# SEMTECH INDUSTRIAL HIGH VOLTAGE CAPACITORS MONOLITHIC CERAMIC TYPE

Semtech's Industrial Capacitors employ a new body design for cost efficient, volume manufacturing. This capacitor body design also expands our voltage capability to 10 KV and our capacitance range to .47μF. If your requirement exceeds our single device ratings, Semtech can build a custom capacitor assembly to reach the values you need.

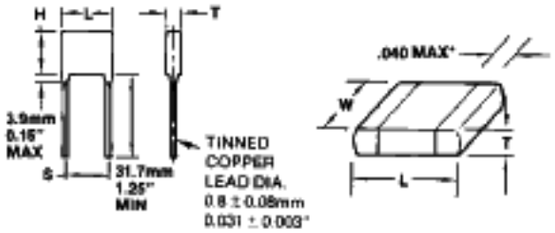
- **X7R AND NPO DIELECTRICS**
- **100 pF TO .47μF CAPACITANCE RANGE**
- **1 TO 10 KV VOLTAGE RANGE**
- **14 CHIP SIZES**

## CAPABILITY MATRIX

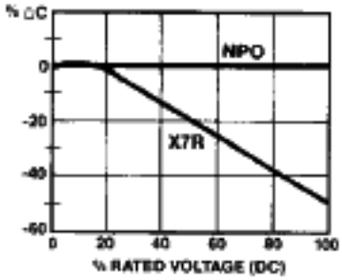
| Size | Bias Voltage (Note 2) | Dielectric Type | Maximum Capacitance—EIA Code (Note 1) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1 KV | 2 KV | 3 KV | 4 KV | 5 KV | 6 KV | 7 KV | 8 KV | 9 KV | 10 KV |
| 1515 | — | NPO | 102 | 561 | 271 | 181 | 121 | | | | | |
| | VDCW | X7R | 562 | 222 | 102 | 471 | 271 | | | | | |
| | 0 | X7R | 123 | 472 | 222 | 821 | 561 | | | | | |
| 2020 | — | NPO | 182 | 122 | 561 | 331 | 221 | 181 | | | | |
| | VDCW | X7R | 103 | 472 | 182 | 681 | 471 | 271 | | | | |
| | 0 | X7R | 223 | 103 | 392 | 152 | 102 | 561 | | | | |
| 2520 | — | NPO | 222 | 152 | 681 | 391 | 271 | 221 | 101 | | | |
| | VDCW | X7R | 153 | 682 | 222 | 821 | 561 | 331 | 181 | | | |
| | 0 | X7R | 333 | 123 | 472 | 182 | 122 | 681 | 391 | | | |
| 3333 | — | NPO | 682 | 472 | 222 | 122 | 821 | 561 | 271 | | | |
| | VDCW | X7R | 473 | 153 | 562 | 272 | 182 | 102 | 561 | | | |
| | 0 | X7R | 104 | 333 | 123 | 562 | 392 | 222 | 122 | | | |
| 3530 | — | NPO | 562 | 392 | 182 | 102 | 681 | 471 | 221 | | | |
| | VDCW | X7R | 393 | 153 | 562 | 272 | 182 | 102 | 561 | | | |
| | 0 | X7R | 823 | 333 | 123 | 562 | 392 | 222 | 122 | | | |
| 4020 | — | NPO | 152 | 102 | 821 | 681 | 391 | 331 | 271 | 181 | 121 | 101 |
| | VDCW | X7R | 123 | 562 | 272 | 122 | 821 | 681 | 471 | 391 | 391 | 331 |
| | 0 | X7R | 223 | 123 | 562 | 272 | 182 | 152 | 102 | 821 | 681 | 561 |
| 4040 | — | NPO | 103 | 682 | 332 | 222 | 122 | 102 | 391 | 331 | | |
| | VDCW | X7R | 563 | 273 | 103 | 392 | 272 | 182 | 471 | 471 | | |
| | 0 | X7R | 124 | 563 | 223 | 822 | 562 | 392 | 182 | 102 | | |
| 4540 | — | NPO | 123 | 822 | 332 | 222 | 152 | 122 | 471 | 331 | | |
| | VDCW | X7R | 683 | 333 | 123 | 472 | 332 | 222 | 102 | 561 | | |
| | 0 | X7R | 154 | 683 | 273 | 103 | 682 | 472 | 222 | 122 | | |
| 5040 | — | NPO | 182 | 122 | 102 | 681 | 471 | 391 | 271 | 221 | 151 | 121 |
| | VDCW | X7R | 153 | 682 | 332 | 152 | 102 | 821 | 561 | 471 | 391 | 391 |
| | 0 | X7R | 273 | 153 | 682 | 332 | 222 | 182 | 122 | 102 | 821 | 681 |
| 5440 | — | NPO | 153 | 103 | 472 | 272 | 182 | 122 | 561 | 391 | | |
| | VDCW | X7R | 104 | 333 | 153 | 562 | 392 | 272 | 122 | 681 | | |
| | 0 | X7R | 224 | 683 | 333 | 123 | 822 | 562 | 272 | 152 | | |
| 5550 | — | NPO | 183 | 123 | 562 | 332 | 222 | 152 | 681 | 561 | | |
| | VDCW | X7R | 124 | 393 | 183 | 682 | 472 | 332 | 152 | 821 | | |
| | 0 | X7R | 274 | 823 | 393 | 153 | 103 | 682 | 332 | 182 | | |
| 6560 | — | NPO | 273 | 183 | 822 | 562 | 332 | 272 | 122 | 821 | | |
| | VDCW | X7R | 184 | 563 | 273 | 103 | 682 | 472 | 272 | 122 | | |
| | 0 | X7R | 394 | 124 | 563 | 223 | 153 | 103 | 562 | 272 | | |
| 6666 | — | NPO | 123 | 682 | 562 | 472 | 272 | 222 | 152 | 122 | 102 | 681 |
| | VDCW | X7R | 823 | 473 | 183 | 822 | 682 | 472 | 332 | 272 | 182 | 122 |
| | 0 | X7R | 154 | 104 | 393 | 183 | 153 | 103 | 682 | 562 | 392 | 272 |
| 7565 | — | NPO | 333 | 223 | 103 | 682 | 392 | 332 | 152 | 102 | | |
| | VDCW | X7R | 224 | 683 | 333 | 123 | 822 | 562 | 332 | 152 | | |
| | 0 | X7R | 474 | 154 | 683 | 273 | 183 | 123 | 682 | 332 | | |

