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.

차재 어플리케이션 가이드

폐사는 자동차용 전자기기를 다음의 4개의 구분으로 분류한 후, 폐사제품별로 사용 가능한 구분을 설정하고 있습니다. 자동차용 전자기기에 폐사제품을 사용하실 때에는, 해당 구분을 반드시 확인한 후, 그에 대응하는 폐사제품을 사용해 주시길 부탁 드립니다. 불명확한 경우에는 폐사로 문의 바랍니다.

구 분	자동차용 전자기기 (대표 예)
제어계	· 엔진ECU (전자제어연료분사장치) · 크루즈 컨트롤 유닛 · 4WS (4륜 조향 시스템) · 트랜스미션 · 파워 스티어링 · HEV/PHV/EV기간제어 (배터리, 인버터, DC-DC) · 차량위치정보제공장치 등
안전계	· ABS (잠김 방지 브레이크 시스템) · ESC (전자 제어 주행 안정 장치) · 에어백 · ADAS (주행·방향·정지를 직접 제어하는 장치) 등
차체계	· 와이퍼 · 자동문 · 파워 윈도우 · 키리스 엔트리 시스템 · 전동 도어 미러 · 디지털 미러 · 차량실내조명 · 카 에어컨·공조 시스템 · LED헤드라이트 · TPMS (타이어 공기압 감시 시스템) · 자동차 도난 방지 장치 (이모빌라이저) 등
정보계	· 차량용 인포테인먼트 기기 · ITS / Telematics기기 · Instrument Cluster · ADAS (센서, 안전장치·파워트레인과 연동 되지 않는 기기) · 블랙박스 (자동차 업계 순정품) 등

▶ 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.

SMD 파워 인덕터 (NR시리즈 H타입 / S타입 / V타입)

리플로우
AEC-Q200

AEC-Q200 Grade 3 (Grade 3 테스트 조건으로 평가 실시를 마쳤습니다.)
*사용 환경 온도: -40~85℃

■품번 표기법

*사용온도범위 : -40~125℃(제품자기발열 포함)

N R S	4 0 1 8	T △	1 0 0	M	D G V	V
①	②	③	④	⑤	⑥	⑦

△=스페이스

①형식

기호	형식
NRH	외장수지사양
NRS	
NRV	

②크기 (L×W×H)

기호	크기(L×W×H) [mm]
2010	2.0×2.0×1.0
2012	2.0×2.0×1.2
2410	2.4×2.4×1.0
2412	2.4×2.4×1.2
3010	3.0×3.0×1.0
3012	3.0×3.0×1.2
3015	3.0×3.0×1.5
4010	4.0×4.0×1.0
4012	4.0×4.0×1.2
4018	4.0×4.0×1.8
5010	4.9×4.9×1.0
5012	4.9×4.9×1.2
5014	4.9×4.9×1.4
5020	4.9×4.9×2.0
5024	4.9×4.9×2.4
5030	4.9×4.9×3.0
5040	4.9×4.9×4.0
6010	6.0×6.0×1.0
6012	6.0×6.0×1.2
6014	6.0×6.0×1.4
6020	6.0×6.0×2.0
6028	6.0×6.0×2.8
6045	6.0×6.0×4.5
8030	8.0×8.0×3.0
8040	8.0×8.0×4.0

③포장

기호	포장
T△	테이핑

④공칭인덕턴스

기호(예)	공칭인덕턴스 [μH]
2R2	2.2
100	10
101	100

※R=소수점

⑤인덕턴스 허용차

기호	인덕턴스 허용차
M	±20%
N	±30%

⑥개별 사양

⑦당사관리기호

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

▶ 본 카탈로그에는 지면 사정상 대표적인 사양만 기재하고 있으므로, 폐사제품을 검토하실 때에는 납입 사양서에서 상세한 사양을 확인하여 주시기 바랍니다.
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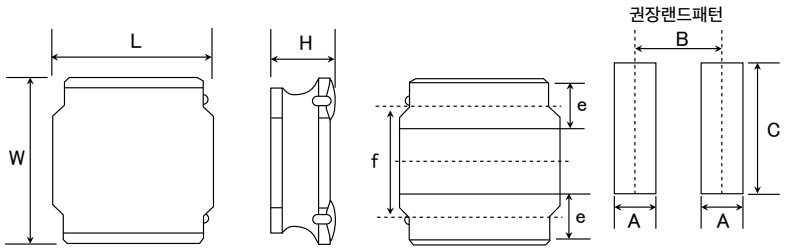
■표준외형크기 / 표준수량



Type	A	B	C
NRV2010	0.65	1.35	2.0
NRV2012, NRS2012			
NRH2410	0.7	1.45	2.0
NRH2412			
NRH3010	0.8	2.2	2.7
NRH3012, NRV3012			
NRS3015			
NRS4010	1.2	2.8	3.7
NRS4012			
NRS4018			
NRS8030	1.8	5.6	7.5
NRS8040			

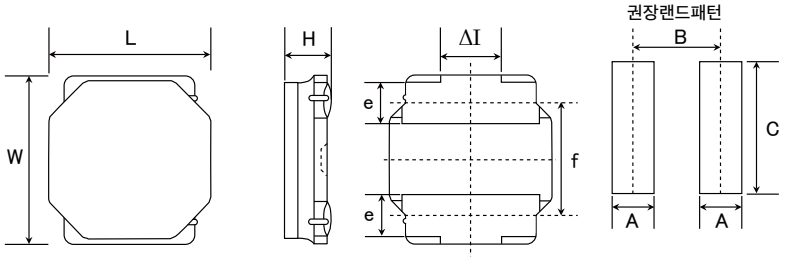
단위 : mm

Type	L	W	H	e	f	표준수량[pcs] 테이핑
NRV2010	2.0±0.1 (0.079±0.004)	2.0±0.1 (0.079±0.004)	1.0 max (0.039 max)	0.5±0.2 (0.020±0.008)	1.25±0.2 (0.050±0.008)	2500
NRV2012 NRS2012	2.0±0.1 (0.079±0.004)	2.0±0.1 (0.079±0.004)	1.2 max (0.047 max)	0.5±0.2 (0.020±0.008)	1.25±0.2 (0.050±0.008)	2500
NRH2410	2.4±0.1 (0.095±0.00)	2.4±0.1 (0.095±0.004)	1.0 max (0.039 max)	0.6±0.2 (0.024±0.008)	1.45±0.2 (0.057±0.008)	2500
NRH2412	2.4±0.1 (0.095±0.004)	2.4±0.1 (0.095±0.004)	1.2 max (0.047 max)	0.6±0.2 (0.024±0.008)	1.45±0.2 (0.057±0.008)	2500
NRH3010	3.0±0.1 (0.118±0.004)	3.0±0.1 (0.118±0.004)	1.0 max (0.039 max)	0.9±0.2 (0.035±0.008)	1.9±0.2 (0.075±0.008)	2000
NRH3012 NRV3012	3.0±0.1 (0.118±0.004)	3.0±0.1 (0.118±0.004)	1.2 max (0.047 max)	0.9±0.2 (0.035±0.008)	1.9±0.2 (0.075±0.008)	2000
NRS3015	3.0±0.1 (0.118±0.004)	3.0±0.1 (0.118±0.004)	1.5 max (0.059 max)	0.9±0.2 (0.035±0.008)	1.9±0.2 (0.075±0.008)	2000
NRS4010	4.0±0.2 (0.158±0.008)	4.0±0.2 (0.158±0.008)	1.0 max (0.039 max)	1.1±0.2 (0.043±0.008)	2.5±0.2 (0.098±0.008)	5000
NRS4012	4.0±0.2 (0.158±0.008)	4.0±0.2 (0.158±0.008)	1.2 max (0.047 max)	1.1±0.2 (0.043±0.008)	2.5±0.2 (0.098±0.008)	4500
NRS4018	4.0±0.2 (0.158±0.008)	4.0±0.2 (0.158±0.008)	1.8 max (0.071 max)	1.1±0.2 (0.043±0.008)	2.5±0.2 (0.098±0.008)	3500
NRS8030	8.0±0.2 (0.315±0.008)	8.0±0.2 (0.315±0.008)	3.0 max (0.118 max)	1.60±0.3 (0.063±0.012)	5.6±0.3 (0.22±0.012)	1000
NRS8040	8.0±0.2 (0.315±0.008)	8.0±0.2 (0.315±0.008)	*1) 4.2 max (0.165 max) *2) 4.0 max (0.158 max)	1.60±0.3 (0.063±0.012)	5.6±0.3 (0.22±0.012)	1000

*1) 0R9~6R8 타입 *2) 100~101타입

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.



Type	A	B	C
NRS5010	1.5	3.6	4.0
NRS5012			
NRS5014			
NRS5020			
NRS5024			
NRS5030			
NRS5040			
NRS6010	1.6	4.7	5.7
NRS6012			
NRS6014			
NRS6020			
NRS6028			
NRS6045			

단위 : mm

Type	L	W	H	e	f	ΔI	표준수량[pcs] 테이핑
NRS5010	4.9±0.2 (0.193±0.008)	4.9±0.2 (0.193±0.008)	1.0 max (0.039 max)	1.2±0.2 (0.047±0.008)	3.3±0.2 (0.130±0.008)	1.3typ (0.051typ)	1000
NRS5012	4.9±0.2 (0.193±0.008)	4.9±0.2 (0.193±0.008)	1.2 max (0.047 max)	1.2±0.2 (0.047±0.008)	3.3±0.2 (0.130±0.008)	1.3typ (0.051typ)	1000
NRS5014	4.9±0.2 (0.193±0.008)	4.9±0.2 (0.193±0.008)	1.4 max (0.055 max)	1.2±0.2 (0.047±0.008)	3.3±0.2 (0.130±0.008)	1.3typ (0.051typ)	1000
NRS5020	4.9±0.2 (0.193±0.008)	4.9±0.2 (0.193±0.008)	2.0 max (0.079 max)	1.2±0.2 (0.047±0.008)	3.3±0.2 (0.130±0.008)	1.3typ (0.051typ)	800
NRS5024	4.9±0.2 (0.193±0.008)	4.9±0.2 (0.193±0.008)	*3) 2.5 max (0.098 max) *4) 2.4 max (0.095 max)	1.2±0.2 (0.047±0.008)	3.3±0.2 (0.130±0.008)	1.3typ (0.051typ)	2500
NRS5030	4.9±0.2 (0.193±0.008)	4.9±0.2 (0.193±0.008)	*5) 3.1 max (0.122 max) *6) 3.0 max (0.118 max)	1.2±0.2 (0.047±0.008)	3.3±0.2 (0.130±0.008)	1.3typ (0.051typ)	500
NRS5040	4.9±0.2 (0.193±0.008)	4.9±0.2 (0.193±0.008)	*7) 4.1 max (0.161 max) *8) 4.0 max (0.158 max)	1.2±0.2 (0.047±0.008)	3.3±0.2 (0.130±0.008)	1.3typ (0.051typ)	1500
NRS6010	6.0±0.2 (0.236±0.008)	6.0±0.2 (0.236±0.008)	1.0 max (0.039 max)	1.35±0.2 (0.053±0.008)	4.0±0.2 (0.158±0.008)	2.3typ (0.091typ)	1000
NRS6012	6.0±0.2 (0.236±0.008)	6.0±0.2 (0.236±0.008)	1.2 max (0.047 max)	1.35±0.2 (0.053±0.008)	4.0±0.2 (0.158±0.008)	2.3typ (0.091typ)	1000
NRS6014	6.0±0.2 (0.236±0.008)	6.0±0.2 (0.236±0.008)	1.4 max (0.055 max)	1.35±0.2 (0.053±0.008)	4.0±0.2 (0.158±0.008)	2.3typ (0.091typ)	1000
NRS6020	6.0±0.2 (0.236±0.008)	6.0±0.2 (0.236±0.008)	2.0 max (0.079 max)	1.35±0.2 (0.053±0.008)	4.0±0.2 (0.158±0.008)	2.3typ (0.091typ)	2500
NRS6028	6.0±0.2 (0.236±0.008)	6.0±0.2 (0.236±0.008)	2.8 max (0.110 max)	1.35±0.2 (0.053±0.008)	4.0±0.2 (0.158±0.008)	2.3typ (0.091typ)	2000
NRS6045	6.0±0.2 (0.236±0.008)	6.0±0.2 (0.236±0.008)	4.5 max (0.177 max)	1.35±0.2 (0.053±0.008)	4.0±0.2 (0.158±0.008)	2.3typ (0.091typ)	1500

*3) 1R0~1R5 타입 *4) 2R2~330 타입
*5) R47~100 타입 *6) 150~470 타입
*7) 1R5~100 타입 *8) 150~470 타입

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 SMD파워 인덕터는 전부 RoHS 대응품입니다.

주)
·사용하시는 회로나 기기에 따라 개별사양의 교체가 필요합니다. 반드시 정규판매채널로 문의해 주시기 바랍니다.
·차재(차체계, 정보계) 용도 (AEC-Q200 qualified) 제품입니다. 상세에 대해서는 "차재 어플리케이션 가이드"를 반드시 확인해 주십시오.
＜ AEC-Q200 : AEC-Q200 qualified＞
차재(차체계, 정보계) 용도 SMD파워 인덕터는 대표 아이템에 의한 AEC-Q200에 대응한 평가 시험을 끝냈습니다.
본 제품의 상세한 사양, 평가 시험 결과 등에 관해서는 정규판매채널로 문의해 주시기 바랍니다.
또한, 주문할 때 납입사양서의 승인을 부탁 드립니다.

●NRV2010 type

품번	공칭인덕턴스 [μH]	인덕턴스허용차	자기공진주파수 [MHz] (min.)	직류저항 [Ω] (±20%)	정격전류 ※) [mA] 직류중첩허용전류 Idc1	정격전류 ※) [mA] 온도상승허용전류 Idc2	측정주파수 [kHz]	주기
NRV2010T R47N GFV	0.47	±30%	–	0.052	2,100	2,000	100	
NRV2010T R68N GFV	0.68	±30%	–	0.060	1,850	1,850	100	
NRV2010T 1R0N GFV	1.0	±30%	–	0.080	1,550	1,600	100	
NRV2010T 1R5M GFV	1.5	±20%	–	0.100	1,350	1,450	100	
NRV2010T 2R2M GFV	2.2	±20%	–	0.175	1,100	1,100	100	
NRV2010T 3R3M GFV	3.3	±20%	–	0.250	880	1,000	100	
NRV2010T 4R7M GFV	4.7	±20%	–	0.320	760	820	100	

●NRV2012 type

품번	공칭인덕턴스 [μH]	인덕턴스허용차	자기공진주파수 [MHz] (min.)	직류저항 [Ω] (±20%)	정격전류 ※) [mA] 직류중첩허용전류 Idc1	정격전류 ※) [mA] 온도상승허용전류 Idc2	측정주파수 [kHz]	주기
NRV2012T 1R0N GFV	1.0	±30%	–	0.073	2,200	1,650	100	
NRV2012T 1R5N GFV	1.5	±30%	–	0.100	1,800	1,400	100	
NRV2012T 2R2M GFV	2.2	±20%	–	0.129	1,600	1,200	100	
NRV2012T 3R3M GFV	3.3	±20%	–	0.227	1,250	900	100	
NRV2012T 4R7M GFV	4.7	±20%	–	0.325	1,100	750	100	

●NRS2012실드타입

품번	공칭인덕턴스 [μH]	인덕턴스허용차	자기공진주파수 [MHz] (min.)	직류저항 [Ω] (±20%)	정격전류 ※) [mA] 직류중첩허용전류 Idc1	정격전류 ※) [mA] 온도상승허용전류 Idc2	측정주파수 [kHz]	주기
NRS2012T 1R0N GJV	1.0	±30%	–	0.070	1,900	1,700	100	
NRS2012T 1R5N GJV	1.5	±30%	–	0.090	1,650	1,500	100	
NRS2012T 2R2M GJV	2.2	±20%	–	0.107	1,350	1,370	100	
NRS2012T 3R3M GJV	3.3	±20%	–	0.190	1,000	1,020	100	
NRS2012T 4R7M GJV	4.7	±20%	–	0.241	900	910	100	

●NRH2410실드타입

품번	공칭인덕턴스 [μH]	인덕턴스허용차	자기공진주파수 [MHz] (min.)	직류저항 [Ω] (±20%)	정격전류 ※) [mA] 직류중첩허용전류 Idc1	정격전류 ※) [mA] 온도상승허용전류 Idc2	측정주파수 [kHz]	주기
NRH2410T R68NN 4V	0.68	±30%	120	0.060	2,200	1,570	100	
NRH2410T 1R0NN 4V	1.0	±30%	106	0.070	1,800	1,410	100	
NRH2410T 1R5MN V	1.5	±20%	94	0.110	1,550	1,160	100	
NRH2410T 2R2MN V	2.2	±20%	77	0.150	1,290	970	100	
NRH2410T 3R3MN V	3.3	±20%	56	0.220	1,000	770	100	
NRH2410T 4R7MN V	4.7	±20%	50	0.290	880	670	100	
NRH2410T 6R8MN V	6.8	±20%	43	0.410	750	570	100	
NRH2410T 100MN V	10	±20%	32	0.690	550	450	100	
NRH2410T 150MN V	15	±20%	27	1.02	470	370	100	
NRH2410T 220MN V	22	±20%	22	1.47	390	300	100	

●NRH2412실드타입

품번	공칭인덕턴스 [μH]	인덕턴스허용차	자기공진주파수 [MHz] (min.)	직류저항 [Ω] (±20%)	정격전류 ※) [mA] 직류중첩허용전류 Idc1	정격전류 ※) [mA] 온도상승허용전류 Idc2	측정주파수 [kHz]	주기
NRH2412T R47NNGJV	0.47	±30%	180	0.050	2,900	2,100	100	
NRH2412T 1R0NNGHV	1.0	±30%	101	0.077	2,350	1,300	100	
NRH2412T 1R5NNGHV	1.5	±30%	89	0.100	2,100	1,150	100	
NRH2412T 2R2MNGHV	2.2	±20%	72	0.140	1,700	1,000	100	
NRH2412T 3R3MNGHV	3.3	±20%	56	0.225	1,400	750	100	
NRH2412T 4R7MNGHV	4.7	±20%	45	0.300	1,150	650	100	
NRH2412T 6R8MNGHV	6.8	±20%	34	0.420	950	550	100	
NRH2412T 100MNGHV	10	±20%	29	0.600	810	450	100	

※) 직류중첩허용전류(Idc1)는 직류중첩에 의한 인덕턴스 저하가 30%이내가 되는 직류전류값 (at 20℃)
※) 온도상승허용전류(Idc2)는 온도상승이 40℃가 되는 직류전류값 (at 20℃)
※) 정격전류값은 직류중첩허용전류, 또는 온도상승허용전류를 모두 만족시키는 직류전류값

▶ 본 카탈로그에는 지면 사정상 대표적인 사양만 기재하고 있으므로, 폐사제품을 검토하실 때에는 납입 사양서에서 상세한 사양을 확인하여 주시기 바랍니다.
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■아이템 일람

●NRH3010 실드타입

품번	공칭인덕턴스 [μH]	인덕턴스허용차	자기공진주파수 [MHz] (min.)	직류저항 [Ω] (±20%)	정격전류 ※) [mA]		측정주파수 [kHz]	주기
					직류중첩허용전류 Idc1	온도상승허용전류 Idc2		
NRH3010T 1R2NN V	1.2	±30%	120	0.065	1,700	1,480	100	
NRH3010T 1R5NN V	1.5	±30%	99	0.075	1,440	1,370	100	
NRH3010T 2R2MN V	2.2	±20%	86	0.083	1,300	1,300	100	
NRH3010T 3R3MN V	3.3	±20%	64	0.130	1,000	1,030	100	
NRH3010T 4R7MN V	4.7	±20%	50	0.170	850	900	100	
NRH3010T 6R8MN V	6.8	±20%	44	0.250	700	745	100	
NRH3010T 100MN V	10	±20%	34	0.350	600	620	100	
NRH3010T 150MN V	15	±20%	25	0.550	450	480	100	
NRH3010T 220MN V	22	±20%	22	0.770	380	410	100	
NRH3010T 470MN V	47	±20%	17	2.05	250	285	100	

