

+125°C Miniature Radial Lead, Aluminum Capacitors

Features-

- Suitable For Tantalum Replacement Applications
- Very Stable, Long Life
- Case Sizes Through 18 x 36mm
- Optional 3rd Lead On Diameters ≥ 12.5mm



General Specifications-

Operating Temperature:

-40 to +125°C

Voltage Range:

6.3 – 63 VDC

Capacitance Range:

1μF to 6,800μF

Capacitance Tolerance:

±20% (Std.)

Case Size Range:

8.0 X 12.0mm – 18.0 X 36.0mm

Termination:

2 or 3 Radial Leads.

Life Validation Test: 2,000hrs @ +125°C

Δ CAP ≤ 15% (6.3 – 10VDC),

≤ 10% (16 – 63)

From initial measurement.

Δ ESR ≤ 1.25X Initial specified limit.

Δ DCL ≤ Initial specified limit.

Shelf Test: 500hrs @ +105°C

Δ CAP ≤ 12% From initial measurement.

Δ ESR ≤ 1.25X Initial specified limit.

Δ DCL ≤ 2X Initial specified limit.

DC Leakage Current: (After 2 min. charge)

I = 0.01CV

Where:

I is in μA

C is in μF

V is in Volts

Ripple Current Multipliers:

Temperature:

| Ambient Temp. | Multiplier |
|---------------|------------|
| +125°C | 0.45 |
| +105°C | 1.00 |
| +95°C | 1.18 |
| +85°C | 1.34 |
| +75°C | 1.48 |
| ≤ +65°C | 1.61 |

Frequency (Hz):

| VDC | 50-60 | 100-120 | 300-400 | 1k-100k |
|---------|-------|---------|---------|---------|
| 0 – 25 | 0.85 | 1.00 | 1.05 | 1.10 |
| 26 – 63 | 0.80 | 1.00 | 1.30 | 1.40 |

Low Temperature Performance:

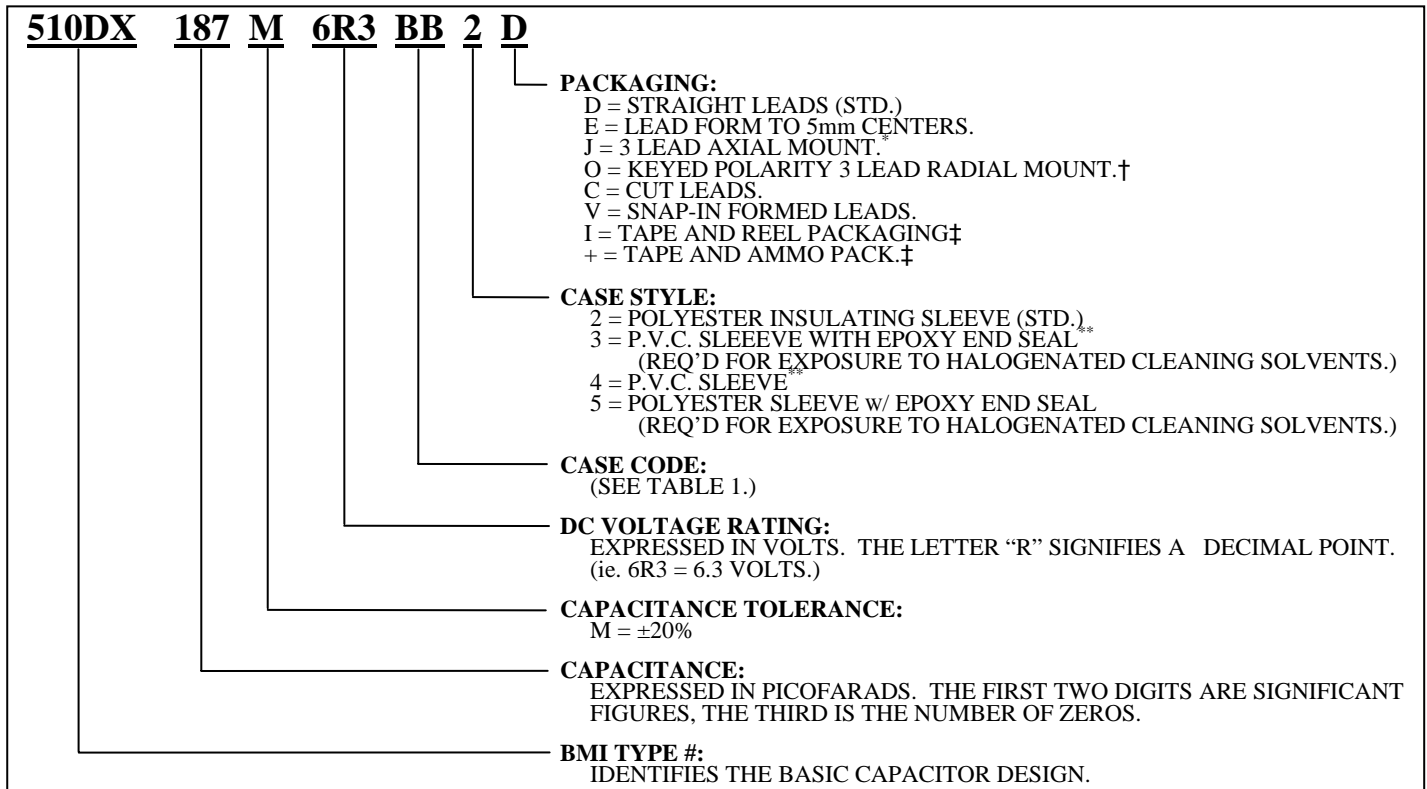
Capacitance Ratio $C^{-40°C}/C^{+25°C}$ min. @ 120Hz

