# Approval Specification

Customer :

Product: Thick Film Chip Resistor

CR-06 ±5%

Sizes : 1206

Approval Date. :_____

Customer Approval :

(please sign & return)

TMTEC CO., LTD.


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## 1. Features

- Small and light weight
- Excellent heat resistance and moisture resistance
- Taping & bulk cassette are available for automatic pick-and-place machines
- Lead free products meet RoHS requirement

## 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 platting with external electrode that is the main role makes the resistor mounted on PCB.

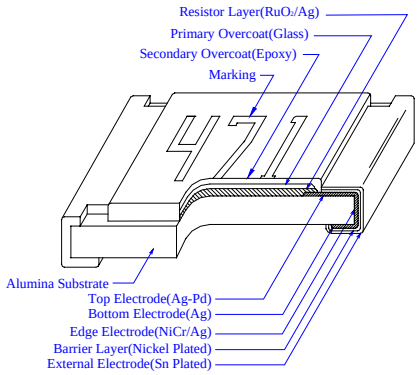



Fig. 1 Product construction

## 4. Quick Reference Data

| | |
|---|---|
| Type name | CR-06 |
| Size code | 1206 |
| Resistance tolerance | ±5%, E24 series |
| Resistance range | 1Ω~10MΩ, Jumper (<50mΩ); |
| Temperature Coefficient of Resistance (ppm/°C)<br>1Ω ≤ R ≤ 10Ω<br>10Ω ≤ R ≤ 1MΩ<br>1MΩ ≤R ≤ 10MΩ | ±5%<br>±200<br>±100<br>±200 |
| Power rating (at 70°C) | 1/4W |
| Max. operation voltage<br>(DC or RMS) | 200V |
| Max. overload voltage | 400V |
| Jumper Rated current | 2A |
| Climatic category<br>(IEC 60068) | 55/155/42 |

## 5. Order information

| Digits | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Order Code | C | R | - | 0 | 6 | J | L | 7 | - | - | - | 1 | 8 | K |
| | **Type Name**<br>CR-06: 1206 | | | | | **Tolerance**<br>J : ±5% | **Function code**<br>L : Lead Free | **Packaging**<br>7 : 7" reel, paper tape, 5000 pcs/reel<br>A : 10" reel, paper tape, 10000 pcs/reel<br>D : 13" reel, paper tape, 20000 pcs/reel<br>F : Bulk package<br>- : Not Applicable | **Resistance Value**<br>- - - - 0R: Jumper<br>- - - - 1R: 1Ω<br>- - - 1R2: 1.2Ω<br>- - - 3K9: 3..9KΩ<br>- - - 18K: 18KΩ<br>- - 100K: 100KΩ<br>- - - 1M2: 1.2MΩ | | | | | |

## 6. Functional description

### Derating curve

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

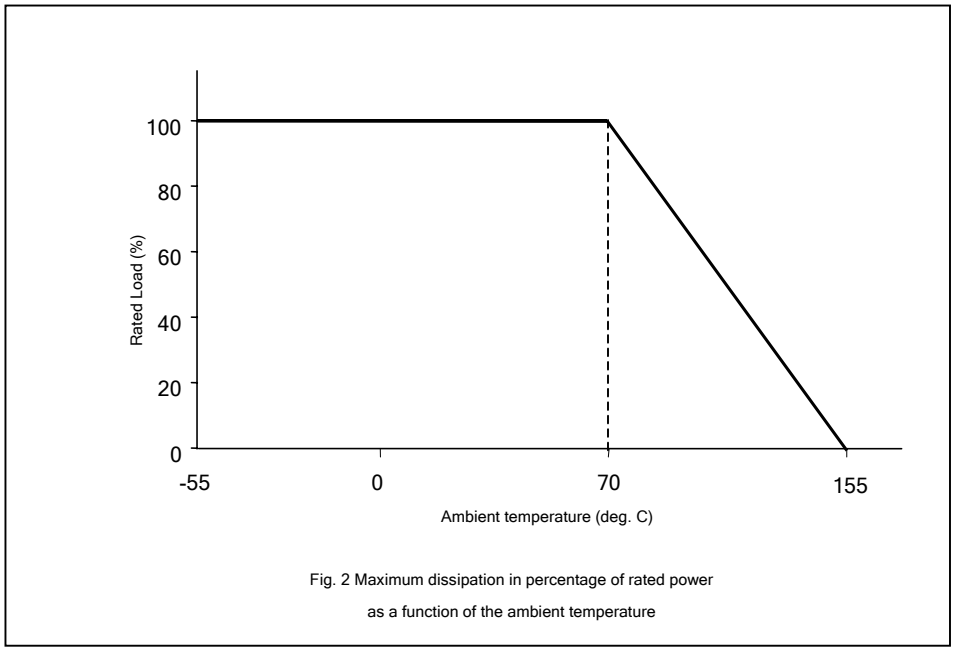



Fig. 2 Maximum dissipation in percentage of rated power as a function of the ambient temperature

