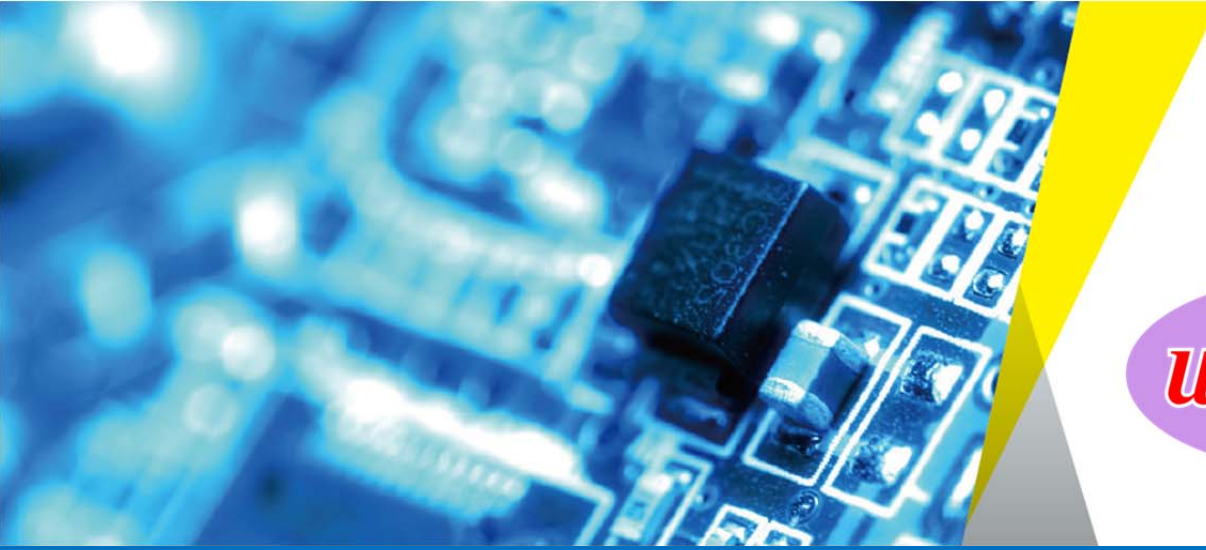




**UniRoyal**

# DATASHEET

**Product Name**    **High Resistance Thick Film Chip Resistors**

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**Part Name**    **0402/0603/0805/1206/1210/1812/2010/2512 Series**

**File No.**    **SMD-SP-002**

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

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Royal Technology (Thailand) Co., Ltd.

## 1. Scope

- 1.1 This datasheet is the characteristics of High Resistance Thick Film Chip Resistors manufactured by UNI-ROYAL.
- 1.2 High Resistance.
- 1.3 Suitable for reflow & wave soldering.
- 1.4 Application AV adapters , LCD back-light camera strobe etc.
- 1.5 Compliant with RoHS directive.
- 1.6 Halogen free requirement.

## 2. Part No. System

Part No. includes 14 codes shown as below:

2.1 1<sup>st</sup>~4<sup>th</sup> codes: Part name. E.g.: 0402, 0603, 0805, 1206, 1210, 1812, 2010, 2512.

2.2 5<sup>th</sup>~6<sup>th</sup> codes: Power rating.

E.g.: W=Normal Size "1~G" = "1~16"

| Wattage     | 1/2 | 1/4 | 1/8 | 1/10 | 1/16 | 3/4 | 1  |
|-------------|-----|-----|-----|------|------|-----|----|
| Normal Size | W2  | W4  | W8  | WA   | WG   | 07  | 1W |

If power rating is equal or lower than 1 watt, 5<sup>th</sup> code would be "W" and 6<sup>th</sup> code would be a number or letter.

E.g.: WA=1/10W W4=1/4W

2.3 7<sup>th</sup> code: Tolerance. E.g.: F=±1% J=±5%

2.4 8<sup>th</sup>~11<sup>th</sup> codes: Resistance value.

2.4.1 If value belongs to standard value of E-24 series, the 8<sup>th</sup> code is zero, 9<sup>th</sup>~10<sup>th</sup> codes are the significant figures of resistance value, and the 11<sup>th</sup> code is the power of ten.

2.4.2 If value belongs to standard value of E-96 series, the 8<sup>th</sup>~10<sup>th</sup> codes are the significant figures of resistance value, and the 11<sup>th</sup> code is the power of ten.

2.4.3 11<sup>th</sup> codes listed as following:

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>

2.5 12<sup>th</sup>~14<sup>th</sup> codes.

