

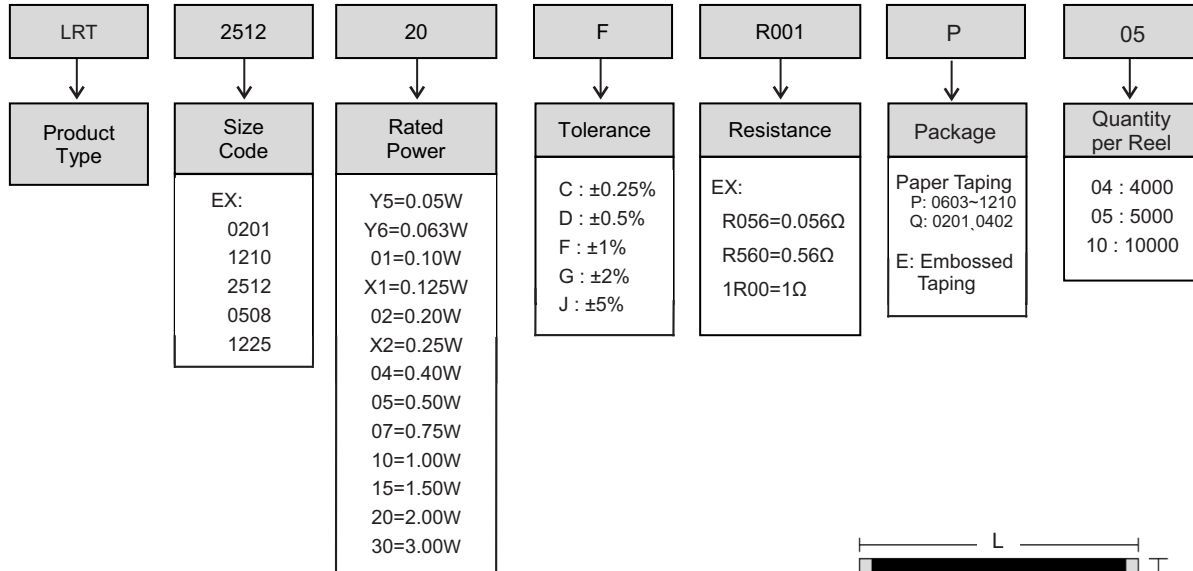
FEATURES

- Low Resistance, Low TCR, Inductance
- High precision current sensing
- High power capability
- Halogen free and lead free

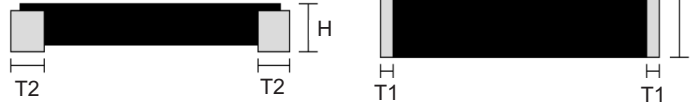
APPLICATION

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

PART NUMBER EXAMPLE



DIMENSIONS (unit : mm)



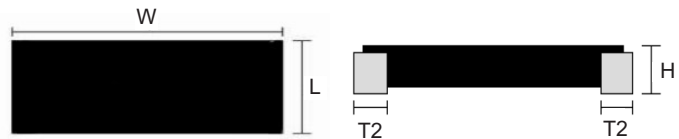
STANDARD TYPE

Size	L	W	H	T1	T2
0201	0.60±0.03	0.30±0.03	0.26±0.05	0.15±0.05	0.15±0.05
0402	1.00±0.10	0.50±0.05	0.35±0.05	0.20±0.10	0.25±0.10
0603	1.60±0.10	0.80±0.10	0.45±0.10	0.25±0.15	0.30±0.15
0805	2.00±0.10	1.25±0.10	0.55±0.10	0.35±0.20	0.40±0.20
1206	3.10±0.10	1.60±0.10	0.55±0.10	0.40±0.20	0.45±0.20
1210	3.10±0.10	2.50±0.15	0.55±0.10	0.50±0.20	0.50±0.20
2010	5.00±0.20	2.50±0.15	0.55±0.10	0.60±0.25	0.60±0.25
2512	6.30±0.20	3.20±0.20	0.55±0.10	0.65±0.25	0.65±0.25
2512 (3W)	6.30±0.20	3.20±0.20	0.70±0.15	0.65±0.25	0.65±0.25

