

CSR2010FKR150 Datasheet

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| | |
|------------------------------|--|
| DiGi Electronics Part Number | CSR2010FKR150-DG |
| Manufacturer | Stackpole Electronics Inc |
| Manufacturer Product Number | CSR2010FKR150 |
| Description | RES 0.15 OHM 1% 1W 2010 |
| Detailed Description | 150 mOhms ±1% 1W Chip Resistor 2010 (5025 Metric) Current Sense Thick Film |

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Purchase and inquiry

Manufacturer Product Number:

CSR2010FKR150

Series:

CSR

Resistance:

150 mOhms

Power (Watts):

1W

Features:

Current Sense

Operating Temperature:

-55°C ~ 155°C

Supplier Device Package:

2010

Height - Seated (Max):

0.026" (0.65mm)

Failure Rate:

-

Manufacturer:

Stackpole Electronics Inc

Product Status:

Active

Tolerance:

±1%

Composition:

Thick Film

Temperature Coefficient:

±100ppm/°C

Package / Case:

2010 (5025 Metric)

Size / Dimension:

0.197" L x 0.100" W (5.00mm x 2.54mm)

Number of Terminations:

2

Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Unaffected

HTSUS:

8533.21.0030

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

EAR99

CSR / CSRN Series

Thick Film Current Sensing Resistor

Stackpole Electronics, Inc.
Resistive Product Solutions



Features:

- 0201 to 1225 sizes available
- Power ratings to 3 W
- Available in E24 and other common values
- E96 and other values may be available upon request
- RoHS compliant, REACH compliant, lead free and halogen free

Electrical Specifications

| Type/Code | Power Rating (W) @ 70°C | TCR (ppm/°C) | Ohmic Range (Ω) and Tolerance |
|-------------------------|----------------------------|--------------------------|--|
| | | | 1%, 2%, 5% |
| CSR0201 | 0.05 | ± 1000 | 0.1 - 0.13 |
| | | ± 600 | 0.15 - 0.5 |
| | | ± 300 | 0.51 - 1 |
| CSR0402 | 0.125 | ± 200 ⁽¹⁾ | 0.05 - 1 |
| CSR0603 | 0.125 | ± 300 ⁽³⁾ | 0.02 - 0.3 |
| | | ± 200 ⁽²⁾ | 0.33 - 1 |
| CSR0603-HP | 0.2 | ± 400 | 0.051 - 0.1 |
| | | ± 300 | 0.11 - 0.5 |
| | | ± 200 | 0.51 - 1 |
| CSR0805 | 0.25 | ± 200 ⁽³⁾ | 0.02 - 1 |
| CSR0805-HP | 0.5 | ± 400 | 0.051 - 0.1 |
| | | ± 300 | 0.102 - 0.5 |
| | | ± 200 | 0.51 - 1 |
| CSR1206 | 0.5 | ± 100 ⁽²⁾ | 0.01 - 1 |
| CSR1210 | 0.5 | ± 600 | 0.01 - 0.02 |
| | | ± 400 | 0.022 - 0.051 |
| | | ± 300 | 0.056 - 0.091 |
| | | ± 200 | 0.1 - 1 |
| CSR1210-HP | 0.75 | ± 600 | 0.01 - 0.02 |
| | | ± 400 | 0.022 - 0.05 |
| | | ± 300 | 0.051 - 0.091 |
| | | ± 200 | 0.1 - 1 |
| CSR2010 | 1 | ± 200 ⁽³⁾ | 0.01 - 1 |
| CSRN2010 | 1 | ± 200 | 0.01 - 1 |
| CSR2512 | 2 | ± 200 ⁽³⁾ | 0.01 - 1 |
| CSRN2512 ⁽¹⁾ | 2 | ± 200 | 0.01 - 1 |
| CSR1225 | 3 | ± 300 | 0.003 - 0.004 |
| | | ± 200 | 0.005 - 0.02 |
| | | ± 150 | 0.022 - 0.03 |
| | | ± 100 | 0.033 - 7.5 |

* AEC-Q200 Compliant

(1) Contact Stackpole for TCR below 500m Ω

(2) Contact Stackpole for TCR below 150m Ω

(3) Contact Stackpole for TCR below 100m Ω

Please refer to the High-Power Resistor Application Note for more information on designing and implementing high power resistor types.

