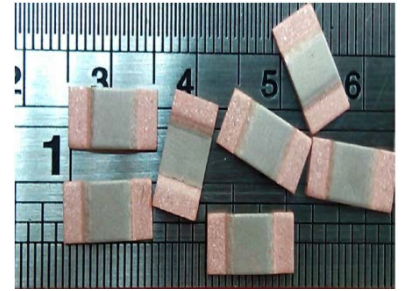


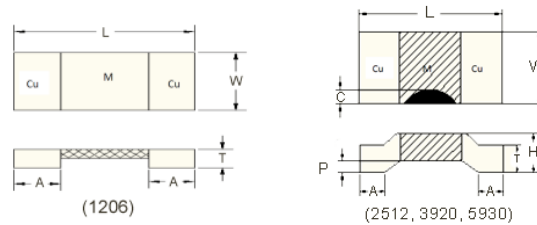
- Features:
- Available in up to 10W power rating
  - Resistance value from 0.2 to 5mΩ
  - Current handling up to 224A in 5930 size
  - Excellent long term stability
  - AEC-Q200 qualified
  - RoHS compliant and halogen-free



- Applications:
- Power modules
  - Frequency converters
  - Current sensor for power hybrid sources
  - High current handling for automotive engine controls and power management

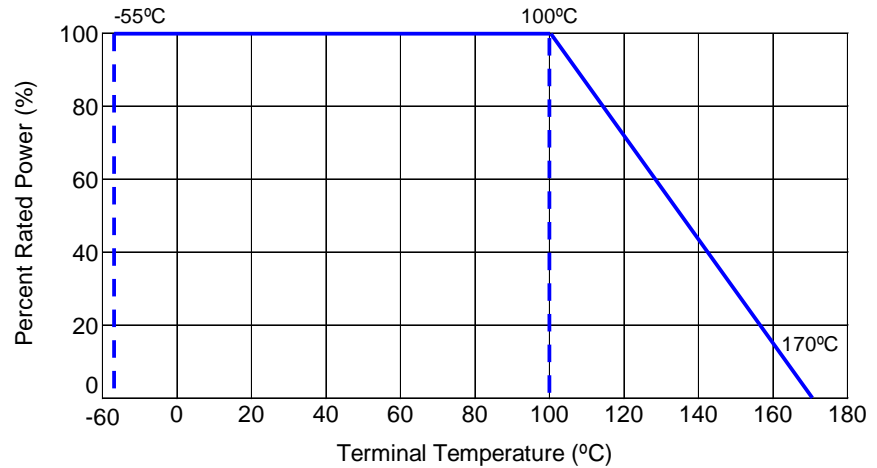
Electrical Specifications			
Type / Code	Power Rating	TCR (ppm/°C)	Ohmic Range (Ω) and Tolerance
			1% and 5%
HCS1206	2W	±300 ppm/°C	0.0003
		±200 ppm/°C	0.0005
		±150 ppm/°C	0.001
HCS2512	3W	±150 ppm/°C	0.0003
		±115 ppm/°C	0.0005
		±115 ppm/°C	0.00075
		±100 ppm/°C	0.001
	2W	±50 ppm/°C	0.002
		±50 ppm/°C	0.003
	1.5W	±50 ppm/°C	0.004
HCS3920	5W	±50 ppm/°C	0.005
		±200 ppm/°C	0.002
		±150 ppm/°C	0.003
		±70 ppm/°C	0.005
	4W	±50 ppm/°C	0.001
	3W	±50 ppm/°C	0.002
	2.5W	±50 ppm/°C	0.003
	2W	±50 ppm/°C	0.004
HCS5930	10W	±50 ppm/°C	0.005
	7W	±100 ppm/°C	0.002
	6W	±100 ppm/°C	0.003
		±75 ppm/°C	0.005
	4W	±50 ppm/°C	0.001
	3W	±50 ppm/°C	0.002

