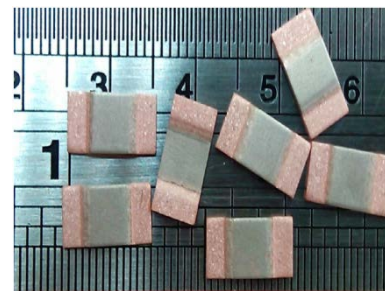


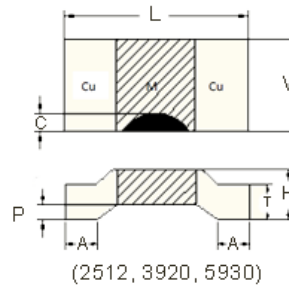
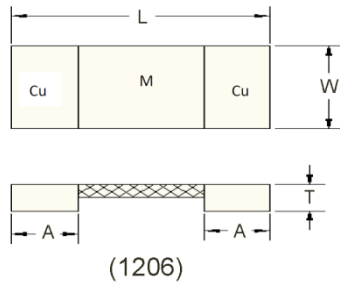
- Features:
- Available in up to 10W power rating
 - Resistance value from 0.2 to 5m Ω
 - Current handling up to 224A in 5930 size
 - Excellent long term stability
 - AEC-Q200 qualified
 - RoHS compliant

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



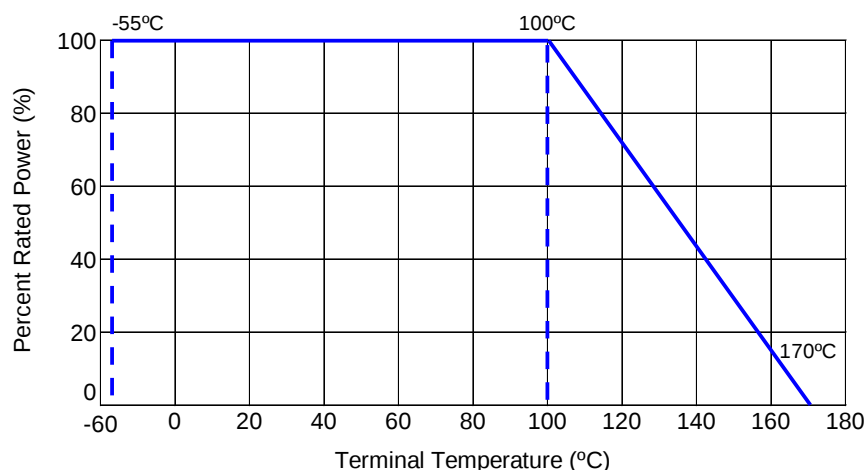
Electrical Specifications			
Type / Code	Power Rating	TCR (ppm/ $^{\circ}$ C)	Ohmic Range (Ω) and Tolerance
			1% and 5%
HCS1206	2W	± 300 ppm/ $^{\circ}$ C	0.0003
		± 200 ppm/ $^{\circ}$ C	0.0005
		± 150 ppm/ $^{\circ}$ C	0.001
HCS2512	3W	± 150 ppm/ $^{\circ}$ C	0.0003
		± 115 ppm/ $^{\circ}$ C	0.0005
		± 115 ppm/ $^{\circ}$ C	0.00075
		± 100 ppm/ $^{\circ}$ C	0.001
		± 50 ppm/ $^{\circ}$ C	0.002
	2W	± 50 ppm/ $^{\circ}$ C	0.003
		± 50 ppm/ $^{\circ}$ C	0.004
HCS3920	5W	± 200 ppm/ $^{\circ}$ C	0.0002
		± 150 ppm/ $^{\circ}$ C	0.0003
		± 70 ppm/ $^{\circ}$ C	0.0005
		± 50 ppm/ $^{\circ}$ C	0.001
	4W	± 50 ppm/ $^{\circ}$ C	0.002
	3W	± 50 ppm/ $^{\circ}$ C	0.003
	2.5W	± 50 ppm/ $^{\circ}$ C	0.004
	2W	± 50 ppm/ $^{\circ}$ C	0.005
HCS5930	10W	± 100 ppm/ $^{\circ}$ C	0.0002
	7W	± 100 ppm/ $^{\circ}$ C	0.0003
	6W	± 75 ppm/ $^{\circ}$ C	0.0005
		± 50 ppm/ $^{\circ}$ C	0.001
	4W	± 50 ppm/ $^{\circ}$ C	0.002

