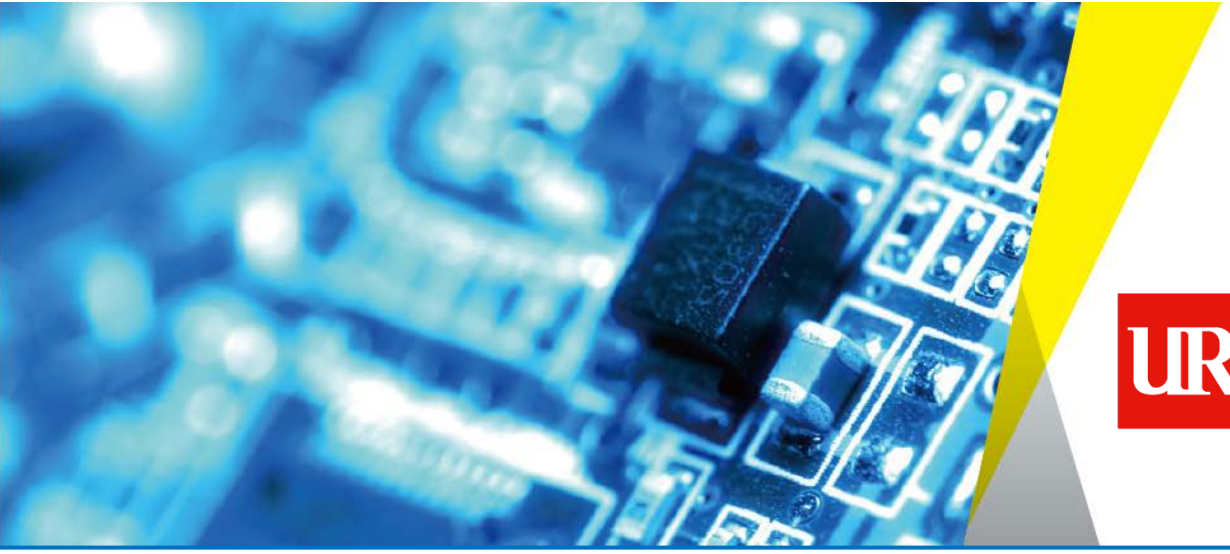

DATA SHEET

Product Name **Wire -Wound Non-inductive Film Fixed Resistors**

Part Name **KNPI Series**

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1. Scope

1.1 This datasheet is the characteristics of Wire -Wound Non-inductive Film Fixed Resistors manufactured by UNI-ROYAL

1.2 Excellent flame retardant coating

1.3 too low or too high ohmic value can be supplied on a case to case basis

1.4 Non-inductive production process

2. Part No. System

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

2.1 Non-Inductive Wire-Wound Fixed Resistors type, the 1st to 3rd digits are to indicate the product type and 4th digit is the special feature.

Example: KNPI= Non-Inductive Wire-Wound Fixed Resistors

2.2 5th~6th 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; "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 (≧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

2.2.2 For power rating less than 1 watt, the 5th digit will be the letters W, or S to represent the size required & the 6th digit will be a number or a letter code.

Example: WA=1/10W;

2.2.3 For power of 1 watt to 16 watt, the 5th digit will be a number or a letter code and the 6th digit will be the letters of W or S.

Example: AW=10W; 3S=3W-S

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

F=±1% G=±2% J=±5% K= ±10%

2.4 The 8th to 11th digits is to denote the Resistance Value.

2.4.1 For the standard resistance values of E-24 series, the 8th digit is "0",the 9th & 10th digits are to denote the significant figures of the resistance and the 11th digit is the number of zeros following.;

For the standard resistance values of E-96 series, the 8th digit to the 10th digits is to denote the significant figures of the resistance and the 11th digit is the 11th 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 11th digit:

$0=10^0$ $1=10^1$ $2=10^2$ $3=10^3$ $4=10^4$ $5=10^5$

$6=10^6$ $J=10^{-1}$ $K=10^{-2}$ $L=10^{-3}$ $M=10^{-4}$

2.4.3 The 12th, 13th & 14th digits.

The 12th digit is to denote the Packaging Type with the following codes:

A=Tape/Box (Ammo pack) B=Bulk/Box

T=Tape/Reel P=Tape/Box of PT-26 products

2.4.4 The 13th digit is normally to indicate the Packing Quantity of Tape/Box & Tape/Reel packaging types. The following letter code is to be used for some packing quantities:

A=500pcs B=2500pcs C=10000pcs

D=20000pcs G=25000pcs H=50000pcs

2.4.5 For the FORMED type products, the 13th & 14th digits are used to denote the forming types of the product with the following letter codes:

MF=M-type with flattened lead wire F0= F-type

MK= M-type with kinked lead wire F1= F1-type

ML= M-type with normal lead wire F2= F2-type

MC= M-type with bending lead wire F3= F3-type

2.4.6 For some items, the 14th digit alone can use to denote special features of additional information with the following codes:

P=Panasert type 1=Avisert type 1 2=Avisert type 2

3=Avisert type 3 A=Cutting type CO 1/4W-A type B= Cutting type CO 1/4W-B type

3. Ordering Procedure

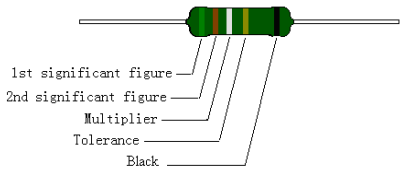
(Example: KNPI 2W ±5% 100Ω T/B-1000)

K N P I 2 W J 0 1 0 1 A 1 0

- **K N P** — Product Type: KNP= Wire-Wound Fixed Resistors
- **I** — Special Features: I= Non-inductive
- **2 W** — Wattage:
  Normal size:
  1W=1W
  2W=2W
  3W=3W
  5W=5W
  7W=7W
  8W=8W
  9W=9W
  Small size:
  2S=2W-S
  3S=3W-S
  5S=5W-S
  7S=7W-S
  8S=8W-S
  9S=9W-S
  AS=10W-S
- **J** — Tolerance: G=±2% J=±5% K=±10%
- **0 1 0 1** — Resistance Value:
  ±2%、±5%、10% series: The 1st digit will be ”0”; the 2nd & 3rd digits are for the significant figures of the resistance and the 4th digit denotes number of zeros following
  ≤±1%series: The 1st to 3rd digits are for the significant figures of the resistance and 4th digit denotes number of zeros following.
  $J=10^{-1}$; $K=10^{-2}$; $L=10^{-3}$
- **A** — Packing Type: A=Tape/Box T=Tape/Reel B=Bulk/Box P=Tape/Box of PT-26 product
- **1** — Packing quantity:
  1=1,000pcs
  2=2,000pcs
  3=3,000pcs
  4=4,000pcs
  5=5,000pcs
  A=500pcs
  B=2,500pcs
  0= Bulk/Box
- **0** — Additional Information:
  0=NIL
  P=Panasert type
  1=Avisert type 1
  2=Avisert type 2
  3=Avisert type 3
  8=PT-58mm
  9=PT-64mm
  7=Lead wire(H)38mm
  A=PT-83mm
  C=PT-73mm
  D=PT-71mm

4. Marking

Resistors shall be marked with color coding
Colors shall be in accordance with JIS C 0802



4.1 Label:
Label shall be marked with following items:

(1) Type and style

(2) Nominal resistance

(3) Resistance tolerance

(4) Quantity

(5) Lot number

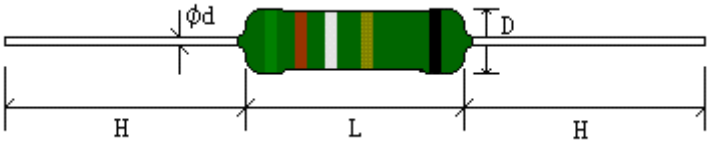
(6) PPM

Example:

Wier -Wound Non-inductive Film Fixed Resistors

WATT : 1W	VAL: 1Ω
Q’TY: 1000	TOL: 5%
LOT: 509528	PPM:

5. Ratings & Dimension



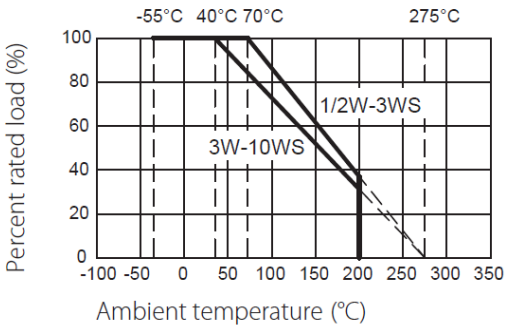
2.1 Normal size

Type	Dimension(mm)					Tolerance	Resistance Range
	D±1	L±1	d±0.05	H±3	PT		
KNPⅠ1/2W	3.0	9.5	0.54	28	52	±2%、±5%、±10%	0.01Ω~30Ω
KNPⅠ1WS	3.0	9.5	0.54	28	52	±2%、±5%、±10%	0.01Ω~30Ω
KNPⅠ1W	4.0	11.5	0.70	25	52	±2%、±5%、±10%	0.01Ω~62Ω
KNPI 2WS	4.0	11.5	0.70	25	52	±2%、±5%、±10%	0.01Ω~62Ω
KNPI 2W	5.5	15.5	0.70	28	64	±2%、±5%、±10%	0.018Ω~120Ω
KNPI 3WS	5.5	15.5	0.70	28	64	±2%、±5%、±10%	0.018Ω~120Ω
KNPI 3W	6.5	17.5	0.75	28	64	±2%、±5%、±10%	0.024Ω~150Ω
KNPI 5WS	6.5	17.5	0.75	28	64	±2%、±5%、±10%	0.024Ω~150Ω
KNPI 5W	8.5	24.5	0.75	38	90	±2%、±5%、±10%	0.043Ω~430Ω
KNPI 7WS	8.5	24.5	0.75	38	90	±2%、±5%、±10%	0.043Ω~430Ω
KNPI 7W	8.5	29.5	0.75	38	B/B	±2%、±5%、±10%	0.047Ω~430Ω
KNPI 8WS	8.5	29.5	0.75	38	B/B	±2%、±5%、±10%	0.047Ω~430Ω
KNPI 8W	8.5	39.5	0.75	38	B/B	±2%、±5%、±10%	0.091Ω~620Ω
KNPI 9WS	8.5	39.5	0.75	38	B/B	±2%、±5%、±10%	0.091Ω~620Ω
KNPI 9W	8.5	52.5	0.75	38	B/B	±2%、±5%、±10%	0.13Ω~820Ω
KNPI 10WS	8.5	52.5	0.75	38	B/B	±2%、±5%、±10%	0.13Ω~820Ω

6. Derating Curve

Resistors shall have a power rating based on continuous load operation at an ambient temperature from -55℃ to 70℃. For temperature in excess of 70℃, the load shall be derate as shown in figure 1

Figure1

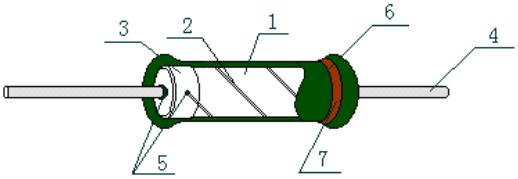


6.1 Voltage rating:

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)
The overload voltage is 2.5 times RCWV or Max. Overload voltage whichever is less.

7. Structure



No.	Name	Raw materials
1	Basic body	Rod Type Ceramics
2	Resistor	Ni-Cr Alloys
3	End cap	Steel (Tin Plated iron Surface)
4	Lead wire	Tin solder coated copper wire
5	Joint	By welding
6	Coating	Insulated Resin Color: Deep Green
7	Marking	Epoxy Resin

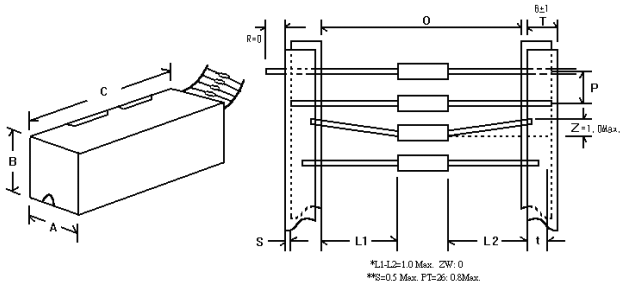
8. Performance Specification

Characteristic	Limits	Test Methods (GB/T5729&JIS-C-5201&IEC60115-1)
Temperature Coefficient	≧20Ω: ±300PPM/℃ <20Ω: ±400PPM/℃	4.8 Natural resistance changes per temp. Degree centigrade $\frac{R_2-R_1}{R_1(t_2-t_1)} \times 10^6$ (PPM/℃) R_1: Resistance Value at room temperature （t_1）; R_2: Resistance at test temperature (Upper limit temperature or Lower limit temperature) t_1: +25°C or specified room temperature t_2: Upper limit temperature or Lower limit temperature test temperature
Short-Time Overload	Resistance change rate is: ±(2%+0.05Ω)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:±(5%+0.05Ω) 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℃±5℃ 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℃±3℃ Dwell time in solder:2~3seconds.
Load life in humidity	Resistance change rate is:±(5%+0.05Ω) Max.. With no evidence of mechanical damage.	7.9 resistance change after 1,000 hours (1.5 hours “ON”,0.5 hour “OFF”) at RCWV in a humidity test chamber controlled at 40℃ ±2℃ and 90 to 95% relative humidity.
Load life	Resistance change rate is:±(5%+0.05Ω) 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 ℃±2℃ ambient.

Low Temperature Storage	Resistance change rate is:±(5%+0.05Ω Max.. With no evidence of mechanical damage.	4.23.4 Lower limit temperature ，for 2H.
High Temperature Exposure	Resistance change rate is:±(5%+0.05Ω Max.. With no evidence of mechanical damage.	4.23.2 Upper limit temperature ，for 16H.
Rapid change of temperature	Resistance change rate is:±(2%+0.05Ω Max.. With no evidence of mechanical damage.	4.19 30 min at -55 °C and 30 min at 155°C; 100 cycles.

9. Packing

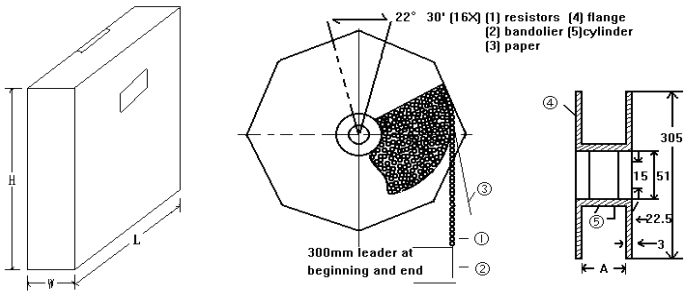
9.1 Tapes in Box Packing



Dimension of T/B (mm)

Part No.	O	P	A±5	B±5	C±5	Qty/Box
KNPI 1/2W	52±1	5±0.3	75	45	255	1,000pcs
KNPI 1WS	52±1	5±0.3	75	45	255	1,000pcs
KNPI 1W	52±1	5±0.3	86	82	255	1,000pcs
KNPI 2WS	52±1	5±0.3	86	82	255	1,000pcs
KNPI 2W	64±5	10±0.5	90	119	255	1,000pcs
KNPI 3WS	64±5	10±0.5	90	119	255	1,000pcs
KNPI 3W	64±5	10±0.5	90	88	255	500pcs
KNPI 5WS	64±5	10±0.5	90	88	255	500pcs
KNPI 5W	90±5	10±0.5	115	124	500	500PCS
KNPI 7WS	90±5	10±0.5	115	124	500	500PCS

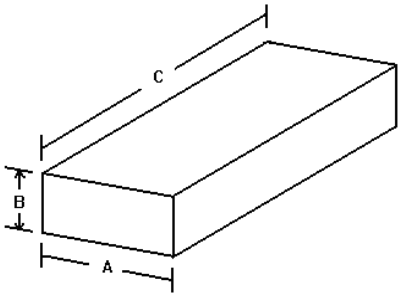
9.2 Tapes in Reel Packing



Dimension of Reel (mm)

Part No.	O	A	W±5	H±5	L±5	Qty/Box
KNPI 1/2W	52±1	73±2	85	295	293	2,500pcs
KNPI 1WS	52±1	73±2	85	295	293	2,500pcs
KNPI 1W	52±1	73±2	85	295	293	2,500pcs
KNPI 2WS	52±1	73±2	85	295	293	2,500pcs
KNPI 2W	64±5	80±5	95	295	293	1,000pcs
KNPI 3WS	64±5	80±5	95	295	293	1,000pcs
KNPI 3W	64±5	80±5	95	295	293	1,000pcs
KNPI 5WS	64±5	80±5	95	295	293	1,000pcs
KNPI 5W	90±5	115±5	121	310	310	700pcs
KNPI 7WS	90±5	115±5	121	310	310	700pcs

9.3 Bulk in Box Packing



Dimension of Box (mm)

Part No.	A±5	B±5	C±5	Qty/Box
KNPI 1/2W	140	80	240	250/5,000pcs
KNPI 1WS	140	80	240	250/5,000pcs
KNPI 1W	140	80	240	100/2,500pcs
KNPI 2WS	140	80	240	100/2,500pcs
KNPI 2W	140	80	240	100/1,500pcs
KNPI 3WS	140	80	240	100/1,500pcs
KNPI 3W	140	80	240	100/1,000pcs
KNPI 5WS	140	80	240	100/1,000pcs
KNPI 5W	140	80	240	25/400pcs
KNPI 7WS	140	80	240	25/400pcs
KNPI 7W	140	80	240	25/300pcs
KNPI 8WS	140	80	240	25/300pcs
KNPI 8W	140	80	240	25/300pcs
KNPI 9WS	140	80	240	25/200pcs
KNPI 9W	140	80	240	25/200pcs
KNPI 10WS	140	80	240	25/200pcs

10. Note

10.1. UNI-ROYAL recommend products store in warehouse with temperature between 15 to 35℃ 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.

10.2. Cartons must be placed in correct direction which indicated on carton, otherwise the reel or wire will be deformed.

10.3. 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_2, H_2S, NH_3, SO_2, NO_2, etc.

11. Record

Version	Description	Page	Date	Amended by	Checked by
1	First version	1~7	Mar.20, 2018	Haiyan Chen	Nana Chen
2	1.Modify the Derating Curve 2. Modify characteristic	5~6	Feb.23, 2019	Haiyan Chen	Yuhua Xu
3	Modify the product name code identity，"KNPN" changed to "KNPI"	1~7	Jun.12, 2020	Haiyan Chen	Yuhua Xu