

APPROVAL SHEET

Product Name : Metal Film Low Ohm Chip Resistor

Part No. : RTL

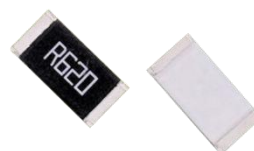
Description : Size 0603~2512

For more contact information, please refer to our website: www.rideetech.com

Metal Film Low Ohm Chip Resistor — RTL Series

Applications

- Consumer electronics
- Communication devices
- Measuring instrument
- Industrial / Power supply
- Battery management system



Features

- Low Resistance / TCR / Inductance
- Precision current sensing
- High power capability
- Halogen free and lead free
- RoHS compliant

Part Number Explanation

RTL	2512	X2	F	R005	T	S
Product	Size (Inch)	Rated Power	Tolerance	Resistance	Packaging	Functional
Metal Film Low Ohm Chip Resistor	0603 0805 1206 1210 2010 2512	X1 : 1/8W X2 : 1/4W 03 : 1/3W 05 : 1/2W 06 : 2/3W 07 : 3/4W 10 : 1W 20 : 2W	F : $\pm 1.0\%$ G : $\pm 2.0\%$ J : $\pm 5.0\%$	R020=20m Ω R150=150m Ω 1R00=1 Ω 10R0=10 Ω	T=Tape & Reel	S= Standard P= Power Type M= Meet AEC-Q200 ME= Meet AEC-Q200 & Anti-sulfur

Standard Electrical Specifications

Type	Power Rating at 70°C	Max. RCWV	Max. Overload Voltage	Resistance Tolerance (%)	Temperature Coefficient (TCR; ppm/°C)	Resistance Range
RTL0603	0.125W	337mV	754mV	±1、±2、±5	±200	40mΩ≤R≤91mΩ
					±100	100mΩ≤R≤910mΩ
RTL0805	0.25W	477mV	1067mV	±1、±2、±5	±400~±200	10mΩ≤R≤46mΩ
					±100	47mΩ≤R≤910mΩ
RTL1206	0.25W	1580mV	3540mV	±1、±2、±5	±100	1Ω≤R≤10Ω
	0.33W	551mV	1232mV	±1、±2、±5	±400~±200	10mΩ≤R≤46mΩ
					±100	47mΩ≤R≤910mΩ
RTL1210	0.66W	779mV	1742mV	±1、±2、±5	±400~±200	10mΩ≤R≤46mΩ
					±100	47mΩ≤R≤910mΩ
RTL2010	0.75W	2740mV	6120mV	±1、±2、±5	±100	1Ω≤R≤10Ω
	0.75W	826mV	1847mV	±1、±2、±5	±400~±200	10mΩ≤R≤46mΩ
					±100	47mΩ≤R≤910mΩ
RTL2512	1W	3160mV	7070mV	±1、±2、±5	±100	1Ω≤R≤10Ω
	1W	954mV	2133mV	±1、±2、±5	±400~±200	10mΩ≤R≤46mΩ
					±100	47mΩ≤R≤910mΩ

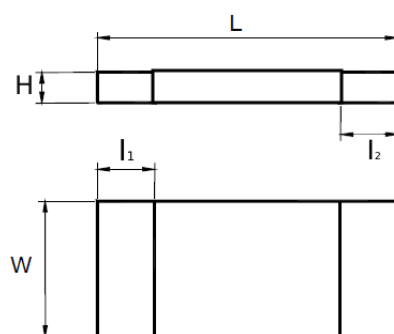
- Functional code: S
- Beyond the above specification also can meet the special requirements. For detail questions, please contact us freely.

