

# CONDUCTIVE POLYMER ALUMINUM SOLID ELECTROLYTIC CAPACITORS

## PCL

Chip Type, Higher Capacitance  
LongLife Assurance



## Expanded

- Long life of 20000 hours at 105°C.
- High reliability, Low ESR, High ripple current.
- SMD type : Lead free reflow soldering condition at 260°C peak correspondence.
- Compliant to the RoHS directive (2011/65/EU, (EU)2015/863).
- AEC-Q200 compliant. Please contact us for details.

**PCL** Long Life **PCS**



## Specifications

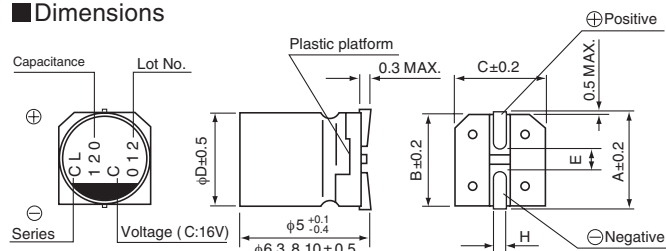
| Item                                              | Performance Characteristics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                    |                                                     |       |                                               |           |                                               |                       |                                                   |
|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------------------------------------------------|-------|-----------------------------------------------|-----------|-----------------------------------------------|-----------------------|---------------------------------------------------|
| Category Temperature Range                        | -55 to +105°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                    |                                                     |       |                                               |           |                                               |                       |                                                   |
| Rated Voltage Range                               | 2.5 to 25V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                    |                                                     |       |                                               |           |                                               |                       |                                                   |
| Rated Capacitance Range                           | 12 to 3300μF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                    |                                                     |       |                                               |           |                                               |                       |                                                   |
| Capacitance Tolerance                             | ±20% at 120Hz, 20°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                    |                                                     |       |                                               |           |                                               |                       |                                                   |
| Tangent of loss angle (tan δ)                     | Less than or equal to the specified value at 120Hz, 20°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                    |                                                     |       |                                               |           |                                               |                       |                                                   |
| ESR (※ 1)                                         | Less than or equal to the specified value at 100kHz, 20°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                    |                                                     |       |                                               |           |                                               |                       |                                                   |
| Leakage Current (※ 2)                             | Less than or equal to the specified value . After 2 minutes' application of rated voltage at 20°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                    |                                                     |       |                                               |           |                                               |                       |                                                   |
| Temperature Characteristics (Max.Impedance Ratio) | Z+105°C / Z+20°C ≤ 1.25 (100kHz)<br>Z-55°C / Z+20°C ≤ 1.25                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                    |                                                     |       |                                               |           |                                               |                       |                                                   |
| Endurance                                         | <p>The specifications listed at right shall be met when the capacitors are restored to 20°C after the rated voltage is applied for 20000 hours at 105°C.</p> <table border="1"> <tr> <td>Capacitance change</td><td>Within ± 20% of the initial capacitance value (※ 3)</td></tr> <tr> <td>tan δ</td><td>150% or less than the initial specified value</td></tr> <tr> <td>ESR (※ 1)</td><td>150% or less than the initial specified value</td></tr> <tr> <td>Leakage current (※ 2)</td><td>Less than or equal to the initial specified value</td></tr> </table>                                                                                                                                                                                                                                                                                                                                                                                                                        | Capacitance change | Within ± 20% of the initial capacitance value (※ 3) | tan δ | 150% or less than the initial specified value | ESR (※ 1) | 150% or less than the initial specified value | Leakage current (※ 2) | Less than or equal to the initial specified value |
| Capacitance change                                | Within ± 20% of the initial capacitance value (※ 3)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                    |                                                     |       |                                               |           |                                               |                       |                                                   |
| tan δ                                             | 150% or less than the initial specified value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                    |                                                     |       |                                               |           |                                               |                       |                                                   |
| ESR (※ 1)                                         | 150% or less than the initial specified value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                    |                                                     |       |                                               |           |                                               |                       |                                                   |
| Leakage current (※ 2)                             | Less than or equal to the initial specified value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                    |                                                     |       |                                               |           |                                               |                       |                                                   |
| Damp Heat (Steady State)                          | <p>The specifications listed at right shall be met when the capacitors are restored to 20°C after the rated voltage is applied for 1000 hours at 60°C, 90% RH.</p> <table border="1"> <tr> <td>Capacitance change</td><td>Within ± 20% of the initial capacitance value (※ 3)</td></tr> <tr> <td>tan δ</td><td>150% or less than the initial specified value</td></tr> <tr> <td>ESR (※ 1)</td><td>150% or less than the initial specified value</td></tr> <tr> <td>Leakage current (※ 2)</td><td>Less than or equal to the initial specified value</td></tr> </table>                                                                                                                                                                                                                                                                                                                                                                                                                  | Capacitance change | Within ± 20% of the initial capacitance value (※ 3) | tan δ | 150% or less than the initial specified value | ESR (※ 1) | 150% or less than the initial specified value | Leakage current (※ 2) | Less than or equal to the initial specified value |
| Capacitance change                                | Within ± 20% of the initial capacitance value (※ 3)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                    |                                                     |       |                                               |           |                                               |                       |                                                   |
| tan δ                                             | 150% or less than the initial specified value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                    |                                                     |       |                                               |           |                                               |                       |                                                   |
| ESR (※ 1)                                         | 150% or less than the initial specified value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                    |                                                     |       |                                               |           |                                               |                       |                                                   |
| Leakage current (※ 2)                             | Less than or equal to the initial specified value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                    |                                                     |       |                                               |           |                                               |                       |                                                   |
| Resistance to Soldering Heat                      | <p>After soldering the capacitor under the soldering conditions prescribed here, the capacitor shall meet the specifications listed at right.<br/>Pre-heating shall be done at 150 to 200°C and for 60 to 180 sec.<br/>The duration for over +230°C temperature at capacitor surface shall not exceed 60 seconds.<br/>In case peak temperature is 250°C or less, reflow soldering shall be two times maximum.<br/>In case peak temperature is 260°C or less, reflow soldering shall be once.<br/>Measurement for solder temperature profile shall be made at the capacitor top.</p> <table border="1"> <tr> <td>Capacitance change</td><td>Within ± 10% of the initial capacitance value (※ 3)</td></tr> <tr> <td>tan δ</td><td>130% or less than the initial specified value</td></tr> <tr> <td>ESR (※ 1)</td><td>130% or less than the initial specified value</td></tr> <tr> <td>Leakage current (※ 2)</td><td>Less than or equal to the initial specified value</td></tr> </table> | Capacitance change | Within ± 10% of the initial capacitance value (※ 3) | tan δ | 130% or less than the initial specified value | ESR (※ 1) | 130% or less than the initial specified value | Leakage current (※ 2) | Less than or equal to the initial specified value |
| Capacitance change                                | Within ± 10% of the initial capacitance value (※ 3)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                    |                                                     |       |                                               |           |                                               |                       |                                                   |
| tan δ                                             | 130% or less than the initial specified value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                    |                                                     |       |                                               |           |                                               |                       |                                                   |
| ESR (※ 1)                                         | 130% or less than the initial specified value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                    |                                                     |       |                                               |           |                                               |                       |                                                   |
| Leakage current (※ 2)                             | Less than or equal to the initial specified value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                    |                                                     |       |                                               |           |                                               |                       |                                                   |
| Marking                                           | Navy blue print on the case top                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |                                                     |       |                                               |           |                                               |                       |                                                   |

