

Approval Sheet

for

Wire Wound Resistors

KNP series

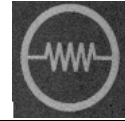
$\pm 1\%$ & $\pm 5\%$

YAGEO CORPORATION

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1. PRODUCT:

WIRE WOUND RESISTORS

(Normal & Miniature Style)

Green body color

2. PART NUMBER:

Part number of the wire wound resistor is identified by the name, power, tolerance, packing, temperature coefficient, special type and resistance value.

Example :

KNP	100	J	T	-	73-	100R
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Series Name	Power Rating	Resistance Tolerance	Packing Style	Temperature Coefficient of Resistance	Special Type	Resistance Value

(1) Style: KNP SERIES

(2) Power Rating : -25=1/4W 、 50S=1/2WS 、 -50=1/2W 、 1WS=1WS 、 100=1W 、 2WS=2WS 、 200=2W 、 3WS=3WS 、 300=3W 、 400=4W 、 5WS=5WS 、 500=5W 、 7WS=7WS

(3) Tolerance: F=±1% J=±5%

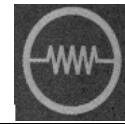
(4) Packaging Type: R=Paper Taping Reel
 T=Tape on Box Packing
 B=Bulk Packing

(5) Temperature Coefficient

(6) Special Type : 52- = 52mm
 73- = 73mm
 91- = 91mm
 M = M-Type Forming for Bulk
 MB = MB-Type Forming
 F = F-Type Forming for Bulk
 FK = FK-Type Forming
 FFK = FFK-Type Forming
 FKK = FKK-Type Forming

(7) Resistance Value : E24 Series

Example : 0R1 、 1R 、 10R 、 100R



3. BAND-CODE:



COLOR	1ST BAND	2ND BAND	MULTIPLIER	TOLERANCE
BLACK	0	0	1 Ω	
BROWN	1	1	10 Ω	± 1 % (F)
RED	2	2	100 Ω	± 2 % (G)
ORANGE	3	3	1K Ω	
YELLOW	4	4		
GREEN	5	5		
BLUE	6	6		
VIOLET	7	7		
GREY	8	8		
WHITE	9	9		
GOLD			0.1 Ω	± 5 % (J)
SILVER			0.01 Ω	

4. ELECTRICAL CHARACTERISTICS

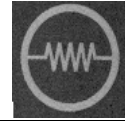
Normal Style

STYLE	KNP-25	KNP-50	KNP100	KNP200	KNP300	KNP400	KNP500
Power Rating at 70 °C	1/4W	1/2W	1 W	2 W	3W	4 W	5 W
Standard Value Range ±5%	1 Ω~22 Ω	0.1 Ω~47 Ω	0.1 Ω~100 Ω	0.1 Ω~150 Ω	0.1 Ω~330 Ω	0.1 Ω~330 Ω	0.1 Ω~390 Ω
Maximum Value Range ±5%	100 Ω	1K Ω	2K Ω	3K9 Ω	4K7 Ω	4K7 Ω	5K1 Ω
Dielectric Withstanding Voltage	200V	300V					
Minimum Value Range ±5%	0.1 Ω	0.05 Ω					
Operating Temp. Range	- 40 °C to + 200 °C						
Temperature Coefficient	± 300 ppm /°C						

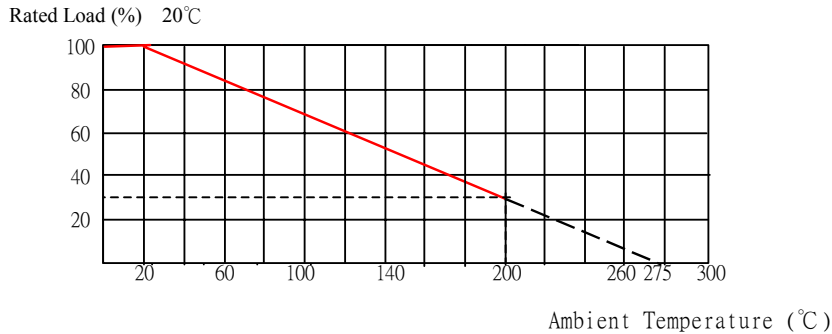
Miniature Style

STYLE	KNP50S	KNP1WS	KNP2WS	KNP3WS	KNP5WS	KNP7WS
Power Rating at 70 °C	1/2W	1 W	2 W	3W	5 W	7 W
Standard Value Range ±5%	1 Ω~22 Ω	0.1 Ω~47 Ω	0.1 Ω~100 Ω	0.1 Ω~150 Ω	0.1 Ω~330 Ω	0.1 Ω~390 Ω
Maximum Value Range ±5%	100 Ω	1K Ω	2K Ω	3K9 Ω	4K7 Ω	5K1 Ω
Dielectric Withstanding Voltage	200V	300V				
Minimum Value Range ±5%	0.1 Ω	0.05 Ω				
Operating Temp. Range	- 40 °C to + 200 °C					
Temperature Coefficient	± 300 ppm /°C					

