

Features:

- Available in up to 15 W (70°C) power rating
- Elevated resistive element for lower thermal stress on PCB
- High temperature capability with operation up to 170°C
- High pulse capability
- Excellent long-term stability
- RoHS compliant, REACH compliant, lead free, and halogen free
- AEC-Q200 compliant

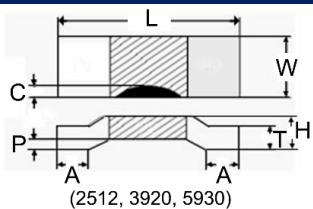
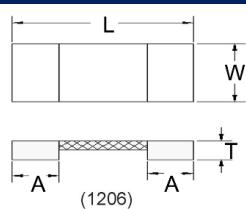


Electrical Specifications

Type/Code	Power Rating (W) @ 100°C (*)	Power Rating (W) @ 70°C (*)	TCR (ppm/°C)	Ohmic Range (Ω) and Tolerance	
				1% and 5%	
HCS1206	2	-	±300	0.0003	
			±200	0.0005	
			±150	0.001	
HCS2512	9	10	±300	0.00025	
			±200	0.0003	
			±115	0.0005	
	4	6	±115	0.00075	
			±100	0.001	
			±50	0.002	
	3	4	±50	0.003	
	2	3	±50	0.004	
	1.5	2.5	±50	0.005	
	5	12	±150	0.0002	
		10	±150	0.0003	
		9	±70	0.0005	
		8	±60	0.0007	
		7	±50	0.001	
		6	±50	0.002	
		5	±50	0.003	
		4	±50	0.004	
HCS3920	2	3	±50	0.005	
			10	0.0001	
			15	0.0002	
			±250	0.0003	
			±100	0.0005	
			7	0.0007	
			8	0.001	
			9	0.002	
	6	10	±100	0.003	
		15	±75	0.005	
HCS5930	4	7	±50	0.001	
		-	±50	0.002	
	3	8	±50	0.003	
		9	±50	0.004	
		-	±50	0.005	

(*) Power ratings based on terminal temperature limits; higher terminal temperatures require power derating per derating curve.

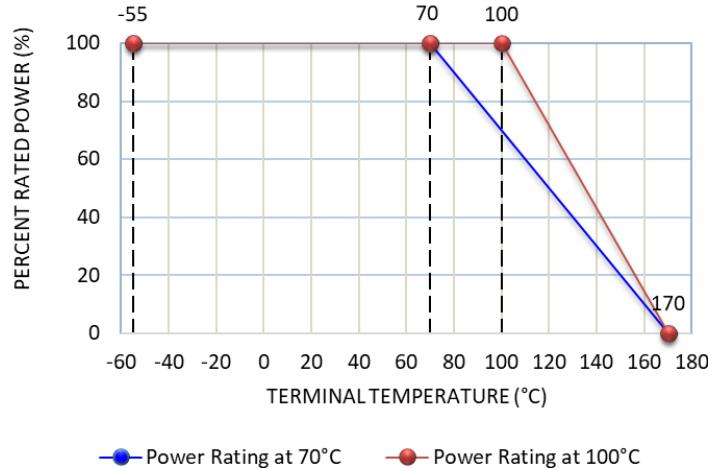
Mechanical Specifications



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...1L00	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...L250	0.256 ± 0.008 6.50 ± 0.20	0.128 ± 0.008 3.25 ± 0.20	0.053 ± 0.006 1.35 ± 0.15	0.039 ± 0.006 1.00 ± 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...L300	0.256 ± 0.008 6.50 ± 0.20	0.128 ± 0.008 3.25 ± 0.20	0.049 ± 0.006 1.24 ± 0.15	0.035 ± 0.006 0.89 ± 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 0.77 ± 0.15	0.017 ± 0.006 0.42 ± 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	0.028 ± 0.006 0.70 ± 0.15	0.014 ± 0.006 0.35 ± 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	0.028 ± 0.006 0.70 ± 0.15	0.014 ± 0.006 0.35 ± 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...L700	0.402 ± 0.008 10.20 ± 0.20	0.205 ± 0.008 5.20 ± 0.20	0.047 ± 0.006 1.20 ± 0.15	0.028 ± 0.006 0.70 ± 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

