Features:

- High power metal alloy current sense resistor
- High temperature performance up to 225 °C (for operation up to 275 ºC, contact factory)
- Low thermal EMF (< 1 µ V/C)
- Proprietary processing technique produces extremely low resistance values
- Qualified to AEC-Q200
- RoHS compliant, lead-free and halogen-free

Electrical Specifications - CSS

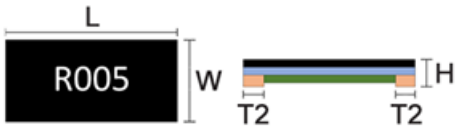
Type / Code	Maximum Power Rating (Watts)	Maximum Rating Current (A)	Maximum Overload Current (A)	TCR (ppm/°C)	Ohmic Range (Ω) and Tolerance		
					0.5%	1%	5%
CSS0201	0.2	4.47	7.07	± 200 ppm/ºC	-	0.01, 0.02	-
CSS0402	0.33	11.48	18.16	± 150 ppm/ºC	-	0.0025	-
		8.12	12.84	± 100 ppm/ºC	-	0.005, 0.006, 0.008, 0.01, 0.015, 0.02	-
CSS0603	0.33	12.84	20.31	± 150 ppm/ºC	-	0.002	-
		11.49	18.16	± 100 ppm/ºC	-	0.0025, 0.003, 0.004, 0.005	-
		7.41	11.72	± 75 ppm/ºC	-	0.01, 0.015, 0.02	-
CSS0508	1	31.63	50	± 150 ppm/ºC	-	0.001, 0.0015	-
				± 100 ppm/ºC		0.002, 0.0025, 0.003, 0.004, 0.005	
CSS0805	0.5	22.36	35.35	± 150 ppm/ºC	-	0.001	-
		18.25	28.86	± 100 ppm/ºC	-	0.0015	-
		15.81	25	± 75 ppm/ºC	-	0.002, 0.003, 0.004, 0.005	-
		9.12	14.43	± 50 ppm/ºC	-	0.006, 0.007, 0.01, 0.015, 0.02	-
CSS1206	1	31.62	63.25	±50 ppm/ºC	-	0.001 - 0.004	
				±25 ppm/ºC	0.007 - 0.015	0.005 - 0.015	
				±15 ppm/ºC	0.016 - 0.05	0.016 - 0.05	
CSS2010	1	31.62	63.25	±50 ppm/ºC	-	0.001 - 0.003	
				±25 ppm/ºC	-	0.004 - 0.006	
				±15 ppm/ºC	0.007 - 0.1	0.007 - 0.1	
CSS2512	2	63.25	141.42	±50 ppm/ºC	-	0.0005 - 0.003	
				±25 ppm/ºC	-	0.004 - 0.006	
				±15 ppm/ºC	0.007 - 0.075	0.007 - 0.075	
CSS2725	4	126.49	316.23	±100 ppm/ºC	-	0.0002	
				±50 ppm/ºC	-	0.00025 - 0.003	
CSS2728	3	27.39	61.24	±25 ppm/ºC	0.004 -0.007	0.004 - 0.007	
				±15 ppm/ºC	0.008 - 0.19	0.008 - 0.1	
CSS4527	5	100	173	±50 ppm/ºC	0.007 - 0.12	0.0005 - 0.12	

Electrical Specifications – CSSH (High Power)

Type / Code	Maximum Power Rating (Watts)	Maximum Rating Current (A)	Maximum Overload Current (A)	TCR (ppm°C)	Ohmic Range (Ω) and Tolerance	
					0.5%	1%, 2%, 5%
CSSH0805	1	31.62	63.24	± 100 ppm/ºC	-	0.001, 0.0015, 0.002
CSSH2512	3	100	223.61	±150 ppm/ºC	-	0.0003
				±50 ppm/ºC	-	0.0005 - 0.0025
				±25 ppm/ºC	0.007 - 0.01	0.003 - 0.01
				±50 ppm/ºC	0.0101 - 0.05	0.0101 - 0.08
CSSH2728	4	31.62	70.71	±25 ppm/ºC	0.004 - 0.007	0.004 - 0.007
				±15 ppm/ºC	0.008 - 0.019	0.008 - 0.05

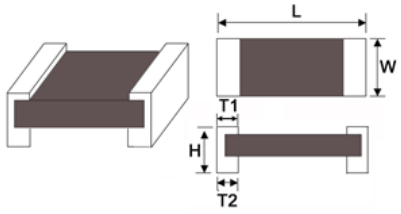
Please refer to the High Power Resistor Application Note (page 8) for more information on designing and implementing high power resistor types.