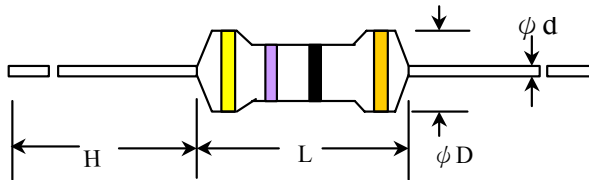
* Standard resistance is as the above list , below or over this resistance on request.



5. DERATING CURVE



6. DIMENSIONS



STYLE		DIMENSION			
Normal	Miniature	L	φD	H	φd
KNP-25	KNP50S	6.3±0.5	2.4±0.2	28±2.0	0.6±0.05
KNP-50	KNP1WS	9.0±0.5	3.3±0.3	26±2.0	0.6±0.05
KNP100	KNP2WS	11.5±1.0	4.5±0.5	35±2.0	0.8±0.05
KNP200	KNP3WS	15.5±1.0	5.0±0.5	33±2.0	0.8±0.05
KNP300	KNP5WS	17.5±1.0	6.5±1.0	32±2.0	0.8±0.05
KNP400					
KNP500	KNP7WS	24.5±1.0	8.5±1.0	38±2.0	0.8±0.05

* KNP1WS (for MB Type) φd = 0.8±0.05 mm

7. ENVIRONMENTAL CHARACTERISTICS

(1) Short Time Over Load Test

At 2.5 times of the rated voltage applied for 5 seconds, the resistor should be free from defects after the resistor is released from load for about 30 minutes

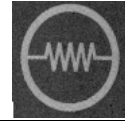
$$\text{Short Time Overload Voltage} = 2.5 * \sqrt{\text{Power Rating} \times \text{Resistance Value}}$$

The change of the resistance value should be within ± 2.0 % + 0.05Ω

(2) Dielectric Withstanding Voltage

The resistor is placed on the metal V Block. Apply a Table I dielectric withstanding between the terminals connected together with the block for about 60 seconds.

The resistor shall be able to withstand without breakdown or flashover.



(3) Temperature Coefficient Test

Test of resistors above room temperature $100^{\circ}\text{C} \pm 2^{\circ}\text{C}$ (Testing Temperature 115°C to 130°C) at the constant temperature silicon plate for over 5 minutes. Then measure the resistance value.
 The Temperature Coefficient is calculated by the following equation and its value should be within the range of requested.

$$\text{Resistor Temperature Coefficient} = \frac{R - R_0}{R_0} \times \frac{1}{t - t_0} \times 10^6$$

R = Resistance value under the testing temperature

R₀ = Resistance value at the room temperature

t = The testing temperature

t₀ = Room temperature

(4) Insulation Resistance

Apply test terminal on lead and resistor body.

The test resistance should be high than 100M ohm.

(5) Solderability

Immerse the specimen into the solder pot at $235 \pm 5^{\circ}\text{C}$ for 5 ± 0.5 seconds.

At least 95% solder coverage on the termination.

(6) Resistance to Solvent

The specimen into the appropriate solvent of IPA condition of ultrasonic machine for 1 minutes.

The specimen is no deterioration of coatings and color code.

(7) Terminal Strength

Direct Load – Resistors shall be held by one terminal and the load shall be gradually applied in the direction of the longitudinal axis of the resistor unit the applied load reaches 5 pounds ◦

The load shall be held for 10 seconds. The load of weight shall be ≥ 2.5 kg (24.5N).

