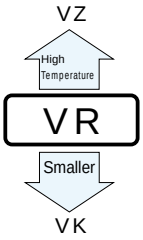
# ALUMINUM ELECTROLYTIC CAPACITORS

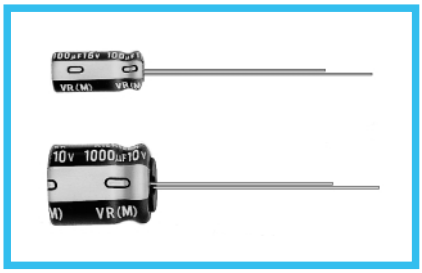
nichicon

## VR Miniature Sized series

Anti-Solvent Feature (Through 100V only)

- One rank smaller case sizes than VX series.
- Compliant to the RoHS directive (2011/65/EU).



## ■Specifications

| Item | Performance Characteristics |
|---|---|
| Category Temperature Range | −40 to +85˚C (6.3V to 400V), −25 to +85˚C (450V) |
| Rated Voltage Range | 6.3 to 450V |
| Rated Capacitance Range | 0.1 to 33000μF |
| Capacitance Tolerance | ±20% at 120Hz, 20˚C |
| Leakage Current | Rated voltage (V) \| 6.3 to 100V: After 1 minute's application of rated voltage, leakage current is not more than 0.03CV or 4 (μA), whichever is greater. After 2 minutes' application of rated voltage, leakage current is not more than 0.01CV or 3 (μA), whichever is greater. \| 160 to 450V: After 1 minute's application of rated voltage, CV ≦ 1000 : I = 0.1CV+40μA or less; After 1 minute's application of rated voltage, CV > 1000 : I = 0.04CV+100 (μA) or less |
| Tangent of loss angle (tan δ) | For capacitance of more than 1000μF, add 0.02 for every increase of 1000μF. Measurement frequency : 120Hz at 20˚C |

| Rated voltage (V) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | 160 to 315 | 350 to 450 |
|---|---|---|---|---|---|---|---|---|---|---|
| tan δ (MAX.) | 0.28 | 0.24 | 0.20 | 0.16 | 0.14 | 0.12 | 0.10 | 0.08 | 0.20 | 0.25 |

Stability at Low Temperature — Measurement frequency : 120Hz

| Rated voltage (V) | | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | 160 to 200 | 250 to 350 | 400 | 450 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Impedance ratio | Z−25˚C / Z+20˚C | 5 | 4 | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 4 | 6 | 15 |
| ZT / Z20 (MAX.) | Z−40˚C / Z+20˚C | 12 | 10 | 8 | 5 | 4 | 3 | 3 | 3 | 4 | 8 | 10 | — |

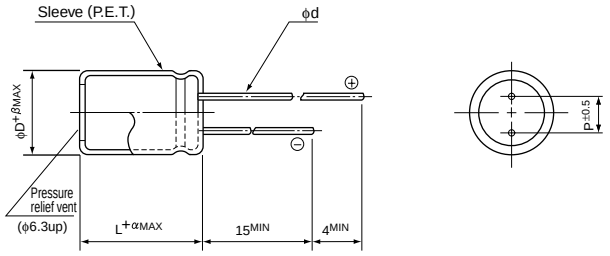
Endurance — The specifications listed at right shall be met when the capacitors are restored to 20°C after the rated voltage is applied for 2000 hours at 85°C.

| | |
|---|---|
| Capacitance change | Within ±20% of the initial capacitance value |
| tan δ | 200% or less than the initial specified value |
| Leakage current | Less than or equal to the initial specified value |

Shelf Life — After storing the capacitors under no load at 85˚C for 1000 hours and then performing voltage treatment based on JIS C 5101-4 clause 4.1 at 20°C, they shall meet the specified values for the endurance characteristics listed above.

Marking — Printed with white color letter on black sleeve.

## ■Radial Lead Type




(mm)

| φD | 4 | 5 | 6.3 | 8 | 10 | 12.5 | 16 | 18 | 20 | 22 | 25 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| P | 1.5 | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 | 10.0 | 10.0 | 12.5 |
| φd | 0.45 | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.8 | 0.8 | 1.0 | 1.0 | 1.0 |
| β | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 1.0 | 1.0 |

| α | (L<20) 1.5 |
|---|---|
| | (L≧20) 2.0 |

• Please refer to page 20 about the end seal configuration.

## Type numbering system (Example : 10V 330μF)

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U | V | R | 1 | A | 3 | 3 | 1 | M | E | D | |

- 12: Size code
- 10–11: Configuration※
- 9: Capacitance tolerance (±20%)
- 6–8: Rated capacitance (330μF)
- 4–5: Rated voltage (10V)
- 3: Series name
- 1–2: Type

※ Configuration

| φ D | Pb-free leadwire Pb-free PET sleeve |
|---|---|
| 4 | DD6 |
| 5 | DD |
| 6.3 | ED |
| 8 · 10 | PD |
| 12.5 to 18 | HD |
| 20 to 25 | RD |

Please refer to page 20, 21, 22 about the formed or taped product spec.
Please refer to page 4 for the minimum order quantity.

