폐사제품에 관한 주의사항

폐사제품을 사용하시기 전에 반드시 읽어 주십시오.

⚠ 주 의

카탈로그의 기재 내용

본 카탈로그의 기재 내용은 2019년 10월 기준입니다. 제품의 업데이트 등으로 인해 예고 없이 기재 내용이 변경되는 경우나 본 카탈로그에 기재된 제품의 공급을 중단하는 경우가 있습니다. 따라서, 사용 시에는 반드시 최신 정보를 확인한 후 사용하시기 바랍니다.

만일 본 카탈로그 기재 내용 또는 납입사양서의 범위 외에서 폐사제품을 사용하여 그 사용기기에 손해, 불량 등이 발생하더라도 폐사는 일체의 책임을 지지 않으므로 양해해 주시기 바랍니다.

납입사양서의 승인

본 카탈로그에 기재된 제품의 상세한 사양에 관해서는 납입사양서가 준비되어 있으므로 폐사에 문의해 주시기 바랍니다. 폐사제품의 사용 전에, 반드시 납입사양서에 대한 승인 후 사용해주시기 바랍니다.

실제 기기에서의 사전 평가

폐사제품 사용 시에는 사용할 기기에 실제로 장착된 상태 및 실제 사용 환경에서의 평가 및 확인을 반드시 해주시기 바랍니다.

용도의 한정

1. 사용 가능한 기기

본 카탈로그에 기재된 제품은 일반적인 전자기기【AV기기, OA기기, 가전제품, 사무기기, 정보・통신기기(휴대전화, PC 등)】및 본 카탈로그 또는 납입사양서에 개별로 기재된 기기에 범용・표준적인 용도로 사용하기 위한 목적으로 만들어졌습니다.

또한, 자동차용 전자기기, 통신 인프라・산업기기, 의료기기(등급분류 1등급, 2등급, 3등급)에의 사용에 관하여서는 이러한 기기에 사용 할 수 있는 제품 라인이 준비되어 있으므로, 본 카탈로그 또는 납입사양서의 내용을 확인 후, 당해 제품을 사용 부탁 드립니다.

2. 개별 문의가 필요한 기기

본 카탈로그에 기재된 제품에 대하여, 그 고장이나 불량, 또는 그것에 기인하는 오작동이 생명, 신체 혹은 재산에 위해나 손해를 가할 우려, 또는 사회에 심각한 영향을 미칠 우려가 있는 아래의 기기(본 카탈로그 또는 납입사양서에 기재된 사용 가능한 기기 제외)에의 사용을 검토하는 때에는, 반드시 사전에 폐사로 문의를 부탁 드립니다.

(1) 운송기기(자동차 구동 제어장치, 열차 제어장치, 선박 제어장치 등)
(2) 교통용 신호기기
(3) 방재・방범기기
(4) 의료기기(등급분류 3등급)
(5) 공공성이 높은 정보통신기기・정보처리기기(전화교환기, 전화・무선・방송 등의 기지국 등)
(6) 그 외, 상기와 동등한 품질이나 신뢰성이 요구되는 기기

3. 사용금지기기

고도의 안전성이나 신뢰성이 요구되는 아래의 기기에 대하여는 폐사제품을 사용하지 않도록 부탁 드립니다.

(1) 우주기기(인공위성, 로켓 등)
(2) 항공기기(※주1)
(3) 의료기기(등급분류 4등급), 임플란트(체내 식립형) 의료기기(※주2)
(4) 발전제어기기(원자력・수력・화력발전소 용 등의 기기 등)
(5) 해저기기(해저 중계 기기, 해중 작업 장치 등)
(6) 군사용기기
(7) 그 외, 상기와 동등한 안전성이나 신뢰성이 요구되는 기기

※주1:항공기의 안전운행에 직접적으로 지장을 미치지 않는 기기【기내 엔터테인먼트 기기, 기내조명, 전동시트, 조리용기기 등】에 한하여, 폐사가 별도 지정하는 일정 조건을 만족하는 경우, 폐사제품을 사용할 수 있는 경우가 있습니다. 이러한 기기에서의 사용을 검토하는 때에는 반드시 사전에 폐사에 문의해 주시기 바랍니다.

※주2: 체내에 식립하는 체내 장치뿐만 아니라, 이와 연결하는 체외 장치도 포함합니다.

4. 책임의 제한

폐사의 서면에 의한 사전 승낙을 얻지 않고, 폐사가 사용 용도로 정하지 않은 기기, 앞서 기술한 폐사로의 문의가 필요한 기기 또는 폐사가 사용을 금지하는 기기에 본 카탈로그에 기재된 제품을 사용함으로써 고객 또는 제3자에게 발생한 손해에 관하여 폐사는 일체의 책임을 지지 않으므로 양해해 주시기 바랍니다.