**Mechanical Specifications**

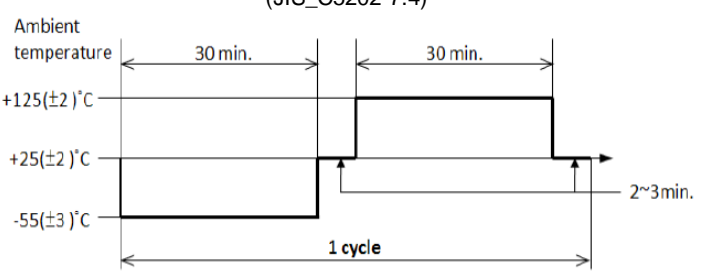


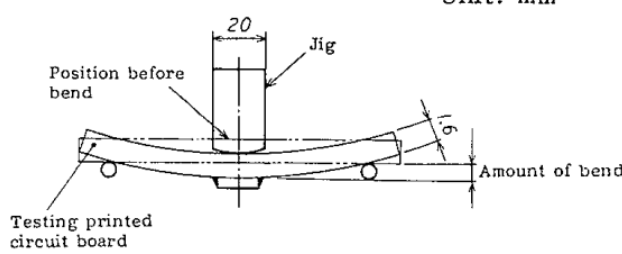
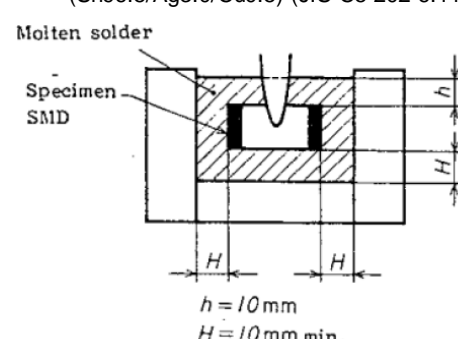
Type / Code	L	W	H	T	A	C (max.)	P	Unit
HCS1206...L300	0.126 ± 0.008 3.20 ± 0.20	0.065 ± 0.008 1.65 ± 0.20	NA	0.047 ± 0.006 1.20 ± 0.15	0.031 ± 0.008 0.80 ± 0.20	NA	NA	inches mm
HCS1206...L500	0.126 ± 0.008 3.20 ± 0.20	0.065 ± 0.008 1.65 ± 0.20	NA	0.035 ± 0.006 0.90 ± 0.15	0.031 ± 0.008 0.80 ± 0.20	NA	NA	inches mm
HCS1206...L100	0.126 ± 0.008 3.20 ± 0.20	0.065 ± 0.008 1.65 ± 0.20	NA	0.035 ± 0.006 0.90 ± 0.15	0.031 ± 0.008 0.80 ± 0.20	NA	NA	inches mm
HCS2512...L300	0.256 ± 0.008 6.50 ± 0.20	0.128 ± 0.008 3.25 ± 0.20	0.046 ± 0.006 1.17 ± 0.15	0.032 ± 0.006 0.82 ± 0.15	0.035 ± 0.008 0.90 ± 0.20	0.016 0.40	0.014 ± 0.004 0.35 ± 0.10	inches mm
HCS2512...L500	0.256 ± 0.008 6.50 ± 0.20	0.128 ± 0.008 3.25 ± 0.20	0.042 ± 0.006 1.07 ± 0.15	0.028 ± 0.006 0.72 ± 0.15	0.035 ± 0.008 0.90 ± 0.20	0.016 0.40	0.014 ± 0.004 0.35 ± 0.10	inches mm
HCS2512...L750	0.256 ± 0.008 6.50 ± 0.20	0.128 ± 0.008 3.25 ± 0.20	0.037 ± 0.006 0.95 ± 0.15	0.024 ± 0.006 0.60 ± 0.15	0.035 ± 0.008 0.90 ± 0.20	0.016 0.40	0.014 ± 0.004 0.35 ± 0.10	inches mm
HCS2512...1L00	0.256 ± 0.008 6.50 ± 0.20	0.128 ± 0.008 3.25 ± 0.20	0.029 ± 0.006 0.73 ± 0.15	0.015 ± 0.006 0.38 ± 0.15	0.035 ± 0.008 0.90 ± 0.20	0.016 0.40	0.014 ± 0.004 0.35 ± 0.10	inches mm
HCS2512...2L00	0.256 ± 0.008 6.50 ± 0.20	0.128 ± 0.008 3.25 ± 0.20	0.038 ± 0.006 0.96 ± 0.15	0.024 ± 0.006 0.61 ± 0.15	0.035 ± 0.008 0.90 ± 0.20	0.016 0.40	0.014 ± 0.004 0.35 ± 0.10	inches mm
HCS2512...3L00	0.256 ± 0.008 6.50 ± 0.20	0.128 ± 0.008 3.25 ± 0.20	0.030 ± 0.006 0.76 ± 0.15	0.016 ± 0.006 0.41 ± 0.15	0.035 ± 0.008 0.90 ± 0.20	0.016 0.40	0.014 ± 0.004 0.35 ± 0.10	inches mm
HCS2512...4L00	0.256 ± 0.008 6.50 ± 0.20	0.128 ± 0.008 3.25 ± 0.20	0.026 ± 0.006 0.66 ± 0.15	0.012 ± 0.006 0.31 ± 0.15	0.035 ± 0.008 0.90 ± 0.20	0.016 0.40	0.014 ± 0.004 0.35 ± 0.10	inches mm
HCS2512...5L00	0.256 ± 0.008 6.50 ± 0.20	0.128 ± 0.008 3.25 ± 0.20	0.026 ± 0.006 0.66 ± 0.15	0.012 ± 0.006 0.31 ± 0.15	0.035 ± 0.008 0.90 ± 0.20	0.016 0.40	0.014 ± 0.004 0.35 ± 0.10	inches mm
HCS3920...L200	0.402 ± 0.008 10.20 ± 0.20	0.205 ± 0.008 5.20 ± 0.20	0.078 ± 0.006 1.98 ± 0.15	0.058 ± 0.006 1.48 ± 0.15	0.071 ± 0.012 1.80 ± 0.30	0.024 0.60	0.020 ± 0.004 0.50 ± 0.10	inches mm
