



**Automotive grade Anti-Sulfurated  
Thick Film Chip Resistor Arrays  
( CNSA Series Standard )  
Halogen-Free  
AEC-Q200 qualified**

Document No.

TCNSA-XX0S001A

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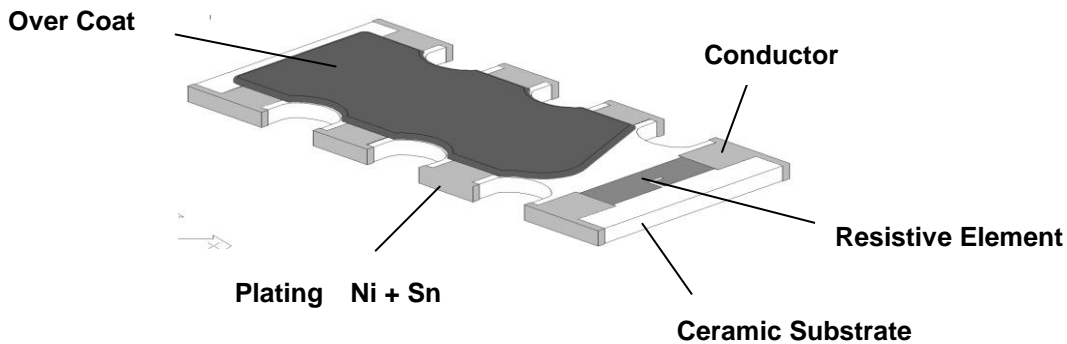
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**1. Scope :**

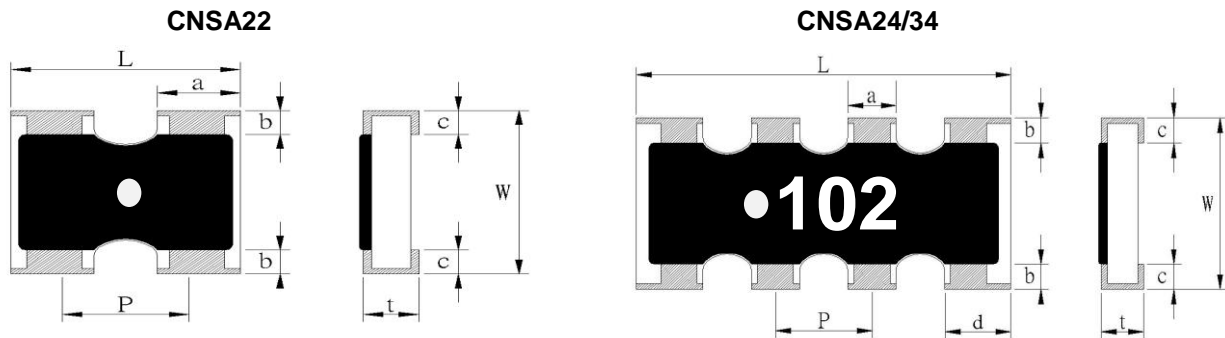
This specification applies for the CNSA series of Anti-Sulfurated thick film chip resistor arrays by TA-I.

**2. Construction , Dimensions , Schematic :**

**2.1 Construction :**



**2.1.1 Chip Resistor Arrays :**



UNIT: mm

Type	L	W	t	P	a	b	c	d
CNSA22	1.0 ± 0.1	1.0 ± 0.1	0.35 ± 0.1	0.65 ± 0.1	0.33 ± 0.1	0.15 ± 0.1	0.25 ± 0.1	0.33±0.1
CNSA24	2.0 ± 0.1	1.0 ± 0.1	0.4 ± 0.1	0.5 ± 0.05	0.3 ± 0.1	0.15 ± 0.1	0.25 ± 0.1	0.4±0.1
CNSA34	3.2 ± 0.2	1.6 ± 0.15	0.5 ± 0.1	0.8 ± 0.05	0.45 ± 0.1	0.3 ± 0.2	0.3 ± 0.2	0.6±0.1



