

## Data Sheet

Customer :

Product : Automotive Grade High Voltage Thin Film Flat Chip Resistor- ARHV..A Series

Size: 1206 /1210

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## Automotive Grade High Voltage Thin Film Flat Chip Resistor



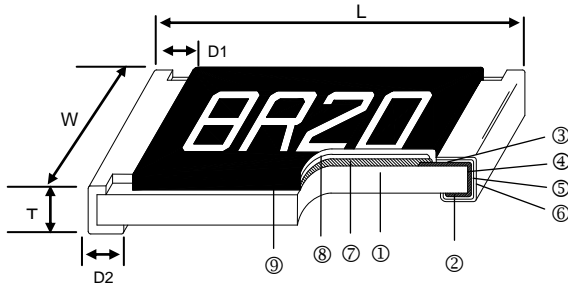
### ■ Features

- High operating voltage  $U_{max}$ . up to 1000 V
- Low voltage coefficient <1 ppm/V
- Superior moisture resistivity (85°C;85% RH)
- AEC-Q200 Compliance
- Test proven immunity to humidity, moisture, and sulfur

### ■ Applications

- Industrial and automotive inverters
- Battery management system
- Testing / Measurement Equipment
- Automatic Equipment Controller

### ■ Construction



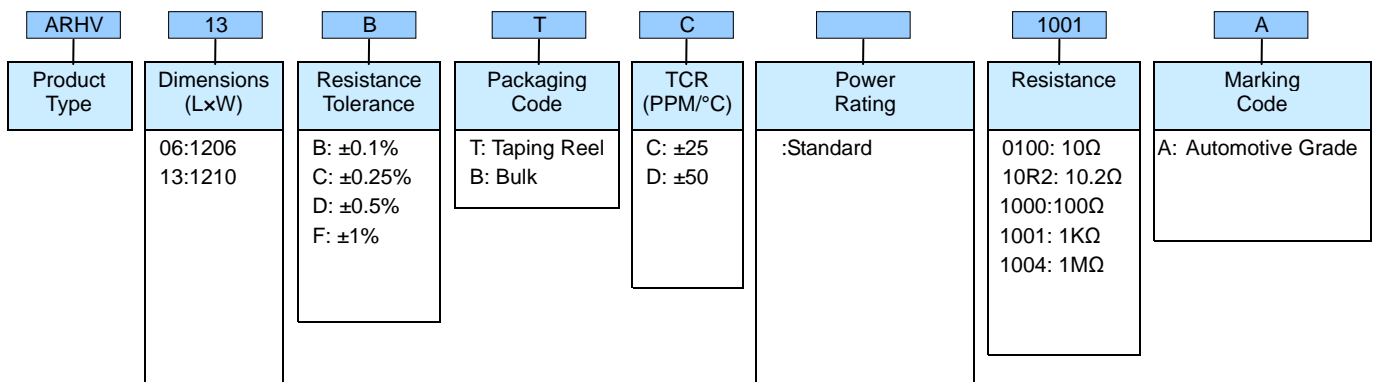
① Alumina Substrate	④ Edge Electrode	⑦ Resistor Layer
② Bottom Electrode	⑤ Barrier Layer	⑧ Overcoat
③ Top Electrode	⑥ External Electrode	⑨ Marking

### ■ Dimensions

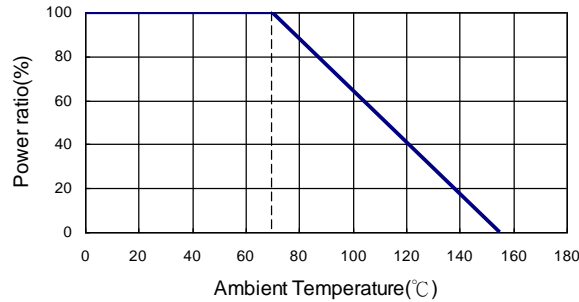
Unit: mm

Type	Size (Inch)	L	W	T	D1	D2	Weight (g) (1000pcs)
ARHV06	1206	3.05±0.15	1.55±0.15	0.55±0.10	0.42±0.20	0.35±0.25	10.8
ARHV13	1210	3.10±0.15	2.40±0.15	0.55±0.10	0.40±0.20	0.55±0.25	15.7