HCS3920...L300	0.402 ± 0.008 10.20 ± 0.20	0.205 ± 0.008 5.20 ± 0.20	0.076 ± 0.006 1.92 ± 0.15	0.056 ± 0.006 1.42 ± 0.15	0.071 ± 0.012 1.80 ± 0.30	0.024 0.60	0.020 ± 0.004 0.50 ± 0.10	inches mm
HCS3920...L500	0.402 ± 0.008 10.20 ± 0.20	0.205 ± 0.008 5.20 ± 0.20	0.054 ± 0.006 1.36 ± 0.15	0.034 ± 0.006 0.86 ± 0.15	0.071 ± 0.012 1.80 ± 0.30	0.024 0.60	0.020 ± 0.004 0.50 ± 0.10	inches mm
HCS3920...1L00	0.402 ± 0.008 10.20 ± 0.20	0.205 ± 0.008 5.20 ± 0.20	0.036 ± 0.006 0.92 ± 0.15	0.017 ± 0.006 0.42 ± 0.15	0.071 ± 0.012 1.80 ± 0.30	0.024 0.60	0.020 ± 0.004 0.50 ± 0.10	inches mm
HCS3920...2L00	0.402 ± 0.008 10.20 ± 0.20	0.205 ± 0.008 5.20 ± 0.20	0.047 ± 0.006 1.19 ± 0.15	0.027 ± 0.006 0.69 ± 0.15	0.071 ± 0.012 1.80 ± 0.30	0.024 0.60	0.020 ± 0.004 0.50 ± 0.10	inches mm
HCS3920...3L00	0.402 ± 0.008 10.20 ± 0.20	0.205 ± 0.008 5.20 ± 0.20	0.037 ± 0.006 0.94 ± 0.15	0.017 ± 0.006 0.44 ± 0.15	0.071 ± 0.012 1.80 ± 0.30	0.024 0.60	0.020 ± 0.004 0.50 ± 0.10	inches mm
HCS3920...4L00	0.402 ± 0.008 10.20 ± 0.20	0.205 ± 0.008 5.20 ± 0.20	0.033 ± 0.006 0.85 ± 0.15	0.014 ± 0.006 0.35 ± 0.15	0.071 ± 0.012 1.80 ± 0.30	0.024 0.60	0.020 ± 0.004 0.50 ± 0.10	inches mm
HCS3920...5L00	0.402 ± 0.008 10.20 ± 0.20	0.205 ± 0.008 5.20 ± 0.20	0.033 ± 0.006 0.85 ± 0.15	0.014 ± 0.006 0.35 ± 0.15	0.071 ± 0.012 1.80 ± 0.30	0.024 0.60	0.020 ± 0.004 0.50 ± 0.10	inches mm
HCS5930...L200	0.591 ± 0.008 15.00 ± 0.20	0.305 ± 0.008 7.75 ± 0.20	0.076 ± 0.006 1.92 ± 0.15	0.056 ± 0.006 1.42 ± 0.15	0.165 ± 0.008 4.20 ± 0.20	0.039 1.00	0.020 ± 0.004 0.50 ± 0.10	inches mm
HCS5930...L300	0.591 ± 0.008 15.00 ± 0.20	0.305 ± 0.008 7.75 ± 0.20	0.057 ± 0.006 1.44 ± 0.15	0.037 ± 0.006 0.94 ± 0.15	0.165 ± 0.008 4.20 ± 0.20	0.039 1.00	0.020 ± 0.004 0.50 ± 0.10	inches mm
HCS5930...L500	0.591 ± 0.008 15.00 ± 0.20	0.305 ± 0.008 7.75 ± 0.20	0.043 ± 0.006 1.08 ± 0.15	0.023 ± 0.006 0.58 ± 0.15	0.165 ± 0.008 4.20 ± 0.20	0.039 1.00	0.020 ± 0.004 0.50 ± 0.10	inches mm
HCS5930...1L00	0.591 ± 0.008 15.00 ± 0.20	0.305 ± 0.008 7.75 ± 0.20	0.054 ± 0.006 1.37 ± 0.15	0.034 ± 0.006 0.87 ± 0.15	0.165 ± 0.008 4.20 ± 0.20	0.039 1.00	0.020 ± 0.004 0.50 ± 0.10	inches mm
HCS5930...2L00	0.591 ± 0.008 15.00 ± 0.20	0.305 ± 0.008 7.75 ± 0.20	0.037 ± 0.006 0.95 ± 0.15	0.018 ± 0.006 0.45 ± 0.15	0.165 ± 0.008 4.20 ± 0.20	0.039 1.00	0.020 ± 0.004 0.50 ± 0.10	inches mm
HCS5930...3L00	0.591 ± 0.008 15.00 ± 0.20	0.305 ± 0.008 7.75 ± 0.20	0.035 ± 0.006 0.90 ± 0.15	0.016 ± 0.006 0.40 ± 0.15	0.165 ± 0.008 4.20 ± 0.20	0.039 1.00	0.020 ± 0.004 0.50 ± 0.10	inches mm

