

Carbon Film Resistors

Carbon film fixed resistors with axial leads · product code KCF



Illustration; not a photograph of a specific part.

RATED POWER

1/8W – 5W

MAX. WORKING VOLTAGE

200V – 500V

MAX. OVERLOAD VOLTAGE

400V – 1000V

RESISTANCE RANGE

0.1Ω ~ 22MΩ

How to order

KCF

1 · Product code
Carbon film resistor

25

2 · Rated power ①
1/4W

B

3 · Packing ③
Bulk

J

4 · Tolerance ②
±5%

2

5 · No. of total
characters ④
100=10R=2

100

6 · Resistance value ④
100=10R

Ordering example as given on the original sheet (printed as separate parts, not as one string); positions 1 to 6 are explained in the tables below.

1 · Product code			
KCF		Carbon film resistor	

2 · Rated power ①			
Code	Power	Code	Power
12	1/6W	200	2W
25	1/4W	1WS	1WS
50	1/2W	2WS	2WS
125	1/8W	500	5W
100	1W	700	7W

3 · Packing ③	
T52	Tape/box
T73	Tape/box
B	Bulk
R	Tape reel

4 · Tolerance ②	
F	±1%
J	±5%

5 · No. of total characters ④	
100=10R=2	
100R=101=3	
10K=1000=4	

6 · Resistance value ④	
100=10R	
100R=101	
10K = 10,000	

General

Scope

This specification applies to KOME carbon film resistors.

Nominal resistance

The nominal resistance is the resistance marked on the resistor body and is, as a rule, given in the units Ω, KΩ, MΩ.

Nominal resistance tolerance

The nominal resistance tolerance is represented by one capital letter selected from G (±2%), J (±5%) ②.

Ratings

CF (carbon film fixed resistors)

Style	Max. working voltage	Max. overload voltage	Resistance value range
CF1/6W / CF1/8W	200V	400V	0.1Ω ~ 22MΩ
CF1/4W / CF1/4WS	250V	500V	0.1Ω ~ 22MΩ
CF1/2W / CF1/2WS	350V	700V	0.1Ω ~ 22MΩ
CF1W / CF1WS	500V	1000V	0.1Ω ~ 22MΩ
CF2W / CF2WS	500V	1000V	0.1Ω ~ 22MΩ
CF3W / CF3WS	500V	1000V	0.1Ω ~ 22MΩ
CF5W / CF5WS	500V	1000V	0.1Ω ~ 22MΩ

Power rating

The power rating is defined as the maximum power that can be applied continuously at an ambient temperature of 70°C. When the ambient temperature exceeds 70°C, use Chart 1.

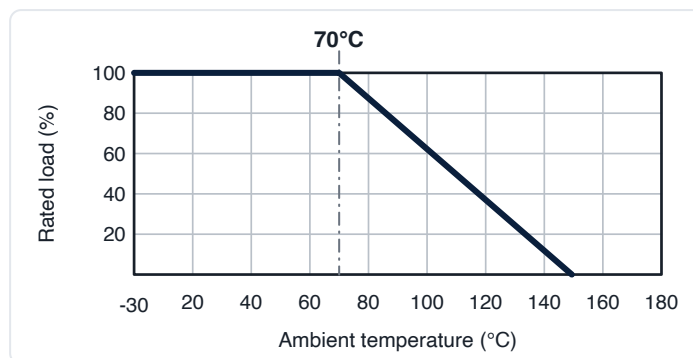


Chart 1 — Power derating curve ⑤

Rated voltage

The rated voltage is the DC voltage, or the AC voltage (effective value at commercial frequency, e.g. 50 c/s, 60 c/s), at which the rated power is applied. It can be calculated with the following equation ⑥:

$E = \sqrt{P \times R}$	E = Rated voltage
	P = Rated power (W)
	R = Nominal resistance value (Ω)

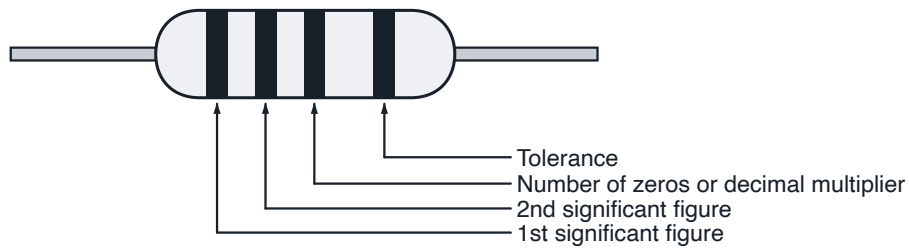
When the calculated rated voltage exceeds the maximum usable voltage shown in Chart 1 ⑥, the maximum usable voltage is defined as the voltage according to the power derating curve shown in Chart 1.

