

# CSS2728FT50L0 Datasheet

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DiGi Electronics Part Number	CSS2728FT50L0-DG
Manufacturer	<a href="#">Stackpole Electronics Inc</a>
Manufacturer Product Number	CSS2728FT50L0
Description	RES 0.05 OHM 1% 3W 2728
Detailed Description	50 mOhms $\pm$ 1% 3W Chip Resistor Wide 2827 (7067 Metric), 2728 Automotive AEC-Q200, Current Sense Metal Element

This model CSS2728FT50L0 is available at DiGi Electronics.

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## Purchase and inquiry

Manufacturer Product Number:

CSS2728FT50L0

Series:

CSS

Resistance:

50 MOhms

Power (Watts):

3W

Features:

Automotive AEC-Q200, Current Sense

Operating Temperature:

-55°C ~ 225°C

Supplier Device Package:

2728

Size / Dimension:

0.264" L x 0.283" W (6.71mm x 7.19mm)

Number of Terminations:

2

Manufacturer:

Stackpole Electronics Inc

Product Status:

Active

Tolerance:

±1%

Composition:

Metal Element

Temperature Coefficient:

±15ppm/°C

Package / Case:

Wide 2827 (7067 Metric), 2728

Ratings:

AEC-Q200

Height - Seated (Max):

0.049" (1.24mm)

Failure Rate:

-

## Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Unaffected

HTSUS:

8533.21.0030

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

EAR99

**CSS / CSSH Series**

Ultra-Precision Metal Alloy Current Sensing Chip Resistor

Stackpole Electronics, Inc.

Resistive Product Solutions

**Features:**

- High temperature performance up to 225°C (for operation up to 275°C, contact Stackpole)
- Low thermal EMF (< 1 $\mu$  V/C) typically
- RoHS compliant, REACH compliant, lead free, and halogen free
- AEC-Q200 compliant



Electrical Specifications					
Type/Code	Maximum Power Rating (W)	TCR (ppm/°C)	Ohmic Range ( $\Omega$ ) and Tolerance		
			0.5%	1%	5%
CSS0201	0.2	$\pm 200$	-	0.01, 0.02	-
CSS0402	0.33	$\pm 150$	-	0.0025	-
		$\pm 100$	-	0.005, 0.006, 0.008, 0.01, 0.015, 0.02	-
CSS0603	0.33	$\pm 150$	-	0.002	-
		$\pm 100$	-	0.0025, 0.003, 0.004, 0.005	-
		$\pm 75$	-	0.01, 0.015, 0.02	-
CSS0508	1	$\pm 150$	-	0.001, 0.0015	-
		$\pm 100$	-	0.002, 0.003, 0.004, 0.005	-
CSS0805	0.5	$\pm 100$	-	0.0015	-
		$\pm 75$	-	0.002, 0.003, 0.004, 0.005	-
		$\pm 50$	-	0.006, 0.007, 0.01, 0.015, 0.02	-
CSSH0805	1	$\pm 100$	-	0.0005	-
		$\pm 75$	-	0.001 - 0.002	-
		$\pm 50$	0.007 - 0.013	0.0025 - 0.013	-
CSS1206	1	$\pm 175$	-	0.0005 - 0.0006	-
		$\pm 75$	0.005 - 0.006	-	-
		$\pm 50$	-	0.001 - 0.004	-
		$\pm 25$	0.007 - 0.015	0.005 - 0.015	-
		$\pm 15$	0.016 - 0.05	0.016 - 0.05	-
CSSH1206	2	$\pm 75$	0.005	0.001 - 0.005	-
CSS2010	1	$\pm 100$	-	0.0005 - 0.0009	-
		$\pm 50$	-	0.001 - 0.003	-
		$\pm 25$	0.007 - 0.015	0.004 - 0.006	-
		$\pm 15$	0.016 - 0.049	0.007 - 0.1	-
CSSH2010	2	$\pm 100$	-	0.0005 - 0.0009	-
		$\pm 75$	-	0.001 - 0.0019	-
		$\pm 50$	-	0.002 - 0.0069	-
		$\pm 25$	0.007 - 0.012	0.007 - 0.012	-
CSS2512	2	$\pm 150$	-	0.0003	-
		$\pm 75$	0.001	-	-
		$\pm 50$	0.0011 - 0.003	0.0005 - 0.003	-
		$\pm 25$	0.0031 - 0.0069	0.004 - 0.006	-
		$\pm 15$	0.007 - 0.05	0.08 - 0.5	-
CSSH2512	3	$\pm 150$	-	0.0003	-
		$\pm 75$	0.001	-	-
		$\pm 50$	0.0011 - 0.0025	0.0005 - 0.0025	-
			0.011 - 0.05	0.011 - 0.1	-
		$\pm 25$	0.003 - 0.01	0.003 - 0.01	-

**CSS / CSSH Series**  
Ultra-Precision Metal Alloy Current Sensing Chip Resistor

**Stackpole Electronics, Inc.**  
Resistive Product Solutions

Electrical Specifications (cont.)					
Type/Code	Maximum Power Rating (W)	TCR (ppm/°C)	Ohmic Range (Ω) and Tolerance		
			0.5%	1%	5%
CSS2725	4	± 100	-	0.0002	
		± 50	-	0.00025 - 0.003	
CSS2728	3	± 25	0.004 - 0.007	0.004 - 0.007 0.101 - 0.2	
		± 15	0.008 - 0.019	0.008 - 0.1	
CSSH2728	4	± 25	0.004 - 0.007	0.004 - 0.007	
		± 15	0.008 - 0.019	0.008 - 0.05	
CSSH3637	7	± 50	0.0005, 0.00075	0.0003, 0.0005, 0.00075	
	6	± 50	0.001		
CSS4527	5	± 50	0.007 - 0.12	0.0005 - 0.2	

