Notice for TAIYO YUDEN products

Please read this notice before using the TAIYO YUDEN products.

⚠ REMINDERS

Product Information in this Catalog

Product information in this catalog is as of October 2019. All of the contents specified herein and production status of the products listed in this catalog are subject to change without notice due to technical improvement of our products, etc. Therefore, please check for the latest information carefully before practical application or use of our products.

Please note that TAIYO YUDEN shall not be in any way responsible for any damages and defects in products or equipment incorporating our products, which are caused under the conditions other than those specified in this catalog or individual product specification sheets.

Approval of Product Specifications

Please contact TAIYO YUDEN for further details of product specifications as the individual product specification sheets are available. When using our products, please be sure to approve our product specifications or make a written agreement on the product specification with TAIYO YUDEN in advance.

Pre-Evaluation in the Actual Equipment and Conditions

Please conduct validation and verification of our products in actual conditions of mounting and operating environment before using our products.

Limited Application

1. Equipment Intended for Use

The products listed in this catalog are intended for general-purpose and standard use in general electronic equipment (e.g., AV equipment, OA equipment, home electric appliances, office equipment, information and communication equipment including, without limitation, mobile phone, and PC) and other equipment specified in this catalog or the individual product specification sheets.

TAIYO YUDEN has the line-up of the products intended for use in automotive electronic equipment, telecommunications infrastructure and industrial equipment, or medical devices classified as GHTF Classes A to C (Japan Classes I to III). Therefore, when using our products for these equipment, please check available applications specified in this catalog or the individual product specification sheets and use the corresponding products.

2. Equipment Requiring Inquiry

Please be sure to contact TAIYO YUDEN for further information before using the products listed in this catalog for the following equipment (excluding intended equipment as specified in this catalog or the individual product specification sheets) which may cause loss of human life, bodily injury, serious property damage and/or serious public impact due to a failure or defect of the products and/or malfunction attributed thereto.

(1) Transportation equipment (automotive powertrain control system, train control system, and ship control system, etc.)
(2) Traffic signal equipment
(3) Disaster prevention equipment, crime prevention equipment
(4) Medical devices classified as GHTF Class C (Japan Class III)
(5) Highly public information network equipment, data-processing equipment (telephone exchange, and base station, etc.)
(6) Any other equipment requiring high levels of quality and/or reliability equal to the equipment listed above

3. Equipment Prohibited for Use

Please do not incorporate our products into the following equipment requiring extremely high levels of safety and/or reliability.

(1) Aerospace equipment (artificial satellite, rocket, etc.)
(2) Aviation equipment *1
(3) Medical devices classified as GHTF Class D (Japan Class IV), implantable medical devices *2
(4) Power generation control equipment (nuclear power, hydroelectric power, thermal power plant control system, etc.)
(5) Undersea equipment (submarine repeating equipment, underwater work equipment, etc.)
(6) Military equipment
(7) Any other equipment requiring extremely high levels of safety and/or reliability equal to the equipment listed above

*Notes:

1. There is a possibility that our products can be used only for aviation equipment that does not directly affect the safe operation of aircraft (e.g., in-flight entertainment, cabin light, electric seat, cooking equipment) if such use meets requirements specified separately by TAIYO YUDEN. Please be sure to contact TAIYO YUDEN for further information before using our products for such aviation equipment.
2. Implantable medical devices contain not only internal unit which is implanted in a body, but also external unit which is connected to the internal unit.

4. Limitation of Liability

Please note that unless you obtain prior written consent of TAIYO YUDEN, TAIYO YUDEN shall not be in any way responsible for any damages incurred by you or third parties arising from use of the products listed in this catalog for any equipment that is not intended for use by TAIYO YUDEN, or any equipment requiring inquiry to TAIYO YUDEN or prohibited for use by TAIYO YUDEN as described above.

Safety Design

When using our products for high safety and/or reliability-required equipment or circuits, please fully perform safety and/or reliability evaluation. In addition, please install (i) systems equipped with a protection circuit and a protection device and/or (ii) systems equipped with a redundant circuit or other system to prevent an unsafe status in the event of a single fault for a failsafe design to ensure safety.

Intellectual Property Rights

Information contained in this catalog is intended to convey examples of typical performances and/or applications of our products and is not intended to make any warranty with respect to the intellectual property rights or any other related rights of TAIYO YUDEN or any third parties nor grant any license under such rights.

Limited Warranty

Please note that the scope of warranty for our products is limited to the delivered our products themselves and TAIYO YUDEN shall not be in any way responsible for any damages resulting from a failure or defect in our products. Notwithstanding the foregoing, if there is a written agreement (e.g., supply and purchase agreement, quality assurance agreement) signed by TAIYO YUDEN and your company, TAIYO YUDEN will warrant our products in accordance with such agreement.

TAIYO YUDEN's Official Sales Channel

The contents of this catalog are applicable to our products which are purchased from our sales offices or authorized distributors (hereinafter "TAIYO YUDEN's official sales channel"). Please note that the contents of this catalog are not applicable to our products purchased from any seller other than TAIYO YUDEN's official sales channel.

Caution for Export

Some of our products listed in this catalog may require specific procedures for export according to "U.S. Export Administration Regulations", "Foreign Exchange and Foreign Trade Control Law" of Japan, and other applicable regulations. Should you have any questions on this matter, please contact our sales staff.

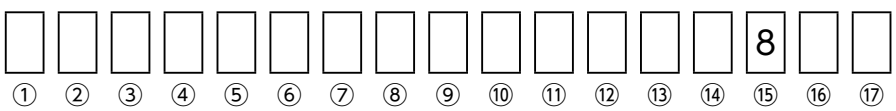
Industrial Application Guide

The products described as "For Telecommunications Infrastructure and Industrial Equipment" in this catalog are intended for use in the equipment shown in the below table as its typical example. Therefore, when using our products for these equipment, please check it carefully by referring to the part number or the individual product specification sheets and use the corresponding products. Should you have any questions on this matter, please contact us.

Category	Telecommunications Infrastructure and Industrial Equipment (Typical Example)
Telecommunications Infrastructure	・Base Station ・Optical Transceiver ・Router/Switch (Carrier-Grade) ・UPS (Uninterruptible Power Supply), etc.
Factory Automation	・PLC (Programmable Logic Controller) ・Servomotor/Servo Driver ・Industry Robot, etc.
Measurement	・Gas Meter ・Water Meter ・Flow Meter ・Pressure Gauge Meter ・Magnetometer ・Thermometer, etc.
Electric Power Apparatus	・Power Conditioner (Solar Power System) ・Smart Meter ・GFCI (Ground Fault Circuit Interrupter) ・Electric Vehicle Charging Station, etc.

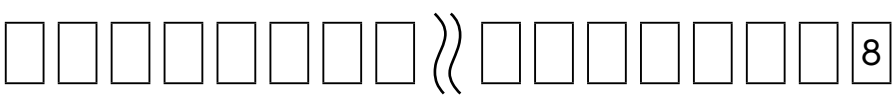
Part Numbering System

Multilayer Ceramic Capacitors:



If the 15th code from the left is "8", it indicates "For Telecommunications Infrastructure and Industrial Equipment" or "For Medical Devices".

Inductors:



If the 1st code from the right is "8" regardless of the total digit number, it indicates "For Telecommunications Infrastructure and Industrial Equipment" or "For Medical Devices".

Because there are some exceptions, for details please refer to each page of this catalog where the part numbering system of each product is described.

▶ This catalog contains the typical specification only due to the limitation of space. When you consider the purchase of our products, please check our product specification sheets. For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our website (http://www.ty-top.com/) .

Medical Application Guide

The products described as "For Medical Devices" in this catalog are intended for use in the medical devices classified as GHTF Classes A to C (Japan Classes I to III) except for all medical devices classified as GHTF Class D (Japan Class IV) and implantable medical devices (bone-anchored hearing aid, artificial retina system, and external unit which is connected to internal unit which is implanted in a body, etc.). Therefore, when using our products for these medical devices, please check it carefully by referring to the part number or the individual product specification sheets and use the corresponding products. Should you have any questions on this matter, please contact us.

Risk Level		Low → High			
Japan	Classification according to the PMD Act of Japan (based on the GHTF Rules)	**Class I** General Medical Devices (GHTF Class A)	**Class II** Controlled Medical Devices (GHTF Class B)	**Class III** Specially-controlled Medical Devices (GHTF Class C)	**Class IV** Specially-controlled Medical Devices (GHTF Class D)
		Medical devices with extremely low risk to the human body in case of problems	Medical devices with relatively low risk to the human body in case of problems	Medical devices with relatively high risk to the human body in case of problems	Medical devices highly invasive to patients and with life-threatening risk in case of problems
		[Ex.] ・In Vitro Diagnostic Devices ・Nebulizer ・Blood Gas Analyzer ・Plethysmographs ・Breathing Sensor ・AC-powered Operating Table ・Surgical Light ・Cholesterol Analysis Device ・Blood Type Analysis Device, etc.	[Ex.] ・Electronic Thermometer ・Electronic Blood Pressure Gauge ・Electronic Endoscope ・Hearing Aid ・Electrocardiograph ・MRI ・Ultrasonic Diagnostic System ・Diagnostic Imaging Equipment ・X-ray Diagnostic Equipment ・Central Monitor ・Pulse Oximeter, etc.	[Ex.] ・Dialysis Machine ・Radiation Therapy Equipment ・Infusion Pump ・Respirator ・Glucose Monitoring System ・AED (Automated External Defibrillator) ・Skin Laser Scanner ・Electric Surgical Unit ・Insulin Pump, etc.	[Ex.] ・Cardiac Pacemaker ・Video Flexible Angioscope ・Implantable Infusion Pump ・Cardiac Electrosurgical Unit ・Inspection Device with Cardiac Catheter ・Defibrillator, etc.
U.S.A.	FDA Classification	**Class I** General Controls	**Class II** General Controls and Special Controls	**Class III** General Controls and Premarket Approval	
		Medical devices without the possibility of causing serious injury or harm to the patient or user even if there is a defect or malfunction in such medical devices	Medical devices with the possibility of causing injury or harm to the patient or user if there is a defect or malfunction in such medical devices	Medical devices with the possibility of causing serious injury, disability or death to the patient or user if a defect or malfunction occurs in such medical devices	

Coverage of those Classes by TAIYO YUDEN Products	Product Series for Medical Devices *Note: It is prohibited that our products are used in some medical devices such as implantable medical devices even if such medical devices are classified as GHTF Class C (Japan Class III).	N/A

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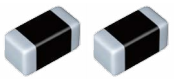
WIRE-WOUND CHIP INDUCTORS (LB SERIES)



REFLOW

■PART NUMBER

*Operating Temp. : −40～105℃(Including self-generated heat)

L	B	△	△	2	0	1	2	T	1	0	0	M	△	8
①		②		③				④	⑤			⑥	⑦	⑧

△=Blank space

①Series name

Code	Series name
LB	Wound chip inductor

②Characteristics

Code	Characteristic
△△	Standard
△C	High current
△R	Low Rdc

③Dimensions(L×W)

Code	Type(inch)	Dimensions (L×W) [mm]
2012	2012(0805)	2.0×1.25
2016	2016(0806)	2.0×1.6
2518	2518(1007)	2.5×1.8
3218	3218(1207)	3.2×1.8
3225	3225(1210)	3.2×2.5

④Packaging

Code	Packaging
T	Taping

⑤Nominal inductance

Code (example)	Nominal inductance[μH]
1R0	1.0
100	10
101	100

※R=Decimal point

⑥Inductance tolerance

Code	Inductance tolerance
K	±10%
M	±20%

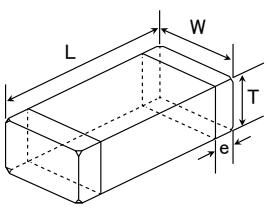
⑦Special code

Code	Special code
△	Standard
R	Low Rdc type

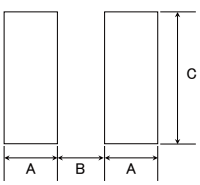
⑧Internal code

Code	Internal code
8	Inductor for Telecommunications infrastructure and Industrial equipment / Medical devices

■STANDARD EXTERNAL DIMENSIONS / STANDARD QUANTITY



Recommended Land Patterns
Surface Mounting
・Mounting and soldering conditions should be checked beforehand.
・Applicable soldering process to these products is reflow soldering only.



Type	A	B	C
2012	0.60	1.0	1.45
2016	0.60	1.0	1.8
2518	0.60	1.5	2.0
3218	0.85	1.7	2.0
3225	0.85	1.7	2.7

Unit:mm

Type	L	W	T	e	Standard quantity [pcs]	
					Paper tape	Embossed tape
LB 2012 LB C2012 LB R2012	2.0±0.2 (0.079±0.008)	1.25±0.2 (0.049±0.008)	1.25±0.2 (0.049±0.008)	0.5±0.2 (0.020±0.008)	—	3000
LB 2016 LB C2016	2.0±0.2 (0.079±0.008)	1.6±0.2 (0.063±0.008)	1.6±0.2 (0.063±0.008)	0.5±0.2 (0.020±0.008)	—	2000
LB 2518 LB C2518 LB R2518	2.5±0.2 (0.098±0.008)	1.8±0.2 (0.071±0.008)	1.8±0.2 (0.071±0.008)	0.5±0.2 (0.020±0.008)	—	2000
LB 3218	3.2±0.2 (0.128±0.008)	1.8±0.2 (0.071±0.008)	1.8±0.2 (0.071±0.008)	0.6±0.2 (0.024±0.008)	—	2000
LB C3225	3.2±0.2 (0.128±0.008)	2.5±0.2 (0.098±0.008)	2.5±0.2 (0.098±0.008)	0.6±0.3 (0.024±0.012)	—	1000

Unit:mm(inch)

■PART NUMBER

・All the Wire-wound Chip Inductors of the catalog lineup are RoHS compliant.

