Data Sheet

Customer:	
Product:	Automotive Grade Thick Film Flat Array Chip Resistor – CNF..A Series
Size:	0402x2/0402x4/0603x4
Issued Date:	08-Mar-23
Edition:	REV.A1

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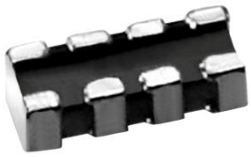
Automotive Grade Thick Film Flat Array Chip Resistor



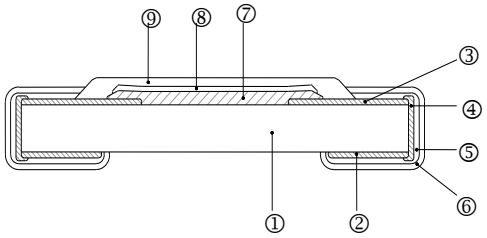
■Scope

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

■Features

－AEC-Q200 Compliance
－Small size and light weight
－Reduction of assembly costs and matching with placement machines
－Reliability, high quality
－Suitable for IR reflow soldering

■Construction

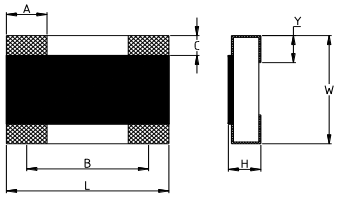


■Applications

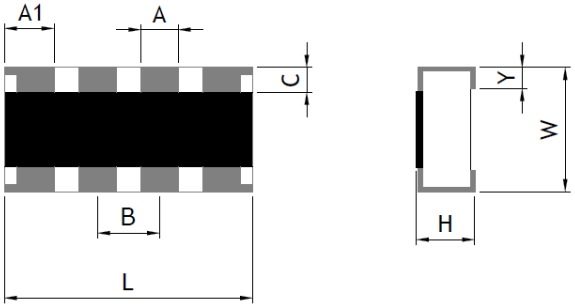
－Automotive Industry
－Entertainment
－Computer & Related Products
－Communication Equipment
－Power Equipment
－Measuring Instrument

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

■Dimensions



CNF22



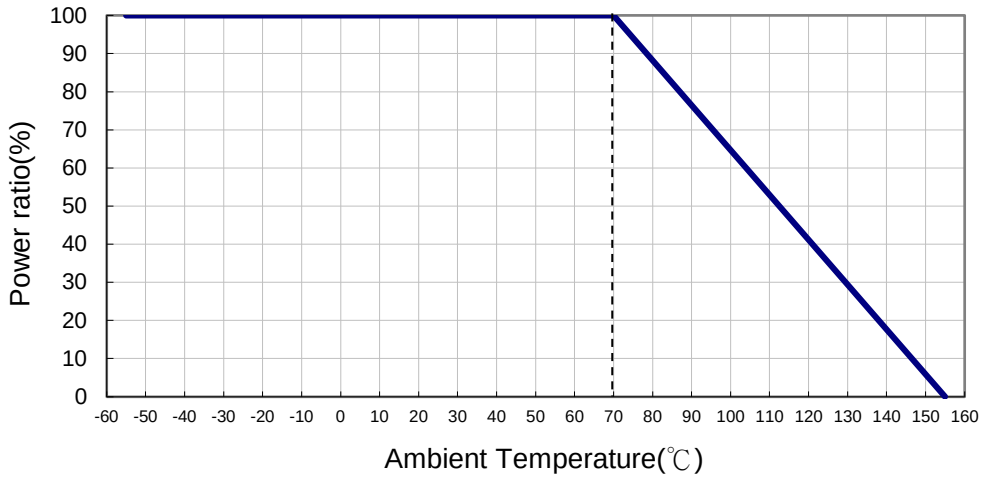
CNF42/CNF43

Type	Number of Resistors	L (mm)	W (mm)	H (mm)	A (mm)	A1 (mm)	B (mm)	C (mm)	Y (mm)	Weight (g) (1000pcs)
CNF22	2	1.25±0.10	1.00±0.10	0.35±0.10	0.43±0.1	-	0.82±0.05	0.18±0.15	0.26±0.15	1.6
CNF42	4	2.00±0.10	1.00±0.10	0.45±0.10	0.3±0.10	0.40±0.10	0.5±0.10	0.20±0.10	0.35±0.15	3.3
CNF43	4	3.20±0.10	1.60±0.15	0.55±0.10	0.5±0.15	0.65±0.10	0.8±0.05	0.23±0.15	0.47±0.15	9.0