$V = \sqrt{P \cdot R}$

**Mechanical Specifications**



Type/Code	Maximum Power Rating (W)	Resistance Range (Ω)	L	W	H	T1	Unit
CSS0201	0.2	0.01, 0.02	0.024 ± 0.006	0.012 ± 0.006	0.010 ± 0.004	0.006 ± 0.004	inches
			0.60 ± 0.15	0.30 ± 0.15	0.25 ± 0.10	0.15 ± 0.10	mm
CSS0402	0.33	0.0025	0.039 ± 0.006	0.022 ± 0.006	0.012 ± 0.004	0.012 ± 0.004	inches
		0.005 - 0.02	1.00 ± 0.15	0.55 ± 0.15	0.30 ± 0.10	0.30 ± 0.10	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	inches
		0.0025, 0.003				0.014 ± 0.008	mm
		0.004 - 0.02				0.35 ± 0.20	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	0.012 ± 0.008	inches
		0.0015				0.30 ± 0.20	mm
		0.002				0.015 ± 0.010	inches
		0.003 - 0.005				0.37 ± 0.25	mm
CSS0805	0.5	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	0.014 ± 0.010	inches
		0.002				0.36 ± 0.25	mm
		0.003 - 0.02				0.013 ± 0.010	inches
CSS0805	0.5	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	inches
		0.002				0.70 ± 0.20	mm
		0.003 - 0.02				0.024 ± 0.008	inches
CSS0805	0.5	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	0.60 ± 0.20	mm
		0.002				0.016 ± 0.008	inches
CSS0805	0.5	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	0.40 ± 0.20	mm
		0.002				0.016 ± 0.008	inches

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Mechanical Specifications (cont.)							
Type/Code	Maximum Power Rating (W)	Resistance Range (Ω)	L	W	H	T1	Unit
CSSH0805	1	0.0005	0.081 ± 0.010 2.05 ± 0.25	0.051 ± 0.012 1.30 ± 0.30	0.024 ± 0.008	0.030 ± 0.008	inches
		0.001			0.60 ± 0.20	0.75 ± 0.20	mm
					0.022 ± 0.008	0.016 ± 0.008 0.40 ± 0.20	inches
		0.0015			0.55 ± 0.20		mm
					0.002	0.018 ± 0.008	0.014 ± 0.008 0.35 ± 0.20
		0.45 ± 0.20				mm	
		0.0025			0.014 ± 0.008	0.018 ± 0.008 0.35 ± 0.20	inches
0.45 ± 0.20	mm						
0.003 - 0.008	0.009 - 0.013	0.014 ± 0.008	0.015 ± 0.008 0.37 ± 0.20	inches			
		0.35 ± 0.20		mm			
CSS1206	1	0.0005 - 0.0006	0.126 ± 0.010 3.20 ± 0.25	0.063 ± 0.010 1.60 ± 0.25	0.045 ± 0.010	0.029 ± 0.010	inches
		0.001 - 0.0015			1.15 ± 0.25	0.73 ± 0.25	mm
					0.025 ± 0.010	0.020 ± 0.010	inches
		0.002 - 0.004			0.65 ± 0.25	0.51 ± 0.25	mm
					0.005	0.022 ± 0.010	0.020 ± 0.010
0.006 - 0.05	0.006 - 0.05	0.55 ± 0.25	0.51 ± 0.25	mm			
		0.022 ± 0.010	0.024 ± 0.010	inches			
CSSH1206	2	0.001	0.126 ± 0.010 3.20 ± 0.25	0.063 ± 0.010 1.60 ± 0.25	0.025 ± 0.010	0.020 ± 0.010	inches
		0.002 - 0.004			0.65 ± 0.25	0.51 ± 0.25	mm
					0.005	0.021 ± 0.010	0.020 ± 0.010
CSS2010	1	0.0005 - 0.0009	0.200 ± 0.010 5.08 ± 0.25	0.100 ± 0.010 2.54 ± 0.25	0.021 ± 0.010	0.051 ± 0.010	inches
		0.001 - 0.003			0.55 ± 0.25	0.51 ± 0.25	mm
					0.0031 - 0.1	0.021 ± 0.010	0.024 ± 0.010
CSSH2010	2	0.0005 - 0.0009	0.200 ± 0.010 5.08 ± 0.25	0.100 ± 0.010 2.54 ± 0.25	0.55 ± 0.25	0.60 ± 0.25	mm
		0.001 - 0.003			0.031 ± 0.010	0.057 ± 0.010	inches
					0.79 ± 0.25	1.44 ± 0.25	mm
		0.0031 - 0.004			0.031 ± 0.010	0.051 ± 0.010	inches
0.79 ± 0.25	1.30 ± 0.25		mm				
CSS2512	2	0.0003	0.246 ± 0.010 6.25 ± 0.25	0.126 ± 0.010 3.20 ± 0.25	0.025 ± 0.010	0.031 ± 0.010	inches
		0.0005 - 0.0007			0.65 ± 0.25	0.79 ± 0.25	mm
					0.00075	0.031 ± 0.010	0.031 ± 0.010
		0.0008 - 0.004			0.79 ± 0.25	1.37 ± 0.25	mm
					0.0041 - 0.075	0.031 ± 0.010	0.074 ± 0.010
		0.08 - 0.1			0.79 ± 0.25	1.88 ± 0.25	mm
					0.3 - 0.5	0.026 ± 0.010	0.044 ± 0.010
0.65 ± 0.25	1.12 ± 0.25	mm					
0.026 ± 0.010	0.026 ± 0.010	0.025 ± 0.010	inches				
	0.65 ± 0.25	0.62 ± 0.25	mm				
0.028 ± 0.010	0.028 ± 0.010	0.034 ± 0.010	inches				
	0.72 ± 0.25	0.87 ± 0.25	mm				