Performance and test methods

Item	Standard	Requirement	Test method
Resistance vs. temperature characteristics	JIS C 5202 5.2	$R_x < 100\text{K}\Omega$: +350 ~ -500 ppm/°C $100\text{K}\Omega \leq R_x \leq 1\text{M}\Omega$: 0 ~ -700 ppm/°C $1\text{M}\Omega < R_x$: 0 ~ -1500 ppm/°C	Measure the resistance R_0 (Ω) at room temperature T_0 (°C), then measure it again at a temperature 100°C higher than room temperature. $\text{PPM} = (R - R_0) / R_0 \times 10^6 / ((T_0 + 100) - T_0)$
Short-time overload	JIS C 5202 5.5	Resistance variation within $\pm(0.75\% + 0.05\Omega)$; no mechanical breakage	Apply a DC voltage of 2.5 times the rated voltage for 5 seconds, then leave at room temperature for 30 minutes and measure. Max. overload voltage: 0.50W – 700V (DC).
Insulation resistance	JIS C 5202 5.6	1000MΩ or more	In V-block: lay the resistor on a 90° metal V-block, apply 100V DC between the resistor leads and the V-block for one minute and measure.
Voltage endurance	JIS C 5202 5.7	Resistance variation within $\pm(2\% + 0.05\Omega)$; no mechanical breakage	Lay the resistor on the 90° metal V-block and apply the AC test voltage for one minute. Test voltage: 0.25W – 500V (AC), 0.50W – 700V (AC).
Intermittent overload	JIS C 5202 5.8	Resistance variation within $\pm(2.00\% + 0.05\Omega)$	Apply an AC voltage of 4 times the rated voltage for 1 second and rest for 25 seconds; repeat this cycle 10000±200 times. After the test, leave the resistor at room temperature for 30 minutes and measure. Maximum voltage for intermittent overload: 0.50W – 700V (AC).
Terminal strength	— ⑦	Resistance variation within $\pm(0.5\% + 0.05\Omega)$; no mechanical breakage	Pull test: apply a force of 2.5kg to the lead in the direction of the lead axis for 30±5 seconds.
Resistance to soldering heat	JIS C 5202 7.10 ⑦	Resistance variation within $\pm(1.0\% + 0.05\Omega)$; no mechanical breakage	Dip the lead into a solder bath at a temperature of 350°C ± 10°C up to 4±0.8mm from the resistor body ⑦; measure after 3 hours at room temperature.
Solderability	JIS C 5202 6.5	More than 95% of the lead surface shall be covered with new solder after the leads are dipped in the solder.	Dip the lead into a solder bath at a temperature of 260°C±5°C up to 4±0.8mm from the resistor body, hold for 5 ± 0.5 seconds, then inspect.
Humidity load	JIS C 5202 7.9	Resistance variation within $\pm(3.0\% + 0.05\Omega)$; no mechanical breakage	In a temperature chamber at 40°C±2°C and 90 – 95% relative humidity, apply the rated voltage for 1.5 hours and switch it off for 0.5 hour; repeat this cycle for 1000 hours. After the test, leave at room temperature for 1 hour ⑧, then measure.
Load life	JIS C 5202 7.10 ⑦	Resistance variation within $\pm(3\% + 0.05\Omega)$; no mechanical breakage	In a constant-temperature chamber at 70°C ± 2°C, apply the rated DC voltage for 1.5 hours and switch it off for 0.5 hour; repeat this cycle for 1000 hours. After the test, leave at room temperature for 1 hour ⑧, then measure.

Standard: JIS C 5202 clause. — : no clause given on the original sheet.