Mechanical Specifications (cont.)								
Type/Code	L	W	H	T	A	C (max.)	P	Unit
HCS3920...3L00	0.402 ± 0.008 10.20 ± 0.20	0.205 ± 0.008 5.20 ± 0.20	0.037 ± 0.006 0.95 ± 0.15	0.018 ± 0.006 0.45 ± 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...L100	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...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 0.46 ± 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:

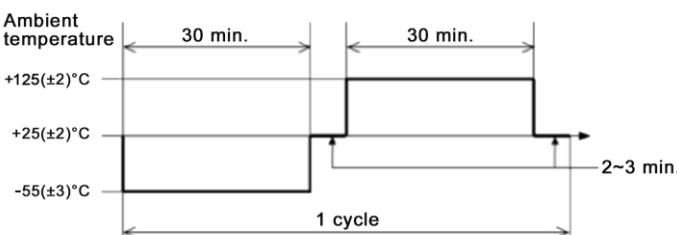


Performance Characteristics

Test	Test Method	Test Specification	Test Condition
Temperature Coefficient of Resistance (TCR)	JIS-C-5202 5.2	Refer to Electrical Specifications	+25°C / +125°C (JIS-C5202-5.2) TCR (ppm/°C) = $\frac{\Delta R}{R \times \Delta t} \times 10^6$
Short Time Overload	JIS-C-5202 5.5	ΔR: ± 1%	5 times rated power for 5 seconds

Performance Characteristics (cont.)

Test	Test Method	Test Specification	Test Condition
Moisture Resistance	MIL-STD-202 Method 106	$\Delta R: \pm 1\%$	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.
High Temperature Exposure	JIS-C-5202 7.2	$\Delta R: \pm 1\%$	The chip (mounted on board) is exposed in the heat chamber, 125°C for 1000 hours
Load Life	JIS-C-5202 7.10	$\Delta R: \pm 1\%$	Apply rated power for 1000 hours with 1.5 hours ON and 0.5 hour OFF.
Rapid Change of Temperature	JIS-C-5202 7.4	$\Delta R: \pm 1\%$	The chip (mounted on board) is exposed, $-55 \pm 3^\circ\text{C}$ (30 min) / $+125 \pm 2^\circ\text{C}$ (30 minutes) for 5 cycles. The following conditions as the figure

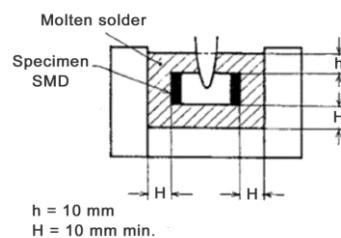
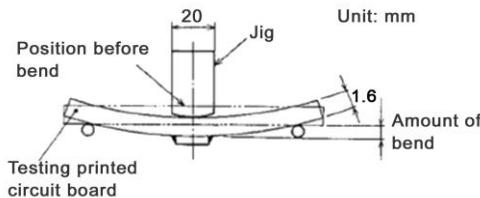


Operating temperature range is -55 to $+170^\circ\text{C}$

Recommended storage condition is 22 to 28°C , humidity is of 40% to 75% .

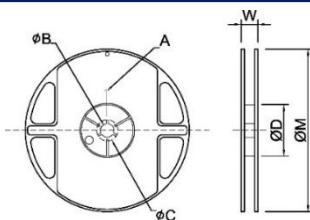
Function Performance Characteristics

Test	Test Method	Test Specification	Test Condition
Bending Strength	JIS-C-5202 6.1	$\Delta R: \pm 1\%$	Mount the chip to test $90\text{ mm (L)} \times 40\text{ mm (W)}$ FR4 printed circuit board substrate. Apply pressure in direction of arrow unit band width reaches 2 mm ($+0.2$ / -0 mm) illustrated in the picture below and hold for 10 ± 1 seconds
Solderability	JIS-C-5202 6.11	Solder shall cover 95% or more of the electrode area	The part shall be immersed into the flux specified in the solder bath $235 \pm 5^\circ\text{C}$ for 2 seconds ± 0.5 seconds. It shall be immersed to a point 10 mm from its root. ($\text{Sn}96.5/\text{Ag}3.0/\text{Cu}0.5$)



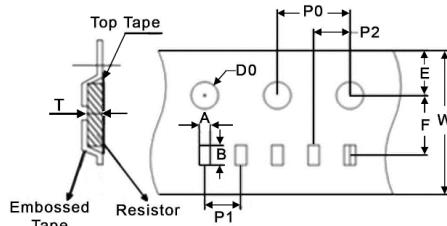
Note: The terminal temperature of component should be below 100°C .