안전설계

안전성이나 신뢰성의 요구가 높은 기기, 회로 등에 폐사제품을 사용할 때에는, 충분히 안전성 평가나 신뢰성 평가를 실시하여 주십시오. 또, 보호회로・보호장치를 설치한 시스템, 다중회로를 설치하여 단일 고장으로는 불안전하게 되지 않는 시스템 등에 의한 고장안전(fail-safe)설계를 하여, 충분한 안전성의 확보를 부탁 드립니다.

지식재산권의 취급

본 카탈로그에 기재된 정보는 제품의 대표적 동작・응용을 설명하는 것으로서, 그러한 사용 시에 폐사 및 제3자의 지식재산권 그 외의 권리에 대한 보증 또는 실시권을 허락하는 것은 아닙니다.

보증범위

폐사제품의 보증범위는 납입된 폐사제품 단품의 보증에 한정되고, 폐사제품의 고장이나 불량으로부터 유발되는 손해에 관해서 폐사는 일체의 책임을 지지 않으므로 양해해 주시기 바랍니다. 단, 기본거래계약서, 품질보증협정서 등 별도의 서면 계약이 체결 되어 있는 경우에는 그 내용에 따라 보증합니다.

정규판매채널

본 카탈로그의 기재 내용은 폐사의 영업소・판매 자회사・판매 대리점(소위 '정규판매채널')으로부터 구입하신 폐사제품에 대해 적용됩니다. 상기 이외로부터 구입하신 폐사제품에 관해서는 적용이 제외되므로 양해해 주시기 바랍니다.

수출 주의사항

본 카탈로그에 기재된 제품의 일부에는 수출 시 일본의 '외국환 및 외국무역법' 및 미국의 수출관리 관련법규 등의 규제를 확인하신 후 필요한 절차를 취하실 필요가 있는 제품이 있습니다. 불명확한 경우에는 폐사에 문의해 주시기 바랍니다.

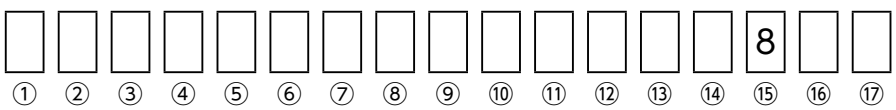
통신 인프라・산업기기 어플리케이션 가이드

본 카탈로그에서 '통신 인프라·산업기기 용도' 라고 기재된 폐사제품은, 다음에 표시된 기기(대표 예)에서 사용할 것을 의도하였습니다. 따라서, 이러한 기기에 폐사제품을 사용하실 때에는, 품번, 납입사양서 등으로부터 당해 폐사제품이 통신 인프라·산업기기 용도임을 반드시 확인 한 후, 당해 폐사제품을 사용해 주시길 부탁 드립니다. 불명확한 경우에는 폐사로 문의 바랍니다.

구 분	통신 인프라·산업기기 (대표 예)
통신 인프라	· 기지국 통신장치 · 광 트랜시버 · 라우터 / 스위치 (carrier grade) · UPS (무정전 전원장치) 등
공장 자동화	· PLC (Programmable Logic Controller) · 서보모터 / 서보 드라이버 · 산업용 로봇 등
계측기기	· 가스미터 · 수도미터 · 유량계 · 압력센서 · 자기센서 · 온도센서 등
전력기기	· 파워컨디셔너 (태양광발전 시스템) · 스마트미터 (전력량계) · 누전브레이커 (누전차단기) · EV충전 스탠드 등

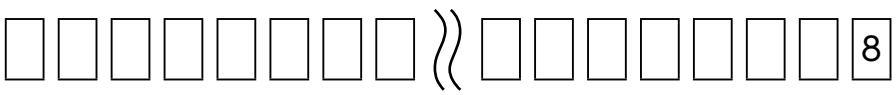
■ 품번 표기법

【적층 세라믹 커패시터】



※왼쪽에서 15번째 자리가 '8'인 경우, '통신 인프라·산업기기, 의료기기 용도'를 뜻합니다.

【인덕터】



※총 자릿수를 불문하고, 오른쪽에서 첫 번째 자리가 '8'인 경우, '통신 인프라·산업기기, 의료기기 용도'를 뜻합니다.

일부 예외가 있기 때문에, 상세에 관하여는 각 제품의 품번 표기법이 게재된 페이지를 확인 부탁 드립니다.

▶ 본 카탈로그에는 지면 사정상 대표적인 사양만 기재하고 있으므로, 폐사제품을 검토하실 때에는 납입 사양서에서 상세한 사양을 확인하여 주시기 바랍니다.
또한, 각 제품의 상세 정보(특성 그래프, 신뢰성 정보, 사용상의 주의사항 등)에 대해서는 폐사 웹 사이트(http://www.ty-top.com/)에 게재하고 있습니다.

