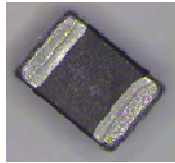
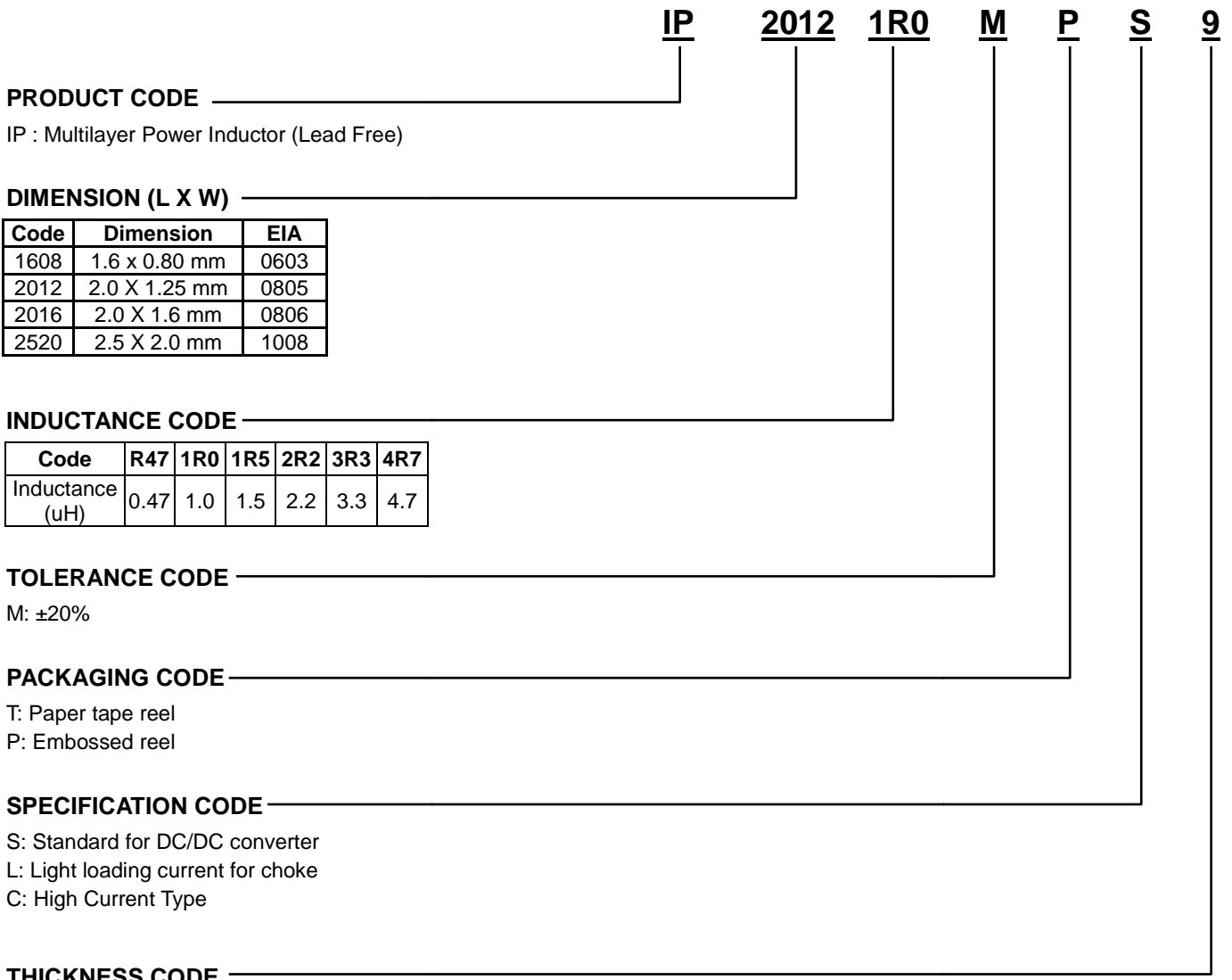


Multi-Layer Power Inductors (IP Series)



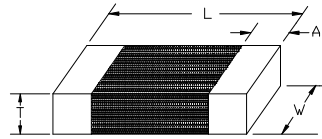
ORDERING CODE 1
 Standard External Dimensions.....2
 Power Inductor for Choke (L Type)3
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 Testing Condition & Requirements (IP Series) 7
 Packaging Specification 10
 Cautions..... 12

