

# DATA SHEET

**Product Name** High-Precision Anti-Surge Thick Film Chip Resistors

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**Part Name** PS Series

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Kunshan Foss Electronic material Co., Ltd.

Brands *RoyalOhm* *UniOhm*



**1. Scope**

- 1.1 This specification for approve relates to the High-Precision Anti-Surge Thick Film Chip Resistors manufactured by UNI-ROYAL.
- 1.2 Suitable for reflow & wave soldering
- 1.3 Application monitors,power supplies,DVD,camcorder,laptop computer

**2. Part No. System**

Part No. includes 14 codes shown as below:

2.1 1st~4th codes: Part name. E.g.: PS02、PS03、PS05、PS06、PS07、PS10、PS12

2.2 5th~6th codes: Power rating.

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

Wattage	1/32	3/4	1/2	1/3	1/4	1/8	1/10	1/16	1/20	1
Normal Size	WH	07	W2	W3	W4	W8	WA	WG	WM	1W

If power rating is lower or equal 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.: D=±0.5% F=±1%                      G=±2%                      J=±5%                      K= ±10%

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

2.4.1 If value belongs to standard value of ≥5% series, 8<sup>th</sup> code would be zero,9<sup>th</sup>~10<sup>th</sup> codes are significant figures of the resistance and 11<sup>th</sup> code is the power of ten.

2.4.2 If value belongs to standard value of ≤2% series, 8<sup>th</sup>~10<sup>th</sup> codes are significant figures of the resistance, and 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.: C=Bulk                      T=Tape/Reel

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

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

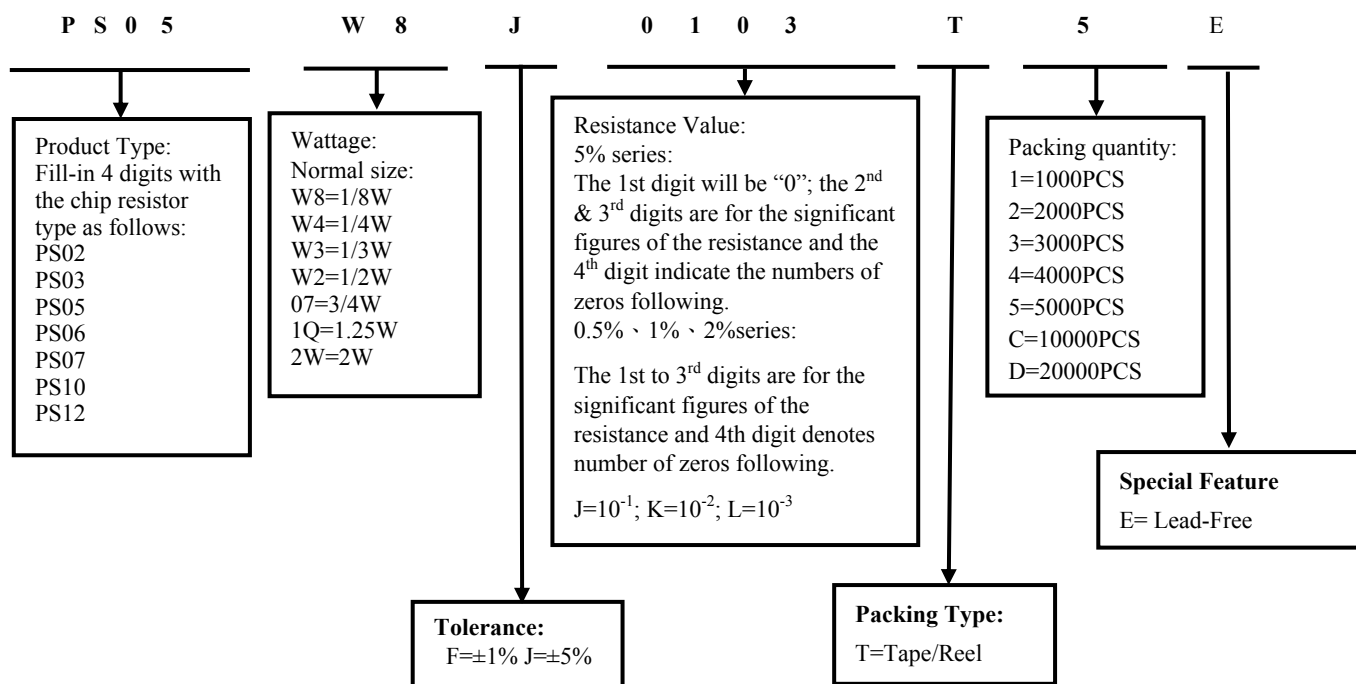
Chip Product: BD=B/B-20000pcs                      TC=T/R-10000pcs

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

E = Environmental Protection, Lead Free, or Standard type.

