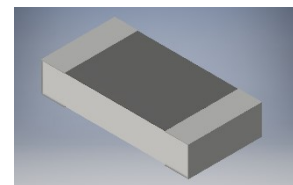


Features:

- 0201 to 2512 (standard terminations) and 0612 to 1225 (wide terminations) available
- Low resistance, TCR and inductance
- Excellent long-term stability
- High precision current sensing
- High power capability
- “-UP” High power version
- Non-standard resistance values available
- AEC-Q200 qualified (all sizes except 0201)
- RoHS compliant, lead free and halogen free
- REACH compliant



Applications:

- Consumer electronics
- Computer
- Telecom
- Measuring instrument
- Industrial / Power supply
- Battery management system

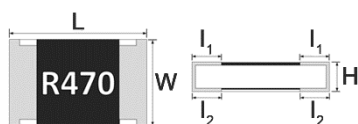
Electrical Specifications								
Type/Code	Power Rating (W) @ 70°C	Max Rated Current (A)	Max Overload (A)	TCR (ppm/°C)	Ohmic Range (Ω) and Tolerance			
					0.5%	1%	2%	5%
CSRT0201	0.2	2	4.47	± 100	0.05 - 0.098			
				± 50	0.1 - 10			
CSRT0402	0.25	2.24	5	± 100	0.05 - 0.098			
				± 50	0.1 - 10			
CSRT0603	0.4	2.83	6.32	± 100	0.05 - 0.098			
				± 50	0.1 - 10			
CSRT0805	0.5	3.58	8	± 150	0.039 - 0.049			
				± 100	0.05 - 0.098			
				± 50	0.1 - 10			
CSRT1206	0.5	7.07	15.81	± 200	-	0.01 - 0.038		
	1	5.06	11.32	± 150	0.039 - 0.049			
				± 100	0.05 - 0.098			
				± 50	0.1 - 10			
CSRT1210	1	5.06	11.32	± 150	0.039 - 0.049			
				± 100	0.05 - 0.098			
				± 50	0.1 - 10			
CSRT2010	1.5	3.87	8.66	± 50	0.1 - 10			
CSRT2512	3	5.48	12.25	± 50	0.1 - 10			

Electrical Specifications – High Power								
Type/Code	Power Rating (W) @ 70°C	Max Rated Current (A)	Max Overload (A)	TCR (ppm/°C)	Ohmic Range (Ω) and Tolerance			
					0.5%	1%	2%	5%
CSRT2512 -UP	3.5	8.37	18.71	± 50	0.05 - 50			

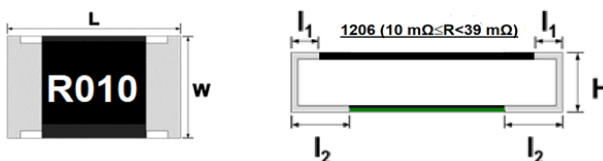
Electrical Specifications – Wide Termination

Type/Code	Power Rating (W) @ 70°C	Max Rated Current (A)	Max Overload (A)	TCR (ppm/°C)	Ohmic Range (Ω) and Tolerance			
					0.5%	1%	2%	5%
CSRT0612	1	10	22.36	± 150	-	0.01 - 0.019		
				± 100	0.1 - 0.5	0.02 - 0.5		
CSRT1020	2	14.14	31.62	± 150	-	0.01 - 0.019		
				± 100	0.1 - 0.5	0.02 - 0.5		
CSRT1225	3	17.32	38.73	± 150	-	0.01 - 0.019		
				± 100	0.1 - 0.5	0.02 - 0.5		

