HITANO ENTERPRISE CORP.

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Data Sheet

Customer：

Product : Automotive Grade Green Chip Resistor – HCRG Series

Size: 0402/0603/0805/1206/1210/2010/2512

Issued Date: 15-Jun-22

Edition : REV.A

Record of change

Date	Ver.	Description	Page

VENDOR：	
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MAKER：	
☐ **VIKING TECH CORPORATION** No.70, Guangfu N. Rad., Hsin Chu Industrial Park, Hukou Hsiang, Hsin Chu Hsien, 303, Taiwan TEL:886-3-5972931 FAX:886-3-5972935•886-3-5973494	

HITANO
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Since 1980

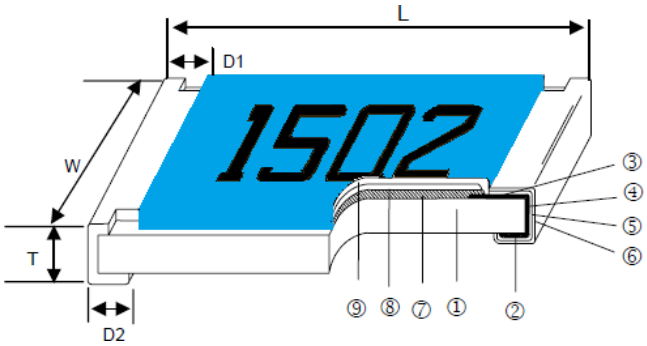
HCRG series.

Automotive Grade Green Chip Resistor

■ Features

- —AEC-Q200 Compliance
- —Total Lead(Pb)-free without RoHS exemptions
- —Highly reliable multilayer electrode construction
- —Compatible with all soldering process
- —100% CCD inspection

■ 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	⓪	Secondary Overcoat

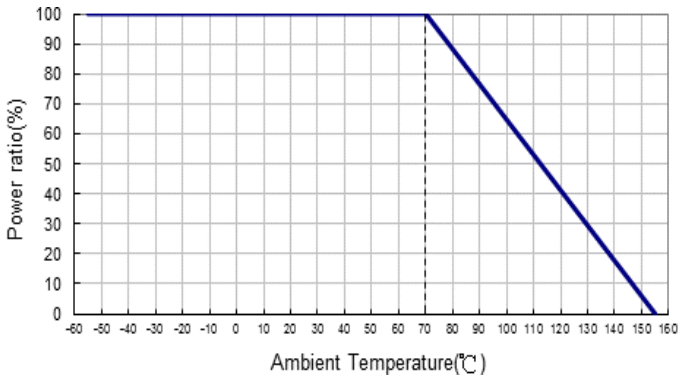
■ Applications

- —Automotive Industry
- —Telecommunication Equipments
- —Radio and Tape Recorders, TV Tuners
- —Digital Cameras, Watches, Pocket Calculators
- —Computers, Instruments
- —Medical Equipment

■ Dimensions

Type	Size (Inch)	L (mm)	W (mm)	T (mm)	D1 (mm)	D2 (mm)	Weight (g) (1000pcs)
HCRG02	0402	1.00±0.05	0.50±0.05	0.35±0.05	0.20±0.10	0.20±0.10	0.6
HCRG03	0603	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	2.0
HCRG05	0805	2.00±0.10	1.25±0.10	0.50±0.10	0.35±0.20	0.40±0.20	4.3
HCRG06	1206	3.10±0.10	1.55±0.10	0.55±0.10	0.50±0.25	0.50±0.20	8.9
HCRG10	1210	3.10±0.10	2.60±0.15	0.55±0.10	0.50±0.25	0.50±0.20	16
HCRG0A	2010	5.00±0.10	2.50±0.15	0.55±0.10	0.60±0.25	0.50±0.20	24
HCRG12	2512	6.35±0.10	3.10±0.15	0.55±0.10	0.60±0.25	0.50±0.20	39

■ Derating Curve



*** If you have any request not find from above datas, please contact our sales for further information, we may do our best to meet your request.*

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■ Part Numbering

Part Number：HCRG03FA7---10R

Part Number：HCRG03JA7----0R

HCRG	03	F	A	7	-	-	-	1	0	R
HCRG	03	J	A	7	-	-	-	-	0	R

Product Type	Dimensions	Resistance Tolerance	Function Code	Packaging Code	Resistance
HCRG	02: 0402 03: 0603 05: 0805 06: 1206 10: 1210 0A: 2010 12: 2512	F: ±1% J: ±5%	A: Automotive Grade	4: 7" Reel 4Kpcs 6: 7" Reel 10Kpcs 7: 7" Reel 5Kpcs	- - - 1R2: 1.2Ω - - - 3K3: 3.3KΩ - - - 10K: 10KΩ - - 100K: 100KΩ "-" to fill up 6 spaces

