

# Approval Specification

Customer :

Product: Thick Film Array Chip Resistor

CN-22 / CN-42 / CN-43/ CN-82

CNA43

$\pm 5\%$

Sizes : Convex Array

0402x2 / 0402x4

0603x4 / 0402x8

Concave Array

0603x4

Approval Date. : \_\_\_\_\_

Customer Approval :

## Product Specification - Array Resistor Series

CN-22,CN-42,CN-43,CN-82,CNA43

Sizes Convex array 0402x2.0402x4.0603x4.0402x8. Convex array 0603x4

### 1. Features

- Less board space than individual chip resistors
- Cost reduction efficiency by eliminating mounter operations
- Lead free products are available

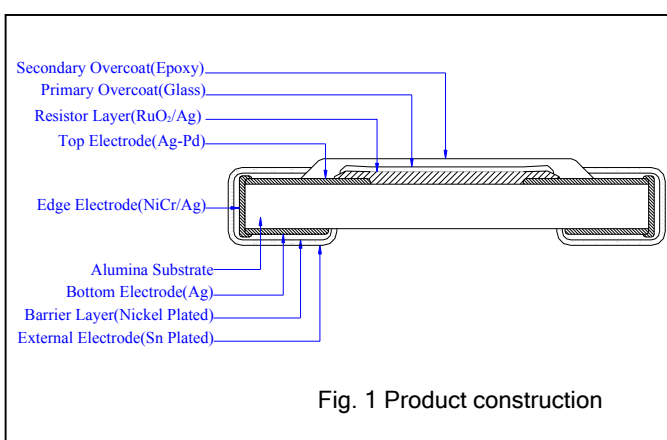
### 2. Applications

- All general purpose applications

### 3. Description

The resistors are constructed on the alumina substrate. Top electrodes are added to each end and connected with resistive paste that is applied to top surface of the alumina substrate. The resistive layer is made by resistive paste that is prepared to approach the nominal value. Laser trimming process makes the resistance value to meet the nominal value and within the tolerance.

The resistive layer is protected by primary overcoat and secondary overcoat. Marking on secondary overcoat let user to know the resistance value directly. The barrier layer is added to edge electrodes for plating with external electrode that is the main role makes the resistor mounted on PCB.



### 4. Quick Reference Data

| Type name                                         | CN-22                      | CN-42                  | CN-82                        | CN-43                      | CNA43                   |
|---------------------------------------------------|----------------------------|------------------------|------------------------------|----------------------------|-------------------------|
| Size code                                         | Convex Array<br>0402x2     | Convex Array<br>0402x4 | Convex Array<br>0402x8       | Convex Array<br>0603x4     | Concave Array<br>0603x4 |
| Resistance tolerance                              | ±5%(E24 series)            |                        |                              |                            |                         |
| Resistance range                                  | ±5%:<br>10Ω~1MΩ,<br>Jumper |                        | ±5%:<br>10Ω~560kΩ,<br>Jumper | ±5%:<br>10Ω~1MΩ,<br>Jumper |                         |
| Temperature Coefficient of<br>Resistance (ppm/°C) | ±5%<br>±200<br>±200        |                        | ±5%<br>±200<br>-             | ±5%<br>±200<br>±200        |                         |
| 10Ω ≤ R ≤ 560KΩ                                   |                            |                        |                              |                            |                         |
| 620KΩ ≤ R ≤ 1MΩ                                   |                            |                        |                              |                            |                         |
| Power rating (at 70°C)                            | 1/16W                      | 1/16W                  | 1/32W                        | 1/16W                      |                         |
| Max. operation voltage<br>(DC or RMS)             | 25V                        | 25V                    | 25V                          | 50V                        |                         |
| Max. overload voltage                             | 50V                        | 50V                    | 50V                          | 100V                       |                         |
| Jumper Rated current                              | 1A                         | 1A                     | 0.5A                         | 1A                         |                         |
| Climatic category<br>(IEC 60068)                  | 55/125/42                  |                        |                              | 55/155/42                  |                         |

