

Specification

(Reference)

Title: LINEAR POSITIVE $\tilde{T}C$ CHIP THERMISTORS; RECTANGULAR
TYPE

Style: LTC1/10,1/8

RoHS COMPLIANCE ITEM

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Issue Dept.: Research & Development Department Hokkaido Research Center

1. Scope

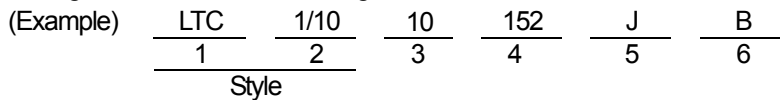
1.1 This specification covers the detail requirements for linear positive T-C chip thermistors; rectangular type, style of LTC1/10,1/8.

1.2 Applicable documents

- JIS C 5201-1: 1998, JIS C 5201-8: 1998, JIS C 5201-8-1: 1998
- IEC60115-1: 1999, IEC60115-8: 1989 Amendment 1: 1992, IEC60115-8-1: 1989
- EIAJ RC-2134B-2002

2. Classification

Type designation shall be the following form.



- 1 Linear positive T-C chip thermistors; rectangular type Style
- 2 Rated dissipation and/or dimension
- 3 Temperature coefficient of resistance
- 4 Rated resistance Example; 152 → 1.5kΩ
- 5 Tolerance on rated resistance
- 6 Packaging form

3. Rating

3.1 The ratings shall be in accordance with Table-1.

Table-1

Style	Rated dissipation (W)	Isolation voltage (V)	Category temperature range (°C)
LTC1/10	0.1	100	-40~+125
LTC1/8	0.125		

3.2 Temperature coefficient of resistance and rated resistance .

3.2.1 The combination of temperature coefficient of resistance and rated resistance shall be in accordance with Table-2.

Table-2

Rated resistance		Tolerance	Temperature coefficient of resistance				
Resistance range			Symbol	Nominal value (10 ⁻⁶ °C)	Tolerance		
LTC1/10	LTC1/8	J(±5%)	05	500	±100×10 ⁻⁶ °C		
100Ω~5.1kΩ	100Ω~10kΩ			08		800	±150×10 ⁻⁶ °C
100Ω~5.1kΩ	100Ω~10kΩ					10	
100Ω~3.3kΩ	100Ω~4.7kΩ		15	1500			
100Ω~3.3kΩ	100Ω~4.7kΩ			20	2000		
100Ω~1.6kΩ	100Ω~2.2kΩ		24		2400	±10%	
100Ω~3.3kΩ	100Ω~3.6kΩ				28		2800
100Ω~3.3kΩ	100Ω~3.6kΩ		30	3000			
100Ω~3.3kΩ	100Ω~3.6kΩ			33	3300		
51Ω~910Ω	51Ω~1.2kΩ		36		3600		
51Ω~560Ω	51Ω~910Ω			39	3900		
33Ω~360Ω	33Ω~470Ω		42		4200		
33Ω~200Ω	33Ω~180Ω			45	4500		

3.2.2 The symbol of the temperature coefficient of resistance

The symbol of the temperature coefficient of resistance shall be in accordance with Table-2.

Example) 05..... $500 \times 10^{-6}/^{\circ}\text{C}$
10..... $1,000 \times 10^{-6}/^{\circ}\text{C}$

3.2.3 Symbols for rated resistance

The symbol of the rated resistance shall be combined one English capital letter and one digit in accordance with Table-3 and Table-4.

Table-3

Code	A	B	C	D	E	F	G	H	J	K	L	M
Value	1.0	1.1	1.2	1.3	1.5	1.6	1.8	2.0	2.2	2.4	2.7	3.0

Code	N	P	Q	R	S	T	U	V	W	X	Y	Z
Value	3.3	3.6	3.9	4.3	4.7	5.1	5.6	6.2	6.8	7.5	8.2	9.1

Table-4

Code	0	1	2	3	4
Multiplier	10^0	10^1	10^2	10^3	10^4

Example) A1..... $1.0 \times 10^1 = 10\Omega$
E3..... $1.5 \times 10^3 = 1.5k\Omega$

3.3 Climatic category

40/125/56

Lower category temperature -40°C
Upper category temperature $+125^{\circ}\text{C}$
Duration of the damp heat, steady state test 56days

3.4 Stability class

5%

Limits for change of resistance:

-for long - term tests $\pm(5\%+0.1\Omega)$
-for short - term tests $\pm(1\%+0.05\Omega)$

3.5 Derating

The derated values of dissipation at temperature in excess of 70°C shall be as indicated by the following curve.

