Notice for TAIYO YUDEN products

Please read this notice before using the TAIYO YUDEN products.

⚠ REMINDERS

Product Information in this Catalog

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

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

Approval of Product Specifications

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

Pre-Evaluation in the Actual Equipment and Conditions

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

Limited Application

1. Equipment Intended for Use

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

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

2. Equipment Requiring Inquiry

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

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

3. Equipment Prohibited for Use

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

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

*Notes:

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

4. Limitation of Liability

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

Safety Design

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

Intellectual Property Rights

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

Limited Warranty

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

TAIYO YUDEN's Official Sales Channel

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

Caution for Export

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

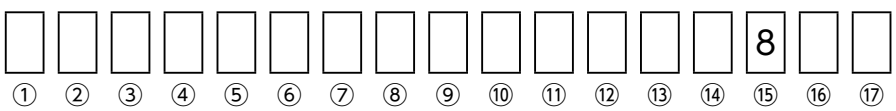
Industrial Application Guide

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

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

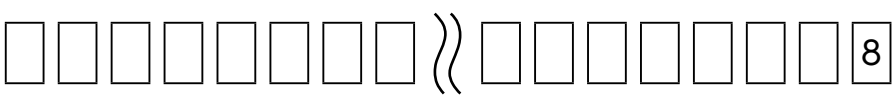
Part Numbering System

Multilayer Ceramic Capacitors:



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

Inductors:



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

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

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

Medical Application Guide

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

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

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

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

SMD POWER INDUCTORS (NR SERIES H TYPE/S TYPE/V TYPE)

REFLOW

■PART NUMBER

*Operating Temp. : −40～125℃(Including self-generated heat)

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

△=Blank space

①Series name

Code	Series name
NRH	Coating resin specification
NRS	
NRV	

②Dimensions(L×W×H)

Code	Dimensions(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

③Packaging

Code	Packaging
T△	Taping

④Nominal inductance

Code (example)	Nominal inductance[μH]
2R2	2.2
100	10
101	100

※R=Decimal point

⑤Inductance tolerance

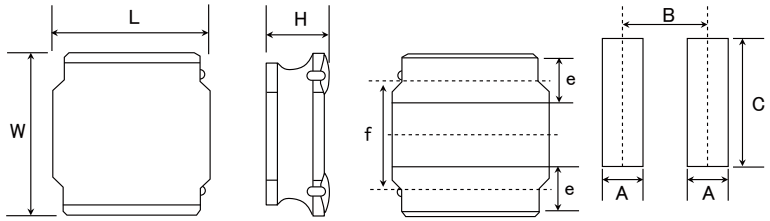
Code	Inductance tolerance
M	±20%
N	±30%

⑥Special code

⑦Internal code

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

■STANDARD EXTERNAL DIMENSIONS / STANDARD QUANTITY



Recommended Land Patterns

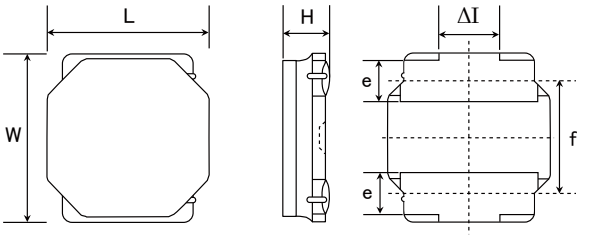
Type	A	B	C
NRV2010	0.65	1.35	2.0
NRV2012, NRS2012			
NRH2410	0.7	1.45	2.0
NRH2412			
NRH3010	0.8	2.2	2.7
NRH3012, NRV3012			
NRS3015			
NRS4010	1.2	2.8	3.7
NRS4012			
NRS4018			
NRS8030	1.8	5.6	7.5
NRS8040			

Unit : mm

Type	L	W	H	e	f	Standard quantity [pcs] Taping
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 type, *2) 100～101type

Unit : mm (inch)



Recommended Land Patterns

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			

Unit : mm

Type	L	W	H	e	f	ΔI	Standard quantity [pcs] Taping
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 type, *4) 2R2～330 type
*5) R47～100 type, *6) 150～470 type
*7) 1R5～100 type, *8) 150～470 type

Unit : mm (inch)

■PART NUMBER

・All the SMD Power Inductors of the catalog lineup are RoHS compliant.

Notes)

・The exchange of individual specifications is necessary depending on your application and/or circuit condition. Please contact TAIYO YUDEN's official sales channel.

・The products are for Telecommunications infrastructure and Industrial equipment and for Medical devices.
Please consult with TAIYO YUDEN's official sales channel for the details of the product specifications, etc.,
and please review and approve the product specifications before ordering.
Please be sure to contact us for further information in advance when the products are used for automotive electronic equipment.

●NRV2010 type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±20%)	Rated current ※) [mA]		Measuring frequency [kHz]	Note
					Saturation current Idc1	Temperature rise current Idc2		
NRV2010T R47N GF8	0.47	±30%	–	0.052	2,100	2,000	100	
NRV2010T R68N GF8	0.68	±30%	–	0.060	1,850	1,850	100	
NRV2010T 1R0N GF8	1.0	±30%	–	0.080	1,550	1,600	100	
NRV2010T 1R5M GF8	1.5	±20%	–	0.100	1,350	1,450	100	
NRV2010T 2R2M GF8	2.2	±20%	–	0.175	1,100	1,100	100	
NRV2010T 3R3M GF8	3.3	±20%	–	0.250	880	1,000	100	
NRV2010T 4R7M GF8	4.7	±20%	–	0.320	760	820	100	

●NRV2012 type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±20%)	Rated current ※) [mA]		Measuring frequency [kHz]	Note
					Saturation current Idc1	Temperature rise current Idc2		
NRV2012T 1R0N GF8	1.0	±30%	–	0.073	2,200	1,650	100	
NRV2012T 1R5N GF8	1.5	±30%	–	0.100	1,800	1,400	100	
NRV2012T 2R2M GF8	2.2	±20%	–	0.129	1,600	1,200	100	
NRV2012T 3R3M GF8	3.3	±20%	–	0.227	1,250	900	100	
NRV2012T 4R7M GF8	4.7	±20%	–	0.325	1,100	750	100	

●NRS2012 Shielded type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±20%)	Rated current ※) [mA]		Measuring frequency [kHz]	Note
					Saturation current Idc1	Temperature rise current Idc2		
NRS2012T 1R0N GJ8	1.0	±30%	–	0.070	1,900	1,700	100	
NRS2012T 1R5N GJ8	1.5	±30%	–	0.090	1,650	1,500	100	
NRS2012T 2R2M GJ8	2.2	±20%	–	0.107	1,350	1,370	100	
NRS2012T 3R3M GJ8	3.3	±20%	–	0.190	1,000	1,020	100	
NRS2012T 4R7M GJ8	4.7	±20%	–	0.241	900	910	100	

●NRH2410 Shielded type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±20%)	Rated current ※) [mA]		Measuring frequency [kHz]	Note
					Saturation current Idc1	Temperature rise current Idc2		
NRH2410T R68NN 48	0.68	±30%	120	0.060	2,200	1,570	100	
NRH2410T 1R0NN 48	1.0	±30%	106	0.070	1,800	1,410	100	
NRH2410T 1R5MN 8	1.5	±20%	94	0.110	1,550	1,160	100	
NRH2410T 2R2MN 8	2.2	±20%	77	0.150	1,290	970	100	
NRH2410T 3R3MN 8	3.3	±20%	56	0.220	1,000	770	100	
NRH2410T 4R7MN 8	4.7	±20%	50	0.290	880	670	100	
NRH2410T 6R8MN 8	6.8	±20%	43	0.410	750	570	100	
NRH2410T 100MN 8	10	±20%	32	0.690	550	450	100	
NRH2410T 150MN 8	15	±20%	27	1.02	470	370	100	
NRH2410T 220MN 8	22	±20%	22	1.47	390	300	100	

●NRH2412 Shielded type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±20%)	Rated current ※) [mA]		Measuring frequency [kHz]	Note
					Saturation current Idc1	Temperature rise current Idc2		
NRH2412T R47NNGJ8	0.47	±30%	180	0.050	2,900	2,100	100	
NRH2412T 1R0NNGH8	1.0	±30%	101	0.077	2,350	1,300	100	
NRH2412T 1R5NNGH8	1.5	±30%	89	0.100	2,100	1,150	100	
NRH2412T 2R2MNGH8	2.2	±20%	72	0.140	1,700	1,000	100	
NRH2412T 3R3MNGH8	3.3	±20%	56	0.225	1,400	750	100	
NRH2412T 4R7MNGH8	4.7	±20%	45	0.300	1,150	650	100	
NRH2412T 6R8MNGH8	6.8	±20%	34	0.420	950	550	100	
NRH2412T 100MNGH8	10	±20%	29	0.600	810	450	100	

※) The saturation current value (Idc1) is the DC current value having inductance decrease down to 30%. (at 20℃)
※) The temperature rise current value (Idc2) is the DC current value having temperature increase up to 40℃. (at 20℃)
※) The rated current is the DC current value that satisfies both of current value saturation current value and temperature rise current value.

■PART NUMBER

●NRH3010 Shielded type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±20%)	Rated current ※) [mA]		Measuring frequency [kHz]	Note
					Saturation current Idc1	Temperature rise current Idc2		
NRH3010T 1R2NN 8	1.2	±30%	120	0.065	1,700	1,480	100	
NRH3010T 1R5NN 8	1.5	±30%	99	0.075	1,440	1,370	100	
NRH3010T 2R2MN 8	2.2	±20%	86	0.083	1,300	1,300	100	
NRH3010T 3R3MN 8	3.3	±20%	64	0.130	1,000	1,030	100	
NRH3010T 4R7MN 8	4.7	±20%	50	0.170	850	900	100	
NRH3010T 6R8MN 8	6.8	±20%	44	0.250	700	745	100	
NRH3010T 100MN 8	10	±20%	34	0.350	600	620	100	
NRH3010T 150MN 8	15	±20%	25	0.550	450	480	100	
NRH3010T 220MN 8	22	±20%	22	0.770	380	410	100	
NRH3010T 470MN 8	47	±20%	17	2.05	250	285	100	

●NRH3012 Shielded type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±20%)	Rated current ※) [mA]		Measuring frequency [kHz]	Note
					Saturation current Idc1	Temperature rise current Idc2		
NRH3012T R47NN 8	0.47	±30%	160	0.033	2,600	1,900	100	
NRH3012T 1R0NN 8	1.0	±30%	111	0.048	2,200	1,710	100	
NRH3012T 1R5NN 8	1.5	±30%	95	0.055	1,700	1,600	100	
NRH3012T 2R2MN 8	2.2	±20%	78	0.075	1,500	1,370	100	
NRH3012T 3R3MN 8	3.3	±20%	61	0.100	1,200	1,210	100	
NRH3012T 4R7MN 8	4.7	±20%	50	0.130	1,000	1,060	100	
NRH3012T 6R8MN 8	6.8	±20%	43	0.190	850	890	100	
NRH3012T 100MN 8	10	±20%	32	0.270	730	720	100	
NRH3012T 150MN 8	15	±20%	26	0.450	530	570	100	
NRH3012T 220MN 8	22	±20%	22	0.630	500	500	100	

●NRV3012 Shielded type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±20%)	Rated current ※) [mA]		Measuring frequency [kHz]	Note
					Saturation current Idc1	Temperature rise current Idc2		
NRV3012T 1R0N 8	1.0	±30%	110	0.065	2,500	1,600	100	
NRV3012T 1R5N 8	1.5	±30%	92	0.075	2,100	1,400	100	
NRV3012T 2R2M 8	2.2	±20%	70	0.120	1,800	1,100	100	
NRV3012T 3R3M 8	3.3	±20%	55	0.150	1,600	1,000	100	
NRV3012T 4R7M 8	4.7	±20%	48	0.190	1,250	850	100	
NRV3012T 6R8M 8	6.8	±20%	40	0.300	950	650	100	
NRV3012T 100M 8	10	±20%	32	0.470	800	550	100	

●NRS3015 Shielded type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±20%)	Rated current ※) [mA]		Measuring frequency [kHz]	Note
					Saturation current Idc1	Temperature rise current Idc2		
NRS3015T 1R0NNGH8	1.0	±30%	100	0.030	2,100	2,100	100	
NRS3015T 1R5NNGH8	1.5	±30%	87	0.038	1,800	1,820	100	
NRS3015T 2R2MNGH8	2.2	±20%	64	0.058	1,480	1,500	100	
NRS3015T 3R3MNGH8	3.3	±20%	49	0.078	1,210	1,230	100	
NRS3015T 4R7MNGH8	4.7	±20%	40	0.120	1,020	1,040	100	
NRS3015T 6R8MNGH8	6.8	±20%	36	0.160	870	880	100	
NRS3015T 100MNGH8	10	±20%	28	0.220	700	710	100	
NRS3015T 220MNGH8	22	±20%	20	0.520	470	470	100	

