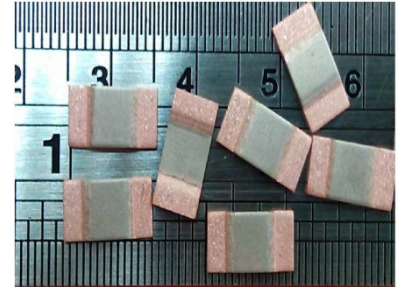


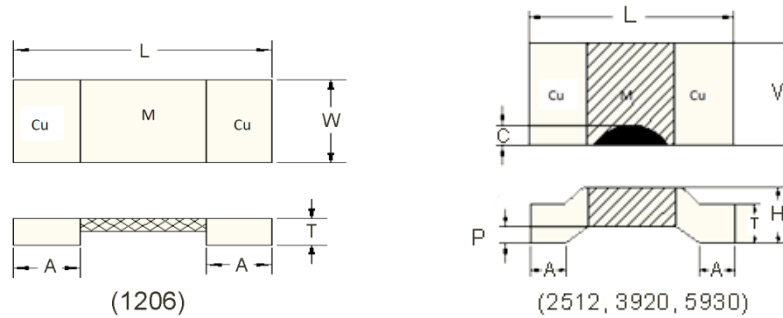
- Features:
- Available in up to 10W power rating
 - Resistance value from 0.2 to 5mΩ
 - Current handling up to 224A in 5930 size
 - Excellent long term stability
 - AEC-Q200 qualified
 - RoHS compliant



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

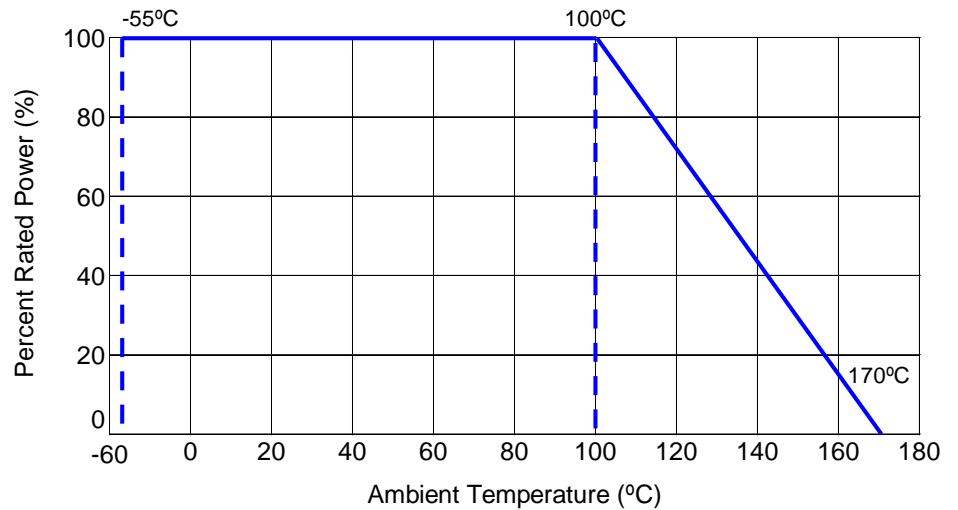
Electrical Specifications			
Type / Code	Power Rating	TCR (ppm/°C)	Ohmic Range (Ω) and Tolerance
			1% and 5%
HCS1206	2W	±300 ppm/°C	0.0003
		±200 ppm/°C	0.0005
		±150 ppm/°C	0.001
HCS2512	3W	±150 ppm/°C	0.0003
		±115 ppm/°C	0.0005
		±115 ppm/°C	0.00075
		±100 ppm/°C	0.001
HCS3920	5W	±100 ppm/°C	0.001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