**Power Derating Curve:**



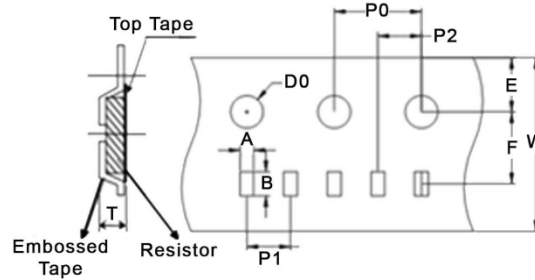
Operating temperature range of -55 to 170°C.  
Storage condition: 22~28°C, humidity of 40~75%.

Environmental Performance Characteristics		
Test	Test Specification	Test Condition
Short Time Overload	$\Delta R: \pm(1\%+0.0005\Omega)$	5 times rated power for 5 seconds
Temperature Coefficient of Resistance (TCR)	Refer to Electrical Specifications	+25°C / +125°C (JIS-C5202-5.2) $TCR \text{ (ppm/}^\circ\text{C)} = \frac{\Delta R}{R \times \Delta t} \times 10^6$
Moisture Resistance	$\Delta R: \pm(1\%+0.0005\Omega)$	The specimens shall be placed in a chamber and subjected to a relative humidity of 90~98% and a temperature of 25°C/65°C, 10 cycles. (MIL-STD-202, Method 106)
High Temperature Exposure	$\Delta R: \pm(1\%+0.0005\Omega)$	The chip (mounted on board) is exposed in the heat chamber, 125°C for 1000 hr. (JIS-C5202-7.2)
Load Life	$\Delta R: \pm(1\%+0.0005\Omega)$	Apply rated power for 1000 hours with 1.5 hours ON and 0.5 hour OFF. (JIS-C5202-7.10)
Rapid Change of Temperature	$\Delta R: \pm(1\%+0.0005\Omega)$	The chip (mounted on board) is exposed, -55 ± 3°C (30 min) / +125 ± 2°C (30 min) for 5 cycles. The following conditions as the figure below. (JIS_C5202-7.4) 

Function Performance Characteristics		
Test	Test Specification	Test Condition
Bending Strength	$\Delta R: \pm(1\%+0.0005\Omega)$	<p>Mount the chip to test 90mm(L)*40mm(W) FR4 printed circuit board substrate. Apply pressure in direction of arrow unit band width reaches 2mm (+0.2/-0mm) illustrated in the picture below and hold for <math>10 \pm 1</math> sec. (JIS-C5202-6.1)</p> <p style="text-align: right;">Unit: mm</p> 
Solderability	Solder shall cover 95% or more of the electrode area	<p>The part shall be immersed into the flux specified in the solder bath <math>235\text{C} \pm 5\text{C}</math> for 2 seconds <math>\pm 0.5</math> seconds. It shall be immersed to a point 10mm from its root. (Sn96.5/Ag3.0/Cu0.5) (JIS-C5 202 6.11)</p>  <p style="text-align: center;"><math>h = 10 \text{ mm}</math> <math>H = 10 \text{ mm min.}</math></p>

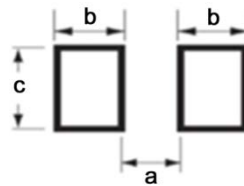
Note: The terminal temperature of component should be below 100°C.

**Taping Specifications – Embossed Plastic Tape**



Type / Code	A	B	E	F	W	Unit
HCS1206	0.074 ± 0.004 1.88 ± 0.10	0.140 ± 0.004 3.56 ± 0.10	0.069 ± 0.004 1.75 ± 0.10	0.138 ± 0.002 3.50 ± 0.05	0.315 ± 0.004 8.00 ± 0.10	inches mm
HCS2512 (all Ω ranges)	0.140 ± 0.004 3.55 ± 0.10	0.266 ± 0.004 6.75 ± 0.10	0.069 ± 0.004 1.75 ± 0.10	0.217 ± 0.002 5.50 ± 0.05	0.472 ± 0.008 12.00 ± 0.20	inches mm
HCS3920 (all Ω ranges)	0.217 ± 0.004 5.50 ± 0.10	0.425 ± 0.004 10.80 ± 0.10	0.069 ± 0.004 1.75 ± 0.10	0.295 ± 0.002 7.50 ± 0.05	0.630 ± 0.008 16.00 ± 0.20	inches mm
HCS5930 (all Ω ranges)	0.327 ± 0.004 8.30 ± 0.10	0.606 ± 0.004 15.40 ± 0.10	0.069 ± 0.004 1.75 ± 0.10	0.453 ± 0.004 11.50 ± 0.10	0.945 ± 0.012 24.00 ± 0.30	inches mm
Type / Code	P0	P1	P2	D0	T	Unit
HCS1206	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.061 ± 0.002 1.55 ± 0.05	0.055 ± 0.004 1.40 ± 0.10	inches mm
HCS2512 (0.0003Ω, 0.0005Ω, 0.00075Ω, 0.002Ω)	0.157 ± 0.002 4.00 ± 0.05	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.059 ± 0.004 1.50 ± 0.10	0.055 ± 0.004 1.40 ± 0.10	inches mm
HCS2512 (0.001Ω, 0.003Ω)	0.157 ± 0.002 4.00 ± 0.05	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.059 ± 0.004 1.50 ± 0.10	0.043 ± 0.004 1.10 ± 0.10	inches mm
HCS2512 (0.004Ω, 0.005Ω)	0.157 ± 0.002 4.00 ± 0.05	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.059 ± 0.004 1.50 ± 0.10	0.031 ± 0.004 0.80 ± 0.10	inches mm
HCS3920 (0.0002Ω, 0.0003Ω, 0.0005Ω, 0.002Ω)	0.157 ± 0.002 4.00 ± 0.05	0.315 ± 0.004 8.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.059 ± 0.004 1.50 ± 0.10	0.078 ± 0.004 1.97 ± 0.10	inches mm
HCS3920 (0.001Ω, 0.003Ω, 0.004Ω, 0.005Ω)	0.157 ± 0.002 4.00 ± 0.05	0.315 ± 0.004 8.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.059 ± 0.004 1.50 ± 0.10	0.049 ± 0.004 1.25 ± 0.10	inches mm
HCS5930 (0.0002Ω, 0.0003Ω, 0.001Ω)	0.157 ± 0.004 4.00 ± 0.10	0.472 ± 0.004 12.00 ± 0.10	0.079 ± 0.004 2.00 ± 0.10	0.059 ± 0.004 1.50 ± 0.10	0.091 ± 0.004 2.30 ± 0.10	inches mm
HCS5930 (0.0005Ω, 0.002Ω, 0.003Ω)	0.157 ± 0.004 4.00 ± 0.10	0.472 ± 0.004 12.00 ± 0.10	0.079 ± 0.004 2.00 ± 0.10	0.059 ± 0.004 1.50 ± 0.10	0.055 ± 0.004 1.40 ± 0.10	inches mm