| Rated Voltage (VDC) | Capacitance Remaining |
|---------------------|-----------------------|
| 6.3 – 10 | 75% |
| 16 – 25 | 80% |
| 35 – 63 | 85% |

ESR Ratio $ESR^{-40°C}/ESR^{+25°C}$ max. @ 120Hz

| Rated Voltage (VDC) | Multiplier |
|---------------------|------------|
| 6.3 – 10 | 35X |
| 16 – 25 | 30X |
| 35 - 63 | 25X |

PART NUMBER BREAK-DOWN:



*Available for 12.5, 16, and 18 mm dia. units.

**Sleeving rated to +105°C.

†Available for 12.5, 16, and 18 mm dia. units with epoxy end-seal.

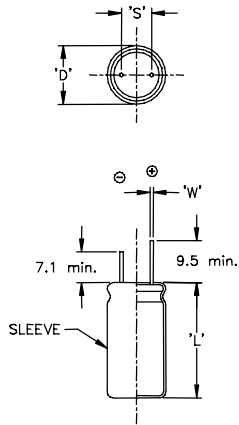
‡Available for 8 and 10 mm dia. units.

Table 1. Case Dimensions mm(in.)

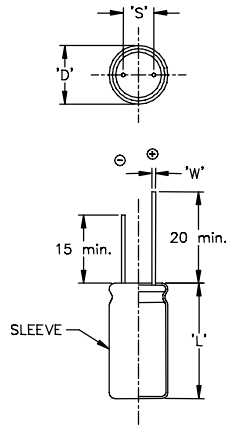
| CASE CODE | NOMINAL | | STYLES 2& 4 | | STYLES 3 & 5 (w/EPOXY) | | LEAD SPACING | | WIRE GAUGE 'W' |
|-----------|--------------|--------------|--------------|--------------|------------------------|--------------|--------------|-------------|--------------------|
| | 'D' | 'L' | 'D' MAX. | 'L' MAX. | 'D' MAX. | 'L' MAX. | S ± 0.6 | T ± 0.5 | |
| BB | 8.0 (0.315) | 12.0 (0.472) | 8.5 (0.335) | 13.0 (0.512) | 8.5 (0.335) | 14.0 (0.551) | 3.5 (0.138) | N/A | No. 22 AWG (0.025) |
| BD | 8.0 (0.315) | 16.0 (0.630) | 8.5 (0.335) | 17.0 (0.669) | 8.5 (0.335) | 18.8 (0.740) | 3.5 (0.138) | N/A | No. 22 AWG (0.025) |
| CC | 10.0 (0.394) | 13.0 (0.512) | 10.5 (0.413) | 14.3 (0.563) | 10.5 (0.413) | 16.0 (0.630) | 5.0 (0.197) | N/A | No. 22 AWG (0.025) |
| CD | 10.0 (0.394) | 16.0 (0.630) | 10.5 (0.413) | 17.0 (0.669) | 10.5 (0.413) | 18.8 (0.740) | 5.0 (0.197) | N/A | No. 22 AWG (0.025) |
| CG | 10.0 (0.394) | 20.0 (0.787) | 10.5 (0.413) | 21.5 (0.846) | 10.5 (0.413) | 23.0 (0.906) | 5.0 (0.197) | N/A | No. 22 AWG (0.025) |
| DG | 12.5 (0.492) | 20.0 (0.787) | 13.0 (0.512) | 21.5 (0.846) | 13.0 (0.512) | 23.0 (0.906) | 5.0 (0.197) | 2.5 (0.098) | No. 20 AWG (0.032) |