Mechanical Specifications (0201 – 0805)



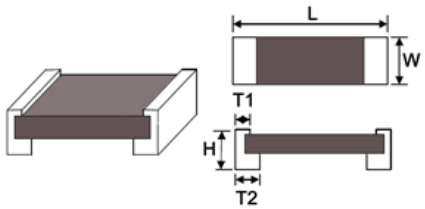
Type / Code	Maximum Power Rating (Watts)	Resistance Range (Ω)	L	W	H	T2 Bottom	Unit
CSS0201	0.2	0.01, 0.02	0.024 ± 0.006 0.60 ± 0.15	0.012 ± 0.006 0.30 ± 0.15	0.010 ± 0.004 0.25 ± 0.10	0.006 ± 0.004 0.15 ± 0.10	inches mm
CSS0402	0.33	0.0025	0.039 ± 0.006 1.00 ± 0.15	0.022 ± 0.006 0.55 ± 0.15	0.012 ± 0.004 0.30 ± 0.10	0.012 ± 0.004 0.30 ± 0.10	inches mm
		0.005 - 0.02	0.039 ± 0.006 1.00 ± 0.15	0.022 ± 0.006 0.55 ± 0.15	0.012 ± 0.004 0.30 ± 0.10	0.009 ± 0.004 0.23 ± 0.10	inches mm
CSS0603	0.33	0.002	0.063 ± 0.010 1.60 ± 0.25	0.031 ± 0.010 0.80 ± 0.25	0.016 ± 0.010 0.40 ± 0.25	0.018 ± 0.008 0.45 ± 0.20	inches mm
		0.0025, 0.003	0.063 ± 0.010 1.60 ± 0.25	0.031 ± 0.010 0.80 ± 0.25	0.016 ± 0.010 0.40 ± 0.25	0.014 ± 0.008 0.35 ± 0.20	inches mm
		0.004 - 0.02	0.063 ± 0.010 1.60 ± 0.25	0.031 ± 0.010 0.80 ± 0.25	0.016 ± 0.010 0.40 ± 0.25	0.012 ± 0.008 0.30 ± 0.20	inches mm
CSS0508	1	0.001	0.049 ± 0.010 1.25 ± 0.25	0.079 ± 0.010 2.00 ± 0.25	0.017 ± 0.006 0.42 ± 0.15	0.015 ± 0.010 0.38 ± 0.25	inches mm
		0.0015	0.049 ± 0.010 1.25 ± 0.25	0.079 ± 0.010 2.00 ± 0.25	0.017 ± 0.006 0.42 ± 0.15	0.015 ± 0.010 0.37 ± 0.25	inches mm
		0.002	0.049 ± 0.010 1.25 ± 0.25	0.079 ± 0.010 2.00 ± 0.25	0.017 ± 0.006 0.42 ± 0.15	0.014 ± 0.010 0.36 ± 0.25	inches mm
		0.003 - 0.005	0.049 ± 0.010 1.25 ± 0.25	0.079 ± 0.010 2.00 ± 0.25	0.017 ± 0.006 0.42 ± 0.15	0.013 ± 0.010 0.32 ± 0.25	inches mm
CSS0805	0.5	0.001, 0.0015	0.079 ± 0.010 2.00 ± 0.25	0.049 ± 0.010 1.25 ± 0.25	0.016 ± 0.010 0.40 ± 0.25	0.028 ± 0.008 0.70 ± 0.20	inches mm
		0.002	0.079 ± 0.010 2.00 ± 0.25	0.049 ± 0.010 1.25 ± 0.25	0.016 ± 0.010 0.40 ± 0.25	0.024 ± 0.008 0.60 ± 0.20	inches mm
		0.003 - 0.02	0.079 ± 0.010 2.00 ± 0.25	0.049 ± 0.010 1.25 ± 0.25	0.016 ± 0.010 0.40 ± 0.25	0.016 ± 0.008 0.40 ± 0.20	inches mm
CSSH0805	1	0.001	0.083 ± 0.010 2.10 ± 0.25	0.059 ± 0.010 1.50 ± 0.25	0.020 ± 0.010 0.50 ± 0.25	0.020 ± 0.010 0.50 ± 0.25	inches mm
		0.0015	0.083 ± 0.010 2.10 ± 0.25	0.059 ± 0.010 1.50 ± 0.25	0.017 ± 0.010 0.42 ± 0.25	0.020 ± 0.010 0.50 ± 0.25	inches mm
		0.002	0.083 ± 0.010 2.10 ± 0.25	0.059 ± 0.010 1.50 ± 0.25	0.014 ± 0.010 0.35 ± 0.25	0.020 ± 0.010 0.50 ± 0.25	inches mm

