

# Radial Leaded Aluminum Electrolytic Capacitors

## RES Series



### FEATURES

- Small size
- Long life and high ripple current
- Endurance: 5000 - 7000 hours at 105°C
- RoHS Compliance and Halogen-free

### APPLICATIONS

- Communications equipment
- Industrial equipment

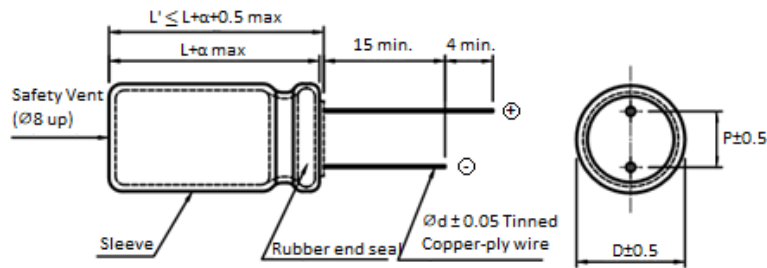


### HOW TO ORDER

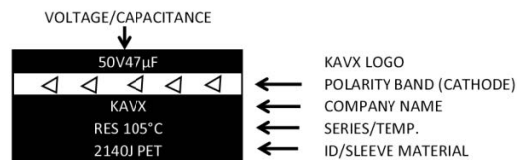
| R                               | ES                 | 0511                                | 220                                                                                                                                           | M                            | 050                                                                                                 | K                                                  | -                                                                                                                                                                     |
|---------------------------------|--------------------|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-----------------------------------------------------------------------------------------------------|----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product Type</b><br>Aluminum | <b>Series Type</b> | <b>Case Size</b><br>See table below | <b>Capacitance Code</b><br>µF code: 1st two digits represent significant figures, 3rd digit represents multiplier (number of zeros to follow) | <b>Tolerance</b><br>M = ±20% | <b>Rated DC Voltage</b><br>016 = 16Vdc<br>025 = 25Vdc<br>035 = 35Vdc<br>050 = 50Vdc<br>100 = 100Vdc | <b>Packaging</b><br>K = Ammo Pack<br>B = Bulk Pack | <b>Lead Type</b><br>" " empty = Standard long lead<br>"C"= Lead cut only<br>"F"= Lead cut and form<br>"L"= Lead cut and bend (Left)<br>"R"= Lead cut and bend (Right) |

### CASE DIMENSIONS millimeters (inches)

| Code | D±0.50(0.020) | L             | d±0.05(0.002) | P±0.50(0.020) | α            | Typical Weight (g) |
|------|---------------|---------------|---------------|---------------|--------------|--------------------|
| 0511 | 5.00 (0.020)  | 11.00 (0.433) | 0.50 (0.020)  | 2.00 (0.079)  | 2.00 (0.079) | 0.41               |
| 0611 | 6.30 (0.248)  | 11.00 (0.433) | 0.50 (0.020)  | 2.50 (0.098)  | 2.00 (0.079) | 0.68               |
| 0612 | 6.30 (0.248)  | 12.00 (0.472) | 0.50 (0.020)  | 2.50 (0.098)  | 2.00 (0.079) | 0.71               |
| 0812 | 8.00 (0.315)  | 12.00 (0.472) | 0.50 (0.020)  | 3.50 (0.138)  | 2.00 (0.079) | 1.00               |
| 0816 | 8.00 (0.315)  | 16.00 (0.629) | 0.50 (0.020)  | 3.50 (0.138)  | 2.00 (0.079) | 1.33               |
| 0820 | 8.00 (0.315)  | 20.00 (0.787) | 0.60 (0.024)  | 3.50 (0.138)  | 2.00 (0.079) | 1.81               |



### MARKING



- \*If different rubber seal is needed, please contact your sales representative.  
 \*For ammo packing lead shape please refer to "Lead forming taping specification for ammo pack".  
 \*If different lead shape is needed, please refer to "Termination type".