2.5.1 12<sup>th</sup> code: Packaging Type. E.g.: T=Tape/Reel

2.5.2 13<sup>th</sup> code: Standard Packing Quantity.

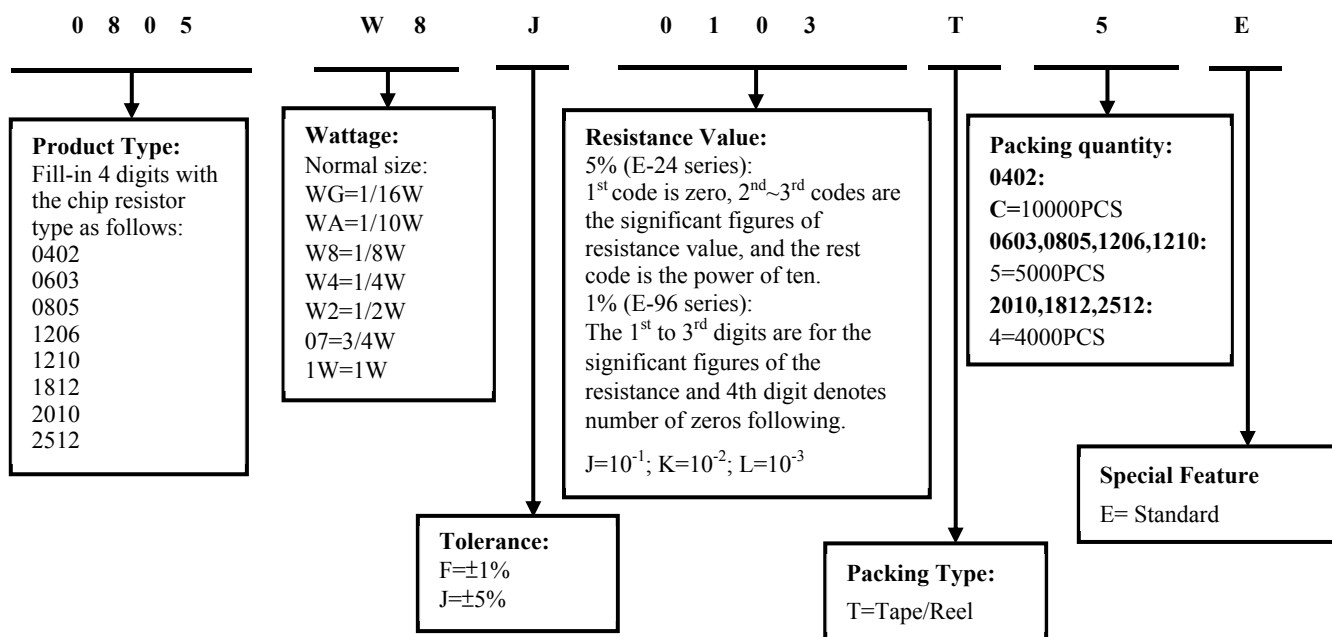
4=4,000pcs 5=5,000pcs C=10,000pcs

2.5.3 14<sup>th</sup> code: Special features.

E = Standard

## 3. Ordering Procedure:

(Example: 0805 1/8W ±5% 10KΩ T/R-5000)



## 4. Marking

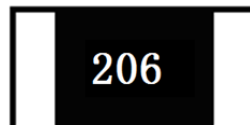
4.1 For 0402 size. Due to the very small size of the resistor's body, there is no marking on the body.



4.2  $\pm 5\%$  tolerance products (E-24 series):

3 codes.

1<sup>st</sup>~2<sup>nd</sup> codes are the significant figures of resistance value, and the rest code is the power of ten.



206  $\rightarrow$  20M

4.3  $\pm 1\%$  tolerance products (E-96 series):

4 codes.

1<sup>st</sup>~3<sup>rd</sup> codes are the significant figures of resistance value, and the rest code is the power of ten.

Letter "R" in mark means decimal point.



2005  $\rightarrow$  20M

4.4 Standard E-96 series values of 0603  $\leq 1\%$  : due to the small size of the resistor's body, 3 digits marking will be used to indicate the accurate resistance value by using the following multiplier & resistance code.

