

Aluminum Capacitors +125 °C, Miniature, Radial Lead


FEATURES

- +125 °C performance
- Suitable for tantalum foil replacement applications
- Low DC leakage currents
- Very stable, long life
- Case sizes through 0.709" x 1.417" [18.0 mm x 36.0 mm]
- Optional third lead on diameters \geq 0.492" [12.5 mm]
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

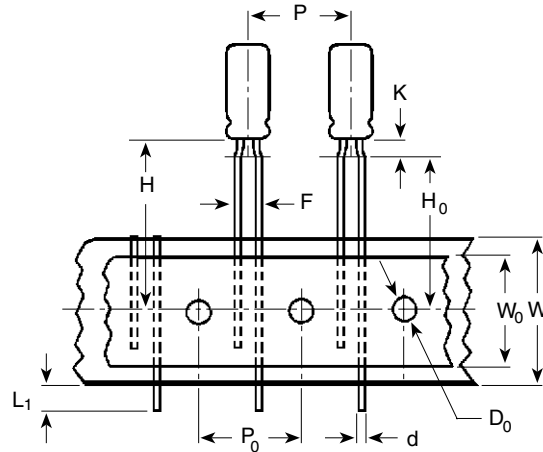


| QUICK REFERENCE DATA | |
|--|---|
| DESCRIPTION | VALUE |
| Nominal case size Ø D x L in mm | 0.236" x 0.433" [6.0 x 11.0] to 0.709" x 1.417" [18.0 x 36.0] |
| Operating temperature | -40 °C to +125 °C |
| Rated capacitance range, C _R | 1.0 µF to 6800 µF |
| Tolerance on C _R | ± 20 % |
| Rated voltage range, U _R | 6.3 WV _{DC} to 63 WV _{DC} |
| Termination | 2 and 3 radial leads |
| Life validation test at 125 °C | 2000 h: ΔCAP ≤ 15 % (6.3 WV _{DC} to 10 WV _{DC}), ≤ 10 % (16 WV _{DC} to 63 WV _{DC}) from initial measurement. ΔDF ≤ 1.25 x initial specified limit. ΔDCL ≤ initial specified limit. |
| Shelf life at 105 °C | 500 h: ΔCAP ≤ 12 % from initial measurement. ΔDF ≤ 1.25 x initial specified limit. ΔDCL ≤ 2.0 x initial specified limit. |
| DC leakage current (after 2 min charge) | I = 0.01 CV I in µA, C in µF, V in Volts |

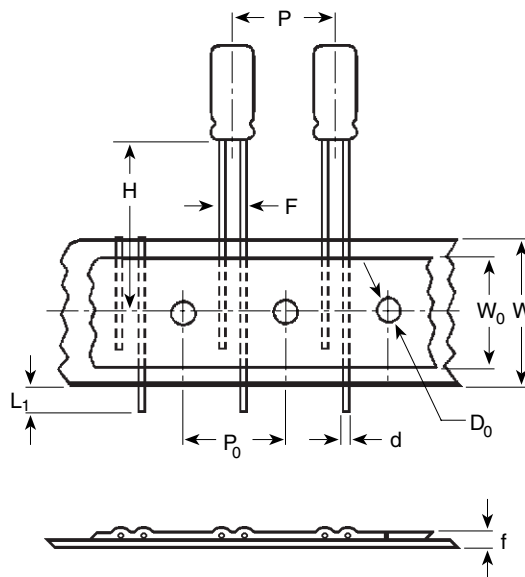
| RIPPLE CURRENT MULTIPLIERS | | | | |
|----------------------------|-------------|------------|------------|-----------|
| TEMPERATURE | | | | |
| AMBIENT TEMPERATURE | MULTIPLIERS | | | |
| +125 °C | 0.4 | | | |
| +105 °C | 1.0 | | | |
| +85 °C | 1.41 | | | |
| +75 °C | 1.58 | | | |
| ≤ +65 °C | 1.73 | | | |
| FREQUENCY (Hz) | | | | |
| FREQUENCY (Hz) | 50 TO 60 | 100 TO 120 | 300 TO 400 | 1K AND UP |
| MULTIPLIERS | 0.85 | 1.00 | 1.05 | 1.10 |
| | 0.80 | 1.00 | 1.30 | 1.40 |

