Data Sheet

Customer：	
Product :	Automotive Grade High Power Thin Film Chip Resistors – ARTP..A Series
Size:	0402/0603/0805
Issued Date:	1-Jul-24
Edition :	REV. A2

RoHS Compliant

HONG KONG HELISTO INDUSTRIAL LIMITED
香港海利斯特实业有限公司

SHENZHEN HELISTO TECHNOLOGYCOLTD
深圳市海利斯特科技有限公司

ADD:5/F., A Block, Hongdu Industrial Park, Fanshen Road, 45 Area, Baoan, Shenzhen, China
TEL:+86-755-29741555 29749555
FAX:+86-755-29742111
E-mail:donnyhai@helisto.com
www.Helisto.com

Produced by (QC)	Checked (QC)	Approved by (QC)	Prepared by (Sales)	Accepted by (Customer)
1-Jul-24	1-Jul-24	1-Jul-24		
Chun	***Ben Chang***	***Ben Chang***		

Automotive Grade High Power Thin Film Chip Resistors (ARTP..A Series)



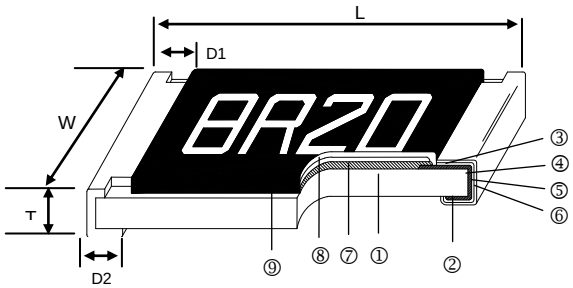
Features

- Operating temperature up to 175℃ for 1000 hr
- Rated dissipation up to 0.4 W for size 0805
- AEC-Q200 Qualified
- Superior temperature cycling robustness
- Advanced sulfur resistance verified according to ASTM B 809

Applications

- Automotive
- Industrial
- High power and high temperature applications
- Replacement for larger case sizes

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)
ARTP02	0402	1.00±0.05	0.50±0.05	0.30±0.05	0.20±0.10	0.20±0.10	0.54
ARTP03	0603	1.55±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	1.83
ARTP05	0805	2.00±0.15	1.25±0.15	0.55±0.10	0.30±0.20	0.40±0.20	4.71

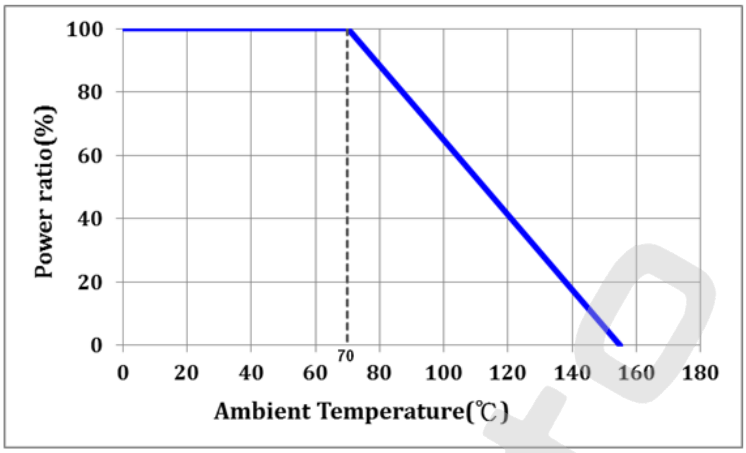
Part Numbering

ARTP	05	F	T	C		1001	A
Product Type	Dimensions (L×W)	Resistance Tolerance	Packaging Code	TCR (PPM/℃)	Power Rating	Resistance	Marking Code
	02: 0402 03: 0603 05: 0805	B: ±0.1% D: ±0.5% F: ±1%	T: Taping Reel B: Bulk	C: ±25 D: ±50	: Standard* (See Remark)	0100: 10Ω 10R2: 10.2Ω 1000: 100Ω 1001: 1KΩ 1002: 10 KΩ 1003: 100KΩ	A: Automotive Grade

