有关敝公司产品的注意事项 【高度安全性，可靠性的应用设备(汽车室内 / 产业机器)】

请务必在使用敝司产品之前阅读。

⚠ 注 意

- 本产品目录中所记载的内容为2017年10月之内容。因改良等原因，可能会不经预告而变更记载内容，所以请务必在使用前先确认最新的产品信息。未按照本产品目录中所记载的内容或交货规格说明书使用敝公司产品的，即便其致使使用设备发生损害、瑕疵等时，敝公司也不承担任何责任，敬请悉知。

- 就规格相关的详细内容，敝公司备有交货规格说明书，详情请向敝公司咨询。

- 使用敝公司产品时，请务必事先安装到设备之后，在实际使用的环境下进行评估和确认。

- 本产品目录中所记载的产品可使用于一般电子设备（音像设备、办公自动化设备、家电产品、办公设备、信息/通讯设备）、医疗设备（国际（IMDRF）第一类，第二类）、产业机器、室内电灯等。若考虑将本产品目录中所记载的产品使用于可能会直接危及生命或身体的设备［运输用设备（汽车驱动控制设备、火车控制设备、船舶控制设备等）、交通用信号设备、医疗设备（国际（IMDRF）第三类）］等的，请务必事先向敝公司咨询。

  另外，请勿将敝公司产品使用于对安全性和可靠性要求较高的设备（航天设备、航空设备※、医疗设备（国际（IMDRF）第四类）、原子能控制设备、海底设备、军事设备等）。

  ※ 注释：仅限于对航空设备的安全运行不产生直接干扰的设备[机内娱乐设备、机内照明设备、电动座椅、餐饮设备等]，在满足敝公司另行指定的相关条件时，亦可将敝公司产品用于以上用途。在贵公司考虑将敝公司的产品用于以上用途时，请务必事先向敝公司咨询相关的信息。

  且即便属于一般电子设备，使用于对安全性和可靠性要求较高的设备、电路上时，敝公司建议进行充分的安全评估，并根据需要，在设计时追加保护电路等。

  未经敝公司的事先书面同意，把本产品目录中所记载的产品使用于前述需要向敝公司咨询的设备或敝公司禁止使用的设备，从而给客户或第三方造成损害的，敝公司不承担任何责任，敬请悉知。

- 本产品目录中所记载的信息是用于说明相关产品的典型操作以及相关应用。此类信息的使用不代表对于敝公司以及第三方的知识产权以及其他权利的使用许可或是不侵权保证。

- 敝公司产品的保证范围仅限于交付的敝公司产品单品，就敝公司产品的故障或瑕疵所诱发的损害，敝公司不承担任何责任，敬请悉知。但是，以书面形式另行签署了交易基本合同书，品质保证协定书等时，敝公司将根据该合同等的条件提供保证。

- 本产品目录中所记载的内容适用于从敝公司营业所、销售子公司、销售代理店（即“正规销售渠道”）购买的敝公司产品，并不适用于从上述以外的渠道购买的敝公司产品，敬请悉知。

- 出口相关注意事项

  本产品目录中所记载的部分产品在出口时须事先确认《外汇和对外贸易法》以及美国出口管理的相关法规，并办理相关手续。如有不明之处，请向敝公司咨询。

绕线型片状电感器(LB系列)

回流焊

■型号标示法　　*使用温度范围　:-40～105℃（包括本身发热）

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

△＝空格

①类型

代码	类型
LB	绕线型片状电感器

②特性

代码	特性
△△	标准品
△C	大电流
△R	低Rdc

③尺寸 (L × W)

代码	外型 (inch)	尺寸 (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

④包装

代码	包装
T	卷盘带装

⑤标称电感值

代码 (例)	标称电感值 [μH]
1R0	1.0
100	10
101	100

※R＝小数点

⑥电感量公差

代码	电感量公差
K	±10%
M	±20%

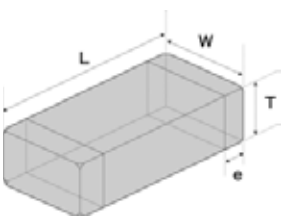
⑦个别规格

代码	个别规格
△	标准品
R	低Rdc 型

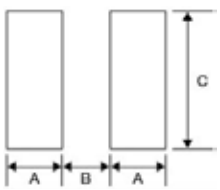
⑧本公司管理记号

代码	本公司管理记号
V	产业机器/车内用途

■标准外型尺寸 / 标准数量



推荐焊盘图案
实装上的注意
·请确认实装状态后使用。
·本产品焊法限定为回流焊法。



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

单位: mm

Type	L	W	T	e	标准数量[pcs]	
					纸带	压纹带
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

单位: mm (inch)

▶由于篇幅有限，本产品目录中只记载了有代表性的产品规格，若考虑使用弊司产品时，请确认交货规格说明书中的详细规格。
另外，有关各产品的详细信息(特性图、可靠性信息、使用时的注意事项等)，请参阅弊司网站(http://www.ty-top.com/)。

■型号一览

・商品目录记载的绕线型片状电感器均为RoHS对应产品。

注）
・根据使用电路和机器，需要按照相应规格处理。请务必咨询正规销售渠道。

・*2：面向工业设备、医疗设备的产品。
关于本产品的详细规格和评估测试结果等信息，请咨询官方销售渠道。
此外，订购时请索取产品规格书。
若用于汽车设备时，请务必事先咨询本公司。

●2012(0805)type

型号	标称电感值 [μH]	电感量公差	自共振频率 [MHz] (min.)	直流电阻 [Ω] (±30%)	额定电流 [mA] (max.)	测试频率 [MHz]	注释
LB 2012T1R0M V	1.0	±20%	100	0.15	405	7.96	*2
LB 2012T2R2M V	2.2	±20%	80	0.23	260	7.96	*2
LB 2012T3R3M V	3.3	±20%	55	0.30	235	7.96	*2
LB 2012T4R7M V	4.7	±20%	45	0.40	190	7.96	*2
LB 2012T6R8M V	6.8	±20%	38	0.47	135	7.96	*2
LB 2012T100□ V	10	±10%, ±20%	32	0.70	120	2.52	*2
LB 2012T100□RV	10	±10%, ±20%	32	0.50	120	2.52	*2
LB 2012T150□ V	15	±10%, ±20%	28	1.3	100	2.52	*2
LB 2012T220□ V	22	±10%, ±20%	16	1.7	80	2.52	*2
LB 2012T470□ V	47	±10%, ±20%	11	3.7	60	2.52	*2
LB 2012T680□ V	68	±10%, ±20%	10	6.0	50	2.52	*2
LB 2012T101□ V	100	±10%, ±20%	8	7.0	45	0.796	*2

型号	标称电感值 [μH]	电感量公差	自共振频率 [MHz] (min.)	直流电阻 [Ω] (±30%)	额定电流 [mA] (max.)	测试频率 [MHz]	注释
LB C2012T1R0M V	1.0	±20%	100	0.19	620	7.96	*2
LB C2012T2R2M V	2.2	±20%	70	0.33	430	7.96	*2
LB C2012T4R7M V	4.7	±20%	45	0.50	295	7.96	*2
LB C2012T100□ V	10	±10%, ±20%	40	1.2	200	2.52	*2
LB C2012T220□ V	22	±10%, ±20%	16	3.7	130	2.52	*2
LB C2012T470□ V	47	±10%, ±20%	11	5.8	90	2.52	*2

型号	标称电感值 [μH]	电感量公差	自共振频率 [MHz] (min.)	直流电阻 [Ω] (±30%)	额定电流 [mA] (max.)	测试频率 [MHz]	注释
LB R2012T1R0M V	1.0	±20%	100	0.07	400	7.96	*2
LB R2012T2R2M V	2.2	±20%	80	0.13	260	7.96	*2
LB R2012T4R7M V	4.7	±20%	45	0.24	200	7.96	*2
LB R2012T100□ V	10	±10%, ±20%	32	0.36	150	2.52	*2
LB R2012T220□ V	22	±10%, ±20%	16	1.0	100	2.52	*2
LB R2012T470□ V	47	±10%, ±20%	11	1.7	75	2.52	*2
LB R2012T101□ V	100	±10%, ±20%	8	4.0	50	0.796	*2

