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 and 2015/863

- 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 [2]

Code	Tolerance
J	±5% [1]
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 S40, S41 and S42 package codes; 3-digit resistor codes.
2. 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.

Ordering Information

Part Number Examples

Tolerance / Value	3-Digit Code J [±5%]
10 Ohms	S42C083100JP
120 Ohms	S42C083121JP
1k Ohms	S42C083102JP
68k Ohms	S42C083683JP

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	±5% Std. or 0.5 ohm [whichever is greater]	-55°C to +125°C	±200ppm/°C	0.031	12.5V	25V
S41X043	0.0015	Isolated	10 - 1M				0.063	50V	100V
S41X083	0.0015	Isolated	10 - 1M				0.031	50V	100V
S41C083	0.0015	Isolated	10 - 1M				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.

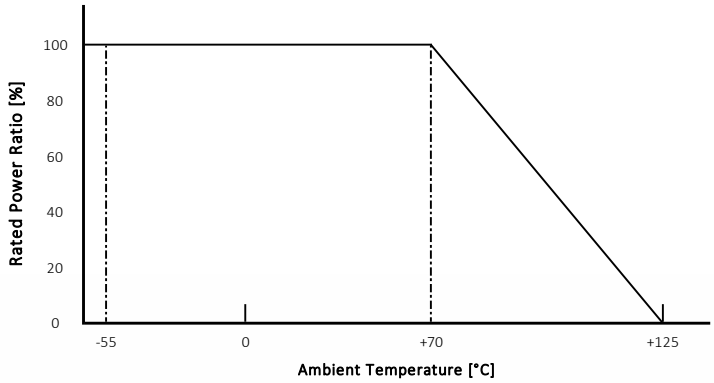
Operating Conditions – 0 ohm

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]
S40	0.0008	Isolated	0.0	1.0	2.0	100
S41X043	0.0015	Isolated				
S41X083	0.0015	Isolated				
S41C083	0.0015	Isolated				
S42	0.0037	Isolated				

Electrical & Environmental Specifications

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.

$$E = \sqrt{PxR}$$

E = Rated Voaltge [V]

P = Rated Power [W]

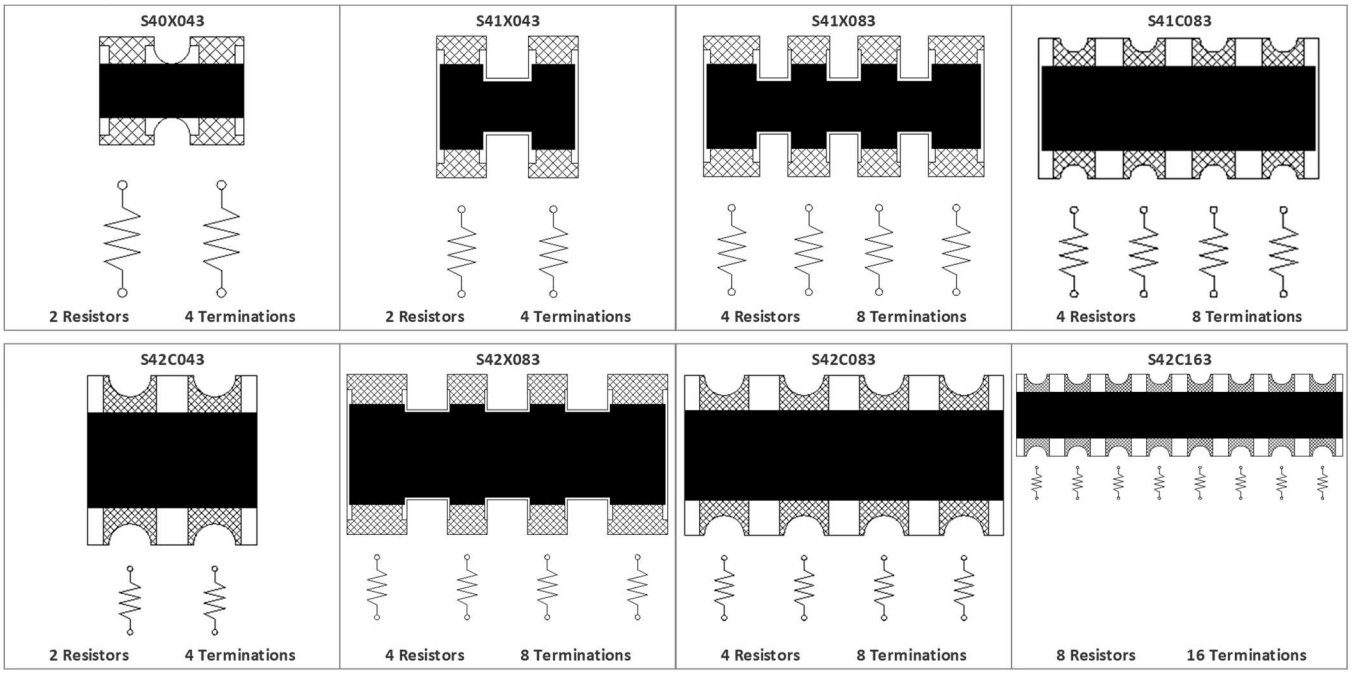
R = Nomimal Resistance [Ω]

