

# Approval Specification

Customer :

Product: Thick Film High Precision Chip Resistor

CR-02 / CR-03 / CR-05 / CR-06

$\pm 0.1\%$  &  $\pm 0.5\%$

Sizes : 0402 / 0603 / 0805 / 1206

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

Customer Approval :

### 1. Features

- Reduced size of final equipment
- Low assembly costs
- Higher component and equipment reliability
- Complete high precision SMD family

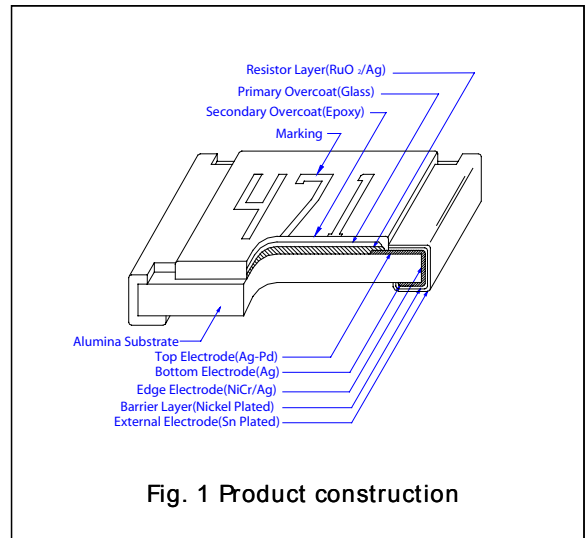
### 2. Applications

- Measuring instruments
- Power supplies
- EDP
- Telecommunication equipment

### 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	CR-02	CR-03	CR-05	CR-06
Size code	0402	0603	0805	1206
Resistance tolerance	±0.5% (E24, E96 series)	±0.5% & ±0.1% (E24, E96 series)		
Resistance range	10Ω~1MΩ	10Ω~1MΩ		
Temperature Coefficient of Resistance (ppm/°C) 10Ω ≤ R ≤ 1MΩ	±100	±100		
Power rating (at 70°C)	1/16W	1/10W	1/8W	1/4W
Max. operation voltage (DC or RMS)	50V	50V	150V	200V
Max. overload voltage	100V	100V	300V	400V
Jumper Rated current	1A	1A	2A	2A
Climatic category (IEC 60068)	55/125/42	55/155/42		