ORDERING CODE



Code	5	7	8	9	B	C
Thickness (mm)	0.5	0.7	0.8	0.9	1.1	1.2

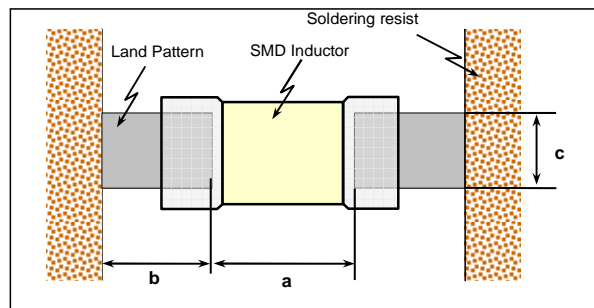
Standard External Dimensions



Unit: mm

Series	L	W	T	A (Min/Max)
IP1608 (0603)	1.6±0.15	0.8±0.15	0.95 max	0.1/0.5
IP2012 (0805)	2.0±0.2	1.25±0.2	0.55 max	0.20/0.80
IP2012 (0805)	2.0±0.2	1.25±0.2	1.0 max	0.20/0.80
IP2016 (0806)	2.0±0.2	1.6±0.2	1.0 max	0.20/0.80
IP2520 (1008)	2.5±0.2	2.0±0.2	1.0 max	0.20/0.80

Recommended Pad Dimensions



Size mm (EIA)	L x W (mm)	a (mm)	b (mm)	c (mm)
1608 (0603)	1.6 x 0.8	0.8 to 1.0	0.6 to 0.8	0.6 to 0.8
2012 (0805)	2.0 x 1.25	0.8 to 1.2	0.8 to 1.2	0.9 to 1.6
2016 (0806)	2.0 x 1.6	0.8 to 1.2	0.8 to 1.2	0.9 to 1.6
2520 (1008)	2.5 x 2.0	1.0 to 1.4	0.6 to 1.0	1.8 to 2.2

Unit: mm/(inch)

Power Inductor for Choke (L Type)

■ Feature

1. Ferrite core and magnetic shielding enables the design of compact circuits with higher mounting density
2. Multilayer block structure yields higher reliability.
3. Low DC resistance
4. RoHS complaint

■ Application

1. Separation of analog and digital circuits
2. Prevents interference between PLL and the other digital circuits

■ Part Numbers & Characteristic

● IP2012_L Series (EIA 0805)

Ordering Code	Inductance [uH]	Inductance Tolerance	Measuring frequency [MHz]	DC Resistance [Ω]		Rated Current [A]	Saturation Current [A]	SRF (MHz)	Thickness [mm] (max.)	Packing
				(max)	(typ.)					
IP20122R2MPL9	2.20	±20%	1	0.32	0.25	0.80	0.30	50	0.90±0.10	7" Embossed 3 kpcs
IP20124R7MPL9	4.70	±20%	1	0.32	0.25	0.80	0.20	30		
IP2012100MPLC	10.0	±20%	1	0.65	0.55	0.48	0.10	20	1.25±0.20	7" Embossed 2 kpcs

※Rated current specifies that self-heat generation is below 40℃ during DC loaded (at 20℃)

※Saturated current specifies that inductance drop is below 50% during DC loaded (at 20℃)

Power Inductor for DC/DC converter (S Type)

■ Feature

1. Small and light weight
2. Low DC resistance
3. RoHS complaint

■ Application

DC/DC converter for the Mobile equipment; Mobile Phone, DSC, WLAN

■ Part Numbers & Characteristic

● IP1608 (0603)

Type	Ordering Code	Inductance [uH]	Inductance Tolerance	Measuring frequency [MHz]	DC Resistance [Ω]	Rated Current [A] (max.)	Saturation Current [A] (Typ.)	Thickness [mm]	Packing
Standard	IP1608R33MTS8	0.33	±20%	1	0.270±25%	0.35	1.10	0.80±0.15	7" Paper 4kpcs
	IP1608R50MTS8	0.50			0.120±25%	0.90	0.80		
	IP16081R0MTS8	1.00			0.170±25%	0.75	0.50		
	IP16082R2MTS8	2.20			0.270±25%	0.75	0.25		
High Current	IP16084R7MTC8	4.7			0.440±25%	0.62	0.01		

