香港電阻

香 港 電 阻 製 造 廠

香港柴湾安业街十二号长益工业大厦**10**字楼**A**座

HONG KONG RESISTORS MANUFACTORY

(wholly owned by Hong Kong Resistors Manufactory International Ltd.)

AN ISO 9001:2015 CERTIFIED MANUFACTURER

AN ISO 45001: 2018 MANUFACTURER

AN ISO 14001: 2015 MANUFACTURER

10A Cheong Yick Industrial Building, 12 On Yip St., Chai Wan, Hong Kong

Tel.: (852)28962782 Fax.: (852) 28965291

国内工厂一 : 东莞溢辉电子有限公司

地址 : 广东省东莞市大岭山镇大岭山大道396号4栋801室

Tel.: (86 769)83315373 Fax.: (86 769) 83311603

国内工厂二:恒辉电阻(益阳)有限公司

地址 : 湖南省益阳市资阳区长春工业园五福路

Tel.: (86 737)3800399 Fax.: (86 737) 3800199

国内工厂三：南充溢辉电子科技有限公司

地址：四川省南充市高坪区青莲街道金辉路8号

Tel.: (86 817) 3315 388 Fax.:(86 817)3315 388

DATASHEET

Name of Product: Automotive Grade Metal Thin Film Chip Resistors-ARM Series

Sales Executive:_____ Date: 2023/11/27

制造 Prepared by	品质 Quality by	业务 Sales by	核准 Authorized by
客户 customer approval	客户 customer approval	客户 customer approval	客户 customer approval

Spec. No. ARM 2023

Rev. No.: 2023 Nov

Automotive Grade Metal Thin Film Chip Resistors



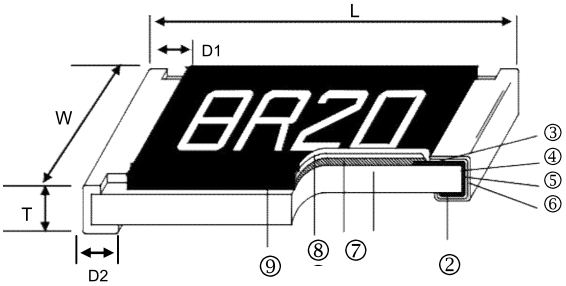
■Features

－AEC-Q200 Compliance
－High precision resistance tolerance: ±0.02%
－Low TCR down to ±5ppm/℃
－Advanced sulfur resistance verified according to ASTM B 809

■Applications

－Automotive
－Telecommunication
－Medical equipment
－Industrial equipment
Industrial measurement instrumentation, industrial machines
Various sensors, medical electronics

