

CEMENT RESISTORS, CYLINDRICAL TYPE

圓柱型水泥電阻器



Features

- 1. Standard taping package can be for automatic insertion and forming.
- 2. Fully automated process and strict quality control system result uniform quality and consistent performance in reliability.
- 3. Small and lightweight body style save the PWB space considerably.
- 4. High Dielectric Withstanding Voltage up to 1KV.
- 5. Flameproof construction in a ceramic tube, resistant to humidity and insulation.

特色

- 1. 標準帶裝方式，供自動插件及成型作業。
- 2. 全自動化生產及嚴格品質控管，高品質，高可靠度產品。
- 3. 體積小，重量輕，節省印刷電路版使用空間。
- 4. 耐電壓能力達1KV。
- 5. 不燃性套管包覆，具耐溼及絕緣特性。

ELECTRICAL AND MECHANICAL PERFORMANCE

電氣及機械特性

特性 Characteristics	規格值 Standards	試驗方法 Test Methods
阻值容許誤差 Resistance Tolerance	±5% (J)	-
溫度係數 Resistance Temp. Coeff.	±300 ppm / °C	-55°C ~ 155°C
額定負載 Power Rating Load	Surface temp. 275°C Max. 最高表面溫度 275°C, ΔR/R ≤ ±1%	Rated voltage for 30 minutes 額定電壓 / 30分鐘
短時間過負載 Short Time Overload	±2%	10 times(power film : 5 times) of rated wattage for 5 seconds. 10倍(皮膜型 : 5倍)額定功率 / 5秒
耐電壓 Dielectric Withstanding Voltage	No evidence of mechanical damage or insulation breakdown. 無機械性能損壞及絕緣擊穿現象	AC 1000V for 1 minutes 施加 AC 1000V 電壓 1 分鐘
絕緣電阻 Insulation Resistance	1,000MΩ	DC 500V megger
端子強度 Terminal Strength	No evidence of mechanical damage. 無機械性能損壞現象	1 kg
焊錫性 Solder-ability	Minimum 95% coverage 焊錫面積 ≥ 95%	235±5°C for 2 seconds
浸錫耐熱性 Resistance to Soldering Heat	No evidence of mechanical damage. 無機械性能損壞現象, ΔR/R ≤ ±1%	270±5°C for 10 ±1 seconds 350±10°C for 3.5 ±0.5 seconds

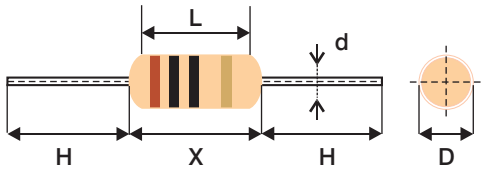
ENVIRONMENTAL CHARACTERISTICS

耐環境特性

特性 Characteristics	規格值 Standards	試驗方法 Test Methods
溫度週率 Temp. Cycle	ΔR/R ≤ ±1%	-55°C (30 min.) → Room Temp.(3 min.) → +155°C (30 min.) → Room Temp.(3 min.) / (5 cycles)
負載壽命 Load Life	ΔR/R ≤ ±5%	Rated power load 90 minutes ON 30 minutes OFF 70°C 1000 hours
耐濕壽命 Moisture-proof Load Life	ΔR/R ≤ ±5%	Rated power load 90 minutes ON 30 minutes OFF 40°C 95% RH 1000 hours
不燃性 Nonflammability	not flamed	16 times of rated wattage for 5 min.

Dimensions

尺寸



Rated Wattage	D±1	L±1	X Max.	H±3	d±0.1	Resistance(Ω)		Max. Working Voltage
						Wire Wound	Power Film	
1W	4.5	6.5	9	28	0.65	0.1~47	48~10K	150V
2W	5.0	8.5	10.5	28	0.65	0.1~100	101~10K	150V
3W	6.5	11	14	28	0.8	0.1~150	151~33K	350V
5W	7	16	19	28	0.8	0.1~150	151~50K	350V

