Data Sheet

Customer:	
Product:	Automotive Grade Thick Film High Precision Low TCR Chip Resistor – CRTC..A Series
Size:	0402/0603/0805/1206
Issued Date:	26-Aug-25
Edition:	REV.A2

RoHS Compliant

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26-Aug-25	26-Aug-25	26-Aug-25		
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Automotive Grade Thick Film High Precision Low TCR Chip Resistor



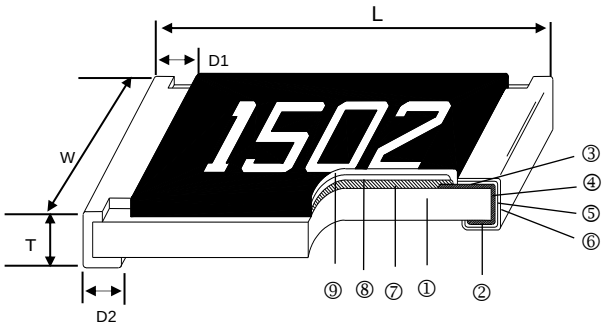
Scope

– This specification applies to all sizes of rectangular-type fixed chip resistors with Ruthenium-base as material.

Features

– AEC-Q200 qualified
– Small size and light weight
– Highly reliable multilayer electrode construction
– Compatible with all soldering process
– 100% CCD inspection
– MSL: Level 1

Construction



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

Applications

– Industrial
– Car Media
– Digital Cameras, Watches, Pocket Calculators
– Computers, Instruments
– Medical Equipment

Dimensions

Type	Size (Inch)	L (mm)	W (mm)	T (mm)	D1 (mm)	D2 (mm)	Weight (mg)
CRTC02	0402	1.00±0.05	0.50±0.05	0.35±0.05	0.18±0.10	0.25±0.10	0.6
CRTC03	0603	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	2.0
CRTC05	0805	2.00±0.10	1.25±0.10	0.50±0.10	0.35±0.20	0.40±0.20	4.4
CRTC06	1206	3.10±0.10	1.55±0.10	0.55±0.10	0.50±0.25	0.50±0.20	8.9

Part Numbering

CRTC	06	F	T	C	V	1002	A
Product Type	Dimensions	Resistance Tolerance	Packaging Code	TCR (PPM/°C)	Power Rating	Resistance	Marking
	02: 0402 03: 0603 05: 0805 06: 1206	B: ±0.1% C: ±0.25% D: ±0.5% F: ±1%	T: 7"Taping Reel V:10"Taping Reel W:13"Taping Reel	C: ±25 D: ±50	Y: 1/16W X: 1/10W W: 1/8W P: 1/5W V: 1/4W O: 1/3W	1000: 100Ω 2201: 2.2KΩ 1002: 10KΩ 1004: 1MΩ	A:Automotive Grade

■Standard Electrical Specifications

Item / Type	Power Rating at 70°C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range (E24、E96)				TCR (PPM/°C)
					±0.1%	±0.25%	±0.5%	±1%	
CRTC02 (0402)	1/16W	-55 ~ +155°C	50V	100V	300Ω~1M				±25* ±50
CRTC03 (0603)	1/10W		75V	150V	10Ω~1MΩ				
CRTC05 (0805)	1/8W		150V	300V	10Ω~3MΩ	10Ω~6.8MΩ	10Ω~10MΩ		
CRTC06 (1206)	1/4W		200V	400V	10Ω~5.1MΩ		10Ω~10MΩ		

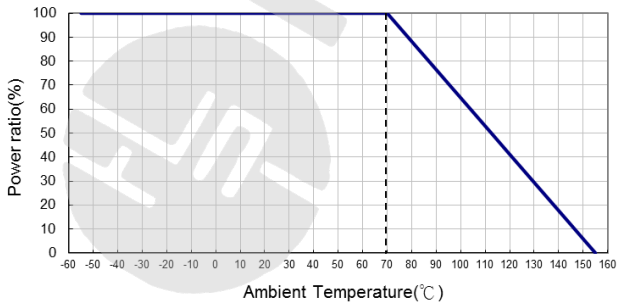
■High Power rating Electrical Specifications

