

# SK [ For General ]

85°C Single-Ended Lead Aluminum Electrolytic Capacitors

## Miniature Aluminum Electrolytic Capacitors

### ELECTRICAL CHARACTERISTICS

Operating Temperature Range : -40 ~ +85°C / -25 ~ +85°C

Rated Voltage Range : 6.3 ~ 100V / 160 ~ 450V

Rated Capacitance Range : 0.1 ~ 22000μF / 0.47 ~ 470μF

Capacitance Tolerance : -20 ~ +20% at 120Hz, 20°C

DC Leakage Current (μA) :  $I = 0.01CV$  (μA) or  $3\mu A / I = 0.03CV$  (μA) + 10μA whichever is greater.  
(After Rated Voltage Applied for 2 Minutes )

Dissipation Factor

|           |     |    |    |    |    |    |    |     |           |           |
|-----------|-----|----|----|----|----|----|----|-----|-----------|-----------|
| WV (V):   | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | 160 ~ 250 | 350 ~ 450 |
| D.F (%) : | 24  | 20 | 16 | 14 | 12 | 10 | 10 | 10  | 20        | 24        |

For capacitors whose capacitance exceeds 1000μF. The value of DF(%) is increased by 2% for every addition of 1000μF.

Endurance : After the rated voltage has been applied at 85°C for 2000 hours, the capacitors shall meet following requirements.

- Capacitance Change : Within 20% of Initial Value
- Dissipation Factor : 200% or Less of Initial Specified Value
- Leakage Current : Initial Specified Value or Less

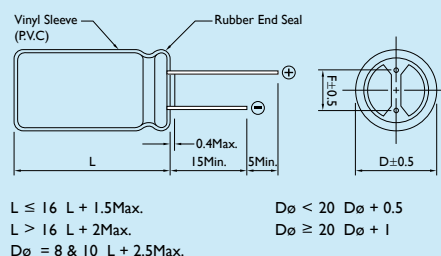
Shelf Life : After have been placed at 85°C without voltage applied for 1000 hours the capacitors shall meet following requirements.

- Capacitance Change : Within 20% of Initial Value
- Dissipation Factor : 200% or Less of Initial Specified Value
- Leakage Current : Initial Specified Value or Less

### DIAGRAM OF DIMENSIONS

| Dø   | F    | dø   |
|------|------|------|
| 4.0  | 1.5  | 0.45 |
| 5.0  | 2.0  | 0.5  |
| 6.3  | 2.5  |      |
| 8.0  | 3.5  | 0.6  |
| 10.0 | 5.0  |      |
| 12.0 |      |      |
| 13.0 |      |      |
| 16.0 | 7.5  | 0.8  |
| 18.0 |      |      |
| 22.0 | 10.0 |      |

Rubber Stand-off



### DESCRIPTION

Lower-cost capacitors suitable for high density printed circuit boards.

Very high volumetric efficiency

Ideally suited for general purpose applications, decoupling bypass, and filtering circuit in entertainment electronics.

Featuring high CV products with moderate cost

### MULTIPLIER FOR RIPPLE CURRENT

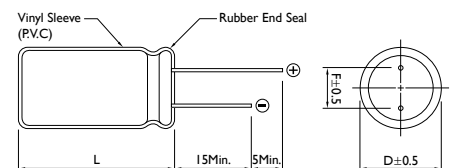
Frequency Coefficient

| FREQUENCY (Hz)        | 120  | 300  | 1K   | 10K~100K |
|-----------------------|------|------|------|----------|
| 6.3~100V Below~68μF   | 1.00 | 1.20 | 1.30 | 1.50     |
| 6.3~100V 100~680μF    | 1.00 | 1.10 | 1.15 | 1.20     |
| 6.3~110V 1000~22000μF | 1.00 | 1.05 | 1.10 | 1.15     |
| 160~450V Below~220μF  | 1.00 | 1.25 | 1.40 | 1.40     |
| 160~450V 220μF Above  | 1.00 | 1.10 | 1.13 | 1.13     |

Temperature Coefficient

| TEMPERATURE (°C) | 50   | 70   | 85   |
|------------------|------|------|------|
| FACTOR           | 1.30 | 1.15 | 1.00 |