의료기기 어플리케이션 가이드

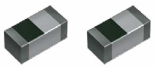
본 카탈로그에서 '의료기기 용도'라고 기재된 폐사제품은, 등급분류 4등급으로 분류되는 의료기기의 전부 및 등급분류 3등급으로 분류되는 임플란트(체내 식립형) 의료기기(이식형 골전도 보청기, 인공 망막 시스템과 이에 연결하는 체외 장치 등)를 제외하고, 의료기기(등급분류 1등급, 2등급, 3등급)에서 사용할 것을 의도하였습니다. 따라서, 이러한 의료기기에 폐사제품을 사용하실 때에는 품번, 납입사양서 등으로부터 당해 폐사제품이 의료기기 용도 제품임을 반드시 확인 한 후, 당해 폐사제품을 사용해 주시길 부탁 드립니다. 불명확한 경우에는 폐사로 문의 바랍니다.

인체에 대한 리스크		저 → 고			
일본	의약품 의료기기 등 법에 따른 분류 (GHTF)	**1등급** 일반 의료기기 (GHTF Class A)	**2등급** 관리 의료기기 (GHTF Class B)	**3등급** 고도관리 의료기기 (GHTF Class C)	**4등급** 고도관리 의료기기 (GHTF Class D)
		불량이 발생한 경우에도, 인체에 리스크가 극히 낮다고 생각되는 의료기기	불량이 발생한 경우에도, 인체에 리스크가 비교적 낮다고 생각되는 의료기기	불량이 발생한 경우, 인체에 리스크가 비교적 높다고 생각되는 의료기기	환자에 침습성이 높고, 불량이 발생한 경우, 생명의 위험에 직결될 우려가 있는 의료기기
		【대표 예】 ·체외진단용 기기 ·네뷸라이져 ·혈액가스 분석장치 ·맥파계 ·호흡센서 ·전동수술대 ·수술용 조명장치 ·콜레스테롤 분석장치 ·혈액형 분석장치 등	【대표 예】 ·전자체온계 ·전자혈압계 ·전자내시경 ·보청기 ·심전계 ·자가공명영상 진단장치(MRI) ·초음파 진단장치 ·화상 진단기기 ·X선 진단장치 ·센트럴 모니터 ·펄스옥시미터 등	【대표 예】 ·투석기기 ·방사선 치료기기 ·수액펌프 ·인공호흡기 ·글루코오스 모니터시스템 ·전자동 제세동기(AED) ·피부 레이저 스캐너 ·전기수술유닛 ·인슐린펌프 등	【대표 예】 ·이식형 심장 페이스메이커 ·비디오 혈관 내시경 ·프로그램식 이식형 수액펌프 ·심장용 전기수술유닛 ·심장 카테터부속 검사장치 ·세동유발기 등
미국	FDA 분류	**Class I** General Controls	**Class II** General Controls and Special Controls		**Class III** General Controls and Premarket Approval
		의료기기에 결함이나 고장이 있는 경우에도, 환자나 사용자에게 큰 부상이나 위해를 주지 않을 것을 전제로 하는 의료기기	의료기기에 결함이나 불량이 있는 경우, 환자 또는 사용자가 부상당하거나 위해를 입는 것이 예상되는 의료기기		의료기기에 결함이나 불량이 발생한 경우, 환자 또는 사용자에게 심각한 부상, 장애 또는 사망에 이르는 것도 예상되는 의료기기
한국	의료기기 법에 따른 분류	**1등급** 잠재적 위해성이 거의 없는 의료기기	**2등급** 잠재적 위해성이 낮은 의료기기	**3등급** 중증도의 잠재적 위해성을 가진 의료기기	**4등급** 고도의 위해성을 가진 의료기기
		인체에 직접 접촉되지 아니하거나 접촉되더라도 잠재적 위험성이 거의 없고, 고장이나 이상으로 인하여 인체에 미치는 영향이 경미한 의료기기	사용 중 고장이나 이상으로 인한 인체에 대한 위험성은 있으나 생명의 위험 또는 중대한 기능장애에 직면할 가능성이 적어 잠재정 위험성이 낮은 의료기기	인체내에 일정기간 삽입되어 사용되거나, 잠재적 위험성이 높은 의료기기	인체내에 영구적으로 이식되는 의료기기 심장, 중추신경계, 중앙혈관계 등에 직접 접촉되어 사용되는 의료기기 동물의 조직 또는 추출물을 이용하거나 안전성 등의 검증을 위한 정보가 불충분한 원자재를 사용한 의료기기

당사 제품의 대응 상황	의료기기용 제품군 주 : 3등급로 분류되어 있어도, 임플란트 등 일부 의료기기는 미대응	미대응

▶ 본 카탈로그에는 지면 사정상 대표적인 사양만 기재하고 있으므로, 폐사제품을 검토하실 때에는 납입 사양서에서 상세한 사양을 확인하여 주시기 바랍니다.
또한, 각 제품의 상세 정보(특성 그래프, 신뢰성 정보, 사용상의 주의사항 등)에 대해서는 폐사 웹 사이트(http://www.ty-top.com/)에 게재하고 있습니다.