Mechanical Specifications (1206 – 2728)



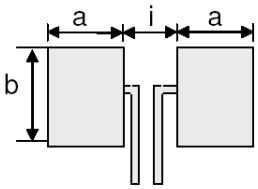
Type / Code	Maximum Power Rating (Watts)	Resistance Range (Ω)	L	W	H	T1 Top Termination	T2 Bottom Termination	Unit
CSS1206	1	0.001	0.126 ± 0.010 3.20 ± 0.25	0.063 ± 0.010 1.60 ± 0.25	0.025 ± 0.010 0.65 ± 0.25	0.020 ± 0.010 0.51 ± 0.25	0.020 ± 0.010 0.51 ± 0.25	inches mm
		0.002 - 0.004	0.126 ± 0.010 3.20 ± 0.25	0.063 ± 0.010 1.60 ± 0.25	0.022 ± 0.010 0.55 ± 0.25	0.020 ± 0.010 0.51 ± 0.25	0.020 ± 0.010 0.51 ± 0.25	inches mm
		0.005	0.126 ± 0.010 3.20 ± 0.25	0.063 ± 0.010 1.60 ± 0.25	0.022 ± 0.010 0.55 ± 0.25	0.024 ± 0.010 0.60 ± 0.25	0.024 ± 0.010 0.60 ± 0.25	inches mm
CSS1206	1	0.006 - 0.05	0.126 ± 0.010 3.20 ± 0.25	0.063 ± 0.010 1.60 ± 0.25	0.022 ± 0.010 0.55 ± 0.25	0.020 ± 0.010 0.51 ± 0.25	0.020 ± 0.010 0.51 ± 0.25	inches mm
CSS2010	1	0.001 - 0.003	0.200 ± 0.010 5.08 ± 0.25	0.100 ± 0.010 2.54 ± 0.25	0.031 ± 0.010 0.79 ± 0.25	0.051 ± 0.010 1.30 ± 0.25	0.051 ± 0.010 1.30 ± 0.25	inches mm
		0.0031 - 0.1	0.200 ± 0.010 5.08 ± 0.25	0.100 ± 0.010 2.54 ± 0.25	0.025 ± 0.010 0.65 ± 0.25	0.031 ± 0.010 0.79 ± 0.25	0.031 ± 0.010 0.79 ± 0.25	inches mm
CSS2512	2	0.0005 - 0.004	0.246 ± 0.010 6.25 ± 0.25	0.126 ± 0.010 3.20 ± 0.25	0.031 ± 0.010 0.79 ± 0.25	0.074 ± 0.010 1.88 ± 0.25	0.074 ± 0.010 1.88 ± 0.25	inches mm
		0.0041 - 0.075	0.246 ± 0.010 6.25 ± 0.25	0.126 ± 0.010 3.20 ± 0.25	0.025 ± 0.010 0.65 ± 0.25	0.044 ± 0.010 1.12 ± 0.25	0.044 ± 0.010 1.12 ± 0.25	inches mm
CSSH2512	3	0.0005	0.246 ± 0.010 6.25 ± 0.25	0.126 ± 0.010 3.20 ± 0.25	0.031 ± 0.010 0.79 ± 0.25	0.074 ± 0.010 1.88 ± 0.25	0.074 ± 0.010 1.88 ± 0.25	inches mm
		0.0006 - 0.0029	0.246 ± 0.010 6.25 ± 0.25	0.126 ± 0.010 3.20 ± 0.25	0.031 ± 0.010 0.79 ± 0.25	0.044 ± 0.010 1.12 ± 0.25	0.044 ± 0.010 1.12 ± 0.25	inches mm
		0.003	0.246 ± 0.010 6.25 ± 0.25	0.126 ± 0.010 3.20 ± 0.25	0.031 ± 0.010 0.79 ± 0.25	0.074 ± 0.010 1.88 ± 0.25	0.074 ± 0.010 1.88 ± 0.25	inches mm