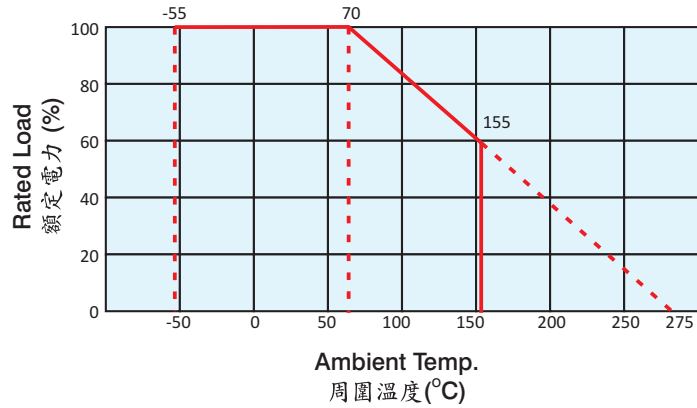
Note: 1. Too low or too high ohmic values can be supplied only case by case.
2. Max. Overload Voltage is 2 times of Max. Working Voltage.

Rate Continuous Working Voltage (RCWV) shall be determined
√ Rated Power X Resistance Value or Max. Working Voltage listed above,
whichever less.

Derating Curve

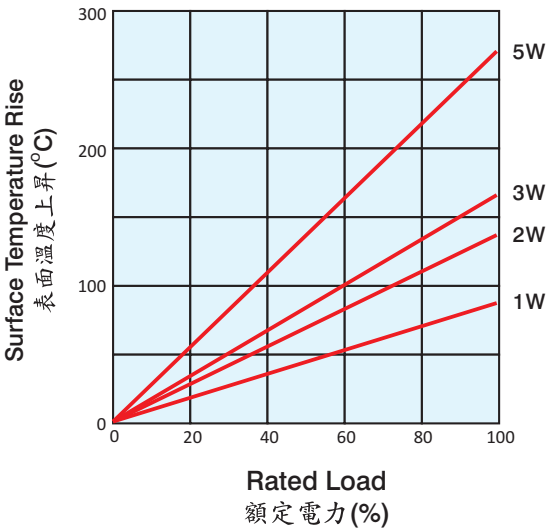
電力輕減曲線

For resistors operated in ambient temperatures above 70°C,
power rating must be derated in accordance with the curve
below.



Surface Temperature Rise

表面溫度上昇曲線



How to order

訂貨方式

It is composed by Type, Rated Wattage, Nominal Resistance, Tolerance, Marking and Package. e.g.

ROP 5W 10R J M T/B
a. b. c. d. e. f.

- a. : Type(種類) : Cement Resistors, Cylindrical Type are called "ROP".
- b. : Rated Wattage(額定電力) : Shown by "W", such as 1W, 2W, 3W, 5W.
- c. : Nominal Resistance(公稱電阻值) : 10Ω.
- d. : Tolerance(容許誤差): J= ±5% .
- e. : Marking(標示) : Mmarking (M-蓋印) / Nil : Color coding(空白-色碼)
- f. : Package (包裝方式):
T/R=tape & reel (捲裝); T/B=tape in box(帶裝); Nil= Bulk(散裝).

MILLI OHM WIRE RESISTORS(SHUNT)

微電阻跳線電阻器



Features

- 1. Milli ohm.
- 2. Low inductance.
- 3. High stability.
- 4. It is custom-made.