■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

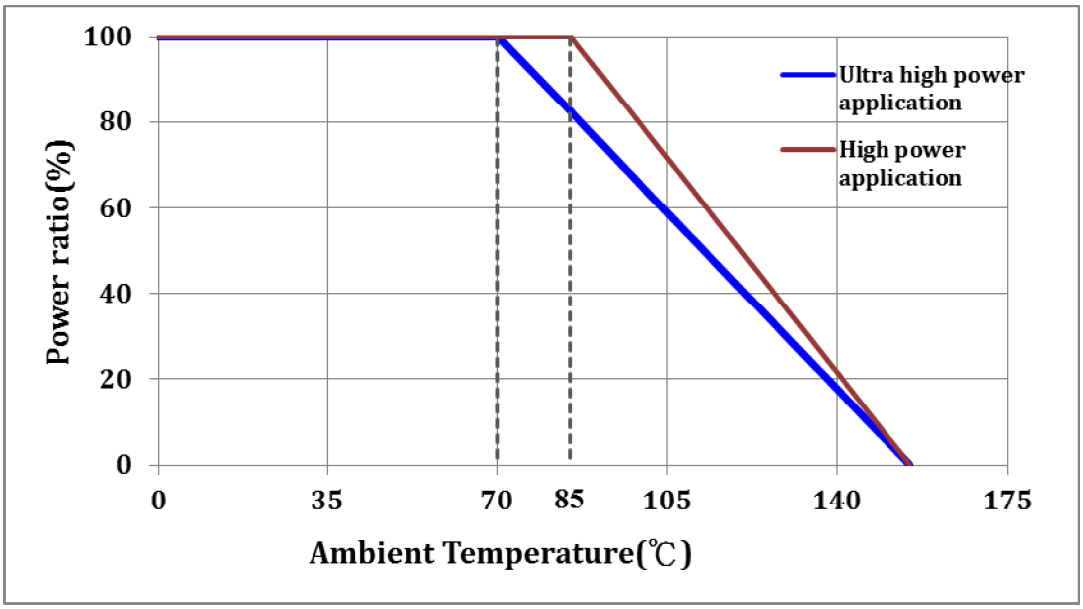
Unit: mm

Type	Size (Inch)	L	W	T	D1	D2
ARM02	0402	1.00±0.05	0.50±0.05	0.30±0.05	0.20±0.10	0.20±0.10
ARM03	0603	1.55±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20
ARM05	0805	2.00±0.15	1.25±0.15	0.55±0.10	0.30±0.20	0.40±0.20
ARM06	1206	3.05±0.15	1.55±0.15	0.55±0.10	0.42±0.20	0.35±0.25

■Part Numbering

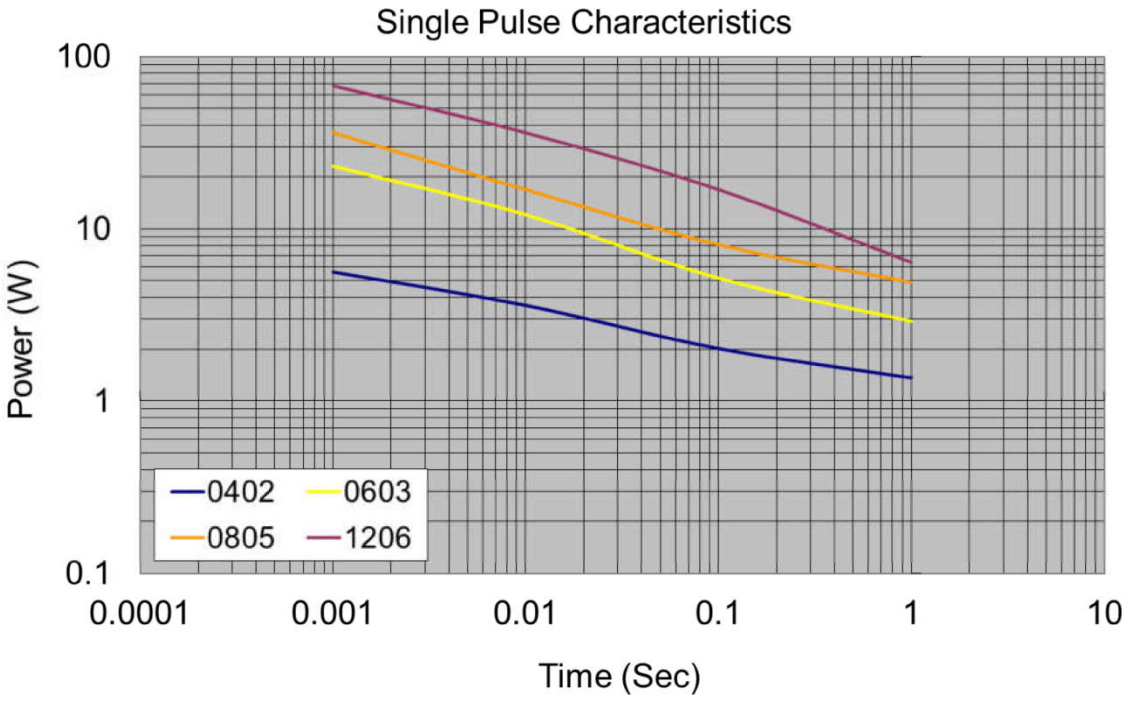
ARM	06	100R	D	C3	1/8W
Type	Size	Value	Tolerance	TCR	Power
	02 : 0402		P : ±0.02%	C7: ±5PPM	1/32W
	03 : 0603		A : ±0.05%	C6: ±10PPM	1/16W
	05 : 0805		B : ±0.1%	C3: ±25PPM	1/10W
	06 : 1206		D : ±0.5%	C2: ±50PPM	1/6W
				C1: ±100PPM	1/8W
					1/4W