●2016(0806)type

型号	标称电感值 [μH]	电感量公差	自共振频率 [MHz] (min.)	直流电阻 [Ω] (±30%)	额定电流 [mA] (max.)	测试频率 [MHz]	注释
LB 2016T1R0M V	1.0	±20%	100	0.09	490	7.96	*2
LB 2016T1R5M V	1.5	±20%	80	0.11	380	7.96	*2
LB 2016T2R2M V	2.2	±20%	70	0.13	375	7.96	*2
LB 2016T3R3M V	3.3	±20%	55	0.20	285	7.96	*2
LB 2016T4R7M V	4.7	±20%	45	0.25	225	7.96	*2
LB 2016T6R8M V	6.8	±20%	38	0.35	200	7.96	*2
LB 2016T100□ V	10	±10%, ±20%	32	0.50	155	2.52	*2
LB 2016T150□ V	15	±10%, ±20%	28	0.70	130	2.52	*2
LB 2016T220□ V	22	±10%, ±20%	16	1.0	105	2.52	*2
LB 2016T330□ V	33	±10%, ±20%	14	1.7	85	2.52	*2
LB 2016T470□ V	47	±10%, ±20%	11	2.4	70	2.52	*2
LB 2016T680□ V	68	±10%, ±20%	10	3.0	55	2.52	*2
LB 2016T101□ V	100	±10%, ±20%	8	4.5	40	0.796	*2

型号	标称电感值 [μH]	电感量公差	自共振频率 [MHz] (min.)	直流电阻 [Ω] (±30%)	额定电流 [mA] (max.)	测试频率 [MHz]	注释
LB C2016T1R0M V	1.0	±20%	100	0.10	690	7.96	*2
LB C2016T1R5M V	1.5	±20%	80	0.15	600	7.96	*2
LB C2016T2R2M V	2.2	±20%	70	0.20	520	7.96	*2
LB C2016T3R3M V	3.3	±20%	55	0.27	410	7.96	*2
LB C2016T4R7M V	4.7	±20%	45	0.37	355	7.96	*2
LB C2016T6R8M V	6.8	±20%	38	0.59	290	7.96	*2
LB C2016T100□ V	10	±10%, ±20%	32	0.82	245	2.52	*2
LB C2016T150□ V	15	±10%, ±20%	28	1.2	200	2.52	*2
LB C2016T220□ V	22	±10%, ±20%	16	1.8	165	2.52	*2
LB C2016T330□ V	33	±10%, ±20%	14	2.8	135	2.52	*2
LB C2016T470□ V	47	±10%, ±20%	11	4.3	110	2.52	*2
LB C2016T680□ V	68	±10%, ±20%	10	7.0	95	2.52	*2
LB C2016T101□ V	100	±10%, ±20%	8	8.0	75	0.796	*2

(注) 型号中的[]中标有电感值代码 (M或K)。

・LB、LBC系列
※) 额定电流: 直流叠加导致的电感降低在10%以内、以及温度上升20℃或以下都满足的最大直流电流值。

・LBR系列
※) 额定电流: 直流叠加导致的电感降低在20%以内、以及温度上升20℃或以下都满足的最大直流电流值。

▶由于篇幅有限，本产品目录中只记载了有代表性的产品规格，若考虑使用弊司产品时，请确认交货规格说明书中的详细规格。
另外，有关各产品的详细信息(特性图、可靠性信息、使用时的注意事项等)，请参阅弊司网站(http://www.ty-top.com/)。

■型号一览

●2518(1007)type

型号	标称电感值 [μH]	电感量公差	自共振频率 [MHz] (min.)	直流电阻 [Ω] (±30%)	额定电流 [mA] (max.)	测试频率 [MHz]	注释
LB 2518T1R0M V	1.0	±20%	100	0.06	665	7.96	*2
LB 2518T1R5M V	1.5	±20%	80	0.07	405	7.96	*2
LB 2518T2R2M V	2.2	±20%	68	0.09	340	7.96	*2
LB 2518T3R3M V	3.3	±20%	54	0.11	280	7.96	*2
LB 2518T4R7M V	4.7	±20%	46	0.13	240	7.96	*2
LB 2518T4R7MRV	4.7	±20%	46	0.10	235	7.96	*2
LB 2518T6R8M V	6.8	±20%	38	0.15	195	7.96	*2
LB 2518T100□ V	10	±10%, ±20%	30	0.25	165	2.52	*2
LB 2518T150□ V	15	±10%, ±20%	23	0.32	145	2.52	*2
LB 2518T220□ V	22	±10%, ±20%	19	0.50	115	2.52	*2
LB 2518T330□ V	33	±10%, ±20%	15	0.70	95	2.52	*2
LB 2518T470□ V	47	±10%, ±20%	12	0.95	85	2.52	*2
LB 2518T680□ V	68	±10%, ±20%	9.5	1.5	70	2.52	*2
LB 2518T101□ V	100	±10%, ±20%	9.0	2.1	60	0.796	*2
LB 2518T151□ V	150	±10%, ±20%	7.0	3.2	45	0.796	*2
LB 2518T221□ V	220	±10%, ±20%	5.5	4.5	40	0.796	*2
LB 2518T331□ V	330	±10%, ±20%	4.5	7.0	30	0.796	*2
LB 2518T471□ V	470	±10%, ±20%	3.5	10	25	0.796	*2
LB 2518T681□ V	680	±10%, ±20%	3.0	17	20	0.796	*2
LB 2518T102□ V	1000	±10%, ±20%	2.4	24	15	0.252	*2

型号	标称电感值 [μH]	电感量公差	自共振频率 [MHz] (min.)	直流电阻 [Ω] (±30%)	额定电流 [mA] (max.)	测试频率 [MHz]	注释
LB C2518T1R0M V	1.0	±20%	100	0.080	775	7.96	*2
LB C2518T1R0MRV	1.0	±20%	100	0.065	890	7.96	*2
LB C2518T1R5M V	1.5	±20%	80	0.110	730	7.96	*2
LB C2518T2R2M V	2.2	±20%	68	0.130	630	7.96	*2
LB C2518T3R3M V	3.3	±20%	54	0.160	560	7.96	*2
LB C2518T4R7M V	4.7	±20%	41	0.200	510	7.96	*2
LB C2518T6R8M V	6.8	±20%	38	0.300	420	7.96	*2
LB C2518T100□ V	10	±10%, ±20%	30	0.360	375	2.52	*2
LB C2518T150□ V	15	±10%, ±20%	23	0.650	285	2.52	*2
LB C2518T220□ V	22	±10%, ±20%	19	0.770	250	2.52	*2
LB C2518T330□ V	33	±10%, ±20%	15	1.50	185	2.52	*2
LB C2518T470□ V	47	±10%, ±20%	12	1.90	165	2.52	*2
LB C2518T680□ V	68	±10%, ±20%	9.5	2.80	140	2.52	*2
LB C2518T101□ V	100	±10%, ±20%	9.0	3.70	125	0.796	*2
LB C2518T151□ V	150	±10%, ±20%	7.0	6.10	95	0.796	*2
LB C2518T221□ V	220	±10%, ±20%	5.5	8.40	80	0.796	*2
LB C2518T331□ V	330	±10%, ±20%	4.5	12.3	65	0.796	*2
LB C2518T471□ V	470	±10%, ±20%	3.5	22.0	50	0.796	*2
LB C2518T681□ V	680	±10%, ±20%	3.0	28.0	45	0.796	*2

型号	标称电感值 [μH]	电感量公差	自共振频率 [MHz] (min.)	直流电阻 [Ω] (±30%)	额定电流 [mA] (max.)	测试频率 [MHz]	注释
LB R2518T1R0M V	1.0	±20%	100	0.045	960	7.96	*2
LB R2518T2R2M V	2.2	±20%	68	0.07	480	7.96	*2
LB R2518T4R7M V	4.7	±20%	45	0.10	345	7.96	*2
LB R2518T100□ V	10	±10%, ±20%	30	0.19	235	2.52	*2
LB R2518T220□ V	22	±10%, ±20%	19	0.44	175	2.52	*2
LB R2518T470□ V	47	±10%, ±20%	11	0.84	120	2.52	*2
LB R2518T101□ V	100	±10%, ±20%	9	1.89	80	0.796	*2

●3218(1207)type

型号	标称电感值 [μH]	电感量公差	自共振频率 [MHz] (min.)	直流电阻 [Ω] (±30%)	额定电流 [mA] (max.)	测试频率 [MHz]	注释
LB 3218T1R0M V	1.0	±20%	100	0.06	1,075	7.96	*2
LB 3218T1R5M V	1.5	±20%	80	0.07	860	7.96	*2
LB 3218T2R2M V	2.2	±20%	68	0.09	775	7.96	*2
LB 3218T3R3M V	3.3	±20%	54	0.11	560	7.96	*2
LB 3218T4R7M V	4.7	±20%	41	0.13	550	7.96	*2
LB 3218T6R8M V	6.8	±20%	40	0.17	380	7.96	*2
LB 3218T100□ V	10	±10%, ±20%	30	0.25	340	2.52	*2
LB 3218T150□ V	15	±10%, ±20%	25	0.32	300	2.52	*2
LB 3218T220□ V	22	±10%, ±20%	19	0.49	255	2.52	*2
LB 3218T330□ V	33	±10%, ±20%	15	0.75	215	2.52	*2
LB 3218T470□ V	47	±10%, ±20%	12	0.92	205	2.52	*2
LB 3218T680□ V	68	±10%, ±20%	11	1.49	145	2.52	*2
LB 3218T101□ V	100	±10%, ±20%	8.0	2.4	140	0.796	*2
LB 3218T151□ V	150	±10%, ±20%	7.0	3.2	105	0.796	*2
LB 3218T221□ V	220	±10%, ±20%	5.0	5.4	80	0.796	*2
LB 3218T331□ V	330	±10%, ±20%	4.0	7.0	65	0.796	*2
LB 3218T471□ V	470	±10%, ±20%	3.5	14	54	0.796	*2
LB 3218T681□ V	680	±10%, ±20%	3.0	17	45	0.796	*2
LB 3218T102□ V	1000	±10%, ±20%	2.4	27	39	0.252	*2