Item / Type	Power Rating at 85°C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range (E24、E96)				TCR (PPM/°C)
					±0.1%	±0.25%	±0.5%	±1%	
CRTC02 (0402)	1/8W	-55 ~ +155°C	75V	100V	300Ω~1M				±25* ±50
CRTC03 (0603)	1/5W		100V	150V	10Ω~1MΩ				
CRTC05 (0805)	1/4W		150V	300V	10Ω~3MΩ	10Ω~6.8MΩ	10Ω~10MΩ		
CRTC06 (1206)	1/3W		200V	400V	10Ω~5.1MΩ		10Ω~10MΩ		

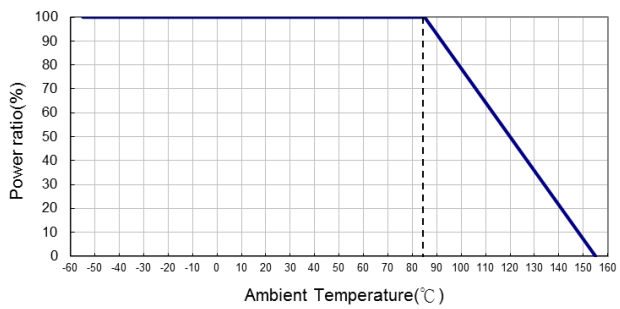
Operating Voltage=$\sqrt{}$(P*R) or Max. Operating Voltage listed above, whichever is lower.
Overload Voltage=2.5*$\sqrt{}$(P*R) or Max. Overload Voltage listed above, whichever is lower.
*TCR(25°C/-55°C): -50~+25PPM/°C
■ Viking is capable of manufacturing the optional spec based on customer's requirement.

■Derating Curve

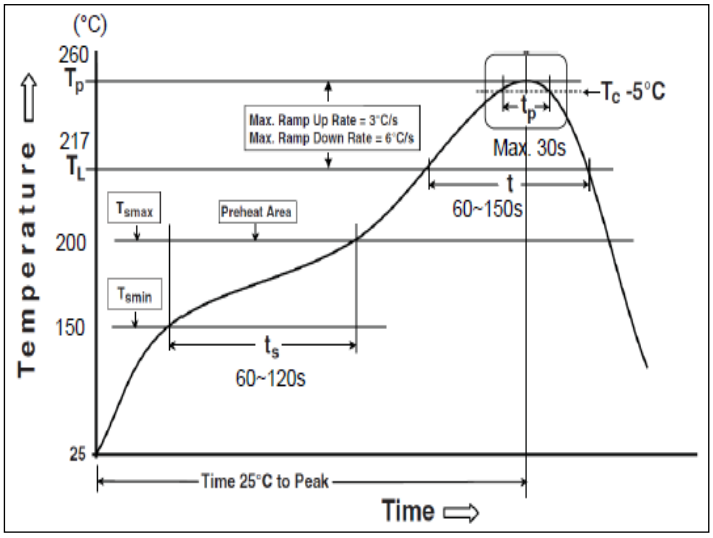
For Standard power rating:



For High power rating:



■Soldering Condition (Ref. IPC/JEDEC J-STD-020 & J-STD-002)



Reflow Profiles	
Profile Feature	**Pb-Free Assembly**
Preheat Min. Temperature (Tsmin) Max Temperature (Tsmax) Preheating time (ts) from (Tsmin to Tsmax)	 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.

