A S J

ASJ PTE LTD

LEAD FREE THIN FILM
CHIP RESISTOR SPECIFICATION

Reference No.	:	SYS-ENG-209
Revision No.	:	D

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1.0 SCOPE

This specification specifies fixed thin film chip resistor (referred to as resistor hereinafter) for use in electronic equipment. In case there are discrepancies in specifications between this specification and the Customer's specifications, the latter shall precede.

2.0 PART NUMBERING SYSTEM

Part Numbering is made in accordance with the following system:

CT XX	XXXX	X	X	X	
Resistance	Resistance Value	Tolerance	Packaging	TCR	(ppm°C)
CT05 - 0201		A - ±0.05%	E - 4K reel	B	- ±10
CT10 - 0402		B - ±0.1%	L - 5K reel	C	- ±15
CT16 - 0603		C - ±0.25%	K - 10K reel	D	- ±25
CT21 - 0805		D - ±0.5%	Y – 20K reel	E	- ±50
CT32 - 1206		E - ±0.01%	V – 50K reel		
CT40 - 1210		F - ±1%			
CT50 - 2010		G - ±2%			
CT63 - 2512		J - ±5%			

3.0 RATING

3.1 Rated Power

3.1.1 Resistor Rated Power

	Rated Power	Maximum Working Voltage	Maximum Overload Voltage	Dielectric Withstanding Voltage
CT05	1/20W	15V	50V	50V
CT10	1/16W	25V	100V	100V
CT16	1/16W	50V	100V	100V
CT21	1/10W	100V	200V	250V
CT32	1/8W	150V	250V	250V
CT40	1/4W	150V	300V	400V
CT50	1/2W	150V	300V	400V
CT63	3/4W	150V	300V	400V

3.2 Power Derating Characteristics

Rated Power shall be the load power corresponding to nominal wattage suitable for continuous use at 70°C ambient temperature. In case the ambient temperature exceeds 70°C, reduce the load power in accordance with Derating curve in Fig. 1.

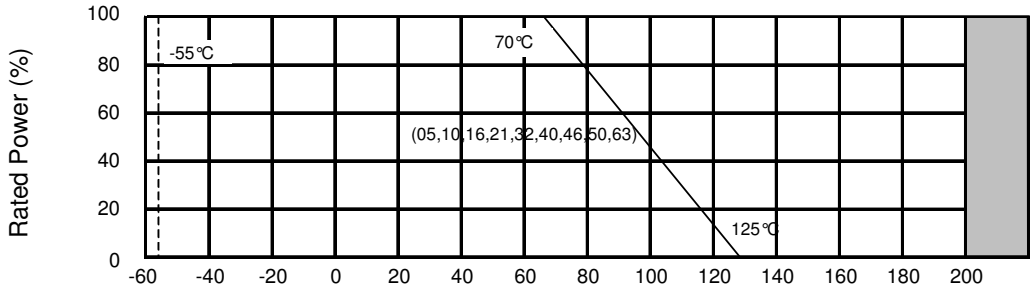


Fig.1 Power Derating Characteristics

3.3 Standard Atmospheric Condition
Unless otherwise specified, the standard range of atmospheric conditions for making measurements and tests is as follows :

Ambient Temperature = +5°C to +35°C
Relative Humidity = < 85% RH
Air Pressure = 86 to 106kPa

If there may be any doubt about the results, measurement shall be made within the following limits :
Ambient Temperature = 20± 2°C
Relative Humidity = 60 to 70% RH
Air Pressure = 86 to 106kPa

3.4 Operating Temperature Range -55°C to +155°C

3.5 Storage Temperature Range -5°C to +40°C

3.6 Flammability Rating Tested in accordance to UL-94, V-0

3.7 Moisture Sensitivity Level Rating : Level 1

3.8 Product Assurance
ASJ resistor shall warranty 12 months from the date of shipment.

3.9 ASJ resistors are RoHS compliance in accordance to RoHS Directive 2002/95/EC.

3.10 Resistance, Resistance Tolerance and Temperature Coefficient of Resistance. (Table 1)

Table 1	Resistance Range
CT05 (0201)	10Ω to 22KΩ
CT10 (0402)	1Ω to 121KΩ
CT16 (0603)	1Ω to 681Ω
CT21 (0805)	1Ω to 1.5MΩ
CT32 (1206)	1Ω to 1.5MΩ
CT40 (1210)	1Ω to 1MΩ
CT50 (2010)	1Ω to 1MΩ
CT63 (2512)	1Ω to 1MΩ
Temperature Coefficient Resistance (TCR)	0201 to 2512 ±50ppm/°C, ±25ppm/°C (±15ppm/°C, ±10ppm/ °C - upon request)

3.11 Rated Voltage

The rated voltage is calculated from the rated power and nominal resistance by the following formula:

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

Where E : Rated Voltage (V)
P : Rated Power (W)
R : Nominal Resistance (Ω)

In case the value calculated by the formula exceeds the maximum working voltage given in Section 3.1.1. the maximum working voltage in Section 3.1.1. shall be regarded as the rated voltage.

4.0 MARKING ON PRODUCT

The nominal resistance shall be marked on the surface of each resistor.

Part Number	Color	Marking on Product
CT05 (0201)	-	No marking
CT10 (0402)	-	No marking
CT16 (0603)	Light Brown	1) Tolerance : +/-1.0% (F) ° Four Numerals Marking (E96 Series) ° 0603 Three Characters Marking based on E-96 marking standard. 2) Tolerance: ±5.0% (J) Three Numerals Marking
CT21 (0805)	Light Brown	
CT32 (1206)	Light Brown	
CT40 (1210)	Light Brown	
CT50 (2010)	Light Brown	
CT63 (2512)	Light Brown	

4.1 Numeric Numbering

4.1.1 5% Tolerance : ***Three Numerals Marking***
First 2 digits are significant figures, third digit is number of zeros. Letter R is decimal point.