特色

- 1. 微阻值。
- 2. 低感量。
- 3. 穩定性卓越。
- 4. 依照客戶規格承製。

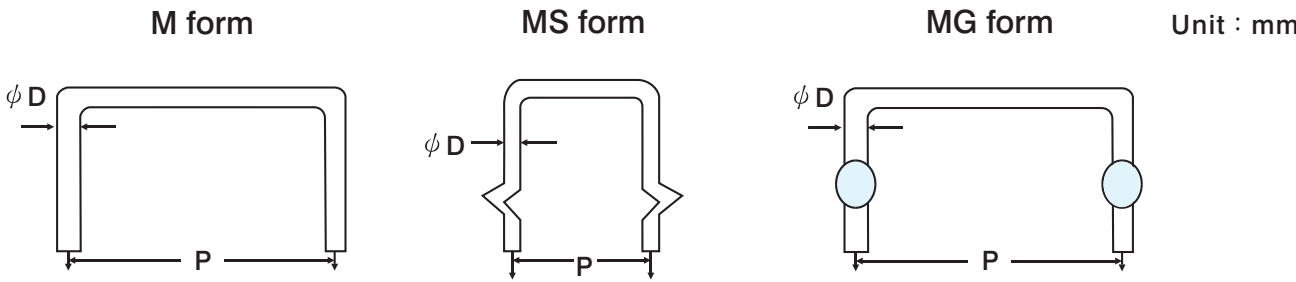
ELECTRICAL AND MECHANICAL PERFORMANCE

電氣及機械特性

特性 Characteristics	規格值 Standards	試驗方法 Test Methods
阻值容許誤差 Resistance Tolerance	±5% (J) or ±2% (G)	-
溫度係數 Resistance Temp. Coeff.	CNALLOY : ±200 ppm/°C CN30W : ±200 ppm/°C CMW : ±50 ppm/°C CN49W : ±50 ppm/°C	-
額定負載 Power Rating Load	Surface temp. 275°C Max. 最高表面溫度 275°C, ΔR/R ≤ ±1%	Rated voltage for 30 minutes 額定電壓 / 30分鐘
短時間過負載 Short Time Overload	±2%	10 times of rated wattage for 5 seconds. 10 倍額定功率 / 5秒
浸錫耐熱性 Resistance to Soldering Heat	No evidence of mechanical damage. 無機械性能損壞現象, ΔR/R ≤ ±1%	270 ±5°C for 10 ±1 seconds 350 ±10°C for 3.5 ±0.5 seconds

Forming Type

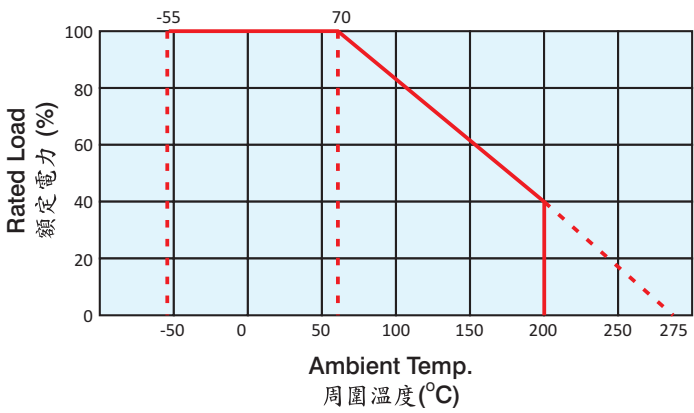
成型樣式



Derating Curve

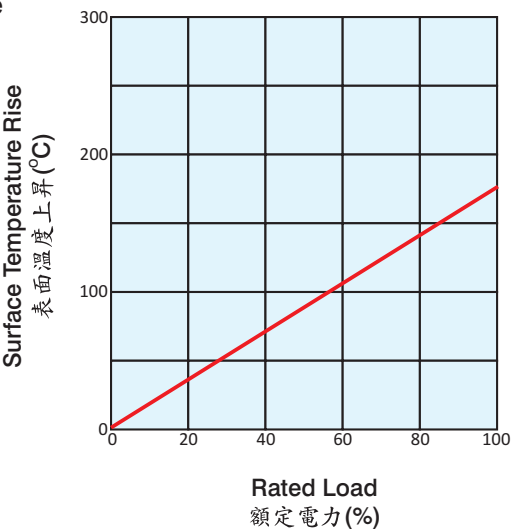
電力輕減曲線

For resistors operated in ambient temperatures above 70°C, power rating must be derated in accordance with the curve below.



Surface Temperature Rise

表面溫度上昇曲線



How to order

訂貨方式

It is composed by Type, Wire Diameter(Current), Pitch, Nominal Resistance, Tolerance and Forming. e.g.

$$\frac{\text{WOR}}{\text{a.}} \times \frac{1.6(10\text{A})}{\text{b.}} \times \frac{10}{\text{c.}} \frac{10\text{mR}}{\text{d.}} \frac{\text{J}}{\text{e.}} \frac{\text{MS}}{\text{f.}}$$

- a. : Type(種類) : Milli Ohm Wire Resistors is called "WOR"(Shunt)
- b. : Wire Diameter (Current) (尺寸(電流)) : Please supply the data of wire diameter or current you may apply.
- c. : Pitch (跨距) : According to mounting requirements, there are 5mm, 10mm.....etc.
- d. : Nominal Resistance(公稱電阻值) : 10mΩ .
- e. : Tolerance(容許誤差) : J=±5%, G=±2%
- f. : Forming(成型) : Upon the shape of forming, there are "M" form , "MS" form and "MG" form.