| DK | 12.5 (0.492) | 25.0 (0.984) | 13.0 (0.512) | 26.5 (1.043) | 13.0 (0.512) | 29.0 (1.142) | 5.0 (0.197) | 2.5 (0.098) | No. 20 AWG (0.032) |
| DM | 12.5 (0.492) | 26.5 (1.043) | 13.0 (0.512) | 28.0 (1.102) | 13.0 (0.512) | 29.5 (1.161) | 5.0 (0.197) | 2.5 (0.098) | No. 20 AWG (0.032) |
| DT | 12.5 (0.492) | 33.5 (1.319) | 13.0 (0.512) | 34.2 (1.347) | 13.0 (0.512) | 36.0 (1.417) | 5.0 (0.197) | 2.5 (0.098) | No. 20 AWG (0.032) |
| DS | 12.5 (0.492) | 42.5 (1.673) | 13.0 (0.512) | 43.7 (1.721) | 13.0 (0.512) | 45.5 (1.791) | 5.0 (0.197) | 2.5 (0.098) | No. 20 AWG (0.032) |
| EK | 16.0 (0.630) | 25.0 (0.984) | 16.5 (0.650) | 26.2 (1.032) | 16.5 (0.650) | 27.9 (1.098) | 7.5 (0.295) | 3.8 (0.150) | No. 20 AWG (0.032) |
| EN | 16.0 (0.630) | 32.0 (0.260) | 16.5 (0.650) | 33.5 (1.319) | 16.5 (0.650) | 36.0 (1.417) | 7.5 (0.295) | 3.8 (0.150) | No. 20 AWG (0.032) |
| ER | 16.0 (0.630) | 36.0 (1.417) | 16.5 (0.650) | 37.5 (1.476) | 16.5 (0.650) | 40.0 (1.575) | 7.5 (0.295) | 3.8 (0.150) | No. 20 AWG (0.032) |
| EU | 16.0 (0.630) | 40.0 (1.575) | 16.5 (0.650) | 41.7 (1.642) | 16.5 (0.650) | 42.4 (1.669) | 7.5 (0.295) | 3.8 (0.150) | No. 20 AWG (0.032) |
| FR | 18.0 (0.709) | 36.0 (1.417) | 18.5 (0.728) | 37.5 (1.476) | 18.5 (0.728) | 40.0 (1.575) | 7.5 (0.295) | 3.8 (0.150) | No. 20 AWG (0.032) |

Radial-Leaded Capacitor Dimensions

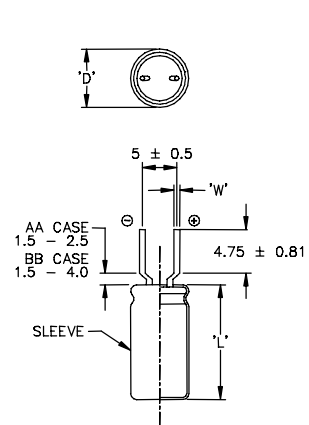
TERMINAL CODE C



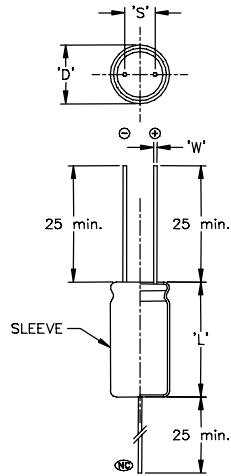
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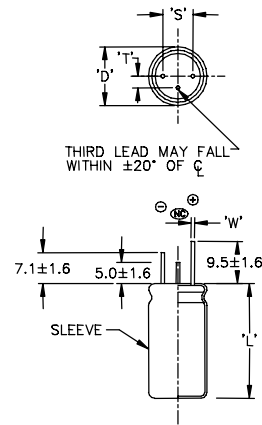
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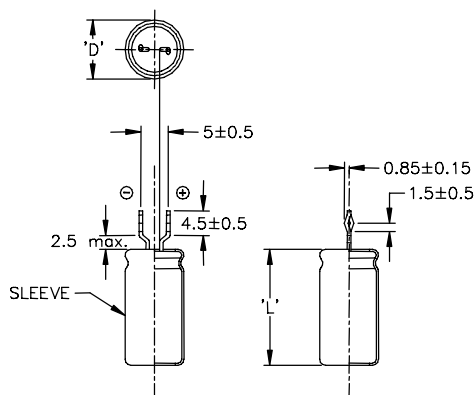
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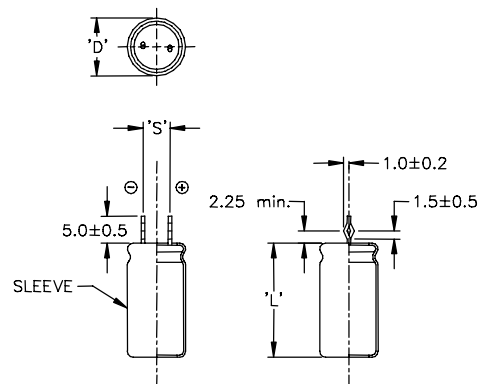
TERMINAL CODE O