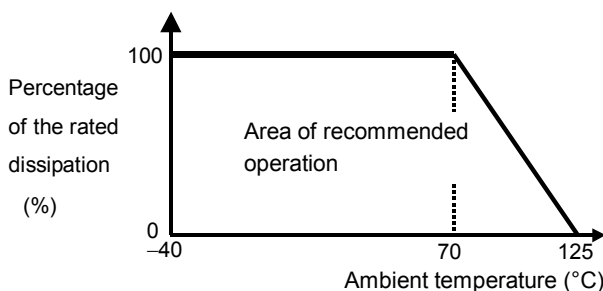


Figure-1 Derating curve

3.6 Rated voltage

d. c. or a. c. r. m. s. voltage calculated from the square root of the product of the rated resistance and the rated dissipation.

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

E : Rated voltage (V)
P : Rated dissipation (W)
R : Rated resistance (Ω)

4. Packaging form

The standard packaging form shall be in accordance with Table-5.

Table-5

Symbol	Packaging form	Standard packaging quantity / units
B	Bulk (loose package)	1,000 pcs.
TP	Paper taping 8mm width, 4mm pitches	5,000 pcs.

5. Dimensions

5.1 The resistor shall be of the design and physical dimensions in accordance with Figure-2 and Table-6.

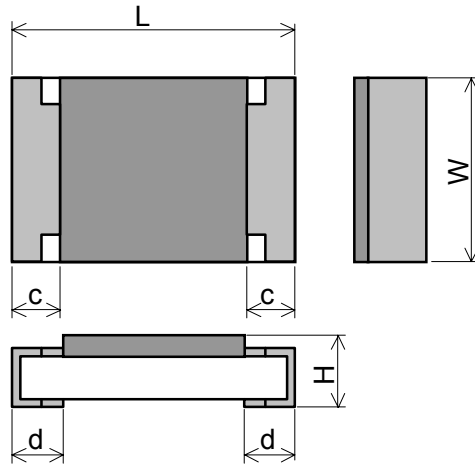


Figure-2

Table-6

Unit : mm

Style	L	W	H	c	d
LTC1/10	2.0 ± 0.15	1.25 ^{+0.10} _{-0.05}	0.6 ± 0.1	0.4 ± 0.2	0.3 ^{+0.2} _{-0.1}
LTC1/8	3.1 ± 0.1	1.55 ± 0.10	0.6 ± 0.1	0.45 ± 0.20	0.3 ^{+0.2} _{-0.1}

5.2 Net weight (Reference)

Style	Net weight(mg)
LTC1/10	5
LTC1/8	9

6. Marking

The combination symbol of nominal resistance value and temperature coefficient of resistance shall be marked on over coat side as shown in following examples.

(Example) 10E3.....1,000×10⁻⁶/°C,1.5kΩ
10K2.....3,900×10⁻⁶/°C,240Ω

Table-7(2)