Power Type Electrical Specifications

Type	Power Rating at 70°C	Max. RCWV	Max. Overload Voltage	Resistance Tolerance (%)	Temperature Coefficient (TCR; ppm/°C)	Resistance Range
RTL0603	0.25W	477mV	1067mV	±1、±2、±5	±200	40mΩ≤R≤91mΩ
					±100	100mΩ≤R≤910mΩ
RTL0805	0.5W	675mV	1508mV	±1、±2、±5	±400~±200	10mΩ≤R≤46mΩ
					±100	47mΩ≤R≤910mΩ
RTL1206	0.5W	2240mV	5000mV	±1、±2、±5	±100	1Ω≤R≤10Ω
	0.75W	826mV	1847mV	±1、±2、±5	±400~±200	10mΩ≤R≤46mΩ
					±100	47mΩ≤R≤910mΩ
RTL1210	0.75W	826mV	1847mV	±1、±2、±5	±400~±200	10mΩ≤R≤46mΩ
					±100	47mΩ≤R≤910mΩ
RTL2010	1W	3160mV	7070mV	±1、±2、±5	±100	1Ω≤R≤10Ω
	1W	954mV	2133mV	±1、±2、±5	±400~±200	10mΩ≤R≤46mΩ
					±100	47mΩ≤R≤910mΩ
RTL2512	2W	4470mV	10000mV	±1、±2、±5	±100	1Ω≤R≤10Ω
	2W	1349mV	3017mV	±1、±2、±5	±400~±200	10mΩ≤R≤46mΩ
					±100	47mΩ≤R≤910mΩ

- Functional code: P
- Beyond the above specification also can meet the special requirements. For detail questions, please contact us freely.

■ Dimension



■ Resistance $\geq 40\text{m}\Omega$

Unit: mm

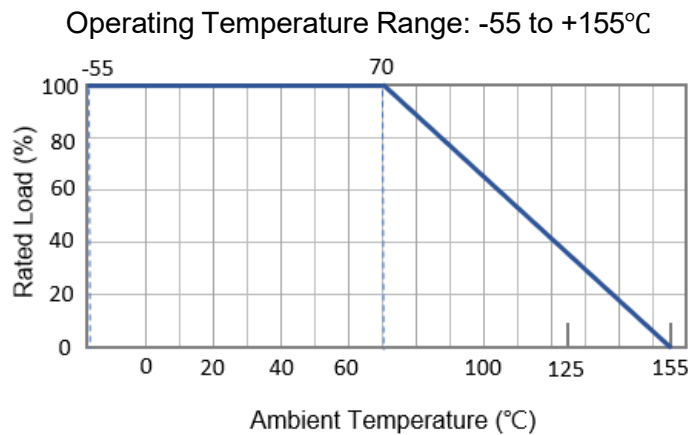
Type	L	W	l_1	l_2	H
RTL0603	1.60 ± 0.10	0.80 ± 0.10	0.30 ± 0.20	0.30 ± 0.20	0.45 ± 0.10
RTL0805	2.00 ± 0.10	1.25 ± 0.10	0.40 ± 0.20	0.40 ± 0.20	0.50 ± 0.10
RTL1206	3.10 ± 0.10	1.60 ± 0.10	0.50 ± 0.25	0.50 ± 0.25	0.55 ± 0.10
RTL1210	3.10 ± 0.10	2.60 ± 0.10	0.50 ± 0.25	0.50 ± 0.25	0.55 ± 0.10
RTL2010	5.00 ± 0.20	2.50 ± 0.20	0.60 ± 0.25	0.60 ± 0.25	0.60 ± 0.10
RTL2512	6.30 ± 0.20	3.10 ± 0.20	0.60 ± 0.25	0.90 ± 0.25	0.60 ± 0.15

■ Resistance $\leq 39\text{m}\Omega$

Unit: mm

Type	L	W	l_1	l_2	H
RTL0603	1.60 ± 0.10	0.80 ± 0.10	0.30 ± 0.20	0.50 ± 0.20	0.50 ± 0.10
RTL0805	2.00 ± 0.10	1.25 ± 0.10	0.40 ± 0.20	0.65 ± 0.20	0.60 ± 0.10
RTL1206	3.10 ± 0.10	1.60 ± 0.10	0.50 ± 0.25	0.90 ± 0.25	0.65 ± 0.10
RTL1210	3.10 ± 0.10	2.60 ± 0.10	0.50 ± 0.25	0.90 ± 0.25	0.65 ± 0.10
RTL2010	5.00 ± 0.20	2.50 ± 0.20	0.60 ± 0.25	1.25 ± 0.25	0.65 ± 0.10
RTL2512	6.30 ± 0.20	3.10 ± 0.20	0.60 ± 0.25	1.90 ± 0.25	0.65 ± 0.15

Derating curve



Voltage Rating or Current Rating

The direct or alternating voltage for the rated power can be calculated from the following formula but must not exceed the maximum voltage.

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

V = Rated Voltage(V)
 P = Rated Power(W)
 R = Rated Resistance(Ω)

Recommended Customer Soldering Parameters

Recommended IR Reflow Soldering Conditions

Preliminary heating: 150°C~180°C, 120s max
 Soldering: 220°C, 60s max
 Peak temperature: 245°C, 15s max

Recommended WAVE Soldering Conditions

Reservoir Temperature: 260°C, 10s max
 Number of times: two times max

Recommend Land Pattern Design

Type	W	D	L
RTL0603	0.90	1.00	3.00
RTL0805	1.30	1.15	3.50
RTL1206	1.80	1.30	4.70
RTL1210	3.00	1.30	4.70
RTL2010	3.00	1.50	6.80
RTL2512	3.70	1.60	7.60

Unit : mm



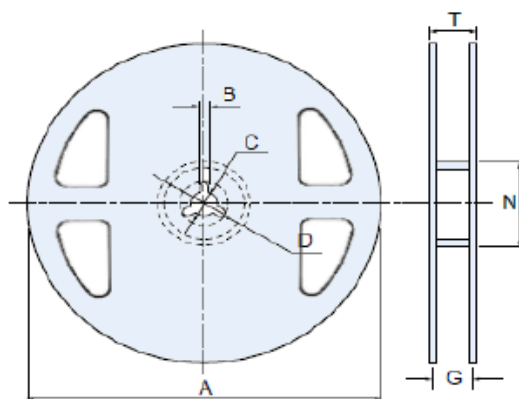
■ Reliability Test and Requirement (Standard)

Test Item	Test Method	Procedure	Requirements
Temperature Coefficient of Resistance (T.C.R)	JIS-C-5201-1 4.8 IEC-60115-1 4.8	Temperature: (T1. +25°C) ~ (T2. +155°C) $TCR(ppm/^{\circ}C) = (R2-R1)/R1 \times 1/(T2-T1) \times 10^6$	As Spec
Short Time Overload	JIS-C-5201-1 4.13 IEC-60115-1 4.13	5 × Rated power for 5 seconds	$\Delta R \leq \pm(2\% + 0.5m\Omega)$ F: $\Delta R \leq \pm(1\% + 0.5m\Omega)$
Resistance to Soldering Heat	JIS-C-5201-1 4.18 IEC-60115-1 4.18	260±5°C for 10 seconds.	$\Delta R \leq \pm(1\% + 0.5m\Omega)$ F: $\Delta R \leq \pm(0.5\% + 0.5m\Omega)$ No mechanical damage
Load Life	JIS-C-5201-1 4.25 IEC-60115-1 4.25.	Permanent resistance change after 1000+48/-0 hours (1.5 hours ON , 0.5 hour OFF) at RCWV or Max. Keep the resistor at 70±2°C ambient"	$\Delta R \leq \pm(3\% + 0.5m\Omega)$
Insulation Resistance	JIS-C-5201-1 4.6 IEC-60115-1 4.6	Apply the maximum overload voltage (DC) for 1 minute	$\Delta R \geq 10G\Omega$
Bending Strength	JIS-C-5201-1 4.33 IEC-60115-1 4.33	Bending 3mm for 0603 0805 2mm for 1206 2010 2512	$\Delta R \leq \pm(1\% + 0.5m\Omega)$ F: $\Delta R \leq \pm(0.5\% + 0.5m\Omega)$ No mechanical damage
Solderability	JIS-C-5201-1 4.17 IEC-60115-1 4.17	After immersing flux, dip in the 245±2°C molten solder bath for 3±0.5 sec	Over 95% of termination must be covered with Solder

