



# APPROVAL SHEET

## ASW18M SERIES

ANTI-SURGE

PRECISION WIREWOUND RESISTORS

TINY SIZE

PRODUCE	CHECK AND APPROVE	ACCEPTED BY
EM	CE	HONORABLE CUSTOMER
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## 1. PRODUCT:

### ANTI-SUGER PRECISION WIREWOUND RESISTORS: TINY SIZE

#### FEATURES

- Advanced Isabellenhütte Germany alloy technology
- Very low TCR: lower than  $\pm 50 \text{ ppm}/^\circ\text{C}$ .
- Tolerance up to  $\pm 0.05\%$
- Excellent overall stability: Class 0.25
- Very low noise and voltage coefficient
- Non-inductance winding available under request
- Perfect pulse loading capability
- Compliant to RoHS directive 2011/65/EU
- Compliant to REACH (EC No. 1907/2006)) (last updated: 27/06/2018)

#### APPLICATIONS

- Current sensor for test and measuring instruments
- Power supply with high reliability
- Components burn-in devices
- Pulse load and in rush current protector
- Medical equipment
- Military electronics



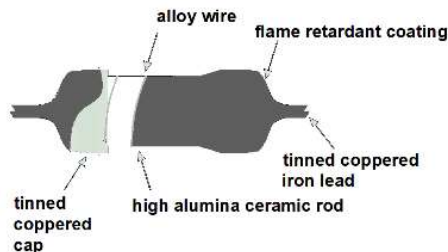
## 2. PART NUMBER:

Part number is identified by the series name, size code, tolerance, temperature coefficient, packing style and resistance value. For example:

**ASW18** / **M** / **J** / **2** / **T** / **300**  
**Series** / **Size** / **Tolerance** / **TCR** / **Packing** / **Resistance**

- (1) Series name: ASW18M SERIES 3W
- (2) Size code: M tiny size;
- (3) Tolerance: W $\pm$ 0.05%; B $\pm$ 0.1%; C $\pm$ 0.25%; D $\pm$ 0.50%; F $\pm$ 1.0%; J $\pm$ 5.0%
- (4) T.C.R.: 7 =  $\pm$ 5ppm/ $^{\circ}$ C; 6 =  $\pm$ 10ppm/ $^{\circ}$ C; 5 =  $\pm$ 15ppm/ $^{\circ}$ C; 4 =  $\pm$ 20ppm/ $^{\circ}$ C; 3 =  $\pm$ 25ppm/ $^{\circ}$ C; 2 =  $\pm$ 50ppm/ $^{\circ}$ C; 1 =  $\pm$ 100ppm/ $^{\circ}$ C; 0 =  $\pm$ 250ppm/ $^{\circ}$ C
- (5) Packaging Type: B = Bulk/Box; T = Tape/ Reel
- (6) Resistance Value f: R10=0.1  $\Omega$ ; 1R1=1.1  $\Omega$ ; 2R7=2.7  $\Omega$ ; 300=30  $\Omega$ ; 331= 330 $\Omega$ ;

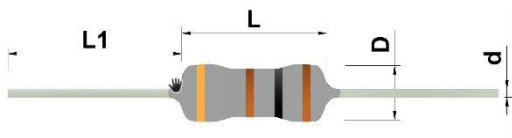
## 3. Structure



## 4. MARKING: COLOR BAND-CODES:

Five color band codes for tight tolerances 1%,0.5%, 0.25%, 0.1%

Four color band codes for normal tolerances like 5% and 2%



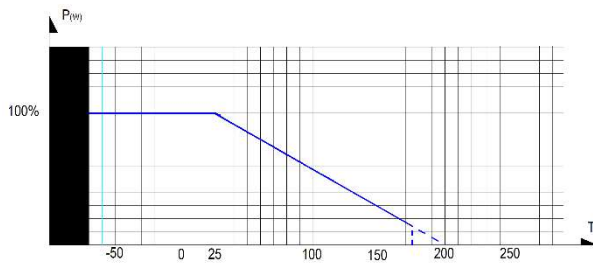
Digital marking is available upon request.

