

Data Sheet

Customer:

Product: Automotive Grade Thick Film Flat Array Chip
Resistor – CNF..A Series

Size: 0402x2/0402x4/0603x4

Issued Date: 10-Dec-24

Edition: REV.A3



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10-Dec-24	10-Dec-24	10-Dec-24		
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Automotive Grade Thick Film Flat Array Chip Resistor

■ Scope

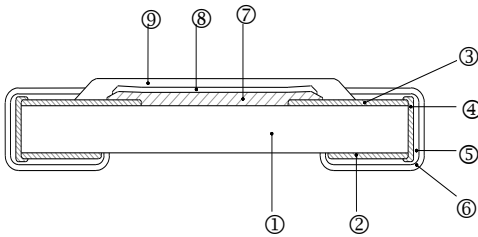
- This specification applies to all sizes of rectangular-type fixed chip resistors with Ruthenium-base as material.



■ Features

- AEC-Q200 Qualified
- Small size and light weight
- Reduction of assembly costs and matching with placement machines
- Reliability, high quality
- Suitable for IR reflow soldering
- 100% CCD inspection

■ Construction

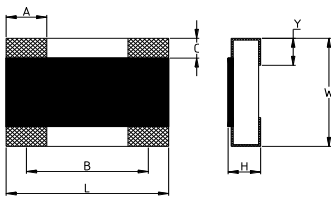


■ Applications

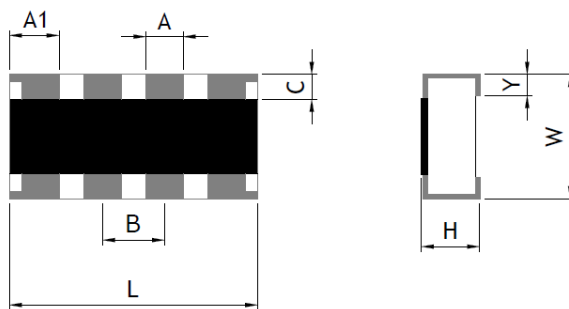
- Automotive Industry
- Entertainment
- Computer & Related Products
- Communication Equipment
- Power Equipment
- Measuring Instrument

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



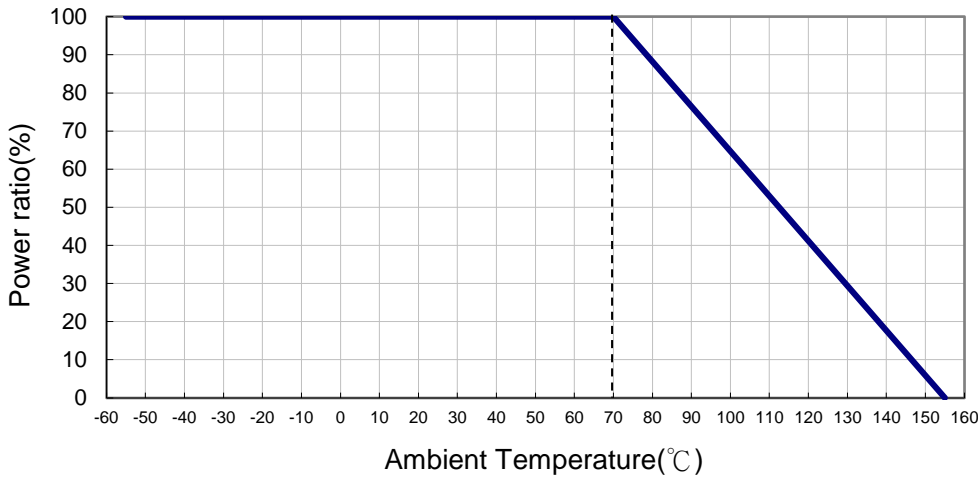
CNF42/CNF43

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		TCR (PPM/°C)
						±1% (E24,E96)	±5% (E24)	
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= $\sqrt{P \cdot R}$ or Max. Operating Voltage listed above, whichever is lower.

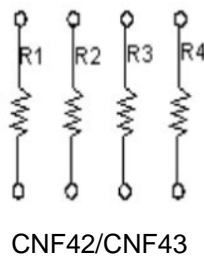
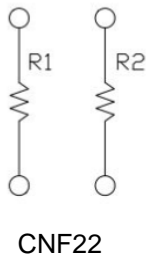
Overload Voltage= $2.5 \cdot \sqrt{P \cdot R}$ or Max. Overload Voltage listed above, whichever is lower.

