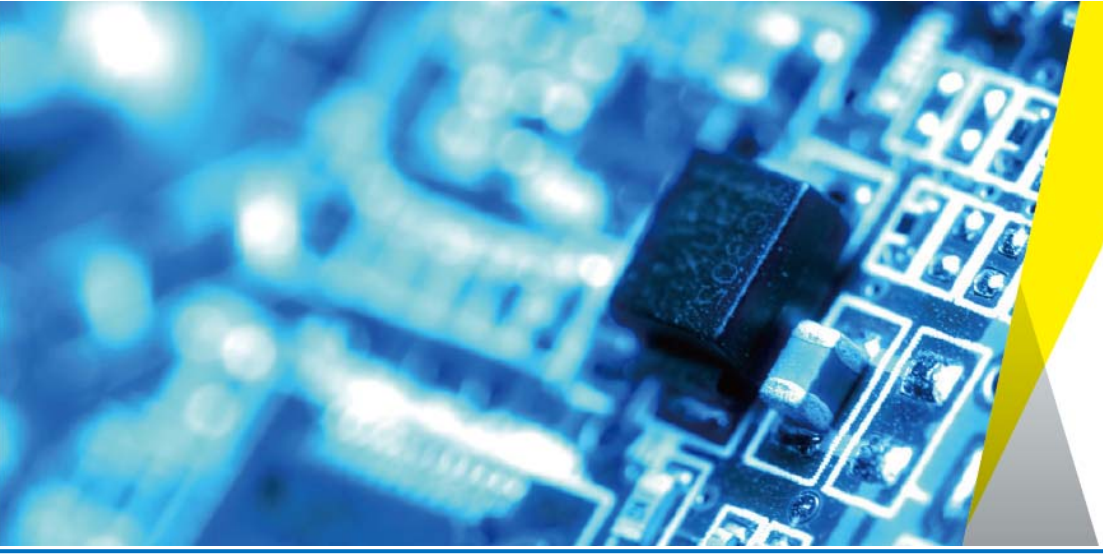

DATASHEET

Product Name	**Wire-wound Power Resistors**
Part Name	**WPR Series**
File No.	**DIP-SP-014**

Uniroyal Electronics Global Co., Ltd.

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Manufacture Plant	Uniroyal Electronics Industry Co., Ltd.
	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 Power Resistors manufactured by UNI-ROYAL
1.2 Small body size； High power.
1.3 Excellent flame retardant coating； Provides stable performance in various environments.
1.4 Compliant with RoHS directive.
1.5 Halogen free requirement.

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: WPR0 =Wire-wound Power Resistors
2.2 5th~6th 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; 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

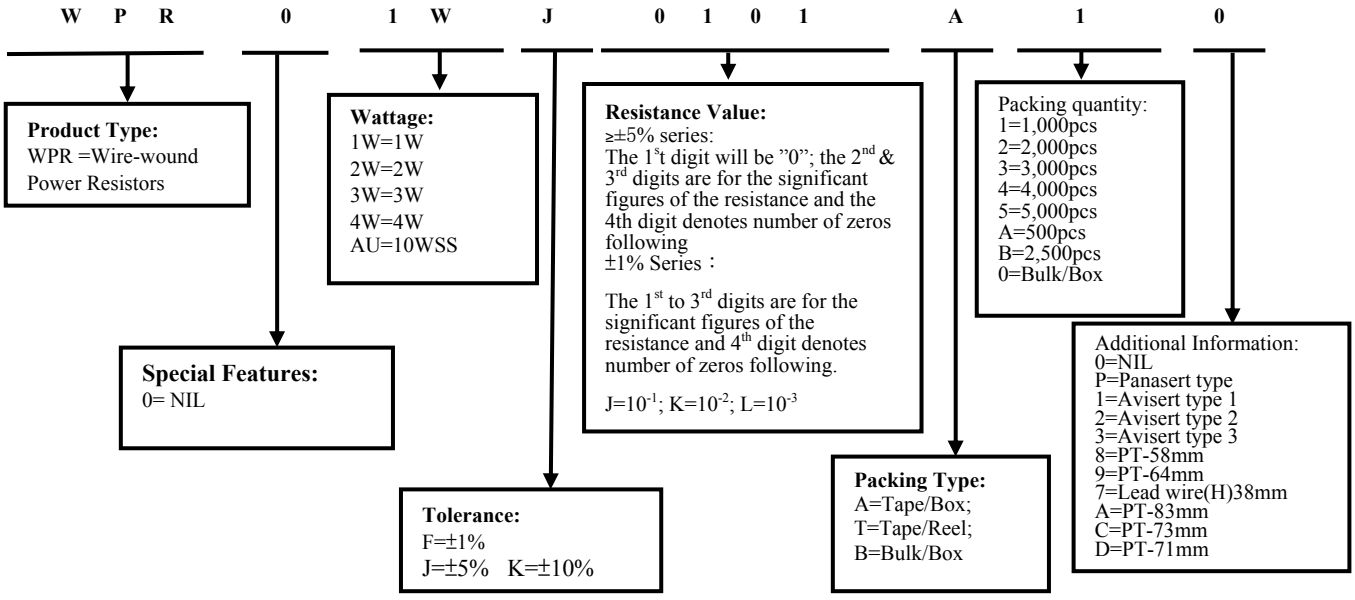
1W~16W (≧1W)