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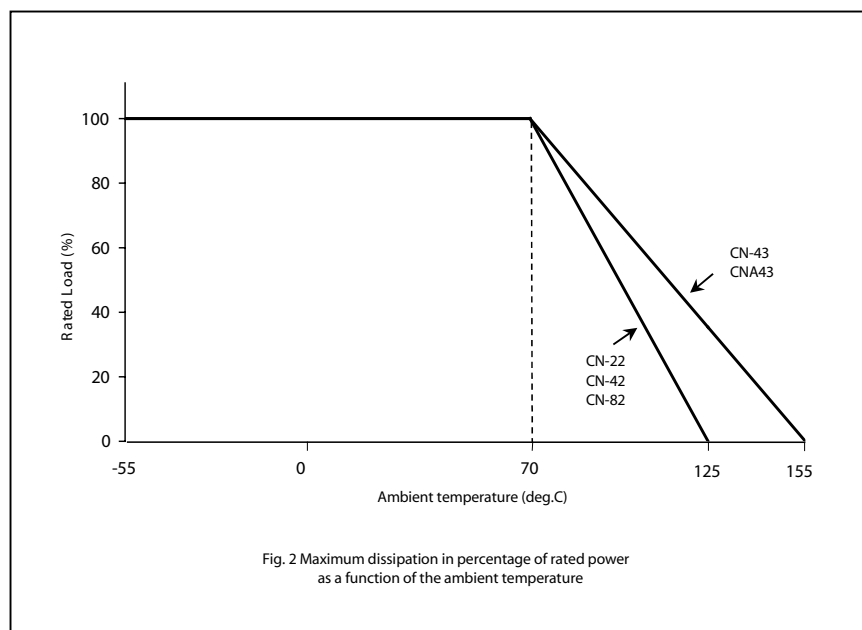
### 5. Order information

| Digits     | 1                           | 2 | 3 | 4 | 5 | 6                | 7                    | 8                                        | 9                       | 10 | 11 | 12 | 13 | 14 |
|------------|-----------------------------|---|---|---|---|------------------|----------------------|------------------------------------------|-------------------------|----|----|----|----|----|
| Order Code | C                           | N | - | 4 | 3 | J                | -                    | 7                                        | -                       | -  | -  | 1  | 0  | K  |
|            | <b>Type Name</b>            |   |   |   |   | <b>Tolerance</b> | <b>Function code</b> | <b>Packaging</b>                         | <b>Resistance Value</b> |    |    |    |    |    |
|            | CN-22: Convex Array 0402x2  |   |   |   |   | J : ?5%          | - : Normal           | 6 : 7" reel, paper tape, 10000 pcs/reel  | ---0R : Jumper          |    |    |    |    |    |
|            | CN-42: Convex Array 0402x4  |   |   |   |   | K : ?10%         | F : ?100ppm          | 7 : 7" reel, paper tape, 5000 pcs/reel   | -3K32 : 3.32K?          |    |    |    |    |    |
|            | CN-43: Convex Array 0603x4  |   |   |   |   |                  | G : ?200ppm          | A : 10" reel, paper tape, 10000 pcs/reel | -10K2 : 10.2K?          |    |    |    |    |    |
|            | CN-82: Convex Array 0402x8  |   |   |   |   |                  | L : Lead Free        | B : 10" reel, paper tape, 20000 pcs/reel | -100K : 100K?           |    |    |    |    |    |
|            | CNA43: Concave Array 0603x4 |   |   |   |   |                  | U : ?100ppm          | C : 13" reel, paper tape, 40000 pcs/reel | ---1M2 : 1.2M?          |    |    |    |    |    |
|            |                             |   |   |   |   |                  | Lead Free            | D : 13" reel, paper tape, 20000 pcs/reel |                         |    |    |    |    |    |
|            |                             |   |   |   |   |                  | W : ?200ppm          |                                          |                         |    |    |    |    |    |
|            |                             |   |   |   |   |                  | Lead Free            |                                          |                         |    |    |    |    |    |

