

DATASHEET

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

Part Name **KNPI Series**

File No. **DIP-SP-011**

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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
- 1.5 Compliant with RoHS directive.
- 1.6 Halogen free requirement.

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 dicting 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 ($\geq 1W$)

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

- 2.2.2 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=10⁰ 1=10¹ 2=10² 3=10³ 4=10⁴ 5=10⁵

6=10⁶ 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:

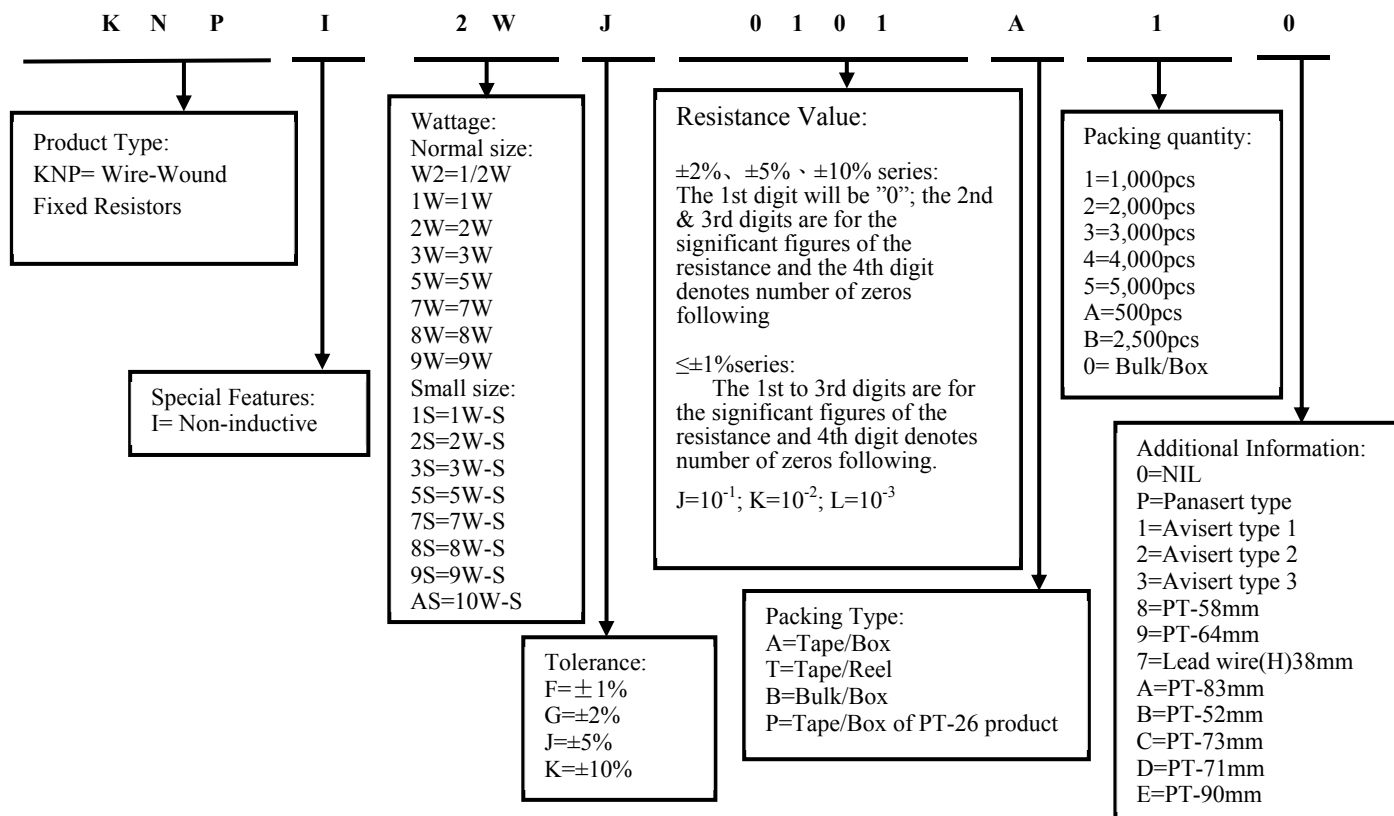
P=Panasert type 1=Avisert type 1

2=Avisert type 2

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

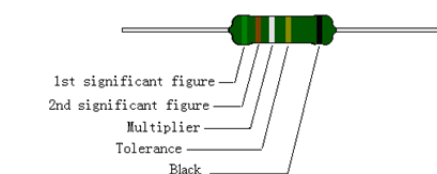
3. Ordering Procedure

(Example: KNPI 2W $\pm 5\%$ 100 Ω T/B-1000)



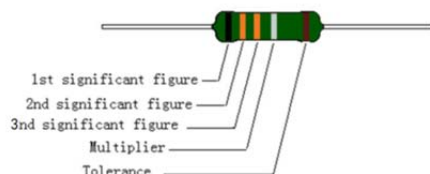
4. Color Code

Resistors shall be marked with color coding
Colors shall be in accordance with JIS C 0802
 $\geq \pm 2\%$ Series



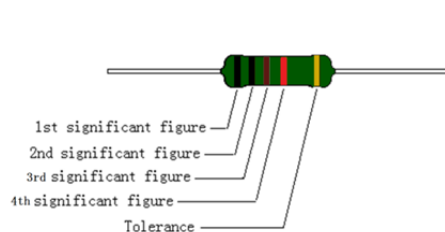
1st Band	2nd Band	3rd Band	4th Band	5th Band
Black = 0	Black = 0	Black = Multiply by 1 (10 ⁰)	Red = $\pm 2\%$	Black
Brown = 1	Brown = 1	Brown = Multiply by 10 (10 ¹)	Gold = $\pm 5\%$	
Red = 2	Red = 2	Red = Multiply by 100 (10 ²)	Silver = $\pm 10\%$	