TERMINAL CODE V 8 mm Dia.



TERMINAL CODE V 10 - 18 mm Dia.



Dimensions in mm

⊕ Positive Lead ⊖ Negative Lead ⊕ No Charge Potential

STANDARD RATINGS FOR TYPE 510DX

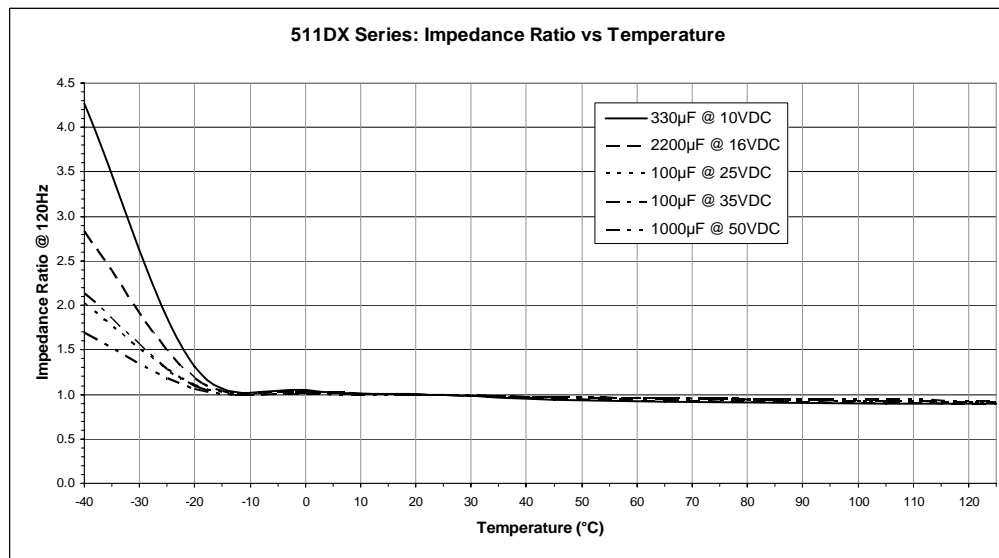
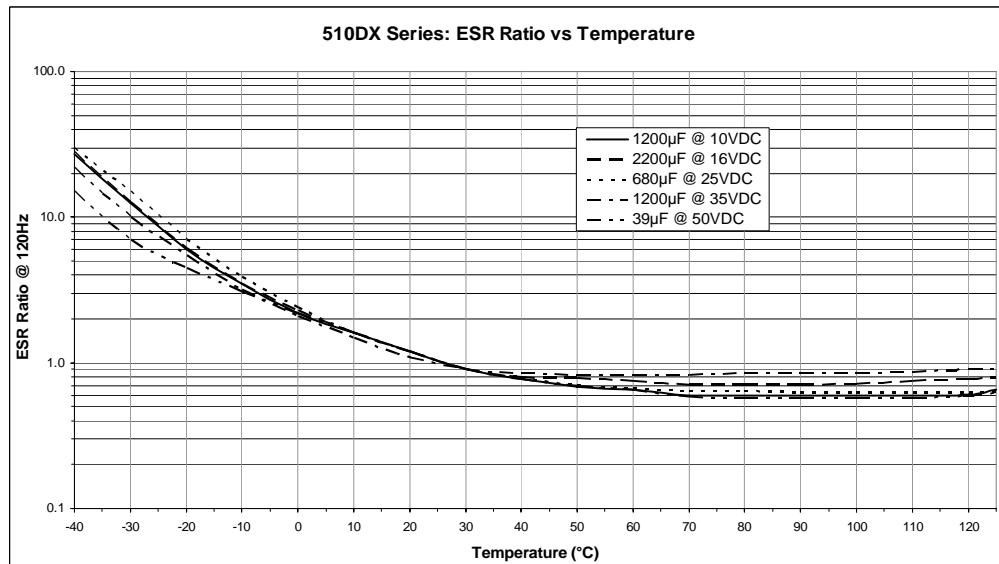
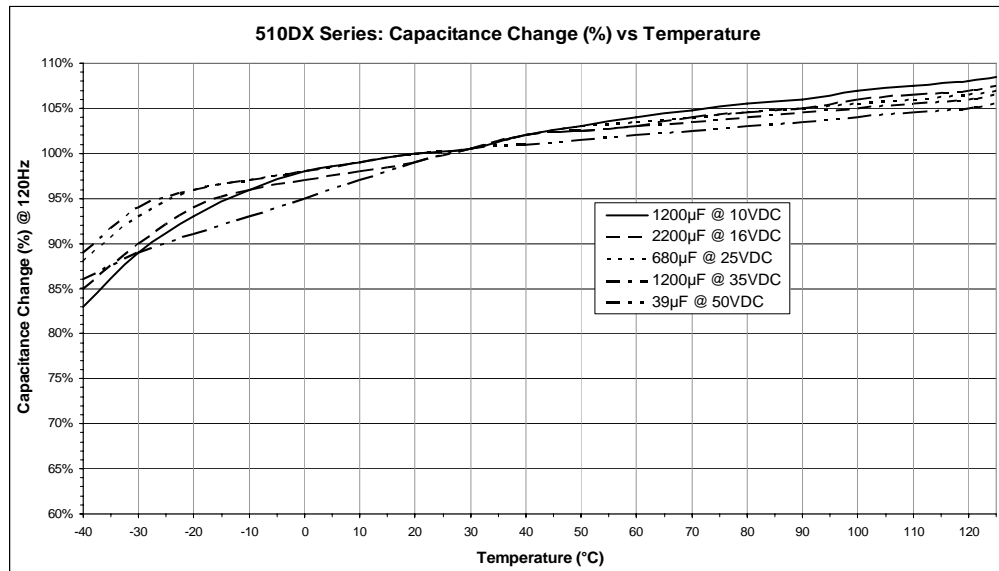
| Rated Capacitance (μF) | Catalog Number | Nominal Case Size D x L (mm) | Max. ESR | Max. ESR | Max. Ripple Current | Max. Ripple Current | Max. Z |
|---|------------------|------------------------------|-----------------|--------------------|----------------------------------|-------------------------------------|------------------|
| | | | +25°C 120Hz (Ω) | +25°C 20-40kHz (Ω) | +105°C 120Hz (A _{rms}) | +105°C 20-40kHz (A _{rms}) | +25°C 100kHz (Ω) |
| 6.3 VOLTS DC WORKING; 8 VOLTS DC SURGE | | | | | | | |
| 180 | 510DX187M6R3BB2D | 8.0 x 12.0 | 2.210 | 0.912 | 0.182 | 0.283 | 0.821 |
| 330 | 510DX337M6R3BD2D | 8.0 x 16.0 | 1.206 | 0.507 | 0.276 | 0.425 | 0.457 |
| 330 | 510DX337M6R3CC2D | 10.0 x 13.0 | 1.206 | 0.507 | 0.294 | 0.454 | 0.457 |
| 560 | 510DX567M6R3CD2D | 10.0 x 16.0 | 0.710 | 0.317 | 0.412 | 0.616 | 0.286 |
| 820 | 510DX827M6R3CG2D | 10.0 x 20.0 | 0.485 | 0.212 | 0.553 | 0.837 | 0.191 |
| 1,000 | 510DX108M6R3DG2D | 12.5 x 20.0 | 0.398 | 0.201 | 0.697 | 0.984 | 0.181 |
| 1,500 | 510DX158M6R3DK2D | 12.5 x 25.0 | 0.265 | 0.133 | 0.931 | 1.313 | 0.121 |
| 1,800 | 510DX188M6R3DM2D | 12.5 x 26.5 | 0.221 | 0.120 | 1.039 | 1.412 | 0.108 |
| 2,200 | 510DX228M6R3DT2D | 12.5 x 33.5 | 0.181 | 0.089 | 1.243 | 1.769 | 0.080 |
