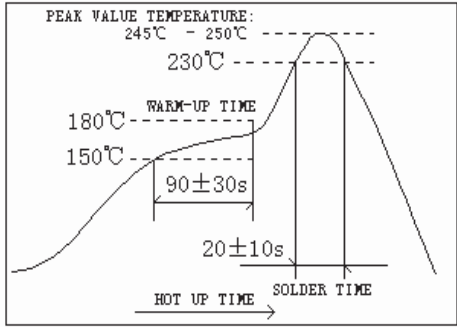


High Power Thick Film Chip Resistors		
7. Performance specification :		
Characteristics	Limits	Test Methods (JIS C 5201-1)
Dielectric withstanding voltage	No evidence of flashover mechanical damage, arcing or insulation break down	4.7 Clamped in the trough of a 90°C metallic v-block and shall be tested at ac potential respectively specified in the type for 60-70 seconds
Temperature Coefficient	$1\Omega \sim 10\Omega \leq \pm 200\text{PPM}/^\circ\text{C}$ $11\Omega \sim 10\text{M}\Omega \leq \pm 100\text{PPM}/^\circ\text{C}$	4.8 Natural resistance change per temp. degree centigrade. $\frac{R2-R1}{R1(t2-t1)} \times 10^6 \quad (\text{PPM}/^\circ\text{C})$ R1: Resistance value at room temperature (T1) R2: Resistance value at room temp. plus 100 °C(T2) Test pattern: room temp. (T1), room temp. +100°C(T2)
Short time overload	Resistance change rate is $\pm 5\% (2.0\% + 0.1 \Omega) \text{ Max.}$ $\pm 1\% (1.0\% + 0.1 \Omega) \text{ Max.}$	4.13 Permanent resistance change after the application of a potential of 2.5 times RCWV for 5 seconds

High Power Thick Film Chip Resistors

7. Performance specification :

Characteristics	Limits	Test Methods (JIS C 5201-1)															
Solderability	95 % coverage Min.	Wave Solder: Test temperature of solder: 245°C ±3°C dipping time in solder : 2-3 seconds.															
		Reflow: 															
Soldering heat	Resistance change rate is: ± (1.0% + 0.05Ω) Max.	4.18 Dip the resistor into a solder bath having a temperature of 260°C ± 3°C and hold it for 10 ± 1 seconds.															
Temperature cycling	Resistance change rate is ± 5% (1.0% + 0.05 Ω) Max. ± 1% (0.5% + 0.05 Ω) Max.	4.19 Resistance change after continuous 5 cycles for duty cycle specified below :															
		<table border="1"> <thead> <tr> <th>Step</th> <th>Temperature</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-55°C ± 3°C</td> <td>30 mins</td> </tr> <tr> <td>2</td> <td>Room temp.</td> <td>10 ~ 15 mins</td> </tr> <tr> <td>3</td> <td>+155°C ± 2°C</td> <td>30 mins</td> </tr> <tr> <td>4</td> <td>Room temp.</td> <td>10 ~ 15 mins</td> </tr> </tbody> </table>	Step	Temperature	Time	1	-55°C ± 3°C	30 mins	2	Room temp.	10 ~ 15 mins	3	+155°C ± 2°C	30 mins	4	Room temp.	10 ~ 15 mins
		Step	Temperature	Time													
		1	-55°C ± 3°C	30 mins													
		2	Room temp.	10 ~ 15 mins													
3	+155°C ± 2°C	30 mins															
4	Room temp.	10 ~ 15 mins															