※ 1 ESR should be measured at both of the terminal ends closest where the terminals protrude through the plastic platform.

※ 2 Conditioning : If any doubt arises, measure the leakage current after the voltage treatment of applying DC rated voltage continuously to the capacitor for 120 minutes at 105°C.

※ 3 Initial value : The value before test of examination of resistance to soldering.

## Dimensions



| Size | φ5 × 6L    | φ6.3 × 6L  | φ8 × 7L    | φ8 × 10L   | φ8 × 12L   | φ10 × 10L  | φ10 × 12.7L |
|------|------------|------------|------------|------------|------------|------------|-------------|
| φD   | 5.0        | 6.3        | 8.0        | 8.0        | 8.0        | 10.0       | 10.0        |
| L    | 5.9        | 6.0        | 6.9        | 9.9        | 11.9       | 9.9        | 12.6        |
| A    | 6.0        | 7.3        | 9.0        | 9.0        | 9.0        | 11.0       | 11.0        |
| B    | 5.3        | 6.6        | 8.3        | 8.3        | 8.3        | 10.3       | 10.3        |
| C    | 5.3        | 6.6        | 8.3        | 8.3        | 8.3        | 10.3       | 10.3        |
| E    | 1.6        | 2.1        | 3.2        | 3.2        | 3.2        | 4.6        | 4.6         |
| H    | 0.5 to 0.8 | 0.5 to 0.8 | 0.8 to 1.1 | 0.8 to 1.1 | 0.8 to 1.1 | 0.8 to 1.1 | 0.8 to 1.1  |