### ■ Part Numbering



**Derating Curve**



**Standard Electrical Specifications**

Type	Item	Power Rating at 70°C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range				TCR (PPM/°C)
						±0.1%	±0.25%	±0.5%	±1%	
ARHV06 (1206)		1/4W	-55 ~ +155°C	700V	1400V	160K~2MΩ				±25 ±50
ARHV13 (1210)		1/3W	-55 ~ +155°C	1000V	2000V	121K~3.01MΩ				±25 ±50

**Environmental Characteristics**

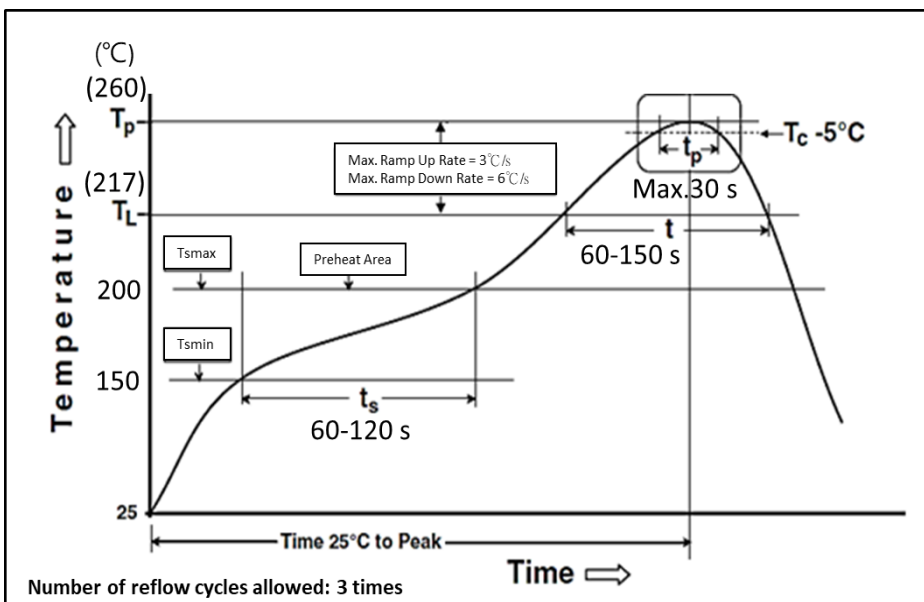
Item	Requirement	Test Method
Temperature Coefficient of Resistance (T.C.R.)	As Spec.	<b>JIS-C-5201-1 4.8</b> <b>IEC-60115-1 4.8</b> -55°C~+125°C, 25°C is the reference temperature
Short Time Overload	$\Delta R \pm 0.05\%$	<b>JIS-C-5201-1 4.13</b> $U = 2 \cdot \sqrt{P \cdot R}$ or Max. overload voltage whichever is lower for 5 seconds
Endurance	$\Delta R \pm 0.1\%$	<b>MIL-STD-202 Method 108</b> $U = \sqrt{P \cdot R}$ 1.5 h on; 0.5 h off; 70 °C; 1000 h
Damp Heat with Load	$\Delta R \pm 0.1\%$	<b>MIL-STD-202 Method 103</b> $U = 0.1 \cdot \sqrt{P \cdot R}$ 40±2°C, 90~95% R.H. 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Biased Humidity	$\Delta R \pm 0.25\%$	<b>MIL-STD-202 Method 103</b> $U = 0.3 \cdot \sqrt{P \cdot R}$ 1000 hrs 85°C/85%RH Voltage isn't exceeding 100V
Temperature Cycling	$\Delta R \pm 0.1\%$	<b>JESD22 Method JA-104</b> -55°C to +125°C, 1000 cycles
High Temperature Exposure	$\Delta R \pm 0.2\%$	<b>MIL-STD-202 Method 108</b> at +155°C for 1000 hrs