(8) Rated Load

At 4 times of the rated voltage applied for 30 minutes, the resistor should be free from defects after the resistor is released from load for about 30 minutes

The change of the resistance value shall be within $\pm 1.0\% + 0.05 \Omega$

(9) Load Life in Humidity

Place the specimen in a test chamber at $40 \pm 2^{\circ}\text{C}$ and 90 ~ 95 % relative humidity. Apply the rated voltage to the specimen at the 1.5 hours on and 0.5 hour off cycle. The total length of test is 1,000 hours

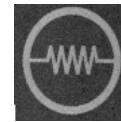
The change of the resistance value shall be within $\pm 5 \% + 0.05 \Omega$

(10) Load Life Test

Placed in the constant temperature chamber of $70 \pm 3^{\circ}\text{C}$ the resistor shall be connected to the lead wire at the point of 25mm. Length with each terminal, the resistors shall be arranged not much effected mutually by the temperature of the resistors and the excessive ventilation shall not be performed, for 90 minutes on and 30 minutes off under this condition the rated D.C. voltage is applied continuously for 1000+48/-0 hours then left at no-load for 1hour, measured at this time the resistance value ◦

The change of the resistance value shall be within $\pm 5 \% + 0.05 \Omega$.

There shall be no remarkable change in the appearance and the color code shall be legible after the test.



(11) Temperature Cycling Test

The temperature cycle shown in the following table shall be repeated 5 times consecutively. The measurement of the resistance value is done before the first cycle and after ending the fifth cycle, leaving in the room temperature for about 1 hour ◦

Temperature Cycling Conditions:

Step	Temperature(°C)	Time (minute)
1	-55 ± 3	30
2	25 ± 3	2 ~ 3
3	155 ± 3	30
4	25 ± 3	2 ~ 3

The change of the resistance value shall be within ± 1.0 % + 0.05 Ω
 After the test the resistor shall be free from the electrical or mechanical damage.

(12) Resistance to Soldering Heat

The terminal lead shall be dipped into the solder pot at 350 ± 10 °C for 3 ± 0.5 seconds up to 2 ~ 2.5 mm.

The change of the resistance value shall be within ± 1.0 % + 0.05 Ω

(13) Overload Flame Retardant

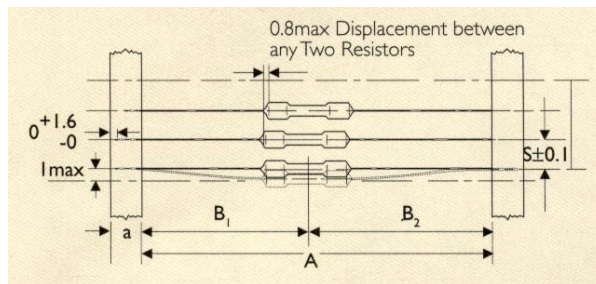
At 4 times of the rated voltage applied for 1 minute

$$\text{Overload Test Voltage} = 4 * \sqrt{\text{Power Rating} \times \text{Resistance Value}}$$

The resistor shall be able to no evidence of flaming arcing.

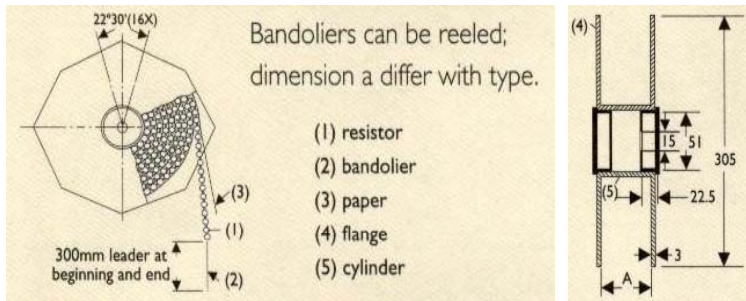
8. PACKING METHODS

Bandolier for Axial leads



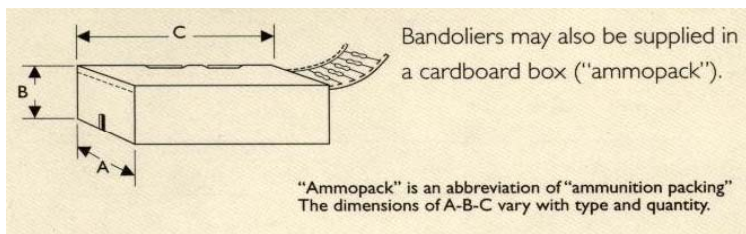
STYLE		DIMENSIONS				Unit: : mm	
Normal	Miniature	a	A	B1-B2	S(spacing)	T (max. deviation of spacing)	
KNP-25	KNP50S	6 ± 0.5	52.4 ± 1.0 26.0 ± 1.0	1.0 1.0	5	1 mm per 10 spacing 0.5 mm per 5 spacing	
KNP-50	KNP1WS	6 ± 0.5	52.4 ± 1.0	1.0	5		
KNP100	KNP2WS	6 ± 0.5	73.0 ± 1.5 52.4 ± 1.5	1.5 1.0	5		
KNP200 KNP300 KNP400	KNP3WS KNP5WS	6 ± 0.5	73.0 ± 1.5 52.4 ± 1.5	1.5 1.0	10		
KNP500	KNP7WS	6 ± 0.5	91.0 ± 1.5 73.0 ± 1.5	1.5 1.5	10		

