

# DATASHEET

**Product Name**    **Wire-wound Anti-Surge Fixed Resistors**

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**Part Name**    **KNPA Series**

**File No.**    **DIP-SP-012**

## **Uniroyal Electronics Global Co., Ltd.**

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## 1. Scope

- 1.1 This datasheet is the characteristics of Wire-wound Anti-Surge Fixed Resistors manufactured by UNI-ROYAL.
- 1.2 Excellent flame retardant coating
- 1.3 According to IEC 61000-4-5
- 1.4 Applies to electricity meters, home appliance and ballast
- 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 Wire-Wound Fixed Resistors type, the 1<sup>st</sup> to 3<sup>rd</sup> digits are to indicate the product type and 4<sup>th</sup> digit is the special feature.

Example: KNPA= Wire-Wound Anti-Surge Fixed Resistors type.

- 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 |
| Normal Size | W2  |

1W~16W (≥ 1W )

|                  |    |    |    |    |    |    |    |    |    |
|------------------|----|----|----|----|----|----|----|----|----|
| Wattage          | 1  | 2  | 3  | 4  | 5  | 7  | 8  | 9  | 10 |
| Normal Size      | 1W | 2W | 3W | 4W | 5W | 7W | 8W | 9W | AW |
| Small Size       | 1S | 2S | 3S | 4S | 5S | 7S | 8S | 9S | AS |
| Ultra Small size | 1U | 2U | 3U | 4U | 5U | 7U | 8U | 9U | AU |

- 2.2.2 For power rating less than 1 watt, the 5<sup>th</sup> digit will be the letters W, S or U to represent the size required & the 6<sup>th</sup> 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 5<sup>th</sup> digit will be a number or a letter code and the 6<sup>th</sup> digit will be the letters of W or S.

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

- 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.

F=±1% G=±2% 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 5% 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 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 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>

- 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:

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

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

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

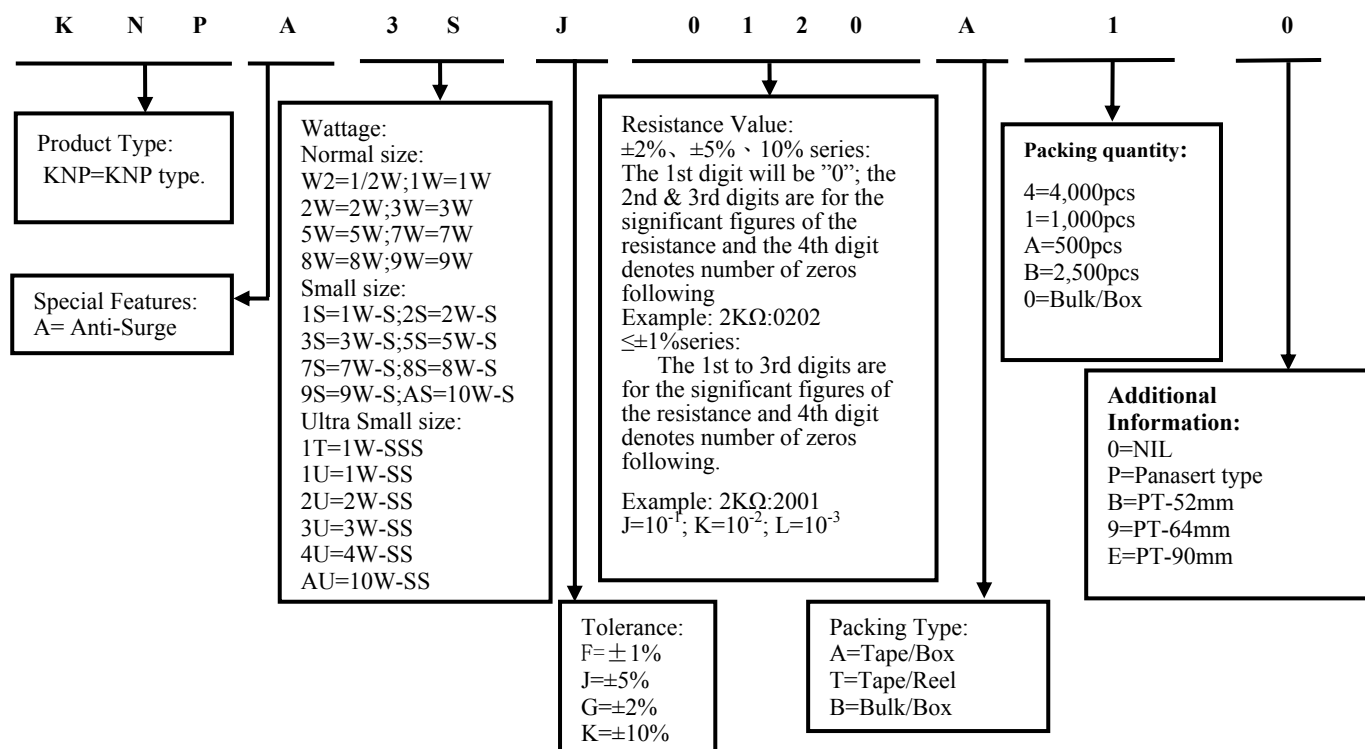
A=500pcs 1=1000pcs 2=2000pcs 5=5000pcs

- 2.4.5 For some items, the 14<sup>th</sup> digit alone can use to denote special features of additional information with the following codes:

0=NIL P=Panasert type 0=NIL 1=Avisert type 1 2=Avisert type 2  
3=Avisert type 3

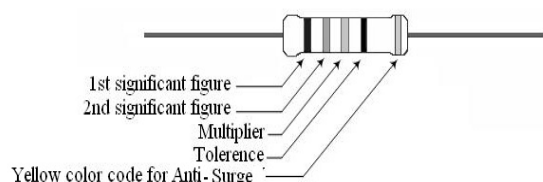
## 3. Ordering Procedure

(Example: KNPA 3W-S  $\pm 5\%$  12 $\Omega$  T/B-1000 )



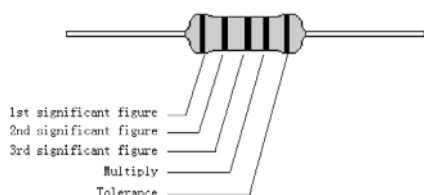
## 4. Color Code

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 <sup>0</sup> )           | Red = $\pm 2\%$     | Yellow   |
| Brown = 1  | Brown = 1  | Brown = Multiply by 10 (10 <sup>1</sup> )          | Gold = $\pm 5\%$    |          |
| Red = 2    | Red = 2    | Red = Multiply by 100 (10 <sup>2</sup> )           | Silver = $\pm 10\%$ |          |
| Orange = 3 | Orange = 3 | Orange = Multiply by 1,000 (10 <sup>3</sup> )      |                     |          |
| Yellow = 4 | Yellow = 4 | Yellow = Multiply by 10,000 (10 <sup>4</sup> )     |                     |          |
| Green = 5  | Green = 5  | Green = Multiply by 100,000 (10 <sup>5</sup> )     |                     |          |
| Blue = 6   | Blue = 6   | Blue = Multiply by 1,000,000 (10 <sup>6</sup> )    |                     |          |
| Violet = 7 | Violet = 7 | Violet = Multiply by 10,000,000 (10 <sup>7</sup> ) |                     |          |
| Gray = 8   | Gray = 8   | Gold = Multiply by 0.1 (10 <sup>-1</sup> )         |                     |          |
| White = 9  | White = 9  | Silver = Multiply by 0.01 (10 <sup>-2</sup> )      |                     |          |

$\pm 1\%$  Series



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

### 4.3 Label:

Label shall be marked with following items:

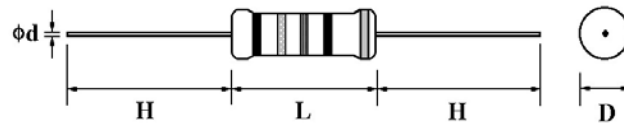
- (1) Type and style
- (2) Nominal resistance
- (3) Resistance tolerance
- (4) Quantity
- (5) Lot number
- (6) PPM

