



# Low Resistance Chip Resistor

## ERL Series

### 1. Scope

This specification applies to the ERL Low Resistance Chip Resistor for use in electronic equipments.

### 2. Part number

<b>E R L</b>	<b>* * * *</b>	<b>*</b>	<b>R * * *</b>	<b>*</b>	<b>T *</b>
<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>	<b>(5)</b>	<b>(6)</b>

- (1) Series code
- (2) Chip size code
- (3) Performance: C: High heat-proof type; M: Low thermoelectric power type
- (4) Resistance value: 10m = R010; 5m = R005;
- (5) Resistance tolerance
- (6) Package: T1=1000pcs/reel; T4=4000pcs/reel; T5=5000pcs/reel;

### 3. Specification

Part Number		Specification				
		Power Rating	Resistance Value Range	Resistance Tolerance	TCR	
TYPE	Short Electrode	ERL0816	0.25W	10m ~ 100m ohm	G : ±2.0%	±100ppm/°C
		ERL1220	0.5W	10m ~ 100m ohm	F:±1.0% ,G:±2%	±100ppm/°C
		ERL1632	1.0W	5m ~ 100m ohm	F : ±1.0%	±50ppm/°C
		ERL3264	2.0W	1m ~ 3m ohm	F:±1.0% ,G:±2%	±100ppm/°C
				5m ~ 100m ohm	F : ±1.0%	±50ppm/°C
	Long Electrode	ERL2012	0.66W	1m ~ 50m ohm	J : ±5.0%	±150ppm/°C
		ERL3216	1.5W	1m ~ 50m ohm	J : ±5.0%	±150ppm/°C
		ERL6432	3.0W	1m ~ 100m ohm	F:±1.0% ,G:±2%	±100ppm/°C
		ERL7638	3.5W	1m ~ 100m ohm	F:±1.0% ,G:±2%	±100ppm/°C
		ERL9045	4.0W	1m ~ 100m ohm	F : ±1.0%	±50ppm/°C
ERL11050	5.0W	1m ~ 100m ohm	F : ±1.0%	±50ppm/°C		

Parameter	Specification
Rated ambient Temperature	+70°C Derating curve as Figure 1
Operating temperature range	Type C: -55°C ~ +170°C Type M: -66°C ~ +155°C
Rated voltage	$\sqrt{\text{Power} * \text{Resistance}}$

### 4. Structure

Stick a ceramic substrate on a top side of resistive metal foil which is equipped plated electrodes and heat resistive epoxy resin coating for insulation on bottom side.



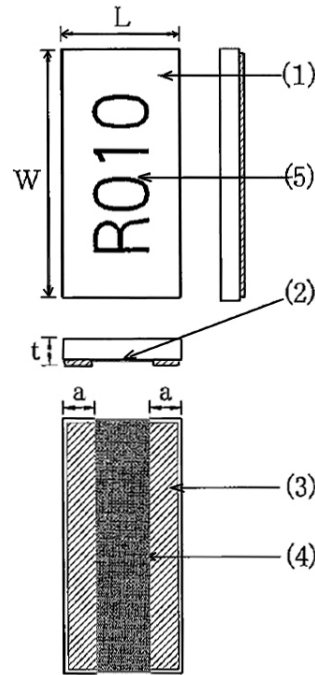
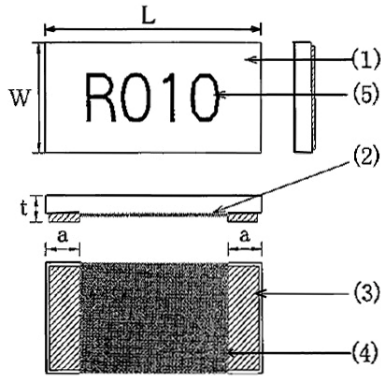
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### 5. Dimensions

A: Short electrode

B: Long Electrode



(1) Substrate	Alumina 96%
(2) Resistor	Ni- alloy
(3) Terminals	Sn (on Cu)
(4) Over Coat	Heat resistive epoxy resin
(5) Marking	Resin (White ink)

