Thin Film Technology Corp.

Product Family: Current Sensing Power Resistor

Part Number Series: CPA0612-*F Series (Face Down - Black Marked)

RoHS COMPLIANT 2011/65/EU

HF HALOGEN-FREE

Construction:

- Cu alloy foil resistive element
- High purity alumina ceramic substrate
- Inherently Anti-sulfur
- Pre-tinned (Sn100, matte) terminations over Ni barrier is standard.
- Halogen Free and Beryllium Free
- RoHS compliant without exemptions

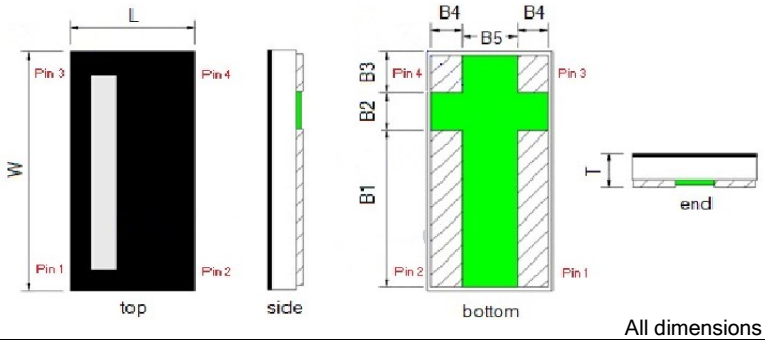
Features:

- Resistance range of 0.5mΩ~25mΩ
- TCR from ±50ppm/°C ~150ppm/°C
- Power of 1 Watt
- Tolerance down to ±0.5%
- AEC-Q200 Qualified
- MSL = 1, Mass = 11mg

Description:

These low resistance, high power chip resistors exhibit excellent performance in resistance, noise performance, surface heat distribution and have a lower surface temperature. They are designed and produced with a face (pattern) down construction. They are useful in many current sensing applications.

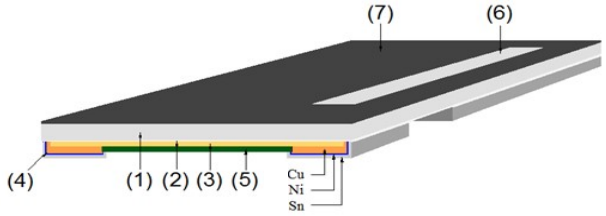
Product Dimensions:



All dimensions in inches (mm in parentheses).

Dimension	L	W	T	B1	B2	B3	B4	B5
CPA0612-*F	0.061 ±0.008 (1.55 ±0.20)	0.126 ±0.008 (3.20 ±0.20)	0.020 ±0.008 (0.50 ±0.20)	0.085 ±0.008 (2.16 ±0.20)	0.020 ±0.008 (0.50 ±0.20)	0.018 ±0.008 (0.46 ±0.20)	0.016 ±0.008 (0.41 ±0.20)	0.029 ±0.008 (0.73 ±0.20)

Product Construction:



* Marking will consist of a black marked top surface with an orientation marker in white or light gray color.

Layers			
1	Substrate (alumina ceramic)	5	Protective Coating (epoxy)
2	Adhesive (epoxy)	6	Marking Coating (epoxy)*
3	Resistor element (Cu alloy)	7	Marking Coating (epoxy)*
4	Terminal Electrode (Sn, Ni, Cu)		

Part Numbering: Ex: CPA0612RR001FF-T50

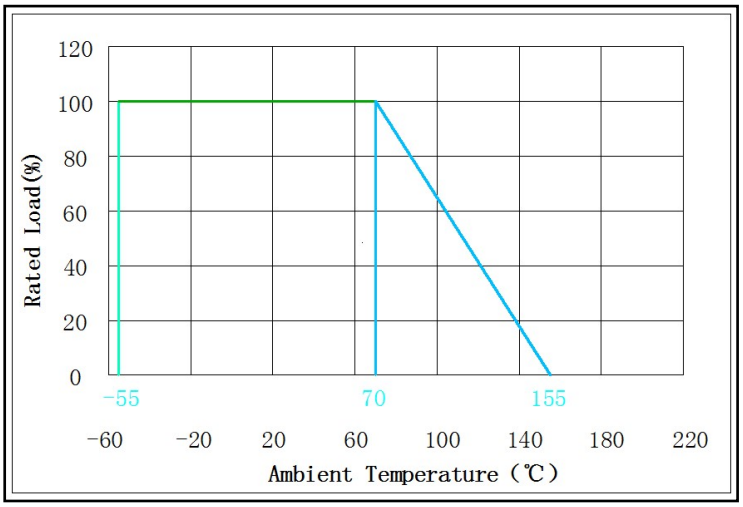
Series Name	Ceramic Type	English Size (Metric Size)	Temp. Coefficient of Resistance (TCR)	Resistance Value *	Tolerance	Serial Code	AEC-Q200	T&R Packaging Qty
CP	**A** = Alumina	**0612** (1632)	**Q** = ±50ppm/°C **R** = ±100ppm/°C **G** = ±150ppm/°C	Ex. **R001** = 0.001Ω (4 digits)	**D** = ±0.5% **F** = ±1.0%	**F** = Face Down	**A** = AEC-Q200 Leave Blank for Non AEC-Q200	**-T50** = 5,000

