

# SAK

## +85°C Low Profile Radial Lead Aluminum Electrolytic Capacitors



For all general purpose applications

### FEATURES

- Low Profile
- Voltage range: 6.3 WVDC to 400 WVDC
- Capacitance range: 1  $\mu$ F to 10,000  $\mu$ F

### SPECIFICATIONS

|                                   |   |   |               |      |      |   |  |                 |       |                       |     |     |     |  |
|-----------------------------------|---|---|---------------|------|------|---|--|-----------------|-------|-----------------------|-----|-----|-----|--|
| Capacitance Tolerance             |   | $\pm 20\%$ at 120Hz, 20°C   |               |      |      |   |  |                 |       |                       |     |     |     |  |
| Operating Temperature Range       |   | -40°C to +85°C  |               |      |      |   |  |                 |       |                       |     |     |     |  |
| Dissipation Factor<br>120Hz, 20°C | WVDC  | 6.3   | 10            | 16   | 25   | 35  | 50   | 63              | 100   | 160                   | 200 | 250 | 400 |  |
|                                   | tan $\delta$  | .28   | .24           | .20  | .28  | .16   | .14  | .10             | .08   | .20                   | .20 | .20 | .25 |  |
|                                   |   | Note: For above D.F. specifications, add .02 for every 1,000 $\mu$ F above 1,000 $\mu$ F  |               |      |      |   |  |                 |       |                       |     |     |     |  |
| Impedance Ratio<br>(Max.) @120Hz  | WVDC  | 6.3   | 10            | 16   | 25   | 35  | 50   | 63              | 100   | 160                   | 200 | 250 | 400 |  |
|                                   | -25/20°C  | 5   | 4             | 3    | 2    | 2   | 2  | 2               | 2     | 4                     | 4   | 4   | 4   |  |
|                                   | -40/20°C  | 12  | 10            | 8    | 5    | 4   | 3  | 3               | 3     | 15                    | 15  | 15  | 10  |  |
| Leakage Current                   | WVDC  | $\leq 100$ WVDC   |               |      |      | $\leq 100$ WVDC                             |  |                 |       | $\leq 150$ WVDC       |     |     |     |  |
|                                   | Time  | 1 minute  |               |      |      | 2 minutes                                   |  |                 |       | 1 minute              |     |     |     |  |
|                                   |   | .03 CV or 4 $\mu$ A<br>Whichever is greater   |               |      |      | .01 CV or 3 $\mu$ A<br>Whichever is greater |  |                 |       | .04 CV or 100 $\mu$ A |     |     |     |  |
| Load Life                         | 2,000 hours at 85°C with rated WVDC<br>Capacitors will meet the requirements listed below |   |               |      |      |   |  |                 |       |                       |     |     |     |  |
|                                   | Capacitance change<br>Dissipation factor<br>Leakage current                               |   |               |      |      |   | <20% of initial measured value<br><200% of initial specified value<br><Initial specified value |                 |       |                       |     |     |     |  |
| Shelf Life                        |   | 1,000 hours at 85°C with no voltage applied.<br>Units will meet load life specifications. |               |      |      |   |  |                 |       |                       |     |     |     |  |
| Ripple Multipliers                | WVDC  | Capacitance ( $\mu$ F)  | Frequency(Hz) |      |      |   |  | Temperature(°C) |       |                       |     |     |     |  |
|                                   |   |   | 60            | 120  | 300  | 1K  | 10K  | +105°C          | +85°C | +70°C                 |     |     |     |  |
|                                   | 6.3 to 100  | $\leq 47$   | 0.75          | 1.0  | 1.35 | 1.57  | 2.0  | 1.0             | 1.3   | 1.5                   |     |     |     |  |
|                                   |   | $47 < C \leq 470 \mu$ F   | 0.8           | 1.0  | 1.23 | 1.32  | 1.5  | 1.0             | 1.3   | 1.5                   |     |     |     |  |
|                                   |   | $470 < C \leq 1,000 \mu$ F  | 0.85          | 1.0  | 1.1  | 1.13  | 1.15   | 1.0             | 1.3   | 1.5                   |     |     |     |  |
| 160 to 400                        | 10 to 150 $\mu$ F   | 0.8   | 1.0           | 1.25 | 1.40 | 1.60  | 1.0  | 1.4             | 1.8   |                       |     |     |     |  |

### SPECIAL ORDER OPTIONS

(See pages 33 thru 37)

- Special tolerances:  $\pm 10\%$  (K),  $-10\% + 30\%$  (Q)
- Tape and Reel/Ammo-Pack
- Cut, Formed, Cut and Formed, and Snap In Leads



