

## Data Sheet

Customer :

Product :	Automotive Grade High Voltage Thin Film Flat Chip Resistor- ARHV..A Series
Size:	0805 /1206 /1210
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## Automotive Grade High Voltage Thin Film Flat Chip Resistor



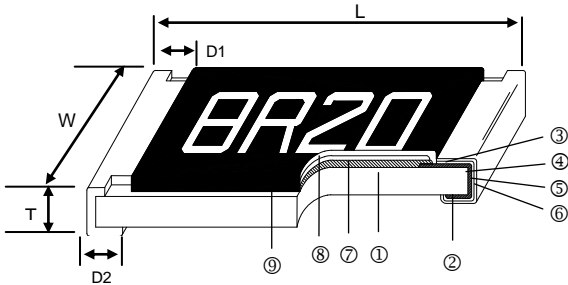
### ■ Features

- High operating voltage  $U_{max}$ . up to 1000 V
- Low voltage coefficient <math><1.5 \text{ ppm/V}</math>
- Superior moisture resistivity (85°C;85% RH)
- AEC-Q200 Qualified
- 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

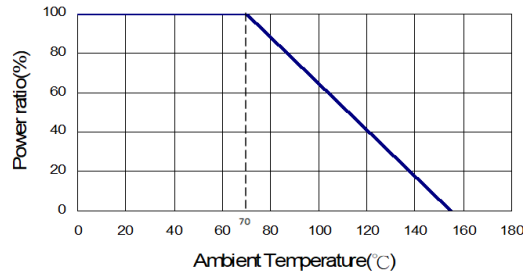
Type	Size (Inch)	L	W	T	D1	D2	Weight (g) (1000pcs)
ARHV05	0805	2.00±0.15	1.25±0.15	0.55±0.10	0.30±0.20	0.40±0.25	5.3
ARHV06	1206	3.05±0.15	1.55±0.15	0.55±0.10	0.42±0.20	0.35±0.25	10.8
ARHV13	1210	3.10±0.15	2.40±0.15	0.55±0.10	0.40±0.20	0.55±0.25	15.7

### ■ Part Numbering

ARHV	13	B	T	C		1001	A
Product Type	Dimensions (LxW)	Resistance Tolerance	Packaging Code	TCR (PPM/°C)	Power Rating	Resistance	Marking Code
	05:0805 06:1206 13:1210	B: ±0.1% C: ±0.25% D: ±0.5% F: ±1%	T: Taping Reel B: Bulk	B: ±10 N: ±15 C: ±25 D: ±50	:Standard* (See Remark)	0100: 10Ω 10R2: 10.2Ω 1000:100Ω 1001: 1KΩ 1004: 1MΩ	A: Automotive Grade NA: No Making Automotive Grade

\*Remark: Standard part no need for power rating code.

**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)	VCR (PPM/V)
						±0.1%	±0.25%	±0.5%	±1%		
ARHV05 (0805)		1/5W	-55 ~ +155°C	450V	900V	180K~1MΩ				±10 ±15 ±25 ±50	<1.5
ARHV06 (1206)		1/4W	-55 ~ +155°C	700V	1400V	160K~2MΩ				±10 ±15 ±25 ±50	<1.5
ARHV13 (1210)		1/3W	-55 ~ +155°C	1000V	2000V	121K~3.01MΩ				±10 ±15 ±25 ±50	<1.5

Operating Voltage= $\sqrt{P \cdot R}$  or Max. operating voltage listed above, whichever is lower.  
 Overload Voltage= $2 \cdot \sqrt{P \cdot R}$  or Max. overload voltage listed above, whichever is lower.