### Soldering condition

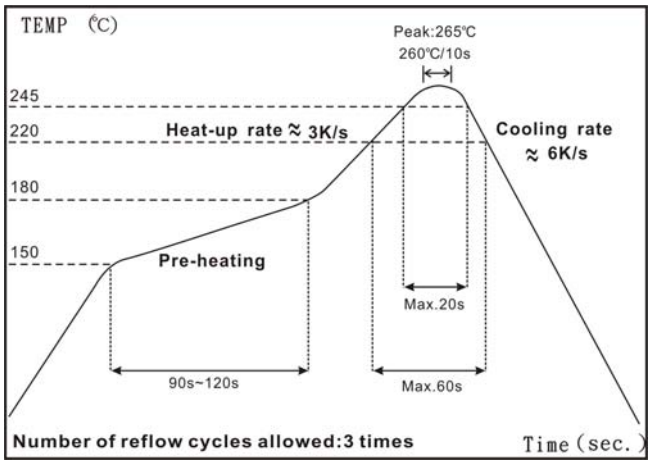



Fig.3 IR Reflow Soldering

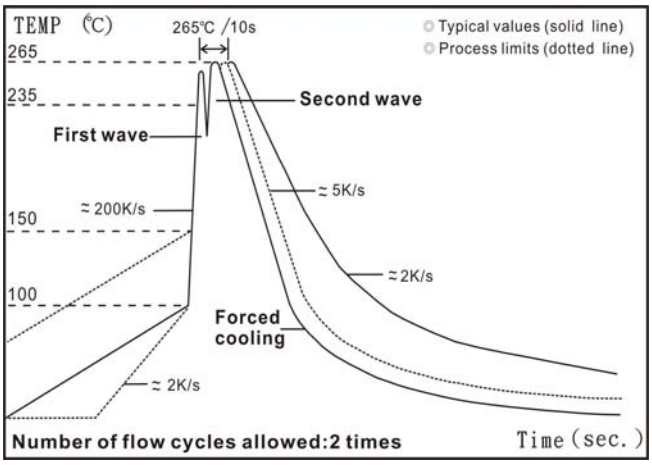



Fig.4 Wave Soldering (Flow Soldering)

(1) Time of IR reflow soldering at maximum temperature point 260℃ : 10s
(2) Time of wave soldering at maximum temperature point 265℃ : 10s
(3) Time of soldering iron at maximum temperature point 410℃ : 5s

## 7. Mechanical Data

### Dimension

| Type | CR-06 |
|---|---|
| L (mm) | 3.10±0.10 |
| W (mm) | 1.55±0.10 |
| H (mm) | 0.55±0.10 |
| A (mm) | 0.50±0.25 |
| B (mm) | 0.50±0.20 |

### Outline

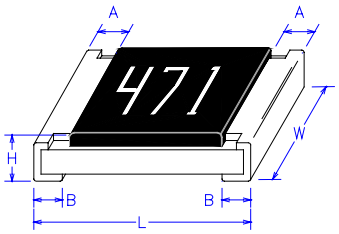



Fig.5. Product Outline

### Mass per 1000 pcs

| TYPE NAME | MASS (g) |
|---|---|
| CR-06 | 8.84 |

### Termination

(1) Thickness of Tin plating product termination : ≧3um
(2) Thickness of Nickel plating product termination : ≧3um
(3) The weight proportion between Tin and Nickel is 1 : 1

### Marking

Type A: 5% 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

The marking example is as table 1.

**Table 1 Making code example**

| Type | Product | Value | Example |
|---|---|---|---|
| A | CR-06, ±5% | 68KΩ | 683 |
| | | Jumper | 0 |

## 8. Test And Requirements

In table 2 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 2 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~+155,20°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 Max. overload voltage for 5 seconds | ±(2.0%+0.10Ω) | <50mΩ |
| Insulation Resistance | JIS C 5202 5.6<br>IEC 60115-1 4.6 | Max. overload voltage 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 with 5 seconds for 3 mm | ±(1.0%+0.05Ω) | <50mΩ |
| Resistance to soldering heat | JIS C 5202 6.4<br>IEC 60115 4.18 | 260±5°C for 10 seconds | ±(1.0%+0.05Ω) | <50mΩ |
| 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 | 245±5°C for 3 seconds. | >95% coverage | |
| Endurance at upper category temperature | JIS C 5202 7.2<br>IEC 60115-1 2.23.2 | at +155,C for 1000 hrs | ±(1.5%+0.10Ω) | <50mΩ |
| Rapid change of temperature | JIS C 5202 7.4<br>IEC 60115-1 4.19 | -55°C to +155°C,<br>5 cycles | ±(1.0%+0.05Ω) | <50mΩ |
| Damp heat with load | JIS 5202 7.9 | 40±2°C, 90~95% R.H. or Max. working voltage for 1000 hrs with 1.5hrs “ON” and 0.5 hrs “OFF” | ±(3.0%+0.10Ω) | <100mΩ |
| Endurance | JIS C 5202 7.10<br>IEC 60115-1 4.25.1 | 70±2°C,RCWV or Max. working voltage for 1000 hrs with 1.5 hrs “ON” and 0.5 hrs “OFF” | ±(3.0%+0.10Ω) | <100mΩ |