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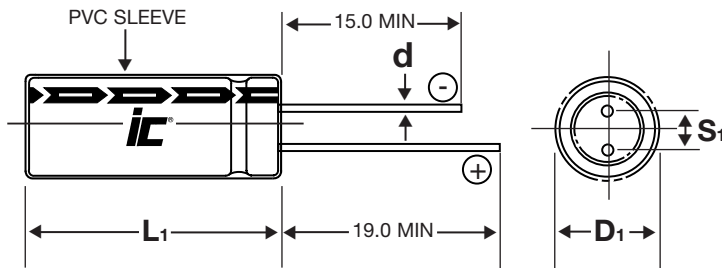
Aluminum Electrolytic

## PHYSICAL DIMENSIONS

| WVDC<br>( $\mu$ F) | 6.3<br>(8) | 10<br>(13) | 16<br>(20) | 25<br>(32) | 35<br>(44) | 50<br>(63) | 63<br>(79) | 100<br>(125) | 160<br>(200) | 200<br>(250) | 250<br>(300) | 400<br>(450) |
|--------------------|------------|------------|------------|------------|------------|------------|------------|--------------|--------------|--------------|--------------|--------------|
| 1                  |            |            |            |            |            | 5x9        |            | 5x9          |              |              |              |              |
| 2.2                |            |            |            |            |            | 5x9        |            | 5x9          |              |              |              |              |
| 3.3                |            |            |            |            |            | 5x9        |            | 5x9          |              |              |              |              |
| 4.7                |            |            |            |            |            | 5x9        |            | 5x9          |              |              |              |              |
| 10                 |            |            |            |            |            |            | 5x9        | 6.3x9        |              |              |              | 16x15        |
| 22                 |            |            |            |            |            | 5x9        | 6.3x9      | 8x9          |              |              | 16x15        | 18x15        |
| 33                 |            |            |            |            | 5x9        | 6.3x9      | 6.3x9      | 10x9         |              | 16x15        | 18x15        | 18x20        |
| 47                 |            |            |            | 5x9        |            | 6.3x9      | 8x9        | 10x12.5      | 16x15        | 18x15        | 18x20        | 18x25        |
| 68                 |            |            |            |            |            |            |            |              | 18x15        |              | 18x20        |              |
| 100                |            | 5x9        |            | 6.3x9      | 8x9        | 10x9       | 10x12.5    | 12.5x15      | 18x20        |              | 18x25        |              |
| 150                |            |            |            |            |            |            |            |              | 18x25        |              |              |              |
| 220                |            | 6.3x9      | 8x9        |            | 10x9       |            | 12.5x12.5  | 16x15        |              |              |              |              |
| 330                | 6.3x9      | 8x9        |            | 10x9       | 10x12.5    | 12.5x12.5  | 12.5x15    | 18x20        |              |              |              |              |
| 470                |            | 8x9        | 10x9       | 10x12.5    | 12.5x12.5  | 16x15      | 18x15      | 18x25        |              |              |              |              |
| 1000               | 10x9       | 10x12.5    | 12.5x12.5  | 12.5x15    | 16x15      | 18x20      | 18x25      |              |              |              |              |              |
| 2200               |            | 12.5x15    | 16x15      | 18x15      | 18x20      | 18x25      |            |              |              |              |              |              |
| 3300               |            | 16x15      | 18x15      | 18x20      |            |            |            |              |              |              |              |              |
| 4700               | 16x15      | 18x15      | 18x20      | 18x25      |            |            |            |              |              |              |              |              |
| 6800               | 18x15      | 18x20      | 18x25      |            |            |            |            |              |              |              |              |              |
| 10000              | 18x20      | 18x25      |            |            |            |            |            |              |              |              |              |              |

Convert to inches, divide by 25.4

DxL(mm)



### LEAD INFORMATION V.S. CASE DIAMETER

| D | 5.0 | 6.3 | 8.0 | 10.0 | 12.5 | 16.0 | 18.0 |
|---|-----|-----|-----|------|------|------|------|
| S | 2.0 | 2.5 | 3.5 | 5.0  | 5.0  | 7.5  | 7.5  |
| d | 0.5 | 0.5 | 0.6 | 0.6  | 0.6  | 0.8  | 0.8  |
| B | 0.5 | 0.5 | 0.5 | 0.5  | 0.8  | 0.5  | 0.5  |

$L_1 = L + 1.0$ mm Max.  $D \leq 8$ mm  
 $L_1 = L + 1.5$ mm Max.  $D \geq 10$ mm  
 $D_i = D + B$  Max.  
 $S_i = S \pm 0.5$  Max.