Multiplier Code (for 0603  $\leq \pm 1\%$  marking)

| Code       | A      | B      | C      | D      | E      | F      | G      | H      | X         | Y         | Z         |
|------------|--------|--------|--------|--------|--------|--------|--------|--------|-----------|-----------|-----------|
| Multiplier | $10^0$ | $10^1$ | $10^2$ | $10^3$ | $10^4$ | $10^5$ | $10^6$ | $10^7$ | $10^{-1}$ | $10^{-2}$ | $10^{-3}$ |

Standard E-96 series Resistance Value code (for 0603  $\leq \pm 1\%$  marking)

| Value | Code | Value | Code | Value | Code | Value | Code |
|-------|------|-------|------|-------|------|-------|------|
| 100   | 01   | 178   | 25   | 316   | 49   | 562   | 73   |
| 102   | 02   | 182   | 26   | 324   | 50   | 576   | 74   |
| 105   | 03   | 187   | 27   | 332   | 51   | 590   | 75   |
| 107   | 04   | 191   | 28   | 340   | 52   | 604   | 76   |
| 110   | 05   | 196   | 29   | 348   | 53   | 619   | 77   |
| 113   | 06   | 200   | 30   | 357   | 54   | 634   | 78   |
| 115   | 07   | 205   | 31   | 365   | 55   | 649   | 79   |
| 118   | 08   | 210   | 32   | 374   | 56   | 665   | 80   |
| 121   | 09   | 215   | 33   | 383   | 57   | 681   | 81   |
| 124   | 10   | 221   | 34   | 392   | 58   | 698   | 82   |
| 127   | 11   | 226   | 35   | 402   | 59   | 715   | 83   |
| 130   | 12   | 232   | 36   | 412   | 60   | 732   | 84   |
| 133   | 13   | 237   | 37   | 422   | 61   | 750   | 85   |
| 137   | 14   | 243   | 38   | 432   | 62   | 768   | 86   |
| 140   | 15   | 249   | 39   | 442   | 63   | 787   | 87   |
| 143   | 16   | 255   | 40   | 453   | 64   | 806   | 88   |
| 147   | 17   | 261   | 41   | 464   | 65   | 825   | 89   |
| 150   | 18   | 267   | 42   | 475   | 66   | 845   | 90   |
| 154   | 19   | 274   | 43   | 487   | 67   | 866   | 91   |
| 158   | 20   | 280   | 44   | 499   | 68   | 887   | 92   |
| 162   | 21   | 287   | 45   | 511   | 69   | 909   | 93   |
| 165   | 22   | 294   | 46   | 523   | 70   | 931   | 94   |
| 169   | 23   | 301   | 47   | 536   | 71   | 953   | 95   |
| 174   | 24   | 309   | 48   | 549   | 72   | 976   | 96   |

So the resistance value are marked as the following examples



1.96K $\Omega$ =196 $\times 10^1\Omega$ =29B



12.4 $\Omega$ =124 $\times 10^{-1}\Omega$ =10X

4.5 Standard E-24 and not belong to E-96 series values ( $\leq \pm 1\%$ ) of 0603 size: the marking is the same as 5% tolerance but marking as underline.