Example

Nominal Resistance	*Marking*	*Remarks*
1 Ω	1R0	1 X 10^0 = 1
10 Ω	100	10 X 10^0 = 1 0
100 Ω	101	10 X 10^1 = 1 00
4.7K Ω	472	47 X 10^2 = 47 00
47K Ω	473	47 X 10^3 = 47 000
470K Ω	474	47 X 10^4 = 47 0000
4.7M Ω	475	47 X 10^5 = 47 00000

4.1.2 1% Tolerance : ***Four Numerals Marking***
First 3 digits are significant figures, fourth digit is number of zeros.

Example :

Nominal Resistance	***Marking***	***Remarks***
1 Ω	1R00	1 X 10^0 = 1
10 Ω	10R0	10 X 10^0 = 10
100 Ω	1000	100 X 10^0 = 100
4.7K Ω	4701	470 X 10^1 = 470 0
47K Ω	4702	470 X 10^2 = 470 00
470K Ω	4703	470 X 10^3 = 470 000
1M Ω	1004	100 X 10^4 = 100 0000

4.1.3 0603 1% Tolerance : ***Three Character E-96 Marking Standard***.
The first 2 digits for the 3 digits E-96 part marking standard (Refer Table 2 & 3). The third character is a letter multiplier :

Nominal resistance	***Marking***	***Remark***
33.2 Ω	51 R	332 X 10^{-1} Ω
150 Ω	18 A	150 X 10^0 Ω
4.99K Ω	68 B	499 X 10^1 Ω
1 0.2K Ω	02 C	102 X 10^2 Ω
100K Ω	01 D	100 X 10^3 Ω

4.1.3.1 EIA-96 Marking Scheme

Table 2 Significant figures

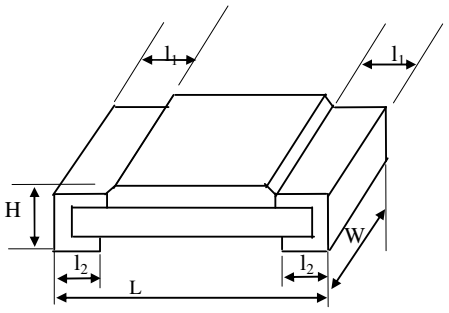
Significant Figures	Symbol	Significant Figures	Symbol	Significant Figures	Symbol	Significant Figures	Symbol
100	01	178	25	316	49	562	73
102	02	182	26	324	50	576	74
105	03	187	27	332	51	590	75
107	04	191	28	340	52	604	76
110	05	196	29	348	53	619	77
113	06	200	30	357	54	634	78
115	07	205	31	365	55	649	79
118	08	210	32	374	56	665	80
121	09	215	33	383	57	681	81
124	10	221	34	392	58	698	82
127	11	226	35	402	59	715	83
130	12	232	36	412	60	732	84
133	13	237	37	422	61	750	85
137	14	243	38	432	62	768	86
140	15	249	39	442	63	787	87
143	16	255	40	453	64	806	88
147	17	261	41	464	65	825	89
150	18	267	42	475	66	845	90
154	19	274	43	487	67	866	91
158	20	280	44	499	68	887	92
162	21	287	45	511	69	909	93
165	22	294	46	523	70	931	94
169	23	301	47	536	71	953	95
174	24	309	48	549	72	976	96

Table 3 Multiplier

Symbol	Multiplier	Symbol	Multiplier
A	10^0	G	10^6
B	10^1	H	10^7
C	10^2	X	10^{-1}
D	10^3	Y	10^{-2}
E	10^4		
F	10^5		

5.0 DIMENSIONS, CONSTRUCTIONS AND MATERIALS

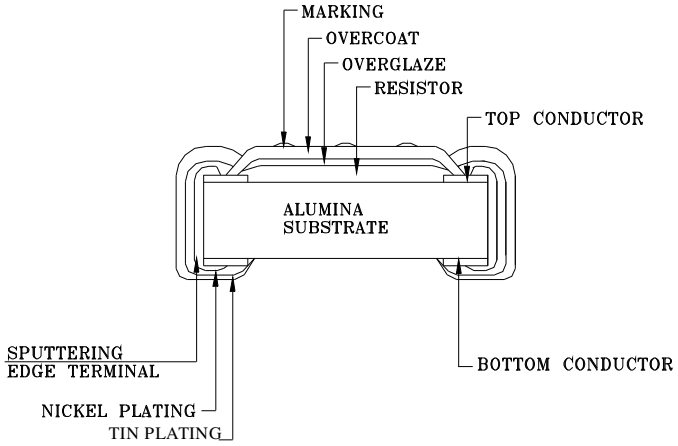
5.1 Dimensions



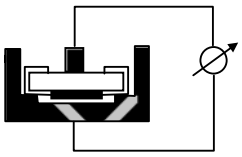
Unit : Inches (Millimeters)

