

# Type LP 105 °C Snap-In Aluminum Electrolytic Capacitors

## Stable ESR, Long Life, Snap-In



Type LP radial snap-in aluminum electrolytic capacitors are small in size and are rated for low voltage applications. Their durable construction guarantees a long life while operating up to 105 °C with a stable ESR. These features make the Type LP ideal for use in switch-mode power supplies.

## Highlights

- High Reliability
- 105 °C
- 22 to 35 mm diameter with 10 mm lead spacing

## Specifications

|                                     |                       |
|-------------------------------------|-----------------------|
| <b>Capacitance Range:</b>           | 100 to 47,000 $\mu$ F |
| <b>Voltage Range:</b>               | 16 to 250 Vdc         |
| <b>Capacitance tolerance:</b>       | $\pm$ 20%             |
| <b>Operating Temperature Range:</b> | -40 °C to +105 °C     |
| <b>Dissipation Factor:</b>          |                       |

| DF at 120 Hz, +25 °C |    |         |         |          |
|----------------------|----|---------|---------|----------|
| Vdc                  | 16 | 25 - 35 | 50 - 63 | 100- 250 |
| DF %                 | 30 | 25      | 20      | 15       |

For values that are >1000  $\mu$ F, the DF (%) increases 2% for every additional 1000  $\mu$ F

### DC Leakage Test:

$I = .02CV$   
 C = capacitance in  $\mu$ F  
 V = rated voltage  
 I = leakage current in  $\mu$ A

### Voltage/Frequency Ripple Multipliers:

| Rated Vdc  | Ripple Multipliers |        |        |         |        |         |
|------------|--------------------|--------|--------|---------|--------|---------|
|            | 60 Hz              | 100 Hz | 300 Hz | 1000 Hz | 10 kHz | 100 kHz |
| 10 to 50   | 0.90               | 1.00   | 1.03   | 1.05    | 1.10   | 1.10    |
| 63 to 100  | 0.85               | 1.00   | 1.07   | 1.13    | 1.19   | 1.20    |
| 160 to 250 | 0.80               | 1.00   | 1.15   | 1.25    | 1.35   | 1.40    |

### Temperature Ripple Multipliers:

| Temperature | Ripple Multiplier |
|-------------|-------------------|
| +85 °C      | 1.65              |
| +65 °C      | 2.25              |
| +45 °C      | 2.55              |

The maximum ripple current at 105 °C and 120 Hz are the Ratings Table. Adjust to other temperature and frequencies using the tables here.

### Load Life Test:

1,000 h @ full load at +105 °C per EIA IS-749  
 $\Delta$  Capacitance  $\pm$ 20%  
 ESR 200% of limit  
 DCL 100% of limit

### Shelf Life:

500 h @ 105 °C, capacitance,  $\leq$ 200% ESR and DC  $\pm$ 20%, initial requirements

### Vibration:

10 to 55 Hz, 0.06" and 10 g max, 2 h in each plane



Complies with the EU Directive 2002/95/EC requirement restricting the use of Lead (Pb), Mercury (Hg), Cadmium (Cd), Hexavalent chromium (Cr(VI)), PolyBrominated Biphenyls (PBB) and PolyBrominated Diphenyl Ethers (PBDE).

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## Part Numbering System



| Diameter | Length |        |        |        |        |        |    |
|----------|--------|--------|--------|--------|--------|--------|----|
|          | 25     | 30     | 35     | 40     | 45     | 50     |    |
| mm (in)  | (1.00) | (1.18) | (1.38) | (1.57) | (1.77) | (2.00) |    |
| 22       | (0.87) | A1     | A3     | A5     | A7     | A4     | A9 |
| 25       | (1.00) | C1     | C3     | C5     | C7     | C4     | C9 |
| 30       | (1.18) | E1     | E3     | E5     | E7     | E4     | E9 |
| 35       | (1.38) | H1     | H3     | H5     | H7     | H4     | H9 |