ELECTRICAL CHARACTERISTICS & RESISTANCE RANGE
STANDARD TYPE

Size Code	Rating Power at 70°C (W)	Max. Rating Current (A)	Max. Overload Current (A)	T.C.R. (ppm/°C)	Resistance Range	
					±0.25% (C)	±0.5% (D), ±1.0% (F) ±2.0% (G), ±5.0% (J)
0201	0.05	1.00	2.50	±100		50mΩ ≤ R < 100mΩ
	0.1	1.41	3.16			
	0.2	2.00	4.47			
0402	0.0625	1.12	2.80	----- ±50		----- 100mΩ ≤ R ≤ 10Ω
	0.125	1.58	3.54			
	0.25	2.24	5.00			
0603	0.1	1.41	3.54	±50		100mΩ ≤ R ≤ 10Ω
	0.2	2.00	4.47			
	0.4	2.83	6.32			
0805	0.125	1.79	4.48	±150 ----- ±100 ----- ±50		39mΩ ≤ R < 50mΩ ----- 50mΩ ≤ R < 100mΩ ----- 100mΩ ≤ R ≤ 10Ω
	0.25	2.53	5.66			
	0.5	3.58	8.00			
1206	0.25	2.53	6.33	±150 ----- ±100 ----- ±50		39mΩ ≤ R < 50mΩ ----- 50mΩ ≤ R < 100mΩ ----- 100mΩ ≤ R ≤ 10Ω
	0.5	3.58	8.00			
	1	5.06	11.32			
1210	0.5	3.58	8.95	±50	470mΩ ≤ R ≤ 10Ω	100mΩ ≤ R ≤ 10Ω
	1	5.06	11.32			
2010	0.75	2.74	6.85	±50	470mΩ ≤ R ≤ 10Ω	100mΩ ≤ R ≤ 10Ω
	1.5	3.87	8.66			
2512	1	3.16	7.91	±50	470mΩ ≤ R ≤ 10Ω	100mΩ ≤ R ≤ 10Ω
	2	4.47	10.00			
	3	5.48	12.25			

■ **DIMENSIONS** (unit : mm)



WIDE TERMINAL & OTHERS

Size	L	W	H	T1	T2
0508	1.25±0.10	2.00±0.10	0.55±0.15	0.25±0.15	0.35±0.15
0612	1.60±0.15	3.20±0.20	0.55±0.15	0.30±0.20	0.50±0.20
1020	2.50±0.15	5.00±0.15	0.55±0.15	0.40±0.20	0.50±0.20
1206L	3.30±0.20	1.70±0.20	1.00±0.10	0.20±0.15	0.68±0.20
1225	3.20±0.20	6.30±0.20	0.55±0.15	0.60±0.25	0.80±0.25

■ **ELECTRICAL CHARACTERISTICS & RESISTANCE RANGE** (CONTINUE)