Notes)
・The exchange of individual specifications is necessary depending on your application and/or circuit condition. Please contact TAIYO YUDEN's official sales channel.
・The products are for Telecommunications infrastructure and Industrial equipment and for Medical devices.
Please consult with TAIYO YUDEN's official sales channel for the details of the product specifications, etc.,
and please review and approve the product specifications before ordering.
Please be sure to contact us for further information in advance when the products are used for automotive electronic equipment.

●2012(0805)type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±30%)	Rated current [mA] (max.)	Measuring frequency [MHz]	Note
LB 2012T1R0M 8	1.0	±20%	100	0.15	405	7.96	
LB 2012T2R2M 8	2.2	±20%	80	0.23	260	7.96	
LB 2012T3R3M 8	3.3	±20%	55	0.30	235	7.96	
LB 2012T4R7M 8	4.7	±20%	45	0.40	190	7.96	
LB 2012T6R8M 8	6.8	±20%	38	0.47	135	7.96	
LB 2012T100□ 8	10	±10%, ±20%	32	0.70	120	2.52	
LB 2012T100□R8	10	±10%, ±20%	32	0.50	120	2.52	
LB 2012T150□ 8	15	±10%, ±20%	28	1.3	100	2.52	
LB 2012T220□ 8	22	±10%, ±20%	16	1.7	80	2.52	
LB 2012T470□ 8	47	±10%, ±20%	11	3.7	60	2.52	
LB 2012T680□ 8	68	±10%, ±20%	10	6.0	50	2.52	
LB 2012T101□ 8	100	±10%, ±20%	8	7.0	45	0.796	

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±30%)	Rated current [mA] (max.)	Measuring frequency [MHz]	Note
LB C2012T1R0M 8	1.0	±20%	100	0.19	620	7.96	
LB C2012T2R2M 8	2.2	±20%	70	0.33	430	7.96	
LB C2012T4R7M 8	4.7	±20%	45	0.50	295	7.96	
LB C2012T100□ 8	10	±10%, ±20%	40	1.2	200	2.52	
LB C2012T220□ 8	22	±10%, ±20%	16	3.7	130	2.52	
LB C2012T470□ 8	47	±10%, ±20%	11	5.8	90	2.52	

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±30%)	Rated current [mA] (max.)	Measuring frequency [MHz]	Note
LB R2012T1R0M 8	1.0	±20%	100	0.07	400	7.96	
LB R2012T2R2M 8	2.2	±20%	80	0.13	260	7.96	
LB R2012T4R7M 8	4.7	±20%	45	0.24	200	7.96	
LB R2012T100□ 8	10	±10%, ±20%	32	0.36	150	2.52	
LB R2012T220□ 8	22	±10%, ±20%	16	1.0	100	2.52	
LB R2012T470□ 8	47	±10%, ±20%	11	1.7	75	2.52	
LB R2012T101□ 8	100	±10%, ±20%	8	4.0	50	0.796	

●2016(0806)type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±30%)	Rated current [mA] (max.)	Measuring frequency [MHz]	Note
LB 2016T1R0M 8	1.0	±20%	100	0.09	490	7.96	
LB 2016T1R5M 8	1.5	±20%	80	0.11	380	7.96	
LB 2016T2R2M 8	2.2	±20%	70	0.13	375	7.96	
LB 2016T3R3M 8	3.3	±20%	55	0.20	285	7.96	
LB 2016T4R7M 8	4.7	±20%	45	0.25	225	7.96	
LB 2016T6R8M 8	6.8	±20%	38	0.35	200	7.96	
LB 2016T100□ 8	10	±10%, ±20%	32	0.50	155	2.52	
LB 2016T150□ 8	15	±10%, ±20%	28	0.70	130	2.52	
LB 2016T220□ 8	22	±10%, ±20%	16	1.0	105	2.52	
LB 2016T330□ 8	33	±10%, ±20%	14	1.7	85	2.52	
LB 2016T470□ 8	47	±10%, ±20%	11	2.4	70	2.52	
LB 2016T680□ 8	68	±10%, ±20%	10	3.0	55	2.52	
LB 2016T101□ 8	100	±10%, ±20%	8	4.5	40	0.796	

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±30%)	Rated current [mA] (max.)	Measuring frequency [MHz]	Note
LB C2016T1R0M 8	1.0	±20%	100	0.10	690	7.96	
LB C2016T1R5M 8	1.5	±20%	80	0.15	600	7.96	
LB C2016T2R2M 8	2.2	±20%	70	0.20	520	7.96	
LB C2016T3R3M 8	3.3	±20%	55	0.27	410	7.96	
LB C2016T4R7M 8	4.7	±20%	45	0.37	355	7.96	
LB C2016T6R8M 8	6.8	±20%	38	0.59	290	7.96	
LB C2016T100□ 8	10	±10%, ±20%	32	0.82	245	2.52	
LB C2016T150□ 8	15	±10%, ±20%	28	1.2	200	2.52	
LB C2016T220□ 8	22	±10%, ±20%	16	1.8	165	2.52	
LB C2016T330□ 8	33	±10%, ±20%	14	2.8	135	2.52	
LB C2016T470□ 8	47	±10%, ±20%	11	4.3	110	2.52	
LB C2016T680□ 8	68	±10%, ±20%	10	7.0	95	2.52	
LB C2016T101□ 8	100	±10%, ±20%	8	8.0	75	0.796	

・□ Please specify the Inductance tolerance code(K or M)

・LB、LBCseries
※)Rated Current: The maximum DC value having inductance decrease within 10 % and temperature increase within 20 degC by the application of DC bias.

・LBRseries
※)Rated Current: The maximum DC value having inductance decrease within 20 % and temperature increase within 20 degC by the application of DC bias.

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■PART NUMBER

●2518(1007)type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±30%)	Rated current [mA] (max.)	Measuring frequency [MHz]	Note
LB 2518T1R0M 8	1.0	±20%	100	0.06	665	7.96	
LB 2518T1R5M 8	1.5	±20%	80	0.07	405	7.96	
LB 2518T2R2M 8	2.2	±20%	68	0.09	340	7.96	
LB 2518T3R3M 8	3.3	±20%	54	0.11	280	7.96	
LB 2518T4R7M 8	4.7	±20%	46	0.13	240	7.96	
LB 2518T4R7MR8	4.7	±20%	46	0.10	235	7.96	
LB 2518T6R8M 8	6.8	±20%	38	0.15	195	7.96	
LB 2518T100□ 8	10	±10%, ±20%	30	0.25	165	2.52	
LB 2518T150□ 8	15	±10%, ±20%	23	0.32	145	2.52	
LB 2518T220□ 8	22	±10%, ±20%	19	0.50	115	2.52	
LB 2518T330□ 8	33	±10%, ±20%	15	0.70	95	2.52	
LB 2518T470□ 8	47	±10%, ±20%	12	0.95	85	2.52	
LB 2518T680□ 8	68	±10%, ±20%	9.5	1.5	70	2.52	
LB 2518T101□ 8	100	±10%, ±20%	9.0	2.1	60	0.796	
LB 2518T151□ 8	150	±10%, ±20%	7.0	3.2	45	0.796	
LB 2518T221□ 8	220	±10%, ±20%	5.5	4.5	40	0.796	
LB 2518T331□ 8	330	±10%, ±20%	4.5	7.0	30	0.796	
LB 2518T471□ 8	470	±10%, ±20%	3.5	10	25	0.796	
LB 2518T681□ 8	680	±10%, ±20%	3.0	17	20	0.796	
LB 2518T102□ 8	1000	±10%, ±20%	2.4	24	15	0.252	

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±30%)	Rated current [mA] (max.)	Measuring frequency [MHz]	Note
LB C2518T1R0M 8	1.0	±20%	100	0.080	775	7.96	
LB C2518T1R0MR8	1.0	±20%	100	0.065	890	7.96	
LB C2518T1R5M 8	1.5	±20%	80	0.110	730	7.96	
LB C2518T2R2M 8	2.2	±20%	68	0.130	630	7.96	
LB C2518T3R3M 8	3.3	±20%	54	0.160	560	7.96	
LB C2518T4R7M 8	4.7	±20%	41	0.200	510	7.96	
LB C2518T6R8M 8	6.8	±20%	38	0.300	420	7.96	
LB C2518T100□ 8	10	±10%, ±20%	30	0.360	375	2.52	
LB C2518T150□ 8	15	±10%, ±20%	23	0.650	285	2.52	
LB C2518T220□ 8	22	±10%, ±20%	19	0.770	250	2.52	
LB C2518T330□ 8	33	±10%, ±20%	15	1.50	185	2.52	
LB C2518T470□ 8	47	±10%, ±20%	12	1.90	165	2.52	
LB C2518T680□ 8	68	±10%, ±20%	9.5	2.80	140	2.52	
LB C2518T101□ 8	100	±10%, ±20%	9.0	3.70	125	0.796	
LB C2518T151□ 8	150	±10%, ±20%	7.0	6.10	95	0.796	
LB C2518T221□ 8	220	±10%, ±20%	5.5	8.40	80	0.796	
LB C2518T331□ 8	330	±10%, ±20%	4.5	12.3	65	0.796	
LB C2518T471□ 8	470	±10%, ±20%	3.5	22.0	50	0.796	
LB C2518T681□ 8	680	±10%, ±20%	3.0	28.0	45	0.796	

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±30%)	Rated current [mA] (max.)	Measuring frequency [MHz]	Note
LB R2518T1R0M 8	1.0	±20%	100	0.045	960	7.96	
LB R2518T2R2M 8	2.2	±20%	68	0.07	480	7.96	
LB R2518T4R7M 8	4.7	±20%	45	0.10	345	7.96	
LB R2518T100□ 8	10	±10%, ±20%	30	0.19	235	2.52	
LB R2518T220□ 8	22	±10%, ±20%	19	0.44	175	2.52	
LB R2518T470□ 8	47	±10%, ±20%	11	0.84	120	2.52	
LB R2518T101□ 8	100	±10%, ±20%	9	1.89	80	0.796	

●3218(1207)type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±30%)	Rated current [mA] (max.)	Measuring frequency [MHz]	Note
LB 3218T1R0M 8	1.0	±20%	100	0.06	1,075	7.96	
LB 3218T1R5M 8	1.5	±20%	80	0.07	860	7.96	
LB 3218T2R2M 8	2.2	±20%	68	0.09	775	7.96	
LB 3218T3R3M 8	3.3	±20%	54	0.11	560	7.96	
LB 3218T4R7M 8	4.7	±20%	41	0.13	550	7.96	
LB 3218T6R8M 8	6.8	±20%	40	0.17	380	7.96	
LB 3218T100□ 8	10	±10%, ±20%	30	0.25	340	2.52	
LB 3218T150□ 8	15	±10%, ±20%	25	0.32	300	2.52	
LB 3218T220□ 8	22	±10%, ±20%	19	0.49	255	2.52	
LB 3218T330□ 8	33	±10%, ±20%	15	0.75	215	2.52	
LB 3218T470□ 8	47	±10%, ±20%	12	0.92	205	2.52	
LB 3218T680□ 8	68	±10%, ±20%	11	1.49	145	2.52	
LB 3218T101□ 8	100	±10%, ±20%	8.0	2.4	140	0.796	
LB 3218T151□ 8	150	±10%, ±20%	7.0	3.2	105	0.796	
LB 3218T221□ 8	220	±10%, ±20%	5.0	5.4	80	0.796	
LB 3218T331□ 8	330	±10%, ±20%	4.0	7.0	65	0.796	
LB 3218T471□ 8	470	±10%, ±20%	3.5	14	54	0.796	
LB 3218T681□ 8	680	±10%, ±20%	3.0	17	45	0.796	
LB 3218T102□ 8	1000	±10%, ±20%	2.4	27	39	0.252	

・□ Please specify the Inductance tolerance code(K or M)

・LB、LBCseries

※)Rated Current: The maximum DC value having inductance decrease within 10 % and temperature increase within 20 degC by the application of DC bias.

・LBRseries

※)Rated Current: The maximum DC value having inductance decrease within 20 % and temperature increase within 20 degC by the application of DC bias.