## Outline Drawing



## Ratings

| Cap (μF)                    | Catalog Part Number | Max ESR @ 120 Hz +25 °C (Ω) | Max Ripple @ 120 Hz +105 °C (A) | Size (Inches) |       | Size (mm) |    |
|-----------------------------|---------------------|-----------------------------|---------------------------------|---------------|-------|-----------|----|
|                             |                     |                             |                                 | D             | L     | D         | L  |
| <b>16 Vdc; 20 Vdc Surge</b> |                     |                             |                                 |               |       |           |    |
| 4,700                       | LP472M016A1P3       | 0.141                       | 1.20                            | 0.866         | 0.984 | 22        | 25 |
| 5,600                       | LP562M016C1P3       | 0.120                       | 1.43                            | 0.984         | 0.984 | 25        | 25 |
| 8,200                       | LP822M016A5P3       | 0.081                       | 1.82                            | 0.866         | 1.378 | 22        | 35 |
| 12,000                      | LP123M016E3P3       | 0.055                       | 2.38                            | 1.181         | 1.181 | 30        | 30 |
| 15,000                      | LP153M016H3P3       | 0.046                       | 3.00                            | 1.378         | 1.181 | 35        | 30 |
| 22,000                      | LP223M016E7P3       | 0.030                       | 3.53                            | 1.181         | 1.575 | 30        | 40 |
| 27,000                      | LP273M016H7P3       | 0.025                       | 4.27                            | 1.378         | 1.575 | 35        | 40 |
| 33,000                      | LP333M016H9P3       | 0.020                       | 5.00                            | 1.378         | 1.969 | 35        | 50 |
| 47,000                      | LP473M016E9P3       | 0.020                       | 6.80                            | 1.181         | 1.969 | 30        | 50 |
| <b>25 Vdc; 32 Vdc Surge</b> |                     |                             |                                 |               |       |           |    |
| 2,700                       | LP272M025C1P3       | 0.180                       | 1.000                           | 0.984         | 0.984 | 25        | 25 |
| 3,300                       | LP332M025A1P3       | 0.151                       | 1.160                           | 0.866         | 0.984 | 22        | 25 |
| 3,300                       | LP332M025C1P3       | 0.150                       | 1.143                           | 0.984         | 0.984 | 25        | 25 |
| 4,700                       | LP472M025C1P3       | 0.106                       | 1.480                           | 0.984         | 0.984 | 25        | 25 |
| 5,600                       | LP562M025E1P3       | 0.090                       | 1.857                           | 1.181         | 0.984 | 30        | 25 |
| 5,600                       | LP562M025C3P3       | 0.089                       | 1.730                           | 0.984         | 1.181 | 25        | 30 |
| 6,800                       | LP682M025C5P3       | 0.073                       | 1.940                           | 0.984         | 1.378 | 25        | 35 |
| 10,000                      | LP103M025H3P3       | 0.050                       | 3.333                           | 1.378         | 1.181 | 35        | 30 |
| 12,000                      | LP123M025H3P3       | 0.041                       | 2.970                           | 1.378         | 1.181 | 35        | 30 |
| 15,000                      | LP153M025E7P3       | 0.033                       | 3.360                           | 1.181         | 1.575 | 30        | 40 |
| 22,000                      | LP223M025H9P3       | 0.023                       | 4.857                           | 1.378         | 1.969 | 35        | 50 |