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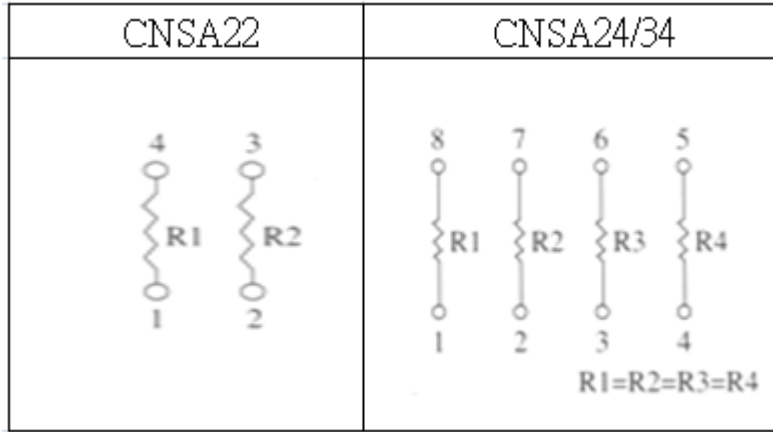
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**2.3 Schematic :**



**3. Type Designation:**

**3.1 Chip Resistor Arrays**

**CNSA**

**34**

**J**

**T**

**103**

Product Code

size

Tolerance

Packaging

Nominal

CNSA : Automotive grade

Anti-Sulfurated

Resistance

Chip Resistor Array Power Rating

22-0402\*2

24-0402\*4

34-0603\*4

J-±5%

G-±2%

F-±1%

T- Paper Tape

3 digits E.G.:

(E-24) 103 = 10KΩ

5R6 = 5.6Ω

4 digits E.G. :

(E-96) 1540 = 154Ω

43R2 = 43.2Ω



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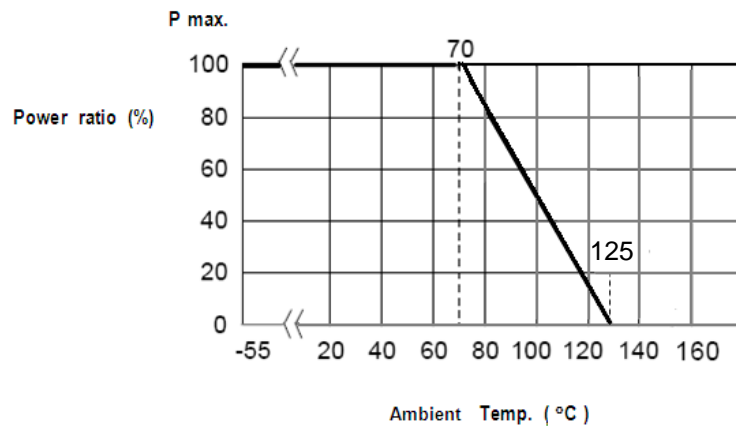
#### 4. Ratings & Characteristics :

Type	Power Rating at 70°C	Rating Voltage	Max. Working Voltage	Max. Over Load Voltage	Operating Temp. (°C)	Resistance Tolerance (%)	Resistance Range (Ω)	Temp Co-efficient PPM/°C
CNSA22	1/16W	Refer 4.2	25V	50V	-55 ↓ +125°C	±5% ±2% ±1%	10Ω~1MΩ	±250
CNSA24							10Ω~1MΩ	±200
CNSA34			50V	100V		±5%	3.0Ω~9.1Ω	±400
CNSA34			50V	100V				
CNSA22			25V	50V		±5%	3.0Ω~9.1Ω	±500
CNSA24			25V	50V		±5%	3.0Ω~9.1Ω	

0Ω THICK FILE CHIP RESISTOR ARRAYS			
Type	Rate Current	Max Overload Current	Resistance Range
CNSA Series	1A	2.5A	50mΩ MAX

#### 4.1 Derating Curve :

For resistors operated at ambient temperature over 70°C , power rating shall be derated in accordance with figure 1.



**Figure 1**

#### 4.2 Rated Voltage:

The rated voltage is calculated by the following formula:

$$E = \sqrt{P \cdot R}$$

E=Rated Voltage(V)  
 P=Rated Power(W)  
 R=Resistance Value(Ω)

E.G. : What is CNSA34JT102 the rated voltage ?

CNSA34JT102 P:1/16W ; R:102 = 1KΩ = 1000Ω

$$E = \sqrt{0.0625(W) \cdot 1000(\Omega)} = 7.9 (V)$$



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**5. Reliability Tests:**

Test Items	Reference standard	Condition of Test	Test Limits $\Delta R$
Temperature Coefficient of Resistance	IEC 60115-1 4.8	-At +25/-55 °C and +25/+125 °C	Refer 5.0
Short Time Overload	IEC60115-1 4.13	2.5 X rated voltage for 5 sec	$\pm(2.0\%+0.1\Omega)$ 0 $\Omega$ : 50 m $\Omega$ or less
High Temperature Exposure (Storage)	AEC-Q200-REV D-Test 3 MIL-STD-202 Method 108	1000 hrs. @ T=125°C. Unpowered. Measurement at 24 $\pm$ 2 hours after test conclusion.	0.5%, 1%: $\pm(1.0\%+0.05\Omega)$ 2%, 5%: $\pm(2.0\%+0.1\Omega)$ 0 $\Omega$ : 50m $\Omega$ or less
Temperature Cycling	AEC-Q200-REV D-Test 4 JESD22 Method JA-104	1000 Cycles (-55°C to +125°C) Measurement at 24 $\pm$ 4 hours after test conclusion. 30min maximum dwell time at each temperature extreme. 1 min. maximum transition time.	$\pm(2\% + 0.1\Omega)$ 0 $\Omega$ : 50m $\Omega$ or less
Moisture Resistance	AEC-Q200-REV D-Test 6 MIL-STD-202 Method 106	T=24 hours / Cycle, 10 Cycles. Notes : Steps 7a& 7b not required. Unpowered.	$\pm(2.0\%+0.1\Omega)$ 0 $\Omega$ : 50m $\Omega$ or less
Biased Humidity	AEC-Q200-REV D-Test 7 MIL-STD-202 Method 103	1000 hours 85°C/85%RH. Note: Specified conditions: 10% of operating power (not exceeding max working voltage). Measurement at 24 $\pm$ 2 hours after test conclusion.	$\pm(3\% + 0.1\Omega)$ 0 $\Omega$ : 100m $\Omega$ or less
Operational Life	AEC-Q200-REV D-Test 8 MIL-STD-202 Method 108	1000 hours TA=125°C at 35% rated power. Measurement at 24 $\pm$ 4 hours after test conclusion.	$\pm(3\% + 0.1\Omega)$ 0 $\Omega$ : 100m $\Omega$ or less
External Visual	AEC-Q200-REV D-Test 9 MIL-STD-883 Method 2009	Electrical test not required. Inspect device construction, marking and workmanship.	
Physical Dimension	AEC-Q200-REV D-Test 10 JESD22 Method JB-100	Verify physical dimensions to the applicable device detail specification. Note: User(s) and Suppliers spec. Electrical test not required.	
Resistance to Solvents	AEC-Q200-REV D-Test 12 MIL-STD-202 Method 215	a:Isopropyl Alcohol : Mineral Spirits= 1 : 3 b:Terpene Defluxer (Bioact EC-7R) c:Deionized water : Propylene Glycol Monomethyl Ether : monoethanolamine = 42 : 1 : 1	Marking and protective layer can not be detached
Mechanical Shock	AEC-Q200-REV D-Test 13 MIL-STD-202 Method 213	Wave Form : Tolerance for half sine shock pulse. Peak value is 100g's. Normal duration(D) is 6(ms)	$\pm(1\% + 0.1\Omega)$ 0 $\Omega$ : 50m $\Omega$ or less
Vibration	AEC-Q200-REV D-Test 14 MIL-STD-202 Method 204	5 g's for 20 min., 12 cycles each of 3 orientations. Note: Test from 10-2000 Hz.	$\pm(1\% + 0.1\Omega)$ 0 $\Omega$ : 50m $\Omega$ or less



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Resistance to Soldering Heat	AEC-Q200-REV D-Test 15 MIL-STD-202 Method 210	Condition B : Immerse the specimens in and eutectic solder at 260±5°C for 10±1S .	±(1% + 0.1 Ω ) 0 Ω : 50mΩ or less
Thermal Shock	AEC-Q200-REV D-Test 16 MIL-STD-202 Method 107	-55°C/+155°C. Note: Number of cycles required-300, Maximum transfer time-20 seconds, Dwell time-15 minutes. Air-Air.	±(1% + 0.1 Ω ) 0 Ω : 50mΩ or less
ESD	AEC-Q200-REV D-Test 17	verify the voltage setting at 500V	±(2% + 0.1 Ω )
Solderability	AEC-Q200-REV D-Test 18 J-STD-002	Method B, aging 4 hours at 155 °C dry heat Lead-free solder bath at 235±3 °C Dipping time: 3±0.5 seconds	> 95% area covered with tin
Flammability	AEC-Q200-REV D-Test 20 UL-94	V-0 or V-1 are acceptable. Electrical test not required.	V-0 or V-1
Board Flex ( Bending )	AEC-Q200-REV D-Test 21	The duration of the applied forces shall be 60 (+ 5) Sec 3mm deflection	±(1% + 0.1 Ω ) 0 Ω : 50mΩ or less
Terminal Strength (SMD)	AEC-Q200-REV D-Test 22	Force of 1.8kg for 60 seconds	±(1% + 0.05 Ω ) 0 Ω : 50mΩ or less
Sulfuration Test	ASTM-B-809-95	Sulfur (Sulfur Vapor) 1,000 hours, 105±2°C, unpowered	0.5%, 1%:±(1%+0.05Ω) 2%, 5%:±(2%+0.05Ω) 0 Ω : 100mΩ or less

Note\* : RCWV : Rated continuous working voltage .



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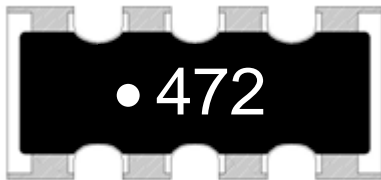
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## 6. Marking

### 6.1 $\pm 2\%$ & $\pm 5\%$ (E24) : CNSA24 / 34

Resistance value is expressed by 3 digits, the first two digits represent the significant figures of nominal resistance value in $\Omega$ , and the third digit represents exponent for base of 10.

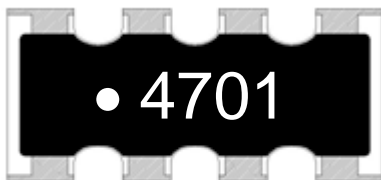
E.G.  $472 = 47 \times 10^2 = 4700 \Omega = 4.7K \Omega$



### 6.2 $\pm 1\%$ (E96) : CNSA24 / 34

Resistance value is expressed by 4 digits, the first three digits represent the significant figures of nominal resistance value in $\Omega$ , and the fourth digit represents exponent for base of 10.

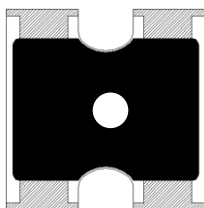
E.G.  $4701 = 470 \times 10^1 = 4700 \Omega = 4.7k \Omega$



### 6.3 CNSA24 / 34

E.G. :  $0 = 0 \Omega$

### 6.4 CNSA22 :





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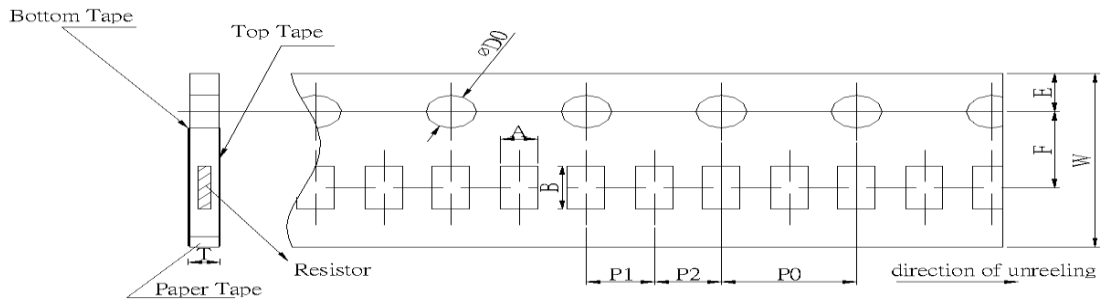
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**7. Taping & Reel**

**7.1 Taping Dimensions**

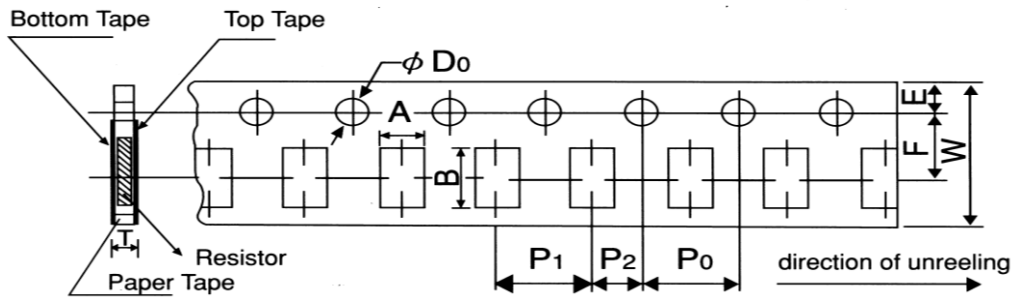
**7.1.1 2 mm pitch paper**



UNIT: mm

Type	A	B	W	F	E	P1	P2	P0	$\phi D0$	T0
CNSA22	1.2±0.15	1.2±0.1	8.0±0.2	3.5±0.05	1.75±0.1	2.0±0.1	2.0±0.05	4.0±0.1	1.5	0.45±0.1
CNSA24		2.2±0.2								0.64±0.1

**7.1.2 4 mm pitch paper**



UNIT: mm

Type	A	B	W	F	E	P1	P2	P0	$\phi D0$	T
CNSA34	2.0±0.15	3.6±0.2	8.0±0.2	3.5±0.05	1.75±0.1	4.0±0.1	2.0±0.05	4.0±0.1	1.5	0.84±0.1



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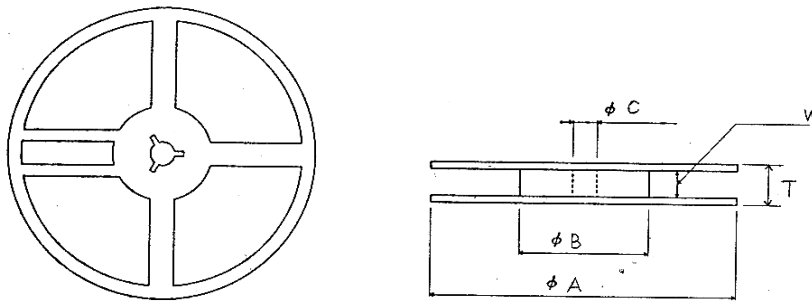
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Package Type	Paper Tape	
	4 mm pitch	2 mm pitch
	178mm/R	178mm/R
CNSA22		10000
CNSA24		10000
CNSA34	5000	

### 7.2 Reel Specifications



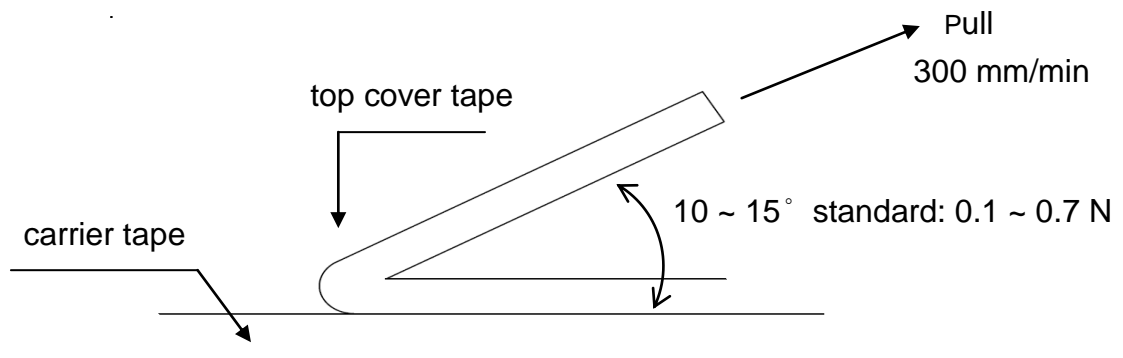
UNIT: mm

Type	$\phi A$	$\phi B$	$\phi C$	W	T
CNSA22/24/34	$178.0 \pm 2.0$	$60.0 \pm 1.0$	$13.0 \pm 1.0$	$9.0 \pm 1.0$	$11.5 \pm 1.0$