Mechanical Specifications

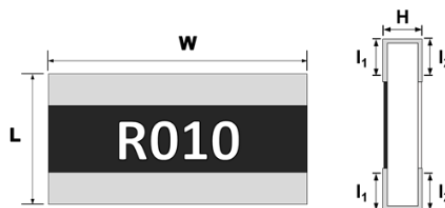


Type/Code	L Body Length	W Body Width	H Body Height	l ₁ Top Termination	l ₂ Bottom Termination	Unit
CSRT0201	0.024 ± 0.001	0.012 ± 0.001	0.010 ± 0.002	0.006 ± 0.002	0.006 ± 0.002	inches
	0.60 ± 0.03	0.30 ± 0.03	0.26 ± 0.05	0.15 ± 0.05	0.15 ± 0.05	mm
CSRT0402	0.039 ± 0.004	0.020 ± 0.002	0.014 ± 0.002	0.008 ± 0.004	0.010 ± 0.004	inches
	1.00 ± 0.10	0.50 ± 0.05	0.35 ± 0.05	0.20 ± 0.10	0.25 ± 0.10	mm
CSRT0603	0.063 ± 0.004	0.031 ± 0.004	0.018 ± 0.004	0.010 ± 0.006	0.012 ± 0.006	inches
	1.60 ± 0.10	0.80 ± 0.10	0.45 ± 0.10	0.25 ± 0.15	0.30 ± 0.15	mm
CSRT0805	0.079 ± 0.004	0.049 ± 0.004	0.022 ± 0.004	0.014 ± 0.008	0.016 ± 0.008	inches
	2.00 ± 0.10	1.25 ± 0.10	0.55 ± 0.10	0.35 ± 0.20	0.40 ± 0.20	mm
CSRT1206 (0.039 Ω - 10 Ω)	0.122 ± 0.004	0.063 ± 0.004	0.022 ± 0.004	0.016 ± 0.008	0.018 ± 0.008	inches
	3.10 ± 0.10	1.60 ± 0.10	0.55 ± 0.10	0.40 ± 0.20	0.45 ± 0.20	mm
CSRT1210	0.122 ± 0.004	0.098 ± 0.006	0.022 ± 0.004	0.020 ± 0.008	0.020 ± 0.008	inches
	3.10 ± 0.10	2.50 ± 0.15	0.55 ± 0.10	0.50 ± 0.20	0.50 ± 0.20	mm
CSRT2010	0.197 ± 0.008	0.098 ± 0.006	0.022 ± 0.004	0.024 ± 0.010	0.024 ± 0.010	inches
	5.00 ± 0.20	2.50 ± 0.15	0.55 ± 0.10	0.60 ± 0.25	0.60 ± 0.25	mm
CSRT2512 (-UP)	0.248 ± 0.008	0.126 ± 0.008	0.028 ± 0.006	0.026 ± 0.010	0.026 ± 0.010	inches
	6.30 ± 0.20	3.20 ± 0.20	0.70 ± 0.15	0.65 ± 0.25	0.65 ± 0.25	mm



Type/Code	L Body Length	W Body Width	H Body Height	l ₁ Top Termination	l ₂ Bottom Termination	Unit
CSRT1206 (0.01 Ω - 0.038 Ω)	0.130 ± 0.008	0.067 ± 0.008	0.026 ± 0.008	0.008 ± 0.006	0.027 ± 0.008	inches
	3.30 ± 0.20	1.70 ± 0.20	0.65 ± 0.20	0.20 ± 0.15	0.68 ± 0.20	mm

Mechanical Specifications – Wide Termination



Type/Code	L Body Length	W Body Width	H Body Height	l_1 Top Termination	l_2 Bottom Termination	Unit
CSRT0612	0.063 ± 0.006	0.126 ± 0.008	0.022 ± 0.006	0.012 ± 0.008	0.020 ± 0.008	inches
	1.60 ± 0.15	3.20 ± 0.20	0.55 ± 0.15	0.30 ± 0.20	0.50 ± 0.20	mm
CSRT1020	0.098 ± 0.006	0.197 ± 0.006	0.022 ± 0.006	0.016 ± 0.008	0.020 ± 0.008	inches
	2.50 ± 0.15	5.00 ± 0.15	0.55 ± 0.15	0.40 ± 0.20	0.50 ± 0.20	mm
CSRT1225	0.126 ± 0.008	0.248 ± 0.008	0.022 ± 0.006	0.024 ± 0.010	0.031 ± 0.010	inches
	3.20 ± 0.20	6.30 ± 0.20	0.55 ± 0.15	0.60 ± 0.25	0.80 ± 0.25	mm

