

S4x Series

Sulfur Resistant Chip Resistor Arrays



Features

- Anti-Sulfur Design Structure
- Leadless Surface Mount Construction
- Concave or Convex Terminations
- Solder Coated Nickel Barrier Pads
- Isolated 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

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

Description

S4x Series Chip Arrays are designed to resist sulfurization which occurs in high-sulfur environments. 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 | |
|--------------|--------------|----------------|--------------------|----------------|-----------------|
| S41X083 | | 103 | J | P | |
| ↓ | | | | ↓ | |
| Package Code | Package Code | | | | |
| S40X043 | S42C043 | | | | |
| S41X043 | S42X083 | | | | |
| S41X083 | S42C083 | | | | |
| S41C083 | S42C163 | | | | |
| | | | ↓ | | |
| | | Code | Tolerance | | |
| | | J | ±5% ¹ | | |
| | | G | ±2% ² | | |
| | | F | ±1% ^{3,4} | | |
| | | X | Zero Ohm | | |
| | | | ↓ | | |
| | | Code | Resistor Value * | Code | Termination |
| | | 103 | 10k ohm | P | Matte Sn Finish |

* See Addendum for Standard EIA Values and Codes

Notes:

1. Standard tolerance is ±5% and available for all S40, S41 and S42 package codes; 3-digit resistor codes.
2. Optional tolerance at ±2% is available for all S41 and S42 package codes; 3-digit resistor codes.
3. Optional tolerance at ±1% is available for all S41, S42C043, S42X083 and S42C083 package codes; 3-digit resistor codes.
4. Consult factory for availability with S42C163 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%] | G [±2%] | F [±1%] |
| 10 Ohms | S42C083100JP | S42C083100GP | S42C083100FP |
| 120 Ohms | S42C083121JP | S42C083121GP | S42C083121FP |
| 1k Ohms | S42C083102JP | S42C083102GP | S42C083102FP |
| 68k Ohms | S42C083683JP | S42C083683GP | S42C083683FP |

3-Digit Resistor Code

1st and 2nd digits are resistor value, 3rd digit is number of zeros.

Ex. 102 = 1,000 ohm = 1k ohm

Ex. 683 = 68,000 ohm = 68k ohm

Electrical & Environmental Specifications

Operating Conditions

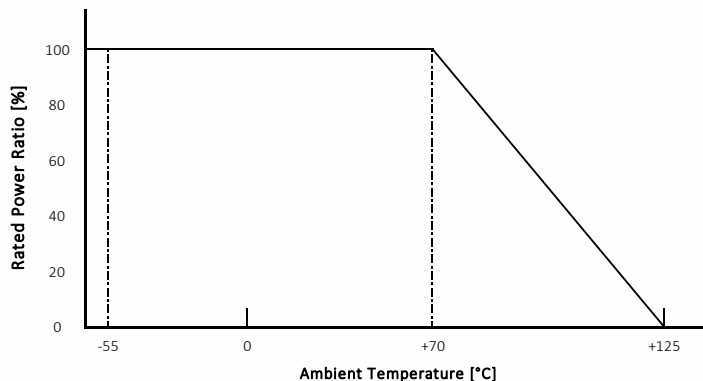
| Package | PCB Area Per Resistor [Sq. Inch] | Circuit Type | Resistance Range [ohm] | Resistance Tolerance ¹ [%] | Operating Temperature Range | Temperature Coefficient | +70°C Power Per Resistor ² [Watts] | Maximum Operating Voltage | Maximum Overload Voltage |
|---------|----------------------------------|--------------|------------------------|---------------------------------------|-----------------------------|-------------------------|---|---------------------------|--------------------------|
| S40 | 0.0008 | Isolated | 10 - 1M | | | | 0.031 | 12.5V | 25V |
| S41X043 | 0.0015 | Isolated | 10 - 1M | ±5% Std. | | | 0.063 | 50V | 100V |
| S41X083 | 0.0015 | Isolated | 10 - 1M | or 0.5 ohm | -55°C to +125°C | ±200ppm/°C | 0.031 | 50V | 100V |
| S41C083 | 0.0015 | Isolated | 10 - 1M | [whichever is greater] | | | 0.03125 | 50V | 100V |
| S42 | 0.0037 | Isolated | 10 - 1M | | | | 0.063 | 50V | 100V |

1. Standard product tolerance is ±5%. Reference Ordering Information for availability of ±2% and ±1% tolerances.

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

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.