**3. Ordering Procedure**

(Example: PS05 1/8W ±5% 10KΩ T/R-5000)



**4. Marking**

(1) For PS02 size. Due to the very small size of the resistor's body, there is no marking on the body



(2) Normally, the making of 0Ω PS03, 0Ω PS05, 0Ω PS06, 0Ω PS07, 0Ω PS10, 0Ω PS12, resistors as following



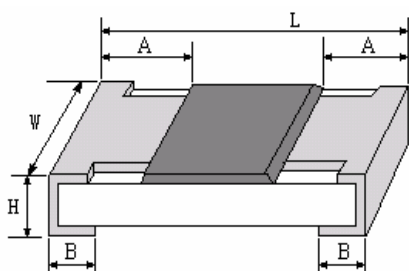
(3) ±5% Tolerance: The first two digits are significant figures of resistance and the third denotes number of zeros following



(4) ±1% Tolerance: 4 digits, first three digits are significant; fourth digit is number of zeros. Letter r is decimal point.



**5. Ratings & Dimension**



Type	Dimension(mm)				
	L	W	H	A	B
PS02(0402)	1.00±0.10	0.50±0.05	0.35±0.05	0.20±0.10	0.25±0.20
PS03(0603)	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20
PS05(0805)	2.00±0.15	1.25+0.15/-0.10	0.55±0.10	0.40±0.20	0.40±0.20
PS06(1206)	3.10±0.15	1.55+0.15/-0.10	0.55±0.10	0.45±0.20	0.45±0.20
PS07(1210)	3.10±0.10	2.60±0.20	0.55±0.10	0.55±0.25	0.50±0.20
PS10(2010)	5.00±0.10	2.50±0.20	0.55±0.10	0.60±0.25	0.50±0.20
PS12(2512)	6.35±0.10	3.20±0.20	0.55±0.10	0.60±0.25	0.50±0.20

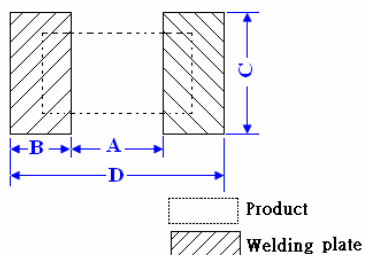
**6. Resistance Range**

Type	Power Rating at 70°C	Resistance Range	
		1.0%	5.0%
PS02	1/8W	1Ω-10MΩ	1Ω-10MΩ
PS03	1/4W	1Ω-10MΩ	1Ω-10MΩ
PS05	1/3W	1Ω-10MΩ	1Ω-10MΩ
PS06	1/2W	0.1Ω-10MΩ	0.1Ω-10MΩ
PS07	3/4W	0.1Ω-10MΩ	0.1Ω-10MΩ
PS10	1.25W	1Ω-10MΩ	1Ω-10MΩ
PS12	2W	0.1Ω-10MΩ	0.1Ω-10MΩ

**7. Ratings**

Type	Max Working Voltage	Max Overload Voltage	Dielectric Withstanding Voltage	Operating Temperature
PS02	50V	100V	100V	-55 ~ +155°C
PS03	50V	100V	300V	
PS05	150V	300V	500V	
PS06	200V	400V	500V	
PS07	200V	500V	500V	
PS10	400V	800V	500V	
PS12	500V	1000V	500V	

