

Data Sheet

Customer :

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

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Automotive Grade High Voltage Thin Film Flat Chip Resistor



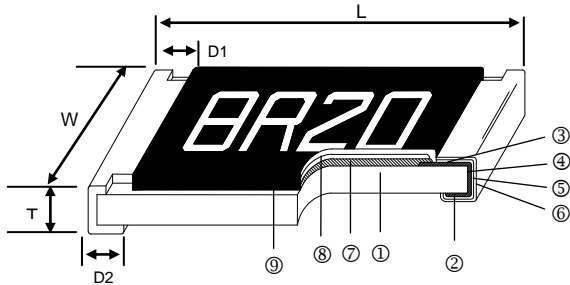
■ Features

- High operating voltage U_{max} . up to 1000 V
- Low voltage coefficient <1 ppm/V
- Superior moisture resistivity (85°C;85% RH)
- AEC-Q200 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

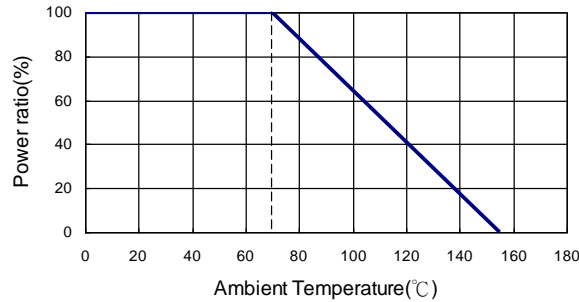
Unit: mm

Type	Size (Inch)	L	W	T	D1	D2	Weight (g) (1000pcs)
ARHV06	1206	3.05±0.15	1.55±0.15	0.55±0.10	0.42±0.20	0.35±0.25	9.02
ARHV13	1210	3.10±0.15	2.40±0.15	0.55±0.10	0.40±0.20	0.55±0.25	10

■ 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
	06:1206 13: 1210	B: ±0.1% C: ±0.25% D: ±0.5% F: ±1%	T: Taping Reel B: Bulk	C: ±25 D: ±50	:Standard	0100: 10Ω 10R2: 10.2Ω 1000:100Ω 1001: 1KΩ 1004: 1MΩ	A: Automotive Grade

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~1MΩ				±25 ±50
ARHV13 (1210)		1/3W	-55 ~ +155°C	1000V	2000V	121K~1MΩ				±25 ±50

Environmental Characteristics

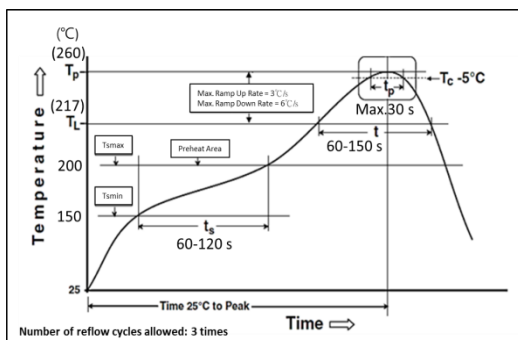
Item	Requirement	Test Method
Temperature Coefficient of Resistance (T.C.R.)	As Spec.	JIS-C-5201-1 4.8 IEC-60115-1 4.8 -55°C~+125°C, 25°C is the reference temperature
Short Time Overload	$\Delta R \pm 0.05\%$	JIS-C-5201-1 4.13 $U = 2 \cdot \sqrt{P \cdot R}$ or Max. overload voltage whichever is lower for 5 seconds
Endurance	$\Delta R \pm 0.1\%$	MIL-STD-202 Method 108 $U = \sqrt{P \cdot R}$ 1.5 h on; 0.5 h off; 70 °C; 1000 h
Damp heat	$\Delta R \pm 0.1\%$	MIL-STD-202 Method 103 $U = 0.1 \cdot \sqrt{P \cdot R}$ 40±2°C, 90~95% R.H. 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Biased Humidity	$\Delta R \pm 0.25\%$	MIL-STD-202 Method 103 $U = 0.3 \cdot \sqrt{P \cdot R}$ 1000 hrs 85°C/85%RH
Temperature Cycling	$\Delta R \pm 0.1\%$	JESD22 Method JA-104 -55°C to +125°C, 1000 cycles
High Temperature Exposure	$\Delta R \pm 0.2\%$	MIL-STD-202 Method 108 at +155°C for 1000 hrs

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

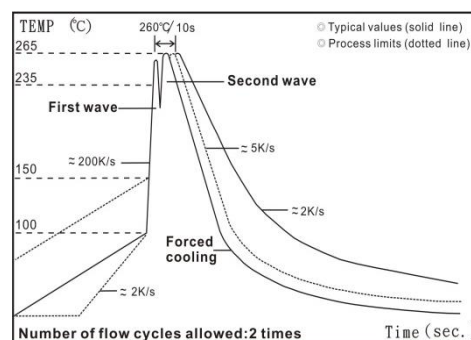
RCWV(Rated continuous working voltage)= $\sqrt{(P \cdot R)}$ or Max. Operating voltage whichever is lower

■ **Storage Temperature: 15~28°C; Humidity < 80%RH**

■ **Soldering Condition**



IR Reflow Soldering



Wave Soldering (Flow Soldering)

- (1) Time of IR reflow soldering at maximum temperature point 260°C : 10s
- (2) Time of wave soldering at maximum temperature point 260°C : 10s
- (3) Time of soldering iron at maximum temperature point 410°C : 5s