Electrical & Environmental Specifications

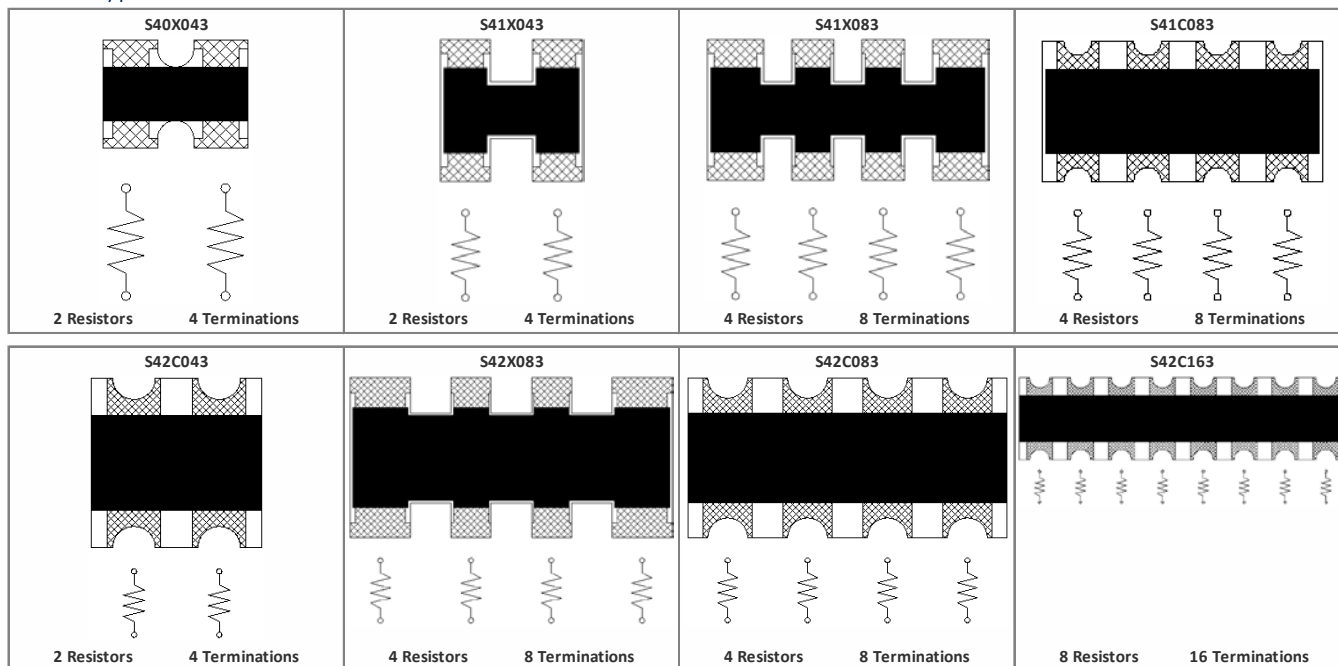
Rated Voltage

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 Voltage [V]
P = Rated Power [W]
R = Nominal Resistance [Ω]