Marking

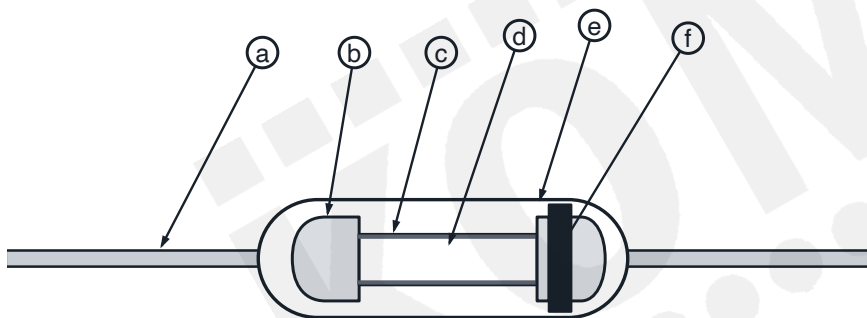


Color code

Color	1st band	2nd band	3rd band	4th band
Black	0	0	10^0	
Brown	1	1	10^1	
Red	2	2	10^2	$\pm 2.0\%$
Orange	3	3	10^3	
Yellow	4	4	10^4	
Green	5	5	10^5	
Blue	6	6	10^6	
Violet	7	7	10^7	
Grey	8	8	10^8	
White	9	9	10^9	
Gold			10^{-1}	$\pm 5.0\%$
Silver			10^{-2}	$\pm 10.0\%$

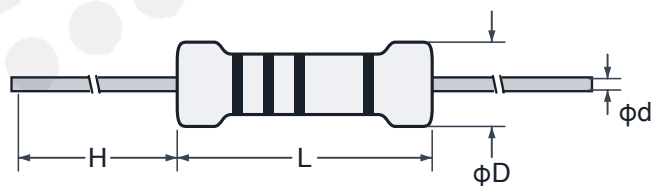
Construction and dimensions

Construction



Part	
a	Lead wire
b	End cap
c	Carbon film
d	Ceramic rod
e	Epoxy resin
f	Color code

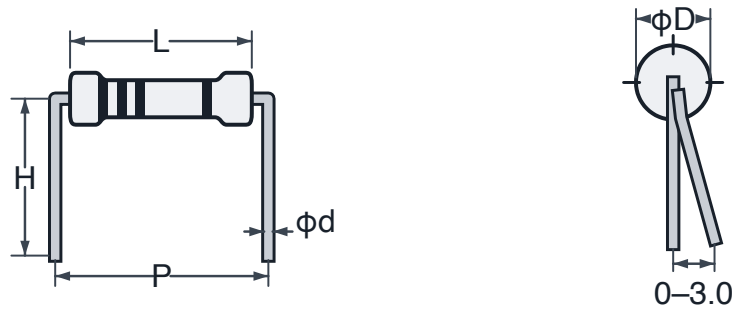
Dimensions



Watts	L	D	H	d $\pm 0.05\text{mm}$
1/6W 1/8W 1/16W	3.2 $\pm$ 0.3	1.8 $\pm$ 0.3	28 $\pm$ 2.0	0.4
1/4WS				
1/4W	6.0 $\pm$ 0.5	2.3 $\pm$ 0.3	28 $\pm$ 2.0	0.45
1/2WS				
1/2W	9.0 $\pm$ 0.5	3.2 $\pm$ 0.3	26.0 $\pm$ 2.0	0.52
1WS				
1W	11.0 $\pm$ 1.0	4.2 $\pm$ 0.5	35.0 $\pm$ 3.0	0.65
2WS				
2W	15.0 $\pm$ 1.0	5.0 $\pm$ 0.5	33.0 $\pm$ 3.0	0.72
3WS				
3W	17.0 $\pm$ 1.0	6.0 $\pm$ 0.5	36.0 $\pm$ 3.0	0.72
5WS				
5W	24.0 $\pm$ 1.0	8.0 $\pm$ 1.0	33.0 $\pm$ 3.0	0.72