Example:

| Wire-wound Anti-Surge Fixed Resistors |                  |
|---------------------------------------|------------------|
| WATT : 8W                             | VAL: 22 $\Omega$ |
| Q'TY: 25                              | TOL: 5%          |
| LOT: 7021528                          | PPM:             |

## 5. Ratings & Dimension

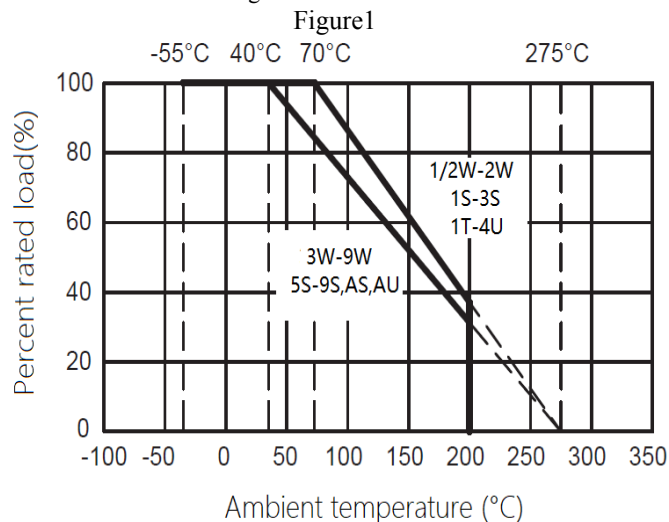
### 5.1 Dimension:



| 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     |                     |                      |                                 |                  |                           |
| KNPA 1W-SSS    | 2.5           | 6.5  | 0.54   | 28  | 52     | 500V                | 1000V                | 350V                            | 1Ω~560Ω          | ±1%<br>±2%<br>±5%<br>±10% |
| KNPA 1W-SS     | 3.0           | 9.0  | 0.54   | 28  | 52     | 500V                | 1000V                | 350V                            | 1Ω~750Ω          |                           |
| KNPA 1/2W,1W-S | 3.5           | 9.5  | 0.54   | 28  | 52     | 500V                | 1000V                | 350V                            | 1.5Ω~820Ω        |                           |
| KNPA 2W-SS     | 3.5           | 9.5  | 0.54   | 28  | 52     | 500V                | 1000V                | 350V                            | 1Ω~910Ω          |                           |
| KNPA 1W,2W-S   | 4.5           | 11.5 | 0.70   | 25  | 52     | 500V                | 1000V                | 500V                            | 2.5Ω~1.2KΩ       |                           |
| KNPA 3W-SS     | 5.5           | 13.5 | 0.70   | 28  | 64     | 500V                | 1000V                | 500V                            | 1Ω~2.2KΩ         |                           |
| KNPA 2W,3W-S   | 5.5           | 15.5 | 0.70   | 28  | 64     | 500V                | 1000V                | 500V                            | 5Ω~3.0KΩ         |                           |
| KNPA 4W-SS     | 5.5           | 15.5 | 0.70   | 28  | 64     | 500V                | 1000V                | 500V                            | 1Ω~2.2KΩ         |                           |
| KNPA 3W,5W-S   | 6.5           | 17.5 | 0.75   | 28  | 64     | 500V                | 1000V                | 500V                            | 6.5Ω~3.9KΩ       |                           |
| KNPA 5W,7W-S   | 8.5           | 24.5 | 0.75   | 38  | 90&B/B | 500V                | 1000V                | 500V                            | 10Ω~5.6KΩ        |                           |
| KNPA 7W,8W-S   | 8.5           | 29.5 | 0.75   | 38  | B/B    | 500V                | 1000V                | 500V                            | 10Ω~8.2KΩ        |                           |
| KNPA 8W,9W-S   | 8.5           | 39.5 | 0.75   | 38  | B/B    | 500V                | 1000V                | 500V                            | 10Ω~10KΩ         |                           |
| KNPA 10W-SS    | 8.5           | 39.5 | 0.75   | 38  | B/B    | 500V                | 1000V                | 500V                            | 1Ω~10KΩ          |                           |
| KNPA 9W,10W-S  | 8.5           | 52.5 | 0.75   | 38  | B/B    | 500V                | 1000V                | 500V                            | 10Ω~15KΩ         |                           |

