
| 1 kHz   | 1               | 1           | 0.5          | 0.10                |                     |                |
| 10 kHz  | 1.5             | 1.5         | 0.25         | 0.10                | 2.5                 | 4 to 6         |
| 100 kHz   | 3.0             | 3.0         | 0.5          | 0.10                |                     |                |
| IR (MΩ. μF)   |                 |             |              |                     |                     |                |
| 25°C  | 10000           | 5000        | 1000         | 10000               | 1000                | 100000         |
| 85°C  | 1000            | 1000        | 1000         | 1000                | 500                 | 1000           |
| Dielectric absorption (%)                           | 0.5             | 1           | 0.05         | 0.6                 | 2.5                 | n.a.           |
| Capacitance range<br>from (pF) to (μF)              | 1000<br>4.7     | 1000<br>4.7 | 1000<br>0.18 | 10<br>0.047         | 100<br>4.7          | 100000<br>1000 |
| Capacitance tolerance (±%)                          | 5 10 20         | 5 10 20     | 2 5 10       | 1 5 10              | 5 10 20             | 10 20          |
| Self-healing  | yes             | yes         | yes          | no                  | no                  | no             |
| Typical failure mode                                | open            | open        | open         | short               | short               | short          |
| Reliability   | high            | high        | high         | high                | moderate            | high           |
| Piezoelectric effect                                | no              | no          | no           | no                  | yes                 | no             |
| Resistance to thermal and<br>mechanical shock       | high            | high        | high         | moderate to<br>low* | moderate to<br>low* | high           |
| Non-linear distortion<br>(3 <sup>rd</sup> harmonic) | very low        | very low    | very low     | low                 | high                | n.a.           |
| Polarity  | no              | no          | no           | no                  | no                  | yes            |

\* possible cracking in the MLCC body

# INTRODUCTION

## Typical Selection Guide

| Presentation   | Type | Dielectric | Size | Nominal Voltage VR-(V) | Capacitance Range (CR)        | Tolerance on CR (Series) |
|--|------|------------|------|------------------------|-------------------------------|--------------------------|
| SMD   | CB   | PET-HT     | 2220 | 63...630               | 10nF... 1μF                   | ±5%<br>±10%              |
|  |      |            | 2824 | 63...630               | 22nF... 1.5μF                 |                          |
|  |      |            | 4030 | 63...630               | 47nF...2.2μF                  |                          |
|  |      |            | 5040 | 100...630              | 82nF...2.2μF                  |                          |
|  |      |            | 6054 | 63...630               | 120nF...4.7μF                 |                          |
| SMD   | CB   | PEN        | 1206 | 25...100               | 1nF...22nF                    | ±5%<br>±10%              |
|  |      |            | 1210 | 25...100               | 12nF...100nF                  |                          |
|  |      |            | 1812 | 63...400               | 1nF...220nF                   |                          |
|  |      |            | 2220 | 63...400               | 5.6nF.. 680nF                 |                          |
|  |      |            | 2824 | 63...400               | 22nF...820nF                  |                          |
|  |      |            | 4030 | 63...630               | 47nF.. 2.2μF                  |                          |
|  |      |            | 6054 | 63...630               | 82nF.. 2.7μF<br>180nF.. 4.7μF |                          |
| SMD   | CB   | PPS        | 1206 | 16...50                | 1nF...39nF                    | ±2%<br>±5%<br>±10%       |
|  |      |            | 1210 | 16...50                | 12nF...100nF                  |                          |
|  |      |            | 1812 | 16...50                | 47nF...150nF                  |                          |
|  SMD  | CL   | PEN        | 2824 | 630V                   | 6.8nF...18nF                  | ±5%<br>±10%              |
|  |      |            | 2840 | 630V                   | 22nF...33nF                   |                          |

| Market Selector | Application  | Short Description   | Selection Criteria   | Typical SMD Film Solution   |
|-----------------|--|---|--|---|
| TELECOM         | ADSL (XDSL) Network devices                        | Regarding Broadband Access systems (DSLAM, Access Hub...), for filtering stage and/or splitters, due to high speed communication, telecom standards require very accurate filters and even surge voltage pulse capability | <ul style="list-style-type: none"> <li>• Good filtering capability (Low ESR&amp;ESL)</li> <li>• Trend is SMD preferred</li> <li>• Specific size can be offered</li> <li>• Surge voltage capability (CT)</li> </ul> | CB or CL Series in Polyester<br>10nF to 100nF<br>250 to 630Vdc                                      |
|                 | Modem - Gateway ADSL                               | Due to high speed communication, telecom standards require very accurate filters. Film chip is the most convenient solution.  | <ul style="list-style-type: none"> <li>• Good filtering capability (Low ESR&amp;ESL)</li> <li>• Capacitance stability</li> <li>• SMD preferred</li> <li>• Specific size can be offered</li> </ul>                  | CB Series in Polyester<br>10nF to 470nF / 63Vdc to 400Vdc in PPS<br>10nF to 100 nF / 16Vdc to 50Vdc |
|                 | Phone, DECT Handset, fax                           | Film chips used in ringing circuits as a tip & ring device  | <ul style="list-style-type: none"> <li>• Capacitance stability</li> <li>• Good filtering capability (Low ESR&amp;ESL)</li> <li>• SMD version</li> </ul>  | CB Series in Polyester<br>470nF to 1 μF / 63Vdc to 250Vdc   |
|                 | Wireless Communication (GSM, Bluetooth systems...) | PPS Film chip is a convenient alternative to NP0 ceramic for time constant, filtering or oscillation and resonance function within the PLL circuit  | <ul style="list-style-type: none"> <li>• Capacitance stability</li> <li>• Tight tolerance (2%)</li> <li>• Good filtering capability (Low ESR&amp;ESL)</li> <li>• SMD version needed</li> </ul>                     | CB Series in PPS<br>1.5nF to 33nF<br>16Vdc  |
|                 | Base station                                       | Film chips can be used as an interesting solution for filtering device  | <ul style="list-style-type: none"> <li>• Capacitance stability</li> <li>• Good filtering capability (Low ESR&amp;ESL)</li> <li>• SMD version</li> </ul>  | CB Series in Polyester<br>10nF to 470nF<br>63Vdc to 250Vdc  |
| AUTOMOTIVE      | Electronic Fuel Injection Calculator (ECU/EMU)     | Film chips used in differential amplifier which processes information from the engine speed sensors   | <ul style="list-style-type: none"> <li>• Capacitance stability</li> <li>• Tight Tol and low DF</li> <li>• SMD required</li> <li>• Open failure mode</li> <li>• Harsh conditions</li> </ul>                         | CB Series in Polyester<br>10nF to 1μF<br>63Vdc  |
|                 | HID Headlamp system                                | For integration reason, Film caps in SMD version are preferred to be used in HID modules at 2 different stages : Ballast (DC/DC convertor) and Lamp Ignition  | <ul style="list-style-type: none"> <li>• Good filtering capability (Low ESR&amp;ESL)</li> <li>• Trend is SMD preferred</li> <li>• Specific size can be offered</li> <li>• Surge voltage capability (CT)</li> </ul> | CB or CL Series in Polyester<br>70nF to 1.5μF<br>250 to 630Vdc                                      |
|                 | Safety Airbag/SB tensioners                        | Film chip can be part of the control circuit of the ignition system   | <ul style="list-style-type: none"> <li>• Capacitance stability</li> <li>• Specific size can be offered</li> <li>• SMD required</li> <li>• Open failure mode</li> <li>• Harsh conditions</li> </ul>                 | CB Series in Polyester<br>330nF to 680nF<br>63Vdc   |
|                 | DC motors noise suppression                        | Film chip can be integrated into DC motors modules for wipers or window winder for high frequency noise suppression   | <ul style="list-style-type: none"> <li>• Capacitance stability</li> <li>• Good filtering capability (Low ESR&amp;ESL)</li> <li>• Harsh conditions</li> <li>• Open failure mode</li> <li>• SMD required</li> </ul>  | CB Series in Polyester 1<br>0nF to 2.2μF<br>63Vdc   |
|                 | Car Audio systems                                  | Usually, Film caps technology is well appreciated in audio systems for filtering and especially when it comes to automotive applications  | <ul style="list-style-type: none"> <li>• Capacitance stability</li> <li>• Tight Tol and low DF</li> <li>• SMD required</li> <li>• Open failure mode</li> <li>• No piezoelectric effect</li> </ul>                  | CB Series in Polyester<br>10nF to 1μF<br>63Vdc  |
|                 | "Infotainment applications"                        | For integration reason, Film caps in SMD version could be used in different application stages as backlight circuits, car amplifiers or PLL for navigation systems  | <ul style="list-style-type: none"> <li>• Good filtering capability (Low ESR&amp;ESL)</li> <li>• Capacitance stability</li> <li>• Specific size can be offered</li> <li>• SMD preferred</li> </ul>                  | CB Series in Polyester<br>10nF to 470nF / 63Vdc to 400Vdc in PPS<br>10nF to 100nF / 16Vdc to 50Vdc  |
| INDUSTRIAL      | DC/DC convertor                                    | Film chips used in the input filtering stage for high density modular power supplies  | <ul style="list-style-type: none"> <li>• Capacitance stability</li> <li>• Good filtering capability (Low ESR&amp;ESL)</li> <li>• SMD version</li> <li>• Open failure mode</li> </ul>                               | CB Series in Polyester<br>1μF to 4.7μF<br>100Vdc  |
|                 | Electronic Ballast                                 | Where miniaturization is required SMD version of Film capacitors can be used for usual interference suppression and filtering functions   | <ul style="list-style-type: none"> <li>• Capacitance stability</li> <li>• Good filtering capability (Low ESR&amp;ESL)</li> <li>• SMD version</li> <li>• Open failure mode</li> </ul>                               | CB Series in Polyester<br>10nF to 1μF<br>63Vdc to 400Vdc  |
|                 | Industrial switch                                  | Film chip could be the suitable solution for interference suppression function as it could survive peak voltage requirement without protection device.  | <ul style="list-style-type: none"> <li>• Capacitance stability</li> <li>• Good filtering capability (Low ESR&amp;ESL)</li> <li>• SMD version</li> <li>• Open failure mode</li> </ul>                               | CB Series in Polyester<br>47nF to 470nF<br>250Vdc to 630Vdc   |
|                 | Smoke detector                                     | Where miniaturization is required SMD version of Film capacitors can be used for usual filtering functions  | <ul style="list-style-type: none"> <li>• Good filtering capability (Low ESR&amp;ESL)</li> <li>• Capacitance stability</li> <li>• Specific size can be offered</li> <li>• SMD preferred</li> </ul>                  | CB Series in Polyester<br>100nF to 2.2μF<br>63Vdc to 250Vdc   |
|                 | Industrial circuit breaker                         | PPS Film chip is a convenient alternative to NP0 ceramic for filtering circuit stage  | <ul style="list-style-type: none"> <li>• Capacitance stability</li> <li>• Good filtering capability (Low ESR&amp;ESL)</li> <li>• SMD version needed</li> <li>• Tight tolerance (2%)</li> </ul>                     | CB Series in PPS<br>1.0nF to 150nF<br>16Vdc to 50Vdc  |
| CONSUMER & EDP  | LCD Monitor  | PPS Film chip is a convenient alternative to NP0 ceramic in the inverter stage to drive the LCD display   | <ul style="list-style-type: none"> <li>• Capacitance stability</li> <li>• Good filtering capability (Low ESR&amp;ESL)</li> <li>• SMD version needed</li> <li>• Tight tolerance (2%)</li> </ul>                     | CB Series in PPS<br>1.0nF to 150nF<br>16Vdc to 50Vdc  |
|                 | Display Backlight Inverter (notebooks, PDA)        | PPS Film chip is a convenient alternative to NP0 ceramic in the inverter stage to drive the LCD display   | <ul style="list-style-type: none"> <li>• Capacitance stability</li> <li>• Good filtering capability (Low ESR&amp;ESL)</li> <li>• SMD version needed</li> <li>• Tight tolerance (2%)</li> </ul>                     | CB Series in PPS or Polyester<br>47nF to 100nF<br>50Vdc   |
|                 | Multimedia set top boxes                           | Where miniaturization is required SMD version of Film capacitors can be used for usual interference suppression and filtering functions   | <ul style="list-style-type: none"> <li>• Good filtering capability (Low ESR&amp;ESL)</li> <li>• Capacitance stability</li> <li>• Specific size can be offered</li> <li>• SMD preferred</li> </ul>                  | CB Series in Polyester<br>10nF to 470nF / 63Vdc to 400Vdc in PPS<br>10nF to 100nF / 16Vdc to 50Vdc  |



# INTRODUCTION

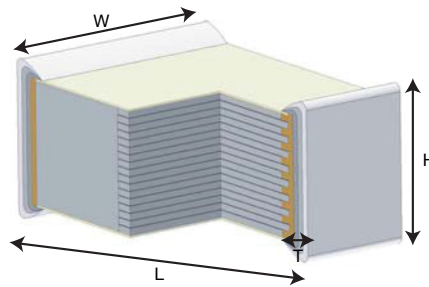
## How to Order, Dimensions and Construction

### HOW TO ORDER

| CB  | 04   | 2                                    | G  | 0104   | K  | --  |
|---|--|--------------------------------------|--|--|--|---|
| <b>Type</b>                               | <b>Size</b>  | <b>Dielectric</b>                    | <b>Voltage</b>   | <b>Capacitance</b>   | <b>Tolerance EIA Code</b>                  | <b>Suffix Packaging</b>   |
| CB: SMD Lead Free<br>CL: ADL SMD leadfree | 01: 1206<br>02: 1210<br>03: 1812<br>04: 2220<br>05: 2824<br>95: 2840<br>16: 4030<br>17: 5040<br>18: 6054 | 2 = PET-<br>HT<br>8 = PPS<br>7 = PEN | B = 16V<br>C = 25V<br>D = 50/63V<br>E = 100V<br>G = 250V<br>I = 400V<br>K = 630V | 1st digit: 0<br>2nd & 3rd: the 2nd significant figures of the capacitance value.<br>4th digit: the number of zeros to be added to the capacitance value. | G <sup>(1)</sup> = 2%<br>J = 5%<br>K = 10% | -- = bulk<br>BA = tape & reel diameter: 180mm<br>BC = tape & reel diameter: 330mm |

**Example of an order:** How to order a chip film PET-HT 100nF ±10% 250V bulk packaging.

<sup>(1)</sup>; Tolerance G available only for PPS Series.



### CASE DIMENSIONS:

millimeters (inches)

| Size Code | Equivalent size     | Length (L)              | Width (W)               | Termination Return      |
|-----------|---------------------|-------------------------|-------------------------|-------------------------|
| 01        | 1206                | 3.30±0.30 (0.130±0.012) | 1.60±0.30 (0.063±0.012) | 0.50±0.30 (0.020±0.012) |
| 02        | 1210                | 3.30±0.30 (0.130±0.012) | 2.50±0.30 (0.098±0.012) | 0.50±0.30 (0.020±0.012) |
| 03        | 1812 <sup>(1)</sup> | 4.50±0.50 (0.177±0.020) | 3.20±0.50 (0.126±0.020) | 0.60±0.40 (0.024±0.157) |
| 04        | 2220                | 5.80±0.50 (0.228±0.020) | 5.00±0.50 (0.197±0.020) | 0.80±0.60 (0.032±0.024) |
| 05        | 2824 <sup>(2)</sup> | 7.20±0.50 (0.283±0.020) | 6.10±0.50 (0.240±0.020) | 0.80±0.60 (0.032±0.024) |
| 95        | 2840                | 7.20±0.50 (0.283±0.020) | 10.0±0.80 (0.343±0.031) | 0.80±0.60 (0.032±0.024) |
| 16        | 4030                | 10.5±0.60 (0.413±0.024) | 7.60±0.80 (0.299±0.031) | 0.80±0.60 (0.032±0.024) |
| 17        | 5040                | 12.8±0.60 (0.504±0.024) | 10.2±0.80 (0.401±0.031) | 0.80±0.60 (0.032±0.024) |
| 18        | 6054                | 15.3±0.60 (0.602±0.024) | 13.7±0.80 (0.539±0.031) | 0.80±0.60 (0.032±0.024) |

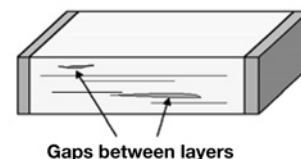
<sup>(1)</sup> size 1812 for PEN dielectric L = 4.7 ± 0.5 mm

<sup>(2)</sup> size 2824 for PEN dielectric & voltage 50 & 100V L = 7.3 +0,7/-0,3 mm

### STACKED FILM CONSTRUCTION

Our SMD Film capacitors (CB series) are using stacked technology with metallized plastic film, which forms the basis for the capacitive element. Combined with the naked design choice, it gives our products an again better self-healing capability as well as a very good capacitance per volume ratio. This also means that internal construction of the multilayer stack, usually hidden in encapsulated film capacitors design, is visible at the cut edges in the surface mount configuration. In a typical film capacitor stack, hundreds of film layers are compacted during manufacturing. Under a magnifying glass these have the appearance of pages in a book. Sometimes, microgaps can be visible between film layers due to structure and process. Subsequent manufacturing and pcb assembly

processes allow a small amount of relaxation in these layers. In some cases, small gaps between layers may become bigger. These are referred to as microgaps, and their occurrence is a standard feature of this technology. Even if it can be considered an cosmetic issue, presence of these gaps has no effect at all on mechanical or electrical performance or reliability. (Detailed report is available upon request.)





# INTRODUCTION – FEEDTHRU 0805/1206 CAPACITORS



## Electrical Properties and Test Conditions – CB Series

### STANDARDIZATION

Reference Standard is CECC 32201

| Test   | Description   | Performance   |
|--|---|---|
| <b>Capacitance C</b>                             | Measurement frequency 1 KHz 20°C  | Shall be within tolerance of the rated value  |
| <b>Dissipation Factor DF</b>                     | Measurement frequency 1 KHz 20°C  | DF < 100.10-4   |
| <b>Insulation Resistance IR</b>                  | Voltage applied 60 sec.:<br>10V for Vr < 100V<br>100V for Vr > = 100V                       | IR > 1000 Mohms for C < = 0.33µF<br>IR x C > 400 sec. For C > 0.33µF  |
| <b>Dielectric Strength</b>                       | Surge Voltage = 1.4Vr applied<br>for 1 minute between terminals                             | There shall be no direct breakdown  |
| <b>Mounting</b>                                  | Board = 1.6mm (0.063") thick epoxy glass laminated<br>or alumina substrate                  | C = within ± 2% of initial value<br>Delta DF = < = 50.10-4<br>at 1 KHz IR = within initial limit                            |
| <b>Adhesion</b>                                  | Force of 5 N applied for 10 secs.   | No visible damage   |
| <b>Board Bending Test</b>                        | Bending of 1 mm(0.039")<br>for 90 mm (3.543") length  | C = within ± 2% of initial value<br>No visible damage   |
| <b>Thermal Shock</b>                             | 500 cycles –55/+125°C   | C = within ± 5% of initial value<br>ESR = no more than 3 times initial value<br>IR = not less than 50% of the initial limit |
| <b>Damp Heat<br/>Steady State</b>                | 40°C 93% RH / no voltage / 56 days  | C = within ± 7% of initial value<br>Delta DF = < 50.10-4 at 1 KHz<br>IR = not less than 50% of the initial limit            |
| <b>Accelerated Damp Heat (Load<br/>Humidity)</b> | 85°C 85% RH 1.5V-500H   | C = within ± 7% of initial value<br>Delta DF = < = 70.10-4 at 1 KHz<br>IR = not less than 50% of the initial limit          |
| <b>Life Test</b>                                 | 85°C / 1.25Vr / 1000H<br>measuring 2 hours after test conclusion                            | C = within ± 8% of initial value<br>Delta DF = < 50.10-4 at 1 KHz<br>IR = not less than 50% of the initial limit            |
| <b>Life Test</b>                                 | 105°C / Vr/1,000 Hours<br>125°C / Vr/1,000 Hours measuring 2 hours after test<br>conclusion | C = within ± 7% of initial value<br>Delta DF = < 50.10-4 at 1 KHz<br>IR = not less than 50% of the initial limit            |
| <b>Charge/Discharge</b>                          | 10,000 cycle / Vr   | C = within ± 5% of initial value<br>Delta DF = < 50.10-4 at 1 KHz<br>IR = not less than 50% of the initial limit            |

# INTRODUCTION – FEEDTHRU 0805/1206 CAPACITORS



## AECQ Documentation – CB Series

### AECQ 200

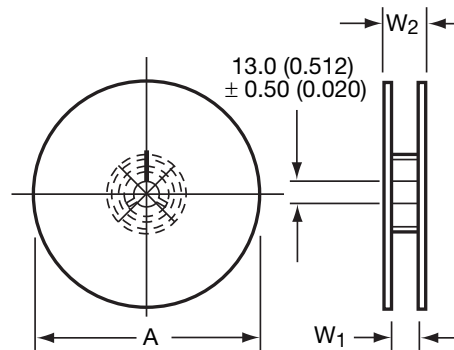
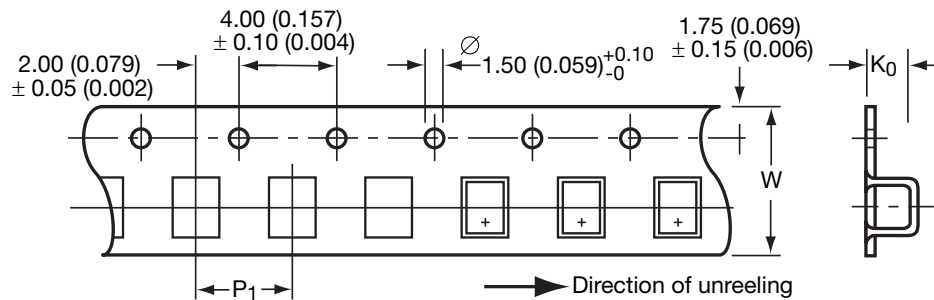
| Test                                | Page # | Reference                           | Sample size per lot | Tests Description   | Criterion  |
|-------------------------------------|--------|-------------------------------------|---------------------|---|--|
| High Temperature Exposure (Storage) | 3      | Mil-std-202 method 108              | 77                  | 1000h at rated operating temperature (125°C) Unpowered Measurement 24h after test conclusion                      | C = within ± 7% of initial value<br>Delta DF < or = 50.10-4 at 1kHz *<br>IR = not less than 50% of initial limit |
| Temperature Cycling                 | 4      | JESD22 method JA-104                | 77                  | 1000 cycles (-55°C to +125°C)<br>1 cycles per hour - gradient 15°C/minute<br>Measurement after 24h at 100°C       | C = within ± 5% of initial value<br>Delta DF < or = 50.10-4 at 1kHz *<br>IR = not less than 50% of initial limit |
| Moisture resistance                 | 6      | Mil-std-202 method 106              | 77                  | t=24 hours/cycle.<br>Note Steps 7A and 7B not required -<br>Unpowered Measurement after 24h at 100°C              | C = within ± 8% of initial value<br>Delta DF < or = 70.10-4 at 1kHz *<br>IR = not less than 50% of initial limit |
| Biased humidity                     | 7      | Mil-std-202 method 103              | 77                  | 1000 hours 40°C/93%RH<br>0.5 Un or 48V max Measurement after 24h at 100°C   | C = within ± 8% of initial value<br>Delta DF < or = 70.10-4 at 1kHz *<br>IR = not less than 50% of initial limit |
| Operational Life                    | 8      | Mil-std-202 method 108              | 77                  | 1000 hours at 125°C<br>100% of Rated Voltage<br>Measurement 24h after test conclusion                             | C = within ± 7% of initial value<br>Delta DF < or = 50.10-4 at 1kHz *<br>IR = not less than 50% of initial limit |
| Resistance to solvents              | 12     | Mil-std-202 method 215              | 5                   | OKEM clean or equivalent  | No visible damage  |
| Mechanical shock                    | 13     | Mil-std-202 method 213              | 30                  | 18 shocks Condition C<br>1/2 sinusoid<br>6 msec.100g's  | C = within ± 2% of initial value<br>Delta DF < or = 50.10-4 at 1kHz *<br>IR = not less than 50% of initial limit |
| Vibration                           | 14     | Mil-std-202 method 204              | 30                  | 12 cycles each of 3 orientations<br>5g's for 20 minutes<br>Test from 10-2000 Hz                                   | C = within ± 2% of initial value<br>Delta DF < or = 50.10-4 at 1kHz *<br>IR = not less than 50% of initial limit |
| Resistance to soldering heat        | 15     | Mil-std-202 method 210              | 30                  | for SMD use Procedure 2<br>(235°C / 30 sec.)<br>3 times   | C = within ± 5% of initial value<br>Delta DF < or = 50.10-4 at 1kHz *<br>IR = not less than 50% of initial limit |
| Thermal Shock                       | 16     | Mil-std-202 method 107              | 30                  | -55°C/+125°C 300 cycles - transfert 20 sec.<br>max Dwell Time =15minutes<br>Measurement 24h after test conclusion | C= within ± 5% of initial value<br>Delta DF < or = 50.10-4 at 1kHz *<br>IR = not less than 50% of initial limit  |
| ESD                                 | 17     | AEC-Q200-002                        | 15                  | Ongoing   |  |
| Solderability                       | 18     | J-STD-002 replaced by: JESD22-B102D | 15                  | dipping in solder bath<br>SnPb at 235°C<br>during 3 or 5 sec. depending on case size                              | 95% solder coverage minimum  |
| Electrical Characterization         | 19     | User spec.                          | 30                  | Electrical characteristics measured at :<br>-55°C / +25°C / +125°C  | Summary to show Min, Max, Mean and standard deviation at room, Min and Max operating temperatures.               |
| Flammability                        | 20     | UL-94                               | 10                  | 20 mm vertical burning test V-0, V-1 or V-2<br>Electrical Test not required                                       | V-0 or V-1 are acceptable  |
| Board Flex                          | 21     | AEC-Q200-005                        | 30                  | 2mm minimum   | C = within ± 2% of initial value No visible damage   |
| Terminal Strength                   | 22     | AEC-Q200-006                        | 30                  | a force of 1.8 kg for 60s sec.  | No visible damage  |

\* For PPS: Delta DF= 10 x 10<sup>-4</sup>

# INTRODUCTION

## Packaging – CB Series

### TAPE & REEL DIMENSIONS



### MARKING ON PACKAGING ONLY

Example of a label for chip film PET-HT 100nF ±10% 250V BULK packaging



### RECOMMENDATIONS

Once the sealed bag is opened, the capacitors must be stored in a dry atmosphere until soldering.

Recommended storage conditions are:

PET & PEN: < 30°C and R.H.<60% for a maximum of 168 hours

PPS: < 30°C and R.H.<60% for a maximum of 4 weeks

The use-by date is 3 years if kept in origin plastic bags.

In case of storage outside the conditions recommended above the capacitors must be dried prior to soldering.

Recommended drying conditions are:

96 hours minimum at 60°C and RH < 10%.

