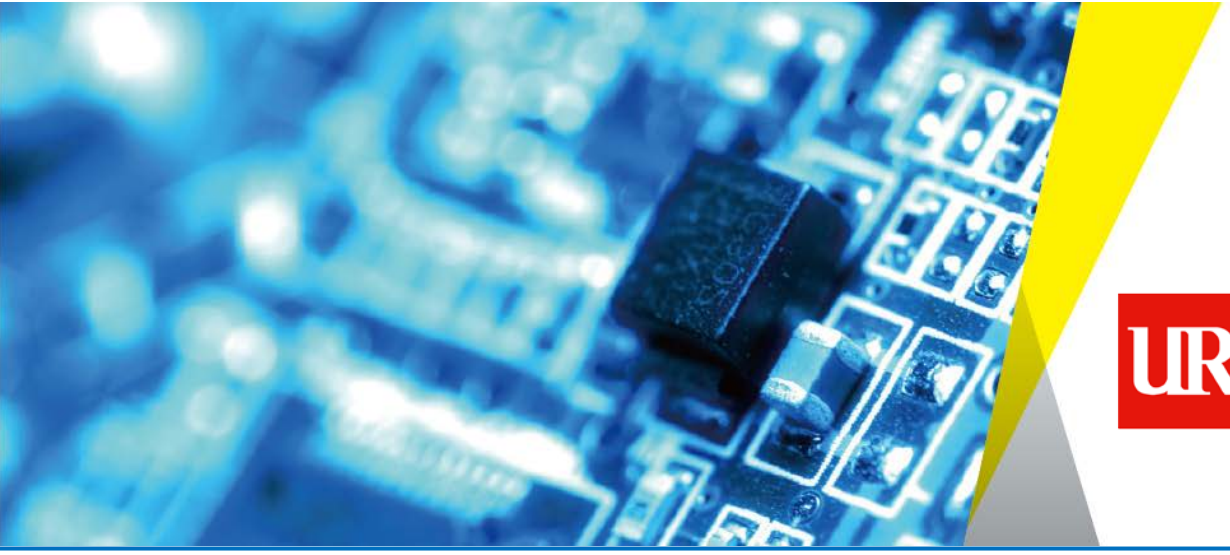

DATA SHEET

Product Name	**Cooper Plated Steel Lead Wire Resistors**
Part Name	**CP/CT Series**
File No.	**DIP-SP-018**

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	Royal Technology (Thailand) Co., Ltd.

1. Scope

This datasheet is the characteristics of Cooper 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 1th ~4th digits

This is to indicate the Chip Resistor. Example: CFR0= Carbon Film Fixed Resistors

5th~6th 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 5th digit will be the letters W to represent the size required & the 6th digit will be a number or a letter code. Example: WA=1/10W; W4=1/4W

2.2 The 7th 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 8th to 11th digits is to denote the Resistance Value.

2.4 The 7th digit is to denote the Resistance Temperature Coefficient

2.4.1 For the standard resistance values of 5%&10% 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 ≤2% series in, the 8th digit to the 10th digits is to denote the significant figures of the resistance and 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=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}

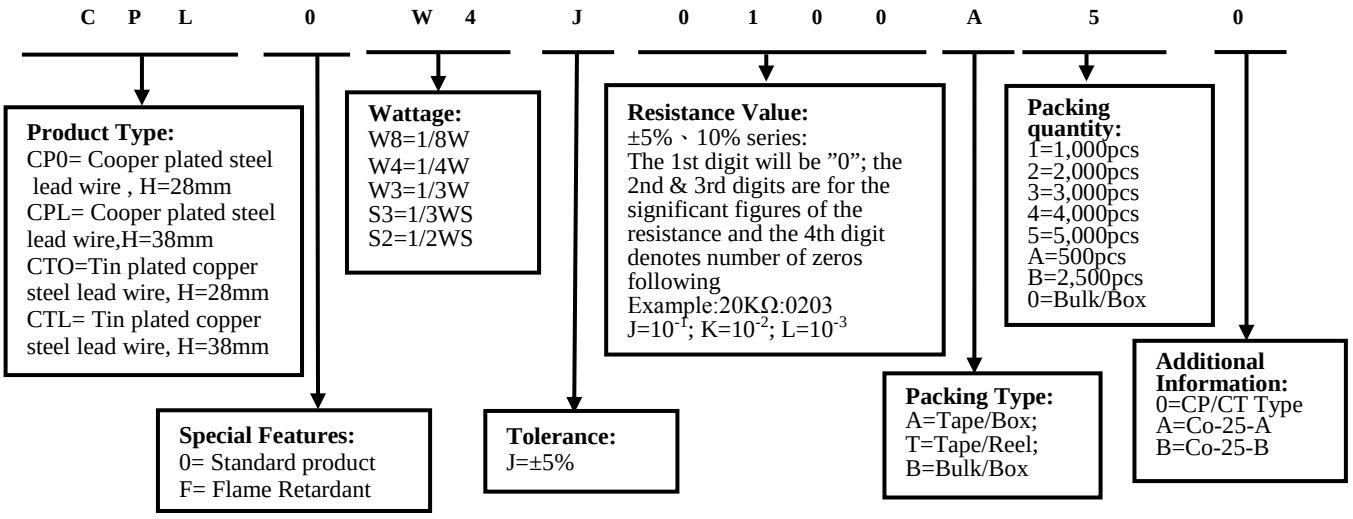
2.4.3 The 12th, 13th & 14th digits.
The 12th digit is to denote the Packaging Type with the following codes:
C=Bulk in (Chip Product) T=Tape/Reel