## 6. Derating Curve

Resistors shall have a power rating based on continuous load operation at an ambient temperature from -55°C to 40°C or 70°C. For temperature in excess of 40°C or 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:

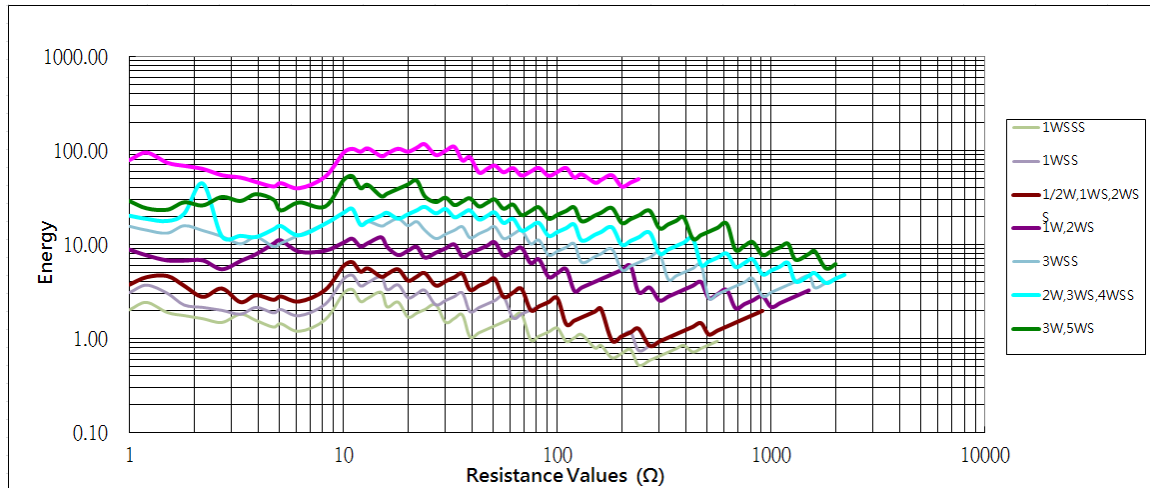
$$RCWV = \sqrt{P \times R}$$

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

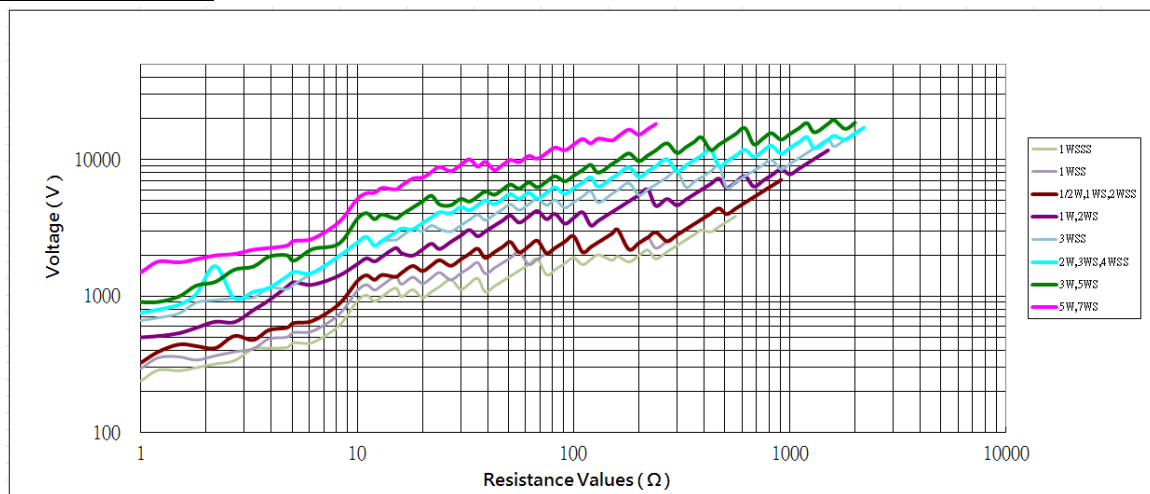
P = power rating (WATT.)