Reel Specifications



Type/Code	A	B	C	D	W	M	Unit
HCS1206	0.079 ± 0.020 2.00 ± 0.50	0.512 ± 0.020 13.00 ± 0.50	0.697 ± 0.020 17.70 ± 0.50	2.362 ± 0.020 60.00 ± 0.50	0.472 ± 0.020 12.00 ± 0.50	7.008 ± 0.039 178.00 ± 1.00	inches mm
HCS2512	0.079 ± 0.020 2.00 ± 0.50	0.512 ± 0.020 13.00 ± 0.50	0.697 ± 0.020 17.70 ± 0.50	2.441 ± 0.020 62.00 ± 0.50	0.650 ± 0.020 16.50 ± 0.50	9.843 ± 0.039 250.00 ± 1.00	inches mm
HCS3920	0.098 ± 0.020 2.50 ± 0.50	0.531 ± 0.020 13.50 ± 0.50	0.697 ± 0.020 17.70 ± 0.50	3.898 ± 0.020 99.00 ± 0.50	0.815 ± 0.020 20.70 ± 0.50	12.992 ± 0.039 330.00 ± 1.00	inches mm
HCS5930	0.098 ± 0.020 2.50 ± 0.50	0.531 ± 0.020 13.50 ± 0.50	0.697 ± 0.020 17.70 ± 0.50	3.898 ± 0.020 99.00 ± 0.50	1.157 ± 0.020 29.40 ± 0.50	12.992 ± 0.039 330.00 ± 1.00	inches mm

Taping Specifications - Plastic Tape

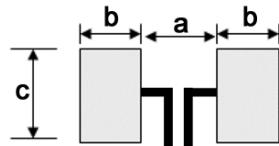


Type / Code	A	B	E	F	W	Unit
HCS1206	0.074 ± 0.004 1.88 ± 0.10	0.140 ± 0.004 3.56 ± 0.10	0.069 ± 0.004 1.75 ± 0.10	0.138 ± 0.002 3.50 ± 0.05	0.315 ± 0.004 8.00 ± 0.10	inches mm
HCS2512 (all Ω ranges)	0.140 ± 0.004 3.55 ± 0.10	0.266 ± 0.004 6.75 ± 0.10	0.069 ± 0.004 1.75 ± 0.10	0.217 ± 0.002 5.50 ± 0.05	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

Taping Specifications - Plastic Tape (cont.)

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 (0.00025, 0.0003, 0.0005, 0.00075, 0.002)	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 (0.001, 0.003)	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 (0.004, 0.005)	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 (0.0002, 0.0003, 0.0004, 0.0005, 0.0007, 0.002)	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 (0.001, 0.003, 0.004, 0.005)	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 (0.0001, 0.0002, 0.0003, 0.001)	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 (0.0005, 0.002, 0.003)	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 Layouts



Type/Code	a	b	c	Unit
1206	0.055 1.40	0.067 1.70	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

Recommended Solder Profile

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

100% Copper

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

Wave Soldering

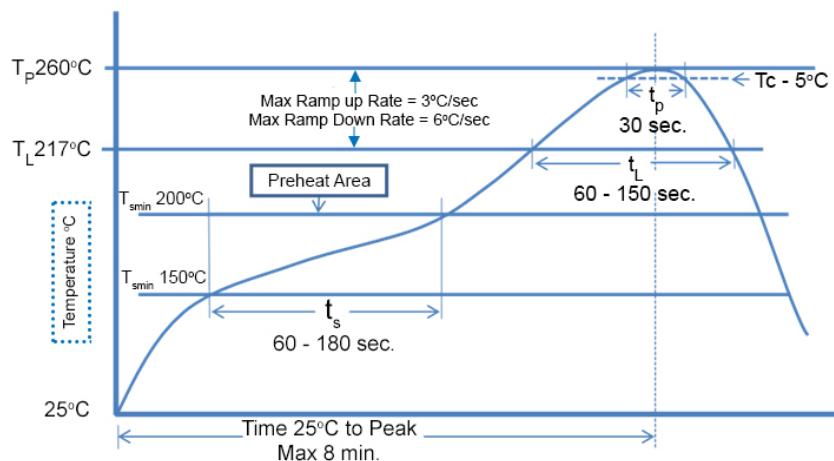
Description	Maximum	Recommended	Minimum
Preheat Time	80 seconds	70 seconds	60 seconds
Temperature Diff.	140°C	120°C	100°C
Solder Temp.	260°C	250°C	240°C
Dwell Time at Max.	10 seconds	5 seconds	*
Ramp DN (°C/sec)	N/A	N/A	N/A