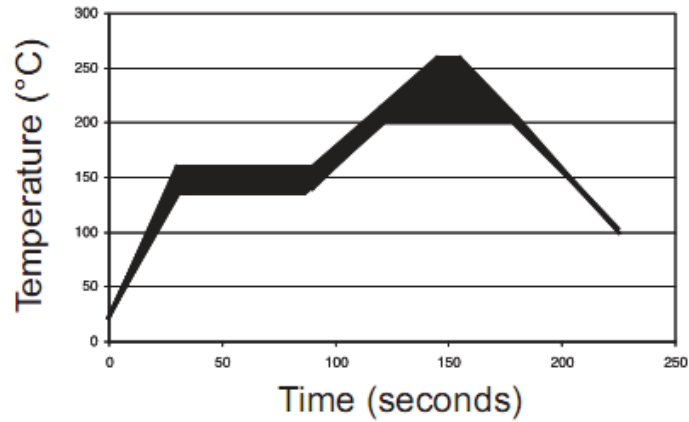
**Recommended Pad Layout**



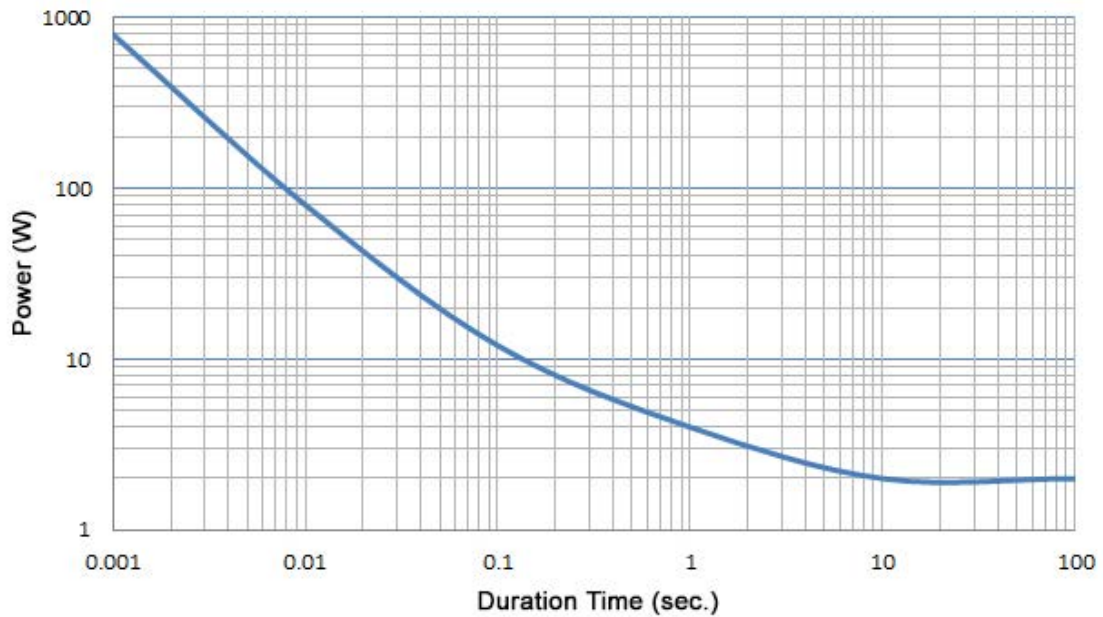
Type / Code	a	b	c	Unit
1206	0.055 1.40	0.083 2.10	0.071 1.80	inches mm
2512	0.150 3.80	0.071 1.80	0.134 3.40	inches mm
3920	0.220 5.60	0.106 2.70	0.244 6.20	inches mm
5930	0.220 5.60	0.205 5.20	0.344 8.75	inches mm