●NRS4010 Shielded type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±20%)	Rated current ※) [mA]		Measuring frequency [kHz]	Note
					Saturation current Idc1	Temperature rise current Idc2		
NRS4010T 1R0NDGG8	1.0	±30%	116	0.056	2,000	1,900	100	
NRS4010T 2R2MDGG8	2.2	±20%	73	0.085	1,200	1,500	100	
NRS4010T 3R3MDGG8	3.3	±20%	58	0.100	1,100	1,400	100	
NRS4010T 4R7MDGG8	4.7	±20%	47	0.140	950	1,200	100	
NRS4010T 6R8MDGG8	6.8	±20%	38	0.200	800	1,000	100	
NRS4010T 100MDGG8	10	±20%	31	0.300	620	750	100	
NRS4010T 150MDGG8	15	±20%	24	0.430	540	600	100	
NRS4010T 220MDGG8	22	±20%	19	0.570	450	500	100	

●NRS4012 Shielded type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±20%)	Rated current ※) [mA]		Measuring frequency [kHz]	Note
					Saturation current Idc1	Temperature rise current Idc2		
NRS4012T 1R0NDGG8	1.0	±30%	100	0.042	2,800	2,200	100	
NRS4012T 2R2MDGJ8	2.2	±20%	70	0.060	1,650	1,900	100	
NRS4012T 3R3MDGJ8	3.3	±20%	60	0.070	1,400	1,700	100	
NRS4012T 4R7MDGJ8	4.7	±20%	45	0.095	1,200	1,500	100	
NRS4012T 6R8MDGJ8	6.8	±20%	35	0.125	900	1,300	100	
NRS4012T 100MDGJ8	10	±20%	30	0.170	800	1,100	100	
NRS4012T 150MDGJ8	15	±20%	24	0.260	650	750	100	
NRS4012T 220MDGJ8	22	±20%	18	0.400	500	620	100	

※) The saturation current 8alue (Idc1) is the DC current 8alue ha8ing inductance decrease down to 30%. (at 20°C)
※) The temperature rise current 8alue (Idc2) is the DC current 8alue ha8ing temperature increase up to 40°C. (at 20°C)
※) The rated current is the DC current 8alue that satisfies both of current 8alue saturation current 8alue and temperature rise current 8alue.

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■PART NUMBER

●NRS4018 Shielded type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±20%)	Rated current ※) [mA]		Measuring frequency [kHz]	Note
					Saturation current Idc1	Temperature rise current Idc2		
NRS4018T 1R0NDGJ8	1.0	±30%	90	0.027	4,000	3,200	100	
NRS4018T 1R5NDGJ8	1.5	±30%	75	0.037	3,300	2,400	100	
NRS4018T 2R2MDGJ8	2.2	±20%	60	0.042	3,000	2,200	100	
NRS4018T 3R3MDGJ8	3.3	±20%	45	0.055	2,300	2,000	100	
NRS4018T 4R7MDGJ8	4.7	±20%	35	0.070	2,000	1,700	100	
NRS4018T 6R8MDGJ8	6.8	±20%	30	0.098	1,600	1,450	100	
NRS4018T 100MDGJ8	10	±20%	25	0.150	1,300	1,200	100	
NRS4018T 150MDGJ8	15	±20%	18	0.210	1,100	850	100	
NRS4018T 220MDGJ8	22	±20%	15	0.290	900	720	100	
NRS4018T 330MDGJ8	33	±20%	12	0.460	700	550	100	
NRS4018T 470MDGJ8	47	±20%	10	0.650	600	440	100	
NRS4018T 680MDGJ8	68	±20%	8.3	1.00	520	320	100	
NRS4018T 101MDGJ8	100	±20%	6.5	1.45	420	280	100	
NRS4018T 151MDGJ8	150	±20%	5.5	2.30	340	220	100	
NRS4018T 221MDGJ8	220	±20%	4.0	3.80	275	170	100	

●NRS5010 type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±20%)	Rated current ※) [mA]		Measuring frequency [kHz]	Note
					Saturation current Idc1	Temperature rise current Idc2		
NRS5010T 1R0NMGF8	1.0	±30%	95	0.070	2,350	1,750	100	
NRS5010T 2R2NMGF8	2.2	±30%	65	0.105	1,500	1,400	100	
NRS5010T 3R3MMGF8	3.3	±20%	42	0.125	1,400	1,250	100	
NRS5010T 4R7MMGF8	4.7	±20%	37	0.145	1,200	1,150	100	
NRS5010T 6R8MMGF8	6.8	±20%	33	0.185	1,000	1,000	100	
NRS5010T 100MMGF8	10	±20%	23	0.250	850	900	100	
NRS5010T 150MMGF8	15	±20%	19	0.400	680	650	100	
NRS5010T 220MMGF8	22	±20%	15	0.600	550	450	100	

●NRS5012 type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±20%)	Rated current ※) [mA]		Measuring frequency [kHz]	Note
					Saturation current Idc1	Temperature rise current Idc2		
NRS5012T 1R0NMGF8	1.0	±30%	100	0.053	4,500	2,300	100	
NRS5012T 1R5NMGF8	1.5	±30%	86	0.070	3,800	2,200	100	
NRS5012T 2R2MMGF8	2.2	±20%	70	0.085	3,100	2,000	100	
NRS5012T 3R3MMGF8	3.3	±20%	48	0.160	2,400	1,450	100	
NRS5012T 4R7MMGF8	4.7	±20%	40	0.180	2,200	1,400	100	
NRS5012T 6R8MMGF8	6.8	±20%	36	0.260	1,700	1,100	100	
NRS5012T 100MMGF8	10	±20%	26	0.420	1,400	850	100	
NRS5012T 150MMGF8	15	±20%	22	0.670	1,200	640	100	

●NRS5014 Shielded type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±20%)	Rated current ※) [mA]		Measuring frequency [kHz]	Note
					Saturation current Idc1	Temperature rise current Idc2		
NRS5014T R47NMGG8	0.47	±30%	185	0.025	5,800	3,300	100	
NRS5014T 1R2NMGG8	1.2	±30%	86	0.045	3,800	2,400	100	
NRS5014T 2R2NMGG8	2.2	±30%	56	0.065	2,800	2,000	100	
NRS5014T 3R3NMGG8	3.3	±30%	48	0.080	2,350	1,700	100	
NRS5014T 4R7NMGG8	4.7	±30%	41	0.100	2,050	1,400	100	
NRS5014T 6R8MMGG8	6.8	±20%	33	0.150	1,600	1,200	100	
NRS5014T 100MMGG8	10	±20%	27	0.200	1,400	1,050	100	
NRS5014T 150MMGG8	15	±20%	20	0.320	1,100	650	100	
NRS5014T 220MMGG8	22	±20%	16	0.450	900	550	100	

●NRS5020 Shielded type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±20%)	Rated current ※) [mA]		Measuring frequency [kHz]	Note
					Saturation current Idc1	Temperature rise current Idc2		
NRS5020T R47NMGJ8	0.47	±30%	230	0.012	6,100	5,000	100	
NRS5020T 1R0NMGJ8	1.0	±30%	81	0.021	4,000	3,600	100	
NRS5020T 1R5NMGJ8	1.5	±30%	68	0.026	3,350	3,200	100	
NRS5020T 2R2NMGJ8	2.2	±30%	57	0.035	2,900	2,900	100	
NRS5020T 3R3NMGJ8	3.3	±30%	46	0.048	2,400	2,400	100	
NRS5020T 4R7MMGJ8	4.7	±20%	37	0.060	2,000	2,000	100	
NRS5020T 6R8MMGJ8	6.8	±20%	30	0.090	1,600	1,650	100	
NRS5020T 100MMGJ8	10	±20%	24	0.120	1,300	1,450	100	
NRS5020T 150MMGJ8	15	±20%	20	0.165	1,100	1,200	100	
NRS5020T 220MMGJ8	22	±20%	17	0.260	900	1,000	100	
NRS5020T 470MMGJ8	47	±20%	12	0.435	630	560	100	
NRS5020T 101MMGJ8	100	±20%	7	0.850	420	400	100	

※) The saturation current 8alue (Idc1) is the DC current 8alue ha8ing inductance decrease down to 30%. (at 20℃)
※) The temperature rise current 8alue (Idc2) is the DC current 8alue ha8ing temperature increase up to 40℃. (at 20℃)
※) The rated current is the DC current 8alue that satisfies both of current 8alue saturation current 8alue and temperature rise current 8alue.

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■PART NUMBER

●NRS5024 Shielded type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±20%)	Rated current ※) [mA]		Measuring frequency [kHz]	Note
					Saturation current Idc1	Temperature rise current Idc2		
NRS5024T 1R0NMGJ8	1.0	±30%	85	0.016	5,800	4,400	100	
NRS5024T 1R5NMGJ8	1.5	±30%	67	0.022	5,200	3,600	100	
NRS5024T 2R2NMGJ8	2.2	±30%	51	0.029	4,100	3,100	100	
NRS5024T 3R3NMGJ8	3.3	±30%	41	0.043	3,100	2,400	100	
NRS5024T 4R7MMGJ8	4.7	±20%	37	0.055	2,700	2,000	100	
NRS5024T 6R8MMGJ8	6.8	±20%	28	0.080	2,200	1,600	100	
NRS5024T 100MMGJ8	10	±20%	21	0.125	1,700	1,200	100	
NRS5024T 150MMGJ8	15	±20%	18	0.170	1,400	1,000	100	
NRS5024T 220MMGJ8	22	±20%	15	0.230	1,200	820	100	
NRS5024T 330MMGJ8	33	±20%	11	0.370	1,000	630	100	

●NRS5030 Shielded type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±30%)	Rated current ※) [mA]		Measuring frequency [kHz]	Note
					Saturation current Idc1	Temperature rise current Idc2		
NRS5030T R47NMGJ8	0.47	±30%	185	0.010	9,000	5,000	100	
NRS5030T 1R0NMGJ8	1.0	±30%	110	0.015	6,600	4,000	100	
NRS5030T 2R2NMGJ8	2.2	±30%	46	0.023	4,200	3,500	100	
NRS5030T 3R3MMGJ8	3.3	±20%	36	0.030	3,600	3,000	100	
NRS5030T 4R7MMGJ8	4.7	±20%	31	0.035	3,100	2,600	100	
NRS5030T 6R8MMGJ8	6.8	±20%	22	0.052	2,500	2,300	100	
NRS5030T 100MMGJ8	10	±20%	20	0.070	2,100	1,700	100	
NRS5030T 150MMGJ8	15	±20%	14	0.125	1,600	1,400	100	
NRS5030T 220MMGJ8	22	±20%	13	0.180	1,400	1,050	100	
NRS5030T 330MMGJ8	33	±20%	10	0.225	1,150	800	100	
NRS5030T 470MMGJ8	47	±20%	9	0.325	950	700	100	

●NRS5040 Shielded type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±30%)	Rated current ※) [mA]		Measuring frequency [kHz]	Note
					Saturation current Idc1	Temperature rise current Idc2		
NRS5040T 1R5NMGJ8	1.5	±30%	60	0.017	6,400	4,500	100	
NRS5040T 2R2NMGJ8	2.2	±30%	42	0.022	5,000	3,700	100	
NRS5040T 3R3NMGJ8	3.3	±30%	32	0.027	4,000	3,300	100	
NRS5040T 4R7NMGK8	4.7	±30%	28	0.029	3,300	3,100	100	
NRS5040T 6R8MMGJ8	6.8	±20%	21	0.049	2,800	2,400	100	
NRS5040T 100MMGJ8	10	±20%	18	0.056	2,300	2,100	100	
NRS5040T 150MMGJ8	15	±20%	13	0.080	2,000	1,800	100	
NRS5040T 220MMGK8	22	±20%	9	0.126	1,500	1,400	100	
NRS5040T 330MMGJ8	33	±20%	7	0.180	1,300	1,200	100	
NRS5040T 470MMGJ8	47	±20%	6	0.310	1,100	900	100	