**Environmental Characteristics**

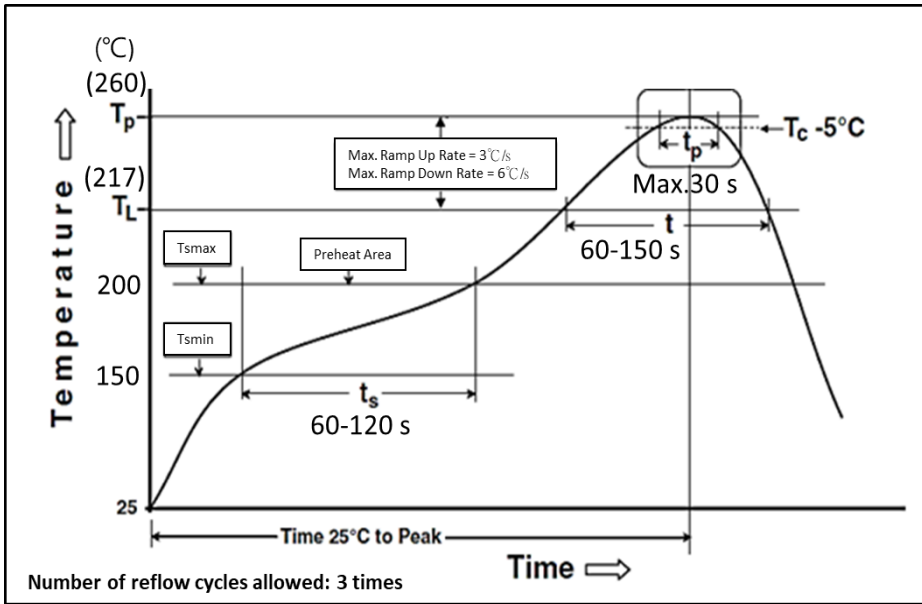
Item	Requirement	Test Method
Temperature Coefficient of Resistance (T.C.R.)	As Spec.	<b>JIS-C-5201-1 4.8</b> <b>IEC-60115-1 4.8</b> -55°C~+125°C, 25°C is the reference temperature
Short Time Overload	$\Delta R \pm 0.05\%$	<b>JIS-C-5201-1 4.13</b> $U = 2 \cdot \sqrt{P \cdot R}$ or Max. overload voltage 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 * Max. Operating Voltage 10 pulses 10us / 700us
Periodic electric overload	$\Delta R \pm 0.1\%$	<b>IEC 60115-1 4.39</b> U = 2 * Max. Operating Voltage 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 0805 : 2KV 1206.1210 : 6KV
Dielectric Withstand Voltage	By Type	<b>MIL-STD-202 Method 301</b> Max. Operating voltage for 1 minute
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 1000 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)**



Profile Feature	Pb-Free Assembly
<b>Preheat</b>	
Min. Temperature ( $T_{smin}$ )	150 °C
Max Temperature ( $T_{smax}$ )	200 °C
Preheating time ( $t_s$ ) from ( $T_{smin}$ to $T_{smax}$ )	60-120 seconds
Ramp-up rate ( $T_L$ to $T_p$ )	3 °C/second max.
Liquidous temperature ( $T_L$ )	217 °C
Time ( $t_L$ ) maintained above $T_L$	60-150 seconds
Min. Peak temperature ( $T_p$ min)	235°C
Max. Peak temperature ( $T_p$ max)	260°C
Time ( $t_p$ ) within 5 °C of the specified classification temperature ( $T_c$ )	30 seconds max.
Ramp-down rate ( $T_p$ to $T_L$ )	6 °C/second max.
Time 25 °C to peak temperature	8 minutes max.