**Soldering Recommendations:**

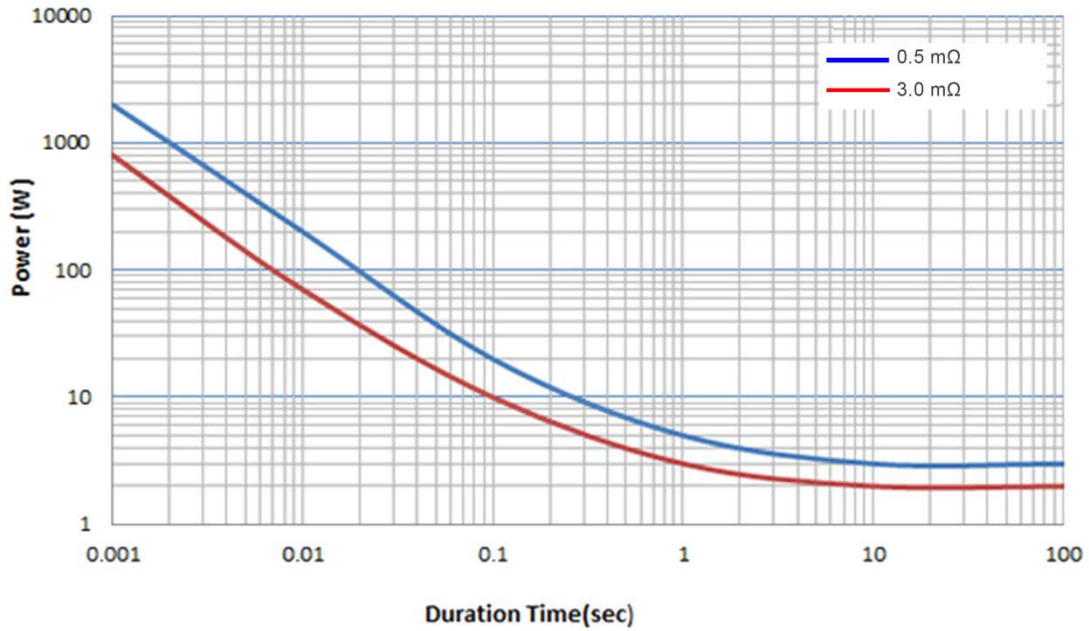
- Peak reflow temperatures and durations
  - ✓ IR Reflow Peak = 260°C max for 10 seconds
  - ✓ Not suitable for wave soldering
- Compatible with lead and lead-free solder reflow processes
- Recommended IR reflow profile:



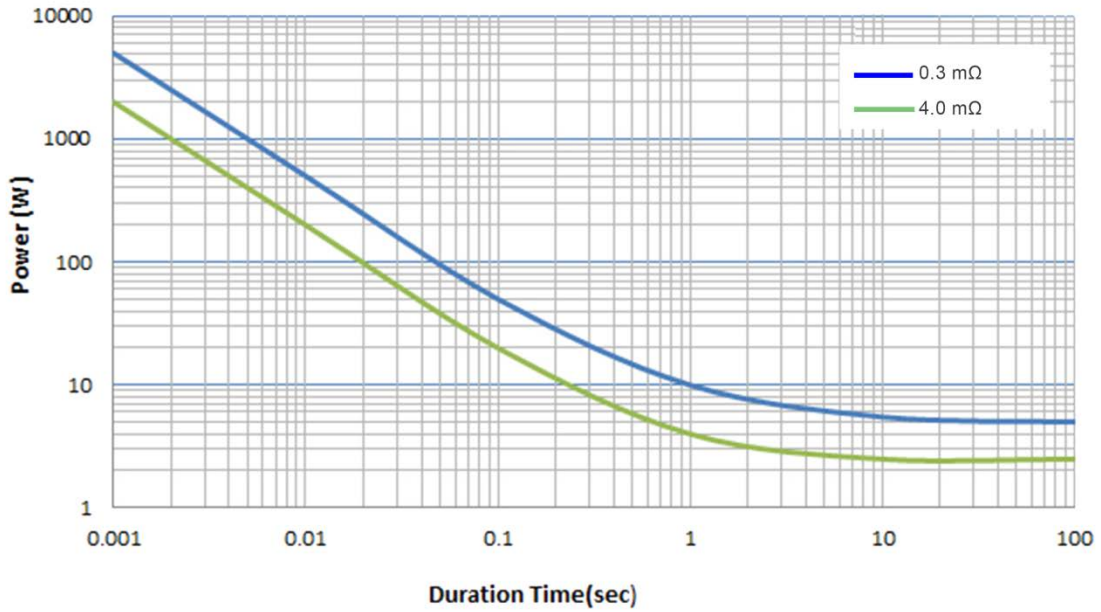
**Pulsed Power Characteristics – HCS1206FTL500**