| LOW TEMPERATURE PERFORMANCE | |
|--|-----------------------|
| CAPACITANCE RATIO C ^{-55 °C} /C ^{+25 °C} MINIMUM AT 120 Hz | |
| RATED VOLTAGE (WV _{DC}) | CAPACITANCE REMAINING |
| 6.3 to 10 | 75 % |
| 16 to 25 | 80 % |
| 36 to 63 | 85 % |
| ESR RATIO ESR ^{-55 °C} /ESR ^{+25 °C} MAXIMUM AT 120 Hz | |
| RATED VOLTAGE (WV _{DC}) | MULTIPLIER |
| 6.3 to 10 | 35 |
| 16 to 25 | 30 |
| 36 to 63 | 25 |

| DIMENSIONS in inches [millimeters] | | | | | | | | | | |
|------------------------------------|--------------|--------------|----------------|--------------|----------------|--------------|------------------|------------------|---------------|---------|
| CASE CODE | NOMINAL | | STYLES 2 AND 4 | | STYLES 3 AND 5 | | LEAD SPACING | | LEAD DIAMETER | |
| | D | L | D (max.) | L (max.) | D (max.) | L (max.) | S ± 0.024 [0.60] | T ± 0.020 [0.50] | NOMINAL | AWG NO. |
| BB | 0.315 [8.0] | 0.472 [12.0] | 0.335 [8.5] | 0.512 [13.0] | 0.335 [8.5] | 0.551 [14.0] | 0.138 [3.5] | n/a | 0.025 [0.63] | 22 |
| BD | 0.315 [8.0] | 0.630 [16.0] | 0.335 [8.5] | 0.669 [17.0] | 0.335 [8.5] | 0.709 [18.0] | 0.138 [3.5] | n/a | 0.025 [0.63] | 22 |
| CC | 0.394 [10.0] | 0.512 [13.0] | 0.413 [10.5] | 0.563 [14.3] | 0.413 [10.5] | 0.630 [16.0] | 0.197 [5.0] | n/a | 0.025 [0.63] | 22 |
| CG | 0.394 [10.0] | 0.787 [20.0] | 0.413 [10.5] | 0.846 [21.5] | 0.413 [10.5] | 0.906 [23.0] | 0.197 [5.0] | n/a | 0.025 [0.63] | 22 |
| DG | 0.492 [12.5] | 0.787 [20.0] | 0.512 [13.0] | 0.846 [21.5] | 0.512 [13.0] | 0.906 [23.0] | 0.197 [5.0] | 0.098 [2.5] | 0.028 [0.71] | 20 |
| DK | 0.492 [12.5] | 0.984 [25.0] | 0.512 [13.0] | 1.043 [26.5] | 0.512 [13.0] | 1.142 [29.0] | 0.197 [5.0] | 0.098 [2.5] | 0.032 [0.81] | 20 |
| EN | 0.630 [16.0] | 1.260 [32.0] | 0.650 [16.5] | 1.319 [33.5] | 0.650 [16.5] | 1.417 [36.0] | 0.295 [7.5] | 0.150 [3.8] | 0.032 [0.81] | 20 |
| ER | 0.630 [16.0] | 1.417 [36.0] | 0.650 [16.5] | 1.476 [37.5] | 0.650 [16.5] | 1.575 [40.0] | 0.295 [7.5] | 0.150 [3.8] | 0.032 [0.81] | 20 |
| FR | 0.709 [18.0] | 1.417 [36.0] | 0.728 [18.5] | 1.476 [37.5] | 0.728 [18.5] | 1.575 [40.0] | 0.295 [7.5] | 0.150 [3.8] | 0.032 [0.81] | 20 |