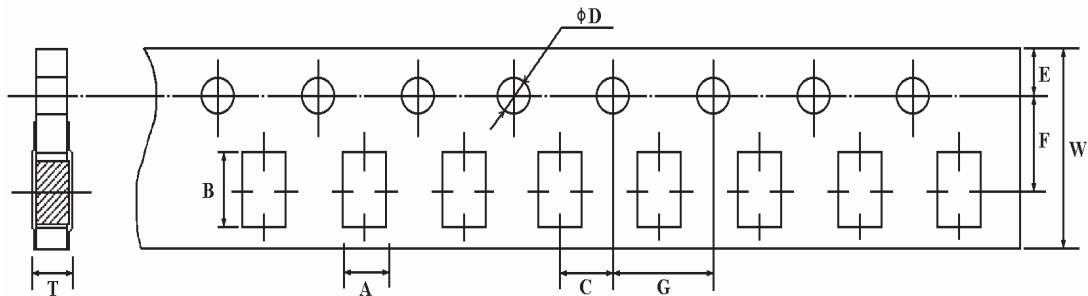
High Power Thick Film Chip Resistors		
7. Performance specification :		
Characteristics	Limits	Test Methods (JIS C 5201-1)
Humidity	Resistance change rate is ± 5% (3.0% + 0.1 Ω) Max. ± 1% (0.5% + 0.1 Ω) Max.	4.24 Temporary resistance change after 240 hours exposure in a humidity test chamber controlled at 40±2°C and 90-95% relative humidity
Load life in humidity	Resistance change rate is ± 5% (3.0% + 0.1 Ω) Max. ± 1% (1.0% + 0.1 Ω) Max.	7.9 Resistance change after 1,000 hours (1.5 hours "on", 0.5 hour "off") at RCWV in a humidity chamber controlled at 40°C ± 2°C and 90 to 95 % relative humidity
Load Life	Resistance change rate is ± 5% (3.0% + 0.1 Ω) Max. ± 1% (1.0% + 0.1 Ω) Max.	4.25.1 Permanent resistance change after 1,000 hours operating at RCWV, with duty cycle of (1.5 hours"on", 0.5 hour"off") at 70°C ± 2°C ambient
Terminal bending	Resistance change rate is ± (1.0% + 0.05Ω) Max.	4.33 Twist of Test Board : Y/X = 3/90 mm for 60 seconds

High Power Thick Film Chip Resistors

8. Packing specification :

8.1 Taping Dimension (mm)

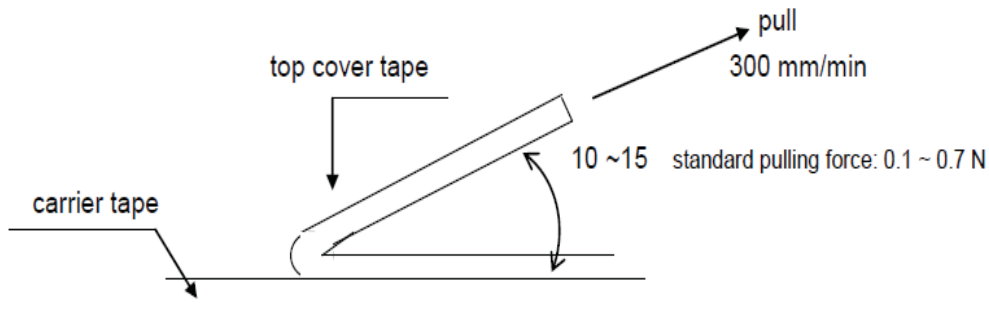
A. Paper taping



Type	$A \pm 0.2$	$B \pm 0.2$	$C \pm 0.05$	$\phi D \begin{matrix} +0.1 \\ -0 \end{matrix}$	$E \pm 0.1$	$F \pm 0.05$	$G \pm 0.1$	$W \pm 0.2$	$T \pm 0.1$
HP03	1.10	1.90	2.0	1.5	1.75	3.5	4.0	8.0	0.67
HP05	1.65	2.40	2.0	1.5	1.75	3.5	4.0	8.0	0.81
HP06	2.00	3.60	2.0	1.5	1.75	3.5	4.0	8.0	0.81

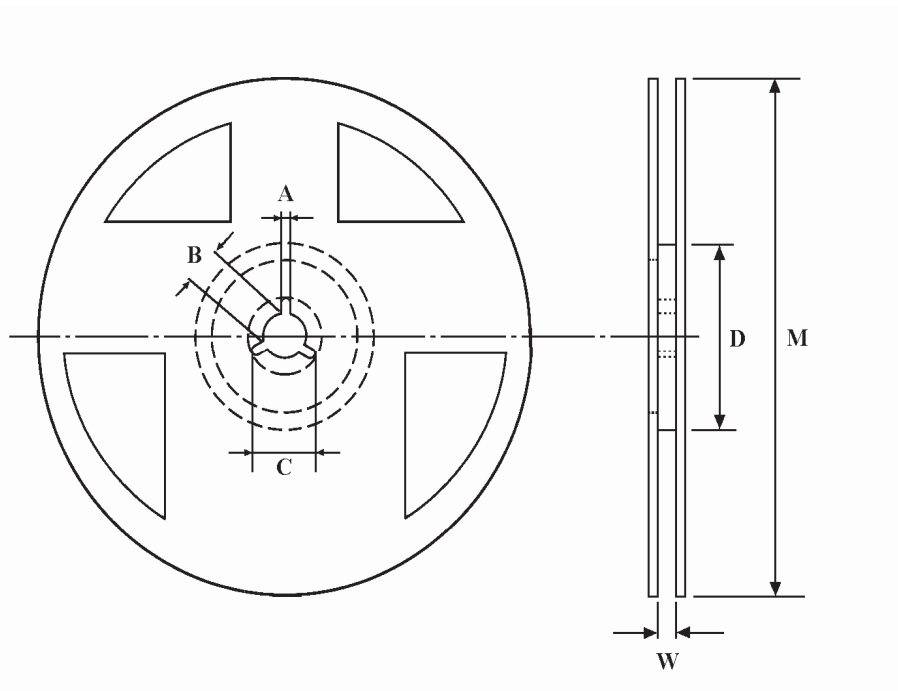
* Peeling Strength of Top Cover Tape

Test Condition: 0.1 to 0.7 N at a peel-off speed of 300 mm / min.