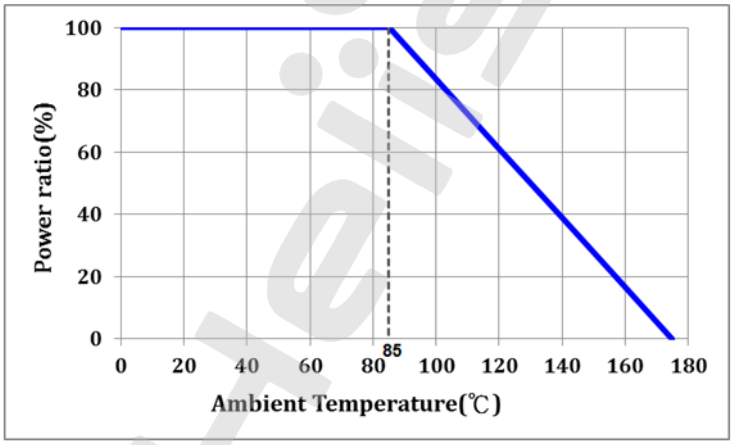
*Remark: Standard part no need for power rating code.

■Functional Performance

Derating- Power Operation 70

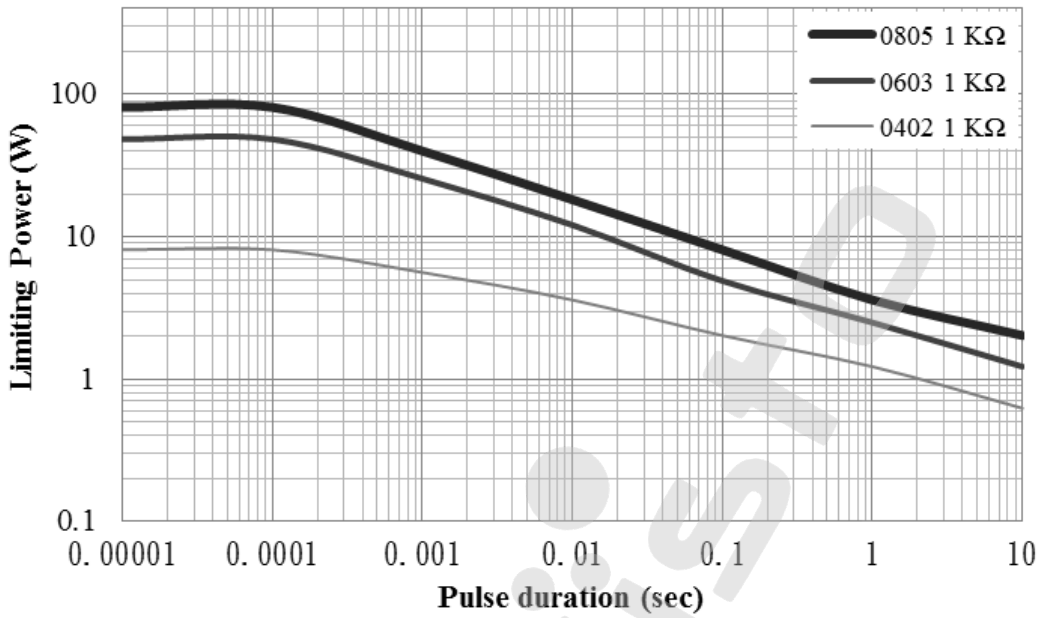


Derating- Advanced Power Operation

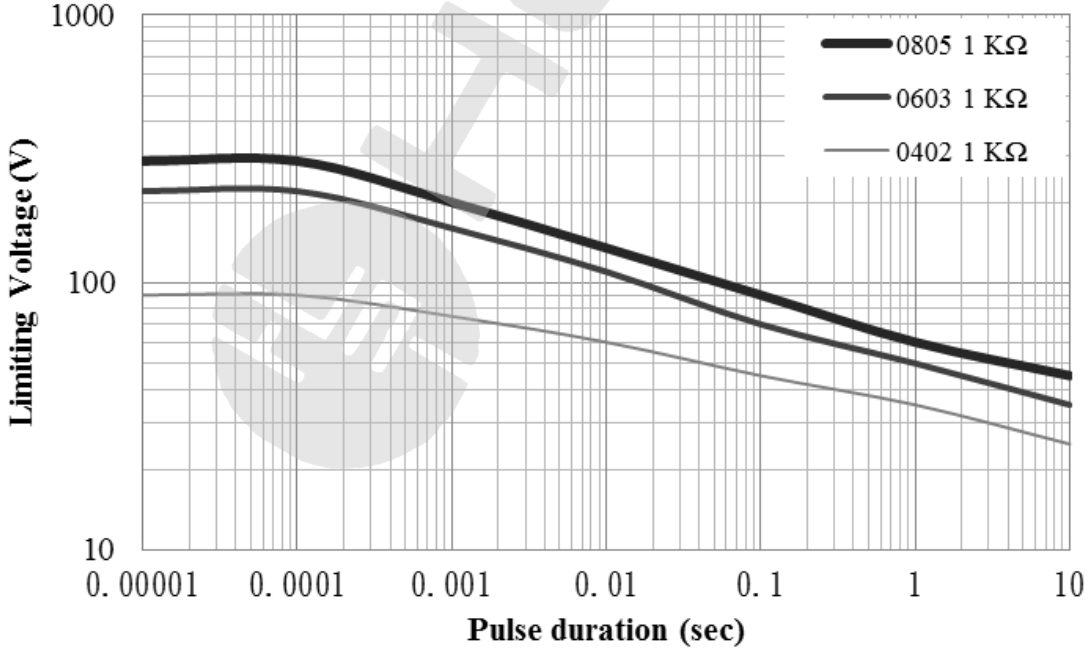


■Functional Performance

Single pulse



Pulse Voltage



■Standard Electrical Specifications

Item / Type	Power Rating at 85℃	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range			TCR (PPM/℃)
					±0.1%	±0.5%	±1%	
ARTP02	1/5W	-55 ~ +175°C	50V	100V	47Ω –100KΩ			±25
					47Ω – 100KΩ			±50
ARTP03	1/4W		75V	150V	47Ω –100KΩ	10Ω –100KΩ		±25
					–	10Ω – 100KΩ		±50
ARTP05	2/5W		150V	300V	47Ω –100KΩ	10Ω –100KΩ		±25
					–	10Ω – 100KΩ		±50

■Maximum Resistance Change at Rated Dissipation

Operation Mode		Power P_{70}	Advanced Temperature P_{85}
Rated dissipation	ARTP02	0.200W	0.200W
	ARTP03	0.250W	0.250W
	ARTP05	0.400W	0.400W
Operating temperature range		-55 ~ 155℃	-55 ~ 175℃
Permissible film temperature		155℃	175℃
Max. resistance change at rated dissipation for resistance range, |△R/R| after:	ARTP02	47Ω – 100KΩ	47Ω – 100KΩ
	ARTP03	10Ω – 100KΩ	10Ω – 100KΩ
	ARTP05	10Ω – 100KΩ	10Ω – 100KΩ
	1000hr	≦ 0.2%	≦ 0.3%
	8000hr	≦ 0.4%	–

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.
■Viking is capable of manufacturing the optional spec based on customer's requirement.