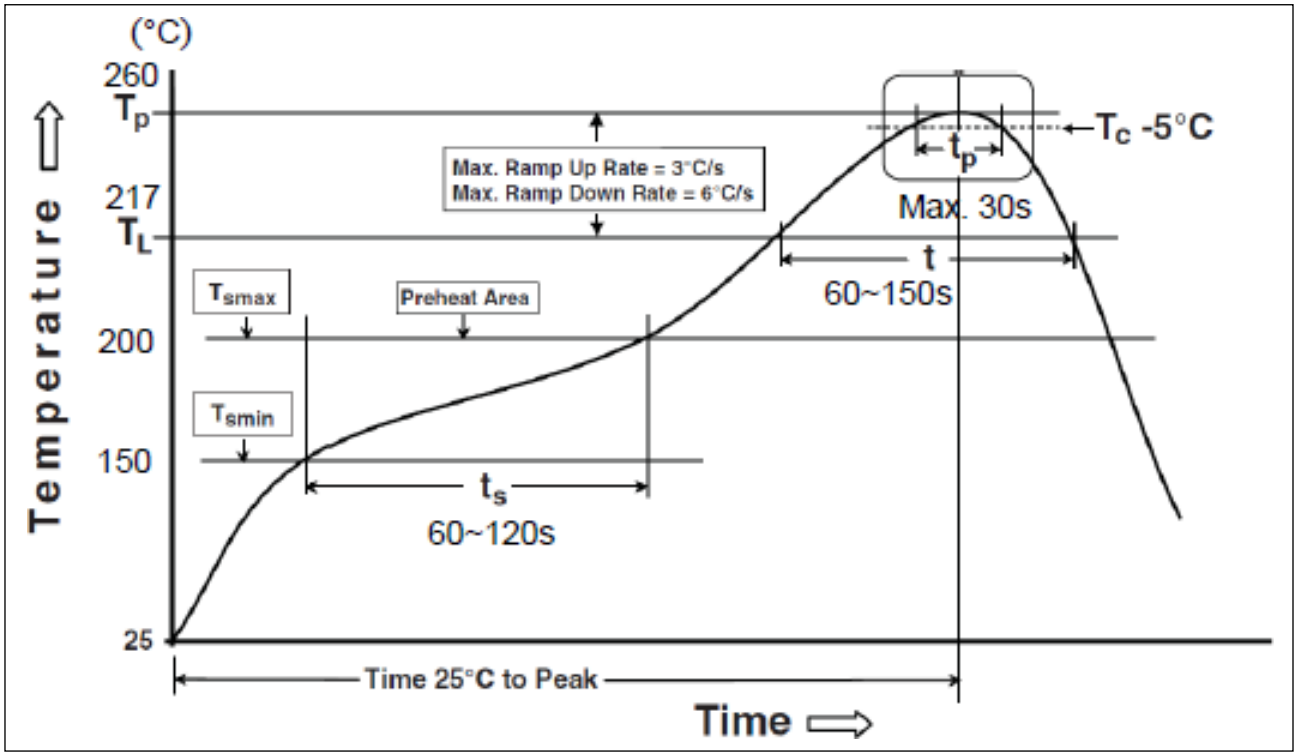
■ Standard Electrical Specifications

Item / Type	Power Rating at 70°C Jumper Rated Current	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range ±1%(E24、E96)	Resistance Range ±5%(E24)	TCR (PPM/°C)
HCRG02 (0402)	1/16W	-55 ~ +155°C	50V	100V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 10MΩ		±200 ±100 ±200
	Jumper: 1A				-	0Ω (<50mΩ)	-
HCRG03 (0603)	1/10W	-55 ~ +155°C	75V	150V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 10MΩ		±200 ±100 ±200
	Jumper: 1A				-	0Ω (<50mΩ)	-
HCRG05 (0805)	1/8W	-55 ~ +155°C	150V	300V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 10MΩ		±200 ±100 ±200
	Jumper: 2A				-	0Ω (<50mΩ)	-
HCRG06 (1206)	1/4W	-55 ~ +155°C	200V	400V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 10MΩ		±200 ±100 ±200
	Jumper: 2A				-	0Ω (<50mΩ)	-
HCRG10 (1210)	1/3W	-55 ~ +155°C	200V	400V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 10MΩ		±200 ±100 ±200
	Jumper: 2.5A				-	0Ω (<50mΩ)	-
HCRG0A (2010)	3/4W	-55 ~ +155°C	200V	400V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 10MΩ		±200 ±100 ±200
	Jumper: 3.5A				-	0Ω (<50mΩ)	-
HCRG12 (2512)	1W	-55 ~ +155°C	250V	500V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 10MΩ		±200 ±100 ±200
	Jumper: 4A				-	0Ω (<50mΩ)	-

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.