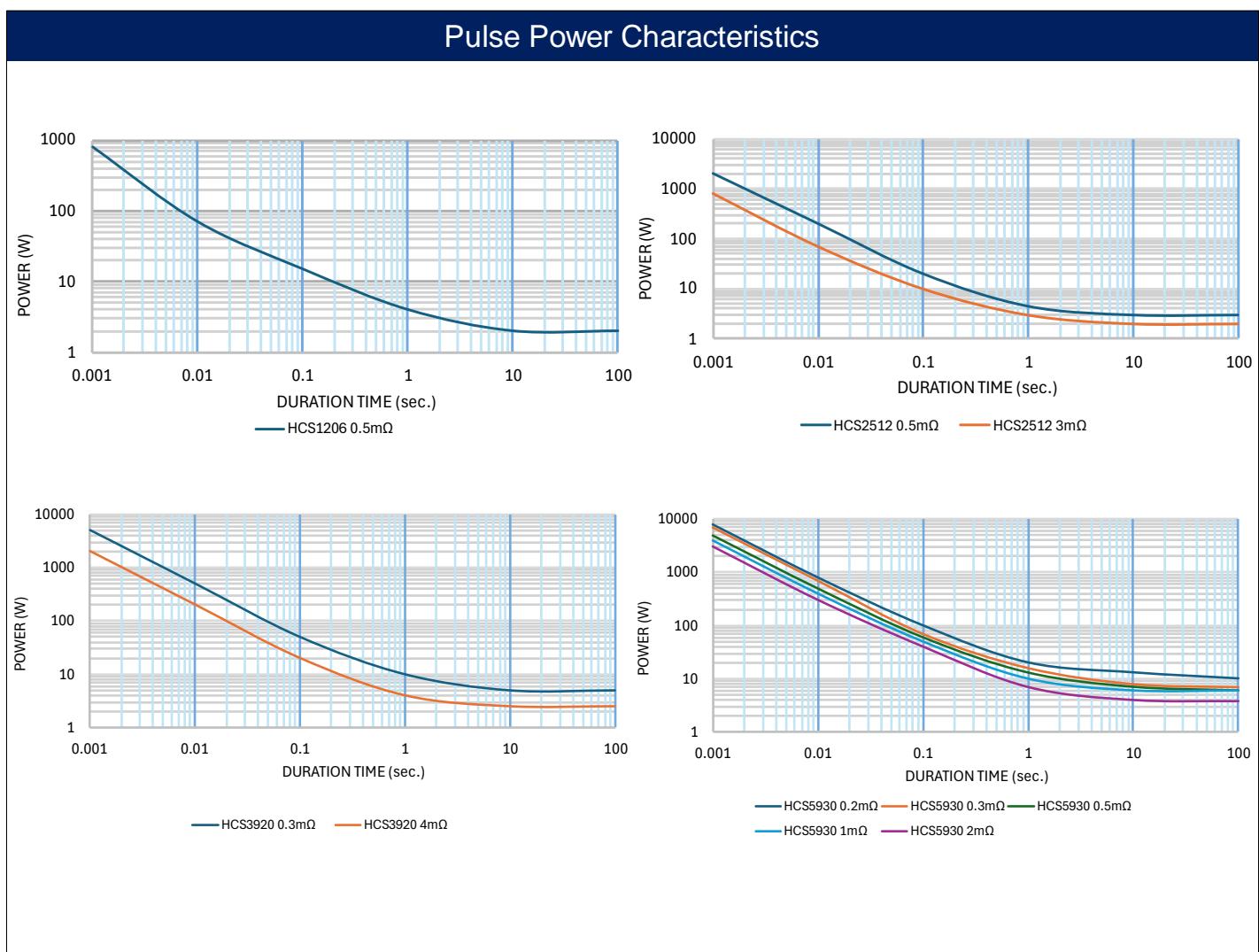
Temperature Diff. = Difference between final preheat stage and soldering stage.