### 7.3 Peel off Strength:

Peel –off force of paper and blister tape is in accordance with “JIS-C5202”

that is , 0.1 to 0.7 N at a peel-off speed of 300 mm / minute.







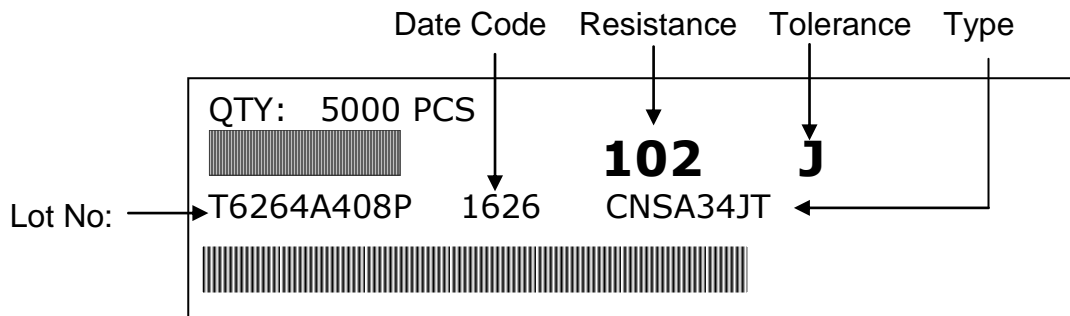
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**8. Label**

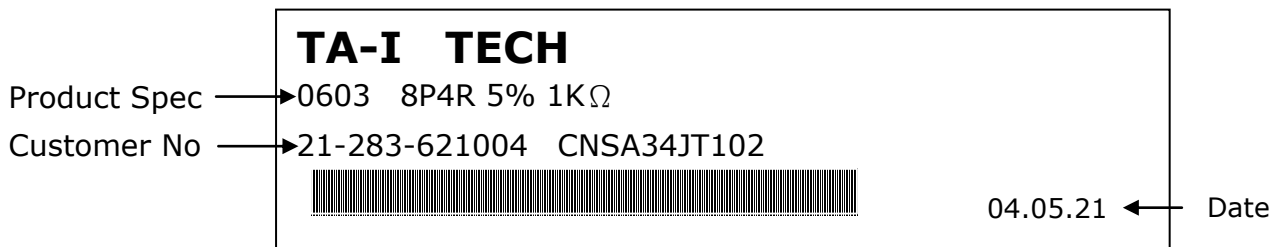
**8.1 Manufacture Label :**

**8.1.1 Chip Resistor Array :**



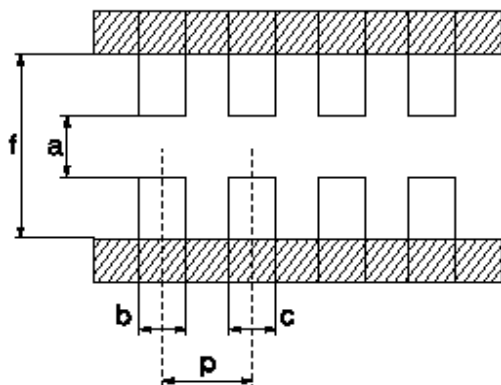
**8.2. Customer Label ( By customer request ) :**

**8.2.1 Chip Resistor Array :**



**9. Recommended land patterns :**

**9.1 CNSA22, CNSA34**



Land pattern		Dimension ( mm )				
Type	Size	a	b	c	p	f
CNSA	22	0.5	0.35~0.4	0.35~0.4	0.65	1.4~1.5
CNSA	34	0.7~0.9	0.4~0.5	0.4~0.5	0.8	2.2~2.6