### 6. Functional description

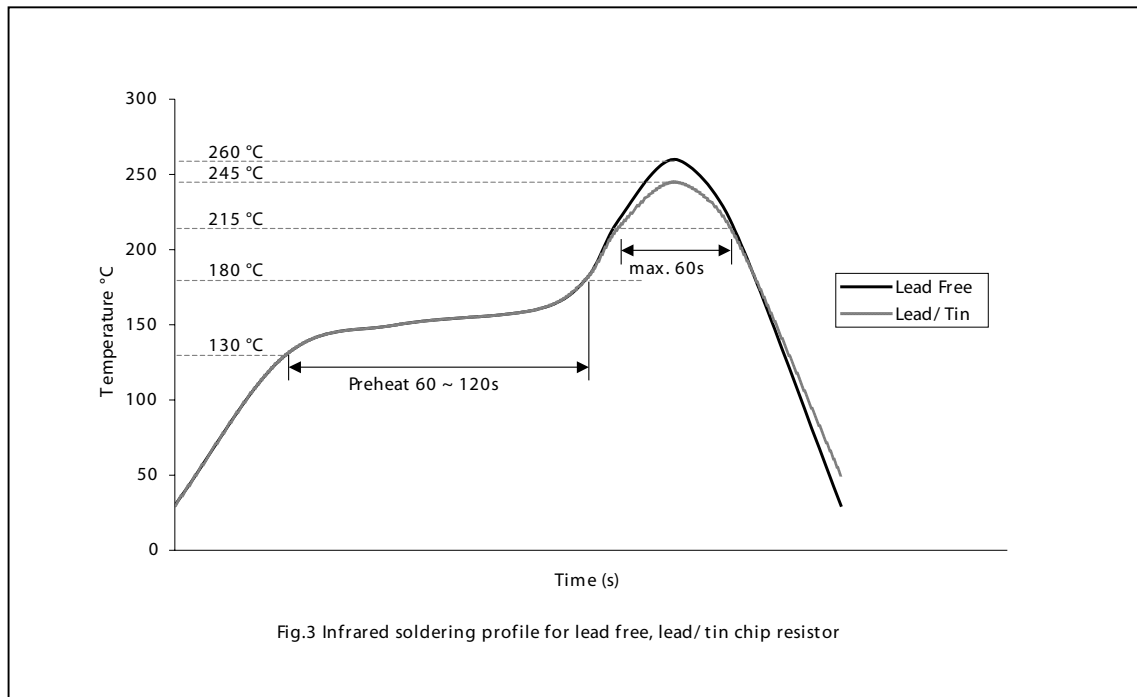
#### Derating curve

For resistors operate in the ambient temperature over 70°C, loading power ratio will derate in accordance with following curve.



### Soldering condition

TMTEC chip resistor can be applied in lead/tin and pure tin processes. Typical example of soldering processed that provide reliable joints without any damage are given in Figs. 3.