		0.0031 - 0.004	0.246 ± 0.010 6.25 ± 0.25	0.126 ± 0.010 3.20 ± 0.25	0.031 ± 0.010 0.79 ± 0.25	0.066 ± 0.010 1.68 ± 0.25	0.066 ± 0.010 1.68 ± 0.25	inches mm
		0.0041 - 0.01	0.246 ± 0.010 6.25 ± 0.25	0.126 ± 0.010 3.20 ± 0.25	0.026 ± 0.010 0.65 ± 0.25	0.044 ± 0.010 1.12 ± 0.25	0.044 ± 0.010 1.12 ± 0.25	inches mm
CSS2725	4	0.00025, 0.0005	0.268 ± 0.010 6.81 ± 0.25	0.254 ± 0.010 6.45 ± 0.25	0.039 ± 0.010 0.99 ± 0.25	0.085 ± 0.010 2.16 ± 0.25	0.085 ± 0.010 2.16 ± 0.25	inches mm
		0.001	0.268 ± 0.010 6.81 ± 0.25	0.254 ± 0.010 6.45 ± 0.25	0.043 ± 0.010 1.09 ± 0.25	0.085 ± 0.010 2.16 ± 0.25	0.085 ± 0.010 2.16 ± 0.25	inches mm
		0.0015	0.268 ± 0.010 6.81 ± 0.25	0.254 ± 0.010 6.45 ± 0.25	0.039 ± 0.010 0.99 ± 0.25	0.085 ± 0.010 2.16 ± 0.25	0.085 ± 0.010 2.16 ± 0.25	inches mm
		0.002	0.268 ± 0.010 6.81 ± 0.25	0.254 ± 0.010 6.45 ± 0.25	0.035 ± 0.010 0.89 ± 0.25	0.071 ± 0.010 1.80 ± 0.25	0.071 ± 0.010 1.80 ± 0.25	inches mm
		0.0025	0.268 ± 0.010 6.81 ± 0.25	0.254 ± 0.010 6.45 ± 0.25	0.035 ± 0.010 0.89 ± 0.25	0.065 ± 0.010 1.65 ± 0.25	0.065 ± 0.010 1.65 ± 0.25	inches mm
		0.003	0.268 ± 0.010 6.81 ± 0.25	0.254 ± 0.010 6.45 ± 0.25	0.035 ± 0.010 0.89 ± 0.25	0.051 ± 0.010 1.30 ± 0.25	0.051 ± 0.010 1.30 ± 0.25	inches mm
CSS2728	3	0.004 - 0.1	0.264 ± 0.010 6.71 ± 0.25	0.283 ± 0.010 7.19 ± 0.25	0.039 ± 0.010 0.99 ± 0.25	0.045 ± 0.010 1.14 ± 0.25	0.045 ± 0.010 1.14 ± 0.25	inches mm
CSSH2728	4	0.004 - 0.1	0.264 ± 0.010 6.71 ± 0.25	0.283 ± 0.010 7.19 ± 0.25	0.039 ± 0.010 0.99 ± 0.25	0.045 ± 0.010 1.14 ± 0.25	0.045 ± 0.010 1.14 ± 0.25	inches mm

Mechanical Specifications (4527)



Type / Code	Maximum Power Rating (Watts)	Resistance Range (Ω)	L	W	H	T1 Top Termination	T2 Bottom Termination	Unit
CSS4527	5	0.0005 - 0.005	0.450 ± 0.010 11.43 ± 0.25	0.270 ± 0.010 6.85 ± 0.25	0.059 ± 0.010 1.50 ± 0.25	0.038 ± 0.010 0.97 ± 0.25	0.127 ± 0.010 3.22 ± 0.25	inches mm
		0.0051 - 0.1	0.450 ± 0.010 11.43 ± 0.25	0.270 ± 0.010 6.85 ± 0.25	0.059 ± 0.010 1.50 ± 0.25	0.038 ± 0.010 0.97 ± 0.25	0.071 ± 0.010 1.82 ± 0.25	inches mm

