



**Thin Film Technology Corp.**

**Product Family:** 4-Terminal Current Sensing Power Resistor

**Part Number Series:** D1CPA0612 Series



	<p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>High purity alumina ceramic</li> <li>Nickel alloy resistive foil</li> <li>100% matte tin over Ni terminations</li> <li>Halogen Free</li> <li>RoHS compliant and Pb free</li> <li>Inherently Anti-Sulfur</li> </ul>	<p><b>Features:</b></p> <ul style="list-style-type: none"> <li>0612 English case size</li> <li>Power up to 1W</li> <li>Resistances from 0.5mΩ~25mΩ</li> <li>TCR down to ±50ppm/°C</li> <li>Tolerance down to ±0.5%</li> <li>AEC-Q200 qualified</li> <li>Moisture Sensitivity Level (MSL) = 1</li> </ul>
<p><b>Description:</b> 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.</p>		

### Product Construction:

	Number	Description
	1	Substrate (alumina ceramic)
	2	Adhesion layer (epoxy)
	3	Resistive element (Cu alloy)
	4	Terminal electrode (Cu, Ni, Sn)
	5	Protective coating
	6	Marking (flame retardant epoxy, white)
	7	Marking (flame retardant epoxy, black)

**Part Numbering:** Ex: D1CPA0612RR001FF-T50

Series Name	English Size (Metric Size)	Temp. Coefficient of Resistance (TCR)	Resistance Value*	Resistance Tolerance	Internal Code	Automotive Grade	T&R Packaging Quantity
D1CPA	0612 (1632)	Q = ±50ppm/°C R = ±100ppm/°C G = ±150ppm/°C S = ±200ppm/°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 pcs/reel

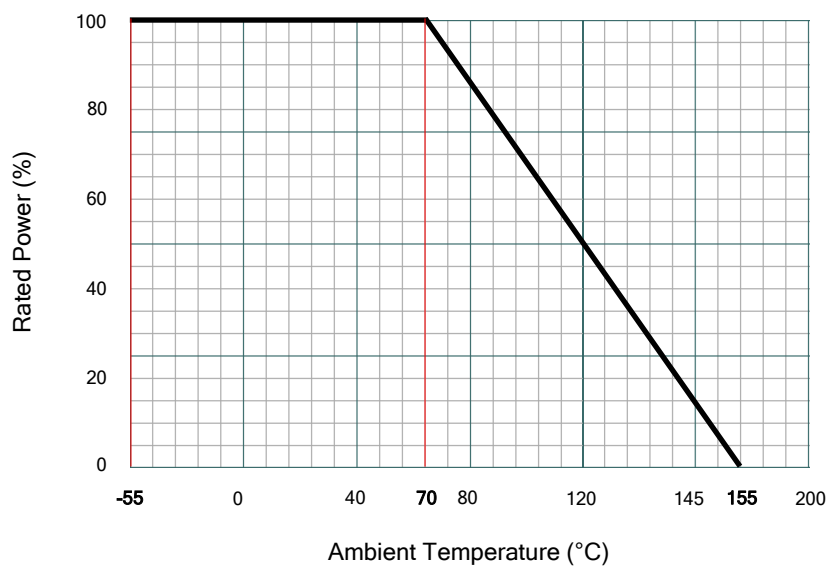
\*Note: For resistance values of one milliohm or greater, use "R" to specify the decimal point (i.e. R005=0.005Ω). For resistance values less than one milliohm or those with 1/2 milliohm increments, use "M" to specify the decimal point (i.e. 0M50=0.0005Ω and 7M50 = 7.50mΩ).

### Product Dimensions:

All dimensions shown in inches, mm in parenthesis.							
Dimension (Metric)	L	W	T	D	C	B	A
D1CPA0612 (1632)	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)

**Electrical Specifications:**

Type	D1CPA0612		
Metric Size	1632		
Power Rating	1W		
Resistance Range	0.5mΩ 0.75mΩ	1mΩ~4mΩ	5mΩ~25mΩ
Resistance Tolerance (code)	±1.0%(F)		±0.5%(D) ±1.0%(F)
TCR ppm/°C (code)	±150(G) ±200(S)	±100(R)	±50(Q)
Rated Voltage	$\sqrt{\text{Power} \times \text{Resistance}}$		
Operating Temp. Range	-55°C~+155°C		
Maximum Over Current	45A, 10msec, 10 times Interval of 60 seconds minimum		
Packaging (code)	5,000pcs/reel (-T50)		