### TECHNICAL SPECIFICATIONS

|                                    |                                                  |                                                              |
|------------------------------------|--------------------------------------------------|--------------------------------------------------------------|
| <b>Category Temperature Range:</b> | -40°C to +105°C                                  |                                                              |
| <b>Capacitance Range</b>           | at 25°C, 120Hz                                   | 1.0µF - 1,000µF                                              |
| <b>Capacitance Tolerance:</b>      | at 25°C, 120Hz                                   | ±20%                                                         |
| <b>Dissipation Factor (%)</b>      | Measurement Frequency: 120Hz at 25°C             | Please see the Ratings and Part Number Reference Table below |
| <b>Leakage Current:</b>            | After 2 minutes at rated working voltage at 25°C | ≤0.01CV (µA) or 3µA, whichever is greater                    |

# Radial Leaded Aluminum Electrolytic Capacitors

## RES Series

### CAPACITANCE AND RATED VOLTAGE RANGE (FIGURES DENOTES CASE SIZE)

| Capacitance |      | Rated Voltage DC (V <sub>R</sub> ) |      |      |      |      |
|-------------|------|------------------------------------|------|------|------|------|
| μF          | Code | 16V                                | 25V  | 35V  | 50V  | 100V |
| 1.0         | 1R0  |                                    |      |      | 0511 |      |
| 2.2         | 2R2  |                                    |      |      | 0511 |      |
| 4.7         | 4R7  |                                    |      |      | 0511 |      |
| 10          | 100  |                                    |      |      | 0511 |      |
| 15          | 150  |                                    |      |      |      | 0612 |
| 22          | 220  |                                    |      |      | 0511 |      |
| 47          | 470  |                                    | 0511 |      | 0611 |      |
| 56          | 560  |                                    |      | 0611 |      |      |
| 100         | 101  |                                    | 0611 | 0612 | 0812 |      |
| 220         | 221  | 0611                               | 0812 | 0816 |      |      |
| 330         | 331  |                                    | 0816 |      |      |      |
| 470         | 471  | 0812, 0816                         | 0820 |      |      |      |
| 1000        | 102  | 0820                               |      |      |      |      |

Released ratings

### RATINGS & PART NUMBER REFERENCE

| Part No.        | Case Size | Capacitance (μF) | Rated Voltage (V) | DCL Max. (μA) | DF Max. (%) | Impedance @100kHz/20°C (Ω <sub>max</sub> ) | 100kHz RMS Current (mA)/105°C | MSL |
|-----------------|-----------|------------------|-------------------|---------------|-------------|--------------------------------------------|-------------------------------|-----|
| 16V             |           |                  |                   |               |             |                                            |                               |     |
| RES0611221M016* | 0611      | 220              | 16                | 35.2          | 16          | 0.140                                      | 450                           | 1   |
| RES0812471M016* | 0812      | 470              | 16                | 75.2          | 16          | 0.130                                      | 950                           | 1   |
| RES0816471M016* | 0816      | 470              | 16                | 75.2          | 16          | 0.087                                      | 850                           | 1   |
| RES0820102M016* | 0820      | 1000             | 16                | 160.0         | 16          | 0.045                                      | 1250                          | 1   |
| 25V             |           |                  |                   |               |             |                                            |                               |     |
| RES0511470M025* | 0511      | 47               | 25                | 11.8          | 14          | 0.570                                      | 210                           | 1   |
| RES0611101M025* | 0611      | 100              | 25                | 25.0          | 14          | 0.210                                      | 350                           | 1   |
| RES0812221M025* | 0812      | 220              | 25                | 55.0          | 14          | 0.130                                      | 660                           | 1   |
| RES0816331M025* | 0816      | 330              | 25                | 82.5          | 14          | 0.086                                      | 850                           | 1   |
| RES0820471M025* | 0820      | 470              | 25                | 117.5         | 14          | 0.069                                      | 1050                          | 1   |
| 35V             |           |                  |                   |               |             |                                            |                               |     |
| RES0611560M035* | 0611      | 56               | 35                | 19.6          | 12          | 0.210                                      | 350                           | 1   |
| RES0612101M035* | 0612      | 100              | 35                | 35.0          | 12          | 0.250                                      | 400                           | 1   |
| RES0816221M035* | 0816      | 220              | 35                | 77.0          | 12          | 0.086                                      | 850                           | 1   |
| 50V             |           |                  |                   |               |             |                                            |                               |     |
| RES05111R0M050* | 0511      | 1                | 50                | 3             | 10          | 4.000                                      | 38                            | 1   |
| RES05112R2M050* | 0511      | 2.2              | 50                | 3             | 10          | 2.500                                      | 57                            | 1   |
| RES05114R7M050* | 0511      | 4.7              | 50                | 3             | 10          | 1.900                                      | 90                            | 1   |
| RES0511100M050* | 0511      | 10               | 50                | 5.0           | 10          | 1.500                                      | 120                           | 1   |
| RES0511220M050* | 0511      | 22               | 50                | 11.0          | 10          | 0.680                                      | 180                           | 1   |
| RES0611470M050* | 0611      | 47               | 50                | 23.5          | 10          | 0.300                                      | 295                           | 1   |
| RES0812101M050* | 0812      | 100              | 50                | 50.0          | 10          | 0.170                                      | 560                           | 1   |
| 100V            |           |                  |                   |               |             |                                            |                               |     |
| RES0612150M100* | 0612      | 15               | 100               | 15            | 8           | 1.000                                      | 126                           | 1   |