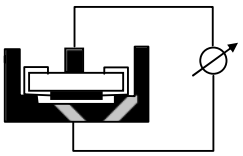
CODE	L	W	H	1_1	1_2
CT05 (0201)	0.024±0.004 (0.60±0.10)	0.012±0.002 (0.30±0.05)	0.010±0.002 (0.25±0.05)	0.006±0.004 (0.15±0.10)	0.006±0.004 (0.15±0.10)
CT10 (0402)	0.040±0.004 (1.00±0.10)	0.020±0.002 (0.50±0.05)	0.014±0.002 (0.35±0.05)	0.008±0.004 (0.20±0.10)	0.010±0.004 (0.25±0.10)
CT16 (0603)	0.063±0.004 (1.60±0.10)	0.031±0.004 (0.80±0.10)	0.018±0.004 (0.45±0.10)	0.012±0.008 (0.30±0.20)	0.012±0.008 (0.30±0.20)
CT21 (0805)	0.079±0.006 (2.00±0.15)	0.049±0.004 (1.25±0.10)	0.020±0.004 (0.50±0.10)	0.016±0.008 (0.40±0.20)	0.016±0.008 (0.40±0.20)
CT32 (1206)	0.122±0.004 (3.10±0.10)	0.063±0.006 (1.60±0.15)	0.022±0.002 (0.55±0.05)	0.020±0.010 (0.50±0.25)	0.020±0.010 (0.50±0.25)
CT40 (1210)	0.122±0.004 (3.10±0.10)	0.098±0.006 (2.50±0.15)	0.022±0.002 (0.55±0.05)	0.020±0.010 (0.50±0.25)	0.016±0.008 (0.40±0.20)
CT50 (2010)	0.200±0.006 (5.00±0.15)	0.098±0.006 (2.50±0.15)	0.022±0.002 (0.55±0.05)	0.024±0.010 (0.60±0.25)	0.016±0.008 (0.40±0.20)
CT63 (2512)	0.250±0.006 (6.30±0.15)	0.126±0.006 (3.20±0.15)	0.022±0.002 (0.55±0.05)	0.024±0.010 (0.60±0.25)	0.016±0.008 (0.40±0.20)

5.2 Resistor Construction



6.0 ELECTRICAL CHARACTERISTICS AND TEST CONDITIONS

CHARACTERISTICS		SPECIFICATIONS Resistance	TESTING CONDITIONS
1	Resistance Value	Resistance accuracy being fully relies with respect to tolerance of resistor.	***JIS C 5202 5.1*** Application time to be within 5 secs . Applied Voltage for resistance measurement : <10Ω 0.1V 10~99Ω 0.3V 100~999 1.0V 1K~ 9.9K 3.0 V 10K~ 99.9K 10.0 V 100K~999K 30.0 V 1M & Over 50.0 V
2	Resistance Temperature Coefficient	NA Refer Section 3.10 Table 1	***JIS C 5202 5.2*** Measure R at t_o=25^{0}C and after 45 minutes measure R at t=125^{0}C. *Calculation :* $TCR(ppm/^0C)=\frac{R-R_0}{R_0} * \frac{1}{t-t_0} * 10^6$
3	Short Time Overload	±1.0%	***JIS C 5202 5.5*** Apply at 2.5 times rated voltage for 5 seconds. Applied voltage shall not exceed maximum overload voltage or current.
4	Insulation Resistance	> 10G Ω	***JIS C 5202 5.6*** Refer to table 3.1 voltage applied for 1 minute 

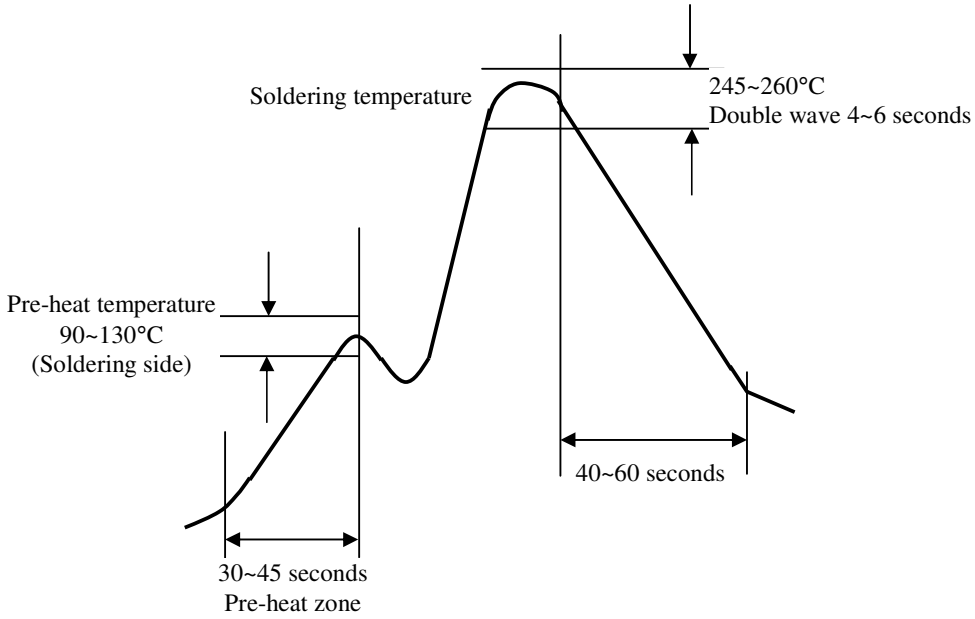
5	Dielectric Withstanding Voltage	No failure of resistor such as short-circuit, burning, breakdown. ±(1%+0.05Ω) for 1% & 5% tolerance resistor	***JIS C 5202 5.7*** Max working voltage applied for 1 min.  The variation in relation to the initial resistance shall be within ± 1%.
6	Intermittent Overload	±1% for 1% & 5% tolerance resistor	***JIS C 5202 5.8*** Apply 4 times rated voltage for 1 secs ON and 25 secs OFF. Total 10 000 $^{+400}_{-0}$ cycles Applied voltage/current shall not exceed maximum intermittent overload voltage/ current.
7	Noise	<10dB	***JIS C 5202 5.9*** V_n(dB) = T-*f*(T-S)-D
8	Terminal Strength A) Bend Test (Applicable for chip size smaller than CT40) B) Pull Test (Applicable for chip size bigger than CT21) C) Push Test D) Robushness test	Tolerance resistor. With no evidence of mechanical damage after releasing the pressure. ±1% for 1% & 5% ±(1.0%+0.05Ω) for 1% & 5% ±(1.0%+0.05Ω) for 1% & 5% After reading/initial reading >50-%	***JIS C 5202 6.1*** ***JIS C 5202 6.1.4(1) Method 2*** Bend Test : Apply force till 3mm bend and hold for 5±1 secs. Measure resistance while applying pressure. Pull Test : Apply 0.5kgF for 30±5 secs ***JIS C 5202 6.1.4(3) Method B*** Push Test : Apply 1.2kgF for 60±5secs Component mounted on board precondition using steam aging for 4 hour. Initial reading = Force required to break away components mounted on board. After Reading = Force required to break away components mounted on board after preconditioned.

