

**UNI-ROYAL**  
厚聲集團

# DATA SHEET

**Product Name** Multi-Lead Wire-wound Fixed Resistors

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**Part Name** KNHW Series

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## 1. Scope

- 1.1 This specification for approve relates to the Multi-Lead Wire-wound Fixed Resistors manufactured by UNI-ROYAL.
- 1.2 All materials are inorganic and non-flammable
- 1.3 Super heat dissipation & High stability
- 1.4 Special design of Multi-lead wire easy to assembled on PCB

## 2. Part No. System

The standard Part No. includes 14 digits with the following explanation:

2.1 Multi-Lead Wire-wound Fixed Resistors the 1<sup>st</sup> to 4<sup>th</sup> digits are to indicate the product type.

Example: KNHW= Multi-Lead Wire-wound Fixed Resistors

2.2 5<sup>th</sup>~6<sup>th</sup> digits:

2.2.1 This is to indicate the wattage or power rating. To dieting the size and the numbers,

The following codes are used; and please refer to the following chart for detail:

W=Normal Size; S=Small Size; U=Extra Small Size; “1”~“G”to denotes“1”~“16”as Hexadecimal:

1/16W~1/2W (< 1W)

Wattage	1/2	1/3	1/4	1/5	1/6	1/8	1/10	1/16
Normal Size	W2	W3	W4	W5	W6	W8	WA	WG
Small Size	S2	S3	S4	S5	S6	S8	SA	SG

1W~16W ( $\geq 1W$ )

Wattage	1	2	3	5	7	8	9	10	15
Normal Size	1W	2W	3W	5W	7W	8W	9W	AW	FW
Small Size	1S	2S	3S	5S	7S	8S	9S	AS	FS

2.3 The 7<sup>th</sup> digit is to denote the Resistance Tolerance. The following letter code is to be used for indicating the standard Resistance Tolerance.

J=±5% K= ±10%

2.4 The 8<sup>th</sup> to 11<sup>th</sup> digits is to denote the Resistance Value.

2.4.1 For the standard resistance values of E-24 series, the 8<sup>th</sup> digit is “0”, the 9<sup>th</sup> & 10<sup>th</sup> digits are to denote the significant figures of the resistance and the 11<sup>th</sup> digit is the zeros following;

For the standard resistance values of E-96 series, the 8<sup>th</sup> digit to the 10<sup>th</sup> digits is to denote the significant figures of the resistance and the 11<sup>th</sup> digit is the zeros following.

2.4.2 The following number s and the letter codes are to be used to indicate the number of zeros in the 11<sup>th</sup> digit:

0=10<sup>0</sup> 1=10<sup>1</sup> 2=10<sup>2</sup> 3=10<sup>3</sup> 4=10<sup>4</sup> 5=10<sup>5</sup> 6=10<sup>6</sup> J=10<sup>-1</sup> K=10<sup>-2</sup> L=10<sup>-3</sup> M=10<sup>-4</sup> N=10<sup>-5</sup> P=10<sup>-6</sup>

2.4.3 The 12<sup>th</sup>, 13<sup>th</sup> & 14<sup>th</sup> digits.

The 12<sup>th</sup> digit is to denote the Packaging Type with the following codes:

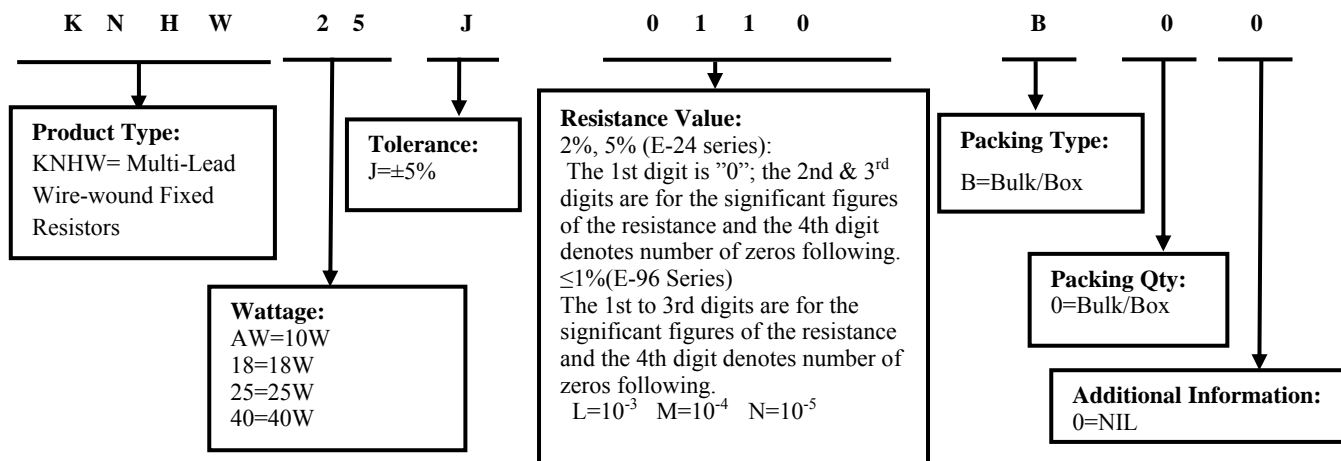
B=Bulk /Box

2.4.4 Current Sense Resistors, The 13<sup>th</sup> digit should be filled with “0”

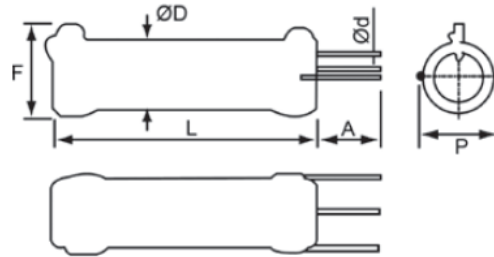
2.4.5 Current Sense Resistors, The 14<sup>th</sup> digit should be filled with “0”

## 3. Ordering Procedure

(Example: KNHW 25W ±5% 11 Ω B/B )



**4. Dimension**

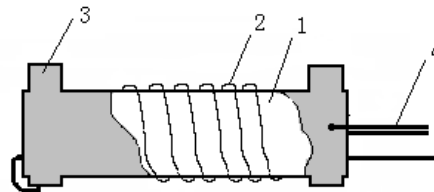


Unit:mm

Type	L±1	A±1	F±1	P±1	ΦD±1	d±0.05
KNHW 10W	45	10	15	12	11.5	1.0
KNHW 18W	40	12	18	15	14.5	1.0
KNHW 25W	50	12	18	15	14.5	1.0
KNHW 40W	65	12	20	17	16.5	1.0

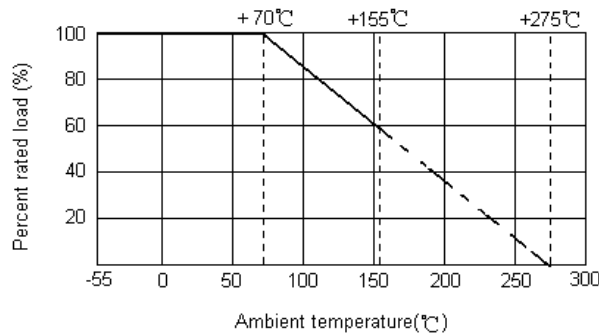
\*Remark: For further information, please contact our sales team.

**5. Structure**



No	Name	Raw material
1	Ceramic tube	Ceramic
2	Alloy wire	Fe、Cr、Al
3	Ring terminal	Stainless steel
4	Lead wire	Copper wire plated tin

**6. Derating Curve**



**6.1 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:

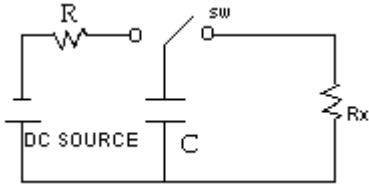
$$RCWV = \sqrt{P \times R}$$

Where: RCWV = rated dc or RMS ac continuous working voltage at commercial-line frequency and waveform (VOLT.)