No	Test items	Condition of test (JIS C 5201 - 1)	Performance requirements
6	Mounting Bound strength of the end face plating Final measurements	Sub-clause 4. 31 Substrate material: Epoxide woven glass Test substrate: Figure-4 Sub-clause 4. 33 Bent value: 3 mm Resistance Sub-clause 4. 33. 6 Visual examination	$\Delta R \leq \pm (1\%+0.05\Omega)$ No visible damage
7	Resistance to soldering heat Component solvent resistance	Sub-clause 4. 18 Solder temperature: 260 °C ± 5 °C Immersion time: 10 s ± 0. 5 s Visual examination Resistance Sub-clause 4.29 Solvent: 2-propanol Solvent temperature: 23 °C ± 5 °C Method 2 Recovery: 48 h Visual examination Resistance	As in 4. 18. 3. 4 No sign of damage such as cracks. $\Delta R \leq \pm (1\%+0.05\Omega)$ No visible damage $\Delta R \leq \pm (1\%+0.05\Omega)$
8	Mounting Adhesion Rapid change temperature	Sub-clause 4. 31 Substrate material: Epoxide woven glass Test substrate: Figure-3 Sub-clause 4. 32 Force: 5 N Duration: 10 s ± 1 s Visual examination Sub-clause 4.19 Lower category temperature: -40 °C Upper category temperature: +85 °C Duration of exposure at each temperature: 30 min. Number of cycles: 5 cycles. Visual examination Resistance	No visible damage No visible damage $\Delta R \leq \pm (1\%+0.05\Omega)$

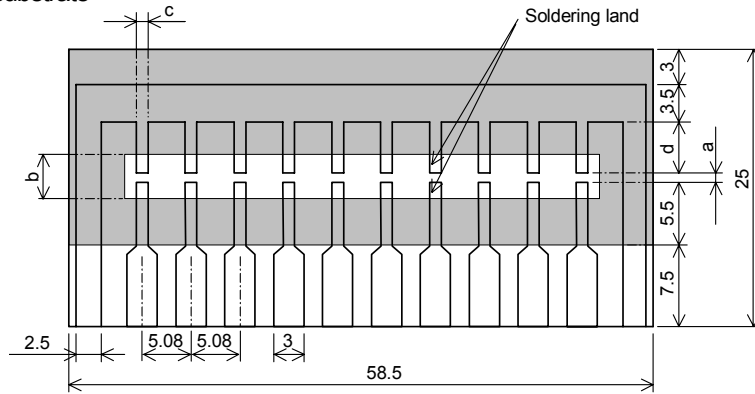
Table-7(3)

No	Test items	Condition of test (JIS C 5201-1)	Performance requirements
9	Climatic sequence -Dry heat -Damp heat, cycle (12+12hour cycle) First cycle -Cold -Damp heat, cycle (12+12hour cycle) Remaining cycle -D.C. load	Sub-clause 4. 23 Sub-clause 4. 23. 2 Test temperature: +125 °C Duration: 16 h Sub-clause 4. 23. 3 Test method: 2 Test temperature: 55 °C [Severity(2)] Sub-clause 4. 23. 4 Test temperature -40 °C Duration: 2h Sub-clause 4. 23. 6 Test method: 2 Test temperature: 55 °C [Severity (2)] Number of cycles: 5 cycles Sub-clause 4. 23. 7 The applied voltage shall be the rated voltage Duration: 1 min. Visual examination Resistance	No visible damage $\Delta R \leq \pm (5\%+0.1\Omega)$
10	Mounting Endurance at 70 °C	Sub-clause 4. 31 Substrate material: Epoxide woven glass Test substrate: Figure - 3 Sub-clause 4. 25. 1 Ambient temperature: 70 °C ± 2 °C Duration: 1000 h The voltage shall be applied in cycles of 1.5 h on and 0.5 h. The applied voltage shall be the rated voltage Examination at 48 h , 500 h and 1000 h: Visual examination Resistance	No visible damage $\Delta R \leq \pm (5\%+0.1\Omega)$

Table-7(4)

No	Test items	Condition of test (JIS C 5201-1)	Performance requirements
11	Mounting Variation of resistance with temperature	Sub - clause 4. 31 Substrate material: Epoxide woven glass Test substrate: Figure-3 Sub-clause 4. 8 +20 °C / + 75°C	As in Table-2
12	Mounting Damp heat, steady state	Sub-clause 4. 31 Substrate material: Epoxide woven glass Test substrate: Figure-3 Sub-clause 4. 24 Ambient temperature: 40 °C ± 2 °C Relative humidity : 93 \pm ₃ % Without voltage applied. Without polarizing voltage [4. 24. 2. 1, c)] Visual examination Resistance	No visible damage Legible marking $\Delta R \leq \pm (5\%+0.1\Omega)$
13	Dimensions (detail) Mounting Endurance at upper category temperature	Sub-clause 4. 4. 3 Sub-clause 4. 31 Substrate material: Epoxide woven glass Test substrate: Figure-3 Sub-clause 4. 25. 3 Ambient temperature:125 °C ± 2 °C Duration: 1000 h Examination at 48 h, 500 h and 1000 h: Visual examination Resistance	As in Table-6 No visible damage $\Delta R \leq \pm (5\%+0.1\Omega)$