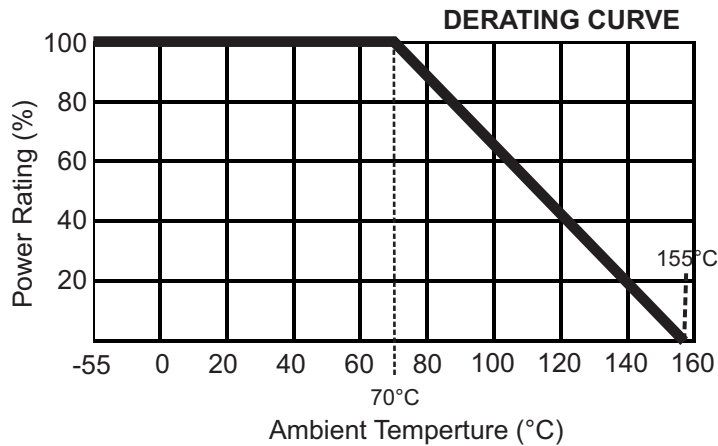
Size Code	Rating Power at 70°C (W)	Max. Rating Current (A)	Max. Overload Current (A)	T.C.R. (ppm/°C)	Resistance Range (mΩ)	
					±0.5% (D)	±1% (F), ±2% (G), ±5% (J)
0508	1	10.00	22.36	±150	---	10mΩ ≤ R < 20mΩ
				±100	100mΩ ≤ R ≤ 500mΩ	20mΩ ≤ R ≤ 500mΩ
0612	1	10.00	22.36	±150	---	10mΩ ≤ R < 20mΩ
				±100	100mΩ ≤ R ≤ 500mΩ	20mΩ ≤ R ≤ 500mΩ
1020	2	14.14	31.62	±150	---	10mΩ ≤ R < 20mΩ
				±100	100mΩ ≤ R ≤ 500mΩ	20mΩ ≤ R ≤ 500mΩ
1225	3	17.32	38.73	±150	---	10mΩ ≤ R < 20mΩ
				±100	100mΩ ≤ R ≤ 500mΩ	20mΩ ≤ R ≤ 500mΩ

Size Code	Rating Power at 70°C (W)	Max. Rating Current (A)	Max. Overload Current (A)	T.C.R. (ppm/°C)	Resistance Range (mΩ)	
					±0.5% (D)	±1% (F), ±2% (G), ±5% (J)
1206L	0.25	5.00	12.50	±200		10mΩ ≤ R < 39mΩ
	0.5	7.07	15.81			

■ **POWER DERATING CURVE**

The Operating Temperature Range : -55°C ~ +155°C

Power rating or current 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 the curve below.



■ **RATING CURRENT**

Resistance Range : <1 Ω

Rated Current : The resistor should have a DC continuous working current or AC (rms) 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 = Rating Current (A)
 P = Rating Power (W)
 R = Resistance (Ω)

■ **RATING VOLTAGE**

Resistance Range : ≥1 Ω

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

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

V = Rating Voltage (V)
 P = Rating Power (W)
 R = Nominal Resistance (Ω)

■ TEST PROCEDURES :

Test Item	Test Method	Procedure	Requirement
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	As Spec.
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%+0.001 Ω)
		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	≥ 10G Ω
Dielectric Withstanding Voltage	JIS-C-5201-1 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
Core Body Strength	JIS-C-5201-1 4.15	Central part pressurizing force : 10N, 10 seconds	No broken
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%+0.001 Ω) 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%+0.001 Ω) No Visual damage
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 1000 hrs with 1.5hrs "ON" and 0.5hr "OFF"	± (1.0%+0.001 Ω)
Biased Humidity	MIL-STD-202 Method 103	1000 hours, 85°C / 85% RH, 10% of operating power. Measurement at 24±4 hours after test conclusion	± (0.5%+0.05 Ω)
Load Life (Endurance)	JIS-C-5201-1 4.25 IEC-60115-1 4.25.1	70±2°C, RCWV or Max. working voltage whichever is less for 1000 hours with 1.5hrs "ON" and 0.5hr "OFF"	± (1.0%+0.001 Ω)
High Temperature Exposure	JIS-C-5201-1 4.25 IEC-60068-2-2	At 155±5°C for 1000 hours	± (1.0%+0.001 Ω)
Resistance to Solvent	JIS-C-5201-1 4.29	The tested resistor be immersed into isopropyl alcohol of 20~25°C for 60 seconds. Then the resistor is left in the room for 48 hrs.	± (1.0%+0.001 Ω) No Visual damage
Terminal Strength (SMD)	JIS-C5201-1 4.32 AEC Q200-006	Pressurizing force for 10 seconds 0201 / 0402 / 0603 : 8N; 0805 / 0508 and above : 17.7N	No broken
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%+0.001 Ω) No Visual damage