2.4.4 The 13th 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 14th 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

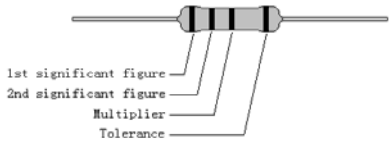
3. Ordering Procedure

(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

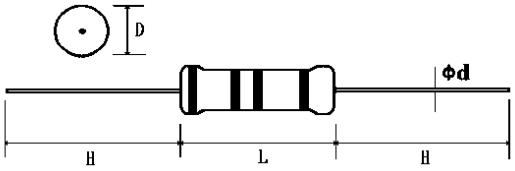


4.1 Label:
Label shall be marked with following items:
(1) Type and style
(2) Nominal resistance
(3) Resistance tolerance
(4) Quantity
(5) Lot number
(6) PPM

Example:

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

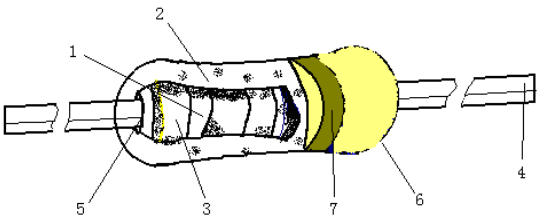
5. Dimension



UNIT: mm

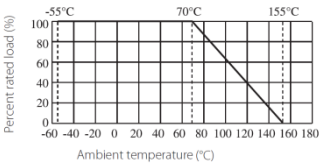
TYPE	D	L	d ± 0.05	H ±3	Max. Working Voltage	Max. Overload Voltage	Dielectric Withstanding Voltage	Resistance Range
CP/CT 1/8W	1.9±0.3	3.3±0.3	0.54	28	200V	400V	400V	1Ω~10MΩ
CP/CT 1/4W	2.2±0.5	6.5±1.0	0.54	28/38	250v	500v	500V	1Ω~10MΩ
CP/CT 1/3WS	2.2±0.5	6.5±1.0	0.54	28/38	300V	600V	500V	1Ω~10MΩ
CP/CT 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℃.
It is constant between -55 to 70℃, and derate to zero when temperature rise from 70 to 155℃.
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 (GB/T5729&JIS-C-5201&IEC60115-1)
Temperature Coefficient	≤10Ω：±300 PPM/℃ 11Ω~99KΩ：±450 PPM/℃ 100KΩ~1MΩ：0~-700 PPM/℃ 1.1MΩ~10MΩ：0~-1500 PPM/℃	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°C or specified room temperature t_2: Test temperature（-55℃or 125℃）
Short-time overload	Resistance change rate is: ±(1%+0.05Ω)Max. With no evidence of mechanical damage.	4.13 Permanent resistance change after the application of a potential of 2.5 times RCWV for 5 seconds.
Insulation resistance	Insulation resistance is: 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℃ 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: 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: ±(1%+0.05Ω) 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℃±5℃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℃± 3℃ Dwell time in solder2~3 seconds.
Rapid change of temperature	ΔR/R ±(1%+0.05 Ω） 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: ΔR/R ±3% for <100KΩ ±5% for ≥ 100KΩ	7.9 Resistance change after 1,000 hours (1.5 hours "ON",0.5 hour "OFF") at RCWV in a humidity test chamber controlled at 40℃ ±2℃ and 90 to 95% relative humidity.
Load life	Normal type: ΔR/R ±2% for <56KΩ ±3% for ≥56KΩ	4.25.1 Permanent resistance change after 1,000 hours operating at RCWV with duty cycle of 1.5 hours "ON",0.5 hour "OFF" at 70 ℃ ± 2℃ ambient.
Low Temperature Storage	Normal type: ΔR/R ±2% for <56KΩ ±3% for ≥56KΩ	IEC 60068-2-1 (Aa) Lower limit temperature，for 2H.
High Temperature Exposure	Normal type: ΔR/R ±2% for <56KΩ ±3% for ≥56KΩ	MIL-STD-202 108A 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℃ 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