●NRH3012 실드타입

품번	공칭인덕턴스 [μH]	인덕턴스허용차	자기공진주파수 [MHz] (min.)	직류저항 [Ω] (±20%)	정격전류 ※) [mA]		측정주파수 [kHz]	주기
					직류중첩허용전류 Idc1	온도상승허용전류 Idc2		
NRH3012T R47NN V	0.47	±30%	160	0.033	2,600	1,900	100	
NRH3012T 1R0NN V	1.0	±30%	111	0.048	2,200	1,710	100	
NRH3012T 1R5NN V	1.5	±30%	95	0.055	1,700	1,600	100	
NRH3012T 2R2MN V	2.2	±20%	78	0.075	1,500	1,370	100	
NRH3012T 3R3MN V	3.3	±20%	61	0.100	1,200	1,210	100	
NRH3012T 4R7MN V	4.7	±20%	50	0.130	1,000	1,060	100	
NRH3012T 6R8MN V	6.8	±20%	43	0.190	850	890	100	
NRH3012T 100MN V	10	±20%	32	0.270	730	720	100	
NRH3012T 150MN V	15	±20%	26	0.450	530	570	100	
NRH3012T 220MN V	22	±20%	22	0.630	500	500	100	

●NRV3012 실드타입

품번	공칭인덕턴스 [μH]	인덕턴스허용차	자기공진주파수 [MHz] (min.)	직류저항 [Ω] (±20%)	정격전류 ※) [mA]		측정주파수 [kHz]	주기
					직류중첩허용전류 Idc1	온도상승허용전류 Idc2		
NRV3012T 1R0N V	1.0	±30%	110	0.065	2,500	1,600	100	
NRV3012T 1R5N V	1.5	±30%	92	0.075	2,100	1,400	100	
NRV3012T 2R2M V	2.2	±20%	70	0.120	1,800	1,100	100	
NRV3012T 3R3M V	3.3	±20%	55	0.150	1,600	1,000	100	
NRV3012T 4R7M V	4.7	±20%	48	0.190	1,250	850	100	
NRV3012T 6R8M V	6.8	±20%	40	0.300	950	650	100	
NRV3012T 100M V	10	±20%	32	0.470	800	550	100	

●NRS3015 실드타입

품번	공칭인덕턴스 [μH]	인덕턴스허용차	자기공진주파수 [MHz] (min.)	직류저항 [Ω] (±20%)	정격전류 ※) [mA]		측정주파수 [kHz]	주기
					직류중첩허용전류 Idc1	온도상승허용전류 Idc2		
NRS3015T 1R0NNGHV	1.0	±30%	100	0.030	2,100	2,100	100	
NRS3015T 1R5NNGHV	1.5	±30%	87	0.038	1,800	1,820	100	
NRS3015T 2R2MNGHV	2.2	±20%	64	0.058	1,480	1,500	100	
NRS3015T 3R3MNGHV	3.3	±20%	49	0.078	1,210	1,230	100	
NRS3015T 4R7MNGHV	4.7	±20%	40	0.120	1,020	1,040	100	
NRS3015T 6R8MNGHV	6.8	±20%	36	0.160	870	880	100	
NRS3015T 100MNGHV	10	±20%	28	0.220	700	710	100	
NRS3015T 220MNGHV	22	±20%	20	0.520	470	470	100	

●NRS4010 실드타입

품번	공칭인덕턴스 [μH]	인덕턴스허용차	자기공진주파수 [MHz] (min.)	직류저항 [Ω] (±20%)	정격전류 ※) [mA]		측정주파수 [kHz]	주기
					직류중첩허용전류 Idc1	온도상승허용전류 Idc2		
NRS4010T 1R0NDGGV	1.0	±30%	116	0.056	2,000	1,900	100	
NRS4010T 2R2MDGGV	2.2	±20%	73	0.085	1,200	1,500	100	
NRS4010T 3R3MDGGV	3.3	±20%	58	0.100	1,100	1,400	100	
NRS4010T 4R7MDGGV	4.7	±20%	47	0.140	950	1,200	100	
NRS4010T 6R8MDGGV	6.8	±20%	38	0.200	800	1,000	100	
NRS4010T 100MDGGV	10	±20%	31	0.300	620	750	100	
NRS4010T 150MDGGV	15	±20%	24	0.430	540	600	100	
NRS4010T 220MDGGV	22	±20%	19	0.570	450	500	100	

●NRS4012 실드타입

품번	공칭인덕턴스 [μH]	인덕턴스허용차	자기공진주파수 [MHz] (min.)	직류저항 [Ω] (±20%)	정격전류 ※) [mA]		측정주파수 [kHz]	주기
					직류중첩허용전류 Idc1	온도상승허용전류 Idc2		
NRS4012T 1R0NDGGV	1.0	±30%	100	0.042	2,800	2,200	100	
NRS4012T 2R2MDGJV	2.2	±20%	70	0.060	1,650	1,900	100	
NRS4012T 3R3MDGJV	3.3	±20%	60	0.070	1,400	1,700	100	
NRS4012T 4R7MDGJV	4.7	±20%	45	0.095	1,200	1,500	100	
NRS4012T 6R8MDGJV	6.8	±20%	35	0.125	900	1,300	100	
NRS4012T 100MDGJV	10	±20%	30	0.170	800	1,100	100	
NRS4012T 150MDGJV	15	±20%	24	0.260	650	750	100	
NRS4012T 220MDGJV	22	±20%	18	0.400	500	620	100	

※)직류중첩허용전류(Idc1)는 직류중첩에 의한 인덕턴스 저하가 30%이내가 되는 직류전류값 (at 20℃)
※)온도상승허용전류(Idc2)는 온도상승이 40℃가 되는 직류전류값 (at 20℃)
※)정격전류값은 직류중첩허용전류, 또는 온도상승허용전류를 모두 만족시키는 직류전류값

▶ 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

●NRS4018 실드타입

품번	공칭인덕턴스 [μH]	인덕턴스허용차	자기공진주파수 [MHz] (min.)	직류저항 [Ω] (±20%)	정격전류 ※) [mA]		측정주파수 [kHz]	주기
					직류중첩허용전류 Idc1	온도상승허용전류 Idc2		
NRS4018T 1R0NDGJV	1.0	±30%	90	0.027	4,000	3,200	100	
NRS4018T 1R5NDGJV	1.5	±30%	75	0.037	3,300	2,400	100	
NRS4018T 2R2MDGJV	2.2	±20%	60	0.042	3,000	2,200	100	
NRS4018T 3R3MDGJV	3.3	±20%	45	0.055	2,300	2,000	100	
NRS4018T 4R7MDGJV	4.7	±20%	35	0.070	2,000	1,700	100	
NRS4018T 6R8MDGJV	6.8	±20%	30	0.098	1,600	1,450	100	
NRS4018T 100MDGJV	10	±20%	25	0.150	1,300	1,200	100	
NRS4018T 150MDGJV	15	±20%	18	0.210	1,100	850	100	
NRS4018T 220MDGJV	22	±20%	15	0.290	900	720	100	
NRS4018T 330MDGJV	33	±20%	12	0.460	700	550	100	
NRS4018T 470MDGJV	47	±20%	10	0.650	600	440	100	
NRS4018T 680MDGJV	68	±20%	8.3	1.00	520	320	100	
NRS4018T 101MDGJV	100	±20%	6.5	1.45	420	280	100	
NRS4018T 151MDGJV	150	±20%	5.5	2.30	340	220	100	
NRS4018T 221MDGJV	220	±20%	4.0	3.80	275	170	100	

●NRS5010 type

품번	공칭인덕턴스 [μH]	인덕턴스허용차	자기공진주파수 [MHz] (min.)	직류저항 [Ω] (±20%)	정격전류 ※) [mA]		측정주파수 [kHz]	주기
					직류중첩허용전류 Idc1	온도상승허용전류 Idc2		
NRS5010T 1R0NMGFV	1.0	±30%	95	0.070	2,350	1,750	100	
NRS5010T 2R2NMGFV	2.2	±30%	65	0.105	1,500	1,400	100	
NRS5010T 3R3MMGFV	3.3	±20%	42	0.125	1,400	1,250	100	
NRS5010T 4R7MMGFV	4.7	±20%	37	0.145	1,200	1,150	100	
NRS5010T 6R8MMGFV	6.8	±20%	33	0.185	1,000	1,000	100	
NRS5010T 100MMGFV	10	±20%	23	0.250	850	900	100	
NRS5010T 150MMGFV	15	±20%	19	0.400	680	650	100	
NRS5010T 220MMGFV	22	±20%	15	0.600	550	450	100	

●NRS5012 type

품번	공칭인덕턴스 [μH]	인덕턴스허용차	자기공진주파수 [MHz] (min.)	직류저항 [Ω] (±20%)	정격전류 ※) [mA]		측정주파수 [kHz]	주기
					직류중첩허용전류 Idc1	온도상승허용전류 Idc2		
NRS5012T 1R0NMGFV	1.0	±30%	100	0.053	4,500	2,300	100	
NRS5012T 1R5NMGFV	1.5	±30%	86	0.070	3,800	2,200	100	
NRS5012T 2R2MMGFV	2.2	±20%	70	0.085	3,100	2,000	100	
NRS5012T 3R3MMGFV	3.3	±20%	48	0.160	2,400	1,450	100	
NRS5012T 4R7MMGFV	4.7	±20%	40	0.180	2,200	1,400	100	
NRS5012T 6R8MMGFV	6.8	±20%	36	0.260	1,700	1,100	100	
NRS5012T 100MMGFV	10	±20%	26	0.420	1,400	850	100	
NRS5012T 150MMGFV	15	±20%	22	0.670	1,200	640	100	

●NRS5014 실드타입

품번	공칭인덕턴스 [μH]	인덕턴스허용차	자기공진주파수 [MHz] (min.)	직류저항 [Ω] (±20%)	정격전류 ※) [mA]		측정주파수 [kHz]	주기
					직류중첩허용전류 Idc1	온도상승허용전류 Idc2		
NRS5014T R47NMGGV	0.47	±30%	185	0.025	5,800	3,300	100	
NRS5014T 1R2NMGGV	1.2	±30%	86	0.045	3,800	2,400	100	
NRS5014T 2R2NMGGV	2.2	±30%	56	0.065	2,800	2,000	100	
NRS5014T 3R3NMGGV	3.3	±30%	48	0.080	2,350	1,700	100	
NRS5014T 4R7NMGGV	4.7	±30%	41	0.100	2,050	1,400	100	
NRS5014T 6R8MMGGV	6.8	±20%	33	0.150	1,600	1,200	100	
NRS5014T 100MMGGV	10	±20%	27	0.200	1,400	1,050	100	
NRS5014T 150MMGGV	15	±20%	20	0.320	1,100	650	100	
NRS5014T 220MMGGV	22	±20%	16	0.450	900	550	100	

●NRS5020 실드타입

품번	공칭인덕턴스 [μH]	인덕턴스허용차	자기공진주파수 [MHz] (min.)	직류저항 [Ω] (±20%)	정격전류 ※) [mA]		측정주파수 [kHz]	주기
					직류중첩허용전류 Idc1	온도상승허용전류 Idc2		
NRS5020T R47NMGJV	0.47	±30%	230	0.012	6,100	5,000	100	
NRS5020T 1R0NMGJV	1.0	±30%	81	0.021	4,000	3,600	100	
NRS5020T 1R5NMGJV	1.5	±30%	68	0.026	3,350	3,200	100	
NRS5020T 2R2NMGJV	2.2	±30%	57	0.035	2,900	2,900	100	
NRS5020T 3R3NMGJV	3.3	±30%	46	0.048	2,400	2,400	100	
NRS5020T 4R7MMGJV	4.7	±20%	37	0.060	2,000	2,000	100	
NRS5020T 6R8MMGJV	6.8	±20%	30	0.090	1,600	1,650	100	
NRS5020T 100MMGJV	10	±20%	24	0.120	1,300	1,450	100	
NRS5020T 150MMGJV	15	±20%	20	0.165	1,100	1,200	100	
NRS5020T 220MMGJV	22	±20%	17	0.260	900	1,000	100	
NRS5020T 470MMGJV	47	±20%	12	0.435	630	560	100	
NRS5020T 101MMGJV	100	±20%	7	0.850	420	400	100	

※) 직류중첩허용전류(Idc1)는 직류중첩에 의한 인덕턴스 저하가 30%이내가 되는 직류전류값 (at 20℃)
※) 온도상승허용전류(Idc2)는 온도상승이 40℃가 되는 직류전류값 (at 20℃)
※) 정격전류값은 직류중첩허용전류, 또는 온도상승허용전류를 모두 만족시키는 직류전류값

▶ 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

●NRS5024 실드타입

품번	공칭인덕턴스 [μH]	인덕턴스허용차	자기공진주파수 [MHz] (min.)	직류저항 [Ω] (±20%)	정격전류 ※) [mA]		측정주파수 [kHz]	주기
					직류중첩허용전류 Idc1	온도상승허용전류 Idc2		
NRS5024T 1R0NMGJV	1.0	±30%	85	0.016	5,800	4,400	100	
NRS5024T 1R5NMGJV	1.5	±30%	67	0.022	5,200	3,600	100	
NRS5024T 2R2NMGJV	2.2	±30%	51	0.029	4,100	3,100	100	
NRS5024T 3R3NMGJV	3.3	±30%	41	0.043	3,100	2,400	100	
NRS5024T 4R7MMGJV	4.7	±20%	37	0.055	2,700	2,000	100	
NRS5024T 6R8MMGJV	6.8	±20%	28	0.080	2,200	1,600	100	
NRS5024T 100MMGJV	10	±20%	21	0.125	1,700	1,200	100	
NRS5024T 150MMGJV	15	±20%	18	0.170	1,400	1,000	100	
NRS5024T 220MMGJV	22	±20%	15	0.230	1,200	820	100	
NRS5024T 330MMGJV	33	±20%	11	0.370	1,000	630	100	

●NRS5030 실드타입

품번	공칭인덕턴스 [μH]	인덕턴스허용차	자기공진주파수 [MHz] (min.)	직류저항 [Ω] (±30%)	정격전류 ※) [mA]		측정주파수 [kHz]	주기
					직류중첩허용전류 Idc1	온도상승허용전류 Idc2		
NRS5030T R47NMGJV	0.47	±30%	185	0.010	9,000	5,000	100	
NRS5030T 1R0NMGJV	1.0	±30%	110	0.015	6,600	4,000	100	
NRS5030T 2R2NMGJV	2.2	±30%	46	0.023	4,200	3,500	100	
NRS5030T 3R3MMGJV	3.3	±20%	36	0.030	3,600	3,000	100	
NRS5030T 4R7MMGJV	4.7	±20%	31	0.035	3,100	2,600	100	
NRS5030T 6R8MMGJV	6.8	±20%	22	0.052	2,500	2,300	100	
NRS5030T 100MMGJV	10	±20%	20	0.070	2,100	1,700	100	
NRS5030T 150MMGJV	15	±20%	14	0.125	1,600	1,400	100	
NRS5030T 220MMGJV	22	±20%	13	0.180	1,400	1,050	100	
NRS5030T 330MMGJV	33	±20%	10	0.225	1,150	800	100	
NRS5030T 470MMGJV	47	±20%	9	0.325	950	700	100	

●NRS5040 실드타입

품번	공칭인덕턴스 [μH]	인덕턴스허용차	자기공진주파수 [MHz] (min.)	직류저항 [Ω] (±30%)	정격전류 ※) [mA]		측정주파수 [kHz]	주기
					직류중첩허용전류 Idc1	온도상승허용전류 Idc2		
NRS5040T 1R5NMGJV	1.5	±30%	60	0.017	6,400	4,500	100	
NRS5040T 2R2NMGJV	2.2	±30%	42	0.022	5,000	3,700	100	
NRS5040T 3R3NMGJV	3.3	±30%	32	0.027	4,000	3,300	100	
NRS5040T 4R7NMGKV	4.7	±30%	28	0.029	3,300	3,100	100	
NRS5040T 6R8MMGJV	6.8	±20%	21	0.049	2,800	2,400	100	
NRS5040T 100MMGJV	10	±20%	18	0.056	2,300	2,100	100	
NRS5040T 150MMGJV	15	±20%	13	0.080	2,000	1,800	100	
NRS5040T 220MMGKV	22	±20%	9	0.126	1,500	1,400	100	
NRS5040T 330MMGJV	33	±20%	7	0.180	1,300	1,200	100	
NRS5040T 470MMGJV	47	±20%	6	0.310	1,100	900	100	

●NRS6010 type

품번	공칭인덕턴스 [μH]	인덕턴스허용차	자기공진주파수 [MHz] (min.)	직류저항 [Ω] (±20%)	정격전류 ※) [mA]		측정주파수 [kHz]	주기
					직류중첩허용전류 Idc1	온도상승허용전류 Idc2		
NRS6010T 1R5MMGFV	1.5	±20%	77	0.090	2,400	1,900	100	
NRS6010T 2R2MMGFV	2.2	±20%	56	0.110	1,900	1,700	100	
NRS6010T 3R3MMGFV	3.3	±20%	42	0.135	1,600	1,500	100	
NRS6010T 4R7MMGFV	4.7	±20%	36	0.165	1,300	1,400	100	
NRS6010T 6R8MMGFV	6.8	±20%	30	0.220	1,200	1,200	100	
NRS6010T 100MMGFV	10	±20%	25	0.270	1,000	1,100	100	
NRS6010T 220MMGFV	22	±20%	12	0.580	650	700	100	

●NRS6012 실드타입

품번	공칭인덕턴스 [μH]	인덕턴스허용차	자기공진주파수 [MHz] (min.)	직류저항 [Ω] (±20%)	정격전류 ※) [mA]		측정주파수 [kHz]	주기
					직류중첩허용전류 Idc1	온도상승허용전류 Idc2		
NRS6012T 1R0NMGJV	1.0	±30%	95	0.050	3,000	2,400	100	
NRS6012T 1R5NMGGV	1.5	±30%	69	0.067	2,600	2,100	100	
NRS6012T 2R5NMGGV	2.5	±30%	45	0.090	2,100	1,800	100	
NRS6012T 3R3NMGGV	3.3	±30%	42	0.105	1,800	1,700	100	
NRS6012T 4R7MMGGV	4.7	±20%	36	0.125	1,600	1,550	100	
NRS6012T 5R3MMGJV	5.3	±20%	34	0.125	1,500	1,550	100	
NRS6012T 6R8MMGJV	6.8	±20%	30	0.165	1,300	1,350	100	
NRS6012T 100MMGJV	10	±20%	22	0.200	1,000	1,200	100	
NRS6012T 150MMGJV	15	±20%	18	0.295	800	800	100	
NRS6012T 220MMGJV	22	±20%	12	0.465	760	650	100	
NRS6012T 330MMGJV	33	±20%	8	0.580	590	550	100	
NRS6012T 470MMGJV	47	±20%	6	0.965	520	460	100	
NRS6012T 680MMGJV	68	±20%	3	1.16	440	410	100	
NRS6012T 101MMGJV	100	±20%	1	1.67	350	320	100	

※) 직류중첩허용전류(Idc1)는 직류중첩에 의한 인덕턴스 저하가 30%이내가 되는 직류전류값 (at 20℃)
※) 온도상승허용전류(Idc2)는 온도상승이 40℃가 되는 직류전류값 (at 20℃)
※) 정격전류값은 직류중첩허용전류, 또는 온도상승허용전류를 모두 만족시키는 직류전류값

▶ 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

●NRS6014 실드타입

품번	공칭인덕턴스 [μH]	인덕턴스허용차	자기공진주파수 [MHz] (min.)	직류저항 [Ω] (±20%)	정격전류 ※) [mA]		측정주파수 [kHz]	주기
					직류중첩허용전류 Idc1	온도상승허용전류 Idc2		
NRS6014T 1R2NMGGV	1.2	±30%	77	0.042	4,000	2,750	100	
NRS6014T 2R2NMGGV	2.2	±30%	61	0.055	3,000	2,300	100	
NRS6014T 3R3NMGGV	3.3	±30%	41	0.075	2,500	2,000	100	
NRS6014T 4R7MMGGV	4.7	±20%	36	0.090	2,000	1,900	100	
NRS6014T 6R8MMGGV	6.8	±20%	30	0.115	1,700	1,650	100	
NRS6014T 100MMGGV	10	±20%	24	0.140	1,400	1,400	100	
NRS6014T 150MMGGV	15	±20%	20	0.210	1,150	1,200	100	
NRS6014T 220MMGGV	22	±20%	16	0.300	950	1,000	100	