● IP2012 (EIA 0805)

Type	Ordering Code	Inductance [uH]	Inductance Tolerance	Measuring frequency [MHz]	DC Resistance [Ω]	Rated Current [A] (max.)	Saturation Current [A] (Typ.)	Thickness [mm]	Packing
Low Profile	IP2012R47MTS5	0.47	±20%	1	0.120±25%	1.10	0.90	0.50±0.05	7" Paper 4kpcs
	IP20121R0MTS5	1.0			0.190±25%	0.90	0.70		
	IP20122R2MTS5	2.2			0.340±25%	0.60	0.35		
Standard	IP2012R47MPS9	0.47	±20%	1	0.090±25%	1.20	1.20	0.90±0.10	7" Embossed 3 kpcs
	IP20121R0MPS9	1.0			0.110±25%	1.00	1.10		
	IP20121R5MPS9	1.5			0.130±25%	0.95	0.90		
	IP20122R2MPS9	2.2			0.170±25%	0.95	0.45		
	IP20123R3MPS9	3.3			0.190±25%	0.80	0.30		
	IP20124R7MPS9	4.7			0.230±25%	0.80	0.18		
High Current	IP20121R0MPC9	1.0	±20%	1	0.080±25%	1.70	1.50	0.90±0.10	7" Embossed 3 kpcs
	IP20122R2MPC9	2.2		1	0.125±25%	1.30	0.70		

● IP2016 (EIA 0806)

Type	Ordering Code	Inductance [uH]	Inductance Tolerance	Measuring frequency [MHz]	DC Resistance [Ω]	Rated Current [A] (max.)	Saturation Current [A] (Typ.)	Thickness [mm]	Packing
Standard	IP2016R47MPS9	0.47	±20%	1	0.070±25%	1.60	1.20	0.90±0.10	7" Embossed 3 kpcs
	IP20161R0MPS9	1.00			0.110±25%	1.30	1.10		
	IP20161R5MPS9	1.50			0.120±25%	1.20	0.80		
	IP20162R2MPS9	2.20			0.130±25%	1.20	0.55		
	IP20163R3MPS9	3.30			0.150±25%	1.10	0.30		
	IP20164R7MPS9	4.70			0.180±25%	0.90	0.15		
High Current	IP2016R24MPC9	0.24	±20%	1	0.020±25%	3.40	5.00	0.90±0.10	7" Embossed 3 kpcs

● IP2520 (EIA 1008)

Type	Ordering Code	Inductance [uH]	Inductance Tolerance	Measuring frequency [MHz]	DC Resistance [Ω]	Rated Current [A] (max.)	Saturation Current [A]		Thickness [mm]	Packing
							Typ.	Max.		
Standard	IP2520R47MPS9	0.47	±20%	1	0.040±25%	1.80	1.60	1.28	0.90±0.10	7" mbossed 3 kpcs
	IP25201R0MPS9	1.00			0.060±25%	1.60	1.20	0.96		
	IP25201R5MPS9	1.50			0.070±25%	1.50	0.80	0.64		
	IP25202R2MPS9	2.20			0.090±25%	1.30	0.70	0.56		
	IP25203R3MPS9	3.30			0.090±25%	1.20	0.30	0.24		
	IP25204R7MPS9	4.70			0.130±25%	1.10	0.30	0.24		