Part number	Type	Resistance Value Range	Dimension (mm)			
			L	W	a	t
ERL0816	A(Short electrode)	10m ohm~	1.6+/-0.20	0.8+/-0.20	0.3+/-0.20	0.5+/-0.20
ERL1220	A(Short electrode)	10m ohm~	2.0+/-0.20	1.25+/-0.20	0.4+/-0.20	0.5+/-0.20
ERL1632	A(Short electrode)	5~9m ohm~	3.2+/-0.20	1.6+/-0.20	1.1+/-0.20	0.5+/-0.20
		10m ohm~	3.2+/-0.20	1.6+/-0.20	0.5+/-0.20	0.5+/-0.20
ERL3264	A(Short electrode)	1~3m ohm~	6.3+/-0.20	3.1+/-0.20	2.55+/-0.25	0.5+/-0.20
		5~8m ohm~	6.3+/-0.20	3.1+/-0.20	1.9+/-0.20	0.5+/-0.20
		9m ohm~	6.3+/-0.20	3.1+/-0.20	1.0+/-0.20	0.5+/-0.20
ERL2012	B(Long electrode)	1m ohm~	1.25+/-0.20	2.0+/-0.20	0.55+/-0.20	0.5+/-0.20
		2m ohm~	1.25+/-0.20	2.0+/-0.20	0.3+/-0.20	0.5+/-0.20
ERL3216	B(Long electrode)	1m ohm~	1.6+/-0.20	3.2+/-0.20	0.55+/-0.20	0.5+/-0.20
		2m ohm~	1.6+/-0.20	3.2+/-0.20	0.3+/-0.20	0.5+/-0.20
ERL6432	B(Long electrode)	1m ohm~	3.1+/-0.20	6.3+/-0.20	1.2+/-0.20	0.5+/-0.20
		2m ohm~	3.1+/-0.20	6.3+/-0.20	0.5+/-0.20	0.5+/-0.20
ERL7638	B(Long electrode)	1m ohm~	3.8+/-0.20	7.6+/-0.20	1.35+/-0.20	0.5+/-0.20
		2m ohm~	3.8+/-0.20	7.6+/-0.20	0.6+/-0.20	0.5+/-0.20
ERL9045	B(Long electrode)	1m ohm~	4.5+/-0.20	9.0+/-0.20	1.6+/-0.20	0.5+/-0.20
		2m ohm~	4.5+/-0.20	9.0+/-0.20	0.7+/-0.20	0.5+/-0.20
ERL11050	B(Long electrode)	1m ohm~	5.0+/-0.20	11.0+/-0.20	1.6+/-0.20	0.5+/-0.20
		2m ohm~	5.0+/-0.20	11.0+/-0.20	0.8+/-0.20	0.5+/-0.20



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#### 6. Marking Resistance value

Resistance value is marked on the top surface.

Eg.) 50m ohm → R050  
 10m ohm → R010  
 100m ohm → R100

#### 7. Reliability testing

Parameter	Conditions	Specification
Short Time Over Load	Apply rush current, calculated in the following expression for 10ms, continuing it 10 times with 60s pauses. $I = \sqrt{(P/R)}$ [A] P = Max dissipation (W) R = Resistance value (ohm)	±(1.0% +0.0005Ω)
Load life	Rated voltage for 90min followed by a pause of 30min at a temperature of 70±3°C. Cycles shall be repeated for 1000h.	±(2.0% +0.0005Ω)
Moisture Load life	Rated voltage for 90min followed by a pause of 30min at a temperature of 60±2°C with relative humidity of 90%. Cycles shall be repeated for 1000h.	±(2.0% +0.0005Ω)
Temperature Cycle	[-55°C 30min → R.T. 3min → +155°C 30min → R.T. 3min ] 5 continuous cycles.	±(1.0% +0.0005Ω)
Soldering Heating	Dipped into solder for 10±1sec at 260±5°C	±(1.0% +0.0005Ω)
Substrate Bending	Between fulcrums :90mm Bend width : 2mm Glass-epoxy board t=1.6mm	±(1.0% +0.0005Ω)
Solderability	Dipped into solder for 3±0.5sec at 245±5°C	A new solder shall cover minimum of 90 %



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### A: Short electrode

P/N	Power Rating	Peak Power	Peak Current	Condition
ERL0816	0.25W	2.5W	15A	Impression time 10m sec. Repetition 10 times. Interval 60 Sec.
ERL1220	0.5W	6.5W	25A	
ERL1632	1.0W	12W	35A	
ERL3264	2.0W	56W	70A	

### B: Long electrode

P/N	Power Rating	Less 10m ohm		Over 10.1m ohm		Condition
		Peak Power	Peak Current	Peak Power	Peak Current	
ERL2012	0.66W	20W	45A	14W	20A	Impression time 10m sec. Repetition 10 times. Interval 60 Sec.
ERL3216	1.5W	56W	64A	36W	35A	
ERL6432	3.0W	225W	125A	150W	70A	
ERL7638	3.0W	325W	150A	210W	80A	
ERL9045	4.0W	440W	180A	300W	100A	
ERL11050	5.0W	600W	240A	440W	120A	

Calculation of the maximum over current

$$\text{Max over current} = \sqrt{(\text{Max power} / \text{Resistance value})}$$

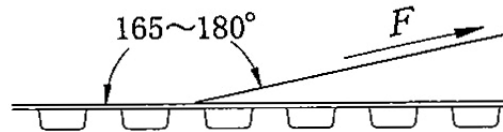
Or it becomes which of the max current or small value.