| Cap (μF)                    | Catalog Part Number | Max ESR @ 120 Hz +25 °C (Ω) | Max Ripple @ 120 Hz +105 °C (A) | Size (Inches) |       | Size (mm) |    |
|-----------------------------|---------------------|-----------------------------|---------------------------------|---------------|-------|-----------|----|
|                             |                     |                             |                                 | D             | L     | D         | L  |
| <b>35 Vdc; 44 Vdc Surge</b> |                     |                             |                                 |               |       |           |    |
| 1,800                       | LP182M035A1P3       | 0.188                       | 1.040                           | 0.866         | 0.984 | 22        | 25 |
| 2,700                       | LP272M035C1P3       | 0.155                       | 1.257                           | 0.984         | 0.984 | 25        | 25 |
| 3,900                       | LP392M035E1P3       | 0.108                       | 1.571                           | 1.181         | 0.984 | 30        | 25 |
| 5,600                       | LP562M035E3P3       | 0.074                       | 2.050                           | 1.181         | 1.181 | 30        | 30 |
| 6,800                       | LP682M035E5P3       | 0.060                       | 2.286                           | 1.181         | 1.378 | 30        | 35 |
| 6,800                       | LP682M035C7P3       | 0.061                       | 2.320                           | 0.984         | 1.575 | 25        | 40 |
| 8,200                       | LP822M035H3P3       | 0.051                       | 2.690                           | 1.378         | 1.181 | 35        | 30 |
| 10,000                      | LP103M035E7P3       | 0.041                       | 3.000                           | 1.181         | 1.575 | 30        | 40 |
| 12,000                      | LP123M035H7P3       | 0.035                       | 3.590                           | 1.378         | 1.575 | 35        | 40 |
| 15,000                      | LP153M035H9P3       | 0.028                       | 4.000                           | 1.378         | 1.969 | 35        | 50 |
| <b>50 Vdc; 63 Vdc Surge</b> |                     |                             |                                 |               |       |           |    |
| 1,200                       | LP122M050A1P3       | 0.280                       | 0.860                           | 0.866         | 0.984 | 22        | 25 |
| 1,500                       | LP152M050A1P3       | 0.225                       | 0.983                           | 0.866         | 0.984 | 22        | 25 |
| 2,200                       | LP222M050A5P3       | 0.151                       | 1.330                           | 0.866         | 1.378 | 22        | 35 |
| 2,200                       | LP222M050E1P3       | 0.150                       | 1.429                           | 1.181         | 0.984 | 30        | 25 |
| 3,300                       | LP332M050E3P3       | 0.101                       | 0.176                           | 1.181         | 1.181 | 30        | 30 |
| 3,300                       | LP332M050C5P3       | 0.101                       | 1.710                           | 0.984         | 1.378 | 25        | 35 |
| 3,300                       | LP332M050C3P3       | 0.101                       | 1.710                           | 0.984         | 1.181 | 25        | 30 |
| 3,900                       | LP392M050C7P3       | 0.085                       | 1.970                           | 0.984         | 1.575 | 25        | 40 |
| 4,700                       | LP472M050H3P3       | 0.071                       | 2.270                           | 1.378         | 1.181 | 35        | 30 |