Orange = 3	Orange = 3	Orange = Multiply by 1,000 (10 ³)		
Yellow = 4	Yellow = 4	Yellow = Multiply by 10,000 (10 ⁴)		
Green = 5	Green = 5	Green = Multiply by 100,000 (10 ⁵)		
Blue = 6	Blue = 6	Blue = Multiply by 1,000,000 (10 ⁶)		
Violet = 7	Violet = 7	Violet = Multiply by 10,000,000 (10 ⁷)		
Gray = 8	Gray = 8	Gold = Multiply by 0.1 (10 ⁻¹)		
White = 9	White = 9	Silver = Multiply by 0.01 (10 ⁻²)		

$\pm 1\%$ Series



1st Band	2nd Band	3rd Band	4th Band	5th Band
Black = 0	Black = 0	Black = Multiply by 1 (10 ⁰)	Black = Multiply by 1 (10 ⁰)	Brown = $\pm 1\%$
Brown = 1	Brown = 1	Brown = Multiply by 10 (10 ¹)	Brown = Multiply by 10 (10 ¹)	
Red = 2	Red = 2	Red = Multiply by 100 (10 ²)	Red = Multiply by 100 (10 ²)	
Orange = 3	Orange = 3	Orange = Multiply by 1,000 (10 ³)	Orange = Multiply by 1,000 (10 ³)	
Yellow = 4	Yellow = 4	Yellow = Multiply by 10,000 (10 ⁴)	Yellow = Multiply by 10,000 (10 ⁴)	
Green = 5	Green = 5	Green = Multiply by 100,000 (10 ⁵)	Green = Multiply by 100,000 (10 ⁵)	
Blue = 6	Blue = 6	Blue = Multiply by 1,000,000 (10 ⁶)	Blue = Multiply by 1,000,000 (10 ⁶)	
Violet = 7	Violet = 7	Violet = Multiply by 10,000,000 (10 ⁷)	Violet = Multiply by 10,000,000 (10 ⁷)	
Gray = 8	Gray = 8	Gold = Multiply by 0.1 (10 ⁻¹)	Gold = Multiply by 0.1 (10 ⁻¹)	
White = 9	White = 9	Silver = Multiply by 0.01 (10 ⁻²)	Silver = Multiply by 0.01 (10 ⁻²)	