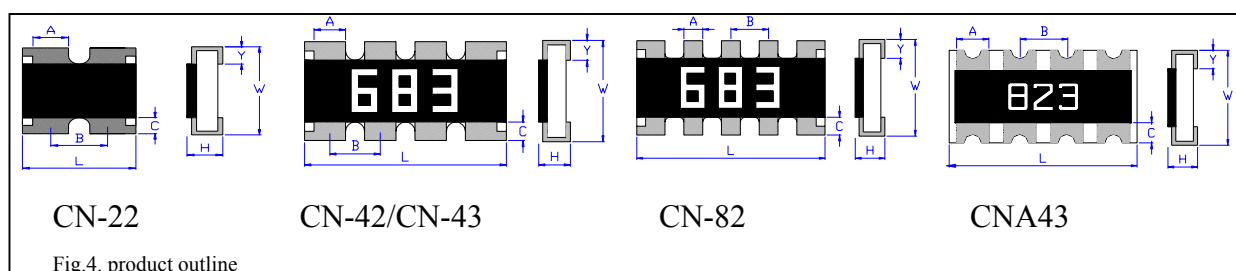


## 7. Mechanical Data

### Mass per 1000 pcs

| TYPE NAME | MASS (g) |
|-----------|----------|
| CN-22     | 0.95     |
| CN-42     | 2.857    |
| CN-43     | 8.474    |
| CN-82     | 9.19     |
| CNA43     | 9.186    |

### Outline



### Dimension

| Type  | L(mm)     | W(mm)     | H(mm)     | A(mm)     | B(mm)     | C(mm)     | Y(mm)     |
|-------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| CN-22 | 1.00±0.10 | 1.00±0.10 | 0.35±0.10 | 0.25±0.10 | 0.65±0.05 | 0.20±0.10 | 0.25±0.10 |
| CN-42 | 2.00±0.10 | 1.00±0.10 | 0.45±0.10 | 0.30±0.10 | 0.50±0.05 | 0.22±0.15 | 0.22±0.15 |
| CN-43 | 3.20±0.15 | 1.60±0.15 | 0.55±0.10 | 0.50±0.15 | 0.80±0.05 | 0.30±0.15 | 0.30±0.15 |
| CN-82 | 3.20±0.15 | 1.60±0.15 | 0.55±0.15 | 0.35±0.10 | 0.64±0.05 | 0.40±0.15 | 0.40±0.15 |
| CNA43 | 3.20±0.15 | 1.60±0.15 | 0.55±0.10 | 0.50±0.15 | 0.80±0.05 | 0.30±0.15 | 0.40±0.15 |

### Marking

Type A: product with 3 digits marking, the first two digits are significant figures; third digit is number of zeros to follow. Letter "R" is as decimal point. Letter "0" for jumper

Type B: CN-22 is without marking due the size is too small.

The marking example is as table 1.

| Type | Product                          | Value  | Example |
|------|----------------------------------|--------|---------|
| A    | CN-42<br>CN-43<br>CN-82<br>CNA43 | 68K?   |         |
|      |                                  | Jumper |         |
| B    | CN-22                            | N/A    |         |

## 8. Test And Requirements

In table 3 the tests and requirements are listed with reference relevant clause of IEC 60115-1. A short description of the test procedure is given. Essentially all tests are carried out refer to the schedule of IEC 60115-8-1. The testing also covers the requirements specified by EIA.