ENVIRONMENTAL CHARACTERISTICS

耐環境特性

特性 Characteristics	規格值 Standards	試驗方法 Test Methods
溫度週率 Temp. Cycle	ΔR/R ≤ ±1%	-55°C (30 min.) → Room Temp.(3 min.) → +200°C (30 min.) → Room Temp.(3 min.) / (5 cycles)
負載壽命 Load Life	ΔR/R ≤ ±3%	Rated power load 90 minutes ON 30 minutes OFF 70°C 1000 hours
耐濕壽命 Moisture-proof Load Life	ΔR/R ≤ ±2%	Rated power load 90 minutes ON 30 minutes OFF 40°C 95% RH 250 hours

※ 參考規格 Reference Standards
JIS C 5201-1

PRECISION CURRENT SENSING RESISTORS

精密型電流精測電阻器



Features

- 1. Low inductance.
- 2. Low temperature coefficient.
- 3. Very low resistance value.
- 4. Resistance tolerance : $\pm 1\%$ 、 $\pm 2\%$ 、 $\pm 5\%$.
- 5. Suitable for all kinds current sense application.

特色

- 1. 低感性。
- 2. 低溫度係數。
- 3. 超低電阻值範圍。
- 4. 高精密電阻值： $\pm 1\%$ 、 $\pm 2\%$ 、 $\pm 5\%$ 。
- 5. 適合各種類型的電流感應器之應用。

ELECTRICAL AND MECHANICAL PERFORMANCE

電氣及機械特性

特性 Characteristics	規格值 Standards	試驗方法 Test Methods
阻值容許誤差 Resistance Tolerance	$\pm 5\%$ (J)、 $\pm 2\%$ (G)、 $\pm 1\%$ (F)	-
溫度係數 Resistance Temp. Coeff.	± 100 ppm / $^{\circ}\text{C}$	$-55^{\circ}\text{C} \sim 200^{\circ}\text{C}$
額定負載 Power Rating Load	Surface temp. 275°C Max. 最高表面溫度 275°C , $\Delta R/R \leq \pm 1\%$	Rated voltage for 30 minutes 額定電壓 / 30分鐘
電感量 Inductance	$< 10\text{nH}$	-
焊錫性 Solder-ability	Minimum 95% coverage 焊錫面積 $\geq 95\%$	$235^{\circ}\text{C} \pm 5^{\circ}\text{C}$ for 2 seconds
浸錫耐熱性 Resistance to Soldering Heat	No evidence of mechanical damage. 無機械性能損壞現象, $\Delta R/R \leq \pm 1\%$	$270 \pm 5^{\circ}\text{C}$ for 10 ± 1 seconds $350 \pm 10^{\circ}\text{C}$ for 3.5 ± 0.5 seconds

ENVIRONMENTAL CHARACTERISTICS

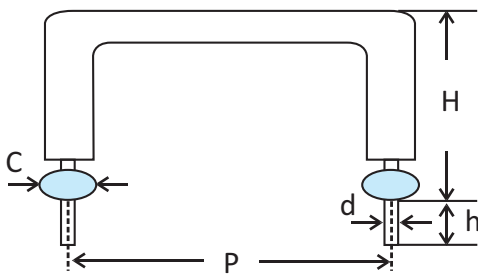
耐環境特性

特性 Characteristics	規格值 Standards	試驗方法 Test Methods
溫度週率 Temp. Cycle	$\Delta R/R \leq \pm 1\%$	-55°C (30 min.) $\rightarrow$ Room Temp.(3 min.) $\rightarrow +200^{\circ}\text{C}$ (30 min.) $\rightarrow$ Room Temp.(3 min.) / (5 cycles)
負載壽命 Load Life	$\Delta R/R \leq \pm 1\%$	Rated power load 90 minutes ON 30 minutes OFF 70°C 1000 hours
耐濕壽命 Moisture-proof Load Life	$\Delta R/R \leq \pm 1\%$	Rated power load 90 minutes ON 30 minutes OFF 40°C 95% RH 1000 hours