고주파 적층 칩 인덕터 (HK시리즈)



리플로우

■품번 표기법

*사용온도범위 : −55～125℃

H K △	1 0 0 5	△	1 0 N	J	− T	V
①	②		③	④	⑤	⑥

△＝스페이스

①형식

기호	형식
HK△	고주파 적층 칩 인덕터

②크기 (L × W)

기호	형상(inch)	크기(L×W) [mm]
1005	1005(0402)	1.0 × 0.5

③공칭인덕턴스

기호 (예)	공칭인덕턴스 [μH]
3N9	3.9
10N	10.0
R10	100
R12	120

※R=소수점
※N=nH 로서의 소수점

④인덕턴스 허용차

기호	인덕턴스 허용차
J	±5%
S	±0.3nH

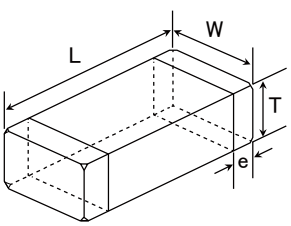
⑤포장

기호	포장
−T	테이핑

⑥당사관리기호

기호	당사관리기호
V	차재 용도
8	통신 인프라·산업기기, 의료기기 용도

■표준외형크기 / 표준수량



Type	L	W	T	e	표준수량 [pcs]	
					종이테이핑	엠보스 테이핑
HK 1005 (0402)	1.0±0.05 (0.039±0.002)	0.5±0.05 (0.020±0.002)	0.5±0.05 (0.020±0.002)	0.25±0.10 (0.010±0.004)	10000	−

단위 : mm(inch)

▶ 본 카탈로그에는 지면 사정상 대표적인 사양만 기재하고 있으므로, 폐사제품을 검토하실 때에는 납입 사양서에서 상세한 사양을 확인하여 주시기 바랍니다.
또한, 각 제품의 상세 정보(특성 그래프, 신뢰성 정보, 사용상의 주의사항 등)에 대해서는 폐사 웹 사이트(http://www.ty-top.com/)에 게재하고 있습니다.

■아이템 일람

·카탈로그에 기재된 고주파 적층 칩 인덕터는 전부 RoHS 대응품입니다.

주)
·사용하시는 회로나 기기에 따라 개별사양의 교체가 필요합니다. 반드시 정규판매채널로 문의해 주시기 바랍니다.
·통신 인프라·산업기기, 의료기기 용도 제품입니다.
본 제품의 상세한 사양, 평가 시험 결과 등에 관해서는 정규판매채널로 문의해 주시기 바랍니다.
또한, 주문할 때 납입사양서의 승인을 부탁 드립니다.
자동차용 전자기기에 사용하시는 경우에는 반드시 폐사에 사전 문의해 주시기 바랍니다.

