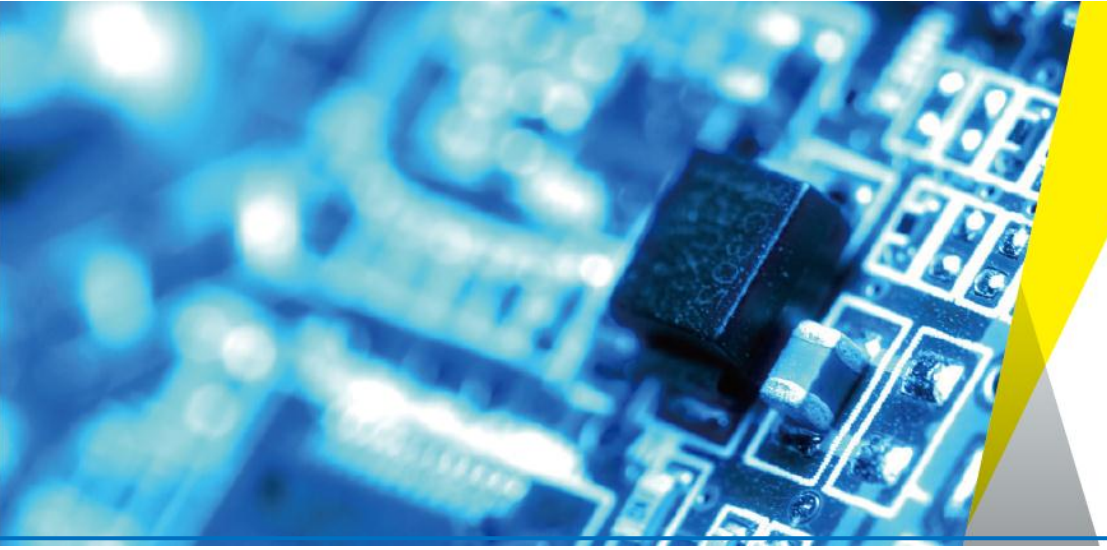

DATA SHEET

Product Name	**Wire -Wound Fusible Resistors**
Part Name	**KNPU Series**
File No.	**DIP-SP-013**

Uniroyal Electronics Global Co., Ltd.

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	Aeon Technology Corporation
	Royal Electronic Factory (Thailand) Co., Ltd.
	Royal Technology (Thailand) Co., Ltd.

1. Scope

1.1 This datasheet is the characteristics of wire wound fusible resistors manufactured by UNI-ROYAL
1.2 Suitable for all kinds of protection circuit
1.3 Non-flammable coating，could withstand high Temperature
1.4 Common resistor with additional safety function ， no flame or smoke ， no explosion or coating crack when fusing
1.5 UL items available （file NO：E306074）
1.6 Compliant with RoHS directive.
1.7 Halogen free requirement.

2. Part No. System

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

2.1 Wire wound fusible Resistors type, the 1st to 3rd digits are to indicate the product type and 4th digit is the special feature.
Example: KNPU= Wire wound fusible Resistors type.

2.2 5th~6th digits:
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, This is to indicate the wattage or power rating .To distinguish the size and the number, the following codes are used; and please refer to the following chart for details:
1W~7W (≧1W)

Wattage	1	2	3	5	7
Normal Size	1W	2W	3W	5W	7W

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 5% 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.;

