No.:	TWLC–K–HTS-0001 /5
Date:	2018. 6. 20

Data sheet

Title: FIXED CHIP RESISTORS; RECTANGULAR TYPE & WIDE TERMINATION - LOW OHM

Style: TWLC32,50,63

AEC-Q200 qualified

RoHS COMPLIANCE ITEM
Halogen and Antimony Free

Note: ・Stock conditions
Temperature: +5°C ~ +35°C
Relative humidity: 25% ~ 75%
The period of guarantee: Within 2 year from shipmen t by the company.
Solderability shall be satisfied.
・Product specification contained in this data sheet
are subject to change at any time without notice
・If you have any questions or a Purchasing Specification for any quality Agreement is necessary, please contact our sales staff.

釜屋電機株式會社
KAMAYA ELECTRIC CO., LTD.
Hokkaido Research Center
Approval by: T. Sannomiya
Drawing by: M. Shibuya

1. Scope

1.1 This data sheet covers the detail requirements for fixed chip resistors; rectangular type & wide termination - low ohm, style of TWLC32, 50, 63.

1.2 Applicable documents

JIS C 5201–1: 2011S C 5201–8: 2014, JIS C 5201–8–1: 2014
IEC60115–1: 2008, IEC60115–8: 2014, IEC60115–8–1: 2014
EIAJ RC–2134C–2010

2. Classification

Type designation shall be the following form.

(Example)

TWLC	50	-	R470	J	TE
1	2	3	4	5	6
Style					

1 Fixed thick film chip resistors; rectangular type and low ohm — Style
2 Size
3 Temperature coefficient of resistance

–(Dash)	Standard

4 Rated resistance Rated resistance and symbol shall be in accordance with Sub-clause 3.3.

R470	4 digit, Ex. R470--> 470mΩ,

5 Tolerance on rated resistance

F	±1%
J	±5%

6 Packaging form

B	Bulk (loose package)
TP	Paper taping
TE	Embossed taping

3. Rating

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

Table–1

Style	Rated dissipation (W)	Rated current range (A)	Temperature coefficient of resistance (10^{-6}/ °C)		Rated resistance range(Ω)	Tolerance on rated resistance
TWLC32	1.0	1.04~7.07	–(Dash)	0~+200	0.5~0.91	F(±1%), J(±5%)
				0~+250	0.2~0.47	
				0~+350	0.1~0.18	
				0~+800	0.02~0.091	
TWLC50	1.0	1.04~7.07	–(Dash)	0~+200	0.2~0.91	F(±1%), J(±5%)
				0~+350	0.1~0.18	
				0~+250	0.02~0.091	
TWLC63	2.0	1.48～10.0	–(Dash)	0~+200	0.2~0.91	F(±1%), J(±5%)
				0~+350	0.1~0.18	
				0~+250	0.02~0.091	

Style	Limiting element voltage(V)	Isolation voltage (V)	Category temperature range (°C)
TWLC32	0.95	500	–55~+155
TWLC50	0.95		
TWLC63	1.34		

3.2 Rated resistance

The rated resistance shall be in accordance with Table–2

Table–2

Rated resistance		Rated resistance		Rated resistance	
Rated resistance [mΩ]	Symbol	Rated resistance [mΩ]	Symbol	Rated resistance [mΩ]	Symbol
20	R020	100	R100	680	R680
22	R022	110	R110	700	R700
24	R024	120	R120	750	R750
25	R025	130	R130	800	R800
27	R027	150	R150	820	R820
30	R030	160	R160	900	R900
33	R033	180	R180	910	R910
36	R036	200	R200		
39	R039	220	R220		
40	R040	240	R240		
43	R043	250	R250		
47	R047	270	R270		
50	R050	300	R300		
51	R051	330	R330		
56	R056	360	R360		
60	R060	390	R390		
62	R062	400	R400		
65	R065	430	R430		
68	R068	470	R470		
70	R070	500	R500		
75	R075	510	R510		
80	R080	560	R560		
82	R082	600	R600		
90	R090	620	R620		
91	R091	650	R650		

3.3 Climatic category

55/155/56

Lower category temperature	–55 °C
Upper category temperature	+155 °C
Duration of the damp heat, steady state test	56days

3.4 Stability class

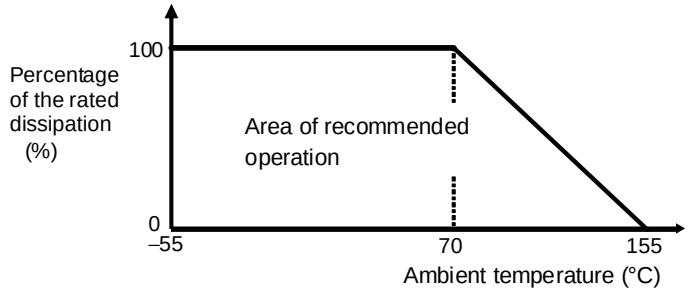
5%

Limits for change of resistance:

–for long–term tests	±5%
–for short–term tests	±1%

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)

Limiting element voltage can only be applied to resistors when the resistance value is equal to or higher than the critical resistance value.