MSL:

PEN & PET-HT = 3

PPS = 2a

Standard IPC/JEDEC J-STD-033

### TAPE & REEL CHARACTERISTICS

In accordance with IEC 286 and EIA 481, the material used:

Carrier tape: Antistatic Material

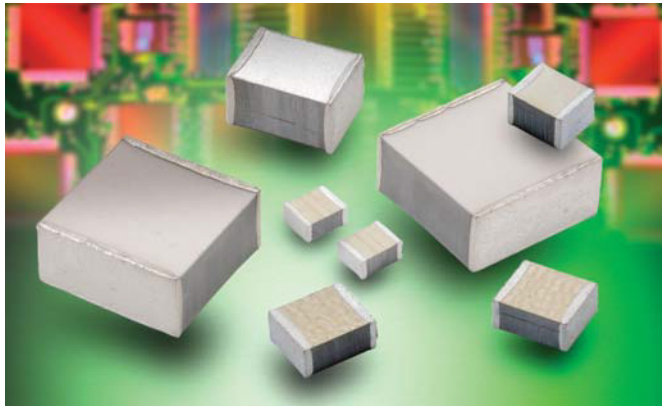
Cover tape: Polyester

Reel: Recyclable Material

Parts in bulk or on reel are packed in hermetically sealed plastic bags.

# CB Series: PET-HT Dielectric – Lead Free Version

## General Description



### GENERAL DESCRIPTION

Film chip capacitor using a naked and stacked construction with metallized High Temperature PET (polyethylene terephthalate).

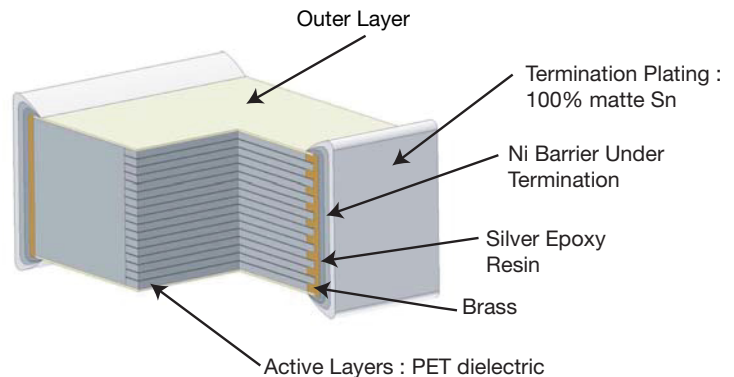
### ADVANTAGES

- Use of high temperature dielectric films makes these capacitors suitable for IR or vapor phase reflow processes. This chip is built without specific encapsulation.
- The intrinsic elasticity of the dielectric film allows an excellent compatibility of the capacitor with all types of material for printed circuit boards.
- The self-healing property of film technology results to a safety open failure mode and better overall reliability.
- Excellent thermal shock resistance.
- Low dissipation factor ESR & ESL.
- No piezoelectric effect.
- Available in tape and reel suitable for automatic placement.
- Non-polar construction.

### APPLICATIONS

General purpose function in low voltage applications where miniaturization and SMD is required. Typical applications would be:

- Automotive (Airbag, Fuel injection calculator...)
- Telecom (Public switching systems, modems, telephone set, cordless, mobile)
- Industrial (SMPS, Power convertor module...)



### PERFORMANCE CHARACTERISTICS

|                                    |   |
|------------------------------------|---|
| Climatic Category                  | 55/125/56   |
| Capacitance Range                  | 10nF to 4.7μF   |
| Tolerance on C <sub>R</sub>        | ±5%, ±10%   |
| Nominal Voltages                   | 63Vdc to 630Vdc   |
| Test Voltage                       | 1.4Vr 2 sec. at 25°C  |
| Soldering methods                  | IR or vapor phase reflow (not suitable for wave soldering)  |
| Tangent of Loss Angle at 1kHz (DF) | < 100 x 10 <sup>-4</sup>  |
| Insulation resistance minimum : IR | for C ≤ 0.33μF IR > 1000 MΩ at 20°C for 1 min. charge at 10Vdc for VR < 100Vdc and 100Vdc for VR ≥ 100Vdc<br>for C > 0.33μF IR C > 400 sec. at 20°C for 1 min. charge at 10Vdc for VR < 100Vdc and 100Vdc for VR ≥ 100Vdc |
| Temperature range                  | -55°C to 125°C with voltage derating of 1.25%/°C between 105°C and 125°C  |
| A.C. applications                  | for high frequency A.C. application please check with KYOCERA AVX   |

# CB SERIES: PET-HT DIELECTRIC – LEAD FREE VERSION



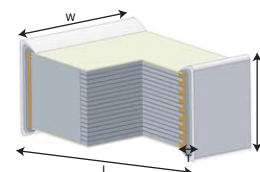
## Capacitance Values & Nominal Voltages

### CAPACITANCE VALUES (CR) AND NOMINAL VOLTAGES (VR)

millimeters (inches)

| Capacitance Range (CR)     | Ordering Code   | VOLTAGE Vdc: 63V Vac: 40V            |              |              |              |                 |              |              |                 |              |              |                |      |               |
|----------------------------|-----------------|--------------------------------------|--------------|--------------|--------------|-----------------|--------------|--------------|-----------------|--------------|--------------|----------------|------|---------------|
|                            |                 | Chip Dimensions *Tolerances (page 6) |              |              |              | Tape Dimensions |              |              | Reel Dimensions |              |              | Packaging Unit |      | Reel Pkg Code |
|                            |                 | L                                    | W            | H max        | T            | W               | P1           | K0           | A               | W1           | W2 max       | Bulk           | Reel |               |
| 0.270µF                    | CB042D0274+ --  | 5.8 (0.228)                          | 5.0 (0.195)  | 2.8 (0.110)  | 0.8 (0.032)  | 12.0 (0.472)    | 8.0 (0.315)  | 3.1 (0.122)  | 330 (12.99)     | 12.4 (0.488) | 18.4 (0.724) | 1500           | 3000 | BC            |
| 0.330µF                    | CB042D0334+ --  | 5.80 (0.228)                         | 5.00 (0.195) | 3.30 (0.130) | 0.80 (0.032) | 12.0 (0.472)    | 8.00 (0.315) | 3.45 (0.136) | 330 (12.99)     | 12.4 (0.488) | 18.4 (0.724) | 1500           | 2800 | BC            |
| 0.390                      | CB042D0394++ -- | 5.80 (0.228)                         | 5.00 (0.195) | 3.40 (0.134) | 0.80 (0.032) | 12.0 (0.472)    | 8.00 (0.315) | 3.45 (0.136) | 330 (12.99)     | 12.4 (0.488) | 18.4 (0.724) | 1500           | 2800 | BC            |
| 0.470                      | CB042D0474+ --  | 5.80 (0.228)                         | 5.00 (0.195) | 3.50 (0.138) | 0.80 (0.032) | 12.0 (0.472)    | 8.00 (0.315) | 4.10 (0.162) | 330 (12.99)     | 12.4 (0.488) | 18.4 (0.724) | 1500           | 2300 | BC            |
| 0.560                      | CB042D0564+ --  | 5.80 (0.228)                         | 5.00 (0.195) | 3.50 (0.138) | 0.80 (0.032) | 12.0 (0.472)    | 8.00 (0.315) | 4.10 (0.162) | 330 (12.99)     | 12.4 (0.488) | 18.4 (0.724) | 1500           | 2300 | BC            |
| 0.680                      | CB042D0684+ --  | 5.80 (0.228)                         | 5.00 (0.195) | 4.00 (0.158) | 0.80 (0.032) | 12.0 (0.472)    | 8.00 (0.315) | 4.10 (0.162) | 330 (12.99)     | 12.4 (0.488) | 18.4 (0.724) | 1500           | 2300 | BC            |
| 0.820                      | CB052D0824+ --  | 7.2 (0.283)                          | 6.1 (0.24)   | 3.7 (0.146)  | 0.8 (0.032)  | 16.0 (0.629)    | 8.00 (0.315) | 3.8 (0.149)  | 330 (12.99)     | 24.4 (0.96)  | 30.4 (1.196) | 1000           | 2250 | BC            |
| 1µF                        | CB052D0105+ --  | 7.2 (0.283)                          | 6.1 (0.24)   | 3.7 (0.146)  | 0.8 (0.032)  | 16.0 (0.629)    | 8.00 (0.315) | 3.8 (0.149)  | 330 (12.99)     | 24.4 (0.96)  | 30.4 (1.196) | 1000           | 2250 | BC            |
| 1.5                        | CB052D0155+ --  | 7.20 (0.283)                         | 6.10 (0.240) | 5.30 (0.209) | 0.80 (0.032) | 16.0 (0.629)    | 12.0 (0.472) | 5.50 (0.216) | 330 (12.99)     | 16.4 (0.645) | 22.4 (0.881) | 1000           | 1000 | BC            |
| 2.2                        | CB162D0225+ --  | 10.5 (0.413)                         | 7.6 (0.299)  | 5.8 (0.229)  | 0.8 (0.032)  | 24.0 (0.944)    | 12 (0.472)   | 6.19 (0.244) | 330 (12.99)     | 24.4 (0.96)  | 30.4 (1.196) | 500            | 900  | BC            |
| 3.3                        | CB172D0335+ --  | 12.8 (0.503)                         | 10.2 (0.401) | 5.50 (0.216) | 0.80 (0.032) | 24.0 (0.944)    | 16.0 (0.629) | 5.70 (0.224) | 330 (12.99)     | 24.4 (0.961) | 30.4 (1.196) | 300            | 700  | BC            |
| 4.7µF                      | CB182D0475+ --  | 15.3 (0.601)                         | 13.7 (0.539) | 4.90 (0.193) | 0.80 (0.032) | 24.0 (0.944)    | 24.0 (0.944) | 5.50 (0.216) | 330 (12.99)     | 24.4 (0.961) | 30.4 (1.196) | 300            | 500  | BC            |
| VOLTAGE Vdc: 100V Vac: 63V |                 |                                      |              |              |              |                 |              |              |                 |              |              |                |      |               |
| 0.180µF                    | CB042E0184+ --  | 5.8 (0.228)                          | 5.0 (0.195)  | 2.3 (0.091)  | 0.8 (0.032)  | 12.0 (0.472)    | 8.0 (0.315)  | 2.43 (0.096) | 330 (12.99)     | 12.4 (0.488) | 18.4 (0.724) | 1500           | 3500 | BC            |
| 0.220µF                    | CB042E0224+ --  | 5.80 (0.228)                         | 5.00 (0.195) | 3.30 (0.130) | 0.80 (0.032) | 12.0 (0.472)    | 8.00 (0.315) | 3.45 (0.136) | 330 (12.99)     | 12.4 (0.488) | 18.4 (0.724) | 1500           | 3000 | BC            |
| 0.270µF                    | CB042E0274+ --  | 5.8 (0.228)                          | 5.0 (0.195)  | 3.4 (0.134)  | 0.8 (0.032)  | 12.0 (0.472)    | 8.0 (0.315)  | 3.45 (0.136) | 330 (12.99)     | 12.4 (0.488) | 18.4 (0.724) | 1500           | 2800 | BC            |
| 0.330                      | CB042E0334+ --  | 5.80 (0.228)                         | 5.00 (0.195) | 4.00 (0.158) | 0.80 (0.032) | 12.0 (0.472)    | 8.00 (0.315) | 4.10 (0.161) | 330 (12.99)     | 12.4 (0.488) | 18.4 (0.724) | 1500           | 2300 | BC            |
| 0.390                      | CB042E0394+ --  | 5.80 (0.228)                         | 5.00 (0.195) | 3.90 (0.154) | 0.80 (0.032) | 12.0 (0.472)    | 8.00 (0.315) | 4.10 (0.161) | 330 (12.99)     | 12.4 (0.488) | 18.4 (0.724) | 1500           | 2300 | BC            |
| 0.470                      | CB042E0474+ --  | 5.80 (0.228)                         | 5.00 (0.195) | 4.30 (0.169) | 0.80 (0.032) | 12.0 (0.472)    | 8.0 (0.315)  | 4.50 (0.177) | 330 (12.99)     | 12.4 (0.488) | 18.4 (0.724) | 1500           | 1900 | BC            |
| 0.560                      | CB052E0564+ --  | 7.20 (0.283)                         | 6.10 (0.240) | 4.20 (0.165) | 0.80 (0.032) | 16.0 (0.629)    | 12.0 (0.472) | 4.80 (0.189) | 330 (12.99)     | 16.4 (0.645) | 22.4 (0.881) | 1000           | 1800 | BC            |
| 0.680                      | CB052E0684+ --  | 7.20 (0.283)                         | 6.10 (0.240) | 5.00 (0.197) | 0.80 (0.032) | 16.0 (0.629)    | 12.0 (0.472) | 5.23 (0.206) | 330 (12.99)     | 16.4 (0.645) | 22.4 (0.881) | 1000           | 1100 | BC            |
| 0.820                      | CB052E0824+ --  | 7.20 (0.283)                         | 6.10 (0.240) | 4.70 (0.185) | 0.80 (0.032) | 16.0 (0.629)    | 12.0 (0.472) | 4.80 (0.189) | 330 (12.99)     | 16.4 (0.645) | 22.4 (0.881) | 1000           | 1800 | BC            |
| 1µF                        | CB052E0105+ --  | 7.20 (0.283)                         | 6.10 (0.240) | 5.70 (0.224) | 0.80 (0.032) | 16.0 (0.629)    | 12.0 (0.472) | 5.90 (0.232) | 330 (12.99)     | 16.4 (0.645) | 22.4 (0.881) | 1000           | 900  | BC            |
| 1.5                        | CB162E0155+ --  | 10.5 (0.413)                         | 7.60 (0.299) | 6.10 (0.240) | 0.80 (0.032) | 24.0 (0.944)    | 12.0 (0.472) | 6.19 (0.244) | 330 (12.99)     | 24.4 (0.961) | 30.4 (1.196) | 500            | 900  | BC            |

Replace the + by the tolerance code: J = 5% or K = 10%  
 Replace the -- by the packaging suffix: -- = bulk  
 BC = tape & reel



# CB SERIES: PET-HT DIELECTRIC – LEAD FREE VERSION



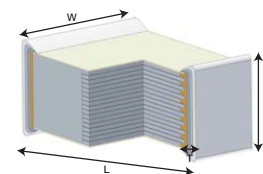
## Capacitance Values & Nominal Voltages

### CAPACITANCE VALUES (CR) AND NOMINAL VOLTAGES (VR)

millimeters (inches)

| VOLTAGE Vdc: 100V Vac: 63V  |                |  |                 |                 |                  |                 |                 |                 |                 |                 |                 |                |      |               |
|-----------------------------|----------------|--|-----------------|-----------------|------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|----------------|------|---------------|
| Capacitance Range (CR)      | Ordering Code  | Chip Dimensions<br>*Tolerances<br>(page 6) |                 |                 |                  | Tape Dimensions |                 |                 | Reel Dimensions |                 |                 | Packaging Unit |      | Reel Pkg Code |
|                             |                | L  | W               | H max           | T                | W               | P1              | K0              | A               | W1              | W2 max          | Bulk           | Reel |               |
| 2.2                         | CB172E0225+ -- | 12.8<br>(0.503)                            | 10.2<br>(0.401) | 5.50<br>(0.216) | 0.80<br>(0.032)  | 24.0<br>(0.944) | 16.0<br>(0.629) | 5.70<br>(0.224) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300            | 700  | BC            |
| 3.3                         | CB182E0335+ -- | 15.3<br>(0.601)                            | 13.7<br>(0.539) | 5.20<br>(0.204) | 0.80<br>(0.032)  | 24.0<br>(0.944) | 24.0<br>(0.944) | 5.50<br>(0.216) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300            | 500  | BC            |
| 4.7µF                       | CB182E0475+ -- | 15.3<br>(0.601)                            | 13.7<br>(0.539) | 7.10<br>(0.279) | 0.80<br>(0.032)  | 24.0<br>(0.944) | 24.0<br>(0.944) | 7.60<br>(0.299) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300            | 300  | BC            |
| VOLTAGE Vdc: 250V Vac: 160V |                |  |                 |                 |                  |                 |                 |                 |                 |                 |                 |                |      |               |
| 0.047µF                     | CB042G0473+ -- | 5.80<br>(0.228)                            | 5.00<br>(0.195) | 3.00<br>(0.118) | 0.80<br>(0.032)  | 12.0<br>(0.472) | 8.00<br>(0.315) | 3.10<br>(0.122) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 3000 | BC            |
| 0.056                       | CB042G0563+ -- | 5.80<br>(0.228)                            | 5.00<br>(0.195) | 3.60<br>(0.142) | 0.80<br>(0.032)  | 12.0<br>(0.472) | 8.00<br>(0.315) | 4.10<br>(0.161) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 2300 | BC            |
| 0.068                       | CB042G0683+ -- | 5.80<br>(0.228)                            | 5.00<br>(0.195) | 4.00<br>(0.158) | 0.80<br>(0.032)  | 12.0<br>(0.472) | 8.00<br>(0.315) | 4.10<br>(0.161) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 2300 | BC            |
| 0.082                       | CB042G0823+ -- | 5.80<br>(0.228)                            | 5.00<br>(0.195) | 4.00<br>(0.158) | 0.80<br>(0.032)  | 12.0<br>(0.472) | 8.00<br>(0.315) | 4.10<br>(0.161) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 2300 | BC            |
| 0.1µF                       | CB042G0104+ -- | 5.80<br>(0.228)                            | 5.00<br>(0.195) | 4.00<br>(0.158) | 0.80<br>(0.032)  | 12.0<br>(0.472) | 8.00<br>(0.315) | 4.10<br>(0.161) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 2300 | BC            |
| 0.120                       | CB052G0124+ -- | 7.20<br>(0.283)                            | 6.10<br>(0.240) | 4.30<br>(0.169) | 0.80<br>(0.032)  | 16.0<br>(0.629) | 12.0<br>(0.472) | 4.80<br>(0.189) | 330<br>(12.99)  | 16.4<br>(0.645) | 22.4<br>(0.881) | 1000           | 1800 | BC            |
| 0.150                       | CB052G0154+ -- | 7.20<br>(0.283)                            | 6.10<br>(0.240) | 4.30<br>(0.169) | 0.80<br>(0.032)  | 16.0<br>(0.629) | 12.0<br>(0.472) | 4.80<br>(0.189) | 330<br>(12.99)  | 16.4<br>(0.645) | 22.4<br>(0.881) | 1000           | 1800 | BC            |
| 0.180                       | CB052G0184+ -- | 7.20<br>(0.283)                            | 6.10<br>(0.240) | 5.10<br>(0.200) | 0.80<br>(0.032)  | 16.0<br>(0.629) | 12.0<br>(0.472) | 5.23<br>(0.206) | 330<br>(12.99)  | 16.4<br>(0.645) | 22.4<br>(0.881) | 1000           | 1100 | BC            |
| 0.220                       | CB052G0224+ -- | 7.20<br>(0.283)                            | 6.10<br>(0.240) | 4.90<br>(0.193) | 0.80<br>(0.032)  | 16.0<br>(0.629) | 12.0<br>(0.472) | 5.23<br>(0.206) | 330<br>(12.99)  | 16.4<br>(0.645) | 22.4<br>(0.881) | 1000           | 1100 | BC            |
| 0.270                       | CB162G0274+ -- | 10.5<br>(0.413)                            | 7.60<br>(0.299) | 4.80<br>(0.189) | 0.80<br>(0.032)  | 24.0<br>(0.944) | 12.0<br>(0.472) | 6.19<br>(0.244) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 500            | 1100 | BC            |
| 0.330                       | CB162G0334+ -- | 10.5<br>(0.413)                            | 7.60<br>(0.299) | 5.60<br>(0.220) | 0.80<br>(0.032)  | 24.0<br>(0.944) | 12.0<br>(0.472) | 6.19<br>(0.244) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 500            | 900  | BC            |
| 0.390                       | CB162G0394+ -- | 10.5<br>(0.413)                            | 7.60<br>(0.299) | 5.40<br>(0.213) | 0.80<br>(0.032)  | 24.0<br>(0.944) | 12.0<br>(0.472) | 6.19<br>(0.244) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 500            | 900  | BC            |
| 0.470                       | CB162G0474+ -- | 10.5<br>(0.413)                            | 7.60<br>(0.299) | 6.15<br>(0.241) | 0.80<br>(0.032)  | 24.0<br>(0.944) | 12.0<br>(0.472) | 6.19<br>(0.244) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 500            | 900  | BC            |
| 0.560                       | CB172G0564+ -- | 12.8<br>(0.503)                            | 10.2<br>(0.402) | 5.60<br>(0.220) | 0.80<br>(0.032)  | 24.0<br>(0.944) | 16.0<br>(0.629) | 5.70<br>(0.225) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300            | 700  | BC            |
| 0.680                       | CB172G0684+ -- | 12.8<br>(0.503)                            | 10.2<br>(0.402) | 6.50<br>(0.255) | 0.80<br>(0.032)  | 24.0<br>(0.944) | 16.0<br>(0.629) | 7.00<br>(0.275) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300            | 600  | BC            |
| 0.820                       | CB172G0824+ -- | 12.8<br>(0.503)                            | 10.2<br>(0.402) | 7.00<br>(0.276) | 0.80<br>(0.032)  | 24.0<br>(0.944) | 16.0<br>(0.629) | 7.00<br>(0.275) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300            | 600  | BC            |
| 0.820                       | CB182G0824+ -- | 15.3<br>(0.601)                            | 13.7<br>(0.539) | 5.10<br>(0.201) | 0.80<br>(0.032)  | 24.0<br>(0.944) | 24.0<br>(0.944) | 5.50<br>(0.217) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300            | 500  | BC            |
| 1µF                         | CB172G0105+ -- | 12.8<br>(0.503)                            | 10.2<br>(0.402) | 7.00<br>(0.276) | 0.80<br>(0.032)  | 24.0<br>(0.944) | 16.0<br>(0.629) | 7.00<br>(0.275) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300            | 600  | BC            |
| 1µF                         | CB182G0105+ -- | 15.3<br>(0.601)                            | 13.7<br>(0.539) | 6.00<br>(0.236) | 0.80<br>(0.032)  | 24.0<br>(0.944) | 24.0<br>(0.944) | 6.30<br>(0.248) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300            | 400  | BC            |
| 1.5                         | CB182G0155+ -- | 15.3<br>(0.601)                            | 13.7<br>(0.539) | 7.00<br>(0.276) | 0.80<br>(0.0315) | 24.0<br>(0.944) | 24.0<br>(0.944) | 7.60<br>(0.299) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300            | 300  | BC            |

Replace the + by the tolerance code: J = 5% or K = 10%  
 Replace the -- by the packaging suffix: -- = bulk  
 BC = tape & reel





# CB SERIES: PET-HT DIELECTRIC – LEAD FREE VERSION



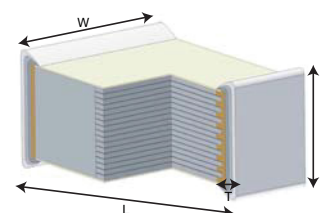
## Capacitance Values & Nominal Voltages

### CAPACITANCE VALUES (CR) AND NOMINAL VOLTAGES (VR)

millimeters (inches)

| Capacitance Range (CR)      | Ordering Code  | VOLTAGE Vdc: 63V Vac: 40V                  |                 |                 |                 |                 |                 |                 |                 |                 |                 |      | Packaging Unit |    | Reel Pkg Code |
|-----------------------------|----------------|--|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------|----------------|----|---------------|
|                             |                | Chip Dimensions<br>*Tolerances<br>(page 6) |                 |                 |                 | Tape Dimensions |                 |                 | Reel Dimensions |                 |                 | Bulk | Reel           |    |               |
|                             |                | L  | W               | H max           | T               | W               | P1              | K0              | A               | W1              | W2 max          |      |                |    |               |
| 0.010µF                     | CB042I0103+ -- | 5.80<br>(0.228)                            | 5.00<br>(0.195) | 3.00<br>(0.017) | 0.80<br>(0.032) | 12.0<br>(0.472) | 8.00<br>(0.315) | 3.10<br>(0.122) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 3000           | BC |               |
| 0.012                       | CB042I0123+ -- | 5.80<br>(0.228)                            | 5.00<br>(0.195) | 2.40<br>(0.095) | 0.80<br>(0.032) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.43<br>(0.096) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 3500           | BC |               |
| 0.015                       | CB042I0153+ -- | 5.80<br>(0.228)                            | 5.00<br>(0.195) | 4.00<br>(0.158) | 0.80<br>(0.032) | 12.0<br>(0.472) | 8.00<br>(0.315) | 4.10<br>(0.161) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 2300           | BC |               |
| 0.018                       | CB052I0183+ -- | 7.2<br>(0.283)                             | 6.1<br>(0.240)  | 2.8<br>(0.110)  | 0.8<br>(0.032)  | 16.0<br>(0.629) | 12<br>(0.472)   | 3.8<br>(0.150)  | 330<br>(12.99)  | 16.4<br>(0.645) | 22.4<br>(0.881) | 1000 | 2250           | BC |               |
| 0.022                       | CB052I0223+ -- | 7.2<br>(0.283)                             | 6.1<br>(0.240)  | 3.5<br>(0.138)  | 0.8<br>(0.032)  | 16.0<br>(0.629) | 12<br>(0.472)   | 3.8<br>(0.150)  | 330<br>(12.99)  | 16.4<br>(0.645) | 22.4<br>(0.881) | 1000 | 2250           | BC |               |
| 0.027                       | CB052I0273+ -- | 7.2<br>(0.283)                             | 6.1<br>(0.240)  | 2.8<br>(0.110)  | 0.8<br>(0.032)  | 16.0<br>(0.629) | 12<br>(0.472)   | 3.8<br>(0.150)  | 330<br>(12.99)  | 16.4<br>(0.645) | 22.4<br>(0.881) | 1000 | 2250           | BC |               |
| 0.033                       | CB052I0333+ -- | 7.2<br>(0.283)                             | 6.1<br>(0.240)  | 3.3<br>(0.130)  | 0.8<br>(0.032)  | 16.0<br>(0.629) | 12<br>(0.472)   | 3.8<br>(0.150)  | 330<br>(12.99)  | 16.4<br>(0.645) | 22.4<br>(0.881) | 1000 | 2250           | BC |               |
| 0.047                       | CB052I0473+ -- | 7.2<br>(0.283)                             | 6.1<br>(0.240)  | 4.5<br>(0.177)  | 0.8<br>(0.032)  | 16.0<br>(0.629) | 12<br>(0.472)   | 4.8<br>(0.189)  | 330<br>(12.99)  | 16.4<br>(0.645) | 22.4<br>(0.881) | 1000 | 1800           | BC |               |
| 0.056                       | CB162I0563+ -- | 10.5<br>(0.413)                            | 7.6<br>(0.299)  | 3.1<br>(0.122)  | 0.8<br>(0.032)  | 24.0<br>(0.944) | 12.0<br>(0.472) | 3.93<br>(0.155) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 500  | 1400           | BC |               |
| 0.068                       | CB162I0683+ -- | 10.5<br>(0.413)                            | 7.6<br>(0.299)  | 3.6<br>(0.141)  | 0.8<br>(0.032)  | 24.0<br>(0.944) | 12.0<br>(0.472) | 3.93<br>(0.155) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 500  | 1400           | BC |               |
| 0.082                       | CB162I0823+ -- | 10.5<br>(0.413)                            | 7.6<br>(0.299)  | 4.2<br>(0.165)  | 0.8<br>(0.032)  | 24.0<br>(0.944) | 12.0<br>(0.472) | 6.19<br>(0.244) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 500  | 900            | BC |               |
| 0.100µF                     | CB162I0104+ -- | 10.5<br>(0.413)                            | 7.6<br>(0.299)  | 4.7<br>(0.185)  | 0.8<br>(0.032)  | 24.0<br>(0.944) | 12.0<br>(0.472) | 6.19<br>(0.244) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 500  | 900            | BC |               |
| 0.120                       | CB172I0124+ -- | 12.8<br>(0.503)                            | 10.2<br>(0.402) | 3.9<br>(0.154)  | 0.8<br>(0.032)  | 24.0<br>(0.944) | 16.0<br>(0.629) | 4.0<br>(0.157)  | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300  | 1100           | BC |               |
| 0.150                       | CB172I0154+ -- | 12.8<br>(0.503)                            | 10.2<br>(0.402) | 4.6<br>(0.181)  | 0.8<br>(0.032)  | 24.0<br>(0.944) | 16.0<br>(0.629) | 4.7<br>(0.185)  | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300  | 900            | BC |               |
| 0.180                       | CB172I0184+ -- | 12.8<br>(0.503)                            | 10.2<br>(0.402) | 5.6<br>(0.220)  | 0.8<br>(0.032)  | 24.0<br>(0.944) | 16.0<br>(0.629) | 7.0<br>(0.274)  | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300  | 600            | BC |               |
| 0.220                       | CB172I0224+ -- | 12.8<br>(0.503)                            | 10.2<br>(0.402) | 6.8<br>(0.265)  | 0.8<br>(0.032)  | 24.0<br>(0.944) | 16.0<br>(0.629) | 7.0<br>(0.274)  | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300  | 600            | BC |               |
| 0.270                       | CB172I0274+ -- | 12.8<br>(0.503)                            | 10.2<br>(0.402) | 6.8<br>(0.265)  | 0.8<br>(0.032)  | 24.0<br>(0.944) | 16.0<br>(0.629) | 7.0<br>(0.274)  | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300  | 600            | BC |               |
| 0.330                       | CB182I0334+ -- | 15.3<br>(0.601)                            | 13.7<br>(0.539) | 5.6<br>(0.220)  | 0.8<br>(0.032)  | 24.0<br>(0.944) | 24.0<br>(0.944) | 6.3<br>(0.248)  | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300  | 400            | BC |               |
| 0.470µF                     | CB182I0474+ -- | 15.3<br>(0.601)                            | 13.7<br>(0.539) | 6.2<br>(0.244)  | 0.8<br>(0.032)  | 24.0<br>(0.944) | 24.0<br>(0.944) | 6.3<br>(0.248)  | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300  | 400            | BC |               |
| VOLTAGE Vdc: 630V Vac: 250V |                |  |                 |                 |                 |                 |                 |                 |                 |                 |                 |      |                |    |               |
| 0.010µF                     | CB042K0103+ -- | 5.80<br>(0.228)                            | 5.00<br>(0.195) | 2.8<br>(0.110)  | 0.80<br>(0.032) | 12.0<br>(0.472) | 8.00<br>(0.315) | 3.10<br>(0.122) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 3000           | BC |               |
| 0.012                       | CB042K0123+ -- | 5.80<br>(0.228)                            | 5.00<br>(0.195) | 3.3<br>(0.130)  | 0.80<br>(0.032) | 12.0<br>(0.472) | 8.00<br>(0.315) | 3.10<br>(0.122) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 2800           | BC |               |
| 0.015                       | CB042K0153+ -- | 5.80<br>(0.228)                            | 5.00<br>(0.195) | 4.0<br>(0.158)  | 0.80<br>(0.032) | 12.0<br>(0.472) | 8.00<br>(0.315) | 4.1<br>(0.161)  | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 2300           | BC |               |
| 0.018                       | CB052K0183+ -- | 5.80<br>(0.228)                            | 6.1<br>(0.240)  | 2.8<br>(0.110)  | 0.80<br>(0.032) | 24.0<br>(0.944) | 12.0<br>(0.472) | 3.8<br>(0.149)  | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 1000 | 2250           | BC |               |