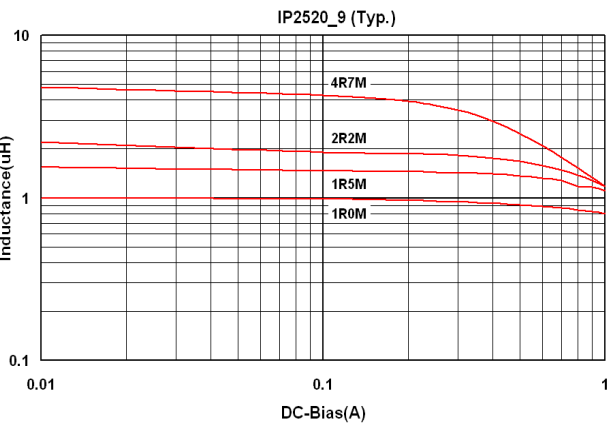
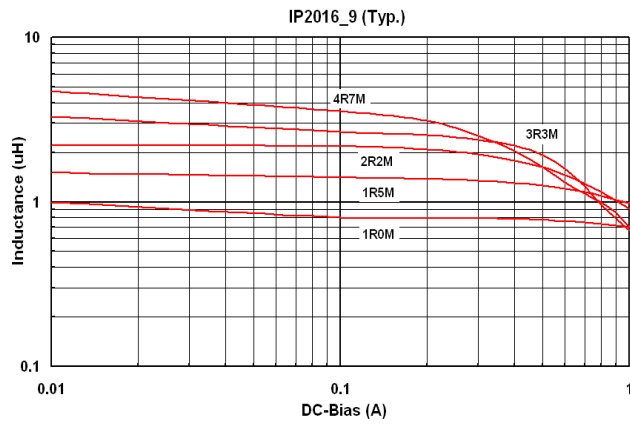
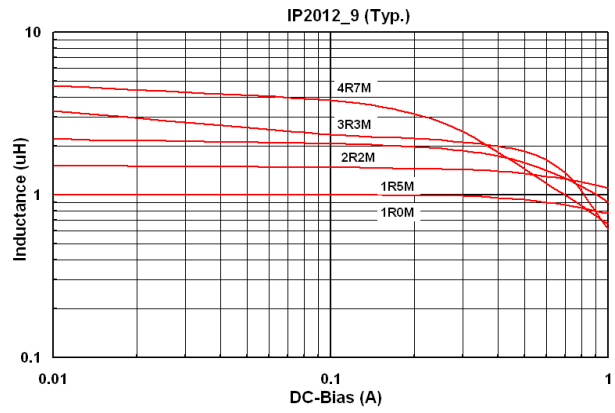
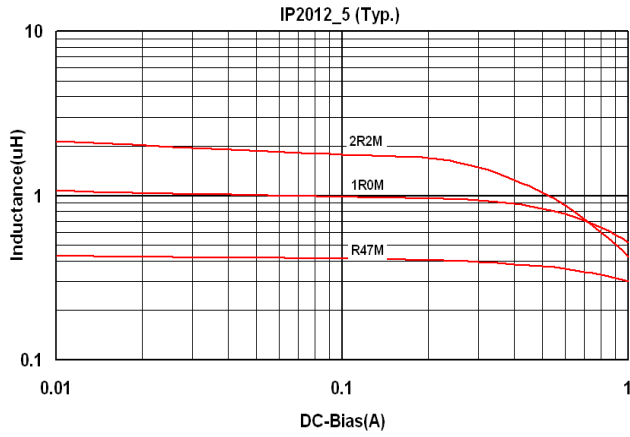
※Rated current specifies that self-heat generation is below 40°C during DC loaded (at 20°C)

※Saturated current specifies that inductance drop is below 30% during DC loaded (at 20°C)