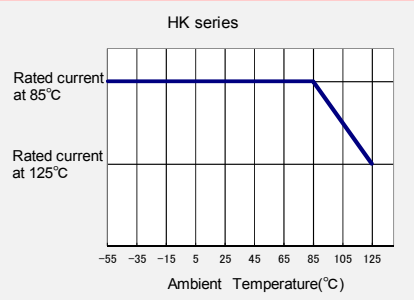
●HK 1005

품번	공칭인덕턴스 [nH]	인덕턴스 허용차	Q값 (min.)	LQ 측정주파수 [MHz]	Q(Typical)주파수 [MHz]					자기공진주파수 [MHz]		직류저항 DC [Ω]		정격전류 [mA] (max.)		두께 [mm]	주기
					100	300	500	800	1000	(min.)	(typ.)	(max.)	(typ.)	−55～+125℃	−55～+85℃		
HK 1005 1N0S−T8	1.0	±0.3nH	8	100	11	25	34	43	52	10000	> 13000	0.08	0.04	300	900	0.50 ±0.05	
HK 1005 1N2S−T8	1.2	±0.3nH	8	100	11	25	35	44	52	10000	> 13000	0.09	0.04	300	900	0.50 ±0.05	
HK 1005 1N5S−T8	1.5	±0.3nH	8	100	11	24	33	44	48	6000	> 13000	0.10	0.05	300	850	0.50 ±0.05	
HK 1005 1N8S−T8	1.8	±0.3nH	8	100	11	23	30	36	42	6000	11000	0.12	0.06	300	700	0.50 ±0.05	
HK 1005 2N0S−T8	2.0	±0.3nH	8	100	11	21	27	34	39	6000	10500	0.12	0.06	300	700	0.50 ±0.05	
HK 1005 2N2S−T8	2.2	±0.3nH	8	100	10	18	25	31	36	6000	10000	0.13	0.07	300	700	0.50 ±0.05	
HK 1005 2N4S−T8	2.4	±0.3nH	8	100	10	18	24	31	35	6000	9500	0.13	0.07	300	650	0.50 ±0.05	
HK 1005 2N7S−T8	2.7	±0.3nH	8	100	10	18	24	31	34	6000	9000	0.13	0.08	300	650	0.50 ±0.05	
HK 1005 3N0S−T8	3.0	±0.3nH	8	100	10	18	24	31	35	6000	8500	0.16	0.09	300	600	0.50 ±0.05	
HK 1005 3N3S−T8	3.3	±0.3nH	8	100	10	18	24	31	35	6000	8000	0.16	0.10	300	550	0.50 ±0.05	
HK 1005 3N6S−T8	3.6	±0.3nH	8	100	10	18	24	31	35	5000	7500	0.20	0.11	300	500	0.50 ±0.05	
HK 1005 3N9S−T8	3.9	±0.3nH	8	100	10	18	24	31	35	4000	7000	0.21	0.12	300	500	0.50 ±0.05	
HK 1005 4N3S−T8	4.3	±0.3nH	8	100	10	18	24	31	35	4000	6500	0.20	0.12	300	500	0.50 ±0.05	
HK 1005 4N7S−T8	4.7	±0.3nH	8	100	10	18	24	31	34	4000	6000	0.21	0.12	300	500	0.50 ±0.05	
HK 1005 5N1S−T8	5.1	±0.3nH	8	100	10	18	24	31	34	4000	5800	0.21	0.13	300	450	0.50 ±0.05	
HK 1005 5N6S−T8	5.6	±0.3nH	8	100	10	18	24	30	35	4000	5700	0.23	0.15	300	430	0.50 ±0.05	
HK 1005 6N2S−T8	6.2	±0.3nH	8	100	10	18	24	30	34	3900	5600	0.25	0.16	300	430	0.50 ±0.05	
HK 1005 6N8J−T8	6.8	±5%	8	100	10	18	23	29	32	3900	5500	0.25	0.17	300	430	0.50 ±0.05	
HK 1005 7N5J−T8	7.5	±5%	8	100	10	18	23	29	32	3700	5200	0.25	0.18	300	400	0.50 ±0.05	
HK 1005 8N2J−T8	8.2	±5%	8	100	10	18	23	29	31	3600	4900	0.28	0.21	300	380	0.50 ±0.05	
HK 1005 9N1J−T8	9.1	±5%	8	100	10	18	23	29	31	3400	4500	0.30	0.22	300	360	0.50 ±0.05	
HK 1005 10NJ−T8	10	±5%	8	100	10	18	23	29	31	3200	4300	0.31	0.23	300	340	0.50 ±0.05	
HK 1005 12NJ−T8	12	±5%	8	100	11	18	23	29	31	2700	3900	0.40	0.28	300	330	0.50 ±0.05	
HK 1005 15NJ−T8	15	±5%	8	100	11	18	23	28	30	2300	3500	0.46	0.31	300	320	0.50 ±0.05	
HK 1005 18NJ−T8	18	±5%	8	100	11	18	23	28	30	2100	3100	0.55	0.35	300	310	0.50 ±0.05	
HK 1005 22NJ−T8	22	±5%	8	100	11	17	22	26	27	1900	2800	0.60	0.42	300	300	0.50 ±0.05	
HK 1005 27NJ−T8	27	±5%	8	100	11	17	21	25	26	1600	2300	0.70	0.47	300	300	0.50 ±0.05	
HK 1005 33NJ−T8	33	±5%	8	100	11	16	20	23	22	1300	1900	0.80	0.50	200	250	0.50 ±0.05	
HK 1005 39NJ−T8	39	±5%	8	100	11	16	20	23	21	1200	1700	0.90	0.52	200	250	0.50 ±0.05	
HK 1005 47NJ−T8	47	±5%	8	100	11	16	19	21	18	1000	1500	1.00	0.58	200	230	0.50 ±0.05	
HK 1005 56NJ−T8	56	±5%	8	100	11	16	18	18	16	750	1300	1.00	0.61	200	220	0.50 ±0.05	
HK 1005 68NJ−T8	68	±5%	8	100	11	15	17	18	11	750	1200	1.20	0.70	180	200	0.50 ±0.05	
HK 1005 82NJ−T8	82	±5%	8	100	10	14	16	15	6	600	1100	1.30	0.81	150	200	0.50 ±0.05	
HK 1005 R10J−T8	100	±5%	8	100	10	14	14	12	—	600	1000	1.50	0.94	150	200	0.50 ±0.05	
HK 1005 R12J−T8	120	±5%	8	100	10	12	10	—	—	600	800	1.60	1.10	150	200	0.50 ±0.05	
HK 1005 R15J−T8	150	±5%	8	100	12	17	17	—	—	550	920	3.20	2.57	140	200	0.50 ±0.05	
HK 1005 R18J−T8	180	±5%	8	100	12	16	—	—	—	500	810	3.70	2.97	130	200	0.50 ±0.05	
HK 1005 R22J−T8	220	±5%	8	100	12	16	—	—	—	450	700	4.20	3.29	120	200	0.50 ±0.05	
HK 1005 R27J−T8	270	±5%	8	100	12	14	—	—	—	400	600	4.80	3.92	110	200	0.50 ±0.05	

※) 초기 L값에 대해 직류중첩을 거는 것으로 L값이 5% 이내의 다운. 또는 소자 온도상승이 20℃ 이내의 값을 정격전류로 한다.