Replace the + by the tolerance code: J = 5% or K = 10%  
 Replace the -- by the packaging suffix: -- = bulk  
 BC = tape & reel





# CB SERIES: PET-HT DIELECTRIC – LEAD FREE VERSION



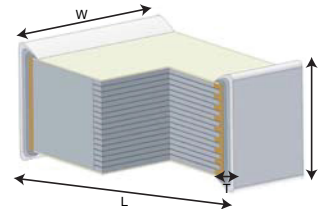
## Capacitance Values & Nominal Voltages

### CAPACITANCE VALUES (CR) AND NOMINAL VOLTAGES (VR)

millimeters (inches)

| Capacitance Range (CR) | Ordering Code  | VOLTAGE Vdc: 630V Vac: 250V             |                 |                 |                 |                 |                 |                 |                 |                 |                 |      | Packaging Unit |    | Reel Pkg Code |
|------------------------|----------------|---|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------|----------------|----|---------------|
|                        |                | Chip Dimensions<br>*Tolerances (page 6) |                 |                 |                 | Tape Dimensions |                 |                 | Reel Dimensions |                 |                 | Bulk | Reel           |    |               |
|                        |                | L                                       | W               | H max           | T               | W               | P1              | K0              | A               | W1              | W2 max          |      |                |    |               |
| 0.022                  | CB052K0223+ -- | 7.20<br>(0.283)                         | 6.10<br>(0.240) | 3.50<br>(0.138) | 0.80<br>(0.032) | 24.0<br>(0.944) | 12.0<br>(0.472) | 3.80<br>(0.149) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 1000 | 2250           | BC |               |
| 0.027                  | CB052K0273+ -- | 7.20<br>(0.283)                         | 6.10<br>(0.240) | 4.10<br>(0.161) | 0.80<br>(0.032) | 16.0<br>(0.629) | 12.0<br>(0.472) | 4.80<br>(0.189) | 330<br>(12.99)  | 16.4<br>(0.645) | 22.4<br>(0.881) | 1000 | 1800           | BC |               |
| 0.033                  | CB052K0333+ -- | 7.20<br>(0.283)                         | 6.10<br>(0.240) | 5.00<br>(0.197) | 0.80<br>(0.032) | 16.0<br>(0.629) | 12.0<br>(0.472) | 4.80<br>(0.189) | 330<br>(12.99)  | 16.4<br>(0.645) | 22.4<br>(0.881) | 1000 | 1100           | BC |               |
| 0.047                  | CB162K0473+ -- | 10.5<br>(0.413)                         | 7.60<br>(0.299) | 3.60<br>(0.141) | 0.80<br>(0.032) | 24.0<br>(0.944) | 12.0<br>(0.472) | 3.93<br>(0.155) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 500  | 1400           | BC |               |
| 0.056                  | CB162K0563+ -- | 10.5<br>(0.413)                         | 7.60<br>(0.299) | 4.30<br>(0.169) | 0.80<br>(0.032) | 24.0<br>(0.944) | 12.0<br>(0.472) | 6.19<br>(0.244) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 500  | 900            | BC |               |
| 0.068                  | CB162K0683+ -- | 10.5<br>(0.413)                         | 7.60<br>(0.299) | 5.20<br>(0.205) | 0.80<br>(0.032) | 24.0<br>(0.944) | 12.0<br>(0.472) | 6.19<br>(0.244) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 500  | 900            | BC |               |
| 0.082                  | CB172K0823+ -- | 12.8<br>(0.503)                         | 10.2<br>(0.402) | 4.30<br>(0.169) | 0.80<br>(0.032) | 24.0<br>(0.944) | 16.0<br>(0.629) | 4.70<br>(0.185) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300  | 900            | BC |               |
| 0.100µF                | CB172K0104+ -- | 12.8<br>(0.503)                         | 10.2<br>(0.402) | 5.00<br>(0.197) | 0.80<br>(0.032) | 24.0<br>(0.944) | 16.0<br>(0.629) | 5.70<br>(0.225) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300  | 700            | BC |               |
| 0.120                  | CB172K0124+ -- | 12.8<br>(0.503)                         | 10.2<br>(0.402) | 5.60<br>(0.220) | 0.80<br>(0.032) | 24.0<br>(0.944) | 16.0<br>(0.629) | 5.70<br>(0.225) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300  | 700            | BC |               |
| 0.150                  | CB172K0154+ -- | 12.8<br>(0.503)                         | 10.2<br>(0.402) | 6.90<br>(0.271) | 0.80<br>(0.032) | 24.0<br>(0.944) | 16.0<br>(0.629) | 7.00<br>(0.275) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300  | 600            | BC |               |
| 0.180                  | CB182K0184+ -- | 15.3<br>(0.601)                         | 13.7<br>(0.539) | 5.00<br>(0.197) | 0.80<br>(0.032) | 24.0<br>(0.944) | 24.0<br>(0.944) | 5.50<br>(0.217) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300  | 500            | BC |               |
| 0.220                  | CB182K0224+ -- | 15.3<br>(0.601)                         | 13.7<br>(0.539) | 5.80<br>(0.229) | 0.80<br>(0.032) | 24.0<br>(0.944) | 24.0<br>(0.944) | 6.30<br>(0.248) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300  | 400            | BC |               |
| 0.270µF                | CB182K0274+ -- | 15.3<br>(0.601)                         | 13.7<br>(0.539) | 7.20<br>(0.284) | 0.80<br>(0.032) | 24.0<br>(0.944) | 24.0<br>(0.944) | 7.60<br>(0.299) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300  | 300            | BC |               |

Replace the + by the tolerance code: J = 5% or K = 10%  
 Replace the -- by the packaging suffix: -- = bulk  
 BC = tape & reel



# CB SERIES: PET-HT DIELECTRIC – LEAD FREE VERSION



## Mounting and Soldering Recommendations

### MOUNTING AND SOLDERING RECOMMENDATIONS

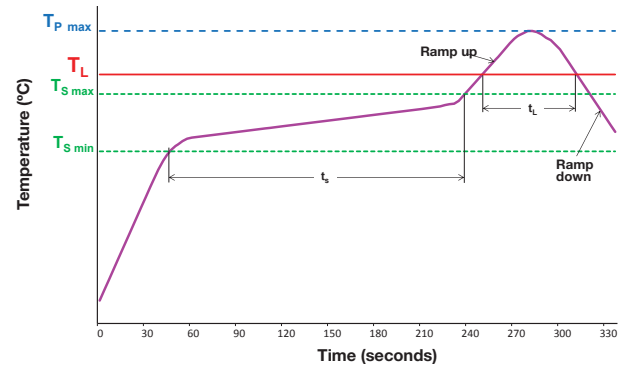
#### SOLDERING PROFILE

The capacitors can be mounted using infrared and vapor phase soldering following recommended below. They are NOT suitable for wave soldering.

All temperature refer to topside of the package, measured on the package body surface.

| Profile Feature  | 2220 to 2824     | 4030 to 6054     |
|--|------------------|------------------|
| Ramp-Up ( $T_{s\ max}$ to $T_p$ )                                | 3°C / second max | 3°C / second max |
| Preheat  |                  |                  |
| - Temperature Min ( $T_{s\ min}$ )                               | 150°C            | 150°C            |
| - Temperature Max ( $T_{s\ max}$ )                               | 200°C            | 200°C            |
| - Time ( $t_{s\ min}$ to $t_{s\ max}$ )                          | 180 sec. max     | 180 sec. max     |
| Time maintained above  |                  |                  |
| - Temperature ( $T_L$ )  | 217°C            | 217°C            |
| - Time ( $t_L$ )   | 60 sec. max      | 75 sec. max      |
| Peak temperature ( $T_{p\ max}$ )                                | 240°C            | 245°C            |
| Customer Peak temperature ( $T_p$ )                              | < 240°C          | < 245°C          |
| Time within 5°C of peak temperature ( $T_p - 5^\circ\text{C}$ )* | 10 sec.          | 10 sec.          |
| Ramp-Down  | 6°C / sec.       | 6°C / sec.       |

\* Example :  $T_p = 238.5^\circ\text{C} \Rightarrow t_p = \text{time between } 238.5^\circ\text{C and } 233.5^\circ\text{C } (T_p - 5^\circ\text{C})$

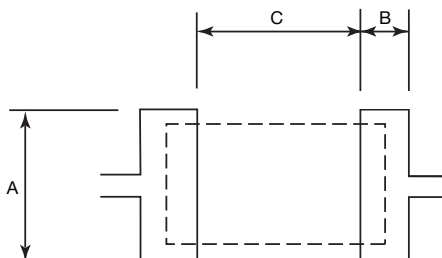


# Reflow soldering referring to JEDEC Standard with some limitations  
# JEDEC J-Std 020C

#### RECOMMENDED SOLDER PASTE THICKNESS

For optimum solderability, the recommended soldering paste thickness:  
2220 to 2824 :150 to 200µm  
4030 to 6054 :200 to 300µm

In case of hand soldering, the temperature of the soldering iron should not be above 250°C. Special care must be taken to avoid touching the capacitor body with the iron tip.



#### PAD DIMENSIONS: MILLIMETERS (INCHES)

| Size Code | Case Size | A            | B            | C            |
|-----------|-----------|--------------|--------------|--------------|
| 04        | 2220      | 5.00 (0.195) | 1.90 (0.075) | 4.50 (0.178) |
| 05        | 2824      | 6.00 (0.234) | 2.50 (0.098) | 5.70 (0.224) |
| 16        | 4030      | 7.50 (0.295) | 3.00 (0.118) | 8.00 (0.315) |
| 17        | 5040      | 11.2 (0.441) | 3.50 (0.137) | 10.3 (0.406) |
| 18        | 6064      | 14.6 (0.575) | 3.60 (0.147) | 12.6 (0.496) |

#### RECOMMENDED CLEANING

To clean flux from the PC board assembly, the recommended products are: ethanol, isopropyl alcohol, and deionized water wash. The cleaning products to avoid are: Toluene, Xylene, Trichloroethylene, Terpene Cleaner EC-7, surface active agent. In case of using another solvent, please contact us.

#### OTHER CAUTIONS

**Flame retardancy:** the dielectric film is not a flame retardant material.

**Environment:** contact us when chips are used in humid or gas atmosphere and /or when using resin.

**Recommended handling:** do not use edged tools, so not to damage the capacitors.

#### TIN WHISKERS TESTS : JEDEC STANDARD NO 22A121

| Stress Type                            | Ref. Spec.  | Test Conditions   | Analysis   | Results |
|--|-------------|---|------------|---------|
| Temperature cycling                    | JESD22-A104 | -55°C +85(+10/-0)°C air<br>5 to 10 minutes soak 3 cycles/hour | SEM x 1000 | Pass    |
| Ambient Temperature / Humidity Storage |             | 30+/-2°C - 60+/-3% RH -2000H                                  | SEM x 1000 | Pass    |
| High Temperature / Humidity Storage    |             | 70+/-5°C - 93+3/-2% RH -1000H                                 | SEM x 1000 | Pass    |

# CB SERIES: PET-HT DIELECTRIC – LEAD FREE VERSION

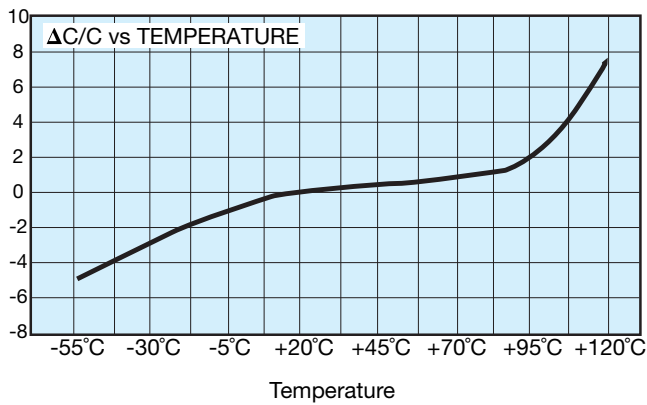


## Electrical Characteristics versus Temperature and Frequency

### ELECTRICAL CHARACTERISTICS VERSUS TEMPERATURE AND FREQUENCY

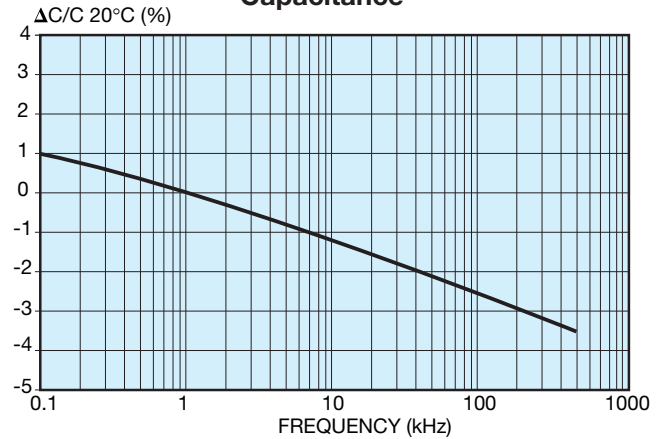
#### ELECTRICAL CHARACTERISTICS

##### Capacitance

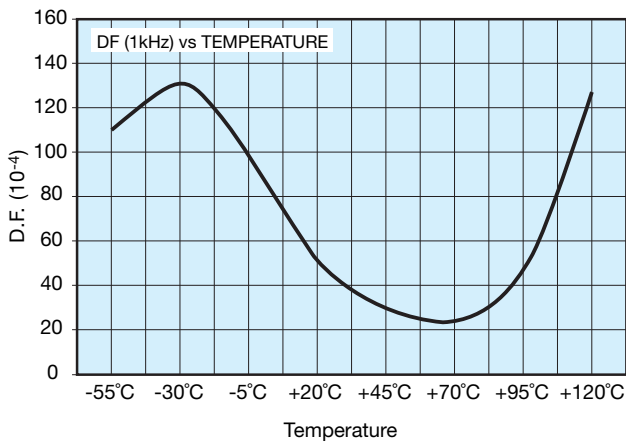


#### FREQUENCY CHARACTERISTICS

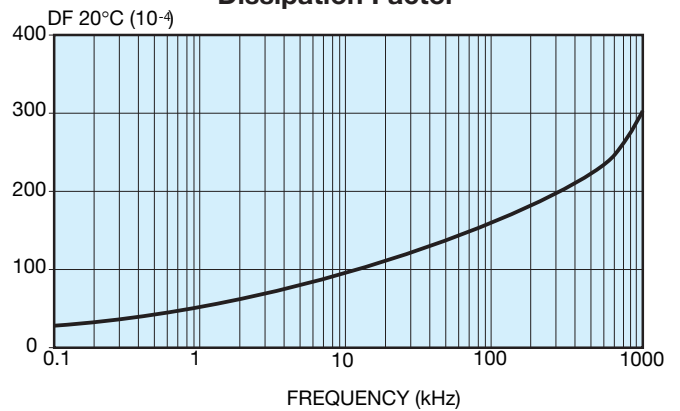
##### Capacitance



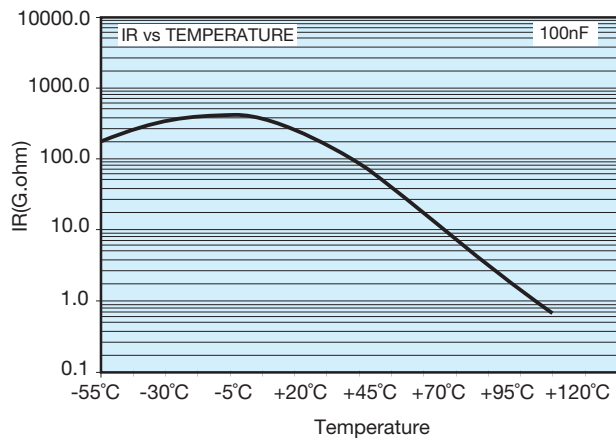
##### Dissipation Factor



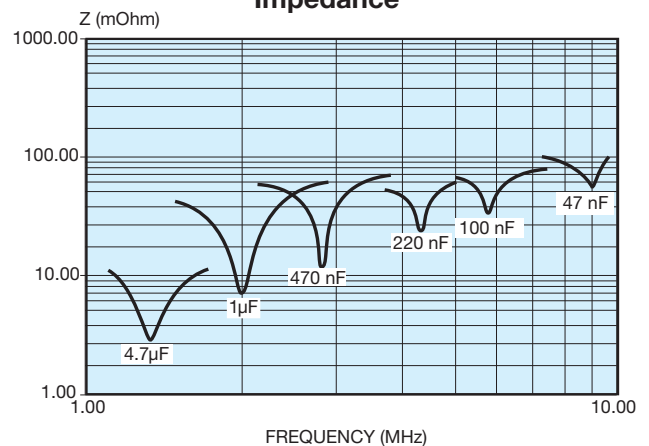
##### Dissipation Factor



##### Insulation Resistance



##### Impedance

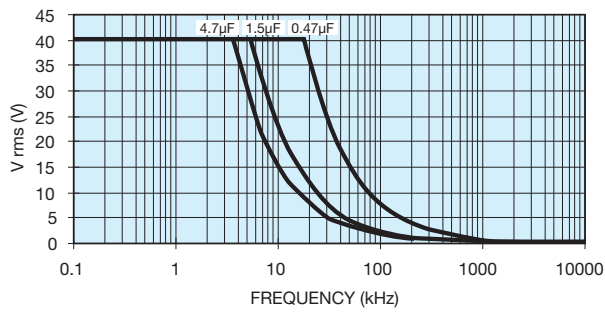


### RMS VOLTAGE AND CURRENT VERSUS FREQUENCY

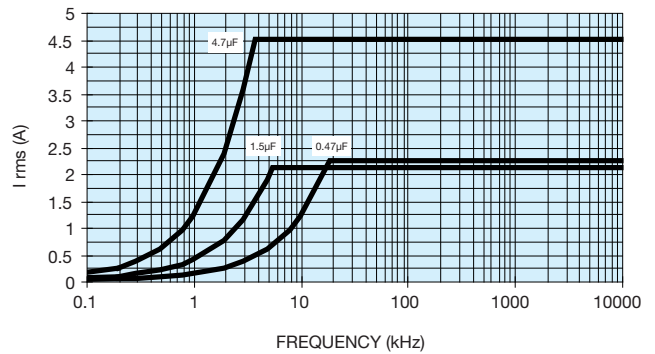
#### MAXIMUM VOLTAGE (VRMS) AND CURRENT (IRMS) VS FREQUENCY

Typical curves results from measurement carried out at ambient temperature (25°C) and sinusoidal wave-forms (for size CB04 to CB18)

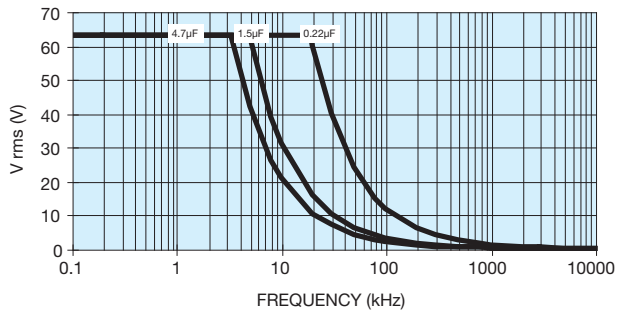
63Vdc / 40 Vac



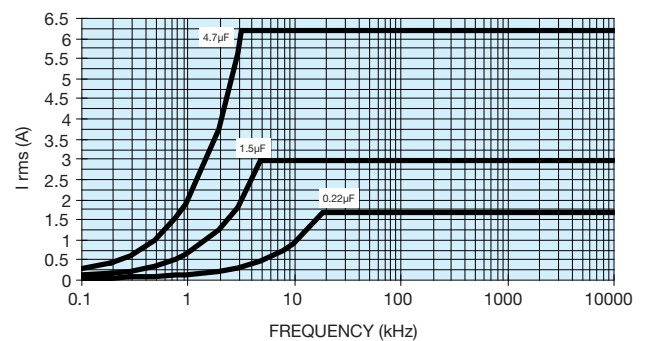
63Vdc / 40 Vac



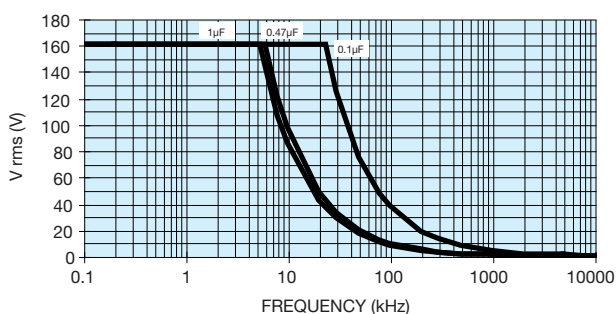
100 Vdc / 63 Vac



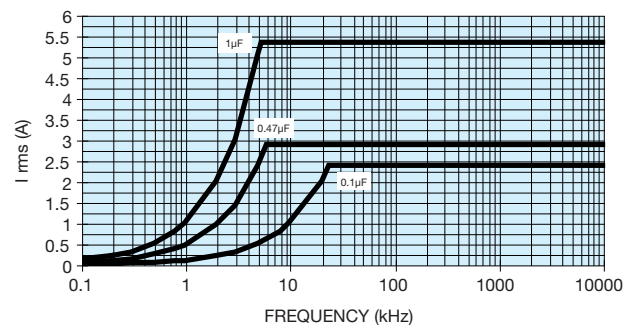
100 Vdc / 63 Vac



250 Vdc / 160 Vac



250 Vdc / 160 Vac



# CB SERIES: PET-HT DIELECTRIC – LEAD FREE VERSION



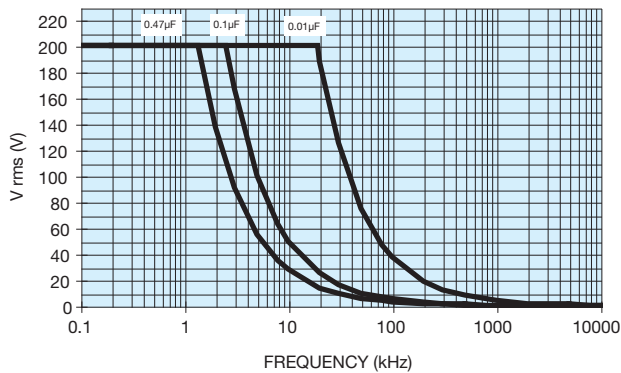
## RMS Voltage and Current versus Frequency

### RMS VOLTAGE AND CURRENT VERSUS FREQUENCY

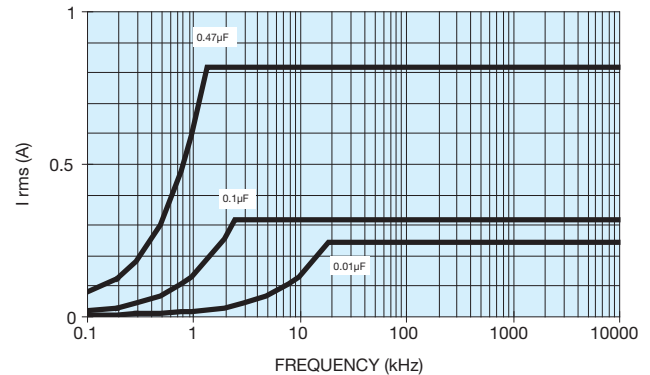
#### MAXIMUM VOLTAGE (VRMS) AND CURRENT (IRMS) VS FREQUENCY

Typical curves results from measurement carried out at ambient temperature (25°C) and sinusoidal wave-forms (for size CB04 to CB18)

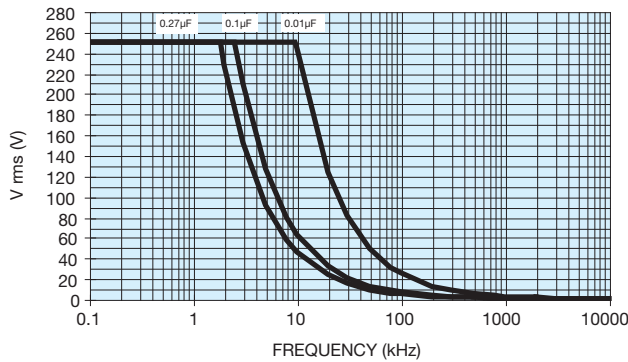
400 Vdc / 200 Vac



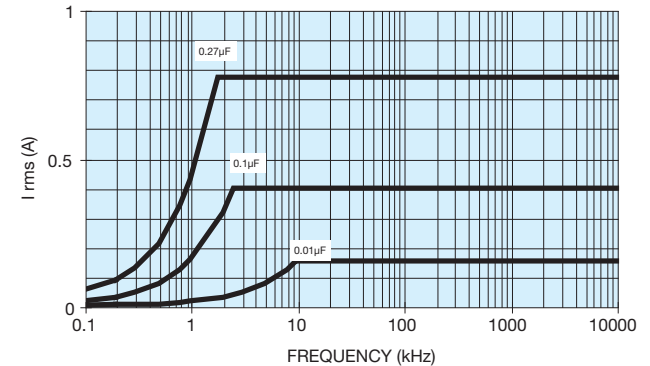
400 Vdc / 200 Vac



630 Vdc / 250 Vac



630 Vdc / 250 Vac



### MAXIMUM PULSE RISE TIME (DV/DT)

|                            |    |     |     |     |     |
|----------------------------|----|-----|-----|-----|-----|
| <b>Voltage Range</b>       | 63 | 100 | 250 | 400 | 630 |
| <b>Dv/dt max. (V/µsec)</b> | 40 | 50  | 150 | 200 | 250 |

# CB SERIES: PET-HT DIELECTRIC – LEAD FREE VERSION



## RoHS

### MATERIALS CONTROLLED BY ROHS (PPM BY WEIGHT):

| Mass / unit (g)         | Lead | Mercury | Cadmium | Hexavalent Chromium | PBB  | PBDE |
|-------------------------|------|---------|---------|---------------------|------|------|
| <b>CB range</b>         | 0    | 0       | 0       | 0                   | 0    | 0    |
| <b>RoHS Limit (ppm)</b> | 1000 | 1000    | 100     | 1000                | 1000 | 1000 |
| <b>Pass/Fail</b>        | Pass | Pass    | Pass    | Pass                | Pass | Pass |

This product has been tested and found to be compliant with all requirements, provisions, and exemptions of EU Directive 2002/95/EC of the European Parliament and Council of January 27, 2003. On the Restriction of use of certain Hazardous Substances (RoHS) in electrical and electronic equipment and EU Directive 2000/53/EC regarding ELV or End of Life Vehicle.