R = nominal resistance (OHM)

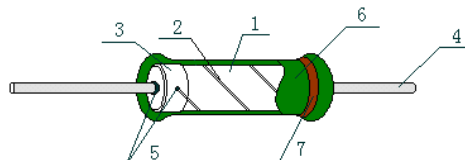
## 7. Pulses Energy Curve



## 8. 1.2/50us Pulses Voltage Curve

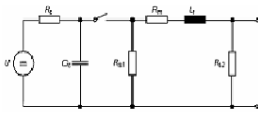
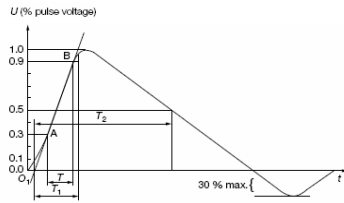


## 9. Structure



| 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    | Normal size & Insulated Non-Flame Paint<br>Color: Deep Green (Normal size)<br>Light Green (small size) |
| 7   | Marking    | Epoxy Resin                                                                                            |

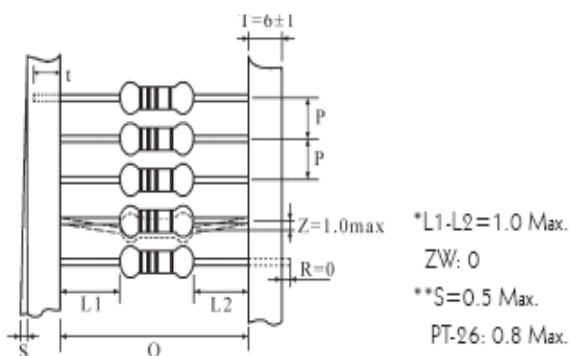
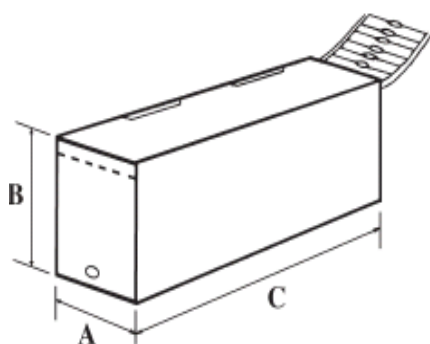
## 10. Performance Specification