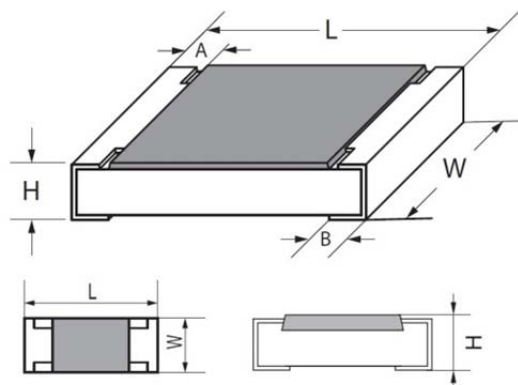


333=33K $\Omega$



680=68 $\Omega$

## 5. Dimension

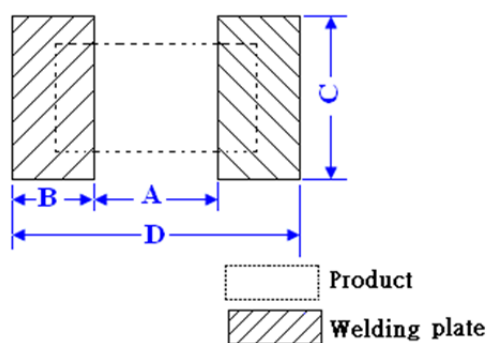


| Type | Dimension(mm)   |                       |                 |                 |                 |
|------|-----------------|-----------------------|-----------------|-----------------|-----------------|
|      | L               | W                     | H               | A               | B               |
| 0402 | 1.00 $\pm$ 0.10 | 0.50 $\pm$ 0.05       | 0.35 $\pm$ 0.05 | 0.20 $\pm$ 0.10 | 0.25 $\pm$ 0.10 |
| 0603 | 1.60 $\pm$ 0.15 | 0.80 $\pm$ 0.10       | 0.45 $\pm$ 0.10 | 0.30 $\pm$ 0.20 | 0.30 $\pm$ 0.20 |
| 0805 | 2.00 $\pm$ 0.15 | 1.25 $\pm$ 0.15/-0.10 | 0.55 $\pm$ 0.10 | 0.40 $\pm$ 0.20 | 0.40 $\pm$ 0.20 |
| 1206 | 3.10 $\pm$ 0.15 | 1.55 $\pm$ 0.15/-0.10 | 0.55 $\pm$ 0.10 | 0.45 $\pm$ 0.20 | 0.45 $\pm$ 0.20 |
| 1210 | 3.10 $\pm$ 0.10 | 2.50 $\pm$ 0.15       | 0.55 $\pm$ 0.10 | 0.50 $\pm$ 0.25 | 0.50 $\pm$ 0.20 |
| 1812 | 4.50 $\pm$ 0.20 | 3.20 $\pm$ 0.20       | 0.55 $\pm$ 0.20 | 0.50 $\pm$ 0.20 | 0.50 $\pm$ 0.20 |
| 2010 | 5.00 $\pm$ 0.10 | 2.50 $\pm$ 0.20       | 0.55 $\pm$ 0.10 | 0.60 $\pm$ 0.25 | 0.50 $\pm$ 0.20 |
| 2512 | 6.35 $\pm$ 0.10 | 3.20 $\pm$ 0.20       | 0.55 $\pm$ 0.10 | 0.60 $\pm$ 0.25 | 0.50 $\pm$ 0.20 |

## 6. Ratings

| Type | Power Rating | Max. Working Voltage | Max. Overload Voltage | Dielectric withstanding Voltage | Operating Temperature             | Resistance Range<br>$\pm 1\%, \pm 5\%$ |
|------|--------------|----------------------|-----------------------|---------------------------------|-----------------------------------|----------------------------------------|
| 0402 | 1/16W        | 50V                  | 100V                  | 100V                            | -55 $^{\circ}$ C~155 $^{\circ}$ C | 10M<R $\leq$ 100M $\Omega$             |
| 0603 | 1/10W        | 75V                  | 150V                  | 300V                            | -55 $^{\circ}$ C~155 $^{\circ}$ C | 10M<R $\leq$ 100M $\Omega$             |
| 0805 | 1/8W         | 150V                 | 300V                  | 500V                            | -55 $^{\circ}$ C~155 $^{\circ}$ C | 10M<R $\leq$ 100M $\Omega$             |
| 1206 | 1/4W         | 200V                 | 400V                  | 500V                            | -55 $^{\circ}$ C~155 $^{\circ}$ C | 10M<R $\leq$ 100M $\Omega$             |
| 1210 | 1/2W         | 200V                 | 500V                  | 500V                            | -55 $^{\circ}$ C~155 $^{\circ}$ C | 10M<R $\leq$ 100M $\Omega$             |
| 1812 | 3/4W         | 200V                 | 500V                  | 500V                            | -55 $^{\circ}$ C~155 $^{\circ}$ C | 10M<R $\leq$ 100M $\Omega$             |
| 2010 | 3/4W         | 200V                 | 500V                  | 500V                            | -55 $^{\circ}$ C~155 $^{\circ}$ C | 10M<R $\leq$ 100M $\Omega$             |
| 2512 | 1W           | 200V                 | 500V                  | 500V                            | -55 $^{\circ}$ C~155 $^{\circ}$ C | 10M<R $\leq$ 100M $\Omega$             |

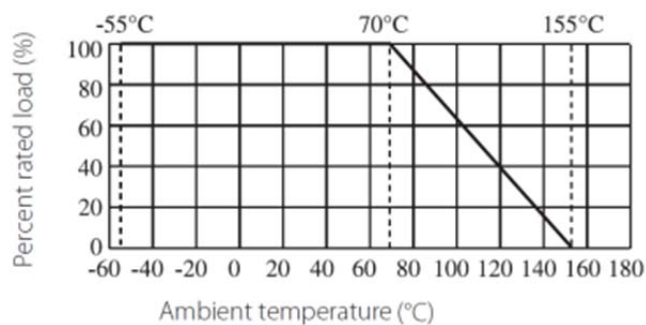
## 7. Soldering pad size recommended



| Type | Dimension(mm) |           |          |          |
|------|---------------|-----------|----------|----------|
|      | A             | B         | C        | D        |
| 0402 | 0.50±0.05     | 0.45±0.05 | 0.5±0.05 | 1.4±0.05 |
| 0603 | 0.9±0.05      | 0.65±0.05 | 0.8±0.05 | 2.1±0.05 |
| 0805 | 1.0±0.1       | 1.0±0.1   | 1.3±0.1  | 3.0±0.1  |
| 1206 | 2.0±0.1       | 1.1±0.1   | 1.6±0.1  | 4.2±0.1  |
| 1210 | 2.0±0.1       | 1.1±0.1   | 2.6±0.1  | 4.2±0.1  |
| 1812 | 3.2±0.1       | 1.4±0.1   | 3.3±0.1  | 5.8±0.1  |
| 2010 | 3.6±0.1       | 1.3±0.1   | 2.6±0.1  | 6.2±0.1  |
| 2512 | 5.0±0.1       | 1.6±0.1   | 3.3±0.1  | 8.2±0.1  |