【ARHV..A Series】

Automotive Grade High Voltage Thin Film Flat Chip Resistor



■ Marking

0603 3digit marking

3digit marking for Example: 14C=13K7Ω 13C=13K3Ω

68B=4K99Ω 68X=49.9Ω



Marking Table

Code	E96	Code	E96	Code	E96	Code	E96				
01	100	25	178	49	316	73	562				
02	102	26	182	50	324	74	576				
03	105	27	187	51	332	75	590				
04	107	28	191	52	340	76	604				
05	110	29	196	53	348	77	619				
06	113	30	200	54	357	78	634				
07	115	31	205	55	365	79	649				
08	118	32	210	56	374	80	665				
09	121	33	215	57	383	81	681				
10	124	34	221	58	392	82	698				
11	127	35	226	59	402	83	715				
12	130	36	232	60	412	84	732				
13	133	37	237	61	422	85	750				
14	137	38	243	62	432	86	768				
15	140	39	249	63	442	87	787				
16	143	40	255	64	453	88	806				
17	147	41	261	65	464	89	825				
18	150	42	267	66	475	90	845				
19	154	43	274	67	487	91	866				
20	158	44	280	68	499	92	887				
21	162	45	287	69	511	93	909				
22	165	46	294	70	523	94	931				
23	169	47	301	71	536	95	953				
24	174	48	309	72	549	96	976				
Code	A	B	C	D	E	F	G	H	X	Y	Z
Multiplier	10 ⁰	10 ¹	10 ²	10 ³	10 ⁴	10 ⁵	10 ⁶	10 ⁷	10 ⁻¹	10 ⁻²	10 ⁻³

0603 3digit marking for E24

Example: 101=100Ω 102=1KΩ

E24	10	11	12	13	15	16	18	20	22	24	27	30	33	36	39	43	47	51	56	62	68	75	82	91
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0805-2512 4digit marking

Example

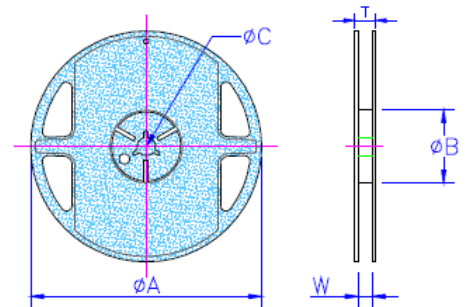
Resistance	100Ω	2.2KΩ	10KΩ	49.9KΩ	100KΩ
marking	1000	2201	1002	4992	1003

■Packaging

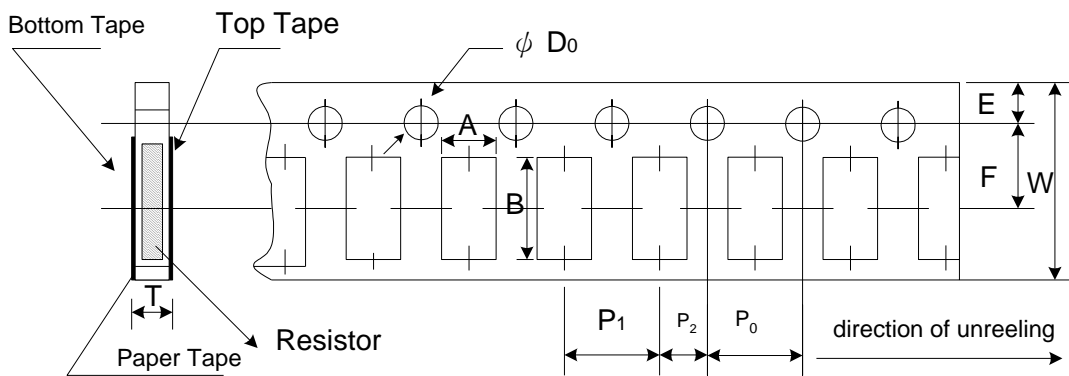
Packing Quantity & Reel Specifications

Unit :mm

Type	ØA	ØB	ØC	W	T	Paper Tape (EA)	Emboss Plastic Tape (EA)
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	-



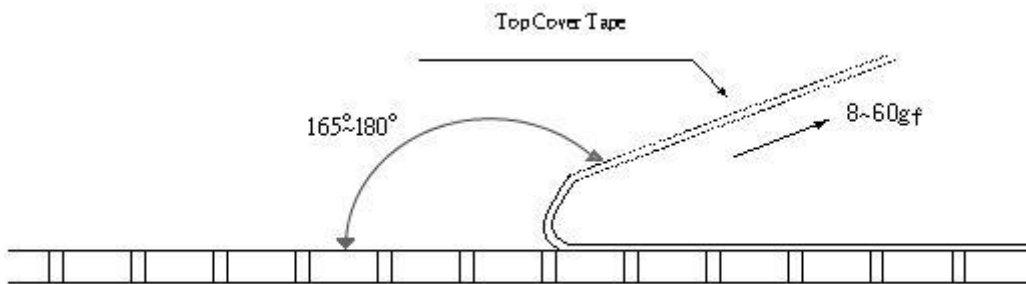
Paper Tape Specifications



Unit: mm

Type	A	B	W	E	F	P ₀	P ₁	P ₂	ΦD ₀	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



Emboss Plastic Tape Specifications

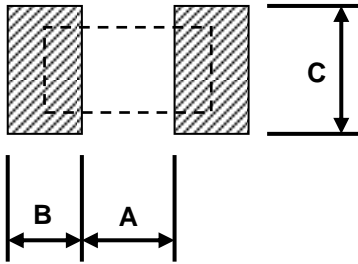
【ARHV..A Series】

Automotive Grade High Voltage Thin Film Flat Chip Resistor



■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

REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION