# 74x Series
## Chip Resistor Arrays

## Features

- Low Cost Thick Film Technology
- Leadless Surface Mount Construction
- Concave or Convex Terminations
- Solder Coated Nickel Barrier Pads
- Isolated and Bussed Circuit Configurations
- Improved TCR Tracking vs. Discrete Resistors
- Fewer Placements Than Discrete Components
- Tape and Reel Packaging

**RoHS Compliant in Accordance with EU Directive 2011/65/EU**
- Lead-Free Termination Finish
- Exemption 7(c)-I, Electrical and electronic components containing lead [Pb] in glass

## Applications

- Data Communications
- Image Processing
- Medical Equipment
- Networking
- Pull-Up/Pull-Down Logic Gates
- DDR SDRAM, MDDR, DRAM
- Portable Test Equipment
- Low Profile High Density Designs

## Description

74x Series Chip Arrays are single packaged devices containing an array of homogeneous resistor elements. Arrays are typically used for convenience when several resistors occupy the same area in a layout. Multiple package sizes and circuit configurations help save placement costs by reducing application component count.

## Ordering Information

| Model | Resistor Value | Resistor Tolerance | RoHS Compliant |
|---|---|---|---|
| 741X083 | 103 | J | P |

| Package Code | Package Code | Package Code |
|---|---|---|
| 740X043 | 742C043 | 745X102 |
| 741X043 | 742X083 | 745C101 |
| 741X083 | 742C083 | 745C102 |
| 741C083 | 742C163 | 746X101 |
| 741X163 | 745X101 | |

| Code | Tolerance |
|---|---|
| J | ±5% [1] |
| G | ±2% [2, 4] |
| F | ±1% [3, 4] |
| X | Zero Ohm |

| Code | Resistor Value * |
|---|---|
| 103 | 10k ohm |

\* See Addendum for Standard EIA Values and Codes

| Code | Termination |
|---|---|
| P | Matte Sn Finish |

Notes:
1. Standard tolerance is ±5% and available for all 740 - 746 package codes; 3-digit resistor codes.
2. Optional tolerance at ±2% is available for all 741 - 745 package codes, 3-digit resistor codes; except 741X163, 745X101 and 745X102 [±5% and ±1% only].
3. Optional tolerance at ±1% is available for all 741 - 745 package codes, 4-digit resistor codes; except 745X101 and 745X102 [±5% and ±1% only].
4. Consult factory for availability with 740X043 package code.

**Not all performance combinations and resistor values may be available.**
**Contact your local CTS Representative or CTS Customer Service for availability.**

This product is specified for use only in standard commercial applications. Supplier disclaims all express and implied warranties and liability in connection with any use of this product in any non-commercial applications or in any application that may expose the product to conditions that are outside of the tolerances provided in its specification.

## Ordering Information

### Part Number Examples

| Tolerance / Value | 3-Digit Code J [±5%] | 3-Digit Code G [±2%] | 4-Digit Code F [±1%] |
|---|---|---|---|
| **10 Ohms** | 742C083100JP | 742C083100GP | 742C08310R0FP |
| **49.9 Ohms** | Not Available | Not Available | 742C08349R9FP |
| **120 Ohms** | 742C083121JP | 742C083121GP | 742C0831200FP |
| **1k Ohms** | 742C083102JP | 742C083102GP | 742C0831001FP |
| **68k Ohms** | 742C083683JP | 742C083683GP | 742C0836802FP |

**3-Digit Resistor Code** [For 5% and 2% tolerance only.]

$1^{st}$ and $2^{nd}$ digits are resistor, $3^{rd}$ digit is number of zeros.
  Ex. 102 = 1,000 ohm = 1k ohm
  Ex. 683 = 68,000 ohm = 68k ohm

**4-Digit Resistor Code** [For 1% tolerance only.]

First three digits are resistor value, $4^{th}$ digit is number of zeros.
  Ex. 1001 = 1,000 ohm = 1k ohm
  Ex. 6802 = 68,000 ohm = 68k ohm

**Resistance Values <100 Ohms**

"R" indicates decimal for values less than 100 ohm.
  Ex. 49R9 = 49.9 ohm

## Electrical & Environmental Specifications

### Operating Conditions

| Package | PCB Area Per Resistor [Sq. Inch] | Circuit Type | Resistance Range [ohm] | Resistance Tolerance [%] [1] | Operating Temperature Range | Temperature Coefficient | +70°C Power Per Resistor [2] [Watts] | Maximum Operating Voltage |
|---|---|---|---|---|---|---|---|---|
| **740** | 0.0008 | Isolated | 10 - 1M | ±5% Std. or 0.5 ohm [whichever is greater] | -55°C to +125°C | ±200ppm/°C | 0.031 | 12.5V |
| **741** | 0.0015 | Isolated | 10 - 1M | | | | 0.063 | 25V |
| **742** | 0.0037 | Isolated | 10 - 1M | | | | 0.063 | 50V |
| **745X** | 0.0058 | Bussed | 10 - 330k | | | | 0.063 | 50V |
| **745C** | 0.0058 | Bussed | 10 - 1M | | | ±250ppm/°C | 0.063 | 50V |
| **746** | 0.0013 | Bussed | 10 - 100k | | | ±200ppm/°C | 0.031 | 25V |