Single pulse high voltage overload	$\Delta R \pm 0.1\%$	<b>IEC61000-4-5</b> $U = 2 \times \sqrt{(P \cdot R)}$ 10pulses 10us / 700us
Periodic electric overload	$\Delta R \pm 0.1\%$	<b>IEC 60115-1 4.39</b> $U = 2 \times \sqrt{(P \cdot R)}$ 0.1 s on; 2.5 s off; 1000 cycles
Bending Strength (Board Flex)	$\Delta R \pm 0.05\%$	<b>JIS-C-5201-1 4.33</b> Bending amplitude 3mm for 60 seconds
Solderability	95% min. coverage	<b>JIS-C-5201-1 4.17</b> <b>IEC-60115-1 4.17</b> 245±5°C for 3 seconds
Resistance to Soldering Heat	$\Delta R \pm 0.02\%$	<b>JIS-C-5201-1 4.18</b> <b>IEC-60115-1 4.18</b> 260±5°C for 10 seconds
Terminal strength	No broken	<b>AEC-Q200-006</b> Force of 1.8 kg for 60 seconds.
Vibration	$\Delta R \pm 0.05\%$	<b>MIL-STD-202 Method 204</b> 5g's for 20min, 12 cycles each of 3 orientations, 10-2000Hz
ESD	$\Delta R \pm 0.5\%$	<b>AEC-Q200-002</b> Human body model 2KV
Resistance to solvents	Marking Unsmearred	<b>MIL-STD-202 Method 215</b> Add Aqueous wash chemical - OKEM Clean or equivalent. Do not use banned solvents.
Flammability	No ignition of the tissue paper or scorching or the pinewood board	<b>UL-94</b> V-0 or V-1 are acceptable. Electrical test not required.
Sulfur Test	$\Delta R \pm 1\%$	<b>ASTM-B-809-95 Modified</b> 105±2 °C no power rating for 750 hrs.

RCWV(Rated continuous working voltage)=  $\sqrt{(P \cdot R)}$  or Max. Operating voltage whichever is lower

- Storage Temperature: 15~28°C; Humidity < 80%RH
- Shelf Life: 2 years from production date.

**■ Soldering Condition(IPC/JEDEC J-STD-020)**



# 【ARHV..A Series】

Automotive Grade High Voltage Thin Film Flat Chip Resistor



## ■ Marking

1206/1210 4digit marking

Example

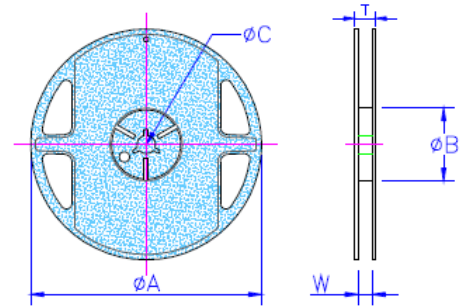
Resistance	100Ω	2.2KΩ	10KΩ	49.9KΩ	100KΩ
marking	1000	2201	1002	4992	1003