※ 參考規格 Reference Standards
JIS C 5201-1

Dimensions

尺寸



Unit : mm

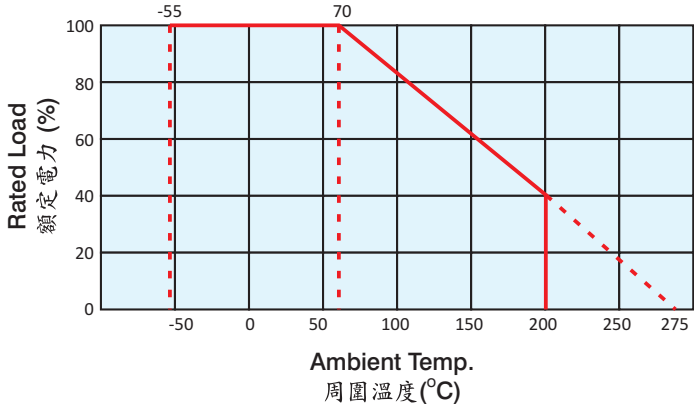
Rated Wattage	H(max.)	h ± 0.3	C ± 0.2	d ± 0.05	P ± 0.5	Resistance Range(m Ω)
1W	25	3.2	1.6	1	12	5~25
3W	25	3.2	1.6	1	15	5~25
5W	30	3.2	1.6	1	20	10~25

Note: Too low or too high ohmic values can be supplied only case by case.

Derating Curve

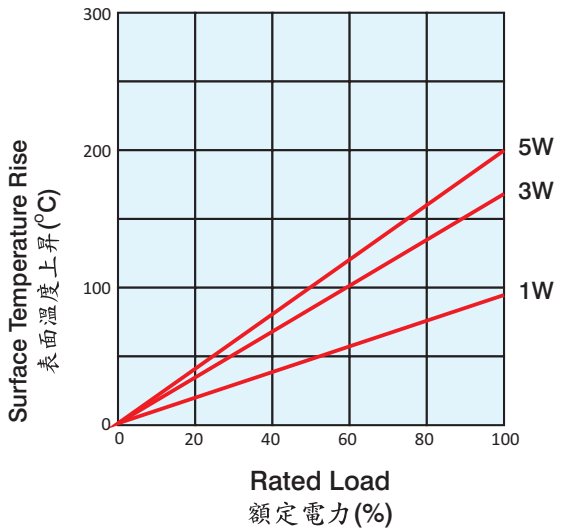
電力輕減曲線

For resistors operated in ambient temperatures above 70°C , power rating must be derated in accordance with the curve below.



Surface Temperature Rise

表面溫度上昇曲線



How to order

訂貨方式

It is composed by Type, Rated Wattage, Nominal Resistance and Tolerance .

CSR	1W	10mR	F
a.	b.	c.	d.

- a. : Type(種類) : Precision Current Sensing Resistors are called "CSR".
- b. : Rated Wattage(額定電力) : Shown by "W" ,such as 1W, 3W, 5W.
- c. : Nominal Resistance(公稱電阻值) : 10m Ω .
- d. : Tolerance(容許誤差): F = $\pm 1\%$, G = $\pm 2\%$, J = $\pm 5\%$.

