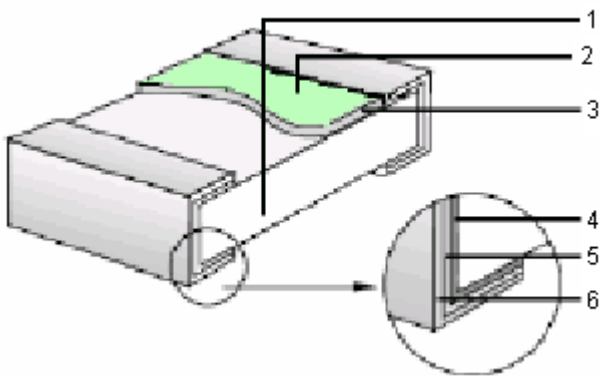


High Power Resistors

HP03 Series

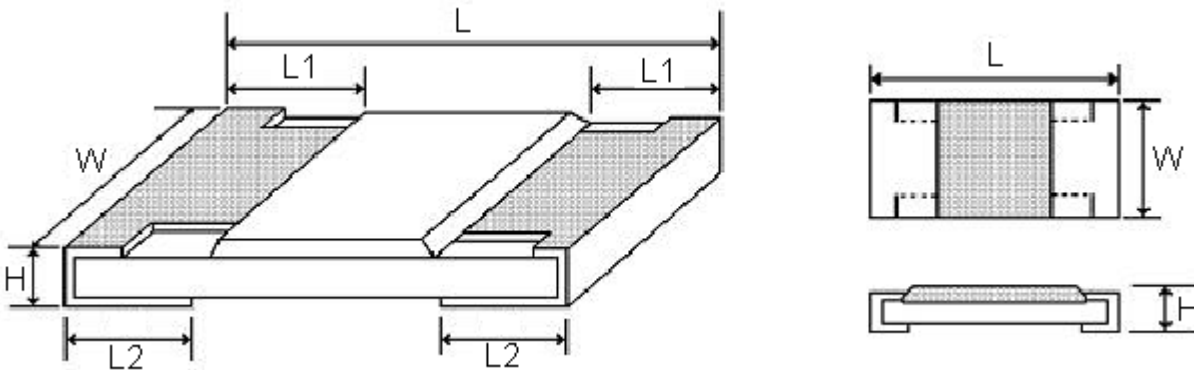


Construction



1. High purity alumina substrate
2. Protective covering
3. Resistive covering
4. Termination inner (Ag / Pd)
5. Termination (between) Ni plating
6. Termination (outer) Sn plating

Power Rating and Dimensions



Dimensions : Millimetres

Dimensions

Type	L	W	H	L1	L2
HP03	1.6 ±0.1	0.8 +0.15 -0.1	0.45 ±0.1	0.3 ±0.2	0.3 ±0.2

Dimensions : Millimetres

Power Rating

Type	Power Rating at 70°C (W)	Tolerance %	Resistance Range (Ω)	Standard Series
HP03	0.125	±1	1 to 10 M	E-96