■Part Numbering

CNF	22	F	T	F	Y	1000	A
Product Type	Dimensions	Resistance Tolerance	Packaging Code	TCR (PPM/°C)	Power Rating	Resistance	Marking
	22: 0402x2 42: 0402x4 43: 0603x4	F: ±1% J: ±5% or Jumper	T: Taping Reel	F: ±200 -: No specified (For Jumper)	Y: 1/16W X: 1/10W W: 1/8W	0030: 3Ω 1000: 100Ω 1002: 10KΩ 2201: 2.2KΩ 1003: 100KΩ 1004: 1MΩ R0R0: 0Ω	A : Automotive Grade

■Derating Curve



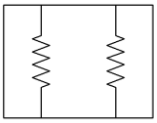
■Electrical Specifications

Item / Type	Power Rating at 70°C Jumper Rated Current	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Number of Resistors	Resistance Range ±1% (E24,E96)	Resistance Range ±5% (E24)	TCR (PPM/°C)
CNF22	1/16W	-55 ~ +155°C	25V	50V	2	1Ω - 1MΩ		±200
	Jumper: 1A					-	0Ω (<50mΩ)	-
CNF42	1/16W	-55 ~ +155°C	50V	100V	4	10Ω - 1MΩ	1Ω - 10MΩ	±200
	Jumper: 1A					-	0Ω (<50mΩ)	-
CNF43	1/10W 1/8W	-55 ~ +155°C	50V	100V	4	10Ω - 1MΩ	1Ω - 10MΩ	±200
	Jumper: 1A					-	0Ω (<50mΩ)	-

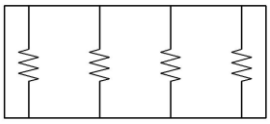
Operating Voltage=$\sqrt{}$(P*R) or Max. Operating Voltage listed above, whichever is lower.
Overload Voltage=2.5*$\sqrt{}$(P*R) or Max. Overload Voltage listed above, whichever is lower.
■ Viking is capable of manufacturing the optional spec based on customer's requirement.

■Storage Temperature: 15~28°C; Humidity < 80%RH
■Shelf Life: 2 years from production date.

■Equivalent Circuit Diagram

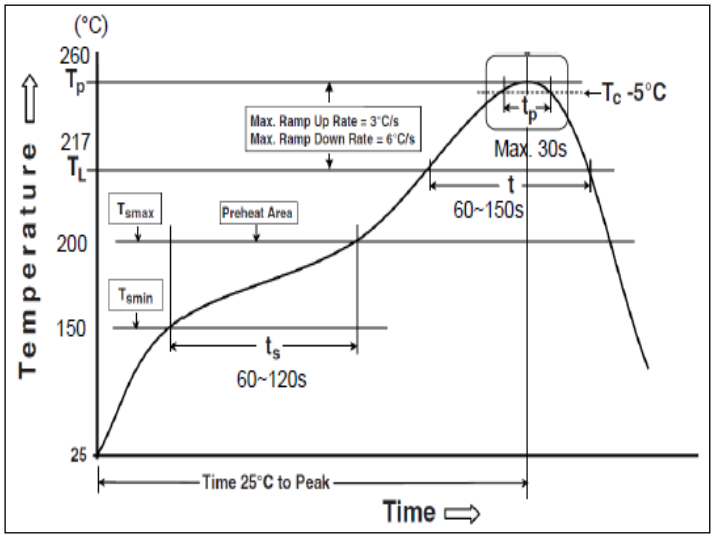


CNF22



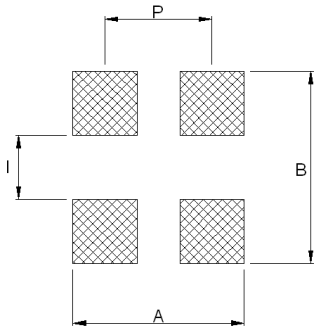
CNF42/CNF43

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

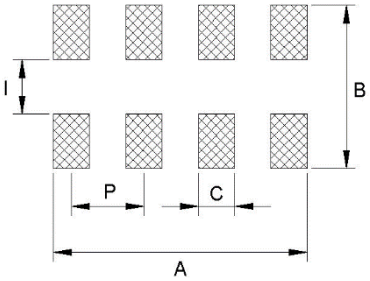


Reflow Profiles	
Profile Feature	**Pb-Free Assembly**
Preheat Min. Temperature (Tsmin) Max Temperature (Tsmax) Preheating time (ts) from (Tsmin to Tsmax)	 150 °C 200 °C 60-120 seconds
Ramp-up rate (T_L to Tp)	3 °C/second max.
Liquidous temperature (T_L) Time (t_L) maintained above T_L	217 °C 60-150 seconds
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.