**CSS / CSSH Series**

Ultra-Precision Metal Alloy Current Sensing Chip Resistor

Stackpole Electronics, Inc.

Resistive Product Solutions

Mechanical Specifications (cont.)								
Type/Code	Maximum Power Rating (W)	Resistance Range ( $\Omega$ )	L	W	H	T1	Unit	
CSSH2512	3	0.0003	0.246 $\pm$ 0.010 6.25 $\pm$ 0.25	0.126 $\pm$ 0.010 3.20 $\pm$ 0.25	0.045 $\pm$ 0.010 1.15 $\pm$ 0.25	0.080 $\pm$ 0.010 2.02 $\pm$ 0.25	inches mm	
		0.0005			0.080 $\pm$ 0.010 2.02 $\pm$ 0.25	inches mm		
		0.0006 - 0.0007			0.074 $\pm$ 0.010 1.88 $\pm$ 0.25	inches mm		
		0.00075			0.054 $\pm$ 0.010 1.37 $\pm$ 0.25	inches mm		
		0.0008 - 0.0029			0.044 $\pm$ 0.010 1.12 $\pm$ 0.25	inches mm		
		0.003 - 0.0035			0.074 $\pm$ 0.010 1.88 $\pm$ 0.25	inches mm		
		0.0036 - 0.004			0.066 $\pm$ 0.010 1.68 $\pm$ 0.25	inches mm		
		0.0041 - 0.01			0.026 $\pm$ 0.010 0.65 $\pm$ 0.25	0.044 $\pm$ 0.010 1.12 $\pm$ 0.25	inches mm	
		0.0101 - 0.079 <sup>(*)</sup>			0.039 $\pm$ 0.010 1.00 $\pm$ 0.25	0.044 $\pm$ 0.010 1.12 $\pm$ 0.25	inches mm	
		0.08 - 0.1 <sup>(*)</sup>			0.039 $\pm$ 0.010 1.00 $\pm$ 0.25	0.034 $\pm$ 0.010 0.87 $\pm$ 0.25	inches mm	
CSS2725	4	0.0002 - 0.0003	0.268 $\pm$ 0.010 6.81 $\pm$ 0.25	0.254 $\pm$ 0.010 6.45 $\pm$ 0.25	0.039 $\pm$ 0.010 0.99 $\pm$ 0.25	0.085 $\pm$ 0.010 2.16 $\pm$ 0.25	inches mm	
		0.00035				0.075 $\pm$ 0.010 1.90 $\pm$ 0.25	inches mm	
		0.0004 - 0.00045				0.051 $\pm$ 0.010 1.30 $\pm$ 0.25	inches mm	
		0.0005				0.085 $\pm$ 0.010 2.16 $\pm$ 0.25	inches mm	
		0.0006				0.071 $\pm$ 0.010 1.80 $\pm$ 0.25	inches mm	
		0.00075				0.059 $\pm$ 0.010 1.50 $\pm$ 0.25	inches mm	
		0.001				0.043 $\pm$ 0.010 1.09 $\pm$ 0.25	0.085 $\pm$ 0.010 2.16 $\pm$ 0.25	inches mm
		0.0015				0.039 $\pm$ 0.010 0.99 $\pm$ 0.25	0.085 $\pm$ 0.010 2.16 $\pm$ 0.25	inches mm
		0.002				0.035 $\pm$ 0.010 0.89 $\pm$ 0.25	0.071 $\pm$ 0.010 1.80 $\pm$ 0.25	inches mm
		0.00225 - 0.0025					0.065 $\pm$ 0.010 1.65 $\pm$ 0.25	inches mm
		0.003					0.051 $\pm$ 0.010 1.30 $\pm$ 0.25	inches mm
CSS2728	3	0.004 - 0.2	0.264 $\pm$ 0.010 6.71 $\pm$ 0.25	0.283 $\pm$ 0.010 7.19 $\pm$ 0.25	0.039 $\pm$ 0.010 0.99 $\pm$ 0.25	0.045 $\pm$ 0.010 1.14 $\pm$ 0.25	inches mm	
CSSH2728	4	0.004 - 0.05	0.264 $\pm$ 0.010 6.71 $\pm$ 0.25	0.283 $\pm$ 0.010 7.19 $\pm$ 0.25	0.039 $\pm$ 0.010 0.99 $\pm$ 0.25	0.045 $\pm$ 0.010 1.14 $\pm$ 0.25	inches mm	
CSSH3637	7	0.0003	0.362 $\pm$ 0.010 9.20 $\pm$ 0.25	0.378 $\pm$ 0.010 9.60 $\pm$ 0.25	0.029 $\pm$ 0.010 0.73 $\pm$ 0.25	0.111 $\pm$ 0.010 2.83 $\pm$ 0.25	inches mm	
		0.0005				0.098 $\pm$ 0.010 2.49 $\pm$ 0.25	inches mm	
		0.00075				0.090 $\pm$ 0.010 2.28 $\pm$ 0.25	inches mm	
	6	0.001				0.090 $\pm$ 0.010 2.28 $\pm$ 0.25	inches mm	

