

SMD Type Power Inductors

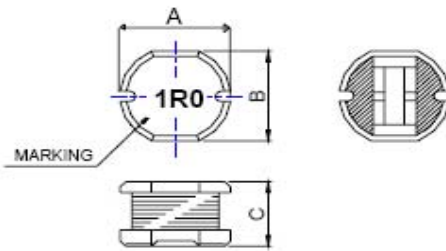
TP0403-SERIES

1. Features

1. Excellent solderability and high heat resistance.
2. Excellent terminal strength construction.
3. Packed in embossed carrier tape and can be used by automatic mounting machine.
4. The products contain no lead and also support lead-free soldering.



2. Dimension



Size	A(mm)	B(mm)	C(mm)
TP0403	4.50±0.3	4.00±0.3	3.20±0.3

Unit: mm

3. Part Numbering

TP
0403
-
1R0
M

A B C D

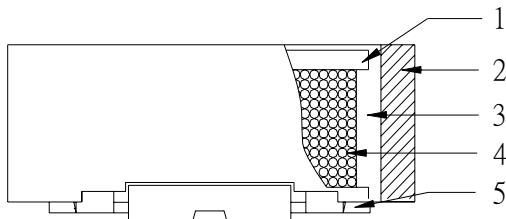
A: Series
 B: Dimension AxC
 C: Inductance 1R0=1.0uH
 D: Inductance Tolerance K=±10%,m=±20%

4. Specification

BULLWILL Part Number	Inductance (uH)		DCR (Ω) max.	Rated Current (A) max.
	Tolerance	Test Frequency (Hz)		
TP0403-1R0M	1.0±20%	1V/7.96M	0.03	4.0
TP0403-1R4M	1.4±20%	1V/7.96M	0.04	3.5
TP0403-1R8M	1.8±20%	1V/7.96M	0.05	3.0
TP0403-2R2M	2.2±20%	1V/7.96M	0.06	2.6
TP0403-2R7M	2.7±20%	1V/7.96M	0.06	2.2
TP0403-3R3M	3.3±20%	1V/7.96M	0.07	2.0
TP0403-3R9M	3.9±20%	1V/7.96M	0.07	2.0
TP0403-4R7M	4.7±20%	1V/7.96M	0.08	1.9
TP0403-5R6M	5.6±20%	1V/7.96M	0.12	1.8

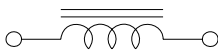
BULLWILL Part Number	Inductance (uH)		DCR (Ω) max	Rated Current (A) max..
	Tolerance	Test Frequency (Hz)		
TP0403-6R8M	6.8±20%	1V/7.96M	0.14	1.6
TP0403-8R2M	8.2±20%	1V/7.96M	0.15	1.4
TP0403-100M	10 ±20%	1V/2.52M	0.19	1.1
TP0403-120M	12 ±20%	1V/2.52M	0.21	1.1
TP0403-150M	15±20%	1V/2.52M	0.25	1.0
TP0403-180M	18±20%	1V/2.52M	0.3	1.0
TP0403-220M,	22±20%	1V/2.52M	0.35	0.80
TP0403-270M	27±20%	1V/2.52M	0.45	0.75
TP0403-330M	33±20%	1V/2.52M	0.6	0.70
TP0403-390M	39±20%	1V/2.52M	0.7	0.65
TP0403-470M	47±20%	1V/2.52M	0.8	0.60
TP0403-560M	56±20%	1V/2.52M	0.85	0.55
TP0403-680M	68±20%	1V/2.52M	1	0.50
TP0403-820M	82±20%	1V/2.52M	1.1	0.46
TP0403-101M	100±20%	1V/1K	1.2	0.22
TP0403-121M	120±20%	1V/1K	1.6	0.20
TP0403-151M	150±20%	1V/1K	2	0.20
TP0403-181M	180±20%	1V/1K	3	0.20
TP0403-221M	220±20%	1V/1K	3	0.20
TP0403-271M	270±20%	1V/1K	4	0.16
TP0403-331M	330±20%	1V/1K	4	0.14
TP0403-391M	390±20%	1V/1K	5	0.12
TP0403-471M	470±20%	1V/1K	6	0.12
TP0403-561M	560±20%	1V/1K	7	0.10

5.Material List



NO	ITEM	MATERIAL
1	CORE	FERRITE CORE (DR TYPE)
2	CORE	FERRITE CORE (RI TYPE)
3	GLUE	G500
4	WIRE	ENAMELLED COPPER WIRE
5	CLIP	SM212-032ET2N