\* Used to denote packing type: "K" for Ammo Pack or "B" for Bulk Pack.  
All technical data relates to an ambient temperature of +25°C

### FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| Rated Voltage (V <sub>dc</sub> ) | Frequency (Hz) |      |      |      |
|----------------------------------|----------------|------|------|------|
|                                  | 120            | 1K   | 10K  | 100K |
| Cap. < 220                       | 0.40           | 0.75 | 0.90 | 1.00 |
| 220 ≤ Cap. < 470                 | 0.50           | 0.85 | 0.94 | 1.00 |
| 470 ≤ Cap. < 1000                | 0.60           | 0.87 | 0.95 | 1.00 |

# Radial Leaded Aluminum Electrolytic Capacitors

## RES Series

### QUALIFICATION TABLE

| Test                                            | RES Series (Temperature range -40°C to +105°C)                                                                                                             |               |                    |                                   |
|-------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------------------|-----------------------------------|
|                                                 | Condition                                                                                                                                                  |               | Characteristics    |                                   |
| Temperature Stability<br>(Max. Impedance Ratio) | 120Hz                                                                                                                                                      |               | Rated Voltage (V)  | 16 - 100                          |
|                                                 |                                                                                                                                                            |               | Z(-25°C) / Z(20°C) | 2                                 |
| Load Life                                       | Application of the rated voltage and the rated ripple current. Test temperature: 105 ± 2°C                                                                 |               | ΔC/C               | Within ±20% of initial limit      |
|                                                 | Diameter                                                                                                                                                   | Life Time (h) | DF                 | ≤ 200% of Initial specified limit |
|                                                 | φD≤6.3                                                                                                                                                     | 5000          | DCL                | Not more than the specified limit |
|                                                 | φD=8                                                                                                                                                       | 7000          |                    |                                   |
| Shelf Life                                      | The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours 105°C without voltage applied. |               | ΔC/C               | Within ±20% of initial limit      |
|                                                 |                                                                                                                                                            |               | DF                 | ≤ 200% of Initial specified limit |
|                                                 |                                                                                                                                                            |               | DCL                | ≤ 200% of Initial specified limit |

The endurance of capacitors is reduced with internal heating produced by ripple current at the rate of halving the lifetime with every 5°C rise. When long life performance is required in actual use the rms ripple current has to be reduced.

### STORAGE

- It is recommended to keep capacitors between the ambient temperatures of 5°C to 35°C (if between 35°C to 85°C, it should be less than three months) and the relative humidity of 75% or below.
- Confirm that the environment does not have any of the following conditions:
  - Damp conditions such as water, saltwater spray, oil spray or fumes. High humidity or humidity condensation situations.
  - In an atmosphere filled with toxic gasses (such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, ammonia, etc.).
  - Being exposed to direct sunlight, ozone, ultraviolet ray, or radiation.
  - Being exposed to acidic or alkaline solutions.
  - Under severe conditions where vibration and / or mechanical shock exceed the applicable ranges of the specification.
- Shelf life

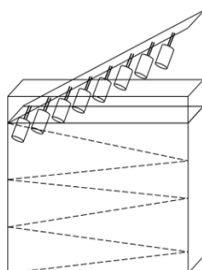
| Years |     |                   |
|-------|-----|-------------------|
| 0-1   | 1-2 | >2                |
| Ok    | Ok  | Performance check |

- Years from manufacturing date code.
- KYOCERA AVX does not guarantee or assume responsibility for product behavior after 3 years of storage.
- Ageing procedure should be performed as follows:
  - Connect the capacitor in series to a 1kΩ resistor, and apply half rated voltage for 2 hours.
  - After half rated voltage for 2 hours applied, increase and apply rated voltage for another 2 hours.