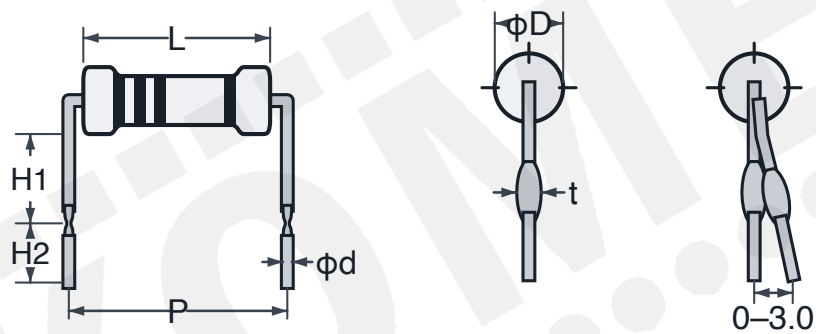
Formed dimensions

M type



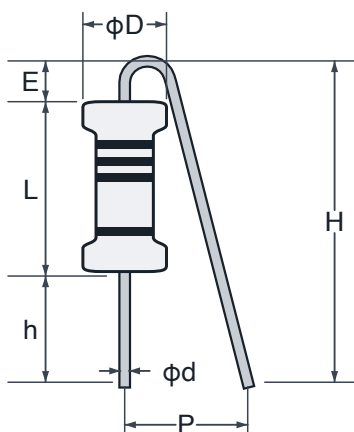
Watts	Dimensions (mm)				
	L	P±1.0	D	d±0.05	H±1.0
1/6W/1/8W/1/16W/1/4WS	3.2±0.3	6	1.8±0.3	0.40	8.0
1/4W/1/2WS	6.0±0.5	10	2.3±0.3	0.45	8.0
1/2W/1WS	9.0±0.5	12.5/15	3.2±0.3	0.52	8.0
1W/2WS	11.0±1.0	15	4.2±0.5	0.65	10
2W/3WS	15.0±1.0	20	5.0±0.5	0.72	10
3W/5WS	17.0±1.0	25	6.0±0.5	0.72	10
5W	24.0±1.0	33	8.0±1.0	0.72	10

MB type



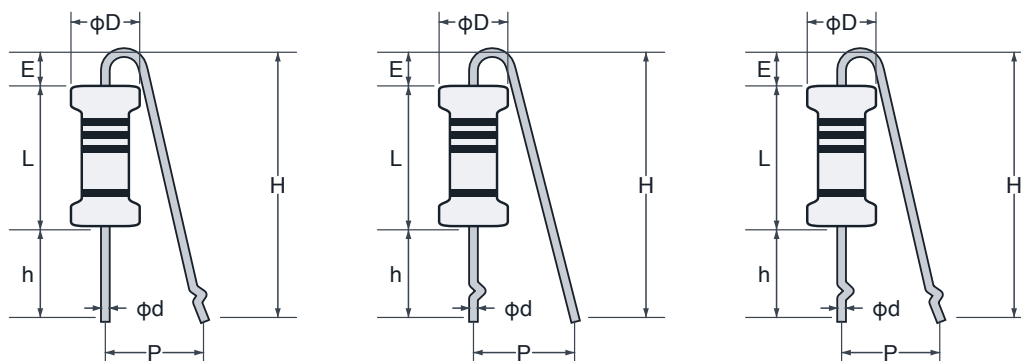
Watts	Dimensions (mm)						
	L	P±1.0	D	d±0.05	H1±1.0 ⑨	H2±1.0 ⑨	t±0.2
1/2W/1WS	9.0±0.5	12.5	3.2±0.3	0.52	10.5	5.0	1.20
1W/2WS	11.0±1.0	15	4.2±0.5	0.65	10.5	5.0	1.25
2W/3WS	15.0±1.0	20	5.0±0.5	0.72	10.5	5.0	1.25
3W/5WS	17.0±1.0	25	6.0±0.5	0.72	10.5	5.0	1.25
5W	24.0±1.0	30	8.0±1.0	0.72	10.5	5.0	1.25

