

# DATASHEET

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**Product Name**    **Copper Plated Steel Lead Wire Resistors**

**Part Name**    **CP/CT Series**

**File No.**    **DIP-SP-018**

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

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## 1. Scope

This datasheet is the characteristics of Copper Plated Steel Lead Wire Type manufactured by UNI-ROYAL.

## 2. Part No. System

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

2.1 The 1<sup>st</sup> to 2<sup>nd</sup> digits are to indicate the product type. Example: CP0= Copper plated steel lead wire , H=28mm

The 3<sup>th</sup> digit is the special feature. Example: 0= Standard product ; F= Flame Retardant ;

5<sup>th</sup>~6<sup>th</sup> digits:

2.1.1 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; 1~"G"to denote"1"~"16"as Hexadecimal:

1/16W~1W: (<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   |
| Extra Small Size | U2  | U3  | U4  | U5  | U6  | U8  | UA   | UG   |

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 |
| Extra Small Size | 1U | 2U | 3U | 5U | 7U | 8U | 9U | AU | FU |

2.1.2 For power rating less or equal to 1 watt, the 5<sup>th</sup> digit will be the letters W to represent the size required & the 6<sup>th</sup> digit will be a number or a letter code. Example: WA=1/10W; W4=1/4W

2.2 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. D=±0.5% F=±1% G=±2% J=±5% K= ±10%

2.3 The 8<sup>th</sup> to 11<sup>th</sup> digits is to denote the Resistance Value.

2.4 The 7<sup>th</sup> digit is to denote the Resistance Temperature Coefficient

2.4.1 For the standard resistance values of 5%&10% 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;

For the standard resistance values of ≤2% series in, the 8<sup>th</sup> digit to the 10<sup>th</sup> digits is to denote the significant figures of the resistance and the 11<sup>th</sup> 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 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:

C=Bulk in (Chip Product) T=Tape/Reel

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

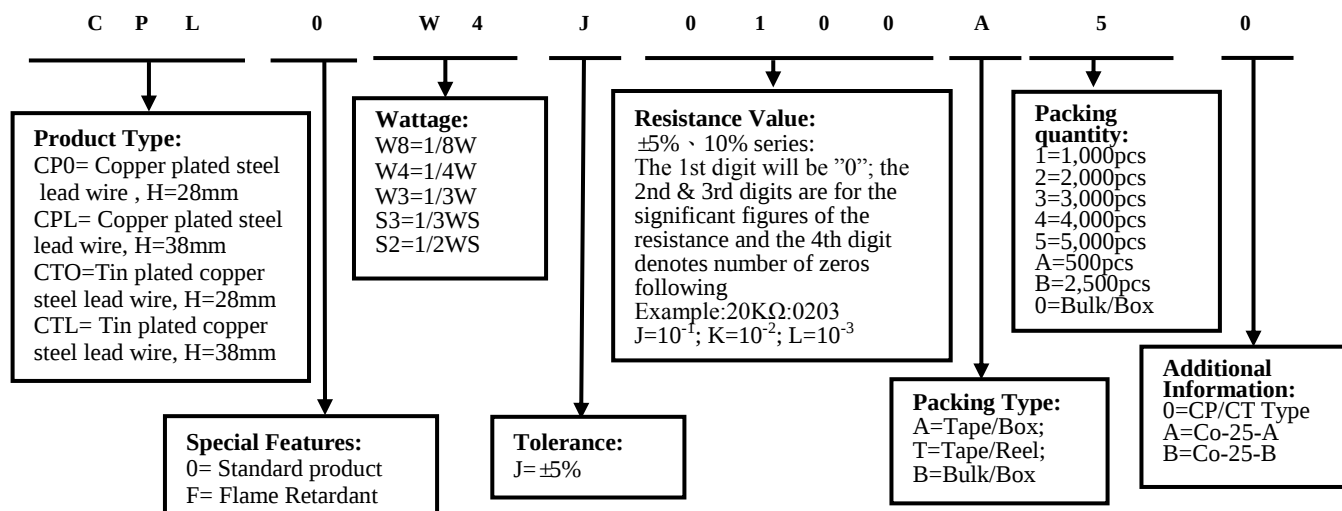
4=4000pcs 5=5000pcs C=10000pcs D=20000pcs E=15000pcs