## 8. Derating Curve

Power rating will change based on continuous load at ambient temperature from -55 to 155°C. It is constant between -55 to 70°C, and derate to zero when temperature rise from 70 to 155°C.



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:

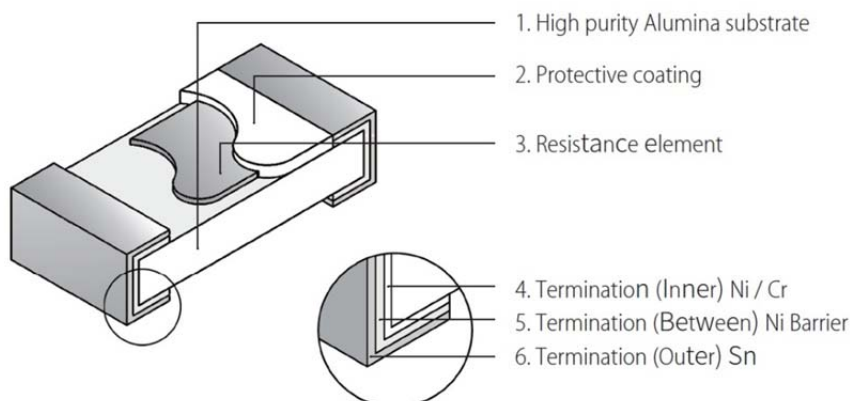
$$RCWV = \sqrt{P \times R}$$

Remark: RCWV: Rating Continuous Working Voltage (Volt.) P: power rating (Watt) R: nominal resistance (Ω)

In no case shall the rated DC or RMS AC continuous working voltage be greater than the applicable maximum value.

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

## 9. Structure



## 10. Performance Specification

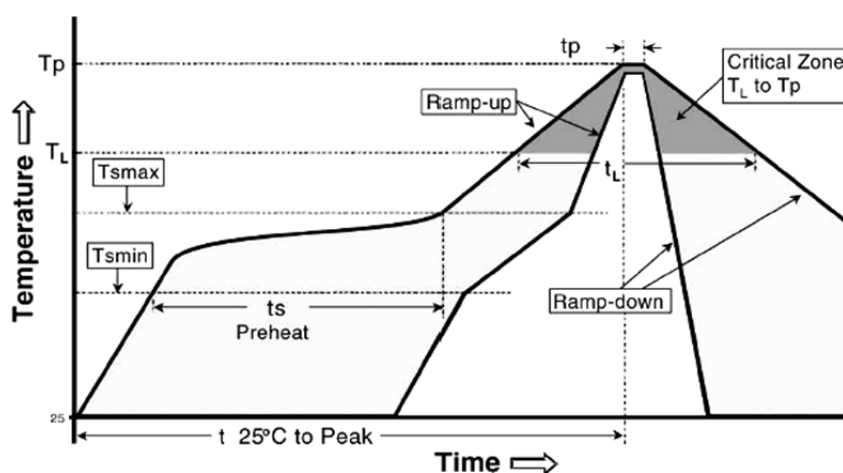
| Characteristic                  | Limits                                                                        | Test Methods<br>(GB/T 5729&JIS-C-5201&IEC60115-1)                                                                                                                                                                                                                                                                                                                                                        |
|---------------------------------|-------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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             | $\pm 1\% \pm (1.0\% + 0.05\Omega)$<br>$\pm 5\% \pm (2.0\% + 0.05\Omega)$      | 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..                                                                                                                                                                                                                                                          |
| Dielectric withstanding voltage | No evidence of flashover mechanical damage, arcing or insulation breaks down. | 4.7 Resistors shall be clamped in the trough of a 90 $^{\circ}$ metallic v-block and shall be tested at ac potential respectively specified in the given list of each product type for 60-70 seconds.                                                                                                                                                                                                    |
| Solderability                   | Coverage must be over 95%.                                                    | 4.17 The area covered with a new, smooth, clean, shiny and continuous surface free from concentrated pinholes. Temperature of solder: 245 $\pm 3^{\circ}\text{C}$ ; Dwell time in solder: 2~3 seconds.                                                                                                                                                                                                   |
| Rapid change of temperature     | $\pm 1\% \pm (0.5\% + 0.05\Omega)$<br>$\pm 5\% \pm (1.0\% + 0.05\Omega)$      | 4.19 30 min at -55 $^{\circ}\text{C}$ and 30 min at 155 $^{\circ}\text{C}$ ; 100 cycles.                                                                                                                                                                                                                                                                                                                 |
| Soldering heat                  | $\pm (1.0\% + 0.05\Omega)$                                                    | 4.18 Dip the resistor into a solder bath having a temperature of 260 $^{\circ}\text{C} \pm 5^{\circ}\text{C}$ and hold it for 10 $\pm 1$ seconds.                                                                                                                                                                                                                                                        |
| Terminal bending                | $\pm (1.0\% + 0.05\Omega)$                                                    | 4.33 Twist of test board:<br>$Y/X = 3/90 \text{ mm}$ for 60Seconds                                                                                                                                                                                                                                                                                                                                       |
| Insulation resistance           | $\geq 1,000 \text{ M}\Omega$                                                  | 4.6 The measuring voltage shall be ,measured with a direct voltage of (100 $\pm 15$ )V or a voltage equal to the dielectric withstanding voltage., and apply for 1min.                                                                                                                                                                                                                                   |
| Humidity ( steady state )       | $\pm 1\% \pm (0.5\% + 0.05\Omega)$<br>$\pm 5\% \pm (3.0\% + 0.05\Omega)$      | 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           | $\pm 1\% \pm (1.0\% + 0.05\Omega)$<br>$\pm 5\% \pm (3.0\% + 0.05\Omega)$      | 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% $\pm 3\%$ RH.                                                                                                                                                                                        |
| Load life                       | $\pm 1\% \pm (1.0\% + 0.05\Omega)$<br>$\pm 5\% \pm (3.0\% + 0.05\Omega)$      | 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 $\pm 2^{\circ}\text{C}$ ambient.                                                                                                                                                                                                   |