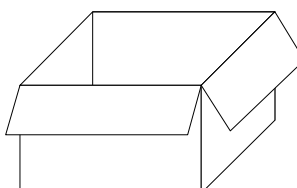
### PACKING

| Size Code | Bulk Pack |                        |                |                        |                | Ammo Pack |                |                    |             |              |
|-----------|-----------|------------------------|----------------|------------------------|----------------|-----------|----------------|--------------------|-------------|--------------|
|           | Bags      | Inner Box              |                | Carton                 |                | Inner Box |                | Carton             |             |              |
|           |           | (LxWxH)<br>290*216*158 |                | (LxWxH)<br>455*310*350 |                | Quantity  | Inner Box Size | Inner Box Quantity | Carton Size | Whole Pieces |
|           | Quantity  | Bags Number            | Quantity / pcs | Inner Box Number       | Quantity / pcs |           | (LxWxH)        |                    | (LxWxH)     |              |
| 0511      | 1000      | 12                     | 12,000         | 4                      | 48,000         | 2000      | 320x230x50     | 10                 | 485x345x275 | 20,000       |
| 0611      | 1000      | 8                      | 8000           | 4                      | 32,000         | 2000      | 340x290x48     | 10                 | 600x354x265 | 20,000       |
| 0612      | 500       | 10                     | 5000           | 4                      | 20,000         | 2000      | 340x290x48     | 10                 | 600x354x265 | 20,000       |
| 0812      | 500       | 10                     | 5000           | 4                      | 20,000         | 950       | 320x230x50     | 6                  | 485x345x275 | 5700         |
| 0816      | 300       | 10                     | 3000           | 4                      | 12,000         | 950       | 320x230x55     | 6                  | 485x345x300 | 5700         |
| 0820      | 300       | 10                     | 3000           | 4                      | 12,000         | 950       | 320x230x55     | 6                  | 485x345x300 | 5700         |

### AMMO PACKING



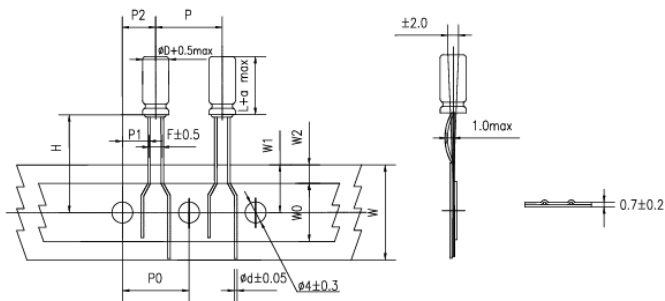
### BULK PACKING



# Radial Leaded Aluminum Electrolytic Capacitors

## RES Series

### LEAD FORMING TAPING SPECIFICATIONS FOR AMMO PACK



| Items                                         | Symbol | Case Size |              |      |              | Tolerance |
|-----------------------------------------------|--------|-----------|--------------|------|--------------|-----------|
|                                               |        | 0511      | 0611<br>0612 | 0812 | 0816<br>0820 |           |
| Lead Wire Diameter                            | d      | 0.5       | 0.5          | 0.5  | 0.5/0.6      | ±0.05     |
| Pitch of Body                                 | P      | 12.7      | 12.7         | 12.7 | 12.7         | ±1.0      |
| Feed Hole Pitch                               | P0     | 12.7      | 12.7         | 12.7 | 12.7         | ±0.2      |
| Distance from Hole Center to Lead             | P1     | 5.35      | 5.1          | 4.6  | 4.6          | ±0.7      |
| Distance from Feed Hole Center to Body Center | P2     | 6.35      | 6.35         | 6.35 | 6.35         | ±1.0      |
| Lead-to-lead distance                         | F      | 2.0       | 2.5          | 3.5  | 3.5          | ±0.5      |
| Height of Body from Tape Center               | H      | 18.5      | 18.5         | 18.5 | 18.5         | ±0.75     |
| Base Tape Width                               | W      | 18.0      | 18.0         | 18.0 | 18.0         | ±0.5      |
| Adhesive Tape Width                           | W0     | 6.0       | 8.0          | 8.0  | 8.0          | min       |
| Hole Position                                 | W1     | 9.0       | 9.0          | 9.0  | 9.0          | +0.75-0.5 |
| Hole Down Tape Position                       | W2     | 1.5       | 1.5          | 1.5  | 1.5          | max       |