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

■ 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.

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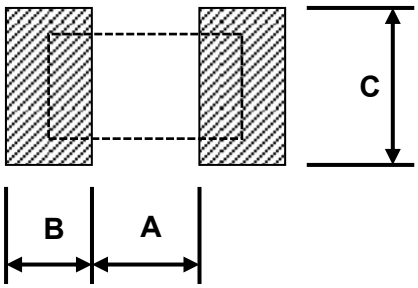
■ Recommend Land Pattern



Type	A (mm)	B (mm)	C (mm)
HCRG02	0.50	0.45	0.60
HCRG03	0.90	0.60	0.90
HCRG05	1.20	0.70	1.30
HCRG06	2.00	0.90	1.60
HCRG10	2.00	0.90	2.80
HCRG0A	3.80	0.90	2.80
HCRG12	4.90	1.60	3.50

■ Environmental Characteristics

Item	Requirement		Test Method
	±1%	±5%	
Temperature Coefficient of Resistance (T.C.R.)	As Spec.		**JIS-C-5201-1 4.8** **IEC-60115-1 4.8** At 25°C/-55°C and 25°C/+125°C, 25°C is the reference temperature
Short Time Overload	±(1.0%+0.05Ω)	±(2.0%+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
Operational Life	±(2.0%+0.05Ω)	±(3.0%+0.10Ω)	**MIL-STD-202 Method 108** Condition D Steady State TA=125°C at derated power. Measurement at 24±4 hours after test conclusion.
Biased Humidity	±(2.0%+0.05Ω)	±(3.0%+0.10Ω)	**MIL-STD-202 Method 103** 1000 hrs 85°C/85%RH 10% of operating power
High Temperature Exposure	±(1.0%+0.05Ω)	±(1.5%+0.10Ω)	**MIL-STD-202 Method 108** at +155°C for 1000 hrs
Board Flex	±(1.0%+0.05Ω)	±(1.0%+0.05Ω)	**AEC-Q200-005** Bending once for 60 seconds 2010, 2512 sizes: 2mm Other sizes: 3mm
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	±(0.5%+0.05Ω)	±(1.0%+0.05Ω)	**JIS-C-5201-1 4.18** **IEC-60115-1 4.18** 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	±(1.0%+0.05Ω)		**JESD22 Method JA-104** -55°C to +125°C, 1000 cycles

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Item	Requirement		Test Method
	±1%	±5%	
Mechanical Shock	±(1.0%+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	±(1.0%+0.05Ω)		**MIL-STD-202 Method 204** 5 g's for 20 min., 12 cycles each of 3 orientations, 10-2000 Hz
ESD	±(3%+0.05Ω)		**AEC-Q200-002** Human body model 0402/0603: 0.5KV 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%	△R±5%	**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.**

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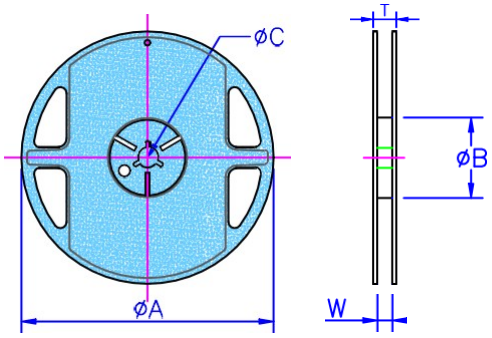
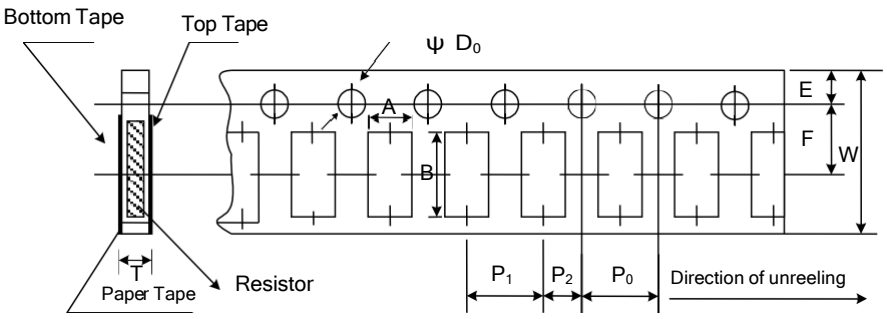
Packaging