(注) 型号中的[]中标有电感值代码 (M或K) 。

·LB、LBC系列

※) 额定电流: 直流叠加导致的电感降低在10%以内、以及温度上升20℃或以下都满足的最大直流电流值。

·LBR系列

※) 额定电流: 直流叠加导致的电感降低在20%以内、以及温度上升20℃或以下都满足的最大直流电流值。

▶由于篇幅有限，本产品目录中只记载了有代表性的产品规格，若考虑使用弊司产品时，请确认交货规格说明书中的详细规格。
另外，有关各产品的详细信息(特性图、可靠性信息、使用时的注意事项等)，请参阅弊司网站(http://www.ty-top.com/)。

■型号一览

●3225(1210)type

型号	标称电感值 [μH]	电感量公差	自共振频率 [MHz] (min.)	直流电阻 [Ω] (±30%)	额定电流 [mA] (max.)	测试频率 [MHz]	注释
LB C3225T1R0MRV	1.0	±20%	250	0.055	1,100	0.1	*2
LB C3225T1R5MRV	1.5	±20%	220	0.060	1,000	0.1	*2
LB C3225T2R2MRV	2.2	±20%	190	0.080	930	0.1	*2
LB C3225T3R3MRV	3.3	±20%	160	0.095	820	0.1	*2
LB C3225T4R7MRV	4.7	±20%	70	0.100	680	0.1	*2
LB C3225T6R8MRV	6.8	±20%	50	0.120	620	0.1	*2
LB C3225T100□RV	10	±10%, ±20%	23	0.133	540	0.1	*2
LB C3225T150□RV	15	±10%, ±20%	20	0.195	420	0.1	*2
LB C3225T220□RV	22	±10%, ±20%	17	0.27	330	0.1	*2
LB C3225T330□RV	33	±10%, ±20%	13	0.41	300	0.1	*2
LB C3225T470□RV	47	±10%, ±20%	10	0.67	220	0.1	*2
LB C3225T680□RV	68	±10%, ±20%	8	1.0	190	0.1	*2
LB C3225T101□RV	100	±10%, ±20%	6	1.4	150	0.1	*2

(注) 型号中的[]中标有电感值代码 (M或K)。

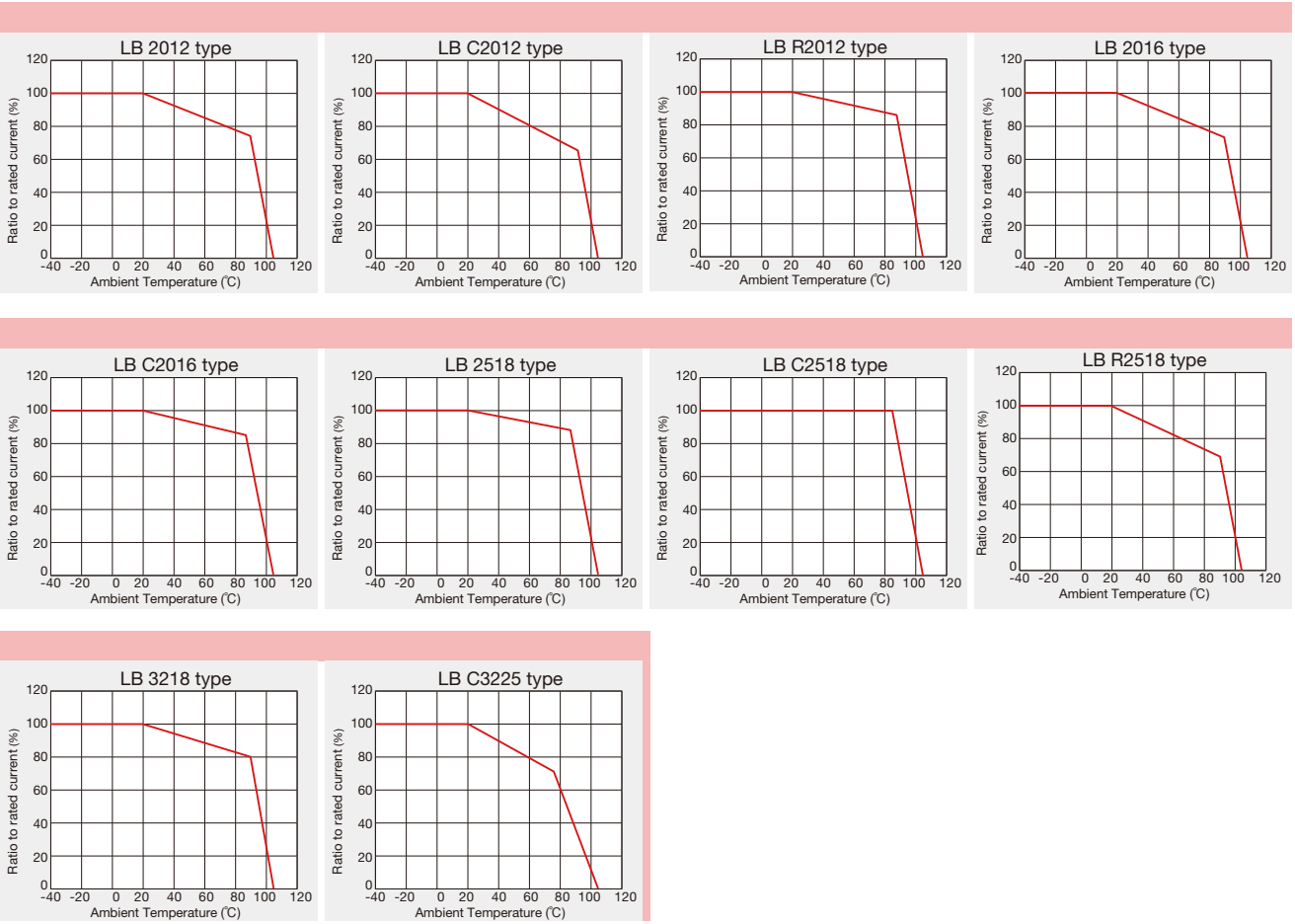
·LB、LBC系列

※) 额定电流: 直流叠加导致的电感降低在10%以内、以及温度上升20℃或以下都满足的最大直流电流值。

■降低额定电流值

●LB系列

LB 系列需要根据周围温度降低额定电流值。
请参照下图降低使用电流的额定值。



▶由于篇幅有限，本产品目录中只记载了有代表性的产品规格，若考虑使用弊司产品时，请确认交货规格说明书中的详细规格。
另外，有关各产品的详细信息(特性图、可靠性信息、使用时的注意事项等)，请参阅弊司网站(http://www.ty-top.com/)。

信号用绕线型片状电感器(LB系列 M型)

回流焊

■型号标示法

*使用温度范围　：-40～105℃（包括本身发热）

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

△＝空格

①类型

代码	类型
LBM	信号用绕线型片状电感器

②尺寸（L × W）

代码	尺寸 (L×W) [mm]
2016	2.0×1.6

③包装

代码	包装
T	卷盘带装

④标称电感值

代码 (例)	标称电感值 [μH]
R12	0.12
1R0	1.00
100	10
101	100

※R＝小数点

⑤电感量公差

代码	电感量公差
J	±5%

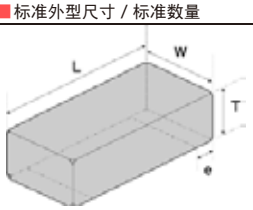
⑥个别规格

代码	个别规格
△	标准品

⑦本公司管理记号

代码	本公司管理记号
V	产业机器/车内用途

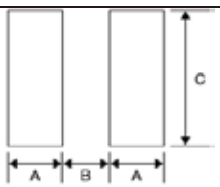
■标准外型尺寸 / 标准数量



推荐焊盘图案
实装上的注意
·请确认实装状态后使用。
·本产品焊法限定为回流焊法。

Type	A	B	C
LBM2016	0.6	1.0	1.8

单位: mm



Type	L	W	T	e	标准数量[pcs]	
					纸带	压纹带
LBM2016	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