| 2,700 | 510DX278M6R3EK2D | 16.0 x 25.0 | 0.147 | 0.071 | 1.438 | 2.068 | 0.064 |
| 3,900 | 510DX398M6R3EN2D | 16.0 x 32.0 | 0.102 | 0.049 | 1.905 | 2.749 | 0.044 |
| 4,700 | 510DX478M6R3ER2D | 16.0 x 36.0 | 0.085 | 0.040 | 2.193 | 3.193 | 0.036 |
| 6,800 | 510DX688M6R3FR2D | 18.0 x 36.0 | 0.059 | 0.036 | 2.844 | 3.641 | 0.032 |
| 10 VOLTS DC WORKING; 13 VOLTS DC SURGE | | | | | | | |
| 150 | 510DX157M010BB2D | 8.0 x 12.0 | 2.210 | 0.948 | 0.182 | 0.278 | 0.854 |
| 220 | 510DX227M010BD2D | 8.0 x 16.0 | 1.507 | 0.528 | 0.247 | 0.417 | 0.475 |
| 270 | 510DX277M010CC2D | 10.0 x 13.0 | 1.228 | 0.528 | 0.292 | 0.445 | 0.475 |
| 390 | 510DX397M010CD2D | 10.0 x 16.0 | 0.850 | 0.330 | 0.377 | 0.604 | 0.297 |
| 560 | 510DX567M010CG2D | 10.0 x 20.0 | 0.592 | 0.220 | 0.501 | 0.821 | 0.198 |
| 680 | 510DX687M010DG2D | 12.5 x 20.0 | 0.488 | 0.207 | 0.629 | 0.965 | 0.187 |
| 1,200 | 510DX128M010DK2D | 12.5 x 25.0 | 0.276 | 0.138 | 0.911 | 1.287 | 0.124 |
| 1,800 | 510DX188M010DT2D | 12.5 x 26.5 | 0.184 | 0.093 | 1.232 | 1.734 | 0.084 |
| 1,800 | 510DX188M010EK2D | 12.5 x 33.5 | 0.184 | 0.074 | 1.285 | 2.027 | 0.067 |
| 2,700 | 510DX278M010EN2D | 16.0 x 25.0 | 0.123 | 0.051 | 1.737 | 2.695 | 0.046 |
| 3,300 | 510DX338M010ER2D | 16.0 x 32.0 | 0.100 | 0.042 | 2.018 | 3.114 | 0.037 |
| 4,700 | 510DX478M010FR2D | 16.0 x 36.0 | 0.071 | 0.037 | 2.582 | 3.576 | 0.033 |
| 16 VOLTS DC WORKING; 20 VOLTS DC SURGE | | | | | | | |
| 82 | 510DX826M016BB2D | 8.0 x 12.0 | 2.588 | 0.986 | 0.168 | 0.272 | 0.888 |
| 150 | 510DX157M016BD2D | 8.0 x 16.0 | 1.415 | 0.549 | 0.255 | 0.409 | 0.494 |