1. See Ordering Information for other options available.

2. Total Rated Package Power equals total number of resistors times rated Power Per Resistor.

### Operating Conditions – 0 ohm

| Package | PCB Area Per Resistor [Sq. Inch] | Circuit Type | Resistance Range [ohm] | Current @ +70°C Max Per Element [A] | Surge Current Max <1 second [A] | Max Resistance [milliohm] |
|---|---|---|---|---|---|---|
| **740** | 0.0008 | Isolated | | | | |
| **741** | 0.0015 | Isolated | 0.0 | 1.0 | 2.0 | 50 |
| **742** | 0.0037 | Isolated | | | | |

# Electrical & Environmental Specifications

## Power Derating Curve – Typical

With the rated ambient temperature set to +70°C, the maximum power [maximum current for 0Ω product] at a temperature of no more than rated ambient temperature shall be equal to the rated power [rate current for 0Ω product]. The maximum power at a temperature exceeding the rated ambient temperature shall be a value determined by reducing the rated power according to the power reduction curve in the figure below.



## Rated Voltage

The rated voltage shall be the DC or AC [effective power frequency] voltage corresponding to the rated power and shall be determined with the formula shown below. If the determined rated voltage exceeds the maximum operating voltage specified in Operating Conditions table, the maximum operating voltage shall be the rated voltage.

$$E = \sqrt{P \times R}$$

E = Rated Voaltge [V]

P = Rated Power [W]

R = Nomimal Resistance [Ω]

## Environmental Parameters

| Test | Maximum Delta R [%] | | | Test Description |
|------|-----|-----|-----------|------------------|
| | 740 | 741 | 742 - 746 | |
| Thermal Cycle | 1.00 | 1.00 | 1.00 | 5 cycles -55°C to +125°C |
| Short Time Overload | 2.00 | 2.50 | 1.00 | 2½ times rated working voltage for 5 seconds |
| Moisture Resistance | 2.00 | 5.00 | 2.00 | 240 hours @ 0.1 rated load; -10°C to +65°C, 90% RH |
| High Temperture Exposure | 3.00 | 1.00 | 1.00 | 1,000 hours @ +125°C, no load |
| Load Life | 3.00 | 5.00 | 2.00 | 1,000 hours @ +70°C, rated load |
| Resistance to Solder Heat | 1.00 | 2.50 | 1.00 | 10 seconds @ +260°C solder |
| Resistance to Solvents | - - - | - - - | - - - | Isopropyl alcohol, Freon TMC |
| Solderability | - - - | - - - | - - - | RMA Flux, +230°C, 5 seconds dip, 95% coverage |

# Electrical & Environmental Specifications

## Circuit Types

| 740X043 | 741X043 | 742C043 | |
|---|---|---|---|
| 2 Resistors   4 Terminations | 2 Resistors   4 Terminations | 2 Resistors   4 Terminations | |

| 741X083 | 741C083 | 742X083 | 742C083 |
|---|---|---|---|
| 4 Resistors   8 Terminations | 4 Resistors   8 Terminations | 4 Resistors   8 Terminations | 4 Resistors   8 Terminations |

| 741X163 | 742C163 | | 746X101 |
|---|---|---|---|
| 8 Resistors   16 Terminations | 8 Resistors   16 Terminations | | 8 Resistors   10 Terminations |

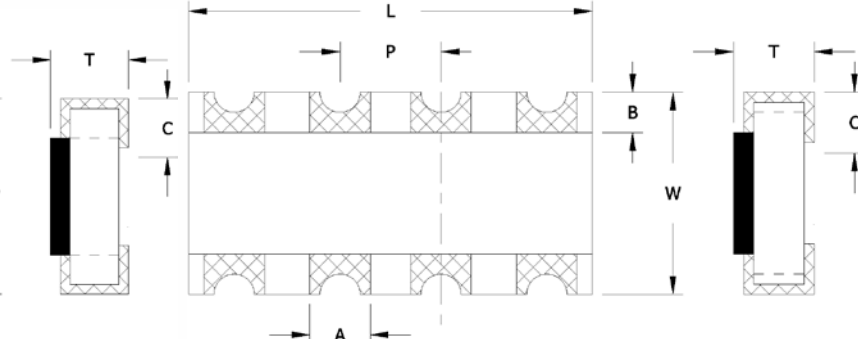| 745X101 | 745X102 | 745C101 | 745C102 |
|---|---|---|---|
| 8 Resistors   10 Terminations | 8 Resistors   10 Terminations | 8 Resistors   10 Terminations | 8 Resistors   10 Terminations |