8. Test substrate

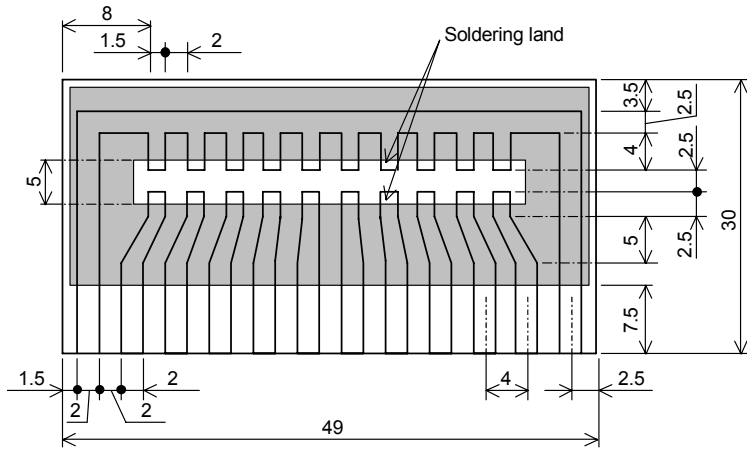


Unit: mm

- :Copper clad
- :Solder resist

Style	a	b	c	d
LTC1/10	1.2	4.0	1.5	4.3

LTC1/10 TEST SUBSTRATE

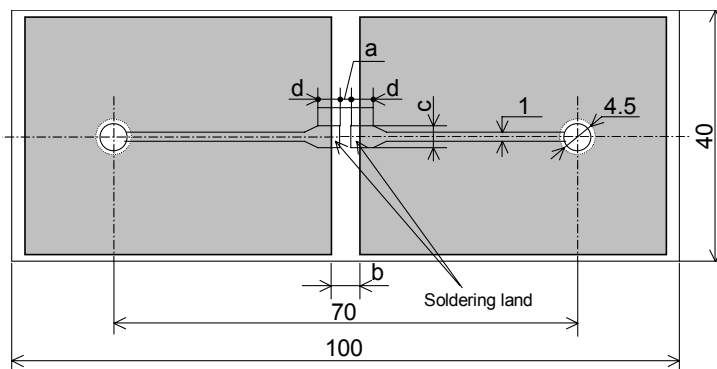


- :Copper clad
- :Solder resist

LTC1/8 TEST SUBSTRATE

Figure-3

- Remark 1). Material: Epoxide woven glass
Thickness: 1.6mm Thickness of copper clad: 0.035mm
- 2). In the case of connection by connector, the connecting terminals are gold plated.
However, the plating is not necessary when the connection is made by soldering.



Unit: mm

- :Copper clad
- :Solder resist

Style	a	b	c	d
LTC1/10	1.2	4.0	1.65	3.0
LTC1/8	2.5	5.0	2.0	2.5

- Remark 1). Material: Epoxide woven glass
Thickness: 1.6mm Thickness of copper clad: 0.035mm