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=CP/CT Type; A=Co-25-A; B=Co-25-B

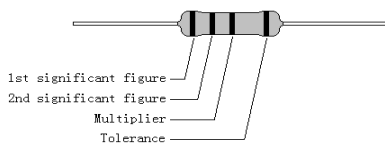
## 3. Ordering Procedure

(Example: CPL 1/4W ±5% 10Ω T/B-5000 )



## 4. Marking

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



### 4.1 Label:

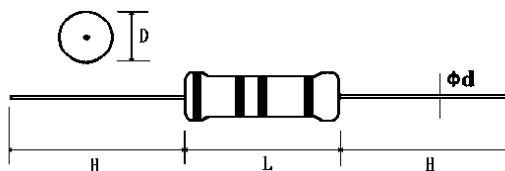
Label shall be marked with following items:

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

#### Example:

Copper plated steel  
WATT: 1/4W VAL: 10Ω  
Q'TY: 5000 TOL: 5%  
LOT: 7021548 PPM:

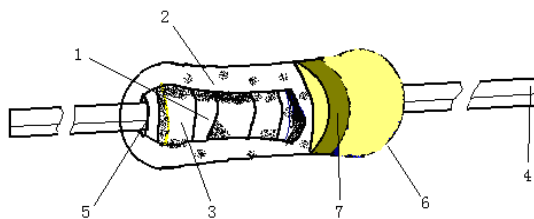
## 5. Dimension



UNIT: mm

| TYPE        | D       | L       | d<br>±0.05 | H<br>±3 | Max.<br>Working<br>Voltage | Max.<br>Overload<br>Voltage | Dielectric<br>Withstanding<br>Voltage | Resistance Range |
|-------------|---------|---------|------------|---------|----------------------------|-----------------------------|---------------------------------------|------------------|
| CP/CT 1/8W  | 1.9±0.3 | 3.3±0.3 | 0.54       | 28      | 200V                       | 400V                        | 400V                                  | 1Ω~10MΩ          |
| CP/CT 1/4W  | 2.2±0.5 | 6.5±1.0 | 0.54       | 28/38   | 250v                       | 500v                        | 500V                                  | 1Ω~10MΩ          |
| CP/CT 1/3WS | 2.2±0.5 | 6.5±1.0 | 0.54       | 28/38   | 300V                       | 600V                        | 500V                                  | 1Ω~10MΩ          |
| CP/CT 1/3W  | 3±0.5   | 9.0±1.0 | 0.54       | 28      | 300V                       | 600V                        | 700V                                  | 1Ω~10MΩ          |
| CP/CT 1/2WS | 3±0.5   | 9.0±1.0 | 0.54       | 28      | 350V                       | 700V                        | 700V                                  | 1Ω~10MΩ          |

## 6. Structure



| No. | Name       | Material                            |
|-----|------------|-------------------------------------|
| 1   | Basic Body | Rod type ceramics                   |
| 2   | Resistor   | Carbon Film                         |
| 3   | End cap    | Cold steel plated with copper/tin   |
| 4   | Lead Wire  | Tin-plated copper plated steel wire |
| 5   | Joint      | By welding                          |
| 6   | Coating    | Insulated resin Color: Beige        |
| 7   | Color code | epoxy resin                         |

## 7. 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:

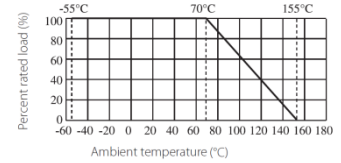
Resistors shall have a rated direct-current (DC) continuous working voltage or an approximate sine-wave root-mean-square (RMS) alternating-current (AC) continuous working voltage at commercial-line frequency and waveform corresponding to the power rating, as determined from the following formula:

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

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.