9	Resistance to soldering heat	±(0.5%+0.05Ω) for 1% & 5% tolerance resistor	***JIS C 5202 6.10*** A) Solder bath method Resistor dipped entirely in solder bath of 260±5°C for 10^{+1}_{0} sec. B) Flow soldering Preheat : 100°C to 105°C for 30±5 sec. Resistor dipped entirely in solder bath of 265±3°C for 5^{+1}_{0} C) Reflow soldering method Peak : 250^{+5}_{0} °C 230±5°C for 30 - 40secs. D) Soldering Iron method Bit temp.: 350±10°C Application time of soldering iron is 3^{+1}_{0} sec. After which the sample shall be left at ambient temperature for 1~ 2 hrs before measurement.
10	Solderability	≥ 95% Coverage	Precondition by baking 4 hours at 155°C. ***IEC 60068-2-58*** Solder bath method : Solder : Sn-3Ag-0.5Cu Flux : 25% Colophony, 75% 2-Propanol by weight. 245±5°C for 2^{+1}_{-0} sec
11	Resistance to Solvent	±(1%+0.05Ω) for 1% & 5% tolerance resistor Marking shall be legible without mechanical damage in appearance.	***JIS C 5202 6.9*** Immerse in 20°C~25°C Isoproyl Alcohol solvent for 60±10secs.
12	Low Temperature	±(0.5%+0.05Ω) for 1% tolerance resistor ±(1%+0.05Ω) for 5% tolerance resistor	***JIS C 5202 7.1*** -55±3°C for 1000 $\pm^{48}_{0}$ hours Sample shall be left at ambient temperature for 1~ 2 hrs after test before measuring final resistance.

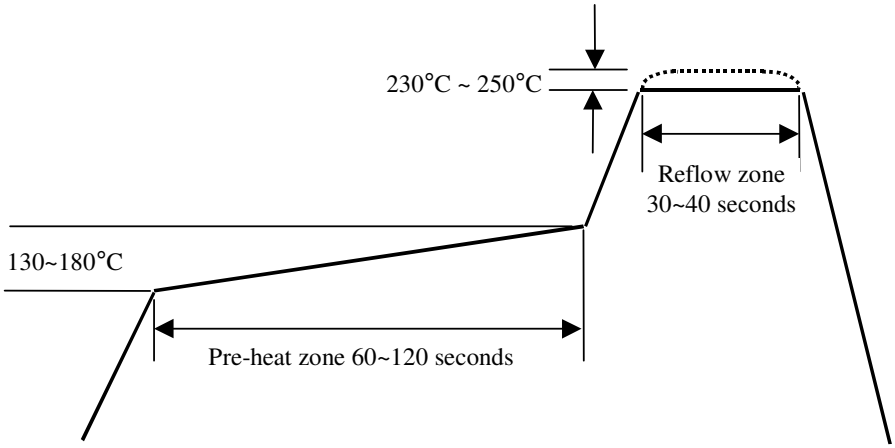
<table>
<tr><td>13</td><td>Low Temperature with Load</td><td>±(0.5%+0.05Ω) for 1% tolerance resistor
±(1%+0.05Ω) for 5% tolerance resistor</td><td>JIS C 5202 7.1
-55±3°C for 90 minutes, 0.1 rated continuous working voltage as per 3.5 shall be applied for 45 $\pm^{5}_{0}$ minutes.
Voltage Sample shall be left at ambient temperature for ~ 8 hrs after the removal of the voltage for 15 $\pm^{5}_{0}$ before measuring final resistance.</td></tr>
<tr><td>14</td><td>Temperature Cycling</td><td>±(0.5%+0.05Ω) for 1% tolerance resistor
±(1%+0.05Ω) for 5% tolerance resistor</td><td>JIS C5202 7.4
<table>
<tr><td>Step</td><td>Temp. (°C)</td><td>Time (minute)</td></tr>
<tr><td>1</td><td>-55 ± 5</td><td>30 mins</td></tr>
<tr><td>2</td><td>25 ± 5</td><td>5 mins max</td></tr>
<tr><td>3</td><td>155 ± 5</td><td>30 mins</td></tr>
<tr><td>4</td><td>25 ± 5</td><td>5 mins max</td></tr>
<tr><td colspan="3">Repeat step 1 to 4 for 5 cycles</td></tr>
</table></td></tr>
<tr><td>15</td><td>Resistance to damp Heat (Humidity)</td><td>±(1%+0.1Ω) for 1% & 5% tolerance resistor</td><td>JIS C 5202 7.5
40±2°C and 90~95%RH for $1000\pm^{48}_{0}$hours
Sample shall be left at ambient temperature for 1~ 2 hrs after test before measuring final resistance.</td></tr>
<tr><td>16</td><td>Loadlife</td><td>±(1.0%+0.05Ω) for 1% tolerance resistor</td><td>JIS C5202 7.10
At 70±3°C Apply DC rated voltage at 90minutes On, 30minutes Off for $1000\pm^{48}_{0}$hours
Sample shall be left at ambient temperature for 1~ 2 hrs after test before measuring final resistance.</td></tr>
<tr><td>17</td><td>Salt Spray</td><td>±(3%+0.1Ω) for 1% & 5% tolerance resistor</td><td>JIS C5202 7.7
Spray 5±1 Wt% salt water for 96±4 hours at 35±2°C</td></tr>
<tr><td>18</td><td>Mounting Quality Test</td><td>Visual check for solder joint wetting condition, resistor body damages</td><td>Solder Paste : Sn-3Ag-0.5Cu
Reflow soldering method
Peak : 250°C $^{+5}_{0}$
230±5°C for 60sec</td></tr>
</table>