■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** At 25°C/+125°C and 25°C/-55°C, 25°C is the reference temperature
Short Time Overload	±(0.2%+0.05Ω)	**JIS-C-5201-1 4.13** **IEC-60115-1 4.13** RCWV*2.5 or Max. Overload Voltage whichever is lower for 5 seconds.
Insulation Resistance	≥10G	**JIS-C-5201-1 4.6** **IEC-60115-1 4.6** Max. Overload Voltage for 1 minute
Endurance	For Standard power rating: 02(R≦30KΩ): ±(0.2%+0.05Ω) 02(R＞30KΩ): ±(0.4%+0.05Ω) 03,05,06: ±(0.2%+0.05Ω)	**JIS-C-5201-1 4.25** **IEC-60115-1 4.25.1** 70±2°C, RCWV for 1000 hrs with 1.5 hrs “ON” and 0.5 hr “OFF”
	For High power rating: 02(R≦30KΩ): ±(0.2%+0.05Ω) 02(R＞30KΩ): ±(0.4%+0.05Ω) 03,05,06: ±(0.2%+0.05Ω)	**MIL-STD-202 Method 108** 85±2°C, RCWV for 1000 hrs with 1.5 hrs “ON” and 0.5 hr “OFF”
Biased Humidity	±(1.0%+0.10Ω)	**MIL-STD-202 Method 103** 1000hrs 85°C/85%RH 10% of operating power (≦100V).
High Temperature Exposure	02(R≦30KΩ)/03(R≦200KΩ): ±(0.2%+0.05Ω) 02(R＞30KΩ)/03(R＞200KΩ): ±(0.5%+0.05Ω) 05,06: ±(0.2%+0.05Ω)	**MIL-STD-202 Method 108** At +155°C for 1000 hrs
Board Flex	±(1.0%+0.05Ω)	**AEC-Q200-005** Bending once for 60 seconds 3mm

Item	Requirement	Test Method
Solderability	95% min. coverage	**JIS-C-5201-1 4.17** **IEC-60115-1 4.17** **J-STD-002** 260±5°C for 3 seconds
Resistance to Soldering Heat	±(0.2%+0.05Ω)	**MIL-STD-202 Method 210** 260±5°C for 10 seconds
Voltage Proof	No breakdown or flashover	**JIS-C-5201-1 4.7** **IEC-60115-1 4.7** 1.42 times Max. Operating Voltage for 1 minute
Leaching	Individual leaching area ≦5% Total leaching area ≦ 10%	**JIS-C-5201-1 4.18** **IEC-60068-2-58 8.2.1** 260±5°C for 30 seconds
Temperature Cycling	02(R≦30KΩ): ±(0.2%+0.05Ω) 02(R＞30KΩ): ±(0.5%+0.05Ω) 03,05,06: ±(0.2%+0.05Ω)	**JESD22 Method JA-104** -55°C to +125°C, 1000 cycles
Mechanical Shock	±(0.25%+0.05Ω)	**MIL-STD-202 Method 213** Wave Form: Tolerance for half sine shock pulse. Peak value is 100g's. Normal duration (D) is 6.
Vibration	±(0.5%+0.05Ω)	**MIL-STD-202 Method 204** 5 g's for 20 min., 12cycles each of 3 orientations, 10-2000 HZ
ESD	±(3%+0.05Ω)	**AEC-Q200-002** Human body model 0402/0603: 1KV 0805 and above: 2KV
Resistance to Solvents	No visible damage on appearance and marking.	**MIL-STD-202 Method 215** Add aqueous wash chemical – OKEM Clean or equivalent. DO not use banned solvents.
Terminal Strength	No broken	**AEC-Q200-006** Force of 1.8kg for 60 seconds
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	△R±1%	**EIA-977 (Condition A)** 60±2°C, no power rating for 500 hrs.

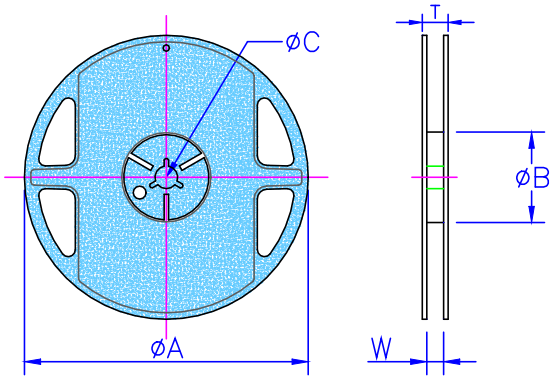
RCWV(Rated Continuous Working Voltage)=√(P*R) or Max. Operating Voltage whichever is lower.

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

■Shelf Life: 2 years from production date.