|                           |                                                                    |                                                                                    |
|---------------------------|--------------------------------------------------------------------|------------------------------------------------------------------------------------|
| Low Temperature Storage   | $\pm 1\%:\pm(1.0\%+0.05\Omega)$<br>$\pm 5\%:\pm(3.0\%+0.05\Omega)$ | IEC 60068-2-1 (Aa)<br>Lower limit temperature , for 2H.                            |
| High Temperature Exposure | $\pm 1\%:\pm(1.0\%+0.05\Omega)$<br>$\pm 5\%:\pm(3.0\%+0.05\Omega)$ | MIL-STD-202 108A<br>Upper limit temperature , for 1000H.                           |
| Leaching                  | No visible damage                                                  | J-STD-002 Test D<br>Samples completely immersed for 30 sec in solder bath at 260°C |

## 11. Soldering Condition

(This is for recommendation, please customer perform adjustment according to actual application)

11.1 Recommend Reflow Soldering Profile : (solder : Sn96.5 / Ag3 / Cu0.5)

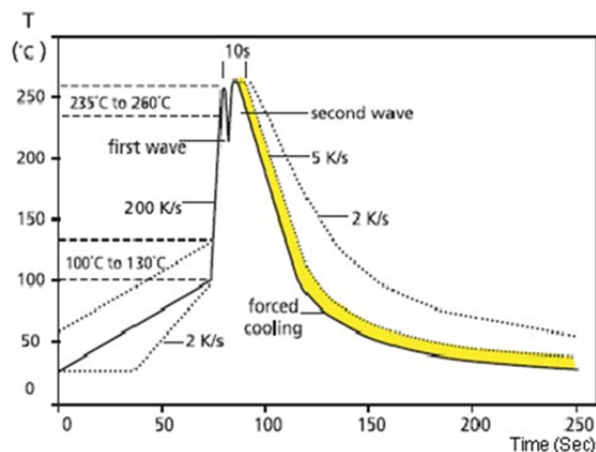


| Profile Feature                                                                                                                                 | Lead (Pb)-Free solder            |
|-------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| Preheat:<br>Temperature Min (Ts <sub>min</sub> )<br>Temperature Max (Ts <sub>max</sub> )<br>Time (Ts <sub>min</sub> to Ts <sub>max</sub> ) (ts) | 150°C<br>200°C<br>60 -120seconds |
| Average ramp-up rate :<br>(Ts max to Tp)                                                                                                        | 3°C / second max.                |
| Time maintained above :<br>Temperature (TL)<br>Time (tL)                                                                                        | 217°C<br>60-150 seconds          |
| Peak Temperature (Tp)                                                                                                                           | 260°C                            |
| Time within $\begin{smallmatrix} +0 \\ -5 \end{smallmatrix}$ °C of actual peak Temperature (tp) <sup>2</sup>                                    | 10 seconds                       |
| Ramp-down Rate                                                                                                                                  | 6°C/second max.                  |
| Time 25°C to Peak Temperature                                                                                                                   | 8minutes max.                    |

