



ARTX Series Thin Film Chip Resistor Product Specification (Automotive Grade)

Document No.	IE-SP-173
Released Date	2021/07/09
Page No	1

1 Scope:

- 1.1 This specification is applicable to lead free and halogen free of RoHS directive for ARTX series thin film chip resistor.
- 1.2 Lead free” stands for product with lead free terminators which meet RoHS requirement.
- 1.3 This product is for automotive electronic application.
- 1.4 AEC-Q200, grade 0 qualified.

2 Explanation Of Part Numbers:

(EX)



Type	Dimension	Packaging	Resistance (4-Digits)	Resistance Tolerance	Temp. coeff.
Automotive grade thin film chip resistor	02(0402) 03(0603) 05(0805) 06(1206)	T:Taping Type	EX. 47.5Ω=47R5 10KΩ=1002	L=± 0.01% P=± 0.02% W=± 0.05% B=± 0.1% C=± 0.25% D=± 0.5% F=± 1.0%	A=±5ppm/°C B=±10ppm/°C C=± 15ppm/°C D=± 25ppm/°C E=± 50ppm/°C

3 General Specifications:

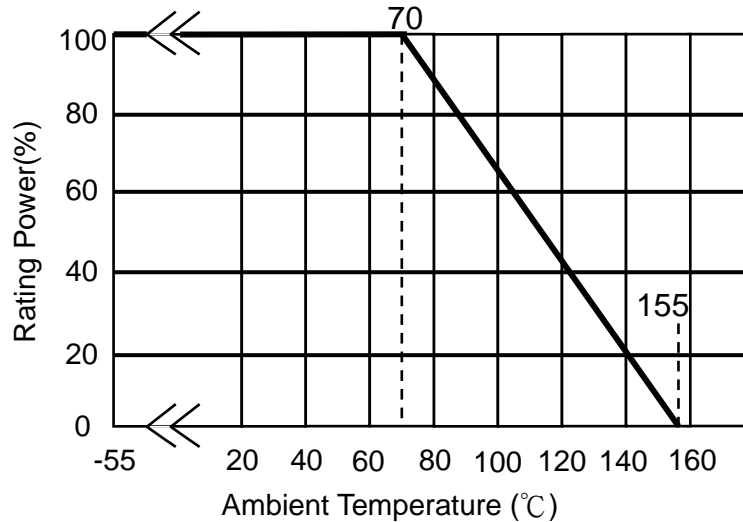
Type	Rated Power	Max. Rated Voltage	Max. Overload Voltage	T.C.R. (ppm/°C)	Resistance Range						
					L(±0.01%) E-96、E-24	P(±0.02%) E-96、E-24	W(±0.05%) E-96、E-24	B(±0.1%) E-96、E-24	C(±0.25%) E-96、E-24	D(±0.5%) E-96、E-24	F(±1%) E-96、E-24
ARTX 0402	1/16 W	50V	100V	±50、±25	50Ω~11KΩ		10Ω~100KΩ				
				±15			10Ω~11KΩ				
				±10			50Ω~11KΩ				
				±5			50Ω~11KΩ	---	---		
ARTX 0603	1/10 W	75V	150V	±50、±25	50Ω~14KΩ		10Ω~330KΩ				
				±15			10Ω~14KΩ				
				±10			50Ω~14KΩ				
				±5			50Ω~14KΩ	---	---		
ARTX 0805	1/8 W	150V	300V	±50、±25	50Ω~17KΩ		10Ω~1MΩ				
				±15			10Ω~17KΩ				
				±10			50Ω~17KΩ				
				±5			50Ω~17KΩ	---	---		
ARTX 106	1/4 W	200V	400V	±50、±25	50Ω~20KΩ		10Ω~1MΩ				
				±15			10Ω~20KΩ				
				±10			50Ω~20KΩ				
				±5			50Ω~20KΩ	---	---		
Temperature category				-55°C ~ +155°C							

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3.1 Power Derating Curve:

Operating Temperature Range: - 55 ~+155 °C

For resistors operated in ambient temperature 70°C, power rating shall be derated in accordance with the curve below:



3.2 Rating Voltage or Rating Current:

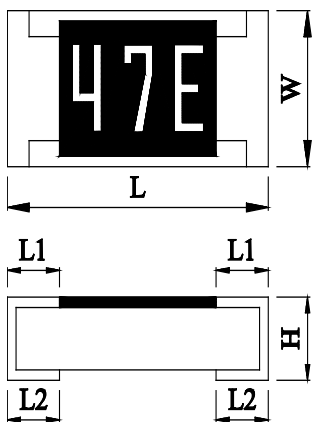
Rating Voltage: relative DC or AC(in rms) voltage according with rated power, which can be calculated by below formula ,but the calculated value should not be over the maximum rated voltage defined in specification.