## 8. Packaging

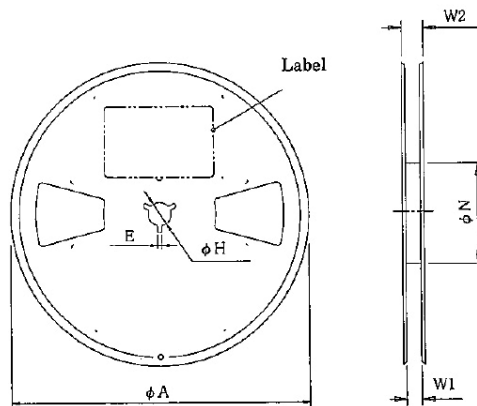
Packing quantity: 1,000 or 5,000 pcs/reel.

Peeling strength of seal tap

$$F = \text{Peeling strength} : 011 - 0.7 \text{ N}$$



Reel form:



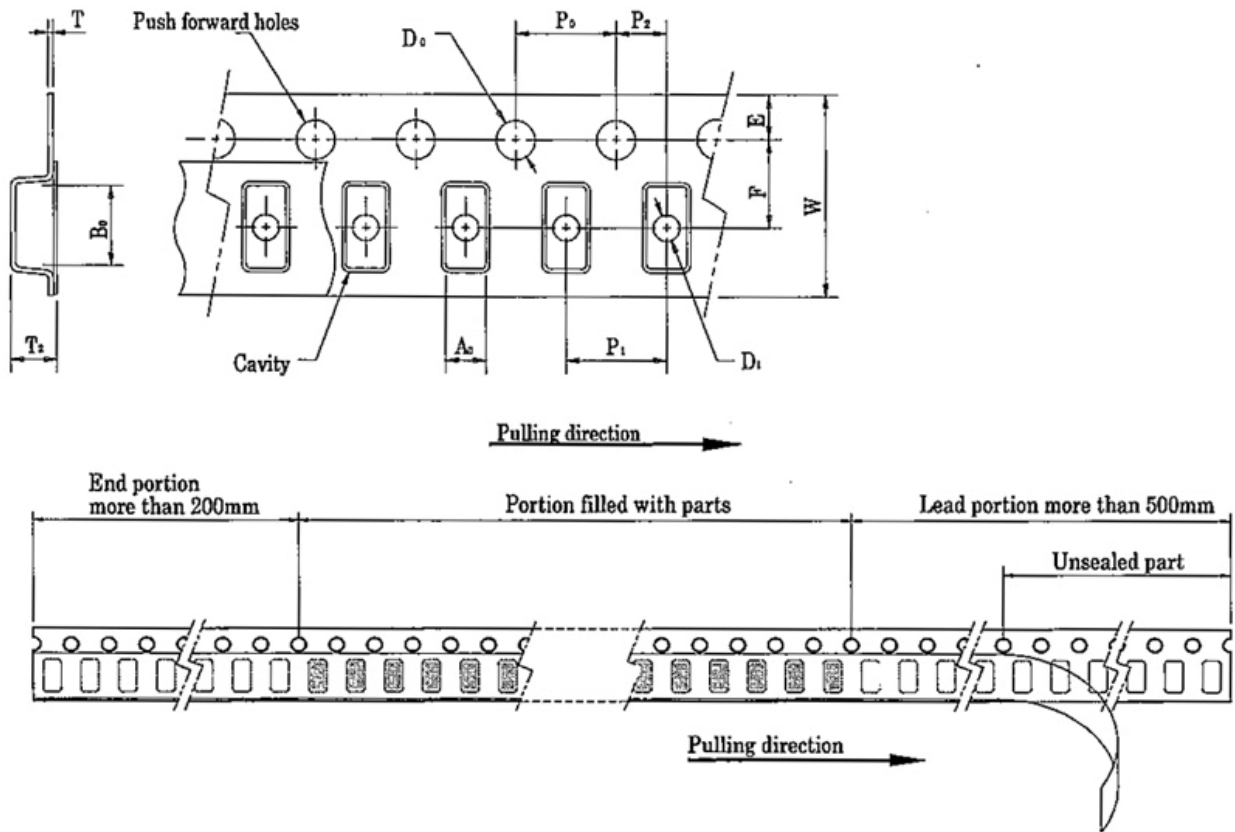
Type	ERL Series : Short / (Long) electrode (mm)						
	0816	1220(2012)	1632(3216)	3264(6432)	(7638)(9045)	(11050)	
Pcs	1000 / 5000			1000/5000	1000	5000	1000
ΦA	180+0/-3			255±1.0	180+0/-3	330±2.0	330±2.0
ΦH	13.0±0.2			13.0±0.3	13.0±0.2	13.0±0.2	13.0±0.2
E	2.0±0.5			2.0±0.2	2.0±0.5	2.0±0.5	2.0±0.5
ΦN	60+1/-0			80±0.5	60+1/-0	80±1.0	100±1.0
W1	9.0±0.3			17.0±0.3	17.0±0.3	17.4±1.0	25.4±1.0
W2	13.0±1.4			19.4±1.0	19.4±1.0	21.4±1.0	29.4±1.0