■ Derating Curve



■ Functional Performance

Maximum pulse power limit



■ Electrical Specifications

Item / Type	Power Rating			Max. Operating Voltage	Max. Overload Voltage	Resistance Range				TCR (PPM/℃)
	Standard	High	Ultra high			±0.02%	±0.05%	±0.1%	±0.5%	
ARM02 (0402)	1/32W	1/16W	1/8W	75V	100V	100Ω – 3KΩ				±5
						100Ω – 3KΩ	47Ω – 100KΩ			±10
						100Ω – 3KΩ	47Ω – 100KΩ		47Ω – 150KΩ	±25
						–	–	47Ω – 100KΩ	10Ω –150KΩ	±100
ARM03 (0603)	1/16W	1/10W	1/6W	100V	200V	100Ω – 5.1KΩ				±5
						100Ω – 5.1KΩ	47Ω – 270KΩ			±10
						100Ω – 5.1KΩ	47Ω – 270KΩ	47Ω – 332KΩ	47Ω – 1MΩ	±25
						–	–	47Ω – 332KΩ	10Ω –1MΩ	±50
ARM05 (0805)	1/10W	1/8W	1/4W	150V	300V	100Ω – 10.2KΩ				±5
						100Ω – 10.2KΩ	47Ω – 475KΩ			±10
						100Ω – 10.2KΩ	47Ω – 475KΩ	47Ω – 2.7MΩ		±25
						–	–	47Ω – 2.7MΩ	10Ω –2.7MΩ	±50
ARM06 (1206)	1/8W	1/4W	–	200V	400V	100Ω – 33.2KΩ				±5
						100Ω – 33.2KΩ	47Ω – 1MΩ			±10
						100Ω – 33.2KΩ	47Ω – 1MΩ	47Ω – 5.1MΩ		±25
						–	–	47Ω – 5.1MΩ	10Ω –5.1MΩ	±50

Operating Voltage=√(P*R) or Max. operating voltage listed above, whichever is lower.
Overload Voltage=2.5*√(P*R) or Max. overload voltage listed above, whichever is lower.
Operating Temperature Range=-55 ~ +155°C
■HKR is capable of manufacturing the optional spec based on customer's requirement.

■ 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℃~+125℃, 25℃ is the reference temperature
Short Time Overload	≦47Ω ΔR±0.1% ≧47Ω ΔR±0.05% for Standard and High power rating		**JIS-C-5201-1 4.13** RCWV*2.5 or Max. overload voltage whichever is lower for 5 seconds
	ΔR±0.1% for Ultra high power rating		
Endurance	Standard power rating at 85℃	ΔR±0.1%	**MIL-STD-202 Method 108** RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
	High power rating at 85℃	ΔR±0.25%	
	Ultra high power rating at 70℃	ΔR±0.5%	
Biased Humidity	ΔR±0.1% for Standard power rating		**MIL-STD-202 Method 103** 1000 hrs 85℃/85%RH 10% of operating power.
	ΔR±0.25% for high power rating		
	ΔR±0.5% for Ultra high power rating		
High Temperature Exposure	≦47Ω ΔR±0.25% ≧47Ω ΔR±0.1% for 0603/0805/1206 size		**MIL-STD-202 Method 108** at +155℃ for 1000 hrs
	≦47Ω ΔR±0.25% ≧47Ω ΔR±0.2% for 0402 size		
Temperature Cycling	≦47Ω ΔR±0.25% ≧47Ω ΔR±0.1%		**JESD22 Method JA-104** -55℃ to +125℃, 1000 cycles
Resistance to soldering heat	ΔR±0.1%		**JIS-C-5201-1 4.18** **IEC-60115-1 4.18** 260±5℃ for 10 seconds
Insulation Resistance	>1000 MΩ		**JIS-C-5201-1 4.6** **IEC-60115-1 4.6** Apply $100V_{DC}$ for 1 minute
Bending Strength (Board Flex)	ΔR±0.1%		**JIS-C-5201-1 4.33** Bending once for 60 seconds Bending displacement: 1206 sizes: 3 mm
Solderability	95% min. coverage		**JIS-C-5201-1 4.17** **IEC-60115-1 4.17** 245±5℃ for 3 seconds
Terminal strength	No broken		**AEC-Q200-006** Force of 1.8kg for 60 seconds.
Mechanical Shock	ΔR±0.1%		**MIL-STD-202 Method 213** Wave Form: Tolerance for half sine shock pulse. Peak value is 100g's. Normal duration (D) is 6.
Vibration	ΔR±0.1%		**MIL-STD-202 Method 204** 5 g's for 20 min., 12 cycles each of 3 orientations, 10-2000 Hz
ESD	ΔR±0.5%		**AEC-Q200-002** Human body model ARM02、ARM03 0.2KV ARM05、ARM06 1KV
Resistance to solvents	Marking Unsmeared		**MIL-STD-202 Method 215** Add Aqueous wash chemical - OKEM Clean or equivalent. Do not use banned solvents.