**Table 3 Test procedure and requirements**

| Test Item                                    | Test Method                           | Test Condition                                                               | Requirement               |        |
|----------------------------------------------|---------------------------------------|------------------------------------------------------------------------------|---------------------------|--------|
|                                              |                                       |                                                                              | ±5%                       | Jumper |
| Temperature Coefficient of Resistance(T.C.R) | JIS C 5202 5.2<br>IEC 60115-1 4.8     | -55°C~+125/+155 °C<br>20°C is the reference temperature                      | Within the specification  |        |
| Short Time Overload                          | JIS C 5202 5.5<br>IEC 60115-1 4.13    | 2.5 times RCWV or RCOV, for 5 seconds                                        | ±(2.0%+0.05%)             | <50m?  |
| Insulation Resistance                        | JIS C 5202 5.6<br>IEC 60115-1 4.6     | RCOV for 1 minute                                                            | ≥10G                      |        |
| Voltage Proof                                | JIS C 5202 5.7<br>IEC 60115-1 4.7     | 1.42 times RCWV (RMS) for 1 minute                                           | no breakdown or flashover |        |
| Substrate Bending Test                       | JIS C 5202 6.1<br>IEC 60115-1 4.33    | Bending once for 5 seconds                                                   | ±(1.0%+0.05%)             | <50m?  |
| Resistance to soldering heat                 | JIS C 5202 6.4<br>IEC 60115 4.18      | 260±5°C for 10 seconds                                                       | ±(1.0%+0.05%)             | <50m?  |
| Leaching                                     | JIS C 5202 6.4<br>IEC 60115 4.18      | 260±5°C for 60 seconds                                                       | no leaching               |        |
| Solderability                                | JIS C 5202 6.5<br>IEC 60115-1 4.17    | 235±5°C for 2 seconds.<br>lead free application:<br>245±3°C for 2 seconds.   | >95% coverage             |        |
| Endurance at upper category temperature      | JIS C 5202 7.2<br>IEC 60115-1 2.23.2  | at +125/+155 °C for 1000 hrs                                                 | ±(1.5%+0.10%)             | <50m?  |
| Rapid change of temperature                  | JIS C 5202 7.4<br>IEC 60115-1 4.19    | -55°C to +125/+155 °C, 5 cycles                                              | ±(1.0%+0.05%)             | <50m?  |
| Damp heat with load                          | JIS 5202 7.9                          | 40±2°C, 90~95% R.H.<br>RCWV, for 1000 hrs with 1.5hrs "ON" and 0.5 hrs "OFF" | ±(3.0%+0.10%)             | <100m? |
| Endurance                                    | JIS C 5202 7.10<br>IEC 60115-1 4.25.1 | 70±2°C, RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"                | ±(3.0+0.10%)              | <100m? |

## 9. Packaging

### Packaging Methods

| Type<br>(unit: piece) | Paper Tape |             |             |
|-----------------------|------------|-------------|-------------|
|                       | 7" (178mm) | 10" (254mm) | 13" (330mm) |
| CN-22/ CN-42          | 10,000     | 20,000      | 40,000      |
| CN-43/CN-82 /CNA43    | 5,000      | 10,000      | 20,000      |

### Paper Tape

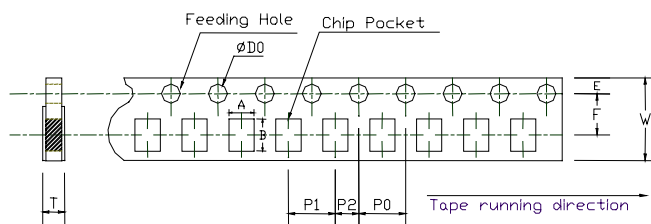
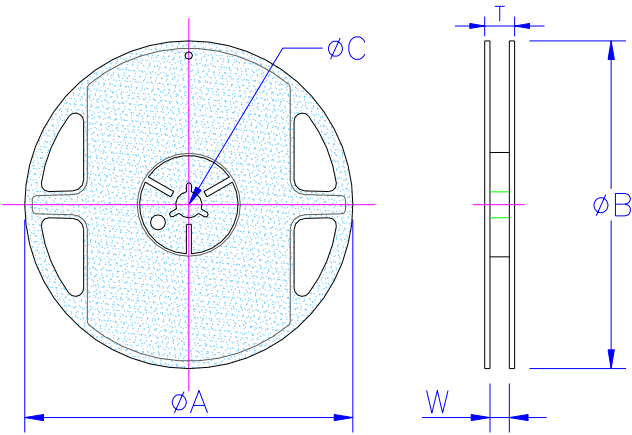