At high value of resistance, the rated voltage may not be applicable.

3.7 Rated current

The rated current calculated from the square root of the quotient of the rated resistance and the rated dissipation.

$$I = \sqrt{P / R}$$

I: Rated current (A)
P: Rated dissipation (W)
R: Rated resistance (Ω)

The rated current shall be corresponding to rated voltage.

4. Packaging form

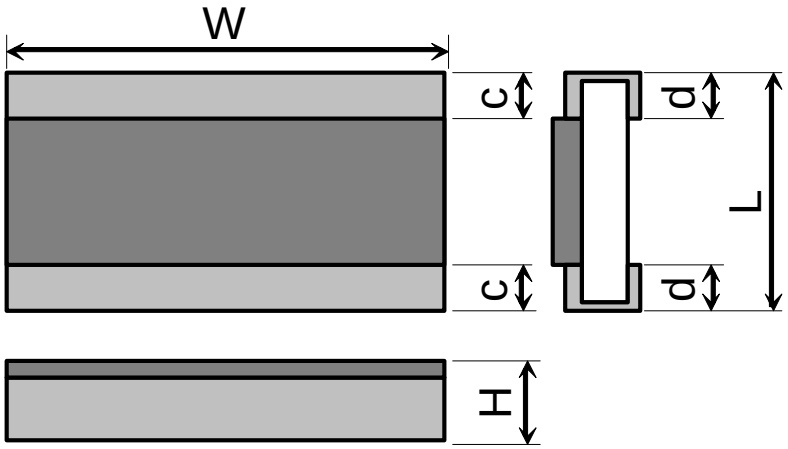
The standard packaging form shall be in accordance with Table–3.

Table–3

Symbol	Packaging form		Standard packaging quantity / units	Application
B	Bulk (loose package)		1,000 pcs.	TWLC32,50,63
TP	Paper taping	8mm width, 4mm pitches	5,000 pcs.	TWLC32
TE	Embossed taping	12mm width, 4mm pitches	4,000 pcs.	TWLC50,63

5. Dimensions

5.1 The resistor shall be of the design and physical dimensions in accordance with Figure–2 and Table–4.



Figure–2

Table–4 Unit: mm

Style	L	W	H	c	d
TWLC32	1.6±0.2	3.2±0.2	0.55±0.10	0.5±0.25	0.5±0.25
TWLC50	2.5±0.15	5.0±0.2	0.55±0.10	0.6±0.2	0.6±0.2
TWLC63	3.2±0.2	6.3±0.2	0.6±0.1	0.6±0.2	0.6±0.2

6. Marking

The rated resistance shall be marked in 4 characters consisting of 3 figures or 3 figures and a letter and marked on over coat side.

(Example) “R100” → 0.1 [Ω]

7. Performance

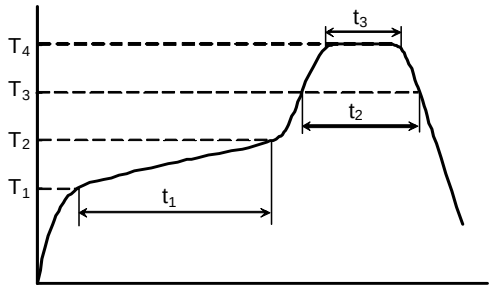
7.1 The standard condition for tests shall be in accordance with Sub–clause 4.2, JIS C 5201–1: 2011.