## Mechanical Specifications

### Package Drawing – Convex, Type X
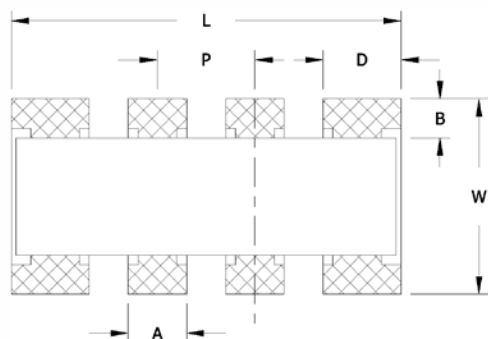
### Package Drawing – Concave, Type C



### Notes

1. JEDEC termination code (e3).  Barrier-plating is nickel [Ni] with Matte tin [Sn] finish.
2. Reflow conditions per JEDEC J-STD-020; +260°C maximum, 20 seconds.
3. MSL = 1.

### Package Configuration/Dimensions

| Package Code | Resistor Size/ Configuration | Termination Pads | # Resistors | Circuit Type | Dimensions [mm] | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | | L | W | P [Typ.] | T | A | B | C | D |
| 740X043 | 0201 X 2 | 4 | 2 | Isolated | 0.80 ±0.10 | 0.60 ±0.10 | 0.50 | 0.35 ±0.10 | 0.35 ±0.10 | 0.175 ±0.125 | 0.15 ±0.10 | 0.25 ±0.10 |
| 741X043 | 0402 X 2 | 4 | 2 | Isolated | 1.00 ±0.20 | 1.00 ±0.20 | 0.65 | 0.35 ±0.10 | 0.295 ±0.135 | 0.20 ±0.15 | 0.25 ±0.10 | 0.33 ±0.15 |
| 741X083 | 0402 X 4 | 8 | 4 | Isolated | 2.00 ±0.20 | 1.00 ±0.20 | 0.50 | 0.40 ±0.15 | 0.30 ±0.15 | 0.20 ±0.15 | 0.25 ±0.20 | 0.40 ±0.15 |
| 741C083 | 0402 X 4 | 8 | 4 | Isolated | 2.00 ±0.20 | 1.00 ±0.20 | 0.50 | 0.375 ±0.125 | 0.29 ±0.11 | 0.20 ±0.10 | 0.265 ±0.115 | N/A |
| 741X163 | 0402 X 8 | 16 | 8 | Isolated | 3.95 ±0.25 | 1.60 ±0.15 | 0.50 | 0.45 ±0.10 | 0.30 ±0.10 | 0.30 ±0.15 | 0.375 ±0.175 | 0.325 ±0.175 |
| 742C043 | 0603 X 2 | 4 | 2 | Isolated | 1.60 ±0.20 | 1.60 ±0.20 | 0.80 | 0.525 ±0.175 | 0.50 ±0.15 | 0.30 ±0.20 | 0.40 ±0.15 | N/A |
| 742X083 | 0603 X 4 | 8 | 4 | Isolated | 3.20 ±0.15 | 1.60 ±0.15 | 0.80 | 0.55 ±0.15 | 0.45 ±0.20 | 0.30 ±0.20 | 0.275 ±0.175 | 0.525 ±0.225 |
| 742C083 | 0603 X 4 | 8 | 4 | Isolated | 3.20 ±0.20 | 1.60 ±0.20 | 0.80 | 0.525 ±0.175 | 0.50 ±0.15 | 0.30 ±0.20 | 0.35 ±0.20 | N/A |
| 742C163 | 0603 X 8 | 16 | 8 | Isolated | 6.40 ±0.20 | 1.60 ±0.20 | 0.80 | 0.525 ±0.175 | 0.50 ±0.15 | 0.30 ±0.20 | 0.40 ±0.15 | N/A |
| 745C101 | --- | 10 | 8 | Bussed | 6.40 ±0.20 | 3.10 ±0.20 | 1.27 | 0.575 ±0.125 | 0.60 ±0.15 | 0.50 ±0.30 | 0.55 ±0.30 | N/A |
| 745C102 | --- | 10 | 8 | Bussed | 6.40 ±0.20 | 3.10 ±0.20 | 1.27 | 0.575 ±0.125 | 0.60 ±0.15 | 0.50 ±0.30 | 0.55 ±0.30 | N/A |
| 745X101 | --- | 10 | 8 | Bussed | 6.40 ±0.20 | 3.20 ±0.20 | 1.27 | 0.60 ±0.10 | 0.95 ±0.20 | 0.50 ±0.15 | 0.50 ±0.15 | 1.10 ±0.15 |
| 745X102 | --- | 10 | 8 | Bussed | 6.40 ±0.20 | 3.20 ±0.20 | 1.27 | 0.60 ±0.10 | 0.95 ±0.20 | 0.50 ±0.15 | 0.50 ±0.15 | 1.10 ±0.15 |
| 746X101 | --- | 10 | 8 | Bussed | 3.20 ±0.20 | 1.60 ±0.15 | 0.64 | 0.60 ±0.10 | 0.35 ±0.05 | 0.30 ±0.15 | 0.35 ±0.15 | 0.45 ±0.05 |