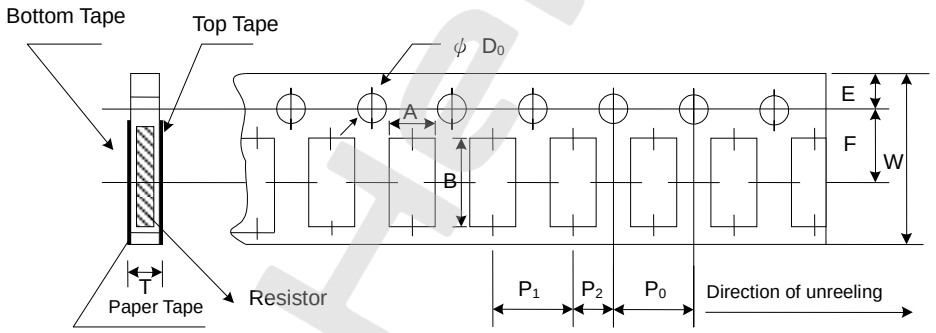
■Packaging

Reel Specifications & Packaging Quantity



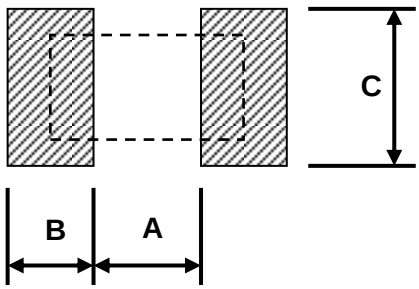
Type	Packaging Quantity		Tape Width	Reel Diameter	ΦA (mm)	ΦB (mm)	ΦC (mm)	W (mm)	T (mm)
CRTC02	Paper	10K	8mm	7 inch	178.5±1.5	$60^{+1/-0}$	13.0±0.2	9.0±0.5	12.5±0.5
		20K	8mm	10 inch	254±1.0	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
		40K	8mm	13 inch	330±1.0	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
CRTC03 CRTC05 CRTC06	Paper	5K	8mm	7 inch	178.5±1.5	$60^{+1/-0}$	13.0±0.2	9.0±0.5	12.5±0.5
		10K	8mm	10 inch	254±1.0	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
		20K	8mm	13 inch	330±1.0	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5

Paper Tape Specifications



Type	A (mm)	B (mm)	W (mm)	E (mm)	F (mm)	P_0 (mm)	P_1 (mm)	P_2 (mm)	ΦD_0 (mm)	T (mm)
CRTC02	0.65±0.10	1.15±0.10	8.0±0.20	1.75±0.10	3.50±0.05	4.00±0.10	2.00±0.05	2.00±0.05	1.50+0.1,-0	0.45±0.10
CRTC03	1.10±0.10	1.90±0.10	8.0±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.70±0.10
CRTC05	1.60±0.10	2.40±0.20	8.0±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.10
CRTC06	1.90±0.10	3.50±0.20	8.0±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.10

■Recommend Land Pattern



Type	A (mm)	B (mm)	C (mm)
CRTC02	0.50	0.45	0.60
CRTC03	0.90	0.60	0.90
CRTC05	1.20	0.70	1.30
CRTC06	2.00	0.90	1.60

■Marking

No Marking for 0402

0805/1206: 4 digits marking

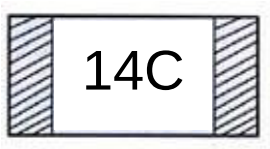
Example:

Resistance	97.6Ω	100Ω	2.2KΩ	10KΩ	49.9KΩ	100KΩ
Marking	97R6	1000	2201	1002	4992	1003

0603(E24): 3 digits marking in E24, When the E24 and E96 are the same resistance, this marking in E96

Example: 01A= 100Ω 05C=11KΩ 123=12KΩ 273=27KΩ

0603(E96): 3 digits marking in E96



3 digits 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**	**X**	**Y**		
Multiplier	10^0	10^1	10^2	10^3	10^4	10^5	10^6	10^{-1}	10^{-2}		

REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version A	Apr 02, 2024	-	- New product release
Version A1	Mar 26, 2025	-	- Modify the descriptions in the Features
Version A2	Aug 26, 2025	-	- Modify 0402 Dimensions