| Characteristic               | Limits                                                                                        | Test Methods<br>(GB/T5729&JIS-C-5201&IEC60115-1)                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Temperature Coefficient      | $\pm 200 \text{ ppm/}^{\circ}\text{C}$                                                        | 4.8 Natural resistance changes per temp. Degree centigrade<br>$\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{ (PPM/}^{\circ}\text{C)}$ $R_1$ : Resistance Value at room temperature ( $t_1$ ) ;<br>$R_2$ : Resistance at test temperature ( $t_2$ )<br>$t_1$ : $+25^{\circ}\text{C}$ or specified room temperature<br>$t_2$ : Test temperature ( $-55^{\circ}\text{C}$ or $125^{\circ}\text{C}$ )                                                          |
| Short-Time Overload          | Resistance change rate must be in $\pm(2\%+0.05\Omega)\text{Max}$ , and no mechanical damage. | 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.                                                                                                                                                                                                                                                                                                                    |
| Terminal strength            | No evidence of mechanical damage                                                              | 4.16 Direct load:<br>Resistance to a 2.5 kg direct load for 10 seconds in the direction of the longitudinal axis of the terminal leads.<br>Twist test:<br>Terminal leads shall be bent through $90^{\circ}$ at a point of about 6mm from the body of the resistor and shall be rotated through $360^{\circ}$ about the original axis of the bent terminal in alternating direction for a total of 3 rotations.                                                  |
| Resistance to soldering heat | Resistance change rate must be in $\pm(1\%+0.05\Omega)$ , and no 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 $10 \pm 1$ seconds.                                                                                                                                                                                                                                                                                           |
| Solderability                | 95% Coverage Min.                                                                             | 4.17 The area covered with a new, smooth, clean, shiny and continuous surface free from concentrated pinholes.<br>Temperature of solder: $245^{\circ}\text{C} \pm 3^{\circ}\text{C}$<br>Dwell time in solder: 2~3seconds.                                                                                                                                                                                                                                       |
| Rapid change of temperature  | Resistance change rate must be in $\pm(2\%+0.05\Omega)$ , and no mechanical damage.           | 4.19 30 min at $-55^{\circ}\text{C}$ and 30 min at $155^{\circ}\text{C}$ ; 100 cycles.                                                                                                                                                                                                                                                                                                                                                                          |
| Humidity ( steady state )    | Resistance change rate must be in $\pm(2\%+0.05\Omega)$ , and no mechanical damage.           | 4.24 Temporary resistance change after 240 hours exposure in a humidity test chamber controlled at $40 \pm 2^{\circ}\text{C}$ and 90-95% relative humidity,                                                                                                                                                                                                                                                                                                     |
| Load life in humidity        | Resistance change rate must be in $\pm(5\%+0.05\Omega)$ , and no mechanical damage.           | 7.9 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 $40 \pm 2^{\circ}\text{C}$ and $93\% \pm 3\% \text{ RH}$ .                                                                                                                                                                                                                                      |
| Surge Immunity               | Resistance change rate is: $\pm(5\%+0.05\Omega)\text{Max}$                                    | Surge voltageas per the 1.2 $\mu\text{s}/50 \mu\text{s}$ exponential open circuit voltage waveform according to IEC 61000-4-5 standard as shown below:<br><br><br>Front time: $T_1 = 1.67 \times T = 1.2 \mu\text{s} \pm 30 \%$<br>Time to half-value: $T_2 = 50 \mu\text{s} \pm 20 \%$ |

|                           |                                                                                     |                                                                                                                                                                                                                                   |
|---------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Resistance to solvent     | No deterioration of protective coatings & markings                                  | 4.29 Specimens shall be immersed in a bath of trichloroethylene completely for 3 min. With ultrasonic                                                                                                                             |
| Load life                 | Resistance change rate must be in $\pm(5\%+0.05\Omega)$ , and no 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 must be in $\pm(5\%+0.05\Omega)$ , and no mechanical damage. | IEC 60068-2-1 (Aa)<br>Lower limit temperature , for 2H.                                                                                                                                                                           |
| High Temperature Exposure | Resistance change rate must be in $\pm(5\%+0.05\Omega)$ , and no mechanical damage. | MIL-STD-202 108A<br>Upper limit temperature , for 16H.                                                                                                                                                                            |

## 11. Packing

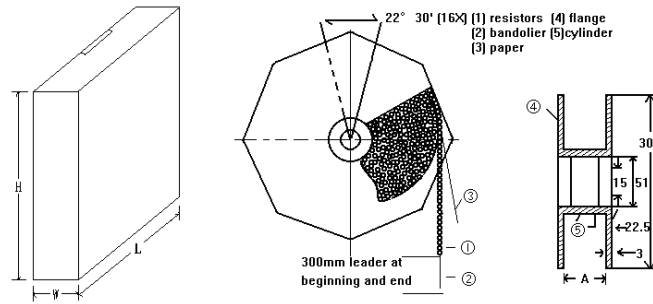
### 11.1 Tapes in Box Packing:



Dimension of T/B (mm)