# Mechanical Specifications

## Recommended Pad Layout

| Package Code | Dimensions [mm] | | | |
|---|---|---|---|---|
| | A | B | C | D |
| 740 | 0.90 | 0.30 | 0.30 | 0.50 |
| 741X043 | 1.80 | 0.50 | 0.40 | 0.67 |
| 741X083 | 1.80 | 0.50 | 0.30 | 0.50 |
| 741C083 | 1.80 | 0.50 | 0.30 | 0.50 |
| 741X163 | 1.80 | 0.50 | 0.30 | 0.50 |
| 742 | 2.60 | 0.80 | 0.45 | 0.80 |
| 745 | 3.90 | 2.10 | 0.90 | 1.27 |
| 746 | 2.60 | 0.80 | 0.35 | 0.64 |

## Marking Information

| Package Code | J & G Tolerance | F Tolerance | | Marking Color [1] |
|---|---|---|---|---|
| | E-24 Value | E-24 Value | E-96 Value | |
| 740X043 | No Marking | - | - | - |
| 741X043 | No Marking | No Marking | No Marking | - |
| 741X083 | No Marking or 3-Digits | No Marking or 4-Digits | No Marking or 4-Digits | - |
| 741C083 | No Marking or 3-Digits | No Marking or 3-Digits | No Marking | - |
| 741X163 | 3-Digits | 4-Digits | 4-Digits | - |
| 742C043 | 3-Digits | 3-Digits or 4-Digits | 4-Digits | White |
| 742X083 | 3-Digits | 3-Digits or 4-Digits | 4-Digits | White |
| 742C083 | 3-Digits | 3-Digits or 4-Digits | 4-Digits | White |
| 742C163 | 3-Digits | 4-Digits | 4-Digits | White |
| 745C101 | 3-Digits | - | - | White |
| 745C102 | 3-Digits | - | - | Orange |
| 745X101 | 3-Digits | - | - | - |
| 745X102 | 3-Digits | - | - | - |
| 746X101 | 3-Digits | - | - | - |

1. May vary from indicated color.

10k ohm − 3-Digit

10k ohm − 4-Digit

## Packaging

### Tape and Reel Information

| REEL DIAMETER 7" | 740X043 | 741X043 741C083 741X083 | 742C043 742C083 742X083 | 741X163 | 742C163 | 745C101 745C102 | 745X101 745X102 | 746X101 |
|---|---|---|---|---|---|---|---|---|
| Parts Per Reel | 10,000 | 10,000 | 5,000 | 5,000 | 4,000 | 4,000 | 4,000 | 5,000 |
| Pitch | 2mm | 2mm | 4mm | 4mm | 4mm | 4mm | 4mm | 4mm |
| Carrier Width | 8mm | 8mm | 8mm | 12mm | 12mm | 12mm | 12mm | 8mm |
| Material | Paper | Paper | Paper | Paper | Plastic | Plastic | Plastic | Paper |