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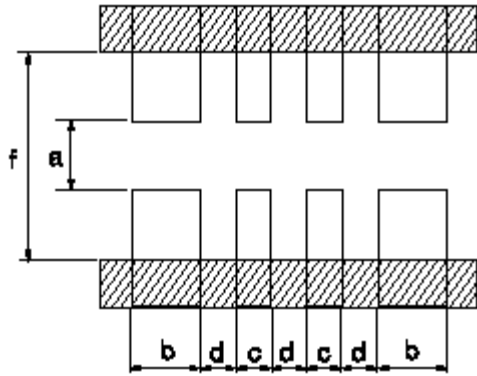
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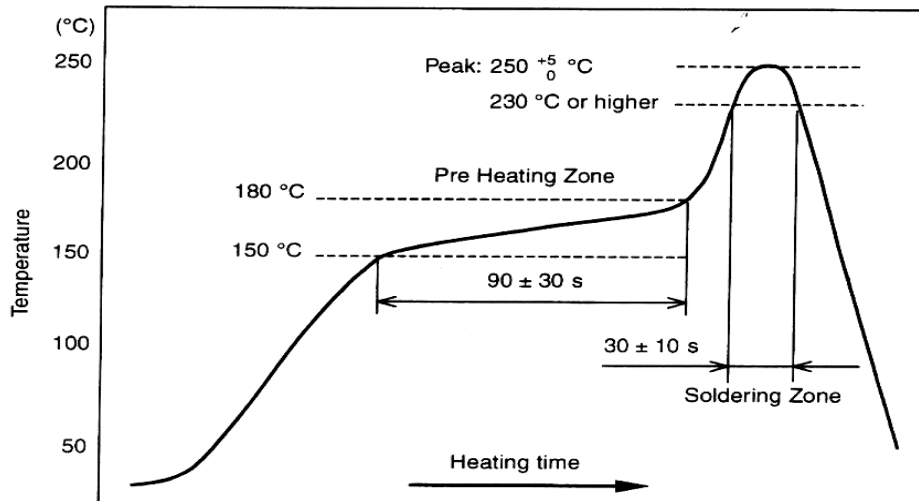
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**9.2 CNSA24**



Type	Size	Dimension ( mm )				
		a	b	c	d	f
CNSA	24	0.4	0.525	0.25	0.25	1.4

**10. Recommend IR – Reflow profile : (solder : Sn96.5 / Ag3 / Cu0.5)**



Peak : 250  $\begin{matrix} +5 \\ -0 \end{matrix}$  °C , 5 sec

Pre – heat Zone : 150 to 180 °C , 90 ± 30 sec

Soldering Zone : 230°C or higher , 30 ± 10 sec



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**11. Storage Conditions:**

Temperature : 5 to 35 °C

Related Humidity : 40 to 75% RH

**12. Shelf Life :**

2 Years from manufacturing date.

**13. ECN :**

Engineering Change Notice: The customer will be informed with ECN if there is significant modification on the characteristics and materials described in Approval Sheet.

**14. Manufacturing Country & City :**

TA-I TECHNOLOGY CO., LTD. ( Taiwan– Tao Yuan )

Tel: 886-3-3246169 Fax : 886-3-3246167

**Associated companies :**

(1) FORTUNE TASK RESISTOR FACTORY ( China – Dongguan )

Tel : 86-769-8339-4790~3 Fax : 86-769-8339-4794

(2) TA-I TECHNOLOGY (DONGGUAN) CO., LTD. ( China –Dongguan )

Tel : 86-769-8339-4790~3 Fax : 86-769-8339-4794

(3) TA-I TECHNOLOGY ( SU ZHOU ) CO., LTD. ( China – Su Zhou)

Tel :86- 512-63457879 Fax : 86-512-63457869

(4) TAI OHM ELECTRONICS ( M ) SDN. BHD. ( Malaysia – Penang)

Tel :604- 3900480 Fax : 604-3901481

(5) P.T.TAI ELECTRONICS Indonesia ( Indonesia – Jakarta )

Tel : 62-21-89830123 Fax : 62-21-89830703