| Part No.    | O          | P            | A $\pm 5$ | B $\pm 5$ | C $\pm 5$ | Qty/Box  |
|-------------|------------|--------------|-----------|-----------|-----------|----------|
| KNPA 1W-SSS | 52 $\pm 1$ | 5 $\pm 0.3$  | 75        | 116       | 255       | 4,000pcs |
| KNPA 1W-SS  | 52 $\pm 1$ | 5 $\pm 0.3$  | 75        | 45        | 255       | 1,000pcs |
| KNPA 2W-SS  | 52 $\pm 1$ | 5 $\pm 0.3$  | 75        | 70        | 255       | 1,000pcs |
| KNPA 1/2W   | 52 $\pm 1$ | 5 $\pm 0.3$  | 75        | 70        | 255       | 1,000pcs |
| KNPA 1W-S   | 52 $\pm 1$ | 5 $\pm 0.3$  | 75        | 70        | 255       | 1,000pcs |
| KNPA 1W     | 52 $\pm 1$ | 5 $\pm 0.3$  | 80        | 82        | 255       | 1,000pcs |
| KNPA 2W-S   | 52 $\pm 1$ | 5 $\pm 0.3$  | 80        | 82        | 255       | 1,000pcs |
| KNPA 2W     | 64 $\pm 5$ | 10 $\pm 0.5$ | 90        | 119       | 255       | 1,000pcs |
| KNPA 3W-SS  | 64 $\pm 5$ | 10 $\pm 0.5$ | 90        | 119       | 255       | 1,000pcs |
| KNPA 3W-S   | 64 $\pm 5$ | 10 $\pm 0.5$ | 90        | 119       | 255       | 1,000pcs |
| KNPA 4W-SS  | 64 $\pm 5$ | 10 $\pm 0.5$ | 90        | 119       | 255       | 1,000pcs |
| KNPA 3W     | 64 $\pm 5$ | 10 $\pm 0.5$ | 90        | 88        | 255       | 500pcs   |
| KNPA 5W-S   | 64 $\pm 5$ | 10 $\pm 0.5$ | 90        | 88        | 255       | 500pcs   |
| KNPA 5W     | 90 $\pm 5$ | 10 $\pm 0.5$ | 115       | 124       | 500       | 500pcs   |
| KNPA 7W-S   | 90 $\pm 5$ | 10 $\pm 0.5$ | 115       | 124       | 500       | 500pcs   |

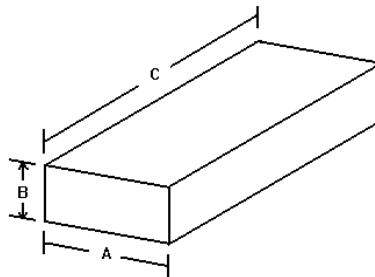
## 11.2 Tapes in Reel Packing:



Dimension of Reel (mm)

| Part No.    | O    | A     | W±5 | H±5 | L±5 | Qty/Box  |
|-------------|------|-------|-----|-----|-----|----------|
| KNPA 1W-SSS | 52±1 | 73±2  | 85  | 294 | 293 | 4,000pcs |
| KNPA 1W-SS  | 52±1 | 73±2  | 85  | 294 | 293 | 2,500pcs |
| KNPA 2W-SS  | 52±1 | 73±2  | 85  | 294 | 293 | 2,500pcs |
| KNPA 1/2W   | 52±1 | 73±2  | 85  | 294 | 293 | 4,000pcs |
| KNPA 1W-S   | 52±1 | 73±2  | 85  | 294 | 293 | 4,000pcs |
| KNPA 1W     | 52±1 | 73±2  | 85  | 294 | 293 | 2,500pcs |
| KNPA 2WS    | 52±1 | 73±2  | 85  | 294 | 293 | 2,500pcs |
| KNPA 2W     | 64±5 | 80±5  | 95  | 294 | 293 | 1,000pcs |
| KNPA 3W-SS  | 64±5 | 80±5  | 95  | 294 | 293 | 1,000pcs |
| KNPA 3WS    | 64±5 | 80±5  | 95  | 294 | 293 | 1,000pcs |
| KNPA 4W-SS  | 64±5 | 80±5  | 95  | 294 | 293 | 1,000pcs |
| KNPA 3W     | 64±5 | 80±5  | 95  | 294 | 293 | 1,000pcs |
| KNPA 5W-S   | 64±5 | 80±5  | 95  | 294 | 293 | 1,000pcs |
| KNPA 5W     | 90±5 | 115±5 | 121 | 310 | 310 | 700pcs   |
| KNPA 7W-S   | 90±5 | 115±5 | 121 | 310 | 310 | 700pcs   |