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■PART NUMBER

●3225(1210)type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz](min.)	DC Resistance [Ω](±30%)	Rated current [mA](max.)	Measuring frequency [MHz]	Note
LB C3225T1R0MR8	1.0	±20%	250	0.055	1,100	0.1	
LB C3225T1R5MR8	1.5	±20%	220	0.060	1,000	0.1	
LB C3225T2R2MR8	2.2	±20%	190	0.080	930	0.1	
LB C3225T3R3MR8	3.3	±20%	160	0.095	820	0.1	
LB C3225T4R7MR8	4.7	±20%	70	0.100	680	0.1	
LB C3225T6R8MR8	6.8	±20%	50	0.120	620	0.1	
LB C3225T100□R8	10	±10%, ±20%	23	0.133	540	0.1	
LB C3225T150□R8	15	±10%, ±20%	20	0.195	420	0.1	
LB C3225T220□R8	22	±10%, ±20%	17	0.27	330	0.1	
LB C3225T330□R8	33	±10%, ±20%	13	0.41	300	0.1	
LB C3225T470□R8	47	±10%, ±20%	10	0.67	220	0.1	
LB C3225T680□R8	68	±10%, ±20%	8	1.0	190	0.1	
LB C3225T101□R8	100	±10%, ±20%	6	1.4	150	0.1	

・□ Please specify the Inductance tolerance code(K or M)

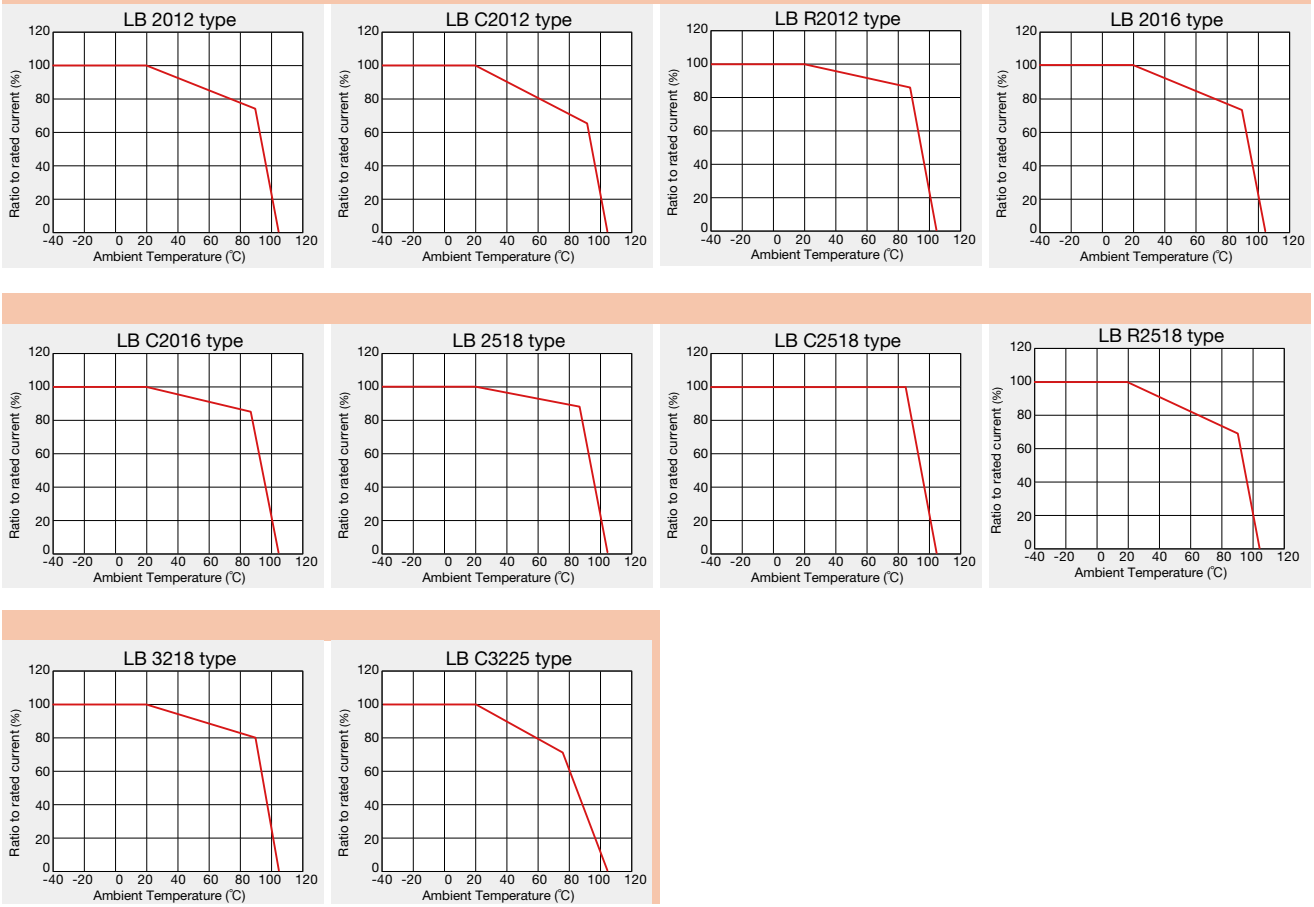
・LB、LBCseries

※)Rated Current: The maximum DC value having inductance decrease within 10 % and temperature increase within 20 degC by the application of DC bias.

Derating of Rated Current

●LB series

Derating of current is necessary for LB series depending on ambient temperature.
Please refer to the chart shown below for appropriate derating of current.



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WIRE-WOUND CHIP INDUCTORS FOR SIGNAL LINES (LB SERIES M TYPE)

REFLOW

■PART NUMBER

*Operating Temp. : −40～105℃(Including self-generated heat)

L	B	M	△	2	0	1	6	T	1	0	0	J	△	8
①				②				③	④			⑤	⑥	⑦

△=Blank space

①Series name

Code	Series name
LBM△	Wound chip inductor for signal line

②Dimensions(L×W)

Code	Type(inch)	Dimensions (L×W)[mm]
2016	2016(0806)	2.0×1.6

③Packaging

Code	Packaging
T	Taping

④Nominal inductance

Code (example)	Nominal inductance[μH]
R12	0.12
1R0	1.00
100	10
101	100

※R=Decimal point

⑤Inductance tolerance

Code	Inductance tolerance
J	±5%

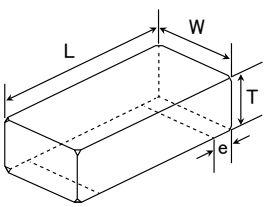
⑥Special code

Code	Special code
△	Standard

⑦Internal code

Code	Internal code
8	Inductor for Telecommunications infrastructure and Industrial equipment / Medical devices

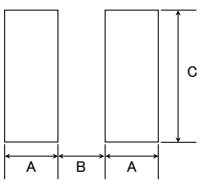
■STANDARD EXTERNAL DIMENSIONS / STANDARD QUANTITY



Recommended Land Patterns
Surface Mounting
・Mounting and soldering conditions should be checked beforehand.
・Applicable soldering process to these products is reflow soldering only.

Type	A	B	C
LBM 2016	0.6	1.0	1.8

Unit:mm



Type	L	W	T	e	Standard quantity [pcs]	
					Paper tape	Embossed tape
LBM 2016	2.0±0.2 (0.08±0.008)	1.6±0.2 (0.063±0.008)	1.6±0.2 (0.063±0.008)	0.5±0.2 (0.02±0.008)	—	2000

Unit:mm(inch)

■PART NUMBER

・All the Wire-wound Chip Inductors of the catalog lineup are RoHS compliant.

Notes)
・The exchange of individual specifications is necessary depending on your application and/or circuit condition. Please contact TAIYO YUDEN's official sales channel.
・The products are for Telecommunications infrastructure and Industrial equipment and for Medical devices.
Please consult with TAIYO YUDEN's official sales channel for the details of the product specifications, etc.,
and please review and approve the product specifications before ordering.
Please be sure to contact us for further information in advance when the products are used for automotive electronic equipment.

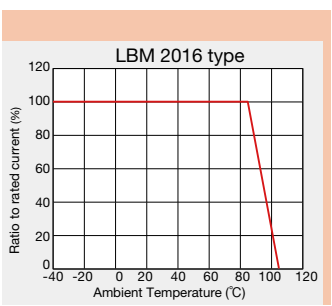
●LBM2016 type

Part number	Nominal inductance [μH]	Inductance tolerance	Q (min.)	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±30%)	Rated current [mA] (max.)	Measuring frequency [MHz]	Note
LBM 2016TR12J 8	0.12	±5%	30	600	0.13	610	25.2	
LBM 2016TR15J 8	0.15	±5%	30	550	0.15	570	25.2	
LBM 2016TR18J 8	0.18	±5%	30	500	0.15	560	25.2	
LBM 2016TR22J 8	0.22	±5%	30	450	0.20	520	25.2	
LBM 2016TR27J 8	0.27	±5%	30	425	0.21	510	25.2	
LBM 2016TR33J 8	0.33	±5%	30	400	0.21	490	25.2	
LBM 2016TR39J 8	0.39	±5%	30	375	0.26	440	25.2	
LBM 2016TR47J 8	0.47	±5%	30	350	0.26	430	25.2	
LBM 2016TR56J 8	0.56	±5%	30	300	0.29	410	25.2	
LBM 2016TR68J 8	0.68	±5%	30	270	0.32	400	25.2	
LBM 2016TR82J 8	0.82	±5%	30	250	0.34	390	25.2	
LBM 2016T1R0J 8	1.0	±5%	30	220	0.38	385	7.96	
LBM 2016T1R2J 8	1.2	±5%	30	180	0.41	370	7.96	
LBM 2016T1R5J 8	1.5	±5%	30	135	0.47	350	7.96	
LBM 2016T1R8J 8	1.8	±5%	30	100	0.48	345	7.96	
LBM 2016T2R2J 8	2.2	±5%	30	75	0.54	340	7.96	
LBM 2016T2R7J 8	2.7	±5%	30	55	0.59	310	7.96	
LBM 2016T3R3J 8	3.3	±5%	30	48	0.68	290	7.96	
LBM 2016T3R9J 8	3.9	±5%	30	43	0.74	275	7.96	
LBM 2016T4R7J 8	4.7	±5%	30	40	0.78	270	7.96	
LBM 2016T5R6J 8	5.6	±5%	25	36	0.88	255	7.96	
LBM 2016T6R8J 8	6.8	±5%	25	33	0.97	240	7.96	
LBM 2016T8R2J 8	8.2	±5%	25	30	1.1	225	7.96	
LBM 2016T100J 8	10	±5%	25	27	1.2	215	2.52	
LBM 2016T120J 8	12	±5%	25	23	1.4	200	2.52	
LBM 2016T150J 8	15	±5%	25	20	1.5	190	2.52	
LBM 2016T180J 8	18	±5%	25	18	2.5	150	2.52	
LBM 2016T220J 8	22	±5%	25	17	2.8	140	2.52	
LBM 2016T270J 8	27	±5%	25	16	3.2	130	2.52	
LBM 2016T330J 8	33	±5%	25	15	3.6	125	2.52	
LBM 2016T390J 8	39	±5%	20	14	3.9	120	2.52	
LBM 2016T470J 8	47	±5%	20	13	4.1	115	2.52	
LBM 2016T560J 8	56	±5%	20	12	5.9	95	2.52	
LBM 2016T680J 8	68	±5%	20	11	7.0	90	2.52	
LBM 2016T820J 8	82	±5%	20	10	7.7	85	2.52	
LBM 2016T101J 8	100	±5%	15	9.0	8.0	80	0.796	

・LBMseries
※) Rated Current : The maximum DC value having inductance decrease within 10 % and temperature increase within 20 degC by the application of DC bias.

■Derating of Rated Current

●LB series M type
Derating of current is necessary for LB series M type depending on ambient temperature.
Please refer to the chart shown below for appropriate derating of current.



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WIRE-WOUND CHIP INDUCTORS (LB SERIES),
WIRE-WOUND CHIP POWER INDUCTORS (CB SERIES),
WIRE-WOUND CHIP INDUCTORS FOR SIGNAL LINES (LB SERIES M TYPE)

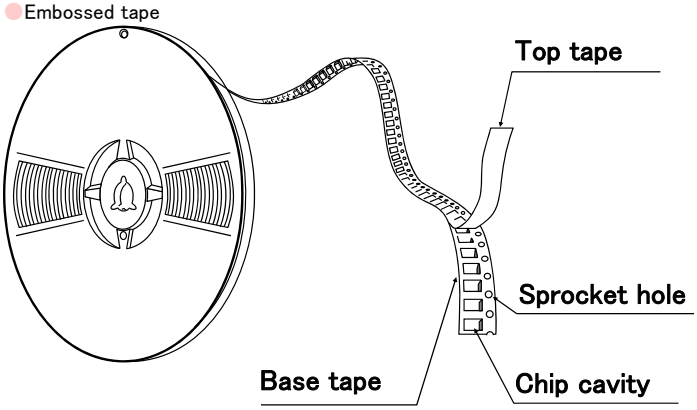
■PACKAGING

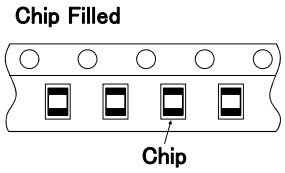
①Minimum Quantity

Type	Standard Quantity [pcs]	
	Paper Tape	Embossed Tape
LB C3225 CB C3225	—	1000
LB 3218	—	2000
LB R2518 LB C2518 LB 2518 CB 2518 CB C2518	—	2000
LBM2016 LB C2016 LB 2016 CB 2016 CB C2016	—	2000
LB 2012 LB C2012 LB R2012 CB 2012 CB C2012	—	3000
CB L2012	4000	—
LB 1608	4000	—
LBMF1608 CBMF1608	—	3000