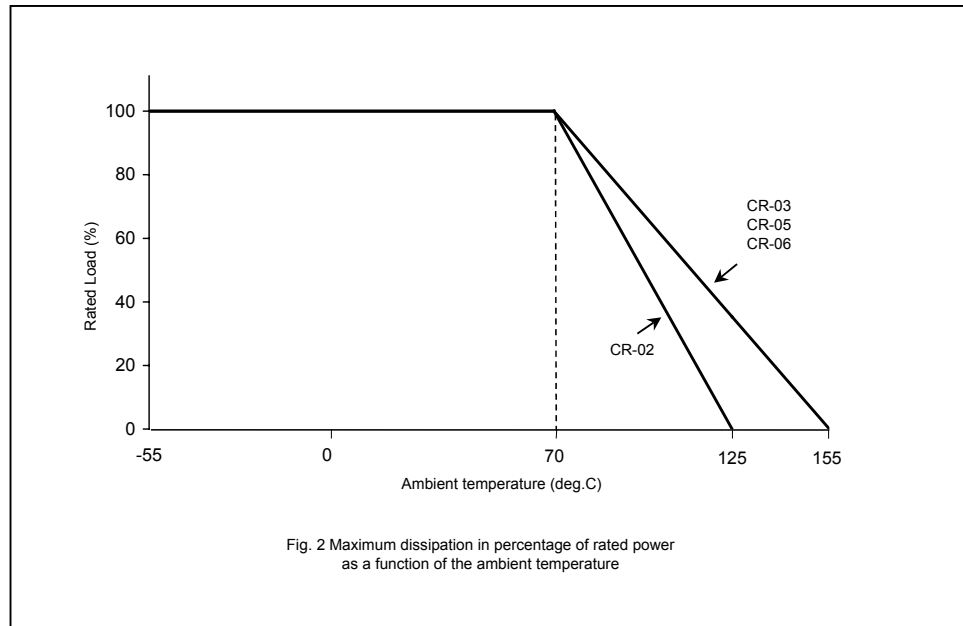
5. Order information

Digits	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Order Code	C	R	-	0	5	B	-	7	-	-	-	1	0	K	
	<b>Type Name</b> CR-02: 0402 CR-03: 0603 CR-05: 0805 CR-06: 1206					<b>Tolerance</b> B : $\pm 0.1\%$ D : $\pm 0.5\%$		<b>Function code</b> - : Normal L : Lead Free		<b>Packaging</b> 6 : 7" reel, paper tape, 10000 pcs/reel 7 : 7" reel, paper tape, 5000 pcs/reel A : 10" reel, paper tape, 10000 pcs/reel B : 10" reel, paper tape, 20000 pcs/reel C : 13" reel, paper tape, 40000 pcs/reel D : 13" reel, paper tape, 20000 pcs/reel F : Bulk package - : Not Applicable				<b>Resistance Value</b> --10R : 10 $\Omega$ -3K32 : 3.32K $\Omega$ -10K2 : 10.2K $\Omega$ -100K : 100K $\Omega$	

6. Functional description

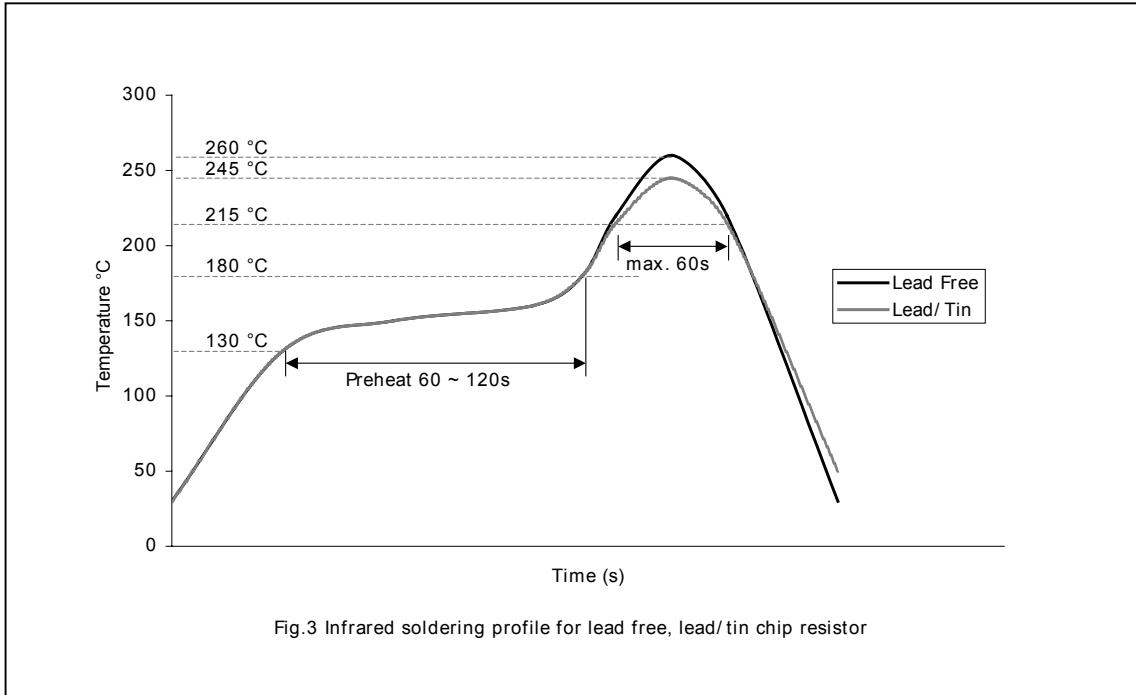
Derating curve

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.