## Addendum

### Standard EIA Codes and Resistor Values – E-24  [3-Digit Resistor Code for J&G Tolerances]

| CODE | OHMS | CODE | OHMS | CODE | OHMS | CODE | OHMS | CODE | OHMS | CODE | OHMS |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 000X * | 0 | 680 | 68 | 511 | 510 | 392 | 3.9K | 303 | 30.0K | 224 | 220K |
| 100 | 10 | 750 | 75 | 561 | 560 | 432 | 4.3K | 333 | 33.0K | 244 | 240K |
| 110 | 11 | 820 | 82 | 621 | 620 | 472 | 4.7K | 363 | 36.0K | 274 | 270K |
| 120 | 12 | 910 | 91 | 681 | 680 | 512 | 5.1K | 393 | 39.0K | 304 | 300K |
| 130 | 13 | 101 | 100 | 751 | 750 | 562 | 5.6K | 433 | 43.0K | 334 | 330K |
| 150 | 15 | 111 | 110 | 821 | 820 | 622 | 6.2K | 473 | 47.0K | 364 | 360K |
| 160 | 16 | 121 | 120 | 911 | 910 | 682 | 6.8K | 513 | 51.0K | 394 | 390K |
| 180 | 18 | 131 | 130 | 102 | 1.0K | 752 | 7.5K | 563 | 56.0K | 434 | 430K |
| 200 | 20 | 151 | 150 | 112 | 1.1K | 822 | 8.2K | 623 | 62.0K | 474 | 470K |
| 220 | 22 | 161 | 160 | 122 | 1.2K | 912 | 9.1K | 683 | 68.0K | 514 | 510K |
| 240 | 24 | 181 | 180 | 132 | 1.3K | 103 | 10.0K | 753 | 75.0K | 564 | 560K |
| 270 | 27 | 201 | 200 | 152 | 1.5K | 113 | 11.0K | 823 | 82.0K | 624 | 620K |
| 300 | 30 | 221 | 220 | 162 | 1.6K | 123 | 12.K | 913 | 91.0K | 684 | 680K |
| 330 | 33 | 241 | 240 | 182 | 1.8K | 133 | 13.K | 104 | 100K | 754 | 750K |
| 360 | 36 | 271 | 270 | 202 | 2.0K | 153 | 15.0K | 114 | 110K | 824 | 820K |
| 390 | 39 | 301 | 300 | 222 | 2.2K | 163 | 16.0K | 124 | 120K | 914 | 910K |
| 430 | 43 | 331 | 330 | 242 | 2.4K | 183 | 18.0K | 134 | 130K | 105 | 1M |
| 470 | 47 | 361 | 360 | 272 | 2.7K | 203 | 20.0K | 154 | 150K | | |
| 510 | 51 | 391 | 390 | 302 | 3.0K | 223 | 22.0K | 164 | 160K | | |
| 560 | 56 | 431 | 430 | 332 | 3.3K | 243 | 24.0K | 184 | 180K | | |
| 620 | 62 | 471 | 470 | 362 | 3.6K | 273 | 27.0K | 204 | 200K | | |

*  Includes tolerance code "X".

## Addendum

### Standard EIA Codes and Resistor Values – E-24  [4-Digit Resistor Code for F Tolerance]

| CODE | OHMS | CODE | OHMS | CODE | OHMS | CODE | OHMS | CODE | OHMS | CODE | OHMS |
|------|------|------|------|------|------|------|------|------|------|------|------|
| 000X * | 0 | 68R0 | 68 | 5100 | 510 | 3901 | 3.9K | 3002 | 30.0K | 2203 | 220K |
| 10R0 | 10 | 75R0 | 75 | 5600 | 560 | 4301 | 4.3K | 3302 | 33.0K | 2403 | 240K |
| 11R0 | 11 | 82R0 | 82 | 6200 | 620 | 4701 | 4.7K | 3602 | 36.0K | 2703 | 270K |
| 12R0 | 12 | 91R0 | 91 | 6800 | 680 | 5101 | 5.1K | 3902 | 39.0K | 3003 | 300K |
| 13R0 | 13 | 1000 | 100 | 7500 | 750 | 5601 | 5.6K | 4302 | 43.0K | 3303 | 330K |
| 15R0 | 15 | 1100 | 110 | 8200 | 820 | 6201 | 6.2K | 4702 | 47.0K | 3603 | 360K |
| 16R0 | 16 | 1200 | 120 | 9100 | 910 | 6801 | 6.8K | 5102 | 51.0K | 3903 | 390K |
| 18R0 | 18 | 1300 | 130 | 1001 | 1.0K | 7501 | 7.5K | 5602 | 56.0K | 4303 | 430K |
| 20R0 | 20 | 1500 | 150 | 1101 | 1.1K | 8201 | 8.2K | 6202 | 62.0K | 4703 | 470K |
| 22R0 | 22 | 1600 | 160 | 1201 | 1.2K | 9101 | 9.1K | 6802 | 68.0K | 5103 | 510K |
| 24R0 | 24 | 1800 | 180 | 1301 | 1.3K | 1002 | 10.0K | 7502 | 75.0K | 5603 | 560K |
| 27R0 | 27 | 2000 | 200 | 1501 | 1.5K | 1102 | 11.0K | 8202 | 82.0K | 6203 | 620K |
| 30R0 | 30 | 2200 | 220 | 1601 | 1.6K | 1202 | 12.K | 9102 | 91.0K | 6803 | 680K |
| 33R0 | 33 | 2400 | 240 | 1801 | 1.8K | 1302 | 13.K | 1003 | 100K | 7503 | 750K |
| 36R0 | 36 | 2700 | 270 | 2001 | 2.0K | 1502 | 15.0K | 1103 | 110K | 8203 | 820K |
| 39R0 | 39 | 3000 | 300 | 2201 | 2.2K | 1602 | 16.0K | 1203 | 120K | 9103 | 910K |
| 43R0 | 43 | 3300 | 330 | 2401 | 2.4K | 1802 | 18.0K | 1303 | 130K | 1004 | 1M |
| 47R0 | 47 | 3600 | 360 | 2701 | 2.7K | 2002 | 20.0K | 1503 | 150K | | |
| 51R0 | 51 | 3900 | 390 | 3001 | 3.0K | 2202 | 22.0K | 1603 | 160K | | |
| 56R0 | 56 | 4300 | 430 | 3301 | 3.3K | 2402 | 24.0K | 1803 | 180K | | |
| 62R0 | 62 | 4700 | 470 | 3601 | 3.6K | 2702 | 27.0K | 2003 | 200K | | |