Allowed Re-flow times : 2 times

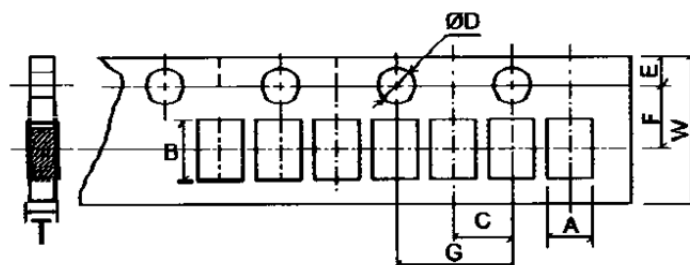
Remark : To avoid discoloration phenomena of chip on terminal electrodes, we suggest use N<sub>2</sub> Re-flow furnace .

## 11.2 Recommend Wave Soldering Profile : (Apply to 0603 and above size)

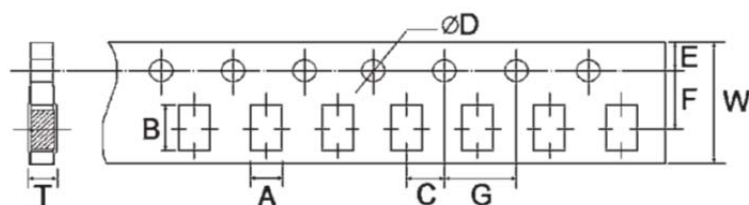


## 12. Packing

### 12.1 Dimension of Paper Taping : (Unit: mm)

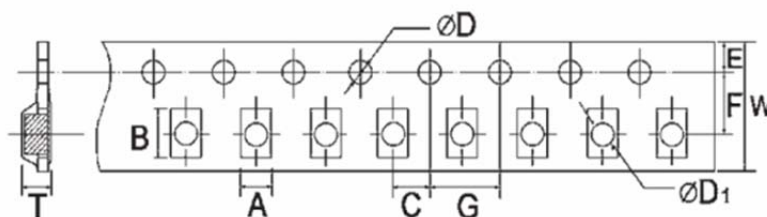


| Type | A         | B         | C<br>±0.05 | $\Phi D^{+0.1}_{-0}$ | E<br>±0.1 | F<br>±0.05 | G<br>±0.1 | W<br>±0.2 | T         |
|------|-----------|-----------|------------|----------------------|-----------|------------|-----------|-----------|-----------|
| 0402 | 0.65±0.10 | 1.20±0.10 | 2.00       | 1.50                 | 1.75      | 3.50       | 4.00      | 8.00      | 0.42±0.05 |



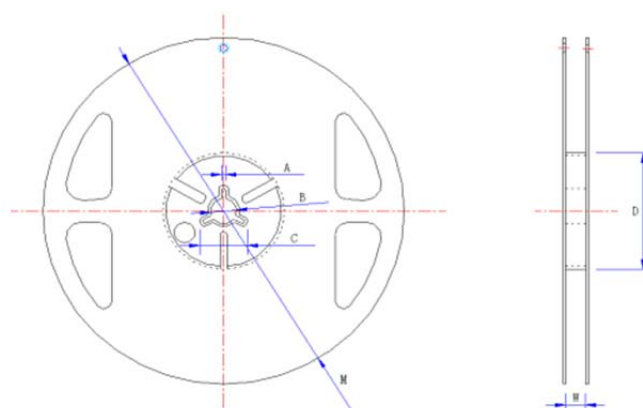
| Type | A<br>±0.2 | B<br>±0.2 | C<br>±0.05 | $\Phi D^{+0.1}_{-0}$ | E<br>±0.1 | F<br>±0.05 | G<br>±0.1 | W<br>±0.2 | T<br>±0.1 |
|------|-----------|-----------|------------|----------------------|-----------|------------|-----------|-----------|-----------|
| 0603 | 1.10      | 1.90      | 2.00       | 1.50                 | 1.75      | 3.50       | 4.00      | 8.00      | 0.67      |
| 0805 | 1.65      | 2.40      | 2.00       | 1.50                 | 1.75      | 3.50       | 4.00      | 8.00      | 0.81      |
| 1206 | 2.00      | 3.60      | 2.00       | 1.50                 | 1.75      | 3.50       | 4.00      | 8.00      | 0.81      |
| 1210 | 2.80      | 3.50      | 2.00       | 1.50                 | 1.75      | 3.50       | 4.00      | 8.00      | 0.75      |