## ■ Packaging

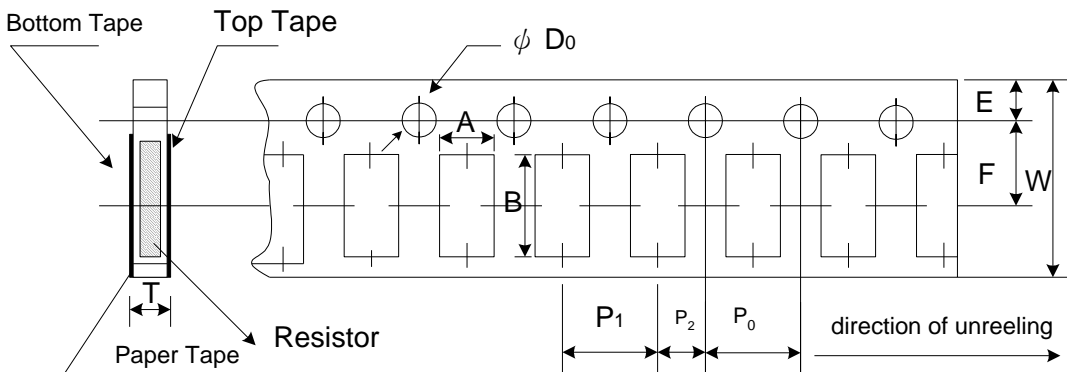
Packing Quantity & Reel Specifications

Unit :mm

Type	∅A	∅B	∅C	W	T	Paper Tape (EA)	Emboss Plastic Tape (EA)
ARHV06	178.0±1.0	60.0±1.0	13.5±0.7	9.5±1.0	11.5±1.0	5,000	
ARHV13	178.0±1.0	60.0±1.0	13.5±0.7	9.5±1.0	11.5±1.0	5,000	-



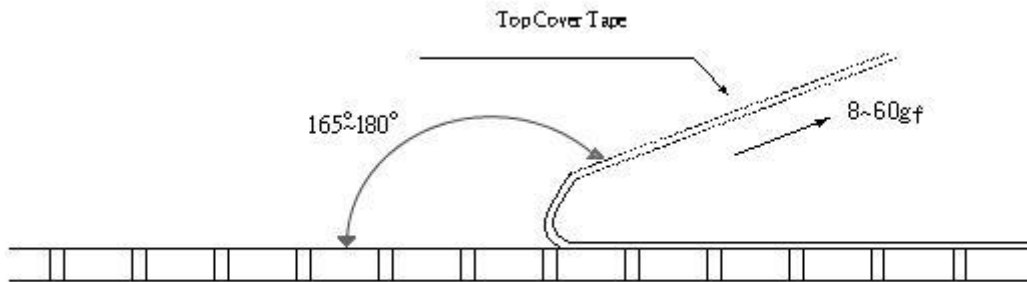
Paper Tape Specifications



Unit: mm

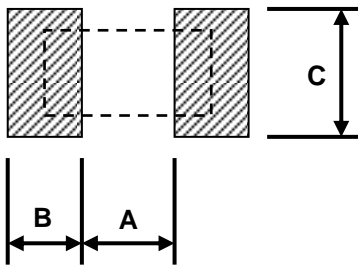
Type	A	B	W	E	F	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	∅D <sub>0</sub>	T
ARHV06	2.00±0.05	3.55±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.55±0.05	0.75±0.05
ARHV13	2.75±0.05	3.40±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.60±0.10	0.75±0.05

- Peel force of top cover tape
- The peel speed shall be about 300mm/min±5%
- The peel force of top cover tape shall be between 8gf to 60gf



**■Recommend Land Pattern**

Unit: mm



Type	A	B	C
ARHV06	2.00	1.15	1.70±0.2
ARHV13	2.00	1.15	2.50±0.2

**■Safety Precautions**

- Install the following fail-safe design systems to ensure safety. If these products are used in equipment, the defects of these products may cause casualties or other severe damage, such as damage to vehicles (cars, trains, ships), traffic lights, medical equipment, aviation Aerospace equipment, electric heating equipment, combustion/gas equipment, rotating equipment, and disaster/crime prevention equipment.
  - ★ The system is equipped with protection circuits and protection devices.
  - ★ The system is equipped with redundant circuits or other systems to prevent an unsafe state in the event of a single failure.
  - ★ The system is equipped with a system to prevent the spread of fire or prevent malfunctions.