●NRS6020 실드타입

품번	공칭인덕턴스 [μH]	인덕턴스허용차	자기공진주파수 [MHz] (min.)	직류저항 [Ω] (±20%)	정격전류 ※) [mA]		측정주파수 [kHz]	주기
					직류중첩허용전류 Idc1	온도상승허용전류 Idc2		
NRS6020T 0R8NMGGV	0.8	±30%	110	0.020	6,400	4,100	100	
NRS6020T 1R5NMGJV	1.5	±30%	93	0.026	4,300	3,600	100	
NRS6020T 2R2NMGJV	2.2	±30%	73	0.034	3,200	2,900	100	
NRS6020T 3R3NMGJV	3.3	±30%	55	0.040	2,800	2,750	100	
NRS6020T 4R7NMGJV	4.7	±30%	43	0.058	2,400	2,150	100	
NRS6020T 6R8NMGJV	6.8	±30%	30	0.085	2,000	1,800	100	
NRS6020T 100MMGGV	10	±20%	18	0.125	1,900	1,500	100	
NRS6020T 220MMGGV	22	±20%	11	0.290	1,250	950	100	

●NRS6028 실드타입

품번	공칭인덕턴스 [μH]	인덕턴스허용차	자기공진주파수 [MHz] (min.)	직류저항 [Ω] (±30%)	정격전류 ※) [mA]		측정주파수 [kHz]	주기
					직류중첩허용전류 Idc1	온도상승허용전류 Idc2		
NRS6028T 0R9NMGJV	0.9	±30%	90	0.013	6,700	4,600	100	
NRS6028T 1R5NMGJV	1.5	±30%	78	0.016	5,100	4,200	100	
NRS6028T 2R2NMGJV	2.2	±30%	68	0.020	4,200	3,700	100	
NRS6028T 3R0NMGJV	3.0	±30%	55	0.023	3,600	3,400	100	
NRS6028T 4R7MMGKV	4.7	±20%	39	0.031	2,700	3,000	100	
NRS6028T 6R8MMGJV	6.8	±20%	25	0.043	2,600	2,500	100	
NRS6028T 100MMGKV	10	±20%	20	0.065	1,900	1,900	100	
NRS6028T 150MMGJV	15	±20%	17	0.095	1,600	1,800	100	
NRS6028T 220MMGJV	22	±20%	12	0.135	1,300	1,400	100	
NRS6028T 330MMGJV	33	±20%	10	0.220	1,100	1,100	100	
NRS6028T 470MMGJV	47	±20%	8	0.300	1,000	920	100	
NRS6028T 680MMGJV	68	±20%	5	0.420	800	770	100	
NRS6028T 101MMGJV	100	±20%	3	0.600	650	660	100	

●NRS6045 실드타입

품번	공칭인덕턴스 [μH]	인덕턴스허용차	자기공진주파수 [MHz] (min.)	직류저항 [Ω] (±30%)	정격전류 ※) [mA]		측정주파수 [kHz]	주기
					직류중첩허용전류 Idc1	온도상승허용전류 Idc2		
NRS6045T 1R0NMGKV	1.0	±30%	110	0.014	9,800	4,500	100	
NRS6045T 1R3NMGKV	1.3	±30%	95	0.016	8,200	4,200	100	
NRS6045T 1R8NMGKV	1.8	±30%	80	0.019	7,200	3,900	100	
NRS6045T 2R3NMGKV	2.3	±30%	60	0.022	6,400	3,600	100	
NRS6045T 3R0NMGKV	3.0	±30%	45	0.024	5,600	3,300	100	
NRS6045T 4R5MMGKV	4.5	±20%	25	0.030	4,400	3,100	100	
NRS6045T 6R3MMGKV	6.3	±20%	15	0.036	3,600	3,000	100	
NRS6045T 100MMGKV	10	±20%	12	0.046	3,100	2,400	100	
NRS6045T 150MMGKV	15	±20%	10	0.070	2,500	1,900	100	
NRS6045T 220MMGKV	22	±20%	7	0.107	2,000	1,600	100	
NRS6045T 330MMGKV	33	±20%	6	0.141	1,650	1,400	100	
NRS6045T 470MMGKV	47	±20%	5	0.211	1,400	1,150	100	
NRS6045T 680MMGKV	68	±20%	4	0.304	1,100	950	100	
NRS6045T 101MMGKV	100	±20%	3	0.466	900	750	100	

●NRS8030 실드타입

품번	공칭인덕턴스 [μH]	인덕턴스허용차	자기공진주파수 [MHz] (min.)	직류저항 [Ω] (±30%)	정격전류 ※) [mA]		측정주파수 [kHz]	주기
					직류중첩허용전류 Idc1	온도상승허용전류 Idc2		
NRS8030T 1R0NJGJV	1.0	±30%	120	0.009	7,800	6,200	100	
NRS8030T 1R5NJGJV	1.5	±30%	80	0.012	6,200	5,300	100	
NRS8030T 2R2NJGJV	2.2	±30%	60	0.015	4,900	4,800	100	
NRS8030T 3R3MJGJV	3.3	±20%	50	0.019	4,200	4,300	100	
NRS8030T 4R7MJGJV	4.7	±20%	40	0.022	3,600	4,000	100	
NRS8030T 6R8MJGJV	6.8	±20%	32	0.029	3,000	3,400	100	
NRS8030T 100MJGJV	10	±20%	27	0.033	2,400	3,000	100	
NRS8030T 150MJGJV	15	±20%	20	0.060	2,000	2,200	100	
NRS8030T 220MJGJV	22	±20%	16	0.070	1,750	1,900	100	
NRS8030T 330MJGJV	33	±20%	13	0.120	1,300	1,500	100	
NRS8030T 470MJGJV	47	±20%	11	0.170	1,100	1,300	100	

※)직류중첩허용전류(Idc1)는 직류중첩에 의한 인덕턴스 저하가 30%이내가 되는 직류전류값 (at 20℃)
※)온도상승허용전류(Idc2)는 온도상승이 40℃가 되는 직류전류값 (at 20℃)
※)정격전류값은 직류중첩허용전류, 또는 온도상승허용전류를 모두 만족시키는 직류전류값

▶ 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

●NRS8040 실드타입

품번	공칭인덕턴스 [μH]	인덕턴스허용차	자기공진주파수 [MHz] (min.)	직류저항 [Ω] (±30%)	정격전류 ※) [mA]		측정주파수 [kHz]	주기
					직류중첩허용전류 Idc1	온도상승허용전류 Idc2		
NRS8040T 0R9NJGJV	0.9	±30%	85	0.006	13,000	7,800	100	
NRS8040T 1R4NJGJV	1.4	±30%	63	0.007	10,000	7,000	100	
NRS8040T 2R0NJGJV	2.0	±30%	50	0.009	8,100	6,300	100	
NRS8040T 3R6NJGJV	3.6	±30%	34	0.015	6,400	4,900	100	
NRS8040T 4R7NJGJV	4.7	±30%	30	0.018	5,400	4,100	100	
NRS8040T 6R8NJGJV	6.8	±30%	24	0.025	4,400	3,700	100	
NRS8040T 100MJGJV	10	±20%	22	0.034	3,800	3,100	100	
NRS8040T 150MJGJV	15	±20%	16	0.050	2,900	2,400	100	
NRS8040T 220MJGJV	22	±20%	13	0.066	2,400	2,200	100	
NRS8040T 330MJGKV	33	±20%	12	0.100	2,000	1,700	100	
NRS8040T 470MJGKV	47	±20%	8	0.140	1,500	1,500	100	
NRS8040T 101MJGKV	100	±20%	6	0.280	1,100	1,000	100	

※)직류중첩허용전류(Idc1)는 직류중첩에 의한 인덕턴스 저하가 30%이내가 되는 직류전류값 (at 20℃)
※)온도상승허용전류(Idc2)는 온도상승이 40℃가 되는 직류전류값 (at 20℃)
※)정격전류값은 직류중첩허용전류, 또는 온도상승허용전류를 모두 만족시키는 직류전류값

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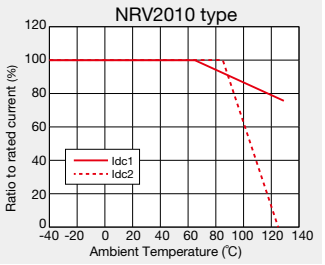
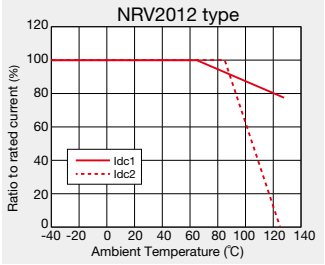
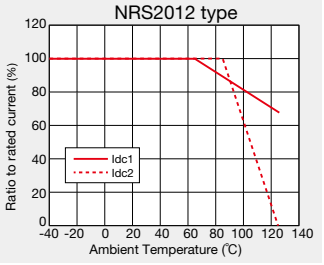
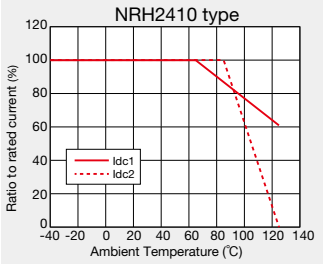
■정격전류의 디레이팅

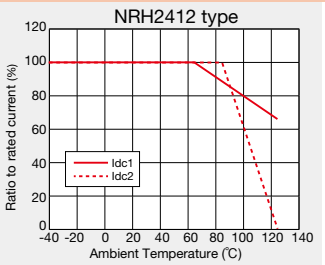
●NR시리즈 H타입 / S타입 / V타입
NR시리즈 H타입/S타입/V타입은 주위 온도에 따라 정격전류의 디레이팅이 필요합니다.
아래 도표를 참조하여 사용전류의 디레이팅을 해 주십시오.

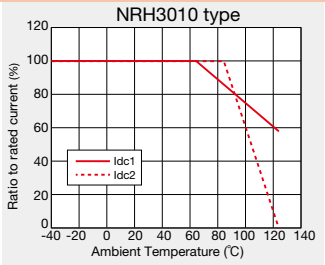


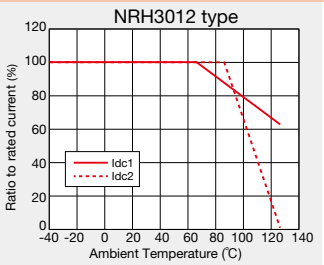


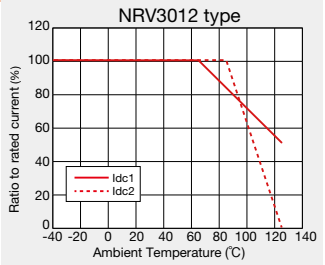


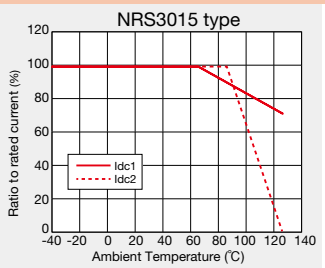


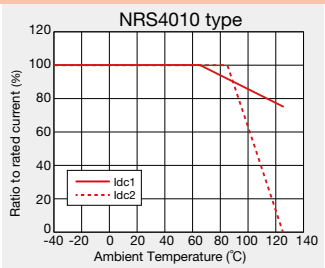


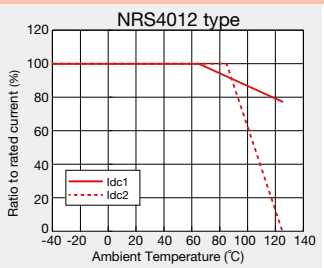


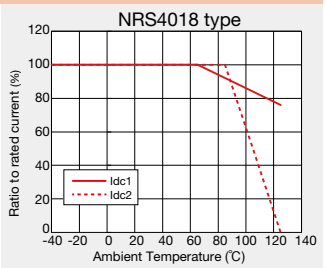


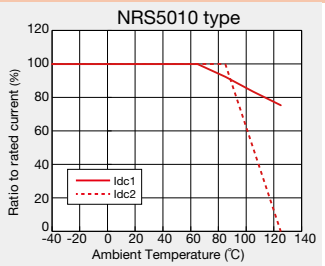


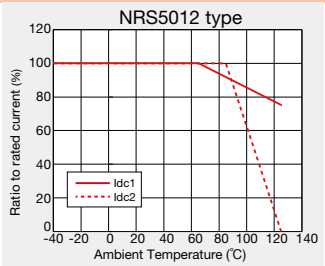


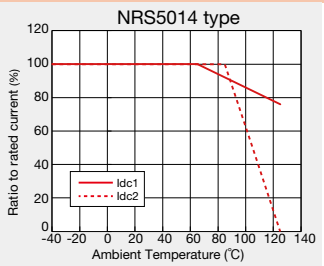


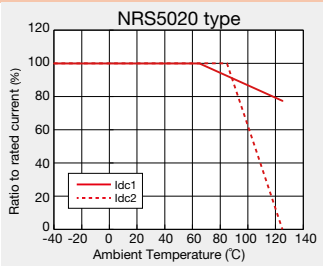


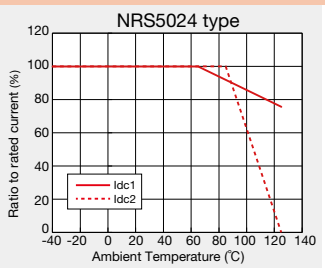


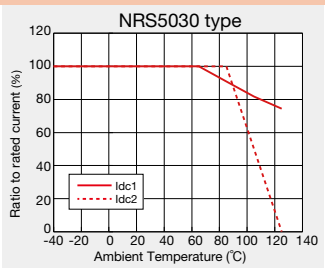


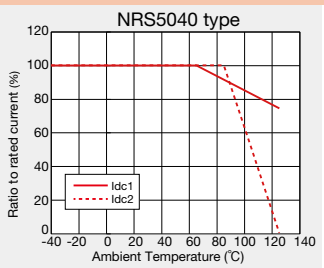


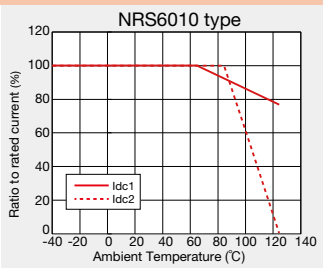












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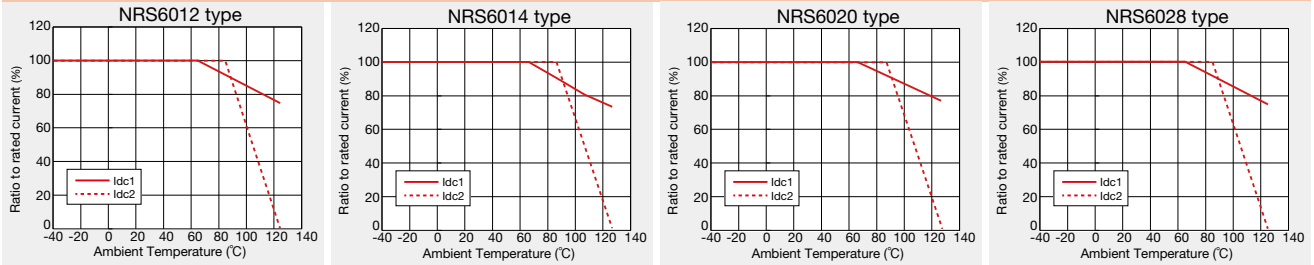

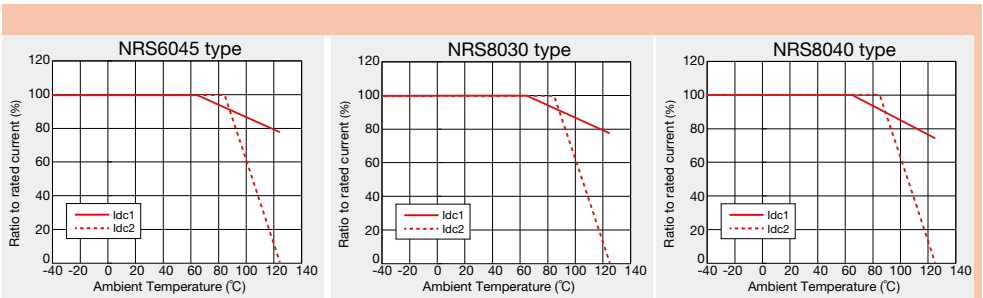

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SMD 파워 인덕터 (NR시리즈 M타입)

리플로우

AEC-Q200

AEC-Q200 Grade 2 (Grade 2 테스트 조건으로 평가 실시를 마쳤습니다.)
*사용 환경 온도: -40~105℃

■품번 표기법　　*사용온도범위　:　-40~125℃(제품자기발열 포함)

N	R	M	6	0	4	5	T	△	1	0	0	M	M	R	S	V
①			②				③		④			⑤	⑥			⑦

△=스페이스

①형식

기호	형식
NRM	외장수지사양

②크기 (L × W × H)

기호	크기(L×W×H) [mm]
6045	6.0 × 6.0 × 4.5

③포장

기호	포장
T△	테이핑

④공칭인덕턴스

기호(예)	공칭인덕턴스 [μH]
2R2	2.2
100	10
102	1000

※R=소수점

⑤인덕턴스 허용차

기호	인덕턴스 허용차
M	±20%
N	±30%

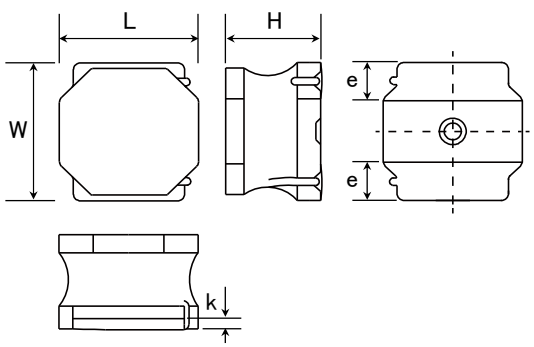
⑥개별 사양

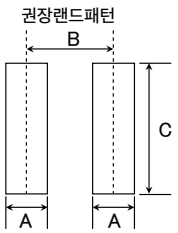
기호	개별 사양
△R△	표준품

⑦당사관리기호

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

■표준외형크기 / 표준수량





Type	A	B	C
NRM6045	2.4	5.0	4.8

단위 : mm

Type	L	W	H	e	k(참고값)	표준수량[pcs] 테이핑
NRM6045	6.0±0.2 (0.236±0.008)	6.0±0.2 (0.236±0.008)	4.5 max (0.177 max)	1.65±0.3 (0.053±0.012)	0.3 min (0.012 min)	1500

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 SMD파워 인덕터는 전부 RoHS 대응품입니다.

주)
·사용하시는 회로나 기기에 따라 개별사양의 교체가 필요합니다. 반드시 정규판매채널로 문의해 주시기 바랍니다.
·차재(차체계, 정보계) 용도 (AEC-Q200 qualified) 제품입니다. 상세에 대해서는 "차재 어플리케이션 가이드"를 반드시 확인해 주십시오.

< AEC-Q200 : AEC-Q200 qualified>
차재(차체계, 정보계) 용도 SMD파워 인덕터는 대표 아이템에 의한 AEC-Q200에 대응한 평가 시험을 끝냈습니다.
본 제품의 상세한 사양, 평가 시험 결과 등에 관해서는 정규판매채널로 문의해 주시기 바랍니다.
또한, 주문할 때 납입사양서의 승인을 부탁 드립니다.

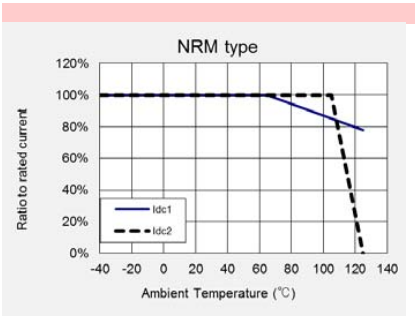
●NRM6045

품번	공칭인덕턴스 [μH]	인덕턴스허용차	직류저항 [mΩ] Max(Typ)	정격전류 ※) [A]			측정주파수 [MHz]	주기
				직류중첩허용전류 Idc1 Max(Typ)	온도상승허용전류① Idc2 Max(Typ)	온도상승허용전류② Idc2 Max(Typ)		
NRM6045T 1R0NMRRV	1	±30%	13 (10)	13.50 (14.50)	4.00 (6.00)	6.20 (7.00)	0.1	
NRM6045T 2R2NMRRV	2.2	±30%	23 (18)	8.50 (9.50)	3.00 (4.00)	4.40 (5.10)	0.1	
NRM6045T 4R7MMRRV	4.7	±20%	36 (30)	6.00 (6.50)	2.20 (3.00)	3.60 (3.90)	0.1	
NRM6045T 100MMRSV	10	±20%	60 (50)	4.00 (4.40)	1.80 (2.40)	2.60 (3.20)	0.1	
NRM6045T 220MMRRV	22	±20%	132 (110)	2.50 (3.00)	1.20 (1.60)	1.80 (2.00)	0.1	
NRM6045T 470MMRRV	47	±20%	272 (227)	1.55 (1.70)	0.70 (0.90)	1.20 (1.30)	0.1	
NRM6045T 101MMRRV	100	±20%	600 (475)	1.05 (1.15)	0.55 (0.70)	0.85 (0.95)	0.1	
NRM6045T 221MMRRV	220	±20%	1320 (1100)	0.70 (0.75)	0.35 (0.50)	0.57 (0.65)	0.1	
NRM6045T 471MMRRV	470	±20%	2760 (2300)	0.45 (0.50)	0.22 (0.30)	0.38 (0.45)	0.1	

※)직류중첩허용전류(Idc1)는 직류중첩에 의한 인덕턴스 저하가 30%이내가 되는 직류전류값 (at 20℃)
※)온도 상승 허용 전류(Idc2)①는 온도 상승이 20℃가 되는 직류 전류값(at 20℃)
※)온도 상승 허용 전류(Idc2)②는 온도 상승이 40℃가 되는 직류 전류값(at 20℃)
※)온도 상승 허용 전류(Idc2)②는 참고값
※)정격전류값은 직류중첩허용전류, 또는 온도상승허용전류를 모두 만족시키는 직류전류값

■정격전류의 디레이팅

●NR시리즈 M타입
NR시리즈 M타입은 주위 온도에 따라 정격전류의 디레이팅이 필요합니다.
아래 도표를 참조하여 사용전류의 디레이팅을 해 주십시오.



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■PACKAGING

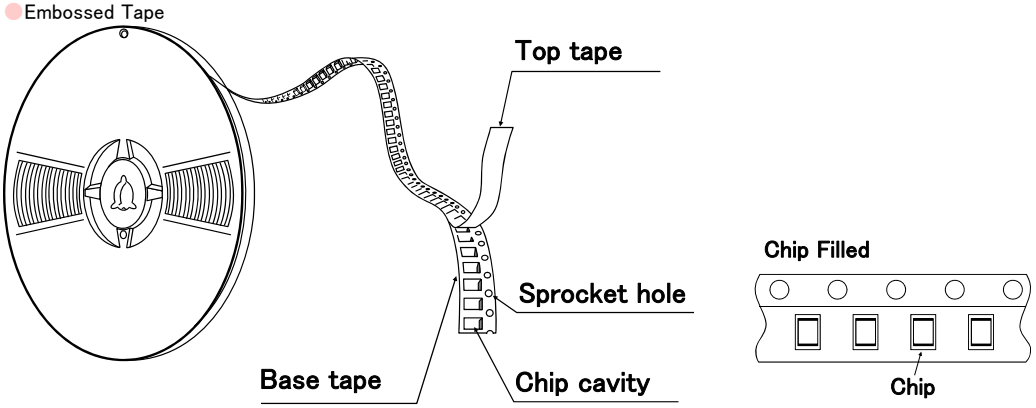
①Minimum Quantity

Type	Standard Quantity [pcs]
	Tape & Reel
NRV2010	2500
NRS2012 NRV2012	2500
NRH2410	2500
NRH2412	2500
NR 3010 NRH3010	2000
NR 3012 NRH3012 NRV3012	2000
NR 3015 NRS3015	2000
NR 4010 NRS4010	5000
NR 4012 NRS4012	4500
NR 4018 NRS4018	3500

Type	Standard Quantity [pcs]
	Tape & Reel
NRS5010	1000
NRS5012	1000
NRS5014	1000
NRS5020	800
NRS5024	2500
NRS5030	500
NR 5040 NRS5040	1500
NRS6010	1000
NR 6012 NRS6012	1000
NRS6014	1000
NR 6020 NRS6020	2500
NR 6028 NRS6028	2000
NR 6045 NRM6045 NRS6045	1500
NRS8030	1000
NR 8040 NRS8040	1000

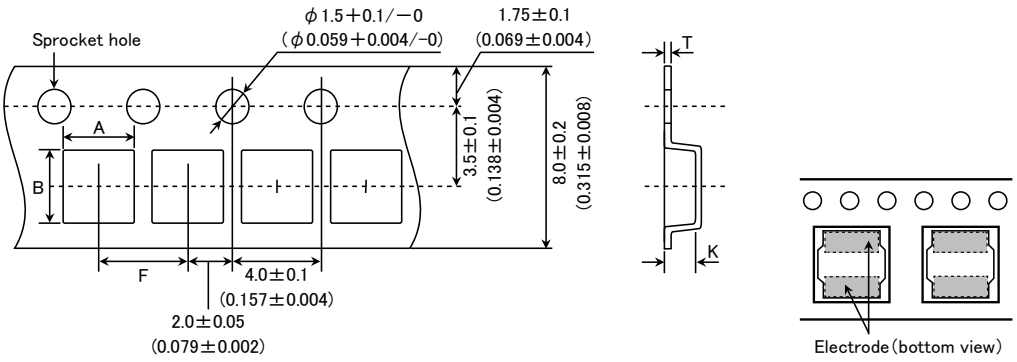
②Tape Material

Embossed Tape



③Taping dimensions

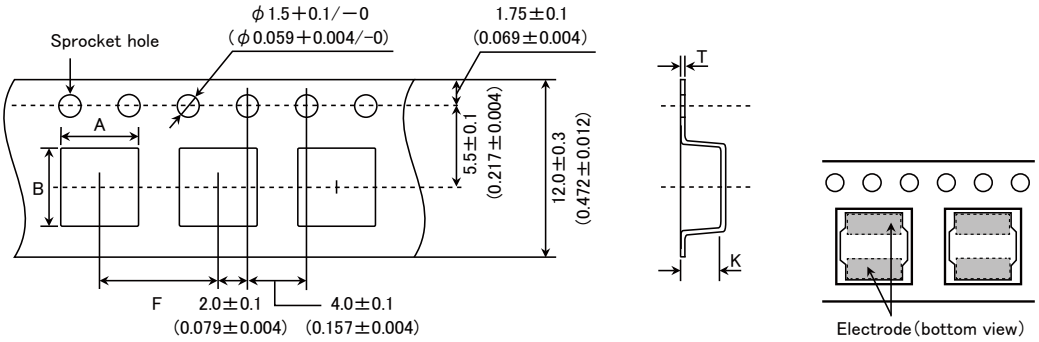
Embossed tape 8mm wide (0.315 inches wide)



Type	Chip cavity		Insertion pitch	Tape thickness	
	A	B	F	T	K
NRV2010	2.2±0.1 (0.102±0.004)	2.2±0.1 (0.102±0.004)	4.0±0.1 (0.157±0.004)	0.25±0.05 (0.009±0.002)	1.3±0.1 (0.051±0.004)
NRS2012 NRV2012					
NRH2410	2.6±0.1 (0.087±0.004)	2.6±0.1 (0.102±0.004)		0.25±0.05 (0.009±0.002)	1.3±0.1 (0.051±0.004)
NRH2412					
NR 3010 NRH3010	3.2±0.1 (0.126±0.004)	3.2±0.1 (0.126±0.004)		0.3±0.05 (0.012±0.002)	1.4±0.1 (0.055±0.004)
NR 3012 NRH3012 NRV3012					1.6±0.1 (0.063±0.004)
NR 3015 NRS3015					1.9±0.1 (0.075±0.004)

Unit:mm(inch)

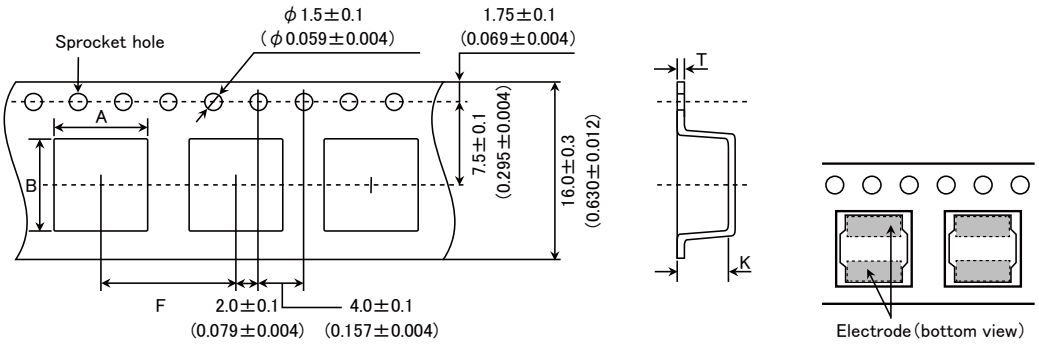
Embossed tape 12mm wide (0.47 inches wide)



Type	Chip cavity		Insertion pitch	Tape thickness	
	A	B	F	T	K
NR 4010 NRS4010	4.3±0.1 (0.169±0.004)	4.3±0.1 (0.169±0.004)	8.0±0.1 (0.315±0.004)	0.3±0.1 (0.012±0.004)	1.4±0.1 (0.055±0.004)
NR 4012 NRS4012					1.6±0.1 (0.063±0.004)
NR 4018 NRS4018					2.1±0.1 (0.083±0.004)
NRS5010	5.25±0.1 (0.207±0.004)	5.25±0.1 (0.207±0.004)			1.4±0.1 (0.055±0.004)
NRS5012					1.4±0.1 (0.055±0.004)
NRS5014					1.6±0.1 (0.063±0.004)
NRS5020					2.3±0.1 (0.091±0.004)
NRS5024					2.7±0.1 (0.106±0.004)
NRS5030	5.15±0.1 (0.203±0.004)	5.15±0.1 (0.203±0.004)		0.4±0.1 (0.016±0.004)	3.2±0.1 (0.126±0.004)
NR 5040 NRS5040	5.15±0.1 (0.203±0.004)	5.15±0.1 (0.203±0.004)			4.2±0.1 (0.165±0.004)
NRS6010	6.3±0.1 (0.248±0.004)	6.3±0.1 (0.248±0.004)			1.4±0.1 (0.055±0.004)
NR 6012 NRS6012					1.6±0.1 (0.063±0.004)
NRS6014					1.6±0.1 (0.063±0.004)
NR 6020 NRS6020					2.3±0.1 (0.090±0.004)
NR 6028 NRS6028					3.1±0.1 (0.122±0.004)
NR 6045 NRM6045 NRS6045					4.7±0.1 (0.185±0.004)

Unit:mm(inch)

Embossed tape 16mm wide (0.63 inches wide)

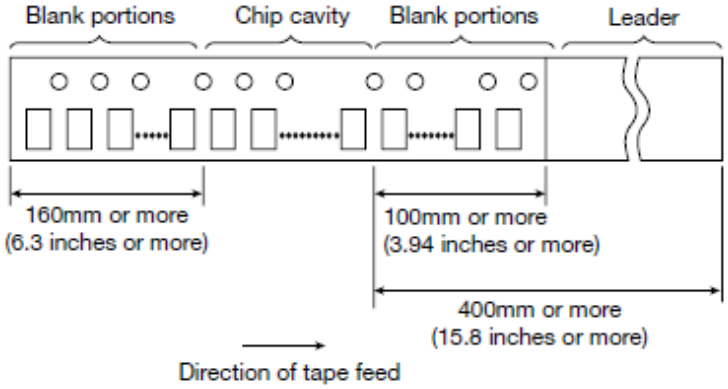


Type	Chip cavity		Insertion pitch	Tape thickness	
	A	B	F	T	K
NRS8030	8.3±0.1 (0.327±0.004)	8.3±0.1 (0.327±0.004)	12.0±0.1 (0.472±0.004)	0.5±0.1 (0.020±0.004)	3.4±0.1 (0.134±0.004)
NR 8040 NRS8040					4.5±0.1 (0.177±0.004)

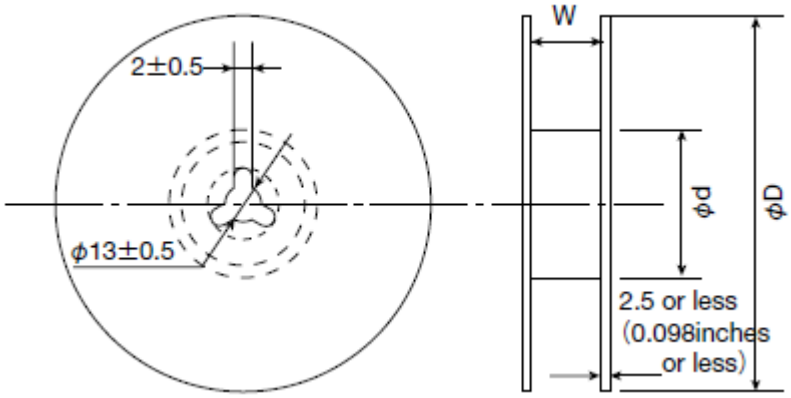
Unit : mm (inch)

④Leader and Blank portion

NR, NRH, NRS, NRV



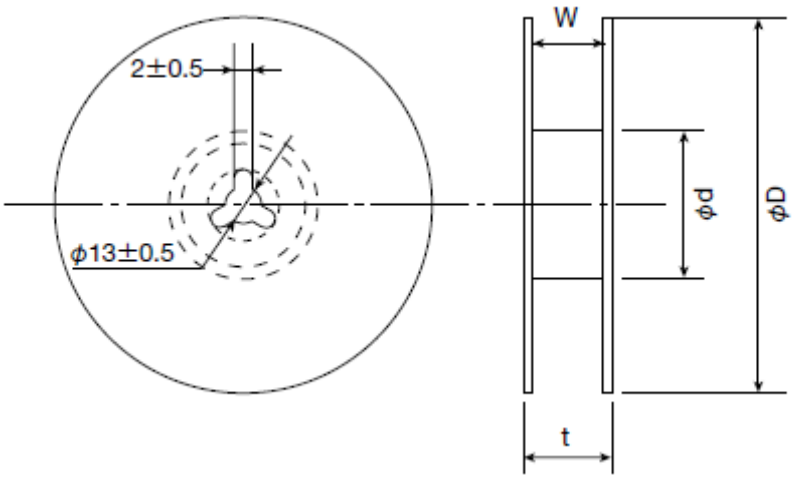
⑤Reel size



Type	Reel size (Reference values)		
	φD	φd	W
NRV2010	180±0.5 (7.087±0.019)	60±1.0 (2.36±0.04)	10.0±1.5 (0.394±0.059)
NRS2012 NRV2012			
NRH2410			
NRH2412			
NR 3010 NRH3010			
NR 3012 NRH3012 NRV3012			
NR 3015 NRS3015			

NRS5010	180±3.0 (7.087±0.118)	60±2.0 (2.36±0.08)	14.0±1.5 (0.551±0.059)
NRS5012			
NRS5014			
NRS5020			
NRS5030			
NRS6010			
NR 6012 NRS6012			
NRS6014			

Unit : mm (inch)

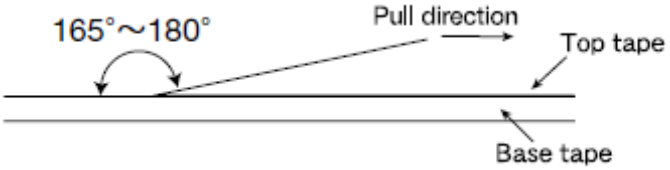


Type	Reel size (Reference values)			
	ϕD	ϕd	t (max.)	W
NR 4010 NRS4010	330±3.0 (12.99±0.118)	80±2.0 (3.15±0.078)	18.5 (0.72)	13.5±1.0 (0.531±0.04)
NR 4012 NRS4012				
NR 4018 NRS4018				
NRS5024				
NR 5040 NRS5040				
NR 6020 NRS6020				
NR 6028 NRS6028				
NR 6045 NRM6045 NRS6045				
NRS8030			22.5 (0.89)	17.5±1.0 (0.689±0.04)
NR 8040 NRS8040				

Unit : mm (inch)

⑥Top Tape Strength

The top tape requires a peel-off force of 0.1 to 1.3N in the direction of the arrow as illustrated below.



■RELIABILITY DATA

1. Operating Temperature Range		
Specified Value	NRV20/30Type,NRH24/30Type NRS20/30/40/50/60/80Type、NRM60Type	−40～＋125℃(Including self-generated heat)
Test Methods and Remarks	Including self-generated heat	

2. Storage Temperature Range		
Specified Value	NRV20/30Type,NRH24/30Type NRS20/30/40/50/60/80Type、NRM60Type	−40～＋85℃
Test Methods and Remarks	−5 to 40℃ for the product with taping.	

3. Rated current		
Specified Value	NRV20/30Type,NRH24/30Type NRS20/30/40/50/60/80Type、NRM60Type	Within the specified tolerance

4. Inductance		
Specified Value	NRV20/30Type,NRH24/30Type NRS20/30/40/50/60/80Type、NRM60Type	Within the specified tolerance
Test Methods and Remarks	Measuring equipment : LCR Meter (HP 4285A or equivalent) Measuring frequency : 100kHz, 1V	

5. DC Resistance		
Specified Value	NRV20/30Type,NRH24/30Type NRS20/30/40/50/60/80Type、NRM6045Type	Within the specified tolerance
Test Methods and Remarks	Measuring equipment : DC ohmmeter (HIOKI 3227 or equivalent)	

6. Self resonance frequency		
Specified Value	NRV30Type,NRH24/30Type NRS30/40/50/60/80Type、NRM60Type	Within the specified tolerance
	NRV20,NRS20	−
Test Methods and Remarks	NRV30,NRH24/30,NRS30/40/50/60/80Type、NRM60Type Measuring equipment : Impedance analyzer/material analyzer(HP4291A or equivalent HP4191A, 4192A or equivalent)	

7. Temperature characteristic		
Specified Value	NRV20/30Type,NRH24/30Type NRS20/30/40/50/60/80Type、NRM60Type	Inductance change : Within ±20%
Test Methods and Remarks	NRV20/30, NRH24/30, NRS20/30/40/50/60/80 Type, 、NRM60Type : Measurement of inductance shall be taken at temperature range within −40℃～＋85℃. With reference to inductance value at ＋20℃., change rate shall be calculated. Change of maximum inductance deviation in step 1 to 5	

Step	Temperature(℃)
1	20
2	Minimum operating temperature
3	20 (Standard temperature)
4	Maximum operating temperature
5	20

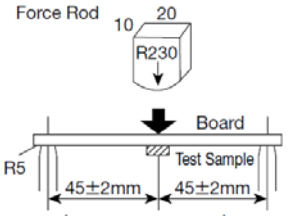
8. Resistance to flexure of substrate

Specified Value	NRV20/30Type,NRH24/30Type NRS20/30/40/50/60/80Type、NRM60Type	No damage

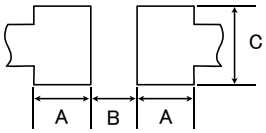
Test Methods and Remarks

The test samples shall be soldered to the test board by the reflow. As illustrated below, apply force in the direction of the arrow indicating until deflection of the test board reaches to 2 mm.

Test board size : 100×40×1.0
Test board material : glass epoxy-resin
Solder cream thickness : 0.10mm (NRS20/30, NRH24/30, NRV20/30Type)
: 0.15mm (NRS40/50/60/80Type,NRM60Type)



Land dimension



Type	A	B	C
NRS20, NRV20	0.65	0.7	2.0
NRH24	0.7	0.75	2.0
NRV30,NRH30,NRS30	0.8	1.4	2.7
NRS40	1.2	1.6	3.7
NRS50	1.5	2.1	4.0
NRS60,NRM60	1.6	3.1	5.7
NRS80	1.8	3.8	7.5

9. Insulation resistance : between wires

Specified Value	NRV20/30Type,NRH24/30Type NRS20/30/40/50/60/80Type、NRM60Type	—

10. Insulation resistance : between wire and core

Specified Value	NRV20/30Type,NRH24/30Type NRS20/30/40/50/60/80Type、NRM60Type	—

11. Withstanding voltage : between wire and core

Specified Value	NRV20/30Type,NRH24/30Type NRS20/30/40/50/60/80Type、NRM60Type	—

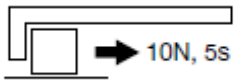
12. Adhesion of terminal electrode

Specified Value	NRV20/30Type,NRH24/30Type NRS20/30/40/50/60/80Type、NRM60Type	Shall not come off PC board

Test Methods and Remarks

The test samples shall be soldered to the test board by the reflow.