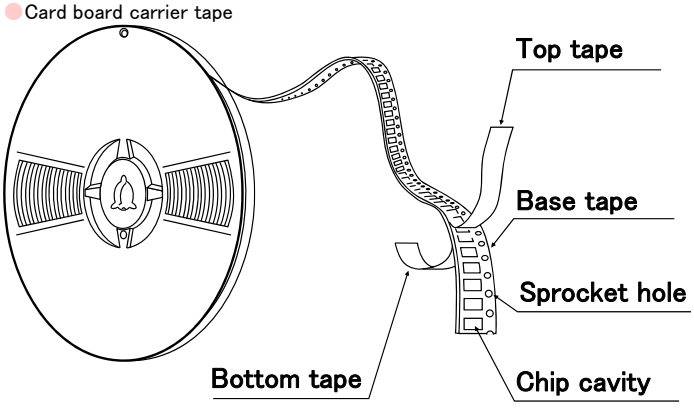
②Tape material

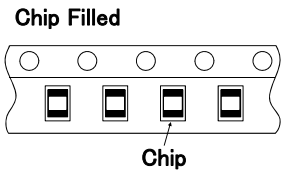
●Embossed tape





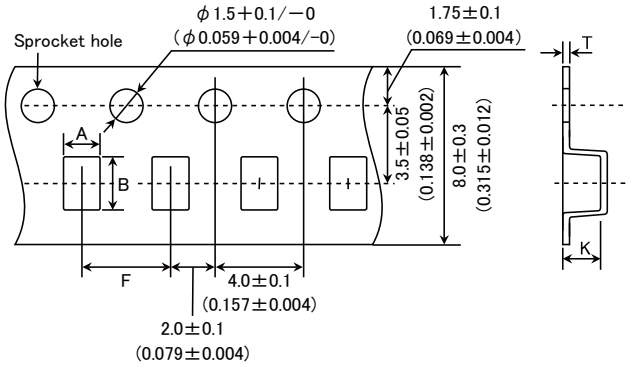
●Card board carrier tape





③Taping Dimensions

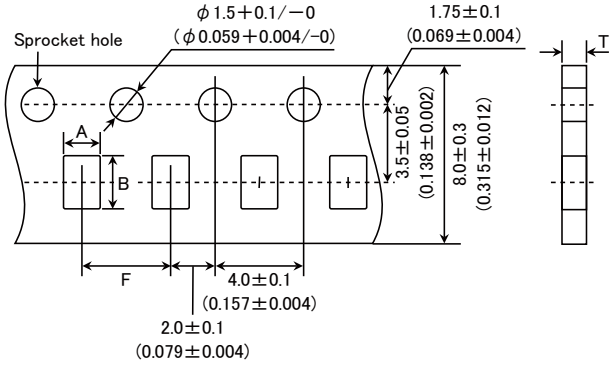
Embossed Tape (0.315 inches wide)



Type	Chip cavity		Insertion pitch	Tape thickness	
	A	B	F	T	K
LBM2016	1.75±0.1 (0.069±0.004)	2.1±0.1 (0.083±0.004)	4.0±0.1 (0.157±0.004)	0.3±0.05 (0.012±0.002)	1.9max. (0.075max.)
LB C3225 CB C3225	2.8±0.1 (0.110±0.004)	3.5±0.1 (0.138±0.004)	4.0±0.1 (0.157±0.004)	0.3±0.05 (0.012±0.002)	4.0max. (0.157max.)
LB 3218	2.1±0.1 (0.083±0.004)	3.5±0.1 (0.138±0.004)	4.0±0.1 (0.157±0.004)	0.3±0.05 (0.012±0.002)	2.2max. (0.087max.)
LB 2518 CB 2518 LB C2518 CB C2518 LB R2518	2.15±0.1 (0.085±0.004)	2.7±0.1 (0.106±0.004)	4.0±0.1 (0.157±0.004)	0.3±0.05 (0.012±0.002)	2.2max. (0.087max.)
LB 2016 CB 2016 LB C2016 CB C2016	1.75±0.1 (0.069±0.004)	2.1±0.1 (0.083±0.004)	4.0±0.1 (0.157±0.004)	0.3±0.05 (0.012±0.002)	1.9max. (0.075max.)
LB 2012 CB 2012 LB C2012 CB C2012 LB R2012	1.45±0.1 (0.057±0.004)	2.25±0.1 (0.089±0.004)	4.0±0.1 (0.157±0.004)	0.25±0.05 (0.010±0.002)	1.45max. (0.057max.)
LBMF1608 CBMF1608	1.1±0.1 (0.043±0.004)	1.9±0.1 (0.075±0.004)	4.0±0.1 (0.157±0.004)	0.25±0.05 (0.010±0.002)	1.2max. (0.047max.)

Unit : mm (inch)

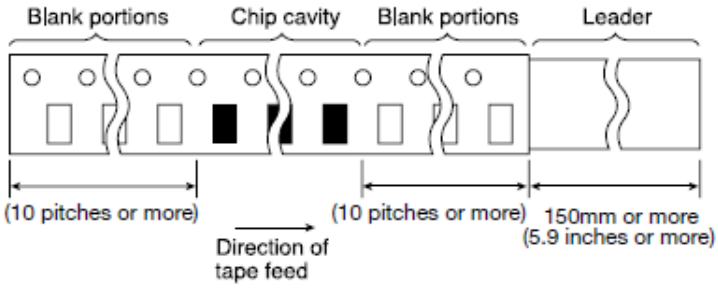
Card board carrier tape (0.315 inches wide)



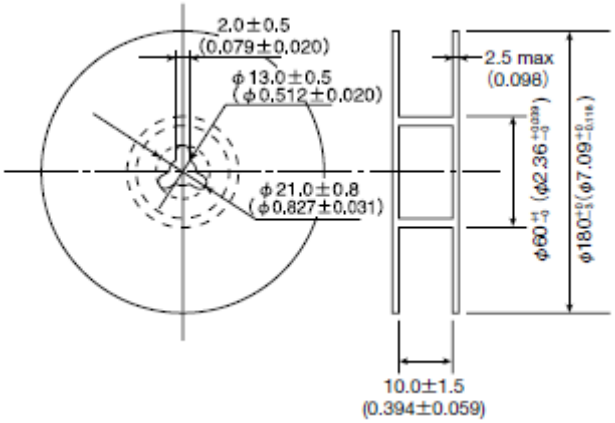
Type	Chip cavity		Insertion pitch	Tape thickness
	A	B	F	T
CB L2012	1.55±0.1 (0.061±0.004)	2.3±0.1 (0.091±0.004)	4.0±0.1 (0.157±0.004)	1.1max. (0.043max.)
LB 1608	1.0±0.1 (0.039±0.004)	1.8±0.1 (0.071±0.004)	4.0±0.1 (0.157±0.004)	1.1max. (0.043max.)

Unit : mm (inch)

④Leader and Blank Portion

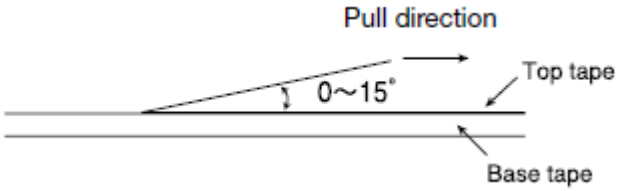


⑤Reel Size



⑥Top Tape Strength

The top tape requires a peel-off force 0.2 to 0.7N in the direction of the arrow as illustrated below.



WIRE-WOUND CHIP INDUCTORS (LB SERIES),
WIRE-WOUND CHIP POWER INDUCTORS (CB SERIES),
WIRE-WOUND CHIP INDUCTORS FOR SIGNAL LINES (LB SERIES M TYPE)

■RELIABILITY DATA

1.Operating temperature Range		
Specified Value	LB, LBC, LBR Series	−40～＋105℃(Including self-generated heat)
	CB, CBC Series	
	LBM Series	
Test Methods and Remarks	Including self-generated heat	

2. Storage Temperature Range(after soldering)		
Specified Value	LB, LBC, LBR Series	−40～＋85℃
	CB, CBC Series	
	LBM Series	
Test Methods and Remarks	LB, CB Series: Please refer the term of "7. storage conditions" in precautions.	

3.Rated Current		
Specified Value	LB, LBC, LBR Series	Within the specified tolerance
	CB, CBC Series	
	LBM Series	

4.Inductance		
Specified Value	LB, LBC, LBR Series	Within the specified tolerance
	CB, CBC Series	
	LBM Series	
Test Methods and Remarks	LB・LBC・LBR・CB・CBC・LBM Series Measuring equipment :LCR Mater(HP4285A or its equivalent)	

5.Q		
Specified Value	LB, LBC, LBR Series	−
	CB, CBC Series	
	LBM Series	Within the specified tolerance
Test Methods and Remarks	LBM Series Measuring equipment : LCR Mater(HP4285A or its equivalent)	

6.DC Resistance		
Specified Value	LB, LBC, LBR Series	Within the specified tolerance
	CB, CBC Series	
	LBM Series	
Test Methods and Remarks	Measuring equipment : DC Ohmmeter (HIOKI 3227 or its equivalent)	

7.Self-Resonant Frequency		
Specified Value	LB, LBC, LBR Series	Within the specified tolerance
	CB, CBC Series	
	LBM Series	
Test Methods and Remarks	Measuring equipment : Impedance analyzer (HP4291A or its equivalent)	

8.Temperature Characteristic

Specified Value	LBM2016				Inductance change : Within±10%
	LB2012	LBR2012	CB2012	LB2016	Inductance change : Within±20%
	CB2016	LB2518	LBR2518	CB2518	
	LBC3225	CBC3225			
	LBC2016	CBC2016	LBC2518	CBC2518	Inductance change : Within±25%
	LB3218				
	LBC2012	CBC2012			Inductance change : Within±35%

Test Methods and Remarks

Change of maximum inductance deviation in step 1–5

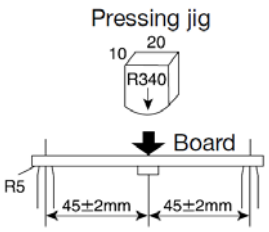
Step	Temperature(℃)
	LB, CB Serie
1	20
2	−40
3	20(Reference temperature)
4	+85(Maximum operating temperature)
5	20

9.Rasistance to Flexure of Substrate

Specified Value	LB, LBC, LBR Series	No damage.
	CB, CBC Series	
	LBM Series	

Test Methods and Remarks

Warp : 2mm(LB・LBC・LBR・CB・CBC・LBM Series)
Test substrate : Board according to JIS C0051
Thickness : 1.0mm



10.Body Strength

Specified Value	LB, LBC, LBR Series	No damage.
	CB, CBC Series	
	LBM Series	

Test Methods and Remarks

LB・LBC・LBR・CB・CBC・LBM
Applied force : 10N
Duration : 10sec.

11.Adhesion of terminal electrode

Specified Value	LB, LBC, LBR Series	No abnormality.
	CB, CBC Series	
	LBM Series	

Test Methods and Remarks

LB・LBC・LBR・CB・CBC・CBL・LBM
Applied force : 10N to X and Y directions
Duration : 5 sec.
Test substrate : Printed board

12.Resistance to vibration		
Specified Value	LB, LBC, LBR Series	Inductance change : Within±20% No significant abnormality in appearance.
	CB, CBC Series	
	LBM Series	Inductance change : Within±20% No significant abnormality in appearance.
Test Methods and Remarks	LB・LBR・LBC・CB・CBC・LBM : According to JIS C5102 clause 8.2. Vibration type : A Directions : 2 hrs each in X, Y and Z directions. Total : 6 hrs Frequency range : 10 to 55 to 10 Hz (1min.) Amplitude : 1.5mm Mounting method : Soldering onto printed board Recovery : At least 2 hrs of recovery under the standard condition after the test, followed by the measurement within 48 hrs.	

13.Drop test		
Specified Value	LB, LBC, LBR Series	—
	CB, CBC Series	
	LBM Series	

14.Solderability		
Specified Value	LB, LBC, LBR Series	At least 90% of surface of terminal electrode is covered by new
	CB, CBC Series	
	LBM Series	
Test Methods and Remarks	LB・LBC・LBR・CB・CBC・CBL・LBM : Solder temperature : 245±5℃ Duration : 5±0.5sec Flux : Methanol solution with 25% of colophony	

15.Resistance to soldering		
Specified Value	LB, LBC, LBR Series	Inductance change : Within±20%
	CB, CBC Series	
	LBM Series	Inductance change : Within±20%
Test Methods and Remarks	LB・LBC・LBR・CB・CBC・CBL・LBM : 3 times of reflow oven at 230℃ MIN for 40sec. with peak temperature at 260 ℃ for 5sec.	

16.Resisitance to solvent		
Specified Value	LB, LBC, LBR Series	—
	CB, CBC Series	
	LBM Series	
Test Methods and Remarks	Solvent temperature : Room temperature Type of solvent : Isopropyl alcohol Cleaning conditions : 90s. Immersion and cleaning.	

17.Thermal shock		
Specified Value	LB, LBC, LBR Series	Inductance change : Within±20% No significant abnormality in appearance.
	CB, CBC Series	
	LBM Series	
Test Methods and Remarks	LB・LBC・LBR・CB・CBC・CBL・LBM : −40～+85℃, maintain times 30min. ,100 cycle Recovery : At least 2 hrs of recovery under the standard condition after the test, followed by the measurement within 48 hrs.	

18.Damp heat life test		
Specified Value	LB, LBC, LBR Series	Inductance change : Within±20% No significant abnormality in appearance.
	CB, CBC Series	
	LBM Series	
Test Methods and Remarks	Temperature : 60±2℃ Humidity : 90～95%RH Duration : 1000 hrs Recovery : At least 2 hrs of recovery under the standard condition after the test, followed by the measurement within 48 hrs.	

19.Loading under damp heat life test		
Specified Value	LB, LBC, LBR Series	Inductance change : Within±20% No significant abnormality in appearance.
	CB, CBC Series	
	LBM Series	
Test Methods and Remarks	Temperature : 60±2℃ Humidity : 90～95%RH Duration : 1000 hrs Applied current : Rated current Recovery : At least 2 hrs of recovery under the standard condition after the test, followed by the measurement within 48 hrs.	

20.High temperature life test		
Specified Value	LB, LBC, LBR Series	—
	CB, CBC Series	Inductance change : Within±20% No significant abnormality in appearance.
	LBM Series	
Test Methods and Remarks	Temperature : 85±2℃ Duration : 1000 hrs Recovery : At least 2 hrs of recovery under the standard condition after the test, followed by the measurement within 48 hrs.	

21.Loading at high temperature life test		
Specified Value	LB, LBC, LBR Series	Inductance change : Within±20% No significant abnormality in appearance.
	CB, CBC Series	—
	LBM Series	
Test Methods and Remarks	Temperature : 85±2℃ Duration : 1000 hrs Applied current : Rated current Recovery : At least 2 hrs of recovery under the standard condition after the test, followed by the measurement within 48 hrs.	