***Note:** For resistance values of one milliohm or greater, use "R" to specify the decimal point (i.e. R005=0.005Ω). For resistance values less than one milliohm or those with 1/2 milliohm increments, use "M" to specify the decimal point (i.e. 0M50=0.0005Ω and 7M50 = 7.50mΩ).

Electrical Specifications:

Type	CPA0612-*F		
English Size	0612		
Metric Size	1632		
Power	1 watt		
Rated Voltage	$\sqrt{(\text{Power x Resistance})}$		
Standard Resistance Values	0.5mΩ ~ 0.75mΩ	1mΩ ~4mΩ	5mΩ ~25mΩ
Resistance Tolerance	±1.0% (F)		±0.5% (D) ±1.0% (F)
TCR ppm/°C (code)	±150ppm/°C (G) ±200ppm/°C (S)	±100ppm/°C (R)	±50ppm/°C (Q)
Operating Temperature	-55°C ~ +155°C Derating from 70°C		
Maximum Over Current	45A, 10msec, 10 times Interval of 60 seconds minimum		
Packaging	5,000 pcs/reel		

Power Derating Curve:



Reliability Specifications:

Test	Test Method	Specification
Resistance Data	Resistance data at 25°C	Must meet datasheet requirements
TCR Data	Tested at 25°C and 125°C TCR = (Rb-Ra)/Ra × 1/(Tb-Ta) × 10^6	Must meet datasheet requirements
Dimensional Data	Measure all dimensions specified in datasheet	Must meet datasheet requirements
Short Time Overload (1) JIS-C-5201, 4.13	Applied voltage: 2.5X rated voltage. Test duration: 5 seconds	±1.0%
Load Life, Power Cycling (1) JIS-C-5201-1, 4.25	Test Temperature: 70°C Applied voltage: rated power Test period: 1,000 hours with power cycling as follows: 90 min. power ON/30 min. power OFF,	±1.0%
Temperature / Humidity (1) JIS-C-5201-1, 4.24	Test Condition: 60°C / 90-95% RH Test period: 1,000 hours	±1.0%

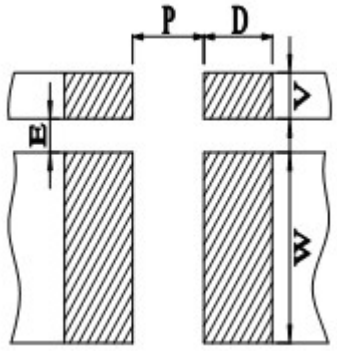
Reliability Specifications–Continued

Test	Test Method	Specification
Temperature Cycle (1) **(Thermal Shock)** JESD22-A-104	Repeat 1,000 cycles as follows: -55°C (30 min.) / +125°C (30 min.) Transition time of 1 minute maximum	±1.0%
Resistance To Solder Heat #1 J-STD-020	One reflow cycle according to JEDEC J-STD-020, cool down then parts are immersed into a molten solder bath with a temperature of 260°C for a period of 10 ±1 seconds.	Part must meet initial specifications following testing.
Resistance To Solder Heat #2 J-STD-020	Per component MSL classification per J-STD-020 3 reflow cycles	±1.0%
Load Life, Endurance (1) MIL-STD-202, Method 108, Condition D	Test Temperature: 70°C Test period: 1,000 hours Electrical load: rated power	±1.0%
HAST (1) **(Highly Accelerated** **Stress Test - Autoclave)**	Test Temperature: 121°C Test Pressure: 30 PSIA Test period: 48 hours No electrical load	±1.0%
Biased Humidity (1) MIL-STD-202, Method 103	Test Temperature: 60°C / 90-95% RH Test period: 1,000 hours Electrical load: 10% of rated power	±1.0%
Terminal Strength AEC-Q200-006	Test Force: 17.7N Duration: 60 ±1 seconds Parts must be soldered onto a PCB to perform test	±0.5%
Flex Strength	Board Flex: Span 90mm, Flex of 2mm Test Duration: 10 seconds	±1.0%
Vibration (1) MIL-STD-202, Method 204, Condition B	Frequency: 10 - 2,000Hz Acceleration: 15G Test Duration: 20 mins / 12 Cycles	±1.0%
Mechanical Shock (1) MIL-STD-202, Method 213, Condition A	Force: 50G Test Duration: 11 ±1 milliseconds	±1.0%
Solderability MIL-STD-202, Method 208H, Category 3	Dipped into molten solder for 3 ±1 seconds at 245°C Flux activity type R0	New solder coverage of 95% minimum
Pre-Conditioning	Per component MSL classification per J-STD-020 3 reflow cycles	N/A