单位: mm (inch)

▶由于篇幅有限，本产品目录中只记载了有代表性的产品规格，若考虑使用弊司产品时，请确认交货规格说明书中的详细规格。
另外，有关各产品的详细信息(特性图、可靠性信息、使用时的注意事项等)，请参阅弊司网站(http://www.ty-top.com/)。

■型号一览

· 商品目录记载的绕线型片状电感器均为RoHS对应产品。

注）
· 根据使用电路和机器，需要按照相应规格处理。请务必咨询正规销售渠道。

· *2：面向工业设备、医疗设备的产品。
关于本产品的详细规格和评估测试结果等信息，请咨询官方销售渠道。
此外，订购时请索取产品规格书。
若用于汽车设备时，请务必事先咨询本公司。

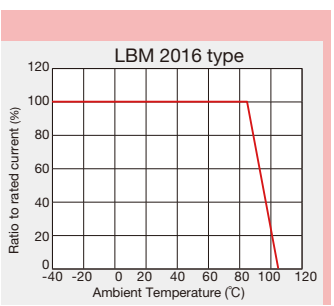
●LBM2016 type

型号	标称电感值 [μH]	电感量公差	Q值 (min.)	自共振频率 [MHz] (min.)	直流电阻 [Ω] (±30%)	额定电流 [mA] (max.)	测试频率 [MHz]	注释
LBM 2016TR12J V	0.12	±5%	30	600	0.13	610	25.2	*2
LBM 2016TR15J V	0.15	±5%	30	550	0.15	570	25.2	*2
LBM 2016TR18J V	0.18	±5%	30	500	0.15	560	25.2	*2
LBM 2016TR22J V	0.22	±5%	30	450	0.20	520	25.2	*2
LBM 2016TR27J V	0.27	±5%	30	425	0.21	510	25.2	*2
LBM 2016TR33J V	0.33	±5%	30	400	0.21	490	25.2	*2
LBM 2016TR39J V	0.39	±5%	30	375	0.26	440	25.2	*2
LBM 2016TR47J V	0.47	±5%	30	350	0.26	430	25.2	*2
LBM 2016TR56J V	0.56	±5%	30	300	0.29	410	25.2	*2
LBM 2016TR68J V	0.68	±5%	30	270	0.32	400	25.2	*2
LBM 2016TR82J V	0.82	±5%	30	250	0.34	390	25.2	*2
LBM 2016T1R0J V	1.0	±5%	30	220	0.38	385	7.96	*2
LBM 2016T1R2J V	1.2	±5%	30	180	0.41	370	7.96	*2
LBM 2016T1R5J V	1.5	±5%	30	135	0.47	350	7.96	*2
LBM 2016T1R8J V	1.8	±5%	30	100	0.48	345	7.96	*2
LBM 2016T2R2J V	2.2	±5%	30	75	0.54	340	7.96	*2
LBM 2016T2R7J V	2.7	±5%	30	55	0.59	310	7.96	*2
LBM 2016T3R3J V	3.3	±5%	30	48	0.68	290	7.96	*2
LBM 2016T3R9J V	3.9	±5%	30	43	0.74	275	7.96	*2
LBM 2016T4R7J V	4.7	±5%	30	40	0.78	270	7.96	*2
LBM 2016T5R6J V	5.6	±5%	25	36	0.88	255	7.96	*2
LBM 2016T6R8J V	6.8	±5%	25	33	0.97	240	7.96	*2
LBM 2016T8R2J V	8.2	±5%	25	30	1.1	225	7.96	*2
LBM 2016T100J V	10	±5%	25	27	1.2	215	2.52	*2
LBM 2016T120J V	12	±5%	25	23	1.4	200	2.52	*2
LBM 2016T150J V	15	±5%	25	20	1.5	190	2.52	*2
LBM 2016T180J V	18	±5%	25	18	2.5	150	2.52	*2
LBM 2016T220J V	22	±5%	25	17	2.8	140	2.52	*2
LBM 2016T270J V	27	±5%	25	16	3.2	130	2.52	*2
LBM 2016T330J V	33	±5%	25	15	3.6	125	2.52	*2
LBM 2016T390J V	39	±5%	20	14	3.9	120	2.52	*2
LBM 2016T470J V	47	±5%	20	13	4.1	115	2.52	*2
LBM 2016T560J V	56	±5%	20	12	5.9	95	2.52	*2
LBM 2016T680J V	68	±5%	20	11	7.0	90	2.52	*2
LBM 2016T820J V	82	±5%	20	10	7.7	85	2.52	*2
LBM 2016T101J V	100	±5%	15	9.0	8.0	80	0.796	*2

· LBM系列
※) 额定电流: 直流叠加导致的电感降低在10%以内、以及温度上升20℃或以下都满足的最大直流电流值。

■降低额定电流值

●LB系列 M型
LB 系列 M型需要根据周围温度降低额定电流值。
请参照下图降低使用电流的额定值。



▶由于篇幅有限，本产品目录中只记载了有代表性的产品规格，若考虑使用弊司产品时，请确认交货规格说明书中的详细规格。
另外，有关各产品的详细信息(特性图、可靠性信息、使用时的注意事项等)，请参阅弊司网站(http://www.ty-top.com/)。

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

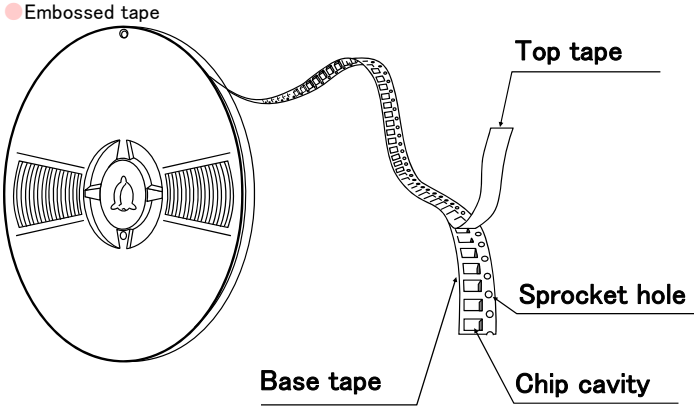
■PACKAGING

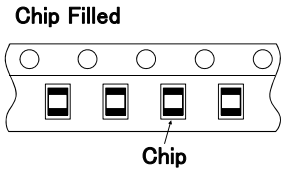
①Minimum Quantity

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

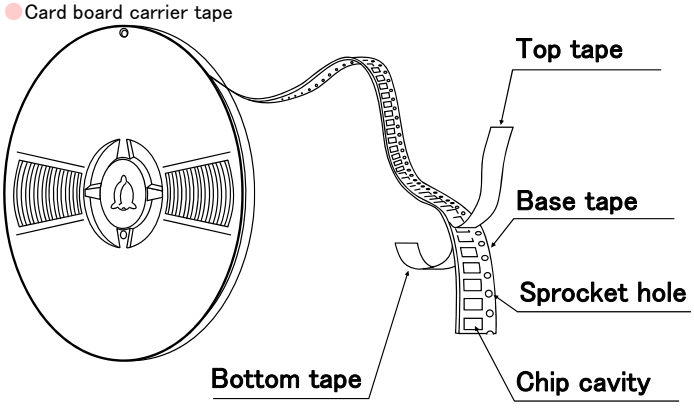
②Tape material

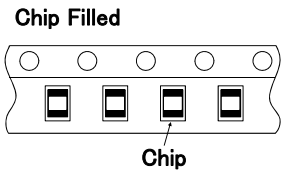
●Embossed tape





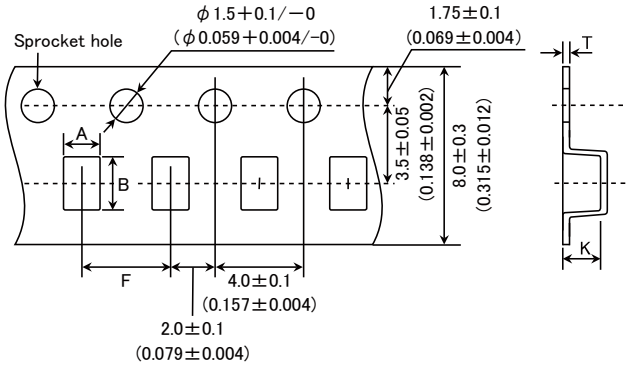
●Card board carrier tape





③Taping Dimensions

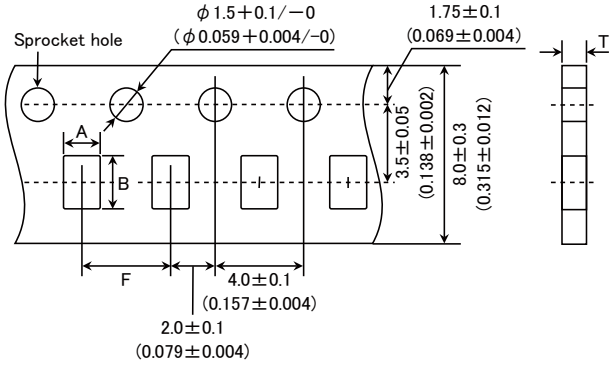
Embossed Tape (0.315 inches wide)



