

- High voltage (to 100V), Low ESR, High ripple current.
- Long life of 3000 hours at 105°C.
- Radial lead type:  
Lead free flow soldering condition correspondence.
- Compliant to the RoHS directive (2011/65/EU).



## Specifications

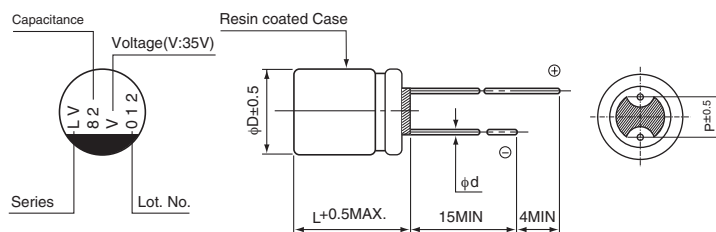
| Item                                              | Performance Characteristics                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                               |                    |                                                    |       |                                               |           |                                               |                       |                                                   |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|----------------------------------------------------|-------|-----------------------------------------------|-----------|-----------------------------------------------|-----------------------|---------------------------------------------------|
| Category Temperature Range                        | -55 to +105°C                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                               |                    |                                                    |       |                                               |           |                                               |                       |                                                   |
| Rated Voltage Range                               | 16 to 100V                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                               |                    |                                                    |       |                                               |           |                                               |                       |                                                   |
| Rated Capacitance Range                           | 6.8 to 470μF                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                               |                    |                                                    |       |                                               |           |                                               |                       |                                                   |
| 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                                         | The specifications listed at right shall be met when the capacitors are restored to 20°C after the rated voltage is applied for 3000 hours at 105°C.                                                                                                                                                                                                   | <table><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)                          | 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.                                                                                                                                                                                            | <table><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                      | After soldering the capacitor under the soldering conditions prescribed here as preheat at 150 to 200°C for 60 to 180 seconds and peak temperature at 265°C for 10 seconds or less, the capacitor shall meet the specifications listed at right, provided that its temperature profile is measured at both of terminal ends facing the soldering side. | <table><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 to the capacitor body.

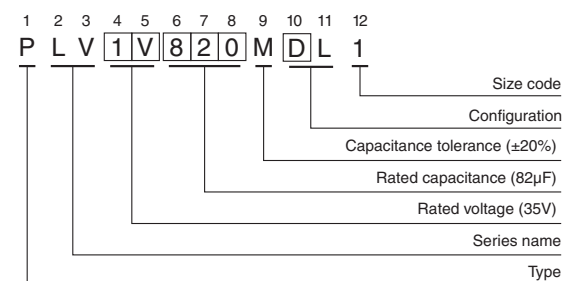
※ 2 Conditioning : If any doubt arises, measure the leakage current after the voltage treatment of applying DC rated voltage continuously to the capacitor for 120 minutes at 105°C.

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

## Dimensions



## Type numbering system (Example : 35V 82μF)



| (mm) |         |          |           |
|------|---------|----------|-----------|
| Size | φ8 × 9L | φ8 × 12L | φ10 × 13L |
| φD   | 8.0     | 8.0      | 10.0      |
| L    | 8.5     | 11.5     | 12.5      |
| P    | 3.5     | 3.5      | 5.0       |
| φd   | 0.6     | 0.6      | 0.6       |

## Voltage

| V    | 16 | 20 | 25 | 35 | 50 | 63 | 80 | 100 |
|------|----|----|----|----|----|----|----|-----|
| Code | C  | D  | E  | V  | H  | J  | K  | 2A  |

Please refer to page 20 about the end seal configuration.

● Dimension table in next page.