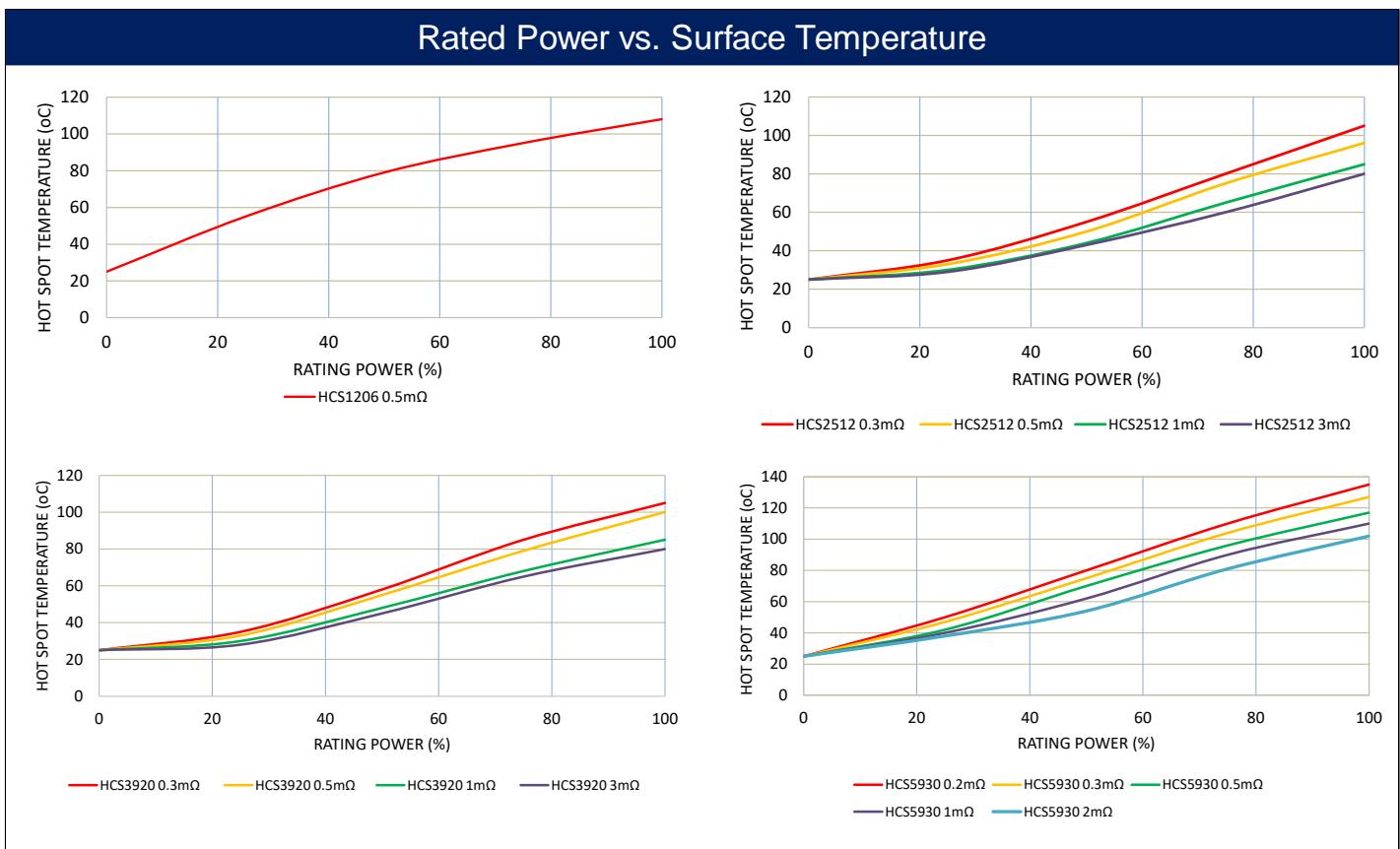
Convection IR Reflow

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







Temperature rise test boards. Use aluminum substrate (MCPBC).

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)
HCS	High Current Metal Alloy 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