## 11.3 Bulk in Box Packing:



Dimension of Box (mm)

| Part No.    | A±5 | B±5 | C±5 | Qty/Box       |
|-------------|-----|-----|-----|---------------|
| KNPA 1W-SSS | 140 | 80  | 240 | 500/10000 pcs |
| KNPA 1W-SS  | 140 | 80  | 240 | 200/4,000pcs  |
| KNPA 2W-SS  | 140 | 80  | 240 | 200/4,000pcs  |
| KNPA 1/2W   | 140 | 80  | 240 | 200/4,000pcs  |
| KNPA 1W-S   | 140 | 80  | 240 | 200/4,000pcs  |
| KNPA 1W     | 140 | 80  | 240 | 100/2,500pcs  |
| KNPA 2W-S   | 140 | 80  | 240 | 100/2,500pcs  |
| KNPA 2W     | 140 | 80  | 240 | 100/1,500pcs  |
| KNPA 3W-SS  | 140 | 80  | 240 | 100/1,500pcs  |
| KNPA 3WS    | 140 | 80  | 240 | 100/1,500pcs  |
| KNPA 3W     | 140 | 80  | 240 | 100/1,000pcs  |
| KNPA 4W-SS  | 140 | 80  | 240 | 100/1,500pcs  |
| KNPA 5WS    | 140 | 80  | 240 | 100/1,000pcs  |
| KNPA 5W     | 140 | 80  | 240 | 25/400pcs     |
| KNPA 7W-S   | 140 | 80  | 240 | 25/400pcs     |
| KNPA 7W     | 140 | 80  | 240 | 25/300pcs     |
| KNPA 8W-S   | 140 | 80  | 240 | 25/300pcs     |
| KNPA 8W     | 140 | 80  | 240 | 25/200pcs     |
| KNPA 9W-S   | 140 | 80  | 240 | 25/200pcs     |
| KNPA 9W     | 140 | 80  | 240 | 25/200pcs     |
| KNPA 10W-S  | 140 | 80  | 240 | 25/200pcs     |
| KNPA 10W-SS | 140 | 80  | 240 | 25/200pcs     |

## 12. Note

- 12.1. 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.
- 12.2. Cartons must be placed in correct direction which indicated on carton, otherwise the reel or wire will be deformed.
- 12.3. Storage conditions as below are inappropriate:
- Stored in high electrostatic environment
  - Stored in direct sunshine, rain, snow or condensation.
  - 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>, Br etc.

## 13. Record

| Version | Description                                               | Page | Date         | Amended by  | Checked by |
|---------|-----------------------------------------------------------|------|--------------|-------------|------------|
| 1       | First version                                             | 1~8  | Mar.20, 2018 | Haiyan Chen | Nana Chen  |
| 2       | 1.Modify the Derating Curve                               | 4    | Feb.23, 2019 | Haiyan Chen | Yuhua Xu   |
|         | 2. Add the Pulses Energy Curve and Pulses Voltage Curve   | 5    |              |             |            |
|         | 3. Modify characteristic                                  | 6~7  |              |             |            |
| 3       | Modify the Paint color                                    | 5    | Jun.24, 2019 | 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        | 6    | Oct.28, 2022 | Haiyan Chen | Yuhua Xu   |
| 6       | 1. Modify the marking identifier                          | 3    | Jul.27, 2023 | Haiyan Chen | Yuhua Xu   |
|         | 2. Cancel Surge Rating                                    | 4    |              |             |            |
| 7       | 1.Increased standard color code system                    | 3    | Apr.01, 2024 | Haiyan Chen | Yuhua Xu   |
|         | 2.Add the 1% tolerance                                    | 3~4  |              |             |            |
| 8       | Extend the resistance range                               | 4    | Aug.09, 2024 | Haiyan Chen | Yuhua Xu   |
| 9       | Modify the packaging size and the number of packages      | 7~8  | Jun.24, 2025 | Haiyan Chen | Yuhua Xu   |
| 10      | Modify the wire diameter                                  | 4    | Mar.28, 2026 | Haiyan Chen | Yuhua Xu   |
| 11      | 1.Add the 1W-SSS,1W-SS,2W-SS,3W-SS,4W-SS,10W-SS           | 1~9  | Apr.29, 2026 | Haiyan Chen | Yuhua Xu   |

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