

## Thick Film Resistor Networks, Single-In-Line, Conformal Coated SIP



### FEATURES

- Isolated, bussed and dual terminator schematics available
- Body height: "A" profile = 0.195" (4.95 mm) and "B" profile = 0.295" (7.50 mm) standard; custom "C" profile = 0.350" (8.89 mm) also available
- "A" profile standard in 4 thru 12 pins
- Thick film resistive elements
- Reduces total assembly costs
- Resistor elements protected by tough epoxy conformal coating
- Wide resistance range (10  $\Omega$  to 2.2 M $\Omega$ )
- Available in bulk pack as standard; optional tube pack is also available
- Meets EIA/ECA-CB23 rev. G whisker test requirements for class 1A products
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



Available


**RoHS\***  
Available

### Note

\* This datasheet provides information about parts that are RoHS-compliant and/or parts that are non-RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS-compliant. Please see the information/tables in this datasheet for details.

### STANDARD ELECTRICAL SPECIFICATIONS

| GLOBAL MODEL/<br>SCHEMATIC | PACKAGE HEIGHT | POWER RATING ELEMENT <sup>(1)</sup><br>$P_{70^{\circ}\text{C}}$ W | RESISTANCE RANGE<br>$\Omega$ | TEMPERATURE COEFFICIENT<br>(- 55 $^{\circ}\text{C}$ to + 125 $^{\circ}\text{C}$ )<br>$\pm$ ppm/ $^{\circ}\text{C}$ | TOLERANCE <sup>(2)</sup><br>$\pm$ % | TEMP. COEFFICIENT TRACKING <sup>(1)</sup><br>(- 55 $^{\circ}\text{C}$ to + 125 $^{\circ}\text{C}$ )<br>$\pm$ ppm/ $^{\circ}\text{C}$ | MAX. WORKING VOLTAGE <sup>(3)</sup><br>$V_{\text{DC}}$ |
|----------------------------|----------------|-------------------------------------------------------------------|------------------------------|--------------------------------------------------------------------------------------------------------------------|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| CSCxxx01                   | A              | 0.20                                                              | 10 to 50                     | 250                                                                                                                | 1, 2, 5                             | 50                                                                                                                                   | 100                                                    |
|                            |                |                                                                   | 50.1 to 2.2M                 | 100                                                                                                                |                                     |                                                                                                                                      |                                                        |
|                            | B              | 0.25                                                              | 10 to 50                     | 250                                                                                                                |                                     |                                                                                                                                      |                                                        |
|                            |                |                                                                   | 50.1 to 2.2M                 | 100                                                                                                                |                                     |                                                                                                                                      |                                                        |
| CSCxxx03                   | A              | 0.30                                                              | 10 to 50                     | 250                                                                                                                | 1, 2, 5                             | 50                                                                                                                                   | 100                                                    |
|                            |                |                                                                   | 50.1 to 2.2M                 | 100                                                                                                                |                                     |                                                                                                                                      |                                                        |
|                            | B              | 0.40                                                              | 10 to 50                     | 250                                                                                                                |                                     |                                                                                                                                      |                                                        |
|                            |                |                                                                   | 50.1 to 2.2M                 | 100                                                                                                                |                                     |                                                                                                                                      |                                                        |
| CSCxxx05                   | A              | 0.20                                                              | 10 to 50                     | 250                                                                                                                | 1, 2, 5                             | 150                                                                                                                                  | 100                                                    |
|                            |                |                                                                   | 50.1 to 2.2M                 | 100                                                                                                                |                                     |                                                                                                                                      |                                                        |
|                            | B              | 0.25                                                              | 10 to 50                     | 250                                                                                                                |                                     |                                                                                                                                      |                                                        |
|                            |                |                                                                   | 50.1 to 2.2M                 | 100                                                                                                                |                                     |                                                                                                                                      |                                                        |

### Notes

- See derating curves for package power rating
- <sup>(1)</sup> For resistor power ratings at + 25  $^{\circ}\text{C}$  see derating curves
- <sup>(2)</sup>  $\pm$  2 % standard,  $\pm$  1 % and  $\pm$  5 % available
- <sup>(3)</sup> Continuous working voltage shall be  $\sqrt{P \times R}$  or maximum working voltage, whichever is less