■Recommend Land Pattern



CNF22



CNF42/CNF43

Type	A (mm)	B (mm)	C (mm)	I (mm)	P (mm)
CNF22	1.50	1.25	-	0.35	0.80
CNF42	2.10	1.80	0.30	0.50	0.50
CNF43	3.10	2.85	0.45	0.80	0.80

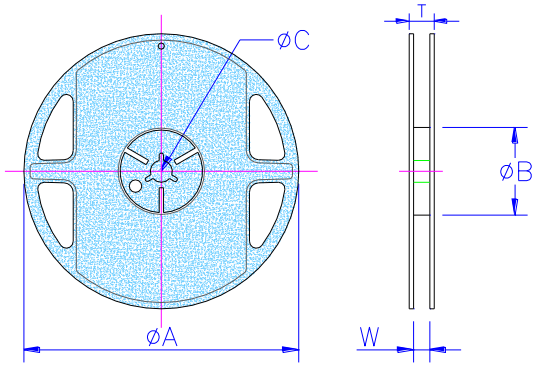
■Environmental Characteristics

Item	Requirement			Test Method
	±1%	±5%	Jumper	
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)	<50mΩ	**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%+0.10Ω)	±(3.0%+0.10Ω)	<100mΩ	**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%+0.10Ω)	±(3.0%+0.10Ω)	<100mΩ	**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)	<50mΩ	**MIL-STD-202 Method 108** at +155°C for 1000 hrs
Board Flex	±(1.0%+0.05Ω)	±(1.0%+0.05Ω)	<50mΩ	**AEC-Q200-005** Bending once for 60 seconds with 3mm
Solderability	95% min. coverage			**JIS-C-5201-1 4.17** **IEC-60115-1 4.17** **J-STD-002** 245±5°C for 3 seconds
Resistance to Soldering Heat	±(0.5%+0.05Ω)	±(1.0%+0.05Ω)	<50mΩ	**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	±(0.5%+0.05Ω)	±(1.5%+0.05Ω)	<50mΩ	**JESD22 Method JA-104** -55°C to +125°C, 1000 cycles
Mechanical Shock	±(0.25%+0.05Ω)	±(1.0%+0.05Ω)	<50mΩ	**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)	±(1.0%+0.05Ω)	<50mΩ	**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 CNF22/CNF42: 0.5KV CNF43: 1KV
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%	<100mΩ	**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.

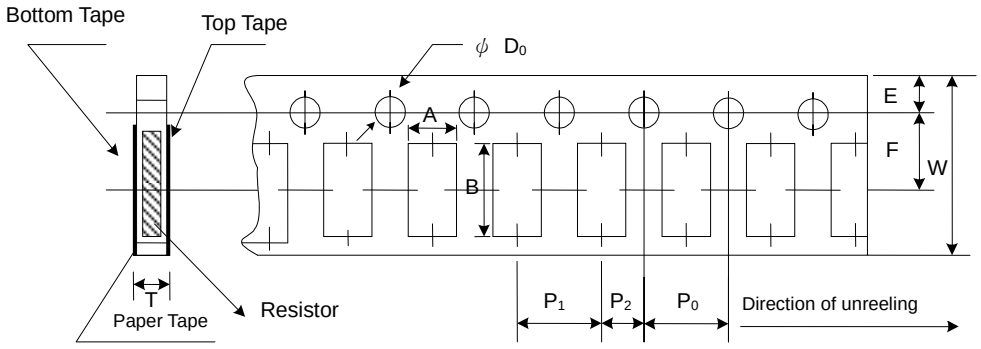
■Packaging

Reel Specifications & Packaging Quantity



Type	Packaging Quantity		Tape Width	Reel Diameter	ΦA (mm)	ΦB (mm)	ΦC (mm)	W (mm)	T (mm)
CNF22	Paper	10K	8mm	7 inch	178.5±1.5	$60^{+1/-0}$	13.0±0.2	9.0±0.5	12.5±0.5
CNF42	Paper	10K	8mm	7 inch	178.5±1.5	$60^{+1/-0}$	13.0±0.2	9.0±0.5	12.5±0.5
CNF43	Paper	5K	8mm	7 inch	178.5±1.5	$60^{+1/-0}$	13.0±0.2	9.0±0.5	12.5±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)
CNF22	1.20±0.1	1.45±0.1	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	2.0±0.05	2.0±0.05	1.50+0.1,-0	0.43±0.1
CNF42	1.20±0.1	2.20±0.1	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	2.0±0.05	2.0±0.05	1.50+0.1,-0	0.70±0.1
CNF43	1.95±0.1	3.50±0.1	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	4.0±0.05	2.0±0.05	1.50+0.1,-0	0.85±0.1

■Marking

No Marking for CNF22

Jumper for CNF42/CNF43: Letter “0”

1% for CNF42/CNF43: 4 digits marking (non-including E24 series)

Example:

Resistance	102Ω	2.49KΩ	30.1KΩ	49.9KΩ	121KΩ
marking	1020	2491	3012	4992	1213

1%&5% for CNF42/CNF43: 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

REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version A	Sep 20, 2022	-	- New product release
Version A1	Mar 08, 2023	-	- Electrical Specifications updated