

770 Series

Conformal Coated SIP Resistor Network



Features

- High-Reliability Cermet Resistors
- Space Saving Versus Individual Resistors
- Available Odd or Even Number of Pins [4 – 12]
- Low Profile w/ 2.54mm Pin Spacing
- Improved TCR Tracking vs. Discrete Resistors
- Epoxy Resin Coating

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

- 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

770 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	Number of Pins	Schematic	Resistor Code	RoHS Compliant																								
770	10	3	103	P																								
	<table><tr><th>Schematic</th><th>Pin Count</th></tr><tr><td>Bussed</td><td>4 - 12</td></tr><tr><td>Isolated</td><td>4, 6, 8, 10, 12</td></tr><tr><td>Dual</td><td>6, 8, 10</td></tr></table>	Schematic	Pin Count	Bussed	4 - 12	Isolated	4, 6, 8, 10, 12	Dual	6, 8, 10	<table><tr><th>Code</th><th>Schematic Type</th></tr><tr><td>1</td><td>Bussed Circuit</td></tr><tr><td>3</td><td>Isolated Circuit</td></tr><tr><td>5</td><td>Dual Terminator Circuit</td></tr></table>	Code	Schematic Type	1	Bussed Circuit	3	Isolated Circuit	5	Dual Terminator Circuit	<table><tr><th>Code</th><th>Resistor Value *</th></tr><tr><td>103</td><td>10k Ohms</td></tr></table> * See notes below.	Code	Resistor Value *	103	10k Ohms	<table><tr><th>Code</th><th>Termination</th></tr><tr><td>P</td><td>SnAgCu Finish</td></tr></table>	Code	Termination	P	SnAgCu Finish
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Notes:

1. See Addendum for standard EIA values and resistor codes.
2. Resistor Tolerance is $\pm 2\%$ for all part numbers.
3. Schematic 5 codes use the following formats. See Addendum tables for available part numbers.
Ex. 220/330 = 220 Ohms/330 Ohms, 470/1.2k = 470 Ohms/1,200 Ohms

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

Schematic 1 or 3 Examples				Schematic 5 Examples			
# Pins	Schematic	R [Ω]	Part Number	For R1 & R2 <1k			
				R1 [Ω]	R2 [Ω]	R1/R2	Part Number
4	1	22	77041220P	81	130	81/130	77010581/130P
7	1	1,600	77041162P	100	200	100/200	770105100/200P
10	1	150,000	77041154P	180	270	180/270	770105180/270P
11	1	390,000	77041394P	220	330	220/330	770105220/330P
4	3	51	77043510P	For R1 & R2 >1k			
8	3	270	77043271P	R1 [Ω]	R2 [Ω]	R1/R2	Part Number
10	3	10,000	77043103P	470	1k	470/1k	770105470/1KP
12	3	680,000	77043684P	750	2.3k	750/2.3k	770105750/2.3KP
				1k	2k	1k/2k	7701051K/2KP
				1.1k	2.2k	1.1k/2.2k	7701051.1/2.2KP
				1.5k	3.3k	1.5k/3.3k	7701051.5/3.3KP
				CTS Part Number is limited to 15 characters maximum, therefore first K is omitted.			