Dimensions: mm





## CASE SIZE & PERMISSIBLE RIPPLE CURRENT OF STANDARD PRODUCTS

D × L: mm

| CAP. (μF) | RATED VOLTAGE WV (SURGE VOLTAGE WV) |        |          |        |          |          |          |        |           |        |           |         |           |         |     |
|-----------|-------------------------------------|--------|----------|--------|----------|----------|----------|--------|-----------|--------|-----------|---------|-----------|---------|-----|
|           | 6.3 (8)                             |        | 10 (13)  |        | 16 (20)  |          | 25 (32)  |        | 35 (44)   |        | 50 (63)   |         | 63 (79)   |         |     |
|           | SIZE                                | RIPPLE | SIZE     | RIPPLE | SIZE     | RIPPLE   | SIZE     | RIPPLE | SIZE      | RIPPLE | SIZE      | RIPPLE  | SIZE      | RIPPLE  |     |
| 0.10      |                                     |        |          |        |          |          |          |        |           |        | 5 × 11    | 1       |           |         |     |
| 0.22      |                                     |        |          |        |          |          |          |        |           |        | 5 × 11    | 2       |           |         |     |
| 0.33      |                                     |        |          |        |          |          |          |        |           |        | 5 × 11    | 3       | 5 × 11    | 3       |     |
| 0.47      |                                     |        |          |        |          |          |          |        |           |        | 5 × 11    | 5       | 5 × 11    | 5       |     |
| 0.68      |                                     |        |          |        |          |          |          |        |           |        | 5 × 11    | 7       |           |         |     |
| 1.0       |                                     |        | 5 × 11   | 10     | 5 × 11   | 10       |          |        |           |        | 5 × 11    | 10      | 5 × 11    | 10      |     |
| 2.2       |                                     |        | 5 × 11   | 20     |          |          |          |        |           |        | 5 × 11    | 23      | 5 × 11    | 29      |     |
| 3.3       |                                     |        |          |        |          |          |          |        |           |        | 5 × 11    | 35      | 5 × 11    | 40      |     |
| 4.7       |                                     |        | 5 × 11   | 20     | 5 × 11   | 25       | 5 × 11   | 30     | 5 × 11    | 35     | 5 × 11    | 40      | 5 × 11    | 45      |     |
| 6.8       |                                     |        |          |        |          |          |          |        |           |        | 5 × 11    | 50      |           |         |     |
| 10        |                                     |        | 5 × 11   | 35     | 5 × 11   | 40       | 5 × 11   | 50     | 5 × 11    | 60     | 5 × 11    | 65      | 5 × 11    | 70      |     |
| 15        |                                     |        |          |        | 5 × 11   | 50       |          |        |           |        | 5 × 11    | 80      |           |         |     |
| 22        | 5 × 11                              | 35     | 5 × 11   | 55     | 5 × 11   | 75       | 5 × 11   | 90     | 5 × 11    | 95     | 5 × 11    | 100     | 5 × 11    | 95      |     |