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 Temperture 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_2S Gas [3ppm]
Resistance to Solvents	---	---	---	Dip in Isopropyl alcohol @ +25°C for 60 seconds
Solderability	---	---	---	RMA Flux, +245°C, 2 seconds dip, 95% coverage

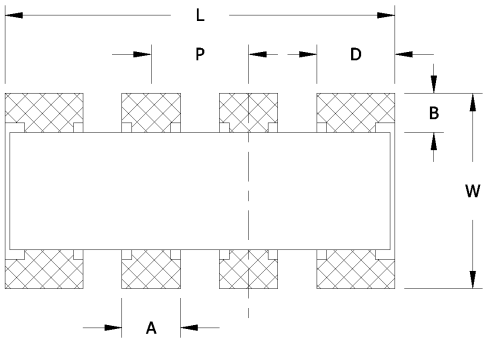
Electrical & Environmental Specifications

Circuit Types

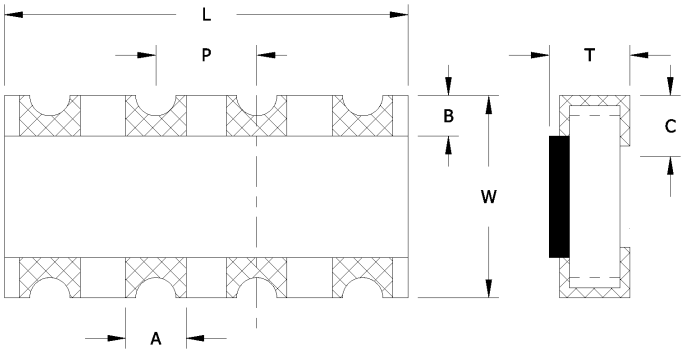


Mechanical Specifications

Package Drawing – Convex, Type X



Package Drawing – Concave, Type C



Notes

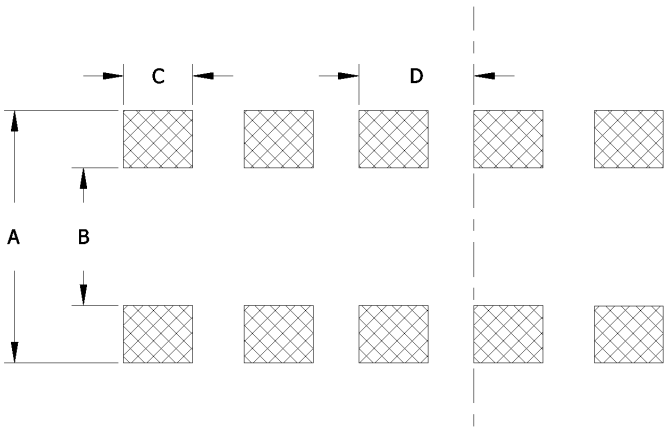
1. JEDEC termination code (e3). Barrier-plating is nickel [Ni] with Matte tin [Sn] finish.
2. Reflow conditions per JEDEC J-STD-020; +260°C maximum, 20 seconds.
3. MSL = 1.

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

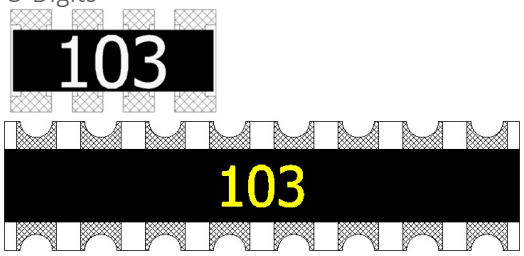
Marking Information

Package Code	J Tolerance E-24 Value	Marking Color
S40X043	1 Dot	Yellow
S41X043	1 Dot or No marking	Yellow -
S41X083	2 Dots or 3-Digits	Yellow White
S41C083	2 Dots	Yellow
S42C043	1 Dot	Yellow
S42X083	2 Dots 3-Digits or 3-Digits	Yellow White
S42C083	2 Dots 3-Digits	Yellow
S42C163	3-Digits	Yellow

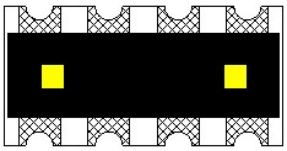
Marking Examples

1 Dot

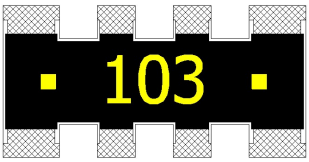
3-Digits



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 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	12.0k	913	91.0k	684	680k
330	33	241	240	182	1.8k	133	13.0k	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".