#### ROHS / ELV STATUS

External Plating

100% Matte Sn as standard

#### LEAD-FREE STATUS / MOISTURE SENSITIVITY RANKING

Pb Free Reflow Solder compliant, MSL = 3.

Reflow soldering referring to Jedec Standard with some limitations. Additional JESD-97 data to be phased in MSL e3 termination.

#### PRODUCT LABELING:

(For informational purposes only to be phased in on reel and container.)

#### PRODUCT TRACEABILITY:

Full internal material traceability by reference to unique lot number marked on reel and external package.

Pb Free:

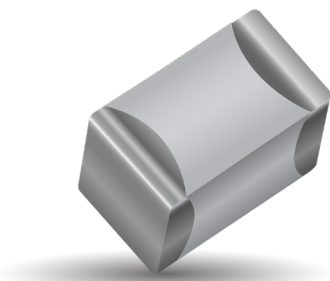


RoHS Compliant:



# CB SERIES: PEN DIELECTRIC – LEAD FREE VERSION

## General Description



## APPLICATIONS

General purpose function in low voltage applications where miniaturization and SMD is required. Typical applications would be:

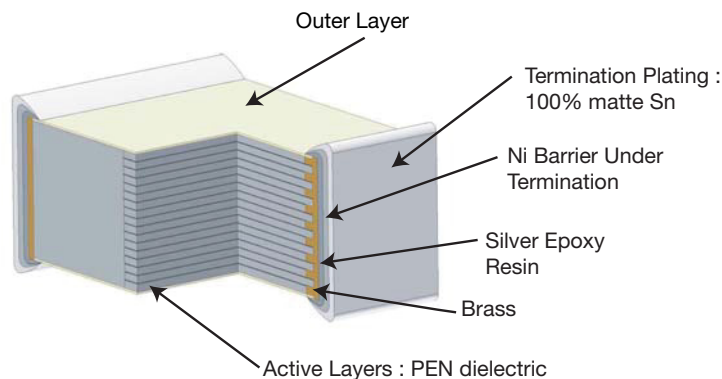
- Automotive (Airbag, Fuel injection calculator...)
- Telecom (Public switching systems, modems, telephone set, cordless, mobile)
- Industrial (SMPS, Power convertor module...)

## GENERAL DESCRIPTION

Film chip capacitor using a naked and stacked construction with metallized PEN (polyethylene naphthalate).

## ADVANTAGES

- Use of high temperature dielectric films make these capacitors suitable for IR or vapor phase reflow processes. This chip is built without specific encapsulation.
- The intrinsic elasticity of the dielectric film allows an excellent compatibility of the capacitor with all types of material for printed circuit boards.
- The self-healing property of film technology results to a safety open failure mode and better overall reliability.
- Excellent thermal shock resistance.
- Low dissipation factor ESR & ESL.
- No piezoelectric effect.
- Available in tape and reel suitable for automatic placement.
- Non-polar construction.



## PERFORMANCE CHARACTERISTICS

|                                    |  |
|------------------------------------|--|
| Climatic Category                  | 55/125/56  |
| Capacitance Range                  | 1nF to 4.7 $\mu$ F   |
| Tolerance on C <sub>R</sub>        | $\pm$ 5%, $\pm$ 10%  |
| Nominal Voltages                   | 25Vdc to 630Vdc  |
| Test Voltage                       | 1.4Vr 2 sec. at 25°C   |
| Soldering methods                  | IR or vapor phase reflow (not suitable for wave soldering)   |
| Tangent of Loss Angle at 1kHz (DF) | $< 100 \times 10^{-4}$   |
| Insulation resistance minimum : IR | for C $\leq$ 0.33 $\mu$ F IR > 1000 M $\Omega$ at 20°C for 1 min. charge at 10Vdc<br>for VR < 100Vdc and 100Vdc for VR $\geq$ 100Vdc<br>for C > 0.33 $\mu$ F IR C > 400 sec. at 20°C for 1 min. charge at 10Vdc<br>for VR < 100Vdc and 100Vdc for VR $\geq$ 100Vdc |
| Temperature range                  | -55°C to 125°C with voltage derating of 1.25%/°C between 105°C and 125°C   |
| A.C. applications                  | For high frequency A.C. application please check with KYOCERA AVX  |

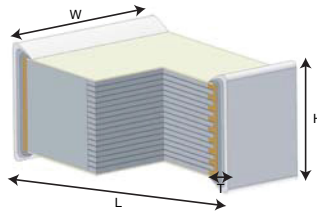


# CB SERIES: PEN DIELECTRIC – LEAD FREE VERSION



## Capacitance Values & Nominal Voltages

### CAPACITANCE VALUES (CR) AND NOMINAL VOLTAGES (VR)



millimeters (inches)

| Capacitance Range (CR) | Ordering Code  | VOLTAGE Vdc: 25V Vac: 16V            |              |              |              |                 |              |              |                 |              |              |      | Packaging Unit |    | Reel Pkg Code |
|------------------------|----------------|--------------------------------------|--------------|--------------|--------------|-----------------|--------------|--------------|-----------------|--------------|--------------|------|----------------|----|---------------|
|                        |                | Chip Dimensions *Tolerances (page 6) |              |              |              | Tape Dimensions |              |              | Reel Dimensions |              |              | Bulk | Reel           |    |               |
|                        |                | L                                    | W            | H max        | T            | W               | P1           | K0           | A               | W1           | W2 max       |      |                |    |               |
| 0.001μF                | CB017C0102+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.0012                 | CB017C0122+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.0015                 | CB017C0152+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.0018                 | CB017C0182+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.0022                 | CB017C0222+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.0027                 | CB017C0272+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.0033                 | CB017C0332+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.0047                 | CB017C0472+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.0056                 | CB017C0562+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.0068                 | CB017C0682+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.0082                 | CB017C0822+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.010μF                | CB017C0103+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.012                  | CB017C0123+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.015                  | CB017C0153+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.018                  | CB017C0183+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.022                  | CB017C0223+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.027                  | CB027C0273+ -- | 3.30 (0.130)                         | 2.50 (0.098) | 1.80 (0.071) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.90 (0.075) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 2500           | BA |               |
| 0.033                  | CB027C0333+ -- | 3.30 (0.130)                         | 2.50 (0.098) | 1.80 (0.071) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.90 (0.075) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 2500           | BA |               |
| 0.047                  | CB027C0473+ -- | 3.30 (0.130)                         | 2.50 (0.098) | 1.80 (0.071) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.90 (0.075) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 2500           | BA |               |
| 0.056                  | CB027C0563+ -- | 3.30 (0.130)                         | 2.50 (0.098) | 1.80 (0.071) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.90 (0.075) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 2500           | BA |               |
| 0.068                  | CB027C0683+ -- | 3.30 (0.130)                         | 2.50 (0.098) | 1.80 (0.071) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.90 (0.075) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 2500           | BA |               |
| 0.082                  | CB027C0823+ -- | 3.30 (0.130)                         | 2.50 (0.098) | 2.20 (0.087) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 2.33 (0.092) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 2000           | BA |               |
| 0.100μF                | CB027C0104+ -- | 3.30 (0.130)                         | 2.50 (0.098) | 2.30 (0.091) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 2.33 (0.092) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 2000           | BA |               |

For other Values: upon request

Replace the + by the tolerance code: J = 5% or K = 10%

Replace the -- by the packaging suffix: -- = bulk

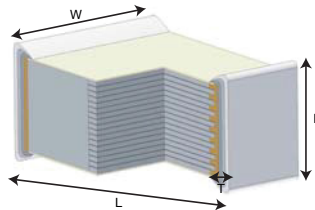
BA = tape & reel

# CB SERIES: PEN DIELECTRIC – LEAD FREE VERSION



## Capacitance Values & Nominal Voltages

### CAPACITANCE VALUES (CR) AND NOMINAL VOLTAGES (VR)



millimeters (inches)

| Capacitance Range (CR) | Ordering Code  | VOLTAGE Vdc: 50V Vac: 40V            |              |              |              |                 |              |              |                 |              |              |      | Packaging Unit |    | Reel Pkg Code |
|------------------------|----------------|--------------------------------------|--------------|--------------|--------------|-----------------|--------------|--------------|-----------------|--------------|--------------|------|----------------|----|---------------|
|                        |                | Chip Dimensions *Tolerances (page 6) |              |              |              | Tape Dimensions |              |              | Reel Dimensions |              |              |      |                |    |               |
|                        |                | L                                    | W            | H max        | T            | W               | P1           | K0           | A               | W1           | W2 max       | Bulk | Reel           |    |               |
| 0.001µF                | CB017D0102+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.0012                 | CB017D0122+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.0015                 | CB017D0152+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.0018                 | CB017D0182+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.0022                 | CB017D0222+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.0027                 | CB017D0272+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.0033                 | CB017D0332+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.0047                 | CB017D0472+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.0056                 | CB017D0562+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.0068                 | CB017D0682+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.0082                 | CB017D0822+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.010µF                | CB017D0103+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.012                  | CB017D0123+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.015                  | CB017D0153+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.018                  | CB017D0183+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.022                  | CB017D0223+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.027                  | CB027D0273+ -- | 3.30 (0.130)                         | 2.50 (0.098) | 1.80 (0.071) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.90 (0.075) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 2500           | BA |               |
| 0.033                  | CB027D0333+ -- | 3.30 (0.130)                         | 2.50 (0.098) | 1.80 (0.071) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.90 (0.075) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 2500           | BA |               |
| 0.047                  | CB027D0473+ -- | 3.30 (0.130)                         | 2.50 (0.098) | 1.80 (0.071) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.90 (0.075) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 2500           | BA |               |
| 0.056                  | CB027D0563+ -- | 3.30 (0.130)                         | 2.50 (0.098) | 1.80 (0.071) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.90 (0.075) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 2500           | BA |               |
| 0.068                  | CB027D0683+ -- | 3.30 (0.130)                         | 2.50 (0.098) | 1.80 (0.071) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.90 (0.075) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 2500           | BA |               |
| 0.082                  | CB027D0823+ -- | 3.30 (0.130)                         | 2.50 (0.098) | 2.20 (0.087) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 2.33 (0.092) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 2000           | BA |               |
| 0.100µF                | CB027D0104+ -- | 3.30 (0.130)                         | 2.50 (0.098) | 2.30 (0.091) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 2.33 (0.092) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 2000           | BA |               |

For other Values: upon request

Replace the + by the tolerance code: J = 5% or K = 10%

Replace the -- by the packaging suffix: -- = bulk

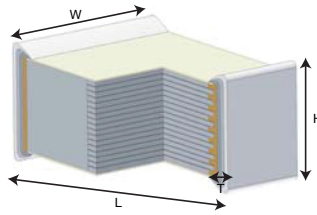
BA = tape & reel

# CB SERIES: PEN DIELECTRIC – LEAD FREE VERSION



## Capacitance Values & Nominal Voltages

### CAPACITANCE VALUES (CR) AND NOMINAL VOLTAGES (VR)



millimeters (inches)

| Capacitance Range (CR) | Ordering Code  | VOLTAGE Vdc: 63V Vac: 40V            |                 |                 |                 |                 |                 |                 |                 |                 |                 |      | Packaging Unit |    | Reel Pkg Code |
|------------------------|----------------|--------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------|----------------|----|---------------|
|                        |                | Chip Dimensions *Tolerances (page 6) |                 |                 |                 | Tape Dimensions |                 |                 | Reel Dimensions |                 |                 | Bulk | Reel           |    |               |
|                        |                | L                                    | W               | H max           | T               | W               | P1              | K0              | A               | W1              | W2 max          |      |                |    |               |
| 0.001µF                | CB037D0102+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 1.90<br>(0.075) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 1.90<br>(0.075) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.0012                 | CB037D0122+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 1.90<br>(0.075) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 1.90<br>(0.075) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.0015                 | CB037D0152+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 1.90<br>(0.075) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 1.90<br>(0.075) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.0018                 | CB037D0182+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 1.90<br>(0.075) | 0.6<br>(0.024)  | 12.0<br>(0.472) | 8.0<br>(0.315)  | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 1.90<br>(0.075) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.0022                 | CB037D0222+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 1.90<br>(0.075) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 1.90<br>(0.075) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.0027                 | CB037D0272+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 1.90<br>(0.075) | 0.6<br>(0.024)  | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 1.90<br>(0.075) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.0033                 | CB037D0332+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 1.90<br>(0.075) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 1.90<br>(0.075) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.0047                 | CB037D0472+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.0056                 | CB037D0562+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 1.90<br>(0.075) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 1.90<br>(0.075) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.0068                 | CB037D0682+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.0082                 | CB037D0822+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 1.90<br>(0.075) | 0.6<br>(0.024)  | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 1.90<br>(0.075) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.010µF                | CB037D0103+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |

For other Values: upon request

Replace the + by the tolerance code: J = 5% or K = 10%

Replace the -- by the packaging suffix: -- = bulk

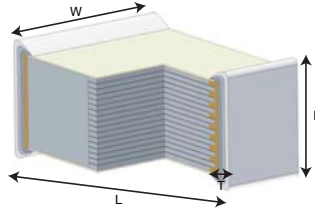
BA or BC = tape & reel

# CB SERIES: PEN DIELECTRIC – LEAD FREE VERSION



## Capacitance Values & Nominal Voltages

### CAPACITANCE VALUES (CR) AND NOMINAL VOLTAGES (VR)



| Capacitance Range (CR) | Ordering Code  | VOLTAGE Vdc: 63V Vac: 40V            |                 |                 |                 |                 |                 |                 |                 |                 |                 |                |      |               |
|------------------------|----------------|--------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|----------------|------|---------------|
|                        |                | Chip Dimensions *Tolerances (page 6) |                 |                 |                 | Tape Dimensions |                 |                 | Reel Dimensions |                 |                 | Packaging Unit |      | Reel Pkg Code |
|                        |                | L                                    | W               | H max           | T               | W               | P1              | K0              | A               | W1              | W2 max          | Bulk           | Reel |               |
| 0.010µF                | CB037D0103+ -- | 4.70<br>(0.185)                      | 3.20<br>(.0126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.0<br>(0.315)  | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 4500 | BC            |
| 0.012                  | CB037D0123+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 1200 | BA            |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 4500 | BC            |
| 0.015                  | CB037D0153+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.40<br>(0.095) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 900  | BA            |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.40<br>(0.095) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 3600 | BC            |
| 0.018                  | CB037D0183+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.50<br>(0.099) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 900  | BA            |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.50<br>(0.099) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 3600 | BC            |
| 0.022                  | CB037D0223+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 1200 | BA            |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 4500 | BC            |
| 0.027                  | CB037D0273+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 1.90<br>(0.075) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 1200 | BA            |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 1.90<br>(0.075) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 4500 | BC            |
| 0.033                  | CB037D0333+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 1200 | BA            |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 4500 | BC            |
| 0.047                  | CB037D0473+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.70<br>(0.107) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 3.10<br>(0.122) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 700  | BA            |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.70<br>(0.107) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 3.10<br>(0.122) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 3000 | BC            |
| 0.056                  | CB037D0563+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.30<br>(0.091) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 900  | BA            |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.30<br>(0.091) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 3600 | BC            |
| 0.068                  | CB037D0683+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 1200 | BA            |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 4500 | BC            |
| 0.082                  | CB037D0823+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.50<br>(0.099) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 900  | BA            |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.50<br>(0.099) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 3600 | BC            |
| 0.100µF                | CB037D0104+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.80<br>(0.111) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 3.10<br>(0.122) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 700  | BA            |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.80<br>(0.111) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 3.10<br>(0.122) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 3000 | BC            |

For other Values: upon request

Replace the + by the tolerance code: J = 5% or K = 10%

Replace the -- by the packaging suffix: -- = bulk

BA or BC = tape & reel



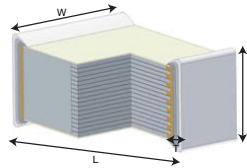
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# CB SERIES: PEN DIELECTRIC – LEAD FREE VERSION



## Capacitance Values & Nominal Voltages

### CAPACITANCE VALUES (CR) AND NOMINAL VOLTAGES (VR)



| Capacitance Range (CR)            | Ordering Code  | VOLTAGE Vdc: 63V Vac: 40V               |                 |                 |                 |                 |                 |                 |                 |                 |                 |                |      |               |
|-----------------------------------|----------------|---|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|----------------|------|---------------|
|                                   |                | Chip Dimensions<br>*Tolerances (page 6) |                 |                 |                 | Tape Dimensions |                 |                 | Reel Dimensions |                 |                 | Packaging Unit |      | Reel Pkg Code |
|                                   |                | L                                       | W               | H max           | T               | W               | P1              | K0              | A               | W1              | W2 max          | Bulk           | Reel |               |
| 0.120                             | CB037D0124+ -- | 4.70<br>(0.185)                         | 3.20<br>(0.126) | 2.30<br>(0.091) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102) | 180<br>(7.087)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 900  | BA            |
|                                   |                | 4.70<br>(0.185)                         | 3.20<br>(0.126) | 2.30<br>(0.091) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 3600 | BC            |
| 0.150                             | CB037D0154+ -- | 4.70<br>(0.185)                         | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.087)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 1200 | BA            |
|                                   |                | 4.70<br>(0.185)                         | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 4500 | BC            |
| 0.180                             | CB037D0184+ -- | 4.70<br>(0.185)                         | 3.20<br>(0.126) | 2.40<br>(0.095) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102) | 180<br>(7.087)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 900  | BA            |
|                                   |                | 4.70<br>(0.185)                         | 3.20<br>(0.126) | 2.40<br>(0.095) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 3600 | BC            |
| 0.220                             | CB037D0224+ -- | 4.70<br>(0.185)                         | 3.20<br>(0.126) | 3.00<br>(0.118) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 3.10<br>(0.122) | 180<br>(7.087)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 700  | BA            |
|                                   |                | 4.70<br>(0.185)                         | 3.20<br>(0.126) | 3.00<br>(0.118) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 3.10<br>(0.122) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 3000 | BC            |
| 0.330                             | CB047D0334+ -- | 5.80<br>(0.228)                         | 5.00<br>(0.195) | 4.00<br>(0.158) | 0.80<br>(0.031) | 16.0<br>(0.629) | 8.00<br>(0.315) | 4.10<br>(0.162) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 2300 | BC            |
| 0.470                             | CB047D0474+ -- | 5.80<br>(0.228)                         | 5.00<br>(0.195) | 4.00<br>(0.158) | 0.80<br>(0.031) | 12.0<br>(0.472) | 8.00<br>(0.315) | 4.10<br>(0.162) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 2300 | BC            |
| 0.560                             | CB047D0564+ -- | 5.80<br>(0.228)                         | 5.00<br>(0.195) | 2.50<br>(0.099) | 0.80<br>(0.031) | 12.0<br>(0.472) | 8.00<br>(0.315) | 3.10<br>(0.122) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 3000 | BC            |
| 0.680                             | CB047D0684+ -- | 5.80<br>(0.228)                         | 5.00<br>(0.195) | 3.90<br>(0.154) | 0.80<br>(0.031) | 12.0<br>(0.472) | 8.00<br>(0.315) | 4.10<br>(0.162) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 2300 | BC            |
| 0.82*                             | CB057D0824+ -- | 7.30<br>(0.287)                         | 6.10<br>(0.240) | 4.40<br>(0.173) | 0.80<br>(0.031) | 16.0<br>(0.629) | 12.0<br>(0.472) | 5.23<br>(0.206) | 330<br>(12.99)  | 16.4<br>(0.645) | 22.4<br>(0.881) | 1000           | 1100 | BC            |
| 1μF*                              | CB057D0105+ -- | 7.30<br>(0.287)                         | 6.10<br>(0.240) | 4.70<br>(0.185) | 0.80<br>(0.031) | 16.0<br>(0.629) | 12.0<br>(0.472) | 4.80<br>(0.189) | 330<br>(12.99)  | 16.4<br>(0.645) | 22.4<br>(0.881) | 1000           | 1800 | BC            |
| 1.5*                              | CB057D0155+ -- | 7.30<br>(0.287)                         | 6.10<br>(0.240) | 4.70<br>(0.185) | 0.80<br>(0.031) | 16.0<br>(0.629) | 12.0<br>(0.472) | 4.80<br>(0.189) | 330<br>(12.99)  | 16.4<br>(0.645) | 22.4<br>(0.881) | 1000           | 1800 | BC            |
| 2.2                               | CB167D0225+ -- | 10.5<br>(0.413)                         | 7.60<br>(0.299) | 6.10<br>(0.240) | 0.80<br>(0.032) | 24.0<br>(0.944) | 12.0<br>(0.472) | 6.19<br>(0.244) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 500            | 900  | BC            |
| 2.7                               | CB177D0275+ -- | 12.8<br>(0.503)                         | 10.2<br>(0.402) | 6.70<br>(0.264) | 0.80<br>(0.032) | 24.0<br>(0.944) | 16.0<br>(0.629) | 7.00<br>(0.274) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300            | 600  | BC            |
| 3.3                               | CB187D0335+ -- | 15.3<br>(0.601)                         | 13.7<br>(0.539) | 5.30<br>(0.209) | 0.80<br>(0.032) | 24.0<br>(0.944) | 24.0<br>(0.944) | 6.30<br>(0.248) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300            | 400  | BC            |
| 4.7                               | CB187D0475+ -- | 15.3<br>(0.601)                         | 13.7<br>(0.539) | 7.20<br>(0.283) | 0.80<br>(0.032) | 24.0<br>(0.944) | 24.0<br>(0.944) | 7.60<br>(0.299) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300            | 300  | BC            |
| <b>VOLTAGE Vdc: 100V Vac: 63V</b> |                |   |                 |                 |                 |                 |                 |                 |                 |                 |                 |                |      |               |
| 0.001μF                           | CB017E0102+ -- | 3.30<br>(0.130)                         | 1.60<br>(0.063) | 1.15<br>(0.045) | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 1.20<br>(0.047) | 180<br>(7.087)  | 8.40<br>(0.331) | 14.4<br>(0.567) | 2000           | 3500 | BA            |
| 0.0012                            | CB017E0122+ -- | 3.30<br>(0.130)                         | 1.60<br>(0.063) | 1.15<br>(0.045) | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 1.20<br>(0.047) | 180<br>(7.087)  | 8.40<br>(0.331) | 14.4<br>(0.567) | 2000           | 3500 | BA            |
| 0.0015                            | CB017E0152+ -- | 3.30<br>(0.130)                         | 1.60<br>(0.063) | 1.15<br>(0.045) | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 1.20<br>(0.047) | 180<br>(7.087)  | 8.40<br>(0.331) | 14.4<br>(0.567) | 2000           | 3500 | BA            |
| 0.0018                            | CB017E0182+ -- | 3.30<br>(0.130)                         | 1.60<br>(0.063) | 1.15<br>(0.045) | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 1.20<br>(0.047) | 180<br>(7.087)  | 8.40<br>(0.331) | 14.4<br>(0.567) | 2000           | 3500 | BA            |

For other Values: upon request

\*Special length: 7.3 +0.7/-0.3 (0.287 +0.026/-0.012)