6. Schematic Diagram



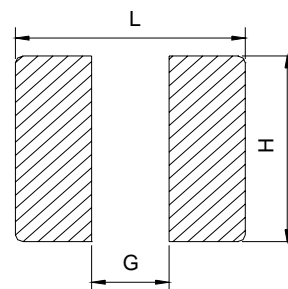
5. Reliability and Test Condition

Item	Performance	Test Condition
Solderability	More than 90% of the terminal electrode shall be covered with fresh solder.	Preheat : 150±25°C for 60 secs Solder : Sn/Ag/Cu(Lead-Free Solder) Solder Temp.:260±5°C Flux : Rosin Dip Time : 4±1 secs
Thermal Shock Test (Temp. Cycle)	Inductance shall not change more than ±20%	ROOM TEMP. → -25±2°C 15 MINUTES → 30 MINUTES
Humidity Resistance Test		ROOM TEMP. → 85±2°C 15 MINUTES → 30 MINUTES
High Temperature Resistance Test		Temperature : 40±2°C Humidity : 90~95% Applied Current : per spec. Time : 500 hrs
		Temperature : 85±2°C Applied Current : per spec. Time : 500 hrs

6. Soldering and Mounting

6-1. Recommended PC Board Pattern

Chip size	Land Patterns For Reflow Soldering		
	L(mm)	G(mm)	H(mm)
TP0302	3.7	1.1	3.3
TP0403	5	1.5	4.5
TP0502	6	1.7	5.5
TP0504	6	1.7	5.5
TP0703	8	2.0	7.5
TP0705	8	2.0	7.5
TP1004	10	2.5	9.5
TP1005	10	2.5	9.5



PC board should be designed so that products are not sufficient under mechanical stress as warping the board. Products shall be positioned in the sideway direction against the mechanical stress to prevent failure.

6-2. Soldering

Mildly activated rosin fluxes are preferred. The minimum amount of solder can lead to damage from the stresses caused by the difference in coefficients of expansion between solder, chip and substrate. BULLWILL terminations are suitable for all wave and re-flow soldering systems. If hand soldering cannot be avoided, the preferred technique is the utilization of hot air soldering tools.

6-2.1 Solder re-flow:

Recommended temperature profiles for re-flow soldering in Figure 1.

6-2.2 Solder Wave:

Wave soldering is perhaps the most rigorous of surface mount soldering processes due to the steep rise in temperature seen by the circuit when immersed in the molten solder wave , typical at 250°C . Due to the risk of thermal damage to products, wave soldering of large size products is discouraged. Recommended temperature profile for wave soldering is shown in Figure 2.

6-2.3 Soldering Iron(Figure 3):

Products attachment with a soldering iron is discouraged due to the inherent process control limitations. In the event that a soldering iron must be employed the following precautions are recommended.

- Note : • Preheat circuit and products to 150°C
- 280°C tip temperature (max)
- Never contact the ceramic with the iron tip
- 1.0mm tip diameter (max)
- Use a 20 watt soldering iron with tip diameter of 1.0mm
- Limit soldering time to 3 sec.

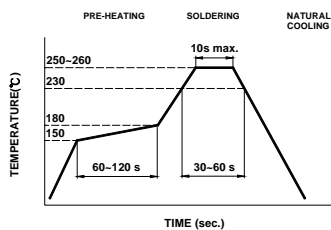


Figure 1. Re-flow Soldering(Lead Free)

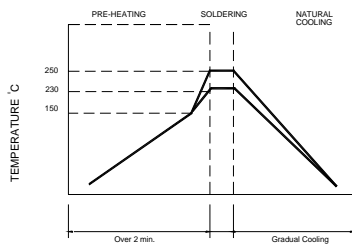


Figure 2. Wave Soldering

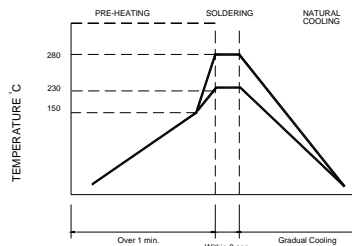
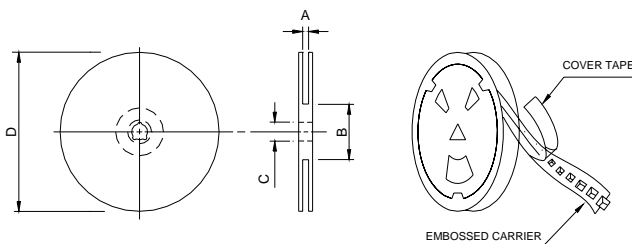