Remark: For ultra-low resistance, the above method can not be expressed, with the following color ring identification



1st Band	2nd Band	3rd Band	4th Band	5th Band
Black = 0	Black = 0	Black = 0	Black = 0	Brown = ±1%
Brown = 1	Brown = 1	Brown = 1	Brown = 1	Red 紅 = ±2%
Red = 2	Red = 2	Red = 2	Red = 2	Gold 金 = ±5%
Orange = 3	Orange = 3	Orange = 3	Orange = 3	Silver 銀 = ±10%
Yellow = 4	Yellow = 4	Yellow = 4	Yellow = 4	
Green = 5	Green = 5	Green = 5	Green = 5	
Blue = 6	Blue = 6	Blue = 6	Blue = 6	
Violet = 7	Violet = 7	Violet = 7	Violet = 7	
Gray = 8	Gray = 8	Gray = 8	Gray = 8	
White = 9	White = 9	White = 9	White = 9	

4.1 Label:

Label shall be marked with following items:

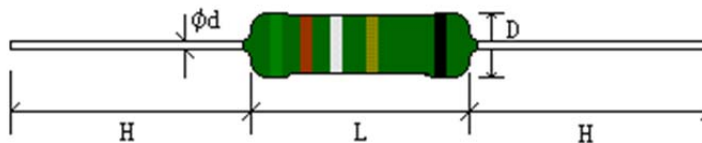
- (1) Type and style
- (2) Nominal resistance
- (3) Resistance tolerance
- (4) Quantity
- (5) Lot number
- (6) PPM

Example:

Wire -Wound Non-inductive Film Fixed Resistors

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

5. Ratings & Dimension

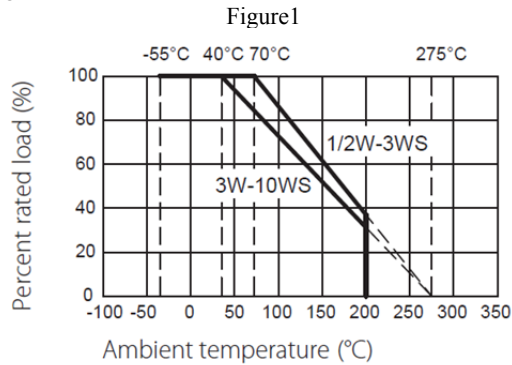


2.1 Normal size

Type	Dimension(mm)					Max Working Voltage	Max Overload Voltage	Dielectric Withstanding Voltage	Resistance Range	Tolerance
	D±1	L±1	d±0.05	H±3	PT					
KNPI 1/2W	3.0	9.5	0.54	28	52	500V	1000V	350V	0.01Ω~30Ω	±1% ±2% ±5% ±10%
KNPI 1WS	3.0	9.5	0.54	28	52	500V	1000V	350V	0.01Ω~30Ω	
KNPI 1W	4.0	11.5	0.70	25	52	500V	1000V	500V	0.01Ω~62Ω	
KNPI 2WS	4.0	11.5	0.70	25	52	500V	1000V	500V	0.01Ω~62Ω	
KNPI 2W	5.5	15.5	0.70	28	64	500V	1000V	500V	0.018Ω~120Ω	
KNPI 3WS	5.5	15.5	0.70	28	64	500V	1000V	500V	0.018Ω~120Ω	
KNPI 3W	6.5	17.5	0.75	28	64	500V	1000V	500V	0.024Ω~150Ω	
KNPI 5WS	6.5	17.5	0.75	28	64	500V	1000V	500V	0.024Ω~150Ω	
KNPI 5W	8.5	24.5	0.75	38	90&B/B	500V	1000V	500V	0.043Ω~430Ω	
KNPI 7WS	8.5	24.5	0.75	38	90&B/B	500V	1000V	500V	0.043Ω~430Ω	
KNPI 7W	8.5	29.5	0.75	38	B/B	500V	1000V	500V	0.047Ω~430Ω	
KNPI 8WS	8.5	29.5	0.75	38	B/B	500V	1000V	500V	0.047Ω~430Ω	
KNPI 8W	8.5	39.5	0.75	38	B/B	500V	1000V	500V	0.091Ω~620Ω	
KNPI 9WS	8.5	39.5	0.75	38	B/B	500V	1000V	500V	0.091Ω~620Ω	
KNPI 9W	8.5	52.5	0.75	38	B/B	500V	1000V	500V	0.13Ω~820Ω	
KNPI 10WS	8.5	52.5	0.75	38	B/B	500V	1000V	500V	0.13Ω~820Ω	