F type



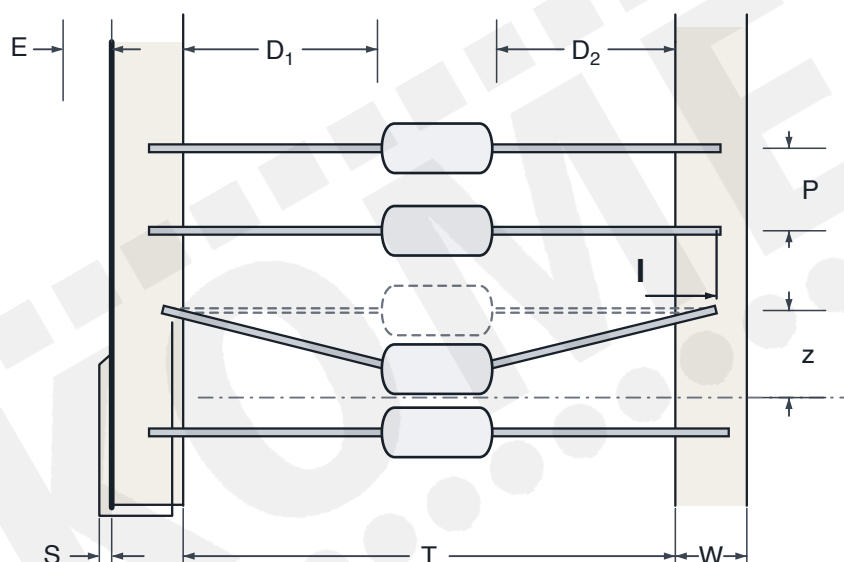
Watts	Dimensions (mm)						
	L	P±1.0	D	d±0.05	h±1.0	H±1.0	E max.
1/4W/1/2WS	6.0±0.5	6-8	2.3±0.3	0.45	8.0	14	3
1/2W/1WS	9.0±0.5	6-8	3.2±0.3	0.52	8.0	18	3.5
1W/2WS	11.0±1.0	6-8	4.2±0.5	0.65	8.0	20	3.5
2W/3WS	15.0±1.0	6-8	5.0±0.5	0.72	8.0	25	3.5
3W/5WS	17.0±1.0	6-8	6.0±0.5	0.72	8.0	30	3.5

FK2, FK1 and FKK types ⑩



Watts	Dimensions (mm)						
	L	P±1.0	D	d±0.05	h+1/-0	H±1.0	E max.
1/2W/1WS	9.0±0.5	5-7	3.2±0.5 ⑩	0.52	8	18	3.5
1W/2WS	11.0±1.0	5-9	4.2±0.5	0.65	8	20	3.5
2W/3WS	15.0±1.0	5-9	5.0±0.5	0.72	8	25	3.5
3W/5WS	17.0±1.0	5-10	6.0±0.5	0.72	8	30	3.5

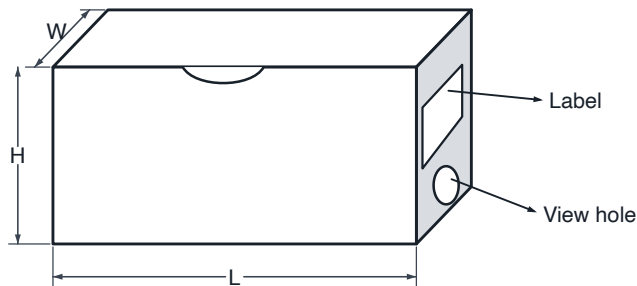
Taping dimensions



Watts	Type	T	P±0.5	W±0.5	D ₁ - D ₂ max.	E max.	Z max.	S max.	I max.
1/6W/1/8W 1/16W/1/4WS	T26(T34)	26±1.5	5	6	0.8	0	1.2	0.8	3.2
	T52(T60)	52±1.5	5	6	0.8	0	1.2	0.8	3.2
1/4W 1/2WS	T26(T34)	26±1.5	5	6	0.8	0	1.2	0.8	3.2
	T52(T60)	52±1.5	5	6	0.8	0	1.2	0.8	3.2
1/2W/1WS	T52(T60)	52±1.5	5	6	0.8	0	1.2	0.8	3.2
1W/2WS	T73(T81)	73±1.5	5	6	0.8	0	1.4	0.8	3.2
2W/3WS	T73(T81)	73±1.5	10	6	0.8	0	1.4	0.8	3.2
3W/5WS	T73(T81)	73±1.5	10	6	0.8	0	1.4	0.8	3.2
5W	T84(T91) ⑪	73±1.5	10	6	0.8	0	1.4	0.8	3.2

Packing

Taping type (ammo box) ③



Label specification	
1	Type
2	Watts, tolerance
3	Resistance, quantity
4	P/N
5	Lot No.