Figure 3. Hand Soldering

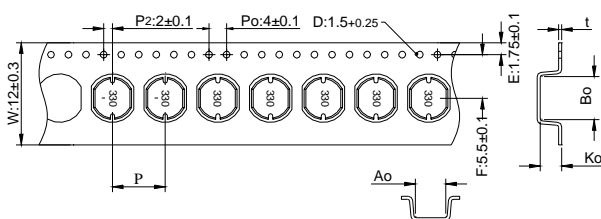
7. Packaging Information

7-1. Reel Dimension



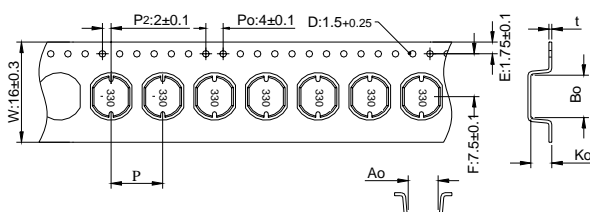
Type	A(mm)	B(mm)	C(mm)	D(mm)
13"x12mm	12.5±0.1	100±1	13±0.5	330
13"x16mm	16.5±0.1	100±1	13±0.5	330
13"x24mm	24.5±0.1	100±1	13±0.5	330

7-2.1 Tape Dimension / 12mm



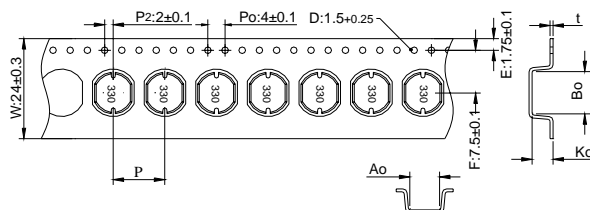
Size	Bo(mm)	Ao(mm)	Ko(mm)	P(mm)	t(mm)
0302	3.7±0.1	3.2±0.1	2.3±0.1	8.0±0.1	0.35±0.05
0403	4.6±0.1	4.1±0.1	3.6±0.1	8.0±0.1	0.40±0.05
0502	6.0±0.1	5.4±0.1	2.3±0.1	8.0±0.1	0.35±0.05
0504	6.1±0.1	5.3±0.1	4.8±0.1	8.0±0.1	0.40±0.05

7-2.2 Tape Dimension / 16mm



Size	Bo(mm)	Ao(mm)	Ko(mm)	P(mm)	t(mm)
0703	8.1±0.1	7.3±0.1	4.0±0.1	12.0±0.1	0.40±0.05
0705	8.1±0.1	7.3±0.1	5.3±0.1	12.0±0.1	0.40±0.05

7-2.3 Tape Dimension / 24mm

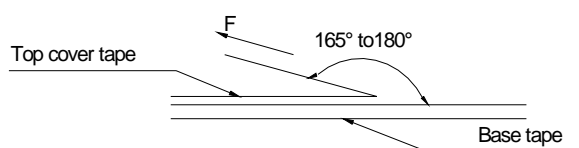


Size	Bo(mm)	Ao(mm)	Ko(mm)	P(mm)	t(mm)
1004	10.3±0.1	9.3±0.1	4.5±0.1	16.0±0.1	0.40±0.05
1005	10.3±0.1	9.3±0.1	6.1±0.1	16.0±0.1	0.40±0.05

7-3. Packaging Quantity

Size	1005	1004	0705	0703	0504	0502	0403	0302
Chip / Reel	500	500	1000	1000	1500	3000	2000	3000
Inner box	1500	1500	4000	4000	4500	9000	6000	9000
Carton	3000	3000	8000.	8000	18000	36000	24000	36000

7-4. Tearing Off Force



The force for tearing off cover tape is 12 to 130 grams in the arrow direction under the following conditions.

Room Temp. (°C)	Room Humidity (%)	Room atm (hPa)	Tearing Speed mm/min
5~35	45~85	860~1060	300

Application Notice

• Storage Conditions

To maintain the solderability of terminal electrodes:

1. Temperature and humidity conditions: Less than 40°C and 70% RH.
2. Recommended products should be used within 6 months from the time of delivery.
3. The packaging material should be kept where no chlorine or sulfur exists in the air.

• Transportation

1. Products should be handled with care to avoid damage or contamination from perspiration and skin oils.
2. The use of tweezers or vacuum pick up is strongly recommended for individual components.
3. Bulk handling should ensure that abrasion and mechanical shock are minimized.