22.Low temperature life test		
Specified Value	LB, LBC, LBR Series	Inductance change : Within±20% No significant abnormality in appearance.
	CB, CBC Series	
	LBM Series	
Test Methods and Remarks	Temperature : －40±2℃ Duration : 1000 hrs Recovery : At least 2 hrs of recovery under the standard condition after the test, followed by the measurement within 48 hrs.	

23.Standard condition		
Specified Value	LB, LBC, LBR Series	Standard test conditions Unless specified, Ambient temperature is 20±15℃ and the Relative humidity is 65±20%. If there is any doubt about the test results, further measurement shall be had within the following limits: Ambient Temperature: 20±2℃ Relative humidity: 65±5% Inductance value is based on our standard measurement systems.
	CB, CBC Series	
	LBM Series	

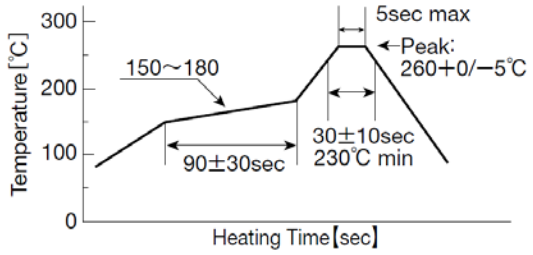
WIRE-WOUND CHIP INDUCTORS (LB SERIES),
WIRE-WOUND CHIP POWER INDUCTORS (CB SERIES),
WIRE-WOUND CHIP INDUCTORS FOR SIGNAL LINES (LB SERIES M TYPE)

■PRECAUTIONS

1. Circuit Design	
Precautions	◆Operating environment 1. The products listed in this catalogue are intended for use in general electronic equipment (e.g., AV equipment, OA equipment, home electric appliances, office equipment, information and communication equipment), general medical equipment, industrial equipment, and automotive interior applications, etc. Please be sure to contact TAIYO YUDEN for further information before using the products for any equipment which may directly cause loss of human life or bodily injury (e.g., specially controlled medical equipment, transportation equipment including, without limitation, automotive powertrain control system, train control system, and ship control system, traffic signal equipment). Please do not incorporate our products into any equipment requiring high levels of safety and/or reliability (e.g., aerospace equipment, aviation equipment, nuclear control equipment, undersea equipment, military equipment, etc.).

2. PCB Design	
Precautions	◆Land pattern design 1. Please contact any of our offices for a land pattern, and refer to a recommended land pattern of a right figure or specifications.
Technical considerations	PRECAUTIONS 【Recommended Land Patterns】 Surface Mounting ・ Mounting and soldering conditions should be checked beforehand. ・ Applicable soldering process to those products is reflow soldering only.

3. Considerations for automatic placement	
Precautions	◆Adjustment of mounting machine 1. Excessive impact load should not be imposed on the products when mounting onto the PC boards. 2. Mounting and soldering conditions should be checked beforehand.
Technical considerations	1. When installing products, care should be taken not to apply distortion stress as it may deform the products.

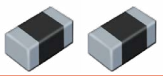
4. Soldering	
Precautions	◆Reflow soldering(LB and CB Types) 1. For reflow soldering with either leaded or lead-free solder, the profile specified in "point for controlling" is recommended. ◆Recommended conditions for using a soldering iron 1. Put the soldering iron on the land-pattern. Soldering iron's temperature – Below 350℃ Duration-3 seconds or less. The soldering iron should not come in contact with inductor directly.
Technical considerations	◆Reflow soldering(LB and CB Types) 1. Reflow profile  ◆Recommended conditions for using a soldering iron 1. Components can be damaged by excessive heat where soldering conditions exceed the specified range.

5. Cleaning	
Precautions	◆Cleaning conditions Washing by supersonic waves shall be avoided.
Technical considerations	◆Cleaning conditions If washed by supersonic waves, the products might be broken.

6. Handling	
Precautions	◆Handling 1. Keep the inductors away from all magnets and magnetic objects. ◆Breakaway PC boards (splitting along perforations) 1. When splitting the PC board after mounting inductors, care should be taken not to give any stresses of deflection or twisting to the board. 2. Board separation should not be done manually, but by using the appropriate devices. ◆Mechanical considerations 1. Please do not give the inductors any excessive mechanical shocks.
Technical considerations	◆Handling 1. There is a case that a characteristic varies with magnetic influence. ◆Breakaway PC boards (splitting along perforations) 1. Planning pattern configurations and the position of products should be carefully performed to minimize stress. ◆Mechanical considerations 1. There is a case to be damaged by a mechanical shock.

7. Storage conditions	
Precautions	◆Storage 1. To maintain the solderability of terminal electrodes and to keep the packing material in good condition, temperature and humidity in the storage area should be controlled. ・ Recommended conditions Ambient temperature : 0～40℃ / Humidity : Below 70% RH The ambient temperature must be kept below 30℃ even under ideal storage conditions, solderability of products electrodes may decrease as time passes. For this reason, These series should be used within 6 months from the time of delivery.
Technical considerations	◆Storage 1. Under a high temperature and humidity environment, problems such as reduced solderability caused by oxidation of terminal electrodes and deterioration of taping/packaging materials may take place.

MULTILAYER CHIP INDUCTORS (LK SERIES)



REFLOW

■PART NUMBER　　*Operating Temp. : −40～85℃

L	K	△	1	0	0	5	△	R	1	0	M	—	T	V
①			②					③			④	⑤		⑥

△=Blank space

①Series name

Code	Series name
LK△	Multilayer chip inductor

②Dimensions (L×W)

Code	Type (inch)	Dimensions (L×W) [mm]
1005	1005 (0402)	1.0×0.5

③Nominal inductance

Code (example)	Nominal inductance [μH]
R12	0.12
R22	0.22
1R0	1.0
2R2	2.2

※R=Decimal point

④Inductance tolerance

Code	Inductance tolerance
K	±10%
M	±20%

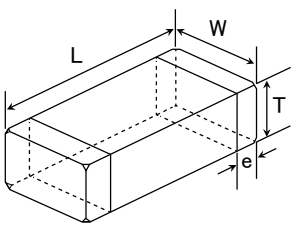
⑤Packaging

Code	Packaging
−T	Taping

⑥Internal code

Code	Internal code
V	MLCI for Automotive
8	MLCI for Telecommunications infrastructure and Industrial equipment / Medical devices

■STANDARD EXTERNAL DIMENSIONS / STANDARD QUANTITY



Type	L	W	T	e	Standard quantity [pcs]	
					Paper tape	Embossed tape
LK 1005 (0402)	1.00±0.05 (0.039±0.002)	0.50±0.05 (0.020±0.002)	0.50±0.05 (0.020±0.002)	0.25±0.10 (0.010±0.004)	10000	—

Unit : mm (inch)

■PART NUMBER

・All the Multilayer Chip Inductors of the catalog lineup are RoHS compliant.

Notes)
・The exchange of individual specifications is necessary depending on your application and/or circuit condition. Please contact TAIYO YUDEN's official sales channel.
・The products are for Telecommunications infrastructure and Industrial equipment and for Medical devices.
Please consult with TAIYO YUDEN's official sales channel for the details of the product specifications, etc.,
and please review and approve the product specifications before ordering.
Please be sure to contact us for further information in advance when the products are used for automotive electronic equipment.

●LK1005

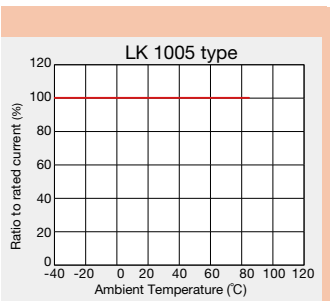
Part number	Nominal inductance [μH]	Inductance tolerance	Q (min.)	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (max.)	Rated current [mA] (max.)	Measuring frequency [MHz]	Thickness [mm]	Note
LK 1005 R12□-T8	0.12	±10%, ±20%	10	180	0.59	25	25	0.50 ±0.05	
LK 1005 R15□-T8	0.15	±10%, ±20%	10	165	0.63	25	25	0.50 ±0.05	
LK 1005 R18□-T8	0.18	±10%, ±20%	10	150	0.76	25	25	0.50 ±0.05	
LK 1005 R22□-T8	0.22	±10%, ±20%	10	135	0.79	25	25	0.50 ±0.05	
LK 1005 R27□-T8	0.27	±10%, ±20%	10	120	0.91	25	25	0.50 ±0.05	
LK 1005 R33□-T8	0.33	±10%, ±20%	10	105	1.05	25	25	0.50 ±0.05	
LK 1005 R39□-T8	0.39	±10%, ±20%	20	85	0.41	20	10	0.50 ±0.05	
LK 1005 R47□-T8	0.47	±10%, ±20%	20	80	0.42	20	10	0.50 ±0.05	
LK 1005 R56□-T8	0.56	±10%, ±20%	20	75	0.47	20	10	0.50 ±0.05	
LK 1005 R68□-T8	0.68	±10%, ±20%	20	70	0.55	20	10	0.50 ±0.05	
LK 1005 R82□-T8	0.82	±10%, ±20%	20	65	0.59	20	10	0.50 ±0.05	
LK 1005 1R0□-T8	1.0	±10%, ±20%	20	60	0.64	20	10	0.50 ±0.05	
LK 1005 1R2□-T8	1.2	±10%, ±20%	20	55	0.79	20	10	0.50 ±0.05	
LK 1005 1R5□-T8	1.5	±10%, ±20%	20	50	0.95	20	10	0.50 ±0.05	
LK 1005 1R8□-T8	1.8	±10%, ±20%	20	45	1.16	20	10	0.50 ±0.05	
LK 1005 2R2□-T8	2.2	±10%, ±20%	20	40	1.15	20	10	0.50 ±0.05	

※ □ mark indicates the Inductance tolerance code.

※) The rated current is either the DC value at which the internal L value is decreased within 5% with the application of DC bias, or the value of current at which the temperature of the element is increased within 20℃.

Derating of Rated Current

●LK series
Until 85 ℃ ambient temperature, LK series is available at 100% of the rated current.
Please refer to the chart shown below.



Multilayer chip inductors
Multilayer chip inductors for high frequency, Multilayer chip bead inductors
Multilayer common mode choke coils (MC series F type)
Metal Multilayer Chip Power Inductors (MCOIL™ MC series)

■PACKAGING

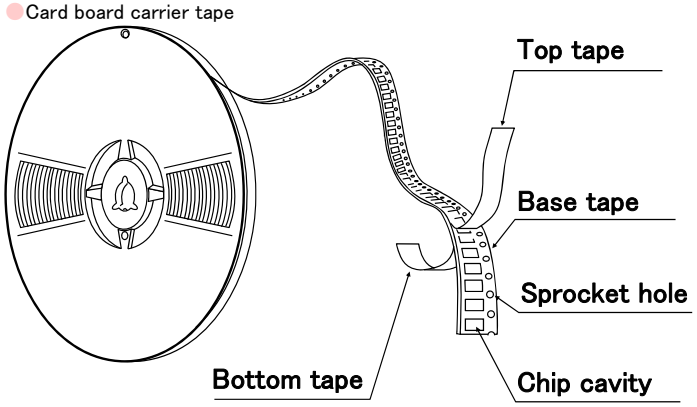
①Minimum Quantity

●Tape & Reel Packaging

Type	Thickness mm (inch)	Standard Quantity [pcs]	
		Paper Tape	Embossed Tape
CK1608 (0603)	0.8 (0.031)	4000	—
CK2125 (0805)	0.85 (0.033)	4000	—
	1.25 (0.049)	—	2000
CKS2125 (0805)	0.85 (0.033)	4000	—
	1.25 (0.049)	—	2000
CKP1608 (0603)	0.8 (0.031)	4000	—
CKP2012 (0805)	0.9 (0.035)	—	3000
CKP2016 (0806)	0.9 (0.035)	—	3000
CKP2520 (1008)	0.7 (0.028)	—	3000
	0.9 (0.035)	—	3000
	1.1 (0.043)	—	2000
LK1005 (0402)	0.5 (0.020)	10000	—
LK1608 (0603)	0.8 (0.031)	4000	—
LK2125 (0805)	0.85 (0.033)	4000	—
	1.25 (0.049)	—	2000
HK0603 (0201)	0.3 (0.012)	15000	—
HK1005 (0402)	0.5 (0.020)	10000	—
HK1608 (0603)	0.8 (0.031)	4000	—
HK2125 (0805)	0.85 (0.033)	—	4000
	1.0 (0.039)	—	3000
HKQ0603S (0201)	0.3 (0.012)	15000	—
HKQ0603U (0201)	0.3 (0.012)	15000	—
AQ105 (0402)	0.5 (0.020)	10000	—
BK0603 (0201)	0.3 (0.012)	15000	—
BK1005 (0402)	0.5 (0.020)	10000	—
BKH0603 (0201)	0.3 (0.012)	15000	—
BKH1005 (0402)	0.5 (0.020)	10000	—
BK1608 (0603)	0.8 (0.031)	4000	—
BK2125 (0805)	0.85 (0.033)	4000	—
	1.25 (0.049)	—	2000
BK2010 (0804)	0.45 (0.018)	4000	—
BK3216 (1206)	0.8 (0.031)	—	4000
BKP0603 (0201)	0.3 (0.012)	15000	—
BKP1005 (0402)	0.5 (0.020)	10000	—
BKP1608 (0603)	0.8 (0.031)	4000	—
BKP2125 (0805)	0.85 (0.033)	4000	—
MCF0605 (0202)	0.3 (0.012)	15000	—
MCF0806 (0302)	0.4 (0.016)	—	10000
MCF1210 (0504)	0.55 (0.022)	—	5000
MCF2010 (0804)	0.45 (0.018)	—	4000
MCEE1005 (0402)	0.55 (0.022)	10000	—
MCEK1210 (0504)	0.5 (0.020)	5000	—
MCFK1608 (0603)	0.6 (0.024)	4000	—
MCFE1608 (0603)	0.65 (0.026)	4000	—
MCHK1608 (0603)	0.8 (0.031)	4000	—
MCKK1608 (0603)	1.0 (0.039)		3000
MCHK2012 (0806)	0.8 (0.031)	4000	—
MCKK2012 (0805)	1.0 (0.039)	-	3000