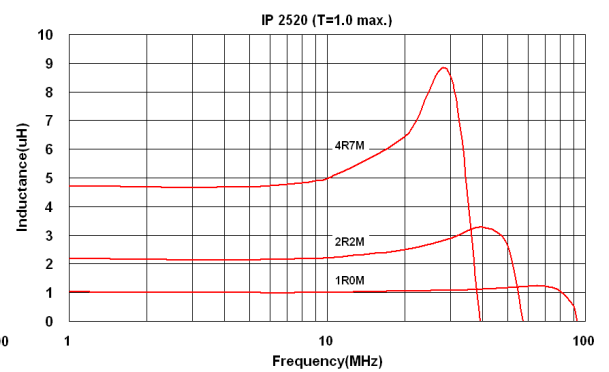
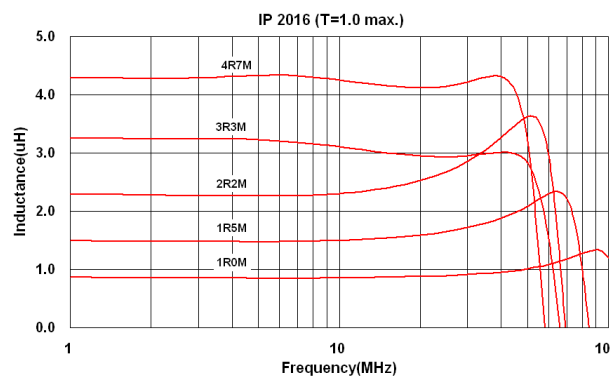
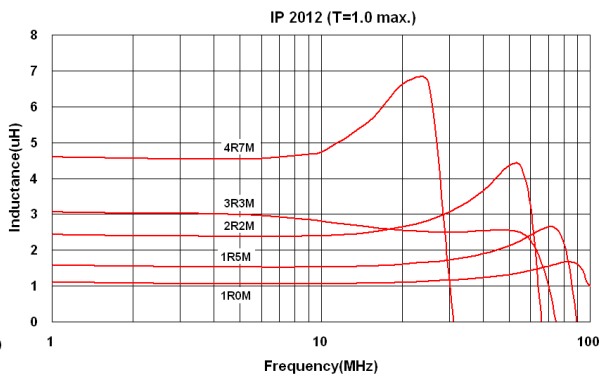
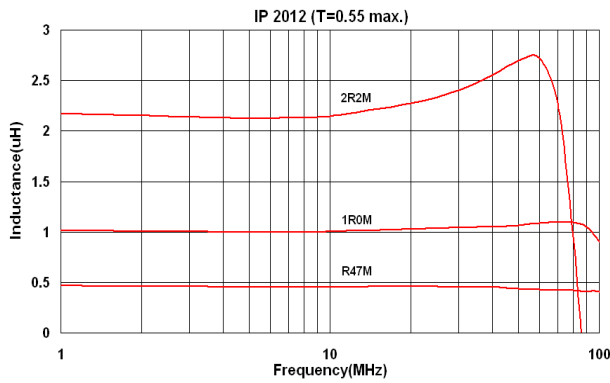
※Operating temperature range from -55°C to 125°C.

Electric Properties

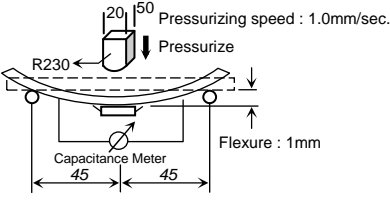
DC Bias characteristics



Inductance vs Frequency



Testing Condition & Requirements (IP Series)

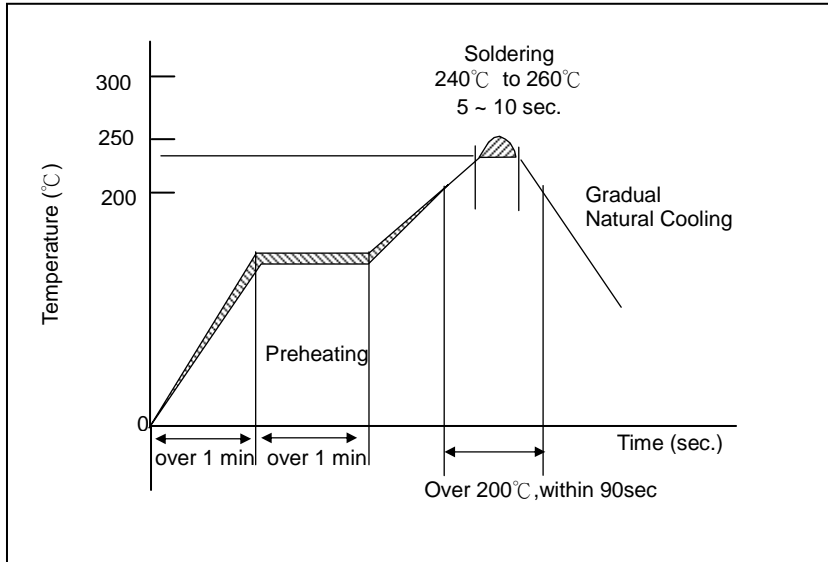
No.	Item	Test Condition	Requirements
1	Appearance	Inductors shall be visually inspected for visible evidence of defect.	No harmful defect for piratical use.
2	Inductance	a. Temperature: 25+/- 3°C b. Relative Humidity: 45 to 75%RH c. Measuring equipment:HP4286A · HP4287A Measuring Jig: HP42851-61100	Within specified tolerance.
3	DC Resistance	Measuring instrument: HP4338B · HIOKI IM-3570	In accordance with electrical specification.
4	Dimension	Dimension shall be measured with caliper or micrometer	In accordance with dimension specification.
5	Solder-ability	Immerse a test sample into a methanol solution containing rosin and immerse into SAC305(Sn96.5Ag3.0Cu0.5) solder of 245±5°C for 3±1 seconds.	90% of the termination is to be soldered evenly and continuously.
6	Resistance to Soldering Heat	Immerse a test sample into a methanol solution containing resin, preheat it at 150 to 180°C for 2~3 minutes and immerse into molten solder of 260+/-5°C for 10+/-1 second so that both terminal electrodes are completely submerged. After this test samples shall be taken out and measured after kept at room temperature for 2 to 3 hours.	No visible damage Remained terminal electrode : 70% min. Inductance variation within 30%
7	Bending Strength	Solder the chip to test jig then apply a force in the direction shown in below. The soldering shall be done with the reflow method and shall be conducted with care so that the soldering is uniform and free of defects such as heat shock. 	No mechanical damage shall be observed.
8	Thermal Shock	Solder a test sample to printed circuit board, and conduct 5 cycles of test under the conditions shown as below. Condition for 1 cycle Step1:-55+0 / -2°C 30±3 min. Step2: Room temperature within 2 to 3 min. Step3:+125 +2 / -0°C 30±3 min. Measured at room temperature after placing for 2 to 3 hrs.	No visible damage Inductance variation within 30%