Notes:

(1) Samples shall be from the pre-conditioned group

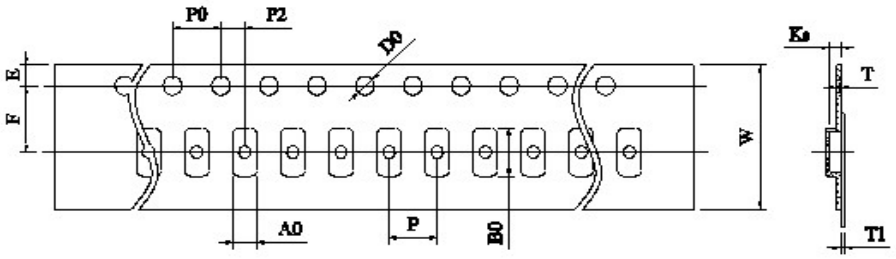
Land Pattern and Dimensions:



All dimensions are in mm.

	CPA0612-*F
P	0.762
W	2.290
D	1.014
V	0.762
E	0.381

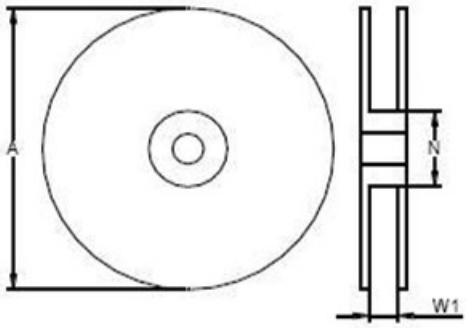
Tape Dimensions:



All dimensions are in mm.

CPA0612-*F			
W	8.00 ±0.30	D0	1.50 ±0.10
P0	4.00 ±0.10	F	3.50 ±0.10
P	4.00 ±0.10	E	1.75 ±0.10
P2	2.00 ±0.10	T	0.20 ±0.10
A0	1.90 ±0.20	T1	Maximum 0.1
B0	3.50 ±0.20	K0	0.85 ±0.20

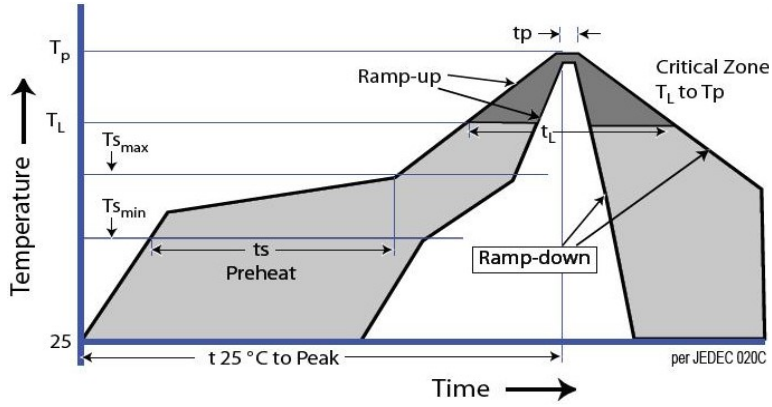
Reel Dimensions:



All dimensions are in mm.

CPA0612-*F	
A	178 ±5
N	60 ±2
W1	9 ±1

Recommended Soldering Conditions:



Profile Feature	Pb-Free Assembly
Average Ramp-Up Rate (Ts_{max} to Tp)	3 °C/second max.
Preheat	
- Temperature Min (Ts_{min})	150 °C
- Temperature Max (Ts_{max})	200 °C
- Time (ts_{min} to ts_{max})	60-180 seconds
Time maintained above:	
- Temperature (T_L)	217 °C
- Time (t_L)	60-150 seconds
Peak Temperature (T_p)	260 +0 °C
Time within 5 °C of actual Peak Temperature (tp)	20-40 seconds
Ramp-Down Rate	6 °C/second max.
Time 25 °C to Peak Temperature	8 minutes max.

Storage Conditions:

Environment Conditions:

Products should be stored under the following environmental conditions.

- Temperature: +5 to +35°C
- Humidity: 45 to 85% relative humidity
- Do not keep products in environments where they may be subject to particulate contamination or harmful gases such as sulfuric acid or hydrogen chloride as it may cause oxidization on electrodes, resulting in poor solderability.
- Products should be stored in a space that does not expose it to high temperatures, vibration, or direct sunlight.
- Products should be stored in the original airtight packaging until use.