● Dimension table in next page.

# VR series

## ■Dimensions

| Cap.(μF) \ V / Code | 6.3 | | 10 | | 16 | | 25 | | 35 | | 50 | | 63 | | 100 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0J | | 1A | | 1C | | 1E | | 1V | | 1H | | 1J | | 2A | |
| **0.1** | 0R1 | | | | | | | | | | • 5×11 | 1.3 | | | 5×11 | 2.1 |
| **0.22** | R22 | | | | | | | | | | • 5×11 | 2.9 | | | 5×11 | 4.7 |
| **0.33** | R33 | | | | | | | | | | • 5×11 | 4.3 | | | 5×11 | 7 |
| **0.47** | R47 | | | | | | | | | | • 5×11 | 6.2 | | | 5×11 | 10 |
| **1** | 010 | | | | | | | | | | • 5×11 | 17 | | | 5×11 | 21 |
| **2.2** | 2R2 | | | | | | | | | | • 5×11 | 28 | | | 5×11 | 30 |
| **3.3** | 3R3 | | | | | | | | | | • 5×11 | 35 | | | 5×11 | 40 |
| **4.7** | 4R7 | | | | | | • 5×11 | 35 | • 5×11 | 40 | • 5×11 | 40 | | | 5×11 | 45 |
| **10** | 100 | | | | • 5×11 | 50 | • 5×11 | 55 | • 5×11 | 60 | • 5×11 | 60 | 5×11 | 65 | 6.3×11 | 75 |
| **22** | 220 | • 5×11 | 65 | • 5×11 | 65 | • 5×11 | 75 | • 5×11 | 80 | • 5×11 | 90 | 5×11 | 95 | 5×11 | 100 | 6.3×11 | 130 |
| **33** | 330 | • 5×11 | 80 | • 5×11 | 85 | • 5×11 | 90 | • 5×11 | 95 | 5×11 | 105 | 5×11 | 125 | 6.3×11 | 140 | 8×11.5 | 180 |
| **47** | 470 | • 5×11 | 95 | • 5×11 | 100 | • 5×11 | 110 | • 5×11 | 115 | 5×11 | 130 | 6.3×11 | 155 | 6.3×11 | 170 | 10×12.5 | 230 |
| **100** | 101 | • 5×11 | 135 | • 5×11 | 145 | 5×11 | 160 | 6.3×11 | 190 | 6.3×11 | 210 | 8×11.5 | 260 | 10×12.5 | 300 | 10×20 | 370 |
| **220** | 221 | 5×11 | 200 | 6.3×11 | 240 | 6.3×11 | 260 | 8×11.5 | 330 | 10×12.5 | 385 | 10×12.5 | 430 | 10×16 | 490 | 12.5×25 | 620 |
| **330** | 331 | 6.3×11 | 270 | 6.3×11 | 290 | 8×11.5 | 370 | 10×12.5 | 440 | 10×12.5 | 490 | 10×16 | 590 | 10×20 | 710 | 12.5×25 | 760 |
| **470** | 471 | 6.3×11 | 320 | 6.3×11 | 350 | 8×11.5 | 440 | 10×12.5 | 550 | 10×16 | 650 | 12.5×20 | 760 | 12.5×20 | 900 | 16×25 | 1000 |
| **1000** | 102 | 8×11.5 | 540 | 10×12.5 | 650 | 10×16 | 790 | 10×20 | 960 | 12.5×20 | 1150 | 12.5×25 | 1350 | 16×25 | 1300 | 18×40 | 1380 |
| **2200** | 222 | 10×20 | 1000 | 10×20 | 1100 | 12.5×20 | 1300 | 12.5×25 | 1550 | 16×25 | 1800 | 16×35.5 | 2100 | 18×35.5 | 2300 | 22×50<br>▲25×40 | 2400<br>2400 |
| **3300** | 332 | 10×20 | 1190 | 12.5×20 | 1450 | 12.5×25 | 1700 | 16×25 | 1980 | 16×35.5 | 2280 | 18×35.5<br>▲22×30 | 2500<br>2450 | 20×40<br>▲25×30 | 2700<br>2600 | 25×50 | 2900 |
| **4700** | 472 | 12.5×20 | 1550 | 12.5×25 | 1800 | 16×25 | 2100 | 16×31.5 | 2450 | 18×35.5<br>▲20×31 | 2700 | 20×40<br>▲25×30 | 2900<br>2900 | 22×50<br>▲25×40 | 3400<br>3200 | | |
| **6800** | 682 | 12.5×25 | 1920 | 16×25 | 2250 | 16×35.5 | 2650 | 18×35.5<br>▲20×31 | 2900<br>2700 | 20×40<br>▲25×30 | 3000<br>2900 | 22×50<br>▲25×40 | 3500<br>3300 | 25×50 | 3900 | | |
| **10000** | 103 | 16×25 | 2350 | 16×35.5 | 2700 | 18×35.5<br>▲20×31 | 2950<br>3000 | 20×40<br>▲25×30 | 3000<br>2900 | 22×50<br>▲25×40 | 3700<br>3600 | 25×50 | 4000 | | | | |
| **15000** | 153 | 16×35.5 | 2850 | 18×35.5 | 3100 | 20×40<br>▲25×30 | 3400<br>3300 | 22×50<br>▲25×40 | 3800<br>3600 | 25×50 | 4300 | | | | | | |
| **22000** | 223 | 18×40<br>▲22×30 | 3350<br>3200 | 20×40<br>▲25×30 | 3700<br>3300 | 22×50<br>▲25×40 | 4200<br>4000 | 25×50 | 4500 | | | | | | | | |
| **33000** | 333 | 22×50<br>▲25×40 | 3900<br>3800 | 22×50<br>▲25×40 | 4500<br>4800 | 25×50 | 4800 | | | | | | | | | Case size<br>φD×L (mm) | Rated ripple |