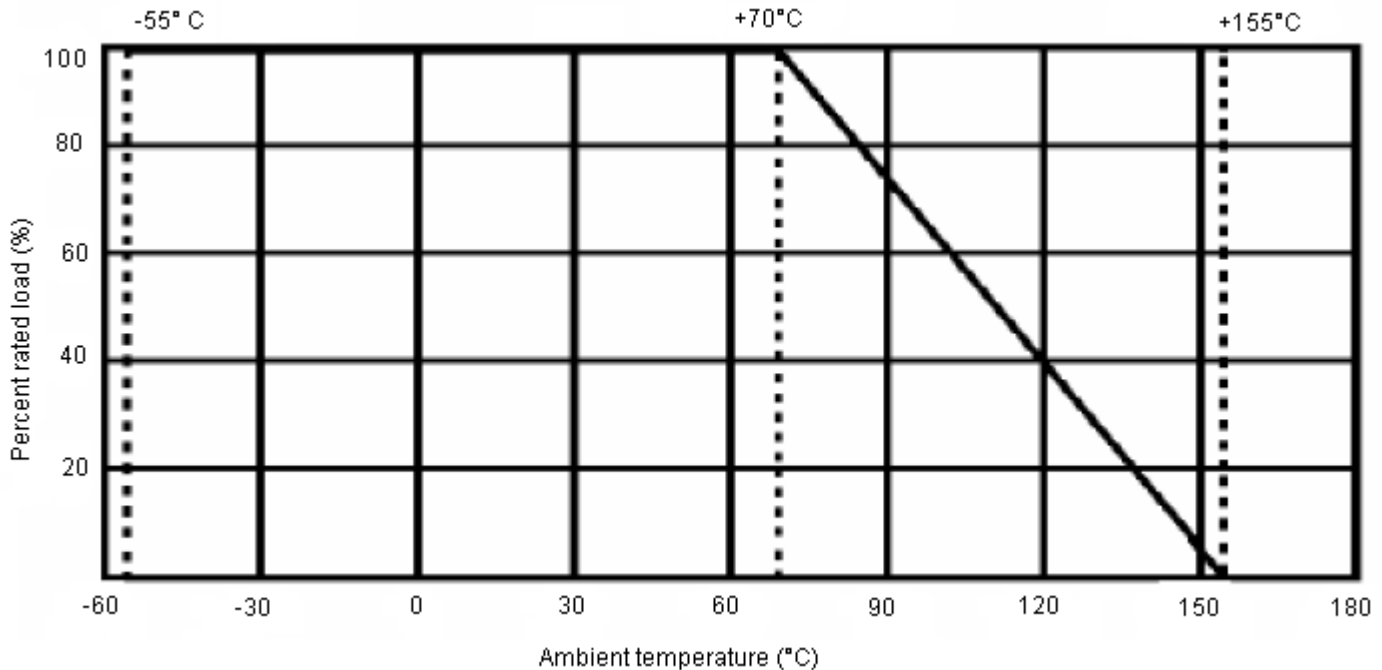
High Power Resistors



HP06 Series

Power Rating

Resistors shall have a power rating based on continuous load operation at an ambient temperature of 70°C. For temperature in excess of 70°C, the load shall be derated



Voltage Rating

Resistors shall have a rated direct-current (DC) continuous working voltage or an approximate sine-wave root-mean-square (RMS) alternating-current (AC) continuous working voltage at commercial line frequency and waveform corresponding to the power rating, as determined from the following formula :

$$RCWV = \sqrt{P \times R}$$

Where : RCWV = Rated DC or RMS AC continuous working voltage at commercial-line frequency and waveform (volt)

P = Power rating (watt)

R = Nominal resistance (Ω)

In no case shall the rated DC or RMS AC continuous working voltage be greater than the applicable maximum value

Specification Table

Type	Power Rating (W)	Maximum Working Voltage (V)	Maximum Overload Voltage (V)	Dielectric Withstanding Voltage (V)	Temperature Range (°C)	Ambient Temperature (°C)
HP03	0.125	50	100	300	-55 to +155	70

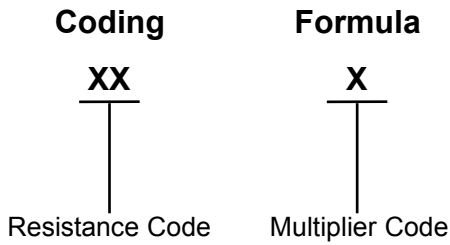
Marking

A. Multiplier Code for Marking Reference

Code	A	B	C	D	E	F	G	H	X	Y	Z
Multiplier	10^0	10^1	10^2	10^3	10^4	10^5	10^6	10^7	10^{-1}	10^{-2}	10^{-3}

High Power Resistors

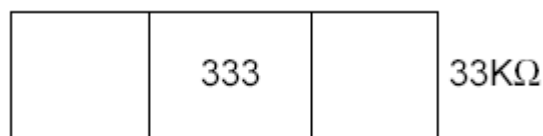
HP06 Series



Value	Code	Value	Code	Value	Code	Value	Code	Value	Code
100	01	162	21	261	41	422	61	681	81
102	02	165	22	267	42	432	62	698	82
105	03	169	23	274	43	442	63	715	83
107	04	174	24	280	44	453	64	732	84
110	05	178	25	287	45	464	65	750	85
113	06	182	26	294	46	475	66	768	86
115	07	187	27	301	47	487	67	787	87
118	08	191	28	309	48	499	68	806	88
121	09	196	29	316	49	511	69	825	89
124	10	200	30	324	50	523	70	845	90
127	11	205	31	332	51	536	71	866	91
130	12	210	32	340	52	549	72	887	92
133	13	215	33	348	53	562	73	909	93
137	14	221	34	357	54	576	74	931	94
140	15	226	35	365	55	590	75	953	95
143	16	232	36	374	56	604	76	976	96
147	17	237	37	383	57	619	77	-	-
150	18	243	38	392	58	634	78	-	-
154	19	249	39	402	59	649	79	-	-
158	20	255	40	412	60	665	80	-	-

*Marking for 0603 E-96 series, the resistance value that no have multiplier code indicate marking follow this:

B. The first two digits are significant figures of resistance and the third one denoted number of zeros and under line the marking letters