| 150 | 510DX157M016CC2D | 10.0 x 13.0 | 1.415 | 0.549 | 0.272 | 0.436 | 0.494 |
| 270 | 510DX277M016CD2D | 10.0 x 16.0 | 0.786 | 0.343 | 0.392 | 0.593 | 0.309 |
| 390 | 510DX397M016CG2D | 10.0 x 20.0 | 0.544 | 0.229 | 0.522 | 0.805 | 0.206 |
| 470 | 510DX477M016DG2D | 12.5 x 20.0 | 0.451 | 0.216 | 0.654 | 0.946 | 0.194 |
| 820 | 510DX827M016DK2D | 12.5 x 25.0 | 0.259 | 0.144 | 0.941 | 1.262 | 0.129 |
| 1,200 | 510DX128M016DT2D | 12.5 x 33.5 | 0.177 | 0.097 | 1.257 | 1.701 | 0.087 |
| 1,200 | 510DX128M016EK2D | 16.0 x 25.0 | 0.177 | 0.077 | 1.311 | 1.987 | 0.070 |
| 1,800 | 510DX188M016EN2D | 16.0 x 32.0 | 0.118 | 0.053 | 1.772 | 2.643 | 0.048 |
| 2,200 | 510DX228M016ER2D | 16.0 x 36.0 | 0.096 | 0.043 | 2.060 | 3.078 | 0.039 |
| 3,300 | 510DX338M016FR2D | 18.0 x 36.0 | 0.064 | 0.039 | 2.719 | 3.501 | 0.035 |
| 25 VOLTS DC WORKING; 32 VOLTS DC SURGE | | | | | | | |
| 56 | 510DX566M025BB2D | 8.0 x 12.0 | 2.605 | 1.026 | 0.168 | 0.267 | 0.923 |
| 100 | 510DX107M025BD2D | 8.0 x 16.0 | 1.459 | 0.571 | 0.251 | 0.401 | 0.514 |
| 100 | 510DX107M025CC2D | 10.0 x 13.0 | 1.459 | 0.571 | 0.268 | 0.428 | 0.514 |
| 180 | 510DX187M025CD2D | 10.0 x 16.0 | 0.810 | 0.357 | 0.386 | 0.581 | 0.321 |
| 270 | 510DX277M025CG2D | 10.0 x 20.0 | 0.540 | 0.238 | 0.524 | 0.789 | 0.214 |
| 330 | 510DX337M025DG2D | 12.5 x 20.0 | 0.442 | 0.224 | 0.661 | 0.927 | 0.202 |
| 470 | 510DX477M025DK2D | 12.5 x 25.0 | 0.310 | 0.150 | 0.859 | 1.238 | 0.135 |
| 560 | 510DX567M025DM2D | 12.5 x 26.5 | 0.261 | 0.135 | 0.957 | 1.331 | 0.121 |
| 680 | 510DX687M025DT2D | 12.5 x 33.5 | 0.215 | 0.100 | 1.141 | 1.661 | 0.090 |