Mechanical Specifications



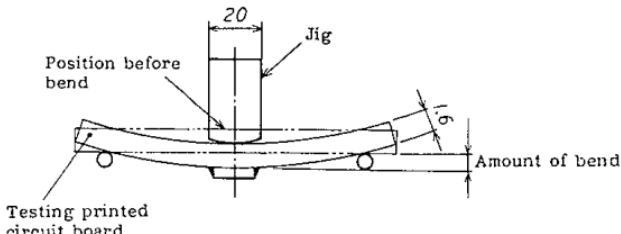
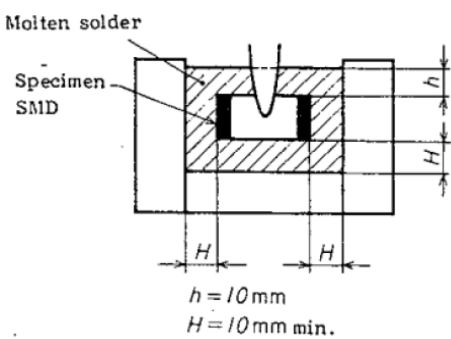
Type / Code	L	W	H	T	A	C (max.)	P	Unit
HCS1206...L300	0.126 ± 0.008 3.20 ± 0.20	0.065 ± 0.008 1.65 ± 0.20	NA	0.047 ± 0.006 1.20 ± 0.15	0.031 ± 0.008 0.80 ± 0.20	NA	NA	inches mm
HCS1206...L500	0.126 ± 0.008 3.20 ± 0.20	0.065 ± 0.008 1.65 ± 0.20	NA	0.035 ± 0.006 0.90 ± 0.15	0.031 ± 0.008 0.80 ± 0.20	NA	NA	inches mm
HCS1206...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...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	0.038 ± 0.006 0.96 ± 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

Power Derating Curve:



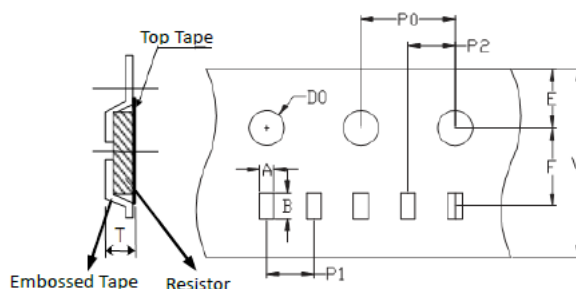
Operating temperature range of -55 to 170°C.
Storage condition: 22~28°C, humidity of 40~75%.

Environmental Performance Characteristics		
Item	Test Condition	Specification
Short Time Overload	5 times rated power for 5 seconds	$\Delta R: \pm(1\%+0.0005\Omega)$
Temperature Coefficient of Resistance (TCR)	+25°C / +125°C (JIS-C5202-5.2) $TCR (ppm/^{\circ}C) = \frac{\Delta R}{R \times \Delta t} \times 10^6$	Refer to Electrical Specifications
Moisture Resistance	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)	$\Delta R: \pm(1\%+0.0005\Omega)$
High Temperature Exposure	The chip (mounted on board) is exposed in the heat chamber, 125°C for 1000 hr. (JIS-C5202-7.2)	$\Delta R: \pm(1\%+0.0005\Omega)$
Load Life	Apply rated power for 1000 hours with 1.5 hours ON and 0.5 hour OFF. (JIS-C5202-7.10)	$\Delta R: \pm(1\%+0.0005\Omega)$
Rapid Change of Temperature	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) The diagram illustrates the temperature cycling test. The y-axis is labeled 'Ambient temperature' with levels at +125(±2)°C, +25(±2)°C, and -55(±3)°C. The x-axis shows time intervals: 30 min. at +125°C, 30 min. at -55°C, and a 2~3 min. dwell at +25°C. One complete cycle is indicated by a bracket at the bottom.	$\Delta R: \pm(1\%+0.0005\Omega)$