■ **MARKING :**

STANDARD TYPE



0201, 0402 : No marking



0603 : 3 digits



0805 ~ 2512 : 4 digits

WIDE TERMINAL

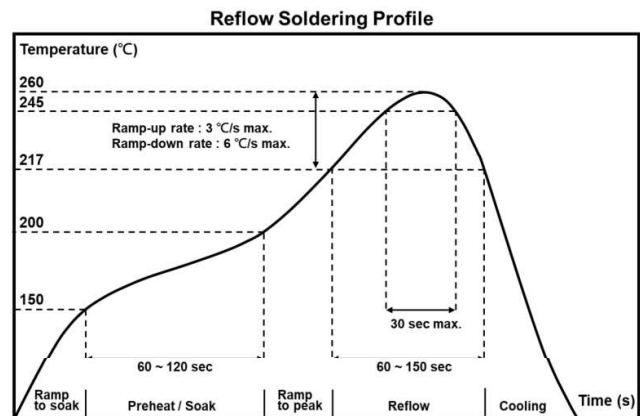
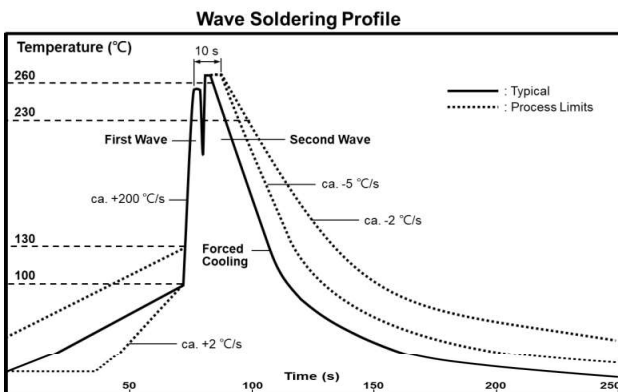


0508 : No marking



0612 ~ 1225 : 4 digits

■ **SOLDERING PROFILE**



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

■ Recommended reflow methods

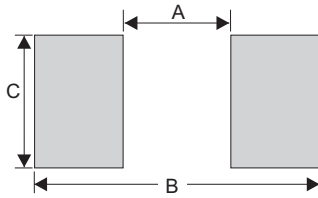
IR, vapor phase oven, hot air oven

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

■ **STORAGE DATA :**

Storage time at the environment temperature: 25±5°C & humidity : 60±20% is valid for one year from the date of delivery.

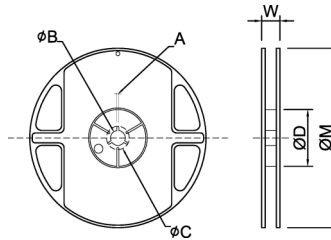
■ **RECOMMEND LAND PATTERN DESIGN** : Dimension (unit: mm)



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

Size	A	B	C
STANDARD TYPE			
0201	0.25	0.85	0.35
0402	0.50	1.60	0.70
0603	0.80	2.40	1.00
0805	1.30	2.90	1.45
1206	2.20	4.20	1.80
1210	2.00	4.40	2.70
2010	3.80	6.60	2.70
2512	4.90	8.10	3.40
WIDE TERMINAL & OTHERS			
1206L	1.20	4.80	1.84
0508	0.40	1.80	2.00
0612	0.50	2.60	3.20
1020	1.00	4.05	5.50
1225	1.20	5.20	7.00

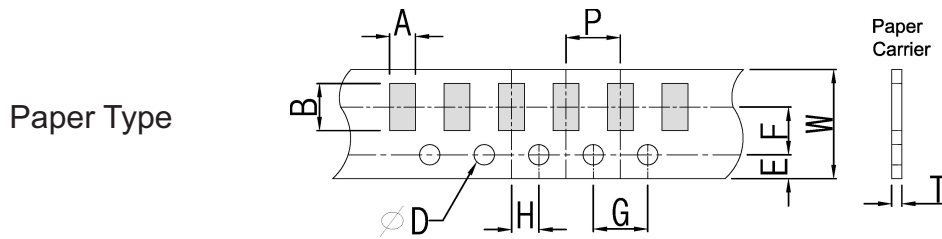
■ **PACKING DIMENSION** (mm)