# 【ARHV..A Series】

Automotive Grade High Voltage Thin Film Flat Chip Resistor



## ■ Marking

0805/1206/1210 4digit marking

Example

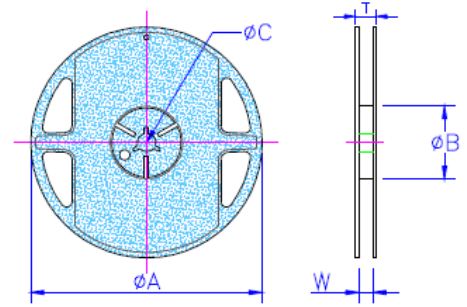
Resistance	100Ω	2.2KΩ	10KΩ	49.9KΩ	100KΩ
marking	1000	2201	1002	4992	1003

## ■ Packaging

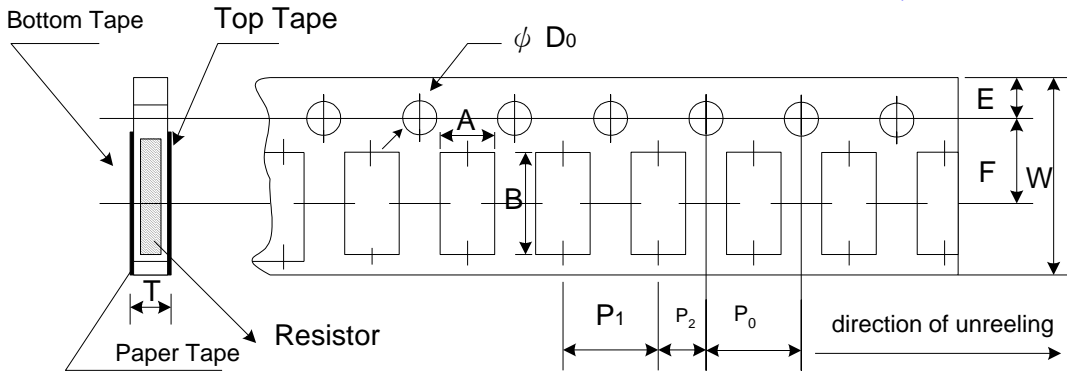
Packing Quantity & Reel Specifications

Unit :mm

Type	ØA	ØB	ØC	W	T	Paper Tape (EA)	Emboss Plastic Tape (EA)
ARHV05	178.0±1.0	60.0±1.0	13.5±0.7	9.5±1.0	11.5±1.0	5,000	-
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	-



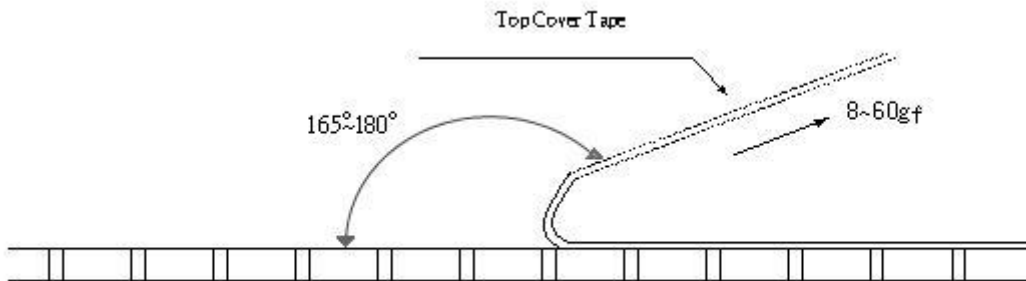
Paper Tape Specifications



Unit: mm

Type	A	B	W	E	F	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	ΦD <sub>0</sub>	T
ARHV05	1.60±0.05	2.37±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
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



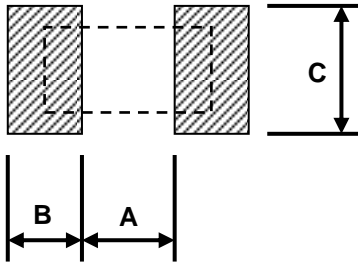
# 【ARHV..A Series】

Automotive Grade High Voltage Thin Film Flat Chip Resistor



## ■Recommend Land Pattern

Unit: mm



Type	A	B	C
ARHV05	1.00	1.00	1.35±0.2
ARHV06	2.00	1.15	1.70±0.2
ARHV13	2.00	1.15	2.50±0.2