●NRS6010 type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±20%)	Rated current ※) [mA]		Measuring frequency [kHz]	Note
					Saturation current Idc1	Temperature rise current Idc2		
NRS6010T 1R5MMGF8	1.5	±20%	77	0.090	2,400	1,900	100	
NRS6010T 2R2MMGF8	2.2	±20%	56	0.110	1,900	1,700	100	
NRS6010T 3R3MMGF8	3.3	±20%	42	0.135	1,600	1,500	100	
NRS6010T 4R7MMGF8	4.7	±20%	36	0.165	1,300	1,400	100	
NRS6010T 6R8MMGF8	6.8	±20%	30	0.220	1,200	1,200	100	
NRS6010T 100MMGF8	10	±20%	25	0.270	1,000	1,100	100	
NRS6010T 220MMGF8	22	±20%	12	0.580	650	700	100	

●NRS6012 Shielded type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±20%)	Rated current ※) [mA]		Measuring frequency [kHz]	Note
					Saturation current Idc1	Temperature rise current Idc2		
NRS6012T 1R0NMGJ8	1.0	±30%	95	0.050	3,000	2,400	100	
NRS6012T 1R5NMGG8	1.5	±30%	69	0.067	2,600	2,100	100	
NRS6012T 2R5NMGG8	2.5	±30%	45	0.090	2,100	1,800	100	
NRS6012T 3R3NMGG8	3.3	±30%	42	0.105	1,800	1,700	100	
NRS6012T 4R7MMGG8	4.7	±20%	36	0.125	1,600	1,550	100	
NRS6012T 5R3MMGJ8	5.3	±20%	34	0.125	1,500	1,550	100	
NRS6012T 6R8MMGJ8	6.8	±20%	30	0.165	1,300	1,350	100	
NRS6012T 100MMGJ8	10	±20%	22	0.200	1,000	1,200	100	
NRS6012T 150MMGJ8	15	±20%	18	0.295	800	800	100	
NRS6012T 220MMGJ8	22	±20%	12	0.465	760	650	100	
NRS6012T 330MMGJ8	33	±20%	8	0.580	590	550	100	
NRS6012T 470MMGJ8	47	±20%	6	0.965	520	460	100	
NRS6012T 680MMGJ8	68	±20%	3	1.16	440	410	100	
NRS6012T 101MMGJ8	100	±20%	1	1.67	350	320	100	

※) The saturation current 8alue (Idc1) is the DC current 8alue ha8ing inductance decrease down to 30%. (at 20°C)
※) The temperature rise current 8alue (Idc2) is the DC current 8alue ha8ing temperature increase up to 40°C. (at 20°C)
※) The rated current is the DC current 8alue that satisfies both of current 8alue saturation current 8alue and temperature rise current 8alue.

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

■PART NUMBER

●NRS6014 Shielded type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±20%)	Rated current ※) [mA]		Measuring frequency [kHz]	Note
					Saturation current Idc1	Temperature rise current Idc2		
NRS6014T 1R2NMGG8	1.2	±30%	77	0.042	4,000	2,750	100	
NRS6014T 2R2NMGG8	2.2	±30%	61	0.055	3,000	2,300	100	
NRS6014T 3R3NMGG8	3.3	±30%	41	0.075	2,500	2,000	100	
NRS6014T 4R7MMGG8	4.7	±20%	36	0.090	2,000	1,900	100	
NRS6014T 6R8MMGG8	6.8	±20%	30	0.115	1,700	1,650	100	
NRS6014T 100MMGG8	10	±20%	24	0.140	1,400	1,400	100	
NRS6014T 150MMGG8	15	±20%	20	0.210	1,150	1,200	100	
NRS6014T 220MMGG8	22	±20%	16	0.300	950	1,000	100	

●NRS6020 Shielded type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±20%)	Rated current ※) [mA]		Measuring frequency [kHz]	Note
					Saturation current Idc1	Temperature rise current Idc2		
NRS6020T 0R8NMGG8	0.8	±30%	110	0.020	6,400	4,100	100	
NRS6020T 1R5NMGJ8	1.5	±30%	93	0.026	4,300	3,600	100	
NRS6020T 2R2NMGJ8	2.2	±30%	73	0.034	3,200	2,900	100	
NRS6020T 3R3NMGJ8	3.3	±30%	55	0.040	2,800	2,750	100	
NRS6020T 4R7NMGJ8	4.7	±30%	43	0.058	2,400	2,150	100	
NRS6020T 6R8NMGJ8	6.8	±30%	30	0.085	2,000	1,800	100	
NRS6020T 100MMGG8	10	±20%	18	0.125	1,900	1,500	100	
NRS6020T 220MMGG8	22	±20%	11	0.290	1,250	950	100	

●NRS6028 Shielded type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±30%)	Rated current ※) [mA]		Measuring frequency [kHz]	Note
					Saturation current Idc1	Temperature rise current Idc2		
NRS6028T 0R9NMGJ8	0.9	±30%	90	0.013	6,700	4,600	100	
NRS6028T 1R5NMGJ8	1.5	±30%	78	0.016	5,100	4,200	100	
NRS6028T 2R2NMGJ8	2.2	±30%	68	0.020	4,200	3,700	100	
NRS6028T 3R0NMGJ8	3.0	±30%	55	0.023	3,600	3,400	100	
NRS6028T 4R7MMGK8	4.7	±20%	39	0.031	2,700	3,000	100	
NRS6028T 6R8MMGJ8	6.8	±20%	25	0.043	2,600	2,500	100	
NRS6028T 100MMGK8	10	±20%	20	0.065	1,900	1,900	100	
NRS6028T 150MMGJ8	15	±20%	17	0.095	1,600	1,800	100	
NRS6028T 220MMGJ8	22	±20%	12	0.135	1,300	1,400	100	
NRS6028T 330MMGJ8	33	±20%	10	0.220	1,100	1,100	100	
NRS6028T 470MMGJ8	47	±20%	8	0.300	1,000	920	100	
NRS6028T 680MMGJ8	68	±20%	5	0.420	800	770	100	
NRS6028T 101MMGJ8	100	±20%	3	0.600	650	660	100	

●NRS6045 Shielded type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±30%)	Rated current ※) [mA]		Measuring frequency [kHz]	Note
					Saturation current Idc1	Temperature rise current Idc2		
NRS6045T 1R0NMGK8	1.0	±30%	110	0.014	9,800	4,500	100	
NRS6045T 1R3NMGK8	1.3	±30%	95	0.016	8,200	4,200	100	
NRS6045T 1R8NMGK8	1.8	±30%	80	0.019	7,200	3,900	100	
NRS6045T 2R3NMGK8	2.3	±30%	60	0.022	6,400	3,600	100	
NRS6045T 3R0NMGK8	3.0	±30%	45	0.024	5,600	3,300	100	
NRS6045T 4R5MMGK8	4.5	±20%	25	0.030	4,400	3,100	100	
NRS6045T 6R3MMGK8	6.3	±20%	15	0.036	3,600	3,000	100	
NRS6045T 100MMGK8	10	±20%	12	0.046	3,100	2,400	100	
NRS6045T 150MMGK8	15	±20%	10	0.070	2,500	1,900	100	
NRS6045T 220MMGK8	22	±20%	7	0.107	2,000	1,600	100	
NRS6045T 330MMGK8	33	±20%	6	0.141	1,650	1,400	100	
NRS6045T 470MMGK8	47	±20%	5	0.211	1,400	1,150	100	
NRS6045T 680MMGK8	68	±20%	4	0.304	1,100	950	100	
NRS6045T 101MMGK8	100	±20%	3	0.466	900	750	100	

●NRS8030 Shielded type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±30%)	Rated current ※) [mA]		Measuring frequency [kHz]	Note
					Saturation current Idc1	Temperature rise current Idc2		
NRS8030T 1R0NJGJ8	1.0	±30%	120	0.009	7,800	6,200	100	
NRS8030T 1R5NJGJ8	1.5	±30%	80	0.012	6,200	5,300	100	
NRS8030T 2R2NJGJ8	2.2	±30%	60	0.015	4,900	4,800	100	
NRS8030T 3R3MJGJ8	3.3	±20%	50	0.019	4,200	4,300	100	
NRS8030T 4R7MJGJ8	4.7	±20%	40	0.022	3,600	4,000	100	
NRS8030T 6R8MJGJ8	6.8	±20%	32	0.029	3,000	3,400	100	
NRS8030T 100MJGJ8	10	±20%	27	0.033	2,400	3,000	100	
NRS8030T 150MJGJ8	15	±20%	20	0.060	2,000	2,200	100	
NRS8030T 220MJGJ8	22	±20%	16	0.070	1,750	1,900	100	
NRS8030T 330MJGJ8	33	±20%	13	0.120	1,300	1,500	100	
NRS8030T 470MJGJ8	47	±20%	11	0.170	1,100	1,300	100	

※) The saturation current 8alue (Idc1) is the DC current 8alue ha8ing inductance decrease down to 30%. (at 20℃)
※) The temperature rise current 8alue (Idc2) is the DC current 8alue ha8ing temperature increase up to 40℃. (at 20℃)
※) The rated current is the DC current 8alue that satisfies both of current 8alue saturation current 8alue and temperature rise current 8alue.

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■PART NUMBER

●NRS8040 Shielded type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [Ω] (±30%)	Rated current ※) [mA]		Measuring frequency [kHz]	Note
					Saturation current Idc1	Temperature rise current Idc2		
NRS8040T 0R9NJGJ8	0.9	±30%	85	0.006	13,000	7,800	100	
NRS8040T 1R4NJGJ8	1.4	±30%	63	0.007	10,000	7,000	100	
NRS8040T 2R0NJGJ8	2.0	±30%	50	0.009	8,100	6,300	100	
NRS8040T 3R6NJGJ8	3.6	±30%	34	0.015	6,400	4,900	100	
NRS8040T 4R7NJGJ8	4.7	±30%	30	0.018	5,400	4,100	100	
NRS8040T 6R8NJGJ8	6.8	±30%	24	0.025	4,400	3,700	100	
NRS8040T 100MJGJ8	10	±20%	22	0.034	3,800	3,100	100	
NRS8040T 150MJGJ8	15	±20%	16	0.050	2,900	2,400	100	
NRS8040T 220MJGJ8	22	±20%	13	0.066	2,400	2,200	100	
NRS8040T 330MJGK8	33	±20%	12	0.100	2,000	1,700	100	
NRS8040T 470MJGK8	47	±20%	8	0.140	1,500	1,500	100	
NRS8040T 101MJGK8	100	±20%	6	0.280	1,100	1,000	100	

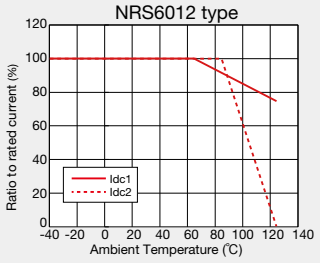
※) The saturation current value (Idc1) is the DC current value having inductance decrease down to 30%. (at 20°C)
※) The temperature rise current value (Idc2) is the DC current value having temperature increase up to 40°C. (at 20°C)
※) The rated current is the DC current value that satisfies both of current value saturation current value and temperature rise current value.

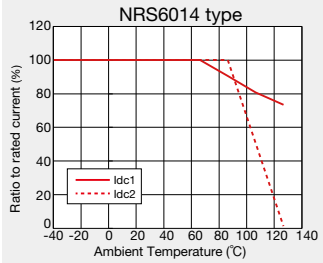
Derating of Rated Current

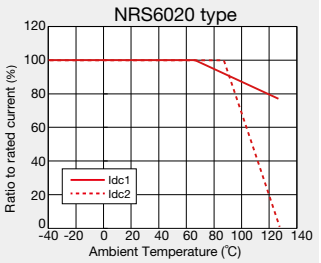
●NR series H type/S type/V type
Derating of current is necessary for NR-series H type/S type/V type depending on ambient temperature.
Please refer to the chart shown below for appropriate derating of current.

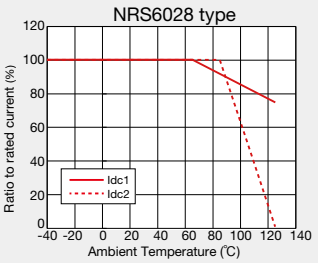
Derating of Rated Current

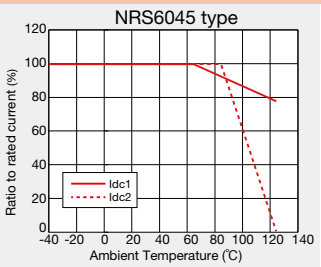
●NR series H type/S type/V type
Derating of current is necessary for NR-series H type/S type/V type depending on ambient temperature.
Please refer to the chart shown below for appropriate derating of current.

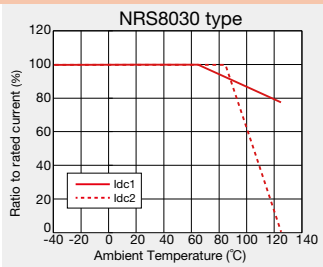


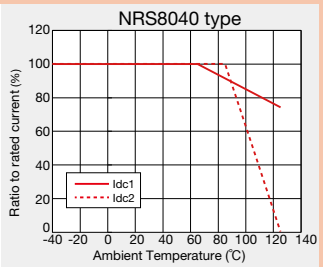












SMD POWER INDUCTORS (NR SERIES M TYPE)

REFLOW

■PART NUMBER

*Operating Temp. : −40～125℃(Including self-generated heat)

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

△=Blank space

①Series name

Code	Series name
NRM	Coating resin specification

②Dimensions(L×W×H)

Code	Dimensions(L×W×H)[mm]
6045	6.0×6.0×4.5

③Packaging

Code	Packaging
T△	Taping

④Nominal inductance

Code (example)	Nominal inductance[μH]
2R2	2.2
100	10
102	1000

※R=Decimal point

⑤Inductance tolerance

Code	Inductance tolerance
M	±20%
N	±30%

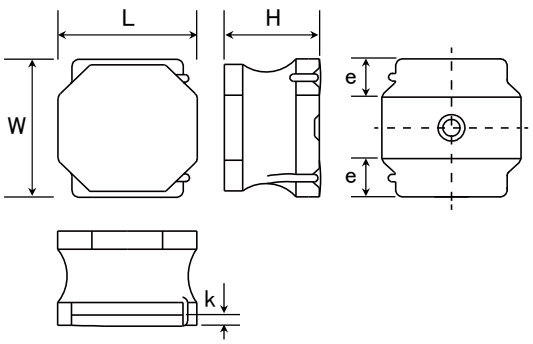
⑥Special code

Code	Special code
△R△	Standard

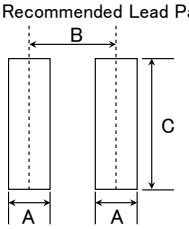
⑦Internal code

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

■STANDARD EXTERNAL DIMENSIONS / STANDARD QUANTITY



Recommended Lead Patterns



Type	A	B	C
NRM6045	2.4	5.0	4.8

Unit:mm

Type	L	W	H	e	k(ref)	Standard quantity [pcs] Taping
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

Unit:mm(inch)

■PART NUMBER

・All the SMD Power Inductors of the catalog lineup are RoHS compliant.

Notes)

・The exchange of individual specifications is necessary depending on your application and/or circuit condition. Please contact TAIYO YUDEN's official sales channel.

・The products are for Telecommunications infrastructure and Industrial equipment and for Medical devices.
Please consult with TAIYO YUDEN's official sales channel for the details of the product specifications, etc.,
and please review and approve the product specifications before ordering.
Please be sure to contact us for further information in advance when the products are used for automotive electronic equipment.

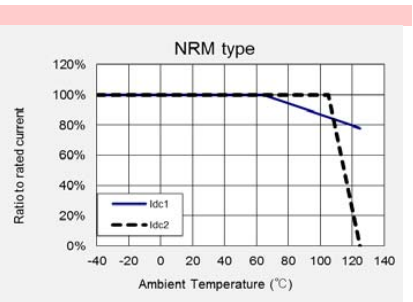
●NRM6045

Parts number	Nominal inductance [μH]	Inductance tolerance	DC Resistance [mΩ] Max (Typ)	Rated current ※) [A]			Measuring frequency [MHz]	Note
				Saturation current Idc1 Max (Typ)	Temperature rise current① Idc2 Max (Typ)	Temperature rise current② Idc2 Max (Typ)		
NRM6045T 1R0NMRR8	1	±30%	13 (10)	13.50 (14.50)	4.00 (6.00)	6.20 (7.00)	0.1	
NRM6045T 2R2NMRR8	2.2	±30%	23 (18)	8.50 (9.50)	3.00 (4.00)	4.40 (5.10)	0.1	
NRM6045T 4R7MMRR8	4.7	±20%	36 (30)	6.00 (6.50)	2.20 (3.00)	3.60 (3.90)	0.1	
NRM6045T 100MMRS8	10	±20%	60 (50)	4.00 (4.40)	1.80 (2.40)	2.60 (3.20)	0.1	
NRM6045T 220MMRR8	22	±20%	132 (110)	2.50 (3.00)	1.20 (1.60)	1.80 (2.00)	0.1	
NRM6045T 470MMRR8	47	±20%	272 (227)	1.55 (1.70)	0.70 (0.90)	1.20 (1.30)	0.1	
NRM6045T 101MMRR8	100	±20%	600 (475)	1.05 (1.15)	0.55 (0.70)	0.85 (0.95)	0.1	
NRM6045T 221MMRR8	220	±20%	1320 (1100)	0.70 (0.75)	0.35 (0.50)	0.57 (0.65)	0.1	
NRM6045T 471MMRR8	470	±20%	2760 (2300)	0.45 (0.50)	0.22 (0.30)	0.38 (0.45)	0.1	

※) The saturation current value (Idc1) is the DC current value having inductance decrease down to 30%. (at 20℃)
※) The temperature rise current value (Idc2)① is the DC current value having temperature increase up to 20℃. (at 20℃)
※) The temperature rise current value (Idc2)② is the DC current value having temperature increase up to 40℃. (at 20℃)
※) The temperature rise current value (Idc2)② is a reference value.
※) The rated current is the DC current value that satisfies both of current value saturation current value and temperature rise current value.

■Derating of Rated Current

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



■PACKAGING

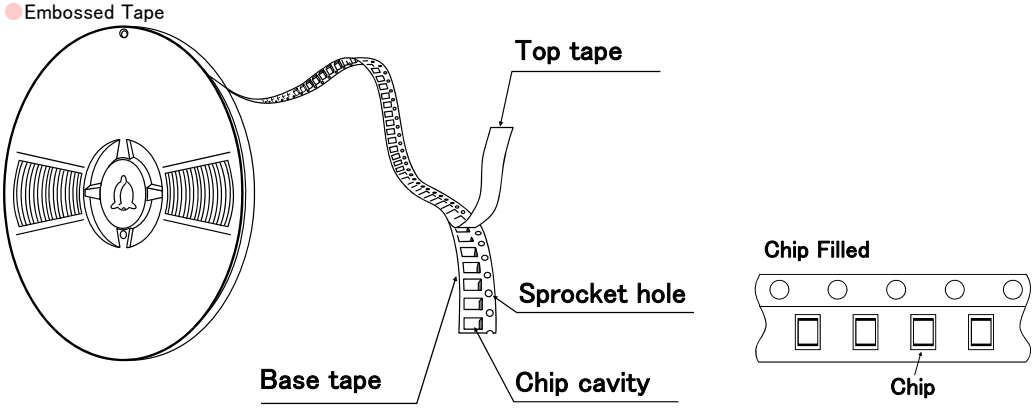
①Minimum Quantity

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

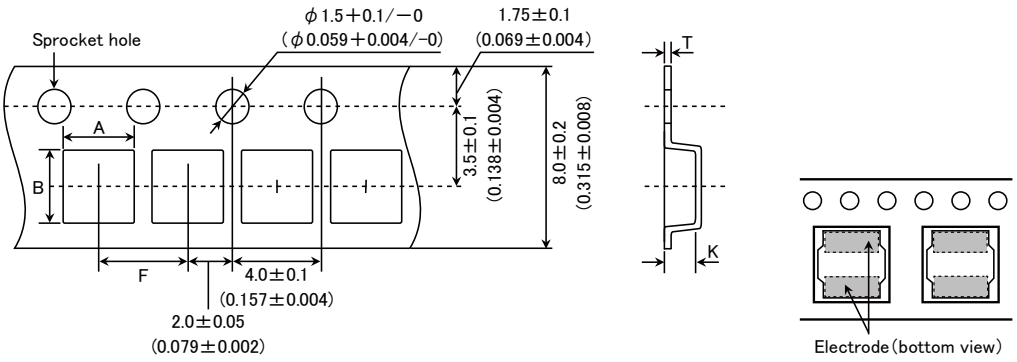
②Tape Material

Embossed Tape



③Taping dimensions

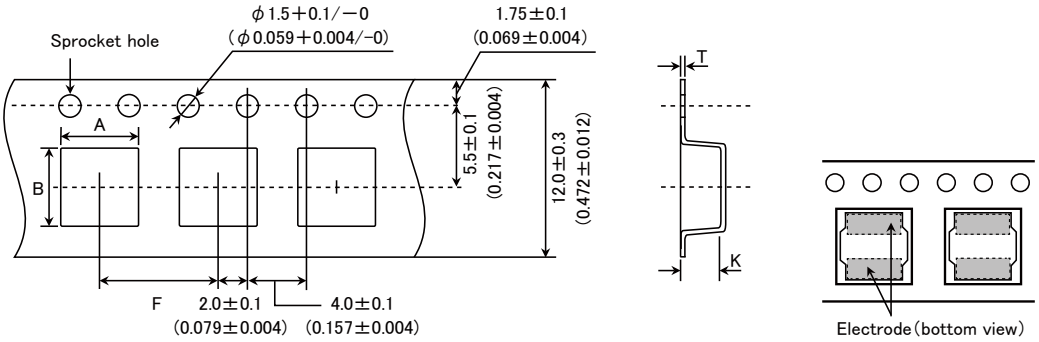
Embossed tape 8mm wide (0.315 inches wide)



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)

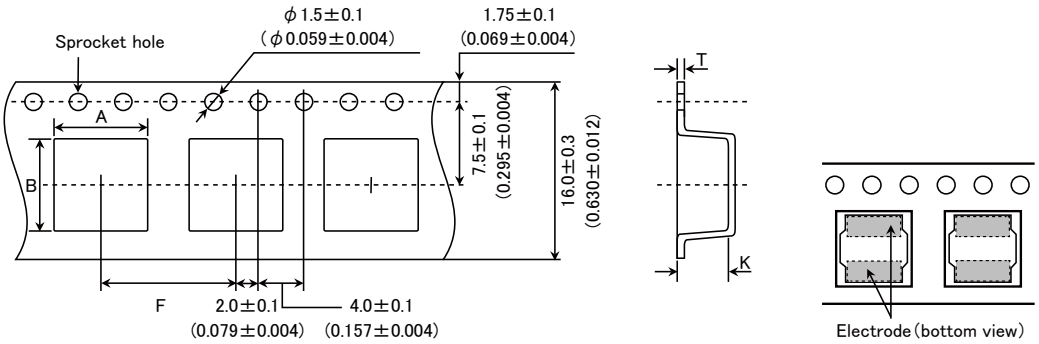
Embossed tape 12mm wide (0.47 inches wide)



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)

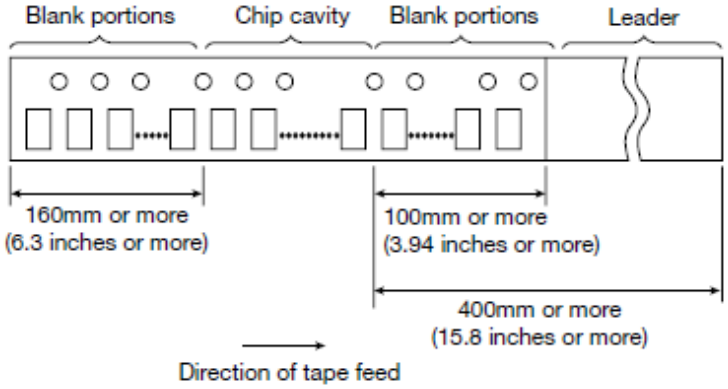


Type	Chip cavity		Insertion pitch	Tape thickness	
	A	B	F	T	K
NRS8030	8.3±0.1 (0.327±0.004)	8.3±0.1 (0.327±0.004)	12.0±0.1 (0.472±0.004)	0.5±0.1 (0.020±0.004)	3.4±0.1 (0.134±0.004)
NR 8040 NRS8040					4.5±0.1 (0.177±0.004)

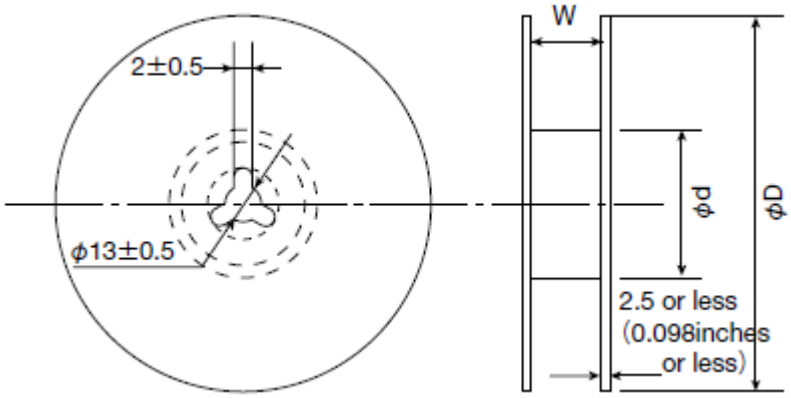
Unit : mm (inch)