Performance Characteristics

Test Item	Test Method	Test Condition	Test Limits
Temperature Coefficient of Resistance (TCR)	JIS C-5201-1 4.8 IEC-60115-1 4.8	TCR +125°C, 25°C is the reference temperature	Refer to Electrical Specifications table
Short Time Overload	JIS C-5201-1 4.13 IEC-60115-1 4.13	Standard Power: 6.25 times rated power whichever is less for 5 seconds High Power (2X/4X) and wide terminal type: 5 times rated power whichever is less for 5 seconds	± (1% + 0.001Ω)
Insulation Resistance	JIS C-5201-1 4.8 IEC-60115-1 4.8	100 VDC for 1 minute	≥ 10GΩ
Dielectric Withstanding Voltage	JIS C-5201-1 4.7	0805, 0612 and above applied 500 VAC, 1 minute 0201, 0402, 0603 applied 300 VAC, 1 minute	No short or burned on the appearance
Core Body Strength	JIS C-5201-1 4.15	Central part pressurizing force: 10 N, 10 seconds	No breakage.
Solderability	JIS C-5201-1 4.17 IEC-60115-1 4.17	245°C ± 5°C for 3 ± 0.5 seconds	>95% coverage - no visual damage
Resistance to Soldering Heat	JIS C-5201-1 4.18 IEC-60115-1 4.18	260°C ± 5°C for 10 seconds	± (1% + 0.001Ω) No visual damage
Leaching	JIS C-5201-1 4.18 IEC-60068-2-58 8.2.1	260°C ± 5°C for 30 seconds	>95% coverage - no visual damage
Rapid Change of Temperature	JIS C-5201-1 4.19 IEC-60115-1 4.19	-55°C to +155°C, 300 cycles	± (1% + 0.001Ω) No visual damage
Damp Heat with Load	JIS C-5201-1 4.24 IEC-60115-1 4.24	40°C ± 2°C, 90 ~ 95% R.H., rated power or max. working current whichever is less for 1000 hours with 1.5 hours "ON" and 0.5 hours "OFF"	± (1% + 0.001Ω)
Biased Humidity	MIL-STD-202 Method 103	1000 hours; 85°C/85% RH, 10% of operating power. Measurement at 24 ± 4 hours after test conclusion.	± (0.5% + 0.05Ω)
Load Life (Endurance)	JIS C-5201-1 4.25 IEC-60115-1 4.25.1	70°C ± 2°C, rated power or max. working current whichever is less for 1000 hours with 1.5 hours "ON" and 0.5 hours "OFF"	± (1% + 0.001Ω)
High Temperature Exposure	JIS C-5201-1 4.25 IEC 60068-2-2	At +155°C ± 5°C for 1000 + 48/- 0 hours all sizes, except 2512-UP At +170°C ± 5°C for 1000 + 48/- 0 hours for 2512-UP	± (1% + 0.001Ω)
Resistance to Solvent	JIS C-5201-1 clause 4.29	The tested resistor be immersed into isopropyl alcohol of 20°C ~ 25°C for 60 seconds. Then the resistor is left in room for 48 hours	± (1% + 0.001Ω) No visual damage
Terminal Strength	JIS C-5201-1 4.32 AEC Q200-006	Pressurizing force for 10 seconds. 0201, 0402, 0603: 8 N; 0805, 0612 and above: 17.7N	No breakage

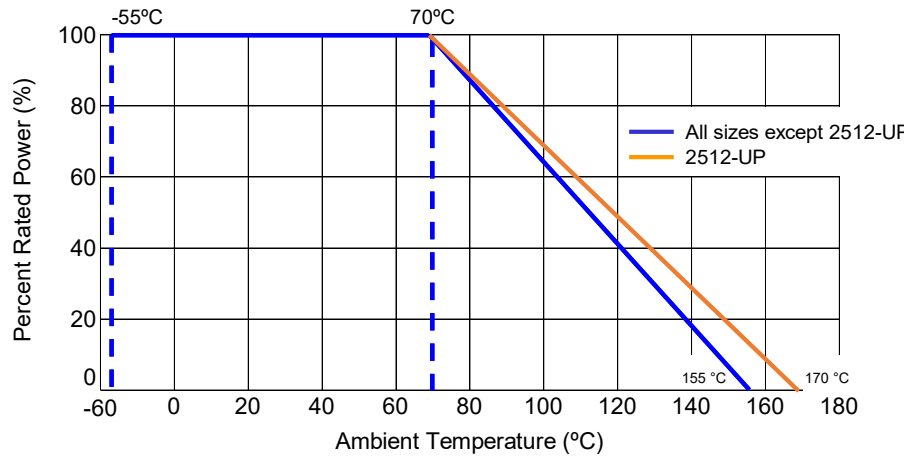
Performance Characteristics (cont.)