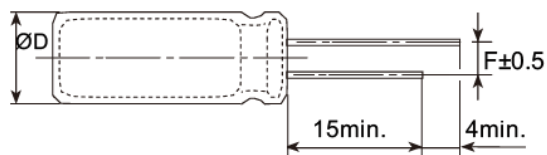
\*All dimensions in mm

# Radial Leaded Aluminum Electrolytic Capacitors

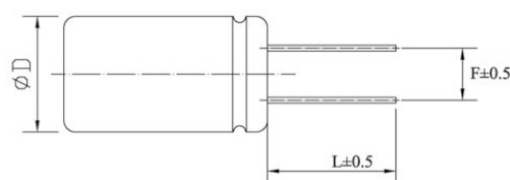
## RES Series

### TERMINATION TYPE

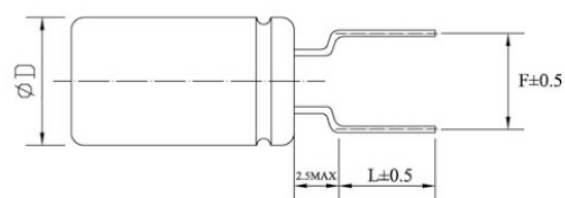
Letter " ": Empty = Standard Long lead.



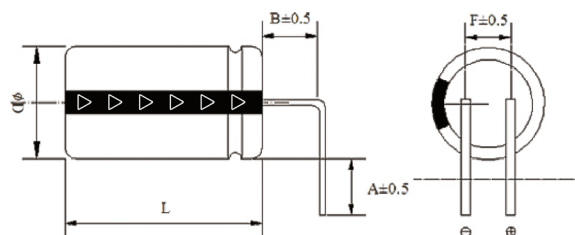
Letter "C": Lead cut only.



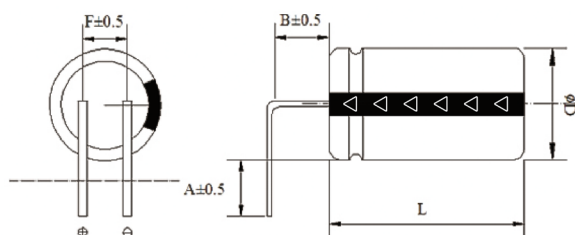
Letter "F": Lead cut and form.



Letter "R": Lead cut and bend (Right).



Letter "L": Lead cut and bend (Left).



| Letter | Termination Type   | Dø | 4ø   | 5ø   | 6.3ø | 8ø   | 10ø  | 12.5ø | 13ø  | 16ø  | 18ø  |
|--------|--------------------|----|------|------|------|------|------|-------|------|------|------|
|        | Standard long lead | F  | 1.50 | 2.00 | 2.50 | 3.50 | 5.00 | 5.00  | 5.00 | 7.50 | 7.50 |
| C      | Lead cut only      | F  | 1.50 | 2.00 | 2.50 | 3.50 | 5.00 | 5.00  | 5.00 | 7.50 | 7.50 |
|        |                    | L  | 3.30 | 3.30 | 3.30 | 3.30 | 3.30 | 3.30  | 3.30 | 3.30 | 3.30 |
| F      | Lead cut and form  | F  | 5.00 | 5.00 | 5.00 | 5.00 |      |       |      |      |      |
|        |                    | L  | 3.50 | 3.50 | 3.50 | 3.50 |      |       |      |      |      |
| R / L  | Lead cut and bend  | F  |      |      |      |      | 5.00 | 5.00  | 5.00 | 7.50 | 7.50 |
|        |                    | A  |      |      |      |      | 3.50 | 3.50  | 3.50 | 3.50 | 3.50 |
|        |                    | B  |      |      |      |      | 2.50 | 2.50  | 2.50 | 2.50 | 2.50 |

\*All dimensions in mm.