Mechanical Specifications

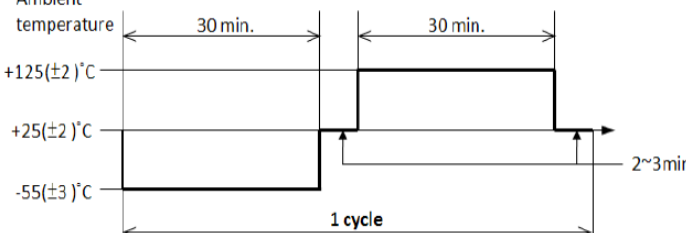


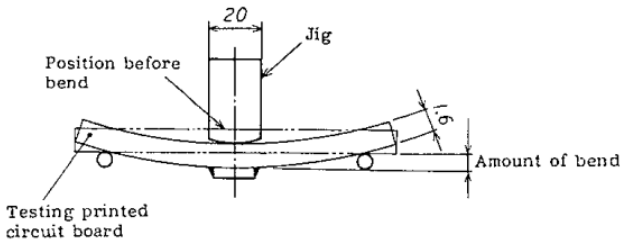
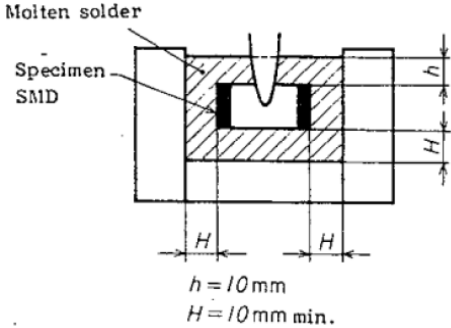
Type / Code	L	W	H	T	A	C (max.)	P	Unit
HCS1206...L300	0.126 ± 0.008 3.20 ± 0.20	0.065 ± 0.008 1.65 ± 0.20	NA	0.047 ± 0.006 1.20 ± 0.15	0.031 ± 0.008 0.80 ± 0.20	NA	NA	inches mm
HCS1206...L500	0.126 ± 0.008 3.20 ± 0.20	0.065 ± 0.008 1.65 ± 0.20	NA	0.035 ± 0.006 0.90 ± 0.15	0.031 ± 0.008 0.80 ± 0.20	NA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

Power Derating Curve:



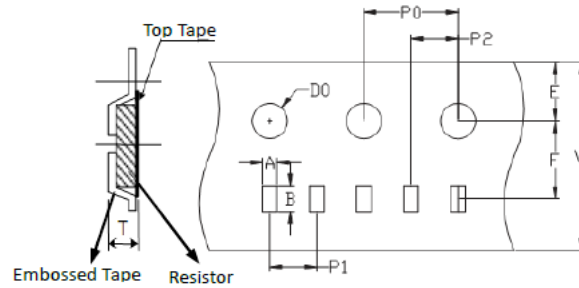
Operating temperature range of -55 to 170°C.
Storage condition: 22~28°C, humidity of 40~75%.

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) 	$\Delta R: \pm(1\%+0.0005\Omega)$

Function Performance Characteristics		
Item	Test Condition	Specification
Bending Strength	<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 10 ± 1 sec. (JIS-C5202-6.1)</p> <p>Unit: mm</p> 	<p>$\Delta R: \pm(1\%+0.0005\Omega)$</p>
Solderability	<p>The part shall be immersed into the flux specified in the solder bath 235°C ± 5°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)</p>  <p>$h = 10 \text{ mm}$ $H = 10 \text{ mm min.}$</p>	<p>Solder shall cover 95% or more of the electrode area</p>

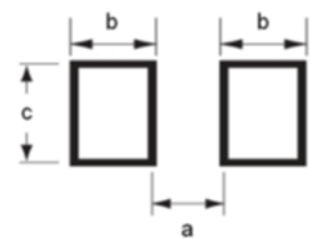
Note: The terminal temperature of component should be below 100°C.