**GLOBAL PART NUMBER INFORMATION**
**New Global Part Numbering: CSC08A03100RGEK (preferred part number format)**

|              |                                                                   |   |                                    |   |                                              |   |                                                                                                                                                      |   |                                                                                         |   |                                                  |   |                                                                             |   |  |  |  |
|--------------|-------------------------------------------------------------------|---|------------------------------------|---|----------------------------------------------|---|------------------------------------------------------------------------------------------------------------------------------------------------------|---|-----------------------------------------------------------------------------------------|---|--------------------------------------------------|---|-----------------------------------------------------------------------------|---|--|--|--|
| C            | S                                                                 | C | 0                                  | 8 | A                                            | 0 | 3                                                                                                                                                    | 1 | 0                                                                                       | 0 | R                                                | G | E                                                                           | K |  |  |  |
| GLOBAL MODEL | PIN COUNT                                                         |   | PACKAGE HEIGHT                     |   | SCHEMATIC                                    |   | RESISTANCE VALUE                                                                                                                                     |   | TOLERANCE CODE                                                                          |   | PACKAGING                                        |   | SPECIAL                                                                     |   |  |  |  |
| CSC          | 04 to 12 pin available<br>04 = 4 pin<br>08 = 8 pin<br>12 = 12 pin |   | A = "A" profile<br>B = "B" profile |   | 01 = Bussed<br>03 = Isolated<br>00 = Special |   | R = $\Omega$<br>K = k $\Omega$<br>M = M $\Omega$<br>10R0 = 10 $\Omega$<br>680K = 680 k $\Omega$<br>1M00 = 1.0 M $\Omega$<br>0000 = 0 $\Omega$ Jumper |   | F = $\pm 1\%$<br>G = $\pm 2\%$<br>J = $\pm 5\%$<br>S = Special<br>Z = 0 $\Omega$ Jumper |   | EK = Lead (Pb)-free, bulk<br>PA = Tin/lead, bulk |   | Blank = Standard (dash number) (up to 3 digits) From 1 to 999 as applicable |   |  |  |  |

**Historical Part Number example: CSC08A03101GEK (will continue to be accepted)**

|                  |           |                |           |                  |                |           |
|------------------|-----------|----------------|-----------|------------------|----------------|-----------|
| CSC              | 08        | A              | 03        | 101              | G              | EK        |
| HISTORICAL MODEL | PIN COUNT | PACKAGE HEIGHT | SCHEMATIC | RESISTANCE VALUE | TOLERANCE CODE | PACKAGING |

**New Global Part Numbering: CSC08A05131AGEK (preferred part number format)**

|              |                                                                   |   |                                    |   |                      |   |                                                                          |   |                                     |   |                                                  |   |                                                                             |   |  |  |  |
|--------------|-------------------------------------------------------------------|---|------------------------------------|---|----------------------|---|--------------------------------------------------------------------------|---|-------------------------------------|---|--------------------------------------------------|---|-----------------------------------------------------------------------------|---|--|--|--|
| C            | S                                                                 | C | 0                                  | 8 | A                    | 0 | 5                                                                        | 1 | 3                                   | 1 | A                                                | G | E                                                                           | K |  |  |  |
| GLOBAL MODEL | PIN COUNT                                                         |   | PACKAGE HEIGHT                     |   | SCHEMATIC            |   | RESISTANCE VALUE                                                         |   | TOLERANCE CODE                      |   | PACKAGING                                        |   | SPECIAL                                                                     |   |  |  |  |
| CSC          | 04 to 12 pin available<br>04 = 4 pin<br>08 = 8 pin<br>12 = 12 pin |   | A = "A" profile<br>B = "B" profile |   | 05 = Dual terminator |   | 3 digit impedance code, followed by alpha modifier (see impedance table) |   | F = ± 1 %<br>G = ± 2 %<br>J = ± 5 % |   | EK = Lead (Pb)-free, bulk<br>PA = Tin/lead, bulk |   | Blank = Standard (Dash Number) (Up to 3 digits) From 1 to 999 as applicable |   |  |  |  |