DIMENSIONS in inches [millimeters] AND AVAILABLE FORMS
Formed Leads


| DIMENSIONS in inches [millimeters] AND PACKAGING QUANTITIES | | |
|--|-----------------------|----------------------|
| CASE SIZE | F LEAD SPACING | STD. QTY/REEL |
| 0.236 x 0.433 [6.0 x 11.0] | 0.197 [5.0] | 800 |
| 0.315 x 0.472 [8.0 x 12.0] | 0.197 [5.0] | 700 |

Unformed (Straight) Leads


| DIMENSIONS in inches [millimeters] AND PACKAGING QUANTITIES | | |
|--|----------------------------|----------------------|
| CASE SIZE | F LEAD SPACING | STD. QTY/REEL |
| 0.236 x 0.433 [6.0 x 11.0] | 0.098 [2.5] ⁽¹⁾ | 800 |
| 0.315 x 0.472 [8.0 x 12.0] | 0.140 [3.5] ⁽¹⁾ | 700 |
| 0.394 x 0.512 [10.0 x 13.0] | 0.197 [5.0] | 500 |
| 0.394 x 0.630 [10.0 x 16.0] | 0.197 [5.0] | 500 |
| 0.394 x 0.787 [10.0 x 20.0] | 0.197 [5.0] | 500 |

Note
⁽¹⁾ Available as special order.



| DIMENSIONS in inches [millimeters] | | | | | |
|--|-------------------------------|-------------------------------|--------------------------------|--------------------------------|--------------------------------|
| ITEM | CASE SIZE (Diameter x Length) | | | | |
| | 0.236 x 0.433 [6.0 x 11.0] | 0.315 x 0.472 [8.0 x 12.0] | 0.394 x 0.512 [10.0 x 13.0] | 0.394 x 0.630 [10.0 x 16.0] | 0.394 x 0.787 [10.0 x 20.0] |
| d - Lead-wire diameter | 0.025 [0.63] | 0.025 [0.63] | 0.025 [0.63] | 0.025 [0.63] | 0.025 [0.63] |
| P - Pitch of component | 0.500 [12.7] | 0.500 [12.7] | 0.500 [12.7] | 0.500 [12.7] | 0.500 [12.7] |
| P ₀ - Feed hole pitch | 0.500 [12.7] | 0.500 [12.7] | 0.500 [12.7] | 0.500 [12.7] | 0.500 [12.7] |
| F - Lead-to-lead distance | 0.197 [5.0] | 0.197 [5.0] | 0.197 [5.0] | 0.197 [5.0] | 0.197 [5.0] |
| K - Clinch height | 0.098 [2.5] | 0.157 [4.0] | n/a | n/a | n/a |
| H - Height of component from tape center | 0.728 [18.5] | 0.787 [20.0] | 0.906 [23.0] | 0.906 [23.0] | 0.906 [23.0] |
| H ₀ - Lead-wire clinch height | 0.630 [16.0] | 0.630 [16.0] | n/a | n/a | n/a |
| W - Tape width | 0.709 [18.0] | 0.709 [18.0] | 0.709 [18.0] | 0.709 [18.0] | 0.709 [18.0] |
| W ₀ - Hold down tape width | 0.591 [15.0] | 0.591 [15.0] | 0.591 [15.0] | 0.591 [15.0] | 0.591 [15.0] |
| D ₀ - Feed hole diameter | 0.157 [4.0] | 0.157 [4.0] | 0.157 [4.0] | 0.157 [4.0] | 0.157 [4.0] |
| t - Total tape thickness | 0.028 [0.7] | 0.028 [0.7] | 0.028 [0.7] | 0.028 [0.7] | 0.028 [0.7] |
| L ₁ - Maximum lead protrusion | 0.118 [3.0] | 0.118 [3.0] | 0.118 [3.0] | 0.118 [3.0] | 0.118 [3.0] |

Note

- Positive leader is standard. Negative leader is available by special order.