No.	Item	Test Condition	Requirements
9	High Humidity State Life Test	<p>Keep a test sample in an atmosphere with a temperature of $40\pm 2^{\circ}\text{C}$, 90~95%RH for 500 +24/-0 hours.</p> <p>After the removal from test chamber, 2 to 3 hours of recovery under standard condition, and measurement shall be made after 24 ± 2 hrs of recovery under standard condition.</p>	<p>No visible damage. Inductance variation within 30%.</p>
10	High Humidity Load Life Test	<p>Solder a test sample to printed circuit board then keep the test sample in an atmosphere with a temperature of $40\pm 2^{\circ}\text{C}$, 90~95%RH for 500+24/-0 hours while supplying the rated current.</p> <p>After the removal from test chamber, 2 to 3 hours of recovery under standard condition, and measurement shall be made after 24 ± 2 hrs of recovery under standard condition.</p>	<p>No visible damage. Inductance variation within 30%.</p>
11	High Temperature State Life Test	<p>Keep a test sample in an atmosphere with a temperature of $85\pm 2^{\circ}\text{C}$ for 500+24/-0 hours. After the removal from test chamber, 2 to 3 hours of recovery under standard condition, and measurement shall be made after 24 ± 2 hrs of recovery under standard condition.</p>	<p>No visible damage. Inductance variation within 30%.</p>
12	High Temperature Load	<p>Solder a test sample to printed circuit board then keep the test sample in an atmosphere with a temperature of $85\pm 2^{\circ}\text{C}$ for 500+24/-0 hours while supplying the rated current.</p> <p>After the removal from test chamber, 2 to 3 hours of recovery under standard condition, and measurement shall be made after 24 ± 2 hrs of recovery under standard condition.</p>	<p>No visible damage. Inductance variation within 30%.</p>

Reflow Profile Chart (Reference)

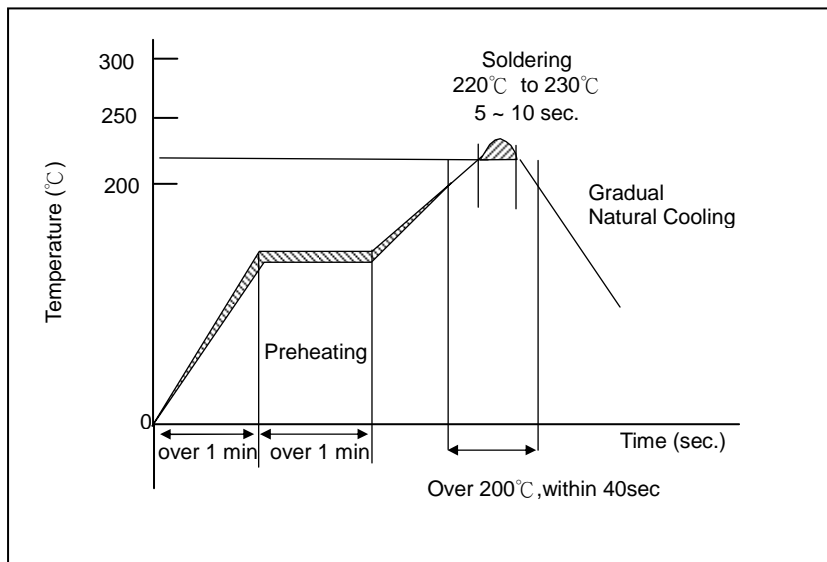
● **Soldering Profile for SMT Process with Lead Free Solder Paste.**