Mechanical Specifications



| Type/Code | Typical Unit Weight (mg) | L Body Length | W Body Width | T Body Height | D1 Top Termination | D2 Bottom Termination | Unit |
|-----------------------|--------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|--------------|
| CSR0201 | 0.18 | 0.024 ± 0.001 0.60 ± 0.03 | 0.012 ± 0.001 0.30 ± 0.03 | 0.009 ± 0.002 0.23 ± 0.05 | 0.005 ± 0.002 0.12 ± 0.05 | 0.006 ± 0.002 0.15 ± 0.05 | inches mm |
| CSR0402 | 0.70 | 0.039 ± 0.002 1.00 ± 0.05 | 0.020 ± 0.002 0.50 ± 0.05 | 0.013 ± 0.004 0.32 ± 0.10 | 0.010 ± 0.004 0.25 ± 0.10 | 0.008 ± 0.004 0.20 ± 0.10 | inches mm |
| CSR0603 | 2.0 | 0.063 ± 0.004 1.60 ± 0.10 | 0.031 ± 0.004 0.80 ± 0.10 | 0.018 ± 0.004 0.45 ± 0.10 | 0.012 ± 0.008 0.30 ± 0.20 | 0.012 ± 0.008 0.30 ± 0.20 | inches mm |
| CSR0805 CSR0805-HP | 4.6 5.3 | 0.079 ± 0.006 2.00 ± 0.15 | 0.049 ± 0.006 1.25 ± 0.15 | 0.022 ± 0.004 0.55 ± 0.10 | 0.012 ± 0.008 0.30 ± 0.20 | 0.016 ± 0.010 0.40 ± 0.25 | inches mm |
| CSR1206 | 8.7 | 0.120 ± 0.006 3.05 ± 0.15 | 0.061 ± 0.006 1.55 ± 0.15 | 0.022 ± 0.004 0.55 ± 0.10 | 0.020 ± 0.012 0.50 ± 0.30 | 0.016 ± 0.010 0.40 ± 0.25 | inches mm |
| CSR1210 | 16.0 | 0.122 ± 0.004 3.10 ± 0.10 | 0.102 ± 0.006 2.60 ± 0.15 | 0.022 ± 0.004 0.55 ± 0.10 | 0.020 ± 0.012 0.50 ± 0.30 | 0.020 ± 0.010 0.50 ± 0.25 | inches mm |
| CSR2010 | 27.0 | 0.197 ± 0.008 5.00 ± 0.20 | 0.096 ± 0.006 2.45 ± 0.15 | 0.024 ± 0.006 0.60 ± 0.15 | 0.024 ± 0.012 0.60 ± 0.30 | 0.067 ± 0.010 1.70 ± 0.25 | inches mm |
| CSRN2010 | 23.7 | 0.197 ± 0.004 5.00 ± 0.10 | 0.098 ± 0.006 2.50 ± 0.15 | 0.024 ± 0.006 0.60 ± 0.15 | 0.024 ± 0.012 0.60 ± 0.30 | 0.020 ± 0.010 0.50 ± 0.25 | inches mm |
| CSR2512 | 53.6 | 0.250 ± 0.004 6.35 ± 0.10 | 0.122 ± 0.006 3.10 ± 0.15 | 0.024 ± 0.004 0.60 ± 0.10 | 0.024 ± 0.012 0.60 ± 0.30 | 0.083 ± 0.004 2.10 ± 0.10 | inches mm |
| CSRN2512 | 40.0 | 0.250 ± 0.004 6.35 ± 0.10 | 0.122 ± 0.006 3.10 ± 0.15 | 0.024 ± 0.004 0.60 ± 0.10 | 0.024 ± 0.012 0.60 ± 0.30 | 0.022 ± 0.010 0.55 ± 0.25 | inches mm |

Mechanical Specifications – Four Terminals



| Type/Code | Typical Unit Weight (mg) | L | W | T | D1 | D2 | F | Unit |
|-----------|--------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|--------------|
| CSR1225 | 64.9 | 0.126 ± 0.006 3.20 ± 0.15 | 0.254 ± 0.006 6.45 ± 0.15 | 0.035 ± 0.006 0.90 ± 0.15 | 0.024 ± 0.012 0.60 ± 0.30 | 0.031 ± 0.010 0.80 ± 0.25 | 0.090 ± 0.005 2.29 ± 0.13 | inches mm |