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)

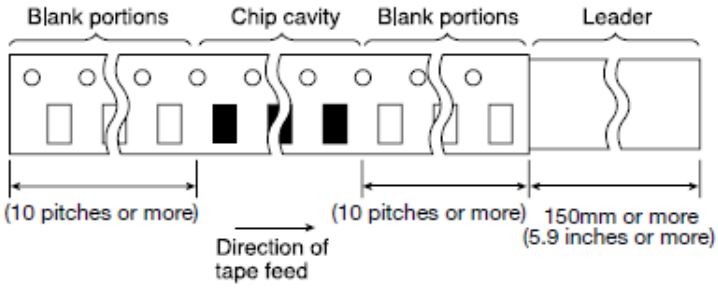
Card board carrier tape (0.315 inches wide)



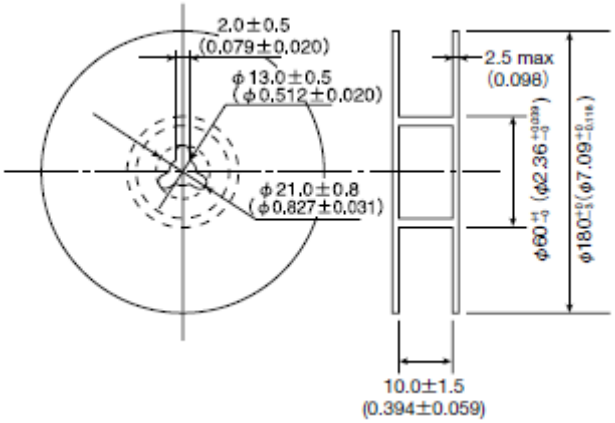
Type	Chip cavity		Insertion pitch	Tape thickness
	A	B	F	T
CB L2012	1.55±0.1 (0.061±0.004)	2.3±0.1 (0.091±0.004)	4.0±0.1 (0.157±0.004)	1.1max. (0.043max.)
LB 1608	1.0±0.1 (0.039±0.004)	1.8±0.1 (0.071±0.004)	4.0±0.1 (0.157±0.004)	1.1max. (0.043max.)

Unit : mm (inch)

④Leader and Blank Portion

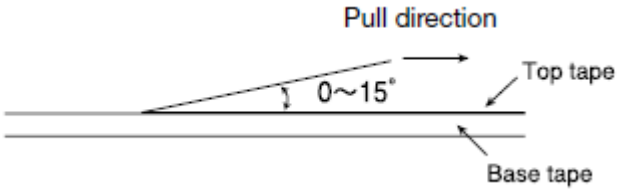


⑤Reel Size



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

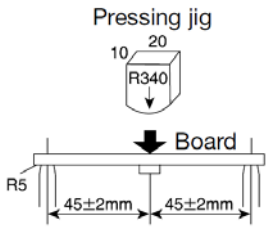
Step	Temperature(℃)
	LB, CB Serie
1	20
2	−40
3	20(Reference temperature)
4	+85(Maximum operating temperature)
5	20

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	

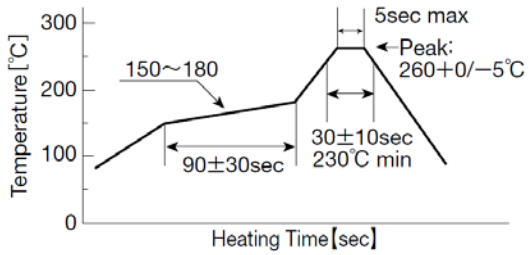
WIRE-WOUND CHIP INDUCTORS (LB SERIES),
WIRE-WOUND CHIP POWER INDUCTORS (CB SERIES),
WIRE-WOUND CHIP INDUCTORS FOR SIGNAL LINES (LB SERIES M TYPE)

■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.

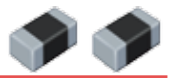
4. Soldering	
Precautions	◆Reflow soldering(LB and CB Types) 1. For reflow soldering with either leaded or lead-free solder, the profile specified in "point for controlling" is recommended. ◆Recommended conditions for using a soldering iron 1. Put the soldering iron on the land-pattern. Soldering iron's 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.

多层片状电感器(LK系列)



回流焊
AEC-Q200

■型号标示法　　*使用温度范围: -40～+85℃

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

△＝空格

①类型

代码	类型
LK△	多层片状电感器

②尺寸 (L×W)

代码	外型 (inch)	尺寸 (L×W) [mm]
1005	1005(0402)	1.0×0.5

③标称电感值

代码 (例)	标称电感值 [μH]
R12	0.12
R22	0.22
1R0	1.0
2R2	2.2

※R＝小数点

④电感量公差

代码	电感量公差
K	±10%
M	±20%

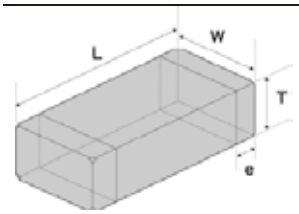
⑤包装

代码	包装
—T	卷盘带装

⑥本公司管理记号

代码	本公司管理记号
V	产业机器/车内用途

■标准外型尺寸 / 标准数量



Type	L	W	T	e	标准数量[pcs]	
					纸带	压纹带
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	—

单位: mm (inch)

▶由于篇幅有限，本产品目录中只记载了有代表性的产品规格，若考虑使用弊司产品时，请确认交货规格说明书中的详细规格。
另外，有关各产品的详细信息(特性图、可靠性信息、使用时的注意事项等)，请参阅弊司网站(http://www.ty-top.com/)。

■型号一览

・产品目录中的多层片状电感器全部属于RoHS对应品。

注）
・根据使用电路和机器，需要按照相应规格处理。请务必咨询正规销售渠道。

・*1：面向汽车室内用途（AEC-Q200 Qualified）的产品。
＜ AEC-Q200 ：AEC-Q200 qualified＞
标注了*1的多层片状磁珠电感器为其代表性产品已通过了应对AEC-Q200标准之评估测试的产品。
85℃ products：AEC-Q200 Grade3 （已在Grade3测试条件下实施评估。）
关于本产品的详细规格和评估测试结果等信息，请咨询官方销售渠道。
此外，订购时请索取产品规格书。
・*2：面向工业设备、医疗设备的产品。

●LK1005

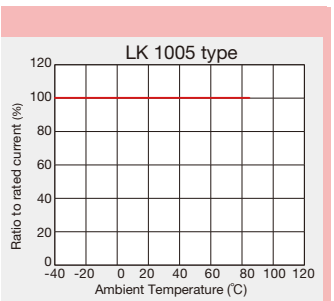
型号	标称电感值 [μH]	电感量公差	Q值 (min.)	自共振频率 [MHz] (min.)	直流电阻 [Ω] (max.)	额定电流 [mA] (max.)	测试频率 [MHz]	厚度 [mm]	注释
LK 1005 R12□-TV	0.12	±10%, ±20%	10	180	0.59	25	25	0.50 ±0.05	*1 ,*2
LK 1005 R15□-TV	0.15	±10%, ±20%	10	165	0.63	25	25	0.50 ±0.05	*1 ,*2
LK 1005 R18□-TV	0.18	±10%, ±20%	10	150	0.76	25	25	0.50 ±0.05	*1 ,*2
LK 1005 R22□-TV	0.22	±10%, ±20%	10	135	0.79	25	25	0.50 ±0.05	*1 ,*2
LK 1005 R27□-TV	0.27	±10%, ±20%	10	120	0.91	25	25	0.50 ±0.05	*1 ,*2
LK 1005 R33□-TV	0.33	±10%, ±20%	10	105	1.05	25	25	0.50 ±0.05	*1 ,*2
LK 1005 R39□-TV	0.39	±10%, ±20%	20	85	0.41	20	10	0.50 ±0.05	*1 ,*2
LK 1005 R47□-TV	0.47	±10%, ±20%	20	80	0.42	20	10	0.50 ±0.05	*1 ,*2
LK 1005 R56□-TV	0.56	±10%, ±20%	20	75	0.47	20	10	0.50 ±0.05	*1 ,*2
LK 1005 R68□-TV	0.68	±10%, ±20%	20	70	0.55	20	10	0.50 ±0.05	*1 ,*2
LK 1005 R82□-TV	0.82	±10%, ±20%	20	65	0.59	20	10	0.50 ±0.05	*1 ,*2
LK 1005 1R0□-TV	1.0	±10%, ±20%	20	60	0.64	20	10	0.50 ±0.05	*1 ,*2
LK 1005 1R2□-TV	1.2	±10%, ±20%	20	55	0.79	20	10	0.50 ±0.05	*1 ,*2
LK 1005 1R5□-TV	1.5	±10%, ±20%	20	50	0.95	20	10	0.50 ±0.05	*1 ,*2
LK 1005 1R8□-TV	1.8	±10%, ±20%	20	45	1.16	20	10	0.50 ±0.05	*1 ,*2
LK 1005 2R2□-TV	2.2	±10%, ±20%	20	40	1.15	20	10	0.50 ±0.05	*1 ,*2