| Cap.(μF) \ V / Code | 160 | | 200 | | 250 | | 315 | | 350 | | 400 | | 450 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2C | | 2D | | 2E | | 2F | | 2V | | 2G | | 2W | | |
| **0.47** | R47 | 6.3×11 | 15 | 6.3×11 | 15 | 6.3×11 | 15 | | | | | | | | |
| **1** | 010 | 6.3×11 | 22 | 6.3×11 | 22 | 6.3×11 | 22 | 6.3×11 | 22 | 6.3×11 | 22 | 8×11.5 | 25 | 8×11.5 | 23 |
| **2.2** | 2R2 | 6.3×11 | 33 | 6.3×11 | 33 | 6.3×11 | 33 | 8×11.5 | 33 | 8×11.5 | 38 | 10×12.5 | 45 | 10×12.5 | 35 |
| **3.3** | 3R3 | 6.3×11 | 40 | 6.3×11 | 40 | 8×11.5 | 46 | 10×12.5 | 55 | 10×12.5 | 55 | 10×12.5 | 55 | 10×16 | 45 |
| **4.7** | 4R7 | 6.3×11 | 50 | 8×11.5 | 55 | 8×11.5 | 55 | 10×12.5 | 65 | 10×12.5 | 65 | 10×16 | 70 | 10×20 | 55 |
| **10** | 100 | 8×11.5 | 80 | 10×12.5 | 95 | 10×16 | 105 | 10×20 | 115 | 10×20 | 115 | 12.5×20 | 130 | 12.5×20 | 90 |
| **22** | 220 | 10×16 | 155 | 10×20 | 170 | 12.5×20 | 190 | 12.5×20 | 190 | 12.5×25 | 200 | 16×25 | 240 | 16×25 | 165 |
| **33** | 330 | 10×20 | 205 | 12.5×20 | 230 | 12.5×20 | 230 | 16×25 | 275 | 16×25 | 275 | 16×31.5 | 300 | 16×35.5 | 230 |
| **47** | 470 | 12.5×20 | 270 | 12.5×20 | 270 | 12.5×25 | 300 | 16×25 | 340 | 16×35.5 | 380 | 16×35.5 | 370 | 18×40<br>▲22×30 | 300<br>290 |
| **100** | 101 | 12.5×25 | 430 | 16×31.5 | 530 | 16×31.5 | 520 | 18×35.5 | 560 | 18×40<br>▲22×30 | 590<br>570 | 20×40<br>▲25×30 | 550<br>530 | 22×40 | 350 |
| **220** | 221 | 16×35.5 | 800 | 18×35.5 | 810 | 20×40<br>▲22×30 | 740<br>820 | 22×50<br>▲25×30 | 850<br>770 | 22×50<br>▲25×40 | 850<br>890 | 25×50 | 750 | | |
| **330** | 331 | 18×40<br>▲22×30 | 940<br>900 | 20×40<br>▲25×30 | 1130<br>1090 | 22×50<br>▲25×30 | 1170<br>970 | 25×50 | 1250 | | | | | | |
| **470** | 471 | 22×40<br>▲25×30 | 1410<br>1290 | 22×50<br>▲25×40 | 1490<br>1550 | 25×50 | 1600 | | | | | | | Case size<br>φD×L (mm) | Rated ripple |
| **1000** | 102 | 25×50 | 1900 | | | | | | | | | | | | |

Size 4×11 is available for capacitors marked "●"
In this case, 6 will be put at 12th digit of type numbering system "▲"

Rated ripple current (mArms) at 85°C 120Hz

## ●Frequency coefficient of rated ripple current

| V | Cap.(μF) \ Frequency | 50Hz | 120Hz | 300Hz | 1 kHz | 10kHz or more |
|---|---|---|---|---|---|---|
| 6.3 to 100 | 0.1 to 47 | 0.75 | 1.00 | 1.35 | 1.57 | 2.00 |
| | 100 to 470 | 0.80 | 1.00 | 1.23 | 1.34 | 1.50 |
| | 1000 to 33000 | 0.85 | 1.00 | 1.10 | 1.13 | 1.15 |
| 160 to 450 | 0.47 to 220 | 0.80 | 1.00 | 1.25 | 1.40 | 1.60 |
| | 330 to 1000 | 0.90 | 1.00 | 1.10 | 1.13 | 1.15 |