ORDERING EXAMPLE

Electrolytic capacitor 510DX series: 510DX 227 M 050 DG 2 D

| DESCRIPTION | |
|-------------|---|
| CODE | EXPLANATION |
| 510DX | Product type |
| 227 | Capacitance value (220 µF) |
| M | Tolerance (M = ± 20 %) |
| 050 | Voltage rating at 105 °C (050 = 50 V) |
| DG | Can size (see "Dimensions" table) |
| 2 | Sleeve and sealing (2 = Polyester sleeve) |
| D | Packaging (D = Bulk; straight leads) |

Note

- For lead (Pb)-free/RoHS compliant products add suffix "E3" to part number.
Example: 510DX227M050DG2DE3

| ELECTRICAL DATA AND ORDERING INFORMATION | | | | | | | |
|---|------------------|--|----------------------------|------------------|-------------------------------|------------------|---------------------------------------|
| CAPACITANCE (µF) | PART NUMBER (1) | NOMINAL CASE SIZE D x L IN INCHES (mm) | MAX. ESR AT +25 °C (mΩ) | | MAX. RIPPLE AT +105 °C (A) | | MAX. Z AT +25 °C (mΩ) 100 Hz |
| | | | 120 Hz | 20 kHz TO 40 kHz | 120 Hz | 20 kHz TO 40 kHz | |
| 6.3 WV_{DC} AT 125 °C, SURGE = 8 V | | | | | | | |
| 330.0 | 510DX337M6R3CC2D | 0.394 x 0.512 [10.0 x 13.0] | 1206.0 | 507.0 | 0.294 | 0.454 | 457.0 |
| 1000.0 | 510DX108M6R3DG2D | 0.492 x 0.787 [12.5 x 20.0] | 398.0 | 201.0 | 0.697 | 0.984 | 181.0 |
| 1500.0 | 510DX158M6R3DK2D | 0.492 x 0.984 [12.5 x 25.0] | 265.0 | 133.0 | 0.931 | 1.313 | 121.0 |
| 4700.0 | 510DX478M6R3ER2D | 0.630 x 1.417 [16.0 x 36.0] | 85.0 | 40.0 | 2.193 | 3.193 | 36.0 |
| 10 WV_{DC} AT 125 °C, SURGE = 13 V | | | | | | | |
| 150.0 | 510DX157M010BB2D | 0.315 x 0.472 [8.0 x 12.0] | 2210.0 | 948.0 | 0.182 | 0.278 | 854.0 |
| 220.0 | 510DX227M010BD2D | 0.315 x 0.630 [8.0 x 16.0] | 1507.0 | 528.0 | 0.247 | 0.417 | 475.0 |
| 1200.0 | 510DX128M010DK2D | 0.492 x 0.984 [12.5 x 25.0] | 276.0 | 138.0 | 0.911 | 1.287 | 124.0 |
| 4700.0 | 510DX478M010FR2D | 0.709 x 1.417 [18.0 x 36.0] | 71.0 | 37.0 | 2.582 | 3.576 | 33.0 |
| 16 WV_{DC} AT 125 °C, SURGE = 20 V | | | | | | | |
| 150.0 | 510DX157M016BD2D | 0.315 x 0.630 [8.0 x 16.0] | 1415.0 | 549.0 | 0.255 | 0.409 | 494.0 |
| 470.0 | 510DX477M016DG2D | 0.492 x 0.787 [12.5 x 20.0] | 451.0 | 216.0 | 0.654 | 0.946 | 194.0 |
| 2200.0 | 510DX228M016ER2D | 0.630 x 1.417 [16.0 x 36.0] | 96.0 | 43.0 | 2.060 | 3.078 | 39.0 |