7.2 The performance shall be satisfied in Table–5.

Table– 5(1)

No.	Test items	Condition of test (JIS C 5201–1)	Performance requirements
1	Visual examination	Sub–clause 4.4.1 Checked by visual examination.	As in 4.4.1 The marking shall be legible, as checked by visual examination.
2	Dimension Resistance	Sub–clause 4.4.2 Sub–clause 4.5 Measurement current: 10(mA) Note: The measuring apparatus corresponding to Digital multimeter of TR6878 for Advantest Corp..	As specified in Table–4 of this specification. As in 4.5.2 The resistance value shall correspond with the rated resistance taking into account the specified tolerance.
3	Voltage proof	Sub–clause 4.7 Method: 4.6.1.4 Test voltage: Alternating voltage with a peak value of 1.42 times the insulation voltage. Duration: 60 s±5 s Insulation resistance Test voltage: Insulation voltage Duration: 1 min.	No breakdown or flash over $R \geq 1$ GΩ
4	Solderability	Sub–clause 4.17 Without aging Flux: The resistors shall be immersed in a non–activated soldering flux for 2 s. Bath temperature: 245 °C±5 °C Immersion time: 2 s±0.5 s	As in 4.17.4.5 The terminations shall be covered with a smooth and bright solder coating.
5	Mounting Overload (in the mounted state) Solvent resistance of the marking	Sub–clause 4.31 Substrate material: Epoxide woven glass Sub–clause 4.13 The applied voltage shall be 2.5 times the rated voltage or the current corresponding to. Duration: 2 s Visual examination Resistance Sub–clause 4.30 Solvent: 2–propanol Solvent temperature: 23 °C±5 °C Method 1 Rubbing material: cotton wool Without recovery	 No visible damage $\Delta R \leq \pm 1\%$ Legible marking

Table–5(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 Sub–clause 4.33 Bent value: TWLC32: 3mm TWLC50,63: 1 mm Resistance Sub–clause 4.33.6 Visual examination	 $\Delta R \leq \pm 1\%$ No visible damage
7	Resistance to soldering heat	Sub–clause 4.18 (JEITA RC-2144 2.3.2) T_1:Pre-heat minimum temp.:150±5 °C T_2:Pre-heat maximum temp.:180±5 °C T_3:Soldering temp.:220 °C T_4:Peak temp.:250 °C t_1:Pre-heat duration:120±5 s t_2:Soldering duration:60 to 90 s t_3:Peak duration(T_4-5°C):20 to 40 s Pre-reflow soldering: 1 time (Initial measurements) Reflow soldering: 3 times  Visual examination Resistance	 No visible damage $\Delta R \leq \pm 1\%$
	Component solvent resistance	Sub–clause 4.29 Solvent: 2–propanol Solvent temperature: 23 °C±5 °C Method 2 Recovery: 48 h Visual examination Resistance	 No visible damage $\Delta R \leq \pm 1\%$

Table–5(3)

No	Test items	Condition of test (JIS C 5201–1)	Performance requirements
8	Mounting Adhesion Rapid change temperature	Sub–clause 4.31 Substrate material: Epoxide woven glass Sub–clause 4.32 Force: 5 N Duration: 10 s±1 s Visual examination Sub–clause 4.19 Lower category temperature: –55 °C Upper category temperature: +155 °C Duration of exposure at each temperature: 30 min. Number of cycles: 5 cycles. Visual examination Resistance	No visible damage No visible damage ΔR ≤ ±1%
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: +155 °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 –55 °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 current shall be the rated current. Duration: 1 min. Visual examination Resistance	No visible damage ΔR ≤ ±5 %
10	Mounting Endurance at 70 °C	Sub–clause 4.31 Substrate material: Epoxide woven glass Sub–clause 4.25.1 Ambient temperature: 70 °C±2 °C Duration: 1000 h The current shall be applied in cycles of 1.5 h on and 0.5 h. The applied current shall be the rated current Examination at 48 h, 500 h and 1000 h: Visual examination Resistance	No visible damage ΔR ≤ ±5 %

Table–5(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 Sub–clause 4.8 +20 °C / +155 °C	 As in Table–1
12	Mounting Damp heat, steady state	Sub–clause 4.31 Substrate material: Epoxide woven glass Sub–clause 4.24 Ambient temperature: 40 °C±2 °C Relative humidity: 93 $^{+2}_{-3}$ % Without current applied. Visual examination Resistance	 No visible damage Legible marking $\Delta R \leq \pm 5\%$
13	Dimensions (detail) Mounting Endurance at upper category temperature	Sub–clause 4.4.3 Sub–clause 4.31 Substrate material: Epoxide woven glass Sub–clause 4.25.3 Ambient temperature:155 °C±2 °C Duration: 1000 h Examination at 48 h, 500 h and 1000 h: Visual examination Resistance	As in Table–4 No visible damage $\Delta R \leq \pm 5\%$