**Power Derating Curve:**

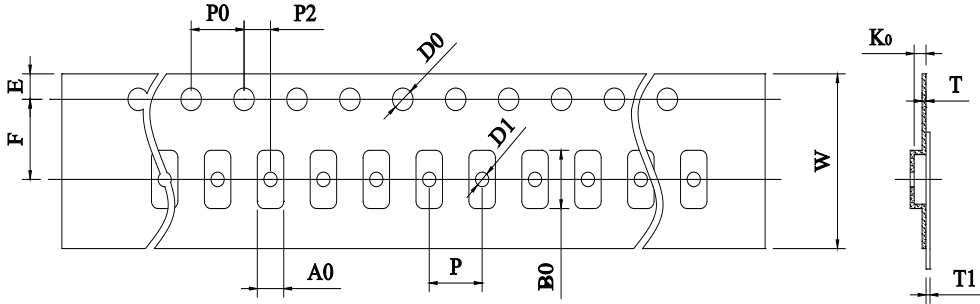
**Reliability Specifications:**

Test	Procedure	Specification
<b>Resistance Data</b>	Resistance data at 25°C	Must meet datasheet requirements
<b>TCR Data</b>	Tested at 25°C and 125°C $TCR = (R_b - R_a) / R_a \times 1 / (T_b - T_a) \times 10^{-6}$	Must meet datasheet requirements
<b>Dimensional Data</b>	Measure all dimensions specified in datasheet	Must meet datasheet requirements
<b>Short Time Overload</b> JIS-C-5201, 4.13	Applied voltage: 2.5X rated power. Test duration: 5 seconds	±1.0%
<b>Load Life</b> JIS-C-5201-1, 4.25	Test Temperature: 70°C ±2°C Applied voltage: rated voltage Test period: 1,000 hours with power cycling as follows: 90 min. power ON/30 min. power OFF,	±1.0%
<b>Moisture Load Life</b> JIS-C-5201-1, 4.24	Test Condition: 60°C ±2°C/95% RH 90 min. power ON/30 min. power OFF,	±1.0%
<b>Temperature Cycle (Thermal Shock)</b> JESD22-A-104	Repeat 1,000 cycles as follows: -55 ±3°C (30 min.) / +155 ±3°C (30 min.) Transition time of 1 minute maximum	±1.0%
<b>Resistance To Solder Heat</b> 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.
<b>High Temperature Exposure</b> MIL-STD-202, Method 108, Condition D	Test Temperature: Maximum rated operational temperature Test period: 1,000 hours No electrical load	±1.0%
<b>Mechanical Shock</b> MIL-STD-202, Method 213, Condition A	A = 100G, t = 11ms, 5 times shock	±1.0%
<b>Solderability</b> MIL-STD-202, Method 208H, Category 3	Dipped into molten solder for 3 ±0.5 seconds at 245 ±5°C Flux activity type R0	New solder coverage of 90% minimum
<b>Substrate Bending</b> IEC60115-1 4.33	Span between fulcrums: 90mm Bend width: 2mm Test board: glass-epoxy Thickness: 1.6mm	±1.0%

**AEC-Q200 Test Requirements (Table 7):**

AEC Test #	Test Name	AEC-Q200 Test Requirements	Specification
3	High Temp. Exposure (Storage) MIL-STD-202, Method 108	Test Temp 125°C +/-3°C Test Period: 1,000 hours No Electrical Load	±1.0%
4	Temp. Cycling (Thermal Shock) JESD22 Method JA-104	Repeat 1,000 cycles as follows: -55°C +/-3°C for 30 minutes +125°C +/-3°C for 30 minutes Transition time of 1 minute max	±1.0%
7	Biased Humidity MIL-STD-202, Method 103	Test conditions: 85°C and 85% RH 10% of rated power Test Period 1,000 hours	±1.0%
8	Load Life (Operational Life) MIL-STD-202, Method 108	Test Temperature: 125°C +/-3°C Applied voltage: rated power (derated Power will be required if temp exceeds the derating point of part) Test Period: 1,000 hours (condition D)	±1.0%
12	Resistance to Solvents MIL-STD-202, Method 215	3 minute soak 2-3 ounce force 10 strokes/repetition 3 repetitions	No damage
13	Mechanical Shock MIL-STD-202, Method 213	Force: 100G peak Test duration: 6 ms Half-sine waveform Velocity: 12.3ft/sec	±1.0%
14	Vibration MIL-STD-202, Method 204	Frequency: 10-2,000 Hz Acceleration: 5G Test duration: 20 minutes, 12 cycles	±1.0%
15	Resistance to soldering heat MIL-STD-202, Method 210	Condition B (Solder dip, no pre-heat) 260°C +/-5°C	±1.0%
17	ESD AEC-Q200-002	HBM, 100pF, 1.5k ohms Repetition: 5 times	±1.0%
18	Solderability J-STD-002	Non-activated flux dip: 5-10 seconds SAC solder dip: 2 +/-0.5 seconds at 245°C +/-5°C	95% coverage
20	Flammability UL-94	V-0 or V-1 are acceptable Electrical test not required	Provide certificate
21	Board Flex AEC-Q200-005	90 mm span between fulcrums 2 mm bend 60 seconds minimum holding time	±1.0%
22	Terminal Strength (SMD) AEC-Q200-006	Force of 17.7 N 60 seconds	±1.0%
24	Flame Retardance AEC-Q200-001	Mounted parts subjected to voltages from 9.0 to 32 VDC (current clamped up to 500A) in 1.0 VDC increments. Voltage applied for 1 hour minimum or until failure occurs	Must meet AEC-Q200 requirements