High Power Resistors

HP06 Series



Performance specification

Characteristics	Limits	Test Methods (JIS C 5201-1)															
Temperature Coefficient	$\leq 10 \text{ E} : \pm 200 \text{ PPM} / ^\circ\text{C}$ $> 10 \text{ E} : \pm 100 \text{ PPM} / ^\circ\text{C}$	Natural resistance change per temperature degree centigrade $R2-R1 / R1 (t2-t1) \times 10^6 \text{ (PPm} / ^\circ\text{C)}$ R1 : Resistance value at room temperature (t1) R2 : Resistance value at room temperature plus 100°C (t2) Test pattern : Room temperature (t1), Room temperature +100°C (t2)															
Short Time Overload	Resistance change rate is $\pm 5\% (2\% + 0.1 \Omega)$ maximum $\pm 1\% (1\% + 0.1 \Omega)$ maximum	Permanent resistance change after the application of a potential of 2.5 times RCWV for 5 seconds															
Terminal Bending	$\pm (1\% + 0.05 \Omega)$ maximum	Twist of Test Board : Y/X = 3/90 mm for 60 seconds															
Dielectric Withstanding Voltage	No evidence of flashover mechanical damage, arcing or insulation break down	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 to 70 seconds															
Solderability	Minimum 95% coverage	Test temperature of solder : $245 \pm 3^\circ\text{C}$; dipping time in Solder : 2 to 3 seconds															
Soldering Heat	Resistance change rate is $\pm (1\% + 0.05 \Omega)$ maximum	Dip the resistor into a solder bath having a temperature of $260^\circ\text{C} \pm 3^\circ\text{C}$ and hold it for 10 ± 1 seconds															
Temperature Cycling	$\pm 5\% (1\% + 0.05 \Omega)$ maximum $\pm 1\% (0.5\% + 0.05 \Omega)$ maximum	Resistance change after continuous 5 cycles for duty cycle specified below: <table border="1" data-bbox="912 1386 1477 1543"> <thead> <tr> <th>Step</th> <th>Temperature</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>$-55^\circ\text{C} \pm 3^\circ\text{C}$</td> <td>30 minutes</td> </tr> <tr> <td>2</td> <td>Room temperature</td> <td>10 to 15 minutes</td> </tr> <tr> <td>3</td> <td>$+155^\circ\text{C} \pm 2^\circ\text{C}$</td> <td>30 minutes</td> </tr> <tr> <td>4</td> <td>Room temperature</td> <td>10 to 15 minutes</td> </tr> </tbody> </table>	Step	Temperature	Time	1	$-55^\circ\text{C} \pm 3^\circ\text{C}$	30 minutes	2	Room temperature	10 to 15 minutes	3	$+155^\circ\text{C} \pm 2^\circ\text{C}$	30 minutes	4	Room temperature	10 to 15 minutes
Step	Temperature	Time															
1	$-55^\circ\text{C} \pm 3^\circ\text{C}$	30 minutes															
2	Room temperature	10 to 15 minutes															
3	$+155^\circ\text{C} \pm 2^\circ\text{C}$	30 minutes															
4	Room temperature	10 to 15 minutes															
Load Life in Humidity	Resistance change rate is $\pm 5\% (3\% + 0.1 \Omega)$ maximum $\pm 1\% (1\% + 0.1 \Omega)$ maximum	Resistance change after 1,000 hours (1.5 hours "on", 0.5 hour "off") at RCWV in a humidity chamber controlled at $40^\circ\text{C} \pm 2^\circ\text{C}$ and 90 to 95% relative humidity															
Load Life	Resistance change rate is $\pm 5\% (3\% + 0.1 \Omega)$ maximum $\pm 1\% (1\% + 0.1 \Omega)$ maximum	Permanent resistance change after 1,000 hours operating at RCWV with duty cycle of (1.5 hours "on", 0.5 hour "off") at $70^\circ\text{C} \pm 2^\circ\text{C}$ ambient															

High Power Resistors



HP06 Series

Resistance Preferred Value Range

E6	E12	E24	E96	E6	E12	E24	E96	E6	E12	E24	E96
10	10	10	10				21.5				46.4
			10.2	22	22	22	22.1	47	47	47	47.5
			10.5				22.6				48.7
			10.7				23.2				49.9
		11	11				23.7			51	51.1
			11.3			24	24.3				52.3
			11.5				24.9				53.6
			11.8				25.5				54.9
	12	12	12.1				26.1	56	56	56	56.2
			12.4				27.7				57.6
			12.7	27	27	27	27.4				12.7
		13	13				28				59
			13.3				28.7				60.4
			13.7				29.4			62	61.9
			14			30	30.1				63.4
			14.3				30.9				64.9
			14.7				31.6				66.5
15	15	15	15				32.4	68	68	68	68.1
			15.4	33	33	33	33.2				69.8
			15.8				34				71.5
		16	16.2				34.8			75	75
			16.5				35.7				76.8
			16.9			36	36.5				78.7
			17.4				37.4				80.6
			17.8				38.3	82	82	82	82.5
	18	18	18.2	39	39	39	39.2				84.5
			18.7				40.2				86.6
			19.1				41.2				88.7
			19.6				42.2			91	90.9
		20	20			43	43.2				93.1
			20.5				44.2				95.3
			21				45.3				97.6

Above values in accordance with IEC Publication 63 (1963) and BS2488

Stocked Values

Tolerance	Wattage (W)	Preferred Value Range	Range Value
1%	0.063	E96	1R5 - 1M
1%	0.1	E24	1R5 - 1M
1%	0.125	E24	10R - 1M