

**LTRL Series Low-Resistance Metal Film
Chip Resistor Product Specifications**

规格书

SPECIFICATION

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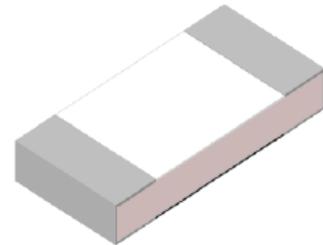
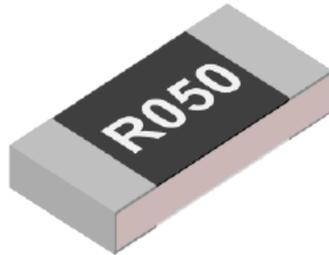
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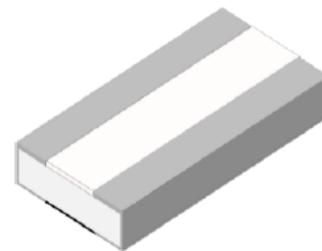
LTRL Series Low-Resistance Metal Film Chip Resistor Product Specifications

■ Low-Resistance Metal Film Chip Resistor — LTRL Series

Standard Type



Wide Terminal Type



Top view

Bottom view

■ Applications

- Computer & relative products
- Communication devices
- Consumer electronics
- Measuring instrument
- Industrial / Power supply
- Battery management system

■ Features

- Low Resistance / TCR / Inductance($\cong 5\text{nH}$)
- Excellent long-term stability
- High precision current sensing
- High power capability
- Halogen free and lead free
- RoHS compliant
- AEC-Q200 compliant

LTRL Series Low-Resistance Metal Film Chip Resistor Product Specifications

■ Parts Number Explanation

■ Example:

LTRL	1206	05	F	R560	P	05	Z
Product Type	Size (Inch)	Rated Power	Tolerance	Resistance	Package	Quantity (PCS)	Optional
LTRL Series Low-Resistance Metal Film Chip Resistor	0201	Y5: 0.05W	C: $\pm 0.25\%$	EX.	P : Paper Taping (0603~1210)	04: 4000	
	0402	Y6: 0.063W	D: $\pm 0.5\%$	R056 = 0.056 Ω		05: 5000	
	0603	01: 0.10W	F: $\pm 1\%$	R560 = 0.56 Ω	Q: Paper Taping (0201、0402)	10: 10000	
	0805	X1: 0.125W	G: $\pm 2\%$	1R00 = 1 Ω			
	1206	02: 0.20W	J: $\pm 5\%$		E: Embossed Taping		
	1210	X2: 0.25W					
	2010	04: 0.40W					
	2512	05: 0.50W					
	0508	07: 0.75W					
	0612	10: 1.00W					
	1020	15: 1.50W					
	1225	20: 2.00W					
		30: 3.00W					

■ Standard Electrical Specifications

LTRL Series Low-Resistance Metal Film Chip Resistor Product Specifications

■ Standard Type:

型别 Type	额定功率 Rated power at 70°C	最大额定 电流 Max. Rated Current	最大过载 电流 Max. Overload Current	温度系数 T.C.R (PPM/°C)	阻值范围 Resistance Range	
					C ±0.25%	D: ±0.5% F: ±1.0% G: ±2.0% J: ±5.0%
LTRL0201	1/20W	1.00A	2.50A	±100	-	50mΩ ≅ R < 100mΩ
				±50	-	100mΩ ≅ R ≅ 10Ω
	1/10W	1.41A	3.16A	±100	-	50mΩ ≅ R < 100mΩ
				±50	-	100mΩ ≅ R ≅ 10Ω
	1/5W	2.00A	4.47A	±100	-	50mΩ ≅ R < 100mΩ
				±50	-	100mΩ ≅ R ≅ 10Ω
LTRL0402	1/16W	1.12A	2.80A	±100	-	50mΩ ≅ R < 100mΩ
				±50	-	100mΩ ≅ R ≅ 10Ω
	1/8W	1.58A	3.54A	±100	-	50mΩ ≅ R < 100mΩ
				±50	-	100mΩ ≅ R ≅ 10Ω
	1/4W	2.24A	5.00A	±100	-	50mΩ ≅ R < 100mΩ
				±50	-	100mΩ ≅ R ≅ 10Ω
LTRL0603	1/10W	1.41A	3.54A	±100	-	50mΩ ≅ R < 100mΩ
				±50	-	100mΩ ≅ R ≅ 10Ω
	1/5W	2.00A	4.47A	±100	-	50mΩ ≅ R < 100mΩ
				±50	-	100mΩ ≅ R ≅ 10Ω
	2/5W	2.83A	6.32A	±100	-	50mΩ ≅ R < 100mΩ
				±50	-	100mΩ ≅ R ≅ 10Ω
LTRL0805	1/8W	1.79A	4.48A	±150	-	39mΩ ≅ R < 50mΩ
				±100	-	50mΩ ≅ R < 100mΩ
				±50	-	100mΩ ≅ R ≅ 10Ω
	1/4W	2.53A	5.66A	±150	-	39mΩ ≅ R < 50mΩ
				±100	-	50mΩ ≅ R < 100mΩ
				±50	-	100mΩ ≅ R ≅ 10Ω
1/2W	3.58A	8.00A	±150	-	39mΩ ≅ R < 50mΩ	
			±100	-	50mΩ ≅ R < 100mΩ	
			±50	-	100mΩ ≅ R ≅ 10Ω	
LTRL1206	1/4W	2.53A	6.33A	±150	-	39mΩ ≅ R < 50mΩ
				±100	-	50mΩ ≅ R < 100mΩ
				±50	470mΩ ≅ R ≅ 10Ω	100mΩ ≅ R ≅ 10Ω
	1/2W	3.58A	8.00A	±150	-	39mΩ ≅ R < 50mΩ
				±100	-	50mΩ ≅ R < 100mΩ
				±50	470mΩ ≅ R ≅ 10Ω	100mΩ ≅ R ≅ 10Ω
3/4W	4.39A	9.81A	±150	-	39mΩ ≅ R < 50mΩ	
			±100	-	50mΩ ≅ R < 100mΩ	
			±50	470mΩ ≅ R ≅ 10Ω	100mΩ ≅ R ≅ 10Ω	