■Environmental Characteristics

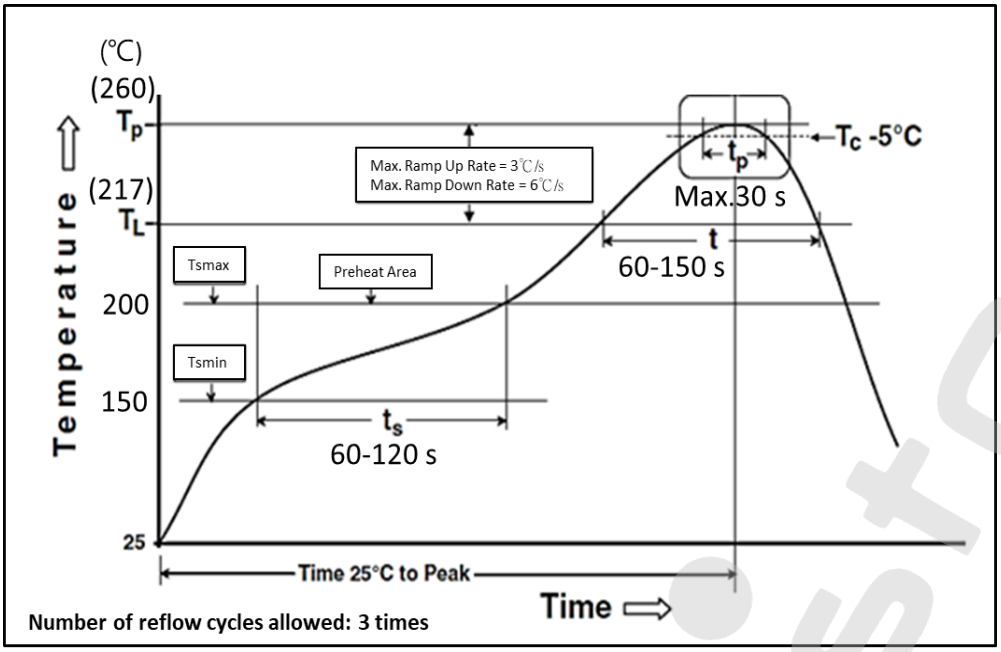
Item	Requirement			Test Method
Temperature Coefficient of Resistance (T.C.R.)	As Spec.			**MIL-STD-202 Method 304** +25/-55/+25/+125/+25°C
Short Time Overload (Power operation mode)	ΔR±0.25%			**JIS-C-5201-1 4.13** RCWV*2.5 or Max. overload voltage whichever is lower for 5 seconds
Insulation Resistance	>1000 MΩ			**MIL-STD-202 Method 302** Apply 100V_{DC} for 1 minute
Endurance	Power at 70 ℃	1000hrs	ΔR±0.20%	**MIL-STD-202 Method 108** RCWV with 1.5 hrs "ON" and 0.5 hrs "OFF" 1000 hrs
		8000hrs	ΔR±0.40%	
	Advanced temperature at 85℃	1000hrs	ΔR±0.30%	
High Temperature Exposure	ΔR±0.20%	+155°C		**MIL-STD-202 Method 108** 1000 hrs
	ΔR±0.30%	+175°C		
Temperature Cycling	ΔR±0.25%			**JESD22 Method JA-104** -55°C to +155°C, 1000 cycles
Biased Humidity	Power operation mode ΔR±0.5%			**MIL-STD-202 Method 103** 1000hrs 85℃/85%RH 10% of operating power (≦100 V)
Bending Strength (Board Flex)	ΔR±0.1%			**JIS-C-5201-1 4.33** Bending once for 60 seconds Bending displacement: 0402 0603 0805 sizes: 3 mm
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	ΔR±0.1%			**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 1.8kg 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 0402: 0.4KV；0603: 0.5KV；0805: 1.5KV
Resistance to solvents	Marking Unsmeared			**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.

RCWV(Rated continuous working voltage)= √(P*R) or Max. Operating voltage whichever is lower

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

■ **Shelf Life: 2 years from production date.**

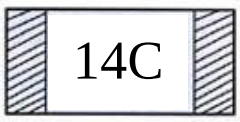
■Soldering Condition(IPC/JEDEC J-STD-020)



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

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 4digit marking Example

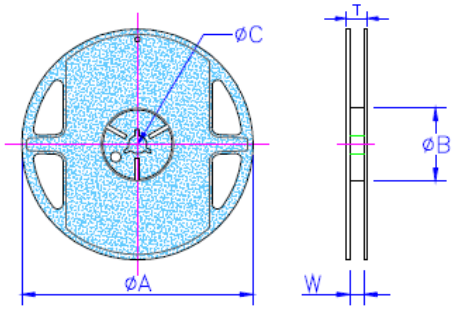
Resistance	100Ω	2.2KΩ	10KΩ	49.9KΩ	100KΩ
marking	1000	2201	1002	4992	1003