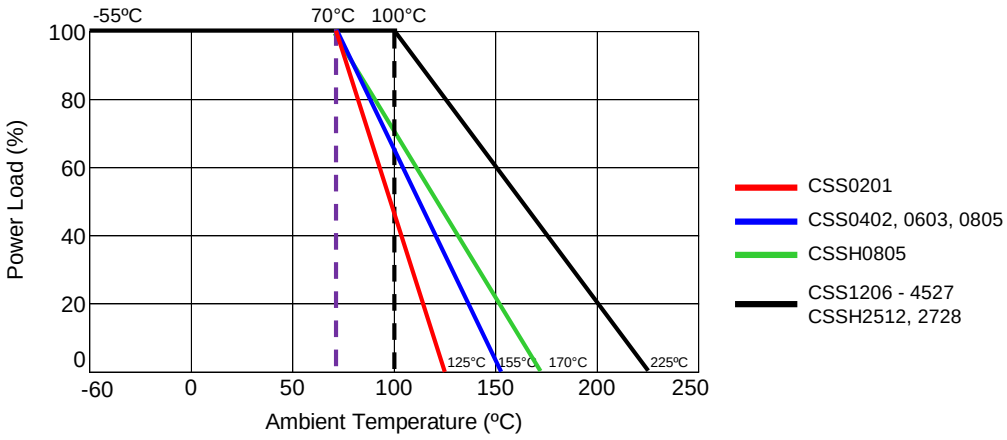
Recommended Pad Layouts



Type / Code	Maximum Power Rating (Watts)	Resistance Range (Ω)	a	b	i	Unit
CSS0201	0.2	0.01, 0.02	0.008 0.20	0.013 0.33	0.010 0.25	inches mm
CSS0402	0.33	0.0025	0.024 0.60	0.024 0.60	0.014 0.35	inches mm
		0.005 - 0.02	0.024 0.60	0.024 0.60	0.016 0.40	inches mm
CSS0603	0.33	0.002	0.056 1.41	0.036 0.92	0.015 0.38	inches mm
		0.0025, 0.003	0.053 1.35	0.036 0.92	0.020 0.50	inches mm
		0.004 - 0.02	0.051 1.30	0.036 0.92	0.024 0.60	inches mm
CSS0508	1	0.001	0.035 0.90	0.091 2.30	0.016 0.40	inches mm
		0.0015	0.035 0.90	0.091 2.30	0.016 0.40	inches mm
		0.002	0.035 0.90	0.091 2.30	0.016 0.40	inches mm
		0.003 - 0.005	0.033 0.85	0.091 2.30	0.020 0.50	inches mm
CSS0805	0.5	0.001	0.063 1.60	0.057 1.44	0.016 0.40	inches mm
		0.0015, 0.002	0.061 1.55	0.057 1.44	0.020 0.50	inches mm
		0.003 - 0.02	0.055 1.40	0.057 1.44	0.031 0.80	inches mm
CSSH0805	1	0.001, 0.0015, 0.002	0.039 1.00	0.071 1.80	0.039 1.00	inches mm
CSS1206	1	0.001 - 0.05	0.063 1.60	0.086 2.18	0.039 1.00	inches mm