LTRL Series Low-Resistance Metal Film Chip Resistor Product Specifications

型别 Type	额定功率 Rated power at 70°C	最大额定 电流 Max. Rated Current	最大过载 电流 Max. Overload Current	温度系数 T.C.R (PPM/°C)	阻值范围 Resistance Range	
					C ±0.25%	D: ±0.5% F: ±1.0% G: ±2.0% J: ±5.0%
LTRL1206	1W	5.06A	11.32A	±150	-	39mΩ ≅ R < 50mΩ
				±100	-	50mΩ ≅ R < 100mΩ
				±50	470mΩ ≅ R ≅ 10Ω	100mΩ ≅ R ≅ 10Ω
LTRL1210	1/2W	3.58A	8.95A	±150	-	39mΩ ≅ R < 50mΩ
				±100	-	50mΩ ≅ R < 100mΩ
				±50	470mΩ ≅ R ≅ 10Ω	100mΩ ≅ R ≅ 10Ω
	1W	5.06A	11.32A	±150	-	39mΩ ≅ R < 50mΩ
				±100	-	50mΩ ≅ R < 100mΩ
				±50	470mΩ ≅ R ≅ 10Ω	100mΩ ≅ R ≅ 10Ω
LTRL2010	3/4W	2.74A	6.85A	±50	470mΩ ≅ R ≅ 10Ω	100mΩ ≅ R ≅ 10Ω
	1.5W	3.87A	8.66A	±50	470mΩ ≅ R ≅ 10Ω	100mΩ ≅ R ≅ 10Ω
LTRL2512	1W	3.16A	7.91A	±50	470mΩ ≅ R ≅ 10Ω	100mΩ ≅ R ≅ 10Ω
	2W	4.47A	10.00A	±50	470mΩ ≅ R ≅ 10Ω	100mΩ ≅ R ≅ 10Ω
	3W	5.48A	12.25A	±50	470mΩ ≅ R ≅ 10Ω	100mΩ ≅ R ≅ 10Ω

型别 Type	额定功率 Rated power at 70°C	最大额定 电流 Max. Rated Current	最大过载 电流 Max. Overload Current	温度系数 T.C.R (PPM/°C)	阻值范围 Resistance Range	
					F: ±1.0% G: ±2.0% J: ±5.0%	
LTRL1206	1/4W	5.00A	12.50A	±200	10mΩ ≅ R < 39mΩ	
	1/2W	7.07A	15.81A	±200	10mΩ ≅ R < 39mΩ	

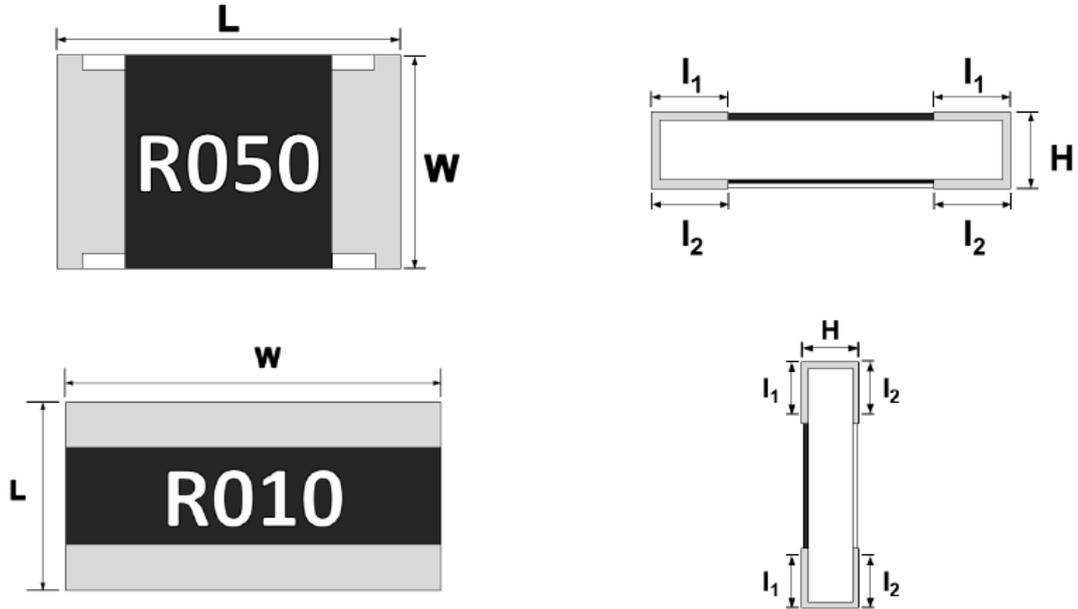
■ Wide Terminal Type:

型别 Type	额定功率 Rated power at 70°C	最大额定 电流 Max. Rated Current	最大过载 电流 Max. Overload Current	温度系数 T.C.R (PPM/°C)	阻值范围 Resistance Range	
					D: ±0.5%	F: ±1.0% G: ±2.0% J: ±5.0%
LTRL0508	1W	10.00A	22.36A	±100	100mΩ ≅ R ≅ 2Ω	10mΩ ≅ R ≅ 2Ω
LTRL0612	1W	10.00A	22.36A	±100	100mΩ ≅ R ≅ 2Ω	10mΩ ≅ R ≅ 2Ω
LTRL1020	2W	14.14A	31.62A	±100	100mΩ ≅ R ≅ 2Ω	10mΩ ≅ R ≅ 2Ω
LTRL1225	3W	17.32A	38.73A	±100	100mΩ ≅ R ≅ 2Ω	10mΩ ≅ R ≅ 2Ω

- Operating Temperature Range : -55°C ~ +155°C.
- For non-standard parts, please contact our sales dept.

LTRL Series Low-Resistance Metal Film Chip Resistor Product Specifications

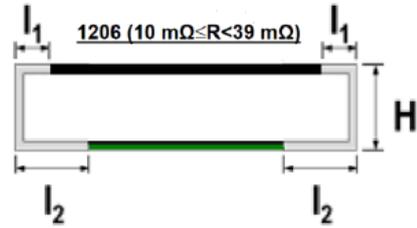
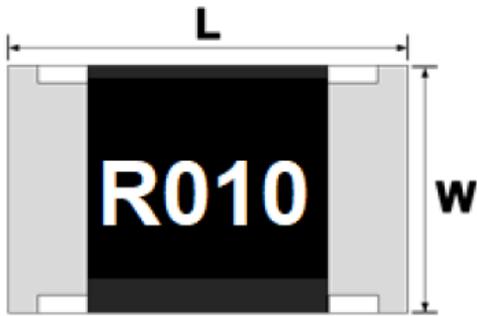
■ Type Dimensions



Unit : mm

Type	L	W	H	l1	l2
LTRL0201	0.60±0.03	0.30±0.03	0.26±0.05	0.15±0.05	0.15±0.05
LTRL0402	1.00±0.10	0.50±0.05	0.35±0.05	0.20±0.10	0.25±0.10
LTRL0603	1.60±0.10	0.80±0.10	0.45±0.10	0.25±0.15	0.30±0.15
LTRL0805	2.00±0.10	1.25±0.10	0.55±0.10	0.35±0.20	0.40±0.20
LTRL1206	3.10±0.10	1.60±0.10	0.55±0.10	0.40±0.20	0.45±0.20
LTRL1210	3.10±0.10	2.50±0.15	0.55±0.10	0.50±0.20	0.50±0.20
LTRL2010	5.00±0.20	2.50±0.15	0.55±0.10	0.60±0.25	0.60±0.25
LTRL2512	6.30±0.20	3.20±0.20	0.55±0.10	0.65±0.25	0.65±0.25
LTRL2512(3W)	6.30±0.20	3.20±0.20	0.70±0.15	0.65±0.25	0.65±0.25
LTRL0508	1.25±0.10	2.00±0.10	0.55±0.15	0.25±0.15	0.35±0.15
LTRL0612	1.60±0.15	3.20±0.20	0.55±0.15	0.30±0.20	0.50±0.20
LTRL1020	2.50±0.15	5.00±0.15	0.55±0.15	0.40±0.20	0.50±0.20
LTRL1225	3.20±0.20	6.30±0.20	0.55±0.15	0.60±0.25	0.80±0.25

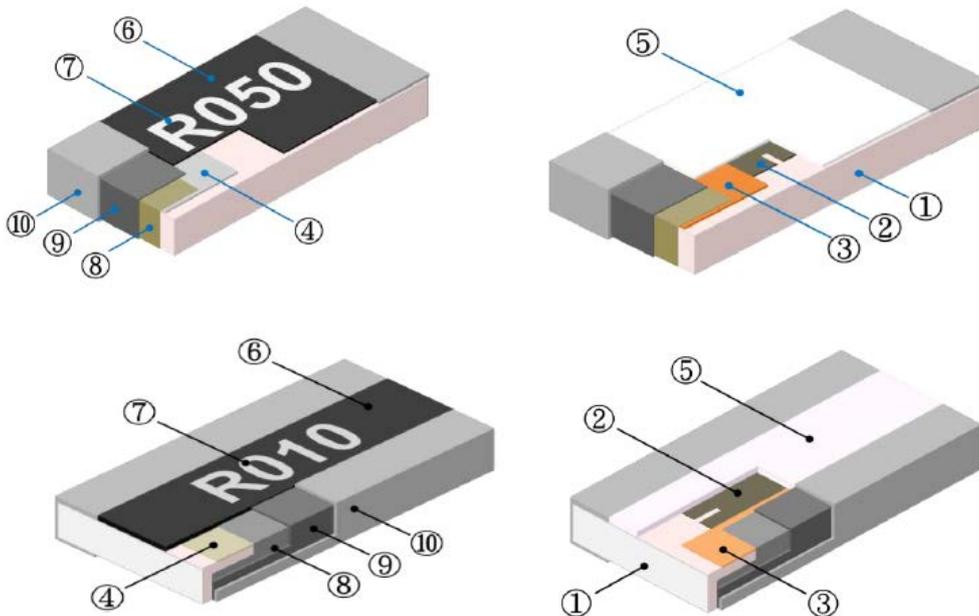
LTRL Series Low-Resistance Metal Film Chip Resistor Product Specifications



Unit : mm

Type	L	W	H	l ₁	l ₂
LTRL1206 10mΩ ≅ R < 39mΩ	3.30±0.20	1.70±0.20	0.65±0.20	0.20±0.15	0.68±0.20

■ Construction



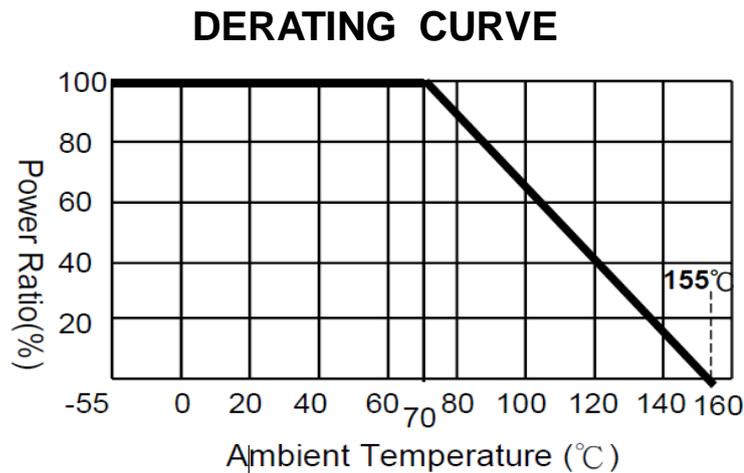
①	Alumina Substrate	⑥	Top Protective Overcoat
②	Resistive Layer	⑦	Marking
③	Bottom Inner Electrode(Cu)	⑧	Side Inner Electrode
④	Top Inner Electrode	⑨	Barrier Layer(Ni)
⑤	Bottom Protective Overcoat White(≥39mΩ) Green(<39mΩ)	⑩	Solder coating (Sn)

LTRL Series Low-Resistance Metal Film Chip Resistor Product Specifications

■ Performance Characteristics

■ Power Derating Curve

The Operating Temperature Range: -55°C ~+155°C. Power rating is in the case based on continuous full-load at ambient temperature of 70°C. For operation at ambient temperature in excess of 70°C, the load should be derated in accordance with figure of derating Curve.



■ Rated Voltage

Resistance Range: $\geq 1\Omega$

Rated Voltage: The resistor shall have a DC continuous working voltage or a RMS AC continuous working voltage at commercial-line frequency and wave form corresponding to the power rating, as determined formula as following:

$$V = \sqrt{RP}$$

V = Rated voltage (V)
P = Rated power (W)
R = Nominal Resistance (Ω)

■ Rated Current

Resistance Range: $< 1\Omega$

Rated Voltage: The resistor shall have a DC continuous working Current or a RMS AC continuous working Current at commercial-line frequency and wave form corresponding to the power rating, as determined formula as following:

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

I = Rated Current (A)
P = Rated power (W)
R = Resistance (Ω)

LTRL Series Low-Resistance Metal Film Chip Resistor Product Specifications

■ Reliability Tests and Requirements

Test Item	Test Method	Procedure	Requirements
Temperature Coefficient of Resistance (T.C.R)	JIS-C-5201-1 4.8 IEC-60115-1 4.8	At 25°C /+125°C, 25°C is the reference temperature	Refer to Standard Electrical Specifications
Short Time Overload	JIS-C-5201-1 4.13 IEC-60115-1 4.13	Standard power : 6.25 times rated power whichever is less for 5 seconds.	±(1.0%+0.001Ω)
		High power (2X/4X) and wide terminal type : 5 times rated power whichever is less for 5 seconds.	
Insulation Resistance	JIS-C-5201-1 4.6 IEC-60115-1 4.6	Apply 100VDC for 1 minute.	≧ 10GΩ
Solderability	JIS-C-5201-1 4.17 IEC-60115-1 4.17	245±5°C for 3 seconds.	>95% Coverage No Visual damage
Resistance to Soldering Heat	JIS-C-5201-1 4.18 IEC-60115-1 4.18	260±5°C for 10 seconds.	±(1.0%+0.001Ω) No Visual damage
Leaching	JIS-C-5201-1 4.18 IEC-60068-2-58 8.2.1	260±5°C for 30 seconds.	>95%Coverage No Visual damage
Rapid Change of Temperature	JIS-C-5201-1 4.19 IEC-60115-1 4.19	-55°C to +155°C, 300 cycles	±(1.0%+0.001Ω) No Visual damage
High Temperature Exposure	JIS-C5201-1 4.25 IEC 60068-2-2	At 155±5°C for 1000 hours.	±(1.0%+0.001Ω)
Resistance to Solvent	JIS-C-5201-1 4.29	The tested resistor be immersed into isopropyl alcohol of 20~25°C for 60 secs. Then the resistor is left in the room for 48 hrs.	±(1.0%+0.001Ω) No Visual damage

LTRL Series Low-Resistance Metal Film Chip Resistor Product Specifications

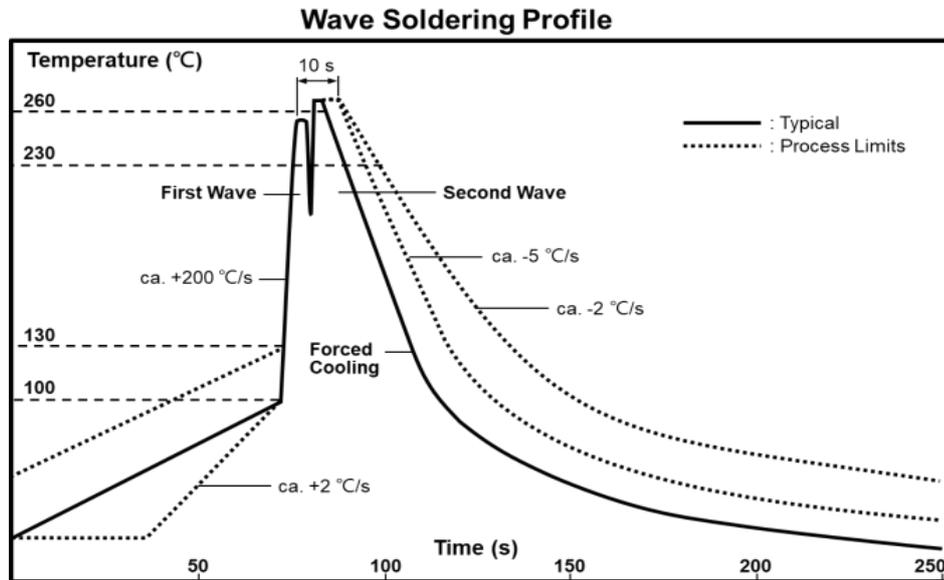
Test Item	Test Method	Procedure	Requirements
Damp Heat with Load	JIS-C-5201-1 4.24 IEC-60115-1 4.24	40±2°C, 90~95% R.H. RCWV or Max. working Current whichever is less for 1000hrs with 1.5hrs "ON" and 0.5hr "OFF"	±(1.0%+0.001Ω)
Load Life (Endurance)	JIS-C-5201-1 4.25 IEC-60115-1 4.25.1	70±2°C, Rated power, or Max. Working current whichever is less for 1000hrs with 1.5hrs "ON" and 0.5hr "OFF" .	±(0.5%+0.05Ω)
Bending Strength	JIS-C-5201-1 4.33 IEC-60115-1 4.33	Bending once for 5 seconds D : 0201 / 0402 / 0603 / 0805 = 5mm 1206 / 1210 / 0508 / 0612 = 3mm 2010 / 2512 / 1020 / 1225 = 2mm	±(1.0%+0.001Ω) No Visual damage
Dielectric Withstanding Voltage	JIS-C5201-1 4.7	0805 / 0508 and above applied 500VAC for 1 minute. 0201 / 0402 / 0603 applied 300VAC for 1 minute.	No short or burned on the appearance.
Biased Humidity	MIL-STD-202 Method 103	1,000 hours; 85°C / 85% RH, 10% of operating power. Measurement at 24±4 hours after test conclusion.	±(0.5%+0.05Ω)
Terminal Strength	JIS-C5201-1 4.32 AEC Q200-006	Pressurizing force for 10 seconds 0201 : 3.4N ; 0402 / 0603 : 8N ; 0805 / 0508 and above : 17.7N	No broken

- Temperature Coefficient of Resistance test to - 55 °C is available on request

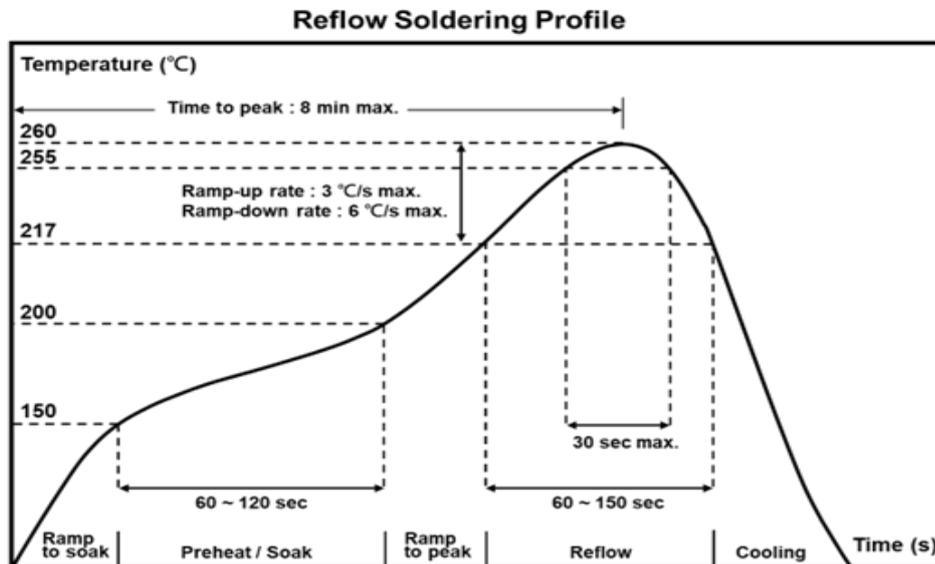
LTRL Series Low-Resistance Metal Film Chip Resistor Product Specifications

■ Recommended Customer Soldering Parameters

■ Wave solder Temperature condition



■ Solder reflow Temperature condition



■ Rework temperature (hot air equipment) : 350°C, 3~5seconds

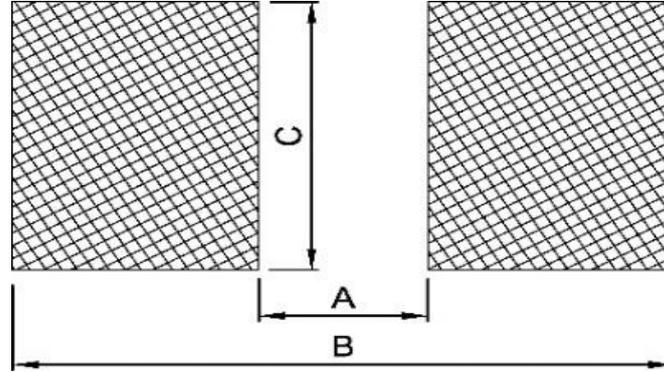
■ Recommended reflow methods

IR, vapor phase oven, hot air oven

If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.

LTRL Series Low-Resistance Metal Film Chip Resistor Product Specifications

■ Recommend Land Patter Design



Type	A	B	C
LTRL0201	0.25	0.85	0.35
LTRL0402	0.50	1.60	0.70
LTRL0603	0.80	2.40	1.00
LTRL0805	1.30	2.90	1.45
LTRL1206	2.20	4.20	1.80
LTRL1206 $10\text{m}\Omega \leq R < 39\text{m}\Omega$	1.20	4.80	1.84
LTRL1210	2.00	4.40	2.70
LTRL2010	3.80	6.60	2.70
LTRL2512	4.90	8.10	3.40
LTRL0508	0.40	1.80	2.00
LTRL0612	0.50	2.60	3.20
LTRL1020	1.00	4.05	5.50
LTRL1225	1.20	5.20	7.00

LTRL Series Low-Resistance Metal Film Chip Resistor Product Specifications

■ Plating Thickness

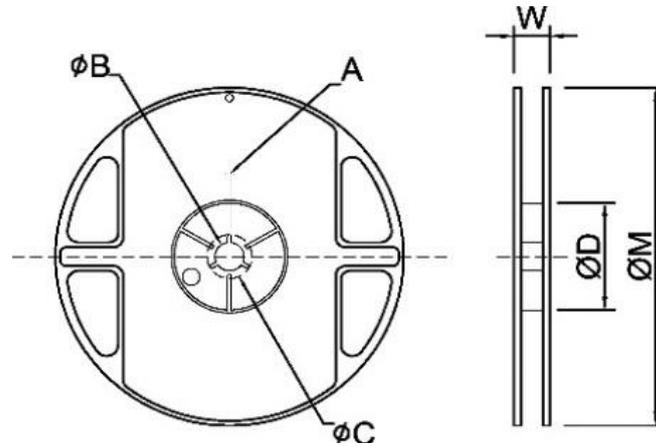
Ni: $\geq 3\mu\text{m}$

Sn (Tin): $\geq 3\mu\text{m}$

■ Appendix for SMD Chip Resistor

■ Packaging Information

■ Reel Dimensions



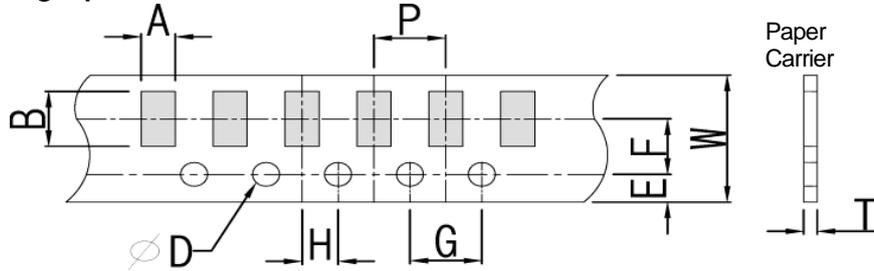
Unit: mm

Type	Size		A	φ B	φ C	φ D	W	φ M
LTRL0201	7"	10K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	11.5±2.0	178±2.0
LTRL0402	7"	10K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	11.5±2.0	178±2.0
LTRL0603	7"	5K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	11.5±2.0	178±2.0
LTRL0805	7"	5K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	11.5±2.0	178±2.0
LTRL1206	7"	5K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	11.5±2.0	178±2.0
LTRL1210	7"	5K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	11.5±2.0	178±2.0
LTRL2010	7"	4K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	16.0±2.0	178±2.0
LTRL2512	7"	4K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	16.0±2.0	178±2.0
LTRL0508	7"	5K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	11.5±2.0	178±2.0
LTRL0612	7"	5K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	11.5±2.0	178±2.0
LTRL1020	7"	4K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	16.0±2.0	178±2.0
LTRL1225	7"	4K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	16.0±2.0	178±2.0

LTRL Series Low-Resistance Metal Film Chip Resistor Product Specifications

■ Packaging Information

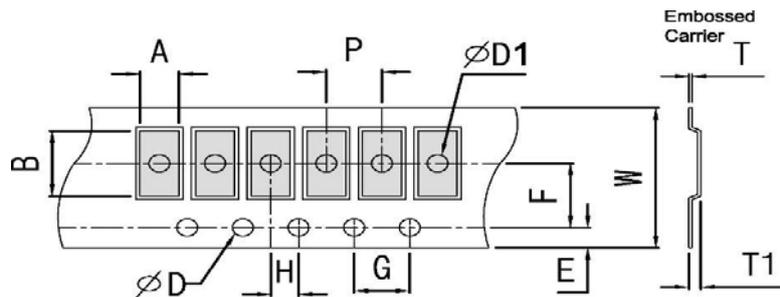
■ Tapping Specifications



Unit: mm

Paper Type										
Type	A	B	W	E	F	G	H	T	ϕD	P
0201	0.45 ± 0.10	0.75 ± 0.10	8.0 ± 0.20	1.75 ± 0.10	3.5 ± 0.05	4.0 ± 0.10	2.0 ± 0.05	0.35 ± 0.10	$1.50^{+0.10}_{-0}$	2.0 ± 0.10
0402	0.70 ± 0.10	1.20 ± 0.10	8.0 ± 0.20	1.75 ± 0.10	3.5 ± 0.05	4.0 ± 0.10	2.0 ± 0.05	0.45 ± 0.10		2.0 ± 0.10
0603	1.05 ± 0.20	1.80 ± 0.20	8.0 ± 0.20	1.75 ± 0.10	3.5 ± 0.05	4.0 ± 0.10	2.0 ± 0.05	0.60 ± 0.10		4.0 ± 0.10
0805	1.55 ± 0.20	2.30 ± 0.20	8.0 ± 0.20	1.75 ± 0.10	3.5 ± 0.05	4.0 ± 0.10	2.0 ± 0.05	0.75 ± 0.10		4.0 ± 0.10
1206	1.90 ± 0.20	3.05 ± 0.20	8.0 ± 0.20	1.75 ± 0.10	3.5 ± 0.05	4.0 ± 0.10	2.0 ± 0.05	0.75 ± 0.10		4.0 ± 0.10
1210	2.85 ± 0.20	3.05 ± 0.20	8.0 ± 0.20	1.75 ± 0.10	3.5 ± 0.05	4.0 ± 0.10	2.0 ± 0.05	0.75 ± 0.10		4.0 ± 0.10
0508	1.55 ± 0.20	2.30 ± 0.20	8.0 ± 0.20	1.75 ± 0.10	3.5 ± 0.05	4.0 ± 0.10	2.0 ± 0.05	0.75 ± 0.10		4.0 ± 0.10
0612	1.90 ± 0.20	3.05 ± 0.20	8.0 ± 0.20	1.75 ± 0.10	3.5 ± 0.05	4.0 ± 0.10	2.0 ± 0.05	0.75 ± 0.10		4.0 ± 0.10