**Note:**

RCWV：Rated continuous working voltage

RCWV=Square of Rated power * Resistance value

## 9. Packaging

### Packaging Methods

| Type (unit: piece) | Paper Tape | | | Embossed Tape | Bulk Cassette |
|---|---|---|---|---|---|
| | 7" (178mm) | 10" (254mm) | 13" (330mm) | 7"(178mm) | |
| CR-06 | 5000 | 10000 | 20000 | - | 5000 |

### Paper Tape

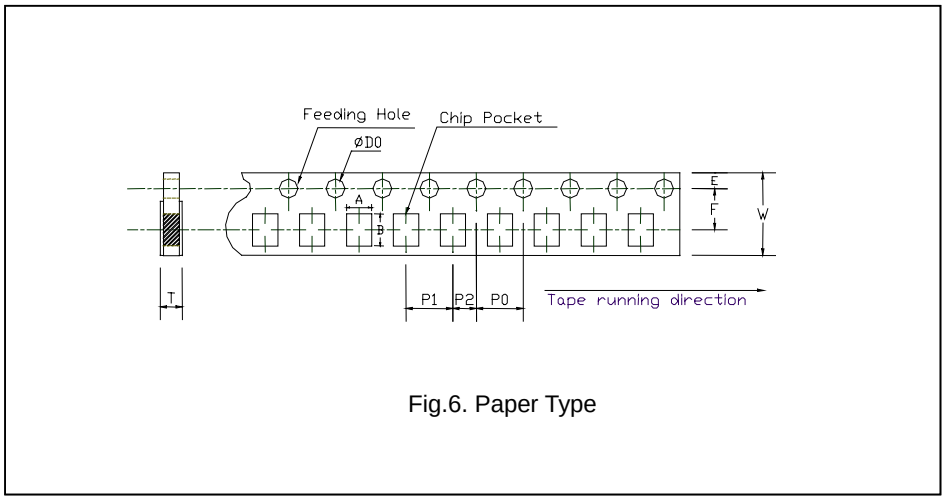
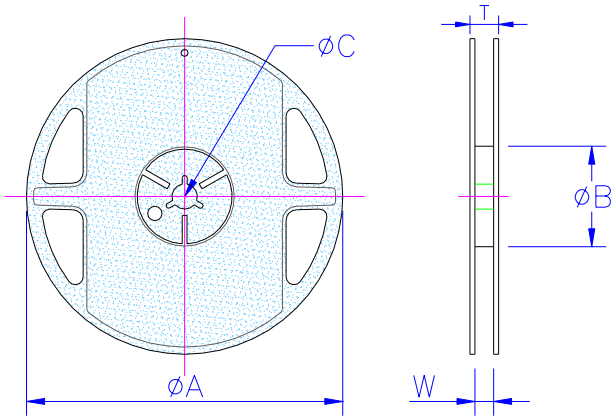



Fig.6. Paper Type

| Type | A | B | W | E | F | P0 | P1 | P2 | $\phi$ D0 | T |
|---|---|---|---|---|---|---|---|---|---|---|
| CR-06 | 1.90±0.1 | 3.50±0.2 | 8.0±0.2 | 1.75±0.1 | 3.5±0.05 | 4.0±0.1 | 4.0±0.05 | 2.0±0.05 | $1.5^{+0.1/-0}$ | 0.85±0.1 |

Unit: mm

### Reel Specification



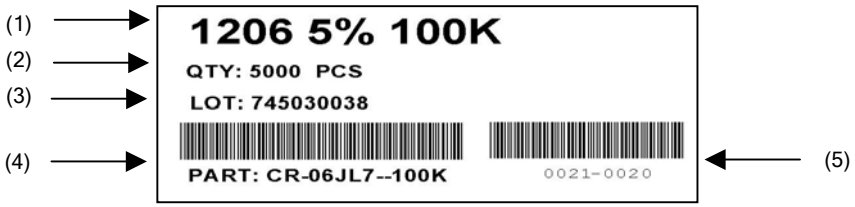

| Style | Packing | Tape width | Reel Diameter | $\phi$ A | $\phi$ B | $\phi$ C | W | T |
|---|---|---|---|---|---|---|---|---|
| CR-06 | Paper | 8mm | 7 inch | $180^{+0/-3}$ | $60^{+1/-0}$ | 13.0±0.2 | 9.0±0.3 | 11.4±1 |
| | | | 10 inch | 254±1 | 100±1 | 13.0±0.2 | 9.5±0.5 | 13.5±1 |
| | | | 13 inch | 330±1 | 100±1 | 13.0±0.2 | 9.5±0.5 | 13.5±1 |

Unit: mm

### 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. Storage Condition

(1)Suggest temperature：5~40℃
(2)Suggest humidity：40%~80%R.H.

## 11. Revising History

| Revision | Date | Change notification | Description |
|---|---|---|---|
| Rev.1 | 2005/2/23 | N/A | New issue |
| Rev.2 | 2005/8/8 | N/A | Revise soldering condition and reel drawing. |
| Rev.3 | 2006/4/6 | N/A | Add storage condition of chip resistor. |