## STANDARD PART LISTING

| Capacitance (µF) | WVDC | IC <sup>®</sup> PART NUMBER | Maximum ESR Ω<br>120Hz, +20°C | Maximum RMS Ripple Current (mA)<br>120Hz, +85°C | Dimensions DxL (mm) |
|------------------|------|-----------------------------|-------------------------------|---|---------------------|
| 1                | 50   | 105SAK050M                  | 198.944                       | 13  | 5x9                 |
| 1                | 100  | 105SAK100M                  | 132.629                       | 21  | 5x9                 |
| 2.2              | 50   | 225SAK050M                  | 90.429                        | 26  | 5x9                 |
| 2.2              | 100  | 225SAK100M                  | 60.286                        | 30  | 5x9                 |
| 3.3              | 50   | 335SAK050M                  | 60.286                        | 35  | 5x9                 |
| 3.3              | 100  | 335SAK100M                  | 40.191                        | 40  | 5x9                 |
| 4.7              | 50   | 475SAK050M                  | 42.328                        | 40  | 5x9                 |
| 4.7              | 100  | 475SAK100M                  | 28.219                        | 50  | 5x9                 |
| 10               | 63   | 106SAK063M                  | 16.579                        | 70  | 5x9                 |
| 10               | 100  | 106SAK100M                  | 13.263                        | 80  | 6.3x9               |
| 10               | 400  | 106SAK400M                  | 41.447                        | 140   | 16x15               |
| 22               | 50   | 226SAK050M                  | 9.043                         | 90  | 5x9                 |
| 22               | 63   | 226SAK063M                  | 7.536                         | 110   | 6.3x9               |
| 22               | 100  | 226SAK100M                  | 6.029                         | 135   | 8x9                 |
| 22               | 250  | 226SAK250M                  | 15.071                        | 280   | 16x15               |
| 22               | 400  | 226SAK400M                  | 18.839                        | 280   | 18x15               |
| 33               | 35   | 336SAK035M                  | 7.033                         | 100   | 5x9                 |
| 33               | 50   | 336SAK050M                  | 6.029                         | 120   | 6.3x9               |
| 33               | 63   | 336SAK063M                  | 5.024                         | 135   | 6.3x9               |
| 33               | 100  | 336SAK100M                  | 4.019                         | 170   | 10x9                |
| 33               | 200  | 336SAK200M                  | 10.048                        | 350   | 16x15               |
| 33               | 250  | 336SAK250M                  | 10.048                        | 350   | 18x15               |
| 33               | 400  | 336SAK400M                  | 12.560                        | 350   | 18x20               |
| 47               | 25   | 476SAK025M                  | 5.644                         | 110   | 5x9                 |
| 47               | 50   | 476SAK050M                  | 4.233                         | 140   | 6.3x9               |
| 47               | 63   | 476SAK063M                  | 3.527                         | 175   | 8x9                 |
| 47               | 100  | 476SAK100M                  | 2.822                         | 230   | 10x12.5             |
| 47               | 160  | 476SAK160M                  | 7.055                         | 420   | 16x15               |
| 47               | 200  | 476SAK200M                  | 7.055                         | 420   | 18x15               |
| 47               | 250  | 476SAK250M                  | 7.055                         | 420   | 18x20               |
| 47               | 400  | 476SAK400M                  | 8.818                         | 420   | 18x25               |
| 68               | 160  | 686SAK160M                  | 4.876                         | 490   | 18x15               |
| 68               | 250  | 686SAK250M                  | 4.876                         | 490   | 18x20               |
| 100              | 10   | 107SAK010M                  | 3.979                         | 135   | 5x9                 |
| 100              | 25   | 107SAK025M                  | 2.653                         | 180   | 6.3x9               |
| 100              | 35   | 107SAK035M                  | 2.321                         | 210   | 8x9                 |
| 100              | 50   | 107SAK050M                  | 1.989                         | 240   | 10x9                |
| 100              | 63   | 107SAK063M                  | 1.658                         | 300   | 10x12.5             |
| 100              | 100  | 107SAK100M                  | 1.326                         | 370   | 12.5x15             |
| 100              | 160  | 107SAK160M                  | 3.316                         | 590   | 18x20               |
| 100              | 250  | 107SAK250M                  | 3.316                         | 590   | 18x25               |
| 150              | 200  | 157SAK200M                  | 2.210                         | 710   | 18x25               |
| 220              | 10   | 227SAK010M                  | 1.809                         | 220   | 6.3x9               |