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Taping form:



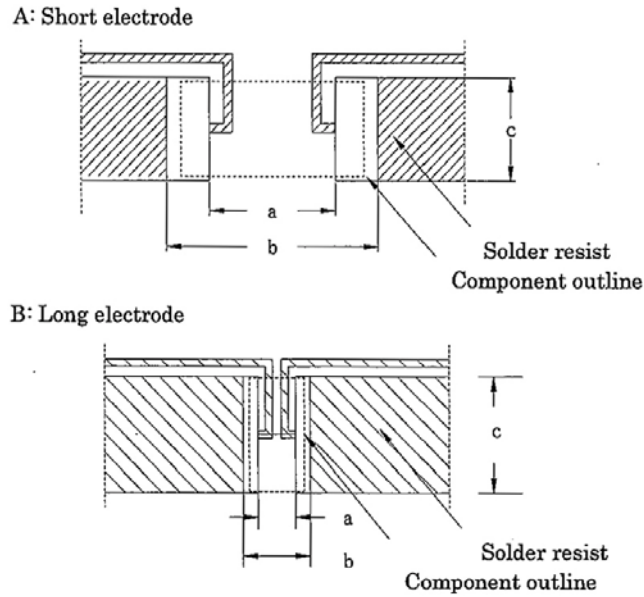
Symbol	ERL Series : Short / (Long) electrode (mm)						
	0816	1220(2012)	1632(3216)	3264(6432)	(7638)	(9045)	(11050)
A0	0.95±0.05	1.46±0.1	1.90±0.1	3.43±0.1	4.98±0.1	4.75±0.1	5.36±0.1
B0	1.85±0.05	2.3±0.1	3.5±0.1	6.63±0.1	7.88±0.1	9.45±0.1	11.74±0.1
W	8.0±0.1	8.0+0.2/-0	8.0±0.2	12±0.3	16+0.3/-0.1	16+0.3/-0.1	24+0.3/-0.1
F	3.5±0.05	3.5±0.05	3.5±0.05	5.5±0.05	7.5±0.1	7.5±0.1	11.5±0.1
E	1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.1
P0	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1
P1	4.0±0.1	4.0±0.1	4.0±0.1	4.0±0.1	8.0±0.1	8.0±0.1	8.0±0.1
P2	2.0±0.05	2.0±0.05	2.0±0.05	2.0±0.05	2.0±0.1	2.0±0.1	2.0±0.1
D0	1.5+0.1/-0	1.5+0.1/-0	1.5+0.1/-0	1.5+0.1/-0	1.5+0.1/-0	1.5+0.1/-0	1.5+0.1/-0
D1	0.6±0.05	-	1.0+0.2/-0	1.5+0.2/-0	1.5+0.25/-0	1.5+0.25/-0	1.5+0.25/-0
T	0.2±0.05	0.2±0.05	0.2±0.05	0.2±0.05	0.31±0.05	0.32±0.05	0.33±0.05
T2	0.55±0.05	0.65±0.1	0.75±0.1	0.76±0.1	0.93±0.1	1.89±0.1	1.96±0.1



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### 9. Recommended Land Pattern (For current sensing)

Board material: Glass-Epoxy (FR4) 0.6mm thickness, copper fin thickness: 100um  
 Board surface temperature shall not exceed 100°C when applying rated wattage.



Land Pattern:

Part Number	Type	Resistance Range (ohm)	Dimension (mm)		
			a	b	c
ERL0816	A	10m~	0.90	2.20	1.00
ERL1220	A	10m~	1.20	2.70	1.50
ERL1632	A	5m~9m	1.00	4.00	1.90
		10m~	2.00	4.00	1.90
ERL3264	A	5m~8m	2.50	7.40	3.50
		9m~	4.40	7.40	3.50
ERL2012	B	1m	0.15	2.00	2.20
		2m~	0.60	2.00	2.20
ERL3216	B	1m	0.40	2.40	3.40
		2m~	1.00	2.40	3.40
ERL6432	B	1m	0.70	4.20	6.60
		2m~	2.20	4.20	6.60
ERL7638	B	1m	1.10	4.60	7.80
		2m~	2.60	4.60	7.80
ERL9045	B	1m	1.30	5.10	9.20
		2m~	3.10	5.10	9.20
ERL11050	B	1m	1.80	5.60	11.20
		2m~	3.40	5.60	11.20