NOTES: 1. EIA Capacitance Code: Value in Picofarads; two significant figures followed by number of zeros: 562 = 5600 pf, 273 = 27000 pf (.027 mfd).

2. • Class I Dielectric (NPO) has zero voltage coefficient. Values shown are at 0 volt bias, or at working volts (VDCW).
   • Class II Dielectric (X7R) has voltage coefficient, and values derate at VDCW by up to 50% of value at 0 volt bias. Capacitance @ VDCW is function of design of unit and may vary.




## INDUSTRIAL CAPACITOR DC VOLTAGE COEFFICIENTS




## GENERAL SPECIFICATIONS

- **OPERATING TEMPERATURE RANGE**
  -55°C to 125°C
- **TEMPERATURE COEFFICIENT**
  NPO: ±30 ppm/°C
  X7R: ±15% ΔC Max.
- **DISSIPATION FACTOR**
  NPO: 0.1% Max, 0.02% typical
  X7R: 2.5% Max, 1.5% typical
- **INSULATION RESISTANCE**
  @ 25°C, 1.0 KV: >100GΩ or 1000ΩF, whichever is less
  @ 125°C, 1.0 KV: >10GΩ or 100ΩF, whichever is less
- **DIELECTRIC WITHSTANDING VOLTAGE**
  1.2 × VDCW Min, 50 m-amp Max, 5 seconds
- **AGING RATE**
  NPO: 0% per decade hour
  X7R: <2.0% per decade hour
- **TEST PARAMETERS**
  1 KHz, 1.0 VRMS±0.2 VRMS, 25°C
  0 Volts