# CSS / CSSH Series

Ultra-Precision Metal Alloy Current Sensing Chip Resistor

Stackpole Electronics, Inc.  
Resistive Product Solutions

Mechanical Specifications (cont.)							
Type/Code	Maximum Power Rating (W)	Resistance Range (Ω)	L	W	H	T1	Unit
CSS4527	5	0.0005	0.450 ± 0.010 11.43 ± 0.25	0.270 ± 0.010 6.85 ± 0.25	0.059 ± 0.010 1.50 ± 0.25	0.137 ± 0.010	inches
		0.0006 - 0.003				3.47 ± 0.25	mm
		0.004 - 0.005				0.127 ± 0.010	inches
		0.0051 - 0.2				3.22 ± 0.25	mm

(\*) with heat sink

Power Derating Curve:



Performance Characteristics																																																																																																															
Test	Test Method	Test Specification	Test Condition																																																																																																												
Temperature Coefficient of Resistance (TCR)	JIS-C-5201-1 4.8	Per specification (refer to Electrical Specification table)	$TCR (ppm/^{\circ}C) = \frac{R2 - R1}{R1 (T2 - T1)} \times 10^6$ R1: resistance of room temperature (T1) R2: resistance of 125°C (T2)																																																																																																												
Short Time Overload	JIS C 5201-1 4.13	<table border="1"> <thead> <tr> <th>Size</th> <th>Power (W)</th> <th>Max. R Change</th> </tr> </thead> <tbody> <tr><td>CSS0201</td><td>0.2</td><td>≤ ± 0.5%</td></tr> <tr><td>CSS0402</td><td>0.33</td><td>± 1% + 0.5mΩ</td></tr> <tr><td>CSS0603</td><td>0.33</td><td>± 1% + 0.5mΩ</td></tr> <tr><td>CSS0508</td><td>1</td><td>± 1% + 0.5mΩ</td></tr> <tr><td>CSS0805</td><td>0.5</td><td>± 1% + 0.5mΩ</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>CSSH1206</td><td>2</td><td>≤ ± 0.5%</td></tr> <tr><td>CSS2010</td><td>1</td><td>≤ ± 0.5%</td></tr> <tr><td>CSSH2010</td><td>2</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>CSSH3637</td><td>6 and 7</td><td>≤ 0.5% + 0.5mΩ</td></tr> <tr><td>CSS4527</td><td>5</td><td>≤ ± 2%</td></tr> </tbody> </table>	Size	Power (W)	Max. R Change	CSS0201	0.2	≤ ± 0.5%	CSS0402	0.33	± 1% + 0.5mΩ	CSS0603	0.33	± 1% + 0.5mΩ	CSS0508	1	± 1% + 0.5mΩ	CSS0805	0.5	± 1% + 0.5mΩ	CSSH0805	1	≤ ± 1%	CSS1206	1	≤ ± 0.5%	CSSH1206	2	≤ ± 0.5%	CSS2010	1	≤ ± 0.5%	CSSH2010	2	≤ ± 0.5%	CSS2512	2	≤ ± 0.5%	CSSH2512	3	≤ ± 0.5%	CSS2725	4	≤ ± 0.5%	CSS2728	3	≤ ± 0.5%	CSSH2728	4	≤ ± 0.5%	CSSH3637	6 and 7	≤ 0.5% + 0.5mΩ	CSS4527	5	≤ ± 2%	The number of rated power are as follows: <table border="1"> <thead> <tr> <th>Size</th> <th>Power (W)</th> <th>Rated Power</th> </tr> </thead> <tbody> <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>CSSH1206</td><td>2</td><td>5 times</td></tr> <tr><td>CSS2010</td><td>1</td><td>5 times</td></tr> <tr><td>CSSH2010</td><td>2</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>CSSH3637</td><td>6 and 7</td><td>5 times</td></tr> <tr><td>CSS4527</td><td>5</td><td>5 times</td></tr> </tbody> </table>	Size	Power (W)	Rated Power	CSS0201	0.2	2.5 times	CSS0402	0.33	2.5 times	CSS0603	0.33	2.5 times	CSS0508	1	2.5 times	CSS0805	0.5	2.5 times	CSSH0805	1	4 times	CSS1206	1	5 times	CSSH1206	2	5 times	CSS2010	1	5 times	CSSH2010	2	5 times	CSS2512	2	5 times	CSSH2512	3	5 times	CSS2725	4	5 times	CSS2728	3	5 times	CSSH2728	4	5 times	CSSH3637	6 and 7	5 times	CSS4527	5	5 times
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		CSSH2728	4	≤ ± 0.5%																																																																																																											
CSSH3637	6 and 7	≤ 0.5% + 0.5mΩ																																																																																																													
CSS4527	5	≤ ± 2%																																																																																																													
Size	Power (W)	Rated Power																																																																																																													
CSS0201	0.2	2.5 times																																																																																																													
CSS0402	0.33	2.5 times																																																																																																													
CSS0603	0.33	2.5 times																																																																																																													
CSS0508	1	2.5 times																																																																																																													
CSS0805	0.5	2.5 times																																																																																																													
CSSH0805	1	4 times																																																																																																													
CSS1206	1	5 times																																																																																																													
CSSH1206	2	5 times																																																																																																													
CSS2010	1	5 times																																																																																																													
CSSH2010	2	5 times																																																																																																													
CSS2512	2	5 times																																																																																																													
CSSH2512	3	5 times																																																																																																													
CSS2725	4	5 times																																																																																																													
CSS2728	3	5 times																																																																																																													
CSSH2728	4	5 times																																																																																																													
CSSH3637	6 and 7	5 times																																																																																																													
CSS4527	5	5 times																																																																																																													
			Rating power duration: 5 seconds.																																																																																																												