| Capacitance (µF) | WVDC | IC <sup>®</sup> PART NUMBER | Maximum ESR Ω<br>120Hz, +20°C | Maximum RMS Ripple Current (mA)<br>120Hz, +85°C | Dimensions DxL (mm) |
|------------------|------|-----------------------------|-------------------------------|---|---------------------|
| 220              | 16   | 227SAK016M                  | 1.507                         | 270   | 8x9                 |
| 220              | 35   | 227SAK035M                  | 1.055                         | 330   | 10x9                |
| 220              | 63   | 227SAK063M                  | 0.754                         | 470   | 12.5x12.5           |
| 220              | 100  | 227SAK100M                  | 0.603                         | 620   | 16x15               |
| 330              | 6.3  | 337SAK6R3M                  | 1.407                         | 250   | 6.3x9               |
| 330              | 10   | 337SAK010M                  | 1.206                         | 300   | 8x9                 |
| 330              | 25   | 337SAK025M                  | 0.804                         | 370   | 10x9                |
| 330              | 35   | 337SAK035M                  | 0.703                         | 460   | 10x12.5             |
| 330              | 50   | 337SAK050M                  | 0.603                         | 520   | 12.5x12.5           |
| 330              | 63   | 337SAK063M                  | 0.502                         | 600   | 12.5x15             |
| 330              | 100  | 337SAK100M                  | 0.402                         | 830   | 18x20               |
| 470              | 10   | 477SAK010M                  | 0.847                         | 360   | 8x9                 |
| 470              | 16   | 477SAK016M                  | 0.705                         | 400   | 10x9                |
| 470              | 25   | 477SAK025M                  | 0.564                         | 520   | 10x12.5             |
| 470              | 35   | 477SAK035M                  | 0.494                         | 570   | 12.5x12.5           |
| 470              | 50   | 477SAK050M                  | 0.423                         | 730   | 16x15               |
| 470              | 63   | 477SAK063M                  | 0.353                         | 840   | 18x15               |
| 470              | 100  | 477SAK100M                  | 0.282                         | 1080  | 18x25               |
| 1000             | 6.3  | 108SAK6R3M                  | 0.464                         | 490   | 10x9                |
| 1000             | 10   | 108SAK010M                  | 0.398                         | 620   | 10x12.5             |
| 1000             | 16   | 108SAK016M                  | 0.332                         | 700   | 12.5x12.5           |
| 1000             | 25   | 108SAK025M                  | 0.265                         | 820   | 12.5x15             |
| 1000             | 35   | 108SAK035M                  | 0.232                         | 990   | 16x15               |
| 1000             | 50   | 108SAK050M                  | 0.199                         | 1180  | 18x20               |
| 1000             | 63   | 108SAK063M                  | 0.166                         | 1410  | 18x25               |
| 2200             | 10   | 228SAK010M                  | 0.211                         | 950   | 12.5x15             |
| 2200             | 16   | 228SAK016M                  | 0.181                         | 1170  | 16x15               |
| 2200             | 25   | 228SAK025M                  | 0.151                         | 1350  | 18x15               |
| 2200             | 35   | 228SAK035M                  | 0.136                         | 1520  | 18x20               |
| 2200             | 50   | 228SAK050M                  | 0.121                         | 1750  | 18x25               |
| 3300             | 10   | 338SAK010M                  | 0.151                         | 1270  | 16x15               |
| 3300             | 16   | 338SAK016M                  | 0.131                         | 1430  | 18x15               |
| 3300             | 25   | 338SAK025M                  | 0.111                         | 1660  | 18x20               |
| 4700             | 6.3  | 478SAK6R3M                  | 0.120                         | 1380  | 16x15               |
| 4700             | 10   | 478SAK010M                  | 0.113                         | 1530  | 18x15               |
| 4700             | 16   | 478SAK016M                  | 0.099                         | 1740  | 18x20               |
| 4700             | 25   | 478SAK025M                  | 0.085                         | 2060  | 18x25               |
| 6800             | 6.3  | 688SAK6R3M                  | 0.112                         | 1640  | 18x15               |
| 6800             | 10   | 688SAK010M                  | 0.088                         | 1830  | 18x20               |
| 6800             | 16   | 688SAK016M                  | 0.078                         | 2120  | 18x25               |
| 10000            | 6.3  | 109SAK6R3M                  | 0.076                         | 1950  | 18x20               |
| 10000            | 10   | 109SAK010M                  | 0.070                         | 2230  | 18x25               |