■ Reliability Test and Requirement (AEC-Q200 Grade)

Test Item	Test Method	Procedure	Requirements
DC Resistance	AEC-Q200 7.1 IEC 60115-1 JIS C 5201-1 4.5	Measure the resistance Value.	F: $\pm 1\%$ G: $\pm 2\%$ J: $\pm 5\%$
High Temperature Exposure (Storage)	AEC-Q200 7.3	1000 hrs. @ T=155°C. Unpowered. Measurement at 24 $\pm$ 2 hours after test conclusion.	$\Delta R \leq \pm(3\% + 0.5m\Omega)$ F: $\Delta R \leq \pm(1\% + 0.5m\Omega)$
Temperature Cycling	AEC-Q200 7.4	1000 Cycles (-55°C to +125°C). Measurement at 24 $\pm$ 2 hours after test conclusion.	$\Delta R \leq \pm(1\% + 0.5m\Omega)$ F: $\Delta R \leq \pm(0.5\% + 0.5m\Omega)$ No mechanical damage.
Moisture Resistance	AEC-Q200 7.6	Test 65°C/80~100%RH/10Cycles. Measurement at 24 $\pm$ 2 hours after test conclusion. (t=24hrs/cycle).	$\Delta R \leq \pm(1\% + 0.5m\Omega)$ F: $\Delta R \leq \pm(0.5\% + 0.5m\Omega)$
Biased Humidity	AEC-Q200 7.7	1000 hours 85°C/85%RH. 10% of operating power. Measurement at 24 $\pm$ 2 hours after test conclusion.	$\Delta R \leq \pm(3\% + 0.5m\Omega)$ F: $\Delta R \leq \pm(1\% + 0.5m\Omega)$
Operational Life	AEC-Q200 7.8	Test 1000hr @ TA=125°C at specified rated power. Measurement at 24 $\pm$ 2 hours after test conclusion.	$\Delta R \leq \pm(3\% + 0.5m\Omega)$ F: $\Delta R \leq \pm(1\% + 0.5m\Omega)$
External Visual	AEC-Q200 7.9	Inspect device construction, marking and workmanship.	No visual damage and refer Ridee marking code.
Physical Dimension	AEC-Q200 7.10	Verify physical dimensions to the applicable device detail specification.	Within the spec.
Mechanical Shock	AEC-Q200 7.13	Test Peak value:100g's,Wave:Hail-sine, Duration:6ms,Velocity:12.3ft/sec.	Within product specification tolerance and no visible damage.
Vibration	AEC-Q200 7.14	5 g's for 20 min., 12 cycles each of 3 orientations. Test from 10-2000 Hz.	No mechanical damage.
Resistance to Solder Heat	AEC-Q200 7.15	Solder dipping @ 270°C $\pm$ 5°C for 10sec. $\pm$ 1sec.	$\Delta R \leq \pm(1\% + 0.5m\Omega)$ F: $\Delta R \leq \pm(0.5\% + 0.5m\Omega)$ No mechanical damage.
Thermal Shock	AEC-Q200 7.16	-55 to 155°C/ dwell time 15min/ Max transfer time 20sec/ 300cycles.	$\Delta R \leq \pm(1\% + 0.5m\Omega)$ F: $\Delta R \leq \pm(0.5\% + 0.5m\Omega)$ No mechanical damage.
ESD	AEC-Q200-002	Test contact min. 1KV.	$\Delta R \leq \pm(1\% + 0.5m\Omega)$ No mechanical damage.
Solderability	AEC-Q200 7.18	a) Baking 155°C 4H, dipping 235°C 5s b) Steam 1H, dipping 215°C 5s c) Steam 1H, dipping 260°C 7s	Over 95% of termination must be covered with solder.
Bending Strength	AEC-Q200 7.21	Bending 2mm 2512.2010.1210.1206, 3mm 0805.0603.	$\Delta R \leq \pm(1\% + 0.5m\Omega)$ F : $\Delta R \leq \pm(0.5\% + 0.5m\Omega)$ No mechanical damage.
Terminal Strength	AEC-Q200 7.22	Force 1 Kg for 60 seconds.	No mechanical damage
Sulfuration Test	ASTM B-809 EIA-977	105 $\pm$ 2°C, 750hrs	$\Delta R \leq \pm(3\% + 0.5m\Omega)$