## Type numbering system (Example : 16V 120μF)

| 1                            | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|
| P                            | C | L | 1 | C | 1 | 2 | 1 | M | C  | L  | 1  | G  | S  |
| Taping code                  |   |   |   |   |   |   |   |   |    |    |    |    |    |
| Size code                    |   |   |   |   |   |   |   |   |    |    |    |    |    |
| Configuration                |   |   |   |   |   |   |   |   |    |    |    |    |    |
| Capacitance tolerance (±20%) |   |   |   |   |   |   |   |   |    |    |    |    |    |
| Rated capacitance (120μF)    |   |   |   |   |   |   |   |   |    |    |    |    |    |
| Rated voltage (16V)          |   |   |   |   |   |   |   |   |    |    |    |    |    |
| Series name                  |   |   |   |   |   |   |   |   |    |    |    |    |    |
| Type                         |   |   |   |   |   |   |   |   |    |    |    |    |    |

## Voltage

| V    | 2.5 | 4 | 6.3 | 10 | 16 | 20 | 25 |
|------|-----|---|-----|----|----|----|----|
| Code | e   | g | j   | A  | C  | D  | E  |

## Frequency coefficient of rated ripple current

| Frequency   | 120Hz | 1kHz | 10kHz | 100kHz or more |
|-------------|-------|------|-------|----------------|
| Coefficient | 0.05  | 0.30 | 0.70  | 1.00           |