**Paper Tape Dimensions:**

 <p style="text-align: right;">All dimensions in mm.</p>												
Size	A0	B0	W	F	E	P0	P	P2	D0	T	T1	K0
D1CPA0612	2.05 ±0.20	3.65 ±0.20	8.00 ±0.30	3.50 ±0.10	1.75 ±0.10	4.00 ±0.10	4.00 ±0.10	2.00 ±0.10	1.50 ±0.10	0.20 ±0.10	Max 0.10	0.85 ±0.20

**Reel Dimensions:**

	Size	A	N	W1
	D1CPA0612	178 ±5.00	60.0 ±2.00	9.00 ±1.00

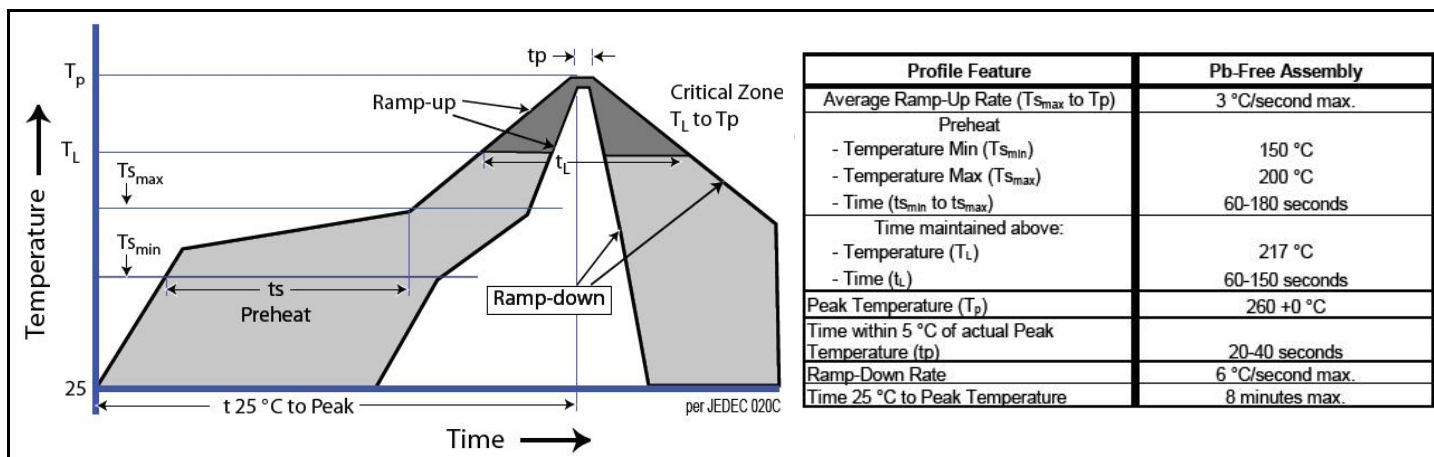
All dimensions in mm.

**Recommended Land Pattern:**

	Size	P	W	D	V	E
	D1CPA0612*	0.76	2.29	1.01	0.76	0.38

All dimensions in mm.

Note: PCB material is FR4. Board thickness is 1.10mm. 1 oz. copper used on current sense resistor placement layer.

**Soldering Profile:****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 oxidation 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.