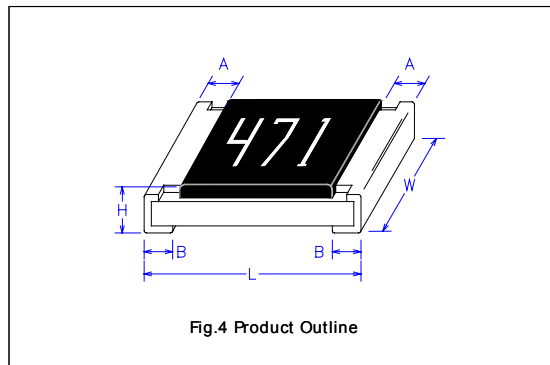


**7. Mechanical Data**

**Mass per 1000 pcs**

TYPE NAME	MASS (g)
CR-02	0.58
CR-03	2.02
CR-05	4.54
CR-06	8.84

**Outline**



**Dimension**

Type	L (mm)	W (mm)	H (mm)	A (mm)	B (mm)
CR-02	1.00±0.05	0.50±0.05	0.35±0.05	0.20±0.10	0.25±0.10
CR-03	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20
CR-05	2.00±0.10	1.25±0.10	0.50±0.10	0.35±0.20	0.40±0.20
CR-06	3.10±0.10	1.55±0.10	0.55±0.10	0.50±0.25	0.50±0.20



## 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
			$\pm 0.5\%$ & $\pm 0.1\%$
Temperature Coefficient of Resistance(T.C.R)	JIS C 5202 5.2 IEC 60115-1 4.8	-55°C~+125/+155 °C 20°C is the reference temperature	Within the specification
Short Time Overload	JIS C 5202 5.5 IEC 60115-1 4.13	2.5 times RCWV or RCOV, for 5 seconds	$\pm(1.0\%+0.05\Omega)$
Insulation Resistance	JIS C 5202 5.6 IEC 60115-1 4.6	RCOV for 1 minute	$\geq 10G$
Voltage Proof	JIS C 5202 5.7 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 IEC 60115-1 4.33	Bending once for 5 seconds	$\pm(1.0\%+0.05\Omega)$
Resistance to soldering heat	JIS C 5202 6.4 IEC 60115 4.18	260 $\pm$ 5°C for 10 seconds	$\pm(0.5\%+0.05\Omega)$
Leaching	JIS C 5202 6.4 IEC 60115 4.18	260 $\pm$ 5°C for 60 seconds	no leaching
Solderability	JIS C 5202 6.5 IEC 60115-1 4.17	235 $\pm$ 5°C for 2 seconds. lead free application: 245 $\pm$ 3°C for 2 seconds.	>95% coverage
Endurance at upper category temperature	JIS C 5202 7.2 IEC 60115-1 2.23.2	at 125/+155 °C for 1000 hrs	$\pm(1.0\%+0.05\Omega)$
Rapid change of temperature	JIS C 5202 7.4 IEC 60115-1 4.19	-55°C to +125/+155 °C, 5 cycles	$\pm(0.5\%+0.05\Omega)$
Damp heat with load	JIS 5202 7.9	40 $\pm$ 2°C, 90~95% R.H. RCWV, for 1000 hrs with 1.5hrs "ON" and 0.5 hrs "OFF"	$\pm(2.0\%+0.10\Omega)$
Endurance	JIS C 5202 7.10 IEC 60115-1 4.25.1	70 $\pm$ 2°C, RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"	$\pm(2.0+0.10\Omega)$

## 9. Packaging

### Packaging Methods

Type (unit: piece)	Paper Tape			Embossed Tape	Bulk Cassette
	7" (178mm)	10" (254mm)	13" (330mm)	7"(178mm)	
CR-02	10000	20000	40000	-	50000
CR-03	5000	10000	20000	-	25000
CR-05	5000	10000	20000	-	10000
CR-06	5000	10000	20000	-	5000