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

E=Rating Voltage(V)
 P=Rating Power(W)
 R=Nominal Resistance value(Ω)

4 Dimension:

Unit:mm



Dimension		L	W	H	L1	L2
Type	Size Code					
ARTX	0402	1.00±0.10	0.50±0.05	0.30±0.05	0.20±0.10	0.25±0.10
ARTX	0603	1.60±0.10	0.80±0.10	0.45±0.10	0.25±0.15	0.25±0.15
ARTX	0805	2.00±0.10	1.25±0.10	0.50±0.10	0.35±0.20	0.35±0.20
ARTX	1206	3.10±0.10	1.60±0.10	0.55±0.10	0.45±0.20	0.40±0.20

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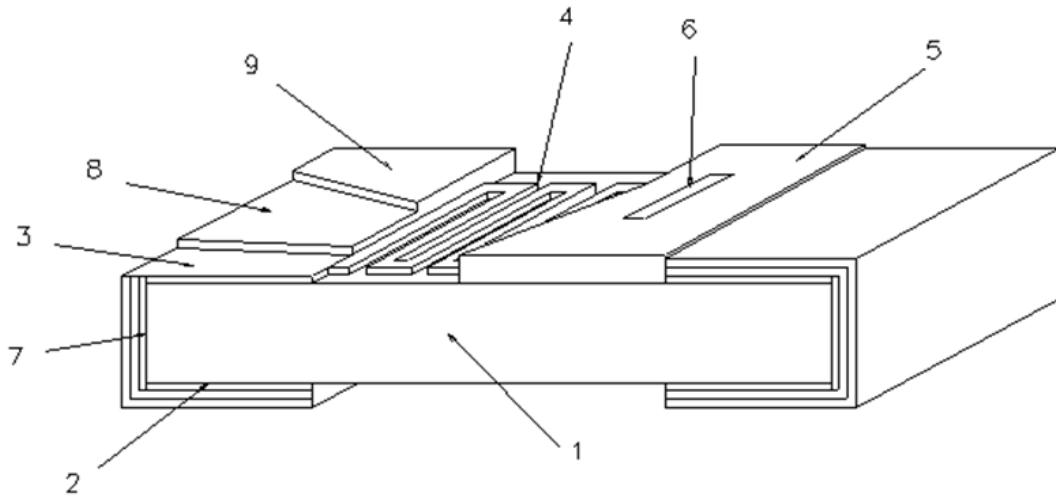
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5 Structure Graph:



1	Ceramic substrate	6	Marking
2	Bottom inner electrode	7	Terminal inner electrode
3	Top inner electrode	8	Ni layer
4	Resistive layer	9	Sn layer
5	Protective coating		

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Series No. **60**



ARTX Series Thin Film Chip Resistor Product Specification (Automotive Grade)

Document No.	IE-SP-173
Released Date	2021/07/09
Page No	4

6 Reliability Test Items:

Item	Conditions	Specifications
		Resistance Tolerance
Electrical Characterization	$TCR \text{ (ppm / } ^\circ\text{C)} = \frac{(R2 - R1)}{R1 (T2 - T1)} \times 10^6$ R1: Resistance at room temperature (Ω) R2: Resistance at -55°C or $+125^\circ\text{C}$ (Ω) T1: Room temperature ($^\circ\text{C}$) T2: Temperature -55°C or $+125^\circ\text{C}$ Experiment evidence: AEC-Q200	Ref to 3.specification
Short Time Overload	Applied 2.5 times rated voltage for 5 seconds and release the load for about 30 minutes, then measure its resistance variance rate. (Rated voltage refer to item 3. general specifications) Refer to JIS-C5201-1 4.13	$\pm(0.05\%+0.05\Omega)$
Solderability	Test method: Test item 1 (solder pot test): Method B Precondition: The specimens are subjected to 155°C dry bake for $4\text{hrs}\pm 15\text{min}$. The specimens are immersed into the flux first, then fully immersed into the solder pot, at a temperature of $235\pm 5^\circ\text{C}$ for $5+0/-0.5$ sec. Then rinse with water and observe the soldering coverage under the microscope. Test item 2 (Leaching test): Method D The specimens are immersed into the flux first, then fully immersed into the solder pot, at a temperature of $260\pm 5^\circ\text{C}$ for $30+0/-0.5$ sec. Then rinse with water and observe the soldering coverage under the microscope. Experiment evidence AEC-Q200	Conductor be soldered area $\geq 95\%$.
Resistance to Soldering Heat	The specimens are fully immersed into the Pb-free solder pot, then take them out to stabilize for 1 hour or more and measure of its resistance variance rate. Temp of solder pot : $260\pm 5^\circ\text{C}$ Soldering duration : $10\pm 1\text{sec}$. Experiment evidence AEC-Q200	$\pm(0.05\%+0.05\Omega)$
Board Flex (Bending Test)	Solder the specimens on the test PCB and put the PCBA onto the Bending Tester. Add force at the central part of PCB, and the duration of the applied forces shall be $60 (+ 5)$ Sec. Measure of its resistance variance rate in load. Bending depth (D) : $02 \text{ 、 } 03 \text{ 、 } 05=5\text{mm}$ $005 \text{ 、 } 01 \text{ 、 } 06 \text{ 、 } 12=3\text{mm}$ $20 \text{ 、 } 25=2\text{mm}$ Experiment evidence: AEC-Q200	$\pm(0.1\%+0.05\Omega)$

