

Approval Sheet

for

**Wire Wound Resistors
Flame-Proof & Non-Inductive Type**

NKN series

$\pm 1\%$, $\pm 5\%$

YAGEO CORPORATION

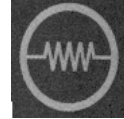
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1. PRODUCT:

Non-Inductive WIRE WOUND RESISTORS

(Normal & Miniature Style)

Green body color

2. PART NUMBER:

Part number of the Non-Inductive wire wound resistor is identified by the name, power, tolerance, packing, temperature coefficient, special type and resistance value. and the 5th color band is black to represent NKN series.

Example :

NKN	100	J	T	-	73-	10R
(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 : NKN SERIES

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

(3) Tolerance : F=±1% J=±5%

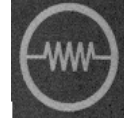
(4) Packaging Type: R=Paper Taping Reel
T=Tape on Box Packing
B=Bulk Packing

(5) Temperature Coefficient : ±300ppm/°C

(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



3. BAND-CODE:

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

4. ELECTRICAL CHARACTERISTICS

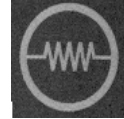
Normal Style

STYLE	NKN-50	NKN100	NKN200	NKN300	NKN400	NKN500
Power Rating at 70 °C	1/2W	1 W	2 W	3W	4 W	5 W
Dielectric Withstanding Voltage	250V	400V				
Resistance Range	0.1Ω~5Ω	0.1Ω~10Ω	0.1Ω~22Ω	0.1Ω~27Ω		0.1Ω~33Ω
Operating Temp. Range	- 40 °C to + 200 °C					
Temperature Coefficient	± 300 ppm /					

Miniature Style

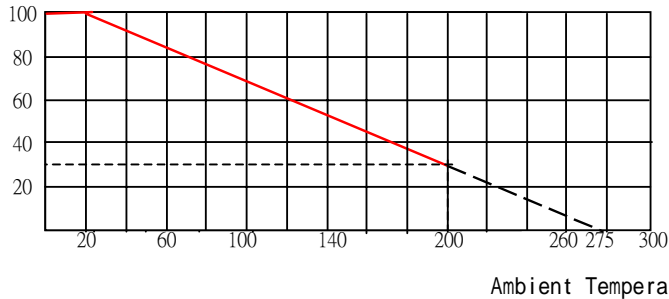
STYLE	NKN1WS	NKN2WS	NKN3WS	NKN5WS	NKN7WS
Power Rating at 70 °C	1 W	2 W	3W	5 W	7 W
Dielectric Withstanding Voltage	250V	400V			
Resistance Range	0.1Ω~5Ω	0.1Ω~10Ω	0.1Ω~22Ω	0.1Ω~27Ω	0.1Ω~33Ω
Operating Temp. Range	- 40 °C to + 200 °C				
Temperature Coefficient	± 300 ppm /				

* Below or over this resistance on request.

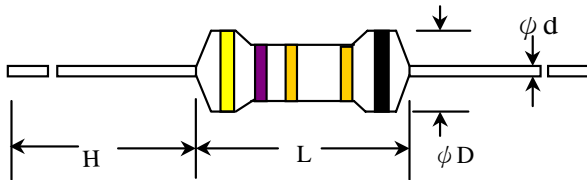


5. DERATING CURVE

Rated Load (%) 20



6. DIMENSIONS



STYLE		DIMENSION			
Normal	Miniature	L	ϕD	H	ϕd
NKN-50	NKN1WS	9.0±0.5	3.3±0.3	26±2.0	0.55±0.05
NKN100	NKN2WS	11.5±1.0	4.5±0.5	35±2.0	0.8±0.05
NKN200	NKN3WS	15.5±1.0	5.0±0.5	33±2.0	0.8±0.05
NKN300	NKN5WS	17.5±1.0	6.5±1.0	32±2.0	0.8±0.05
NKN400					
NKN500	NKN7WS	24.5±1.0	8.5±1.0	38±2.0	0.8±0.05

* NKN1WS (for MB Type) $\phi d = 0.8 \pm 0.05$ 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

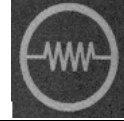
$$\text{Short Time Overload Voltage} = 2.5 * \sqrt{\text{Power Rating} \times \text{Resistance Value}}$$

The change of the resistance value should be within $\pm 2.0 \% + 0.05 \Omega$

(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 $260 \pm 5^{\circ}\text{C}$ 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 reached 5 pounds ◦

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

(8) 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

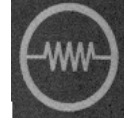
The change of the resistance value shall be within $\pm 5\% + 0.05 \Omega$

(9) 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.