\* Includes tolerance code "X".

## Addendum

### Standard EIA Codes and Resistor Values – E-96  [4-Digit Resistor Code for F Tolerance]

| CODE | OHMS | CODE | OHMS | CODE | OHMS | CODE | OHMS | CODE | OHMS | CODE | OHMS | CODE | OHMS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 000X * | 0 | 26R1 | 26.1 | 69R8 | 69.8 | 1870 | 187 | 4990 | 499 | 1331 | 1.33k |
| 10R0 | 10.0 | 26R7 | 26.7 | 71R5 | 71.5 | 1910 | 191 | 5110 | 511 | 1371 | 1.37k |
| 10R2 | 10.2 | 27R4 | 27.4 | 73R2 | 73.2 | 1960 | 196 | 5230 | 523 | 1401 | 1.40k |
| 10R5 | 10.5 | 28R0 | 28.0 | 75R0 | 75.0 | 2000 | 200 | 5360 | 536 | 1431 | 1.43k |
| 10R7 | 10.7 | 28R7 | 28.7 | 76R8 | 76.8 | 2050 | 205 | 5490 | 549 | 1471 | 1.47k |
| 11R0 | 11.0 | 29R4 | 29.4 | 78R7 | 78.7 | 2100 | 210 | 5620 | 562 | 1501 | 1.50k |
| 11R3 | 11.3 | 30R1 | 30.1 | 80R6 | 80.6 | 2150 | 215 | 5760 | 576 | 1541 | 1.54k |
| 11R5 | 11.5 | 30R9 | 30.9 | 82R5 | 82.5 | 2210 | 221 | 5900 | 590 | 1581 | 1.58k |
| 11R8 | 11.8 | 31R6 | 31.6 | 84R5 | 84.5 | 2260 | 226 | 6040 | 604 | 1621 | 1.62k |
| 12R1 | 12.1 | 32R4 | 32.4 | 86R6 | 86.6 | 2320 | 232 | 6190 | 619 | 1651 | 1.65k |
| 12R4 | 12.4 | 33R2 | 33.2 | 88R7 | 88.7 | 2370 | 237 | 6340 | 634 | 1691 | 1.69k |
| 12R7 | 12.7 | 34R0 | 34.0 | 90R9 | 90.9 | 2430 | 243 | 6490 | 649 | 1741 | 1.74k |
| 13R0 | 13.0 | 34R8 | 34.8 | 93R1 | 93.1 | 2490 | 249 | 6650 | 665 | 1781 | 1.78k |
| 13R3 | 13.3 | 35R7 | 35.7 | 95R3 | 95.3 | 2550 | 255 | 6810 | 681 | 1821 | 1.82k |
| 13R7 | 13.7 | 36R5 | 36.5 | 97R6 | 97.6 | 2610 | 261 | 6980 | 698 | 1871 | 1.87k |
| 14R0 | 14.0 | 37R4 | 37.4 | 1000 | 100 | 2670 | 267 | 7150 | 715 | 1911 | 1.91k |
| 14R3 | 14.3 | 38R3 | 38.3 | 1020 | 102 | 2740 | 274 | 7320 | 732 | 1961 | 1.96k |
| 14R7 | 14.7 | 39R2 | 39.2 | 1050 | 105 | 2800 | 280 | 7500 | 750 | 2001 | 2.00k |
| 15R0 | 15.0 | 40R2 | 40.2 | 1070 | 107 | 2870 | 287 | 7680 | 768 | 2051 | 2.05k |