**8. Recommend the size of welding plate**

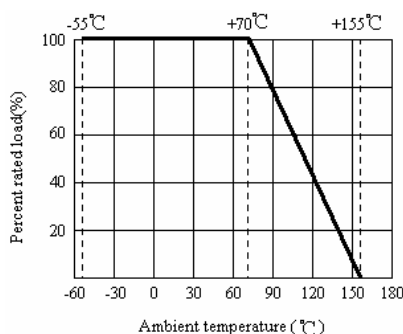


Type	Dimension(mm)			
	A	B	C	D
PS02	0.5±0.05	0.5±0.05	0.6±0.05	1.5±0.05
PS03	0.8±0.05	0.8±0.05	0.9±0.05	2.4±0.05
PS05	1.0±0.1	1.0±0.1	1.4±0.1	3.0±0.1
PS06	2.0±0.1	1.1±0.1	1.8±0.1	4.2±0.1
PS07	2.0±0.1	1.1±0.1	2.9±0.1	4.2±0.1
PS10	3.6±0.1	1.4±0.1	3±0.1	6.4±0.1
PS12	4.9±0.1	1.35±0.1	3.7±0.1	7.6±0.1

**9. Derating Curve**

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

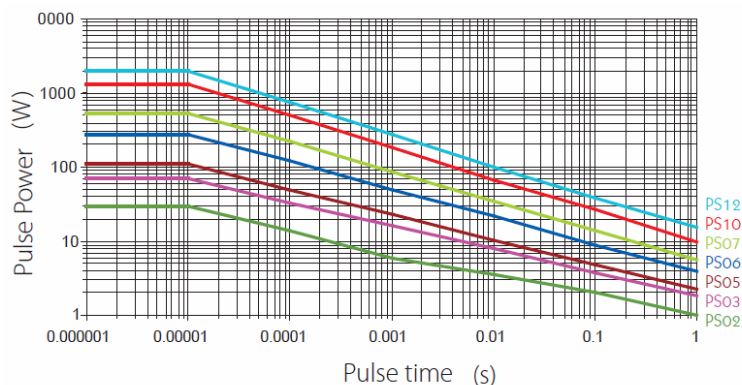
P = power rating (WATT.) R = nominal resistance (OHM)

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

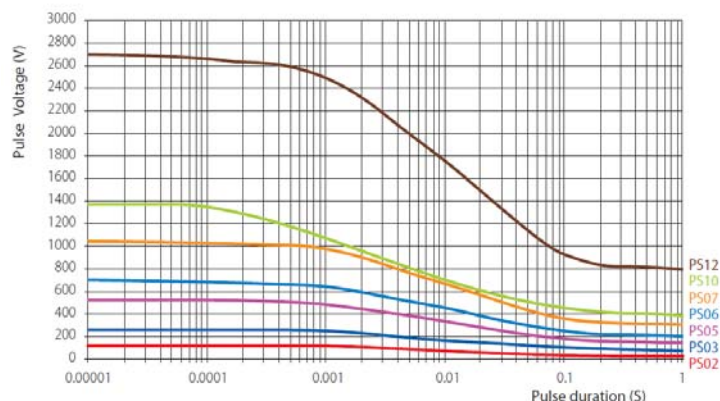
The overload voltage is 2.5 times RCWV or Max. Overload voltage whichever is less

**10. One-pulse Limiting Electric Power**

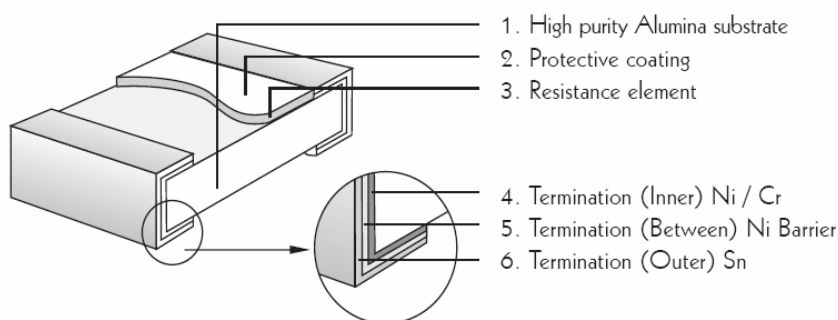
Curve of Pulse Duration :



Pulse Voltage Limit :