The rate of preheat should not exceed 4°C/sec and a target of 2°C/sec is preferred. Ceramic chip components should be preheated to within 100 to 130 °C of the soldering.



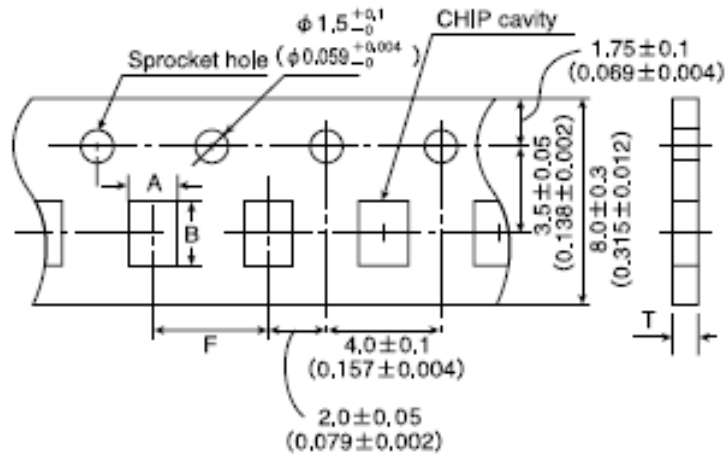
● **Soldering Profile for SMT Process with SnPb Solder Paste.**

The rate of preheat should not exceed 4°C/sec and a target of 2°C/sec is preferred. Ceramic chip components should be preheated to within 100 to 130 °C of the soldering.



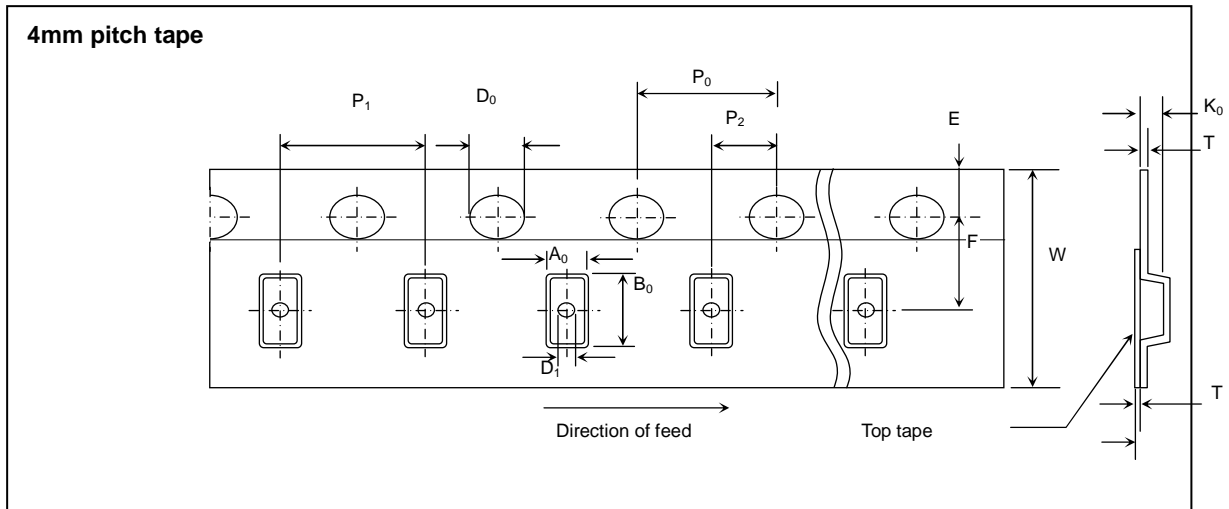
Packaging Specification

- Paper Tape



	Symbol	Product Size Code			
		0603(0201)	1005(0402)	1608(0603)	2012(0805)
		(mm)	(mm)	(mm)	(mm)
Chip cavity	A	0.38 ± 0.02	0.62 ± 0.03	1.0 ± 0.2	1.5 ± 0.2
	B	0.68 ± 0.02	1.12 ± 0.03	1.8 ± 0.2	2.3 ± 0.2
Insertion Pitch	F	2 ± 0.1	2 ± 0.1	4.0 ± 0.1	4.0 ± 0.1
Tape Thickness	T	1.1 max	1.1 max	1.1 max	0.8 max