6.1 Soldering Profile

6.1.1 Flow Soldering



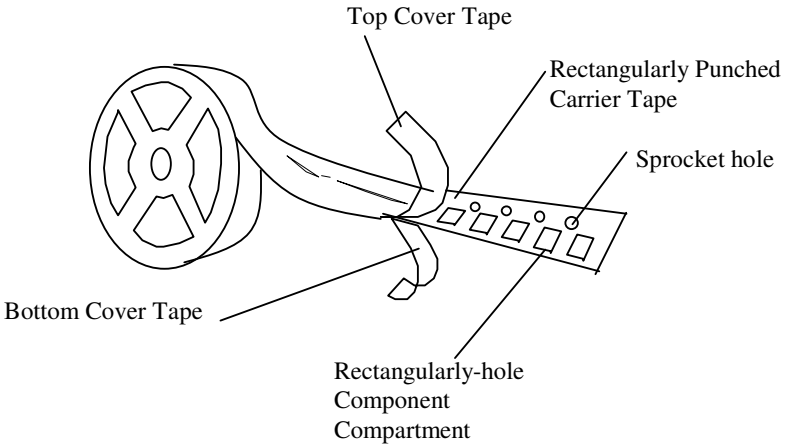
6.1.2 Reflow Soldering



7.0 TAPING

7.1 Structure of Taping

Taping of Rectangularly Punched Carrier System



7.2 Materials

(1) Every taping shall consist of materials as shown in Table - 4

(2) Every taping shall not adversely affect the mechanical, electrical and solderability performances.

(3) Materials of taping shall generate no statics.

(4) The taped products are stored at a temperature -5 to +40°C and a relative humidity 40 to 50% without exposing to direct sunlight and, after such conditioning, the tape shall show no deterioration in performances such as change in adhesion force or peel forces.

Table 4 Materials of Taping

	Carrier Tape	Top Cover Tape	Bottom Cover Tape
Taping of Rectangularly Punched Carrier System	Paper	thermal adhesion polyester	thermal adhesion paper

7.3 Leader and Trailer Tape

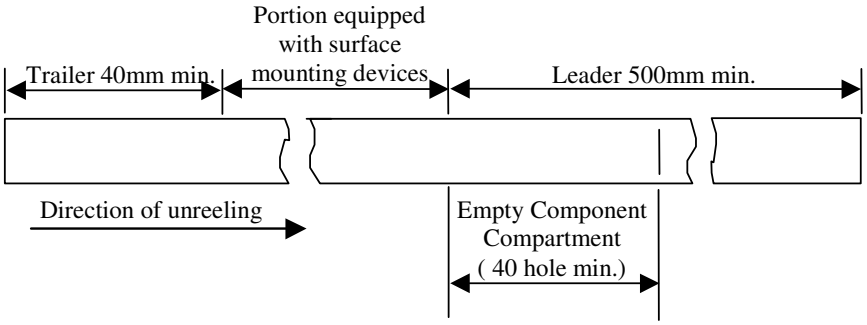
1) Leader Tape The length of leader tape shall be at least 500 mm including 40 or more or rectangular holes (component compartments) in which no component is placed.

The said 40 or more empty component compartments shall be sealed with the top cover tape (see Fig. 2).

2) Trailer Tape The trailer tape at the hub of reel shall be least 40 mm in length including carrier tape with empty component compartments. The empty component compartments shall be sealed with the top cover tape.

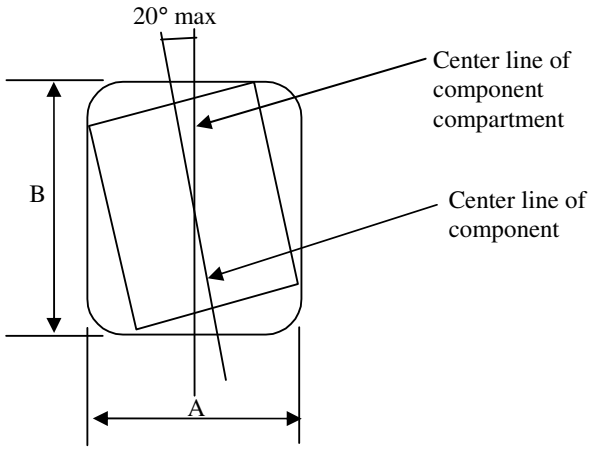
The last portion of the carrier tape shall release from the reel hub.