High Power Thick Film Chip Resistors

8.2 Reel Dimension (mm)



Type	Packaging	Quantity Per Reel	A ± 0.5	B ± 0.5	C ± 0.5	D ± 1	M ± 2	W ± 1
HP03	Paper	5,000 pcs.	2	13	21	60	178	10
HP05	Paper	5,000 pcs.	2	13	21	60	178	10
HP06	Paper	5,000 pcs.	2	13	21	60	178	10

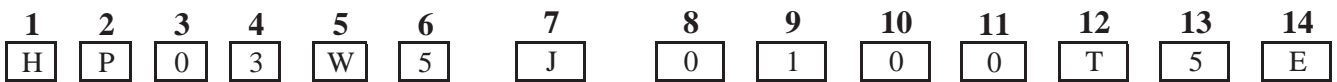
Remark : $\varnothing M$ 10,000pcs. / Reel = 255 ± 2 mm
 20,000pcs. / Reel = 330 ± 2 mm

Part Number System

Explanation of Part Number System

High Power Thick Film Chip Resistors

All part numbers in the coding below start with "TC-" and end with "203"



Product Type:
 Fill-in these 4 digits with the Thick Film High Power Chip resistor types as follows:
 HP02:0402
 HP03:0603
 HP05:0805
 HP06:1206
 HP10:2010
 HP12:2512

Wattage:
 Fill-in these 2 digits with the codes as follows:
Normal size:
 WA = 1/10W
 W5 = 1/5W
 W3 = 1/3W
 W2 = 1/2W
 1W = 1W
 2W = 2W

Tolerance:
 F ~ ± 1%
 J ~ ± 5%

Resistance Value:
 1. E-24 series: the 1st digit is "0", the 2nd & 3rd digits are for the significant figures of the resistance and the 4th indicate the number of zeros following;
 2. E-96 series: the 1st to 3rd digits are for the significant figures of the resistance and the 4th digit indicate the number of zeros following.
 Decimal point is expressed :
 "J"~ 0.1, "K"~0.01, "L"~0.001
 Ex: 2Ω26 ~226K, 226Ω ~2260

Packing Quantity:
 1 = 1,000pcs
 2 = 2,000pcs
 3 = 3,000pcs
 4 = 4,000pcs
 5 = 5,000pcs
 A = 500pcs
 B = 2,500pcs
 C = 10,000pcs
 D = 20,000pcs
 G = 25,000pcs
 H = 50,000pcs

Packing Type:
 T = T/R Packing
 B = Bulk in Poly-bag
 C = Bulk in cassette

Special Feature:
 0 = NIL
 E = Lead Free

Sample :

- HP03 1/5W (0603) +/- 5% 10Ω T/R--5,000 → HP03W5J0100T5E
- HP05 1/3W (0805) +/- 5% 10Ω T/R--5,000 → HP05W3J0100T5E
- HP06 1/2W (1206) +/- 5% 10Ω T/R--5,000 → HP06W2J0100T5E

High Power Thick Film Chip Resistors

Environment Related Substance

This product complies to EU RoHS directive, EU PAHs directive, EU PFOS directive and Halogen free.

Ozone layer depleting substances.

Ozone depleting substances are not used in our manufacturing process of this product.

This product is not manufactured using Chloro fluorocarbons (CFCs), Hydrochlorofluorocarbons (HCFCs), Hydrobromofluorocarbons (HBFCs) or other ozone depleting substances in any phase of the manufacturing process.

Storage Condition

The performance of these products, including the solderability, is guaranteed for a year from the date of arrival at your company, provided that they remain packed as they were when delivered and stored at a temperature of $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ and a relative humidity of $60\% \text{RH} \pm 10\% \text{RH}$

Even within the above guarantee periods, do not store these products in the following conditions. Otherwise, their electrical performance and/or solderability may be deteriorated, and the packaging materials (e.g. taping materials) may be deformed or deteriorated, resulting in mounting failures.

1. In salty air or in air with a high concentration of corrosive gas, such as Cl_2 , H_2S , NH_3 , SO_2 , or NO_2
2. In direct sunlight

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