## 8. Performance Specification

| Characteristic                  | Limits                                                                                                                                                                                       | Test Methods<br>(GB/T5729&JIS-C-5201&IEC60115-1)                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Temperature Coefficient         | $\leq 10\Omega$ : $\pm 300$ PPM/°C<br>$11\Omega \sim 99K\Omega$ : $\pm 450$ PPM/°C<br>$100K\Omega \sim 1M\Omega$ : $0 \sim 700$ PPM/°C<br>$1.1M\Omega \sim 10M\Omega$ : $0 \sim 1500$ PPM/°C | 4.8 Natural resistance changes per temp. Degree centigrade<br>$\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{ (PPM/°C)}$ R <sub>1</sub> : Resistance Value at room temperature (t <sub>1</sub> ) ;<br>R <sub>2</sub> : Resistance at test temperature (t <sub>2</sub> )<br>t <sub>1</sub> : +25 °C or specified room temperature<br>t <sub>2</sub> : Test temperature (-55°C or 125 °C)   |
| Short-time overload             | Resistance change rate is:<br>$\pm(1\% + 0.05\Omega)$ 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.                                                                                                                                                                                                                                                 |
| Insulation resistance           | Insulation resistance is:<br>10,000 MΩ Min.                                                                                                                                                  | 4.6 The measuring voltage shall be either (100 ± 15) V DC for resistors with an isolation voltage < 500V or (500 ± 50) V DC. for resistors with an isolation voltage ≥ 500V                                                                                                                                                                                                                    |
| 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 °C metallic v-block and shall be tested at ac potential respectively specified in the given list of each product type for 60-70 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 ° 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:<br>$\pm(1\% + 0.05\Omega)$ 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°C ± 5°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.<br>Test temp. Of solder: 245°C ± 3°C<br>Dwell time in solder: 2~3 seconds.                                                                                                                                                                                                      |
| Rapid change of temperature     | $\Delta R/R \leq (1\% + 0.05 \Omega)$<br>with no evidence of mechanical damage.                                                                                                              | 4.19 30 min at -55 °C and 30 min at 155 °C; 100 cycles.                                                                                                                                                                                                                                                                                                                                        |

|                           |                                                                                           |                                                                                                                                                                                                           |
|---------------------------|-------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Load life in humidity     | Normal type:<br>$\Delta R/R \pm 3\%$ for $<100K\Omega$<br>$\pm 5\%$ for $\geq 100K\Omega$ | 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 $40\pm 2^{\circ}C$ and $93\%\pm 3\%$ RH. |
| Load life                 | Normal type:<br>$\Delta R/R \pm 2\%$ for $<56K\Omega$<br>$\pm 3\%$ for $\geq 56K\Omega$   | 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 $70\pm 2^{\circ}C$ ambient.            |
| Low Temperature Storage   | Normal type:<br>$\Delta R/R \pm 2\%$ for $<56K\Omega$<br>$\pm 3\%$ for $\geq 56K\Omega$   | IEC 60068-2-1 (Aa)<br>Lower limit temperature , for 2H.                                                                                                                                                   |
| High Temperature Exposure | Normal type:<br>$\Delta R/R \pm 2\%$ for $<56K\Omega$<br>$\pm 3\%$ for $\geq 56K\Omega$   | MIL-STD-202 108A<br>Upper limit temperature , for 16H.                                                                                                                                                    |

## 9. Precaution for storage/Transportation

- 9.1. UNI-ROYAL recommend products store in warehouse with temperature between 15 to  $35^{\circ}C$  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.
- 9.2. Cartons must be placed in correct direction which indicated on carton, otherwise the reel or wire will be deformed.
- 9.3. 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  $Cl_2$ ,  $H_2S$ ,  $NH_3$ ,  $SO_2$ ,  $NO_2$ , Br etc.

## 10. Record

| Version | Description                                        | Page | Date         | Amended by  | Checked by |
|---------|----------------------------------------------------|------|--------------|-------------|------------|
| 1       | First version                                      | 1~5  | Mar.20, 2018 | Haiyan Chen | Nana Chen  |
| 2       | Modify characteristic                              | 4~5  | Feb.25, 2019 | Haiyan Chen | Yuhua Xu   |
| 3       | Modify the temperature coefficient test conditions | 4    | Nov.07, 2022 | Haiyan Chen | Yuhua Xu   |

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