④Leader and Blank portion

NR, NRH, NRS, NRV



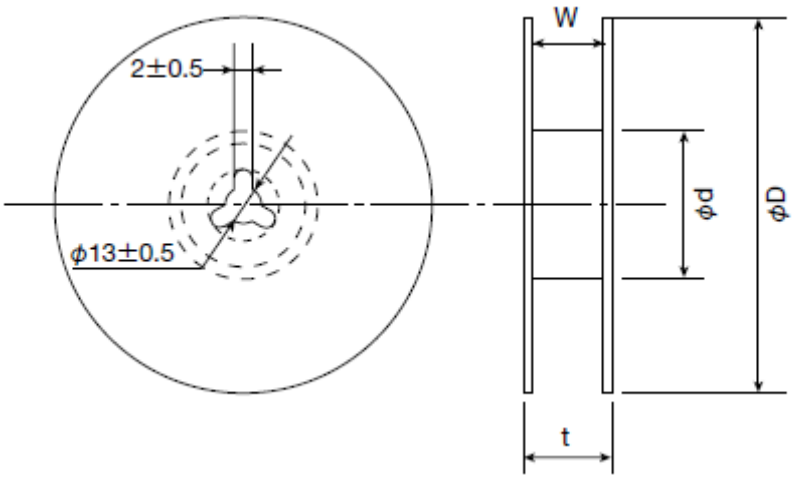
⑤Reel size



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)

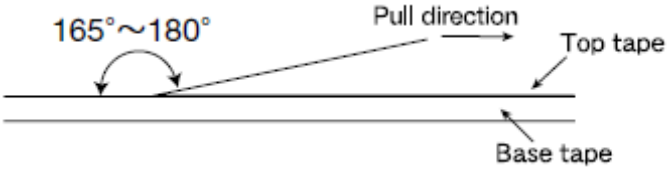


Type	Reel size (Reference values)			
	ϕD	ϕd	t (max.)	W
NR 4010 NRS4010	330±3.0 (12.99±0.118)	80±2.0 (3.15±0.078)	18.5 (0.72)	13.5±1.0 (0.531±0.04)
NR 4012 NRS4012				
NR 4018 NRS4018				
NRS5024				
NR 5040 NRS5040				
NR 6020 NRS6020				
NR 6028 NRS6028				
NR 6045 NRM6045 NRS6045				
NRS8030			22.5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

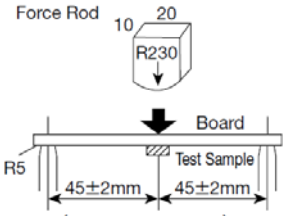
8. Resistance to flexure of substrate

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

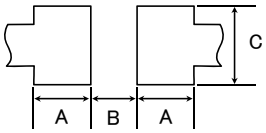
Test Methods and Remarks

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	—

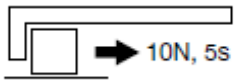
12. Adhesion of terminal electrode

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

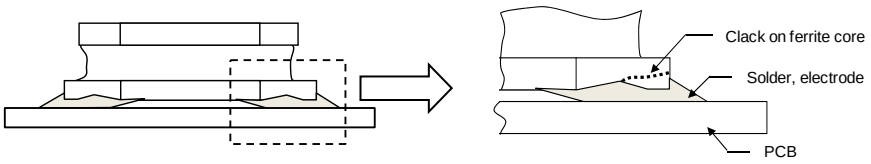
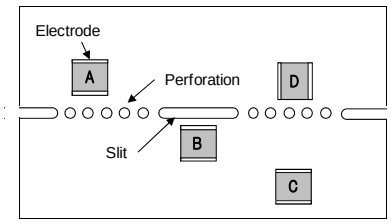
20. High temperature life test		
Specified Value	NRV20/30Type,NRH24/30Type NRS20/30/40/50/60/80Type、NRM60Type	—

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	

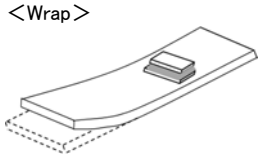
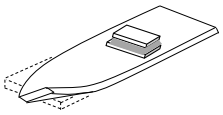
22. Standard condition		
Specified Value	NRV20/30Type,NRH24/30Type NRS20/30/40/50/60/80Type NRM60Type	Standard test condition : Unless otherwise specified, temperature is 20±15℃ and 65±20%of relative humidity. When there is any question concerning measurement result: In order to provide correlation data,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

■PRECAUTIONS

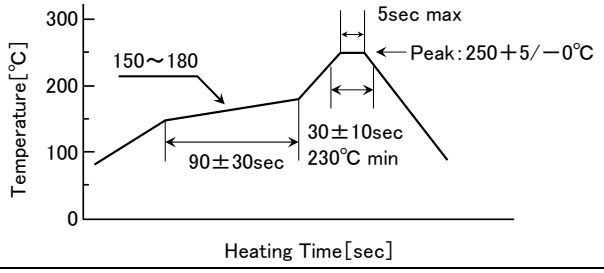
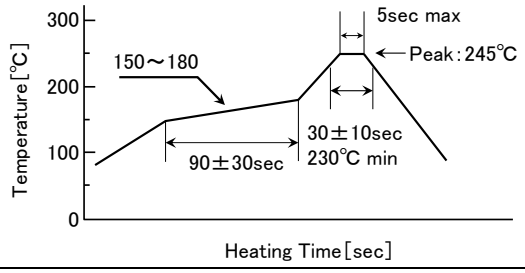
1. Circuit Design	
Precautions	◆Operating environment 1. The products listed in this catalogue are intended for use in general electronic equipment (e.g., AV equipment, OA equipment, home electric appliances, office equipment, information and communication equipment), general medical equipment, industrial 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 POWER INDUCTORS (NS SERIES)

REFLOW

■PART NUMBER

*Operating Temp. : −40～125℃(Including self-generated heat)

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

△=Blank space

①Series name

Code	Series name
NS△	SMD inductor

②Dimensions(L×W×H)

Code	Dimensions(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

③Packaging

Code	Packaging
T△	Taping

④Nominal inductance

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

※R=Decimal point

⑤Inductance tolerance

Code	Inductance tolerance
M	±20%
N	±30%

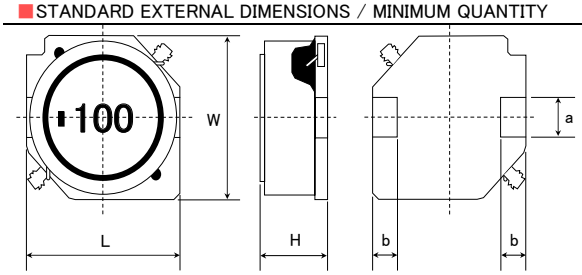
⑥Special code

Code	Special code
N△	125 type standard
NV	101 type standard

⑦Internal code

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

■STANDARD EXTERNAL DIMENSIONS / MINIMUM QUANTITY



Type	L	W	H	a	b	Minimum quantity [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

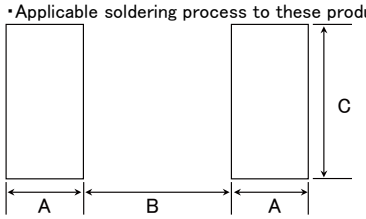
Unit:mm(inch)

Recommended Land Patterns

Surface Mounting

・Mounting and soldering conditions should be checked beforehand.

・Applicable soldering process to these products is reflow soldering only.



Type	A	B	C
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

Unit:mm

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

■PART NUMBER

・All the SMD Power Inductors of the catalog lineup are RoHS compliant.

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

●NS 10145 type

Part number	Nominal inductance [μH]	Inductance tolerance	DC Resistance [Ω] (±20%)	Rated current ※) [A]		Measuring frequency [kHz]	Note
				Saturation current Idc1	Temperature rise current Idc2		
NS 10145T 1R0NNV8	1.0	±30%	0.0049	12.54	8.90	100	
NS 10145T 1R5NNV8	1.5	±30%	0.0060	10.34	7.99	100	
NS 10145T 2R2NNV8	2.2	±30%	0.0085	8.91	6.64	100	
NS 10145T 3R3NNV8	3.3	±30%	0.0100	7.33	6.10	100	
NS 10145T 4R7NNV8	4.7	±30%	0.0144	6.69	5.03	100	
NS 10145T 5R6NNV8	5.6	±30%	0.0181	5.85	4.45	100	
NS 10145T 6R8NNV8	6.8	±30%	0.0230	5.05	4.22	100	
NS 10145T 100MNV8	10	±20%	0.0270	4.22	3.10	100	
NS 10145T 150MNV8	15	±20%	0.0381	3.44	3.00	100	
NS 10145T 220MNV8	22	±20%	0.0570	2.87	2.30	100	
NS 10145T 330MNV8	33	±20%	0.0880	2.36	1.90	100	
NS 10145T 470MNV8	47	±20%	0.130	2.00	1.50	100	
NS 10145T 680MNV8	68	±20%	0.150	1.66	1.45	100	
NS 10145T 101MNV8	100	±20%	0.230	1.40	1.10	100	
NS 10145T 151MNV8	150	±20%	0.350	1.11	0.86	100	
NS 10145T 221MNV8	220	±20%	0.510	0.91	0.78	100	
NS 10145T 331MNV8	330	±20%	0.700	0.71	0.64	100	
NS 10145T 471MNV8	470	±20%	1.03	0.61	0.52	100	
NS 10145T 681MNV8	680	±20%	1.57	0.50	0.42	100	
NS 10145T 102MNV8	1000	±20%	2.58	0.41	0.32	100	
NS 10145T 152MNV8	1500	±20%	3.70	0.36	0.27	100	

●NS 10155 type

Part number	Nominal inductance [μH]	Inductance tolerance	DC Resistance [Ω] (±20%)	Rated current ※) [A]		Measuring frequency [kHz]	Note
				Saturation current Idc1	Temperature rise current Idc2		
NS 10155T 1R5NNV8	1.5	±30%	0.0060	11.90	8.39	100	
NS 10155T 2R2NNV8	2.2	±30%	0.0072	10.00	7.61	100	
NS 10155T 3R3NNV8	3.3	±30%	0.0097	8.50	6.49	100	
NS 10155T 4R7NNV8	4.7	±30%	0.0112	7.40	6.01	100	
NS 10155T 6R8NNV8	6.8	±30%	0.0159	6.00	4.98	100	
NS 10155T 100MNV8	10	±20%	0.0200	4.49	4.40	100	
NS 10155T 150MNV8	15	±20%	0.0310	4.03	3.40	100	
NS 10155T 220MNV8	22	±20%	0.0430	3.37	2.80	100	

●NS 10165 type

Part number	Nominal inductance [μH]	Inductance tolerance	DC Resistance [Ω] (±20%)	Rated current ※) [A]		Measuring frequency [kHz]	Note
				Saturation current Idc1	Temperature rise current Idc2		
NS 10165T 1R5NNV8	1.5	±30%	0.0062	13.60	8.04	100	
NS 10165T 2R2NNV8	2.2	±30%	0.0074	10.80	7.32	100	
NS 10165T 3R3NNV8	3.3	±30%	0.0086	9.30	6.76	100	
NS 10165T 4R7NNV8	4.7	±30%	0.0112	7.70	5.88	100	
NS 10165T 6R8NNV8	6.8	±30%	0.0140	6.00	5.22	100	
NS 10165T 100MNV8	10	±20%	0.0174	5.20	4.66	100	
NS 10165T 150MNV8	15	±20%	0.0280	3.60	3.84	100	
NS 10165T 220MNV8	22	±20%	0.0350	3.10	3.41	100	

※) The saturation current value (Idc1) is the DC current value having inductance decrease down to 30%. (at 20℃)
※) The temperature rise current value (Idc2) is the DC current value having temperature increase up to 40℃. (at 20℃)
※) The rated current is the DC current value that satisfies both of current value saturation current value and temperature rise current value.