| 15R4 | 15.4 | 41R2 | 41.2 | 1100 | 110 | 2940 | 294 | 7870 | 787 | 2101 | 2.10k |
| 15R8 | 15.8 | 42R2 | 42.2 | 1130 | 113 | 3010 | 301 | 8060 | 806 | 2151 | 2.15k |
| 16R2 | 16.2 | 43R2 | 43.2 | 1150 | 115 | 3090 | 309 | 8250 | 825 | 2211 | 2.21k |
| 16R5 | 16.5 | 44R2 | 44.2 | 1180 | 118 | 3160 | 316 | 8450 | 845 | 2261 | 2.26k |
| 16R9 | 16.9 | 45R3 | 45.3 | 1210 | 121 | 3240 | 324 | 8660 | 866 | 2321 | 2.32k |
| 17R4 | 17.4 | 46R4 | 46.4 | 1240 | 124 | 3320 | 332 | 8870 | 887 | 2371 | 2.37k |
| 17R8 | 17.8 | 47R5 | 47.5 | 1270 | 127 | 3400 | 340 | 9090 | 909 | 2431 | 2.43k |
| 18R2 | 18.2 | 48R7 | 48.7 | 1300 | 130 | 3480 | 348 | 9310 | 931 | 2491 | 2.49k |
| 18R7 | 18.7 | 49R9 | 49.9 | 1330 | 133 | 3570 | 357 | 9530 | 953 | 2551 | 2.55k |
| 19R1 | 19.1 | 51R1 | 51.1 | 1370 | 137 | 3650 | 365 | 9760 | 976 | 2611 | 2.61k |
| 19R6 | 19.6 | 52R3 | 52.3 | 1400 | 140 | 3740 | 374 | 1001 | 1.00k | 2671 | 2.67k |
| 20R0 | 20.0 | 53R6 | 53.6 | 1430 | 143 | 3830 | 383 | 1021 | 1.02k | 2741 | 2.74k |
| 20R5 | 20.5 | 54R9 | 54.9 | 1470 | 147 | 3920 | 392 | 1051 | 1.05k | 2801 | 2.80k |
| 21R0 | 21.0 | 56R2 | 56.2 | 1500 | 150 | 4020 | 402 | 1071 | 1.07k | 2871 | 2.87k |
| 21R5 | 21.5 | 57R6 | 57.6 | 1540 | 154 | 4120 | 412 | 1101 | 1.10k | 2941 | 2.94k |
| 22R1 | 22.1 | 59R0 | 59.0 | 1580 | 158 | 4220 | 422 | 1131 | 1.13k | 3011 | 3.01k |
| 22R6 | 22.6 | 60R4 | 60.4 | 1620 | 162 | 4320 | 432 | 1151 | 1.15k | 3091 | 3.09k |
| 23R2 | 23.2 | 61R9 | 61.9 | 1650 | 165 | 4420 | 442 | 1181 | 1.18k | 3161 | 3.16k |
| 23R7 | 23.7 | 63R4 | 63.4 | 1690 | 169 | 4530 | 453 | 1211 | 1.21k | 3241 | 3.24k |
| 24R3 | 24.3 | 64R9 | 64.9 | 1740 | 174 | 4640 | 464 | 1241 | 1.24k | 3321 | 3.32k |
| 24R9 | 24.9 | 66R5 | 66.5 | 1780 | 178 | 4750 | 475 | 1271 | 1.27k | 3401 | 3.40k |
| 25R5 | 25.5 | 68R1 | 68.1 | 1820 | 182 | 4870 | 487 | 1301 | 1.30k | 3481 | 3.48k |