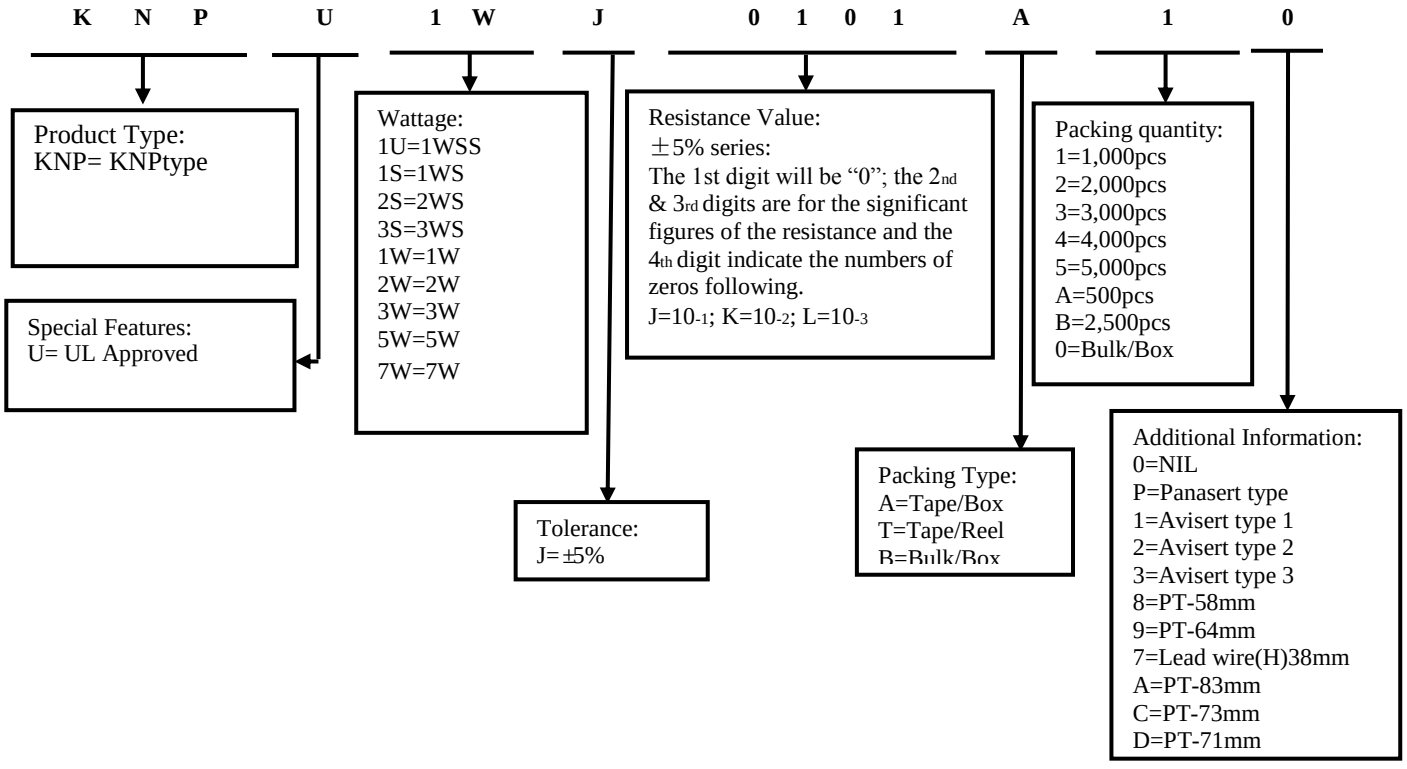
2.4.2 The following number s and the letter codes are to be used to indicate the number of zeros in the 11th digit:
$0=10^0$ $1=10^1$ $2=10^2$ $3=10^3$ $4=10^4$ $5=10^5$ $6=10^6$ $J=10^{-1}$ $K=10^{-2}$ $L=10^{-3}$ $M=10^{-4}$

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:
1=1000pcs 2=2000pcs 5=5000pcs

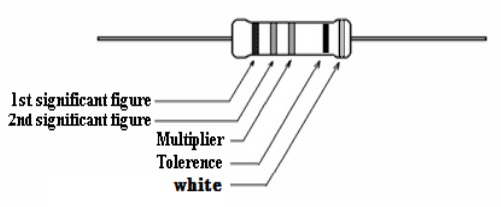
2.4.5 For some items, the 14th digit alone can use to denote special features of additional information with the following codes:
P=Panasert type 0=NIL 1=Avisert type 1 2=Avisert type 2 3=Avisert type 3 A=Cutting type CO 1/4W-A type B= Cutting type

3. Ordering Procedure



4. Marking

Resistors shall be marked with color coding and welding point exposed. Colors shall be in accordance with JIS C 0802
For KNPU ±5%



4.1 Label:

Label shall be marked with following items:

(1) Type and style

(2) Nominal resistance

(3) Resistance tolerance

(4) Quantity

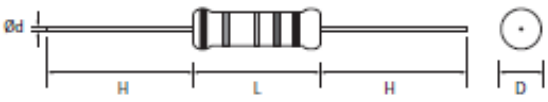
(5) Lot number

(6) PPM

Example**:**

Wire -Wound Fusible Resistors	
WATT : 1W	VAL: 30Ω
Q'TY:	TOL: 5%
LOT: 7021528	PPM:

5. Ratings & Dimension

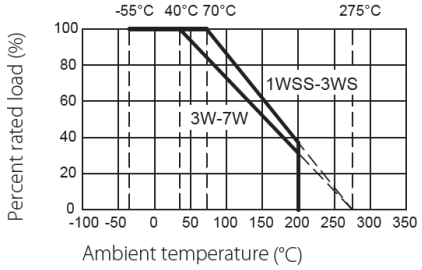


Type	Dimension(mm)					Tolerance	ResistanceRange
	D(MAX)	L(MAX)	H±3	d±0.05	PT		
KNPU 1WSS	3.0	8.5	28	0.54	52	±5%	10Ω
KNPU 1WS	4.3	10.0	28	0.75	52	±5%	0.47Ω~240Ω
KNPU 1W	5.0	12.0	25	0.70	52	±5%	0.47Ω~240Ω
KNPU 2WS	5.0	12.0	25	0.70	52	±5%	0.47Ω~240Ω
KNPU 2W	5.5	16.0	28	0.70	64	±5%	0.47Ω~240Ω
KNPU 3WS	5.5	16.0	28	0.70	64	±5%	0.47Ω~240Ω
KNPU 3W	6.5	17.5	28	0.75	64	±5%	0.47Ω~240Ω
KNPU 5W	8.0	20.0	38	0.75	B/B	±5%	0.47Ω~240Ω
KNPU 7W	8.5	25.0	38	0.75	B/B	±5%	0.47Ω~47Ω

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

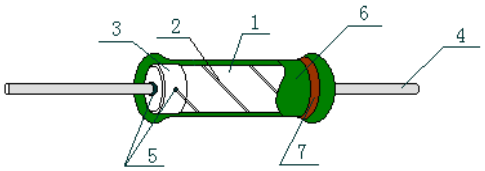


6.1 Voltage rating:
Resistors shall have a rated direct-current (DC) continuous working voltage or an approximate sine-wave root-mean-square (RMS) alternating-current (AC) continuous working voltage at commercial-line frequency and waveform corresponding to the power rating, as determined from the following 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.

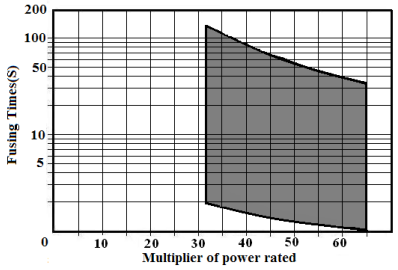
7. Structure



NO.	Name	Raw materials
1	Basic body	Rod Type Ceramics
2	Resistor	Resistance Wire Alloy
3	End cap	Steel (Tin Plated iron Surface)
4	Lead wire	Annealed copper wire coated with tin
5	Joint	By welding
6	Coating	Insulated & Non-Flame paint (Color : Deep Green)
7	Color code	Non-Flame Epoxy Resin

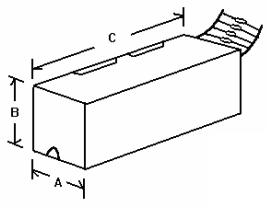
8. Performance Specification

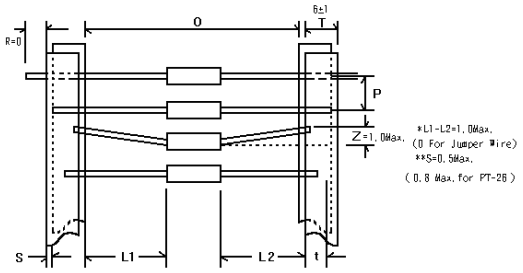
Characteristic	Limits	Test Method (JIS-C-5201& JIS-C-5202&UL1412& IEC60115-1)
Temperature Coefficient	≧20Ω： ±300PPM/℃ ＜20Ω： ±400PPM/℃	JIS-C-5201 4.8 4.8 Natural resistance changes per temp. Degree centigrade $\frac{R_2-R_1}{R_1(t_2-t_1)} \times 10^6$ (PPM/℃) R_1: Resistance Value at room temperature （t_1）; R_2: Resistance at test temperature （t_2） t_1: +25 ℃ or specified room temperature t_2: Test temperature（-55℃or 125℃）
Short-Time Overload	Resistance change rate is: ±(2%+0.05Ω)Max. With no evidence of mechanical damage.	JIS-C-5201 4.13 Permanent resistance change after the application of a potential of 2.5 times RCWV or Max.Overload Votage whichever less for 5 seconds.