|           |                                     |        |          |        |          |          |          |        |           |        |           |         | 6.3 × 11  | 115     |     |
| 33        | 5 × 11                              | 55     | 5 × 11   | 80     | 5 × 11   | 110      | 5 × 11   | 115    | 5 × 11    | 120    | 5 × 11    | 105     | 6.3 × 11  | 130     |     |
|           |                                     |        |          |        |          |          |          |        |           |        | 6.3 × 11  | 125     | 8 × 11    | 140     |     |
| 47        | 5 × 11                              | 75     | 5 × 11   | 95     | 5 × 11   | 130      | 5 × 11   | 135    | 5 × 11    | 120    | 6.3 × 11  | 140     | 6.3 × 11  | 160     |     |
|           |                                     |        |          |        |          |          | 6.3 × 11 | 135    | 6.3 × 11  | 140    | 8 × 11    | 150     | 8 × 11    | 190     |     |
| 68        |                                     |        |          |        | 5 × 11   | 150      | 6.3 × 11 | 145    | 8 × 11    | 180    |           |         |           |         |     |
| 100       | 5 × 11                              | 130    | 5 × 11   | 180    | 5 × 11   | 165      | 6.3 × 11 | 160    | 6.3 × 11  | 185    | 8 × 11    | 230     | 10 × 12   | 300     |     |
|           |                                     |        |          |        |          | 6.3 × 11 | 185      | 8 × 11 | 200       | 8 × 11 | 230       | 10 × 12 | 250       | 10 × 15 | 300 |
| 150       |                                     |        |          |        | 6.3 × 11 | 205      |          |        |           |        |           |         |           |         |     |
| 220       | 5 × 11                              | 200    | 5 × 11   | 215    | 6.3 × 11 | 260      | 8 × 11   | 290    | 8 × 11    | 290    | 10 × 12   | 380     | 10 × 15   | 410     |     |
|           | 6.3 × 11                            | 240    | 6.3 × 11 | 250    | 8 × 11   | 320      | 10 × 12  | 340    | 10 × 12   | 370    | 10 × 15   | 440     | 10 × 19.5 | 490     |     |
|           |                                     |        |          |        |          |          |          |        | 10 × 15   | 370    |           |         |           |         |     |
| 330       | 6.3 × 11                            | 260    | 6.3 × 11 | 265    | 6.3 × 11 | 290      | 8 × 11   | 315    | 8 × 15    | 386    | 10 × 15   | 490     | 10 × 19.5 | 540     |     |
|           | 8 × 11                              | 300    | 8 × 11   | 330    | 8 × 11   | 360      | 8 × 15   | 380    | 10 × 12   | 420    | 10 × 19.5 | 580     | 13 × 20   | 680     |     |
|           |                                     |        |          |        |          |          | 10 × 12  | 420    | 10 × 15   | 490    | 13 × 13   | 530     |           |         |     |
| 470       | 6.3 × 11                            | 330    | 6.3 × 11 | 320    | 8 × 11   | 400      | 8 × 15   | 420    | 10 × 15   | 430    | 10 × 19.5 | 610     | 13 × 20   | 755     |     |
|           | 8 × 11                              | 380    | 8 × 11   | 400    | 10 × 12  | 470      | 10 × 12  | 460    | 10 × 19.5 | 510    | 13 × 20   | 760     | 13 × 25   | 880     |     |
|           |                                     |        |          |        |          |          | 10 × 15  | 540    | 13 × 20   | 640    |           |         | 16 × 25   | 880     |     |