**11. Structure**



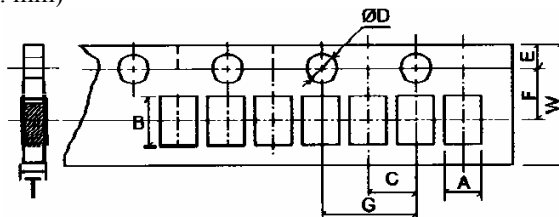
**12. Performance Specification**

Characteristic	Limits	Test Method (GB/T5729&JIS-C-5201&IEC60115)
Temperature Coefficient	PS02: 1Ω~10Ω:±400PPM/°C 11Ω~100Ω:±200PPM/°C > 100Ω:±100PPM/°C  PS03,PS05,PS06,PS07,PS10,PS12: ±100PPM/°C	4.8 Natural resistance changes per temp. Degree centigrade $\frac{R_2-R_1}{R_1(t_2-t_1)} \times 10^6 \text{ (PPM/°C)}$ $\frac{R_3-R_1}{R_1(t_3-t_1)} \times 10^6 \text{ (PPM/°C)}$ R <sub>1</sub> : Resistance Value at room temperature ( t <sub>1</sub> ) ; R <sub>2</sub> : Resistance Value at upper limit temperature ± 2°C ( t <sub>2</sub> ) R <sub>3</sub> : Resistance Value at lower limit temperature ± 3°C ( t <sub>3</sub> ) Test pattern : Room temperature : ( t <sub>1</sub> ) Upper limit temperature : ( t <sub>2</sub> ) Lower limit temperature : ( t <sub>3</sub> )
Short-time overload	±5%    ±(2%+0.1Ω) Max ±1%    ±(1%+0.1Ω) Max	4.13 Permanent resistance change after the application of 2.5 times RCWV for 5 seconds.
Terminal bending	±(1%+0.05Ω) Max	4.33 Twist of test board: Y/x = 3/90 mm for 60 Seconds
Dielectric withstanding voltage	No evidence of flashover mechanical damage, arcing or insulation breaks done.	4.7 Clamped in the trough of a 90° metallic v-block and shall be tested at ac potential respectively specified in the type for 60-70 seconds
Soldering heat	Resistance change rate is ±(1%+0.05Ω) Max	4.18 Dipping the resistor into a solder bath having a temperature of 260°C±5°C and hold it for 10±1 seconds
Solderability	95% coverage Min.	Wave solder: Test temperature of solder: 245°C±3°C dipping time in solder: 2-3 seconds.  Reflow: 

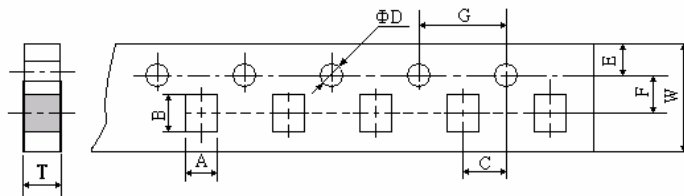
Rapid change of temperature	±5%	±(3.0%+0.1Ω) Max.	4.19 30 min at lower limit temperature and 30 min at upper limit temperature , 5 cycles.
	±1%	±(1.0%+0.1Ω) Max.	
Load life in humidity	±5%	±(3.0%+0.1Ω) Max.	7.9 Resistance change after 1,000 hours (1.5 hours “ON”,0.5 hour “OFF”) at RCWV in a humidity chamber controlled at 40°C±2°C and 90 to 95% relative humidity.
	±1%	±(1.0%+0.1Ω) Max.	
Load life	±5%	±(3.0%+0.1Ω) Max.	4.25.1 Permanent resistance change after 1,000 hours operating at RCWV with duty cycle 1.5 hours “ON”, 0.5 hour “OFF” at 70°C±2 °C ambient.
	±1%	±(1.0%+0.1Ω) Max.	
Low Temperature Storage	±5%	±(3.0%+0.1Ω) Max.	4.23.4 Lower limit temperature , for 2H.
	±1%	±(1.0%+0.1Ω) Max.	
High Temperature Exposure	±5%	±(3.0%+0.1Ω) Max.	4.23.2 Upper limit temperature , for 16H.
	±1%	±(1.0%+0.1Ω) Max.	
Leaching	No visible damage		J-STD-002 Test D Samples completely immersed for 30 sec in solder bath at 260°C