■ Embossed Dimensions



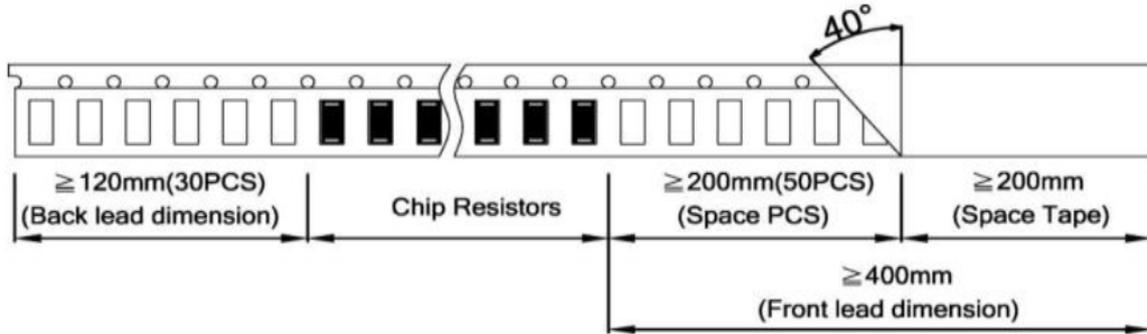
Unit: mm

Embossed Type												
Type	A	B	W	E	F	G	H	T	ϕD	$\phi D1$	T1	P
2010	2.8 ± 0.2	5.6 ± 0.2	12 ± 0.1	1.75 ± 0.1	5.5 ± 0.05	4.0 ± 0.1	2.0 ± 0.05	0.23 ± 0.1	$1.50^{+0.10}_{-0}$	1.50 ± 0.1	0.85 ± 0.15	4.0 ± 0.1
2512	3.4 ± 0.2	6.7 ± 0.2	12 ± 0.1	1.75 ± 0.1	5.5 ± 0.05	4.0 ± 0.1	2.0 ± 0.05	0.23 ± 0.1		1.50 ± 0.1	0.85 ± 0.15	4.0 ± 0.1
1020	2.8 ± 0.2	5.6 ± 0.2	12 ± 0.1	1.75 ± 0.1	5.5 ± 0.05	4.0 ± 0.1	2.0 ± 0.05	0.23 ± 0.1		1.50 ± 0.1	0.85 ± 0.15	4.0 ± 0.1
1225	3.4 ± 0.2	6.7 ± 0.2	12 ± 0.1	1.75 ± 0.1	5.5 ± 0.05	4.0 ± 0.1	2.0 ± 0.05	0.23 ± 0.1		1.50 ± 0.1	0.85 ± 0.15	4.0 ± 0.1

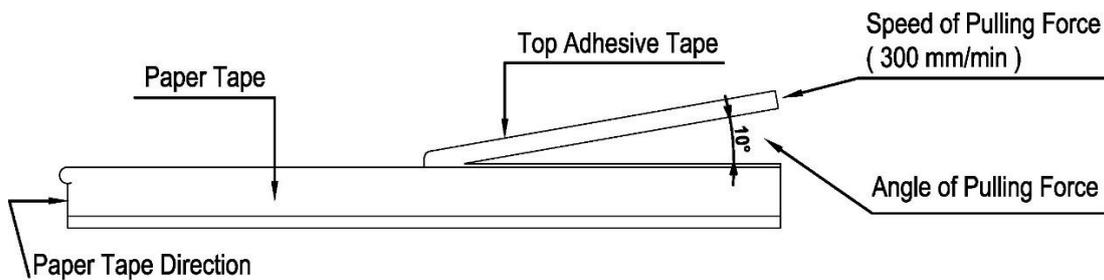
LTRL Series Low-Resistance Metal Film Chip Resistor Product Specifications

■ Packing Material Data / Storage Data

■ Front & Back Lead Dimensions

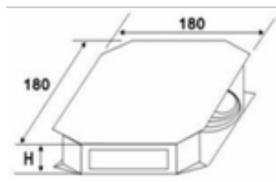


■ Top Adhesive Peel Off Strength : 10~70g

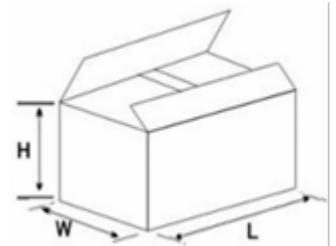


■ Package

Inner Box Size	
Reel	Size H(mm)
1	13
2	24
3	36
5	60
10	113



External Box Size			
Contain (Kpcs)	Length (mm)	Width (mm)	Height (mm)
25K	180	180	60
50K	180	180	110
150K	430	200	200
300K	400	400	200



■ Storage Data :

Storage time at the environment temp: $25\pm 5^\circ\text{C}$ & humidity: $60\pm 20\%$ is valid for two years.