■정격전류의 디레이팅

●HK시리즈
HK시리즈는 주위 온도에 따라 정격전류의 디레이팅이 필요합니다.
아래 도표를 참조하여 사용전류의 디레이팅을 해 주십시오.



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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

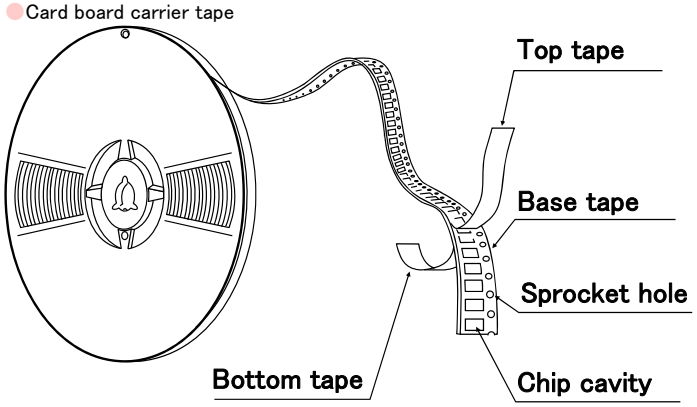
①Minimum Quantity

●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

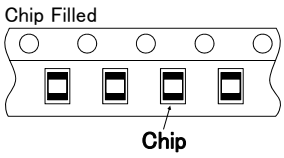
②Taping material

Card board carrier tape

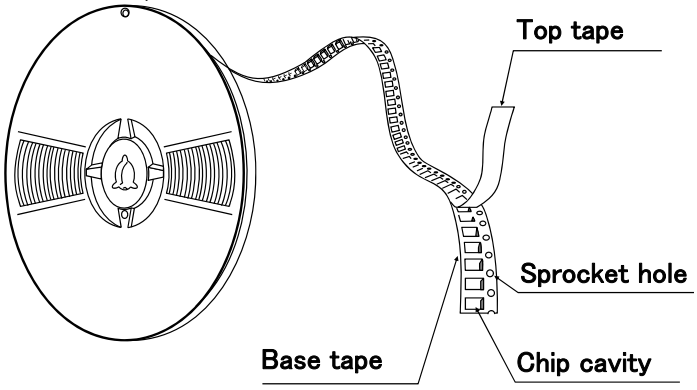


CK	1608
CKP	1608
CK	2125
CKS	2125
LK	1005
LK	1608
LK	2125
HK	0603
HK	1005
HK	1608
HKQ	0603
AQ	105

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

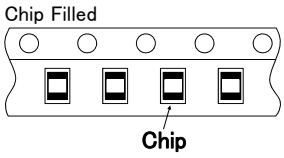


Embossed Tape



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

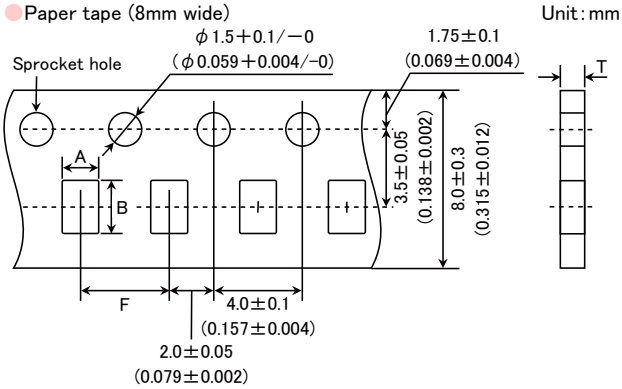
BK	2125
BK	3216
MCF	0806
MCF	1210
MCF	2010
MC	1608
MC	2012



③Taping Dimensions

Paper tape (8mm wide)

Unit : mm (inch)