6. Derating Curve

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



6.1 Voltage rating:

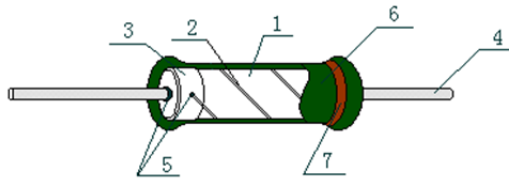
Resistors shall have a rated direct-current (DC) continuous working voltage or an approximate sine-wave root-mean-square (RMS) alternating-current (AC) continuous working voltage at commercial-line frequency and waveform corresponding to the power rating, as determined from the following formula: $RCWV = \sqrt{P \times R}$

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



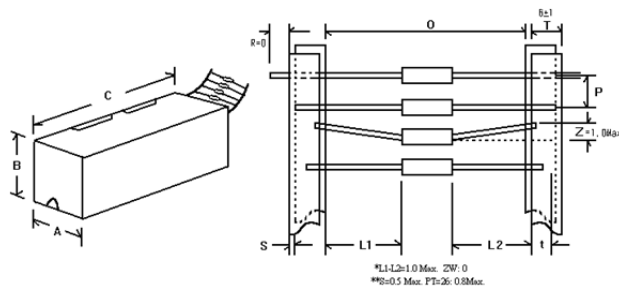
No.	Name	Raw materials
1	Basic body	Rod Type Ceramics
2	Resistor	Alloy
3	End cap	Steel (Tin Plated iron Surface)
4	Lead wire	Tin solder coated copper wire
5	Joint	By welding
6	Coating	Insulated Resin Color: Deep Green (Normal size) Light Green (Small size)
7	Marking	Epoxy Resin

8. Performance Specification

Characteristic	Limits	Test Methods (GB/T5729&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_1 : Resistance Value at room temperature (t_1) ; R_2 : Resistance at test temperature (t_2) t_1 : $+25^\circ\text{C}$ or specified room temperature t_2 : Test temperature (125°C)
Short-Time Overload	Resistance change rate is: $\pm(2\%+0.05\Omega)\text{max.}$ With no evidence of mechanical damage.	4.13 Permanent resistance change after the application of a potential of 2.5 times RCWV or Max. Overload Voltage whichever less 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: $\pm(5\%+0.05\Omega)$ 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 $260^\circ\text{C} \pm 5^\circ\text{C}$ 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: $245^\circ\text{C} \pm 3^\circ\text{C}$ Dwell time in solder: 2~3 seconds.
Load life in humidity	Resistance change rate is: $\pm(5\%+0.05\Omega)$ Max.. With no evidence of mechanical damage.	7.9 Resistance change after 1000 hours (1.5 hours "ON" , 0.5 hours "OFF") at RCWV or Max. Working Voltage whichever less in a humidity test chamber controlled at $40 \pm 2^\circ\text{C}$ and $93\% \pm 3\%$ RH.
Load life	Resistance change rate is: $\pm(5\%+0.05\Omega)$ Max.. With no evidence of mechanical damage.	4.25.1 Permanent Resistance change after 1000 hours operating at RCWV or Max. Working Voltage whichever less with duty cycle of 1.5 hours "ON" , 0.5 hour "OFF" at $70 \pm 2^\circ\text{C}$ or $40 \pm 2^\circ\text{C}$ ambient.
Low Temperature Storage	Resistance change rate is: $\pm(5\%+0.05\Omega)$ Max.. With no evidence of mechanical damage.	IEC 60068-2-1 (Aa) Lower limit temperature , for 2H.
High Temperature Exposure	Resistance change rate is: $\pm(5\%+0.05\Omega)$ Max.. With no evidence of mechanical damage.	MIL-STD-202 108A Upper limit temperature , for 16H.
Rapid change of temperature	Resistance change rate is: $\pm(2\%+0.05\Omega)$ Max.. With no evidence of mechanical damage.	4.19 30 min at -55°C and 30 min at 155°C ; 100 cycles.