9. TAPE ON REEL PACKING

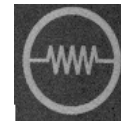


STYLE		TAPE ON REEL	
Normal	Miniature	ACROSS FLANGE (A)	Qty per reel
KNP-25	KNP50S	72	5,000
KNP-50	KNP1WS	72	2,500
KNP100	KNP2WS	95	2,000
KNP200	KNP3WS	95	1,000
KNP300 KNP400	KNP5WS	95	1,000
KNP500	KNP7WS	95	250

10. TAPE ON BOX PACKING

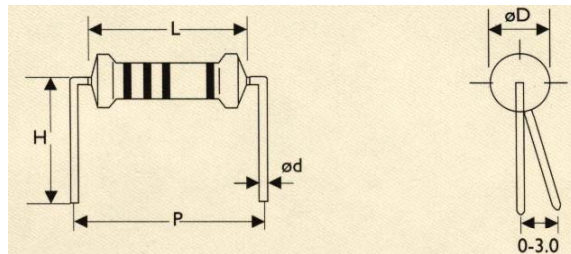


STYLE		Standard Lead Length			Short Lead Length			Qty per box
Normal	Miniature	W (A)	H (B)	L (C)	W (A)	H (B)	L (C)	
KNP-25	KNP50S	81	104	260	48	102	255	5,000
KNP-50	KNP1WS	73	45	258				1,000
KNP100	KNP2WS	103	78	260	81	91	260	1,000
KNP200	KNP3WS	103	94	260	81	91	260	1,000
KNP300 KNP400	KNP5WS	103	78	260	81	91	260	500
KNP500	KNP7WS	116	79	255	103	78	260	250



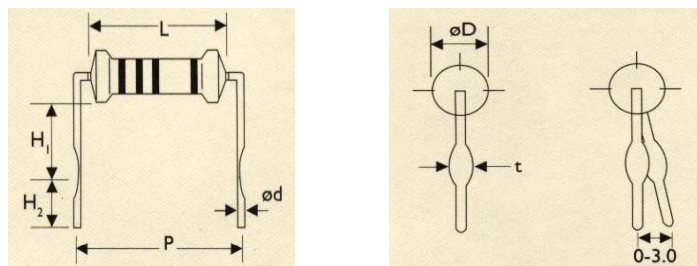
11. SPECIAL TYPE (FORMING DIMENSIONS)

M TYPE

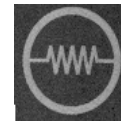


STYLE		DIMENSIONS					UNIT : mm
Normal	Miniature	L	ϕD	ϕd	P	H	
KNP-25	KNP50S	6.3 ± 0.5	2.4 ± 0.2	0.6 ± 0.05	10.0 ± 1	10.0 ± 1	
KNP-50	KNP1WS	9.0 ± 0.5	3.3 ± 0.3	0.6 ± 0.05	12.5 ± 1	10.0 ± 1	
KNP100	KNP2WS	11.5 ± 1.0	4.5 ± 0.5	0.8 ± 0.05	15.0 ± 1	12.5 ± 1	
KNP200	KNP3WS	15.5 ± 1.0	5.0 ± 0.5	0.8 ± 0.05	20.0 ± 1	15.0 ± 1	
KNP300 KNP400	KNP5WS	17.5 ± 1.0	6.5 ± 0.5	0.8 ± 0.05	25.0 ± 1	15.0 ± 1	
KNP500	KNP7WS	24.5 ± 1.0	8.0 ± 0.5	0.8 ± 0.05	30.0 ± 1	15.0 ± 1	