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

2.2.2 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
2.3 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%
2.4 The 8th to 11th digits is to denote the Resistance Value.
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:
A=Tape/Box; T=Tape/Reel; B=Bulk/Box
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=NIL P=Panasert type 1=Avisert type 1 2=Avisert type 2 3=Avisert type 3

3. Ordering Procedure

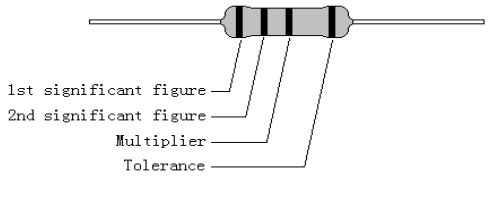
(Example: WPR 1W ±5% 100Ω T/B-1000)



4. Color Code

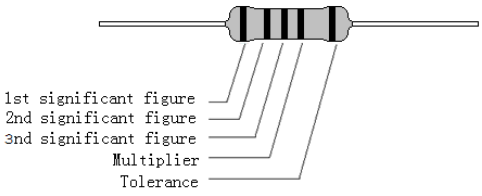
Resistors shall be marked with color coding
Colors shall be in accordance with JIS C 0802

≥±5% Series



1st Band	2nd Band	3rd Band	4th Band
Black = 0	Black = 0	Black = Multiply by 1 (10^0)	Red = ±2%
Brown = 1	Brown = 1	Brown = Multiply by 10 (10^1)	Gold = ±5%
Red = 2	Red = 2	Red = Multiply by 100 (10^2)	Silver = ±10%
Orange = 3	Orange = 3	Orange = Multiply by 1,000 (10^3)	
Yellow = 4	Yellow = 4	Yellow = Multiply by 10,000 (10^4)	
Green = 5	Green = 5	Green = Multiply by 100,000 (10^5)	
Blue = 6	Blue = 6	Blue = Multiply by 1,000,000 (10^6)	
Violet = 7	Violet = 7	Violet = Multiply by 10,000,000 (10^7)	
Gray = 8	Gray = 8	Gold = Multiply by 0.1 (10^{-1})	
White = 9	White = 9	Silver = Multiply by 0.01 (10^{-2})	

±1% Series



1st Band	2nd Band	3rd Band	4th Band	5th Band
Black = 0	Black = 0	Black = 0	Black = Multiply by 1 (10^0)	Brown = ±1%
Brown = 1	Brown = 1	Brown = 1	Brown = Multiply by 10 (10^1)	
Red = 2	Red = 2	Red = 2	Red = Multiply by 100 (10^2)	
Orange = 3	Orange = 3	Orange = 3	Orange = Multiply by 1,000 (10^3)	
Yellow = 4	Yellow = 4	Yellow = 4	Yellow = Multiply by 10,000 (10^4)	
Green = 5	Green = 5	Green = 5	Green = Multiply by 100,000 (10^5)	
Blue = 6	Blue = 6	Blue = 6	Blue = Multiply by 1,000,000 (10^6)	
Violet = 7	Violet = 7	Violet = 7	Violet = Multiply by 10,000,000 (10^7)	
Gray = 8	Gray = 8	Gray = 8	Gold = Multiply by 0.1 (10^{-1})	
White = 9	White = 9	White = 9	Silver = Multiply by 0.01 (10^{-2})	