※型号中的[]中标有电感值公差。

※) 针对初始L值施加了直流重叠电流后，L值会降至5%以内。此外，元件温度上升到20℃以内时的值作为额定电流。

■降低额定电流值

●LK系列
LK 系列可在周围温度峰值 85 ℃的状态下 100% 使用额定电流值。
请参照下图。



▶由于篇幅有限，本产品目录中只记载了有代表性的产品规格，若考虑使用弊司产品时，请确认交货规格说明书中的详细规格。
另外，有关各产品的详细信息（特性图、可靠性信息、使用时的注意事项等），请参阅弊司网站（http://www.ty-top.com/）。

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

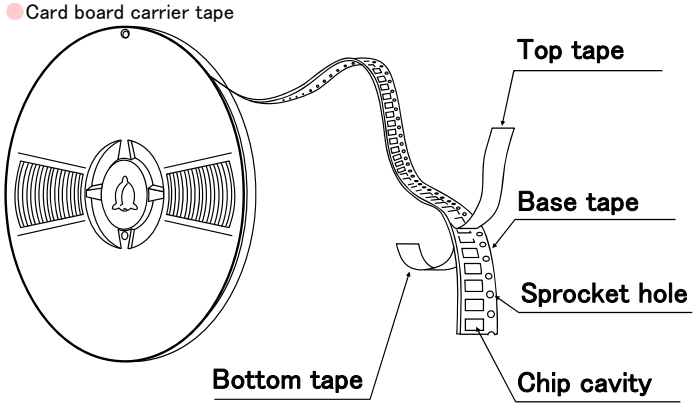
①Minimum Quantity

●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
NM2012 (0805)	0.9 (0.035)	—	3000
NM2520 (1008)	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
HKQ0402 (01005)	0.2 (0.008)	20000	40000
HKQ0603W (0201)	0.3 (0.012)	15000	—
HKQ0603S (0201)	0.3 (0.012)	15000	—
HKQ0603U (0201)	0.3 (0.012)	15000	—
AQ105 (0402)	0.5 (0.020)	10000	—
BK0402 (01005)	0.2 (0.008)	20000	—
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
BKP0402 (01005)	0.2 (0.008)	20000	—
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
MCFK1608 (0603)	0.6 (0.024)	4000	—
MCFE1608 (0603)	0.65 (0.026)	4000	—
MCKK1608 (0603)	1.0 (0.039)		3000
MCHK2012 (0806)	0.8 (0.031)	4000	—
MCKK2012 (0805)	1.0 (0.039)	–	3000

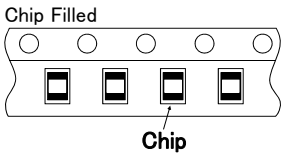
②Taping material

Card board carrier tape

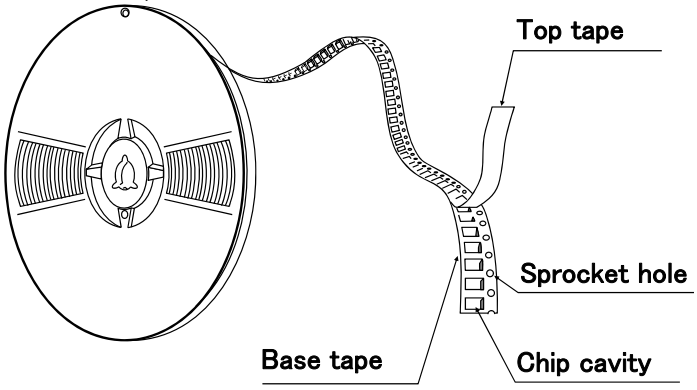


CK	1608
CKP	1608
CK	2125
CKS	2125
LK	1005
LK	1608
LK	2125
HK	0603
HK	1005
HK	1608
HKQ	0402
HKQ	0603
AQ	105

BK	0402
BK	0603
BK	1005
BK	1608
BK	2125
BK	2010
BKP	0402
BKP	0603
BKP	1005
BKP	1608
BKP	2125
BKH	0603
BKH	1005
MCF	0605
MC	1608
MC	2012

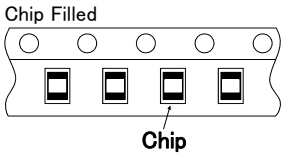


Embossed Tape



CK	2125
CKS	2125
CKP	2012
CKP	2016
CKP	2520
NM	2012
NM	2520
LK	2125
HKQ	0402
HK	2125

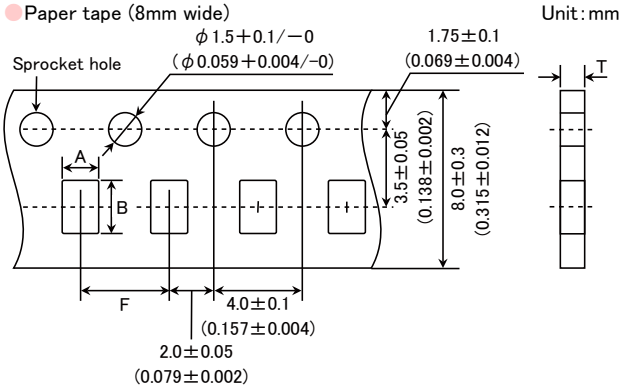
BK	2125
BK	3216
MCF	0806
MCF	1210
MCF	2010
MC	1608
MC	2012



③Taping Dimensions

Paper tape (8mm wide)

Unit : mm (inch)

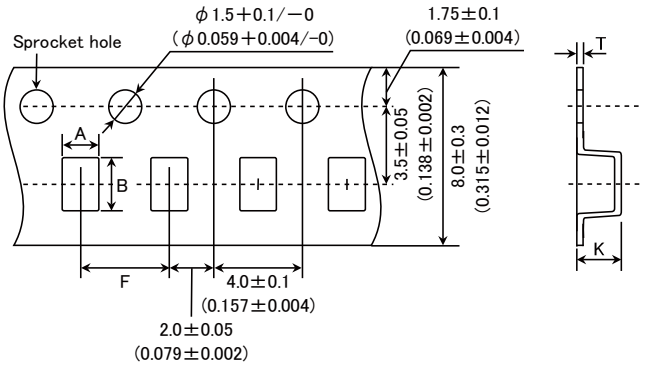


Type	Thickness mm(inch)	Chip cavity		Insertion Pitch	Tape Thickness
		A	B	F	T
CK1608(0603)	0.8 (0.031)	1.0±0.2 (0.039±0.008)	1.8±0.2 (0.071±0.008)	4.0±0.1 (0.157±0.004)	1.1max (0.043max)
CK2125(0805)	0.85(0.033)	1.5±0.2 (0.059±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.1 (0.157±0.004)	1.1max (0.043max)
CKS2125(0805)	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)
HKQ0402(01005)	0.2 (0.008)	0.25±0.04 (0.010±0.002)	0.45±0.04 (0.018±0.002)	2.0±0.05 (0.079±0.002)	0.36max (0.014max)
HKQ0603W(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)
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)
BK0402(01005)	0.2 (0.008)	0.25±0.04 (0.010±0.002)	0.45±0.04 (0.018±0.002)	2.0±0.05 (0.079±0.002)	0.36max (0.014max)
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)
BKP0402(01005)	0.2 (0.008)	0.25±0.04 (0.010±0.002)	0.45±0.04 (0.018±0.002)	2.0±0.05 (0.079±0.002)	0.36max (0.014max)
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)
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)	0.9max (0.035max)
MCHK2012(0805)	0.8 (0.031)	1.55±0.2 (0.061±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.1 (0.157±0.004)	0.9max (0.035max)

Unit : mm(inch)

● Embossed Tape (8mm wide)