Applied force : 10N to X and Y directions.
Duration : 5s.
Solder cream thickness : 0.10mm(NRV20/30Type,NRH24/30type,NRS20/30Type)
: 0.15mm(NRS40/50/60/80Type、NRM60Type)



13. Resistance to vibration

Specified Value	NRV20/30Type,NRH24/30Type NRS20/30/40/50/60/80Type、NRM60Type	Inductance change : Within ±10% No significant abnormality in appearance.

Test Methods and Remarks

The test samples shall be soldered to the test board by the reflow.
Then it shall be submitted to below test conditions.

Frequency Range	10～55Hz	
Total Amplitude	1.5mm (May not exceed acceleration 196m/s^2)	
Sweeping Method	10Hz to 55Hz to 10Hz for 1min.	
Time	X	For 2 hours on each X, Y, and Z axis.
	Y	
	Z	

Recovery : At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48hrs.

14. Solderability

Specified Value	NRV20/30Type,NRH24/30Type NRS20/30/40/50/60/80Type、NRM60Type	At least 90% of surface of terminal electrode is covered by new solder.
Test Methods and Remarks	The test samples shall be dipped in flux, and then immersed in molten solder as shown in below table. Flux : Methanol solution containing rosin 25%.	

Solder Temperature	245±5℃
Time	5±1.0 sec.

※Immersion depth : All sides of mounting terminal shall be immersed.

15. Resistance to soldering heat

Specified Value	NRV20/30Type,NRH24/30Type NRS20/30/40/50/60/80Type、NRM60Type	Inductance change : Within ±10% No significant abnormality in appearance.
Test Methods and Remarks	The test sample shall be exposed to reflow oven at 230±5℃ for 40 seconds, with peak temperature at 260±5℃ for 5 seconds, 2 times. Test board material : glass epoxy-resin Test board thickness : 1.0mm	

16. Thermal shock

Specified Value	NRV20/30Type,NRH24/30Type NRS20/30/40/50/60/80Type、NRM60Type	Inductance change : Within ±10% No significant abnormality in appearance.
Test Methods and Remarks	The test samples shall be soldered to the test board by the reflow. The test samples shall be placed at specified temperature for specified time by step 1 to step 4 as shown in below table in sequence. The temperature cycle shall be repeated 1000 cycles.	

Conditions of 1 cycle		
Step	Temperature (℃)	Duration (min)
1	−40±3	30±3
2	Room temperature	Within 3
3	+85±2	30±3
4	Room temperature	Within 3

17. Damp heat

Specified Value	NRV20/30Type,NRH24/30Type NRS20/30/40/50/60/80Type、NRM60Type	Inductance change : Within ±10% No significant abnormality in appearance.
Test Methods and Remarks	The test samples shall be soldered to the test board by the reflow. The test samples shall be placed in thermostatic oven set at specified temperature and humidity as shown in below table.	

Temperature	60±2℃
Humidity	90～95%RH
Time	1000+24/−0 hour

18. Loading under damp heat

Specified Value	NRV20/30Type,NRH24/30Type NRS20/30/40/50/60/80Type、NRM60Type	Inductance change : Within ±10% No significant abnormality in appearance.
Test Methods and Remarks	The test samples shall be soldered to the test board by the reflow. The test samples shall be placed in thermostatic oven set at specified temperature and humidity and applied the rated current continuously as shown in below table.	

Temperature	60±2℃
Humidity	90～95%RH
Applied current	Rated current
Time	1000+24/−0 hour

19. Low temperature life test

Specified Value	NRV20/30Type,NRH24/30Type NRS20/30/40/50/60/80Type、NRM60Type	Inductance change : Within ±10% No significant abnormality in appearance.
Test Methods and Remarks	The test samples shall be soldered to the test board by the reflow. After that, the test samples shall be placed at test conditions as shown in below table.	

Temperature	−40±2℃
Time	1000+24/−0 hour

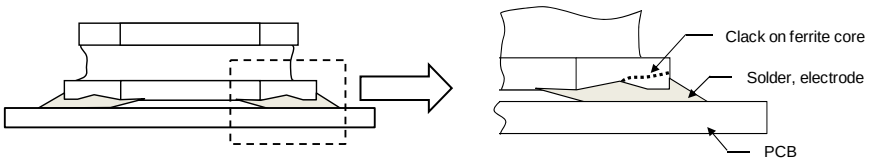
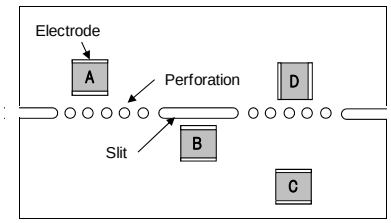
20. High temperature life test		
Specified Value	NRV20/30Type,NRH24/30Type NRS20/30/40/50/60/80Type、NRM60Type	—

21. Loading at high temperature life test		
Specified Value	NRV20/30Type,NRH24/30Type NRS20/30/40/50/60/80Type、NRM60Type	Inductance change : Within ±10% No significant abnormality in appearance.
Test Methods and Remarks	The test samples shall be soldered to the test board by the reflow soldering. Temperature: 85±2℃ Applied current: Rated current Time: 1000+24/−0 hour	

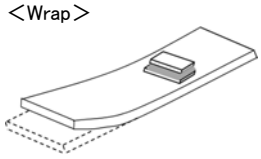
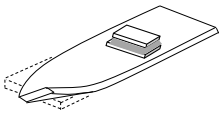
22. Standard condition		
Specified Value	NRV20/30Type,NRH24/30Type NRS20/30/40/50/60/80Type NRM60Type	Standard test condition : Unless otherwise specified, temperature is 20±15℃ and 65±20%of relative humidity. When there is any question concerning measurement result: In order to provide correlation data, the test shall be condition of 20±2℃ of temperature, 65±5% relative humidity. Inductance is in accordance with our measured value.

■PRECAUTIONS

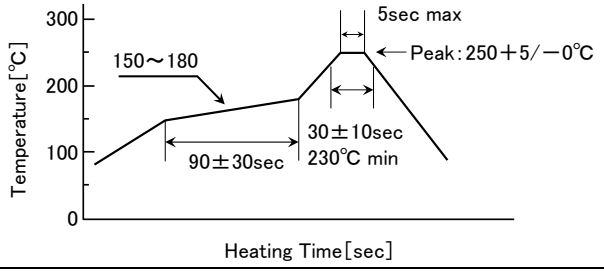
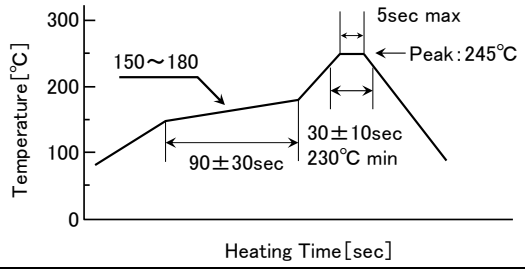
1. Circuit Design	
Precautions	◆Operating environment 1. The products listed in this catalogue are intended for use in general electronic equipment (e.g., AV equipment, OA equipment, home electric appliances, office equipment, information and communication equipment), general medical equipment, industrial 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 refer to a recommended land pattern. 2. There is stress, which has been caused by distortion of a PCB, to the inductor. (NRV20/30, NRH24/30, NRS20/30/40/50/60/80, NRM60 Type) 3. Please consider the arrangement of parts on a PCB. (NRV20/30, NRH24/30, NRS20/30/40/50/60/80, NRM60 Type)
Technical considerations	◆Land pattern design Surface Mounting 1. Mounting and soldering conditions should be checked beforehand. 2. Applicable soldering process to this products is reflow soldering only. 3. Please use the recommended land pattern shown as below. Electrical characteristics and the mounting ability of the product are being considered in the recommended land pattern. If a PCB is designed with other dimensions, defective soldering and stress to a product may occur due to misalignment. The performance of the product may not be brought out. If an adopted land pattern is different from the recommended land pattern, stress to the product will increase. It may cause cracks or defective electrical characteristics of the product. Please conduct validation completely before studying adoption of this product and please judge the pros and cons of adoption of this product with taking on responsibility. (NR30/40/50/60/80, NRV20/30, NRH24/30, NRS20/30/40/50/60/80, NRM60 Type) 4. As coefficients of thermal expansion between an inductor and a PCB differs, cracks may occur on a ferrite core when thermal stress is applied to them after mounting an inductor. (Please refer to the drawings below.) Please conduct validation completely before studying adoption of this product and please judge the pros and cons of adoption of this product with taking on responsibility. (NRV20/30, NRH24/30, NRS20/30/40/50/60/80, NRM60 Type)  5. SMD inductors should be located to minimize any possible mechanical stresses from board warp or deflection. 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. (NRV20/30, NRH24/30, NRS20/30/40/50/60/80, NRM60 Type)  A product tends to undergo stress in order “A>C>B≡D”. Please consider the layouts of a product to minimize any stresses.

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	◆Adjustment of mounting machine 1. When installing products, care should be taken not to apply distortion stress as it may deform the products. 2. Stress may be applied to a product with a warp or a twist in handling of the product. Please conduct validation completely before studying adoption of this product and please judge the pros and cons of adoption of this product with taking on responsibility. (NRV20/30, NRH24/30, NRS20/30/40/50/60/80, NRM60 Type) <Wrap>  <Twist> 

4. Soldering

Precautions	◆Reflow soldering 1. Please contact any of our offices for a reflow soldering, and refer to the recommended condition specified. 2. The product shall be used reflow soldering only. 3. Please do not add any stress to a product until it returns in normal temperature after reflow soldering. ◆Lead free soldering 1. When using products with lead free soldering, we request to use them after confirming adhesion, temperature of resistance to soldering heat, soldering etc sufficiently. ◆Recommended conditions for using a soldering iron ・ Put the soldering iron on the land-pattern. ・ Soldering iron's temperature – Below 350℃ ・ Duration – 3 seconds or less ・ The soldering iron should not directly touch the inductor.
Technical considerations	◆Reflow soldering 1. If products are used beyond the range of the recommended conditions, heat stresses may deform the products, and consequently degrade the reliability of the products. ・ NRV20/30, NRH24/30, NRS20/30/40/50/60/80, NRM60 Type, NS101/125 Type, EST0645/1040/1060 Type Recommended reflow condition (Pb free solder) NR, NS Series  ES Series 

5. Cleaning

Precautions	◆Cleaning conditions 1. Washing by supersonic waves shall be avoided.
Technical considerations	◆Cleaning conditions 1. If washed by supersonic waves, the products might be broken.

6. Handling

Precautions	◆Handling 1. Keep the product away from all magnets and magnetic objects. ◆Breakaway PC boards (splitting along perforations) 1. When splitting the PC board after mounting product, 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 product any excessive mechanical shocks. 2. Please do not add any shock and power to a product in transportation. ◆Pick-up pressure 1. Please do not push to add any pressure to a winding part. Please do not give any shock and push into a ferrite core exposure part. ◆Packing 1. Please avoid accumulation of a packing box as much as possible.
Technical considerations	◆Handling 1. There is a case that a characteristic varies with magnetic influence. ◆Breakaway PC boards (splitting along perforations) 1. The position of the product on PCBs shall be carefully considered to minimize the stress caused from splitting of the PCBs. ◆Mechanical considerations 1. There is a case to be damaged by a mechanical shock. 2. There is a case to be broken by the handling in transportation. ◆Pick-up pressure 1. Damage and a characteristic can vary with an excessive shock or stress. ◆Packing 1. If packing boxes are accumulated, that could cause a deformation on packing tapes or a damage on the products.

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 : －5～40℃ 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, product should be used within 6 months from the time of delivery. In case of storage over 6 months, solderability shall be checked before actual usage.
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.

SMD 파워 인덕터 (NS시리즈)

리플로우
AEC-Q200

AEC-Q200 Grade 3 (Grade 3 테스트 조건으로 평가 실시를 마쳤습니다.)
*사용 환경 온도: -40~85℃

■품번 표기법

*사용온도범위 : -40~125℃ (제품자기발열 포함)

N S △	1 0 1 4 5	T △	1 0 0	M	N V	V
①	②	③	④	⑤	⑥	⑦

△=스페이스

①형식

기호	형식
NS△	실드 사양

②크기 (L×W×H)

기호	크기(L×W×H) [mm]
10145	10.1×10.1×4.5
10155	10.1×10.1×5.5
10165	10.1×10.1×6.5
12555	12.5×12.5×5.5
12565	12.5×12.5×6.5
12575	12.5×12.5×7.5

③포장

기호	포장
T△	테이핑

④공칭인덕턴스

기호(예)	공칭인덕턴스 [μH]
1R0	1.0
100	10
101	100

※R=소수점

⑤인덕턴스 허용차

기호	인덕턴스 허용차
M	±20%
N	±30%

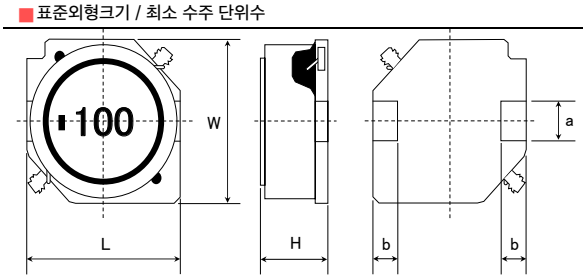
⑥개별 사양

기호	개별 사양
N△	125 Type 표준품
NV	101 Type 표준품

⑦당사관리기호

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

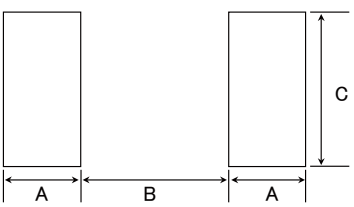
■표준외형크기 / 최소 수주 단위수



Type	L	W	H	a	b	최소 수주 단위수 [pcs]
NS 10145	10.1±0.3 (0.398±0.012)	10.1±0.3 (0.398±0.012)	4.5±0.35 (0.177±0.014)	2.8±0.1 (0.110±0.004)	2.0±0.15 (0.079±0.006)	2000
NS 10155	10.1±0.3 (0.398±0.012)	10.1±0.3 (0.398±0.012)	5.5±0.35 (0.217±0.014)	2.8±0.1 (0.110±0.004)	2.0±0.15 (0.079±0.006)	2000
NS 10165	10.1±0.3 (0.398±0.012)	10.1±0.3 (0.398±0.012)	6.5±0.35 (0.256±0.014)	2.8±0.1 (0.110±0.004)	2.0±0.15 (0.079±0.006)	2000
NS 12555	12.5±0.3 (0.492±0.012)	12.5±0.3 (0.492±0.012)	5.5±0.35 (0.217±0.014)	3.0±0.1 (0.118±0.004)	2.0±0.15 (0.079±0.006)	2000
NS 12565	12.5±0.3 (0.492±0.012)	12.5±0.3 (0.492±0.012)	6.5±0.35 (0.256±0.014)	3.0±0.1 (0.118±0.004)	2.0±0.15 (0.079±0.006)	2000
NS 12575	12.5±0.3 (0.492±0.012)	12.5±0.3 (0.492±0.012)	7.5±0.35 (0.295±0.014)	3.0±0.1 (0.118±0.004)	2.0±0.15 (0.079±0.006)	2000

단위 : mm(inch)

권장랜드패턴
실장상의 주의
·실장상태를 확인하시고 사용하시기 바랍니다.
·본제품의 납땜은 리플로우 납땜공법에 한합니다.



Type	A	B	C
NS 10145	2.5	5.6	3.2
NS 10155	2.5	5.6	3.2
NS 10165	2.5	5.6	3.2
NS 12555	2.5	8.6	3.2
NS 12565	2.5	8.6	3.2
NS 12575	2.5	8.6	3.2

단위 : mm

▶ 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 SMD파워 인덕터는 전부 RoHS 대응품입니다.

주)
·사용하시는 회로나 기기에 따라 개별사양의 교체가 필요합니다. 반드시 정규판매채널로 문의해 주시기 바랍니다.
·차재(차체계, 정보계) 용도 (AEC-Q200 qualified) 제품입니다. 상세에 대해서는 "차재 어플리케이션 가이드"를 반드시 확인해 주십시오.

＜ AEC-Q200 ：AEC-Q200 qualified＞
차재(차체계, 정보계) 용도 SMD파워 인덕터는 대표 아이템에 의한 AEC-Q200에 대응한 평가 시험을 끝냈습니다.
본 제품의 상세한 사양, 평가 시험 결과 등에 관해서는 정규판매채널로 문의해 주시기 바랍니다.
또한, 주문할 때 납입사양서의 승인을 부탁 드립니다.

●NS 10145 type

품번	공칭인덕턴스 [μH]	인덕턴스 허용차	직류저항 [Ω] (±20%)	정격전류 ※) [A]		측정주파수 [kHz]	주기
				직류중첩허용전류 Idc1	온도상승허용전류 Idc2		
NS 10145T 1R0NNVV	1.0	±30%	0.0049	12.54	8.90	100	
NS 10145T 1R5NNVV	1.5	±30%	0.0060	10.34	7.99	100	
NS 10145T 2R2NNVV	2.2	±30%	0.0085	8.91	6.64	100	
NS 10145T 3R3NNVV	3.3	±30%	0.0100	7.33	6.10	100	
NS 10145T 4R7NNVV	4.7	±30%	0.0144	6.69	5.03	100	
NS 10145T 5R6NNVV	5.6	±30%	0.0181	5.85	4.45	100	
NS 10145T 6R8NNVV	6.8	±30%	0.0230	5.05	4.22	100	
NS 10145T 100MNVV	10	±20%	0.0270	4.22	3.10	100	
NS 10145T 150MNVV	15	±20%	0.0381	3.44	3.00	100	
NS 10145T 220MNVV	22	±20%	0.0570	2.87	2.30	100	
NS 10145T 330MNVV	33	±20%	0.0880	2.36	1.90	100	
NS 10145T 470MNVV	47	±20%	0.130	2.00	1.50	100	
NS 10145T 680MNVV	68	±20%	0.150	1.66	1.45	100	
NS 10145T 101MNVV	100	±20%	0.230	1.40	1.10	100	
NS 10145T 151MNVV	150	±20%	0.350	1.11	0.86	100	
NS 10145T 221MNVV	220	±20%	0.510	0.91	0.78	100	
NS 10145T 331MNVV	330	±20%	0.700	0.71	0.64	100	
NS 10145T 471MNVV	470	±20%	1.03	0.61	0.52	100	
NS 10145T 681MNVV	680	±20%	1.57	0.50	0.42	100	
NS 10145T 102MNVV	1000	±20%	2.58	0.41	0.32	100	
NS 10145T 152MNVV	1500	±20%	3.70	0.36	0.27	100	

●NS 10155 type

품번	공칭인덕턴스 [μH]	인덕턴스 허용차	직류저항 [Ω] (±20%)	정격전류 ※) [A]		측정주파수 [kHz]	주기
				직류중첩허용전류 Idc1	온도상승허용전류 Idc2		
NS 10155T 1R5NNVV	1.5	±30%	0.0060	11.90	8.39	100	
NS 10155T 2R2NNVV	2.2	±30%	0.0072	10.00	7.61	100	
NS 10155T 3R3NNVV	3.3	±30%	0.0097	8.50	6.49	100	
NS 10155T 4R7NNVV	4.7	±30%	0.0112	7.40	6.01	100	
NS 10155T 6R8NNVV	6.8	±30%	0.0159	6.00	4.98	100	
NS 10155T 100MNVV	10	±20%	0.0200	4.49	4.40	100	
NS 10155T 150MNVV	15	±20%	0.0310	4.03	3.40	100	
NS 10155T 220MNVV	22	±20%	0.0430	3.37	2.80	100	

●NS 10165 type

품번	공칭인덕턴스 [μH]	인덕턴스 허용차	직류저항 [Ω] (±20%)	정격전류 ※) [A]		측정주파수 [kHz]	주기
				직류중첩허용전류 Idc1	온도상승허용전류 Idc2		
NS 10165T 1R5NNVV	1.5	±30%	0.0062	13.60	8.04	100	
NS 10165T 2R2NNVV	2.2	±30%	0.0074	10.80	7.32	100	
NS 10165T 3R3NNVV	3.3	±30%	0.0086	9.30	6.76	100	
NS 10165T 4R7NNVV	4.7	±30%	0.0112	7.70	5.88	100	
NS 10165T 6R8NNVV	6.8	±30%	0.0140	6.00	5.22	100	
NS 10165T 100MNVV	10	±20%	0.0174	5.20	4.66	100	
NS 10165T 150MNVV	15	±20%	0.0280	3.60	3.84	100	
NS 10165T 220MNVV	22	±20%	0.0350	3.10	3.41	100	