P = power rating (WATT.)

R = nominal resistance (OHM)

## 7. Performance Specification

Characteristic	Limits	Test method (GB/T 5729&JIS-C-5201&IEC60115-1)
Temperature Coefficient	$\geq 20\Omega: \pm 300 \text{ PPM}/^\circ\text{C}$ $< 20\Omega: \pm 400 \text{ PPM}/^\circ\text{C}$	4.8 Natural resistance changes per temp. Degree centigrade $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{ (PPM}/^\circ\text{C)}$ R <sub>1</sub> : Resistance Value at room temperature ( t <sub>1</sub> ) ; R <sub>2</sub> : Resistance at test temperature (Upper limit temperature or Lower limit temperature) t <sub>1</sub> : +25°C or specified room temperature t <sub>2</sub> : Upper limit temperature or Lower limit temperature test temperature
Short-time overload	Resistance change rate is $\pm(2\%+0.05\Omega)$ max. With no evidence of mechanical damage.	4.13 permanent resistance change after the application of a potential of 2.5 times rcwv for 5 seconds.
Terminal strength	No evidence of mechanical damage	4.16 direct load: Resistance to a 2.5 kg direct load for 10 seconds in the direction of the longitudinal axis of the terminal leads. Twist test: Terminal leads shall be bent through 90° at a point of about 6mm from the body of the resistor and shall be rotated through 360° about the original axis of the bent terminal in alternating direction for a total of 3 rotations.
Resistance to soldering heat	Resistance change rate is: $\pm(1\%+0.05\Omega)$ max. With no evidence of mechanical damage.	4.18 Permanent resistance change when leads immersed to a point 2.0-2.5mm from the body in 260°C±5°C solder for 10±1 seconds.
Solderability	95% coverage min.	4.17 The area covered with a new, smooth, clean, shiny and continuous surface free from concentrated pinholes. Test temp. Of solder: 245°C±3°C Dwell time in solder: 2~3seconds.
Humidity (steady state)	Resistance change rate is $\pm(3\%+0.1\Omega)$ max.. With no evidence of mechanical damage	4.24 temporary resistance change after a 240 hours exposure in a humidity test chamber controlled at 40°C±2°C and 90 to 95% relative humidity.
Load life in humidity	Resistance change rate is $\pm(5\%+0.1\Omega)$ max.. With no evidence of mechanical damage.	JIS-C-5202 7.9 resistance change after 1,000 hours operating at RCWV with duty cycle of 1.5 hours "on", 0.5 hour "off" in a humidity test chamber controlled at 40°C±2°C and 90 to 95% relative humidity.
Load life	Resistance change rate is $\pm(5\%+0.1\Omega)$ max.. With no evidence of mechanical damage.	4.25.1 permanent resistance change after 1,000 hours operating at RCWV with duty cycle of 1.5 hours "on", 0.5 hour "off" at 70°C ± 2 °C ambient.
Pulse test	Resistance change rate is $\pm(5\%+0.1\Omega)$ max. with no evidence of mechanical damage and the paint coating don't be cracked and fallen off.	The following discharge cycle is repeated in the circuit in the left fig. 5sec on ; 55 sec off 70700cycles Applied voltage (DC source) , KNHW25W 11Ω DC: 524V, C: 1500 uF 

## 8. Note

- 8.1. UNI-ROYAL recommend products store in warehouse with temperature between 15 to 35°C under humidity between 25 to 75%RH.  
Even under storage conditions recommended above, solder ability of products will be degraded stored over 1 year old.
- 8.2. Cartons must be placed in correct direction which indicated on carton, otherwise the reel or wire will be deformed.
- 8.3. Storage conditions as below are inappropriate:
  - a. Stored in high electrostatic environment
  - b. Stored in direct sunshine, rain, snow or condensation.
  - c. Exposed to sea wind or corrosive gases, such as Cl<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub>, NO<sub>2</sub>, etc.



## 9. Record

Version	Description	Page	Date	Amended by	Checked by
1	First version	1~5	Apr.16, 2019	Haiyan Chen	Yuhua Xu

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