Note: I. Ripple Current: (mA/rms) 85°C, 120Hz

## CASE SIZE & PERMISSIBLE RIPPLE CURRENT OF STANDARD PRODUCTS

D x L: mm

| CAP. (μF) | RATED VOLTAGE W V (SURGE VOLTAGE W V) |        |           |        |           |        |           |        |           |        |         |        |         |        |
|-----------|---------------------------------------|--------|-----------|--------|-----------|--------|-----------|--------|-----------|--------|---------|--------|---------|--------|
|           | 6.3 (8)                               |        | 10 (13)   |        | 16 (20)   |        | 25 (32)   |        | 35 (44)   |        | 50 (63) |        | 63 (79) |        |
|           | SIZE                                  | RIPPLE | SIZE      | RIPPLE | SIZE      | RIPPLE | SIZE      | RIPPLE | SIZE      | RIPPLE | SIZE    | RIPPLE | SIZE    | RIPPLE |
| 680       | 8 x 11                                | 410    | 10 x 12   | 460    | 10 x 12   | 510    | 10 x 15   | 540    | 13 x 20   | 705    |         |        | 13 x 25 | 965    |
|           |                                       |        |           |        | 10 x 15   | 565    | 10 x 19.5 | 595    | 13 x 25   | 780    |         |        | 16 x 25 | 1085   |
| 1000      | 8 x 11                                | 460    | 10 x 12   | 580    | 10 x 12   | 530    | 10 x 19.5 | 760    | 10 x 19.5 | 770    | 13 x 25 | 1100   | 16 x 25 | 1310   |
|           | 10 x 12                               | 580    | 10 x 15   | 630    | 10 x 15   | 630    | 12 x 16   | 760    | 13 x 20   | 950    | 16 x 25 | 1350   | 16 x 32 | 1550   |
|           |                                       |        |           |        | 10 x 19.5 | 790    | 13 x 16   | 760    | 13 x 25   | 1100   |         |        |         |        |
|           |                                       |        |           |        |           |        | 13 x 20   | 950    |           |        |         |        |         |        |
| 1200      | 10 x 12                               | 620    | 10 x 15   | 754    |           |        |           |        |           |        |         |        |         |        |
| 1500      |                                       |        | 10 x 19.5 | 700    | 13 x 16   | 825    |           |        | 16 x 25   | 1240   |         |        |         |        |
| 2200      | 10 x 19.5                             | 840    | 10 x 19.5 | 880    | 10 x 19.5 | 925    | 13 x 20   | 1100   | 16 x 25   | 1600   | 16 x 36 | 1850   | 18 x 40 | 2200   |
|           | 13 x 20                               | 1050   | 13 x 20   | 1100   | 13 x 20   | 1100   | 13 x 25   | 1300   | 16 x 32   | 1800   | 18 x 36 | 2090   | 22 x 35 | 2200   |
|           |                                       |        |           |        | 13 x 25   | 1350   | 16 x 25   | 1550   |           |        |         |        | 22 x 40 | 2200   |
|           |                                       |        |           |        |           |        | 18 x 20   | 1550   |           |        |         |        |         |        |
| 3300      | 10 x 19.5                             | 1000   | 13 x 20   | 1250   | 13 x 20   | 1200   | 16 x 25   | 1660   | 16 x 36   | 1970   | 18 x 36 | 2170   | 22 x 40 | 2500   |
|           | 13 x 20                               | 1250   | 13 x 25   | 1400   | 13 x 25   | 1400   | 16 x 32   | 1950   | 18 x 36   | 2220   | 18 x 40 | 2400   |         |        |
|           |                                       |        |           |        | 16 x 25   | 1700   |           |        |           |        |         |        |         |        |
| 4700      | 13 x 20                               | 1300   | 13 x 25   | 1500   | 13 x 40   | 1882   | 16 x 32   | 1950   | 16 x 36   | 2136   | 18 x 50 | 2350   |         |        |
|           | 13 x 25                               | 1437   | 16 x 25   | 1800   | 16 x 25   | 1800   | 18 x 36   | 2360   | 18 x 36   | 2400   | 22 x 35 | 2240   |         |        |
|           | 16 x 25                               | 1700   |           |        | 16 x 32   | 2100   |           |        |           |        | 22 x 40 | 2500   |         |        |
| 6800      | 16 x 25                               | 1900   | 16 x 25   | 1900   | 16 x 32   | 1980   | 18 x 36   | 2550   | 18 x 40   | 2200   |         |        |         |        |
|           |                                       |        | 16 x 32   | 2150   | 16 x 36   | 2200   |           |        | 22 x 40   | 2600   |         |        |         |        |
|           |                                       |        |           |        | 18 x 36   | 2500   |           |        |           |        |         |        |         |        |
| 10000     | 16 x 25                               | 1900   | 16 x 36   | 2225   | 18 x 36   | 2700   | 22 x 40   | 2800   |           |        |         |        |         |        |
|           | 16 x 32                               | 2250   | 18 x 36   | 2500   |           |        |           |        |           |        |         |        |         |        |
| 15000     | 16 x 36                               | 2500   | 18 x 36   | 2950   | 22 x 40   | 3150   | 22 x 40   | 3200   |           |        |         |        |         |        |
|           | 18 x 36                               | 2880   |           |        |           |        |           |        |           |        |         |        |         |        |
| 22000     | 18 x 40                               | 3650   | 22 x 40   | 3700   | 22 x 40   | 3800   |           |        |           |        |         |        |         |        |