*  Includes tolerance code "X".

## Addendum

### Standard EIA Codes and Resistor Values – E-96  [4-Digit Resistor Code for F Tolerance]

| CODE | OHMS | CODE | OHMS | CODE | OHMS | CODE | OHMS | CODE | OHMS | CODE | OHMS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3571 | 3.57k | 9311 | 9.31k | 2432 | 24.3k | 6342 | 63.4k | 1653 | 165k | 4323 | 432k |
| 3651 | 3.65k | 9531 | 9.53k | 2492 | 24.9k | 6492 | 64.9k | 1693 | 169k | 4423 | 442k |
| 3741 | 3.74k | 9761 | 9.76k | 2552 | 25.5k | 6652 | 66.5k | 1743 | 174k | 4533 | 453k |
| 3831 | 3.83k | 1002 | 10.0k | 2612 | 26.1k | 6812 | 68.1k | 1783 | 178k | 4643 | 464k |
| 3921 | 3.92k | 1022 | 10.2k | 2672 | 26.7k | 6982 | 69.8k | 1823 | 182k | 4753 | 475k |
| 4021 | 4.02k | 1052 | 10.5k | 2742 | 27.4k | 7152 | 71.5k | 1873 | 187k | 4873 | 487k |
| 4121 | 4.12k | 1072 | 10.7k | 2802 | 28.0k | 7322 | 73.2k | 1913 | 191k | 4993 | 499k |
| 4221 | 4.22k | 1102 | 11.0k | 2872 | 28.7k | 7502 | 75.0k | 1963 | 196k | 5113 | 511k |
| 4321 | 4.32k | 1132 | 11.3k | 2942 | 29.4k | 7682 | 76.8k | 2003 | 200k | 5233 | 523k |
| 4421 | 4.42k | 1152 | 11.5k | 3012 | 30.1k | 7872 | 78.7k | 2053 | 205k | 5363 | 536k |
| 4531 | 4.53k | 1182 | 11.8k | 3092 | 30.9k | 8062 | 80.6k | 2103 | 210k | 5493 | 549k |
| 4641 | 4.64k | 1212 | 12.1k | 3162 | 31.6k | 8252 | 82.5k | 2153 | 215k | 5623 | 562k |
| 4751 | 4.75k | 1242 | 12.4k | 3242 | 32.4k | 8452 | 84.5k | 2213 | 221k | 5763 | 576k |
| 4871 | 4.87k | 1272 | 12.7k | 3322 | 33.2k | 8662 | 86.6k | 2263 | 226k | 5903 | 590k |
| 4991 | 4.99k | 1302 | 13.0k | 3402 | 34.0k | 8872 | 88.7k | 2323 | 232k | 6043 | 604k |
| 5111 | 5.11k | 1332 | 13.3k | 3482 | 34.8k | 9092 | 90.9k | 2373 | 237k | 6193 | 619k |
| 5231 | 5.23k | 1372 | 13.7k | 3572 | 35.7k | 9312 | 93.1k | 2433 | 243k | 6343 | 634k |
| 5361 | 5.36k | 1402 | 14.0k | 3652 | 36.5k | 9532 | 95.3k | 2493 | 249k | 6493 | 649k |
| 5491 | 5.49k | 1432 | 14.3k | 3742 | 37.4k | 9762 | 97.6k | 2553 | 255k | 6653 | 665k |
| 5621 | 5.62k | 1472 | 14.7k | 3832 | 38.3k | 1003 | 100k | 2613 | 261k | 6813 | 681k |
| 5761 | 5.76k | 1502 | 15.0k | 3922 | 39.2k | 1023 | 102k | 2673 | 267k | 6983 | 698k |
| 5901 | 5.90k | 1542 | 15.4k | 4022 | 40.2k | 1053 | 105k | 2743 | 274k | 7153 | 715k |
| 6041 | 6.04k | 1582 | 15.8k | 4122 | 41.2k | 1073 | 107k | 2803 | 280k | 7323 | 732k |
| 6191 | 6.19k | 1622 | 16.2k | 4222 | 42.2k | 1103 | 110k | 2873 | 287k | 7503 | 750k |
| 6341 | 6.34k | 1652 | 16.5k | 4322 | 43.2k | 1133 | 113k | 2943 | 294k | 7683 | 768k |
| 6491 | 6.49k | 1692 | 16.9k | 4422 | 44.2k | 1153 | 115k | 3013 | 301k | 7873 | 787k |
| 6651 | 6.65k | 1742 | 17.4k | 4532 | 45.3k | 1183 | 118k | 3093 | 309k | 8063 | 806k |
| 6811 | 6.81k | 1782 | 17.8k | 4642 | 46.4k | 1213 | 121k | 3163 | 316k | 8253 | 825k |
| 6981 | 6.98k | 1822 | 18.2k | 4752 | 47.5k | 1243 | 124k | 3243 | 324k | 8453 | 845k |
| 7151 | 7.15k | 1872 | 18.7k | 4872 | 48.7k | 1273 | 127k | 3323 | 332k | 8663 | 866k |
| 7321 | 7.32k | 1912 | 19.1k | 4992 | 49.9k | 1303 | 130k | 3403 | 340k | 8873 | 887k |
| 7501 | 7.50k | 1962 | 19.6k | 5112 | 51.1k | 1333 | 133k | 3483 | 348k | 9093 | 909k |
| 7681 | 7.68k | 2002 | 20.0k | 5232 | 52.3k | 1373 | 137k | 3573 | 357k | 9313 | 931k |
| 7871 | 7.87k | 2052 | 20.5k | 5362 | 53.6k | 1403 | 140k | 3653 | 365k | 9533 | 953k |
| 8061 | 8.06k | 2102 | 21.0k | 5492 | 54.9k | 1433 | 143k | 3743 | 374k | 9763 | 976k |
| 8251 | 8.25k | 2152 | 21.5k | 5622 | 56.2k | 1473 | 147k | 3833 | 383k | 1004 | 1M |
| 8451 | 8.45k | 2212 | 22.1k | 5762 | 57.6k | 1503 | 150k | 3923 | 392k | | |
| 8661 | 8.66k | 2262 | 22.6k | 5902 | 59.0k | 1543 | 154k | 4023 | 402k | | |
| 8871 | 8.87k | 2322 | 23.2k | 6042 | 60.4k | 1583 | 158k | 4123 | 412k | | |
| 9091 | 9.09k | 2372 | 23.7k | 6192 | 61.9k | 1623 | 162k | 4223 | 422k | | |