# CSS / CSSH Series

## Ultra-Precision Metal Alloy Current Sensing Chip Resistor

Stackpole Electronics, Inc.  
Resistive Product Solutions

### Performance Characteristics (cont.)

Test	Test Method	Test Specification	Test Condition
Insulation Resistance	JIS-C-5201-1 4.6	$\geq 10^9 \Omega$	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
Dielectric Withstanding Voltage	JIS-C-5201-1 4.7	No short or burned in the appearance.	Applied 500 VAC for 1 minute and limit surge current 50 mA (max)

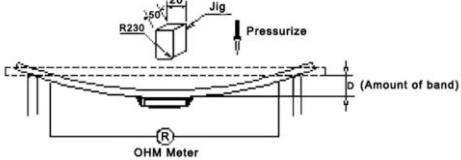
Operating Temperature Range for size CSS0201 is -55 to +125°C.

Operating Temperature Range for sizes CSS0402, CSS0603, CSS0805, and CSS0508 is -55 to +155°C.

Operating Temperature Range for size CSSH0805, CSSH1206, CSSH2010, and CSSH3637 is -55 to +170°C.

Operating Temperature Range for sizes CSS1206 - CSS4527, CSSH 2512 and CSSH 2728 is -55 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: $\leq \pm 1\% + 0.5m\Omega$ CSSH0805 and above 1206: $\leq \pm 0.5\% + 0.5m\Omega$ CSSH3637: $\leq \pm 0.5\% + 0.5m\Omega$ Jumper < Rmax	260 $\pm$ 5°C for 10 $\pm$ 1 seconds
Solderability	JIS C 5201-1 4.17	> 95 % coverage	245 $\pm$ 5°C for 3 $\pm$ 0.5 seconds
Substrate Bending	JIS C 5201-1 4.33	$\pm 1\% + 0.5m\Omega$ CSSH3637: $\leq \pm 0.5\% + 0.5m\Omega$	Span between fulcrums: 90 mm Bend width: 2 mm 
Resistance to Solvent	JIS C 5201-1 4.29	$\leq \pm 0.5\%$ 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	$\leq \pm 0.5\%$ 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: 1.5 mm - 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	$\pm 1\% + 0.5m\Omega$	a = 50 G, t = 11 ms, 5 times shock

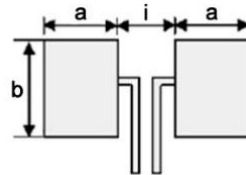
### Environmental Performance

Test Item	Test Method	Test Specifications	Test Condition
Low Temperature Exposure (Storage)	JIS C 5201-1 4.23.4	0201 - 0805: $\leq \pm 1\% + 0.5m\Omega$ $\geq 1206: \pm 0.5\%$	1000 hours at -55 $\pm$ 2°C
High Temperature Exposure (Storage)	JIS C 5201-1 4.23.2	0201 - 0805: $\leq \pm 1\% + 0.5m\Omega$	1000 hours at + 155 $\pm$ 2°C
		CSSH0805: $\pm 1\%$ CSSH3637: $\leq \pm 1\% + 0.5m\Omega$ $\geq 1206: \pm 1\%$	1000 hours at +170 $\pm$ 5°C
		0201 Jumper < Rmax	1000 hours at + 125 $\pm$ 2°C
Temperature Cycling	JESD22 Method JA-104	0201 - 0805: $\leq \pm 1\% + 0.5m\Omega$ CSSH0805: $\leq \pm 0.5\% + 0.5m\Omega$ $\geq 1206: \leq \pm 0.5\% + 0.5m\Omega$	-55 to +150°C 30 minutes each, except for 0201 which is -55 to +125°C 30 minutes each