| Performance Characteristics | | | | |
|---|---|--|---------|--|
| Test | Test Method | Test Specification | Typical | Test Condition |
| Temperature Coefficient of Resistance (TCR) | JIS-C-5201-1 4.8 IEC-60115-1 4.8 | As per specification | Pass | At 25°C/-55°C and 25°C/+125°C, 25°C is the reference temperature. |
| Short Time Overload | JIS-C-5201-1 4.13 IEC 60115-1 4.13 | ±(1% + 0.05Ω) | Pass | RCWV*2.5 or Max. Overload Voltage whichever is lower for 5 seconds |
| Insulation Resistance | JIS-C-5201-1 4.6 IEC-60115-1 4.6 | ≥ 10G | Pass | Max. Overload voltage for 1 minute |
| Endurance | JIS-C-5201-1 4.25 IEC-60115-1 4.25.1 | 0201~0603 ±(1% + 0.05Ω) 0805~2512 ±(2% + 0.05Ω) | Pass | 70 ± 2°C, RCWV for 1000 hours with 1.5 hours "ON" and 0.5 hour "OFF" |
| Damp Heat with Load | JIS-C-5201-1 4.24 IEC-60115-1 4.24 | 0201~0603 ±(0.5% + 0.05Ω) 0805~2512 ±(1% + 0.05Ω) | Pass | 40 ± 2°C, 90~95% R.H., RCWV for 1000 hours with 1.5 hours "ON" and 0.5 hour "OFF" |
| Dry Heat | JIS-C-5201-1 4.23 IEC-60115-1 4.23.2 | 0201~0603 ±(0.5% + 0.05Ω) 0805~2512 ±(2% + 0.05Ω) | Pass | at 155°C for 1000 hours |
| Bending Strength | JIS-C-5201-1 4.33 IEC-60115-1 4.33 | ±(1% + 0.05Ω) | Pass | Bending once for 60 seconds with 3 mm Sizes 2010 and 2512: 2 mm |
| Solderability | JIS-C-5201-1 4.17 IEC-60115-1 4.17 | 95% min. coverage | Pass | 245 ± 5°C for 3 seconds |
| Resistance to Soldering Heat | JIS-C-5201-1 4.18 IEC-60115-1 4.18 | ±(0.5% + 0.05Ω) | Pass | 260 ± 5°C for 10 seconds |
| Voltage Proof | JIS-C-5201-1 4.7 IEC-60115-1 4.7 | No breakdown or flashover | Pass | 1.42 times Max. Operating Voltage for 1 minute. 0201: 50 V; 0402: 100 V; 0603: 150 V; 0805: 300 V 1206/1210/2010/1225: 400 V 2512: 500 V |
| Leaching | JIS-C-5201-1 4.18 IEC-60068-2-58 8.2.1 | Individual leaching area ≤ 5% Total leaching area ≤ 10% | Pass | 260 ±5°C for 30 seconds |
| Rapid Change of Temperature | JIS-C-5201-1 4.19 IEC-60115-1 4.19 | ±(0.5% + 0.05Ω) | Pass | -55°C (30 minutes)/+125°C (30 minutes, 5 cycles) |

Operating temperature range is -55 to +155°C

RCWV (Rated Continuous Working Voltage) = √(P*R) or Max. Operating Voltage whichever is lower.

Recommended storage temperature is 15 to 28°C. Humidity < 80% R.H.

Power Derating Curve:

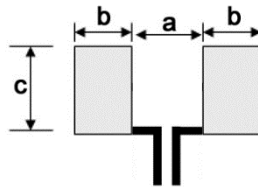


CSR / CSRN Series

Thick Film Current Sensing Resistor

Stackpole Electronics, Inc.
Resistive Product Solutions

Recommended Pad Layouts



| Type/Code | a | b | c | Unit |
|-----------|-------|-------|---------------|--------|
| CSR0201 | 0.010 | 0.012 | 0.016 ± 0.008 | inches |
| | 0.25 | 0.30 | 0.40 ± 0.20 | mm |
| CSR0402 | 0.020 | 0.020 | 0.024 ± 0.008 | inches |
| | 0.50 | 0.50 | 0.60 ± 0.20 | mm |
| CSR0603 | 0.031 | 0.039 | 0.035 ± 0.008 | inches |
| | 0.80 | 1.00 | 0.90 ± 0.20 | mm |
| CSR0805 | 0.039 | 0.039 | 0.053 ± 0.008 | inches |
| | 1.00 | 1.00 | 1.35 ± 0.20 | mm |
| CSR1206 | 0.079 | 0.045 | 0.067 ± 0.008 | inches |
| | 2.00 | 1.15 | 1.70 ± 0.20 | mm |
| CSR1210 | 0.079 | 0.045 | 0.098 ± 0.008 | inches |
| | 2.00 | 1.15 | 2.50 ± 0.20 | mm |
| CSR2010 | 0.055 | 0.094 | 0.110 ± 0.008 | inches |
| | 1.40 | 2.40 | 2.80 ± 0.20 | mm |
| CSRN2010 | 0.142 | 0.055 | 0.098 ± 0.008 | inches |
| | 3.60 | 1.40 | 2.50 ± 0.20 | mm |
| CSR2512 | 0.039 | 0.140 | 0.126 ± 0.008 | inches |
| | 1.00 | 3.55 | 3.20 ± 0.20 | mm |
| CSRN2512 | 0.193 | 0.063 | 0.126 ± 0.008 | inches |
| | 4.90 | 1.60 | 3.20 ± 0.20 | mm |
| CSR1225 | 0.047 | 0.079 | 0.276 ± 0.008 | inches |
| | 1.20 | 2.00 | 7.00 ± 0.20 | mm |