Electrical & Environmental Specifications

Operating Conditions

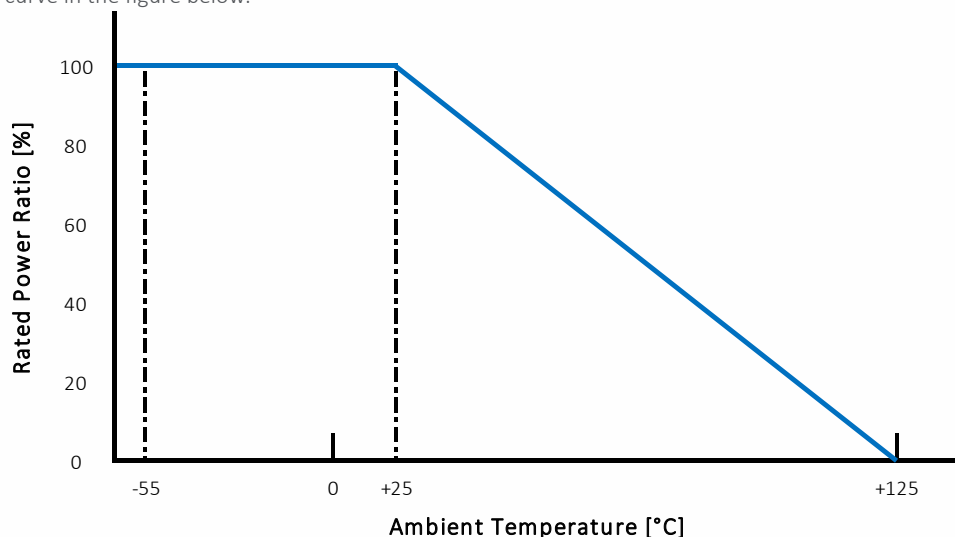
Circuit Schematic	Pin Count	Resistance Range ¹ [Ohm]	Resistance Tolerance [%]	Operating Temperature Range	Temperature Coefficient	+70°C Power Per Resistor ³ [Watts]	Maximum Working Voltage ⁴	Maximum Overload Voltage ⁴
1 - Bussed	4 - 12	22 - 1M	±2% Std.	-55°C to +125°C	±100ppm/°C	150mW @ +25°C 100mW @ +70°C	E = VP*R or 50, whichever is less	E = (VP*R)2.5 or 100, whichever is less
3 - Isolated	4, 6, 8, 10, 12							
5 - Dual Terminator	6, 8, 10							
		Note 2						
1. Except Part Number 77083120P [12 Ohms].								
2. See Addendum for Schematic 5 available part numbers.								
3. Power rating is based on continuous full load operation at an ambient temperature of +25°C.								
For resistors operating at ambient temperatures above +25°C, power rating shall be derated per the Derating Curve below.								
4. P = Power Rating, R = Resistance.								

Pin Count	Package Power @ +25°C	Package Power @ +70°C	Pin Count	Package Power @ +25°C	Package Power @ +70°C
4	500mW	300mW	9	1.2W	800mW
5	700mW	400mW	10	1.4W	900mW
6	800mW	500mW	11	1.5W	1.0W
7	900mW	600mW	12	1.6W	1.1W
8	1.1W	700mW			

Electrical & Environmental Specifications

Power Derating Curve – Typical

With the rated ambient temperature set to +25°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.

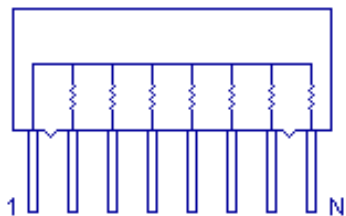
$$E = \sqrt{P \times R}$$

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

Circuit Types

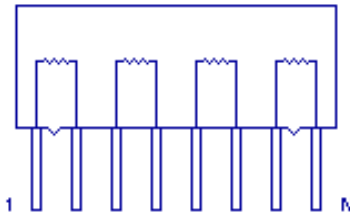
Bussed [Schematic 1]

Available in 4 to 12 pin configurations.



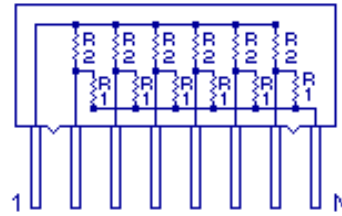
Isolated [Schematic 3]

Available in 4, 6, 8, 10, 12 pin configurations.



Dual Terminator [Schematic 5]

Available in 6, 8, 10 pin configurations.