Replace the + by the tolerance code: J = 5% or K = 10%

Replace the -- by the packaging suffix: -- = bulk

BA or BC = tape & reel

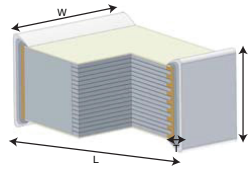


# CB SERIES: PEN DIELECTRIC – LEAD FREE VERSION



## Capacitance Values & Nominal Voltages

### CAPACITANCE VALUES (CR) AND NOMINAL VOLTAGES (VR)



millimeters (inches)

| Capacitance Range (CR) | Ordering Code  | VOLTAGE Vdc: 100V Vac: 63V           |                 |                 |                 |                 |                 |                  |                 |                 |                 |      | Packaging Unit |    | Reel Pkg Code |
|------------------------|----------------|--------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|-----------------|-----------------|-----------------|------|----------------|----|---------------|
|                        |                | Chip Dimensions *Tolerances (page 6) |                 |                 |                 | Tape Dimensions |                 |                  | Reel Dimensions |                 |                 |      |                |    |               |
|                        |                | L                                    | W               | H max           | T               | W               | P1              | K0               | A               | W1              | W2 max          | Bulk | Reel           |    |               |
| 0.0022                 | CB017E0222+ -- | 3.30<br>(0.130)                      | 1.60<br>(0.063) | 1.15<br>(0.045) | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 1.20<br>(0.047)  | 180<br>(7.087)  | 8.40<br>(0.331) | 14.4<br>(0.567) | 2000 | 3500           | BA |               |
| 0.0027                 | CB017E0272+ -- | 3.30<br>(0.130)                      | 1.60<br>(0.063) | 1.15<br>(0.045) | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 1.20<br>(0.047)  | 180<br>(7.087)  | 8.40<br>(0.331) | 14.4<br>(0.567) | 2000 | 3500           | BA |               |
| 0.0033                 | CB017E0332+ -- | 3.30<br>(0.130)                      | 1.60<br>(0.063) | 1.15<br>(0.045) | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 1.20<br>(0.047)  | 180<br>(7.087)  | 8.40<br>(0.331) | 14.4<br>(0.567) | 2000 | 3500           | BA |               |
| 0.0047                 | CB017E0472+ -- | 3.30<br>(0.130)                      | 1.60<br>(0.063) | 1.15<br>(0.045) | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 1.20<br>(0.047)  | 180<br>(7.087)  | 8.40<br>(0.331) | 14.4<br>(0.567) | 2000 | 3500           | BA |               |
| 0.0056                 | CB017E0562+ -- | 3.30<br>(0.130)                      | 1.60<br>(0.063) | 1.15<br>(0.045) | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 1.20<br>(0.047)  | 180<br>(7.087)  | 8.40<br>(0.331) | 14.4<br>(0.567) | 2000 | 3500           | BA |               |
| 0.0068                 | CB017E0682+ -- | 3.30<br>(0.130)                      | 1.60<br>(0.063) | 1.15<br>(0.045) | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 1.20<br>(0.047)  | 180<br>(7.087)  | 8.40<br>(0.331) | 14.4<br>(0.567) | 2000 | 3500           | BA |               |
| 0.0082                 | CB017E0822+ -- | 3.30<br>(0.130)                      | 1.60<br>(0.063) | 1.15<br>(0.045) | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 1.20<br>(0.047)  | 180<br>(7.087)  | 8.40<br>(0.331) | 14.4<br>(0.567) | 2000 | 3500           | BA |               |
| 0.010µF                | CB017E0103+ -- | 3.30<br>(0.130)                      | 1.60<br>(0.063) | 1.15<br>(0.045) | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 1.20<br>(0.047)  | 180<br>(7.087)  | 8.40<br>(0.331) | 14.4<br>(0.567) | 2000 | 3500           | BA |               |
| 0.012                  | CB027E0123+ -- | 3.30<br>(0.130)                      | 2.50<br>(0.098) | 1.80<br>(0.071) | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 1.90<br>(0.075)  | 180<br>(7.087)  | 8.40<br>(0.331) | 14.4<br>(0.567) | 2000 | 2500           | BA |               |
| 0.015                  | CB027E0153+ -- | 3.30<br>(0.130)                      | 2.50<br>(0.098) | 1.80<br>(0.071) | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 1.90<br>(0.075)  | 180<br>(7.087)  | 8.40<br>(0.331) | 14.4<br>(0.567) | 2000 | 2500           | BA |               |
| 0.018                  | CB027E0183+ -- | 3.30<br>(0.130)                      | 2.50<br>(0.098) | 1.80<br>(0.071) | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 1.90<br>(0.075)  | 180<br>(7.087)  | 8.40<br>(0.331) | 14.4<br>(0.567) | 2000 | 2500           | BA |               |
| 0.022                  | CB027E0223+ -- | 3.30<br>(0.130)                      | 2.50<br>(0.098) | 1.80<br>(0.071) | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 1.90<br>(0.075)  | 180<br>(7.087)  | 8.40<br>(0.331) | 14.4<br>(0.567) | 2000 | 2500           | BA |               |
| 0.027                  | CB037E0273+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.20<br>(0.087) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.1024) | 180<br>(7.087)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 900            | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.20<br>(0.087) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.1024) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 3600           | BC |               |
| 0.033                  | CB037E0333+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081)  | 180<br>(7.087)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081)  | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.047                  | CB037E0473+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.60<br>(0.102) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 3.10<br>(0.122)  | 180<br>(7.087)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 700            | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.60<br>(0.102) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 3.10<br>(0.122)  | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 3000           | BC |               |
| 0.056                  | CB037E0563+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.50<br>(0.099) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102)  | 180<br>(7.087)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 900            | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.50<br>(0.099) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102)  | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 3600           | BC |               |
| 0.068                  | CB037E0683+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081)  | 180<br>(7.087)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081)  | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.082                  | CB037E0823+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.50<br>(0.099) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102)  | 180<br>(7.087)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 900            | BA |               |

For other Values: upon request

Replace the + by the tolerance code: J = 5% or K = 10%

Replace the -- by the packaging suffix: -- = bulk

BA or BC = tape & reel



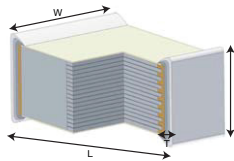
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# CB SERIES: PEN DIELECTRIC – LEAD FREE VERSION



## Capacitance Values & Nominal Voltages

### CAPACITANCE VALUES (CR) AND NOMINAL VOLTAGES (VR)



millimeters (inches)

| Capacitance Range (CR)      | Ordering Code  | VOLTAGE Vdc: 100V Vac: 63V                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |      | Packaging Unit |    | Reel Pkg Code |
|-----------------------------|----------------|--|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------|----------------|----|---------------|
|                             |                | Chip Dimensions<br>*Tolerances<br>(page 6) |                 |                 |                 | Tape Dimensions |                 |                 | Reel Dimensions |                 |                 |      |                |    |               |
|                             |                | L  | W               | H max           | T               | W               | P1              | K0              | A               | W1              | W2 max          | Bulk | Reel           |    |               |
| 0.082                       | CB037E0823+ -- | 4.70<br>(0.185)                            | 3.20<br>(0.126) | 2.50<br>(0.099) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 3600           | BC |               |
| 0.100µF                     | CB037E0104+ -- | 4.70<br>(0.185)                            | 3.20<br>(0.126) | 3.00<br>(0.118) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 3.10<br>(0.122) | 180<br>(7.087)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 700            | BA |               |
|                             |                | 4.70<br>(0.185)                            | 3.20<br>(0.126) | 3.00<br>(0.118) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 3.10<br>(0.122) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 3000           | BC |               |
| 0.120                       | CB047E0124+ -- | 5.80<br>(0.228)                            | 5.00<br>(0.195) | 4.00<br>(0.158) | 0.80<br>(0.032) | 12.0<br>(0.472) | 8.00<br>(0.315) | 4.10<br>(0.162) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 2300           | BC |               |
| 0.150                       | CB047E0154+ -- | 5.80<br>(0.228)                            | 5.00<br>(0.195) | 3.30<br>(0.130) | 0.80<br>(0.032) | 12.0<br>(0.472) | 8.00<br>(0.315) | 3.45<br>(0.136) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 2800           | BC |               |
| 0.180                       | CB047E0184+ -- | 5.80<br>(0.228)                            | 5.00<br>(0.195) | 3.00<br>(0.118) | 0.80<br>(0.032) | 12.0<br>(0.472) | 8.00<br>(0.315) | 3.10<br>(0.122) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 3000           | BC |               |
| 0.220                       | CB047E0224+ -- | 5.80<br>(0.228)                            | 5.00<br>(0.195) | 4.00<br>(0.158) | 0.80<br>(0.032) | 12.0<br>(0.472) | 8.00<br>(0.315) | 4.10<br>(0.162) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 2300           | BC |               |
| 0.330                       | CB047E0334+ -- | 5.80<br>(0.228)                            | 5.00<br>(0.195) | 4.00<br>(0.158) | 0.80<br>(0.032) | 16.0<br>(0.629) | 8.00<br>(0.315) | 4.10<br>(0.162) | 330<br>(12.99)  | 16.4<br>(0.645) | 22.4<br>(0.881) | 1500 | 2300           | BC |               |
| 0.47*                       | CB057E0474+ -- | 7.30<br>(0.287)                            | 6.10<br>(0.240) | 4.50<br>(0.177) | 0.80<br>(0.032) | 16.0<br>(0.629) | 12.0<br>(0.472) | 4.80<br>(0.189) | 330<br>(12.99)  | 16.4<br>(0.645) | 22.4<br>(0.881) | 1000 | 1800           | BC |               |
| 0.56*                       | CB057E0564+ -- | 7.30<br>(0.287)                            | 6.10<br>(0.240) | 4.00<br>(0.158) | 0.80<br>(0.032) | 16.0<br>(0.629) | 12.0<br>(0.472) | 4.10<br>(0.162) | 330<br>(12.99)  | 16.4<br>(0.645) | 22.4<br>(0.881) | 1000 | 2300           | BC |               |
| 0.68*                       | CB057E0684+ -- | 7.30<br>(0.287)                            | 6.10<br>(0.240) | 4.50<br>(0.177) | 0.80<br>(0.032) | 16.0<br>(0.629) | 12.0<br>(0.472) | 4.80<br>(0.189) | 330<br>(12.99)  | 16.4<br>(0.645) | 22.4<br>(0.881) | 1000 | 1800           | BC |               |
| 0.82                        | CB167E0824+ -- | 10.5<br>(0.413)                            | 7.6<br>(0.299)  | 5.80<br>(0.229) | 0.80<br>(0.032) | 24.0<br>(0.944) | 12.0<br>(0.472) | 6.19<br>(0.244) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 500  | 900            | BC |               |
| 1                           | CB167E0105+ -- | 10.5<br>(0.413)                            | 7.60<br>(0.299) | 6.00<br>(0.237) | 0.80<br>(0.032) | 24.0<br>(0.944) | 12.0<br>(0.472) | 6.19<br>(0.244) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 500  | 900            | BC |               |
| 1.5                         | CB177E0155+ -- | 12.8<br>(0.503)                            | 10.2<br>(0.402) | 5.50<br>(0.217) | 0.80<br>(0.032) | 24.0<br>(0.944) | 16.0<br>(0.629) | 5.70<br>(0.224) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300  | 700            | BC |               |
| 2.2                         | CB177E0225+ -- | 12.8<br>(0.503)                            | 10.2<br>(0.402) | 6.90<br>(0.272) | 0.80<br>(0.032) | 24.0<br>(0.944) | 16.0<br>(0.629) | 7.00<br>(0.274) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300  | 600            | BC |               |
| 3.3                         | CB187E0335+ -- | 15.3<br>(0.601)                            | 13.7<br>(0.539) | 7.10<br>(0.280) | 0.80<br>(0.032) | 24.0<br>(0.944) | 24.0<br>(0.944) | 7.60<br>(0.299) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300  | 300            | BC |               |
| VOLTAGE Vdc: 250V Vac: 160V |                |  |                 |                 |                 |                 |                 |                 |                 |                 |                 |      |                |    |               |
| 0.001µF                     | CB037G0102+ -- | 4.70<br>(0.185)                            | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.087)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |
|                             |                | 4.70<br>(0.185)                            | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.0012                      | CB037G0122+ -- | 4.70<br>(0.185)                            | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.087)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |
|                             |                | 4.70<br>(0.185)                            | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.0015                      | CB037G0152+ -- | 4.70<br>(0.185)                            | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.087)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |
|                             |                | 4.70<br>(0.185)                            | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.0018                      | CB037G0182+ -- | 4.70<br>(0.185)                            | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.087)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |

For other Values: upon request

\*Special length: 7.3 +0.7/-0.3 (0.287 +0.026/-0.012)

Replace the + by the tolerance code: J = 5% or K = 10%

Replace the -- by the packaging suffix: -- = bulk

BA or BC = tape & reel

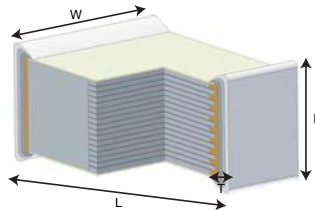


# CB SERIES: PEN DIELECTRIC – LEAD FREE VERSION



## Capacitance Values & Nominal Voltages

### CAPACITANCE VALUES (CR) AND NOMINAL VOLTAGES (VR)



millimeters (inches)

| Capacitance Range (CR) | Ordering Code  | VOLTAGE Vdc: 250V Vac: 160V          |                 |                 |                 |                 |                 |                 |                 |                 |                 |      | Packaging Unit |    | Reel Pkg Code |
|------------------------|----------------|--------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------|----------------|----|---------------|
|                        |                | Chip Dimensions *Tolerances (page 6) |                 |                 |                 | Tape Dimensions |                 |                 | Reel Dimensions |                 |                 | Bulk | Reel           |    |               |
|                        |                | L                                    | W               | H max           | T               | W               | P1              | K0              | A               | W1              | W2 max          |      |                |    |               |
| 0.0018                 | CB037G0182+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.0022                 | CB037G0222+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.087)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.0027                 | CB037G0272+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.087)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.0033                 | CB037G0332+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.087)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.0047                 | CB037G0472+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.087)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.0056                 | CB037G0562+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.087)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.0068                 | CB037G0682+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.087)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.0082                 | CB037G0822+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.087)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.010µF                | CB037G0103+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.087)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.012                  | CB037G0123+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.087)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.015                  | CB037G0153+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.40<br>(0.094) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102) | 180<br>(7.087)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 900            | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.40<br>(0.094) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 3600           | BC |               |
| 0.018                  | CB037G0183+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.50<br>(0.099) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102) | 180<br>(7.087)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 900            | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.50<br>(0.099) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 3600           | BC |               |

For other Values: upon request

Replace the + by the tolerance code: J = 5% or K = 10%

Replace the -- by the packaging suffix: -- = bulk

BA or BC = tape & reel



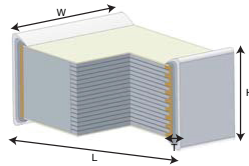
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# CB SERIES: PEN DIELECTRIC – LEAD FREE VERSION



## Capacitance Values & Nominal Voltages

### CAPACITANCE VALUES (CR) AND NOMINAL VOLTAGES (VR)



millimeters (inches)

| Capacitance Range (CR)      | Ordering Code  | VOLTAGE Vdc: 250V Vac: 160V          |                 |                 |                 |                 |                 |                 |                 |                 |                 |                |      |               |
|-----------------------------|----------------|--------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|----------------|------|---------------|
|                             |                | Chip Dimensions *Tolerances (page 6) |                 |                 |                 | Tape Dimensions |                 |                 | Reel Dimensions |                 |                 | Packaging Unit |      | Reel Pkg Code |
|                             |                | L                                    | W               | H max           | T               | W               | P1              | K0              | A               | W1              | W2 max          | Bulk           | Reel |               |
| 0.022                       | CB037G0223+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.90<br>(0.114) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 3.10<br>(0.122) | 180<br>(7.087)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 700  | BA            |
|                             |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.90<br>(0.114) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 3.10<br>(0.122) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 3000 | BC            |
| 0.027                       | CB047G0273+ -- | 5.80<br>(0.228)                      | 5.00<br>(0.195) | 1.80<br>(0.071) | 0.80<br>(0.032) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.43<br>(0.096) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 3500 | BC            |
| 0.033                       | CB047G0333+ -- | 5.80<br>(0.228)                      | 5.00<br>(0.195) | 2.20<br>(0.087) | 0.80<br>(0.032) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.43<br>(0.096) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 3500 | BC            |
| 0.047                       | CB047G0473+ -- | 5.80<br>(0.228)                      | 5.00<br>(0.195) | 2.90<br>(0.114) | 0.80<br>(0.032) | 12.0<br>(0.472) | 8.00<br>(0.315) | 3.10<br>(0.122) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 3000 | BC            |
| 0.056                       | CB047G0563+ -- | 5.80<br>(0.228)                      | 5.00<br>(0.195) | 2.90<br>(0.114) | 0.80<br>(0.032) | 12.0<br>(0.472) | 8.00<br>(0.315) | 3.10<br>(0.122) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 3000 | BC            |
| 0.068                       | CB047G0683+ -- | 5.80<br>(0.228)                      | 5.00<br>(0.195) | 4.00<br>(0.158) | 0.80<br>(0.032) | 12.0<br>(0.472) | 8.00<br>(0.315) | 4.10<br>(0.161) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 2800 | BC            |
| 0.082                       | CB047G0823+ -- | 5.80<br>(0.228)                      | 5.00<br>(0.195) | 4.50<br>(0.177) | 0.80<br>(0.032) | 16.0<br>(0.629) | 8.00<br>(0.315) | 4.60<br>(0.181) | 330<br>(12.99)  | 16.4<br>(0.645) | 22.4<br>(0.881) | 1500           | 1900 | BC            |
| 0.100µF                     | CB047G0104+ -- | 5.80<br>(0.228)                      | 5.00<br>(0.195) | 4.50<br>(0.177) | 0.80<br>(0.032) | 16.0<br>(0.629) | 8.00<br>(0.315) | 4.60<br>(0.181) | 330<br>(12.99)  | 16.4<br>(0.645) | 22.4<br>(0.881) | 1500           | 1900 | BC            |
| 0.120                       | CB057G0124+ -- | 7.20<br>(0.283)                      | 6.10<br>(0.240) | 3.90<br>(0.153) | 0.80<br>(0.032) | 24.0<br>(0.944) | 12.0<br>(0.472) | 4.80<br>(0.189) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 1000           | 1800 | BC            |
| 0.150                       | CB057G0154+ -- | 7.20<br>(0.283)                      | 6.10<br>(0.240) | 4.70<br>(0.185) | 0.80<br>(0.032) | 16.0<br>(0.629) | 12.0<br>(0.472) | 4.80<br>(0.189) | 330<br>(12.99)  | 16.4<br>(0.645) | 22.4<br>(0.881) | 1000           | 1800 | BC            |
| 0.180                       | CB057G0184+ -- | 7.20<br>(0.283)                      | 6.10<br>(0.240) | 5.00<br>(0.197) | 0.80<br>(0.032) | 16.0<br>(0.629) | 12.0<br>(0.472) | 5.23<br>(0.206) | 330<br>(12.99)  | 16.4<br>(0.645) | 22.4<br>(0.881) | 1000           | 1100 | BC            |
| 0.22µF                      | CB057G0224+ -- | 7.20<br>(0.283)                      | 6.10<br>(0.240) | 5.70<br>(0.225) | 0.80<br>(0.032) | 16.0<br>(0.629) | 12.0<br>(0.472) | 5.90<br>(0.232) | 330<br>(12.99)  | 16.4<br>(0.645) | 22.4<br>(0.881) | 1000           | 900  | BC            |
| 0.330                       | CB167G0334+ -- | 10.5<br>(0.413)                      | 7.60<br>(0.299) | 6.10<br>(0.240) | 0.80<br>(0.032) | 24.0<br>(0.944) | 12.0<br>(0.472) | 6.19<br>(0.244) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 500            | 900  | BC            |
| 0.470                       | CB177G0474+ -- | 12.8<br>(0.503)                      | 10.2<br>(0.402) | 5.50<br>(0.205) | 0.80<br>(0.032) | 24.0<br>(0.944) | 16.0<br>(0.629) | 5.70<br>(0.224) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300            | 700  | BC            |
| 0.560                       | CB177G0564+ -- | 12.8<br>(0.503)                      | 10.2<br>(0.402) | 6.00<br>(0.236) | 0.80<br>(0.032) | 24.0<br>(0.944) | 16.0<br>(0.629) | 5.70<br>(0.224) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300            | 700  | BC            |
| 0.680                       | CB187G0684+ -- | 15.3<br>(0.601)                      | 13.7<br>(0.539) | 4.30<br>(0.169) | 0.80<br>(0.032) | 24.0<br>(0.944) | 24.0<br>(0.944) | 4.50<br>(0.177) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300            | 600  | BC            |
| 1µF                         | CB187G0105+ -- | 15.3<br>(0.601)                      | 13.7<br>(0.539) | 6.40<br>(0.252) | 0.80<br>(0.032) | 24.0<br>(0.944) | 24.0<br>(0.944) | 6.30<br>(0.248) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300            | 400  | BC            |
| VOLTAGE Vdc: 400V Vac: 200V |                |                                      |                 |                 |                 |                 |                 |                 |                 |                 |                 |                |      |               |
| 0.001µF                     | CB037I0102+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 1200 | BA            |
|                             |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 4500 | BC            |
| 0.0012                      | CB037I0122+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 1200 | BA            |
|                             |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 4500 | BC            |
| 0.0015                      | CB037I0152+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 1200 | BA            |

For other Values: upon request

Replace the + by the tolerance code: J = 5% or K = 10%

Replace the -- by the packaging suffix: -- = bulk

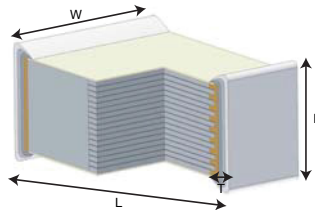
BA or BC = tape & reel

# CB SERIES: PEN DIELECTRIC – LEAD FREE VERSION



## Capacitance Values & Nominal Voltages

### CAPACITANCE VALUES (CR) AND NOMINAL VOLTAGES (VR)



millimeters (inches)

| Capacitance Range (CR) | Ordering Code  | VOLTAGE Vdc: 400V Vac: 200V          |                 |                 |                 |                 |                 |                 |                 |                 |                 |      | Packaging Unit |    | Reel Pkg Code |
|------------------------|----------------|--------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------|----------------|----|---------------|
|                        |                | Chip Dimensions *Tolerances (page 6) |                 |                 |                 | Tape Dimensions |                 |                 | Reel Dimensions |                 |                 | Bulk | Reel           |    |               |
|                        |                | L                                    | W               | H max           | T               | W               | P1              | K0              | A               | W1              | W2 max          |      |                |    |               |
| 0.0015                 | CB03710152+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.0018                 | CB03710182+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.0022                 | CB03710222+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.0027                 | CB03710272+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.0033                 | CB03710332+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.0047                 | CB03710472+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.0056                 | CB03710562+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.0068                 | CB03710682+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.0082                 | CB03710822+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.010µF                | CB04710103+ -- | 5.80<br>(0.228)                      | 5.00<br>(0.195) | 1.90<br>(0.075) | 0.80<br>(0.032) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.10<br>(0.083) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4400           | BC |               |
| 0.012                  | CB04710123+ -- | 5.80<br>(0.228)                      | 5.00<br>(0.195) | 2.20<br>(0.087) | 0.80<br>(0.032) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.43<br>(0.096) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 3500           | BC |               |
| 0.015                  | CB04710153+ -- | 5.80<br>(0.228)                      | 5.00<br>(0.224) | 2.00<br>(0.079) | 0.80<br>(0.087) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.43<br>(0.096) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4400           | BC |               |
| 0.018                  | CB04710183+ -- | 5.80<br>(0.228)                      | 5.00<br>(0.195) | 2.30<br>(0.091) | 0.80<br>(0.032) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.43<br>(0.096) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 3500           | BC |               |
| 0.022                  | CB04710223+ -- | 5.80<br>(0.228)                      | 5.00<br>(0.195) | 2.80<br>(0.110) | 0.80<br>(0.032) | 12.0<br>(0.472) | 8.00<br>(0.315) | 3.10<br>(0.122) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 3000           | BC |               |
| 0.027                  | CB04710273+ -- | 5.80<br>(0.228)                      | 5.00<br>(0.195) | 3.30<br>(0.130) | 0.80<br>(0.032) | 12.0<br>(0.472) | 8.00<br>(0.315) | 3.45<br>(0.136) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 2800           | BC |               |

For other Values: upon request

Replace the + by the tolerance code: J = 5% or K = 10%

Replace the -- by the packaging suffix: -- = bulk

BA or BC = tape & reel



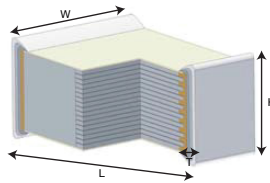
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# CB SERIES: PEN DIELECTRIC – LEAD FREE VERSION



## Capacitance Values & Nominal Voltages

### CAPACITANCE VALUES (CR) AND NOMINAL VOLTAGES (VR)



millimeters (inches)

| Capacitance Range (CR)      | Ordering Code  | VOLTAGE Vdc: 400V Vac: 200V          |                 |                 |                  |                 |                 |                 |                 |                 |                 |                |      |               |
|-----------------------------|----------------|--------------------------------------|-----------------|-----------------|------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|----------------|------|---------------|
|                             |                | Chip Dimensions *Tolerances (page 6) |                 |                 |                  | Tape Dimensions |                 |                 | Reel Dimensions |                 |                 | Packaging Unit |      | Reel Pkg Code |
|                             |                | L                                    | W               | H max           | T                | W               | P1              | K0              | A               | W1              | W2 max          | Bulk           | Reel |               |
| 0.033                       | CB047I0333+ -- | 5.80<br>(0.228)                      | 5.00<br>(0.195) | 3.90<br>(0.154) | 0.80<br>(0.032)  | 12.0<br>(0.472) | 8.00<br>(0.315) | 4.10<br>(0.162) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 2300 | BC            |
| 0.047                       | CB057I0473+ -- | 7.20<br>(0.283)                      | 6.10<br>(0.24)  | 3.20<br>(0.126) | 0.80<br>(0.032)  | 24.0<br>(0.944) | 12.0<br>(0.472) | 3.80<br>(0.149) | 330<br>(12.99)  | 24.4<br>(0.96)  | 30.4<br>(1.196) | 1000           | 2250 | BC            |
| 0.056                       | CB057I0563+ -- | 7.20<br>(0.283)                      | 6.10<br>(0.24)  | 3.70<br>(0.146) | 0.80<br>(0.032)  | 24.0<br>(0.944) | 12.0<br>(0.472) | 3.80<br>(0.149) | 330<br>(12.99)  | 16.4<br>(0.645) | 22.4<br>(0.881) | 1000           | 2250 | BC            |
| 0.068                       | CB057I0683+ -- | 7.20<br>(0.283)                      | 6.10<br>(0.24)  | 4.40<br>(0.173) | 0.80<br>(0.032)  | 24.0<br>(0.944) | 12.0<br>(0.472) | 4.80<br>(0.189) | 330<br>(12.99)  | 16.4<br>(0.645) | 22.4<br>(0.881) | 1000           | 1800 | BC            |
| 0.082                       | CB167I0823+ -- | 10.5<br>(0.413)                      | 7.60<br>(0.299) | 4.50<br>(0.177) | 0.80<br>(0.032)  | 24.0<br>(0.944) | 12.0<br>(0.472) | 4.90<br>(0.193) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 500            | 1100 | BC            |
| 0.100µF                     | CB167I0104+ -- | 10.5<br>(0.413)                      | 7.60<br>(0.299) | 4.00<br>(0.158) | 0.80<br>(0.032)  | 24.0<br>(0.944) | 12.0<br>(0.472) | 4.90<br>(0.193) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 500            | 1100 | BC            |
| 0.120                       | CB167I0124+ -- | 10.5<br>(0.413)                      | 7.60<br>(0.299) | 5.00<br>(0.196) | 0.80<br>(0.032)  | 24.0<br>(0.944) | 12.0<br>(0.472) | 6.19<br>(0.244) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 500            | 900  | BC            |
| 0.150                       | CB167I0154+ -- | 10.5<br>(0.413)                      | 7.60<br>(0.299) | 6.00<br>(0.235) | 0.80<br>(0.032)  | 24.0<br>(0.944) | 12.0<br>(0.472) | 6.19<br>(0.244) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 500            | 900  | BC            |
| 0.180                       | CB177I0184+ -- | 12.8<br>(0.503)                      | 10.2<br>(0.402) | 5.10<br>(0.200) | 0.80<br>(0.032)  | 24.0<br>(0.944) | 16.0<br>(0.629) | 5.70<br>(0.225) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300            | 700  | BC            |
| 0.220                       | CB177I0224+ -- | 12.8<br>(0.503)                      | 10.2<br>(0.402) | 5.00<br>(0.196) | 0.80<br>(0.032)  | 24.0<br>(0.944) | 16.0<br>(0.629) | 5.70<br>(0.225) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300            | 700  | BC            |
| 0.270                       | CB177I0274+ -- | 12.8<br>(0.503)                      | 10.2<br>(0.402) | 6.50<br>(0.255) | 0.80<br>(0.032)  | 24.0<br>(0.944) | 16.0<br>(0.629) | 7.00<br>(0.275) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300            | 600  | BC            |
| 0.330                       | CB187I0334+ -- | 15.3<br>(0.601)                      | 13.7<br>(0.539) | 4.20<br>(0.165) | 0.80<br>(0.032)  | 24.0<br>(0.944) | 24.0<br>(0.944) | 4.50<br>(0.178) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300            | 600  | BC            |
| 0.390                       | CB187I0394+ -- | 15.3<br>(0.601)                      | 13.7<br>(0.539) | 5.80<br>(0.228) | 0.80<br>(0.032)  | 24.0<br>(0.944) | 24.0<br>(0.944) | 6.30<br>(0.248) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300            | 400  | BC            |
| 0.470                       | CB187I0474+ -- | 15.3<br>(0.601)                      | 13.7<br>(0.539) | 6.50<br>(0.255) | 0.80<br>(0.0315) | 24.0<br>(0.944) | 24.0<br>(0.944) | 7.60<br>(0.299) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300            | 300  | BC            |
| VOLTAGE Vdc: 630V Vac: 250V |                |                                      |                 |                 |                  |                 |                 |                 |                 |                 |                 |                |      |               |
| 0.001µF                     | CB037K0102+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024)  | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 1200 | BA            |
|                             |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024)  | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 4500 | BC            |
| 0.0012                      | CB037K0122+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024)  | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 1200 | BA            |
|                             |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024)  | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 4500 | BC            |
| 0.0015                      | CB037K0152+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024)  | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 1200 | BA            |
|                             |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024)  | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 4500 | BC            |
| 0.0018                      | CB037K0182+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024)  | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 1200 | BA            |
|                             |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024)  | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 4500 | BC            |
| 0.0022                      | CB037K0222+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024)  | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500           | 1200 | BA            |