**Historical Part Number example: CSC08A05131AGEK (will continue to be accepted)**

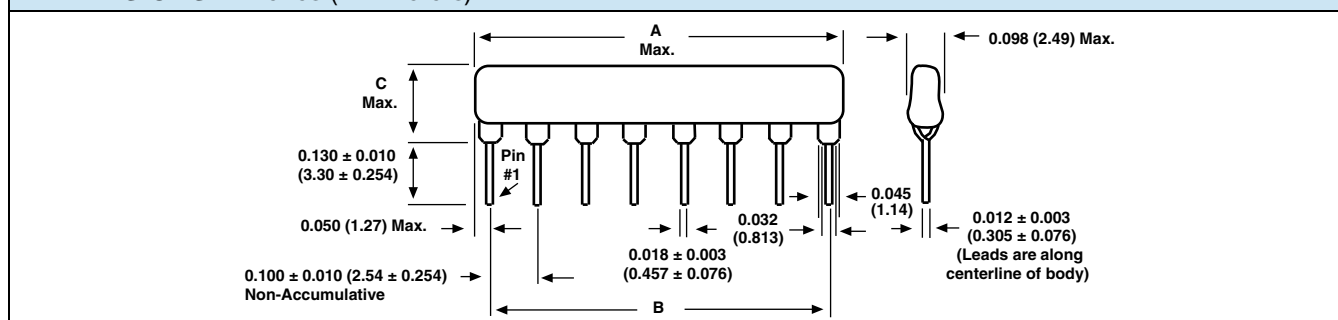
|                  |           |                |           |                    |                    |                |           |
|------------------|-----------|----------------|-----------|--------------------|--------------------|----------------|-----------|
| CSC              | 08        | A              | 05        | 221                | 331                | G              | EK        |
| HISTORICAL MODEL | PIN COUNT | PACKAGE HEIGHT | SCHEMATIC | RESISTANCE VALUE 1 | RESISTANCE VALUE 2 | TOLERANCE CODE | PACKAGING |

**Note**

- For additional information on packaging, refer to the Through-Hole Network Packaging document ([www.vishay.com/doc?31542](http://www.vishay.com/doc?31542)).

**TECHNICAL SPECIFICATIONS**

| PARAMETER                           | UNIT        | CSC SERIES       |
|-------------------------------------|-------------|------------------|
| Voltage coefficient of resistance   | $V_{eff}$   | < 50 ppm typical |
| Dielectric strength                 | $V_{AC}$    | 200              |
| Isolation resistance (03 schematic) | $\Omega$    | > 100M           |
| Operating temperature range         | $^{\circ}C$ | - 55 to + 125    |