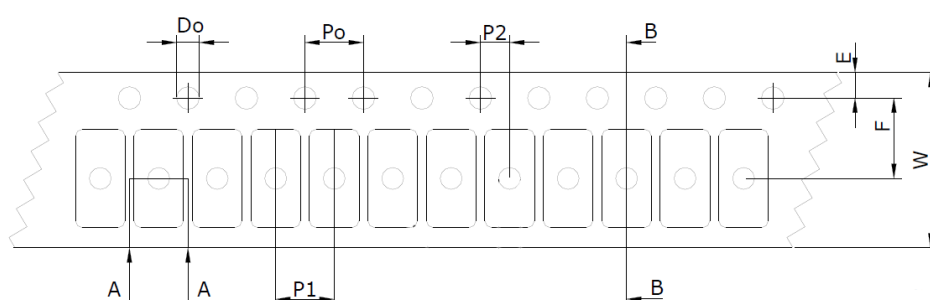
■ Packaging Information



Unit : mm

Size	Packaging Q'ty	A	N	C	D	B	G	T
0603 0805 1206 1210	5kpcs/Reel	178.0±2.0	60.0±0.5	13.0±0.5	20(Min.)	2.0±0.5	10.0±1.5	14.9max.
2010 2512	4kpcs/Reel	178.0±2.0	60.0±0.5	13.0±0.5	20(Min.)	2.0±0.5	13.8±1.5	16.7max.

■ Tapping Specification



Unit : mm

Size	A	B	W	F	E	P1	P2	P0	D
0603	1.10±0.20	1.90±0.20	8.00±0.30	3.50±0.05	1.75±0.10	4.00±0.10	2.00±0.05	4.00±0.10	1.50+0.10/-0
0805	1.65±0.20	2.40±0.20	8.00±0.30	3.50±0.05	1.75±0.10	4.00±0.10	2.00±0.05	4.00±0.10	1.50+0.10/-0
1206	2.00±0.20	3.60±0.20	8.00±0.30	3.50±0.05	1.75±0.10	4.00±0.10	2.00±0.05	4.00±0.10	1.50+0.10/-0
1210	3.00±0.20	3.60±0.20	8.00±0.30	3.50±0.05	1.75±0.10	4.00±0.10	2.00±0.05	4.00±0.10	1.50+0.10/-0
2010	2.80±0.20	5.50±0.20	12.00±0.30	5.50±0.05	1.75±0.10	4.00±0.10	2.00±0.05	4.00±0.10	1.50+0.10/-0
2512	3.50±0.20	6.70±0.20	12.00±0.30	5.50±0.05	1.75±0.10	4.00±0.10	2.00±0.05	4.00±0.10	1.50+0.10/-0

■ Marking

R value $\geq 40\text{m}\Omega$, Overcoating Color is “ Black “.

R value $\leq 39\text{m}\Omega$, Overcoating Color is “ Yellow “

E24/E96 $\pm 1\%$: 4 digits marking

Example:

Resistance	68m Ω
Digits Code	R068

E24 $\pm 2\%$ or $\pm 5\%$: 3 digits marking

Example:

Resistance	1 Ω
Digits Code	1R0

0603: 3 digits marking

Example:

Resistance	68m Ω
Digits Code	68M