Recommended Pad Layouts (cont.)						
Type / Code	Maximum Power Rating (Watts)	Resistance Range (Ω)	a	b	i	Unit
CSS2010	1	0.001 - 0.003	0.114 2.89	0.115 2.92	0.048 1.22	inches mm
		0.0031 - 0.1	0.090 2.29	0.115 2.92	0.095 2.41	inches mm
CSS2512	2	0.0005 - 0.004	0.120 3.05	0.145 3.68	0.050 1.27	inches mm
		0.0041 - 0.075	0.083 2.11	0.145 3.68	0.125 3.18	inches mm
CSSH2512	3	0.0005	0.120 3.05	0.145 3.68	0.050 1.27	inches mm
		0.0006 - 0.0029 0.0041 - 0.01	0.086 2.19	0.145 3.68	0.118 3.00	inches mm
		0.003 - 0.004	0.110 2.79	0.145 3.68	0.071 1.80	inches mm
CSS2725	4	0.00025 - 0.003	0.125 3.18	0.270 6.86	0.052 1.32	inches mm
CSS2728	3	0.004 - 0.1	0.108 2.75	0.308 7.82	0.138 3.51	inches mm
CSSH2728	4	0.004 - 0.1	0.108 2.75	0.308 7.82	0.138 3.51	inches mm
CSS4527	5	0.0005 - 0.005	0.189 4.80	0.344 8.74	0.217 5.51	inches mm
		0.0051 - 0.12	0.134 3.40	0.344 8.74	0.327 8.31	inches mm

Power Derating Curve:

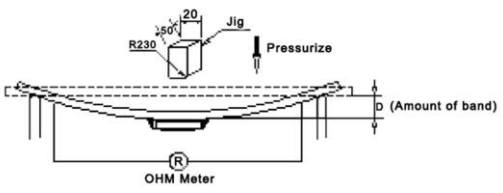


Performance Characteristics

<table>
<tr><th>Test</th><th>Test Method</th><th>Test Specification</th><th>Test Condition</th></tr>
<tr><td>Temperature Coefficient of Resistance (TCR)</td><td>JIS-C-5201-1 4.8</td><td>Per specification (refer to Electrical Specification table)</td><td>TCR (ppm/ºC) $= \frac{(R2-R1)}{R1\ (T2-T1)} \times 10^6$
R1: resistance of room temperature (T1)
R2: resistance of 125 ºC (T2)</td></tr>
<tr><td>Short Time Overload</td><td>JIS C 5201-1 4.13</td><td>
<table>
<tr><th>Size</th><th>Power (W)</th><th>Max. R Change</th></tr>
<tr><td>CSS0201</td><td>0.2</td><td>≤ ± 0.5</td></tr>
<tr><td>CSS0402</td><td>0.33</td><td>± 1% + 0.5 mΩ</td></tr>
<tr><td>CSS0603</td><td>0.33</td><td>± 1% + 0.5 mΩ</td></tr>
<tr><td>CSS0508</td><td>1</td><td>± 1% + 0.5 mΩ</td></tr>
<tr><td>CSS0805</td><td>0.5</td><td>± 1% + 0.5 mΩ</td></tr>
<tr><td>CSSH0805</td><td>1</td><td>≤ ± 1%</td></tr>
<tr><td>CSS1206</td><td>1</td><td>≤ ± 0.5</td></tr>
<tr><td>CSS2010</td><td>1</td><td>≤ ± 0.5</td></tr>
<tr><td>CSS2512</td><td>2</td><td>≤ ± 0.5</td></tr>
<tr><td>CSSH2512</td><td>3</td><td>≤ ± 0.5</td></tr>
<tr><td>CSS2725</td><td>4</td><td>≤ ± 0.5</td></tr>
<tr><td>CSS2728</td><td>3</td><td>≤ ± 0.5</td></tr>
<tr><td>CSSH2728</td><td>4</td><td>≤ ± 0.5</td></tr>
<tr><td>CSS4527</td><td>5</td><td>≤ ± 2%</td></tr>
</table>
</td><td>The number of rated power are as follows:
<table>
<tr><th>Size</th><th>Power (W)</th><th>Rated Power</th></tr>
<tr><td>CSS0201</td><td>0.2</td><td>2.5 times</td></tr>
<tr><td>CSS0402</td><td>0.33</td><td>2.5 times</td></tr>
<tr><td>CSS0603</td><td>0.33</td><td>2.5 times</td></tr>
<tr><td>CSS0508</td><td>1</td><td>2.5 times</td></tr>
<tr><td>CSS0805</td><td>0.5</td><td>2.5 times</td></tr>
<tr><td>CSSH0805</td><td>1</td><td>4 times</td></tr>
<tr><td>CSS1206</td><td>1</td><td>5 times</td></tr>
<tr><td>CSS2010</td><td>1</td><td>5 times</td></tr>
<tr><td>CSS2512</td><td>2</td><td>5 times</td></tr>
<tr><td>CSSH2512</td><td>3</td><td>5 times</td></tr>
<tr><td>CSS2725</td><td>4</td><td>5 times</td></tr>
<tr><td>CSS2728</td><td>3</td><td>5 times</td></tr>
<tr><td>CSSH2728</td><td>4</td><td>5 times</td></tr>
<tr><td>CSS4527</td><td>5</td><td>5 times</td></tr>
</table>
Rating power duration: 5 seconds.</td></tr>
<tr><td>Insulation Resistance</td><td>JIS-C-5201-1 4.6</td><td>≥10^9Ω</td><td>Put the resistor in the fixture, add 100 VDC in terminal for 60 seconds then measure the insulation resistance between electrodes and insulating enclosure or between electrodes and base material</td></tr>
<tr><td>Dielectric Withstanding Voltage</td><td>JIS-C-5201-1 4.7</td><td>No short or burned in the appearance.</td><td>Applied 500 VAC for 1 minute and limit surge current 50 mA (max)</td></tr>
</table>