颜色	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	倍率	精度
黑色	0	0	0	1	
棕色	1	1	1	10	F( $\pm$ 1.0%)
红色	2	2	2	10 <sup>2</sup>	G( $\pm$ 2.0%)
棕色	3	3	3	10 <sup>3</sup>	
黄色	4	4	4	10 <sup>4</sup>	
绿色	5	5	5	10 <sup>5</sup>	D( $\pm$ 0.50%)
蓝色	6	6	6	10 <sup>6</sup>	C( $\pm$ 0.25%)
紫色	7	7	7		B( $\pm$ 0.10%)
灰色	8	8	8		
白色	9	9	9		
金色				10 <sup>-1</sup>	J( $\pm$ 5.0%)
银色				10 <sup>-2</sup>	K( $\pm$ 10%)

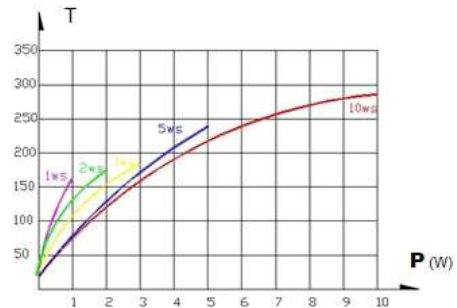
## 4. Derating curve and temperature rising curve

The power dissipation on the resistor generates a temperature rise against the local ambient, depending on the heat flow support of the printed-circuit board (thermal resistance). The rated dissipation applies only if the permitted film temperature is not exceeded. These resistors do not feature a limited lifetime when operated within the permissible limits. However, resistance value drift increasing over operating time may result in exceeding a limit acceptable to the specific application, thereby establishing a functional lifetime.

For resistors working at an ambient temperature of 25°C or above, the power rating shall be derated in accordance with the following curve.

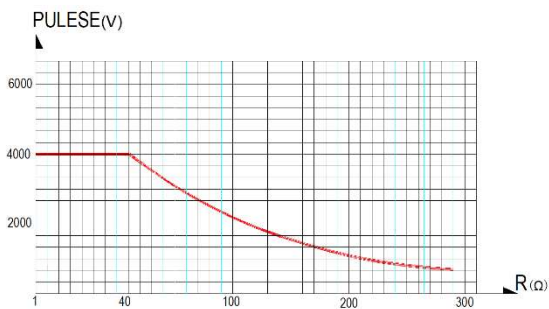


Derating curve

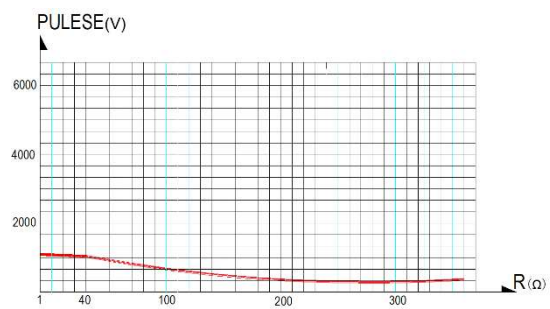


Temperature rising curve

## 5. Surge pulses loading curves



Pulse load rating in accordance with IEC 60115-1,4.27; **1.2μs/50μs**;  
10 pulses loaded, for permissible resistance change  $<\pm(3\%+0.05\Omega)$   
Typical value is  $<0.4\%$



Pulse load rating in accordance with IEC 60115-1,4.27; **10μs/700μs**;  
10 pulses loaded, for permissible resistance change  $<\pm(3\%+0.05\Omega)$   
Typical value is  $<0.4\%$

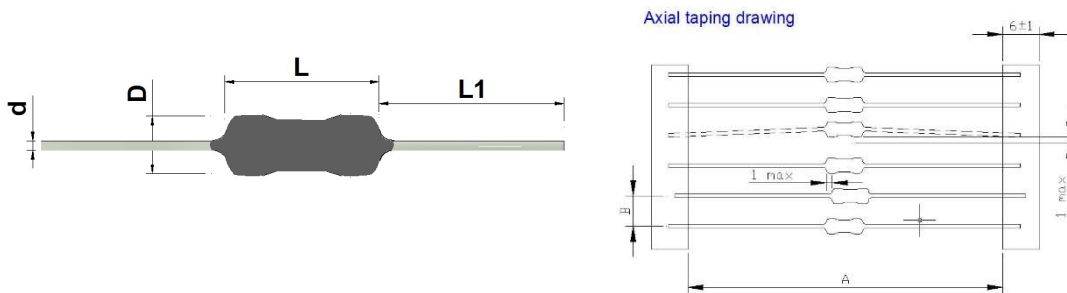
## 6. ELECTRICAL CHARACTERISTICS

Type	Rated dissipation at 25°C	Resistance range Resistance tolerance (%) Temperature coefficient (ppm/°C)			Dielectric withstanding voltage	Working temperature range
		F(±1.0%)	J(±5.0%)	4(±20ppm/°C)		
ASW18M	3.0W	1Ω to 300Ω	1Ω to 300Ω	1Ω to 300Ω	500V	-55°C~200°C

- \* Unless otherwise specified, all values are tested at the following condition:  
Temperature: 21°C to 25°C; Relative humidity: 45% to 70%;
- \* Rated Continuous Working Voltage (RCWV) =  $\sqrt{\text{Power Rating} \times \text{Resistance Value}}$
- \* Resistance and temperature coefficient out of range is available upon request.
- \* High insulating requirement is available upon request.
- \* Non-inductance wound is available on request.