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}

■Packaging

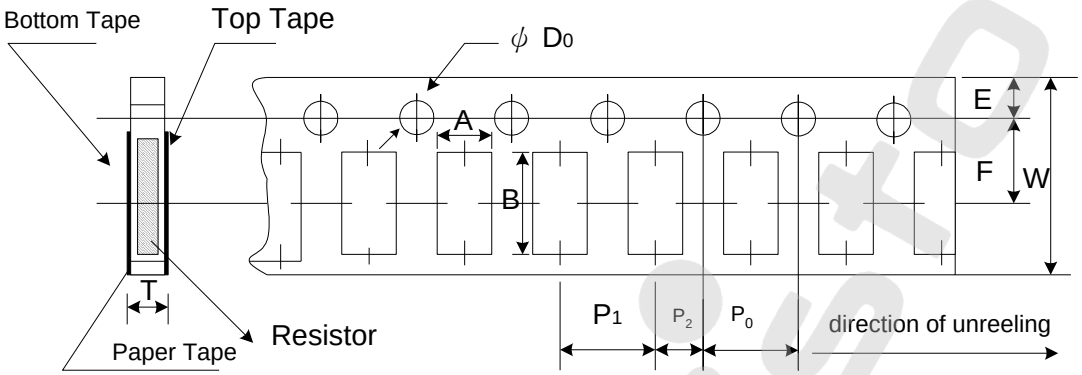


Packing Quantity & Reel Specifications

Unit :mm

Type	ØA	ØB	ØC	W	T	Paper Tape (EA)	Emboss Plastic Tape (EA)
ARTP02	178.0±1.0	60.0+1.0	13.5±0.7	9.5±1.0	11.5±1.0	10,000	-
ARTP03	178.0±1.0	60.0+1.0	13.5±0.7	9.5±1.0	11.5±1.0	5,000	-
ARTP05	178.0±1.0	60.0+1.0	13.5±0.7	9.5±1.0	11.5±1.0	5,000	-

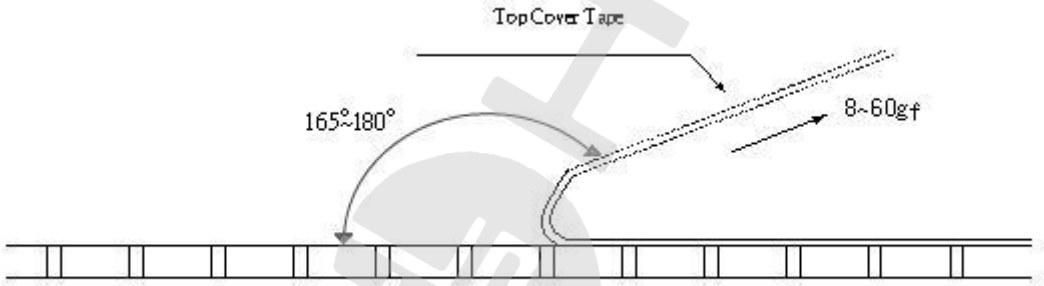
Paper Tape Specifications



Unit: mm

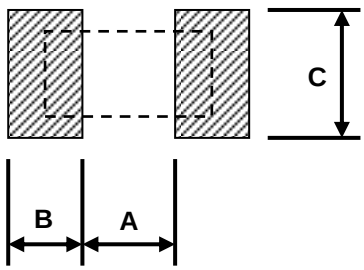
Type	A	B	W	E	F	P_0	P_1	P_2	ΦD_0	T
ARTP02	0.70±0.05	1.16±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	2.00±0.05	2.00±0.05	1.55±0.05	0.40±0.03
ARTP03	1.10±0.05	1.90±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.05	0.60±0.03
ARTP05	1.60±0.05	2.37±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.05	0.75±0.05

■ 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
ARTP02	0.50	0.50	0.60±0.2
ARTP03	0.80	1.00	0.90±0.2
ARTP05	1.00	1.00	1.35±0.2