Circuit Types

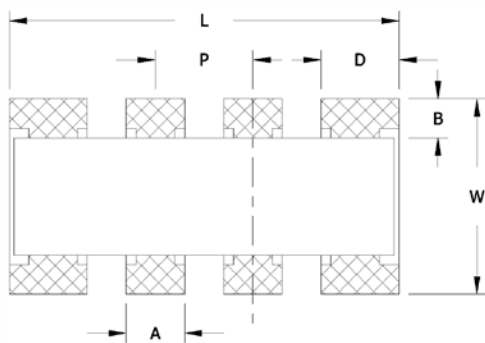


Environmental Parameters

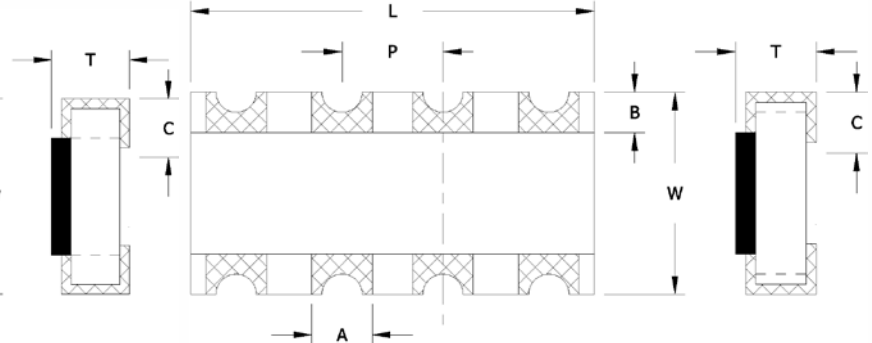
| Test | Maximum Delta R [%] | | | Test Description |
|-----------------------------------|---------------------|-----|-----|---|
| | S40 | S41 | S42 | |
| Thermal Cycle | 1.0 | 1.0 | 1.0 | 5 cycles -55°C to +125°C, 30 minute dwell time |
| Short Time Overload | 2.0 | 2.0 | 2.0 | 2½ times rated working voltage for 5 seconds |
| Moisture Resistance, Steady State | 1.0 | 1.0 | 1.0 | 1,000 hours, no load, +40°C, 90% - 95% R.H. |
| Moisture Resistance, Rated Load | 3.0 | 3.0 | 3.0 | 1,000 hours, +40°C, 90% - 95% R.H., rated voltage 90 minutes on/30 minutes off, 1,000 cycles |
| High Temperature Exposure | 3.0 | 3.0 | 3.0 | 1,000 hours, no load, +125°C |
| Load Life | 3.0 | 3.0 | 3.0 | 1,000 hours @ +70°C, rated load |
| Resistance to Solder Heat | 1.0 | 1.0 | 1.0 | 10 seconds @ +260°C solder |
| Sulfuration-Proof Characteristics | 5.0 | 5.0 | 5.0 | 5,000 hours, +50°C, 90% - 95% R.H., H ₂ S Gas [3ppm] |
| Resistance to Solvents | --- | --- | --- | Dip in Isopropyl alcohol @ +25°C for 60 seconds |
| Solderability | --- | --- | --- | RMA Flux, +245°C, 2 seconds dip, 95% coverage |

Mechanical Specifications

Package Drawing – Convex, Type X



Package Drawing – Concave, Type C



Notes

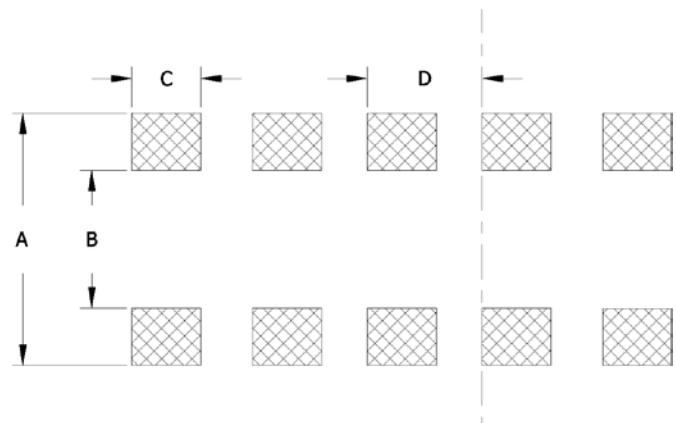
1. JEDEC termination code (e3). Barrier-plating is nickel [Ni] with Matte tin [Sn] finish.
2. Reflow conditions per JEDEC J-STD-020; +260°C maximum, 20 seconds.
3. MSL = 1.

Package Configuration/Dimensions

| Package Code | Resistor Size/ Configuration | Termination Pads | # Resistors | Circuit Type | Dimensions [mm] | | | | | | | |
|--------------|------------------------------|------------------|-------------|--------------|-----------------|------------|----------|------------|------------|------------|------------|------------|
| | | | | | L | W | P [Typ.] | T | A | B | C | D |
| S40X043 | 0201 X 2 | 4 | 2 | Isolated | 0.85 ±0.05 | 0.60 ±0.05 | 0.50 | 0.35 ±0.05 | N/A | 0.11 ±0.05 | 0.17 ±0.05 | 0.37 ±0.05 |
| S41X043 | 0402 X 2 | 4 | 2 | Isolated | 1.00 ±0.20 | 1.00 ±0.20 | 0.65 | 0.35 ±0.05 | N/A | 0.20 ±0.15 | 0.25 ±0.10 | 0.33 ±0.15 |
| S41X083 | 0402 X 4 | 8 | 4 | Isolated | 2.00 ±0.20 | 1.00 ±0.15 | 0.50 | 0.35 ±0.10 | 0.30 ±0.15 | 0.20 ±0.15 | 0.20 ±0.15 | 0.40 ±0.15 |
| S41C083 | 0402 X 4 | 8 | 4 | Isolated | 2.00 ±0.10 | 1.00 ±0.10 | 0.50 | 0.35 ±0.10 | 0.28 ±0.10 | 0.20 ±0.10 | 0.28 ±0.10 | N/A |
| S42C043 | 0603 X 2 | 4 | 2 | Isolated | 1.60 ±0.15 | 1.60 ±0.15 | 0.80 | 0.45 ±0.10 | N/A | 0.35 ±0.15 | 0.40 ±0.15 | 0.50 ±0.15 |
| S42X083 | 0603 X 4 | 8 | 4 | Isolated | 3.20 ±0.10 | 1.60 ±0.10 | 0.80 | 0.50 ±0.10 | 0.40 ±0.15 | 0.30 ±0.20 | 0.25 ±0.15 | 0.60 ±0.15 |
| S42C083 | 0603 X 4 | 8 | 4 | Isolated | 3.20 ±0.15 | 1.60 ±0.15 | 0.80 | 0.45 ±0.10 | 0.50 ±0.15 | 0.35 ±0.15 | 0.40 ±0.15 | N/A |
| S42C163 | 0603 X 8 | 16 | 8 | Isolated | 6.40 ±0.20 | 1.60 ±0.20 | 0.80 | 0.45 ±0.15 | 0.50 ±0.15 | 0.35 ±0.15 | 0.40 ±0.15 | N/A |