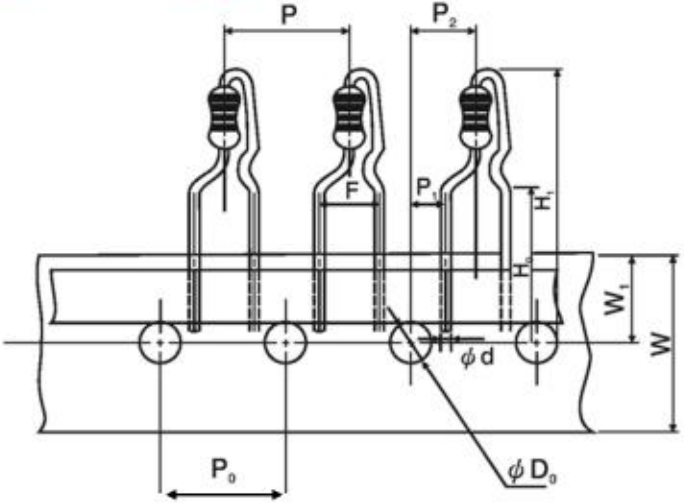
成型形状 Forming Style	规格 Forming Type Name	成型尺寸 Forming Dimension(mm)			
		P	H±0.5	B±0.05	h +1/-0.5
 MB 形 (MB Type)	KNP 1/2W、NKNP 1/2W RSN 1/2W、NRSN 1/2W、FRN 3/4W RSU 2W、KNP 2WS	15±1.5	6.5	1	2
	RD 1/2W、RN 1/2W、RT 1/2W、FRL 1/2W FRN 1W、RSS 1W、NRSS 1W KNP 1W、NKNP 1W、FKN 1W	15±1.5	6.5	1	2
	RSN 1W、NRSN 1W、RDN 1W RT 1W、FRL 1W、RSS 2W NRSS 2W、FRN 2W、KNP 2W NKNP 2W、FKN 2W、KNP 3WS	15±1.5	6.5	1	2
	RN 1WL、RDN 2W、RT 2W RSN 2W、NRSN 2W、RSS 3W NRSS 3W、RSU 3W、FRL 2W FRN 3W、KNP 3W、NKNP 3W FKN 3W、KNP 3WL	20±2	6.5	1	2
	KNP 5W、NKNP 5W、FKN 5W	25±2	6.5	1	2
	RSN 3WL、RSS 5W KNP 6W、NKNP 6W	30±2	6.5	1	2

成型形状 Forming Style	规格 Forming Type Name	成型尺寸 Forming Dimension(mm)					
		P	H	h±1	A±0.05	B±0.05	C±0.2
 MG 形 (MG Type)	KNP 1/2W、NKNP 1/2W RSN 1/2W、NRSN 1/2W、 FRN 3/4W、KNP 2WS	15±1.5	7±1	4.5	0.23	0.8	1.2
	RD 1/2W、RN 1/2W、RT 1/2W FRL 1/2W、FRN 1W、RSS 1W NRSS 1W、KNP 1W NKNP 1W、FKN 1W、RSU 2W	15±1.5	7±1	4.5	0.23	0.8	1.2
	RSN 1W、NRSN 1W、RDN 1W RT 1W、FRL 1W、RSS 2W NRSS 2W、FRN 2W、KNP 2W NKNP 2W、FKN 2W、KNP 3WS	15±1.5	7±1	4.5	0.30	1	1.4
	RN 1WL、RDN 2W、RT 2W RSN 2W、NRSN 2W RSS 3W、NRSS 3W、RSU 3W FRL 2W、FRN 3W KNP 3WL、NKNP 3WL	20±2	10±2	4.5	0.30	1	1.4

成型形状 Forming Style	规格 Forming Type Name	成型尺寸 Forming Dimension(mm)
		A +1/-0.5
 F 形 (F Type)	RD 1/2W、RN 1/2W、RT 1/2W、FRL 1/2W FRN 1W、RSS 1W、NRSS 1W KNP 1W、NKNP 1W、FKN 1W	3.5
	RSN 1W、NRSN 1W、RDN 1W RT 1W、FRL 1W、RSS 2W NRSS 2W、FRN 2W、KNP 2W NKNP 2W、FKN 2W、KNP 3WS	3.5
	RN 1WL、RDN 2W、RT 2W RSN 2W、NRSN 2W RSS 3W、NRSS 3W、RSU 3W FRL 2W、FRN 3W KNP 3WL、NKNP 3WL	3.5

Forming Style : Radial Type Lead Taping (PA)