※) 직류중첩허용전류(Idc1)는 직류중첩에 의한 인덕턴스 저하가 30%이내가 되는 직류전류값(at 20℃)
※) 온도상승허용전류(Idc2)는 온도상승이 40℃가 되는 직류전류값(at 20℃)
※) 정격전류값은 직류중첩허용전류와 온도상승허용전류를 모두 만족시키는 직류전류값

▶ 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

●NS 12555 type

품번	공칭인덕턴스 [μH]	인덕턴스 허용차	직류저항 [Ω] (±20%)	정격전류 ※) [A]		측정주파수 [kHz]	주기
				직류중첩허용전류 Idc1	온도상승허용전류 Idc2		
NS 12555T 6R0NN V	6.0	±30%	0.0140	5.01	5.60	100	
NS 12555T 100MN V	10	±20%	0.0175	4.73	5.04	100	
NS 12555T 150MN V	15	±20%	0.0233	3.89	4.18	100	
NS 12555T 220MN V	22	±20%	0.0297	3.20	3.81	100	
NS 12555T 330MN V	33	±20%	0.0415	2.64	3.16	100	
NS 12555T 470MN V	47	±20%	0.0618	2.23	2.70	100	
NS 12555T 680MN V	68	±20%	0.0832	1.81	2.14	100	
NS 12555T 101MN V	100	±20%	0.117	1.53	1.86	100	
NS 12555T 151MN V	150	±20%	0.215	1.10	1.30	100	
NS 12555T 221MN V	220	±20%	0.270	1.00	1.18	100	
NS 12555T 331MN V	330	±20%	0.410	0.82	0.96	100	
NS 12555T 471MN V	470	±20%	0.520	0.68	0.80	100	
NS 12555T 681MN V	680	±20%	0.870	0.48	0.61	100	
NS 12555T 102MN V	1000	±20%	1.44	0.41	0.46	100	
NS 12555T 152MN V	1500	±20%	1.73	0.40	0.44	100	

●NS 12565 type

품번	공칭인덕턴스 [μH]	인덕턴스 허용차	직류저항 [Ω] (±20%)	정격전류 ※) [A]		측정주파수 [kHz]	주기
				직류중첩허용전류 Idc1	온도상승허용전류 Idc2		
NS 12565T 2R0NN V	2.0	±30%	0.0080	13.91	7.60	100	
NS 12565T 4R2NN V	4.2	±30%	0.0126	9.40	5.91	100	
NS 12565T 7R0NN V	7.0	±30%	0.0162	7.80	5.21	100	
NS 12565T 100MN V	10	±20%	0.0199	6.00	4.75	100	
NS 12565T 150MN V	15	±20%	0.0237	5.60	4.33	100	
NS 12565T 220MN V	22	±20%	0.0310	4.20	3.91	100	
NS 12565T 330MN V	33	±20%	0.0390	3.80	3.22	100	
NS 12565T 470MN V	47	±20%	0.0575	3.34	2.78	100	
NS 12565T 680MN V	68	±20%	0.0775	2.70	2.30	100	
NS 12565T 101MN V	100	±20%	0.123	2.23	1.81	100	
NS 12565T 151MN V	150	±20%	0.173	1.80	1.54	100	
NS 12565T 221MN V	220	±20%	0.273	1.39	1.18	100	

●NS 12575 type

품번	공칭인덕턴스 [μH]	인덕턴스 허용차	직류저항 [Ω] (±20%)	정격전류 ※) [A]		측정주파수 [kHz]	주기
				직류중첩허용전류 Idc1	온도상승허용전류 Idc2		
NS 12575T 1R2NN V	1.2	±30%	0.0058	18.08	9.15	100	
NS 12575T 2R7NN V	2.7	±30%	0.0085	13.91	7.69	100	
NS 12575T 3R9NN V	3.9	±30%	0.0099	12.10	7.38	100	
NS 12575T 5R6NN V	5.6	±30%	0.0116	10.20	6.36	100	
NS 12575T 6R8NN V	6.8	±30%	0.0131	9.50	5.84	100	
NS 12575T 100MN V	10	±20%	0.0156	7.65	5.55	100	
NS 12575T 150MN V	15	±20%	0.0184	6.30	5.22	100	
NS 12575T 220MN V	22	±20%	0.0260	5.50	4.05	100	
NS 12575T 330MN V	33	±20%	0.0390	4.30	3.48	100	
NS 12575T 470MN V	47	±20%	0.0515	3.60	2.95	100	
NS 12575T 680MN V	68	±20%	0.0900	2.78	2.10	100	
NS 12575T 101MN V	100	±20%	0.110	2.50	2.01	100	
NS 12575T 151MN V	150	±20%	0.161	1.90	1.51	100	
NS 12575T 221MN V	220	±20%	0.300	1.60	1.10	100	
NS 12575T 102MN V	1000	±20%	1.170	0.72	0.53	100	

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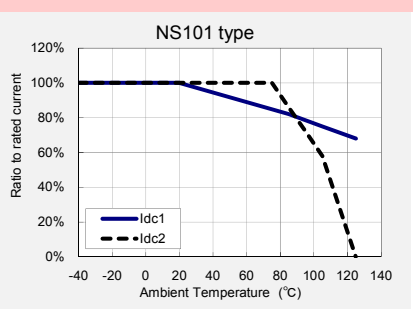
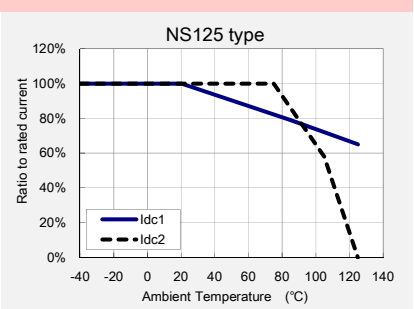
※) 정격전류값은 직류중첩허용전류와 온도상승허용전류를 모두 만족시키는 직류전류값

■정격전류의 디레이팅

●NSシリーズ
NSシリーズは 주위 온도에 따라 정격전류의 디레이팅이 필요합니다.
아래 도표를 참조하여 사용전류의 디레이팅을 해 주십시오.





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SMD POWER INDUCTORS (NS SERIES)

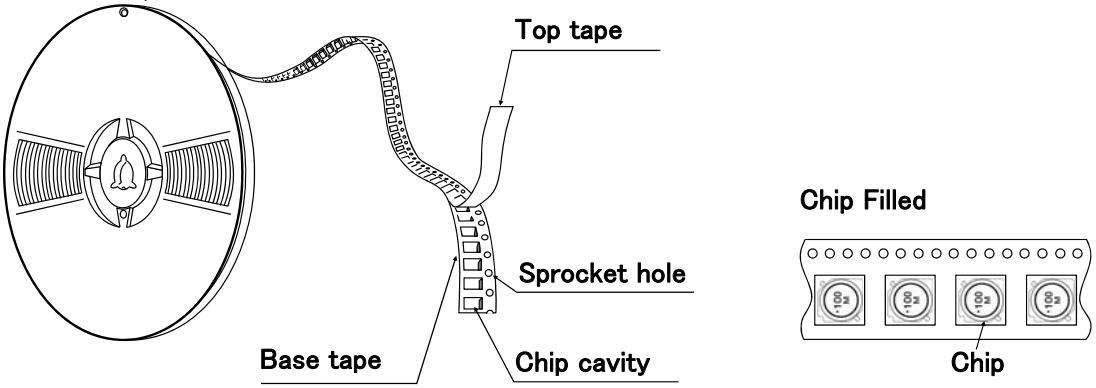
■PACKAGING

①Packing Quantity

Type	Standard Quantity (1reel) [pcs]	Minimum Quantity [pcs]
	Embossed Tape	Embossed Tape
NS10145	500	2000
NS10155	500	2000
NS10165	500	2000
NS12555	500	2000
NS12565	500	2000
NS12575	500	2000

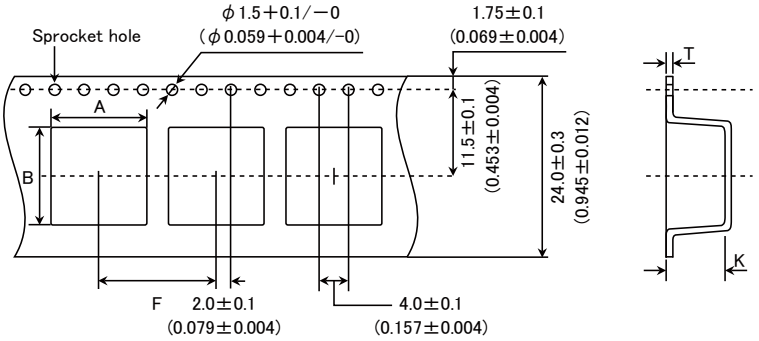
②Tape Material

●Embossed Tape



③Taping dimensions

●Embossed tape 24mm wide (0.945 inches wide)

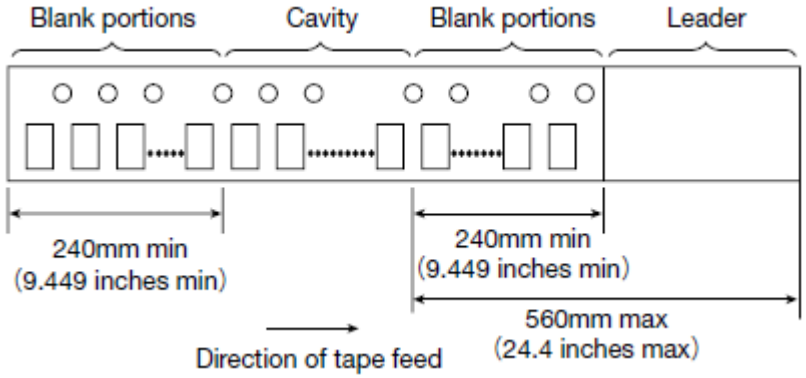


Type	Chip cavity		Insertion pitch	Tape thickness	
	A	B	F	T	K
NS10145	10.5±0.1 (0.413±0.004)	10.5±0.1 (0.413±0.004)	16.0±0.1 (0.630±0.004)	0.4±0.1 (0.016±0.004)	5.0±0.1 (0.197±0.004)
NS10155	10.5±0.1 (0.413±0.004)	10.5±0.1 (0.413±0.004)	16.0±0.1 (0.630±0.004)	0.4±0.1 (0.016±0.004)	6.0±0.1 (0.236±0.004)
NS10165	10.5±0.1 (0.413±0.004)	10.5±0.1 (0.413±0.004)	16.0±0.1 (0.630±0.004)	0.4±0.1 (0.016±0.004)	7.0±0.1 (0.276±0.004)
NS12555	13.0±0.1 (0.512±0.004)	13.0±0.1 (0.512±0.004)	16.0±0.1 (0.630±0.004)	0.4±0.1 (0.016±0.004)	6.1±0.1 (0.240±0.004)
NS12565	13.0±0.1 (0.512±0.004)	13.0±0.1 (0.512±0.004)	16.0±0.1 (0.630±0.004)	0.4±0.1 (0.016±0.004)	7.1±0.1 (0.280±0.004)
NS12575	13.0±0.1 (0.512±0.004)	13.0±0.1 (0.512±0.004)	16.0±0.1 (0.630±0.004)	0.4±0.1 (0.016±0.004)	8.0±0.1 (0.315±0.004)

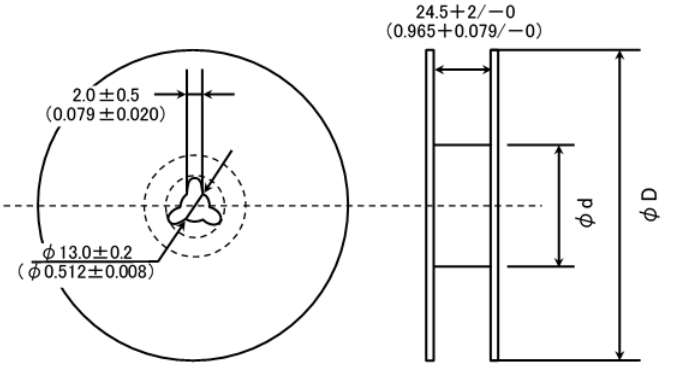
Unit:mm(inch)

▸ 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/) .

④Leader and Blank portion



⑤Reel size

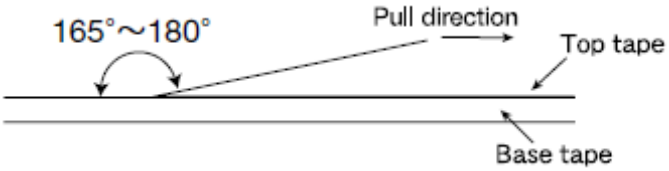


Type	Reel size (Reference values)	
	φD	φd
NS10145	330±2 (12.99±0.079)	100±1 (3.937±0.039)
NS10155		
NS10165		
NS12555		
NS12565		
NS12575		

Unit : mm (inch)

⑥Top Tape Strength

The top tape requires a peel-off force of 0.1 to 1.3N in the direction of the arrow as illustrated below.



SMD POWER INDUCTORS (NS SERIES)

■RELIABILITY DATA

1. Operating Temperature Range		
Specified Value	NS101, NS125 Type	−40～＋125℃(Including self-generated heat)
Test Methods and Remarks	Including self-generated heat	

2. Storage Temperature Range		
Specified Value	NS101, NS125 Type	−40～＋85℃
Test Methods and Remarks	−5 to 40℃ for the product with taping.	

3. Rated current		
Specified Value	NS101, NS125 Type	Within the specified tolerance

4. Inductance		
Specified Value	NS101, NS125 Type	Within the specified tolerance
Test Methods and Remarks	Measuring equipment : LCR Meter (HP 4285A or equivalent) Measuring frequency : 100kHz, 1V	

5. DC Resistance		
Specified Value	NS101, NS125 Type	Within the specified tolerance
Test Methods and Remarks	Measuring equipment : DC ohmmeter (HIOKI 3227 or equivalent)	

6. Self resonance frequency		
Specified Value	NS101, NS125 Type	−

7. Temperature characteristic		
Specified Value	NS101, NS125 Type	Inductance change : Within ±15%

Test Methods and Remarks

NS101, NS125 Type :
Measurement of inductance shall be taken at temperature range within −40℃～＋125℃.
With reference to inductance value at ＋20℃., change rate shall be calculated.
Change of maximum inductance deviation in step 1 to 5

Step	Temperature(℃)
1	20
2	Minimum operating temperature
3	20 (Standard temperature)
4	Maximum operating temperature
5	20

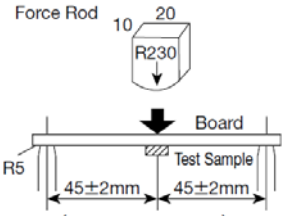
8. Resistance to flexure of substrate

Specified Value	NS101, NS125 Type	No damage

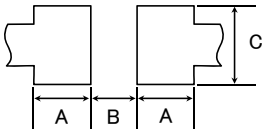
Test Methods and Remarks

The test samples shall be soldered to the test board by the reflow. As illustrated below, apply force in the direction of the arrow indicating until deflection of the test board reaches to 2 mm.

Test board size : 100×40×1.0
Test board material : glass epoxy-resin
Solder cream thickness : 0.15 mm(NS101/125Type)



Land dimension



Type	A	B	C
NS101	2.5	5.6	3.2
NS125	2.5	8.6	3.2

9. Insulation resistance : between wires

Specified Value	NS101, NS125 Type	—

10. Insulation resistance : between wire and core

Specified Value	NS101, NS125 Type	—

11. Withstanding voltage : between wire and core

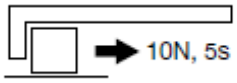
Specified Value	NS101, NS125 Type	—

12. Adhesion of terminal electrode

Specified Value	NS101, NS125 Type	Shall not come off PC board

Test Methods and Remarks

The test samples shall be soldered to the test board by the reflow.
Applied force : 10N to X and Y directions.
Duration : 5s.
Solder cream thickness : 0.15mm(NS101/125Type)



13. Resistance to vibration

Specified Value	NS101, NS125 Type	Inductance change : Within ±10% No significant abnormality in appearance.

Test Methods and Remarks

The test samples shall be soldered to the test board by the reflow.
Then it shall be submitted to below test conditions.

Frequency Range	10～55Hz	
Total Amplitude	1.5mm (May not exceed acceleration 196m/s^2)	
Sweeping Method	10Hz to 55Hz to 10Hz for 1min.	
Time	X	For 2 hours on each X, Y, and Z axis.
	Y	
	Z	

Recovery : At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48hrs.

14. Solderability

Specified Value	NS101, NS125 Type	At least 90% of surface of terminal electrode is covered by new solder.

Test Methods and Remarks

The test samples shall be dipped in flux, and then immersed in molten solder as shown in below table.
Flux : Methanol solution containing rosin 25%.

Solder Temperature	245±5°C
Time	5±1.0 sec.

※Immersion depth : All sides of mounting terminal shall be immersed.

15. Resistance to soldering heat

Specified Value	NS101, NS125 Type	Inductance change : Within ±10% No significant abnormality in appearance.
Test Methods and Remarks	The test sample shall be exposed to reflow oven at 230±5℃ for 40 seconds, with peak temperature at 260±5℃ for 5 seconds, 2 times. Test board material : glass epoxy-resin Test board thickness : 1.0mm Recovery : At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48hrs.	

16. Thermal shock

Specified Value	NS101, NS125 Type	Inductance change : Within ±10% No significant abnormality in appearance.
Test Methods and Remarks	The test samples shall be soldered to the test board by the reflow. The test samples shall be placed at specified temperature for specified time by step 1 to step 4 as shown in below table in sequence. The temperature cycle shall be repeated 100 cycles.	

Conditions of 1 cycle		
Step	Temperature (℃)	Duration (min)
1	−40±3	30±3
2	Room temperature	Within 3
3	+85±2	30±3
4	Room temperature	Within 3

Recovery : At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48hrs.

17. Damp heat

Specified Value	NS101, NS125 Type	Inductance change : Within ±10% No significant abnormality in appearance.
Test Methods and Remarks	The test samples shall be soldered to the test board by the reflow. The test samples shall be placed in thermostatic oven set at specified temperature and humidity as shown in below table.	

Temperature	60±2℃
Humidity	90～95%RH
Time	500+24/−0 hour

Recovery : At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48hrs.

18. Loading under damp heat

Specified Value	NS101, NS125 Type	Inductance change : Within ±10% No significant abnormality in appearance.
Test Methods and Remarks	The test samples shall be soldered to the test board by the reflow. The test samples shall be placed in thermostatic oven set at specified temperature and humidity and applied the rated current continuously as shown in below table.	

Temperature	60±2℃
Humidity	90～95%RH
Applied current	Rated current
Time	500+24/−0 hour

Recovery : At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48hrs.

19. Low temperature life test

Specified Value	NS101, NS125 Type	Inductance change : Within ±10% No significant abnormality in appearance.
Test Methods and Remarks	The test samples shall be soldered to the test board by the reflow. After that, the test samples shall be placed at test conditions as shown in below table.	

Temperature	−40±2℃
Time	500+24/−0 hour

Recovery : At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48hrs.

20. High temperature life test

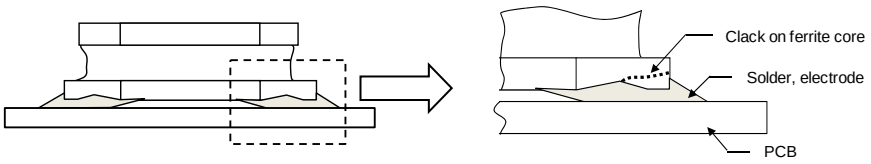
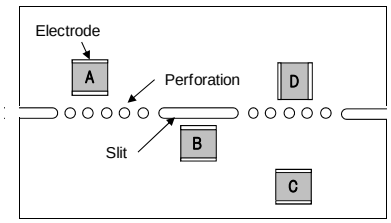
Specified Value	NS101, NS125 Type	—

21. Loading at high temperature life test		
Specified Value	NS101, NS125 Type	Inductance change : Within ±10% No significant abnormality in appearance.
Test Methods and Remarks	The test samples shall be soldered to the test board by the reflow soldering. Temperature: 85±2℃ Applied current: Rated current Time: 500+24/−0 hour Recovery : At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48hrs.	

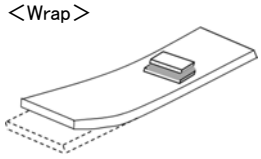
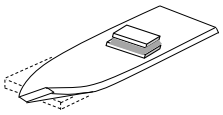
22. Standard condition		
Specified Value	NS101, NS125 Type	Standard test condition : Unless otherwise specified, temperature is 20±15℃ and 65±20%of relative humidity. When there is any question concerning measurement result: In order to provide correlation data, the test shall be condition of 20±2℃ of temperature, 65±5% relative humidity. Inductance is in accordance with our measured value.