**DIMENSIONS** in inches (millimeters)


| 01 SCHEMATIC                                                                       | GLOBAL MODEL | NUMBER OF RESISTORS | A (MAX.)      | B             | C (MAX.)                                                 |
|------------------------------------------------------------------------------------|--------------|---------------------|---------------|---------------|----------------------------------------------------------|
|   | CSC04        | 3                   | 0.390 (9.91)  | 0.300 (7.62)  | "A" profile = 0.195 (4.95)<br>"B" profile = 0.295 (7.50) |
|                                                                                    | CSC05        | 4                   | 0.490 (12.45) | 0.400 (10.16) |                                                          |
|                                                                                    | CSC06        | 5                   | 0.590 (14.99) | 0.500 (12.70) |                                                          |
|                                                                                    | CSC07        | 6                   | 0.690 (17.53) | 0.600 (15.24) |                                                          |
|                                                                                    | CSC08        | 7                   | 0.790 (20.07) | 0.700 (17.78) |                                                          |
|                                                                                    | CSC09        | 8                   | 0.890 (22.61) | 0.800 (20.32) |                                                          |
|                                                                                    | CSC10        | 9                   | 0.990 (25.15) | 0.900 (22.86) |                                                          |
|                                                                                    | CSC11        | 10                  | 1.09 (27.69)  | 1.00 (25.40)  |                                                          |
|                                                                                    | CSC12        | 11                  | 1.19 (30.23)  | 1.100 (27.94) |                                                          |
|                                                                                    |              |                     |               |               |                                                          |
| 03 SCHEMATIC                                                                       | GLOBAL MODEL | NUMBER OF RESISTORS | A (MAX.)      | B             | C (MAX.)                                                 |
|   | CSC04        | 2                   | 0.390 (9.91)  | 0.300 (7.62)  | "A" profile = 0.195 (4.95)<br>"B" profile = 0.295 (7.50) |
|                                                                                    | CSC06        | 3                   | 0.590 (14.99) | 0.500 (12.70) |                                                          |
|                                                                                    | CSC08        | 4                   | 0.790 (20.07) | 0.700 (17.78) |                                                          |
|                                                                                    | CSC10        | 5                   | 0.990 (25.15) | 0.900 (22.86) |                                                          |
|                                                                                    | CSC12        | 6                   | 1.19 (30.23)  | 1.100 (27.94) |                                                          |
|                                                                                    |              |                     |               |               |                                                          |
| 05 SCHEMATIC                                                                       | GLOBAL MODEL | NUMBER OF RESISTORS | A (MAX.)      | B             | C (MAX.)                                                 |
|  | CSC04        | 4                   | 0.390 (9.91)  | 0.300 (7.62)  | "A" profile = 0.195 (4.95)<br>"B" profile = 0.295 (7.50) |
|                                                                                    | CSC05        | 6                   | 0.490 (12.45) | 0.400 (10.16) |                                                          |
|                                                                                    | CSC06        | 8                   | 0.590 (14.99) | 0.500 (12.70) |                                                          |
|                                                                                    | CSC07        | 10                  | 0.690 (17.53) | 0.600 (15.24) |                                                          |
|                                                                                    | CSC08        | 12                  | 0.790 (20.07) | 0.700 (17.78) |                                                          |
|                                                                                    | CSC09        | 14                  | 0.890 (22.61) | 0.800 (20.32) |                                                          |
|                                                                                    | CSC10        | 16                  | 0.990 (25.15) | 0.900 (22.86) |                                                          |
|                                                                                    | CSC11        | 18                  | 1.09 (27.69)  | 1.00 (25.40)  |                                                          |
|                                                                                    | CSC12        | 20                  | 1.19 (30.23)  | 1.100 (27.94) |                                                          |
|                                                                                    |              |                     |               |               |                                                          |

## MECHANICAL SPECIFICATIONS

|                                |                                                |
|--------------------------------|------------------------------------------------|
| Marking resistance to solvents | Permanency testing per MIL-STD-202, method 215 |
| Solderability                  | Per MIL-STD-202, method 208E, RMA flux         |
| Body                           | High alumina, epoxy coated                     |
| Terminals <sup>(1)</sup>       | Solder plated leads                            |

### Note

<sup>(1)</sup> Coating meniscus meets class 2 requirements of IPC-A-610.

## STOCKED RESISTANCE VALUES IN $\Omega$ ("G" TOLERANCE)

Standard E-24 resistance values stocked. Consult factory.

Many dual terminator resistance values stocked. Consult factory.

## IMPEDANCE CODES

| CODE | $R_1 (\Omega)$ | $R_2 (\Omega)$ | CODE | $R_1 (\Omega)$ | $R_2 (\Omega)$ |
|------|----------------|----------------|------|----------------|----------------|
| 500B | 82             | 130            | 141A | 270            | 270            |
| 750B | 120            | 200            | 181A | 330            | 390            |
| 800C | 130            | 210            | 191A | 330            | 470            |
| 990A | 160            | 260            | 221B | 330            | 680            |
| 101C | 180            | 240            | 281B | 560            | 560            |
| 111C | 180            | 270            | 381B | 560            | 1.2K           |
| 121B | 180            | 390            | 501C | 620            | 2.7K           |
| 121C | 220            | 270            | 102A | 1.5K           | 3.3K           |
| 131A | 220            | 330            | 202B | 3K             | 6.2K           |

### Note

- For additional impedance codes, refer to the Dual Terminator Impedance Code Table document ([www.vishay.com/doc?31530](http://www.vishay.com/doc?31530)).

### "A" Profile



### "A" PROFILE + 70 °C PACKAGE RATINGS

|        |        |
|--------|--------|
| CSC12A | 1.5 W  |
| CSC11A | 1.37 W |
| CSC10A | 1.25 W |
| CSC09A | 1.12 W |
| CSC08A | 1.00 W |
| CSC07A | 0.87 W |
| CSC06A | 0.75 W |
| CSC05A | 0.62 W |
| CSC04A | 0.40 W |

### "B" Profile



### "B" PROFILE + 70 °C PACKAGE RATINGS

|        |        |
|--------|--------|
| CSC12B | 1.90 W |
| CSC11B | 1.75 W |
| CSC10B | 1.60 W |
| CSC09B | 1.45 W |
| CSC08B | 1.30 W |
| CSC07B | 1.15 W |
| CSC06B | 1.00 W |
| CSC05B | 0.80 W |
| CSC04B | 0.60 W |

## CIRCUIT APPLICATIONS

### 01 Schematic



#### Bussed

The CSCxxx01 single-in-line resistor networks provide the user with nominally equal resistors, each connected to a common pin (pin no. 1). Commonly used in the following applications:

- “Wired OR” pull-up
- Power gate pull-up
- MOS/ROM pull-up/pull-down
- Open collector pull-up
- TTL input pull-down
- TTL unused gate pull-up

\* “A” profile standard, “B” profile available.

### 03 Schematic



#### Isolated

The CSCxxx03 single-in-line resistor networks provide the user with nominally equal resistors. Each resistor is isolated from all others. Commonly used in the following applications:

- “Wired OR” pull-up
- Power driven pull-up
- Power gate pull-up
- Line termination
- Long-line impedance balancing
- LED current limiting
- ECL output pull-down
- TTL input pull-down

\* “A” Profile standard, “B” profile available.

### 05 Schematic



#### Dual Terminator

The CSCxxx05 circuits contain series pairs of resistors. Each series pair is connected between two common lines. The junction of these resistor pairs is connected to the input terminals. The 05 circuits are designed for TTL dual-line termination and pulse squaring.

\* “A” profile standard, “B” profile available.

## PERFORMANCE

| TEST                            | CONDITIONS                                                                                                             | MAX. $\Delta R$ (TYPICAL TEST LOTS) |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| Thermal shock                   | 5 cycles between - 65 °C and + 125 °C                                                                                  | $\pm 0.50 \% \Delta R$              |
| Short time overload             | 2.5 x rated working voltage, 5 s                                                                                       | $\pm 0.25 \% \Delta R$              |
| Low temperature operation       | 45 min at full rated working voltage at - 65 °C                                                                        | $\pm 0.25 \% \Delta R$              |
| Moisture resistance             | 240 h with humidity ranging from 80 % RH to 98 % RH                                                                    | $\pm 1.00 \% \Delta R$              |
| Resistance to soldering heat    | Leads immersed in + 350 °C solder to within 1/16" of body for 3 s                                                      | $\pm 0.25 \% \Delta R$              |
| Shock                           | Total of 18 shocks at 100 g's                                                                                          | $\pm 0.25 \% \Delta R$              |
| Vibration                       | 12 h at maximum of 20 g's between 10 Hz and 2000 Hz                                                                    | $\pm 0.25 \% \Delta R$              |
| Load life                       | 1000 h at + 70 °C, rated power applied 1.5 h “ON”, 0.5 h “OFF” for full 1000 h period. Derated according to the curve. | $\pm 1.00 \% \Delta R$              |
| Terminal strength               | 4.5 pound pull for 30 s                                                                                                | $\pm 0.25 \% \Delta R$              |
| Insulation resistance           | 10 000 M $\Omega$ (minimum)                                                                                            | -                                   |
| Dielectric withstanding voltage | No evidence of arcing or damage (200 V <sub>RMS</sub> for 1 min)                                                       | -                                   |



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