| ELECTRICAL DATA AND ORDERING INFORMATION | | | | | | | |
|---|----------------------------|--|-------------------------------------|------------------|-------------------------------|------------------|--|
| CAPACITANCE (μ F) | PART NUMBER ⁽¹⁾ | NOMINAL CASE SIZE D x L IN INCHES (mm) | MAX. ESR AT +25 °C (m Ω) | | MAX. RIPPLE AT +105 °C (A) | | MAX. Z AT +25 °C (m Ω) 100 Hz |
| | | | 120 Hz | 20 kHz TO 40 kHz | 120 Hz | 20 kHz TO 40 kHz | |
| 25 WV_{DC} AT 125 °C, SURGE = 32 V | | | | | | | |
| 100.0 | 510DX107M025BD2D | 0.315 x 0.630 [8.0 x 16.0] | 1459.0 | 571.0 | 0.251 | 0.401 | 514.0 |
| 100.0 | 510DX107M025CC2D | 0.394 x 0.512 [10.0 x 13.0] | 1459.0 | 571.0 | 0.268 | 0.428 | 514.0 |
| 330.0 | 510DX337M025DG2D | 0.492 x 0.787 [12.5 x 20.0] | 442.0 | 224.0 | 0.661 | 0.927 | 202.0 |
| 470.0 | 510DX477M025DK2D | 0.492 x 0.984 [12.5 x 25.0] | 310.0 | 150.0 | 0.859 | 1.238 | 135.0 |
| 1500.0 | 510DX158M025ER2D | 0.630 x 1.417 [16.0 x 36.0] | 97.0 | 45.0 | 2.049 | 3.009 | 40.0 |
| 35 WV_{DC} AT 125 °C, SURGE = 44 V | | | | | | | |
| 47.0 | 510DX476M035BB2D | 0.315 x 0.472 [8.0 x 12.0] | 2822.0 | 1067.0 | 0.161 | 0.262 | 960.0 |
| 100.0 | 510DX107M035CC2D | 0.394 x 0.512 [10.0 x 13.0] | 1326.0 | 593.0 | 0.281 | 0.421 | 534.0 |
| 220.0 | 510DX227M035CG2D | 0.394 x 0.787 [10.0 x 20.0] | 603.0 | 248.0 | 0.496 | 0.774 | 223.0 |
| 470.0 | 510DX477M035DK2D | 0.492 x 0.984 [12.5 x 25.0] | 282.0 | 156.0 | 0.901 | 1.214 | 140.0 |
| 1200.0 | 510DX128M035EN2D | 0.630 x 1.260 [16.0 x 32.0] | 111.0 | 58.0 | 1.826 | 2.527 | 52.0 |
| 1500.0 | 510DX158M035ER2D | 0.630 x 1.417 [16.0 x 36.0] | 88.0 | 47.0 | 2.151 | 2.944 | 42.0 |
| 50 WV_{DC} AT 125 °C, SURGE = 63 V | | | | | | | |
| 220.0 | 510DX227M050DG2D | 0.492 x 0.787 [12.5 x 20.0] | 543.0 | 243.0 | 0.597 | 0.892 | 218.0 |
| 330.0 | 510DX337M050DK2D | 0.492 x 0.984 [12.5 x 25.0] | 362.0 | 162.0 | 0.796 | 1.191 | 146.0 |
| 1000.0 | 510DX108M050ER2D | 0.630 x 1.417 [16.0 x 36.0] | 119.0 | 49.0 | 1.847 | 2.883 | 44.0 |
| 63 WV_{DC} AT 125 °C, SURGE = 79 V | | | | | | | |
| 47.0 | 510DX476M063BD2D | 0.315 x 0.630 [8.0 x 16.0] | 1975.0 | 642.0 | 0.215 | 0.378 | 578.0 |
| 47.0 | 510DX476M063CC2D | 0.394 x 0.512 [10.0 x 13.0] | 1975.0 | 642.0 | 0.231 | 0.404 | 578.0 |
| 220.0 | 510DX227M063DK2D | 0.492 x 0.984 [12.5 x 25.0] | 422.0 | 168.0 | 0.737 | 1.167 | 151.0 |
| 1000.0 | 510DX108M063FR2D | 0.709 x 1.417 [18.0 x 36.0] | 93.0 | 45.0 | 2.256 | 3.243 | 41.0 |



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