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ARTX Series Thin Film Chip Resistor Product Specification (Automotive Grade)

Document No.	IE-SP-173
Released Date	2021/07/09
Page No	5

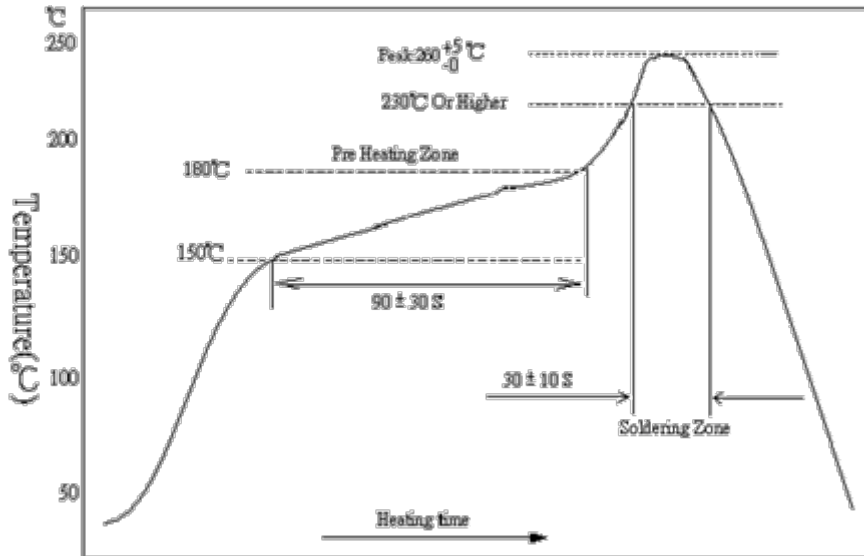
Item	Conditions	Specifications
		Resistance Tolerance
High Temperature Exposure	Put the specimens in the chamber with temperature of $155\pm 3^{\circ}\text{C}$ for 1000 hours. Then take them out to stabilize in room temperature for 24 ± 4 hr or more, and measure of its resistance variance rate. Experiment evidence: AEC-Q200	$\pm(0.3\%+0.05\Omega)$
Temperature Cycling (Rapid Temperature Change)	Put the specimens in the High & low temperature test chamber with temperature varies from -55°C to 125°C for 5 minutes and total 1000 cycles. Then take them out to stabilize in room temperature for 24 ± 4 hr or more, and measure of its resistance variance rate. Experiment evidence: AEC-Q200	$\pm(0.1\%+0.05\Omega)$ No visible damage.
Biased Humidity	Solder the specimens on the test PCB and put them into the constant temperature humidity chamber with $85\pm 2^{\circ}\text{C}$ and $85\pm 5\%RH$. Then apply the test voltage that calculates based on the 10% of rated power for 1000hrs. Then take them out to stabilize in room temperature for 24 ± 4 hr or more, and measure of its resistance variance rate. Experiment evidence: AEC-Q200	$\pm(0.1\%+0.05\Omega)$
Operation Life	Solder the specimens on the test PCB and Put them in the chamber with temperature of $125\pm 3^{\circ}\text{C}$ and load the voltage for 1000 hours. Then take them out to stabilize in room temperature for 24 ± 4 hr or more, and measure of its resistance variance rate. Note: The input voltage shall refer to the power de-rating curve (referring to page 2, No.3.1) Experiment evidence: AEC-Q200	$\pm(0.1\%+0.05\Omega)$

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7 Technical application notes: (This is for recommendation, please customer perform adjustment according to actual application)