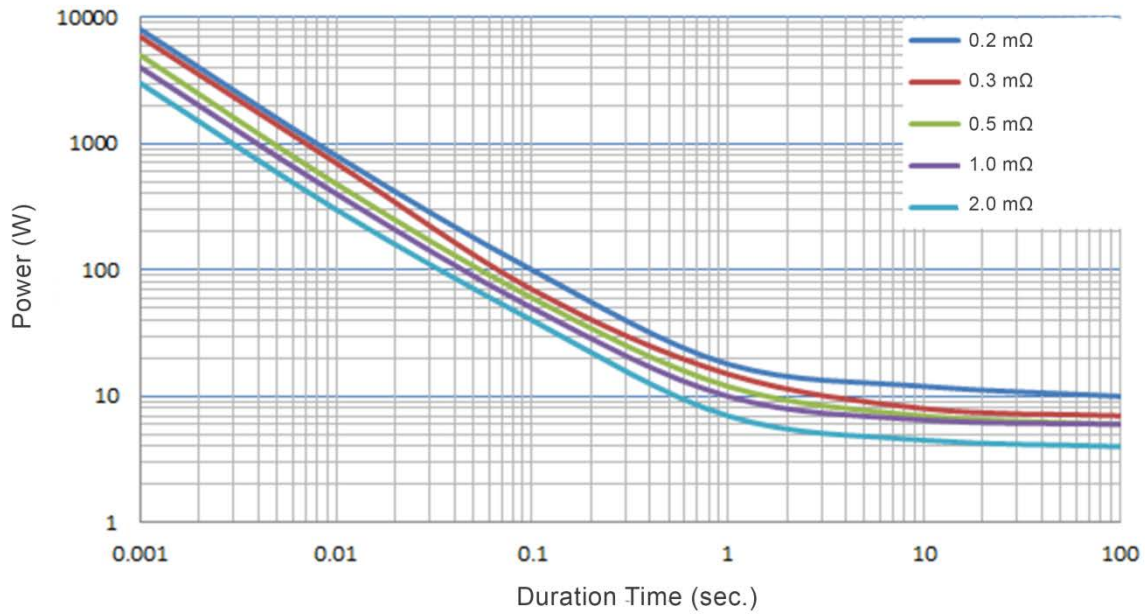
**Pulsed Power Characteristics – HCS2512**



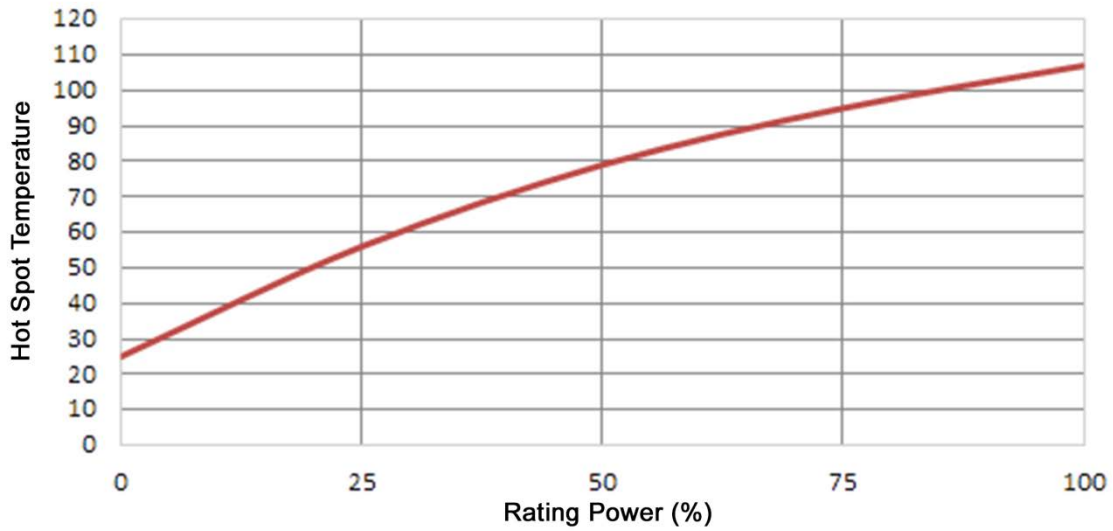
**Pulsed Power Characteristics – HCS3920**