(10) 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.

(11) 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

(12) Overload Flame Retardant

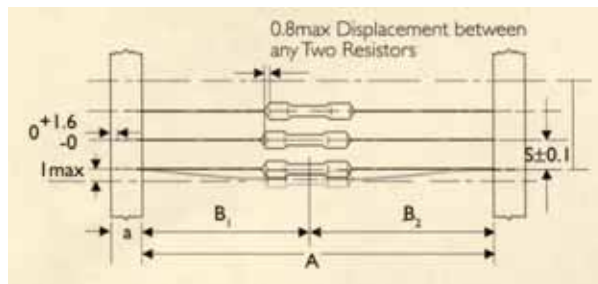
At 4 times of the rated voltage applied for 1 minute

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

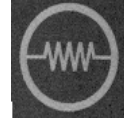
The resistor shall be able to no evidence of flaming arcing.

8. PACKING METHODS

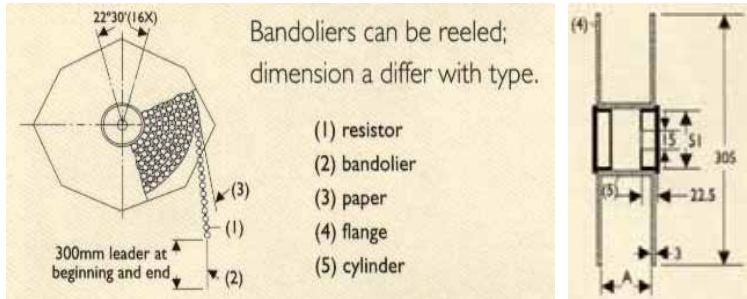
Bandolier for Axial leads



STYLE		DIMENSIONS			Unit: : mm	
Normal	Miniature	a	A	B1-B2	S(spacing)	T (max. deviation of spacing)
NKN-50	NKN1WS	6 ± 0.5	52.4 ± 1.0	1.2	5	1 mm per 10 spacing 0.5 mm per 5 spacing
NKN100	NKN2WS	6 ± 0.5	73.0 ± 1.5 52.4 ± 1.5	1.5 1.2	5	
NKN200	NKN3WS	6 ± 0.5	73.0 ± 1.5	1.5	10	
NKN300	NKN5WS		52.4 ± 1.5	1.2		
NKN400						
NKN500	NKN7WS	6 ± 0.5	91.0 ± 1.5 73.0 ± 1.5	1.5 1.5	10	

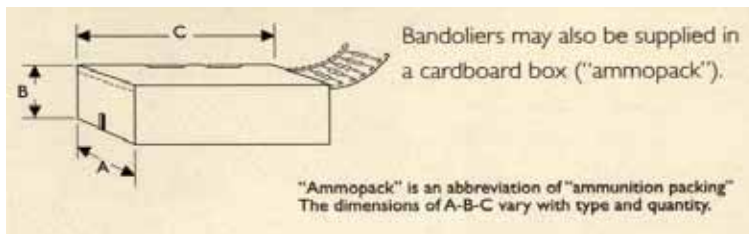


9. TAPE ON REEL PACKING

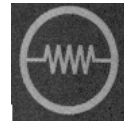


STYLE		TAPE ON REEL	
Normal	Miniature	ACROSS FLANGE (A)	Qty per reel
NKN-50	NKN1WS	72	2,500
NKN100	NKN2WS	95	2,000
NKN200	NKN3WS	95	1,000
NKN300 NKN400	NKN5WS	95	1,000
NKN500	NKN7WS	95	250

10. TAPE ON BOX PACKING

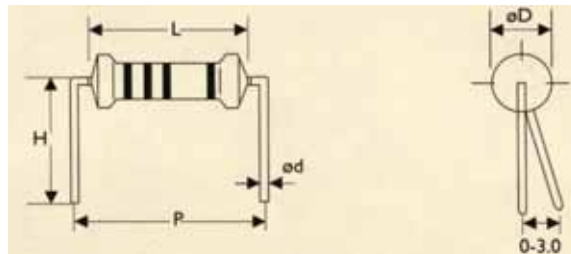


STYLE		Standard Lead Length			Short Lead Length			Qty per box
Normal	Miniature	W (A)	H (B)	L (C)	W (A)	H (B)	L (C)	
NKN-50	NKN1WS	73	45	258	—	—	—	1,000
NKN100	NKN2WS	103	78	260	81	91	260	1,000
NKN200	NKN3WS	103	94	260	81	91	260	1,000
NKN300 NKN400	NKN5WS	103	78	260	81	91	260	500
NKN500	NKN7WS	116	79	255	103	78	260	250