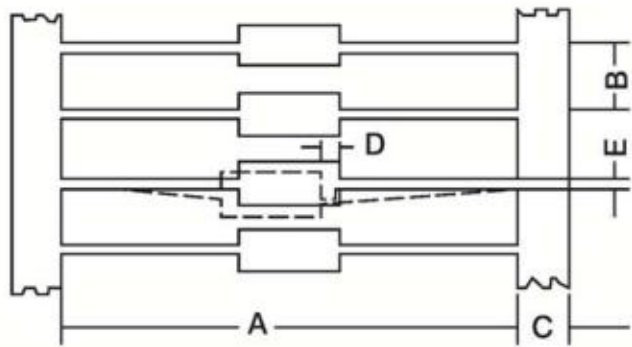
成型形状 : PA



Unit : mm

规格 Forming Type Name	P ±1	P ₀ ±0.3	P ₁ ±0.7	P ₂ ±1	F ±0.8	W ±0.5	W ₁ ±0.5	H ₁ max	H ₀ ±0.5	φD ₀ ±0.2	φd ±0.1
RD1/4W、RN1/4W、RT1/4W、RSN 1/4W KNP1/4W、NRSN1/4W、FRL 1/4W、 RSS1/2W、NRSS1/2W、RSU1W	12.7	12.7	3.85	6.35	5	18	9	32	16	4	0.6
RD 1/2W、RN 1/2W、RT 1/2W、FRL 1/2W FRN 1W、RSU 2W、RSS 1W、NRSS 1W KNP 1W、NKNP 1W	12.7	12.7	3.85	6.35	5	18	9	32	16	4	0.65
RSN 1W、NRSN 1W、RDN 1W RT 1W、FRL 1W、RSS 2W NRSS 2W、FRN 2W、KNP 2W NKNP 2W、FKN 2W、KNP 3WS	12.7	12.7	3.85	6.35	5	18	9	38	16	4	0.8
KNP 3W、NKNP 3W FKN 3W	12.7	12.7	3.85	6.35	5	18	9	38	16	4	0.8
RN 1WL、RDN 2W、RT 2W RSN 2W、NRSN 2W RSS 3W、NRSS 3W、RSU 3W FRL 2W、FRN 3W KNP 3WL、NKNP 3WL	12.7	12.7	3.85	6.35	5	18	9	38	16	4	0.8
FKN 5WS	12.7	12.7	3.85	6.35	5	18	9	50	16	4	0.8