Operating Temperature Range for size 0201: -55 °C to +12 5°C.
Operating Temperature Range for sizes 0402, 0603 and 0805: -55 °C to +155 °C.
Operating Temperature Range for size CSSH0805: -55 °C to +170 °C.
Operating Temperature Range for sizes 1206 - 4527, CSSH 2512 and CSSH 2728: -55 °C to +225 °C.

Mechanical Performance

Test Item	Test Method	Test Specifications	Test Condition
Resistance to Solder Heat	JIS C 5201-1 4.18	0201 - 0805 = ± 1% +0.5m Ω CSSH0805 and ≥ 1206 = ±0.5% Jumper = < Rmax	260 ± 5 °C for 10 ± 1 seconds
Solderability	JIS C 5201-1 4.17	> 95 % coverage	245 ± 5 °C for 3 ± 0.5 seconds
Substrate Bending	JIS C 5201-1 4.33	± 1% + 0.5m Ω	Span between fulcrums: 90 mm Bend width: 2mm 

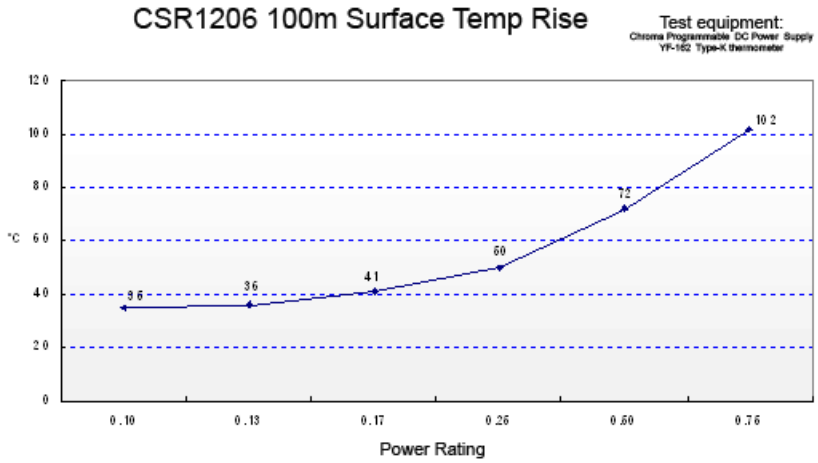
Mechanical Performance (cont.)			
Test Item	Test Method	Test Specifications	Test Condition
Resistance to Solvent	JIS C 5201-1 4.29	≤ ±0.5% No evidence of mechanical damage	The tested resistor is immersed into isopropyl alcohol of 20~25 °C for 60 seconds, then the resistor is left in the room for 48 hours.
Vibration	JIS C 5201-1 4.22	≤ ±0.5% No evidence of mechanical damage	The resistor shall be mounted by its terminal leads to the supporting terminals on the solid table. The entire frequency range from 10 Hz to 55 Hz and return to 10 Hz, shall be transferred in 1 minute. Amplitude: 1.5mm This motion shall be applied for a period of 4 hours in each 3 mutually perpendicular directions (a total of 12 hours)
Mechanical Shock	JIS C 5202 6.7	± 1% + 0.5 mΩ	a = 50 G, t = 11 ms, 5 times shock