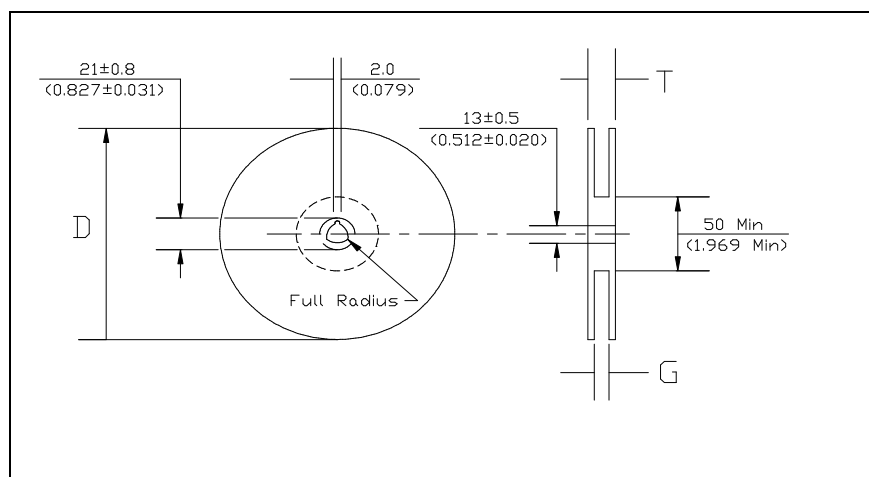
● Embossed Tape



Symbol	2012 (0805)	2016 (0806)	2520 (1008)
P₁	4±0.1	4±0.1	4±0.1
P₀	4±0.1	4±0.1	4±0.1
P₂	2±0.05	2±0.05	2±0.05
A₀	1.55±0.2	1.8±0.1	2.3±0.1
B₀	2.3±0.2	2.2±0.1	2.8±0.1
K₀	1.3±0.1	1.3±0.1	1.4±0.1
W	8±0.3	8±0.3	8±0.3
E	1.75±0.1	1.75±0.1	1.75±0.1
F	3.5±0.05	3.5±0.05	3.5±0.05
D₀	1.5 (+0.1/-0.0)	1.5 (+0.1/-0.0)	1.5 (+0.1/-0.0)
T	0.3 max	0.3 max	0.3 max

Unit: mm/(inch)

● Reel Specifications

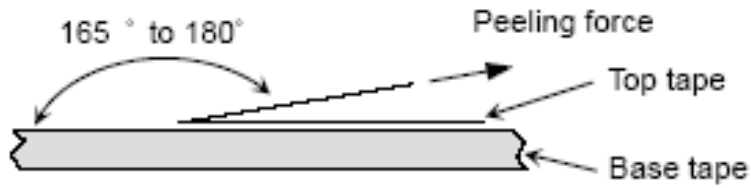


Tape Width (mm)	G (mm)	T max.(mm)	D (mm)
8	10.0±1.5	14.5	178±2.0

● Peel Strength of Top Cover Tape

The peel speed shall be about 300 mm/min.

The peel strength of top cover tape shall be between 0.1 to 1.0N.



Cautions

● Storage

1. The inductor shall be packaged in carrier tapes.
2. To keep storage place temperature from +5 to 35°C, humidity from 45 to 70% RH.
3. The storage atmosphere must be free of gas containing sulfur and chlorine. Also, avoid exposing the product to saline moisture. If the product is exposed to such atmospheres, the terminals will oxidize and solderability will be affected.
4. The solder ability is assured for 12 months from our final inspection date if the above storage condition is followed.

● Handling

Inductor should be handled with care to avoid contamination or damage. The use of vacuum pick-up or plastic tweezers is recommended for manual placement. Tape and reeled packages are suitable for automatic pick and placement machine.