Fig. 2 Explanation of Leader and Trailer Tape



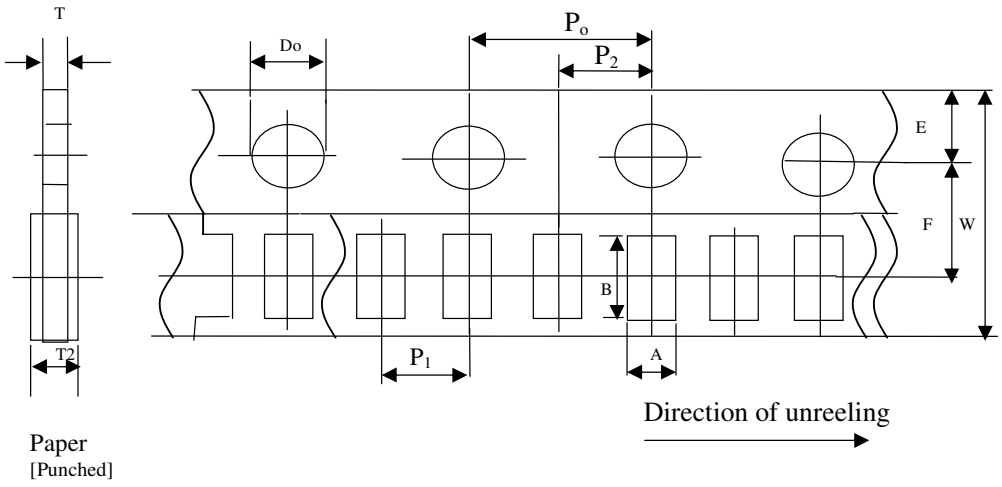
7.4 Position of Taped component The angle made by the center line of taped component and the center line of component compartment shall not exceed 20 degrees (see Fig. 3).

Fig. 3 Angle between Center Line of Component and Center Line of Component compartment



7.5 Dimension

7.5.1 Dimension of Punched Paper Tape Carrier System (CR – 05 & 10)



Remark : Pitch tolerance over any 10 pitches of Po is ± 0.2 mm

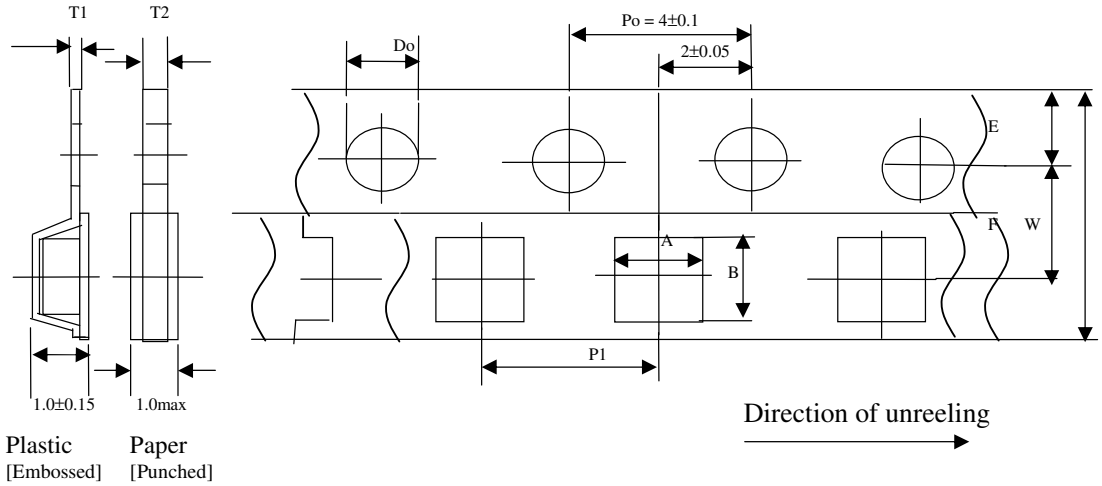
Dimension of Punched Paper Tape Carrier System (CR- 05 & 10)

(unit : mm)

Code	A	B	W	E	F	P_1
CT05	0.45 ± 0.10	0.75 ± 0.1	8.0 ± 0.2	1.75 ± 0.1	3.5 ± 0.05	2.0 ± 0.5
CT10	0.65 ± 0.1	1.15 ± 0.1	8.0 ± 0.2	1.75 ± 0.1	3.5 ± 0.05	2.0 ± 0.5

Code	P_2	P_0	D_0	T_2	T	
CT05	2.0 ± 0.05	4.0 ± 0.1	1.5	0.53max	--	
CT10	2.0 ± 0.05	4.0 ± 0.1	1.5	0.35±0.1	--	

7.5.2 Dimension of Punched Paper Tape Carrier System (CR16, 21, 32, 40, 50, 63)



Remark : Pitch tolerance over any 10 pitches of Po is ± 0.2 mm

Dimension of Punched Paper Tape Carrier System (CR - 16, 21, 32, 40)

Code	A	B	W	E	F	P1	Do	T2
CT16	1.1 ± 0.1	1.9 ± 0.1	8.0 ± 0.2	1.75 ± 0.1	3.5 ± 0.05	4.0 ± 0.1	$1.5 \pm {}^{0.1}_{0}$	0.60 ± 0.1
CT21	1.65 ± 0.1	2.4 ± 0.1						0.75 ± 0.1
CT32	1.9 ± 0.1	3.5 ± 0.1						0.75 ± 0.1
CT40	2.8 ± 0.1	3.5 ± 0.1						0.75 ± 0.1

Dimension of Plastic Embossed Carrier System (CR -50, 63)

Code	A	B	W	E	F	P1	Do	T1
CT50	2.9 ± 0.2	5.4 ± 0.2	12 ± 0.2	1.75 ± 0.1	5.5 ± 0.05	4.0 ± 0.1	$1.5 \pm {}^{0.1}_{0}$	0.2± 0.10
CT63	3.6 ± 0.2	6.6 ± 0.1						

7.6 Performance of Taping

7.6.1 Strength of carrier tape and top cover tape
When a tensile force of 10N (1.02 kgf) is applied in the direction of unreeling the tape, the carrier tape and top cover tape shall withstand this force.