Note: I. Ripple Current: (mA/rms) 85°C, 120Hz



## CASE SIZE & PERMISSIBLE RIPPLE CURRENT OF STANDARD PRODUCTS

D × L: mm

| CAP. (μF) | RATED VOLTAGE WV (SURGE VOLTAGE WV) |        |           |        |           |        |           |        |           |        |           |        |           |        |
|-----------|-------------------------------------|--------|-----------|--------|-----------|--------|-----------|--------|-----------|--------|-----------|--------|-----------|--------|
|           | 100 (125)                           |        | 160 (200) |        | 200 (250) |        | 250 (300) |        | 350 (400) |        | 400 (450) |        | 450 (500) |        |
|           | SIZE                                | RIPPLE | SIZE      | RIPPLE | SIZE      | RIPPLE | SIZE      | RIPPLE | SIZE      | RIPPLE | SIZE      | RIPPLE | SIZE      | RIPPLE |
| 0.22      | 5 × 11                              | 5      |           |        |           |        |           |        |           |        |           |        |           |        |
| 0.47      | 5 × 11                              | 10     | 5 × 11    | 12     | 5 × 11    | 14     | 5 × 11    | 14     | 5 × 11    | 14     | 6.3 × 11  | 14     | 6.3 × 11  | 14     |
| 1.0       | 5 × 11                              | 21     | 5 × 11    | 17     | 5 × 11    | 19     | 5 × 11    | 17     | 6.3 × 11  | 19     | 6.3 × 11  | 16     | 6.3 × 11  | 15     |
|           |                                     |        | 6.3 × 11  | 17     |           |        | 6.3 × 11  | 19     |           |        | 8 × 11    | 19     | 8 × 11    | 19     |
| 2.2       | 5 × 11                              | 30     | 6.3 × 11  | 26     | 6.3 × 11  | 22     | 6.3 × 11  | 24     | 8 × 11    | 33     | 8 × 11    | 26     | 10 × 12   | 33     |
|           |                                     |        |           |        | 8 × 11    | 27     | 8 × 11    | 30     | 10 × 12   | 33     | 10 × 12   | 33     |           |        |
| 3.3       | 5 × 11                              | 45     | 6.3 × 11  | 30     | 6.3 × 11  | 30     | 8 × 11    | 30     | 8 × 11    | 33     | 10 × 12   | 40     | 10 × 15   | 42     |
|           |                                     |        | 8 × 11    | 35     | 8 × 11    | 37     | 10 × 12   | 38     | 10 × 12   | 39     |           |        |           |        |
| 4.7       | 5 × 11                              | 50     | 6.3 × 11  | 32     | 8 × 11    | 36     | 8 × 11    | 36     | 8 × 11    | 36     | 10 × 15   | 45     | 10 × 15   | 50     |
|           |                                     |        | 8 × 11    | 40     | 10 × 12   | 45     | 10 × 12   | 45     | 10 × 12   | 39     |           |        | 10 × 19.5 | 50     |
|           |                                     |        |           |        |           |        |           |        | 10 × 15   | 45     |           |        |           |        |
| 6.8       | 5 × 11                              | 55     |           |        |           |        | 8 × 11    | 40     |           |        |           |        | 10 × 15   | 50     |
|           |                                     |        |           |        |           |        | 10 × 12   | 50     |           |        |           |        | 10 × 19.5 | 50     |
| 10        | 5 × 11                              | 65     | 8 × 11    | 50     | 10 × 12   | 57     | 10 × 15   | 70     | 10 × 15   | 70     | 10 × 15   | 50     | 13 × 20   | 60     |
|           | 6.3 × 11                            | 75     | 10 × 12   | 65     | 10 × 15   | 70     | 10 × 19.5 | 70     | 13 × 20   | 70     | 10 × 19.5 | 56     | 13 × 25   | 75     |
|           |                                     |        | 10 × 15   | 65     |           |        |           |        |           |        | 13 × 20   | 70     |           |        |
| 15        | 8 × 11                              | 93     |           |        |           |        | 10 × 19.5 | 75     | 10 × 19.5 | 90     |           |        | 13 × 20   | 93     |
|           |                                     |        |           |        |           |        | 13 × 20   | 90     |           |        |           |        |           |        |
| 22        | 6.3 × 11                            | 105    | 10 × 15   | 110    | 10 × 15   | 120    | 10 × 19.5 | 130    | 13 × 20   | 130    | 13 × 20   | 100    | 16 × 20   | 100    |
|           | 8 × 11                              | 130    | 10 × 19.5 | 110    |           |        |           |        |           |        | 13 × 25   | 110    | 16 × 25   | 110    |
|           |                                     |        |           |        |           |        |           |        |           |        | 16 × 25   | 130    | 16 × 32   | 130    |
| 33        | 8 × 11                              | 140    | 10 × 19.5 | 150    | 10 × 19.5 | 160    | 13 × 20   | 140    | 13 × 25   | 170    | 13 × 25   | 140    | 16 × 25   | 145    |
|           | 10 × 12                             | 170    |           |        |           |        | 13 × 25   | 160    | 16 × 25   | 170    | 16 × 20   | 145    | 16 × 32   | 160    |
|           |                                     |        |           |        |           |        |           |        |           |        | 16 × 25   | 170    | 16 × 36   | 180    |
| 47        | 10 × 12                             | 190    | 12 × 16   | 145    | 13 × 20   | 160    | 13 × 20   | 180    | 16 × 25   | 220    | 16 × 25   | 180    | 18 × 36   | 200    |
|           | 10 × 15                             | 230    | 12 × 25   | 180    | 13 × 25   | 190    | 13 × 25   | 210    |           |        | 16 × 32   | 220    | 18 × 40   | 230    |
|           |                                     |        | 13 × 20   | 180    |           |        | 16 × 25   | 210    |           |        | 16 × 36   | 220    |           |        |
| 68        | 10 × 15                             | 280    |           |        | 13 × 25   | 230    |           |        |           |        | 18 × 25   | 236    | 18 × 32   | 265    |
| 100       | 10 × 19.5                           | 400    | 13 × 25   | 250    | 16 × 25   | 330    | 16 × 32   | 310    | 16 × 36   | 320    | 16 × 36   | 320    | 22 × 40   | 370    |
|           |                                     |        | 16 × 25   | 300    |           |        |           |        | 18 × 36   | 360    | 18 × 36   | 360    |           |        |