Recommended Solder Profile

This information is intended as a reference for solder profiles for Stackpole resistive components. These profiles should be compatible with most soldering processes. These are only recommendations. Actual numbers will depend on board density, geometry, packages used, etc., especially those cells labeled with “*”.

100% Matte Tin / RoHS Compliant Terminations

Soldering iron recommended temperatures: 330 to 350°C with minimum duration.
Maximum number of reflow cycles: 3.

Wave Soldering

| Description | Maximum | Recommended | Minimum |
|--------------------|------------|-------------|------------|
| Preheat Time | 80 seconds | 70 seconds | 60 seconds |
| Temperature Diff. | 140°C | 120°C | 100°C |
| Solder Temp. | 260°C | 250°C | 240°C |
| Dwell Time at Max. | 10 seconds | 5 seconds | * |
| Ramp DN (°C/sec) | N/A | N/A | N/A |

Temperature Diff. = Difference between final preheat stage and soldering stage.

CSR / CSRN Series
Thick Film Current Sensing Resistor

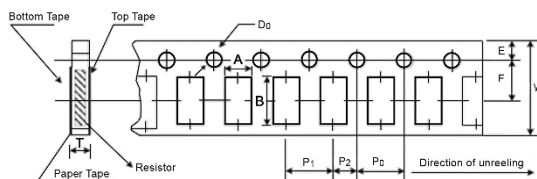
Stackpole Electronics, Inc.
Resistive Product Solutions

| Convection IR Reflow | | | |
|----------------------|-------------|-------------|------------|
| Description | Maximum | Recommended | Minimum |
| Ramp Up (°C/sec) | 3°C/sec | 2°C/sec | * |
| Dwell Time > 217°C | 150 seconds | 90 seconds | 60 seconds |
| Solder Temp. | 260°C | 245°C | * |
| Dwell Time at Max. | 30 seconds | 15 seconds | 10 seconds |
| Ramp DN (°C/sec) | 6°C/sec | 3°C/sec | * |