7.6.2 Peel force of top cover tape

a) Ensure that the peel force meter is reset to ϕ initially.

b) A minimum of 4 holes is required when the top cover tape is pulled.

c) Do not reset the peel force meter.

d) The peel force of top cover tape shall be 0.1N to 0.7N (10 to 70 gf) when the top cover tape is pulled at a speed of 300 mm/min with the angle between the tape during peel and the direction of unreeling maintained at 165 to 180 degree as illustrated in Fig 4.

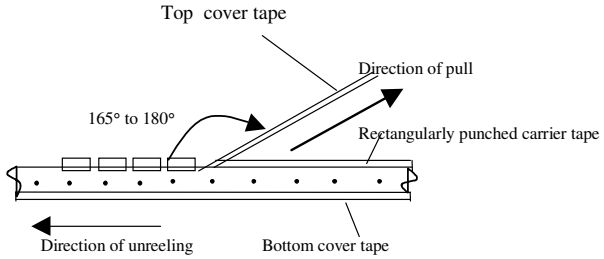


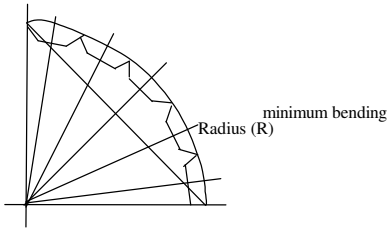
Fig. 4 Peeling Test

7.6.3 Minimum Bending Radius
When the tape is bent with the minimum bending radius specified in Fig 5 and Table 5, components shall maintain their position and shall be free from abnormalities such as damage.

Table 5

Width of Tape	Minimum Bending Radius
8 mm	30 mm
12 mm	30 mm

Fig. 5 Explanation of Minimum Bending Radius



7.6.4 Numbering of missing components and mistake in taping

a) The number of missing components shall not exceed 0.1% of the total number of components (marked number) or one whichever is the larger, and no consecutive missing chip exceeding two is allowed.

b) No mistake is allowed on the position of polarity or termination or front and rear of component at the time of taping.

7.7 Packaging

7.7.1 Taping

7.7.1.1 Quantity – Tape and Reels

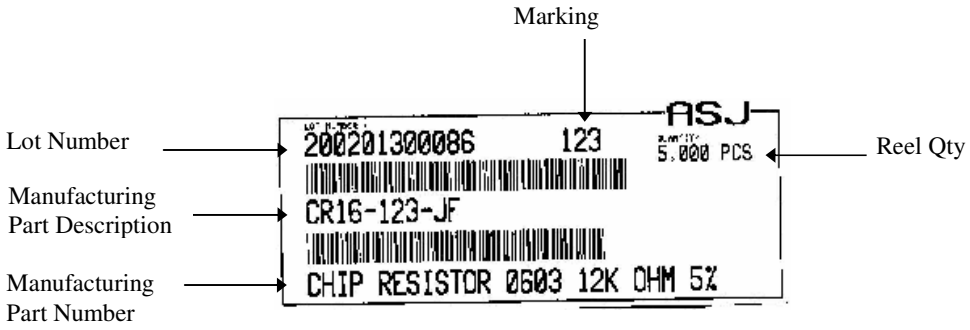
Code	Quantity	Remarks
CT05	10000 pcs	20 000 or 50 000 pcs on request
CT10	10000 pcs	
CT16	5000 pcs	10 000 or 20 000 pcs on request
CT21		
CT32		
CT40	5000 pcs	-
CT50	4000 pcs	-
CT63	4000 pcs	-

7.7.1.2 Quantity – Bulk Cassette

Code	Quantity	Remarks
CT10	50 000pcs	100 000 pcs on request
CT16	25 000pcs	-
CT21	10 000pcs	-
CT32	5 000pcs	-

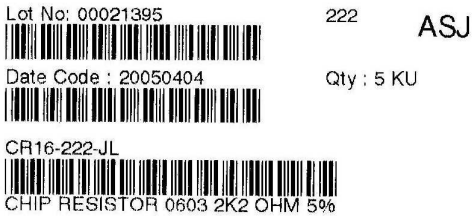
7.7.2 Identification

Production label that indicates the 12 digits lot number, product type, resistance value and tolerance shall be pasted on the surface of each reel.



How to read lot Number :