■PART NUMBER

●NS 12555 type

Part number	Nominal inductance [μH]	Inductance tolerance	DC Resistance [Ω] (±20%)	Rated current ※) [A]		Measuring frequency [kHz]	Note
				Saturation current Idc1	Temperature rise current Idc2		
NS 12555T 6R0NN 8	6.0	±30%	0.0140	5.01	5.60	100	
NS 12555T 100MN 8	10	±20%	0.0175	4.73	5.04	100	
NS 12555T 150MN 8	15	±20%	0.0233	3.89	4.18	100	
NS 12555T 220MN 8	22	±20%	0.0297	3.20	3.81	100	
NS 12555T 330MN 8	33	±20%	0.0415	2.64	3.16	100	
NS 12555T 470MN 8	47	±20%	0.0618	2.23	2.70	100	
NS 12555T 680MN 8	68	±20%	0.0832	1.81	2.14	100	
NS 12555T 101MN 8	100	±20%	0.117	1.53	1.86	100	
NS 12555T 151MN 8	150	±20%	0.215	1.10	1.30	100	
NS 12555T 221MN 8	220	±20%	0.270	1.00	1.18	100	
NS 12555T 331MN 8	330	±20%	0.410	0.82	0.96	100	
NS 12555T 471MN 8	470	±20%	0.520	0.68	0.80	100	
NS 12555T 681MN 8	680	±20%	0.870	0.48	0.61	100	
NS 12555T 102MN 8	1000	±20%	1.44	0.41	0.46	100	
NS 12555T 152MN 8	1500	±20%	1.73	0.40	0.44	100	

●NS 12565 type

Part number	Nominal inductance [μH]	Inductance tolerance	DC Resistance [Ω] (±20%)	Rated current ※) [A]		Measuring frequency [kHz]	Note
				Saturation current Idc1	Temperature rise current Idc2		
NS 12565T 2R0NN 8	2.0	±30%	0.0080	13.91	7.60	100	
NS 12565T 4R2NN 8	4.2	±30%	0.0126	9.40	5.91	100	
NS 12565T 7R0NN 8	7.0	±30%	0.0162	7.80	5.21	100	
NS 12565T 100MN 8	10	±20%	0.0199	6.00	4.75	100	
NS 12565T 150MN 8	15	±20%	0.0237	5.60	4.33	100	
NS 12565T 220MN 8	22	±20%	0.0310	4.20	3.91	100	
NS 12565T 330MN 8	33	±20%	0.0390	3.80	3.22	100	
NS 12565T 470MN 8	47	±20%	0.0575	3.34	2.78	100	
NS 12565T 680MN 8	68	±20%	0.0775	2.70	2.30	100	
NS 12565T 101MN 8	100	±20%	0.123	2.23	1.81	100	
NS 12565T 151MN 8	150	±20%	0.173	1.80	1.54	100	
NS 12565T 221MN 8	220	±20%	0.273	1.39	1.18	100	

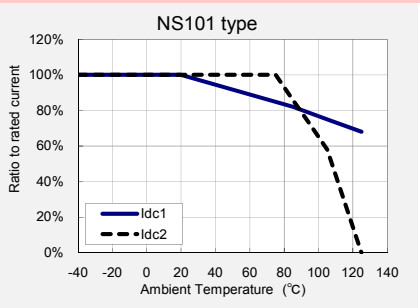
●NS 12575 type

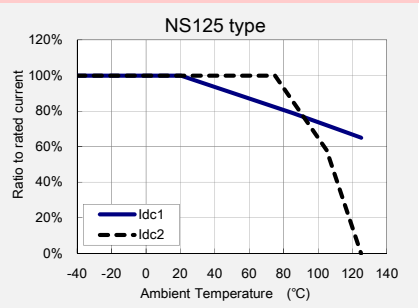
Part number	Nominal inductance [μH]	Inductance tolerance	DC Resistance [Ω] (±20%)	Rated current ※) [A]		Measuring frequency [kHz]	Note
				Saturation current Idc1	Temperature rise current Idc2		
NS 12575T 1R2NN 8	1.2	±30%	0.0058	18.08	9.15	100	
NS 12575T 2R7NN 8	2.7	±30%	0.0085	13.91	7.69	100	
NS 12575T 3R9NN 8	3.9	±30%	0.0099	12.10	7.38	100	
NS 12575T 5R6NN 8	5.6	±30%	0.0116	10.20	6.36	100	
NS 12575T 6R8NN 8	6.8	±30%	0.0131	9.50	5.84	100	
NS 12575T 100MN 8	10	±20%	0.0156	7.65	5.55	100	
NS 12575T 150MN 8	15	±20%	0.0184	6.30	5.22	100	
NS 12575T 220MN 8	22	±20%	0.0260	5.50	4.05	100	
NS 12575T 330MN 8	33	±20%	0.0390	4.30	3.48	100	
NS 12575T 470MN 8	47	±20%	0.0515	3.60	2.95	100	
NS 12575T 680MN 8	68	±20%	0.0900	2.78	2.10	100	
NS 12575T 101MN 8	100	±20%	0.110	2.50	2.01	100	
NS 12575T 151MN 8	150	±20%	0.161	1.90	1.51	100	
NS 12575T 221MN 8	220	±20%	0.300	1.60	1.10	100	
NS 12575T 102MN 8	1000	±20%	1.170	0.72	0.53	100	

※) The saturation current value (Idc1) is the DC current value having inductance decrease down to 30%. (at 20°C)
※) The temperature rise current value (Idc2) is the DC current value having temperature increase up to 40°C. (at 20°C)
※) The rated current is the DC current value that satisfies both of current value saturation current value and temperature rise current value.

■Derating of Rated Current

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





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SMD POWER INDUCTORS (NS SERIES)

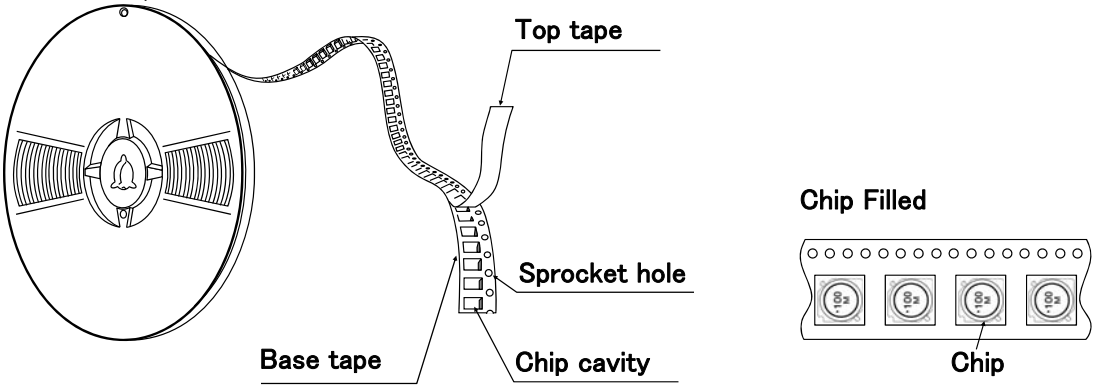
■PACKAGING

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

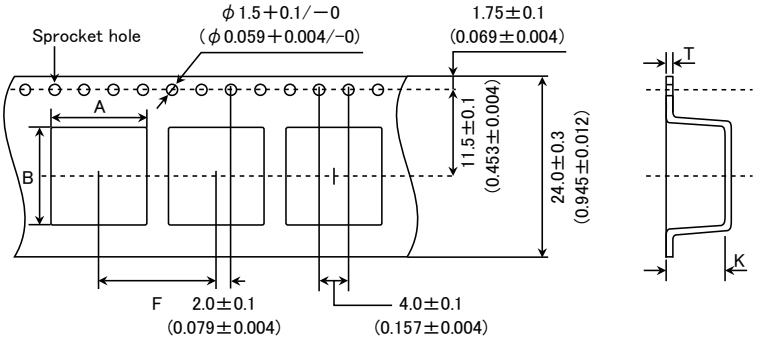
②Tape Material

●Embossed Tape



③Taping dimensions

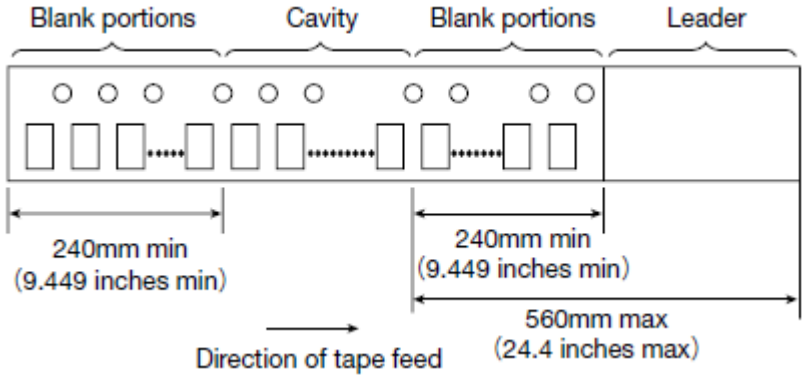
●Embossed tape 24mm wide (0.945 inches wide)



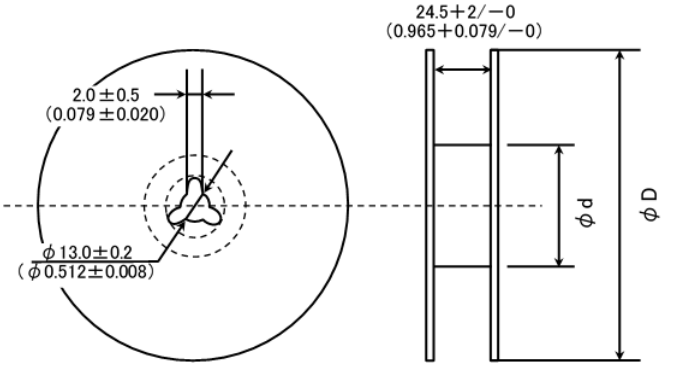
Type	Chip cavity		Insertion pitch	Tape thickness	
	A	B	F	T	K
NS10145	10.5±0.1 (0.413±0.004)	10.5±0.1 (0.413±0.004)	16.0±0.1 (0.630±0.004)	0.4±0.1 (0.016±0.004)	5.0±0.1 (0.197±0.004)
NS10155	10.5±0.1 (0.413±0.004)	10.5±0.1 (0.413±0.004)	16.0±0.1 (0.630±0.004)	0.4±0.1 (0.016±0.004)	6.0±0.1 (0.236±0.004)
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)

④Leader and Blank portion



⑤Reel size

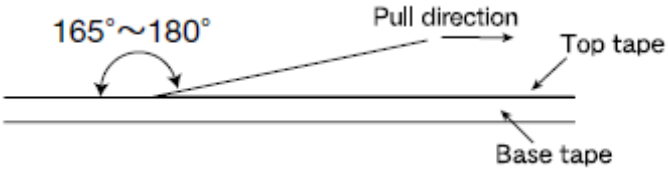


Type	Reel size (Reference values)	
	φD	φd
NS10145	330±2 (12.99±0.079)	100±1 (3.937±0.039)
NS10155		
NS10165		
NS12555		
NS12565		
NS12575		

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

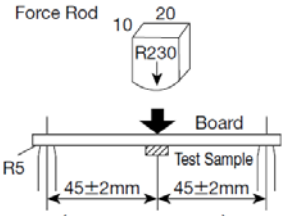
8. Resistance to flexure of substrate

Specified Value	NS101, NS125 Type	No damage

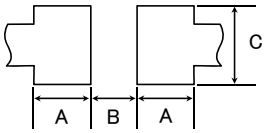
Test Methods and Remarks

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

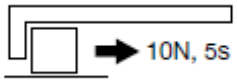
Specified Value	NS101, NS125 Type	—

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

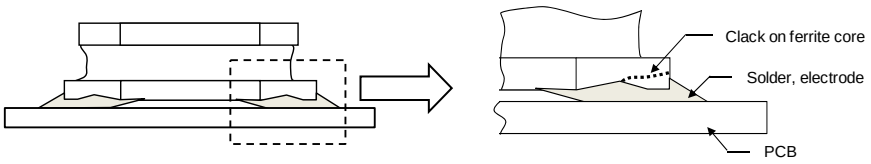
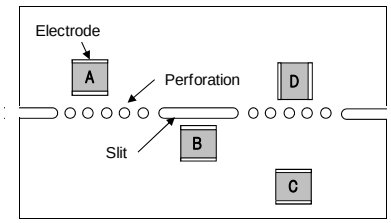
Specified Value	NS101, NS125 Type	—

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.	