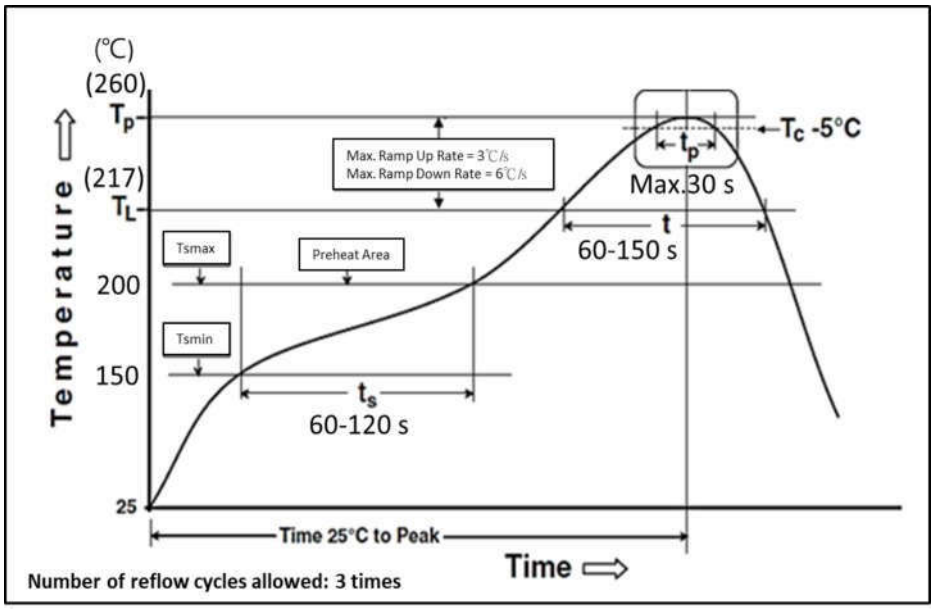
Sulfur Test	ΔR±1%	**ASTM-B-809-95 Modified** 105±2℃ no power rating for 750 hrs.
Flammability	No ignition of the tissue paper or scorching or the pinewood board	**UL-94** V-0 or V-1 are acceptable. Electrical test not required.

RCWV(Rated continuous working voltage)= √(P*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)



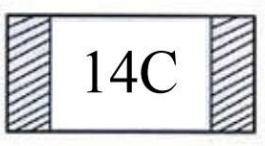
Reflow Profiles	
Profile Feature	**Pb-Free Assembly**
Preheat Min. Temperature (T_{smin}) Max Temperature (T_{smax}) Preheating time (t_s) from (T_{smin} to T_{smax})	 150 °C 200 °C 60-120 seconds
Ramp-up rate (T_L to Tp)	3 °C/second max.
Liquidous temperature (T_L) Time (t_L) maintained above T_L	217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

■ 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}

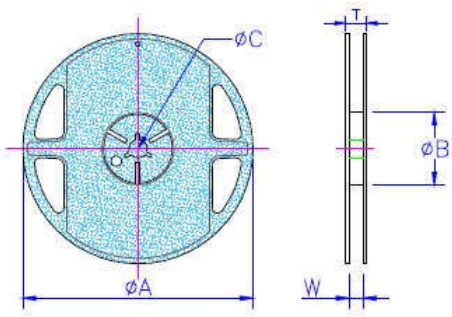
0603 3digit marking for E24 Example: 101=100Ω 102=1KΩ