9. Packing

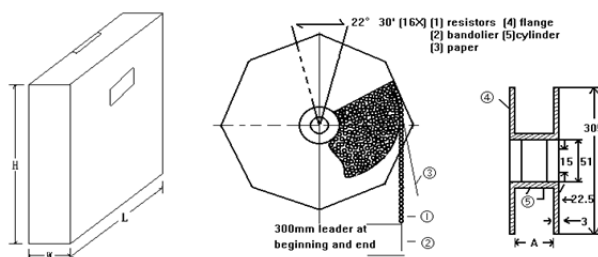
9.1 Tapes in Box Packing



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	80	82	255	1,000pcs
KNPI 2WS	52±1	5±0.3	80	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

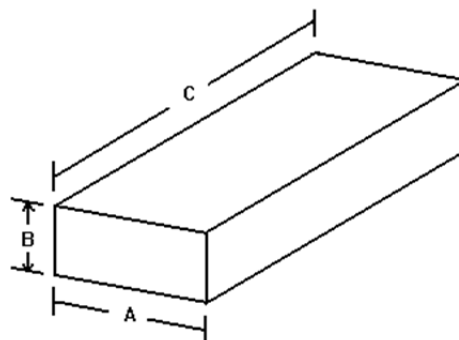
9.2 Tapes in Reel Packing



Dimension of Reel (mm)

Part No.	O	A	W±5	H±5	L±5	Qty/Box
KNPI 1/2W	52±1	73±2	85	294	293	4,000pcs
KNPI 1WS	52±1	73±2	85	294	293	4,000pcs
KNPI 1W	52±1	73±2	85	294	293	2,500pcs
KNPI 2WS	52±1	73±2	85	294	293	2,500pcs
KNPI 2W	64±5	80±5	95	294	293	1,000pcs
KNPI 3WS	64±5	80±5	95	294	293	1,000pcs
KNPI 3W	64±5	80±5	95	294	293	1,000pcs
KNPI 5WS	64±5	80±5	95	294	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	200/4,000pcs
KNPI 1WS	140	80	240	200/4,000pcs
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°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.
- 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 Cl₂, H₂S, NH₃, SO₂, NO₂, Br 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
4	Modify the size of 8W to 10WS wires from "0.75" to "1.00"	4	Mar.15, 2022	Haiyan Chen	Yuhua Xu
5	Modify the temperature coefficient test conditions	5	Oct.28, 2022	Haiyan Chen	Yuhua Xu
6	1.Increased standard color code system 2.Add the 1% tolerance	3 3~4	Apr.01, 2024	Haiyan Chen	Yuhua Xu
7	Modify the ultra-low resistance color code	4	Mar.05,2025	Haiyan Chen	Yuhua Xu
8	Modify the packaging size and the number of packages	7~8	Jun.24, 2025	Haiyan Chen	Yuhua Xu
9	Modify the wire diameter	4	Mar.28, 2026	Haiyan Chen	Yuhua Xu
10	Add the Max Working Voltage; Max Overload Voltage; Dielectric Withstanding Voltage	4	Jun.16, 2026	Haiyan Chen	Yuhua Xu

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