8. Taping

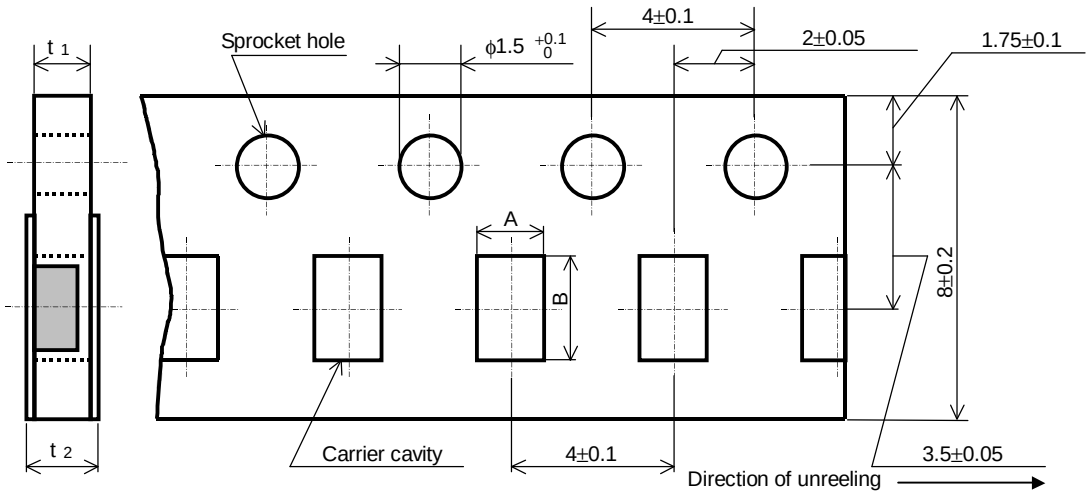
8.1 Applicable documents JIS C 0806–3: 2014, EIAJ ET–7200C: 2010

8.2 Taping dimensions

8.2.1 Paper taping (8mm width, 4mm pitches)

Taping dimensions shall be in accordance with Figure–3 and Table–6.

Unit: mm



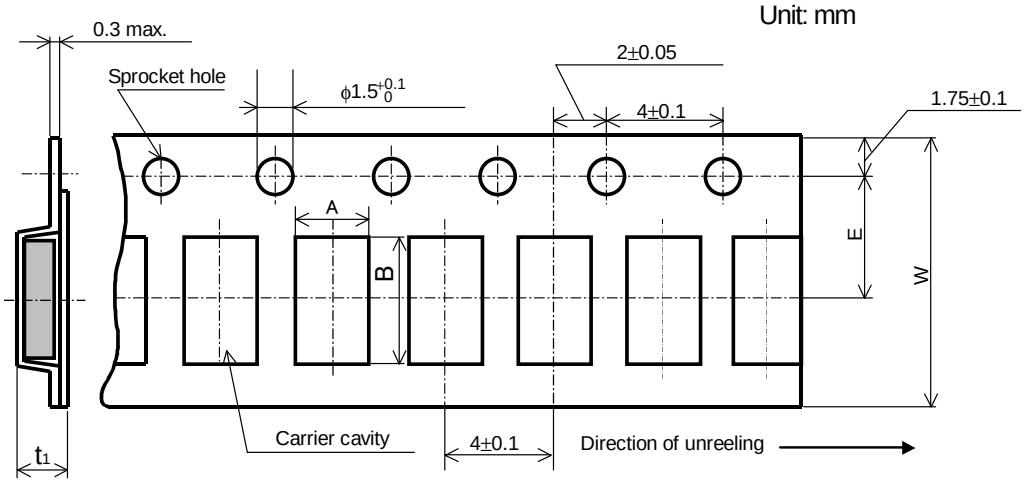
Figure–3

Table–6 Unit: mm

Style	A	B	t_1	t_2
TWLC32	2.00±0.15	3.6±0.2	0.8±0.1	1.0max.