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

0805~2512 4digit marking Example

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

■ Packaging

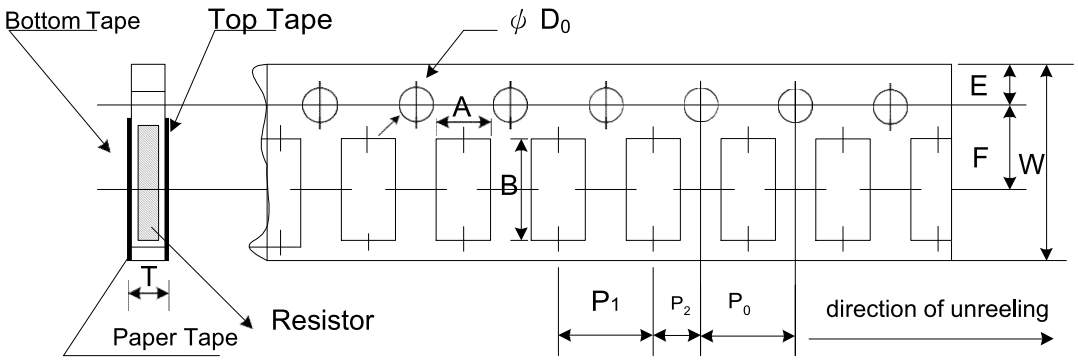


Packing Quantity & Reel Specifications

Unit :mm

Type	ØA	ØB	ØC	W	T	Paper Tape (EA)	Emboss Plastic Tape (EA)
ARM02	178.0±1.0	60.0+1.0	13.5±0.7	9.5±1.0	11.5±1.0	10,000	-
ARM03	178.0±1.0	60.0+1.0	13.5±0.7	9.5±1.0	11.5±1.0	5,000	-
ARM05	178.0±1.0	60.0+1.0	13.5±0.7	9.5±1.0	11.5±1.0	5,000	-
ARM06	178.0±1.0	60.0+1.0	13.5±0.7	9.5±1.0	11.5±1.0	5,000	-

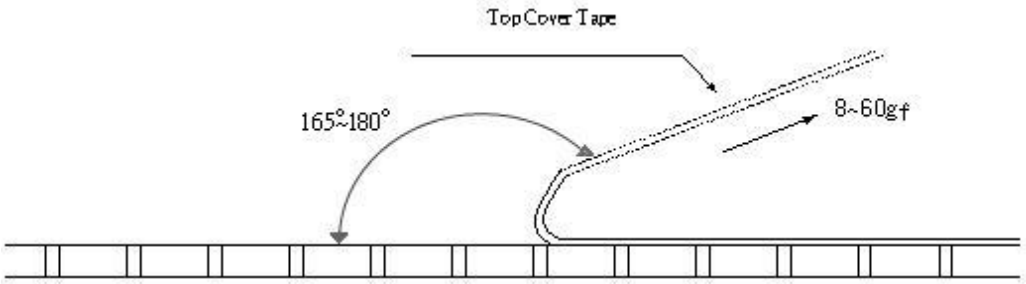
Paper Tape Specifications



Unit: mm

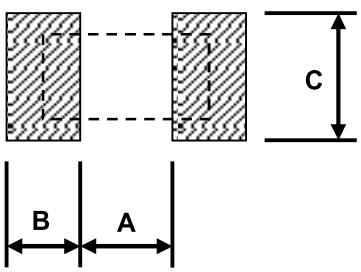
Type	A	B	W	E	F	P_0	P_1	P_2	ΦD_0	T
ARM02	0.70±0.05	1.16±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	2.00±0.05	2.00±0.05	1.55±0.05	0.40±0.03
ARM03	1.10±0.05	1.90±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.05	0.60±0.03
ARM05	1.60±0.05	2.37±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.05	0.75±0.05
ARM06	2.00±0.05	3.55±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.05	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
ARM02	0.50	0.50	0.60±0.2
ARM03	1.00	1.00	1.20±0.2
ARM05	1.20	1.40	1.65±0.2
ARM06	2.20	1.40	2.00±0.2