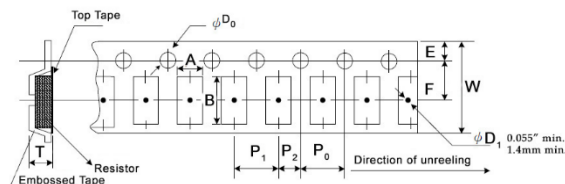
| Type/Code | A | B | C | W | T | Unit |
|-----------|---------------|---------------|---------------|---------------|---------------|--------|
| 0201 | 7.008 ± 0.039 | 2.362 ± 0.039 | 0.531 ± 0.028 | 0.374 ± 0.004 | 0.453 ± 0.039 | inches |
| | 178.00 ± 1.00 | 60.00 ± 1.00 | 13.50 ± 0.70 | 9.50 ± 0.10 | 11.50 ± 1.00 | mm |
| 0402 | 7.008 ± 0.039 | 2.362 ± 0.039 | 0.531 ± 0.028 | 0.374 ± 0.004 | 0.453 ± 0.039 | inches |
| | 178.00 ± 1.00 | 60.00 ± 1.00 | 13.50 ± 0.70 | 9.50 ± 0.10 | 11.50 ± 1.00 | mm |
| 0603 | 7.008 ± 0.039 | 2.362 ± 0.039 | 0.531 ± 0.028 | 0.374 ± 0.004 | 0.453 ± 0.039 | inches |
| | 178.00 ± 1.00 | 60.00 ± 1.00 | 13.50 ± 0.70 | 9.50 ± 0.10 | 11.50 ± 1.00 | mm |
| 0805 | 7.008 ± 0.039 | 2.362 ± 0.039 | 0.531 ± 0.028 | 0.374 ± 0.004 | 0.453 ± 0.039 | inches |
| | 178.00 ± 1.00 | 60.00 ± 1.00 | 13.50 ± 0.70 | 9.50 ± 0.10 | 11.50 ± 1.00 | mm |
| 1206 | 7.008 ± 0.039 | 2.362 ± 0.039 | 0.531 ± 0.028 | 0.374 ± 0.004 | 0.453 ± 0.039 | inches |
| | 178.00 ± 1.00 | 60.00 ± 1.00 | 13.50 ± 0.70 | 9.50 ± 0.10 | 11.50 ± 1.00 | mm |
| 1210 | 7.008 ± 0.039 | 2.362 ± 0.039 | 0.531 ± 0.028 | 0.374 ± 0.004 | 0.453 ± 0.039 | inches |
| | 178.00 ± 1.00 | 60.00 ± 1.00 | 13.50 ± 0.70 | 9.50 ± 0.10 | 11.50 ± 1.00 | mm |
| 2010 | 7.008 ± 0.039 | 2.362 ± 0.039 | 0.531 ± 0.028 | 0.531 ± 0.039 | 0.610 ± 0.039 | inches |
| | 178.00 ± 1.00 | 60.00 ± 1.00 | 13.50 ± 0.70 | 13.50 ± 1.00 | 15.50 ± 1.00 | mm |
| 2512 | 7.008 ± 0.039 | 2.362 ± 0.039 | 0.531 ± 0.028 | 0.531 ± 0.039 | 0.610 ± 0.039 | inches |
| | 178.00 ± 1.00 | 60.00 ± 1.00 | 13.50 ± 0.70 | 13.50 ± 1.00 | 15.50 ± 1.00 | mm |
| 1225 | 7.008 ± 0.039 | 2.362 ± 0.039 | 0.531 ± 0.028 | 0.531 ± 0.039 | 0.610 ± 0.039 | inches |
| | 178.00 ± 1.00 | 60.00 ± 1.00 | 13.50 ± 0.70 | 13.50 ± 1.00 | 15.50 ± 1.00 | mm |

Packaging Specifications – Paper Tape



| Size | A | B | W | E | F | Unit |
|------|---------------|---------------|---------------|------------------|---------------|--------|
| 0201 | 0.015 ± 0.002 | 0.027 ± 0.002 | 0.315 ± 0.004 | 0.069 ± 0.002 | 0.138 ± 0.002 | inches |
| | 0.38 ± 0.05 | 0.68 ± 0.05 | 8.00 ± 0.10 | 1.75 ± 0.05 | 3.50 ± 0.05 | mm |
| 0402 | 0.026 ± 0.004 | 0.045 ± 0.004 | 0.315 ± 0.008 | 0.069 ± 0.004 | 0.138 ± 0.002 | inches |
| | 0.65 ± 0.10 | 1.15 ± 0.10 | 8.00 ± 0.20 | 1.75 ± 0.10 | 3.50 ± 0.05 | mm |
| 0603 | 0.043 ± 0.004 | 0.075 ± 0.004 | 0.315 ± 0.008 | 0.069 ± 0.004 | 0.138 ± 0.002 | inches |
| | 1.10 ± 0.10 | 1.90 ± 0.10 | 8.00 ± 0.20 | 1.75 ± 0.10 | 3.50 ± 0.05 | mm |
| 0805 | 0.063 ± 0.004 | 0.094 ± 0.008 | 0.315 ± 0.008 | 0.069 ± 0.004 | 0.138 ± 0.002 | inches |
| | 1.60 ± 0.10 | 2.40 ± 0.20 | 8.00 ± 0.20 | 1.75 ± 0.10 | 3.50 ± 0.05 | mm |
| 1206 | 0.075 ± 0.004 | 0.138 ± 0.008 | 0.315 ± 0.008 | 0.069 ± 0.004 | 0.138 ± 0.002 | inches |
| | 1.90 ± 0.10 | 3.50 ± 0.20 | 8.00 ± 0.20 | 1.75 ± 0.10 | 3.50 ± 0.05 | mm |
| 1210 | 0.114 ± 0.004 | 0.138 ± 0.008 | 0.315 ± 0.008 | 0.069 ± 0.004 | 0.138 ± 0.002 | inches |
| | 2.90 ± 0.10 | 3.50 ± 0.20 | 8.00 ± 0.20 | 1.75 ± 0.10 | 3.50 ± 0.05 | mm |
| Size | P0 | P1 | P2 | D0 | T | Unit |
| 0201 | 0.157 ± 0.004 | 0.079 ± 0.002 | 0.079 ± 0.004 | 0.059 + 0.004/-0 | 0.017 ± 0.008 | inches |
| | 4.00 ± 0.10 | 2.00 ± 0.05 | 2.00 ± 0.10 | 1.50 + 0.10/-0 | 0.42 ± 0.20 | mm |
| 0402 | 0.157 ± 0.004 | 0.079 ± 0.002 | 0.079 ± 0.002 | 0.059 + 0.004/-0 | 0.018 ± 0.004 | inches |
| | 4.00 ± 0.10 | 2.00 ± 0.05 | 2.00 ± 0.05 | 1.50 + 0.10/-0 | 0.45 ± 0.10 | mm |
| 0603 | 0.157 ± 0.004 | 0.157 ± 0.002 | 0.079 ± 0.002 | 0.059 + 0.004/-0 | 0.028 ± 0.004 | inches |
| | 4.00 ± 0.10 | 4.00 ± 0.05 | 2.00 ± 0.05 | 1.50 + 0.10/-0 | 0.70 ± 0.10 | mm |
| 0805 | 0.157 ± 0.004 | 0.157 ± 0.002 | 0.079 ± 0.002 | 0.059 + 0.004/-0 | 0.033 ± 0.004 | inches |
| | 4.00 ± 0.10 | 4.00 ± 0.05 | 2.00 ± 0.05 | 1.50 + 0.10/-0 | 0.85 ± 0.10 | mm |
| 1206 | 0.157 ± 0.004 | 0.157 ± 0.002 | 0.079 ± 0.002 | 0.059 + 0.004/-0 | 0.033 ± 0.004 | inches |
| | 4.00 ± 0.10 | 4.00 ± 0.05 | 2.00 ± 0.05 | 1.50 + 0.10/-0 | 0.85 ± 0.10 | mm |
| 1210 | 0.157 ± 0.004 | 0.157 ± 0.002 | 0.079 ± 0.002 | 0.059 + 0.004/-0 | 0.033 ± 0.004 | inches |
| | 4.00 ± 0.10 | 4.00 ± 0.05 | 2.00 ± 0.05 | 1.50 + 0.10/-0 | 0.85 ± 0.10 | mm |