Recommended Pad Layout

| Package Code | Dimensions [mm] | | | |
|--------------|-----------------|------|------|------|
| | A | B | C | D |
| S40 | 0.90 | 0.30 | 0.30 | 0.50 |
| S41X043 | 1.60 | 0.50 | 0.40 | 0.65 |
| S41X083 | 1.80 | 0.60 | 0.25 | 0.50 |
| S41C083 | 1.80 | 0.45 | 0.30 | 0.50 |
| S42 | 3.00 | 0.80 | 0.50 | 0.80 |



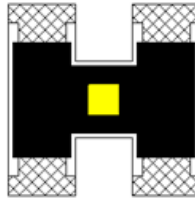
Mechanical Specifications

Marking Information

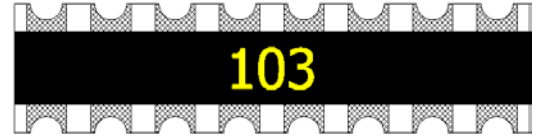
| Package Code | J, G & F Tolerance E-24 Value | Marking Color |
|--------------|-------------------------------|---------------|
| S40X043 | 1 Dot | Yellow |
| S41X043 | 1 Dot | Yellow |
| S41X083 | 2 Dots | Yellow |
| S41C083 | 2 Dots | Yellow |
| S42C043 | 1 Dot | Yellow |
| S42X083 | 2 Dots 3-Digits | Yellow |
| S42C083 | 2 Dots 3-Digits | Yellow |
| S42C163 | 3-Digits | Yellow |

Marking Examples

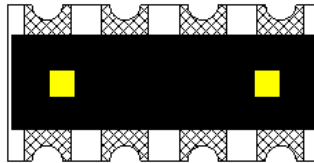
1 Dot



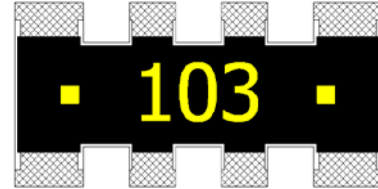
3-Digits



2 Dots



2 Dots 3-Digits



Packaging

Tape and Reel Information

| TAPE DETAILS | S40X043 | S41X043 S41X083 S41C083 | S42C043 S42X083 S42C083 | S42C163 |
|----------------------|---------|-------------------------------|-------------------------------|---------|
| Pocket Length | 1mm | 1.14mm 2.2mm 2.2mm | 1.85mm 3.5mm 3.57mm | 6.9mm |
| Pocket Width | 0.7mm | 1.14mm 1.2mm 1.25mm | 1.85mm 2mm 2mm | 2mm |
| Pocket Pitch | 2mm | 2mm | 4mm | 4mm |
| Tape Width | 8mm | 8mm | 8mm | 12mm |
| Material | Paper | Paper | Paper | Plastic |

| REEL DETAILS | S40X043 | S41X043 S41X083 S41C083 | S42C043 S42X083 S42C083 | S42C163 |
|-----------------------|---------|-------------------------------|-------------------------------|---------|
| Diameter | 7" | 7" | 7" | 7" |
| Parts Per Reel | 10,000 | 10,000 | 5,000 | 4,000 |



Addendum

Standard EIA Codes and Resistor Values – E-24 [3-Digit Resistor Code for J, G & F 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".



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- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



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