

CURRENT SENSING CHIP RESISTOR

TYPE RL73 SERIES

INTRODUCTION

The RL73 Series Current Sensing Chip Resistors are high-performance, low-resistance chip resistors designed for accurate current measurement in power management and protection circuits. Engineered with a high-purity alumina substrate and optimized termination design, the RL73 Series delivers excellent power dissipation, low temperature rise, and exceptional long-term stability.

Available in a wide range of package sizes from 0402 to 7520, power ratings up to 3W, and resistance values from 1mΩ to 1Ω, the RL73 Series provides designers with a versatile solution for current sensing in automotive, industrial, telecommunications, computing, battery management, and power conversion applications. With superior thermal performance, high current capability, low TCR options down to ±100ppm/°C, and compliance with global environmental regulations, the RL73 Series enables efficient, reliable, and accurate current monitoring in today's high-density electronic systems.

The RL73 Series combines compact size, high power density, and proven reliability, enabling engineers to achieve greater design flexibility without compromising performance.



FEATURES

- Excellent Long-Term Reliability and Stability
- RoHS Compliant and Halogen-Free
- High-Purity Alumina Substrate for Superior Heat Dissipation
- High-Power Current Sensing Solution
- Outstanding Thermal Performance

APPLICATIONS

- Battery Management Systems (BMS)
- Electric Vehicles (EV) & E-Mobility
- Motor Control Applications
- Energy Storage Solutions
- Telecom & Networking Infrastructure

ELECTRICAL CHARACTERISTICS

Type		RL730402	RL730603	RL730805	RL731206	RL731210	RL732010	RL732512	RL731225	RL733720	RL737520	RL730612
Rated Power at 70°C		0.063W	0.1W	0.12W	0.25W	0.5W	0.75W	1W	3W	1W	2W	1W
Temperature range		-55°C~ +155°C										
Max. Operating Current		1.11A	2.23A	2.5A	5.00A	7.07A	8.66A	10.0A	31.6A	10.0A	44.7A	10.0A
Resistance Range (mΩ)	±5%	50 - 100 102 - 500 510 - 1000	20 - 50 51 - 100 102 - 300 301 - 1000	20 - 50 51 - 100 102 - 196 200 - 1000	10 - 20 21 - 50 51 - 91 100 - 1000				3 - 5 6 - 20 21 - 30 33 - 8000	10 - 18 20 - 500	1 - 4	10 - 27 30 - 91 100 - 499 500 - 1000
	±2%										5 - 10	
	±1%											
TCR (PPM/°C)		±400	±600	±600	±600				±300	±300 ±150	±300	±600
		±300	±400	±400	±400				±200		±300	
		±200	±300	±300	±300				±150		±200	
			±200	±200	±200				±100		±200 ±150	±100

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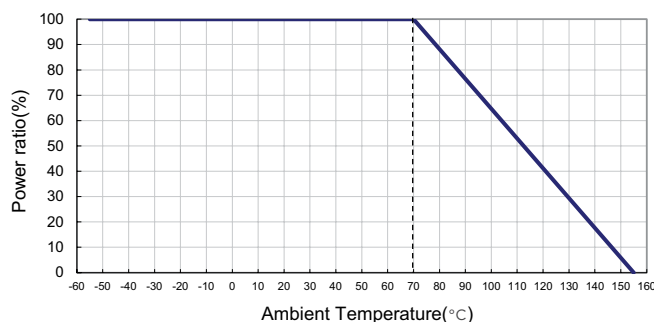


ENVIRONMENTAL CHARACTERISTICS

Item	Requirement	Test Method
Temperature Coefficient of Resistance (T.C.R.)	As Spec.	At 25°C/-55°C and 25°C/+125°C, 25°C is the reference temperature JIS-C-5201-1 4.8 IEC-60115-1 4.8
Short Time Overload	$\pm(1.0\%+0.05\Omega)$	RCWV*2.5 or Max. Overload Voltage whichever is lower for 5 seconds CS06 1W: 5*rated power for 5 seconds JIS C 5201-1 4.13 IEC 60115-1 4.13
	For High power rating	
Insulation Resistance	$\geq 10G\Omega$	Max. Overload Voltage for 1 minute JIS-C-5201-1 4.6 IEC-60115-1 4.6
Endurance	$\pm(1.0\%+0.05\Omega)$	70 $\pm$ 2°C, RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF" JIS-C-5201-1 4.25 IEC-60115-1 4.25.1
Damp Heat with Load	$\pm(0.5\%+0.05\Omega)$	40 $\pm$ 2°C, 90-95% R.H., RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF" JIS-C-5201-1 4.24 IEC-60115-1 4.24
	RL731206 1W : $\pm(1.0\%+0.05\Omega)$	
Dry Heat	$\pm(0.5\%+0.05\Omega)$	at +155°C for 1000 hrs JIS-C-5201-1 4.23 IEC-60115-1 4.23.2
	RL731206 1W : $\pm(1.0\%+0.05\Omega)$	
Bending Strength	$\pm(1.0\%+0.05\Omega)$	Bending once for 60 seconds with 3mm 2010, 2512 sizes: 2mm JIS-C-5201-1 4.33 IEC-60115-1 4.33
Solderability	95% min. coverage	245°5°C for 3 seconds JIS-C-5201-1 4.17 IEC-60115-1 4.17
Resistance to Soldering Heat	$\pm(0.5\%+0.05\Omega)$	260°5°C for 10 seconds JIS-C-5201-1 4.18 IEC-60115-1 4.18
	RL730805 1W : $\pm(1.0\%+0.05\Omega)$	
Voltage Proof	No breakdown or flashover	1.42 times Max. Operating Voltage for 1 minute CS01:50V; CS02:100V; CS03:150V; CS05:300V CS06/13/10/25/37/75/62:400V; CS12:500V JIS-C-5201-1 4.7 IEC-60115-1 4.7
Leaching	Individual leaching area $\leq 5\%$, Total leaching area $\leq 10\%$	260°5°C for 30 seconds JIS-C-5201-1 4.18 IEC-60068-2-58 8.2.1
Rapid Change of Temperature	$\pm(0.5\%+0.05\Omega)$	-55°C to +155°C, 5 cycles JIS-C-5201-1 4.19 IEC-60115-1 4.19
	RL731206 1W : $\pm(1.0\%+0.05\Omega)$	

Note:RCWV(Rated Continuous Working Voltage)= $\sqrt{P \cdot R}$ or Max. Operating Voltage whichever is lower.

DERATING CURVE (Unit: mm)



Type	Resistance Range	A (mm)	B (mm)	C (mm)
RL732512	10-99mΩ	4.9	1.6	3.2±0.2
RL732512	100-1000mΩ	1	3.55	3.2±0.2
RL732512 (±100ppm/°C)	100mΩ	4.9	1.6	3.2±0.2

VOLTAGE RATING

Resistors shall have a rated direct-current (DC) continuous working voltage or an approximate sine-wave root-mean-square (RMS) alternating-current (AC) continuous working voltage at commercial-line frequency and waveform corresponding to the power rating, as determined from the following formula:

$$RCWV = \sqrt{P \times R}$$

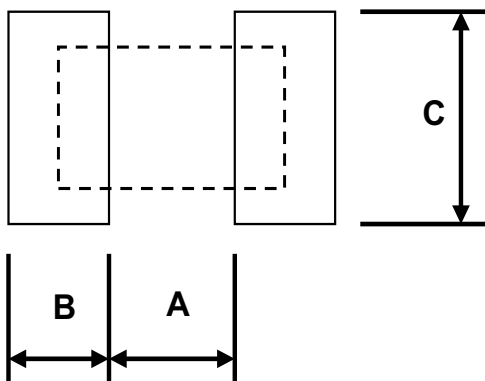
Note:

- Maximum working voltage or $\sqrt{P \times R}$, whichever is lower.
- Maximum overload voltage or $2.5\sqrt{P \times R}$, whichever is lower.

Where: RCWV = Rated DC or RMS AC continuous working voltage at commercial-line frequency and waveform (volt) and
P = Power Rating (watt)

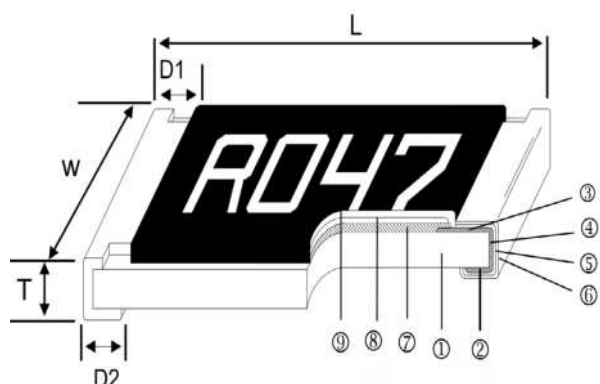
R = Nominal Resistance (ohm)

RECOMMENDED PCB LAYOUT PLAN (Unit: mm)



Type	A (mm)	B (mm)	C (mm)
RL730402	0.5	0.5	0.60±0.2
RL730603	0.8	1	0.90±0.2
RL730805	1	1	1.35±0.2
RL731206	2	1.15	1.70±0.2
RL731206 (1W)	0.9	1.7	1.70±0.2
RL731210	2	1.15	2.50±0.2
RL732010	3.6	1.4	2.50±0.2
RL732512	4.9	1.6	3.20±0.2
RL731225	1.2	2	7.00±0.2
RL733720	1	1.8	3.90±0.2
RL737520	1	1.8	7.60±0.2
RL730612	0.6	1	3.20±0.2

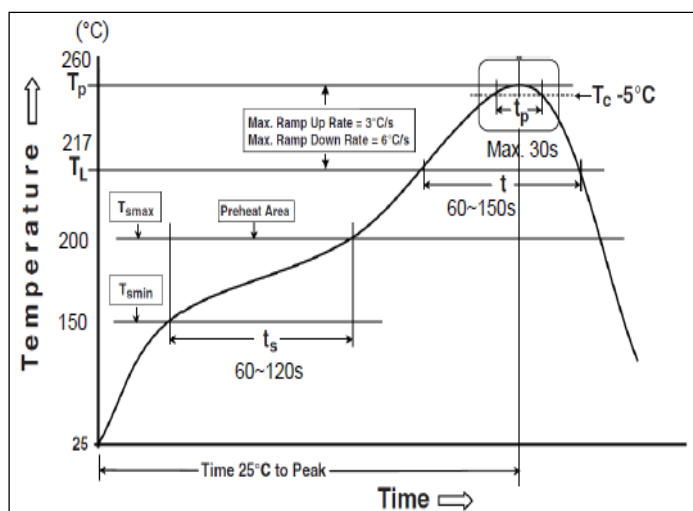
CONSTRUCTION AND DIMENSIONS (Unit: mm)



1	Alumina Substrate	4	Edge Electrode	7	Resistor Layer
2	Bottom Electrode	5	Barrier Layer	8	Primary Overcoat
3	Top Electrode	6	External Electrode	9	Secondary Overcoat

Type	Size (Inch)	L (mm)	W (mm)	T (mm)	D1 (mm)	D2 (mm)	Weight (mg) (1000pcs)
RL730402	0402	1.00±0.05	0.50±0.05	0.32±0.10	0.25±0.10	0.25±0.10	0.7
RL730603	0603	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	1.99
RL730805	0805	2.00±0.10	1.25±0.10	0.55±0.10	0.80±0.20	0.80±0.20	5.3
RL731206	1206	3.10±0.10	1.55±0.10	0.80±0.20	0.80±0.20	0.40±0.25	8.82
RL731206 (1W)	1206 (102-1000mΩ)	3.15±0.10	1.60±0.10	0.65±0.10	0.80±0.20	0.80±0.20	12.15
RL731210	1210	3.10±0.10	2.60±0.15	0.85±0.20	0.80±0.30	0.50±0.25	15.5
RL732010	2010	5.00±0.10	2.50±0.15	0.65±0.10	0.80±0.30	0.50±0.25	27.03
RL732512	2512	6.30±0.20	3.15±0.15	0.70±0.10	2.10±0.30	2.10±0.25	53.08
RL732512 (2W)	2512 (10-99mΩ)	6.30±0.20	3.15±0.15	0.74±0.10	2.10±0.30	2.10±0.25	53.08
RL732512 (2W)	2512 (100-1000mΩ)	6.45±0.15	3.20±0.10	0.90±0.10	2.10±0.30	2.10±0.25	64.88
RL731225	1225	2.00±0.15	2.50±0.10	0.70±0.10	1.00±0.20	1.00±0.20	19.96
RL733720	3720	5.20±0.20	3.50±0.20	0.80±0.20	1.00±0.20	1.00±0.20	35.71
RL737520	7520	7.50±0.30	5.20±0.30	0.80±0.20	1.20±0.20	1.20±0.20	109.9
RL730612	1020	10.50±0.50	5.20±0.30	0.80±0.20	1.20±0.20	1.20±0.20	15.03
RL732512 (2W ±100ppm/°C)	2512 (100mΩ)	6.35±0.20	3.15±0.15	0.74±0.10	2.10±0.30	0.55±0.25	53.08

SOLDERING PROFILE

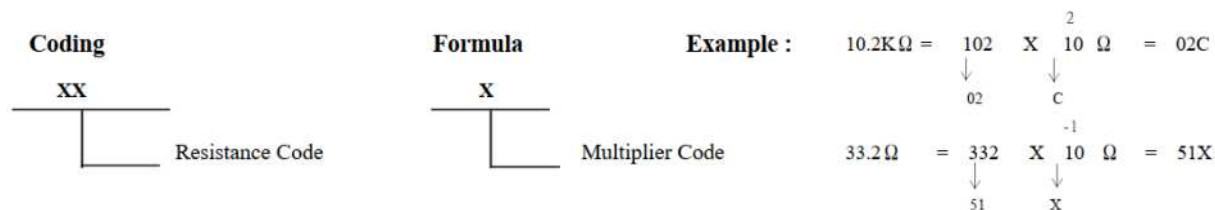


Reflow Profiles

Profile Feature	Pb-Free Assembly
Preheat	150°C
Min. Temperature (T _{min})	200°C
Max Temperature (T _{max})	60-120 seconds
Preheating time (t _s) from (T _{min} to T _{max})	3°C/second max.
Ramp-up rate (T _L to T _P)	217°C
Liquidus temperature (T _L)	60-150 seconds
Time (t _L) maintained above T _L	0.80±0.20
0.80±0.20	235°C
Min. Peak temperature (T _p min)	260°C
Max. Peak temperature (T _p max)	30 seconds max.
Time (t _p) within 5°C of the specified classification temperature (T _c)	6°C/second max.
Ramp-down rate (T _p to T _L)	8 minutes max.
Time 25°C to peak temperature	

MULTIPLIER CODE

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



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



MARKING

For RL730402, RL731206(1W) size. Due to the very small size of the resistor's body, there is no marking on the body.

Normally, the 4 digits marking of 0Ω RL730805, 0Ω RL731206, 0Ω RL731210, 0Ω RL732010 0Ω RL731210, 0Ω RL731210, 0Ω RL732512, 0Ω RL731225, 0 RL733720, 0Ω RL737520, 0Ω RL730612 resistors will be as follows

Example

Resistance	47mΩ	75mΩ	15mΩ	750mΩ	820mΩ
Marking	R047	R075	R015	R750	R820

Marking for 0603

E24 Series (<100mΩ): 3 digits marking with under-line

E24 Series (≥100mΩ): 3 digits marking for E24 or R value suffix is zero in E96: R10=100mΩ; R28=280mΩ

3 digits marking for E24 or R value suffix is zero in E96: R10=100mΩ; R28=280mΩ

3 digits marking for E96: 243=243mΩ; 511=511mΩ

Resistance	1.000Ω	0.100Ω	0.010Ω	0.102Ω	0.024Ω
Marking	1R0	R10	R01	102	024

	0	
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0 → 0

	R10	
--	-----	--

R10 → 100mΩ

	243	
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243 → 243mΩ

ENVIRONMENT RELATED SUBSTANCE

This product complies with the applicable requirements of the EU RoHS Directive, EU PAHs requirements, EU PFOS requirements, and halogen-free material expectations. Ozone-depleting substances are not used in the manufacturing process for this product. This product is not manufactured using chlorofluorocarbons (CFCs), Hydrochlorofluorocarbons (HCFCs), hydrobromofluorocarbons (HBFCs), or other ozone-depleting substances at any stage of manufacture.

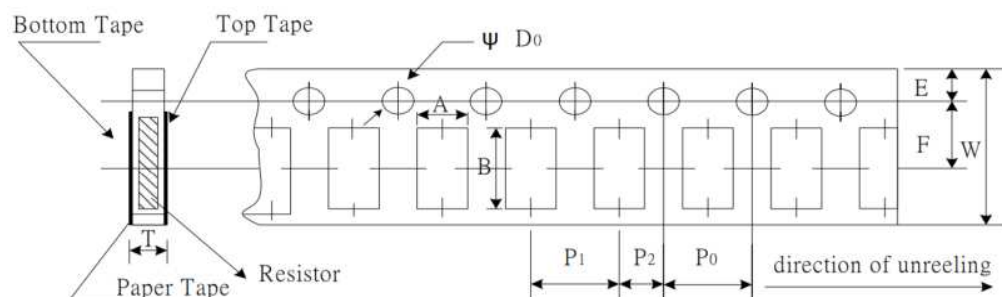
STORAGE CONDITION (MSL1)

The performance of these products, including solderability, is guaranteed for two years from the date of arrival at the customer location, provided the products remain in the original delivered packaging and are stored at 15°C - 28°C and a relative humidity of < 80%RH. Even within this period, the products should not be stored under conditions that may adversely affect electrical performance, solderability, or packaging integrity.

1. In salty air or in atmospheres containing corrosive gases such as Cl₂, H₂S, NH₃, SO₂, or NO₂.
2. In direct sunlight

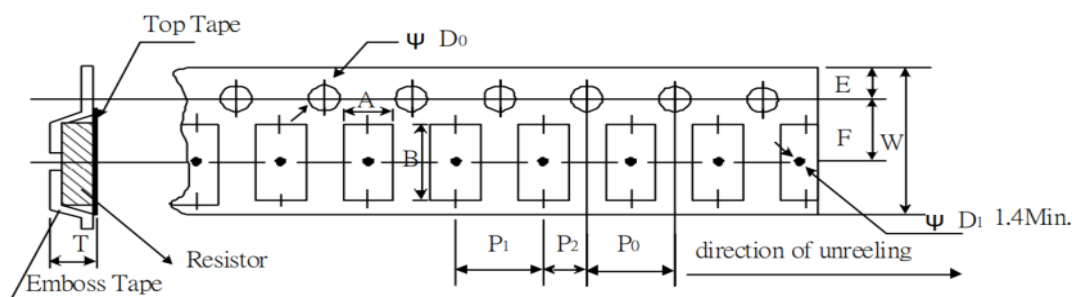
PACKAGING SPECIFICATION

PAPER TAPING DIMENSIONS (Unit: mm)



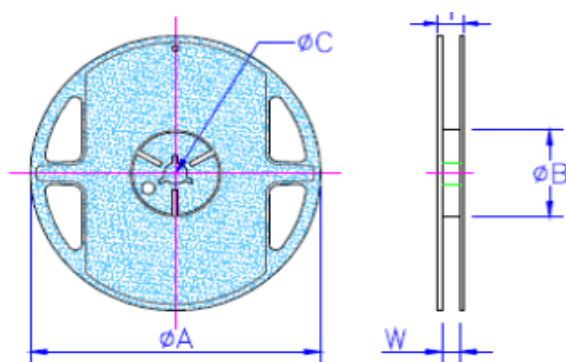
Type	A (mm)	B (mm)	W (mm)	E (mm)	F (mm)	P ₀ (mm)	P ₁ (mm)	P ₂ (mm)	ØD ₀ (mm)	T (mm)
RL730402	0.65±0.10	1.15±0.10	8.00±0.20	1.75±0.10	3.50±0.05	4.00±0.10	2.00±0.05	2.00±0.05	1.50+0.1,-0	0.45±0.10
RL730603	1.10±0.10	1.90±0.10	8.00±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.70±0.10
RL730805	1.60±0.10	2.40±0.20	8.00±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.10
RL731206	1.90±0.10	3.50±0.20	8.00±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.10
RL731210	2.90±0.10	3.50±0.20	8.00±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.10
RL730612	1.90±0.10	3.50±0.20	8.00±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.10

EMBOSED TAPING DIMENSIONS (Unit: mm)



Type	A (mm)	B (mm)	W (mm)	E (mm)	F (mm)	P ₀ (mm)	P ₁ (mm)	P ₂ (mm)	ΦD ₀ (mm)	T (mm)
RL732010	2.80±0.10	5.40±0.20	12.0±0.30	1.75±0.10	5.50±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.50±0.10	1.00±0.20
RL732512	3.50±0.10	6.70±0.10	12.0±0.30	1.75±0.10	5.50±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50±0.10	1.00±0.20
RL732512 (2W)	3.38±0.10	6.68±0.10	12.0±0.30	1.75±0.10	5.50±0.10	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.05	1.45±0.20
RL731225	3.38±0.10	6.68±0.10	12.0±0.30	1.75±0.10	5.50±0.10	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.05	1.45±0.20
RL733720	2.50±0.20	4.45±0.20	12.0±0.30	1.75±0.10	5.50±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.50±0.10	1.20±0.20
RL737520	2.50±0.20	8.30±0.20	16.0±0.30	1.75±0.10	7.80±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.50±0.10	1.20±0.20

REEL DIMENSION (Unit: mm)



Type	Reel Diameter	ΦA (mm)	ΦB (mm)	ΦC (mm)	W (mm)	T (mm)	Paper Tape (EA)	Embossed Plastic Tape (EA)
RL730402	7 inch	178.0±1.0	60.0±1.0	13.5±0.7	9.5±0.1	11.5±1.0	10,000	-
	10 inch	254.0±1.0	100.0±0.5	13.0±0.2	9.5±0.1	13.5±0.5	20,000	-
	13 inch	330.0±1.0	100.0±0.5	13.0±0.2	9.5±0.1	13.5±0.5	40,000	-
RL730603	7 inch	178.0±1.0	60.0±1.0	13.5±0.7	9.5±0.1	11.5±1.0	10,000	-
	10 inch	254.0±1.0	100.0±0.5	13.0±0.2	9.5±0.1	13.5±0.5	20,000	-
	13 inch	330.0±1.0	100.0±0.5	13.0±0.2	9.5±0.1	13.5±0.5	20,000	-
RL730805	7 inch	178.0±1.0	60.0±1.0	13.5±0.7	9.5±0.1	11.5±1.0	5,000	-
	10 inch	254.0±1.0	100.0±0.5	13.0±0.2	9.5±0.1	13.5±0.5	10,000	-
	13 inch	330.0±1.0	100.0±0.5	13.0±0.2	9.5±0.1	13.5±0.5	20,000	-
RL731206	7 inch	178.0±1.0	60.0±1.0	13.5±0.7	9.5±0.1	11.5±1.0	5,000	-
	10 inch	254.0±1.0	100.0±0.5	13.0±0.2	9.5±0.1	13.5±0.5	10,000	-
	13 inch	330.0±1.0	100.0±0.5	13.0±0.2	9.5±0.1	13.5±0.5	20,000	-
RL731210	7 inch	178.0±1.0	60.0±1.0	13.5±0.7	9.5±0.1	11.5±1.0	5,000	-
	10 inch	254.0±1.0	100.0±0.5	13.0±0.2	9.5±0.1	13.5±0.5	10,000	-
	13 inch	330.0±1.0	100.0±0.5	13.0±0.2	9.5±0.1	13.5±0.5	20,000	-
RL732010	7 inch	178.0±1.0	60.0±1.0	13.5±0.7	13.5±1.0	15.5±1.0	-	4,000
	10 inch	250.0±1.0	62.0±0.5	13.0±0.5	12.5±0.5	16.5±0.5	-	8,000
RL732512	7 inch	178.0±1.0	60.0±1.0	13.5±0.7	13.5±1.0	15.5±1.0	-	4,000
	10 inch	250.0±1.0	62.0±0.5	13.0±0.5	12.5±0.5	16.5±0.5	-	8,000
RL732512(2W)	7 inch	178.0±1.0	60.0±1.0	13.5±0.7	13.5±1.0	15.5±1.0	-	2,000
RL731225	7 inch	178.0±1.0	60.0±1.0	13.5±0.7	13.5±1.0	15.5±1.0	-	2,000
RL733720	7 inch	178.0±1.0	60.0±1.0	13.5±0.7	13.5±1.0	15.5±1.0	-	2,000
RL737520	7 inch	178.0±1.0	60.0±1.0	13.5±0.7	17.5±1.0	19.5±1.0	-	2,000
RL730612	7 inch	178.0±1.0	60.0±1.0	13.5±0.7	9.5±0.1	11.5±1.0	5,000	-

Current Sensing Chip Resistor

Type RL73 Series

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ORDERING INFORMATION

Typical product code
RL73 1206 F T G U R100

Product Type

RL73	Current Sensing Chip Resistor
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Dimension (L x W)

RL730402
RL730603
RL730805
RL731206
RL731210
RL732010
RL732512
RL731225
RL733720
RL737520
RL730612

Tolerance

F	±1%
G	±2%
J	±5%

Pack Style

T	Taping Reel
V	10" Taping Reel
W	13" Taping Reel

Resistance

R010	0.01Ω
R100	0.1Ω
1R00	1Ω

Power Rating

Blank	Standard
S	2W
A	1.5W
T	1W
Q	3/4W
U	1/2W
V	1/4W
P	1/5W
W	1/8W

TCR (PPM/ °C)

E	±100
F	±200
G	±300
H	±400
J	±600
K	±150
R	±1000

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