Environmental Performance (cont.)										
Test Item	Test Method	Test Specifications	Test Condition							
Biased Humidity	JIS C 5201-1 4.24	0201 - 0805: $\leq \pm 2\% + 0.5m\Omega$ 0201 Jumper < R max	T = 40 $\pm$ 2°C , RH = 90~95%, Load with Rated Current 1.5 hours "ON", 0.5 hours "OFF", 1000 hours							
		CSSH0805: $\pm 0.5\%$ CSSH3637: $\leq \pm 0.5\% + 0.5m\Omega$ $\geq 1206: \pm 0.5\%$	1000 hours at +85°C / 85% R.H., 10% of operating power 1.5 hours "ON" and 0.5 hours "OFF"							
Load Life	JIS C 5201-1 4.25	0201 - 0805: $\leq \pm 2\% + 0.5m\Omega$ 0201 Jumper = R max CSSH0805: $\pm 1\%$ CSSH3637: $\leq \pm 1\% + 0.5m\Omega$ 1206 - 2728: $\pm 1\%$ 4527: $\pm 2\%$	T = 70 $\pm$ 2°C, load with Rated Current 1.5 hours "ON", 0.5 hours "OFF", 1000 hours							
Whisker Test	JESD Standard No.22A121 class 2	Max 50 $\mu$ m	Test item (Thermal Shock Test):							
			<table border="1"> <thead> <tr> <th colspan="2">Testing Condition</th> </tr> </thead> <tbody> <tr> <td>Minimum Storage Temperature</td> <td>-55 +0 / -10°C</td> </tr> <tr> <td>Maximum Storage Temperature</td> <td>85 + 10 / -0°C</td> </tr> <tr> <td>Temperature-Retaining Time</td> <td>10 minutes</td> </tr> <tr> <td>Number of Temperature Cycles</td> <td>1500</td> </tr> </tbody> </table>	Testing Condition		Minimum Storage Temperature	-55 +0 / -10°C	Maximum Storage Temperature	85 + 10 / -0°C	Temperature-Retaining Time
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	1500									
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 1000 or higher magnification.										

Recommended storage temperature: 25  $\pm$  5°C. Humidity: 60  $\pm$  20%.

**Recommended Pad Layouts**



Type/Code	Maximum Power Rating (W)	Resistance Range ( $\Omega$ )	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	0.024	0.014 0.35	inches mm
		0.005 - 0.02	0.60	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	0.020 0.50	inches mm
		0.004 - 0.02	0.051 1.30	0.92	0.024 0.60	inches mm
CSS0508	1	0.001, 0.0015, 0.002	0.035 0.90	0.091	0.016 0.40	inches mm
		0.003 - 0.005	0.033 0.85	2.30	0.020 0.50	inches mm
CSS0805	0.5	0.0015, 0.002	0.061 1.55	0.057	0.020 0.50	inches mm
		0.003 - 0.02	0.055 1.40	1.44	0.031 0.80	inches mm

**CSS / CSSH Series**

Ultra-Precision Metal Alloy Current Sensing Chip Resistor

Stackpole Electronics, Inc.

Resistive Product Solutions

**Recommended Pad Layouts (cont.)**

Type/Code	Maximum Power Rating (W)	Resistance Range ( $\Omega$ )	a	b	i	Unit
CSSH0805	1	0.0005	0.053 1.35	0.071 1.80	0.012 0.30	inches mm
		0.001 - 0.013	0.039 1.00		0.039 1.00	inches mm
CSS1206	1	0.0005 - 0.0006	0.065 1.65	0.086 2.18	0.035 0.90	inches mm
		0.001 - 0.05	0.063 1.60	0.086 2.18	0.039 1.00	inches mm
CSSH1206	2	0.001 - 0.005	0.063 1.60	0.086 2.18	0.039 1.00	inches mm
CSS2010	1	0.0005 - 0.003	0.114 2.89	0.115 2.92	0.048 1.22	inches mm
		0.0031 - 0.1	0.090 2.29		0.095 2.41	inches mm
CSSH2010	2	0.0005 - 0.003	0.114 2.89	0.115 2.92	0.048 1.22	inches mm
		0.0031 - 0.012	0.090 2.29		0.095 2.41	inches mm
CSS2512	2	0.0003 - 0.0007	0.120 3.05	0.145 3.68	0.050 1.27	inches mm
		0.00075	0.086 2.19	0.145 3.68	0.118 3.00	inches mm
		0.0008 - 0.004	0.120 3.05	0.145 3.68	0.050 1.27	inches mm
		0.00041 - 0.075	0.083 2.11	0.145 3.68	0.125 3.18	inches mm
		0.08 - 0.1	0.083 2.11	0.145 3.68	0.125 3.18	inches mm
		0.3 - 0.5	0.083 2.11	0.145 3.68	0.125 3.18	inches mm
CSSH2512	3	0.0003 - 0.0005	0.120 3.05	0.145 3.68	0.050 1.27	inches mm
		0.0006 - 0.0029	0.086 2.19		0.118 3.00	inches mm
		0.003 - 0.004	0.110 2.79		0.071 1.80	inches mm
		0.0101 - 0.1	0.086 2.19		0.118 3.00	inches mm
CSS2725	4	0.0002 - 0.003	0.125 3.18	0.270 6.86	0.052 1.32	inches mm
CSS2728	3	0.004 - 0.2	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
CSSH3637	7	0.0003 - 0.00075	0.152	0.413 10.50	0.114 2.90	inches mm
	6	0.001	3.85			
CSS4527	5	0.0005 - 0.005	0.228 5.80	0.344 8.74	0.138 3.51	inches mm
		0.0051 - 0.2	0.163 4.15		0.268 6.81	inches mm

**Recommended Solder Profiles**

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 “\*”.