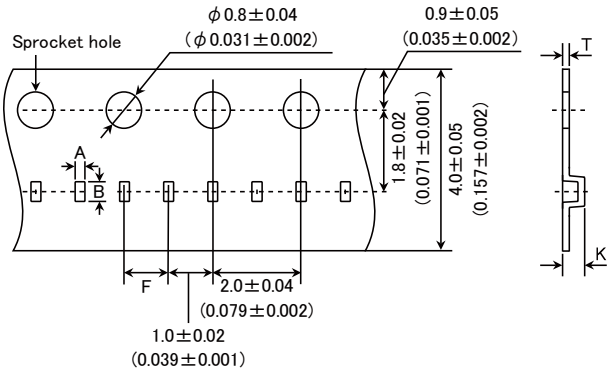
Unit : mm (inch)



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)	
NM2012 (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)
NM2520 (1008)	0.9 (0.035)	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)
	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±0.2 (0.061±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.1 (0.157±0.004)	1.35 (0.053)	0.25 (0.010)

Unit : mm (inch)

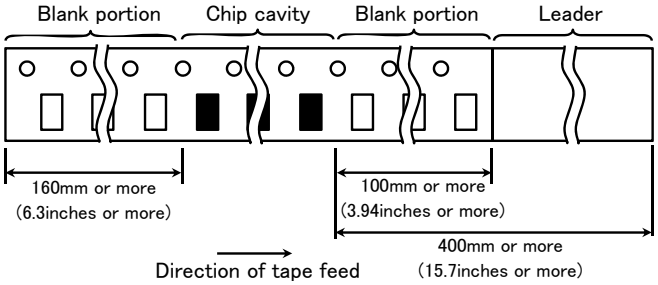
● Embossed Tape (4mm wide)　　Unit : mm (inch)



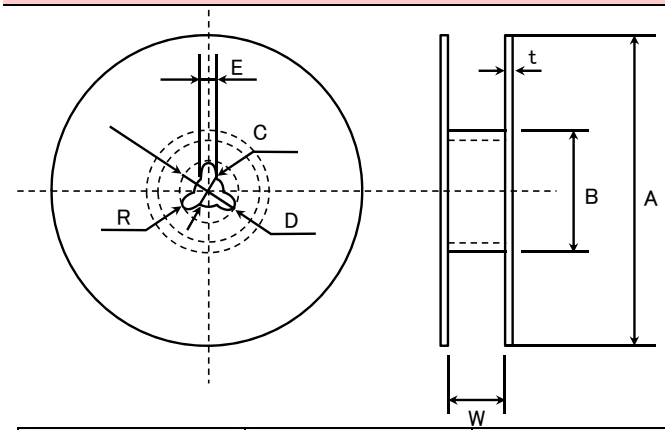
Type	Thickness mm (inch)	Chip cavity		Insertion Pitch	Tape Thickness	
		A	B	F	K	T
HKQ0402 (01005)	0.2 (0.008)	0.23	0.43	1.0±0.02	0.5max.	0.25max.

Unit : mm

④LEADER AND BLANK PORTION



⑤Reel Size



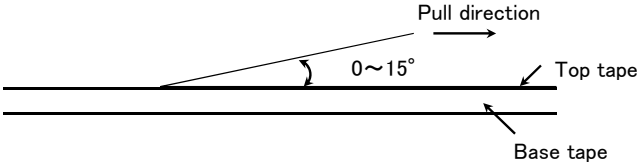
A	B	C	D	E	R
φ178±2.0	φ50 or more	φ13.0±0.2	φ21.0±0.8	2.0±0.5	1.0

	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	BK1005	−55～＋125℃
	BKP1005	−55～＋125℃ (Including self-generated heat)
	LK1005	−40～＋85℃
	HK1005	−55～＋125℃

2. Storage Temperature Range		
Specified Value	BK1005	−55～＋125℃
	BKP1005	−55～＋125℃
	LK1005	−40～＋85℃
	HK1005	−55～＋125℃

3. Rated Current		
Specified Value	BK1005	150～750mA DC
	BKP1005	0.8～2.0A DC
	LK1005	20～25mA DC
	HK1005	110～300mA DC (−55～+125℃)、200～900mA DC (−55～+85℃)

Definition of rated current:
・In the BK Series, the rated current is the value of current at which the temperature of the element is increased within 20℃.
・In the BK Series P type the rated current is the value of current at which the temperature of the element is increased within 40℃.
・In the LK and HK Series, 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℃.

4. Impedance		
Specified Value	BK1005	10～1800Ω ±25%
	BKP1005	10～220Ω ±25%
	LK1005	—
	HK1005	
Test Methods and Remarks	Measuring frequency : 100±1MHz Measuring equipment : 4291A(or its equivalent) Measuring jig : 16192A(or its equivalent), 16193A(or its equivalent)	

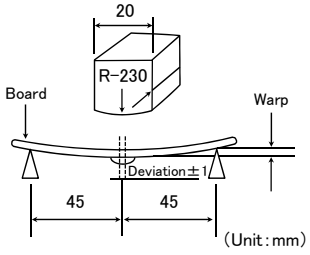
5. Inductance		
Specified Value	BK1005	—
	BKP1005	
	LK1005	0.12～2.2μH: ±10 or ±20%
	HK1005	1.0～6.2nH: ±0.3nH 6.8～270nH: ±5%
Test Methods and Remarks	LK Series Measuring frequency : 10～25MHz Measuring equipment /jig : 4291A＋16193A(or its equivalent) Measuring current : 1mA rms HK Series Measuring frequency : 100MHz Measuring equipment /jig : 4291A＋16193A(or its equivalent)	

6. Q		
Specified Value	BK1005	—
	BKP1005	
	LK1005	10～20 min.
	HK1005	8 min.
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)	

7. DC Resistance		
Specified Value	BK1005	0.03～0.90Ω max.
	BKP1005	0.03～0.20Ω max.
	LK1005	0.41～1.16Ω max.
	HK1005	0.08～4.8Ω max.
Test Methods and Remarks	Measuring equipment：VOAC-7412, VOAC-7512, VOAC-7521（made by Iwasaki Tsushinki）	

8. Self Resonance Frequency（SRF）		
Specified Value	BK1005	—
	BKP1005	
	LK1005	40～180MHz min.
	HK1005	400～10000MHz min.
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. Temperature Characteristic		
Specified Value	BK1005	—
	BKP1005	
	LK1005	
	HK1005	Inductance change：Within ±10%
Test Methods and Remarks	Temperature range : －30～＋85℃ Reference temperature : ＋20℃	

10. Resistance to Flexure of Substrate		
Specified Value	BK1005	No mechanical damage.
	BKP1005	
	LK1005	
	HK1005	
Test Methods and Remarks	Warp : 2mm Testing board : glass epoxy-resin substrate Thickness : 0.8mm  	

11. Solderability		
Specified Value	BK1005	At least 90% of terminal electrode is covered by new solder.
	BKP1005	
	LK1005	
	HK1005	
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.	

12. Resistance to Soldering		
Specified Value	BK1005	Appearance：No significant abnormality
	BKP1005	Impedance change：Within ±30%
	LK1005	Appearance：No significant abnormality Inductance change： Within ±15%
	HK1005	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）	

13. Thermal Shock

Specified Value	BK1005 BKP1005	Appearance：No significant abnormality Impedance change： Within ±30%
	LK1005	Appearance：No significant abnormality Inductance change： Within ±10% Q change： Within ±30%
	HK1005	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.

14. Damp Heat(Steady state)

Specified Value	BK1005 BKP1005	Appearance：No significant abnormality Impedance change： Within ±30%
	LK1005	Appearance：No significant abnormality Inductance change： Within ±10% Q change： Within ±30%
	HK1005	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)

15. Loading under Damp Heat

Specified Value	BK1005 BKP1005	Appearance：No significant abnormality Impedance change： Within ±30%
	LK1005	Appearance：No significant abnormality Inductance change： Within ±10% Q change： Within ±30%
	HK1005	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) Measurement shall be made after 48±2 hrs of recovery under the standard condition.

16. Loading at High Temperature		
Specified Value	BK1005 BKP1005	Appearance：No significant abnormality Impedance change： Within ±30%
	LK1005	Appearance：No significant abnormality Inductance change： Within ±10% Q change： Within ±30%
	HK1005	Appearance：No significant abnormality Inductance change： Within ±10% Q change： Within ±20%
Test Methods and Remarks	Temperature : Maximum operating Temperature 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.