STANDARD RATINGS FOR TYPE 510DX

| Rated Capacitance (μF) | Catalog Number | Nominal Case Size D x L (mm) | Max. ESR | Max. ESR | Max. Ripple Current | Max. Ripple Current | Max. Z |
|---|------------------|------------------------------|-----------------|--------------------|----------------------------------|-------------------------------------|------------------|
| | | | +25°C 120Hz (Ω) | +25°C 20-40kHz (Ω) | +105°C 120Hz (A _{rms}) | +105°C 20-40kHz (A _{rms}) | +25°C 100kHz (Ω) |
| 25 VOLTS DC WORKING; 32 VOLTS DC SURGE (CONTINUED) | | | | | | | |
| 820 | 510DX827M025EK2D | 16.0 x 25.0 | 0.178 | 0.080 | 1.307 | 1.949 | 0.072 |
| 1,200 | 510DX128M025EN2D | 16.0 x 32.0 | 0.122 | 0.055 | 1.742 | 2.595 | 0.050 |
| 1,500 | 510DX158M025ER2D | 16.0 x 36.0 | 0.097 | 0.045 | 2.049 | 3.009 | 0.040 |
| 1,800 | 510DX188M025FR2D | 18.0 x 36.0 | 0.081 | 0.040 | 2.417 | 3.439 | 0.036 |
| 35 VOLTS DC WORKING; 44 VOLTS DC SURGE | | | | | | | |
| 47 | 510DX476M035BB2D | 8.0 x 12.0 | 2.822 | 1.067 | 0.161 | 0.262 | 0.960 |
| 82 | 510DX826M035BD2D | 8.0 x 16.0 | 1.617 | 0.593 | 0.238 | 0.393 | 0.534 |
| 100 | 510DX107M035CC2D | 10.0 x 13.0 | 1.326 | 0.593 | 0.281 | 0.421 | 0.534 |
| 150 | 510DX157M035CD2D | 10.0 x 16.0 | 0.884 | 0.371 | 0.369 | 0.571 | 0.334 |
| 220 | 510DX227M035CG2D | 10.0 x 20.0 | 0.603 | 0.248 | 0.496 | 0.774 | 0.223 |
| 270 | 510DX277M035DG2D | 12.5 x 20.0 | 0.491 | 0.233 | 0.627 | 0.911 | 0.210 |
| 470 | 510DX477M035DK2D | 12.5 x 26.5 | 0.282 | 0.156 | 0.901 | 1.214 | 0.140 |
| 680 | 510DX687M035DT2D | 12.5 x 33.5 | 0.195 | 0.104 | 1.197 | 1.615 | 0.094 |
| 820 | 510DX827M035EK2D | 16.0 x 25.0 | 0.162 | 0.084 | 1.371 | 1.902 | 0.075 |
| 1,200 | 510DX128M035EN2D | 16.0 x 32.0 | 0.111 | 0.058 | 1.826 | 2.527 | 0.052 |
| 1,500 | 510DX158M035ER2D | 16.0 x 36.0 | 0.088 | 0.047 | 2.151 | 2.944 | 0.042 |
| 1,800 | 510DX188M035FR2D | 18.0 x 36.0 | 0.074 | 0.042 | 2.534 | 3.366 | 0.038 |
| 50 VOLTS DC WORKING; 63 VOLTS DC SURGE | | | | | | | |
| 39 | 510DX396M050BB2D | 8.0 x 12.0 | 3.061 | 1.110 | 0.155 | 0.257 | 0.999 |
| 68 | 510DX686M050BD2D | 8.0 x 16.0 | 1.755 | 0.617 | 0.229 | 0.385 | 0.555 |