Note: I. Ripple Current: (mA/rms) 85°C, 120Hz

## CASE SIZE & PERMISSIBLE RIPPLE CURRENT OF STANDARD PRODUCTS

D x L: mm

| CAP. (μF) | RATED VOLTAGE W V (SURGE VOLTAGE W V) |        |           |        |           |        |           |        |           |        |           |        |           |        |
|-----------|---------------------------------------|--------|-----------|--------|-----------|--------|-----------|--------|-----------|--------|-----------|--------|-----------|--------|
|           | 100 (125)                             |        | 160 (200) |        | 200 (250) |        | 250 (300) |        | 350 (400) |        | 400 (450) |        | 450 (500) |        |
|           | SIZE                                  | RIPPLE | SIZE      | RIPPLE | SIZE      | RIPPLE | SIZE      | RIPPLE | SIZE      | RIPPLE | SIZE      | RIPPLE | SIZE      | RIPPLE |
| 150       | 13 x 20                               | 500    |           |        |           |        | 18 x 40   | 410    |           |        |           |        |           |        |
| 220       | 13 x 25                               | 710    | 16 x 32   | 450    | 18 x 25   | 485    | 18 x 36   | 540    |           |        | 18 x 40   | 800    |           |        |
|           |                                       |        | 16 x 36   | 510    | 18 x 32   | 540    | 18 x 40   | 600    |           |        |           |        |           |        |
|           |                                       |        |           |        | 18 x 36   | 600    |           |        |           |        |           |        |           |        |
| 330       | 13 x 25                               | 720    | 18 x 36   | 540    | 16 x 40   | 710    |           |        |           |        |           |        |           |        |
|           | 16 x 25                               | 860    | 18 x 40   | 600    | 16 x 45   | 750    |           |        |           |        |           |        |           |        |
|           |                                       |        |           |        | 18 x 32   | 685    |           |        |           |        |           |        |           |        |
|           |                                       |        |           |        | 18 x 36   | 725    |           |        |           |        |           |        |           |        |
|           |                                       |        |           |        | 18 x 40   | 800    |           |        |           |        |           |        |           |        |
| 470       | 13 x 40                               | 1100   | 22 x 40   | 900    | 18 x 40   | 750    |           |        |           |        |           |        |           |        |
|           | 16 x 25                               | 1100   |           |        | 22 x 35   | 1000   |           |        |           |        |           |        |           |        |
|           | 16 x 32                               | 1100   |           |        |           |        |           |        |           |        |           |        |           |        |
| 680       | 16 x 36                               | 1260   |           |        |           |        |           |        |           |        |           |        |           |        |
| 1000      | 18 x 40                               | 1350   |           |        |           |        |           |        |           |        |           |        |           |        |
|           | 22 x 35                               | 1680   |           |        |           |        |           |        |           |        |           |        |           |        |
| 2200      | 22 x 40                               | 2300   |           |        |           |        |           |        |           |        |           |        |           |        |

Note: I. Ripple Current: (mA/rms) 85°C, 120Hz

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