Taping Specifications



Type / Code	A	B	E	F	W	Unit
HCS1206	0.074 ± 0.004	0.140 ± 0.004	0.069 ± 0.004	0.138 ± 0.002	0.315 ± 0.004	inches
	1.88 ± 0.10	3.56 ± 0.10	1.75 ± 0.10	3.50 ± 0.05	8.00 ± 0.10	mm
HCS2512	0.140 ± 0.004	0.266 ± 0.004	0.069 ± 0.004	0.217 ± 0.002	0.472 ± 0.008	inches
	3.55 ± 0.10	6.75 ± 0.10	1.75 ± 0.10	5.50 ± 0.05	12.00 ± 0.20	mm
HCS3920	0.217 ± 0.004	0.425 ± 0.004	0.069 ± 0.004	0.295 ± 0.002	0.630 ± 0.008	inches
	5.50 ± 0.10	10.80 ± 0.10	1.75 ± 0.10	7.50 ± 0.05	16.00 ± 0.20	mm
HCS5930 (all Ω ranges)	0.317 ± 0.004	0.602 ± 0.004	0.069 ± 0.004	0.453 ± 0.004	0.945 ± 0.012	inches
	8.05 ± 0.10	15.30 ± 0.10	1.75 ± 0.10	11.50 ± 0.10	24.00 ± 0.30	mm
Type / Code	P0	P1	P2	D0	T	Unit
HCS1206	0.157 ± 0.004	0.157 ± 0.004	0.079 ± 0.002	0.061 ± 0.002	0.055 ± 0.004	inches
	4.00 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	1.55 ± 0.05	1.40 ± 0.10	mm
HCS2512	0.157 ± 0.002	0.157 ± 0.004	0.079 ± 0.002	0.059 ± 0.004	0.047 ± 0.008	inches
	4.00 ± 0.05	4.00 ± 0.10	2.00 ± 0.05	1.50 ± 0.10	1.20 ± 0.20	mm
HCS3920	0.157 ± 0.002	0.472 ± 0.004	0.236 ± 0.002	0.059 ± 0.004	0.047 ± 0.008	inches
	4.00 ± 0.05	12.00 ± 0.10	6.00 ± 0.05	1.50 ± 0.10	1.20 ± 0.20	mm
HCS5930 (0.0002Ω, 0.0003Ω)	0.157 ± 0.004	0.472 ± 0.004	0.079 ± 0.004	0.059 ± 0.004	0.091 ± 0.004	inches
	4.00 ± 0.10	12.00 ± 0.10	2.00 ± 0.10	1.50 ± 0.10	2.30 ± 0.10	mm
HCS5930 (0.0005Ω, 0.001Ω)	0.157 ± 0.004	0.472 ± 0.004	0.079 ± 0.004	0.059 ± 0.004	0.055 ± 0.004	inches
	4.00 ± 0.10	12.00 ± 0.10	2.00 ± 0.10	1.50 ± 0.10	1.40 ± 0.10	mm

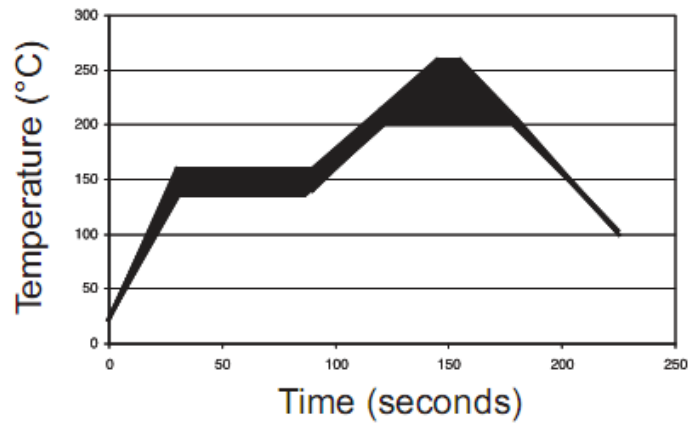
Recommended Pad Layout



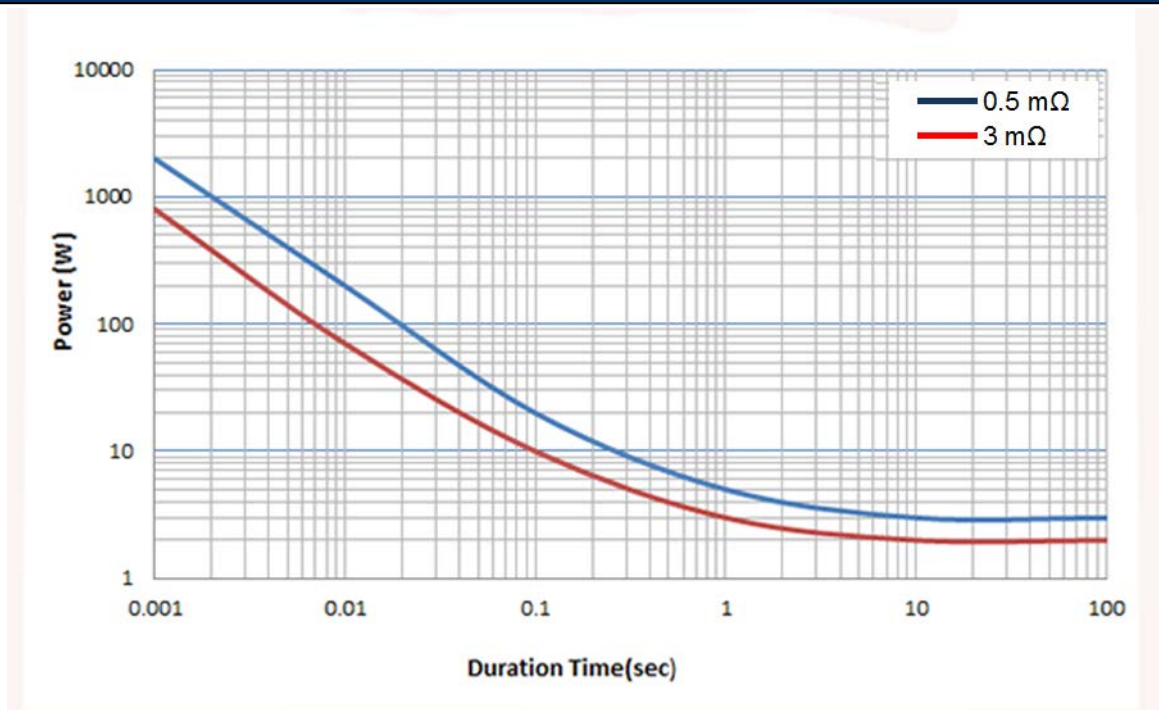
Type / Code	a	b	c	Unit
1206	0.055	0.083	0.071	inches
	1.40	2.10	1.80	mm
2512	0.150	0.071	0.134	inches
	3.80	1.80	3.40	mm
3920	0.220	0.106	0.244	inches
	5.60	2.70	6.20	mm
5930	0.220	0.205	0.344	inches
	5.60	5.20	8.75	mm