| 82 | 510DX826M050CC2D | 10.0 x 13.0 | 1.456 | 0.617 | 0.268 | 0.412 | 0.555 |
| 120 | 510DX127M050CD2D | 10.0 x 16.0 | 0.995 | 0.386 | 0.348 | 0.559 | 0.347 |
| 180 | 510DX187M050CG2D | 10.0 x 20.0 | 0.663 | 0.258 | 0.473 | 0.759 | 0.232 |
| 220 | 510DX227M050DG2D | 12.5 x 20.0 | 0.543 | 0.243 | 0.597 | 0.892 | 0.218 |
| 330 | 510DX337M050DK2D | 12.5 x 25.0 | 0.362 | 0.162 | 0.796 | 1.191 | 0.146 |
| 390 | 510DX397M050DM2D | 12.5 x 26.5 | 0.306 | 0.146 | 0.883 | 1.281 | 0.131 |
| 560 | 510DX567M050DT2D | 12.5 x 33.5 | 0.213 | 0.109 | 1.145 | 1.604 | 0.098 |
| 560 | 510DX567M050EK2D | 16.0 x 25.0 | 0.213 | 0.087 | 1.194 | 1.870 | 0.078 |
| 820 | 510DX827M050EN2D | 16.0 x 32.0 | 0.146 | 0.060 | 1.595 | 2.485 | 0.054 |
| 1,000 | 510DX108M050ER2D | 16.0 x 36.0 | 0.119 | 0.049 | 1.847 | 2.883 | 0.044 |
| 1,500 | 510DX158M050FR2D | 18.0 x 36.0 | 0.080 | 0.043 | 2.432 | 3.317 | 0.039 |
| 63 VOLTS DC WORKING; 79 VOLTS DC SURGE | | | | | | | |
| 27 | 510DX276M063BB2D | 8.0 x 12.0 | 3.438 | 1.154 | 0.146 | 0.252 | 1.039 |
| 47 | 510DX476M063BD2D | 8.0 x 16.0 | 1.975 | 0.642 | 0.215 | 0.378 | 0.578 |
| 47 | 510DX476M063CC2D | 10.0 x 13.0 | 1.975 | 0.642 | 0.231 | 0.404 | 0.578 |
| 82 | 510DX826M063CD2D | 10.0 x 16.0 | 1.132 | 0.401 | 0.326 | 0.548 | 0.361 |
| 120 | 510DX127M063CG2D | 10.0 x 20.0 | 0.774 | 0.268 | 0.438 | 0.744 | 0.241 |
| 150 | 510DX157M063DG2D | 12.5 x 20.0 | 0.619 | 0.252 | 0.559 | 0.875 | 0.227 |
| 220 | 510DX227M063DK2D | 12.5 x 25.0 | 0.422 | 0.168 | 0.737 | 1.167 | 0.151 |
| 270 | 510DX277M063DM2D | 12.5 x 26.5 | 0.344 | 0.151 | 0.833 | 1.255 | 0.136 |
| 390 | 510DX397M063DT2D | 12.5 x 33.5 | 0.238 | 0.113 | 1.083 | 1.572 | 0.102 |
| 390 | 510DX397M063EK2D | 16.0 x 25.0 | 0.238 | 0.090 | 1.131 | 1.834 | 0.081 |
| 560 | 510DX567M063EN2D | 16.0 x 32.0 | 0.166 | 0.062 | 1.494 | 2.444 | 0.056 |
| 680 | 510DX687M063ER2D | 16.0 x 36.0 | 0.137 | 0.051 | 1.724 | 2.826 | 0.045 |
| 1,000 | 510DX108M063FR2D | 18.0 x 36.0 | 0.093 | 0.045 | 2.256 | 3.243 | 0.041 |

510DX TYPICAL PERFORMANCE PROFILES

TEMPERATURE CHARACTERISTICS



510DX TYPICAL PERFORMANCE PROFILES

FREQUENCY CHARACTERISTICS