Dielectric withstanding voltage	No evidence of flashover mechanical damage, arcing or insulation break down	JIS-C-5201 4.7 Resistors shall be clamped in the trough of a 90°metallic V-block ,applied voltage AC1000V, for 60-70 seconds.
Terminal strength	No evidence of mechanical damage	JIS-C-5201 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.
Solderability	95% Coverage Min.	JIS-C-5201 4.17 The area covered with a new, smooth, clean, shiny and continuous surface free from concentrated pinholes. Temperature of solder:245℃ ±3℃ Dwell time in solder: 2~3seconds.
Resistance to soldering heat	Resistance change rate is: (1%+0.05Ω) Max. With no evidence of mechanical damage	JIS-C-5201 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.
Load life	Resistance change rate is :±(5%+0.05Ω Max.. With no evidence of mechanical damage.	JIS-C-5201 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±2° C ambient.
Load life in humidity	Resistance change rate is: ±(5%+0.05Ω) Max.. With no evidence of mechanical damage.	JIS-C-5202 4.24 Resistance change after 1000 hours (1.5hours “ON”， 0.5hours “OFF”) at RCWV or Max.Working Voltage whichever less in a humidity test chamber controlled at 40±2° C and 93%±3% RH.
Fusing test	Resistance should be opened (The Resistance value is over than 50 times from before test value)follow fusing curve condition Magnification of power: 35 times Fusing: 120s (max)	UL1412 
Low Temperature Storage	Resistance change rate is :±(5%+0.05Ω Max.. With no evidence of mechanical damage.	IEC 60068-2-1 (Aa) Lower limit temperature，for 2H.
High Temperature Exposure	Resistance change rate is :±(5%+0.05Ω Max.. With no evidence of mechanical damage.	MIL-STD-202 108A Upper limit temperature ，for 16H.
Rapid change of temperature	Resistance change rate is :±(5%+0.05Ω Max.. With no evidence of mechanical damage.	JIS-C-5201 4.19 30 min at lower limit temperature and 30 min at upper limit temperature，100 cycles.

9. Packing

9.1 Tapes in Box Packing

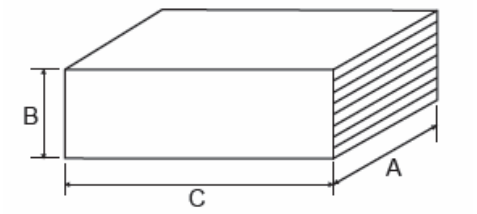




Dimension of T/B (mm)

Part No.	O	P	A ±5	B ±5	C ±5	Qty/Box
KNPU 1W	52 ±1	5 ±0.3	86	80	262	1,000pcs
KNPU 2W	64 ±5	10 ±0.5	92	108	262	1,000pcs
KNPU 3W	64 ±5	10 ±0.5	92	80	256	500pcs
KNPU 1WSS	52 ±1	5 ±0.3	85	70	260	1,000pcs
KNPU 1WS	52 ±1	5 ±0.3	92	106	262	1,000pcs
KNPU 2WS	52 ±1	5 ±0.3	86	80	262	1,000pcs
KNPU 3WS	64 ±5	10 ±0.5	92	108	262	1,000pcs

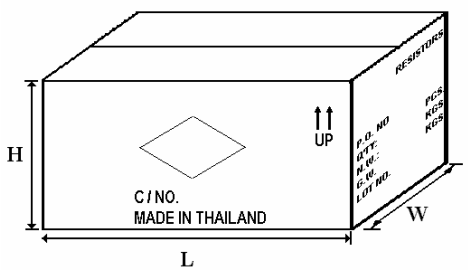
9.2 Box packing (Plastic Case)



Dimension of Box (mm)

Type	L(C) ±5	W(A) ±5	H(B) ±5	Quantity Per Bag (Pcs.)
KNPU5W	36	20	8	100 / 1,000

9.3 Bulk in inner box packing (in plastic case)



Type	Q'ty / Bag (pcs.)	Q'ty / Inner Box (pcs.)	Q'ty / Carton (pcs.)	Carton Box Size L x W x H (±5)
KNPU7W	8	32	1,600	560 x 305 x 310

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	1~6	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 characteristic	4~5	Nov.15, 2019	Haiyan Chen	Yuhua Xu
4	Delete a 1WS dimension	3	May.13, 2020	Haiyan Chen	Yuhua Xu
5	Modify the color ring label	3	Aug.18, 2021	Haiyan Chen	John Zhao
6	Modify the temperature coefficient test conditions	4	Oct.28, 2022	Haiyan Chen	Yuhua Xu
7	Increased standard color code system	3	Apr.01, 2024	Haiyan Chen	Yuhua Xu