**13. Packing of Surface Mount Resistors**

13.1 Dimension of Paper Taping :(Unit: mm)

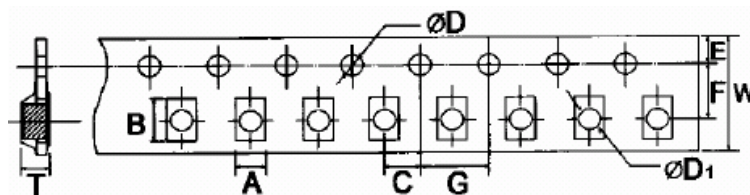


TYPE	A ± 0.1	B ± 0.1	C ± 0.05	+ 0.1 φD - 0	E ± 0.1	F ± 0.05	G ± 0.1	W ± 0.2	T ± 0.05
PS02	0.65	1.20	2.00	1.50	1.75	3.50	4.00	8.00	0.42



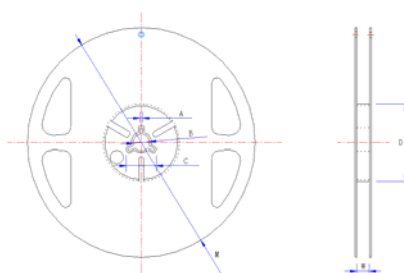
TYPE	A ± 0.2	B ± 0.2	C ± 0.05	+ 0.1 φD - 0	E ± 0.1	F ± 0.05	G ± 0.1	W ± 0.2	T ± 0.10
PS03	1.10	1.90	2.00	1.50	1.75	3.50	4.00	8.00	0.67
PS05	1.65	2.40	2.00	1.50	1.75	3.50	4.00	8.00	0.81
PS06	2.00	3.60	2.00	1.50	1.75	3.50	4.00	8.00	0.81
PS07	2.80	3.50	2.00	1.50	1.75	3.50	4.00	8.00	0.75

13.2 Dimension of Embossed Taping:



Type	A ±0.2	B ±0.2	C ±0.05	+ 0.1 φD - 0	+0.25 φD1 -0	E ±0.1	F ±0.05	G ±0.1	W ±0.2	T ±0.1
PS10	2.9	5.6	2.0	1.5	1.5	1.75	5.5	4.0	12	1.0
PS12	3.5	6.7	2.0	1.5	1.5	1.75	5.5	4.0	12	1.0

13.3 Dimension of Reel : (Unit: mm)



TYPE	TAPING	SIZE	A ±0.5	B ±0.5	C ±0.5	D ±1	L ±2	W ±1
PS02	Paper	10000pcs reel	2.0	13.0	21.0	60.0	178.0	10.0
PS03	Paper	5000pcs reel	2.0	13.0	21.0	60.0	178.0	10.0
PS05	Paper	5000pcs reel	2.0	13.0	21.0	60.0	178.0	10.0
PS06	Paper	5000pcs reel	2.0	13.0	21.0	60.0	178.0	10.0
PS07	Paper	5000pcs reel	2.0	13.0	21.0	60.0	178.0	10.0
PS10	Embossed	4000pcs reel	2.0	13.0	21.0	60.0	178.0	10.0
PS12	Embossed	4000pcs reel	2.0	13.0	21.0	60.0	178.0	10.0

14. **Note**

- 14.1. UNI-ROYAL recommend the storage condition temperature: 15°C~35°C, humidity :25%~75%.  
 (Put condition for individual product).Even under UNI-ROYAL recommended storage condition, solderability of products over 1 year old.  
 (Put condition for each product) may be degraded.
- 14.2. Store / transport cartons in the correct direction, which is indicated on a carton as a symbol.  
 Otherwise bent leads may occur due to excessive stress applied when dropping of a carton.
- 14.3. Product performance and soldered connections may deteriorate if the products are stored in the following places:
  - a. Storage in high Electrostatic.
  - b. Storage in direct sunshine、rain and snow or condensation.
  - c. Where the products are exposed to sea winds or corrosive gases, including Cl<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub>, NO<sub>2</sub>.

15. **Record**

Version	Description of amendment	Page	Date	Amended by	Checked by
1	First issue of this specification	1~7	Mar.20, 2018	Chen Haiyan	Chen Nana

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