Fig. 5 Paper Tape

| Dimension | A              | B              | W             | E              | F              | P0            | P1             | P2             | $\phi D0$         | T              |
|-----------|----------------|----------------|---------------|----------------|----------------|---------------|----------------|----------------|-------------------|----------------|
| CN-22     | $1.20 \pm 0.1$ | $1.20 \pm 0.1$ | $8.0 \pm 0.2$ | $1.75 \pm 0.1$ | $3.5 \pm 0.05$ | $4.0 \pm 0.1$ | $2.0 \pm 0.10$ | $2.0 \pm 0.05$ | $1.5^{+0.1}_{-0}$ | $0.45 \pm 0.1$ |
| CN-42     | $1.20 \pm 0.1$ | $2.20 \pm 0.1$ | $8.0 \pm 0.2$ | $1.75 \pm 0.1$ | $3.5 \pm 0.05$ | $4.0 \pm 0.1$ | $2.0 \pm 0.05$ | $2.0 \pm 0.05$ | $1.5^{+0.1}_{-0}$ | $0.70 \pm 0.1$ |
| CN-43     | $2.0 \pm 0.1$  | $3.6 \pm 0.1$  | $8.0 \pm 0.2$ | $1.75 \pm 0.1$ | $3.5 \pm 0.05$ | $4.0 \pm 0.1$ | $4.0 \pm 0.05$ | $2.0 \pm 0.05$ | $1.5^{+0.1}_{-0}$ | $0.85 \pm 0.1$ |
| CN-82     | $2.0 \pm 0.1$  | $3.6 \pm 0.1$  | $8.0 \pm 0.2$ | $1.75 \pm 0.1$ | $3.5 \pm 0.05$ | $4.0 \pm 0.1$ | $4.0 \pm 0.05$ | $2.0 \pm 0.05$ | $1.5^{+0.1}_{-0}$ | $0.85 \pm 0.1$ |
| CNA43     | $2.0 \pm 0.1$  | $3.6 \pm 0.1$  | $8.0 \pm 0.2$ | $1.75 \pm 0.1$ | $3.5 \pm 0.05$ | $4.0 \pm 0.1$ | $4.0 \pm 0.05$ | $2.0 \pm 0.05$ | $1.5^{+0.1}_{-0}$ | $0.85 \pm 0.1$ |

Unit: mm

Reel Specification



Unit:mm

| Style | Packing | Tape width | Reel Diameter | $\phi A$             | $\phi B$            | $\phi C$ | W       | T      |
|-------|---------|------------|---------------|----------------------|---------------------|----------|---------|--------|
| CN-22 | Paper   | 8 mm       | 7 inch        | 180 <sup>+0/-3</sup> | 60 <sup>+1/-0</sup> | 13.0±0.2 | 9.0±0.3 | 11.4±1 |
| CN-42 |         |            | 10 inch       | 254±1                | 100±1               | 13.0±0.2 | 9.5±0.5 | 13.5±1 |
| CN-43 |         |            | 13 inch       | 330±1                | 100±1               | 13.0±0.2 | 9.5±0.5 | 13.5±1 |
| CN-82 |         |            |               |                      |                     |          |         |        |
| CNA43 |         |            |               |                      |                     |          |         |        |

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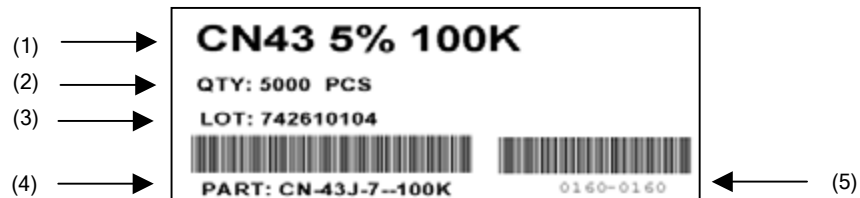
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### Label

The label put on each reel denoted with each products types, tolerance, resistance value, Q'ty, each Lot tracing no and barcode etc.

### Example



- (1) Type / Tolerance / Resistance value
- (2) Reel packing quantity
- (3) Lot Number
- (4) Part Number
- (5) Labeling control sequence

## 10. Revising History

| Revision | Date      | Change notification | Description                    |
|----------|-----------|---------------------|--------------------------------|
| Rev.1    | 2004/7/30 |                     | New issue                      |
| Rev.2    | 2004/10/7 |                     | CN-22 paper tape dimension - T |