Test Item	Test Method	Test Condition	Test Limits
Bending Strength	JIS C-5201-1 4.33 IEC-60115-1 4.33	Bending once for 5 seconds. D: 0201, 0402, 0603, 0805 = 5 mm 1206, 1210, 0612 = 3 mm 2010, 2512, 1020, 1225 = 2 mm	$\pm (1\% + 0.001\Omega)$ No visual damage

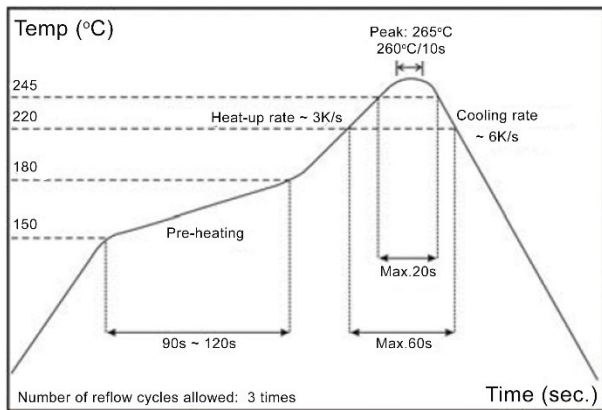
Operating temperature range is -55°C to +155°C for all sizes except 2512-UP

Operating temperature range for 2512-UP is -55°C to +170°C

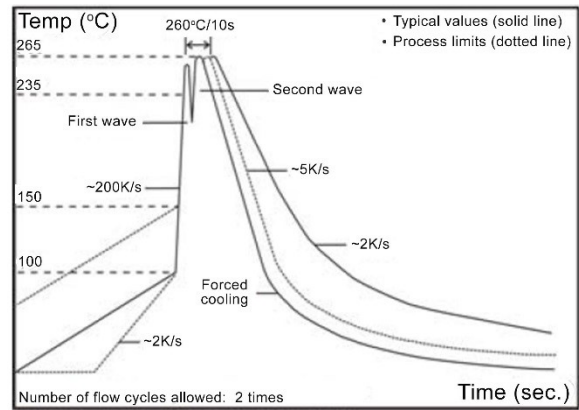
Power Derating Curve:



Soldering Profiles



IR Reflow Soldering



Wave Soldering (Flow Soldering)

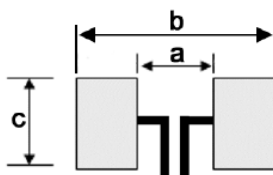
Rework temperature (hot air equipment): 350°C, 3 ~ 5 seconds

Recommended reflow methods:

IR, vapor phase oven, hot air oven

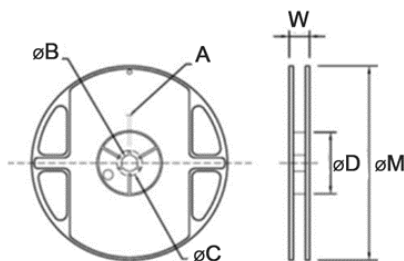
If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.