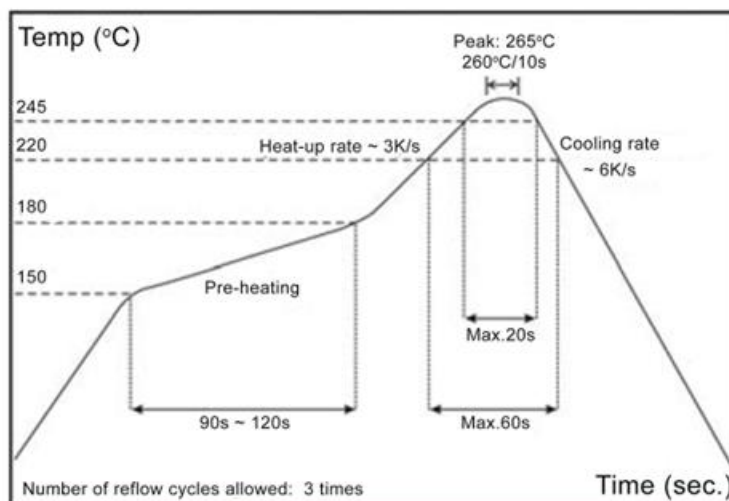
Soldering iron recommended temperatures: 330 to 350°C with minimum duration.  
Maximum number of reflow cycles: 3.

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.

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	*

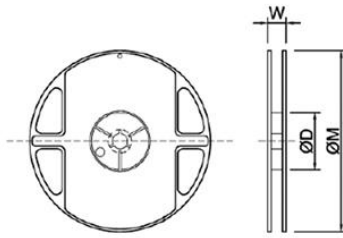
**Recommended Resistor Reflow Profile**



**CSS / CSSH Series**  
Ultra-Precision Metal Alloy Current Sensing Chip Resistor

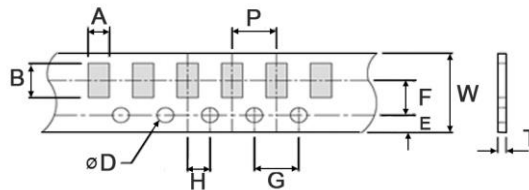
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**Reel Specifications**



Type/Code	Tape Width	W	ØD	ØM	Unit
0201, 0402, 0603 0508, 0805, 1206	8 mm	0.354 ± 0.020 9.00 ± 0.50	2.362 ± 0.079 60.00 ± 2.00	7.008 ± 0.197 178.00 ± 5.00	inches
CSSH0805		0.472 ± 0.020 12.00 ± 0.50			mm
CSSH3637	16 mm	0.685 ± 0.039 17.40 ± 1.00	2.362 ± 0.039 60.00 ± 1.00	7.008 ± 0.079 178.00 ± 2.00	inches mm
2010, 2512, 2725, 2728	12 mm	0.543 ± 0.020 13.80 ± 0.50	3.150 ± 0.039 80.00 ± 1.00	7.008 ± 0.197 178.00 ± 5.00	inches
4527	24 mm	0.984 ± 0.039 25.00 ± 1.00	2.362 ± 0.039 60.00 ± 1.00		mm

**Packaging Specifications – Paper Tape**

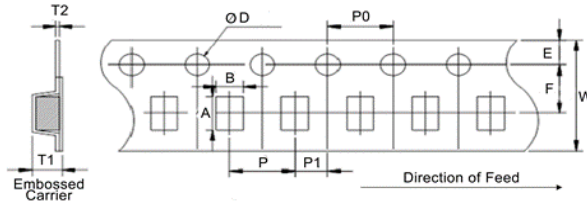


Type/Code	W	P	E	F	ØD	Unit
CSS0201	0.315 ± 0.012 8.00 ± 0.30	0.079 ± 0.004 2.00 ± 0.10	0.069 ± 0.004 1.75 ± 0.10	0.138 ± 0.004 3.50 ± 0.10	0.059 +0.004 / -0 1.50 +0.1 / -0	inches
CSS0402						mm
CSS0603		inches				
CSS0508		mm				
CSS0805		inches				
CSS0805	mm					
Type/Code	G	H	A	B	T	Unit
CSS0201	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.004 2.00 ± 0.10	0.016 ± 0.008 0.40 ± 0.20	0.028 ± 0.008 0.70 ± 0.20	0.018 ± 0.002 0.45 ± 0.05	inches
CSS0402			0.026 ± 0.008 0.65 ± 0.20	0.043 ± 0.008 1.10 ± 0.20	0.017 ± 0.002 0.42 ± 0.05	inches
CSS0603			0.039 ± 0.008 0.98 ± 0.20	0.073 ± 0.008 1.85 ± 0.20	0.024 ± 0.004 0.60 ± 0.10	inches
CSS0508			0.061 ± 0.008 1.55 ± 0.20	0.091 ± 0.008 2.30 ± 0.20	0.028 ± 0.008 0.70 ± 0.20	inches
CSS0805			0.030 ± 0.008 0.75 ± 0.20	inches		