## 12.2 Dimension of plastic taping: (Unit: mm)



| Type | A<br>±0.2 | B<br>±0.2 | C<br>±0.05 | $\Phi D^{+0.1}_{-0}$ | $\Phi D1^{+0.25}_{-0}$ | E<br>±0.1 | F<br>±0.05 | G<br>±0.1 | W<br>±0.2 | T<br>±0.1 |
|------|-----------|-----------|------------|----------------------|------------------------|-----------|------------|-----------|-----------|-----------|
| 2010 | 2.90      | 5.60      | 2.00       | 1.50                 | 1.50                   | 1.75      | 5.50       | 4.00      | 12.00     | 1.00      |
| 1812 | 3.50      | 4.80      | 2.00       | 1.50                 | 1.50                   | 1.75      | 5.50       | 4.00      | 12.00     | 1.00      |
| 2512 | 3.50      | 6.70      | 2.00       | 1.50                 | 1.50                   | 1.75      | 5.50       | 4.00      | 12.00     | 1.00      |

## 12.3 Dimension of plastic taping : (Unit: mm)



| Type | Taping   | Qty/Reel  | A<br>±0.5 | B<br>±0.5 | C<br>±0.5 | D<br>±1 | M<br>±2 | W<br>±1 |
|------|----------|-----------|-----------|-----------|-----------|---------|---------|---------|
| 0402 | Paper    | 10,000pcs | 2.0       | 13.0      | 21.0      | 60.0    | 178.0   | 10.0    |
| 0603 | Paper    | 5,000pcs  | 2.0       | 13.0      | 21.0      | 60.0    | 178.0   | 10.0    |
| 0805 | Paper    | 5,000pcs  | 2.0       | 13.0      | 21.0      | 60.0    | 178.0   | 10.0    |
| 1206 | Paper    | 5,000pcs  | 2.0       | 13.0      | 21.0      | 60.0    | 178.0   | 10.0    |
| 1210 | Paper    | 5,000pcs  | 2.0       | 13.0      | 21.0      | 60.0    | 178.0   | 10.0    |
| 2010 | Embossed | 4,000pcs  | 2.0       | 13.0      | 21.0      | 60.0    | 178.0   | 13.8    |
| 1812 | Embossed | 4,000pcs  | 2.0       | 13.0      | 21.0      | 60.0    | 178.0   | 13.8    |
| 2512 | Embossed | 4,000pcs  | 2.0       | 13.0      | 21.0      | 60.0    | 178.0   | 13.8    |

## 13. Note

13.1 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.

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

13.3 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  $Cl_2$ ,  $H_2S$ ,  $NH_3$ ,  $SO_2$ ,  $NO_2$ , etc.

13.4 The products are used in circuit board thickness greater than 1.6mm. If customers use less than the thickness of the circuit board that you should confirm with the company, in order to recommend a more suitable product.

## 14. Record

| Version | Description                                              | Page | Date          | Amended by  | Checked by |
|---------|----------------------------------------------------------|------|---------------|-------------|------------|
| 1       | First version                                            | 1~6  | Mar.20, 2018  | Haiyan Chen | Nana Chen  |
| 2       | Modify characteristic                                    | 4~5  | Feb.12, 2019  | Haiyan Chen | Yuhua Xu   |
| 3       | Modify the High Temperature Exposure conditions          | 5    | July.29, 2019 | Haiyan Chen | Yuhua Xu   |
| 4       | Modify the reflow curve and add the wave soldering curve | 5    | Apr.29, 2020  | Haiyan Chen | Yuhua Xu   |
| 5       | Modify the temperature coefficient test conditions       | 4    | Oct.13, 2022  | Haiyan Chen | Yuhua Xu   |
| 6       | 1.Add the 1% tolerance                                   | 2~4  | Apr.19, 2025  | Haiyan Chen | Yuhua Xu   |
|         | 2.Add the 0402,1812,2010,2512 Series                     | 1~8  |               |             |            |
|         | 3. Modify the "W" dimension of 1210                      | 4    |               |             |            |
| 7       | Modify the dimensional tolerance of the 0603"L" value    | 4    | Mar.17, 2026  | Haiyan Chen | Yuhua Xu   |

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