Recommended Pad Layout



Type/Code	a	b	c	Unit
CSRT0201	0.010	0.033	0.014	inches
	0.25	0.85	0.35	mm
CSRT0402	0.020	0.063	0.028	inches
	0.50	1.60	0.70	mm
CSRT0603	0.031	0.094	0.039	inches
	0.80	2.40	1.00	mm
CSRT0805	0.051	0.114	0.057	inches
	1.30	2.90	1.45	mm
CSRT1206 (0.01 Ω - 0.038 Ω)	0.047	0.189	0.072	inches
	1.20	4.80	1.84	mm
CSRT1206 (0.039 Ω - 10 Ω)	0.087	0.165	0.071	inches
	2.20	4.20	1.80	mm
CSRT1210	0.079	0.173	0.106	inches
	2.00	4.40	2.70	mm
CSRT2010	0.150	0.260	0.106	inches
	3.80	6.60	2.70	mm
CSRT2512 (-UP)	0.193	0.319	0.134	inches
	4.90	8.10	3.40	mm
CSRT0612	0.020	0.102	0.126	inches
	0.50	2.60	3.20	mm
CSRT1020	0.039	0.159	0.217	inches
	1.00	4.05	5.50	mm
CSRT1225	0.047	0.205	0.276	inches
	1.20	5.20	7.00	mm

Reel Specifications

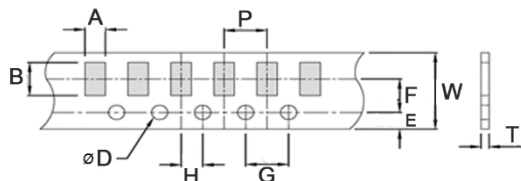


Type/Code	A	B	C	D	W	M	Unit
CSRT0201	0.079 $\pm$ 0.020 2.00 $\pm$ 0.50	0.531 $\pm$ 0.039 13.50 $\pm$ 1.00	0.827 $\pm$ 0.039 21.00 $\pm$ 1.00	2.362 $\pm$ 0.039 60.00 $\pm$ 1.00	0.453 $\pm$ 0.079 11.50 $\pm$ 2.00	7.008 $\pm$ 0.079 178.00 $\pm$ 2.00	inches mm
CSRT0402							
CSRT0603							
CSRT0805							

Reel Specifications (cont.)

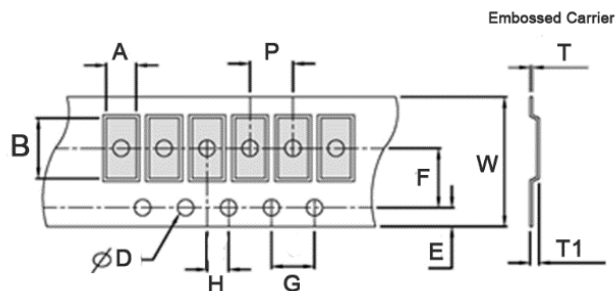
Type/Code	A	B	C	D	W	M	Unit
CSRT1206	0.079 ± 0.020 2.00 ± 0.50	0.531 ± 0.039 13.50 ± 1.00	0.827 ± 0.039 21.00 ± 1.00	2.362 ± 0.039 60.00 ± 1.00	0.453 ± 0.079 11.50 ± 2.00	7.008 ± 0.079 178.00 ± 2.00	inches mm
CSRT1210					0.453 ± 0.079 11.50 ± 2.00		inches mm
CSRT2010					0.453 ± 0.079 11.50 ± 2.00		inches mm
CSRT2512 (-UP)					0.630 ± 0.079 16.00 ± 2.00		inches mm
CSRT0612					0.453 ± 0.079 11.50 ± 2.00		inches mm
CSRT1020					0.453 ± 0.079 11.50 ± 2.00		inches mm
CSRT1225					0.630 ± 0.079 16.00 ± 2.00		inches mm