Function Performance Characteristics		
Item	Test Condition	Specification
Bending Strength	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 10 ± 1 sec. (JIS-C5202-6.1) Unit: mm 	$\Delta R: \pm(1\%+0.0005\Omega)$
Solderability	The part shall be immersed into the flux specified in the solder bath $235^{\circ}\text{C} \pm 5^{\circ}\text{C}$ for 2 seconds ± 0.5 seconds. It shall be immersed to a point 10mm from its root. (Sn96.5/Ag3.0/Cu0.5) (JIS-C5 202 6.11)  $h = 10 \text{ mm}$ $H = 10 \text{ mm min.}$	Solder shall cover 95% or more of the electrode area

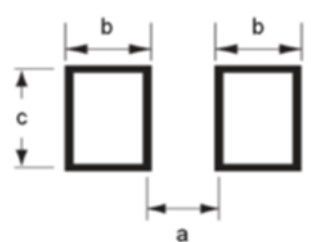
Note: The terminal temperature of component should be below 100°C .

Taping Specifications



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	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	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)	0.317 ± 0.004 8.05 ± 0.10	0.602 ± 0.004 15.30 ± 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	0.157 ± 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	0.047 ± 0.008 1.20 ± 0.20	inches mm
HCS3920	0.157 ± 0.002 4.00 ± 0.05	0.472 ± 0.004 12.00 ± 0.10	0.236 ± 0.002 6.00 ± 0.05	0.059 ± 0.004 1.50 ± 0.10	0.047 ± 0.008 1.20 ± 0.20	inches mm
HCS5930 (0.0002Ω, 0.0003Ω)	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)	0.157 ± 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

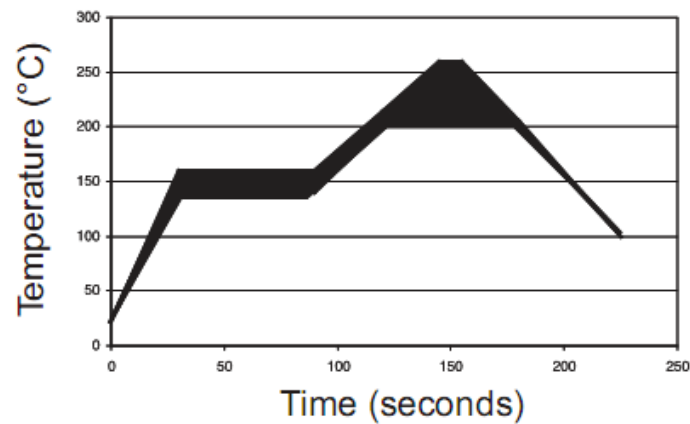
Recommended Pad Layout



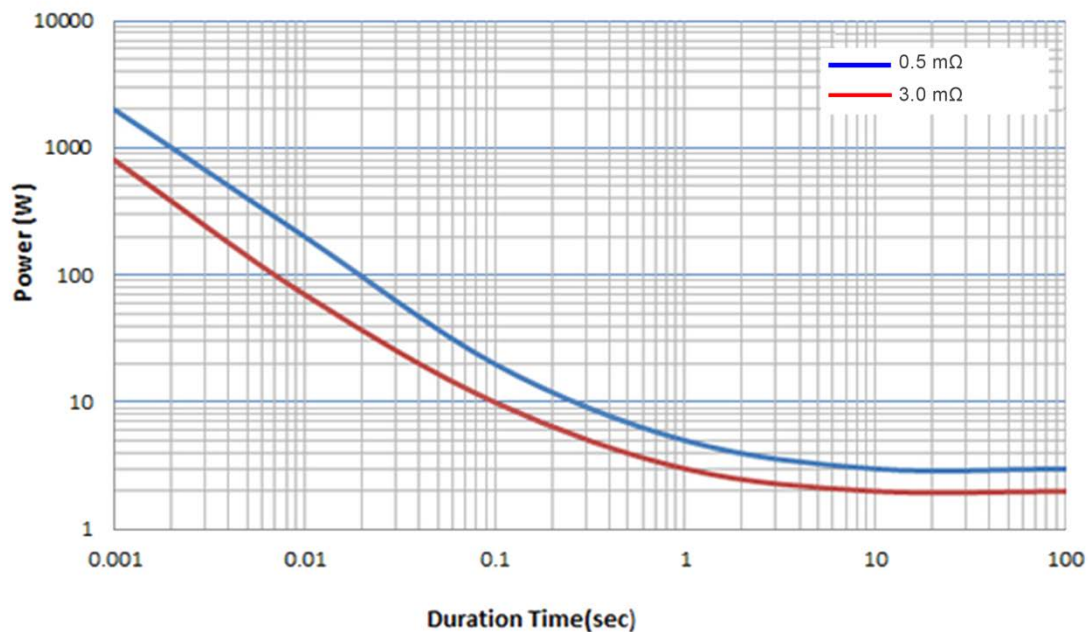
Type / Code	a	b	c	Unit
1206	0.055 1.40	0.083 2.10	0.071 1.80	inches mm
2512	0.150 3.80	0.071 1.80	0.134 3.40	inches mm
3920	0.220 5.60	0.106 2.70	0.244 6.20	inches mm
5930	0.220 5.60	0.205 5.20	0.344 8.75	inches mm