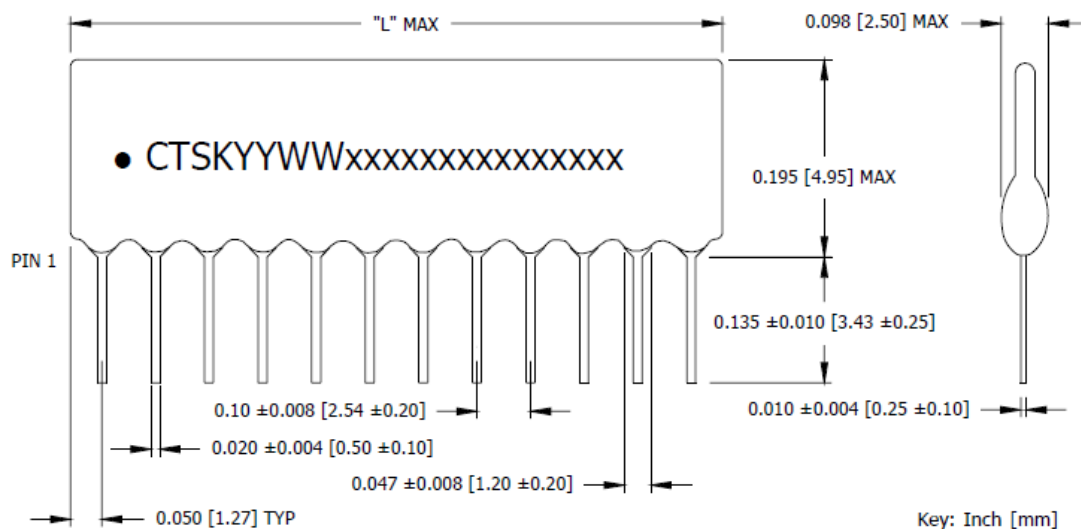
Electrical & Environmental Specifications

Environmental Parameters

Test	Maximum Delta R		Test Description
	Typical	Limit	
Thermal Cycle	±0.25%	±0.5%	-40°C [30 minutes], +85°C [30 minutes], 5 cycles
Short Time Overload	±0.25%	±0.5%	2½ times rated working voltage for 5 seconds [100V maximum]
Moisture Resistance - R ≤ 100Ω	-	±1.0%	+40°C ±2°C, 90%/95% R.H., 1000 hours
Moisture Resistance - R > 100Ω	-	±2.0%	
Temperature Coefficient [T.C.R.]	-	±100ppm/°C	+25°C/-55°C, +25°C/+125°C
High Temperature Exposure	±3.0%	-	1,000 hours @ +125°C, no load
Load Life - R ≤ 100Ω	-	±1.0%	1,000 hours @ +70°C, rated load
Load Life - R > 100Ω	-	±2.0%	
Insulation Resistance		10G Ω min.	200V
Dielectric Strength	±0.25%	±0.5%	200V
Terminal Strength - Lead Pull	±0.25%	±0.5%	9.8N pull 10 seconds
Terminal Strength - Lead Bend	three 45° bends		2.45N
Resistance to Solder Heat	±0.25%	±0.5%	+260°C ±5°C, 10 seconds ±1 second
Solderability	-	-	RMA Flux, +230°C, 5 seconds dip, 95% coverage
Resistance to Solvents	-	-	Isopropyl alcohol, Freon TMC
Mechanical Shock	±0.25%	±0.5%	100g, 1 msec., 3 shocks each plane
Vibration	±0.25%	±0.5%	20g, 10-2000Hz, 4 hours/plane
Flammability	-	-	Conforms to UL94V-0
Non-Fungus per MIL-STD 810C	-	-	-

Mechanical Specifications

Package Drawing



Package Lengths

Pin Count	Dimensions [mm]
	L
4	10.16
5	12.70
6	15.24
7	17.78
8	20.32
9	22.86
10	25.40
11	27.94
12	30.48

Marking Information

- – Pin 1 identifier.
- CTSK – Manufacturer identifier.
- YYWW – Date Code; YY = year, WW = week.
- xxxxxxxxxxxx – reserved for CTS part number, Ex. 770103472P.

Full marking: Ex. ●CTSK2312770103472P

Reduced marking: For parts with 8 pins or less, the part series 770 may be omitted from the part number portions of the marking code. Ex. ●CTSK231283472P

Complete CTS part number and date code information must appear on the bag and carton labels.

Notes

- JEDEC termination code (e1). Barrier-plating is copper [Cu] over iron [Fe] leads with tin-silver-copper [SnAgCu] finish.
- Reflow conditions per JEDEC J-STD-020; +260°C maximum, 20 seconds.
- MSL = 1.

Packaging – Bulk

Standard packaging is bulk in bag. Device quantity is 250 pieces per bag.