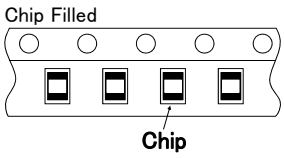
②Taping material

Card board carrier tape

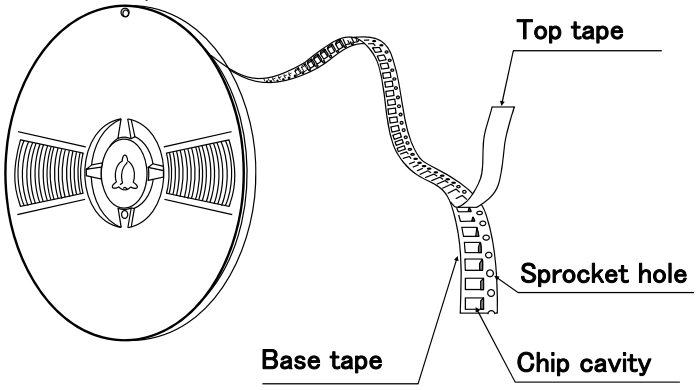


CK	1608
CKP	1608
CK	2125
CKS	2125
LK	1005
LK	1608
LK	2125
HK	0603
HK	1005
HK	1608
HKQ	0603
AQ	105

BK	0603
BK	1005
BK	1608
BK	2125
BK	2010
BKP	0603
BKP	1005
BKP	1608
BKP	2125
BKH	0603
BKH	1005
MCF	0605
MC	1005
MC	1210
MC	1608
MC	2012

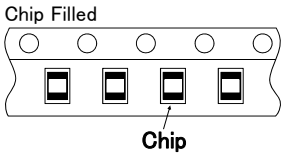


Embossed Tape



CK	2125
CKS	2125
CKP	2012
CKP	2016
CKP	2520
LK	2125
HK	2125

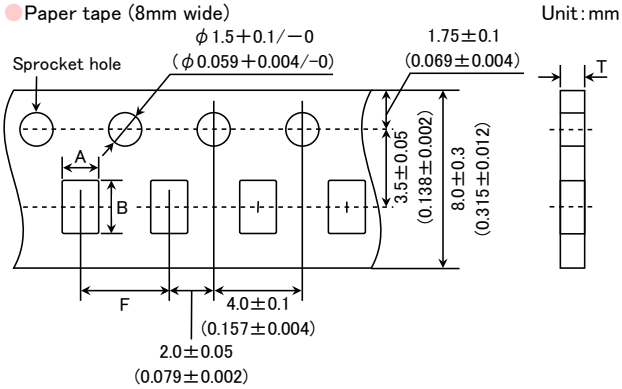
BK	2125
BK	3216
MCF	0806
MCF	1210
MCF	2010
MC	1608
MC	2012



③Taping Dimensions

Paper tape (8mm wide)

Unit : mm (inch)

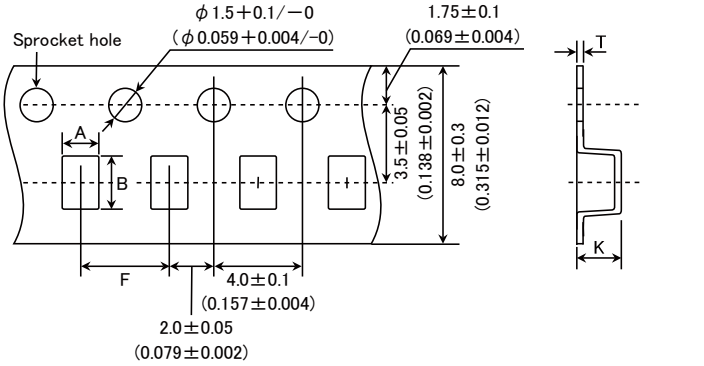


Type	Thickness mm(inch)	Chip cavity		Insertion Pitch	Tape Thickness
		A	B	F	T
CK1608(0603)	0.8 (0.031)	1.0±0.2 (0.039±0.008)	1.8±0.2 (0.071±0.008)	4.0±0.1 (0.157±0.004)	1.1max (0.043max)
CK2125(0805)	0.85(0.033)	1.5±0.2 (0.059±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.1 (0.157±0.004)	1.1max (0.043max)
CKS2125(0805)	0.85(0.033)	1.5±0.2 (0.059±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.1 (0.157±0.004)	1.1max (0.043max)
CKP1608(0603)	0.8 (0.031)	1.0±0.2 (0.039±0.008)	1.8±0.2 (0.071±0.008)	4.0±0.1 (0.157±0.004)	1.1max (0.043max)
LK1005(0402)	0.5 (0.020)	0.65±0.1 (0.026±0.004)	1.15±0.1 (0.045±0.004)	2.0±0.05 (0.079±0.002)	0.8max (0.031max)
LK1608(0603)	0.8 (0.031)	1.0±0.2 (0.039±0.008)	1.8±0.2 (0.071±0.008)	4.0±0.1 (0.157±0.004)	1.1max (0.043max)
LK2125(0805)	0.85(0.033)	1.5±0.2 (0.059±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.1 (0.157±0.004)	1.1max (0.043max)
HK0603(0201)	0.3 (0.012)	0.40±0.06 (0.016±0.002)	0.70±0.06 (0.028±0.002)	2.0±0.05 (0.079±0.002)	0.45max (0.018max)
HK1005(0402)	0.5 (0.020)	0.65±0.1 (0.026±0.004)	1.15±0.1 (0.045±0.004)	2.0±0.05 (0.079±0.002)	0.8max (0.031max)
HK1608(0603)	0.8 (0.031)	1.0±0.2 (0.039±0.008)	1.8±0.2 (0.071±0.008)	4.0±0.1 (0.157±0.004)	1.1max (0.043max)
HKQ0603S(0201)	0.3 (0.012)	0.40±0.06 (0.016±0.002)	0.70±0.06 (0.028±0.002)	2.0±0.05 (0.079±0.002)	0.45max (0.018max)
HKQ0603U(0201)	0.3 (0.012)	0.40±0.06 (0.016±0.002)	0.70±0.06 (0.028±0.002)	2.0±0.05 (0.079±0.002)	0.45max (0.018max)
AQ105(0402)	0.5 (0.020)	0.75±0.1 (0.030±0.004)	1.15±0.1 (0.045±0.004)	2.0±0.05 (0.079±0.002)	0.8max (0.031max)
BK0603(0201)	0.3 (0.012)	0.40±0.06 (0.016±0.002)	0.70±0.06 (0.028±0.002)	2.0±0.05 (0.079±0.002)	0.45max (0.018max)
BK1005(0402)	0.5 (0.020)	0.65±0.1 (0.026±0.004)	1.15±0.1 (0.045±0.004)	2.0±0.05 (0.079±0.002)	0.8max (0.031max)
BK1608(0603)	0.8 (0.031)	1.0±0.2 (0.039±0.008)	1.8±0.2 (0.071±0.008)	4.0±0.1 (0.157±0.004)	1.1max (0.043max)
BK2125(0805)	0.85(0.033)	1.5±0.2 (0.059±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.1 (0.157±0.004)	1.1max (0.043max)
BK2010(0804)	0.45(0.018)	1.2±0.1 (0.047±0.004)	2.17±0.1 (0.085±0.004)	4.0±0.1 (0.157±0.004)	0.8max (0.031max)
BKP0603(0201)	0.3 (0.012)	0.40±0.06 (0.016±0.002)	0.70±0.06 (0.028±0.002)	2.0±0.05 (0.079±0.002)	0.45max (0.018max)
BKP1005(0402)	0.5 (0.020)	0.65±0.1 (0.026±0.004)	1.15±0.1 (0.045±0.004)	2.0±0.05 (0.079±0.002)	0.8max (0.031max)
BKP1608(0603)	0.8 (0.031)	1.0±0.2 (0.039±0.008)	1.8±0.2 (0.071±0.008)	4.0±0.1 (0.157±0.004)	1.1max (0.043max)
BKP2125(0805)	0.85(0.033)	1.5±0.2 (0.059±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.1 (0.157±0.004)	1.1max (0.043max)
BKH0603(0201)	0.3 (0.012)	0.40±0.06 (0.016±0.002)	0.70±0.06 (0.028±0.002)	2.0±0.05 (0.079±0.002)	0.45max (0.018max)
BKH1005(0402)	0.5 (0.020)	0.65±0.1 (0.026±0.004)	1.15±0.1 (0.045±0.004)	2.0±0.05 (0.079±0.002)	0.8max (0.031max)
MCF0605(0202)	0.3 (0.012)	0.62±0.03 (0.024±0.001)	0.77±0.03 (0.030±0.001)	2.0±0.05 (0.079±0.002)	0.45max (0.018max)
MCFK1608(0603)	0.6 (0.024)	1.1±0.05 (0.043±0.002)	1.9±0.05 (0.075±0.002)	4.0±0.1 (0.157±0.004)	0.72max (0.028max)
MCEE1005(0402)	0.55(0.021)	0.8±0.05 (0.031±0.002)	1.3±0.05 (0.051±0.002)	2.0±0.05 (0.079±0.002)	0.64max (0.025max)
MCEK1210(0504)	0.5 (0.020)	1.3±0.1 (0.051±0.004)	1.55±0.1 (0.061±0.004)	4.0±0.1 (0.157±0.004)	0.64max (0.025max)
MCFK1608(0603)	0.6 (0.024)	1.1±0.05 (0.043±0.002)	1.9±0.05 (0.075±0.002)	4.0±0.1 (0.157±0.004)	0.72max (0.028max)
MCFE1608(0603)	0.65(0.026)	1.1±0.05 (0.043±0.002)	1.9±0.05 (0.075±0.002)	4.0±0.1 (0.157±0.004)	0.72max (0.028max)
MCHK1608(0603)	0.8 (0.031)	1.2±0.05 (0.047±0.002)	2.0±0.05 (0.079±0.002)	4.0±0.1 (0.157±0.004)	0.9max (0.035max)
MCHK2012(0805)	0.8 (0.031)	1.65±0.1 (0.065±0.004)	2.4±0.1 (0.094±0.004)	4.0±0.1 (0.157±0.004)	0.9max (0.035max)

Unit : mm(inch)

● Embossed Tape (8mm wide)

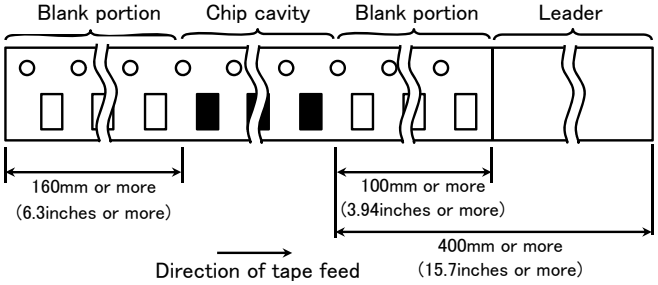
Unit : mm (inch)



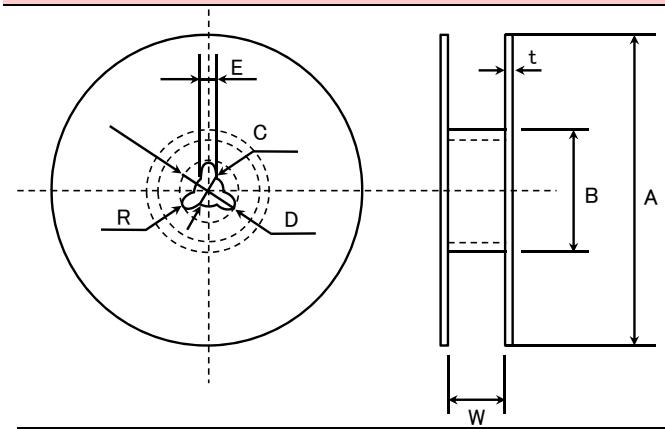
Type	Thickness mm (inch)	Chip cavity		Insertion Pitch	Tape Thickness	
		A	B	F	K	T
CK2125 (0805)	1.25 (0.049)	1.5±0.2 (0.059±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.1 (0.157±0.004)	2.0 (0.079)	0.3 (0.012)
CKS2125 (0805)	1.25 (0.049)	1.5±0.2 (0.059±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.1 (0.157±0.004)	2.0 (0.079)	0.3 (0.012)
CKP2012 (0805)	0.9 (0.035)	1.55±0.2 (0.061±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.1 (0.157±0.004)	1.3 (0.051)	0.3 (0.012)
CKP2016 (0806)	0.9 (0.035)	1.8±0.1 (0.071±0.004)	2.2±0.1 (0.087±0.004)	4.0±0.1 (0.157±0.004)	1.3 (0.051)	0.25 (0.01)
CKP2520 (1008)	0.7 (0.028)	2.3±0.1 (0.091±0.004)	2.8±0.1 (0.110±0.004)	4.0±0.1 (0.157±0.004)	1.4 (0.055)	0.3 (0.012)
	0.9 (0.035)				1.4 (0.055)	
	1.1 (0.043)				1.7 (0.067)	
	1.1 (0.043)				1.7 (0.067)	
LK2125 (0805)	1.25 (0.049)	1.5±0.2 (0.059±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.1 (0.157±0.004)	2.0 (0.079)	0.3 (0.012)
HK2125 (0805)	0.85 (0.033)	1.5±0.2 (0.059±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.1 (0.157±0.004)	1.5 (0.059)	0.3 (0.012)
	1.0 (0.039)				2.0 (0.079)	
BK2125 (0805)	1.25 (0.049)	1.5±0.2 (0.059±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.1 (0.157±0.004)	2.0 (0.079)	0.3 (0.012)
BK3216 (1206)	0.8 (0.031)	1.9±0.1 (0.075±0.004)	3.5±0.1 (0.138±0.004)	4.0±0.1 (0.157±0.004)	1.4 (0.055)	0.3 (0.012)
MCF0806 (0302)	0.4 (0.016)	0.75±0.05 (0.030±0.002)	0.95±0.05 (0.037±0.002)	2.0±0.05 (0.079±0.002)	0.55 (0.022)	0.3 (0.012)
MCF1210 (0504)	0.55 (0.022)	1.15±0.05 (0.045±0.002)	1.40±0.05 (0.055±0.002)	4.0±0.1 (0.157±0.004)	0.65 (0.026)	0.3 (0.012)
MCF2010 (0804)	0.45 (0.018)	1.1±0.1 (0.043±0.004)	2.3±0.1 (0.091±0.004)	4.0±0.1 (0.157±0.004)	0.85 (0.033)	0.3 (0.012)
MCKK1608 (0603)	1.0 (0.039)	1.1±0.1 (0.043±0.004)	1.95±0.1 (±0.004)	4.0±0.1 (0.157±0.004)	1.4 (0.055)	0.25 (0.01)
MCKK2012 (0805)	1.0 (0.039)	1.55±0.1 (0.061±0.004)	2.35±0.1 (0.093±0.004)	4.0±0.1 (0.157±0.004)	1.35 (0.053)	0.25 (0.010)