# Type LP 105 °C Snap-In Aluminum Electrolytic Capacitors

| Cap<br>( $\mu$ F)             | Catalog<br>Part Number | Max ESR<br>@ 120 Hz<br>+25 °C<br>( $\Omega$ ) | Max Ripple<br>@ 120 Hz<br>+105 °C<br>(A) | Size<br>(Inches)            |       | Size<br>(mm) |    |
|-------------------------------|------------------------|---|--|-----------------------------|-------|--------------|----|
|                               |                        |   |  | D                           | L     | D            | L  |
|                               |                        |   |  | <b>50 Vdc; 63 Vdc Surge</b> |       |              |    |
| 5,600                         | LP562M050H5P3          | 0.059   | 2.60                                     | 1.378                       | 1.378 | 35           | 35 |
| 6,800                         | LP682M050E7P3          | 0.049   | 3.16                                     | 1.181                       | 1.575 | 30           | 40 |
| 6,800                         | LP682M050E9P3          | 0.049   | 3.16                                     | 1.181                       | 1.969 | 30           | 50 |
| 8,200                         | LP822M050H9P3          | 0.040   | 3.43                                     | 1.378                       | 1.969 | 35           | 50 |
| <b>63 Vdc; 75 Vdc Surge</b>   |                        |   |  |                             |       |              |    |
| 820                           | LP821M063A1P3          | 0.300   | 0.77                                     | 0.866                       | 0.984 | 22           | 25 |
| 1,200                         | LP122M063C1P3          | 0.210   | 0.99                                     | 0.984                       | 0.984 | 25           | 25 |
| 1,800                         | LP182M063A7P3          | 0.138   | 1.34                                     | 0.866                       | 1.575 | 22           | 40 |
| 1,800                         | LP182M063E1P3          | 0.140   | 1.37                                     | 1.181                       | 0.984 | 30           | 25 |
| 2,200                         | LP222M063E3P3          | 0.113   | 1.55                                     | 1.181                       | 1.181 | 30           | 30 |
| 3,300                         | LP332M063H3P3          | 0.076   | 1.20                                     | 1.378                       | 1.181 | 35           | 30 |
| 4,700                         | LP472M063E9P3          | 0.053   | 2.84                                     | 1.181                       | 1.969 | 30           | 50 |
| 6,800                         | LP682M063H9P3          | 0.037   | 3.36                                     | 1.378                       | 1.969 | 35           | 50 |
| <b>100 Vdc; 125 Vdc Surge</b> |                        |   |  |                             |       |              |    |
| 820                           | LP821M100E1P3          | 0.3   | 0.98                                     | 1.181                       | 0.984 | 30           | 25 |
| 2,200                         | LP222M100H7P3          | 0.113   | 2.03                                     | 1.378                       | 1.575 | 35           | 40 |
| 2,700                         | LP272M100H9P3          | 0.092   | 2.32                                     | 1.378                       | 1.969 | 35           | 50 |
| 2,700                         | LP272M100H7P3          | 0.092   | 2.32                                     | 1.378                       | 1.575 | 35           | 40 |
| <b>200 Vdc; 250 Vdc Surge</b> |                        |   |  |                             |       |              |    |
| 150                           | LP151M200C1P3          | 1.650   | 0.509                                    | 0.984                       | 0.984 | 25           | 25 |
| 150                           | LP151M200A1P3          | 1.650   | 0.509                                    | 0.866                       | 0.984 | 22           | 25 |
| 180                           | LP181M200C1P3          | 1.400   | 0.571                                    | 0.984                       | 0.984 | 25           | 25 |
| 220                           | LP221M200C1P3          | 1.100   | 0.646                                    | 0.984                       | 0.984 | 25           | 25 |
| 220                           | LP221M200E1P3          | 1.100   | 0.646                                    | 1.181                       | 0.984 | 30           | 25 |
| 220                           | LP221M200A3P3          | 1.130   | 0.660                                    | 0.866                       | 1.181 | 22           | 30 |
| 270                           | LP271M200E1P3          | 0.920   | 0.790                                    | 1.181                       | 0.984 | 30           | 25 |
| 270                           | LP271M200C3P3          | 0.920   | 0.790                                    | 0.984                       | 1.181 | 25           | 30 |
| 330                           | LP331M200E3P3          | 0.750   | 0.886                                    | 1.181                       | 1.181 | 30           | 30 |
| 390                           | LP391M200C5P3          | 0.640   | 0.980                                    | 0.984                       | 1.378 | 25           | 35 |
| 470                           | LP471M200E5P3          | 0.540   | 1.143                                    | 1.181                       | 1.378 | 30           | 35 |