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## ■ Dimensions

| Rated Voltage<br>(V)<br>(code) | Surge<br>Voltage<br>(V) | Rated<br>Capacitance<br>(μF) | Case Size<br>φD×L (mm) | tan δ | Leakage Current<br>(μA) | ESR<br>(mΩ)<br>(20°C /100kHz) | Rated Ripple<br>(mArms)<br>(105°C /100kHz) | Part Number    |
|--------------------------------|-------------------------|------------------------------|------------------------|-------|-------------------------|-------------------------------|--------------------------------------------|----------------|
| 2.5<br>(0E)                    | 2.8                     | 270                          | 5×6                    | 0.12  | 337                     | 25                            | 2670                                       | PCL0E271MCL1GS |
|                                |                         | 560                          | ◇ 6.3×6                | 0.12  | 280                     | 20                            | 3500                                       | PCL0E561MCL3GS |
|                                |                         | 2200                         | 8×12                   | 0.12  | 1100                    | 14                            | 5220                                       | PCL0E222MCL1GS |
|                                |                         | 2700                         | 10×10                  | 0.12  | 1350                    | 12                            | 5500                                       | PCL0E272MCL1GS |
|                                |                         | 3300                         | 10×12.7                | 0.12  | 1650                    | 11                            | 5500                                       | PCL0E332MCL1GS |
| 4<br>(0G)                      | 4.6                     | 150                          | 5×6                    | 0.12  | 300                     | 25                            | 2100                                       | PCL0G151MCL1GS |
|                                |                         | 180                          | 5×6                    | 0.12  | 360                     | 25                            | 2300                                       | PCL0G181MCL1GS |
|                                |                         | 390                          | 6.3×6                  | 0.12  | 312                     | 24                            | 2700                                       | PCL0G391MCL1GS |
|                                |                         | 560                          | 8×7                    | 0.12  | 448                     | 22                            | 3200                                       | PCL0G561MCL1GS |
|                                |                         | 1200                         | 8×10                   | 0.12  | 960                     | 15                            | 5400                                       | PCL0G122MCL1GS |
|                                |                         | 1800                         | 8×12                   | 0.12  | 1440                    | 14                            | 5500                                       | PCL0G182MCL1GS |
|                                |                         | 2200                         | 10×10                  | 0.12  | 1760                    | 12                            | 5400                                       | PCL0G222MCL1GS |
|                                |                         | 2700                         | 10×12.7                | 0.12  | 2160                    | 11                            | 5600                                       | PCL0G272MCL1GS |
| 6.3<br>(0J)                    | 7.2                     | 47                           | 5×6                    | 0.12  | 148                     | 30                            | 1900                                       | PCL0J470MCL1GS |
|                                |                         | 220                          | 6.3×6                  | 0.12  | 277                     | 22                            | 2500                                       | PCL0J221MCL1GS |
|                                |                         | 330                          | ◇ 6.3×6                | 0.12  | 415                     | 22                            | 2500                                       | PCL0J331MCL3GS |
|                                |                         | 330                          | 8×7                    | 0.12  | 415                     | 14                            | 3900                                       | PCL0J331MCL1GS |
|                                |                         | 680                          | 8×10                   | 0.12  | 856                     | 12                            | 4600                                       | PCL0J681MCL1GS |
|                                |                         | 1000                         | 8×12                   | 0.12  | 1260                    | 11                            | 4800                                       | PCL0J102MCL1GS |
|                                |                         | 1800                         | 10×12.7                | 0.12  | 2268                    | 10                            | 5500                                       | PCL0J182MCL1GS |
| 10<br>(1A)                     | 11.5                    | 33                           | 5×6                    | 0.12  | 165                     | 70                            | 1100                                       | PCL1A330MCL1GS |
|                                |                         | 68                           | 5×6                    | 0.12  | 340                     | 30                            | 1900                                       | PCL1A680MCL1GS |
|                                |                         | 120                          | 6.3×6                  | 0.12  | 240                     | 30                            | 2700                                       | PCL1A121MCL1GS |
|                                |                         | 150                          | 8×7                    | 0.12  | 300                     | 21                            | 2880                                       | PCL1A151MCL1GS |
|                                |                         | 180                          | ◇ 6.3×6                | 0.12  | 360                     | 27                            | 2700                                       | PCL1A181MCL3GS |
|                                |                         | 470                          | 8×10                   | 0.12  | 940                     | 17                            | 3800                                       | PCL1A471MCL1GS |
|                                |                         | 820                          | 10×10                  | 0.12  | 1640                    | 15                            | 4300                                       | PCL1A821MCL1GS |
|                                |                         | 1200                         | 10×12.7                | 0.12  | 2400                    | 13                            | 4800                                       | PCL1A122MCL1GS |
| 16<br>(1C)                     | 18.4                    | 22                           | 5×6                    | 0.12  | 176                     | 90                            | 1000                                       | PCL1C220MCL1GS |
|                                |                         | 39                           | 6.3×6                  | 0.12  | 124                     | 37                            | 2000                                       | PCL1C390MCL1GS |
|                                |                         | 82                           | 6.3×6                  | 0.12  | 262                     | 30                            | 2700                                       | PCL1C820MCL1GS |
|                                |                         | 100                          | ◇ 6.3×6                | 0.12  | 320                     | 30                            | 2500                                       | PCL1C101MCL3GS |
|                                |                         | 120                          | 8×7                    | 0.12  | 384                     | 27                            | 2900                                       | PCL1C121MCL1GS |
|                                |                         | 270                          | 8×10                   | 0.12  | 864                     | 20                            | 3600                                       | PCL1C271MCL1GS |
|                                |                         | 390                          | 8×12                   | 0.12  | 1248                    | 18                            | 3900                                       | PCL1C391MCL1GS |
|                                |                         | 470                          | 10×10                  | 0.12  | 1504                    | 16                            | 4200                                       | PCL1C471MCL1GS |
|                                |                         | 680                          | 10×12.7                | 0.12  | 2176                    | 14                            | 4700                                       | PCL1C681MCL1GS |
| 20<br>(1D)                     | 23.0                    | 27                           | 6.3×6                  | 0.12  | 108                     | 60                            | 1400                                       | PCL1D270MCL1GS |
|                                |                         | 39                           | 8×7                    | 0.12  | 156                     | 45                            | 2000                                       | PCL1D390MCL1GS |
|                                |                         | 100                          | 8×12                   | 0.12  | 400                     | 22                            | 3200                                       | PCL1D101MCL1GS |
|                                |                         | 180                          | 10×12.7                | 0.12  | 720                     | 20                            | 4300                                       | PCL1D181MCL1GS |
| 25<br>(1E)                     | 28.7                    | 12                           | 6.3×6                  | 0.12  | 100                     | 70                            | 1200                                       | PCL1E120MCL1GS |
|                                |                         | 15                           | ◇ 6.3×6                | 0.12  | 100                     | 70                            | 1200                                       | PCL1E150MCL3GS |
|                                |                         | 33                           | 8×10                   | 0.12  | 165                     | 50                            | 2000                                       | PCL1E330MCL1GS |
|                                |                         | 56                           | 10×10                  | 0.12  | 280                     | 45                            | 2200                                       | PCL1E560MCL1GS |
|                                |                         | 82                           | 10×12.7                | 0.12  | 410                     | 30                            | 3800                                       | PCL1E820MCL1GS |

No marked, [1] will be put at 12th digit of type numbering system.  
◇ : In this case, [3] will be put at 12th digit of type numbering system.

Blue : New product (as of October 2020)

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NICHICON CORPORATION