■PRECAUTIONS

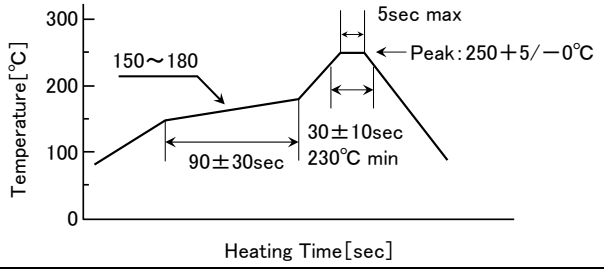
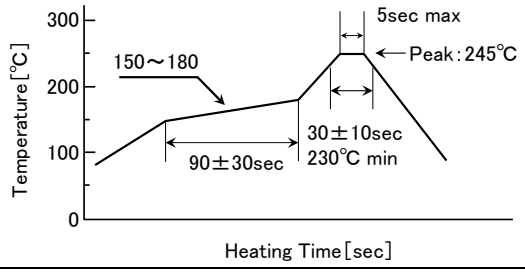
1. Circuit Design	
Precautions	◆Operating environment 1. The products listed in this catalogue are intended for use in general electronic equipment (e.g., AV equipment, OA equipment, home electric appliances, office equipment, information and communication equipment), general medical equipment, industrial 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 refer to a recommended land pattern. 2. There is stress, which has been caused by distortion of a PCB, to the inductor. (NRV20/30, NRH24/30, NRS20/30/40/50/60/80, NRM60 Type) 3. Please consider the arrangement of parts on a PCB. (NRV20/30, NRH24/30, NRS20/30/40/50/60/80, NRM60 Type)
Technical considerations	◆Land pattern design Surface Mounting 1. Mounting and soldering conditions should be checked beforehand. 2. Applicable soldering process to this products is reflow soldering only. 3. Please use the recommended land pattern shown as below. Electrical characteristics and the mounting ability of the product are being considered in the recommended land pattern. If a PCB is designed with other dimensions, defective soldering and stress to a product may occur due to misalignment. The performance of the product may not be brought out. If an adopted land pattern is different from the recommended land pattern, stress to the product will increase. It may cause cracks or defective electrical characteristics of the product. Please conduct validation completely before studying adoption of this product and please judge the pros and cons of adoption of this product with taking on responsibility. (NR30/40/50/60/80, NRV20/30, NRH24/30, NRS20/30/40/50/60/80, NRM60 Type) 4. As coefficients of thermal expansion between an inductor and a PCB differs, cracks may occur on a ferrite core when thermal stress is applied to them after mounting an inductor. (Please refer to the drawings below.) Please conduct validation completely before studying adoption of this product and please judge the pros and cons of adoption of this product with taking on responsibility. (NRV20/30, NRH24/30, NRS20/30/40/50/60/80, NRM60 Type)  5. SMD inductors should be located to minimize any possible mechanical stresses from board warp or deflection. 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. (NRV20/30, NRH24/30, NRS20/30/40/50/60/80, NRM60 Type)  A product tends to undergo stress in order “A>C>B≡D”. Please consider the layouts of a product to minimize any stresses.

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	◆Adjustment of mounting machine 1. When installing products, care should be taken not to apply distortion stress as it may deform the products. 2. Stress may be applied to a product with a warp or a twist in handling of the product. Please conduct validation completely before studying adoption of this product and please judge the pros and cons of adoption of this product with taking on responsibility. (NRV20/30, NRH24/30, NRS20/30/40/50/60/80, NRM60 Type) <Wrap>  <Twist> 

4. Soldering

Precautions	◆Reflow soldering 1. Please contact any of our offices for a reflow soldering, and refer to the recommended condition specified. 2. The product shall be used reflow soldering only. 3. Please do not add any stress to a product until it returns in normal temperature after reflow soldering. ◆Lead free soldering 1. When using products with lead free soldering, we request to use them after confirming adhesion, temperature of resistance to soldering heat, soldering etc sufficiently. ◆Recommended conditions for using a soldering iron ・ Put the soldering iron on the land-pattern. ・ Soldering iron's temperature – Below 350℃ ・ Duration – 3 seconds or less ・ The soldering iron should not directly touch the inductor.
Technical considerations	◆Reflow soldering 1. If products are used beyond the range of the recommended conditions, heat stresses may deform the products, and consequently degrade the reliability of the products. ・ NRV20/30, NRH24/30, NRS20/30/40/50/60/80, NRM60 Type, NS101/125 Type, EST0645/1040/1060 Type Recommended reflow condition (Pb free solder) NR, NS Series  ES Series 

5. Cleaning

Precautions	◆Cleaning conditions 1. Washing by supersonic waves shall be avoided.
Technical considerations	◆Cleaning conditions 1. If washed by supersonic waves, the products might be broken.

6. Handling

Precautions	◆Handling 1. Keep the product away from all magnets and magnetic objects. ◆Breakaway PC boards (splitting along perforations) 1. When splitting the PC board after mounting product, 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 product any excessive mechanical shocks. 2. Please do not add any shock and power to a product in transportation. ◆Pick-up pressure 1. Please do not push to add any pressure to a winding part. Please do not give any shock and push into a ferrite core exposure part. ◆Packing 1. Please avoid accumulation of a packing box as much as possible.
Technical considerations	◆Handling 1. There is a case that a characteristic varies with magnetic influence. ◆Breakaway PC boards (splitting along perforations) 1. The position of the product on PCBs shall be carefully considered to minimize the stress caused from splitting of the PCBs. ◆Mechanical considerations 1. There is a case to be damaged by a mechanical shock. 2. There is a case to be broken by the handling in transportation. ◆Pick-up pressure 1. Damage and a characteristic can vary with an excessive shock or stress. ◆Packing 1. If packing boxes are accumulated, that could cause a deformation on packing tapes or a damage on the products.

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 : －5～40℃ 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, product should be used within 6 months from the time of delivery. In case of storage over 6 months, solderability shall be checked before actual usage.
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.

SMD 파워 인덕터 (ESシリーズ T타입)

리플로우
AEC-Q200

AEC-Q200 Grade 1 (Grade 1 테스트 조건으로 평가 실시를 마쳤습니다.)
*사용 환경 온도: -55~125℃

■품번 표기법

*사용온도범위 : -55~150℃ (제품자기발열 포함)

E S T	1 0 6 0	T	1 0 0	M	D G A
①	②	③	④	⑤	⑥

①형식

기호	형식
EST	실드 사양

②크기 (L×W×H)

기호	크기(L×W×H) [mm]
0645	6.3×6.0×4.5
1040	10.1×10.0×4.0
1060	10.1×10.0×6.0

③포장

기호	포장
T	테이핑

④공칭인덕턴스

기호(예)	공칭인덕턴스 [μH]
1R0	1.0
100	10
101	100

※R=소수점

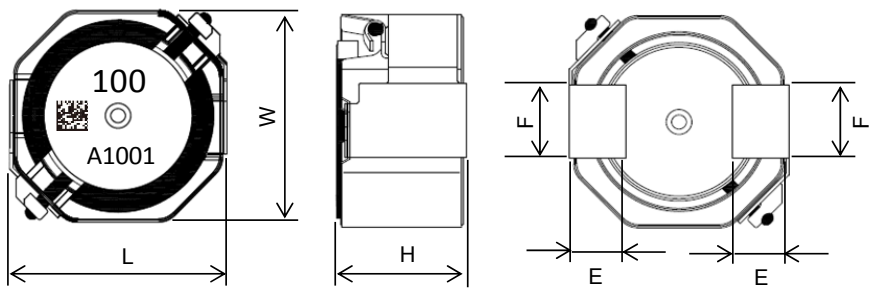
⑤인덕턴스 허용차

기호	인덕턴스 허용차
M	±20%
N	±30%

⑥개별 사양

기호	개별 사양
DGA	표준품

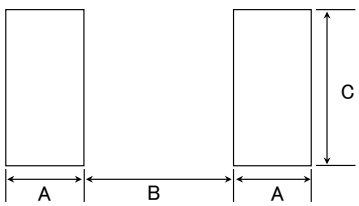
■표준외형크기 / 최소 수주 단위수



Type	L	W	H	E	F	최소 수주 단위수 [pcs]
EST0645	6.3±0.3 (0.248±0.012)	6.0±0.3 (0.236±0.012)	4.5±0.3 (0.177±0.012)	1.7±0.2 (0.067±0.008)	2.0±0.15 (0.079±0.006)	1000
EST1040	10.1±0.3 (0.398±0.012)	10.0±0.3 (0.394±0.012)	4.0±0.3 (0.157±0.012)	2.65±0.2 (0.104±0.008)	3.5±0.15 (0.138±0.006)	700
EST1060	10.1±0.3 (0.398±0.012)	10.0±0.3 (0.394±0.012)	6.0±0.3 (0.236±0.012)	2.65±0.2 (0.104±0.008)	3.5±0.15 (0.138±0.006)	500

단위 : mm(inch)

권장랜드패턴
실장상의 주의
·실장상태를 확인하시고 사용하시기 바랍니다.
·본제품의 납땜은 리플로우 납땜공법에 한합니다.



Type	A	B	C
EST0645	2.2	2.8	2.3
EST1040	3.2	4.6	3.8
EST1060	3.2	4.6	3.8

단위 : mm

▶ 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 SMD파워 인덕터는 전부 RoHS 대응품입니다.

주)
·사용하시는 회로나 기기에 따라 개별사양의 교체가 필요합니다. 반드시 정규판매채널로 문의해 주시기 바랍니다.
·차재(제어계, 안전계) 용도 (AEC-Q200 qualified) 제품입니다. 상세에 대해서는 "차재 어플리케이션 가이드"를 반드시 확인해 주십시오.

＜ AEC-Q200 ：AEC-Q200 qualified＞
차재(제어계, 안전계) 용도 SMD파워 인덕터는 대표 아이템에 의한 AEC-Q200에 대응한 평가 시험을 끝냈습니다.
본 제품의 상세한 사양, 평가 시험 결과 등에 관해서는 정규판매채널로 문의해 주시기 바랍니다.
또한, 주문할 때 납입사양서의 승인을 부탁 드립니다.

●EST0645 type

품번	공칭인덕턴스 [μH]	인덕턴스 허용차	직류저항 [mΩ] Typ	정격전류 ※) [A]			측정주파수 [kHz]	주기
				직류중첩허용전류 Idc1 Max (Typ)	온도상승허용전류① Idc2 Max (Typ)	온도상승허용전류② Idc2 Max (Typ)		
EST0645T1R0NDGA	1	±30%	9±30%	6.70 (8.00)	3.50 (4.00)	4.20 (5.30)	100	
EST0645T1R5NDGA	1.5	±30%	10±30%	5.50 (6.40)	3.20 (3.80)	4.00 (5.10)	100	
EST0645T2R2NDGA	2.2	±30%	13±30%	4.20 (5.40)	2.80 (3.30)	3.60 (4.40)	100	
EST0645T3R3NDGA	3.3	±30%	15±30%	3.50 (4.00)	2.50 (3.00)	3.30 (4.15)	100	
EST0645T4R7NDGA	4.7	±30%	20±30%	3.10 (3.50)	2.30 (2.80)	3.00 (3.50)	100	
EST0645T6R8NDGA	6.8	±30%	29±30%	2.50 (3.00)	2.00 (2.40)	2.60 (3.00)	100	
EST0645T100MDGA	10	±20%	38±20%	2.00 (2.30)	1.70 (2.00)	2.10 (2.50)	100	
EST0645T150MDGA	15	±20%	64±20%	1.70 (2.00)	1.40 (1.60)	1.70 (1.90)	100	
EST0645T220MDGA	22	±20%	79±20%	1.30 (1.60)	1.10 (1.30)	1.50 (1.75)	100	
EST0645T330MDGA	33	±20%	100±20%	1.10 (1.30)	0.95 (1.10)	1.40 (1.60)	100	
EST0645T470MDGA	47	±20%	135±20%	0.85 (1.10)	0.86 (1.00)	1.20 (1.35)	100	
EST0645T680MDGA	68	±20%	210±20%	0.80 (0.92)	0.73 (0.84)	0.90 (1.10)	100	
EST0645T101MDGA	100	±20%	320±20%	0.55 (0.77)	0.56 (0.65)	0.70 (0.86)	100	
EST0645T151MDGA	150	±20%	475±20%	0.50 (0.64)	0.49 (0.56)	0.65 (0.72)	100	
EST0645T221MDGA	220	±20%	670±20%	0.44 (0.53)	0.36 (0.42)	0.50 (0.59)	100	
EST0645T331MDGA	330	±20%	950±20%	0.36 (0.43)	0.30 (0.34)	0.40 (0.48)	100	

※)직류중첩허용전류(Idc1)는 직류중첩에 의한 인덕턴스 저하가 30%이내가 되는 직류전류값(at 20℃)
※)온도 상승 허용 전류(Idc2)①는 온도 상승이 25°C가 되는 직류 전류값(at 20℃)
※)온도 상승 허용 전류(Idc2)②는 온도 상승이 40°C가 되는 직류 전류값(at 20℃)
※)온도 상승 허용 전류(Idc2)②는 참고값
※)정격전류값은 직류중첩허용전류와 온도상승허용전류를 모두 만족시키는 직류전류값

●EST1040 type

품번	공칭인덕턴스 [μH]	인덕턴스 허용차	직류저항 [mΩ] Typ	정격전류 ※) [A]			측정주파수 [kHz]	주기
				직류중첩허용전류 Idc1 Max (Typ)	온도상승허용전류① Idc2 Max (Typ)	온도상승허용전류② Idc2 Max (Typ)		
EST1040T1R0NDGA	1	±30%	8.0±30%	10.70 (11.70)	3.60 (4.60)	5.00 (5.50)	100	
EST1040T1R5NDGA	1.5	±30%	9.6±30%	8.60 (9.80)	3.30 (4.30)	4.60 (5.10)	100	
EST1040T2R2NDGA	2.2	±30%	11.0±30%	7.50 (8.30)	3.10 (4.00)	4.30 (4.70)	100	
EST1040T3R3NDGA	3.3	±30%	13.0±30%	6.60 (7.20)	2.90 (3.60)	3.90 (4.20)	100	
EST1040T4R7NDGA	4.7	±30%	19.0±30%	5.20 (5.70)	2.70 (3.40)	3.60 (3.90)	100	
EST1040T6R8NDGA	6.8	±30%	24.0±30%	4.30 (4.80)	2.30 (2.90)	3.10 (3.40)	100	
EST1040T100MDGA	10	±20%	29.0±20%	3.70 (3.90)	2.00 (2.60)	2.70 (3.00)	100	
EST1040T150MDGA	15	±20%	43.0±20%	2.90 (3.40)	1.60 (2.10)	2.20 (2.50)	100	
EST1040T220MDGA	22	±20%	62.0±20%	2.50 (2.90)	1.50 (1.80)	2.00 (2.10)	100	
EST1040T330MDGA	33	±20%	96.0±20%	2.00 (2.30)	1.10 (1.40)	1.50 (1.60)	100	
EST1040T470MDGA	47	±20%	135.0±20%	1.70 (2.00)	0.76 (1.10)	1.15 (1.30)	100	
EST1040T680MDGA	68	±20%	180.0±20%	1.40 (1.60)	0.74 (1.00)	1.10 (1.20)	100	
EST1040T101MDGA	100	±20%	285.0±20%	1.10 (1.30)	0.59 (0.77)	0.83 (0.91)	100	
EST1040T151MDGA	150	±20%	395.0±20%	0.94 (1.10)	0.44 (0.61)	0.66 (0.74)	100	
EST1040T221MDGA	220	±20%	530.0±20%	0.77 (0.88)	0.41 (0.54)	0.59 (0.65)	100	
EST1040T331MDGA	330	±20%	960.0±20%	0.61 (0.70)	0.29 (0.38)	0.41 (0.45)	100	
EST1040T471MDGA	470	±20%	1200.0±20%	0.53 (0.61)	0.25 (0.35)	0.38 (0.40)	100	

※)직류중첩허용전류(Idc1)는 직류중첩에 의한 인덕턴스 저하가 30%이내가 되는 직류전류값(at 20℃)
※)온도 상승 허용 전류(Idc2)①는 온도 상승이 25°C가 되는 직류 전류값(at 20℃)
※)온도 상승 허용 전류(Idc2)②는 온도 상승이 30°C가 되는 직류 전류값(at 20℃)
※)온도 상승 허용 전류(Idc2)②는 참고값
※)정격전류값은 직류중첩허용전류와 온도상승허용전류를 모두 만족시키는 직류전류값

▶ 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.

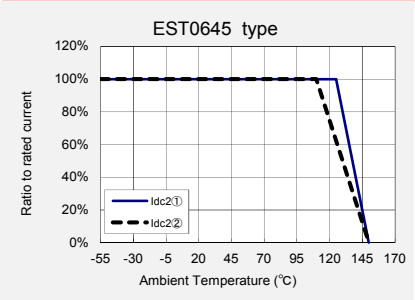
●EST1060 type

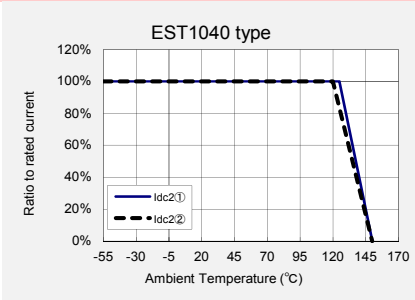
품번	공칭인덕턴스 [μH]	인덕턴스 허용차	직류저항 [mΩ] Typ	정격전류 ※) [A]			측정주파수 [kHz]	주기
				직류중첩허용전류 Idc1 Max (Typ)	온도상승허용전류① Idc2 Max (Typ)	온도상승허용전류② Idc2 Max (Typ)		
EST1060T1R0NDGA	1	±30%	4.5±30%	9.70 (15.00)	6.00 (7.00)	9.00 (11.00)	100	
EST1060T1R5NDGA	1.5	±30%	5.6±30%	9.00 (14.00)	5.60 (6.40)	8.00 (10.00)	100	
EST1060T2R2NDGA	2.2	±30%	6.6±30%	7.50 (11.00)	5.20 (6.00)	7.50 (9.00)	100	
EST1060T3R3NDGA	3.3	±30%	9.0±30%	7.00 (9.50)	4.70 (5.50)	6.50 (8.00)	100	
EST1060T4R7NDGA	4.7	±30%	11.0±30%	5.80 (8.00)	4.20 (4.90)	5.50 (6.80)	100	
EST1060T6R8NDGA	6.8	±30%	16.0±30%	5.50 (6.60)	3.50 (4.20)	5.00 (6.10)	100	
EST1060T100MDGA	10	±20%	22.0±20%	4.30 (5.20)	3.00 (3.70)	4.30 (5.10)	100	
EST1060T150MDGA	15	±20%	31.0±20%	3.70 (4.40)	2.50 (3.20)	3.60 (4.30)	100	
EST1060T220MDGA	22	±20%	44.0±20%	3.10 (3.60)	2.10 (2.60)	2.80 (3.30)	100	
EST1060T330MDGA	33	±20%	61.0±20%	2.40 (3.10)	1.80 (2.10)	2.60 (3.10)	100	
EST1060T470MDGA	47	±20%	82.0±20%	2.10 (2.35)	1.40 (1.80)	2.20 (2.60)	100	
EST1060T680MDGA	68	±20%	101.0±20%	1.70 (2.05)	1.30 (1.60)	2.00 (2.40)	100	
EST1060T101MDGA	100	±20%	169.0±20%	1.40 (1.65)	0.93 (1.20)	1.50 (1.70)	100	
EST1060T151MDGA	150	±20%	246.0±20%	1.20 (1.35)	0.72 (0.95)	1.30 (1.50)	100	
EST1060T221MDGA	220	±20%	320.0±20%	0.95 (1.15)	0.66 (0.86)	1.00 (1.30)	100	
EST1060T331MDGA	330	±20%	458.0±20%	0.75 (0.90)	0.58 (0.72)	0.90 (1.00)	100	
EST1060T471MDGA	470	±20%	775.0±20%	0.65 (0.75)	0.39 (0.50)	0.70 (0.80)	100	

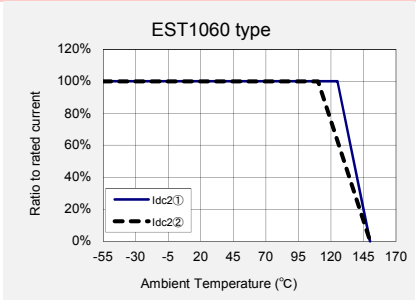
※) 직류중첩허용전류(Idc1)는 직류중첩에 의한 인덕턴스 저하가 30%이내가 되는 직류전류값(at 20℃)
※)온도 상승 허용 전류(Idc2)①는 온도 상승이 25℃가 되는 직류 전류값(at 20℃)
※)온도 상승 허용 전류(Idc2)②는 온도 상승이 40℃가 되는 직류 전류값(at 20℃)
※)온도 상승 허용 전류(Idc2)②는 참고값
※)정격전류값은 직류중첩허용전류와 온도상승허용전류를 모두 만족시키는 직류전류값

■정격전류의 디레이팅

●NS시리즈
ES시리즈 T타입는 주위 온도에 따라 정격전류의 디레이팅이 필요합니다.
아래 도표를 참조하여 사용전류의 디레이팅을 해 주십시오.