Unit : mm (inch)

④LEADER AND BLANK PORTION



⑤Reel Size



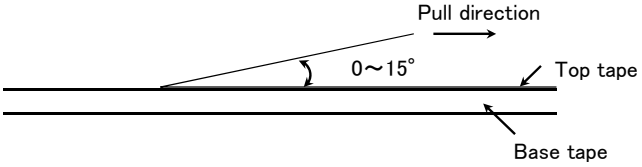
A	B	C	D	E	R
ϕ178±2.0	ϕ50 or more	ϕ13.0±0.2	ϕ21.0±0.8	2.0±0.5	1.0

	t	W
4mm width tape	1.5max.	5±1.0
8mm width tape	2.5max.	10±1.5

(Unit : mm)

⑥Top tape strength

The top tape requires a peel-off force of 0.1～0.7N in the direction of the arrow as illustrated below.



■RELIABILITY DATA

1. Operating Temperature Range		
Specified Value	BK series	−55～＋125℃
	BKP series	−55～＋125℃ (Including self-generated heat)
	LK series	−40～＋85℃
	HK series	−55～＋125℃

2. Storage Temperature Range		
Specified Value	BK series	−55～＋125℃
	BKP series	−55～＋125℃
	LK series	−40～＋85℃
	HK series	−55～＋125℃

3. Rated Current		
Specified Value	BK series	The temperature of the element is increased within 20℃.
	BKP series	The temperature of the element is increased within 40℃
	LK series	The decreasing-rate of inductance value is within 5 %
	HK series	The decreasing-rate of inductance value is within 5 %, or the temperature of the element is increased within 20℃

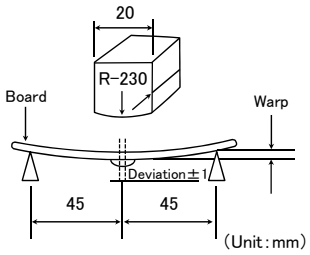
4. Impedance		
Specified Value	BK series	Refer to each specification.
	BKP series	
	LK series	—
	HK series	
Test Methods and Remarks	Measuring frequency : 100±1MHz Measuring equipment : 4291A(or its equivalent) Measuring jig : 16192A(or its equivalent), HW:16193A(or its equivalent)	

5. Inductance		
Specified Value	BK series	—
	BKP series	
	LK series	Refer to each specification.
	HK series	
Test Methods and Remarks	LK Series Measuring frequency : 10～25MHz Measuring equipment /jig : 4291A＋16193A(or its equivalent) Measuring current : 1mA rms HK Series Measuring frequency : 100MHz Measuring equipment /jig : 4291A＋16193A(or its equivalent)	

6. Q		
Specified Value	BK series	—
	BKP series	
	LK series	Refer to each specification.
	HK series	
Test Methods and Remarks	LK Series Measuring frequency : Refer to each specification. Measuring equipment /jig : 4291A＋16193A(or its equivalent) Measuring current : 1mA rms HK Series Measuring frequency : 100MHz Measuring equipment /jig : 4291A＋16193A(or its equivalent)	

7. DC Resistance		
Specified Value	BK series	Refer to each specification.
	BKP series	
	LK series	
	HK series	
Test Methods and Remarks	Measuring equipment: IWATSU VOAC7512(or its equivalent)	

8. Self Resonance Frequency(SRF)		
Specified Value	BK series	—
	BKP series	
	LK series	Refer to each specification.
	HK series	
Test Methods and Remarks	LK Series Measuring equipment : 4195A(or its equivalent) Measuring jig : 41951+16092A(or its equivalent) HK Series : Measuring equipment : 8719C(or its equivalent)	

9. Resistance to Flexure of Substrate		
Specified Value	BK series	No mechanical damage.
	BKP series	
	LK series	
	HK series	
Test Methods and Remarks	Warp : 2mm Testing board : glass epoxy-resin substrate Thickness : 0.8mm 	

10. Solderability		
Specified Value	BK series	At least 90% of terminal electrode is covered by new solder.
	BKP series	
	LK series	
	HK series	
Test Methods and Remarks	Solder temperature : 230±5℃ (JIS Z 3282 H60A or H63A) Solder temperature : 245±3℃ (Sn/3.0Ag/0.5Cu) Duration : 4±1 sec.	

11. Resistance to Soldering		
Specified Value	BK series	Appearance:No significant abnormality
	BKP series	Impedance change:Within ±30%
	LK series	Appearance:No significant abnormality Inductance change: Within ±15%
	HK series	Appearance:No significant abnormality Inductance change: Within ±5%
Test Methods and Remarks	Solder temperature : 260±5℃ Duration : 10±0.5 sec. Preheating temperature : 150 to 180℃ Preheating time : 3 min. Flux : Immersion into methanol solution with colophony for 3 to 5 sec. Recovery : 2 to 3 hrs of recovery under the standard condition after the test.(See Note 1)	

(Note 1) When there are questions concerning measurement result; measurement shall be made after 48±2 hrs of recovery under the standard condition.

12. Thermal Shock

Specified Value	BK series BKP series	Appearance : No significant abnormality Impedance change : Within ±30%
	LK series	Appearance : No significant abnormality Inductance change : Within ±10% Q change : Within ±30%
	HK series	Appearance : No significant abnormality Inductance change : Within ±10% Q change : Within ±20%

Test Methods and Remarks

BK、BKP、HK Series

Conditions for 1 cycle

Step	temperature (℃)	time (min.)
1	−40℃ +0/−3	30±3
2	Room temperature	2～3
3	+125℃ +3/−0	30±3
4	Room temperature	2～3

Number of cycles : 1000

Recovery : 2 to 3 hrs of recovery under the standard condition after the test. (See Note 1)

LK Series

Conditions for 1 cycle

Step	temperature (℃)	time (min.)
1	−40℃ +0/−3	30±3
2	Room temperature	2～3
3	+85℃ +3/−0	30±3
4	Room temperature	2～3

Number of cycles : 1000

Recovery : 2 to 3 hrs of recovery under the standard condition after the test. (See Note 1)

(Note 1) When there are questions concerning measurement result ; measurement shall be made after 48±2 hrs of recovery under the standard condition.

13. Damp Heat (Steady state)

Specified Value	BK series BKP series	Appearance : No significant abnormality Impedance change : Within ±30%
	LK series	Appearance : No significant abnormality Inductance change : Within ±10% Q change : Within ±30%
	HK series	Appearance : No significant abnormality Inductance change : Within ±10% Q change : Within ±20%

Test Methods and Remarks

Temperature : 85±2℃
Humidity : 80 to 85%RH
Duration : 1000+24/−0 hrs
Recovery : 2 to 3 hrs of recovery under the standard condition after the removal from test chamber. (See Note 1)

14. Loading under Damp Heat

Specified Value	BK series BKP series	Appearance : No significant abnormality Impedance change : Within ±30%
	LK series	Appearance : No significant abnormality Inductance change : Within ±10% Q change : Within ±30%
	HK series	Appearance : No significant abnormality Inductance change : Within ±10% Q change : Within ±20%

Test Methods and Remarks

Temperature : 85±2℃
Humidity : 80 to 85%RH
Applied current : Rated current
Duration : 1000+24/−0 hrs
Recovery : 2 to 3 hrs of recovery under the standard condition after the removal from test chamber. (See Note 1)

Note on standard condition: "standard condition" referred to herein is defined as follows:
5 to 35℃ of temperature, 45 to 85% relative humidity, and 86 to 106kPa of air pressure.
When there are questions concerning measurement results:
In order to provide correlation data, the test shall be conducted under condition of 20±2℃ of temperature, 60 to 70% relative humidity, and 86 to 106kPa of air pressure.
Unless otherwise specified, all the tests are conducted under the "standard condition."
(Note 1) When there are questions concerning measurement result ; Measurement shall be made after 48±2 hrs of recovery under the standard condition.

15. Loading at High Temperature		
Specified Value	BK series	Appearance : No significant abnormality Impedance change : Within ±30%
	BKP series	
	LK series	Appearance : No significant abnormality Inductance change : Within ±10% Q change : Within ±30%
	HK series	Appearance : No significant abnormality Inductance change : Within ±10% Q change : Within ±20%
Test Methods and Remarks	Temperature : BK, HK series ⇒ 125±2℃ BKP, LK series ⇒ 85±2℃ Applied current : Rated current Duration : 1000+24/−0 hrs Recovery : 2 to 3 hrs of recovery under the standard condition after the removal from test chamber.(See Note 1)	

Note on standard condition: "standard condition" referred to herein is defined as follows:
5 to 35℃ of temperature, 45 to 85% relative humidity, and 86 to 106kPa of air pressure.
When there are questions concerning measurement results:
In order to provide correlation data, the test shall be conducted under condition of 20±2℃ of temperature, 60 to 70% relative humidity, and 86 to 106kPa of air pressure. Unless otherwise specified, all the tests are conducted under the "standard condition."
(Note 1) Measurement shall be made after 48±2 hrs of recovery under the standard condition.

Precautions on the use of Multilayer chip inductors
Multilayer chip inductors for high frequency, Multilayer chip bead inductors

■PRECAUTIONS

1. Circuit Design

Precautions

◆Verification of operating environment, electrical rating and performance

1. A malfunction in medical equipment, spacecraft, nuclear reactors, etc. may cause serious harm to human life or have severe social ramifications.
   As such, any inductors to be used in such equipment may require higher safety and/or reliability considerations and should be clearly differentiated from components used in general purpose applications.

◆Operating Current (Verification of Rated current)

1. The operating current for inductors must always be lower than their rated values.
2. Do not apply current in excess of the rated value because the inductance may be reduced due to the magnetic saturation effect.

2. PCB Design

Precautions

◆Pattern configurations (Design of Land-patterns)

1. When inductors are mounted on a PCB, the size of land patterns and the amount of solder used (size of fillet) can directly affect inductor performance.
   Therefore, the following items must be carefully considered in the design of solder land patterns:
   (1) The amount of solder applied can affect the ability of chips to withstand mechanical stresses which may lead to breaking or cracking. Therefore, when designing land-patterns it is necessary to consider the appropriate size and configuration of the solder pads which in turn determines the amount of solder necessary to form the fillets.
   (2) When more than one part is jointly soldered onto the same land or pad, the pad must be designed so that each component's soldering point is separated by solder-resist.
   (3) The larger size of land patterns and amount of solder, the smaller Q value after mounting on PCB. It makes higher the Q value to design land patterns smaller than terminal electrode of chips.

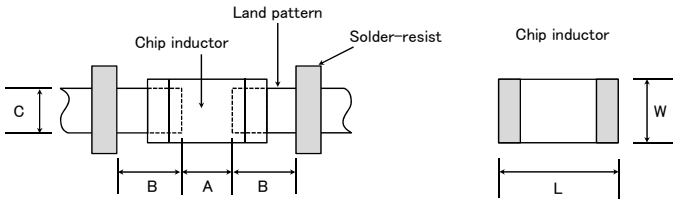
◆Pattern configurations (Inductor layout on panelized[breakaway] PC boards)

1. After inductors have been mounted on the boards, chips can be subjected to mechanical stresses in subsequent manufacturing processes (PCB cutting, board inspection, mounting of additional parts, assembly into the chassis, wave soldering the reflow soldered boards etc.) For this reason, planning pattern configurations and the position of SMD inductors should be carefully performed to minimize stress.