Type	Watts	W (mm)	H (mm)	L (mm)	Qty (pcs)
T26(T34)	1/6W 1/8W 1/16W 1/4WS	50	67	260	5000
	1/4W/1/2WS	50	100	260	5000
T52(T60)	1/6W/1/8W	80	72	266	5000
T52(T60)	1/16W 1/4WS				
T52(T60)	1/4W/1/2WS	80	100	260	5000
T52(T60)	1/2W/1WS	80	85	260	2000
T73(T81)	1W/2WS	110	80	270	1000
T73(T81)	2WS/3WS ⑫	110	92	270	1000
T73(T81)	3W/5WS	110	92	270	500
T84(T91)	5W	110	92	270	250

Bulk ③



Watts		Type	L (mm)	W (mm)	H (mm)	Poly bag	Box (pcs)
1/6W 1/8W	1/16W 1/4WS	P	240	140	76	1000	20000
1/4W	1/2WS	P	240	140	76	500	10000
1/2W	1WS	P	240	140	76	500	5000
1W	2WS	P	240	140	76	200	2000
2W	3WS	P	240	140	76	100	1500
3W/5WS		P	240	140	76	100	1000
5W		P	240	140	76	50	500

① Rated power codes: 25S = 1/4WS, 50S = 1/2WS, 300 = 3W and 500 = 5W; small-size ratings are ordered as written (1WS, 2WS, 3WS, 5WS, 7WS) (not listed on the manufacturer's sheet; added on supplementary confirmation). A code does not mean the rating is available in this series. 1/6W and 1/16W have no small-size (S) version; not every power rating has one. As printed: code 12 = 1/6W is printed twice (shown once); there is no code for 1/16W; 7W (700) appears nowhere else on the sheet; the suffix "WS" is not explained on the original — subject to manufacturer confirmation.

② Tolerance: How to order gives F (±1%) and J (±5%); the tolerance section gives G (±2%) and J (±5%); the color code gives ±2.0%, ±5.0% and ±10.0%, with no band for ±1% — subject to manufacturer confirmation.

③ Packing: How to order lists T52, T73 (tape/box), B (bulk) and R (tape reel); the taping tables also list T26(T34) and T84(T91), the bracketed types are not explained, no reel data is given, and the bulk table gives the type as "P" — subject to manufacturer confirmation.

④ The examples "10K=1000=4" and "10K = 10,000" do not follow the pattern of the other examples — subject to manufacturer confirmation.

⑤ Chart 1 is not captioned on the original sheet (the text calls it chart 1); the interval from -30 to 20 is drawn as wide as the others, and the zero-load temperature is not labelled — subject to manufacturer confirmation.

⑥ The equation is printed " $E=\sqrt{P \times R}$ " without a radical bar and is shown as $E = \sqrt{(P \times R)}$. The text refers to a maximum usable voltage "shown in CHART 1", but Chart 1 shows only the rated load (%) — subject to manufacturer confirmation.

⑦ JIS C 5202 7.10 is cited for both resistance to soldering heat and load life; no dip time is given for resistance to soldering heat, and no clause for terminal strength — subject to manufacturer confirmation.

⑧ The recovery time is printed "lhour" (with a lower-case letter L, not the digit 1) and is shown as 1 hour — subject to manufacturer confirmation.

⑨ The subscripts of H1 and H2 are blurred in the MB drawing and are read from the table headings — subject to manufacturer confirmation.

⑩ FK types: the drawings are not individually labelled and the table does not say which type it covers; D for 1/2W/1WS is printed 3.2 ± 0.5 (other tables: 3.2 ± 0.3) — subject to manufacturer confirmation.

⑪ For 5W the type is T84(T91), but T is printed 73 ± 1.5 ; in the other rows T matches the type number — subject to manufacturer confirmation.

⑫ This row is printed "2WS/ 3WS"; the other tables give 2W/3WS — subject to manufacturer confirmation.