Reel Specifications & Packaging Quantity



Type	Packaging Quantity		Tape Width	Reel Diameter	ΦA (mm)	ΦB (mm)	ΦC (mm)	W (mm)	T (mm)
HCRG02	Paper	10K	8mm	7 inch	178.5±1.5	$60^{+1/-0}$	13.0±0.2	9.0±0.5	12.5±0.5
HCRG03 HCRG05 HCRG06 HCRG10	Paper	5K	8mm	7 inch	178.5±1.5	$60^{+1/-0}$	13.0±0.2	9.0±0.5	12.5±0.5
HCRG0A HCRG12	Embossed	4K	12mm	7 inch	178.5±1.5	$60^{+1/-0}$	13.0±0.5	13.0±0.5	15.5±0.5

Paper Tape Specifications

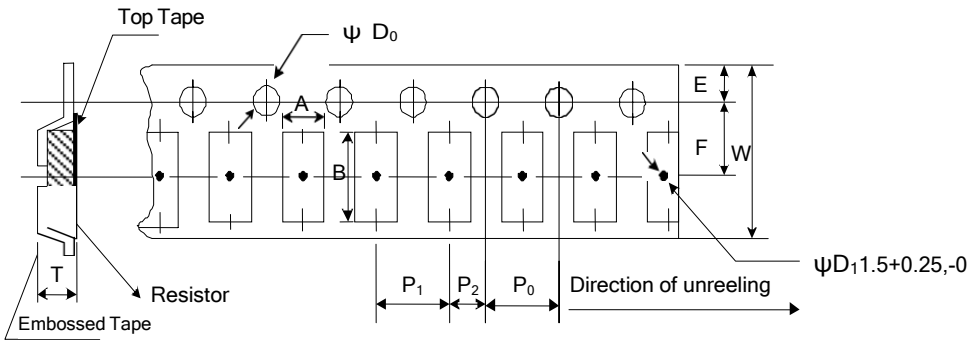


Type	A (mm)	B (mm)	W (mm)	E (mm)	F (mm)	P_0 (mm)	P_1 (mm)	P_2 (mm)	ΦD_0 (mm)	T (mm)
HCRG02	0.65±0.10	1.15±0.10	8.00±0.20	1.75±0.10	3.50±0.05	4.00±0.10	2.00±0.05	2.00±0.05	1.50+0.1,-0	0.45±0.10
HCRG03	1.10±0.10	1.90±0.10	8.00±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.70±0.10
HCRG05	1.60±0.10	2.40±0.20	8.00±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
HCRG06	1.90±0.10	3.50±0.20	8.00±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
HCRG10	2.90±0.10	3.50±0.20	8.00±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

HCRG series.

Automotive Grade Green Chip Resistor

Embossed Plastic 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)
HCRG0A	2.8±0.10	5.40±0.20	12.0±0.30	1.75±0.10	5.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50+0.1, -0	1.2^{+0}
HCRG12	3.5±0.10	6.70±0.10	12.0±0.30	1.75±0.10	5.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50+0.1, -0	1.2^{+0}

■ Marking

No Marking for 0402

Jumper for all: Letter “0”

1% for 0805/1206/1210/2010/2512: 4 digits marking

Example:

Resistance	5.6Ω	97.6Ω	100Ω	2.2KΩ	10KΩ	49.9KΩ	100KΩ
Marking	5R60	97R6	1000	2201	1002	4992	1003

5% for 0603/0805/1206/1210/2010/2512: 3 digits marking in E24

Example: 101=100Ω 102=1KΩ (1^{st} and 2^{nd} are E24 code and 3^{rd} code is multiplier)

E24 code	10	11	12	13	15	16	18	20	22	24	27	30	33	36	39	43	47	51	56	62	68	75	82	91

1% for 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

1% for 0603: 3 digits marking in E96

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

68B=4K99Ω 68X=49.9Ω

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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}		

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REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version A	Jun 15, 2022	-	- New product release