Soldering Recommendations:

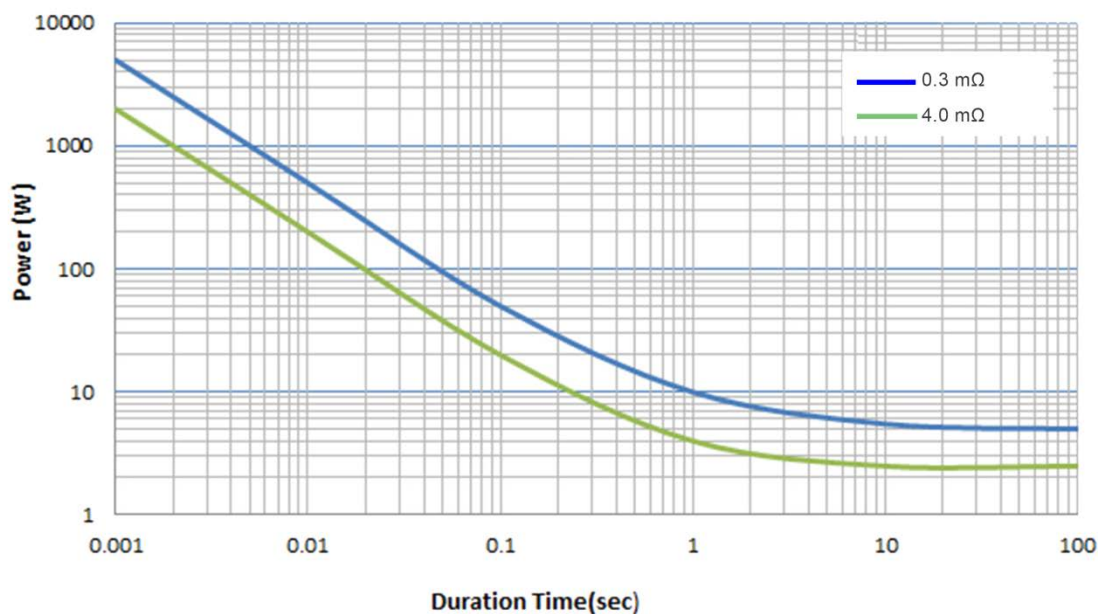
- Peak reflow temperatures and durations
 - ✓ IR Reflow Peak = 260°C max for 10 seconds
 - ✓ Not suitable for wave soldering
- Compatible with lead and lead-free solder reflow processes
- Recommended IR reflow profile:



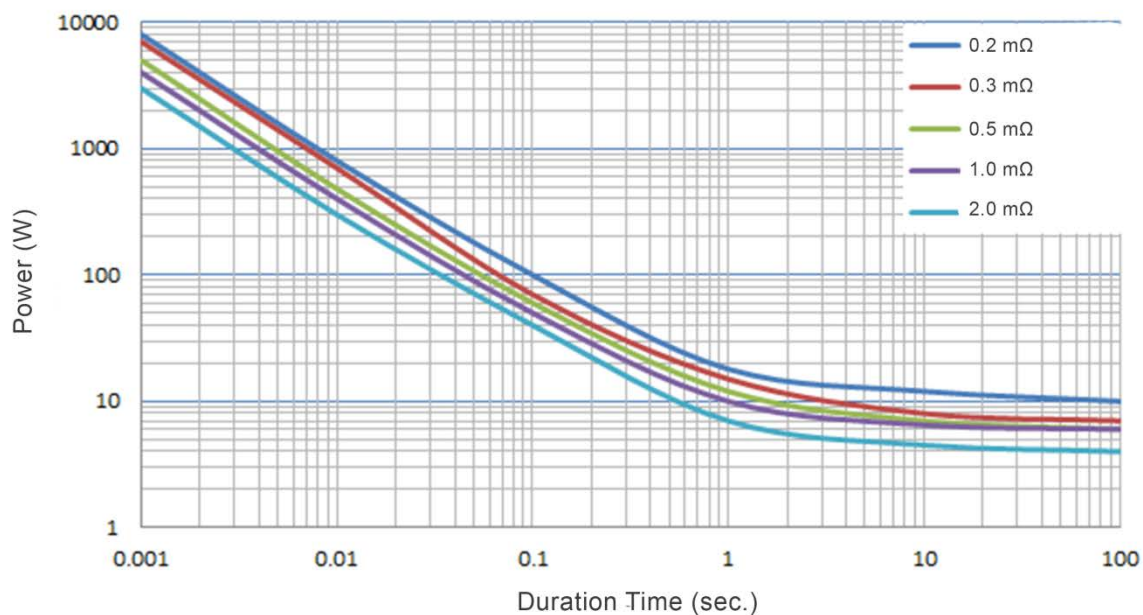
Pulsed Power Characteristics – HCS2512



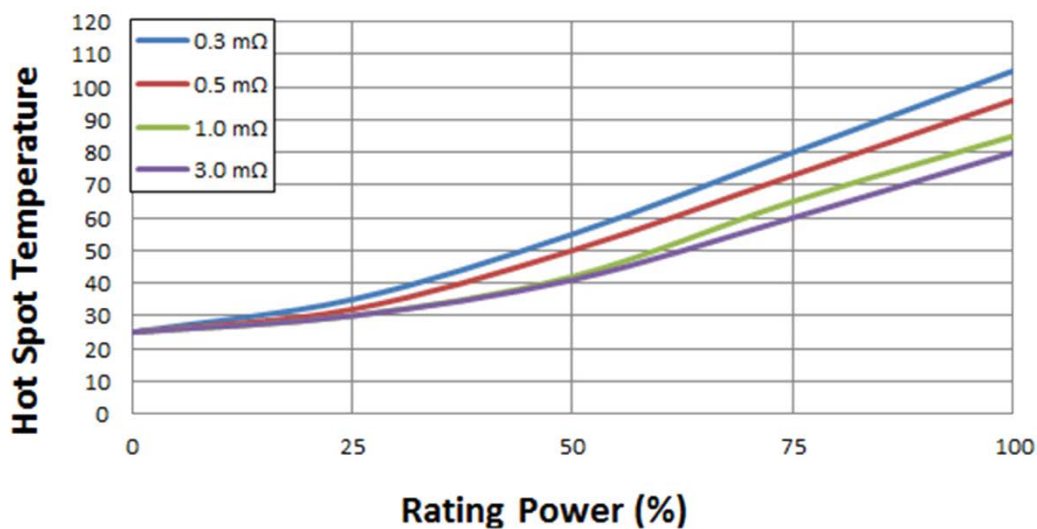
Pulsed Power Characteristics – HCS3920



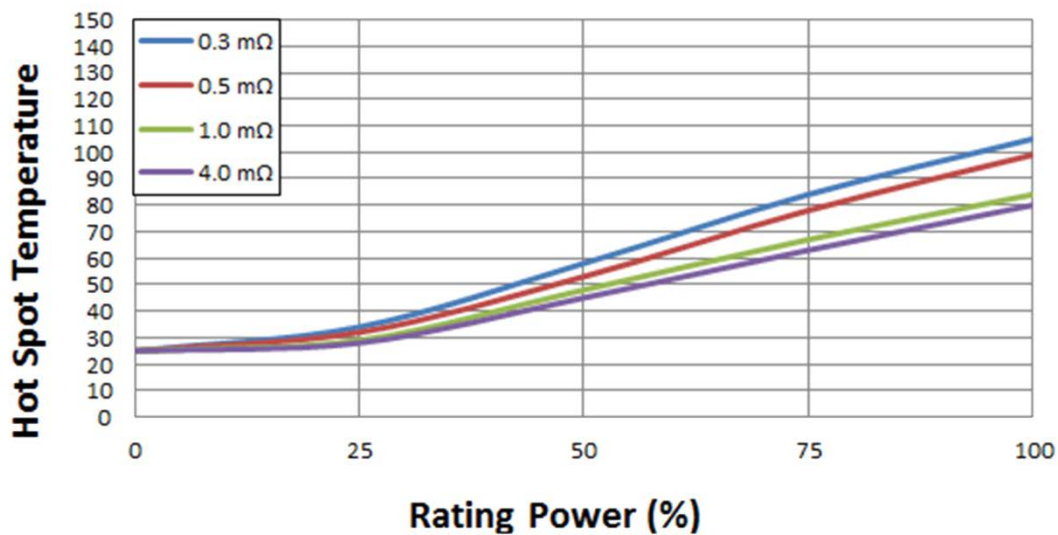
Pulsed Power Characteristics – HCS5930



Rated Power vs. Surface Temperature – HCS2512

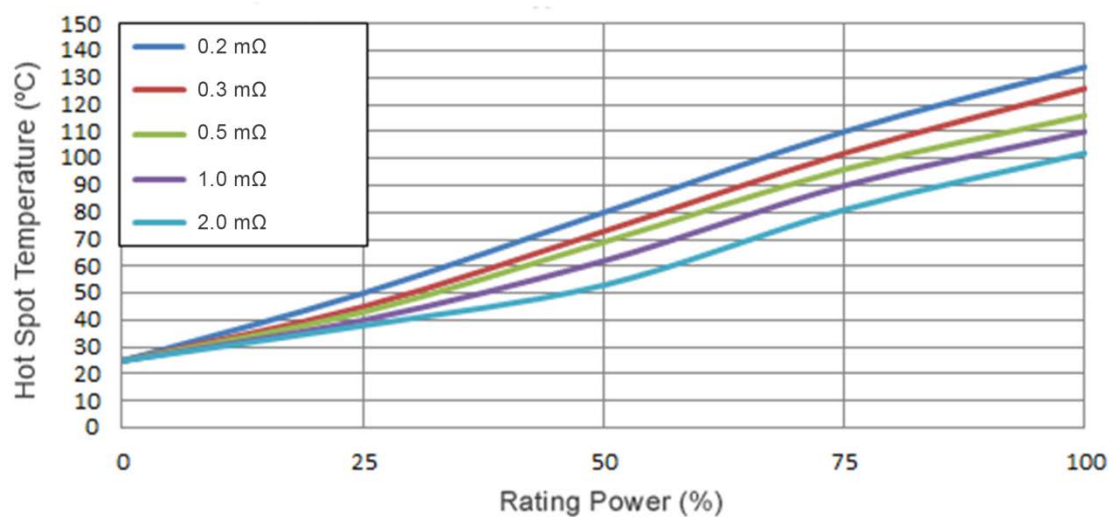


Rated Power vs. Surface Temperature – HCS3920



Temperature rise test boards use aluminum substrate (MCPCB).

Rated Power vs. Surface Temperature – HCS5930



How to Order

1	2	3	4	5	6	7	8	9	10	11	12	13
H	C	S	3	9	2	0	F	T	L	3	0	0
Product Series		Size		Tolerance		Packaging				Resistance Value		
HCS		1206		Code	Tol	Code	Description	Size	Quantity	Four characters with "L" used as multiplier of 10 ⁻³ for any value under 0.1 ohm		
		2512		F	1%	T	7" Reel - Plastic Tape	1206	2000	0.0003 ohm = L300 0.0005 ohm = L500 0.00075 ohm = L750 0.001 ohm = 1L00		
		3920		J	5%		10" Reel - Plastic Tape	2512	4,000			
		5930					13" Reel - Plastic Tape	3920	3,000			
								5930	2,000			