For other Values: upon request

Replace the + by the tolerance code: J = 5% or K = 10%

Replace the -- by the packaging suffix: -- = bulk

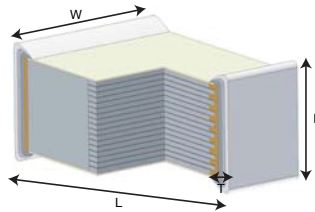
BA or BC = tape & reel

# CB SERIES: PEN DIELECTRIC – LEAD FREE VERSION



## Capacitance Values & Nominal Voltages

### CAPACITANCE VALUES (CR) AND NOMINAL VOLTAGES (VR)



millimeters (inches)

| Capacitance Range (CR) | Ordering Code  | VOLTAGE Vdc: 630V Vac: 250V          |                 |                 |                 |                 |                 |                 |                 |                 |                 |      | Packaging Unit |    | Reel Pkg Code |
|------------------------|----------------|--------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------|----------------|----|---------------|
|                        |                | Chip Dimensions *Tolerances (page 6) |                 |                 |                 | Tape Dimensions |                 |                 | Reel Dimensions |                 |                 |      |                |    |               |
|                        |                | L                                    | W               | H max           | T               | W               | P1              | K0              | A               | W1              | W2 max          | Bulk | Reel           |    |               |
| 0.0022                 | CB037K0222+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.0027                 | CB037K0272+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.0033                 | CB037K0332+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1200           | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.00<br>(0.079) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.0047                 | CB037K0472+ -- | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.50<br>(0.099) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 1201           | BA |               |
|                        |                | 4.70<br>(0.185)                      | 3.20<br>(0.126) | 2.50<br>(0.099) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.06<br>(0.081) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4500           | BC |               |
| 0.0056                 | CB047K0562+ -- | 5.80<br>(0.228)                      | 5.00<br>(0.195) | 2.00<br>(0.079) | 0.80<br>(0.032) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.10<br>(0.083) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4400           | BC |               |
| 0.0068                 | CB047K0682+ -- | 5.80<br>(0.228)                      | 5.00<br>(0.195) | 2.00<br>(0.079) | 0.80<br>(0.032) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.10<br>(0.083) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4400           | BC |               |
| 0.0082                 | CB047K0822+ -- | 5.80<br>(0.228)                      | 5.00<br>(0.195) | 2.20<br>(0.086) | 0.80<br>(0.032) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.43<br>(0.096) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 3500           | BC |               |
| 0.010µF                | CB047K0103+ -- | 5.80<br>(0.228)                      | 5.00<br>(0.195) | 2.00<br>(0.079) | 0.80<br>(0.032) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.10<br>(0.083) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 4400           | BC |               |
| 0.012                  | CB047K0123+ -- | 5.80<br>(0.228)                      | 5.00<br>(0.195) | 3.00<br>(0.118) | 0.80<br>(0.032) | 12.0<br>(0.472) | 8.00<br>(0.315) | 3.10<br>(0.122) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 3000           | BC |               |
| 0.015                  | CB047K0153+ -- | 5.80<br>(0.228)                      | 5.00<br>(0.195) | 3.40<br>(0.136) | 0.80<br>(0.032) | 12.0<br>(0.472) | 8.00<br>(0.315) | 3.45<br>(0.136) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 2800           | BC |               |
| 0.018                  | CB047K0183+ -- | 5.80<br>(0.228)                      | 5.00<br>(0.195) | 4.00<br>(0.157) | 0.80<br>(0.032) | 12.0<br>(0.472) | 8.00<br>(0.315) | 4.10<br>(0.162) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 2300           | BC |               |
| 0.022                  | CB057K0223+ -- | 7.20<br>(0.283)                      | 6.10<br>(0.240) | 3.40<br>(0.136) | 0.80<br>(0.032) | 24.0<br>(0.944) | 12.0<br>(0.472) | 3.80<br>(0.149) | 330<br>(12.99)  | 16.4<br>(0.645) | 22.4<br>(0.881) | 1000 | 2250           | BC |               |
| 0.027                  | CB057K0273+ -- | 7.20<br>(0.283)                      | 6.10<br>(0.240) | 4.00<br>(0.157) | 0.80<br>(0.032) | 24.0<br>(0.944) | 12.0<br>(0.472) | 4.80<br>(0.189) | 330<br>(12.99)  | 16.4<br>(0.645) | 22.4<br>(0.881) | 1000 | 1800           | BC |               |
| 0.033                  | CB057K0333+ -- | 7.20<br>(0.283)                      | 6.10<br>(0.240) | 4.80<br>(0.189) | 0.80<br>(0.032) | 16.0<br>(0.629) | 12.0<br>(0.472) | 5.23<br>(0.206) | 330<br>(12.99)  | 16.4<br>(0.645) | 22.4<br>(0.881) | 1000 | 1100           | BC |               |
| 0.047                  | CB167K0473+ -- | 10.5<br>(0.413)                      | 7.60<br>(0.299) | 3.80<br>(0.150) | 0.80<br>(0.032) | 24.0<br>(0.944) | 12.0<br>(0.472) | 3.93<br>(0.155) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 500  | 1400           | BC |               |
| 0.056                  | CB167K0563+ -- | 10.5<br>(0.413)                      | 7.60<br>(0.299) | 4.60<br>(0.181) | 0.80<br>(0.032) | 24.0<br>(0.944) | 12.0<br>(0.472) | 6.19<br>(0.244) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 500  | 900            | BC |               |
| 0.068                  | CB167K0683+ -- | 10.5<br>(0.413)                      | 7.60<br>(0.299) | 5.50<br>(0.216) | 0.80<br>(0.032) | 24.0<br>(0.944) | 12.0<br>(0.472) | 6.19<br>(0.244) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 500  | 900            | BC |               |
| 0.082                  | CB177K0823+ -- | 12.8<br>(0.503)                      | 10.2<br>(0.402) | 4.50<br>(0.177) | 0.80<br>(0.032) | 24.0<br>(0.944) | 16.0<br>(0.629) | 4.70<br>(0.185) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300  | 900            | BC |               |
| 0.100µF                | CB177K0104+ -- | 12.8<br>(0.503)                      | 10.2<br>(0.402) | 4.60<br>(0.181) | 0.80<br>(0.032) | 24.0<br>(0.944) | 16.0<br>(0.629) | 4.70<br>(0.185) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300  | 900            | BC |               |

For other Values: upon request

Replace the + by the tolerance code: J = 5% or K = 10%

Replace the -- by the packaging suffix: -- = bulk

BA or BC = tape & reel



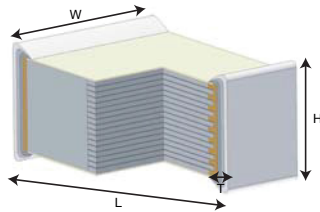
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# CB SERIES: PEN DIELECTRIC – LEAD FREE VERSION

## Capacitance Values & Nominal Voltages



### CAPACITANCE VALUES (CR) AND NOMINAL VOLTAGES (VR)



millimeters (inches)

| Capacitance Range (CR) | Ordering Code  | VOLTAGE Vdc: 630V Vac: 250V             |                 |                 |                 |                 |                 |                 |                 |                 |                 |      | Packaging Unit |    | Reel Pkg Code |
|------------------------|----------------|---|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------|----------------|----|---------------|
|                        |                | Chip Dimensions<br>*Tolerances (page 6) |                 |                 |                 | Tape Dimensions |                 |                 | Reel Dimensions |                 |                 | Bulk | Reel           |    |               |
|                        |                | L                                       | W               | H max           | T               | W               | P1              | K0              | A               | W1              | W2 max          |      |                |    |               |
| 0.120                  | CB177K0124+ -- | 12.8<br>(0.503)                         | 10.2<br>(0.402) | 6.00<br>(0.236) | 0.80<br>(0.032) | 24.0<br>(0.944) | 16.0<br>(0.629) | 7.00<br>(0.275) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300  | 600            | BC |               |
| 0.15*                  | CB177K0154K -- | 12.8<br>(0.503)                         | 10.2<br>(0.402) | 6.90<br>(0.271) | 0.80<br>(0.032) | 24.0<br>(0.944) | 16.0<br>(0.629) | 7.00<br>(0.275) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300  | 600            | BC |               |
| 0.180                  | CB187K0184+ -- | 15.3<br>(0.601)                         | 13.7<br>(0.539) | 5.60<br>(0.220) | 0.80<br>(0.032) | 24.0<br>(0.944) | 24.0<br>(0.944) | 6.30<br>(0.248) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300  | 400            | BC |               |
| 0.220                  | CB187K0224+ -- | 15.3<br>(0.601)                         | 13.7<br>(0.539) | 6.00<br>(0.236) | 0.80<br>(0.032) | 24.0<br>(0.944) | 24.0<br>(0.944) | 6.30<br>(0.248) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 300  | 400            | BC |               |

For other Values: upon request

Replace the + by the tolerance code: J = 5% or K = 10%

Replace the -- by the packaging suffix: -- = bulk

BA or BC = tape & reel

\*Only available in tolerance ±10%



# CB SERIES: PEN DIELECTRIC – LEAD FREE VERSION

## Mounting and Soldering Recommendations

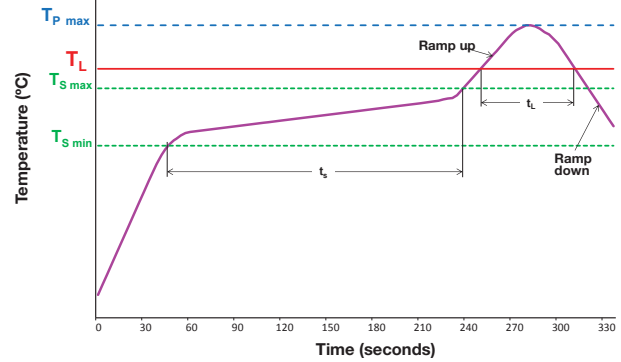
### MOUNTING AND SOLDERING RECOMMENDATIONS SOLDERING PROFILE

The capacitors can be mounted using infrared and vapor phase soldering following recommended below. They are NOT suitable for wave soldering.

All temperature refer to topside of the package, measured on the package body surface.

| Profile Feature  | 1206 to 1812     | 2220 to 6054     |
|--|------------------|------------------|
| Ramp-Up ( $T_{s\ max}$ to $T_p$ )                                | 3°C / second max | 3°C / second max |
| Preheat  |                  |                  |
| - Temperature Min ( $T_{s\ min}$ )                               | 150°C            | 150°C            |
| - Temperature Max ( $T_{s\ max}$ )                               | 200°C            | 200°C            |
| - Time ( $t_{s\ min}$ to $t_{s\ max}$ )                          | 180 sec. max     | 180 sec. max     |
| Time maintained above  |                  |                  |
| - Temperature ( $T_l$ )  | 217°C            | 217°C            |
| - Time ( $t_l$ )   | 60 sec. max      | 75 sec. max      |
| Peak temperature ( $T_{p\ max}$ )                                | 250°C            | 255°C            |
| Customer Peak temperature ( $T_p$ )                              | < 250°C          | < 255°C          |
| Time within 5°C of peak temperature ( $T_p - 5^\circ\text{C}$ )* | 10 sec.          | 10 sec.          |
| Ramp-Down  | 6°C / sec.       | 6°C / sec.       |

\* Example :  $T_p = 238.5^\circ\text{C} \Rightarrow t_p =$  time between  $238.5^\circ\text{C}$  and  $233.5^\circ\text{C}$  ( $T_p - 5^\circ\text{C}$ )

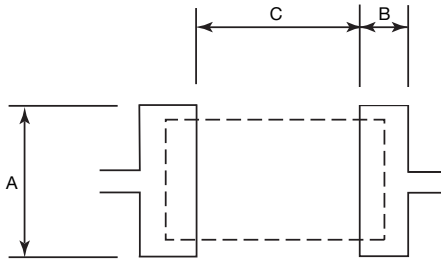


# Reflow soldering referring to JEDEC Standard with some limitations  
# JEDEC J-Std 020C

### RECOMMENDED SOLDER PASTE THICKNESS

For optimum solderability, the recommended soldering paste thickness: 1206 to 2824: 150 to 200µm  
4030 to 6054 :200 to 300µm

In case of hand soldering, the temperature of the soldering iron should not be above 250°C. Special care must be taken to avoid touching the capacitor body with the iron tip.



### PAD DIMENSIONS: MILLIMETERS (INCHES)

| Size Code | Case Size | A            | B            | C            |
|-----------|-----------|--------------|--------------|--------------|
| 01        | 1206      | 1.30 (0.051) | 1.30 (0.051) | 2.20 (0.087) |
| 02        | 1210      | 2.00 (0.079) | 1.30 (0.051) | 2.20 (0.087) |
| 03        | 1812      | 3.00 (0.118) | 1.50 (0.059) | 3.50 (0.137) |
| 04        | 2220      | 5.00 (0.195) | 1.90 (0.075) | 4.50 (0.178) |
| 05        | 2824      | 6.00 (0.234) | 2.50 (0.098) | 5.70 (0.224) |
| 16        | 4030      | 7.50 (0.295) | 3.00 (0.118) | 8.00 (0.315) |
| 17        | 5040      | 11.2 (0.441) | 3.50 (0.137) | 10.3 (0.406) |
| 18        | 6054      | 14.6 (0.575) | 3.60 (0.147) | 12.6 (0.496) |

### RECOMMENDED CLEANING

To clean flux from the PC board assembly, the recommended products are: ethanol, isopropyl alcohol, and deionized water wash. The cleaning products to avoid are: Toluene, Xylene, Trichloroethylene, Terpene Cleaner EC-7, surface active agent. In case of using another solvent, please contact us.

### OTHER CAUTIONS

**Flame retardancy:** the dielectric film is not a flame retardant material.

**Environment:** contact us when chips are used in humid or gas atmosphere and /or when using resin.

**Recommended handling:** do not use edged tools, so not to damage the capacitors..

### TIN WHISKERS TESTS : JEDEC STANDARD NO 22A121

| Stress Type                            | Ref. Spec.  | Test Conditions   | Analysis   | Results |
|--|-------------|---|------------|---------|
| Temperature cycling                    | JESD22-A104 | -55°C +85(+10/-0)°C air<br>5 to 10 minutes soak 3 cycles/hour | SEM x 1000 | Pass    |
| Ambient Temperature / Humidity Storage |             | 30+/-2°C - 60+/-3% RH -2000H                                  | SEM x 1000 | Pass    |
| High Temperature / Humidity Storage    |             | 70+/-5°C - 93+3/-2% RH -1000H                                 | SEM x 1000 | Pass    |

# CB SERIES: PEN DIELECTRIC – LEAD FREE VERSION

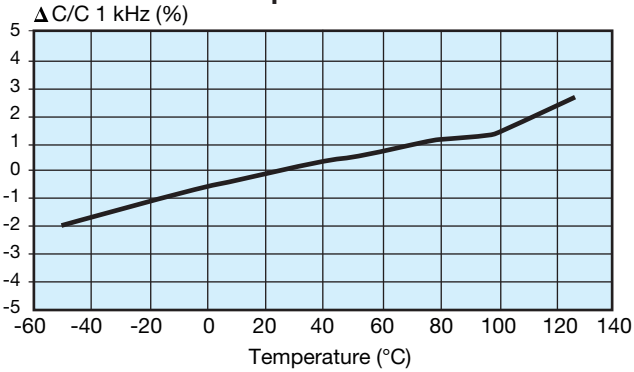


## Electrical Characteristics versus Temperature and Frequency

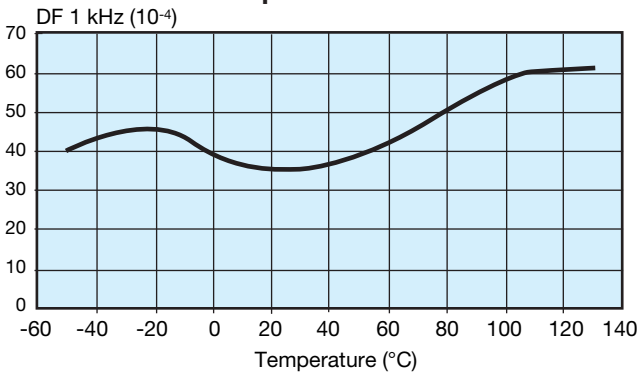
### ELECTRICAL CHARACTERISTICS VERSUS TEMPERATURE AND FREQUENCY

#### ELECTRICAL CHARACTERISTICS

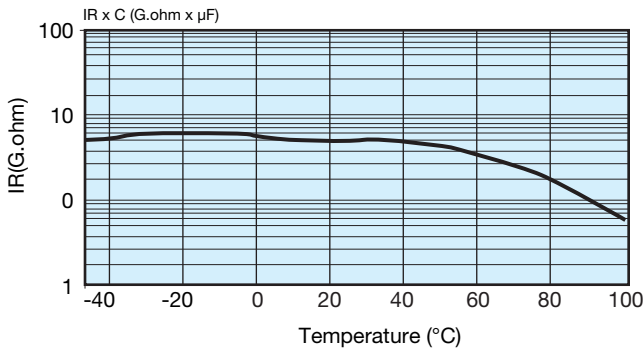
##### Capacitance



##### Dissipation Factor

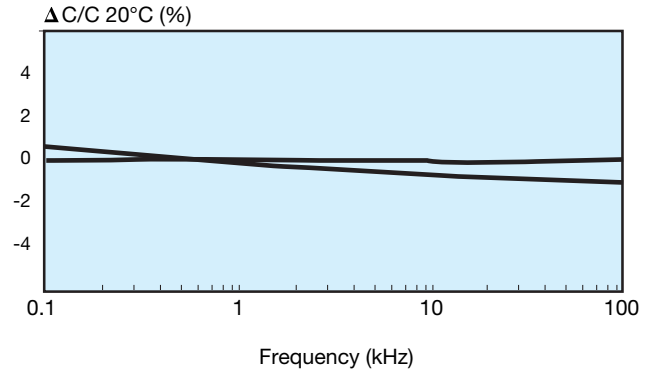


##### Insulation Resistance

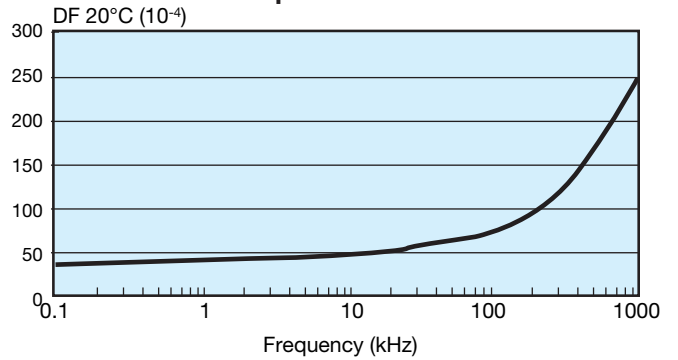


#### FREQUENCY CHARACTERISTICS

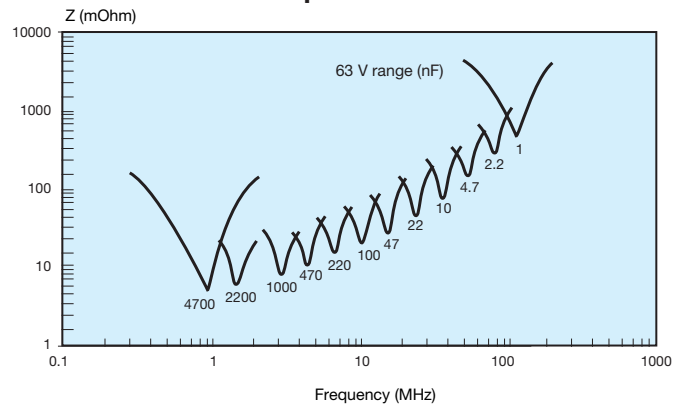
##### Capacitance



##### Dissipation Factor



##### Impedance





# CB SERIES: PEN DIELECTRIC – LEAD FREE VERSION

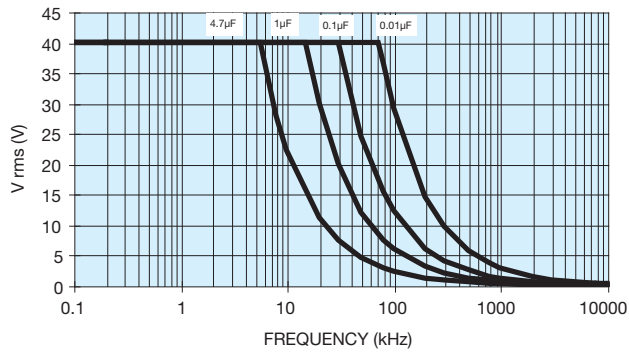
## RMS Voltage and Current versus Frequency

### RMS VOLTAGE AND CURRENT VERSUS FREQUENCY

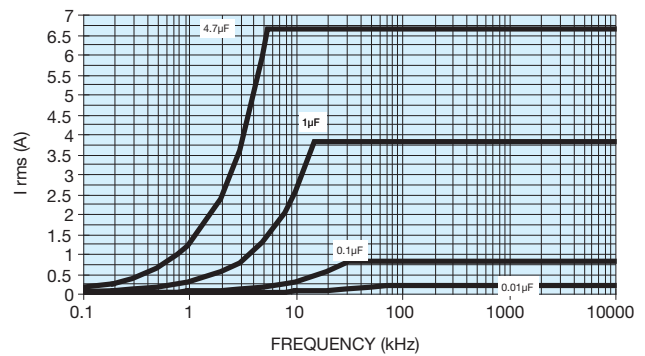
#### MAXIMUM VOLTAGE (VRMS) AND CURRENT (IRMS) VS FREQUENCY

Typical curves results from measurement carried out at ambient temperature (25°C) and sinusoidal wave-forms (for size CB01 to CB05)

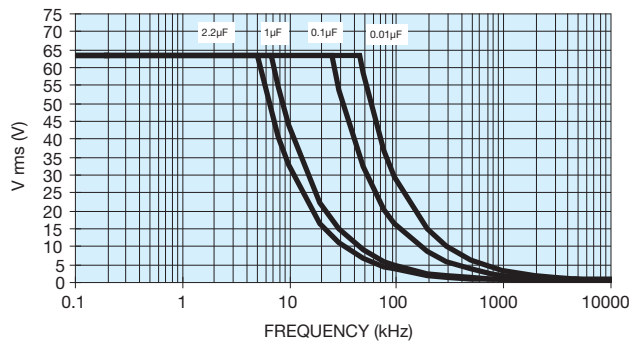
63 Vdc / 40 Vac



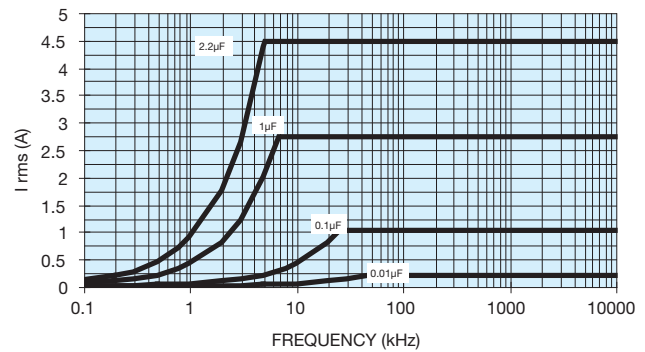
63 Vdc / 40 Vac



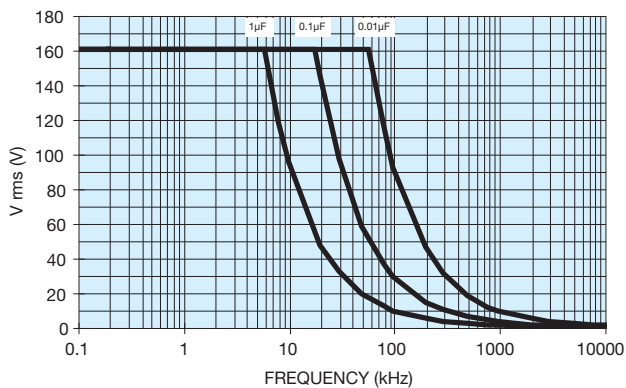
100 Vdc / 63 Vac



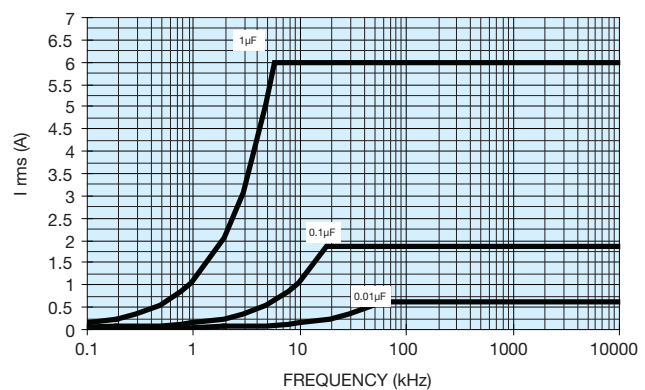
100 Vdc / 63 Vac



250 Vdc / 160 Vac



250 Vdc / 160 Vac



# CB SERIES: PEN DIELECTRIC – LEAD FREE VERSION

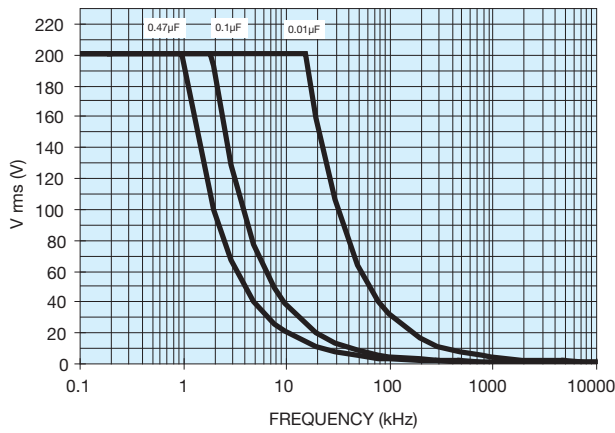
## RMS Voltage and Current versus Frequency