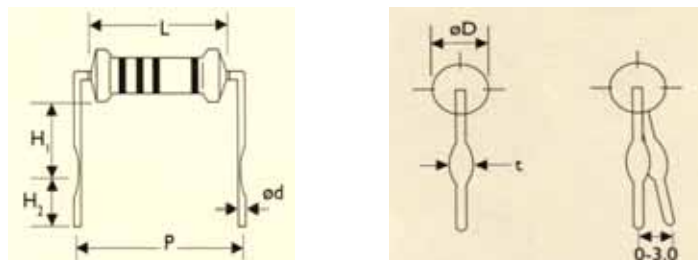
11. SPECIAL TYPE (FORMING DIMENSIONS)

M TYPE

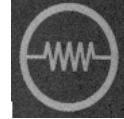


STYLE		DIMENSIONS					UNIT : mm
Normal	Miniature	L	ϕD	ϕd	P	H	
NKN-50	NKN1WS	9.0 ± 0.5	3.3 ± 0.3	0.55 ± 0.05	12.5 ± 1	10.0 ± 1	
NKN100	NKN2WS	11.5 ± 1.0	4.5 ± 0.5	0.8 ± 0.05	15.0 ± 1	12.5 ± 1	
NKN200	NKN3WS	15.5 ± 1.0	5.0 ± 0.5	0.8 ± 0.05	20.0 ± 1	15.0 ± 1	
NKN300 NKN400	KNN5WS	17.5 ± 1.0	6.5 ± 0.5	0.8 ± 0.05	25.0 ± 1	15.0 ± 1	
NKN500	NKN7WS	24.5 ± 1.0	8.0 ± 0.5	0.8 ± 0.05	30.0 ± 1	15.0 ± 1	

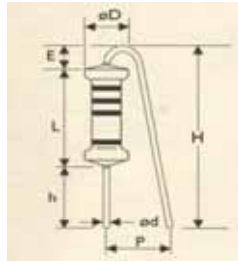
MB TYPE



STYLE		DIMENSIONS							UNIT : mm
Normal	Miniature	L	ϕD	ϕd	P	H 1	H 2	t	
NKN-50	-	9.0 ± 0.5	3.3 ± 0.3	0.55 ± 0.05	12.5 ± 1	6.0 ± 1	5.0 ± 1	1.2 ± 0.2	
-	NKN1WS	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	
NKN100	NKN2WS	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	
NKN200	NKN3WS	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	
NKN500	NKN7WS	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

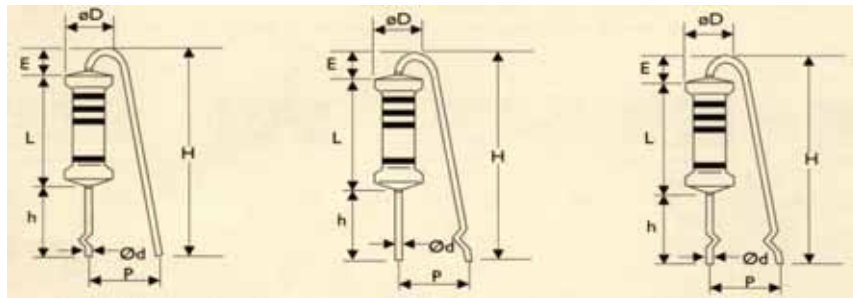


STYLE		DIMENSIONS						UNIT : mm	
Normal	Miniature	L	ϕD	ϕd	P	h	H max	E max	
NKN100	NKN2WS	11.5 ± 1.0	4.5 ± 0.5	0.8 ± 0.05	6.0 ± 1	5.0 ± 1	20	3.5	
NKN200	NKN3WS	15.5 ± 1.0	5.0 ± 0.5	0.8 ± 0.05	6.0 ± 1	5.0 ± 1	25	3.5	

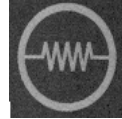
FK TYPE

FFK TYPE

FKK TYPE



STYLE		DIMENSIONS						UNIT : mm	
Normal	Miniature	L	ϕD	ϕd	P	h	H max	E max	
NKN100	NKN2WS	11.5 ± 1.0	4.5 ± 0.5	0.8 ± 0.05	6.0 ± 1	10.0 ± 1	25	3.5	
NKN200	NKN3WS	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 Xindian Plant
3F, No.5, Lane 560, Chung Cheng Road,
Xindian, Taipei, Taiwan, ROC
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- C. China Mudu Plant
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