**Pulsed Power Characteristics – HCS5930**

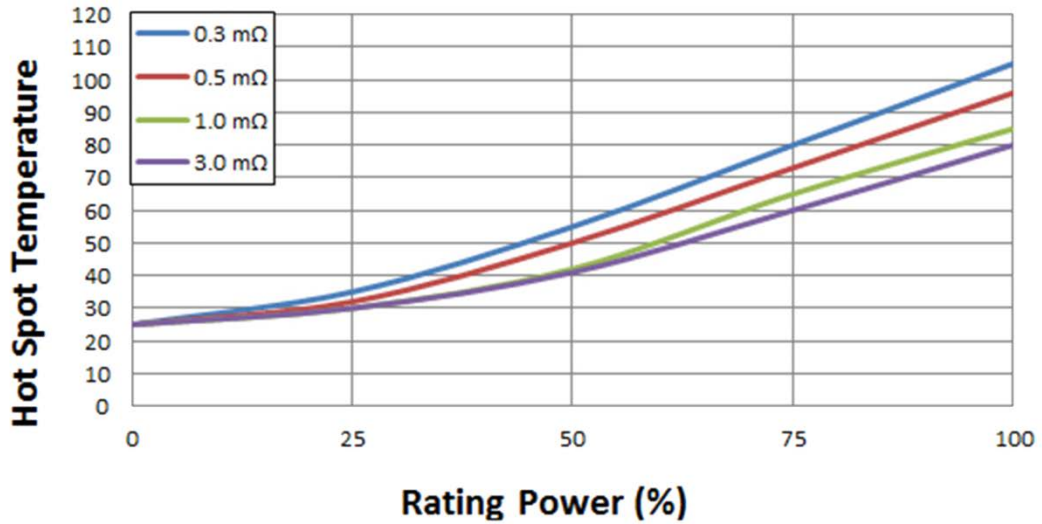


**Rated Power vs. Surface Temperature – HCS1206FTL500**

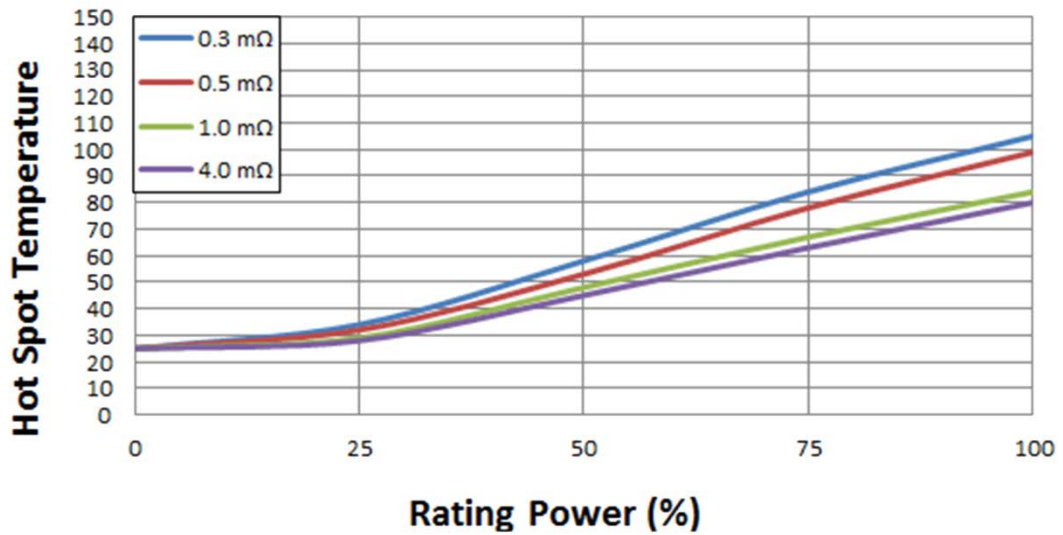




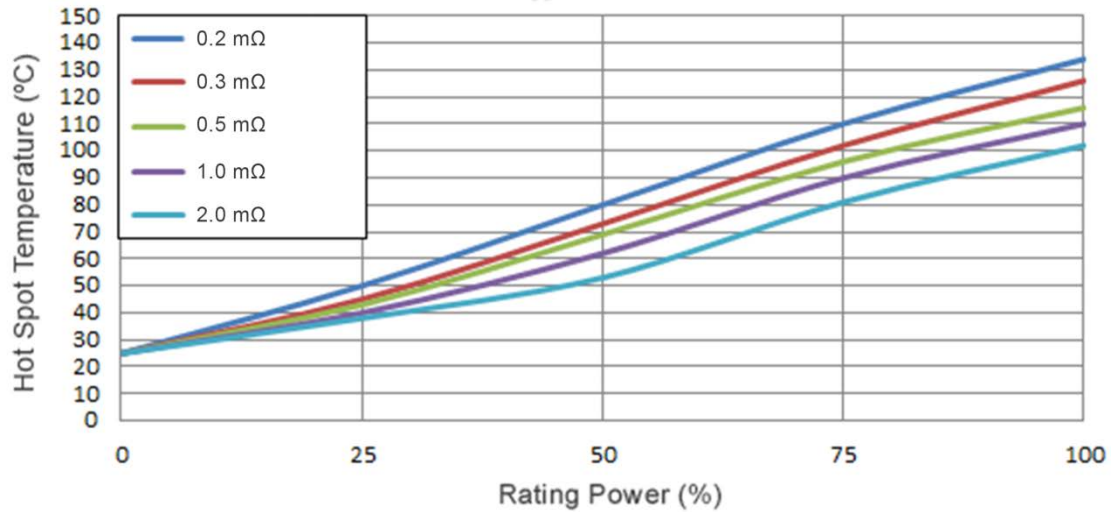
Rated Power vs. Surface Temperature – HCS2512



Rated Power vs. Surface Temperature – HCS3920



**Rated Power vs. Surface Temperature – HCS5930**



Temperature rise test boards use aluminum substrate (MCPCB).

**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 2). 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.

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)
HCS	High Current Shunt Resistor	SMD	YES	100% Copper	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
<b>H</b>	<b>C</b>	<b>S</b>	<b>3</b>	<b>9</b>	<b>2</b>	<b>0</b>	<b>F</b>	<b>T</b>	<b>L</b>	<b>3</b>	<b>0</b>	<b>0</b>

Product Series	Size	Tolerance	Packaging		Resistance Value
HCS	1206 2512 3920 5930	Code Tol F 1% J 5%	Code Description Size Quantity		Four characters with "L" used as multiplier of 10 <sup>-3</sup> for any value under 0.1 ohm
			T 7" Reel - Plastic Tape 1206 2000		0.0003 ohm = L300
			T 10" Reel - Plastic Tape 2512 4,000		0.0005 ohm = L500
			T 13" Reel - Plastic Tape 3920 3,000		0.00075 ohm = L750
			T 13" Reel - Plastic Tape 5930 2,000		0.001 ohm = 1L00