### RMS VOLTAGE AND CURRENT VERSUS FREQUENCY

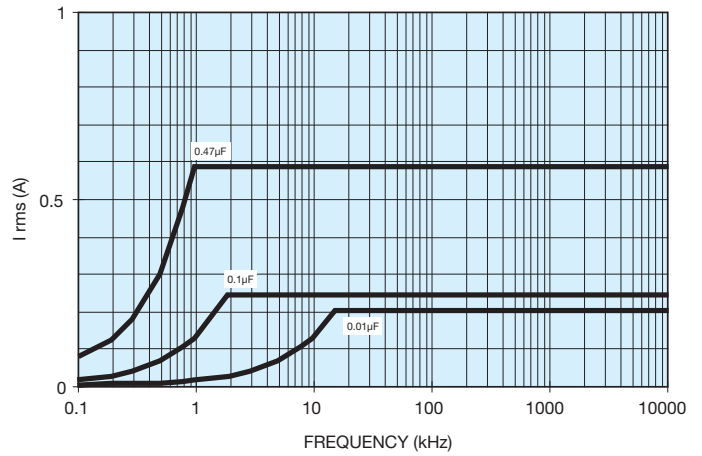
#### MAXIMUM VOLTAGE (VRMS) AND CURRENT (IRMS) VS FREQUENCY

Typical curves results from measurement carried out at ambient temperature (25°C) and sinusoidal wave-forms (for size CB03 to CB05)

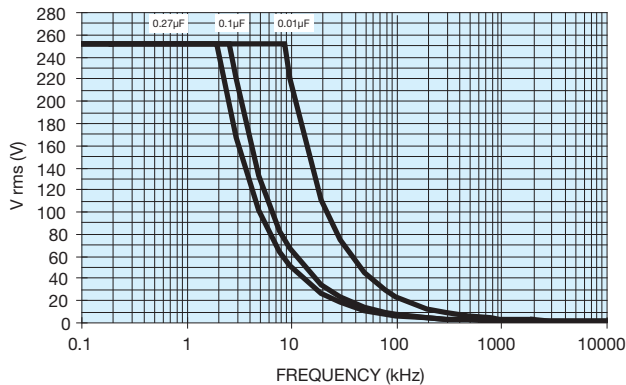
400 Vdc / 200 Vac



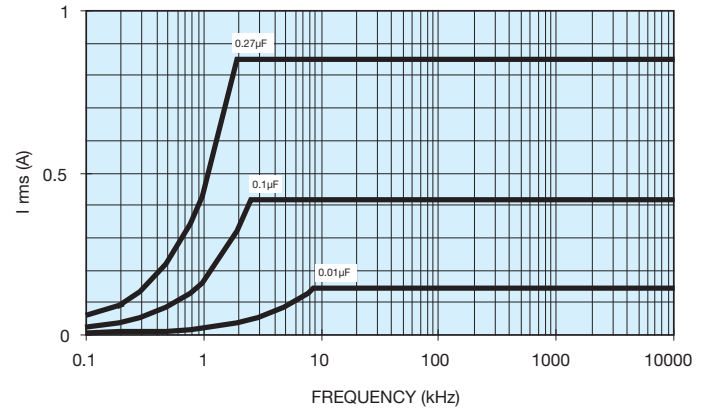
400 Vdc / 200 Vac



630 Vdc / 250 Vac



630 Vdc / 250 Vac



#### MAXIMUM PULSE RISE TIME (DV/DT)

| Voltage Range       | 25 | 50 | 63 | 100 | 250 | 400 | 630 |
|---------------------|----|----|----|-----|-----|-----|-----|
| Dv/dt max. (V/µsec) | 15 | 40 | 40 | 50  | 150 | 200 | 250 |

# CB SERIES: PEN DIELECTRIC – LEAD FREE VERSION

## RoHS

### MATERIALS CONTROLLED BY ROHS (PPM BY WEIGHT):

| Mass / unit (g)  | Lead | Mercury | Cadmium | Hexavalent Chromium | PBB  | PBDE |
|------------------|------|---------|---------|---------------------|------|------|
| CB range         | 0    | 0       | 0       | 0                   | 0    | 0    |
| RoHS Limit (ppm) | 1000 | 1000    | 100     | 1000                | 1000 | 1000 |
| Pass/Fail        | Pass | Pass    | Pass    | Pass                | Pass | Pass |

This product has been tested and found to be compliant with all requirements, provisions, and exemptions of EU Directive 2002/95/EC of the European Parliament and Council of January 27, 2003. On the Restriction of use of certain Hazardous Substances (RoHS) in electrical and electronic equipment and EU Directive 2000/53/EC regarding ELV or End of Life Vehicle.

#### ROHS / ELV STATUS

External Plating

100% Matte Sn as standard

#### LEAD-FREE STATUS / MOISTURE SENSITIVITY RANKING

Pb Free Reflow Solder compliant, MSL = 3.

Reflow soldering referring to Jedec Standard with some limitations. Additional JESD-97 data to be phased in MSL e3 termination.

### PRODUCT LABELING:

(For informational purposes only to be phased in on reel and container.)

### PRODUCT TRACEABILITY:

Full internal material traceability by reference to unique lot number marked on reel and external package.

Pb Free:

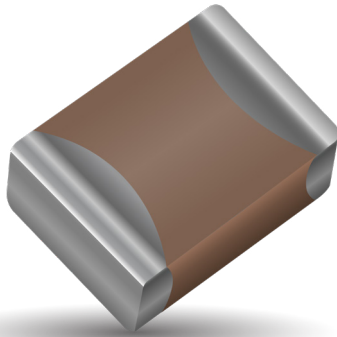


RoHS Compliant:



# CB SERIES: PPS DIELECTRIC – LEAD FREE VERSION

## General Description



### GENERAL DESCRIPTION

Film chip capacitor using a naked and stacked construction with metallized PolyPhenylene Sulfide film (PPS).

### ADVANTAGES

- Applicable for both flow and reflow soldering.
- Very constant Capacitance value with temperature.
- Low dielectric absorption.
- The intrinsic elasticity of the dielectric film provides an excellent compatibility of the capacitor with all types of material for printed circuit boards.
- Excellent thermal shock resistance.
- Low dissipation factor, ESR and ESL.
- No piezoelectric effect.
- Available in tape and reel suitable for automatic placement.
- Non-polar construction.

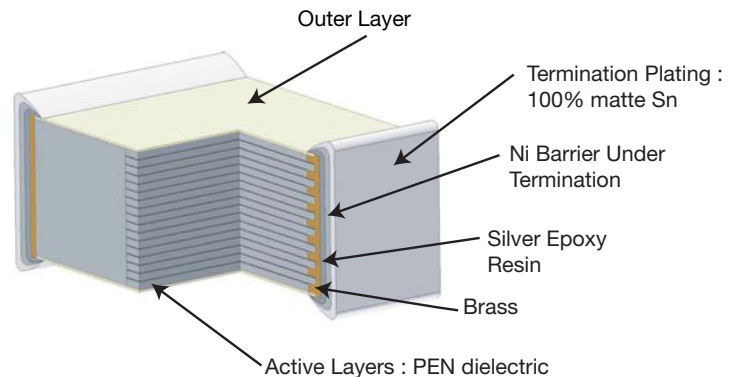
### APPLICATIONS

General purpose function in low voltage applications:

- Filtering, coupling, decoupling
- Time-constant
- Oscillation timing circuit

Typical applications would be:

- Automotive (navigation system ...)
- Telecom (GSM PLL circuit, ADSL system ...)
- Industrial (Lighting and power supplies...)



### PERFORMANCE CHARACTERISTICS

|                                    |   |
|------------------------------------|---|
| Climatic Category                  | 55/125/56   |
| Capacitance Range                  | 1nF to 180nF  |
| Tolerance on C <sub>R</sub>        | ±2%, ±5%, ±10%  |
| Nominal Voltages                   | 16Vdc to 50Vdc  |
| Test Voltage                       | 1.4Vr 2 sec. at 25°C  |
| Soldering methods                  | IR vapor phase reflow   |
| Tangent of Loss Angle at 1kHz (DF) | < 50 x 10 <sup>-4</sup>   |
| Insulation resistance minimum : IR | for C ≤ 0.33μF IR > 1000 MΩ at 20°C<br>for 1 min. charge at 10VDC for VR < 100VDC |
| Temperature range                  | -55°C to 125°C  |
| A.C. applications                  | for high frequency A.C. application please check with KYOCERA AVX                 |

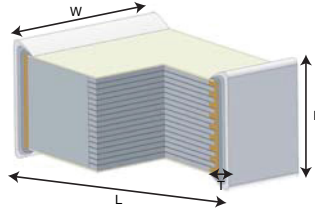
No self-healing properties

# CB SERIES: PPS DIELECTRIC – LEAD FREE VERSION



## Capacitance Values & Nominal Voltages

### CAPACITANCE VALUES (CR) AND NOMINAL VOLTAGES (VR)



millimeters (inches)

| Capacitance Range (CR) | Ordering Code  | VOLTAGE Vdc: 16V Vac: 10V            |              |              |              |                 |              |              |                 |              |              |      | Packaging Unit |    | Reel Pkg Code |
|------------------------|----------------|--------------------------------------|--------------|--------------|--------------|-----------------|--------------|--------------|-----------------|--------------|--------------|------|----------------|----|---------------|
|                        |                | Chip Dimensions *Tolerances (page 6) |              |              |              | Tape Dimensions |              |              | Reel Dimensions |              |              |      |                |    |               |
|                        |                | L                                    | W            | H max        | T            | W               | P1           | K0           | A               | W1           | W2 max       | Bulk | Reel           |    |               |
| 0.001µF                | CB018B0102+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.0012                 | CB018B0122+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.0015                 | CB018B0152+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.0018                 | CB018B0182+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.0022                 | CB018B0222+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.0027                 | CB018B0272+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.0033                 | CB018B0332+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.0047                 | CB018B0472+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.0056                 | CB018B0562+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.0068                 | CB018B0682+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.0082                 | CB018B0822+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.010µF                | CB018B0103+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.012                  | CB018B0123+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.015                  | CB018B0153+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.018                  | CB018B0183+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.022                  | CB018B0223+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.027                  | CB018B0273+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.033                  | CB018B0333+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.039                  | CB018B0393+ -- | 3.30 (0.130)                         | 1.60 (0.063) | 1.15 (0.045) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.20 (0.047) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 3500           | BA |               |
| 0.047                  | CB028B0473+ -- | 3.30 (0.130)                         | 2.50 (0.098) | 1.80 (0.071) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.90 (0.075) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 2500           | BA |               |
| 0.056                  | CB028B0563+ -- | 3.30 (0.130)                         | 2.50 (0.098) | 1.80 (0.098) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.90 (0.075) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 2500           | BA |               |
| 0.068                  | CB028B0683+ -- | 3.30 (0.130)                         | 2.50 (0.098) | 1.80 (0.071) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.90 (0.075) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 2500           | BA |               |
| 0.082                  | CB028B0823+ -- | 3.30 (0.130)                         | 2.50 (0.098) | 1.80 (0.071) | 0.50 (0.020) | 8.00 (0.315)    | 4.00 (0.158) | 1.90 (0.075) | 180 (7.087)     | 8.40 (0.331) | 14.4 (0.567) | 2000 | 2500           | BA |               |

For other Values: upon request

Replace the + by the tolerance code: G = 2%, J = 5% or K = 10%

Replace the -- by the packaging suffix: -- = bulk

BA or BC = tape & reel

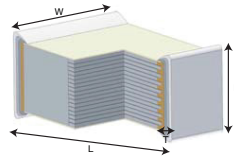
The Important Information/Disclaimer is incorporated in the catalog where these specifications came from or available online at [www.avx.com/disclaimer/](http://www.avx.com/disclaimer/) by reference and should be reviewed in full before placing any order.

# CB SERIES: PPS DIELECTRIC – LEAD FREE VERSION



## Capacitance Values & Nominal Voltages

### CAPACITANCE VALUES (CR) AND NOMINAL VOLTAGES (VR)



millimeters (inches)

| Capacitance Range (CR)    | Ordering Code  | VOLTAGE Vdc: 16V Vac: 10V            |                 |                 |                 |                 |                 |                 |                 |                 |                 |      | Packaging Unit |    | Reel Pkg Code |
|---------------------------|----------------|--------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------|----------------|----|---------------|
|                           |                | Chip Dimensions *Tolerances (page 6) |                 |                 |                 | Tape Dimensions |                 |                 | Reel Dimensions |                 |                 |      |                |    |               |
|                           |                | L                                    | W               | H max           | T               | W               | P1              | K0              | A               | W1              | W2 max          | Bulk | Reel           |    |               |
| 0.100µF                   | CB028B0104+ -- | 3.30<br>(0.130)                      | 2.50<br>(0.098) | 2.10<br>(0.083) | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 2.33<br>(0.092) | 180<br>(7.087)  | 8.4<br>(0.331)  | 14.4<br>(0.567) | 2000 | 2000           | BA |               |
|                           |                | 4.50<br>(0.177)                      | 3.20<br>(0.126) | 2.30<br>(0.091) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102) | 180<br>(7.087)  | 12.4<br>(0.488) | 18.4<br>(0.724) |      |                |    |               |
| 0.120                     | CB038B0124+ -- | 4.50<br>(0.177)                      | 3.20<br>(0.126) | 2.30<br>(0.091) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 3600           | BC |               |
|                           |                | 4.50<br>(0.177)                      | 3.20<br>(0.126) | 2.30<br>(0.091) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102) | 180<br>(7.087)  | 12.4<br>(0.488) | 18.4<br>(0.724) |      |                |    |               |
| 0.150                     | CB038B0154+ -- | 4.50<br>(0.177)                      | 3.20<br>(0.126) | 2.30<br>(0.091) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102) | 180<br>(7.087)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 900            | BA |               |
|                           |                | 4.50<br>(0.177)                      | 3.20<br>(0.126) | 2.30<br>(0.091) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) |      |                |    |               |
| 0.180                     | CB038B0184+ -- | 4.50<br>(0.177)                      | 3.20<br>(0.126) | 2.50<br>(0.098) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102) | 180<br>(7.09)   | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 900            | BA |               |
|                           |                | 4.50<br>(0.177)                      | 3.20<br>(0.126) | 2.50<br>(0.098) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) |      |                |    |               |
| VOLTAGE Vdc: 50V Vac: 40V |                |                                      |                 |                 |                 |                 |                 |                 |                 |                 |                 |      |                |    |               |
| 0.001µF                   | CB018D0102+ -- | 3.30<br>(0.130)                      | 1.60<br>(0.063) | 1.15<br>(0.045) | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 1.20<br>(0.047) | 180<br>(7.087)  | 8.40<br>(0.331) | 14.4<br>(0.567) | 2000 | 3500           | BA |               |
| 0.0012                    | CB018D0122+ -- | 3.30<br>(0.130)                      | 1.60<br>(0.063) | 1.15<br>(0.045) | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 1.20<br>(0.047) | 180<br>(7.087)  | 8.40<br>(0.331) | 14.4<br>(0.567) | 2000 | 3500           | BA |               |
| 0.0015                    | CB018D0152+ -- | 3.30<br>(0.130)                      | 1.60<br>(0.063) | 1.15<br>(0.045) | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 1.20<br>(0.147) | 180<br>(7.087)  | 8.40<br>(0.331) | 14.4<br>(0.567) | 2000 | 3500           | BA |               |
| 0.0018                    | CB018D0182+ -- | 3.30<br>(0.130)                      | 1.60<br>(0.063) | 1.15<br>(0.045) | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 1.20<br>(0.047) | 180<br>(7.087)  | 8.40<br>(0.331) | 14.4<br>(0.567) | 2000 | 3500           | BA |               |
| 0.0022                    | CB018D0222+ -- | 3.30<br>(0.130)                      | 1.60<br>(0.063) | 1.15<br>(0.045) | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 1.20<br>(0.047) | 180<br>(7.087)  | 8.40<br>(0.331) | 14.4<br>(0.567) | 2000 | 3500           | BA |               |
| 0.0027                    | CB018D0272+ -- | 3.30<br>(0.130)                      | 1.60<br>(0.063) | 1.15<br>(0.045) | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 1.20<br>(0.047) | 180<br>(7.087)  | 8.40<br>(0.331) | 14.4<br>(0.567) | 2000 | 3500           | BA |               |
| 0.0033                    | CB018D0332+ -- | 3.30<br>(0.130)                      | 1.60<br>(0.063) | 1.15<br>(0.045) | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 1.20<br>(0.047) | 180<br>(7.087)  | 8.40<br>(0.331) | 14.4<br>(0.567) | 2000 | 3500           | BA |               |
| 0.0047                    | CB018D0472+ -- | 3.30<br>(0.130)                      | 1.60<br>(0.063) | 1.15<br>(0.045) | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 1.20<br>(0.047) | 180<br>(7.087)  | 8.40<br>(0.331) | 14.4<br>(0.567) | 2000 | 3500           | BA |               |
| 0.0056                    | CB018D0562+ -- | 3.30<br>(0.130)                      | 1.60<br>(0.063) | 1.15<br>(0.045) | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 1.20<br>(0.047) | 180<br>(7.087)  | 8.40<br>(0.331) | 14.4<br>(0.567) | 2000 | 3500           | BA |               |
| 0.0068                    | CB018D0682+ -- | 3.30<br>(0.130)                      | 1.60<br>(0.063) | 1.15<br>(0.045) | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 1.20<br>(0.047) | 180<br>(7.087)  | 8.40<br>(0.331) | 14.4<br>(0.567) | 2000 | 3500           | BA |               |
| 0.0082                    | CB018D0822+ -- | 3.30<br>(0.130)                      | 1.60<br>(0.063) | 1.15<br>(0.045) | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 1.20<br>(0.047) | 180<br>(7.087)  | 8.40<br>(0.331) | 14.4<br>(0.567) | 2000 | 3500           | BA |               |
| 0.010µF                   | CB018D0103+ -- | 3.30<br>(0.130)                      | 1.60<br>(0.063) | 1.15<br>(0.045) | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 1.20<br>(0.047) | 180<br>(7.087)  | 8.40<br>(0.331) | 14.4<br>(0.567) | 2000 | 3500           | BA |               |
| 0.012                     | CB028D0123+ -- | 3.30<br>(0.130)                      | 2.50<br>(0.098) | 1.80<br>(0.071) | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 1.90<br>(0.075) | 180<br>(7.087)  | 8.40<br>(0.331) | 14.4<br>(0.567) | 2000 | 2500           | BA |               |
| 0.015                     | CB028D0153+ -- | 3.30<br>(0.130)                      | 2.50<br>(0.098) | 1.80<br>(0.071) | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 1.90<br>(0.158) | 180<br>(7.087)  | 8.40<br>(0.331) | 14.4<br>(0.567) | 2000 | 2500           | BA |               |
| 0.018                     | CB028D0183+ -- | 3.30<br>(0.130)                      | 2.50<br>(0.098) | 1.80<br>(0.071) | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 1.90<br>(0.075) | 180<br>(7.087)  | 8.40<br>(0.331) | 14.4<br>(0.567) | 2000 | 2500           | BA |               |
| 0.022                     | CB028D0223+ -- | 3.30<br>(0.130)                      | 2.50<br>(0.098) | 1.80<br>(0.071) | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 1.90<br>(0.075) | 180<br>(7.087)  | 8.40<br>(0.331) | 14.4<br>(0.567) | 2000 | 2500           | BA |               |

For other Values: upon request

Replace the + by the tolerance code: G = 2%, J = 5% or K = 10%

Replace the -- by the packaging suffix: -- = bulk

BA or BC = tape & reel

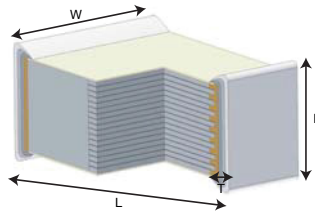


# CB SERIES: PPS DIELECTRIC – LEAD FREE VERSION

## Capacitance Values & Nominal Voltages



### CAPACITANCE VALUES (CR) AND NOMINAL VOLTAGES (VR)



millimeters (inches)

| Capacitance Range (CR) | Ordering Code  | VOLTAGE Vdc: 50V Vac: 40V            |                 |                 |                 |                 |                 |                 |                 |                 |                 |      | Packaging Unit |    | Reel Pkg Code |
|------------------------|----------------|--------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------|----------------|----|---------------|
|                        |                | Chip Dimensions *Tolerances (page 6) |                 |                 |                 | Tape Dimensions |                 |                 | Reel Dimensions |                 |                 |      |                |    |               |
|                        |                | L                                    | W               | H max           | T               | W               | P1              | K0              | A               | W1              | W2 max          | Bulk | Reel           |    |               |
| 0.027                  | CB028D0273+ -- | 3.30<br>(0.130)                      | 2.50<br>(0.098) | 2.10<br>(0.083) | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 2.30<br>(0.091) | 180<br>(7.087)  | 8.40<br>(0.331) | 14.4<br>(0.567) | 2000 | 2000           | BA |               |
| 0.033                  | CB028D0333+ -- | 3.30<br>(0.130)                      | 2.50<br>(0.098) | 2.10<br>(0.083) | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 2.30<br>(0.091) | 180<br>(7.087)  | 8.40<br>(0.331) | 14.4<br>(0.567) | 2000 | 2000           | BA |               |
| 0.039                  | CB028D0393+ -- | 3.30<br>(0.130)                      | 2.50<br>(0.098) | 2.1<br>(0.083)  | 0.50<br>(0.020) | 8.00<br>(0.315) | 4.00<br>(0.158) | 2.30<br>(0.091) | 181<br>(7.087)  | 8.40<br>(0.331) | 14.4<br>(0.567) | 2000 | 2000           | BA |               |
| 0.047                  | CB038D0473+ -- | 4.50<br>(0.1777)                     | 3.20<br>(0.126) | 2.4<br>(0.095)  | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102) | 180<br>(7.087)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 900            | BA |               |
|                        |                | 4.50<br>(0.177)                      | 3.20<br>(0.126) | 2.4<br>(0.095)  | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 3600           | BC |               |
| 0.056                  | CB038D0563+ -- | 4.50<br>(0.177)                      | 3.20<br>(0.126) | 2.40<br>(0.095) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102) | 180<br>(7.087)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 900            | BA |               |
|                        |                | 4.50<br>(0.177)                      | 3.20<br>(0.126) | 2.40<br>(0.095) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 3600           | BC |               |
| 0.068                  | CB038D0683+ -- | 4.50<br>(0.177)                      | 3.20<br>(0.126) | 2.40<br>(0.095) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102) | 180<br>(7.087)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 900            | BA |               |
|                        |                | 4.50<br>(0.177)                      | 3.20<br>(0.126) | 2.40<br>(0.095) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 3600           | BC |               |
| 0.082                  | CB038D0823+ -- | 4.50<br>(0.177)                      | 3.20<br>(0.126) | 2.40<br>(0.095) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102) | 180<br>(7.087)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 900            | BA |               |
|                        |                | 4.50<br>(0.177)                      | 3.20<br>(0.126) | 2.40<br>(0.095) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 3600           | BC |               |
| 0.100µF                | CB038D0104+ -- | 4.50<br>(0.177)                      | 3.20<br>(0.126) | 2.40<br>(0.095) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102) | 180<br>(7.087)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 900            | BA |               |
|                        |                | 4.50<br>(0.177)                      | 3.20<br>(0.126) | 2.40<br>(0.095) | 0.60<br>(0.024) | 12.0<br>(0.472) | 8.00<br>(0.315) | 2.60<br>(0.102) | 330<br>(12.99)  | 12.4<br>(0.488) | 18.4<br>(0.724) | 1500 | 3600           | BC |               |

For other Values: upon request

Replace the + by the tolerance code: G = 2%, J = 5% or K = 10%

Replace the -- by the packaging suffix: -- = bulk

BA or BC = tape & reel

# CB SERIES: PPS DIELECTRIC – LEAD FREE VERSION

## Mounting and Soldering Recommendations

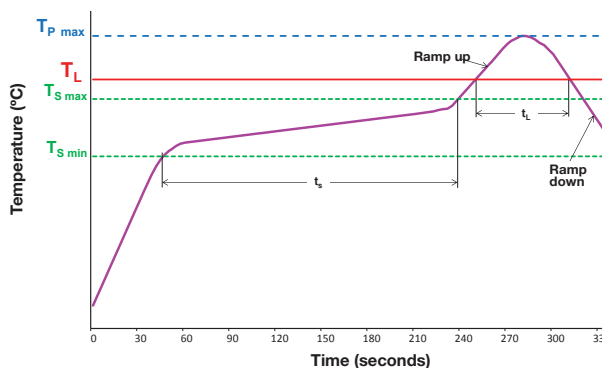
### MOUNTING AND SOLDERING RECOMMENDATIONS SOLDERING PROFILE

The capacitors can be mounted using infrared and vapor phase soldering following recommended below. They are NOT suitable for wave soldering.

All temperature refer to topside of the package, measured on the package body surface.

| Profile Feature  | 1206 to 1812     |
|--|------------------|
| Ramp-Up ( $T_{s,max}$ to $T_p$ )                                   | 3°C / second max |
| Preheat  |                  |
| - Temperature Min ( $T_{s,min}$ )                                  | 150°C            |
| - Temperature Max ( $T_{s,max}$ )                                  | 200°C            |
| - Time ( $t_{s,min}$ to $t_{s,max}$ )                              | 180 sec. max     |
| Time maintained above  |                  |
| - Temperature ( $T_L$ )  | 217°C            |
| - Time ( $t_L$ )   | 60 sec. max      |
| Peak temperature ( $T_{p,max}$ )                                   | 260°C            |
| Customer Peak temperature ( $T_p$ )                                | < 260°C          |
| Time within 5°C of peak temperature ( $T_p \pm 5^\circ\text{C}$ )* | 10 sec.          |
| Ramp-Down  | 6°C / sec.       |

\* Example :  $T_p = 238.5^\circ\text{C} \Rightarrow t_p = \text{time between } 238.5^\circ\text{C and } 233.5^\circ\text{C} (T_p \pm 5^\circ\text{C})$

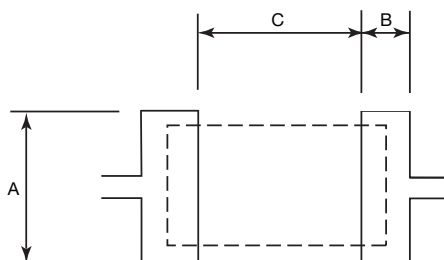


# Reflow soldering referring to JEDEC Standard with some limitations  
# JEDEC J-Std 020C

### RECOMMENDED SOLDER PASTE THICKNESS

For optimum solderability, the recommended soldering paste thickness: 1206 to 1812 :150 to 200µm

In case of hand soldering, the temperature of the soldering iron should not be above 250°C. Special care must be taken to avoid touching the capacitor body with the iron tip.