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

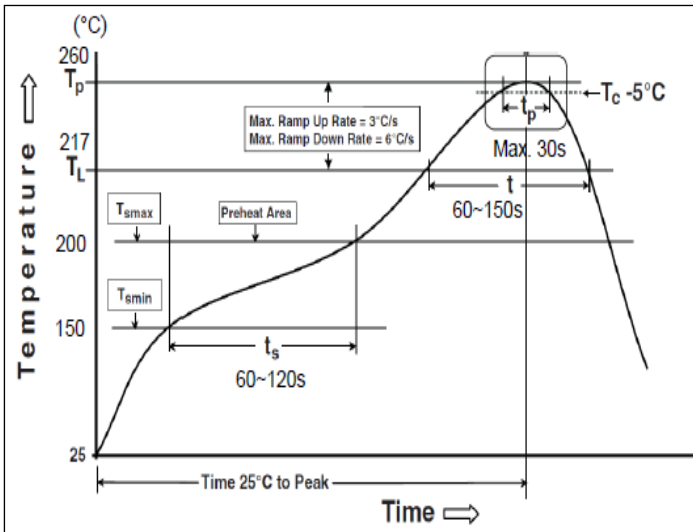
■ Storage Temperature: 15~28°C; Humidity < 80%RH

■ Shelf Life: 2 years from production date.

Equivalent Circuit Diagram

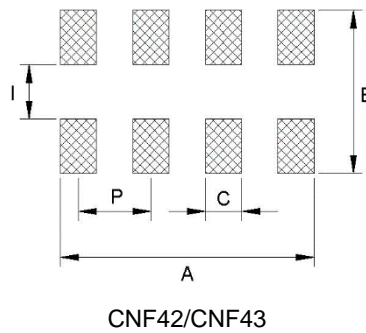
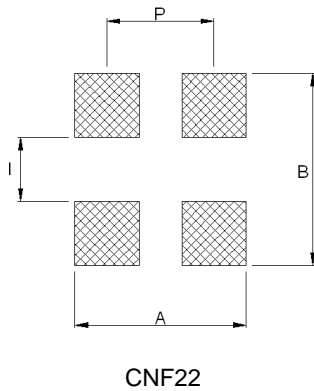


Soldering Condition (Ref. IPC/JEDEC J-STD-020 & J-STD-002)



Reflow Profiles	
Profile Feature	Pb-Free Assembly
Preheat	
Min. Temperature (T _{min})	150 °C
Max Temperature (T _{max})	200 °C
Preheating time (t _s) from (T _{min} to T _{max})	60-120 seconds
Ramp-up rate (T _L to T _p)	3 °C/second max.
Liquidous temperature (T _L)	217 °C
Time (t _L) maintained above T _L	60-150 seconds
Min. Peak temperature (T _p min)	235°C
Max. Peak temperature (T _p max)	260°C
Time (t _p) within 5 °C of the specified classification temperature (T _c)	30 seconds max.
Ramp-down rate (T _p to T _L)	6 °C/second max.
Time 25 °C to peak temperature	8 minutes max.

Recommend Land Pattern



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

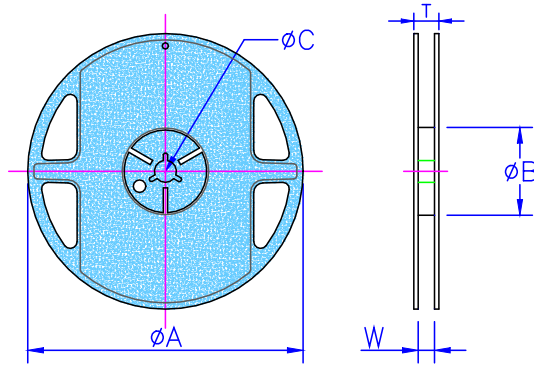
Environmental Characteristics

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 (≤ 100V)
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.

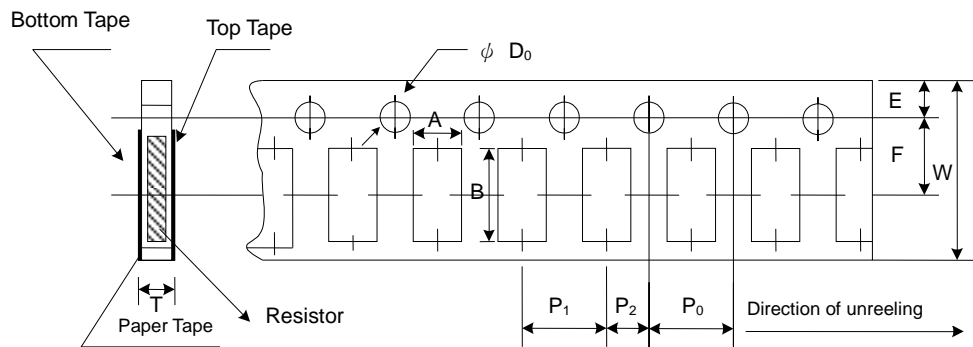
■Packaging

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 (1st and 2nd are E24 code and 3rd 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
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REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version A	Sep 20, 2022	-	- New product release
Version A1	Mar 08, 2023	-	- Electrical Specifications updated
Version A2	Jul 08, 2024	-	- Modify the descriptions in the Features
Version A3	Dec 10, 2024	-	- Modify Equivalent Circuit Diagram picture