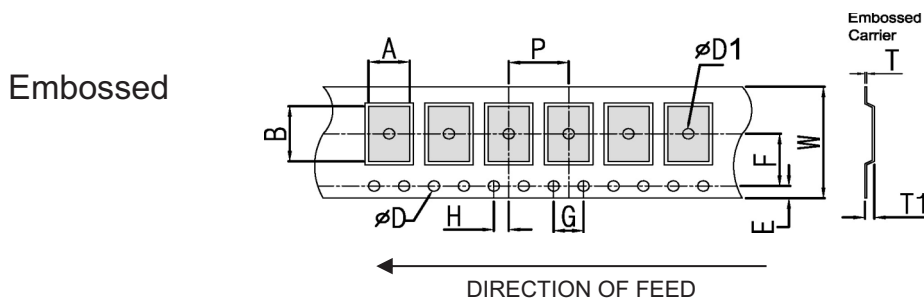
Tape & Reel

Size	Reel		A	B	C	D	W	M
0201	7"	10K/Reel	2.0±0.5	13.5±1.0	21±1.0	60.0±1.0	11.5±2.0	178±2.0
0402	7"	10K/Reel	2.0±0.5	13.5±1.0	21±1.0	60.0±1.0	11.5±2.0	178±2.0
0603	7"	5K/Reel	2.0±0.5	13.5±1.0	21±1.0	60.0±1.0	11.5±2.0	178±2.0
0805	7"	5K/Reel	2.0±0.5	13.5±1.0	21±1.0	60.0±1.0	11.5±2.0	178±2.0
1206	7"	5K/Reel	2.0±0.5	13.5±1.0	21±1.0	60.0±1.0	11.5±2.0	178±2.0
1210	7"	5K/Reel	2.0±0.5	13.5±1.0	21±1.0	60.0±1.0	11.5±2.0	178±2.0
2010	7"	4K/Reel	2.0±0.5	13.5±1.0	21±1.0	60.0±1.0	16.0±2.0	178±2.0
2512	7"	4K/Reel	2.0±0.5	13.5±1.0	21±1.0	60.0±1.0	16.0±2.0	178±2.0
0508	7"	5K/Reel	2.0±0.5	13.5±1.0	21±1.0	60.0±1.0	11.5±2.0	178±2.0
0612	7"	5K/Reel	2.0±0.5	13.5±1.0	21±1.0	60.0±1.0	11.5±2.0	178±2.0
1020	7"	4K/Reel	2.0±0.5	13.5±1.0	21±1.0	60.0±1.0	16.0±2.0	178±2.0
1225	7"	4K/Reel	2.0±0.5	13.5±1.0	21±1.0	60.0±1.0	16.0±2.0	178±2.0

■ **PACKING DIMENSION** (mm) ... continue



Size	A	B	W	E	F	G	H	T	D	P
0201	0.45±0.1	0.75±0.1	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	2.0±0.5	0.35±0.1	1.50 ^{+0.1} ₋₀	2.0±0.1
0402	0.7±0.1	1.20±0.1	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	2.0±0.5	0.35±0.1		2.0±0.1
0603	1.05±0.2	1.80±0.2	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	2.0±0.5	0.35±0.1		4.0±0.1
0805	1.55±0.2	2.30±0.2	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	2.0±0.5	0.35±0.1		4.0±0.1
1206	1.90±0.2	3.05±0.2	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	2.0±0.5	0.35±0.1		4.0±0.1
1210	2.85±0.2	3.05±0.2	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	2.0±0.5	0.35±0.1		4.0±0.1
0508	1.50±0.15	2.25±0.15	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	2.0±0.5	0.35±0.1		4.0±0.1
0612	2.85±0.2	3.05±0.2	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	2.0±0.5	0.35±0.1		4.0±0.1



Size	A	B	W	E	F	G	H	T	D	D1	T1	P
2010	2.80±0.2	5.60±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}	1.50±0.1	0.85±0.15	4.0±0.1
2512	3.40±0.2	6.40±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	2.80±0.2	5.60±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	3.40±0.2	6.40±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