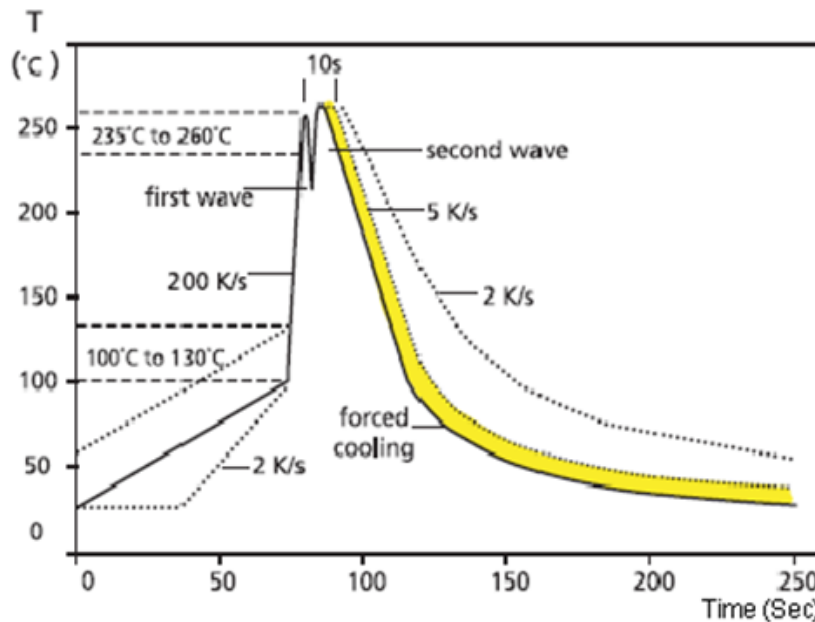
7.1 Recommend Soldering Method:

7.1.1 Lead Free IR Reflow Soldering Profile (MEET J-STD-020D)



Remark: component max. temperature endurance 260 +5/-0 °C ,10sec ◦

7.1.2 Lead Free Double-Wave Soldering Profile(Available for chip size larger than 0603)



7.1.3 Soldering Iron: temperature 350°C ± 10°C , dwell time shall be less than 3 sec.

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ARTX Series Thin Film Chip Resistor Product Specification (Automotive Grade)

Document No.	IE-SP-173
Released Date	2021/07/09
Page No	7

7.2 Automobile Electronic Application:

This specification is for automobile electronic use. RALEC will take no responsibility if any damage, cost or loss occurs when the product has been used in any special circumstances.

7.3 Environment Precautions:

If consumer intends to use our company product in special environment or condition (including but not limited to those mentioned below), then will need to make individual recognition of product features and reliability accordingly.

- (a) Used in high temperature and humidity environment
- (b) Exposed to sea breeze or other corrosive gas, such as Cl₂ 、 H₂S 、 NH₃ 、 SO₂ and NO₂.
- (c) Used in non-verified liquids including water, oil, chemical and organic solvents.
- (d) Using non-verified resin or other coating material to seal or coat our Company product.
- (e) After soldering, it is necessary to use water-soluble detergents to clean residual solder fluxes, even though no-clean fluxes are recommended.

7.4 Momentary Overload Precautions:

The product might be out of function when momentary overloaded. Please make sure to avoid momentary overloading while using and preserving ◦

7.5 Operation and Processing Precautions:

- (a) Avoid damage to the edge of resistor and protective layer caused by mechanical stress.
- (b) Handle with care when printing circuit board (PCB) is divided or fixed on support body, because bending of printing circuit board (PCB) mounting will make mechanical stress for resistors.
- (c) Make sure the power rating is under the limit when using the resistor. When power rating is over the limit, the resistor will be overloaded. There might be machinery damage due to the climbing temperature.
- (d) If the resistor will be exposed under massive impact load (shock wave) in a short period of time, the working environment must be set up well before use.
- (e) Please make evaluation and confirmation when the product is well used in your company and have a through consideration of its fail-safe design to ensure the system safety.

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ARTX Series Thin Film Chip Resistor Product Specification (Automotive Grade)

Document No.	IE-SP-173
Released Date	2021/07/09
Page No	8

8 Storage and transportation requirement:

- 8.1 The temperature condition must be controlled at $25\pm 5^{\circ}\text{C}$, the R.H. must be controlled at $60\pm 15\%$. The stock can maintain quality level in two years.
- 8.2 Please avoid the mentioned harsh environment below when storing to ensure product performance and its' weldability. Places exposed to sea breeze or other corrosive gas, such as Cl_2 、 H_2S 、 NH_3 、 SO_2 and NO_2 .
- 8.3 When the product is moved and stored, please ensure the correct orientation of the box. Do not drop or squeeze the box. Otherwise, the electrode or the body of the product may be damaged.

9 Use below label upon out-box for electronic information product identification: (Export to Mainland China)

	
Marking for control of pollution cause by electronic-information products	Marking for package recovery

10 Attachment:

- 10.1 Documents Revise Record (QA-QR-027)

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ARTX Series Thin Film Chip Resistor Product Specification (Automotive Grade)

Document No.	IE-SP-173
Released Date	2021/07/09
Page No	9

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