Figure-4 LTC BOUND STRENGTH OF THE END FACE PLATING TEST SUBSTRATE

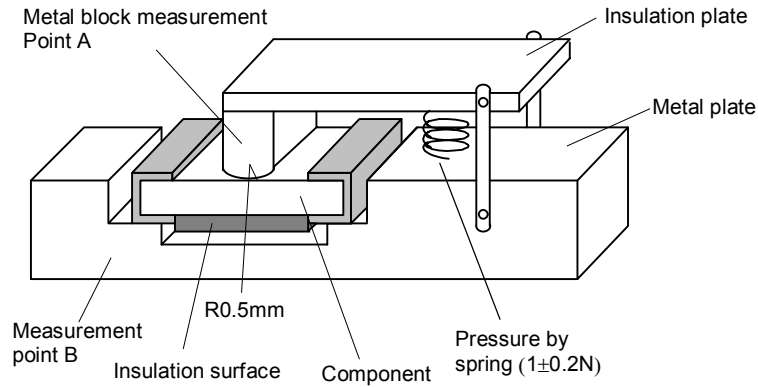


Figure-5

9. Taping

9.1 Applicable documents JIS C 0806-3: 1999, EIAJ ET-7200B: 2003

9.2 Taping dimensions

Taping dimensions shall be in accordance with Figure-6 and Table-8.

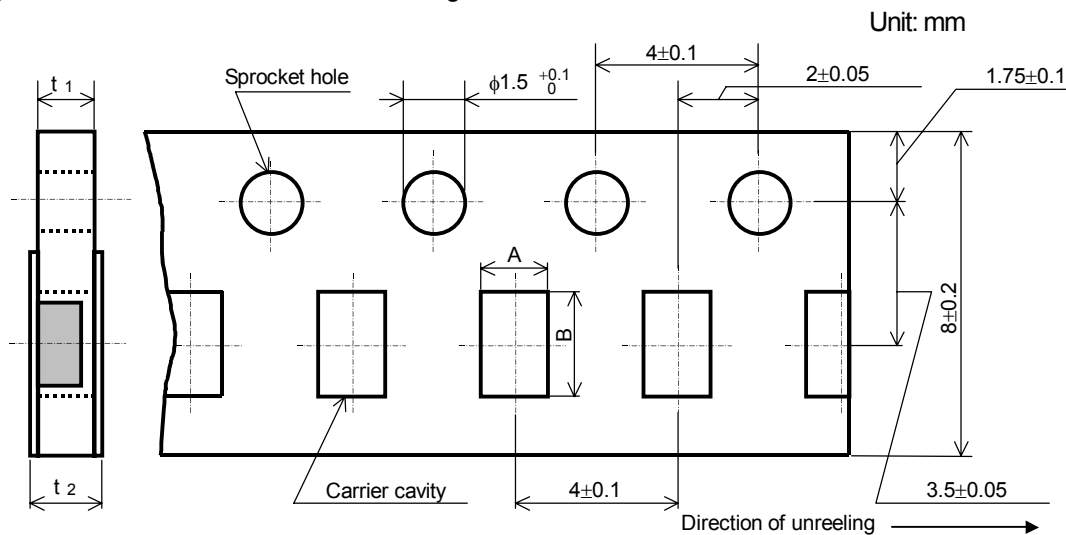


Figure-6

Table-8

Unit: mm

Style	A	B	t ₁	t ₂
LTC1/10	1.65 ± 0.15	2.5 ± 0.2	0.8 ± 0.1	1.0max.
LTC1/8	2.0 ± 0.15	3.6 ± 0.2		

- 1). The cover tapes shall not cover the sprocket holes.
- 2). Tapes in adjacent layers shall not stick together in the packing.
- 3). Components shall not stick to the carrier tape or to the cover tape.
- 4). Pitch tolerance over any 10 pitches $\pm 0.2\text{mm}$.
- 5). The peel strength of the top cover tape shall be with in 0.1N to 0.5N on the test method as shown in the following Figure-7.
- 6). When the tape is bent with the minimum radius for 25 mm, the tape shall not be damaged and the components shall maintain their position and orientation in the tape.
- 7). In no case shall there be two or more consecutive components missing.
The maximum number of missing components shall be one or 0. 1%, whichever is greater..
- 8). The thermistors shall be faced to upward at the over coating side in the carrier cavity.