▶ 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.

SMD POWER INDUCTORS (ES SERIES T Type)

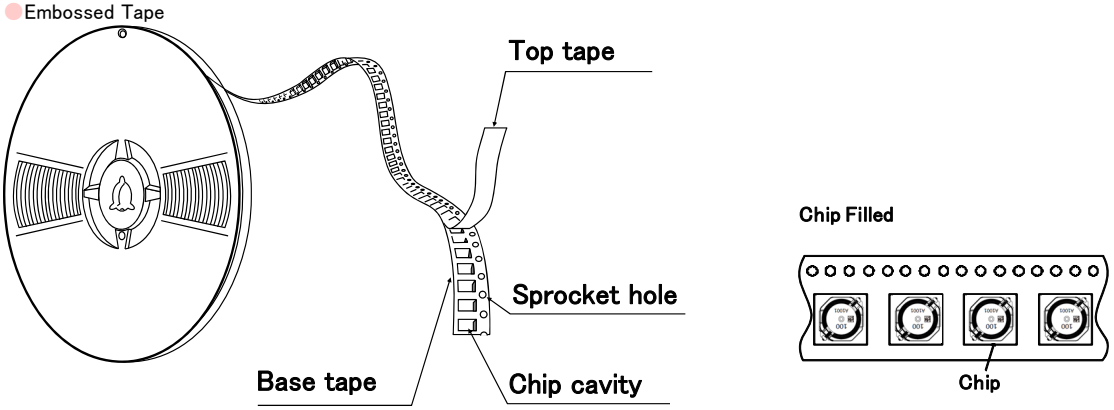
■PACKAGING

①Packing Quantity

Type	Standard Quantity (1reel) [pcs]	Minimum Quantity [pcs]
	Embossed Tape	Embossed Tape
EST0645	1000	1000
EST1040	700	700
EST1060	500	500

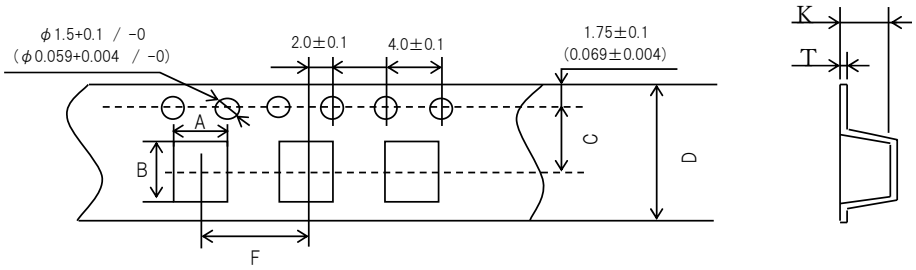
②Tape Material

●Embossed Tape



③Taping dimensions

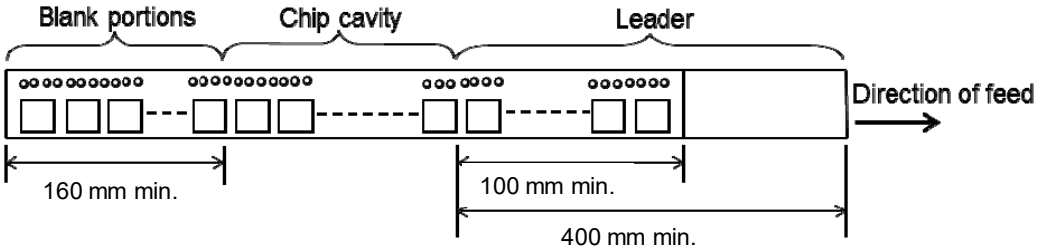
●Embossed tape



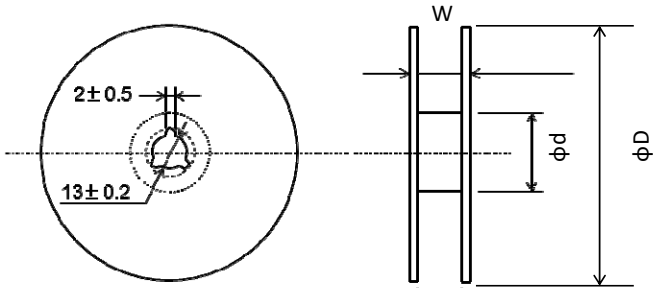
Type	Chip cavity		C	D	Insertion pitch	Tape thickness	
	A	B			F	T	K
EST0645	6.5±0.1 (0.256±0.004)	6.1±0.1 (0.240±0.004)	7.5±0.1 (0.295±0.004)	16.0±0.2 (0.630±0.008)	12.0±0.1 (0.472±0.004)	0.5±0.05 (0.020±0.002)	4.8±0.1 (0.189±0.004)
EST1040	10.5±0.1 (0.413±0.004)	10.5±0.1 (0.413±0.004)	11.5±0.1 (0.453±0.004)	24.0±0.2 (0.945±0.008)	16.0±0.1 (0.630±0.004)	0.5±0.05 (0.020±0.002)	4.6±0.1 (0.181±0.004)
EST1060	10.5±0.1 (0.413±0.004)	10.5±0.1 (0.413±0.004)	11.5±0.1 (0.453±0.004)	24.0±0.2 (0.945±0.008)	16.0±0.1 (0.630±0.004)	0.5±0.05 (0.020±0.002)	6.5±0.1 (0.256±0.004)

Unit : mm (inch)

④Leader and Blank portion



⑤Reel size

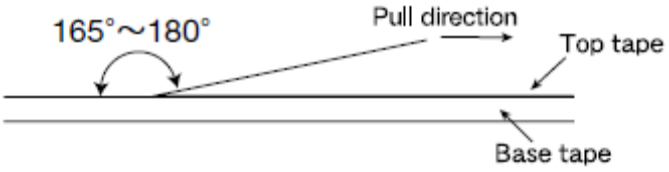


Type	Reel size (Reference values)		
	ϕD	ϕd	W
EST0645	330±2.0 (12.99±0.079)	80±1.0 (3.15±0.039)	21.5±1.0 (0.846±0.039)
EST1040	330±2.0 (12.99±0.079)	100±1.0 (3.937±0.039)	29.5±1.0 (1.161±0.039)
EST1060	330±2.0 (12.99±0.079)	100±1.0 (3.937±0.039)	29.5±1.0 (1.161±0.039)

Unit:mm(inch)

⑥Top Tape Strength

The top tape requires a peel-off force of 0.1 to 1.3N in the direction of the arrow as illustrated below.



SMD POWER INDUCTORS (ES SERIES T TYPE)

■RELIABILITY DATA

1. Operating Temperature Range		
Specified Value	ES Series T Type	−55～＋150℃(Including self-generated heat)
Test Methods and Remarks	Including self-generated heat	

2. Storage Temperature Range		
Specified Value	ES Series T Type	−40～＋85℃
Test Methods and Remarks	−5 to 40℃ for the product with taping.	

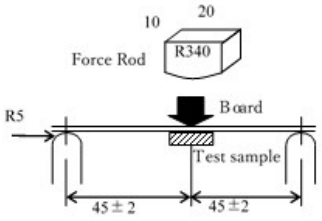
3. Rated current		
Specified Value	ES Series T Type	Within the specified tolerance

4. Inductance		
Specified Value	ES Series T Type	Within the specified tolerance
Test Methods and Remarks	Measuring equipment : LCR Meter (HP 4285A or equivalent) Measuring frequency : 100kHz, 1V	

5. DC Resistance		
Specified Value	ES Series T Type	Within the specified tolerance
Test Methods and Remarks	Measuring equipment : DC ohmmeter (HIOKI 3541 or equivalent)	

6. Self resonance frequency		
Specified Value	ES Series T Type	—

7. Temperature characteristic		
Specified Value	ES Series T Type	Inductance change : Within ±20%
Test Methods and Remarks	Measurement of inductance shall be taken at temperature range within −55℃～＋150℃. With reference to inductance value at ＋20℃., change rate shall be calculated.	

8. Board Flex		
Specified Value	ES Series T Type	No damage
Test Methods and Remarks	AEC-Q200 Test No.21qualified (AEC-Q200-005) The test samples shall be soldered to the test board by the reflow. As illustrated below, apply force in the direction of the arrow indicating until deflection of the test board reaches to 2 mm for 60 s. Test board size : 100×40×1.6 Test board material : glass epoxy-resin	

9. Insulation resistance : between wires		
Specified Value	ES Series T Type	—

10. Insulation resistance : between top side of sample and the terminal		
Specified Value	ES Series T Type	DC100V 100MΩminimum

11. Withstanding voltage : between top side of sample and the terminal		
Specified Value	ES Series T Type	AC100V No break of insulation

12. Terminal Strength

Specified Value	ES Series T Type	Inductance change : Within ±10%
Test Methods and Remarks	AEC-Q200 Test No.22 qualified (AEC-Q200-006) The test samples shall be soldered to the test board by the reflow soldering. Applied force : 17.7N Duration : 60 s	

13. Vibration

Specified Value	ES Series T Type	Inductance change : Within ±10% No significant abnormality in appearance.

Test Methods and Remarks

AEC-Q200 Test No.14 qualified (MIL-STD-202 Method 204)
The test samples shall be soldered to the test board by the reflow.
Then it shall be submitted to below test conditions.

Frequency Range	10～2000Hz	
Total Amplitude	5G	
Sweeping Method	10Hz to 2000Hz to 10Hz for 20min.	
Number of cycle	X	For 12 cycles on each X, Y, and Z axis.
	Y	
	Z	

14. Mechanical Shock

Specified Value	ES Series T Type	Inductance change : Within ±10% No significant abnormality in appearance.

Test Methods and Remarks

AEC-Q200 Test No.13qualified (MIL-STD-202 Method213)
The test samples shall be soldered to the test board by the reflow.
Then it shall be submitted to below test conditions.

Acceleration	981m/s^2
Duration	6msec(Half sine pulse)
Direction	+X, +Y, +Z, -X, -Y, -Z
Number of time	Each 3 times, Total 18 times

15. Solderability

Specified Value	ES Series T Type	At least 90% of surface of terminal electrode is covered by new solder.

Test Methods and Remarks

AEC-Q200 Test No.18qualified (J-STD-002)

	(a) Method B	(c) Method D
Preconditioning	155℃_4hrs	Steam 8hrs±15min
Solder Temperature	235±5℃	260±5℃
Time	5+0/-0.5 sec	30+0/-0.5 sec.

16. Resistance to Soldering Heat

Specified Value	ES Series T Type	Inductance change : Within ±10% No significant abnormality in appearance.
Test Methods and Remarks	AEC-Q200 Test No.15 qualified (MIL-STD-202 Method210) Condition : K The test sample shall be exposed to reflow oven at 183℃ for 90-120 seconds, with peak temperature at 250±5℃ for 30±5 seconds, 3 times.	

17. Temperature Cycling

Specified Value	ES Series T Type	Inductance change : Within ±10% No significant abnormality in appearance.

Test Methods and Remarks

AEC-Q200 Test No.04 qualified (JESD22 Method JA-104)
The test samples shall be soldered to the test board by the reflow. The test samples shall be placed at specified temperature for specified time by following condition.

1Cycle	-55±3℃/30 min⇔150±3℃/30 min
Number of cycle	1000 cycles

18. Biased Humidity		
Specified Value	ES Series T Type	Inductance change : Within ±10% No significant abnormality in appearance.
Test Methods and Remarks	AEC-Q200 Test No.07 qualified (MIL-STD-202 Method 103) The test samples shall be soldered to the test board by the reflow. The test samples shall be placed in thermostatic oven set at specified temperature and humidity as shown in below table. Temperature: 85±2℃ Humidity: 85%RH Time: 1000+24/−0 hour	

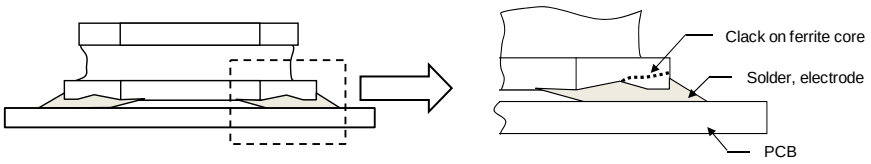
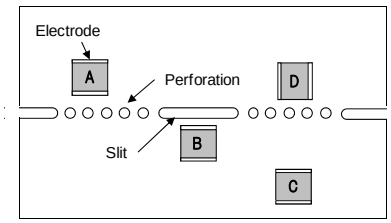
19. High Temperature Exposure		
Specified Value	ES Series T Type	Inductance change : Within ±10% No significant abnormality in appearance.
Test Methods and Remarks	AEC-Q200 Test No.03 qualified (MIL-STD-202 Method 108) The test samples shall be soldered to the test board by the reflow soldering. Temperature: 150±3℃ Time: 1000+24/−0 hour	

20. Operational Life		
Specified Value	ES Series T Type	Inductance change : Within ±10% No significant abnormality in appearance.
Test Methods and Remarks	AEC-Q200 Test No.08 qualified (MIL-PRF-27) The test samples shall be soldered to the test board by the reflow soldering. Temperature: 125±3℃ Applied current: Rated current Time: 1000+24/−0 hour	

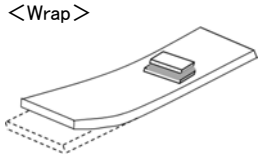
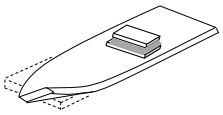
21. Standard condition		
Specified Value	ES Series T Type	Standard test condition : Unless otherwise specified, temperature is 20±15℃ and 65±20%of relative humidity. When there is any question concerning measurement result: In order to provide correlation data, the test shall be condition of 20±2℃ of temperature, 65±5% relative humidity. Inductance is in accordance with our measured value.

■PRECAUTIONS

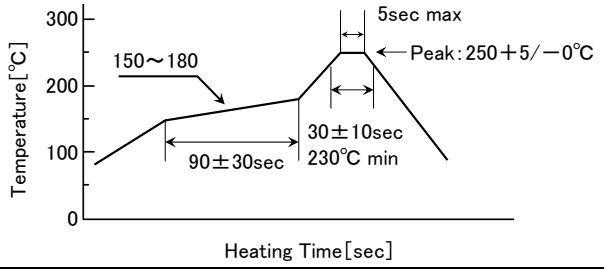
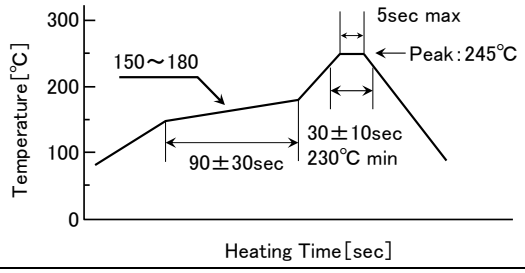
1. Circuit Design	
Precautions	◆Operating environment 1. The products listed in this catalogue are intended for use in general electronic equipment (e.g., AV equipment, OA equipment, home electric appliances, office equipment, information and communication equipment), general medical equipment, industrial 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 refer to a recommended land pattern. 2. There is stress, which has been caused by distortion of a PCB, to the inductor. (NRV20/30, NRH24/30, NRS20/30/40/50/60/80, NRM60 Type) 3. Please consider the arrangement of parts on a PCB. (NRV20/30, NRH24/30, NRS20/30/40/50/60/80, NRM60 Type)
Technical considerations	◆Land pattern design Surface Mounting 1. Mounting and soldering conditions should be checked beforehand. 2. Applicable soldering process to this products is reflow soldering only. 3. Please use the recommended land pattern shown as below. Electrical characteristics and the mounting ability of the product are being considered in the recommended land pattern. If a PCB is designed with other dimensions, defective soldering and stress to a product may occur due to misalignment. The performance of the product may not be brought out. If an adopted land pattern is different from the recommended land pattern, stress to the product will increase. It may cause cracks or defective electrical characteristics of the product. Please conduct validation completely before studying adoption of this product and please judge the pros and cons of adoption of this product with taking on responsibility. (NR30/40/50/60/80, NRV20/30, NRH24/30, NRS20/30/40/50/60/80, NRM60 Type) 4. As coefficients of thermal expansion between an inductor and a PCB differs, cracks may occur on a ferrite core when thermal stress is applied to them after mounting an inductor. (Please refer to the drawings below.) Please conduct validation completely before studying adoption of this product and please judge the pros and cons of adoption of this product with taking on responsibility. (NRV20/30, NRH24/30, NRS20/30/40/50/60/80, NRM60 Type)  5. SMD inductors should be located to minimize any possible mechanical stresses from board warp or deflection. 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. (NRV20/30, NRH24/30, NRS20/30/40/50/60/80, NRM60 Type)  A product tends to undergo stress in order “A>C>B≡D”. Please consider the layouts of a product to minimize any stresses.

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	◆Adjustment of mounting machine 1. When installing products, care should be taken not to apply distortion stress as it may deform the products. 2. Stress may be applied to a product with a warp or a twist in handling of the product. Please conduct validation completely before studying adoption of this product and please judge the pros and cons of adoption of this product with taking on responsibility. (NRV20/30, NRH24/30, NRS20/30/40/50/60/80, NRM60 Type) <Wrap>  <Twist> 

4. Soldering

Precautions	◆Reflow soldering 1. Please contact any of our offices for a reflow soldering, and refer to the recommended condition specified. 2. The product shall be used reflow soldering only. 3. Please do not add any stress to a product until it returns in normal temperature after reflow soldering. ◆Lead free soldering 1. When using products with lead free soldering, we request to use them after confirming adhesion, temperature of resistance to soldering heat, soldering etc sufficiently. ◆Recommended conditions for using a soldering iron ・ Put the soldering iron on the land-pattern. ・ Soldering iron's temperature – Below 350℃ ・ Duration – 3 seconds or less ・ The soldering iron should not directly touch the inductor.
Technical considerations	◆Reflow soldering 1. If products are used beyond the range of the recommended conditions, heat stresses may deform the products, and consequently degrade the reliability of the products. ・ NRV20/30, NRH24/30, NRS20/30/40/50/60/80, NRM60 Type, NS101/125 Type, EST0645/1040/1060 Type Recommended reflow condition (Pb free solder) NR, NS Series  ES Series 

5. Cleaning

Precautions	◆Cleaning conditions 1. Washing by supersonic waves shall be avoided.
Technical considerations	◆Cleaning conditions 1. If washed by supersonic waves, the products might be broken.

6. Handling

Precautions	◆Handling 1. Keep the product away from all magnets and magnetic objects. ◆Breakaway PC boards (splitting along perforations) 1. When splitting the PC board after mounting product, 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 product any excessive mechanical shocks. 2. Please do not add any shock and power to a product in transportation. ◆Pick-up pressure 1. Please do not push to add any pressure to a winding part. Please do not give any shock and push into a ferrite core exposure part. ◆Packing 1. Please avoid accumulation of a packing box as much as possible.
Technical considerations	◆Handling 1. There is a case that a characteristic varies with magnetic influence. ◆Breakaway PC boards (splitting along perforations) 1. The position of the product on PCBs shall be carefully considered to minimize the stress caused from splitting of the PCBs. ◆Mechanical considerations 1. There is a case to be damaged by a mechanical shock. 2. There is a case to be broken by the handling in transportation. ◆Pick-up pressure 1. Damage and a characteristic can vary with an excessive shock or stress. ◆Packing 1. If packing boxes are accumulated, that could cause a deformation on packing tapes or a damage on the products.

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 : －5～40℃ 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, product should be used within 6 months from the time of delivery. In case of storage over 6 months, solderability shall be checked before actual usage.
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.