XXXX	XX	XX	XXXX
Year	Mth	Day	Serialize Number



Lot Number : 8 digits running numbers

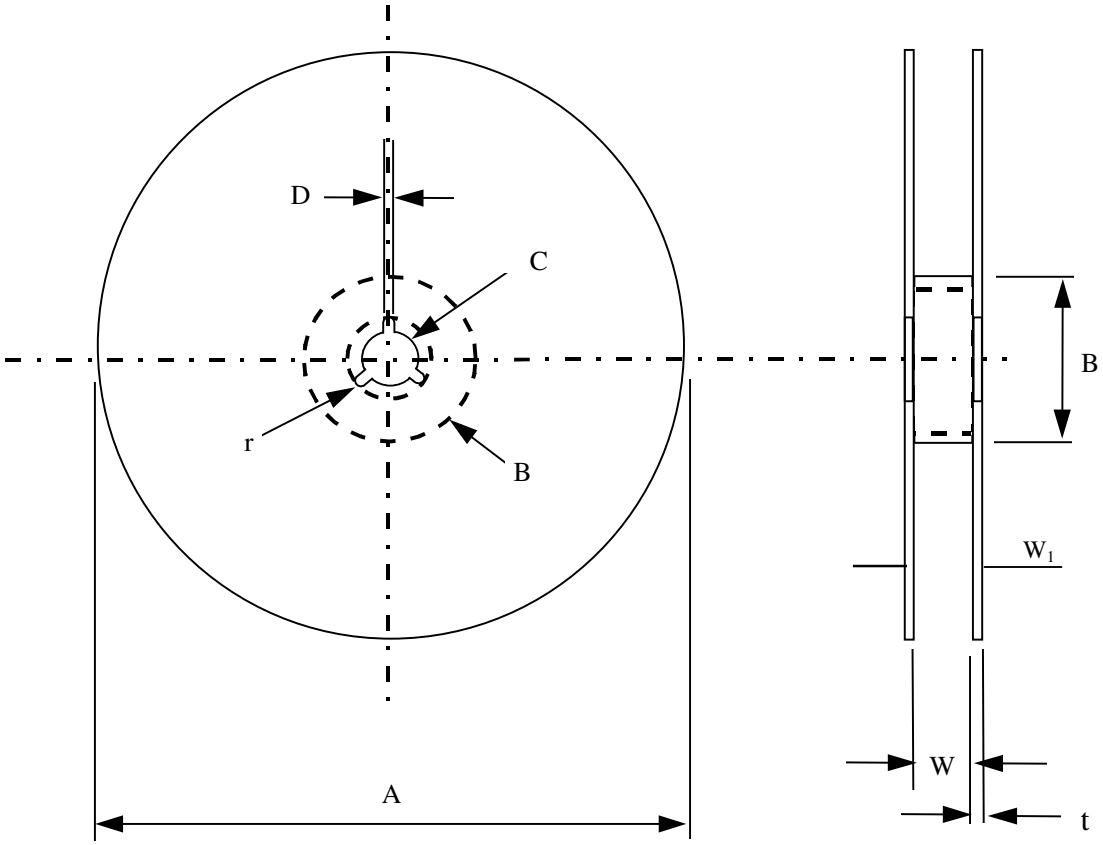
Date Code : YYYYMMDD

YYYY - Year
MM - Month
DD - Date

7.7.3 Packaging Reel Box

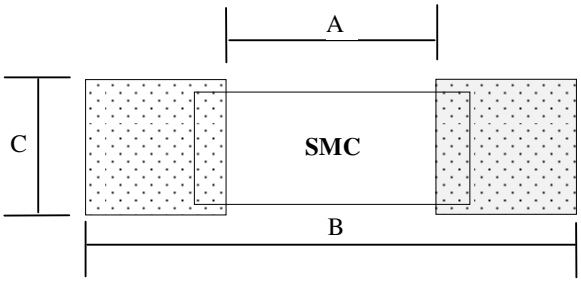
Dimension	Reel Box	Number of Reels
185 X 60 X 186 mm	25K Box	5
185 X 120 X 186 mm	50K Box	10

7.7.4 Reel Dimensions



Model	A	B	C	D	W	W_1	t	r
7"Reel (5K)	ϕ178±2.0	ϕ80min	13± 0.2	ϕ2.0± 0.5	11±1.0	14.4 max	1.0± 0.1	1.0
7"Reel (4K)	ϕ178±2.0	ϕ60min	13± 0.2	ϕ2.0± 0.5	13±1.0	14.4 max	1.2± 0.1	1.0
10"Reel (10K)	ϕ254±2.0	ϕ60min	13± 0.2	ϕ2.0± 0.5	11±1.0	14.4 max	1.5± 0.1	1.0
13"Reel (20K)	ϕ330±2.0	ϕ60min	13± 0.2	ϕ2.0± 0.5	11±1.0	14.4 max	2.1± 0.1	-

8.0 Surface Mount Land Patterns



Product (Type)	Land Dimension		
	A	B	C
CR05 (0201)	0.012 [0.3]	0.04 [1.0]	0.016 [0.4]
CR10 (0402)	0.020 [0.5]	0.059 [1.5]	0.020 ~ 0.024 [0.5 ~ 0.6]
CR10 (0402)	0.020 [0.5]	0.059 [1.5]	0.020 ~ 0.024 [0.5 ~ 0.6]
CR16 (0603)	0.039 [1.0]	0.106 [2.7]	0.020 ~ 0.035 [0.5 ~ 0.9]
CR21 (0805)	0.047 [1.2]	0.138 [3.5]	0.043 ~ 0.051 [1.1 ~ 1.3]
CR32 (1206)	0.087 [2.2]	0.197 [5.0]	0.055 ~ 0.071 [1.4 ~ 1.8]
CR40 (1210)	0.087 [2.2]	0.197 [5.0]	0.083 ~ 0.118 [2.1 ~ 3.0]
CR50 (2010)	0.15 [3.9]	0.331 [8.4]	0.083 ~ 0.118 [2.1 ~ 3.0]
CR63 (2512)	0.205 [5.2]	0.413 [10.5]	0.098 ~ 0.189 [2.5 ~ 4.8]

9.0 APPLICABLE STANDARDS

JIS C 5202	Test Methods of Fixed Resistors for Electronic Equipment.
JIS C 5223	Fixed Thick Film Chip Resistors, Rectangular Type for Use in Electronic Equipment.
JIS C 0806	Packaging of Electronic Components on continuous tapes (surface mount devices).
MIL-R-55342	Resistors, Fixed, Film, Chip, Established Reliability, General Specifications for.
MIL-STD-202	Test Methods for Electronic and Electrical Parts.
IPC/JEDEC J STD 020	Moisture / Reflow sensitivity classification for non hermetic solid state surface mount devices.
2002/95/EC	RoHS Directive
IEC 60068-2-58	Solderability