# ■ Standard Ratings

| Rated Voltage<br>(V)<br>code | Surge Voltage<br>(V) | Rated Capacitance<br>(μF) | Case Size<br>φD × L (mm) | tan δ | Leakage Current<br>(μA) | ESR (mΩ)<br>(at 100kHz 20°C) | Rated Ripple<br>(mA <sub>rms</sub> ) | Part Number  |
|------------------------------|----------------------|---------------------------|--------------------------|-------|-------------------------|------------------------------|--------------------------------------|--------------|
| 16<br>(1C)                   | 18.4                 | 220                       | 8 × 9                    | 0.12  | 704                     | 26                           | 2100                                 | PLV1C221MCL1 |
|                              |                      | 270                       | 8 × 12                   | 0.12  | 864                     | 24                           | 2500                                 | PLV1C271MDL1 |
|                              |                      | 470                       | 10 × 13                  | 0.12  | 1504                    | 23                           | 2900                                 | PLV1C471MDL1 |
| 20<br>(1D)                   | 23.0                 | 150                       | 8 × 9                    | 0.12  | 600                     | 27                           | 2000                                 | PLV1D151MCL1 |
|                              |                      | 220                       | 8 × 12                   | 0.12  | 880                     | 25                           | 2400                                 | PLV1D221MDL1 |
|                              |                      | 330                       | 10 × 13                  | 0.12  | 1320                    | 24                           | 2800                                 | PLV1D331MDL1 |
| 25<br>(1E)                   | 28.7                 | 120                       | 8 × 9                    | 0.12  | 600                     | 28                           | 2000                                 | PLV1E121MCL1 |
|                              |                      | 150                       | 8 × 12                   | 0.12  | 750                     | 26                           | 2400                                 | PLV1E151MDL1 |
|                              |                      | 270                       | 10 × 13                  | 0.12  | 1350                    | 25                           | 2800                                 | PLV1E271MDL1 |
| 35<br>(1V)                   | 40.2                 | 56                        | 8 × 9                    | 0.12  | 392                     | 29                           | 1900                                 | PLV1V560MCL1 |
|                              |                      | 82                        | 8 × 12                   | 0.12  | 574                     | 27                           | 2300                                 | PLV1V820MDL1 |
|                              |                      | 150                       | 10 × 13                  | 0.12  | 1050                    | 26                           | 2700                                 | PLV1V151MDL1 |
| 50<br>(1H)                   | 57.5                 | 33                        | 8 × 9                    | 0.12  | 330                     | 32                           | 1900                                 | PLV1H330MCL1 |
|                              |                      | 39                        | 8 × 12                   | 0.12  | 390                     | 29                           | 2200                                 | PLV1H390MDL1 |
|                              |                      | 68                        | 10 × 13                  | 0.12  | 680                     | 28                           | 2600                                 | PLV1H680MDL1 |
| 63<br>(1J)                   | 72.4                 | 22                        | 8 × 9                    | 0.12  | 277                     | 35                           | 1800                                 | PLV1J220MCL1 |
|                              |                      | 27                        | 8 × 12                   | 0.12  | 340                     | 33                           | 2100                                 | PLV1J270MDL1 |
|                              |                      | 47                        | 10 × 13                  | 0.12  | 592                     | 29                           | 2600                                 | PLV1J470MDL1 |
| 80<br>(1K)                   | 92                   | 10                        | 8 × 9                    | 0.12  | 160                     | 40                           | 1700                                 | PLV1K100MCL1 |
|                              |                      | 12                        | 8 × 12                   | 0.12  | 192                     | 38                           | 1900                                 | PLV1K120MDL1 |
|                              |                      | 22                        | 10 × 13                  | 0.12  | 352                     | 35                           | 2300                                 | PLV1K220MDL1 |
| 100<br>(2A)                  | 115                  | 6.8                       | 8 × 9                    | 0.12  | 136                     | 45                           | 1600                                 | PLV2A6R8MCL1 |
|                              |                      | 10                        | 8 × 12                   | 0.12  | 200                     | 42                           | 1800                                 | PLV2A100MDL1 |
|                              |                      | 18                        | 10 × 13                  | 0.12  | 360                     | 38                           | 2200                                 | PLV2A180MDL1 |

Rated ripple current (mA<sub>rms</sub>) at 105°C 100kHz

- Please refer to page 20, 21, 22 about the formed or taped product spec.
- Please refer to page 3 for the minimum order quantity.