Soldering Recommendations:

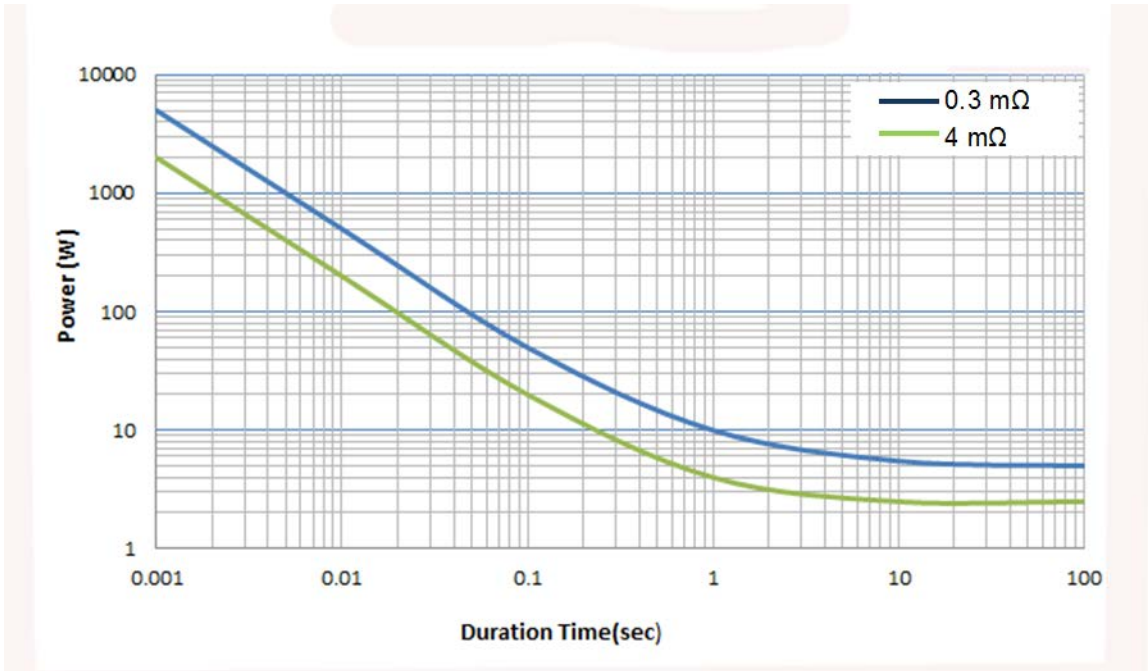
- Peak reflow temperatures and durations
 - ✓ IR Reflow Peak = 260°C max for 10 seconds
 - ✓ Not suitable for wave soldering
- Compatible with lead and lead-free solder reflow processes
- Recommended IR reflow profile:



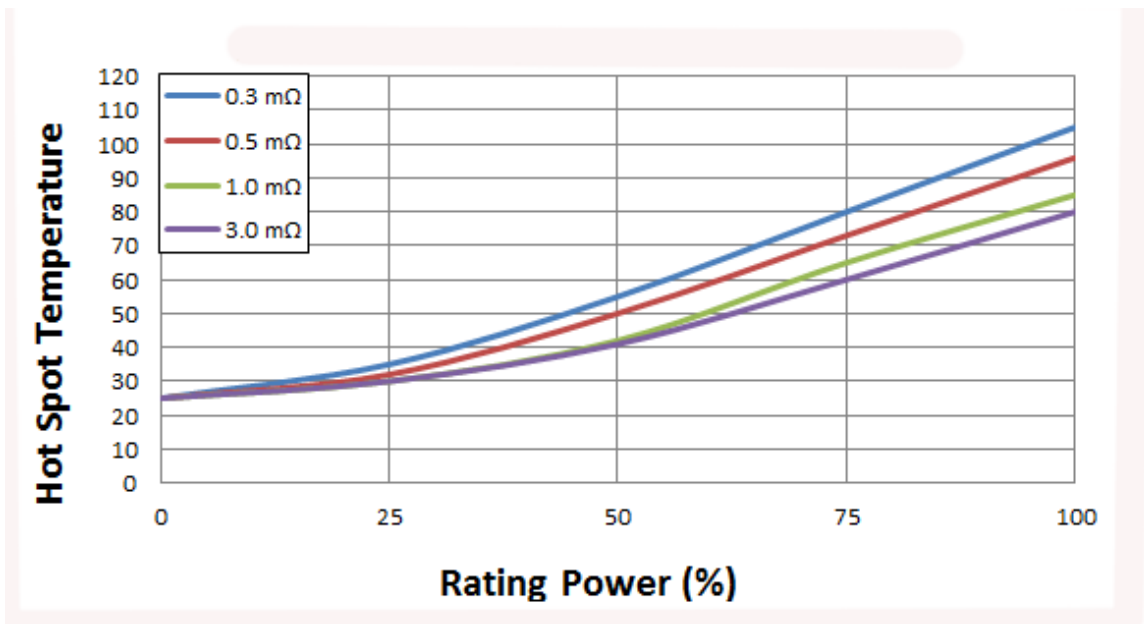
Pulse Power Characteristics – HCS2512



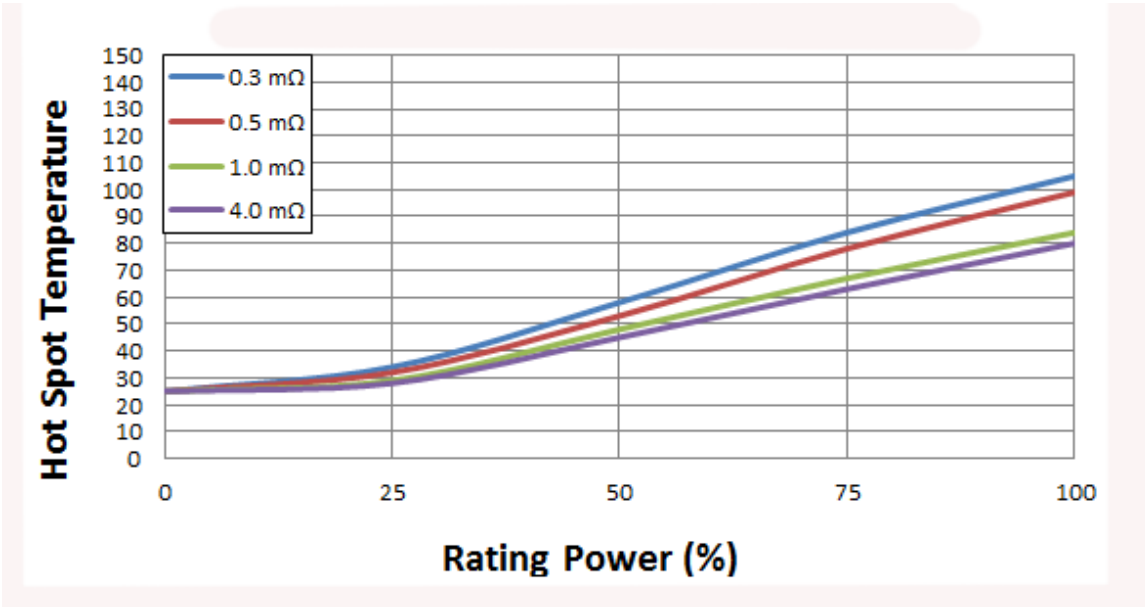
Pulse Power Characteristics – HCS3920



Rated Power vs. Surface Temperature – HCS2512



Rated Power vs. Surface Temperature – HCS3920



Temperature rise test boards use aluminum substrate (MCPCB).

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