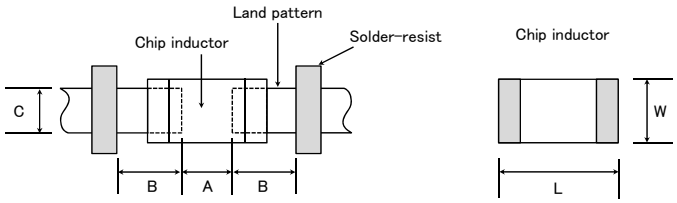
◆Pattern configurations (Inductor layout on panelized [breakaway] PC boards)

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 wave-soldering (Unit: mm)

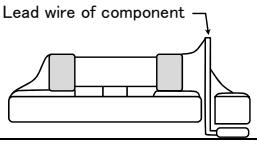
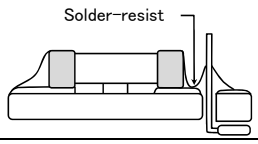
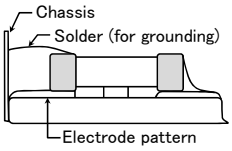
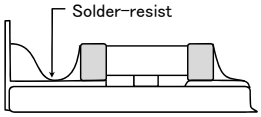
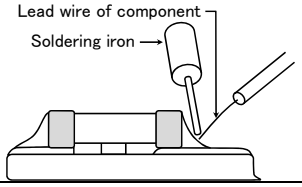
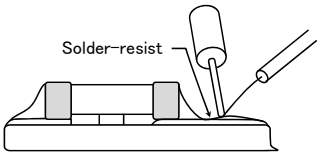
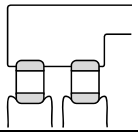
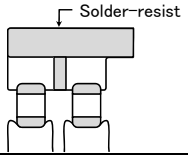
Type		1608	2125
Size	L	1.6	2.0
	W	0.8	1.25
A		0.8～1.0	1.0～1.4
B		0.5～0.8	0.8～1.5
C		0.6～0.8	0.9～1.2

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

Type		1005	1608	2125
Size	L	1.0	2.0	1.6
	W	0.5	1.25	0.8
A		0.45～0.55	0.8～1.0	0.8～1.2
B		0.40～0.50	0.6～0.8	0.8～1.2
C		0.45～0.55	0.6～0.8	0.9～1.6

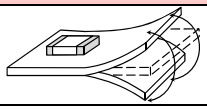
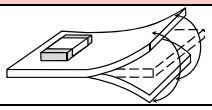
Excess solder can affect the ability of chips to withstand mechanical stresses. Therefore, please take proper precautions when designing land-patterns.

(2) Examples of good and bad solder application

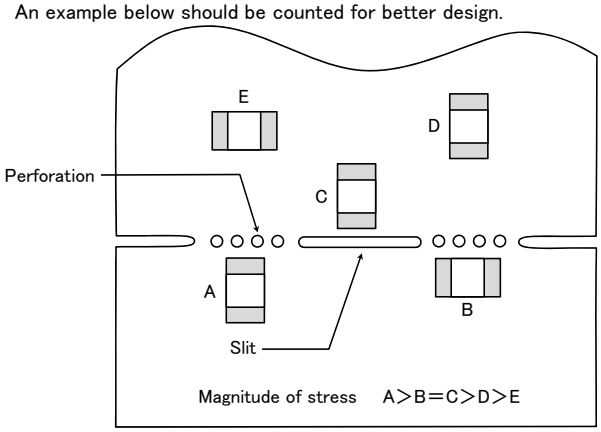
Item	Not recommended	Recommended
Mixed mounting of SMD and leaded components		
Component placement close to the chassis		
Hand-soldering of leaded components near mounted components		
Horizontal component placement		

◆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.

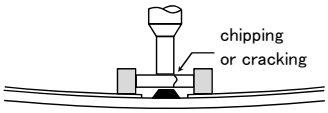
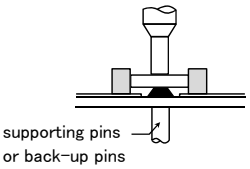
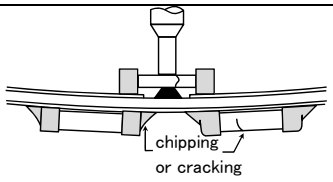
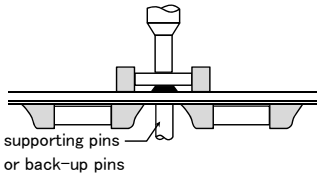
◆Selection of Adhesives

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.

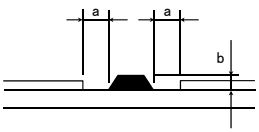
◆Selection of Adhesives

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.

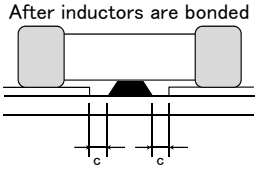
[Recommended conditions]

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

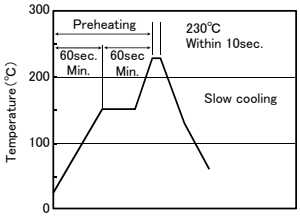
1-1. Preheating when soldering

Heating: Chip inductor components should be preheated to within 100 to 130℃ of the soldering. Cooling: The temperature difference between the components and cleaning process should not be greater than 100℃.

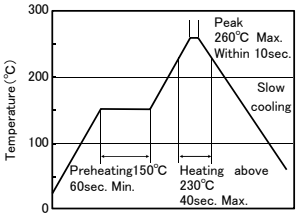
Chip inductors are susceptible to thermal shock when exposed to rapid or concentrated heating or rapid cooling. Therefore, the soldering process must be conducted with a great care so as to prevent malfunction of the components due to excessive thermal shock.

[Reflow soldering]

【Recommended conditions for eutectic soldering】



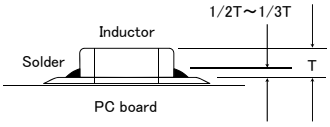
【Recommended condition for Pb-free soldering】



※Ceramic chip components should be preheated to within 100 to 130℃ of the soldering.
※Assured to be reflow soldering for 2 times.

Caution

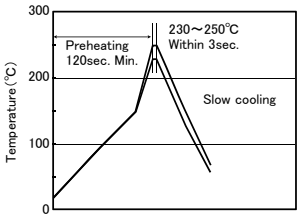
1. The ideal condition is to have solder mass (fillet) controlled to 1/2 to 1/3 of the thickness of the inductor, as shown below:



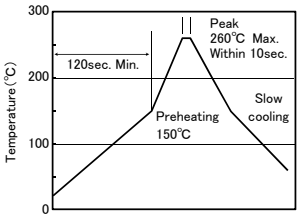
2. Because excessive dwell times can detrimentally affect solderability, soldering duration should be kept as close to recommended times as possible.

[Wave soldering]

【Recommended conditions for eutectic soldering】



【Recommended condition for Pb-free soldering】



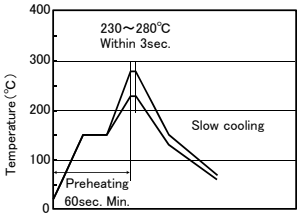
※Ceramic chip components should be preheated to within 100 to 130℃ of the soldering.
※Assured to be wave soldering for 1 time.
※Except for reflow soldering type.

Caution

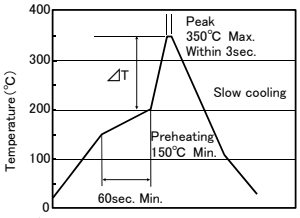
1. Make sure the inductors are preheated sufficiently.
2. The temperature difference between the inductor and melted solder should not be greater than 100 to 130℃.
3. Cooling after soldering should be as gradual as possible.
4. Wave soldering must not be applied to the inductors designated as for reflow soldering only.

[Hand soldering]

【Recommended conditions for eutectic soldering】



【Recommended condition for Pb-free soldering】



(※⊿TT190℃)
※It is recommended to use 20W soldering iron and the tip is 1 ϕ or less.
※The soldering iron should not directly touch the components.
※Assured to be soldering iron for 1 time.
Note: The above profiles are the maximum allowable soldering condition, therefore these profiles are not always recommended.

	Caution 1. Use a 20W soldering iron with a maximum tip diameter of 1.0 mm. 2. The soldering iron should not directly touch the inductor.

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. (1) Excessive cleaning a. 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. Thus the following conditions should be carefully checked; Ultrasonic output Below 20W/ℓ Ultrasonic frequency Below 40kHz Ultrasonic washing period 5 min. or less

6. Post cleaning processes	
Precautions	◆Application of resin coatings, moldings, etc. to the PCB and components. 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. When a resin's hardening temperature is higher than the inductor's operating temperature, the stresses generated by the excess heat may lead to inductor damage or destruction. 3. Stress caused by a resin's temperature generated expansion and contraction may damage inductors. The use of such resins, molding materials etc. is not recommended. When inductors are coated/molded with resin, please check effects on the inductors by analyzing them in actual applications prior to use.

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 chip 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: Below 30℃ Humidity: Below 70% RH 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.