Packaging Specifications - Paper Tape



Type/Code	A	B	W	E	F	Unit
CSRT0201	0.018 ± 0.004 0.45 ± 0.10	0.030 ± 0.004 0.75 ± 0.10	0.315 ± 0.008 8.00 ± 0.20	0.069 ± 0.004 1.75 ± 0.10	0.138 ± 0.002 3.50 ± 0.05	inches mm
CSRT0402	0.028 ± 0.004 0.70 ± 0.10	0.047 ± 0.004 1.20 ± 0.10				inches mm
CSRT0603	0.041 ± 0.008 1.05 ± 0.20	0.071 ± 0.008 1.80 ± 0.20				inches mm
CSRT0805	0.061 ± 0.008 1.55 ± 0.20	0.091 ± 0.008 2.30 ± 0.20				inches mm
CSRT1206	0.075 ± 0.008 1.90 ± 0.20	0.120 ± 0.008 3.05 ± 0.20				inches mm
CSRT1210	0.112 ± 0.008 2.85 ± 0.20	0.120 ± 0.008 3.05 ± 0.20				inches mm
CSRT0612	0.112 ± 0.008 2.85 ± 0.20	0.120 ± 0.008 3.05 ± 0.20				inches mm
Type/Code	G	H	T	P	D	Unit
CSRT0201	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.014 ± 0.004 0.35 ± 0.10	0.079 ± 0.004 2.00 ± 0.10	0.059 ± 0.004/-0 1.50 ± 0.10/-0	inches mm
CSRT0402			0.018 ± 0.004 0.45 ± 0.10	0.079 ± 0.004 2.00 ± 0.10		inches mm
CSRT0603			0.024 ± 0.004 0.60 ± 0.10	0.157 ± 0.004 4.00 ± 0.10		inches mm
CSRT0805			0.030 ± 0.004 0.75 ± 0.10	0.157 ± 0.004 4.00 ± 0.10		inches mm
CSRT1206			0.030 ± 0.004 0.75 ± 0.10	0.157 ± 0.004 4.00 ± 0.10		inches mm
CSRT1210			0.030 ± 0.004 0.75 ± 0.10	0.157 ± 0.004 4.00 ± 0.10		inches mm
CSRT0612			0.030 ± 0.004 0.75 ± 0.10	0.157 ± 0.004 4.00 ± 0.10		inches mm

Packaging Specifications - Embossed Tape



Type/Code	A	B	W	E	F	G	Unit
CSRT2010	0.110 ± 0.008 2.80 ± 0.20	0.220 ± 0.008 5.60 ± 0.20					inches mm
CSRT2512 (-UP)	0.134 ± 0.008 3.40 ± 0.20	0.264 ± 0.008 6.70 ± 0.20	0.472 ± 0.004 12.00 ± 0.10	0.069 ± 0.004 1.75 ± 0.10	0.217 ± 0.002 5.50 ± 0.05	0.157 ± 0.004 4.00 ± 0.10	inches mm
CSRT1020	0.110 ± 0.008 2.80 ± 0.20	0.220 ± 0.008 5.60 ± 0.20					inches mm
CSRT1225	0.134 ± 0.008 3.40 ± 0.20	0.264 ± 0.008 6.70 ± 0.20					inches mm
Type/Code	H	T	T1	P	D	D1	Unit
CSRT2010							
CSRT2512 (-UP)	0.079 ± 0.002 2.00 ± 0.05	0.009 ± 0.004 0.23 ± 0.10	0.033 ± 0.006 0.85 ± 0.15	0.157 ± 0.004 4.00 ± 0.10	0.059 ± 0.004/-0 1.50 ± 0.10/-0	0.059 ± 0.004 1.50 ± 0.10	inches mm
CSRT1020							
CSRT1225							

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)
CSRT	Thin Film Current Sensing Resistor	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. 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	14	15	16	17
C	S	R	T	2	5	1	2	F	T	1	R	0	0	-	U	P
Product Series		Size		Tolerance		Packaging				Resistance Value			Special			
CSRT	Thin Film Current Sensing	Code	W	Code	Tol	Code	Description	Size	Quantity	Four characters with the multiplier used as the decimal holder. "L" used as multiplier of 10 ⁻³ for any value under 0.1 ohm. 0.01 ohm = 10L0 0.098 ohm = 98L0 10 ohm = 10R0			Code	Description		
		0201	0.2	D	0.5%	T	Paper Tape	0201, 0402	10000				-UP	High Power		
		0402	0.25	F	1%			0603, 0805, 1206 1210, 0612	5000							
		0603	0.4	G	2%		Embossed	2010, 2512 1020, 1225	4000							
		0805	0.5	J	5%											
		1206	0.5 1													
		1210	1													
		2010	1.5													
		2512	3													
		2512 (-UP)	3.5													
		0612	1													
		1020	2													
		1225	3													