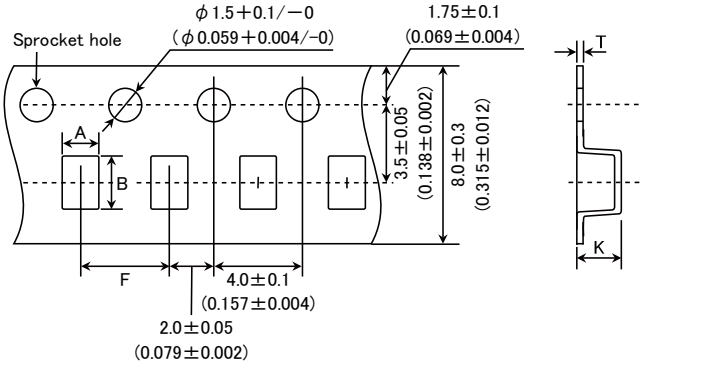
▸ This catalog contains the typical specification only due to the limitation of space. When you consider the purchase of our products, please check our specification.
For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our Web site (http://www.ty-top.com/)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

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)

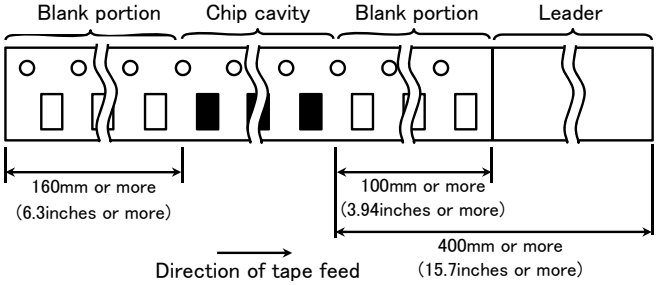
Unit : mm (inch)



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)

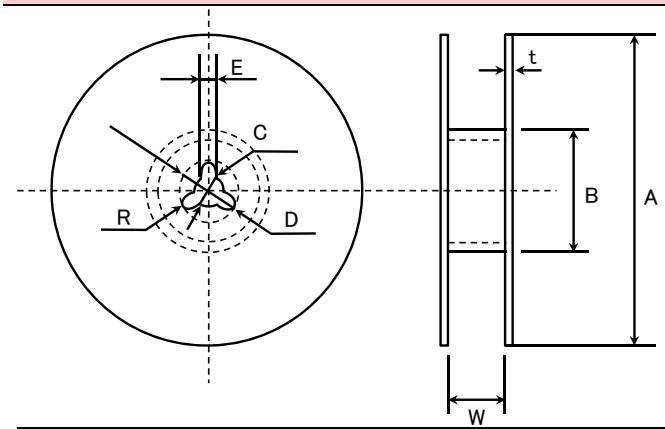
Unit : mm (inch)

④LEADER AND BLANK PORTION



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

⑤Reel Size



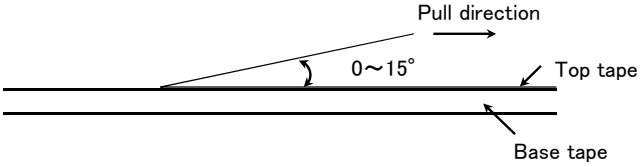
A	B	C	D	E	R
ϕ178±2.0	ϕ50 or more	ϕ13.0±0.2	ϕ21.0±0.8	2.0±0.5	1.0

	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℃

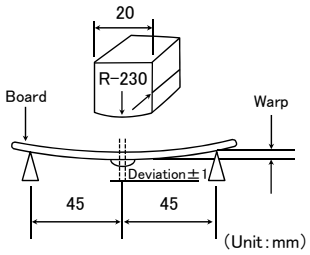
4. Impedance		
Specified Value	BK series	Refer to each specification.
	BKP series	
	LK series	—
	HK series	
Test Methods and Remarks	Measuring frequency : 100±1MHz Measuring equipment : 4291A(or its equivalent) Measuring jig : 16192A(or its equivalent), HW:16193A(or its equivalent)	

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 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 : 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.

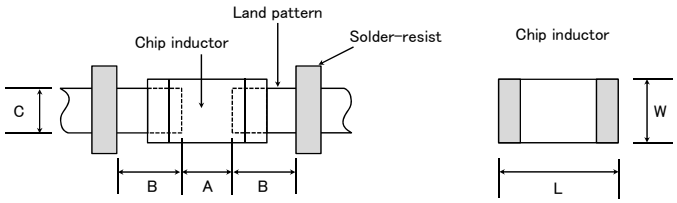
◆Pattern configurations (Inductor layout on panelized[breakaway] PC boards)

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)