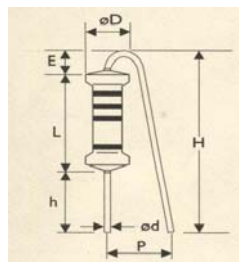
MB TYPE



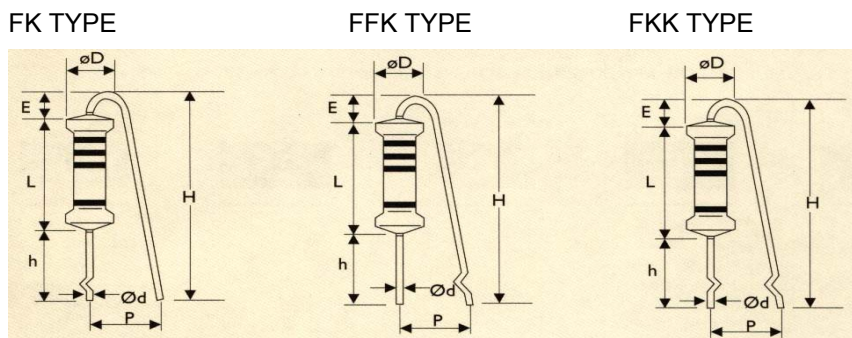
STYLE		DIMENSIONS							UNIT : mm
Normal	Miniature	L	ϕD	ϕd	P	H 1	H 2	t	
KNP-25	KNP50S	6.3 ± 0.5	2.4 ± 0.2	0.6 ± 0.05	10.0 ± 1	6.0 ± 1	5.0 ± 1	1.2 ± 0.2	
KNP-50		9.0 ± 0.5	3.3 ± 0.3	0.6 ± 0.05	12.5 ± 1	6.0 ± 1	5.0 ± 1	1.2 ± 0.2	
	KNP1WS	9.0 ± 0.5	3.3 ± 0.3	0.8 ± 0.05	12.5 ± 1	6.0 ± 1	5.0 ± 1	1.4 ± 0.2	
KNP100	KNP2WS	11.5 ± 1.0	4.5 ± 0.5	0.8 ± 0.05	15.0 ± 1	6.0 ± 1	5.0 ± 1	1.4 ± 0.2	
KNP200	KNP3WS	15.5 ± 1.0	5.0 ± 0.5	0.8 ± 0.05	20.0 ± 1	10.0 ± 1	5.0 ± 1	1.4 ± 0.2	
KNP500	KNP7WS	24.5 ± 1.0	8.0 ± 0.5	0.8 ± 0.05	30.0 ± 1	15.0 ± 1	5.0 ± 1	1.4 ± 0.2	



F TYPE



STYLE		DIMENSIONS						UNIT : mm	
Normal	Miniature	L	ϕD	ϕd	P	h	H max	E max	
KNP100	KNP2WS	11.5 ± 1.0	4.5 ± 0.5	0.8 ± 0.05	6.0 ± 1	5.0 ± 1	20	3.5	
KNP200	KNP3WS	15.5 ± 1.0	5.0 ± 0.5	0.8 ± 0.05	6.0 ± 1	5.0 ± 1	25	3.5	

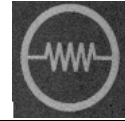


STYLE		DIMENSIONS						UNIT : mm	
Normal	Miniature	L	ϕD	ϕd	P	h	H max	E max	
KNP100	KNP2WS	11.5 ± 1.0	4.5 ± 0.5	0.8 ± 0.05	6.0 ± 1	10.0 ± 1	25	3.5	
KNP200	KNP3WS	15.5 ± 1.0	5.0 ± 0.5	0.8 ± 0.05	6.0 ± 1	10.0 ± 1	30	3.5	

12. Plant Address

- A. Taiwan Hsin Tien Plant
 1F, No.5, Lane 560, Chung Cheng Road,
 Hsin Tien Taipei, Taiwan, ROC
 (台北縣新店市中正路 560 巷 5 號 1 樓)
 Tel. 886-2-2218-2139
 Fax. 886-2-2218-2138

- B. China Dongguan Plant
 7-1, Gaoli Road, Gaoli Industrial Zone
 Tangxia Zhen, Dongguan, Guangdong, China
 (廣東省東莞市塘廈鎮高麗工業區高麗路 7-1 號)
 Tel. 86-769-772 0275
 Fax. 86-769-772 0295



- C. China MuDu Plant
No.158, Fengjiang Road, No.1 Building of NanBangIND.Zone,
Mu Du New District, Suzhou, China
(江蘇省蘇州市木瀆新區楓江路 158 號南濱工業區 1 號)
Tel. 86-512-66518889
Fax. 86-512-66519889