8.2.2 Embossed taping dimensions shall be in accordance with Figure–4 and Table–7.

Unit: mm

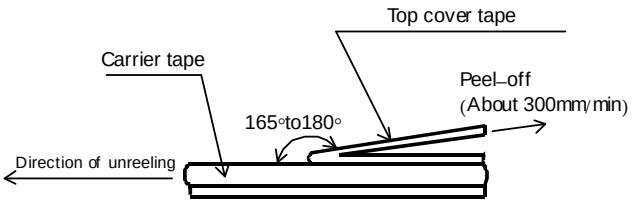


Figure–4

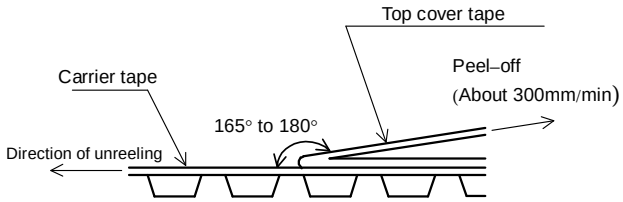
Table–7 Unit: mm

Style	A	B	W	E	t_1
TWLC50	3.1±0.2	5.5±0.2	12±0.3	5.5±0.05	1.1±0.15
TWLC63	3.6±0.2	6.9±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 ±0.2mm.
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 TWLC32: Figure–5, TWLC50,63: Figure–6.
6). When the tape is bent with the minimum radius for (TWLC32: 25mm, TWLC50,63: 30mm) the tape 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 resistors shall be faced to upward at the over coating side in the carrier cavity.



Figure–5

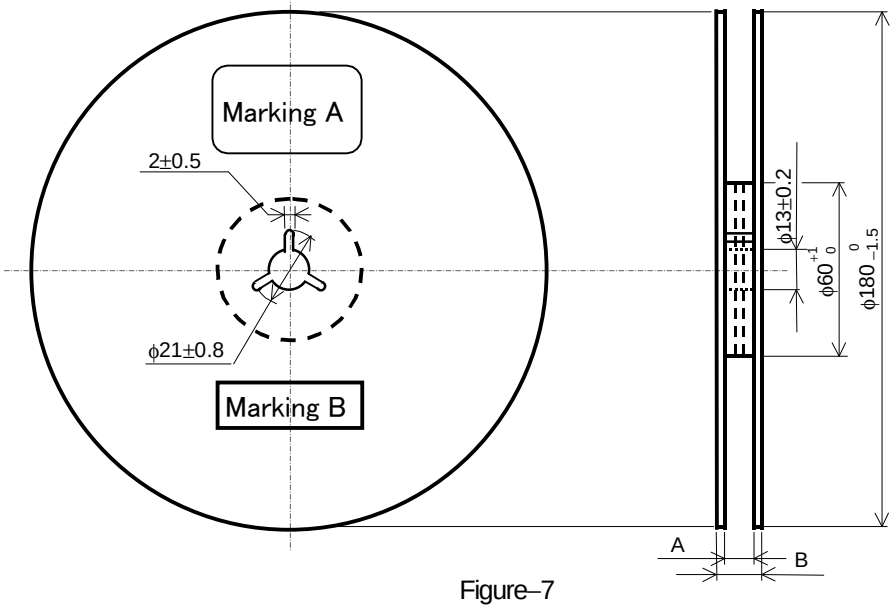


Figure–6

8.3 Reel dimension

Reel dimensions shall be in accordance with the following Figure–7 and Table–8.

Plastic reel (Based on EIAJ ET–7200C) Unit: mm



Figure–7

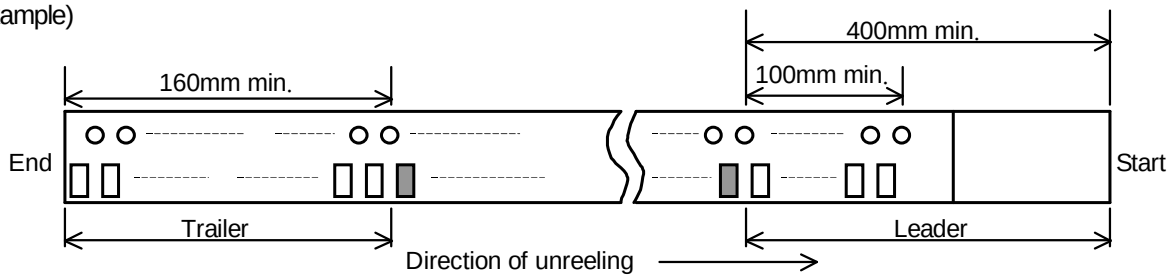
Table–8 Unit: mm

Style	A	B	Note
TWLC32	9 +1.0 0	11.4±1.0	Injection molding
		13±1.0	Vacuum forming
TWLC50,63	13 +1.0 0	17±1.0	Vacuum forming

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

8.4 Leader and trailer tape.

(Example)



Figure–8

9. Marking on package

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

9.1 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

9.2 Marking B (KAMAYA control label)