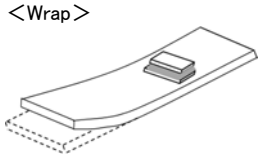
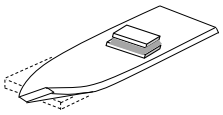
22. Standard condition		
Specified Value	NS101, NS125 Type	Standard test condition : Unless otherwise specified, temperature is 20±15℃ and 65±20%of relative humidity. When there is any question concerning measurement result: In order to provide correlation data, the test shall be condition of 20±2℃ of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

■PRECAUTIONS

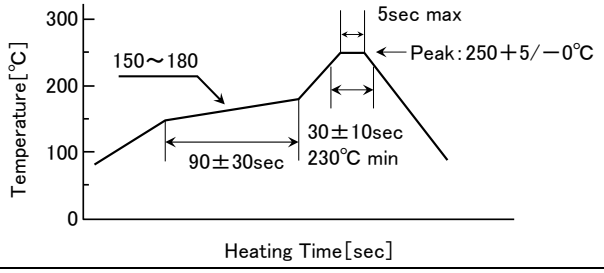
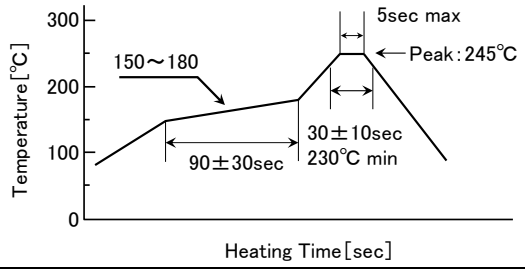
1. Circuit Design	
Precautions	◆Operating environment 1. The products listed in this catalogue are intended for use in general electronic equipment (e.g., AV equipment, OA equipment, home electric appliances, office equipment, information and communication equipment), general medical equipment, industrial 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

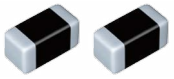
Precautions	◆Cleaning conditions 1. Washing by supersonic waves shall be avoided.
Technical considerations	◆Cleaning conditions 1. If washed by supersonic waves, the products might be broken.

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.

WIRE-WOUND CHIP POWER INDUCTORS (CB SERIES)



REFLOW

■PART NUMBER

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

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

△=Blank space

①Series name

Code	Series name
CB	Wound chip power inductor

②Characteristics

Code	Characteristics
△△	Standard
△C	High current

③Dimensions(L×W)

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

④Packaging

Code	Packaging
T	Taping

⑤Nominal inductance

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

※R=Decimal point

⑥Inductance tolerance

Code	Inductance tolerance
K	±10%
M	±20%

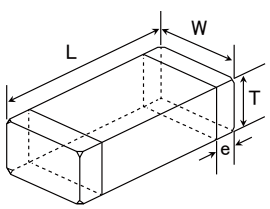
⑦Special code

Code	Special code
△	Standard
R	Low Rdc type

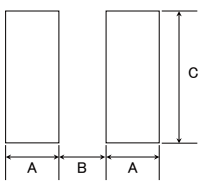
⑧Internal code

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

■STANDARD EXTERNAL DIMENSIONS / STANDARD QUANTITY



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



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

Unit:mm

Type	L	W	T	e	Standard quantity [pcs]	
					Paper tape	Embossed tape
CB 2012 CB C2012	2.0±0.2 (0.079±0.008)	1.25±0.2 (0.049±0.008)	1.25±0.2 (0.049±0.008)	0.5±0.2 (0.020±0.008)	—	3000
CB 2016 CB C2016	2.0±0.2 (0.079±0.008)	1.6±0.2 (0.063±0.008)	1.6±0.2 (0.063±0.008)	0.5±0.2 (0.020±0.008)	—	2000
CB 2518 CB C2518	2.5±0.2 (0.098±0.008)	1.8±0.2 (0.071±0.008)	1.8±0.2 (0.071±0.008)	0.5±0.2 (0.020±0.008)	—	2000
CB C3225	3.2±0.2 (0.126±0.008)	2.5±0.2 (0.098±0.008)	2.5±0.2 (0.098±0.008)	0.6±0.3 (0.024±0.012)	—	1000

Unit:mm(inch)

■PART NUMBER

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

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

●2012(0805)type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz](min.)	DC Resistance [Ω](±30%)	Rated current ※) [mA]		Measuring frequency[MHz]	Note
					Saturation current Idc1	Temperature rise current Idc2		
CB 2012T1R0M 8	1.0	±20%	100	0.15	500	900	7.96	
CB 2012T2R2M 8	2.2	±20%	80	0.23	410	770	7.96	
CB 2012T3R3M 8	3.3	±20%	55	0.30	330	650	7.96	
CB 2012T4R7M 8	4.7	±20%	45	0.40	300	580	7.96	
CB 2012T6R8M 8	6.8	±20%	38	0.47	250	540	7.96	
CB 2012T100□ 8	10	±10%, ±20%	32	0.70	190	440	2.52	
CB 2012T100□R8	10	±10%, ±20%	32	0.50	200	520	2.52	
CB 2012T150□ 8	15	±10%, ±20%	28	1.3	170	320	2.52	
CB 2012T220□ 8	22	±10%, ±20%	16	1.7	135	280	2.52	
CB 2012T470□ 8	47	±10%, ±20%	11	3.7	90	190	2.52	
CB 2012T680□ 8	68	±10%, ±20%	10	6.0	70	140	2.52	
CB 2012T101□ 8	100	±10%, ±20%	8	7.0	60	130	0.796	

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz](min.)	DC Resistance [Ω](±30%)	Rated current ※) [mA]		Measuring frequency[MHz]	Note
					Saturation current Idc1	Temperature rise current Idc2		
CB C2012T1R0M 8	1.0	±20%	100	0.19	700	840	7.96	
CB C2012T2R2M 8	2.2	±20%	70	0.33	530	640	7.96	
CB C2012T4R7M 8	4.7	±20%	45	0.50	360	520	7.96	
CB C2012T100□ 8	10	±10%, ±20%	40	1.2	240	340	2.52	
CB C2012T220□ 8	22	±10%, ±20%	16	3.7	170	190	2.52	
CB C2012T470□ 8	47	±10%, ±20%	11	5.8	120	150	2.52	

●2016(0806)type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz](min.)	DC Resistance [Ω](±30%)	Rated current ※) [mA]		Measuring frequency[MHz]	Note
					Saturation current Idc1	Temperature rise current Idc2		
CB 2016T1R0M 8	1.0	±20%	100	0.09	600	1,100	7.96	
CB 2016T1R5M 8	1.5	±20%	80	0.11	550	1,000	7.96	
CB 2016T2R2M 8	2.2	±20%	70	0.13	510	1,000	7.96	
CB 2016T3R3M 8	3.3	±20%	55	0.20	400	800	7.96	
CB 2016T4R7M 8	4.7	±20%	45	0.25	340	740	7.96	
CB 2016T6R8M 8	6.8	±20%	38	0.35	300	600	7.96	
CB 2016T100□ 8	10	±10%, ±20%	32	0.50	250	520	2.52	
CB 2016T150□ 8	15	±10%, ±20%	28	0.70	210	440	2.52	
CB 2016T220□ 8	22	±10%, ±20%	16	1.0	165	370	2.52	
CB 2016T330□ 8	33	±10%, ±20%	14	1.7	130	270	2.52	
CB 2016T470□ 8	47	±10%, ±20%	11	2.4	110	240	2.52	
CB 2016T680□ 8	68	±10%, ±20%	10	3.0	90	210	2.52	
CB 2016T101□ 8	100	±10%, ±20%	8	4.5	70	170	0.796	

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz](min.)	DC Resistance [Ω](±30%)	Rated current ※) [mA]		Measuring frequency[MHz]	Note
					Saturation current Idc1	Temperature rise current Idc2		
CB C2016T1R0M 8	1.0	±20%	100	0.10	1,100	1,100	7.96	
CB C2016T1R5M 8	1.5	±20%	80	0.15	1,000	1,000	7.96	
CB C2016T2R2M 8	2.2	±20%	70	0.20	750	720	7.96	
CB C2016T3R3M 8	3.3	±20%	55	0.27	600	610	7.96	
CB C2016T4R7M 8	4.7	±20%	45	0.37	550	530	7.96	
CB C2016T6R8M 8	6.8	±20%	38	0.59	450	450	7.96	
CB C2016T100□ 8	10	±10%, ±20%	32	0.82	380	350	2.52	
CB C2016T150□ 8	15	±10%, ±20%	28	1.2	300	300	2.52	
CB C2016T220□ 8	22	±10%, ±20%	16	1.8	250	240	2.52	
CB C2016T330□ 8	33	±10%, ±20%	14	2.8	220	220	2.52	
CB C2016T470□ 8	47	±10%, ±20%	11	4.3	150	150	2.52	
CB C2016T680□ 8	68	±10%, ±20%	10	7.0	130	130	2.52	
CB C2016T101□ 8	100	±10%, ±20%	8	8.0	110	110	0.796	

・□ Please specify the Inductance tolerance code(Kor M)

※)The saturation current value(Idc1) is the DC current value having inductance decrease down to 30%.(at 20℃)
※)The temperature rise current value(Idc2) is the DC current value having temperature increase by 20℃.(at 20℃)
※)The rated current value is following either Idc1 or Idc2, which is the lower one.

■PART NUMBER

●2518(1007)type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz](min.)	DC Resistance [Ω](±30%)	Rated current ※) [mA]		Measuring frequency[MHz]	Note
					Saturation current Idc1	Temperature rise current Idc2		
CB 2518T1R0M 8	1.0	±20%	100	0.06	1,200	1,500	7.96	
CB 2518T1R5M 8	1.5	±20%	80	0.07	650	1,400	7.96	
CB 2518T2R2M 8	2.2	±20%	68	0.09	510	1,300	7.96	
CB 2518T3R3M 8	3.3	±20%	54	0.11	440	1,200	7.96	
CB 2518T4R7MR8	4.7	±20%	46	0.10	310	1,200	7.96	
CB 2518T4R7M 8	4.7	±20%	46	0.13	340	1,100	7.96	
CB 2518T6R8M 8	6.8	±20%	38	0.15	270	930	7.96	
CB 2518T100□ 8	10	±10%, ±20%	30	0.25	250	820	2.52	
CB 2518T150□ 8	15	±10%, ±20%	23	0.32	180	650	2.52	
CB 2518T220□ 8	22	±10%, ±20%	19	0.50	165	580	2.52	
CB 2518T330□ 8	33	±10%, ±20%	15	0.70	130	460	2.52	
CB 2518T470□ 8	47	±10%, ±20%	12	0.95	110	420	2.52	
CB 2518T680□ 8	68	±10%, ±20%	9.5	1.5	70	310	2.52	
CB 2518T101□ 8	100	±10%, ±20%	9.0	2.1	60	260	0.796	
CB 2518T151□ 8	150	±10%, ±20%	7.0	3.2	55	210	0.796	
CB 2518T221□ 8	220	±10%, ±20%	5.5	4.5	50	180	0.796	
CB 2518T331□ 8	330	±10%, ±20%	4.5	7.0	40	140	0.796	
CB 2518T471□ 8	470	±10%, ±20%	3.5	10	35	120	0.796	
CB 2518T681□ 8	680	±10%, ±20%	3.0	17	30	90	0.796	
CB 2518T102□ 8	1000	±10%, ±20%	2.4	24	25	75	0.252	

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz](min.)	DC Resistance [Ω](±30%)	Rated current ※) [mA]		Measuring frequency[MHz]	Note
					Saturation current Idc1	Temperature rise current Idc2		
CB C2518T1R0M 8	1.0	±20%	100	0.08	1,000	1,200	7.96	
CB C2518T1R5M 8	1.5	±20%	80	0.11	950	1,190	7.96	
CB C2518T2R2M 8	2.2	±20%	68	0.13	890	1,100	7.96	
CB C2518T3R3M 8	3.3	±20%	54	0.16	730	1,020	7.96	
CB C2518T4R7M 8	4.7	±20%	41	0.20	680	920	7.96	
CB C2518T6R8M 8	6.8	±20%	38	0.30	550	740	7.96	
CB C2518T100□ 8	10	±10%, ±20%	30	0.36	480	680	2.52	
CB C2518T150□ 8	15	±10%, ±20%	23	0.65	350	500	2.52	
CB C2518T220□ 8	22	±10%, ±20%	19	0.77	320	460	2.52	
CB C2518T330□ 8	33	±10%, ±20%	15	1.5	270	320	2.52	
CB C2518T470□ 8	47	±10%, ±20%	12	1.9	240	290	2.52	
CB C2518T680□ 8	68	±10%, ±20%	9.5	2.8	200	200	2.52	
CB C2518T101□ 8	100	±10%, ±20%	9.0	3.7	160	170	0.796	
CB C2518T151□ 8	150	±10%, ±20%	7.0	6.1	140	130	0.796	
CB C2518T221□ 8	220	±10%, ±20%	5.5	8.4	115	110	0.796	
CB C2518T331□ 8	330	±10%, ±20%	4.5	12.3	100	90	0.796	
CB C2518T471□ 8	470	±10%, ±20%	3.5	22	80	70	0.796	
CB C2518T681□ 8	680	±10%, ±20%	3.0	28	65	60	0.796	