Environmental Performance			
Test Item	Test Method	Test Specifications	Test Condition
Low Temperature Exposure (Storage)	JIS C 5201-1 4.23.4	0201 - 0805 = ± 1% + 0.5 mΩ ≥ 1206 = ± 0.5%	1000 hours at -55 °C ± 2 °C
High Temperature Exposure (Storage)	JIS C 5201-1 4.23.2	0201 - 0805 = ± 1% + 0.5 mΩ	1000 hours at + 155 °C ± 2 °C
		CSSH0805 = ± 1% ≥ 1206 = ± 1%	1000 hours at +170 °C ± 5 °C
		0201 Jumper: < Rmax	1000 hours at + 125 °C ± 2 °C
Temperature Cycling	JIS C 5201-1 4.19	0201 - 0805 = ± 1% + 0.5 mΩ	0201 = -55 °C to +125 °C, 100 cycles 0402 - 0805 = -55 °C +155 °C, 100 cycles
		CSSH0805 = ± 0.5%	-55 °C to +150 °C, 100 cycles
		≥ 1206 = ± 0.5%	Lowest temperature: -55 +0/-10 °C Highest temperature: 150 + 10/-0 °C
Bias Humidity	JIS C 5201-1 4.24	0201 - 0805 = ± 2% + 0.5 mΩ 0201 Jumper = < Rmax	T=40 ± 2 °C , RH = 90~95%, Load with Rated Current 1.5 hours "ON", 0.5 hours "OFF", 1000 hours
		CSSH0805 = ± 0.5% ≥ 1206 = ± 0.5%	1000 hours at +85 °C / 85% R.H., 10% Bias, 1.5 hours "ON" and 0.5 hours "OFF
Whisker Test	JESD Standard No.22A121 class 2	Max 50 μm	Test item (Thermal Shock Test): Testing Condition: Minimum Storage Temperature -55 +0/-10 °C; Maximum Storage Temperature 85 + 10/-0 °C; Temperature-Retaining Time 10 minutes; Number of Temperature Cycles 1,500 Inspection: Inspect for whisker formation on specimens that underwent the acceleration test, with a magnifier (stereo microscope) of about 40 or higher magnification. If judgement is difficult with this method, use a scanning electron microscope (SEM) of about 1,000 or higher magnification.
Load Life	JIS C 5201-1 4.25	0201 - 0805 = ± 2% + 0.5 mΩ 0201 Jumper = Rmax CSSH0805 = ± 1% 1206 - 2728 = ± 1% 4527 = ± 2%	T=70 ± 2 °C, load with Rated Current 1.5 hours "ON", 0.5 hours "OFF", 1000 hours

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 CSR ½ 100 milliohm 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.



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 ≤ 50 mΩ. 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)
CSS	Ultra Precision Current Sensing Chip Resistor	SMD	YES	100% Matte Sn over Ni	Always	Always
CSSH	Ultra Precision Current Sensing Chip Resistor (High Power)	SMD	YES	100% Matte Sn over Ni	Always	Always

"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.

How to Order

1	2	3	4	5	6	7	8	9	10	11	12	13
C	S	S	2	7	2	5	F	T	3	L	0	0

Product Series	
Code	Description
CSS	Metal Alloy
CSSH	High Power

Size	
Size	Power
0201	0.2 W
0402	0.33 W
0603	0.33 W
0508	1 W
0805	0.5 W
(H)0805	1 W
1206	1 W
2010	1 W
2512	2 W
(H)2512	3 W
2725	4 W
2728	3 W
(H)2728	4 W
4527	5 W

Tolerance	
Code	Tol
D	0.5%
F	1%
G	2%
J	5%

Packaging			
Code	Description	Size	Quantity
T	7" Reel - Plastic Tape	0201, 0402	10,000
		0603, 0508	5,000
		0805, (H)0805	
		1206	4,000
		2010, 2512 (H)2512	2,000
		2725, 2728 (H)2728	1,000
		4527	500

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.
0.00025 ohm = L250 0.004 ohm = 4L00 0.05 ohm = 50L0 0.12 ohm = R120