# SEMTECH INDUSTRIAL HIGH VOLTAGE CAPACITORS MONOLITHIC CERAMIC TYPE (cont.)

**CHIP DIMENSIONS**

| Size | (Nom.) Len. in. (mm) | (Nom.) Wid. in. (mm) | T (Max) in. (mm) |
|---|---|---|---|
| 1515 | .150±.015 (3.81±.38) | .150±.015 (3.81±.38) | .120 (3.05) |
| 2020 | .200±.020 (5.08±.51) | .200±.020 (5.08±.51) | .120 (3.05) |
| 2520 | .230±.023 (5.84±.58) | .190±.019 (4.82±.48) | .120 (3.05) |
| 3333 | .330±.033 (8.38±.84) | .330±.033 (8.38±.84) | .150 (3.81) |
| 3530 | .350±.035 (8.89±.89) | .300±.030 (7.62±.76) | .150 (3.81) |
| 4020 | .400±.040 (10.2±1.0) | .200±.020 (5.08±.51) | .150 (3.81) |
| 4040 | .400±.040 (10.2±1.0) | .400±.040 (10.2±1.0) | .150 (3.81) |
| 4540 | .450±.045 (11.4±1.1) | .400±.040 (10.2±1.0) | .150 (3.81) |
| 5040 | .460±.046 (11.7±1.2) | .380±.038 (9.65±.97) | .150 (3.81) |
| 5440 | .540±.054 (13.7±1.4) | .400±.040 (10.2±1.0) | .150 (3.81) |
| 5550 | .550±.055 (14.0±1.4) | .500±.050 (12.7±1.3) | .150 (3.81) |
| 6560 | .650±.065 (16.5±1.7) | .600±.060 (15.2±1.5) | .175 (4.45) |
| 6666 | .660±.066 (16.8±1.7) | .660±.066 (16.8±1.7) | .175 (4.45) |
| 7565 | .750±.075 (19.0±1.9) | .650±.065 (16.5±1.7) | .175 (4.45) |

**ENCAPSULATED DIMENSIONS**

| Size | Len. (Max) in. (mm) | Wid. (Max) in. (mm) | T (Max) in. (mm) | S in. (mm) |
|---|---|---|---|---|
| 1515 | .300 (7.62) | .300 (7.62) | .220 (5.59) | .180±.03 (4.57±.46) |
| 2020 | .350 (8.89) | .350 (8.89) | .220 (5.59) | .230±.03 (5.84±.58) |
| 2520 | .390 (9.65) | .340 (8.64) | .220 (5.59) | .260±.03 (6.60±.66) |
| 3333 | .480 (12.2) | .480 (12.2) | .250 (6.35) | .360±.033 (9.14±.91) |
| 3530 | .500 (12.7) | .450 (11.4) | .250 (6.35) | .380±.035 9.65±.97) |
| 4020 | .550 (13.97) | .350 (8.89) | .250 (6.35) | .430±.040 (10.9±1.1) |
| 4040 | .550 (13.97) | .550 (13.97) | .250 (6.35) | .430±.040 (10.9±1.1) |
| 4540 | .600 (15.24) | .550 (13.97) | .250 (6.35) | .480±.045 (12.2±1.2) |
| 5040 | .610 (15.49) | .530 (12.46) | .250 (6.35) | .490±.046 (12.4±1.2) |
| 5440 | .690 (17.53) | .550 (13.97) | .250 (6.35) | .570±.054 (14.5±1.4) |
| 5550 | .700 (17.78) | .650 (16.51) | .250 (6.35) | .580±.058 (14.7±1.5) |
| 6560 | .800 (20.32) | .750 (19.05) | .275 (6.99) | .680±.065 (17.3±1.7) |
| 6666 | .810 (20.57) | .810 (20.57) | .275 (6.99) | .690±.066 (17.5±1.8) |
| 7565 | .900 (22.86) | .800 (20.32) | .275 (6.99) | .780±.075 (19.8±2) |

## ORDERING INSTRUCTIONS

| 2020 | A | X | 103 | K | 2 |
|---|---|---|---|---|---|
| **PART SIZE CODE** | **FORM** | **DIELECTRIC MATERIAL** | **CAPACITANCE (EIA CODE)** | **CAPACITANCE TOLERANCE** | **VOLTAGE RATING** |
| 1515<br>2020<br>"<br>"<br>7565 | **CHIP**<br>A=Silver Termination<br>D=Palladium / Silver Termination<br>**LEADED**<br>E=Epoxy Encapsulated<br>L=Leaded Only | X=X7R<br><br>N=NPO | Last digit indicates number of zeroes following the first two digits.<br>Ex. 103=10000 pF | J=5%<br>K=10%<br>M=20%<br>Z=+80%-20% | 1 KV<br>2 KV<br>"<br>"<br>10 KV |

Общество с ограниченной ответственностью «МосЧип» ИНН 7719860671 / КПП 771901001
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