Technical considerations

◆Pattern configurations (Design of Land-patterns)

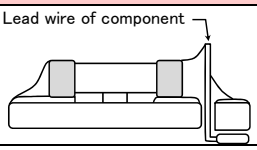
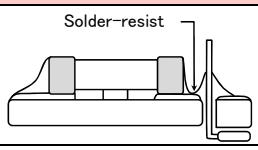
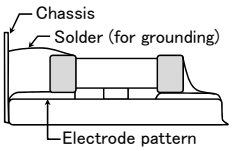
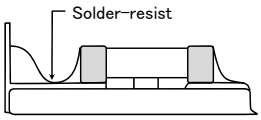
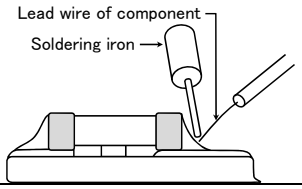
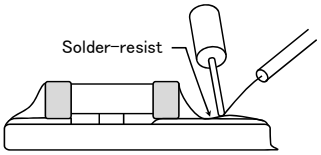
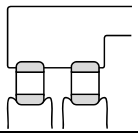
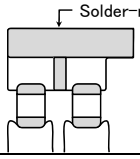
1. The following diagrams and tables show some examples of recommended patterns to prevent excessive solder amounts (larger fillets which extend above the component end terminations). Examples of improper pattern designs are also shown.
   (1) Recommended land dimensions for a typical chip inductor land patterns for PCBs



Recommended land dimensions for reflow-soldering (Unit: mm)

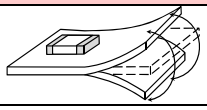
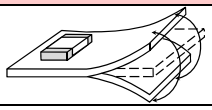
Type		0603	1005
Size	L	0.6	1.0
	W	0.3	0.5
A		0.20～0.30	0.45～0.55
B		0.20～0.30	0.40～0.50
C		0.25～0.40	0.45～0.55

(2) Examples of good and bad solder application

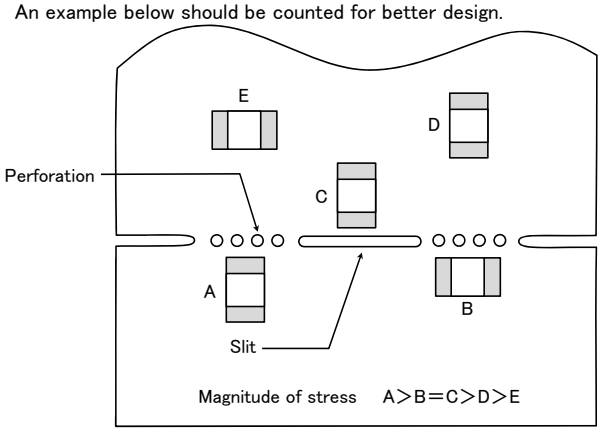
Item	Not recommended	Recommended
Mixed mounting of SMD and leaded components		
Component placement close to the chassis		
Hand-soldering of leaded components near mounted components		
Horizontal component placement		

◆Pattern configurations (Inductor layout on panelized[breakaway] PC boards)

1-1. The following are examples of good and bad inductor layout; SMD inductors should be located to minimize any possible mechanical stresses from board warp or deflection.

Item	Not recommended	Recommended
Deflection of the board		 Position the component at a right angle to the direction of the mechanical stresses that are anticipated.

1-2. To layout the inductors for the breakaway PC board, it should be noted that the amount of mechanical stresses given will vary depending on inductor layout.
An example below should be counted for better design.



1-3. When breaking PC boards along their perforations, the amount of mechanical stress on the inductors can vary according to the method used. The following methods are listed in order from least stressful to most stressful: push-back, slit, V-grooving, and perforation. Thus, any ideal SMD inductor layout must also consider the PCB splitting procedure.

3. Considerations for automatic placement

Precautions

◆Adjustment of mounting machine

1. Excessive impact load should not be imposed on the inductors when mounting onto the PC boards.
2. The maintenance and inspection of the mounter should be conducted periodically.

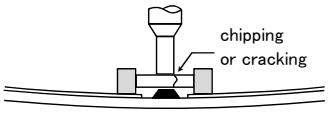
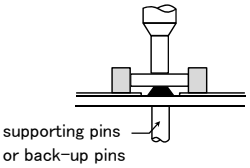
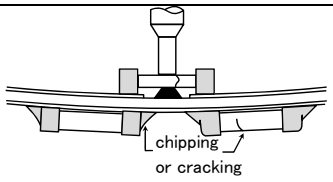
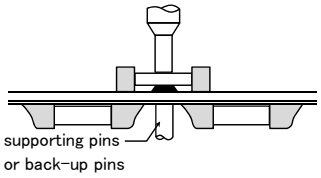
◆Selection of Adhesives

1. Mounting inductors with adhesives in preliminary assembly, before the soldering stage, may lead to degraded inductor characteristics unless the following factors are appropriately checked; the size of land patterns, type of adhesive, amount applied, hardening temperature and hardening period. Therefore, it is imperative to consult the manufacturer of the adhesives on proper usage and amounts of adhesive to use.

Technical considerations

◆Adjustment of mounting machine

1. If the lower limit of the pick-up nozzle is low, too much force may be imposed on the inductors, causing damage. To avoid this, the following points should be considered before lowering the pick-up nozzle:
   (1) The lower limit of the pick-up nozzle should be adjusted to the surface level of the PC board after correcting for deflection of the board.
   (2) The pick-up pressure should be adjusted between 1 and 3N static loads.
   (3) To reduce the amount of deflection of the board caused by impact of the pick-up nozzle, supporting pins or back-up pins should be used under the PC board. The following diagrams show some typical examples of good pick-up nozzle placement:

Item	Improper method	Proper method
Single-sided mounting		
Double-sided mounting		

2. As the alignment pin wears out, adjustment of the nozzle height can cause chipping or cracking of the inductors because of mechanical impact on the inductors. To avoid this, the monitoring of the width between the alignment pin in the stopped position, and maintenance, inspection and replacement of the pin should be conducted periodically.

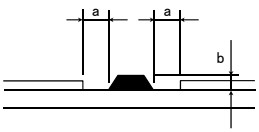
◆Selection of Adhesives

1. Some adhesives may cause reduced insulation resistance. The difference between the shrinkage percentage of the adhesive and that of the inductors may result in stresses on the inductors and lead to cracking. Moreover, too little or too much adhesive applied to the board may adversely affect component placement, so the following precautions should be noted in the application of adhesives.
   (1) Required adhesive characteristics
      a. The adhesive should be strong enough to hold parts on the board during the mounting & solder process.
      b. The adhesive should have sufficient strength at high temperatures.
      c. The adhesive should have good coating and thickness consistency.
      d. The adhesive should be used during its prescribed shelf life.
      e. The adhesive should harden rapidly.
      f. The adhesive must not be contaminated.
      g. The adhesive should have excellent insulation characteristics.
      h. The adhesive should not be toxic and have no emission of toxic gasses.
   (2) When using adhesives to mount inductors on a PCB, inappropriate amounts of adhesive on the board may adversely affect component placement. Too little adhesive may cause the inductors to fall off the board during the solder process. Too much adhesive may cause defective soldering due excessive flow of adhesive on to the land or solder pad.

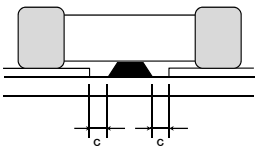
[Recommended conditions]

Figure	0805 case sizes as examples
a	0.3mm min
b	100～120 μm
c	Area with no adhesive

Amount of adhesives



After inductors are bonded



4. Soldering

Precautions

◆Selection of Flux

1. Since flux may have a significant effect on the performance of inductors, it is necessary to verify the following conditions prior to use;
   (1) Flux used should be with less than or equal to 0.1 wt% (Chlorine conversion method) of halogenated content. Flux having a strong acidity content should not be applied.
   (2) When soldering inductors on the board, the amount of flux applied should be controlled at the optimum level.
   (3) When using water-soluble flux, special care should be taken to properly clean the boards.

◆Soldering

1. Temperature, time, amount of solder, etc. are specified in accordance with the following recommended conditions, and please contact us about peak temperature when you use lead-free paste.

Technical considerations

◆Selection of Flux

1-1. When too much halogenated substance (Chlorine, etc.) content is used to activate the flux, or highly acidic flux is used, an excessive amount of residue after soldering may lead to corrosion of the terminal electrodes or degradation of insulation resistance on the surface of the Inductor.

1-2. Flux is used to increase solderability in flow soldering, but if too much is applied, a large amount of flux gas may be emitted and may detrimentally affect solderability. To minimize the amount of flux applied, it is recommended to use a flux-bubbling system.

1-3. Since the residue of water-soluble flux is easily dissolved by water content in the air, the residue on the surface of Inductor in high humidity conditions may cause a degradation of insulation resistance and therefore affect the reliability of the components. The cleaning methods and the capability of the machines used should also be considered carefully when selecting water-soluble flux.

◆Soldering

1-1. Preheating when soldering

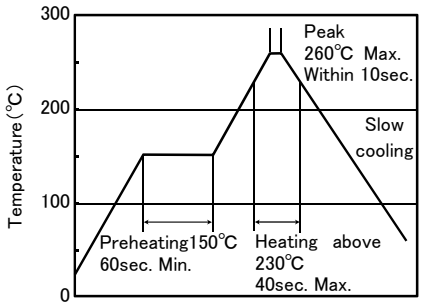
Preheating: Inductors shall be preheated sufficiently, and the temperature difference between the inductors and solder shall be within 130°C.

Cooling: The temperature difference between the components and cleaning process should not be greater than 100°C.

Inductors are susceptible to thermal shock when exposed to rapid or concentrated heating or rapid cooling. Therefore, the soldering process must be conducted with a great care so as to prevent malfunction of the components due to excessive thermal shock.

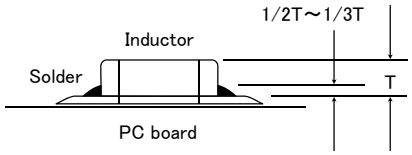
[Reflow soldering]

【Recommended condition for Pb-free soldering】



Caution

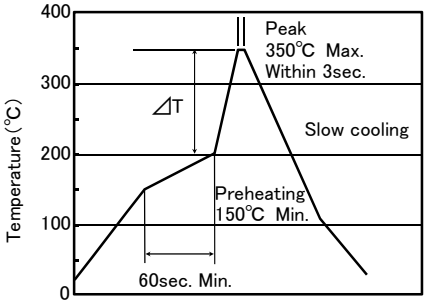
1. Solder (fillet) should wet up to 1/2 to 1/3 of the thickness of an inductor ideally as shown below:



2. Because excessive dwell time can detrimentally affect solderability, soldering duration shall be kept as close to recommended time as possible.
3. The allowable number of reflow soldering is two (2) times.

[Hand soldering]

【Recommended condition for Pb-free soldering】



(※⊿T≦150□)

Caution

1. It is recommended to use a 20W soldering iron with a maximum tip diameter of 1.0 mm.
2. The soldering iron shall not directly touch inductors
3. The allowable number of hand soldering is one (1) time

5. Cleaning

Precautions

◆Cleaning conditions

1. When cleaning the PC board after the Inductors are all mounted, select the appropriate cleaning solution according to the type of flux used and purpose of the cleaning(e.g. to remove soldering flux or other materials from the production process.)
2. Cleaning conditions should be determined after verifying, through a test run, that the cleaning process does not affect the inductor's characteristics.

Technical considerations

◆Cleaning conditions

1. The use of inappropriate solutions can cause foreign substances such as flux residue to adhere to the inductor, resulting in a degradation of the inductor's electrical properties(especially insulation resistance).
2. Inappropriate cleaning conditions(insufficient or excessive cleaning)may detrimentally affect the performance of the inductors.
   In the case of ultrasonic cleaning, too much power output can cause excessive vibration of the PC board which may lead to the cracking of the inductor or the soldered portion, or decrease the terminal electrodes' strength. Therefore, the following conditions should be carefully checked;

Ultrasonic output	20W/ℓ or less
Ultrasonic frequency	40kHz or less
Ultrasonic washing period	5 min. or less

6. Resin coating and mold

Precautions

1. With some type of resins a decomposition gas or chemical reaction vapor may remain inside the resin during the hardening period or while left under normal storage conditions resulting in the deterioration of the inductor's performance.
2. Thermal expansion and thermal shrinkage characteristics of resins may lead to the deterioration of inductors' performance.
3. When a resin hardening temperature is higher than inductor operating temperature, the stresses generated by the excessive heat may lead to damage in inductors.

7. Handling

Precautions

◆Breakaway PC boards(splitting along perforations)

1. When splitting the PC board after mounting inductors and other components, care is required so as not to give any stresses of deflection or twisting to the board.
2. Board separation should not be done manually, but by using the appropriate devices.

◆General handling precautions

1. Always wear static control bands to protect against ESD.
2. Keep the inductors away from all magnets and magnetic objects.
3. Use non-magnetic tweezers when handling inductors.
4. Any devices used with the inductors(soldering irons, measuring instruments) should be properly grounded.
5. Keep bare hands and metal products(i.e., metal desk)away from inductor electrodes or conductive areas that lead to chip electrodes.
6. Keep inductors away from items that generate magnetic fields such as speakers or coils.

◆Mechanical considerations

1. Be careful not to subject the inductors to excessive mechanical shocks.
   (1) If inductors are dropped on the floor or a hard surface they should not be used.
   (2) When handling the mounted boards, be careful that the mounted components do not come in contact with or bump against other boards or components.

8. Storage conditions

Precautions

◆Storage

1. To maintain the solderability of terminal electrodes and to keep the packaging material in good condition, care must be taken to control temperature and humidity in the storage area. Humidity should especially be kept as low as possible.
   ・Recommended conditions
   Ambient temperature: 30℃or below Humidity: 70% RH or below
   The ambient temperature must be kept below 40℃. Even under ideal storage conditions, solderability of inductor is deteriorated as time passes, so inductors should be used within 6 months from the time of delivery.
   ・Inductor should be kept where no chlorine or sulfur exists in the air.

Technical considerations

◆Storage

1. If the parts are stocked in a high temperature and humidity environment, problems such as reduced solderability caused by oxidation of terminal electrodes and deterioration of taping/packaging materials may take place. For this reason, components should be used within 6 months from the time of delivery. If exceeding the above period, please check solderability before using the inductors.