| Cap<br>( $\mu$ F)             | Catalog<br>Part Number | Max ESR<br>@ 120 Hz<br>+25 °C<br>( $\Omega$ ) | Max Ripple<br>@ 120 Hz<br>+105 °C<br>(A) | Size<br>(Inches)              |       | Size<br>(mm) |    |
|-------------------------------|------------------------|---|--|-------------------------------|-------|--------------|----|
|                               |                        |   |  | D                             | L     | D            | L  |
|                               |                        |   |  | <b>200 Vdc; 250 Vdc Surge</b> |       |              |    |
| 470                           | LP471M200E1P3          | 0.540   | 1.140                                    | 1.181                         | 0.984 | 30           | 25 |
| 470                           | LP471M200H3P3          | 0.540   | 1.143                                    | 1.378                         | 1.181 | 35           | 30 |
| 560                           | LP561M200H3P3          | 0.440   | 1.310                                    | 1.378                         | 1.181 | 35           | 30 |
| 680                           | LP681M200E3P3          | 0.370   | 1.520                                    | 1.181                         | 1.181 | 30           | 30 |
| 680                           | LP681M200E5P3          | 0.370   | 1.510                                    | 1.181                         | 1.378 | 30           | 35 |
| 680                           | LP681M200H1P3          | 0.370   | 1.510                                    | 1.378                         | 0.984 | 35           | 25 |
| 820                           | LP821M200H7P3          | 0.300   | 1.750                                    | 1.378                         | 1.575 | 35           | 40 |
| 820                           | LP821M200H3P3          | 0.300   | 1.750                                    | 1.378                         | 1.181 | 35           | 30 |
| 1,000                         | LP102M200H9P3          | 0.250   | 2.114                                    | 1.378                         | 1.969 | 35           | 50 |
| 1,000                         | LP102M200H5P3          | 0.250   | 2.114                                    | 1.378                         | 1.378 | 35           | 35 |
| 1,200                         | LP122M200E9P3          | 0.165   | 2.810                                    | 1.181                         | 1.969 | 30           | 50 |
| 1,200                         | LP122M200H5P3          | 0.165   | 2.740                                    | 1.378                         | 1.378 | 35           | 35 |
| 1,500                         | LP152M200H4P3          | 0.134   | 3.330                                    | 1.378                         | 1.772 | 35           | 45 |
| 1,800                         | LP182M200H9P3          | 0.112   | 3.800                                    | 1.378                         | 1.969 | 35           | 50 |
| <b>250 Vdc; 300 Vdc Surge</b> |                        |   |  |                               |       |              |    |
| 100                           | LP101M250A1P3          | 2.500   | 0.410                                    | 0.866                         | 0.984 | 22           | 25 |
| 150                           | LP151M250C1P3          | 1.660   | 0.540                                    | 0.984                         | 0.984 | 25           | 25 |
| 180                           | LP181M250C3P3          | 1.400   | 0.686                                    | 0.984                         | 1.181 | 25           | 30 |
| 220                           | LP221M250E1P3          | 1.130   | 0.710                                    | 1.181                         | 0.984 | 30           | 25 |
| 270                           | LP271M250C3P3          | 0.922   | 0.840                                    | 0.984                         | 1.181 | 25           | 30 |
| 330                           | LP331M250E3P3          | 0.750   | 0.914                                    | 1.181                         | 1.181 | 30           | 30 |
| 390                           | LP391M250H3P3          | 0.640   | 1.090                                    | 1.378                         | 1.181 | 35           | 30 |
| 470                           | LP471M250E7P3          | 0.530   | 1.260                                    | 1.181                         | 1.575 | 30           | 40 |
| 470                           | LP471M250H1P3          | 0.530   | 1.260                                    | 1.378                         | 0.984 | 35           | 25 |
| 560                           | LP561M250H3P3          | 0.347   | 1.800                                    | 1.378                         | 1.181 | 35           | 30 |
| 680                           | LP681M250E9P3          | 0.370   | 1.920                                    | 1.181                         | 1.969 | 30           | 50 |
| 680                           | LP681M250H5P3          | 0.370   | 2.070                                    | 1.378                         | 1.378 | 35           | 35 |
| 820                           | LP821M250H7P3          | 0.243   | 2.400                                    | 1.378                         | 1.575 | 35           | 40 |
| 1,000                         | LP102M250H4P3          | 0.200   | 2.720                                    | 1.378                         | 1.772 | 35           | 45 |
| 1,200                         | LP122M250H9P3          | 0.165   | 3.100                                    | 1.378                         | 1.969 | 35           | 50 |

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