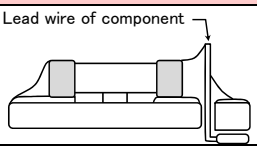
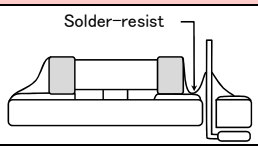
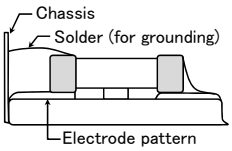
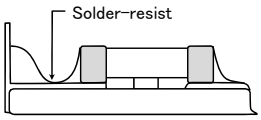
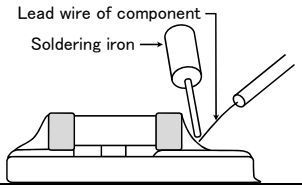
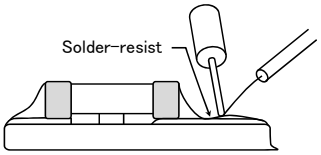
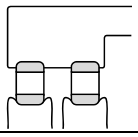
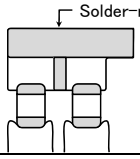
1. The following diagrams and tables show some examples of recommended patterns to prevent excessive solder amounts (larger fillets which extend above the component end terminations). Examples of improper pattern designs are also shown.
   (1) Recommended land dimensions for a typical chip inductor land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



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

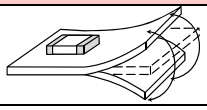
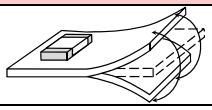
Type		0603	1005
Size	L	0.6	1.0
	W	0.3	0.5
A		0.20～0.30	0.45～0.55
B		0.20～0.30	0.40～0.50
C		0.25～0.40	0.45～0.55

(2) Examples of good and bad solder application

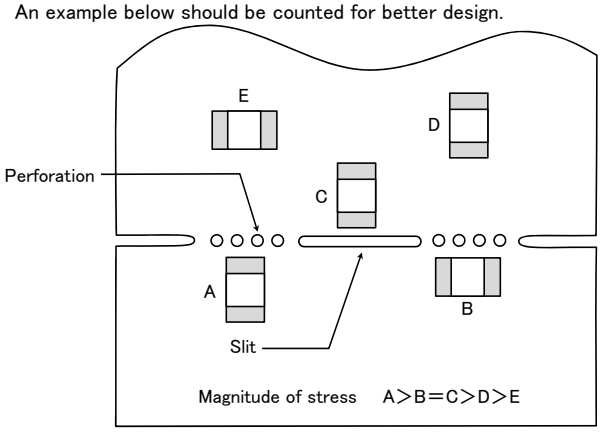
Item	Not recommended	Recommended
Mixed mounting of SMD and leaded components		
Component placement close to the chassis		
Hand-soldering of leaded components near mounted components		
Horizontal component placement		

◆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.

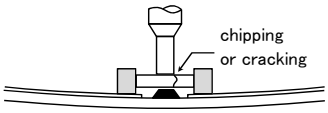
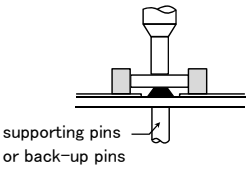
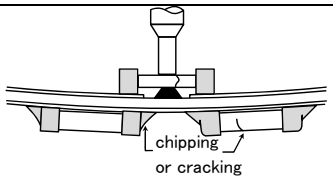
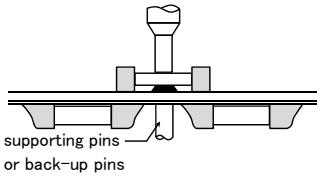
◆Selection of Adhesives

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.

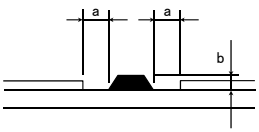
◆Selection of Adhesives

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.

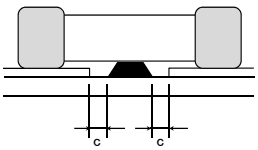
[Recommended conditions]

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

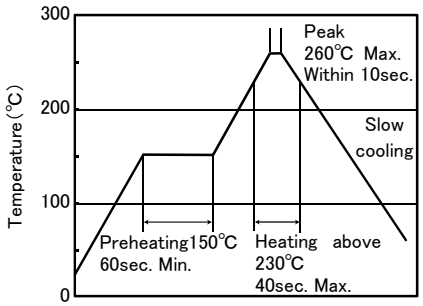
Preheating: Inductors shall be preheated sufficiently, and the temperature difference between the inductors and solder shall be within 130°C.

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.

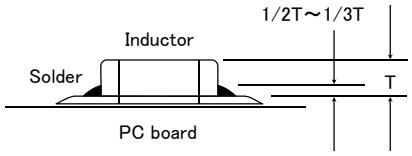
[Reflow soldering]

【Recommended condition for Pb-free soldering】



Caution

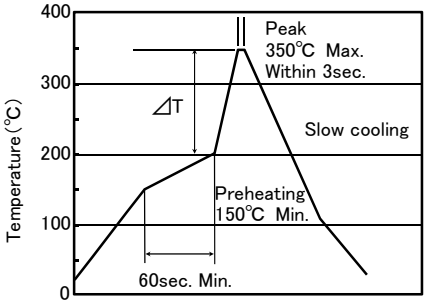
1. Solder (fillet) should wet up to 1/2 to 1/3 of the thickness of an inductor ideally as shown below:



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.