### Paper Tape

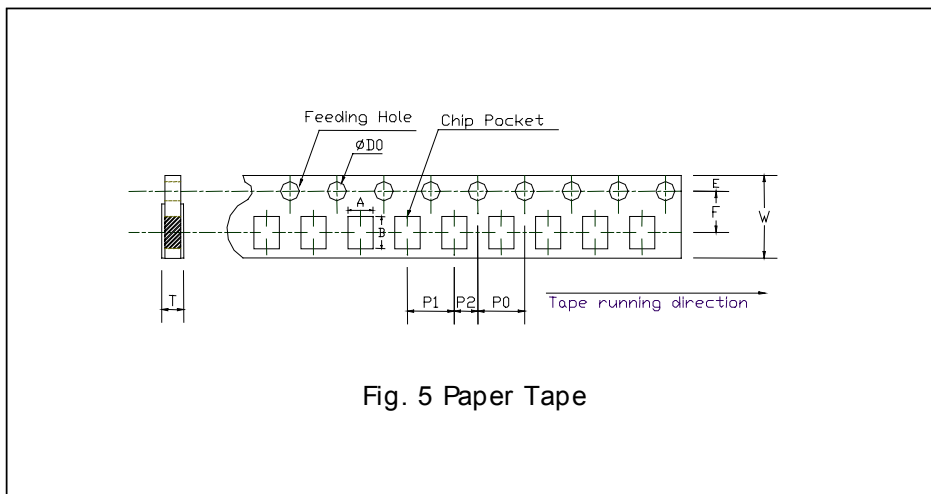


Fig. 5 Paper Tape

Type	A	B	W	E	F	P0	P1	P2	$\phi D0$	T
CR-02	0.65±0.1	1.15±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	1.5 <sup>+0.1/-0</sup>	0.45±0.1
CR-03	1.10±0.1	1.90±0.1					4.0±0.05			0.70±0.1
CR-05	1.60±0.1	2.40±0.2					0.85±0.1			
CR-06	1.90±0.1	3.50±0.2					0.85±0.1			

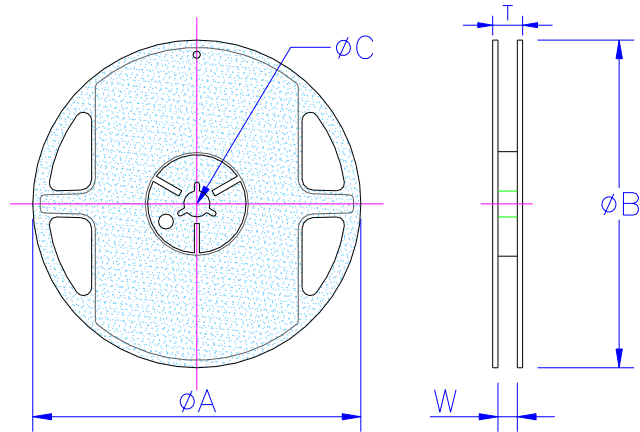
Unit: mm

Product Specification - High Precision Series

CR-02,CR-03,CR-05,CR-06

Sizes 0402,0603,0805,1206

**Reel Specification**



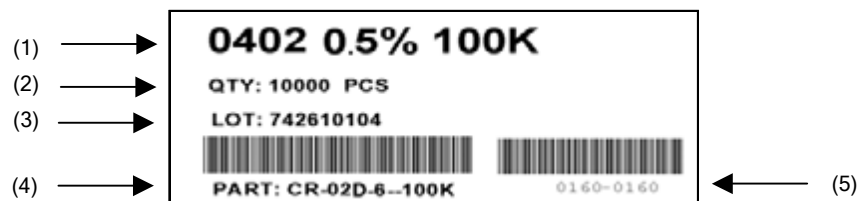
Unit:mm

Style	Packing	Tape width	Reel Diameter	$\phi A$	$\phi B$	$\phi C$	W	T
CR-02 CR-03 CR-05 CR-06	Paper	8 mm	7 inch	$180^{+0/-3}$	$60^{+1/-0}$	$13.0\pm 0.2$	$9.0\pm 0.3$	$11.4\pm 1$
			10 inch	$254\pm 1$	$100\pm 1$	$13.0\pm 0.2$	$9.5\pm 0.5$	$13.5\pm 1$
			13 inch	$330\pm 1$	$100\pm 1$	$13.0\pm 0.2$	$9.5\pm 0.5$	$13.5\pm 1$

**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