**CSS / CSSH Series**  
Ultra-Precision Metal Alloy Current Sensing Chip Resistor

**Stackpole Electronics, Inc.**  
Resistive Product Solutions

**Packaging Specifications – Plastic Tape**



Type/Code	A	B	W	E	F	T1	Unit
CSS1206/CSSH1206 (0.0005Ω - 0.0006Ω)	0.138 ± 0.004 3.50 ± 0.10	0.075 ± 0.004 1.90 ± 0.10	0.315 ± 0.006 8.00 ± 0.15	0.069 ± 0.004 1.75 ± 0.10	0.138 ± 0.004 3.50 ± 0.10	0.050 ± 0.004 1.27 ± 0.10	inches mm
CSS1206/CSSH1206 (≥ 0.001Ω)	0.137 ± 0.004 3.48 ± 0.10	0.072 ± 0.004 1.83 ± 0.10				0.043 ± 0.004 1.10 ± 0.10	inches mm
CSS2010/CSSH2010	0.215 ± 0.004 5.45 ± 0.10	0.114 ± 0.004 2.90 ± 0.10	0.472 ± 0.006 12.00 ± 0.15		0.217 ± 0.004 5.50 ± 0.10	0.052 ± 0.004 1.33 ± 0.10	inches mm
CSS2512/CSSH2512 (0.0003Ω)	0.265 ± 0.004 6.74 ± 0.10	0.138 ± 0.004 3.50 ± 0.10				0.063 ± 0.004 1.60 ± 0.10	inches mm
CSS2512/CSSH2512	0.266 ± 0.004 6.75 ± 0.10					0.051 ± 0.004 1.30 ± 0.10	inches mm
CSS2725	0.281 ± 0.004 7.15 ± 0.10	0.266 ± 0.004 6.75 ± 0.10				0.077 ± 0.004 1.95 ± 0.10	inches mm
CSS2728	0.281 ± 0.004 7.15 ± 0.10	0.303 ± 0.004 7.70 ± 0.10	0.057 ± 0.004 1.45 ± 0.10			inches mm	
CSSH0805 0.0005Ω - 0.001Ω	0.096 ± 0.004 2.45 ± 0.10	0.067 ± 0.004 1.70 ± 0.10	0.315 ± 0.012 8.00 ± 0.30			0.138 ± 0.004 3.50 ± 0.10	0.035 ± 0.010 0.90 ± 0.25
CSSH0805 0.0015Ω - 0.013Ω	0.096 ± 0.004 2.45 ± 0.10				0.022 ± 0.010 0.55 ± 0.25		inches mm
CSSH3637	0.394 ± 0.004 10.00 ± 0.10	0.378 ± 0.004 9.60 ± 0.10	0.630 ± 0.008 16.00 ± 0.20		0.295 ± 0.004 7.50 ± 0.10	0.051 ± 0.004 1.30 ± 0.10	inches mm
CSS4527	0.465 ± 0.004 11.80 ± 0.10	0.283 ± 0.004 7.20 ± 0.10	0.945 ± 0.006 24.00 ± 0.15	0.453 ± 0.004 11.50 ± 0.10		0.079 ± 0.004 2.00 ± 0.10	inches mm
Type/Code	T2	P	P0	P1	ΦD	Unit	
CSS1206/CSSH1206 (0.0005Ω - 0.0006Ω)	0.009 ± 0.004 0.23 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.004 2.00 ± 0.10	0.059 ± 0.004/-0 1.50 ± 0.10/-0	inches	
CSS1206/CSSH1206 (≥ 0.001Ω)	0.008 ± 0.002 0.20 ± 0.05					inches	
CSS2010/CSSH2010	0.009 ± 0.002 0.23 ± 0.05	inches					
CSS2512/CSSH2512 (0.0003Ω)	0.009 ± 0.002 0.24 ± 0.05	0.315 ± 0.004 8.00 ± 0.10				inches	
CSS2512/CSSH2512	0.008 ± 0.002 0.20 ± 0.05	0.157 ± 0.004 4.00 ± 0.10				inches	
CSS2725	0.010 ± 0.002 0.25 ± 0.05	0.315 ± 0.004 8.00 ± 0.10				inches	
CSS2728		0.472 ± 0.004 12.00 ± 0.10				inches	
CSSH0805 0.0005Ω - 0.001Ω	0.008 ± 0.002 0.20 ± 0.05	0.157 ± 0.004 4.00 ± 0.10				inches	
CSSH0805 0.0015Ω - 0.013Ω						inches	
CSSH3637	0.010 ± 0.002 0.25 ± 0.05	0.472 ± 0.004 12.00 ± 0.10				inches	
CSS4527	0.012 ± 0.004 0.30 ± 0.10	0.472 ± 0.004 12.00 ± 0.10	inches				

## 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.

**CSS / CSSH Series**  
Ultra-Precision Metal Alloy Current Sensing Chip Resistor

**Stackpole Electronics, Inc.**  
Resistive Product Solutions

**How to Order**



Product Series		Size	Tolerance		Packaging				Resistance Value
Code	Description	Size	Code	Tol	Code	Description	Size	Quantity	Four characters with the multiplier used as the decimal holder. "L" used as multiplier of 10 <sup>-3</sup> for any value under 0.1 ohm.
CSS	Metal Alloy	0201	D	0.5%	T	7" Reel Paper Tape	0201, 0402	10000	
CSSH	High Power	0402	F	1%			7" Reel Plastic Tape	0603, 0508	5000
		0603	G	2%				0805	4000
		0805	J	5%			1206 (≥0.001Ω)	2000	
		0508					1206 (0.0003 - 0.0006Ω)	1000	
		1206					2010, 2512 (>0.0003Ω)	500	
		2010					2512 (0.0003Ω)		
		2512					2725, 2728, 3637		
		2728					4527		
		2725							
		3637							
		4527							

## OUR CERTIFICATE

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