Addendum

Standard EIA Codes and Resistor Values – E-24 [3-Digit Resistor Codes]

CODE	OHMS	CODE	OHMS	CODE	OHMS	CODE	OHMS	CODE	OHMS	CODE	OHMS
220	22	151	150	102	1,000	682	6,800	473	47,000	334	330,000
240	24	161	160	112	1,100	752	7,500	513	51,000	364	360,000
270	27	181	180	122	1,200	822	8,200	563	56,000	394	390,000
300	30	201	200	132	1,300	912	9,100	623	62,000	434	430,000
330	33	221	220	152	1,500	103	10,000	683	68,000	474	470,000
360	36	241	240	162	1,600	113	11,000	753	75,000	514	510,000
390	39	271	270	182	1,800	123	12,000	823	82,000	564	560,000
430	43	301	300	202	2,000	133	13,000	913	91,000	624	620,000
470	47	331	330	222	2,200	153	15,000	104	100,000	684	680,000
510	51	361	360	242	2,400	163	16,000	114	110,000	754	750,000
560	56	391	390	272	2,700	183	18,000	124	120,000	824	820,000
620	62	431	430	302	3,000	203	20,000	134	130,000	914	910,000
680	68	471	470	332	3,300	223	22,000	154	150,000	105	1,000,000
750	75	511	510	362	3,600	243	24,000	164	160,000		
820	82	561	560	392	3,900	273	27,000	184	180,000		
910	91	621	620	432	4,300	303	30,000	204	200,000		
101	100	681	680	472	4,700	333	33,000	224	220,000		
111	110	751	750	512	5,100	363	36,000	244	240,000		
121	120	821	820	562	5,600	393	39,000	274	270,000		
131	130	911	910	622	6,200	433	43,000	304	300,000		



Addendum

Schematic 5 Resistor Combinations

Model Part Number 770105 For R1 & R2 <1k				Model Part Number 770105 For R1 & R2 >1k			
R1 [Ω]	R2 [Ω]	R1/R2	Part Number	R1 [Ω]	R2 [Ω]	R1/R2	Part Number
81	130	81/130	77010581/130P	470	1k	470/1k	770105470/1KP
100	200	100/200	770105100/200P	560	1k	560/1k	770105560/1KP
100	150	100/150	770105100/150P	750	2.3k	750/2.3k	770105750/2.3KP
100	430	100/430	770105100/430P	1k	2k	1k/2k	7701051K/2KP
106	169	106/169	770105106/169P	1.1k	2.2k	1.1k/2.2k	7701051.1/2.2KP
120	180	120/180	770105120/180P	1k	3.3k	1k/3.3k	7701051K/3.3KP
121	195	121/195	770105121/195P	1.5k	1.5k	1.5k/1.5k	7701051.5/1.5KP
160	240	160/240	770105160/240P	1.5k	3.3k	1.5k/3.3k	7701051.5/3.3KP
162	260	162/260	770105162/260P	2.2k	4.4k	2.2k/4.4k	7701052.2/4.4KP
180	220	180/220	770105180/220P	2.2k	5.6k	2.2k/5.6k	7701052.2/5.6KP
180	270	180/270	770105180/270P	3k	6.2k	3k/6.2k	7701053K/6.2KP
180	300	180/300	770105180/300P	3.3k	4.7k	3.3k/4.7k	7701053.3/4.7KP
180	390	180/390	770105180/390P	3.9k	3.3k	3.9k/3.3k	7701053.9/3.3KP
220	270	220/270	770105220/270P	5k	5k	5k/5k	7701055K/5KP
220	330	220/330	770105220/330P	22k	56k	22k/56k	77010522K/56KP
250	250	250/250	770105250/250P	CTS Part Number is limited to 15 characters maximum, therefore first K is omitted.			
270	470	270/470	770105270/470P				
330	330	330/330	770105330/330P				
330	390	330/390	770105330/390P				
330	470	330/470	770105330/470P				
360	720	360/720	770105360/720P				
390	620	390/620	770105390/620P				
470	680	470/680	770105470/680P				
750	750	750/750	770105750/750P				