4.1 Label:

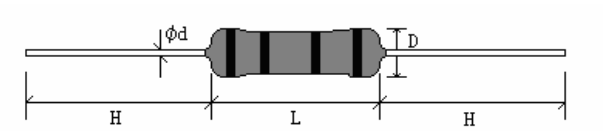
Label shall be marked with following items:

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

Example:

Wire-wound Power Resistors	
WATT: 1W	VAL: 100Ω
Q'TY: 1000	TOL: 5%
LOT: 7021548	PPM:

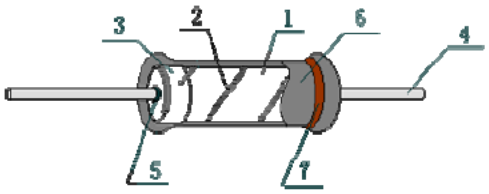
5. Dimension



Unit: mm

Type	D±1	L±1	d±0.05	H±3	Max working voltage	Dielectric withstanding voltage	Tolerance	Resistance
WPR 1W	2.5	6.2	0.60	28	50V	250V	±1% ±5% ±10%	0.1Ω~300Ω
WPR 2W	3.5	9.0	0.75	28	50V	250V		0.1Ω~1KΩ
WPR 3W	4.5	10.5	0.75	25	50V	350V		0.1Ω~1KΩ
WPR 4W	5.5	15.5	0.75	28	50V	350V		0.1Ω~1.8KΩ
WPR 10WSS	8.5	39.5	1.00	38	50V	350V		1Ω~5KΩ

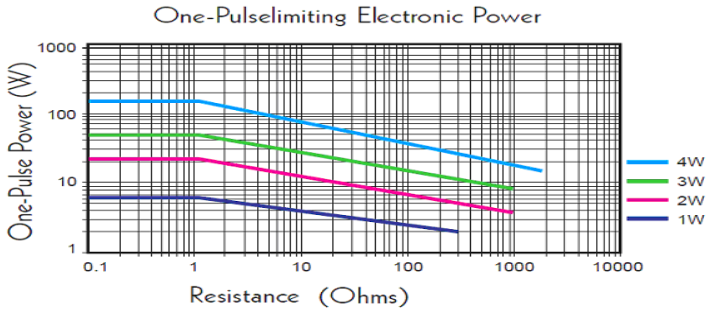
6. Structure



No.	Name	Raw material
1	Basic body	Al_2O_3
2	Alloy wire	Alloy
3	End cap	Steel (Tin plated iron surface)
4	Lead wire	Tinned copper wire
5	Joint	By welding
6	Coating	Insulated resin Color: Gray
7	Color code	Epoxy resin

7. Pulse Withstanding Curve

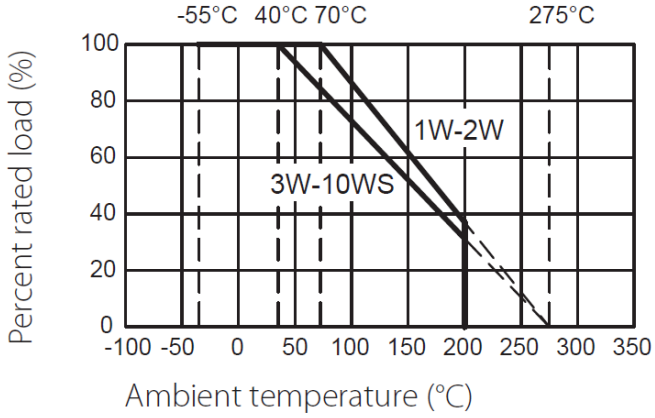
The pulse energy capacity limits in the graph below relate to pulses below 100msduration, low mean power dissipation and at 25℃



8. Derating Curve

Resistors shall have a power rating based on continuous load operation at an ambient temperature from -55℃ to 40℃ or 70℃. For temperature in excess of 40℃ or 70℃, the load shall be derated as shown in figure 1

Figure 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:

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

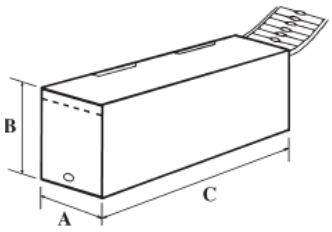
Where: RCWV commercial-line frequency and waveform (Volt.)
P = power rating (WATT.) R = nominal resistance (OHM)
In no case shall the rated DC or RMS AC continuous working voltage be greater than the applicable maximum value.
The overload voltage is 2.5 times RCWV or Max. Overload voltage whichever is less

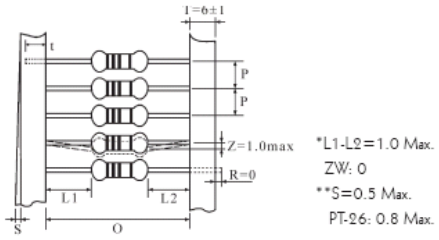
9. Performance Specification

Characteristic	Limits	Test Methods (GB/T5729&JIS-C-5201&IEC60115-1)
Temperature Coefficient	±200 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 must be in ±(5%+0.05Ω) , and no mechanical damage.	4.13 Permanent resistance change after the application of a potential of 2.5 times RCWV or the max. Overload voltage respectively specified in the above list, whichever less for 5 seconds.
Terminal strength	Neither breakage of the lead wire nor loosening of termination	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.	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 solder: 2~3seconds.
Resistance to soldering heat	Resistance change rate must be in ±(1%+0.05Ω) , and no 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.
Insulation resistance	More than 1,000MΩ	4.6 Test voltage DC:500V .test time: after 1 min
Rapid change of temperature	±(2%+0.05Ω)	4.19 30 min at -55 °C and 30 min at 155°C; 100 cycles.
Resistance to solvent	With no evidence of mechanical damage.	Specimens shall be immersed in a bath of alcohol completely for a 3 minutes using ultrasonic test equipment
Humidity	Resistance change rate must be in ±(2%+0.05Ω) , and no mechanical damage.	4.24 temporary resistance change after a 240 hours exposure in a humidity test chamber controlled at 40℃±20℃ and 90- 95% relative humidity.
Load life in humidity	±(5%+0.05Ω)	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±2℃ and 93%±3% RH.
Load life	±(5%+0.05Ω)	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℃or 40 ±2℃ ambient.
Pulse test	Resistance change rate must be in ±(5%+0.05Ω) , and no mechanical damage.	1)The Pulse duration below 100ms 2)The Pulse power dissipation about 25℃
Dielectric withstanding voltage	Flash over, burning, insulation Damage should not be observed	1)test voltage: see table 1 2)duration time 60s
Low Temperature Storage	±(5%+0.05Ω)	IEC 60068-2-1 (Aa) - 55 ℃ for 2hrs
High Temperature Exposure	±(5%+0.05Ω)	MIL-STD-202 108A 155℃ for 16hrs

10. Packing

10.1 Tapes in Box Packing：

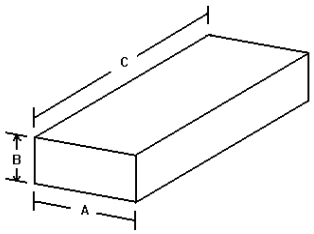




Dimension of T/B (mm)

Part No.	O	P	A±5	B±5	C±5	Qty/Box
WPR 1W	52±1	5±0.3	75	116	255	5,000pcs
WPR 2W	52±1	5±0.3	75	70	255	1,000pcs
WPR 3W	52±1	5±0.3	80	82	255	1,000pcs
WPR 4W	64±5	10±0.5	90	119	255	1,000pcs

10.2 Bulk in Box Packing



Dimension of Box (mm)

Part No.	A±5	B±5	C±5	Qty/Box
WPR 10WS	140	80	240	25/200pcs

11. Precaution for storage/Transportation

11.1. 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.

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

11.3. 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.

12. 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	1. Add 1% tolerance 2.Modify the size of 10WSS wires from "0.75" to "1.00"	4	Mar.15, 2022	Haiyan Chen	Yuhua Xu
4	Modify the temperature coefficient test conditions	4	Oct.28, 2022	Haiyan Chen	Yuhua Xu
5	Increased standard color code system	3	Apr.01, 2024	Haiyan Chen	Yuhua Xu
6	Modify the packaging size and the number of packages	6	Jul.30, 2025	Haiyan Chen	Yuhua Xu