Packaging Specifications – Plastic Tape



| Size | A | B | W | E | F | Unit |
|------|---------------|---------------|---------------|------------------|---------------|--------|
| 2010 | 0.110 ± 0.004 | 0.217 ± 0.004 | 0.472 ± 0.012 | 0.069 ± 0.004 | 0.217 ± 0.002 | inches |
| | 2.80 ± 0.10 | 5.50 ± 0.10 | 12.00 ± 0.30 | 1.75 ± 0.10 | 5.50 ± 0.05 | mm |
| 2512 | 0.133 ± 0.004 | 0.263 ± 0.004 | 0.472 ± 0.012 | 0.069 ± 0.004 | 0.217 ± 0.004 | inches |
| | 3.38 ± 0.10 | 6.68 ± 0.10 | 12.00 ± 0.30 | 1.75 ± 0.10 | 5.50 ± 0.10 | mm |
| 1225 | 0.133 ± 0.004 | 0.263 ± 0.004 | 0.472 ± 0.012 | 0.069 ± 0.004 | 0.217 ± 0.004 | inches |
| | 3.38 ± 0.10 | 6.68 ± 0.10 | 12.00 ± 0.30 | 1.75 ± 0.10 | 5.50 ± 0.10 | mm |
| Size | P0 | P1 | P2 | D0 | T | Unit |
| 2010 | 0.157 ± 0.002 | 0.157 ± 0.004 | 0.079 ± 0.002 | 0.059 + 0.004/-0 | 0.039 ± 0.008 | inches |
| | 4.00 ± 0.05 | 4.00 ± 0.10 | 2.00 ± 0.05 | 1.50 + 0.10, -0 | 1.00 ± 0.20 | mm |
| 2512 | 0.157 ± 0.004 | 0.157 ± 0.004 | 0.079 ± 0.002 | 0.061 + 0.002/-0 | 0.057 ± 0.008 | inches |
| | 4.00 ± 0.10 | 4.00 ± 0.10 | 2.00 ± 0.05 | 1.55 + 0.05, -0 | 1.45 ± 0.20 | mm |
| 1225 | 0.157 ± 0.004 | 0.157 ± 0.004 | 0.079 ± 0.002 | 0.061 + 0.002/-0 | 0.057 ± 0.008 | inches |
| | 4.00 ± 0.10 | 4.00 ± 0.10 | 2.00 ± 0.05 | 1.55 + 0.05, -0 | 1.45 ± 0.20 | mm |

Marking Instructions

0201 and 0402 sizes are not marked.