## 7. Dimension and packing information

Type	L (mm)	D (mm)	d (mm)	Tape		MPQ
				B (mm)	A (mm)	
ASW18M	12±1.0	4.5±1.0	0.8±0.1	5±0.5	52±1.0	1000





## 8. ENVIRONMENTAL CHARACTERISTICS

### (1) Insulation Resistance

IEC 60115-1, 4.6: in V-block for 60 seconds, the test resistance should be high than 10,000 M Ohm.

### (2) Dielectric Withstanding Voltage

IEC 60115-1 4.7: Place resistors in V-block for 60 Seconds, no breakdown or flashover.

### (3) Temperature Coefficient Test

IEC 60115-1, 4.8: Test of resistors at room temperature and 60°C or 100°C on request above room temperature. Then measure the resistance. The Temperature Coefficient is calculated by the following equation and its value should be within the range requested.

$$\text{Resistor Temperature Coefficient} = \frac{R - R_0}{R_0} \times \frac{1}{t - t_0} \times 10^6$$

R = Resistance value under the testing temperature

R<sub>0</sub> = Resistance value at the room temperature

t = the 2<sup>nd</sup> testing temperature

t<sub>0</sub> = Room temperature

### (4) Short Time Overload Test

IEC60115-1 4.13: At 10 times rated power or 2 times the maximum working voltage whichever is lower for 5 seconds, the resistor should be free from defects. The change of the resistance value should be within  $\pm(1\%+0.05\Omega)$  as compared with the value before the test.

### (5) Solderability

IEC 60115-1, 4.17: 260 $\pm$ 5°C for 3 $\pm$ 0.5 Seconds, there are at least 95% solder coverage on the termination.

### (6) Resistance to soldering heat:

IEC 60115-1, 4.18: 260 $\pm$ 3°C for 10 $\pm$ 1 Seconds, immersed to a point 3 $\pm$ 0.5mm from the body. The change of the resistance value should be within  $\pm(0.5\%+0.05\Omega)$  as compared with the value before the test.

### (7) Climatic sequence

IEC 60115-1, 4.19: -55°C to Room Temp. to +125°C to Room Temp. (5 cycles). The change of the resistance value shall be within  $\pm(1\%+0.05\Omega)$  as compared with the value before the test.



## (8) Damp Heat Steady State

IEC 60115-1, 4.24:  $40\pm 2^{\circ}\text{C}$ , 90-95% RH for 56 days, loaded with 0.1 times RCWV or the maximum working voltage whichever is lower. The change of the resistance value should be within  $\pm(5.0\%+0.05\Omega)$

## (9) Load Life Test

IEC 60115-1, 4.25:  $25\pm 2^{\circ}\text{C}$  at RCWV or the maximum working voltage whichever is lower for 1,000+48/-0 Hr. (1.5Hr. on, 0.5Hr. off). The resistors shall be arranged not much effected mutually by the temperature of others and the excessive ventilation shall not be performed. The change of the resistance value should be within  $\pm(5.0\%+0.05\Omega)$  as compared with the value before the test.

## (10) Accidental Overload Test

IEC 60115-1, 4.26: 4 times RCWV for 1 Minute. No evidence of flaming or arcing

## (11) High voltage high pulse overload

Apply 10 pulses with 4000V to the resistor, the pulses parameter is 1.2/50 $\mu\text{s}$ . The change of the resistance shall be within  $\pm(3\%+0.05\Omega)$  as compared with the value before the load.

Apply 10 pulses with 1000V to the resistor, the pulses parameter is 10 $\mu\text{s}$ /700 $\mu\text{s}$ . The change of the resistance shall be within  $\pm(3\%+0.05\Omega)$  as compared with the value before the load.

## Disclaimer

*All products, product specifications and data are subject to change without notice to improve reliability, function or design or otherwise.*

*Thunder Precision Resistors makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product to the maximum extent permitted by applicable law.*