帶裝尺寸



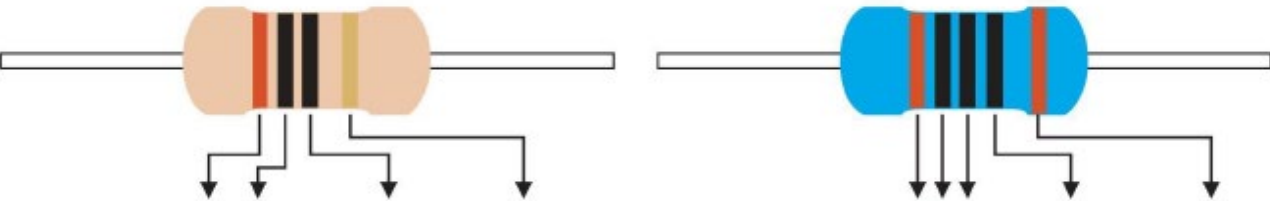
Unit : mm

Series Name 系列名稱	Wattage 功率	Type – Size 帶裝尺寸	A	B	C±1	D Max.	E Max.
RD	≤ 1/4W	T-26	26+1/-0	5±0.5	6	0.6	1.2
		T-52(T/B)*	52±1	5±0.5	6	0.6	1.2
RDN	1/2W	T-52(T/B)*	52±1	5±0.5	6	0.6	1.2
	1W	T-63(T/B)*	63±1	5±0.5	6	0.6	1.2
	2W	T-63(T/B)*	63±1	10±1	6	0.6	1.2
RN		T-76	76±1.5	10±1	6	0.6	1.2
	≤ 1/4W	T-26	26+1/-0	5±0.5	6	0.6	1.2
		T-52(T/B)*	52±1	5±0.5	6	0.6	1.2
	1/2W	T-52(T/B)*	52±1	5±0.5	6	0.6	1.2
	1W	T-63(T/B)*	63±1	5±1	6	0.6	1.2
RSS / NRSS / FRN	1WL	T-63(T/B)*	63±1	10±1	6	0.6	1.2
	≤ 1W	T-52(T/B)*	52±1	5±0.5	6	0.6	1.2
		T-52	52±1	5±0.5	6	0.6	1.2
	2W	T-63(T/B)*	63±1	5±0.5	6	0.6	1.2
		T-63(T/B)*	63±1	10±1	6	0.6	1.2
RSN / NRSN / FRL		T-76	76±1.5	10±1	6	0.6	1.2
	5W	T-93(T/B)*	93±1.5	10±1	6	0.6	1.2
	≤ 1/2W	T-52(T/B)*	52±1	5±0.5	6	0.6	1.2
	1W	T-52	52±1	5±0.5	6	0.6	1.2
		T-63(T/B)*	63±1	5±0.5	6	0.6	1.2
RSU		T-63(T/B)*	63±1	10±1	6	0.6	1.2
	2W	T-76	76±1.5	10±1	6	0.6	1.2
	3WL	T-93(T/B)*	93±1.5	10±1	6	0.6	1.2
	1W	T-52(T/B)*	52±1	5±0.5	6	0.6	1.2
RT		T-52(T/B)*	52±1	5±0.5	6	0.6	1.2
	≤ 1/4W	T-26	26+1/-0	5±0.5	6	0.6	1.2
		T-52(T/B)*	52±1	5±0.5	6	0.6	1.2
	1/2W	T-52(T/B)*	52±1	5±0.5	6	0.6	1.2
	1W	T-63(T/B)*	63±1	5±0.5	6	0.6	1.2
KNP / NKNP / FKN		T-63(T/B)*	63±1	10±1	6	0.6	1.2
	2W	T-76	76±1.5	10±1	6	0.6	1.2
		T-76	76±1.5	10±1	6	0.6	1.2
	3W / 3WL	T-76(T/B)*	76±1.5	10±1	6	0.6	1.2
		T-76	76±1.5	10±1	6	0.6	1.2
ROP	5W / 5WS	T-83(T/B)*	83±1.5	10±1	6	0.6	1.2
	1W	T-52(T/B)*	52±1	5±1	6	0.6	1.2
	2W	T-52(T/B)*	52±1	5±1	6	0.6	1.2
	3W	T-52(T/B)*	52±1	10±1	6	0.6	1.2
	5W	T-63(T/B)*	63±1	10±1	6	0.6	1.2

色碼標示 & 標準阻值對照表

COLOR CODING

色碼標示



Color 色碼	1st,2nd(第一、二碼) Significant Figure (數值)	3rd(第三碼) Multiplier (倍率)	4th(第四碼) Tolerance (誤差值)
Black 黑	0	1	-
Brown 棕	1	10	1%
Red 紅	2	10 ²	2%
Orange 橙	3	10 ³	-
Yellow 黃	4	10 ⁴	-
Green 綠	5	10 ⁵	-
Blue 藍	6	10 ⁶	-
Violet 紫	7	10 ⁷	-
Gray 灰	8	10 ⁸	-
White 白	9	10 ⁹	-
Gold 金	-	10 ⁻¹	5%
Silver 銀	-	10 ⁻²	10%

Color 色碼	1st,2nd, 3rd(第一、二、三碼) Significant Figure (數值)	4th(第四碼) Multiplier (倍率)	5th(第五碼) Tolerance (誤差值)
Black 黑	0	1	-
Brown 棕	1	10	1%
Red 紅	2	10 ²	2%
Orange 橙	3	10 ³	-
Yellow 黃	4	10 ⁴	-
Green 綠	5	10 ⁵	-
Blue 藍	6	10 ⁶	-
Violet 紫	7	10 ⁷	-
Gray 灰	8	10 ⁸	-
White 白	9	10 ⁹	-
Gold 金	-	10 ⁻¹	5%
Silver 銀	-	10 ⁻²	10%

STANDARD VALUES TABLE

標準阻值對照表

E24 SERIES : for ±5%	E96 SERIES : for ±1%
10 11 12 13 15 16 18 20 22 24 27 30 33 36 39 43 47 51 56 62 68 75 82 91	100 102 105 107 110 113 115 118 121 124 127 130 133 137 140 143 147 150 154 158 162 165 169 174 178 182 187 191 196 200 205 210 215 221 226 232 237 243 249 255 261 267 274 280 287 294 301 309 316 324 332 340 348 357 365 374 383 392 402 412 422 432 442 453 464 475 487 499 511 523 536 549 562 576 590 604 619 634 649 665 681 698 715 732 750 768 787 806 825 845 866 887 909 931 953 976