0603 size has three-character marking with examples shown in the table below.

- 1% and 5% marking is the same
- E96 values are only available in 1% tolerance
- If the value has two significant digits, the marking is “R” plus the two significant digits (e.g. R10 = 100 mΩ)
- If the value has three significant digits, the marking is the three significant digits underlined (e.g. 047 = 47 mΩ)

0805 and larger sizes have four-character marking for both 1% and 5% tolerances.

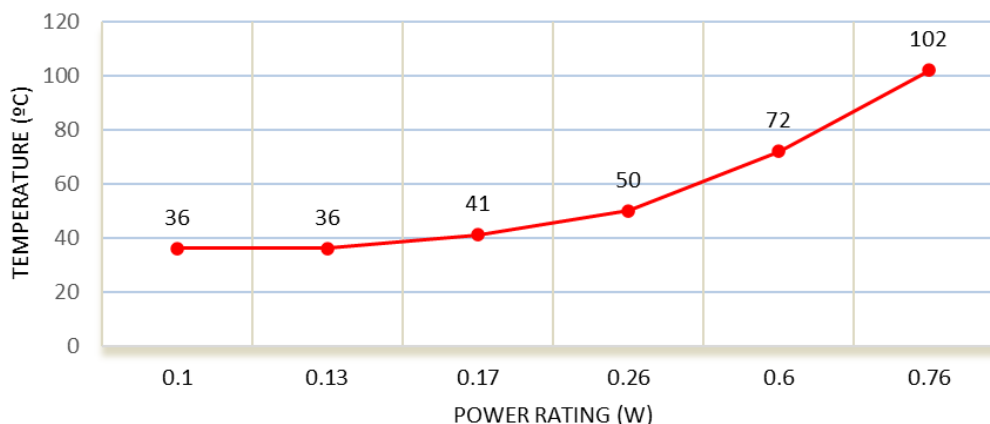
| Size | Ohmic Value | | | | | |
|--------------------|-------------|-------|------------|--------|------------|--------|
| | 5 mΩ | 20 mΩ | 25 mΩ | 100 mΩ | 221 mΩ | 250 mΩ |
| 0201/0402 | No marking | | | | | |
| 0603 1% | NA | R02 | <u>025</u> | R10 | <u>221</u> | R25 |
| 0603 5% | NA | R02 | <u>025</u> | R10 | NA | R25 |
| 0805 and larger 1% | R005 | R020 | R025 | R100 | R221 | R250 |
| 0805 and larger 5% | R005 | R020 | R025 | R100 | NA | R250 |

High Power Chip Resistors and Thermal Management

Stackpole has developed several surface mount resistor series in addition to our current sense resistors, which have had higher power ratings than standard resistor chips. This has caused some uncertainty and even confusion by users as to how to reliably use these resistors at the higher power ratings in their designs.

The data sheets for the RHC, RMCP, RNCP, CSR, CSRN, CSRF, CSS, and CSSH state that the rated power assumes an ambient temperature of no more than 100°C for the CSS / CSSH series and 70°C for all other high power resistor series. In addition, IPC and UL best practices dictate that the combined temperature on any resistor due to power dissipated and ambient air shall be no more than 105°C. At first glance this wouldn't seem too difficult, however the graph below shows typical heat rise for the CSR1206 100 milliohms at full rated power. The heat rise for the RMCP and RNCP would be similar. The RHC with its unique materials, design, and processes would have less heat rise and therefore would be easier to implement for any given customer.

CSR1206 100mΩ Surface Temperature Rise



CSR / CSRN Series

Thick Film Current Sensing Resistor

Stackpole Electronics, Inc.
Resistive Product Solutions

The 102°C heat rise shown here would indicate there will be additional thermal reduction techniques needed to keep this part under 105°C total hot spot temperature if this part is to be used at 0.75 watts of power. However, this same part at the usual power rating for this size would have a heat rise of around 72°C. This additional heat rise may be dealt with using wider conductor traces, larger solder pads and land patterns under the solder mask, heavier copper in the conductors, via through PCB, air movement, and heat sinks, among many other techniques. Because of the variety of methods customers can use to lower the effective heat rise of the circuit, resistor manufacturers simply specify power ratings with the limitations on ambient air temperature and total hot spot temperatures and leave the details of how to best accomplish this to the design engineers. Design guidelines for products in various market segments can vary widely so it would be unnecessarily constraining for a resistor manufacturer to recommend the use of any of these methods over another.