●3225(1210)type

Part number	Nominal inductance [μH]	Inductance tolerance	Self-resonant frequency [MHz](min.)	DC Resistance [Ω](±30%)	Rated current ※) [mA]		Measuring frequency[MHz]	Note
					Saturation current Idc1	Temperature rise current Idc2		
CB C3225T1R0MR8	1.0	±20%	250	0.055	2,000	1,440	0.1	
CB C3225T1R5MR8	1.5	±20%	220	0.060	2,000	1,310	0.1	
CB C3225T2R2MR8	2.2	±20%	190	0.080	2,000	1,130	0.1	
CB C3225T3R3MR8	3.3	±20%	160	0.095	2,000	1,040	0.1	
CB C3225T4R7MR8	4.7	±20%	70	0.100	1,250	1,010	0.1	
CB C3225T6R8MR8	6.8	±20%	50	0.120	950	940	0.1	
CB C3225T100□R8	10	±10%, ±20%	23	0.133	900	900	0.1	
CB C3225T150□R8	15	±10%, ±20%	20	0.195	730	850	0.1	
CB C3225T220□R8	22	±10%, ±20%	17	0.27	620	780	0.1	
CB C3225T330□R8	33	±10%, ±20%	13	0.41	500	570	0.1	
CB C3225T470□R8	47	±10%, ±20%	10	0.67	390	480	0.1	
CB C3225T680□R8	68	±10%, ±20%	8.0	1.0	320	410	0.1	
CB C3225T101□R8	100	±10%, ±20%	6.0	1.4	270	340	0.1	
CB C3225T221□R8	220	±10%, ±20%	3.0	2.5	190	190	0.1	
CB C3225T821□R8	820	±10%, ±20%	1.8	12	110	110	0.1	
CB C3225T102□R8	1000	±10%, ±20%	1.6	13	100	100	0.1	

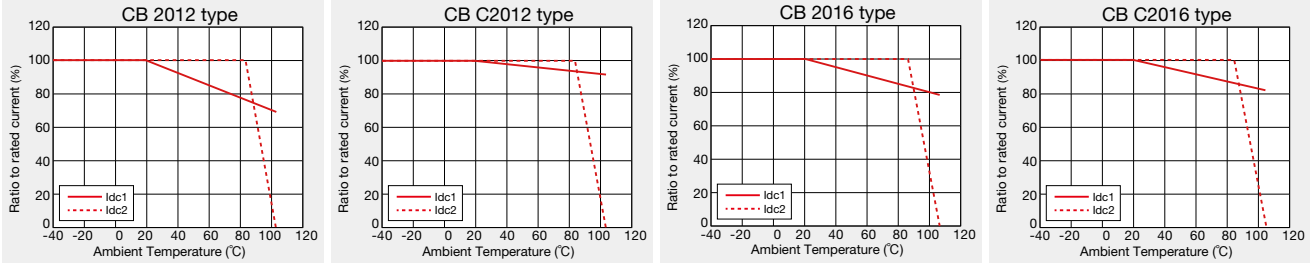
・□ Please specify the Inductance tolerance code(Kor M)

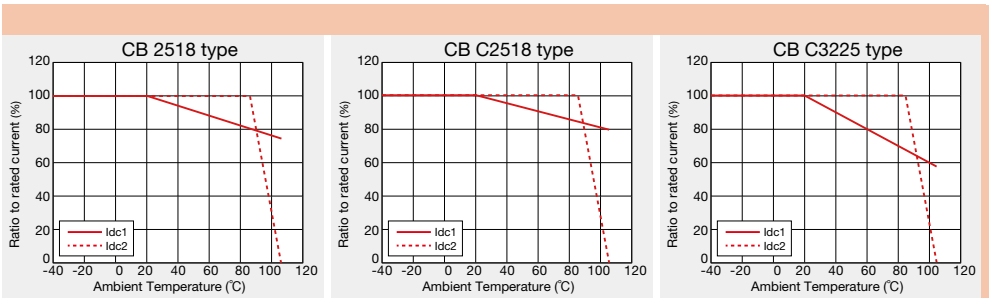
※)The saturation current value(Idc1) is the DC current value having inductance decrease down to 30%.(at 20℃)
※)The temperature rise current value(Idc2) is the DC current value having temperature increase by 40℃.(at 20℃)
※)The rated current value is following either Idc1 or Idc2, which is the lower one.

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

Derating of Rated Current

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





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

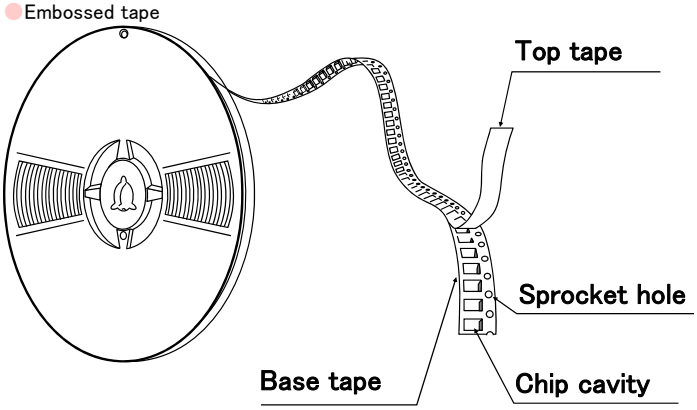
■PACKAGING

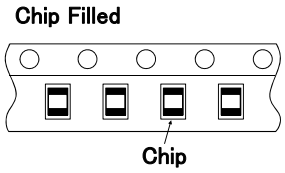
①Minimum Quantity

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

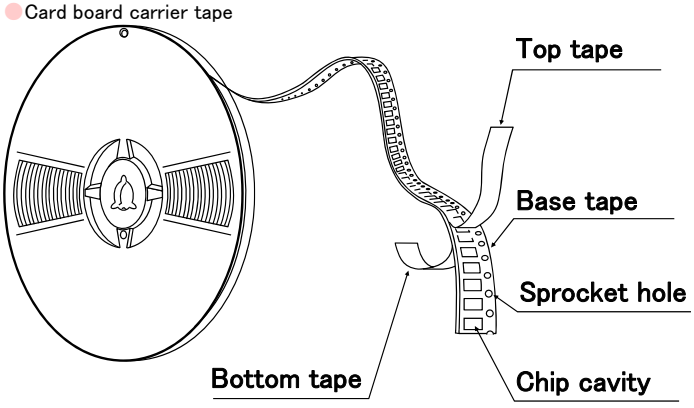
②Tape material

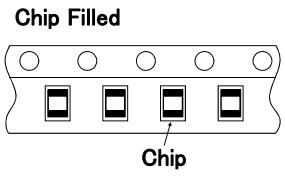
●Embossed tape





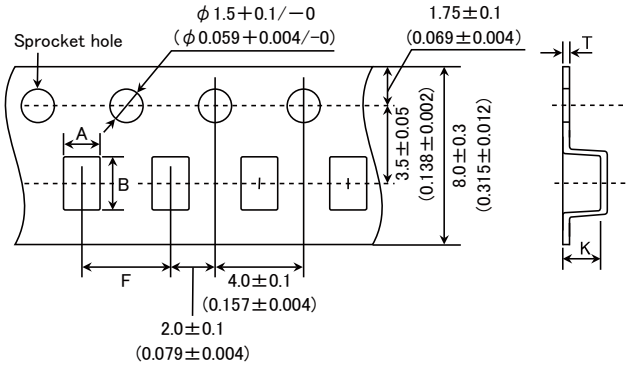
●Card board carrier tape





③Taping Dimensions

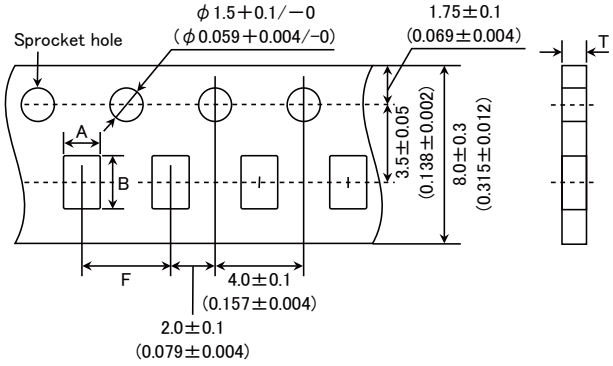
Embossed Tape (0.315 inches wide)



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

Unit : mm (inch)

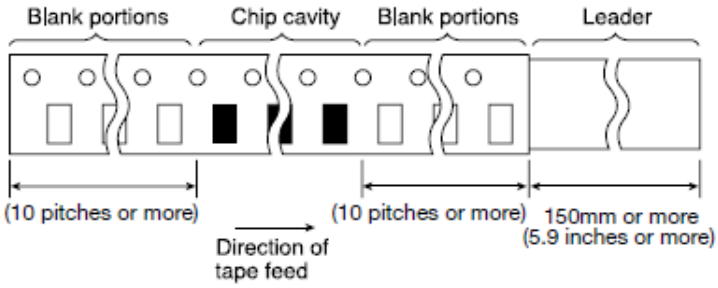
Card board carrier tape (0.315 inches wide)



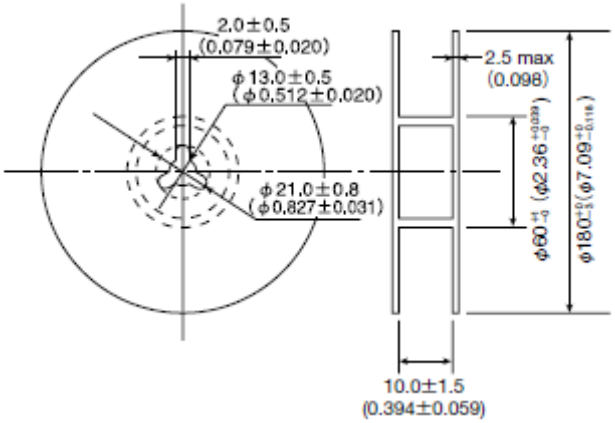
Type	Chip cavity		Insertion pitch	Tape thickness
	A	B	F	T
CB L2012	1.55±0.1 (0.061±0.004)	2.3±0.1 (0.091±0.004)	4.0±0.1 (0.157±0.004)	1.1max. (0.043max.)
LB 1608	1.0±0.1 (0.039±0.004)	1.8±0.1 (0.071±0.004)	4.0±0.1 (0.157±0.004)	1.1max. (0.043max.)

Unit : mm (inch)

④Leader and Blank Portion

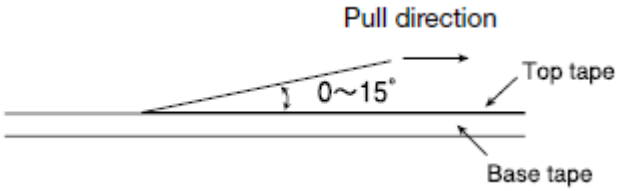


⑤Reel Size



⑥Top Tape Strength

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



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

■RELIABILITY DATA

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

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

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

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

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

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

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

8.Temperature Characteristic

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

Test Methods and Remarks

Change of maximum inductance deviation in step 1–5

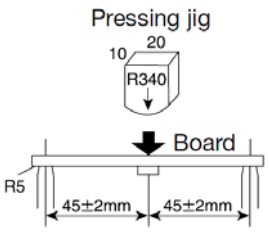
Step	Temperature(℃)
	LB, CB Serie
1	20
2	−40
3	20(Reference temperature)
4	+85(Maximum operating temperature)
5	20

9.Rasistance to Flexure of Substrate

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

Test Methods and Remarks

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



10.Body Strength

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

Test Methods and Remarks

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

11.Adhesion of terminal electrode

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

Test Methods and Remarks

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

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

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

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

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

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

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

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

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

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

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

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

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

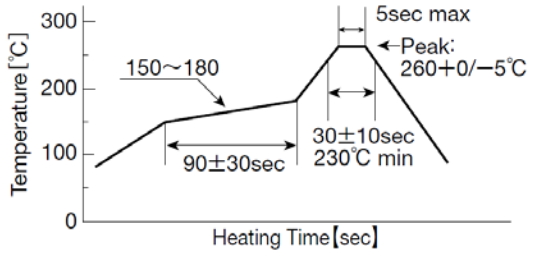
WIRE-WOUND CHIP INDUCTORS (LB SERIES),
WIRE-WOUND CHIP POWER INDUCTORS (CB SERIES),
WIRE-WOUND CHIP INDUCTORS FOR SIGNAL LINES (LB SERIES M TYPE)

■PRECAUTIONS

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

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

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

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

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

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

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