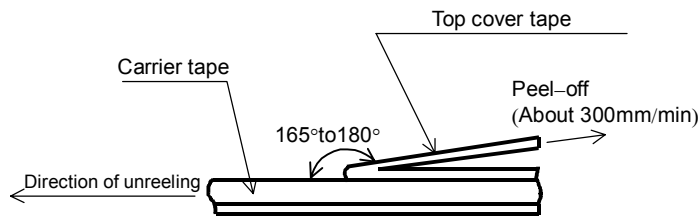


Figure-7

9.3 Reel dimension

Reel dimensions shall be in accordance with the following Figure-8 and Table-9.
Plastic reel (Based on EIAJ ET-7200B) Unit: mm

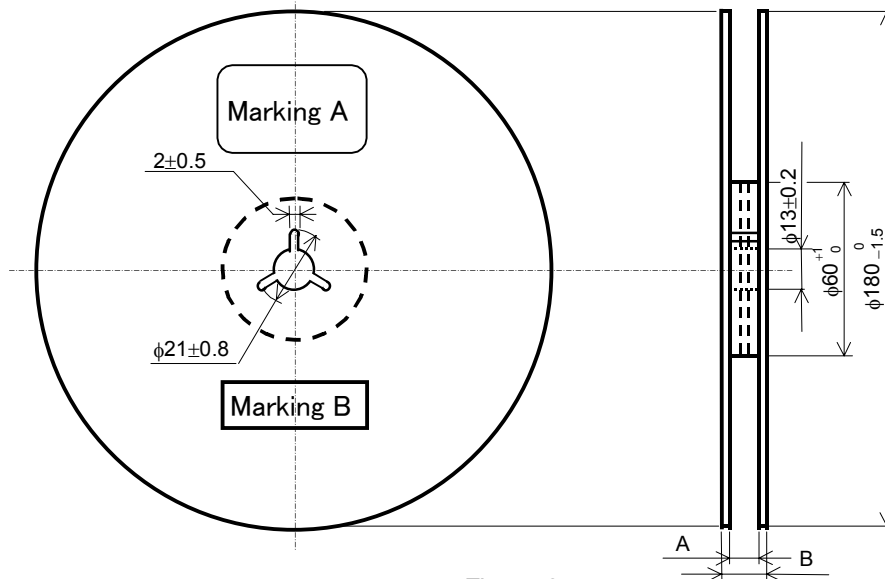


Figure-8

Table-9

Unit: mm

Style	A	B	Note
LTC1/10,1/8	9 ^{+1.0} / ₀	11.4±1.0	Injection molding
		13±1.0	Vacuum forming

Note: Marking label shall be marked on a place of Marking A or two place of marking A and B.

9.4 Leader and trailer tape.

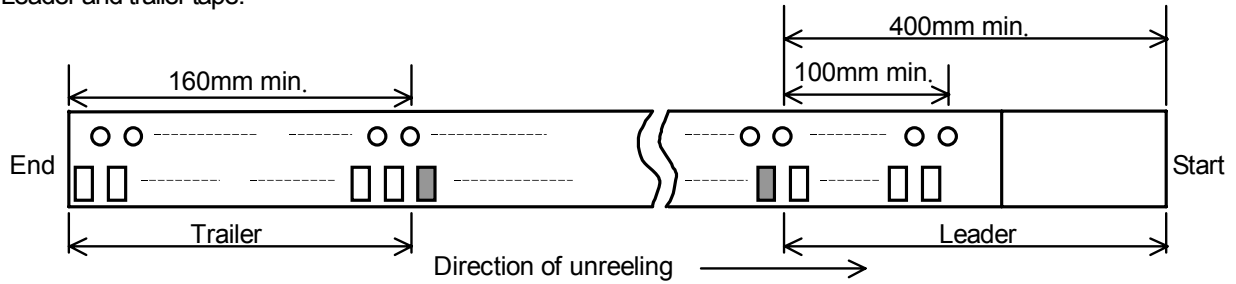


Figure-9

10. Marking on package

The label of a minimum package shall be legibly marked with follows.

10.1 Marking A

(1) Classification

(Style, Temperature coefficient of resistance, Rated resistance, Tolerance on rated resistance, Packaging form)

(2) Quantity (3) Lot number (4) Manufacturer's name or trade mark (5) Others

10.2 Marking B(KAMAYA Control label)