Note: The final resistance value can be affected by the board layout and assembly process, especially the size of the mounting pads and the amount of solder used. This is especially notable for resistance values $\leq 50 \text{ m}\Omega$. This should be taken into account when designing.

RoHS Compliance

Stackpole Electronics has joined the worldwide effort to reduce the amount of lead in electronic components and to meet the various regulatory requirements now prevalent, such as the European Union's directive regarding "Restrictions on Hazardous Substances" (RoHS 3). As part of this ongoing program, we periodically update this document with the status regarding the availability of our compliant components. All our standard part numbers are compliant to EU Directive 2011/65/EU of the European Parliament as amended by Directive (EU) 2015/863/EU as regards the list of restricted substances.

| RoHS Compliance Status | | | | | | |
|-------------------------|--|----------------------------|--------------------------------|-----------------------------------|--|---------------------------------------|
| Standard Product Series | Description | Package / Termination Type | Standard Series RoHS Compliant | Lead-Free Termination Composition | Lead-Free Mfg. Effective Date (Std Product Series) | Lead-Free Effective Date Code (YY/WW) |
| CSR | Thick Film Current Sensing Surface Mount Chip Resistor | SMD | YES | 100% Matte Sn over Ni | May-04 | 04/18 |
| CSRN | Thick Film Current Sensing Surface Mount Chip Resistor, Narrow | SMD | YES | 100% Matte Sn over Ni | May-04 | 04/18 |

"Conflict Metals" Commitment

We at Stackpole Electronics, Inc. are joined with our industry in opposing the use of metals mined in the "conflict region" of the eastern Democratic Republic of the Congo (DRC) in our products. Recognizing that the supply chain for metals used in the electronics industry is very complex, we work closely with our own suppliers to verify to the extent possible that the materials and products we supply do not contain metals sourced from this conflict region. As such, we are in compliance with the requirements of Dodd-Frank Act regarding Conflict Minerals.

Compliance to "REACH"

We certify that all passive components supplied by Stackpole Electronics, Inc. are SVHC (Substances of Very High Concern) free and compliant with the requirements of EU Directive 1907/2006/EC, "The Registration, Evaluation, Authorization and Restriction of Chemicals", otherwise referred to as REACH. Contact us for complete list of REACH Substance Candidate List.

Environmental Policy

It is the policy of Stackpole Electronics, Inc. (SEI) to protect the environment in all localities in which we operate. We continually strive to improve our effect on the environment. We observe all applicable laws and regulations regarding the protection of our environment and all requests related to the environment to which we have agreed. We are committed to the prevention of all forms of pollution.

CSR / CSRN Series

Thick Film Current Sensing Resistor

Stackpole Electronics, Inc.
Resistive Product Solutions

How to Order

C S R 1 2 0 6 F T 1 0 L 0 - H P

| Product Series | |
|----------------|---------------------|
| Code | Description |
| CSR | Standard |
| CSRN | Narrow Terminations |

| Size | |
|---------|-------|
| Code | W |
| 0201 | 0.05 |
| 0402 | 0.125 |
| 0603 | 0.125 |
| 0603-HP | 0.2 |
| 0805 | 0.25 |
| 0805-HP | 0.5 |
| 1206 | 0.5 |
| 1210 | 0.5 |
| 1210-HP | 0.75 |
| 2010 | 1 |
| 2512 | 2 |
| 1225 | 3 |

| Tolerance | |
|-----------|-----|
| Code | Tol |
| F | 1% |
| G | 2% |
| J | 5% |

| Packaging | | | |
|-----------|-----------------------|--------------------------|----------|
| Code | Description | Size | Quantity |
| T | 7" Reel Paper Tape | 0201, 0402 | 10000 |
| | | 0603, 0805 1206, 1210 | 5000 |
| | | 2010, 2512 | 4000 |
| K | 7" Reel Paper Tape | 1225 | 2000 |
| | | 0402 0603, 0805 | 1000 |
| | | 2010, 2512 1225 | 1000 |

| Resistance Value |
|---|
| Four characters with the multiplier used as the decimal holder. "L" used as multiplier of 10 ⁻³ for any value under 0.1 ohm |
| 0.051 ohm = 51L0 0.35 ohm = R350 1 ohm = 1R00 |

| Special | |
|---------|-------------|
| Code | Description |
| blank | Standard |
| -HP | High Power |

OUR CERTIFICATE

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DiGi is a global authorized distributor of electronic components.