### PAD DIMENSIONS: MILLIMETERS (INCHES)

| Size Code | Case Size | A            | B            | C            |
|-----------|-----------|--------------|--------------|--------------|
| 01        | 1206      | 1.30 (0.051) | 1.30 (0.051) | 2.20 (0.087) |
| 02        | 1210      | 2.00 (0.079) | 1.30 (0.051) | 2.20 (0.087) |
| 03        | 1812      | 3.00 (0.118) | 1.50 (0.059) | 3.50 (0.137) |

### RECOMMENDED CLEANING

To clean flux from the PC board assembly, the recommended products are: ethanol, isopropyl alcohol, and deionized water wash. The cleaning products to avoid are: Toluene, Xylene, Trichloroethylene, Terpene Cleaner EC-7, surface active agent. In case of using another solvent, please contact us.

### OTHER CAUTIONS

**Flame retardancy:** the dielectric film is not a flame retardant material.

**Environment:** contact us when chips are used in humid or gas atmosphere and /or when using resin.

**Recommended handling:** do not use edged tools, so not to damage the capacitors.

### TIN WHISKERS TESTS : JEDEC STANDARD NO 22A121

| Stress Type                            | Ref. Spec.  | Test Conditions   | Analysis   | Results |
|--|-------------|---|------------|---------|
| Temperature cycling                    | JESD22-A104 | -55°C +85(+10/-0)°C air<br>5 to 10 minutes soak 3 cycles/hour | SEM x 1000 | Pass    |
| Ambient Temperature / Humidity Storage |             | 30+/-2°C - 60+/-3% RH -2000H                                  | SEM x 1000 | Pass    |
| High Temperature / Humidity Storage    |             | 70+/-5°C - 93+3/-2% RH -1000H                                 | SEM x 1000 | Pass    |

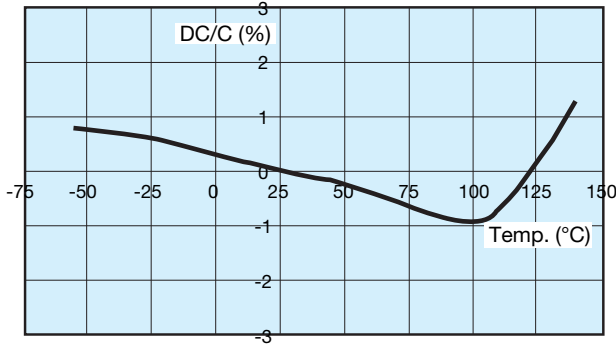
# CB SERIES: PPS DIELECTRIC – LEAD FREE VERSION

## Electrical Characteristics versus Temperature and Frequency

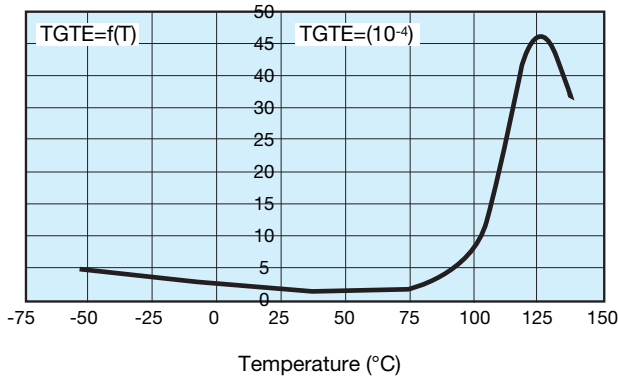
### ELECTRICAL CHARACTERISTICS VERSUS TEMPERATURE AND FREQUENCY

#### ELECTRICAL CHARACTERISTICS

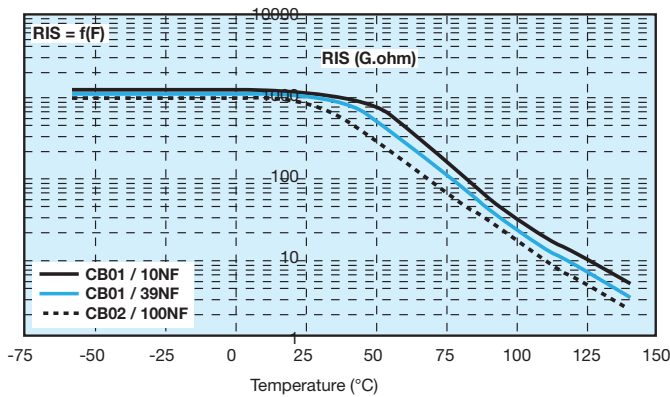
##### Capacitance



##### Dissipation Factor

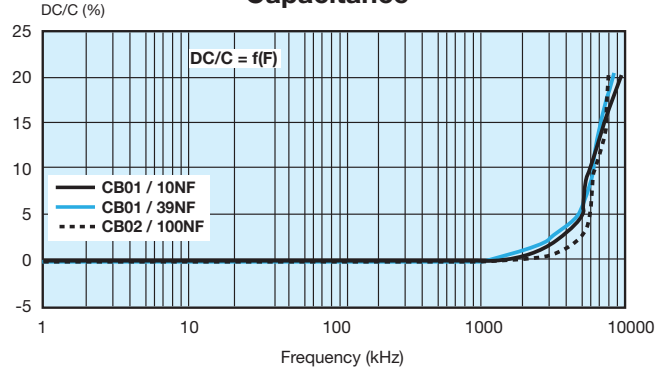


##### Insulation Resistance

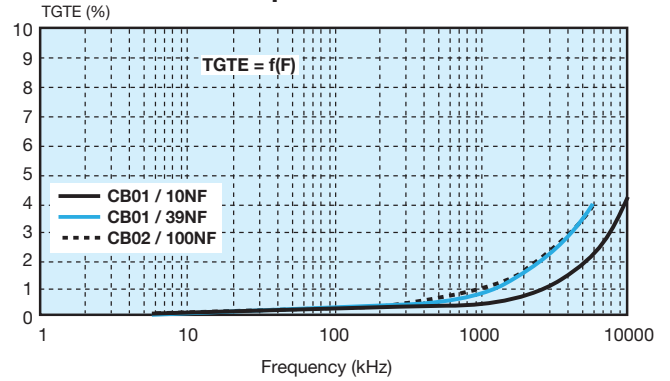


#### FREQUENCY CHARACTERISTICS

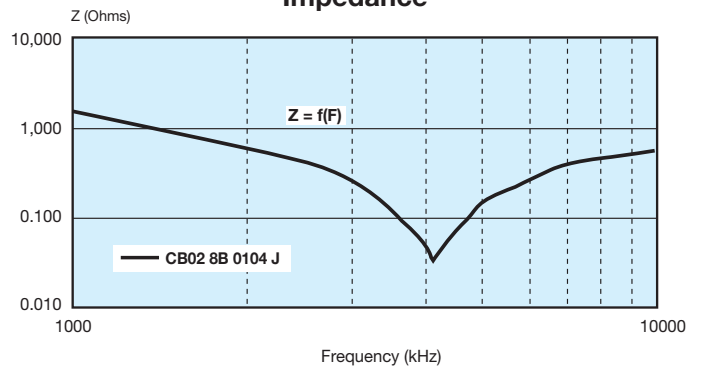
##### Capacitance



##### Dissipation Factor



##### Impedance



# CB SERIES: PPS DIELECTRIC – LEAD FREE VERSION

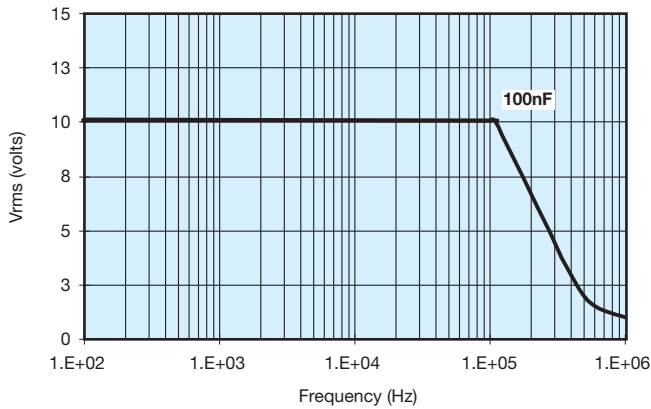
## RMS Voltage and Current versus Frequency

### RMS VOLTAGE AND CURRENT VERSUS FREQUENCY

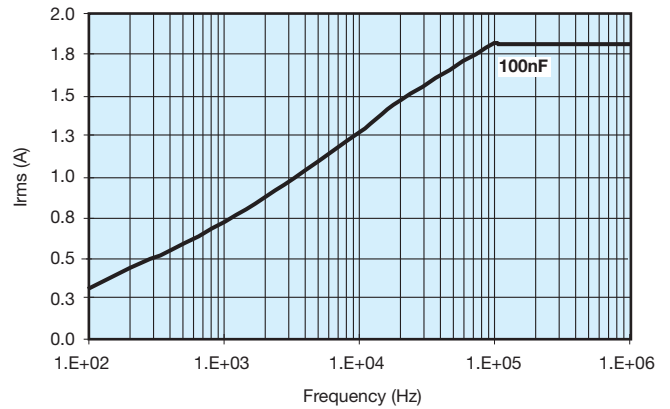
#### MAXIMUM VOLTAGE (VRMS) AND CURRENT (IRMS) VS FREQUENCY

Typical curves results from measurement carried out at ambient temperature (25°C) and sinusoidal wave-forms (for size CB01 to CB03)

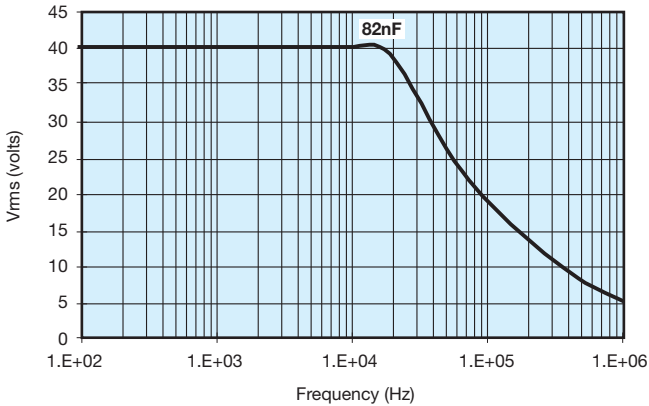
16 Vdc



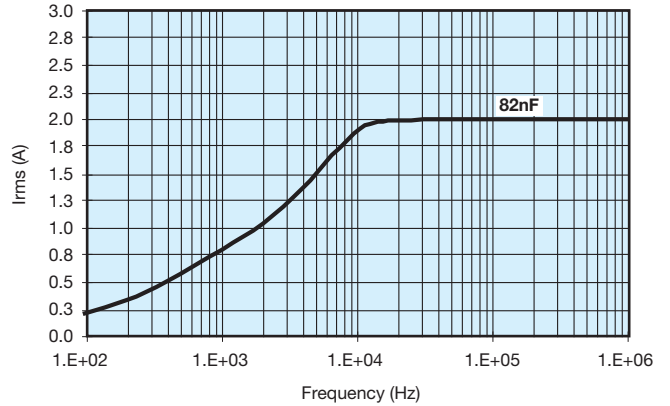
16 Vdc



50 Vdc



50 Vdc



# CB SERIES: PPS DIELECTRIC – LEAD FREE VERSION

## RoHS

### MATERIALS CONTROLLED BY ROHS (PPM BY WEIGHT):

| Mass / unit (g)         | Lead | Mercury | Cadmium | Hexavalent Chromium | PBB  | PBDE |
|-------------------------|------|---------|---------|---------------------|------|------|
| <b>CB range</b>         | 0    | 0       | 0       | 0                   | 0    | 0    |
| <b>RoHS Limit (ppm)</b> | 1000 | 1000    | 100     | 1000                | 1000 | 1000 |
| <b>Pass/Fail</b>        | Pass | Pass    | Pass    | Pass                | Pass | Pass |

This product has been tested and found to be compliant with all requirements, provisions, and exemptions of EU Directive 2002/95/EC of the European Parliament and Council of January 27, 2003. On the Restriction of use of certain Hazardous Substances (RoHS) in electrical and electronic equipment and EU Directive 2000/53/EC regarding ELV or End of Life Vehicle.

#### ROHS / ELV STATUS

External Plating

100% Matte Sn as standard

#### LEAD-FREE STATUS / MOISTURE SENSITIVITY RANKING

Pb Free Reflow Solder compliant, MSL = 2a.

Reflow soldering referring to Jedec Standard with some limitations. Additional JESD-97 data to be phased in MSL e3 termination.

### PRODUCT LABELING:

(For informational purposes only to be phased in on reel and container.)

### PRODUCT TRACEABILITY:

Full internal material traceability by reference to unique lot number marked on reel and external package.

Pb Free:



RoHS Compliant:



# CL SEREIS: HIGH SURGE VOLTAGE SMD FILM CAPACITORS – LEAD FREE VERSION ADSL

## General Description



### GENERAL DESCRIPTION

Film chip capacitor using a naked and stacked construction with metallized Polyethylene Naphtalate film (PEN) Usage of a multitrack technology results to an equivalent serial construction which gives better high voltage surge handling capability.

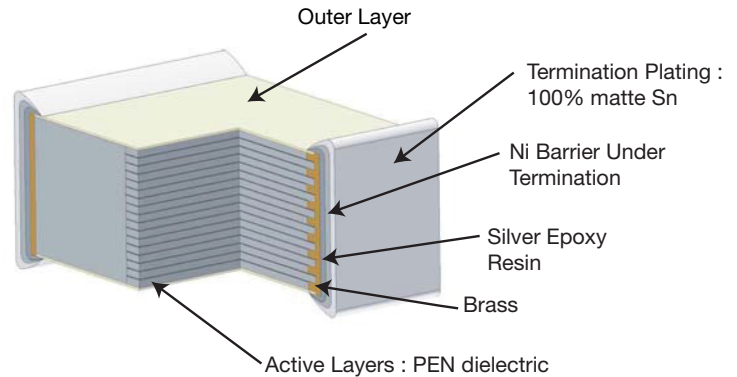
### ADVANTAGES

- Surge Voltage up to 1500V (10/700  $\mu$ s)
- Self healing
- Safe open failure mode
- Low ESR
- Surface Mount (IR/Vapor reflow) solution

### APPLICATIONS

This new version of our High Voltage SMD range has been developed to withstand high line surges common in telecom application.

These capacitors meet the telecom lightning strike protection standards.



### PERFORMANCE CHARACTERISTICS

|                                    |   |
|------------------------------------|---|
| Climatic Category                  | 55/125/56   |
| Capacitance Range                  | 6.8nF to 33nF   |
| Tolerance on $C_R$                 | $\pm 5\%$ , $\pm 10\%$  |
| Nominal Voltages                   | 630Vdc  |
| Test Voltage                       | 1500V (10/700 $\mu$ sec.)   |
| Soldering methods                  | IR or vapor phase reflow (not suitable for wave soldering)                        |
| Tangent of Loss Angle at 1kHz (DF) | $< 100 \times 10^{-4}$  |
| Insulation resistance minimum : IR | for $C \leq 0.33\mu F$ IR > 1000 M $\Omega$ at 20°C<br>for 1 min.charge at 100VDC |
| Temperature range                  | -55°C to 125°C with voltage derating of 1.25%/°C between 105°C and 125°C          |

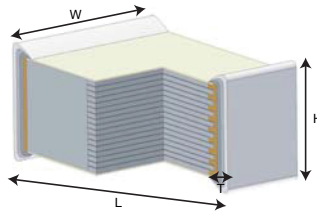


# CL SERIES: HIGH SURGE VOLTAGE SMD FILM CAPACITORS – LEAD FREE VERSION ADSL



## Capacitance Values & Nominal Voltages

### CAPACITANCE VALUES (CR) AND NOMINAL VOLTAGES (VR)



millimeters (inches)

| Capacitance Range (CR) | Ordering Code   | VOLTAGE Vdc: 630V                       |                 |                 |                 |                 |                 |                 |                 |                 |                 |      | Packaging Unit |    | Reel Pkg Code |
|------------------------|-----------------|---|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------|----------------|----|---------------|
|                        |                 | Chip Dimensions<br>*Tolerances (page 6) |                 |                 |                 | Tape Dimensions |                 |                 | Reel Dimensions |                 |                 |      |                |    |               |
|                        |                 | L                                       | W               | H max           | T               | W               | P1              | K0              | A               | W1              | W2 max          | Bulk | Reel           |    |               |
| 0.0068μF               | CL057K0682+ --  | 7.20<br>(0.283)                         | 6.10<br>(0.240) | 2.40<br>(0.094) | 0.80<br>(0.032) | 24.0<br>(0.944) | 12.0<br>(0.472) | 3.80<br>(0.149) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 1000 | 2250           | BC |               |
| 0.0082                 | CL057K0822+ --  | 7.20<br>(0.283)                         | 6.10<br>(0.240) | 2.30<br>(0.090) | 0.80<br>(0.032) | 24.0<br>(0.944) | 12.0<br>(0.472) | 3.80<br>(0.149) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 1000 | 2250           | BC |               |
| 0.010μF                | CL057K0103+ --  | 7.20<br>(0.283)                         | 6.10<br>(0.240) | 2.80<br>(0.110) | 0.80<br>(0.032) | 24.0<br>(0.944) | 12.0<br>(0.472) | 3.80<br>(0.149) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 1000 | 2250           | BC |               |
| 0.012                  | CL057K0123+ --  | 7.20<br>(0.283)                         | 6.10<br>(0.240) | 2.40<br>(0.094) | 0.80<br>(0.032) | 24.0<br>(0.944) | 12.0<br>(0.472) | 3.80<br>(0.149) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 1000 | 2250           | BC |               |
| 0.015                  | CL057K0153+ --  | 7.20<br>(0.283)                         | 6.10<br>(0.240) | 2.90<br>(0.114) | 0.80<br>(0.032) | 24.0<br>(0.944) | 12.0<br>(0.472) | 3.80<br>(0.149) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 1000 | 2250           | BC |               |
| 0.018                  | CL057K0183+ --  | 7.20<br>(0.283)                         | 6.10<br>(0.240) | 3.40<br>(0.134) | 0.80<br>(0.032) | 16.0<br>(0.629) | 12.0<br>(0.472) | 3.80<br>(0.149) | 330<br>(12.99)  | 16.4<br>(0.645) | 22.4<br>(0.881) | 1000 | 2250           | BC |               |
| 0.022                  | CL957K0223+ --  | 7.20<br>(0.283)                         | 10.0<br>(0.394) | 3.00<br>(0.118) | 0.80<br>(0.032) | 16.0<br>(0.629) | 12.0<br>(0.472) | 4.80<br>(0.189) | 330<br>(12.99)  | 16.4<br>(0.645) | 22.4<br>(0.881) | 1000 | 1300           | BC |               |
| 0.027                  | CL957K0273+ --  | 7.20<br>(0.283)                         | 10.0<br>(0.394) | 3.70<br>(0.146) | 0.80<br>(0.032) | 16.0<br>(0.629) | 12.0<br>(0.472) | 4.80<br>(0.189) | 330<br>(12.99)  | 16.4<br>(0.645) | 22.4<br>(0.881) | 1000 | 1300           | BC |               |
| 0.033μF                | CL957K0333+ --  | 7.20<br>(0.283)                         | 10.0<br>(0.394) | 4.00<br>(0.158) | 0.80<br>(0.032) | 16.0<br>(0.629) | 12.0<br>(0.472) | 5.23<br>(0.206) | 330<br>(12.99)  | 16.4<br>(0.645) | 22.4<br>(0.881) | 1000 | 1100           | BC |               |
| VOLTAGE Vdc: 1000V     |                 |   |                 |                 |                 |                 |                 |                 |                 |                 |                 |      |                |    |               |
| 0.080μF                | *CL967K0803+ -- | 10.5<br>(0.413)                         | 9.50<br>(0.373) | 9.10<br>(0.358) | 0.80<br>(0.032) | 24.0<br>(0.944) | 16.0<br>(0.629) | 9.40<br>(0.369) | 330<br>(12.99)  | 24.4<br>(0.961) | 30.4<br>(1.196) | 400  | 400            | BC |               |

\*Dedicated for HID lamp applications

For other Values: upon request

Replace the + by the tolerance code: J = 5% or K = 10%

Replace the -- by the packaging suffix: -- = bulk

BC = tape & reel

# CL SERIES: HIGH SURGE VOLTAGE SMD FILM CAPACITORS – LEAD FREE VERSION ADSL



## Mounting and Soldering Recommendations

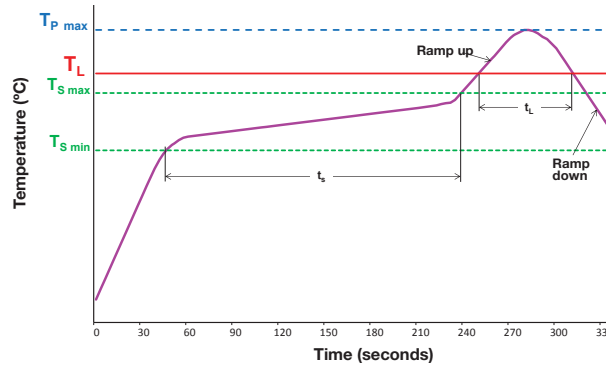
### MOUNTING AND SOLDERING RECOMMENDATIONS SOLDERING PROFILE

The capacitors can be mounted using infrared and vapor phase soldering following recommended below. They are NOT suitable for wave soldering.

All temperature refer to topside of the package, measured on the package body surface.

| Profile Feature                                      | 2824 to 2840     |
|--|------------------|
| Ramp-Up ( $T_{s,max}$ to $T_p$ )                     | 3°C / second max |
| Preheat  | 150°C            |
| - Temperature Min ( $T_{s,min}$ )                    | 200°C            |
| - Temperature Max ( $T_{s,max}$ )                    | 180 sec. max     |
| - Time ( $t_{s,min}$ to $t_{s,max}$ )                |                  |
| Time maintained above                                | 217°C            |
| - Temperature ( $T_L$ )                              | 60 sec. max      |
| - Time ( $t_L$ )                                     |                  |
| Peak temperature ( $T_{p,max}$ )                     | 255°C            |
| Customer Peak temperature ( $T_p$ )                  | < 255°C          |
| Time within 5°C of peak temperature ( $T_p - 5°C$ )* | 10 sec.          |
| Ramp-Down  | 6°C / sec.       |

\* Example :  $T_p = 238.5°C \Rightarrow t_p =$  time between 238.5°C and 233.5°C ( $T_p - 5°C$ )

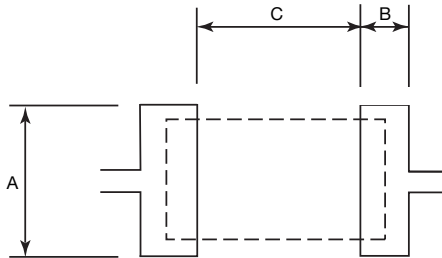


# Reflow soldering referring to JEDEC Standard with some limitations  
# JEDEC J-Std 020C

### RECOMMENDED SOLDER PASTE THICKNESS

For optimum solderability, the recommended soldering paste thickness:  
2824: 150 to 200µm  
2840: 200 to 300µm

In case of hand soldering, the temperature of the soldering iron should not be above 250°C. Special care must be taken to avoid touching the capacitor body with the iron tip.



### PAD DIMENSIONS: MILLIMETERS (INCHES)

| Size Code | Case Size | A            | B            | C            |
|-----------|-----------|--------------|--------------|--------------|
| 05        | 2824      | 6.00 (0.234) | 2.50 (0.098) | 5.70 (0.224) |
| 95        | 2840      | 11.2 (0.440) | 2.50 (0.098) | 5.70 (0.224) |

### RECOMMENDED CLEANING

To clean flux from the PC board assembly, the recommended products are: ethanol, isopropyl alcohol, and deionized water wash. The cleaning products to avoid are: Toluene, Xylene, Trichloroethylene, Terpene Cleaner EC-7, surface active agent. In case of using another solvent, please contact us.

### OTHER CAUTIONS

**Flame retardancy:** the dielectric film is not a flame retardant material.

**Environment:** contact us when chips are used in humid or gas atmosphere and /or when using resin.

**Recommended handling:** do not use edged tools, so not to damage the capacitors.

### TIN WHISKERS TESTS : JEDEC STANDARD NO 22A121

| Stress Type                            | Ref. Spec.  | Test Conditions   | Analysis   | Results |
|--|-------------|---|------------|---------|
| Temperature cycling                    | JESD22-A104 | -55°C +85(+10/-0)°C air<br>5 to 10mn soak 3 cycles/hour | SEM x 1000 | Pass    |
| Ambient Temperature / Humidity Storage |             | 30+/-2°C - 60+/-3% RH -2000H                            | SEM x 1000 | Pass    |
| High Temperature / Humidity Storage    |             | 70+/-5°C - 93+3/-2% RH -1000H                           | SEM x 1000 | Pass    |

# CL SERIESX: HIGH SURGE VOLTAGE SMD FILM CAPACITORS – LEAD FREE VERSION ADSL



RoHS

## MATERIALS CONTROLLED BY ROHS (PPM BY WEIGHT):

| Mass / unit (g)         | Lead | Mercury | Cadmium | Hexavalent Chromium | PBB  | PBDE |
|-------------------------|------|---------|---------|---------------------|------|------|
| <b>CB range</b>         | 0    | 0       | 0       | 0                   | 0    | 0    |
| <b>RoHS Limit (ppm)</b> | 1000 | 1000    | 100     | 1000                | 1000 | 1000 |
| <b>Pass/Fail</b>        | Pass | Pass    | Pass    | Pass                | Pass | Pass |

This product has been tested and found to be compliant with all requirements, provisions, and exemptions of EU Directive 2002/95/EC of the European Parliament and Council of January 27, 2003. On the Restriction of use of certain Hazardous Substances (RoHS) in electrical and electronic equipment and EU Directive 2000/53/EC regarding ELV or End of Life Vehicle.

|  |   |
|--|---|
| <h3>ROHS / ELV STATUS</h3> <p>External Plating<br/>100% Matte Sn as standard</p> | <h3>LEAD-FREE STATUS / MOISTURE SENSITIVITY RANKING</h3> <p>Pb Free Reflow Solder compliant, MSL = 3.<br/>Reflow soldering referring to Jedec Standard with some limitations. Additional JESD-97 data to be phased in MSL e3 termination.</p> |
|--|---|

## PRODUCT LABELING:

(For informational purposes only to be phased in on reel and container.)

## PRODUCT TRACEABILITY:

Full internal material traceability by reference to unique lot number marked on reel and external package.

Pb Free:



RoHS Compliant:





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