

# 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 2021. 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.

### ■ 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 conforming to the product specifications specified in the individual product specification sheets, 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, provided, however, that our products shall be used for general-purpose and standard use in the equipment specified in this catalog or the individual product specification sheets.

### ■ 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.

## ■ 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 for consumer (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, or the equipment approved separately by TAIYO YUDEN.

TAIYO YUDEN has the product series intended for use in the following equipment. 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.

Application	Product Series		Quality Grade <sup>*3</sup>
	Equipment <sup>*1</sup>	Category (Part Number Code <sup>*2</sup> )	
Automotive	Automotive Electronic Equipment (POWERTRAIN, SAFETY)	A	1
	Automotive Electronic Equipment (BODY & CHASSIS, INFOTAINMENT)	C	2
Industrial	Telecommunications Infrastructure and Industrial Equipment	B	2
Medical	Medical Devices classified as GHTF Class C (Japan Class III)	M	2
	Medical Devices classified as GHTF Classes A or B (Japan Classes I or II)	L	3
Consumer	General Electronic Equipment	S	3

\*Notes: 1. Based on the general specifications required for electronic components for such equipment, which are recognized by TAIYO YUDEN, the use of each product series for the equipment is recommended. Please be sure to contact TAIYO YUDEN before using our products for equipment other than those covered by the product series.

2. On each of our part number, the 2nd code from the left is a code indicating the "Category" as shown in the above table. For details, please check the explanatory materials regarding the part numbering system of each of our products.

3. Each product series is assigned a "Quality Grade" from 1 to 3 in order of higher quality. Please do not incorporate a product into any equipment with a higher Quality Grade than the Quality Grade of such product without the prior written consent of TAIYO YUDEN.

### 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 <sup>\*1</sup>
- (3) Medical devices classified as GHTF Class D (Japan Class IV), implantable medical devices <sup>\*2</sup>
- (4) Power generation control equipment (nuclear power, hydroelectric power, thermal power plant control system, etc.)
- (5) Undersea equipment (submarine repeating 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.

# Medical Application Guide

According to the medical devices classified as GHTF Classes A to C (Japan Classes I to III), we have the corresponding product series (the part number code of 2nd digit from the left side is "M" or "L") intended for use in the medical devices. Therefore, when using our products for the medical devices, please be sure to check the classification based on the GHTF Rules and use the corresponding product series.

On the other hand, we don't have the product series intended for use in (i) all medical devices classified as GHTF Class D (Japan Class IV) and (ii) 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, please do not incorporate our products into these medical devices. 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)	<b>Class I</b> General Medical Devices (GHTF Class A)	<b>Class II</b> Controlled Medical Devices (GHTF Class B)	<b>Class III</b> Specially-controlled Medical Devices (GHTF Class C)	<b>Class IV</b> Specially-controlled Medical Devices (GHTF Class D)
		Medical devices with extremely low risk to the human body 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.	Medical devices with relatively low risk to the human body in case of problems  [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.	Medical devices with relatively high risk to the human body in case of problems  [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.	Medical devices highly invasive to patients and with life-threatening risk in case of problems  [Ex.] • Cardiac Pacemaker • Video Flexible Angioscope • Implantable Infusion Pump • Cardiac Electrosurgical Unit • Inspection Device with Cardiac Catheter • Defibrillator, etc.
U.S.A.	FDA Classification	<b>Class I</b> General Controls	<b>Class II</b> General Controls and Special Controls	<b>Class III</b> 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	
Corresponding TAIYO YUDEN Product Series	<b>Product Series for Medical Devices classified as GHTF Classes A or B (Japan Classes I or II)</b> (Part Number Code of 2nd Digit from the Left Side: "L")		<b>Product Series for Medical Devices classified as GHTF Class C (Japan Class III)</b> (Part Number Code of 2nd Digit from the Left Side: "M") (See the Note below.)		N / A

\* Note : It is prohibited that our products are used in some medical devices such as implantable medical devices even if such medical

# Wire-wound Ferrite Power Inductors LLQPB series

## for Medical Devices classified as GHTF Classes A or B (Japan Classes I or II)

Code in front of Series have been extracted from Part number, which describes the segment of products, such as kinds and characteristics.

REFLOW

## PART NUMBER

\* Operating Temp.: -40~+105°C (Including self-generated heat)

L	L	Q	P	B	2	5	1	8	1	2	T	2	R	2	M	
①	②	③	④	⑤	⑥	⑦	⑧									

## ① Series

Code (1)(2)(3)(4)	
LLQP	Wire-wound Ferrite Power Inductor for Medical Devices classified as GHTF Classes A or B (Japan Classes I or II)

## (1) Product Group

Code	
L	Inductors

## (2) Category

Code	Recommended equipment	Quality Grade
L	Medical Devices classified as GHTF Classes A or B (Japan Classes I or II)	3

## (3) Type

Code	
Q	Ferrite Wire-wound (Horizontal type)

## (4) Features, Characteristics

Code	
P	High current power choke

## ② Features

Code	Feature
B	L-shape electrode (Ag-resin × Sn-plate)

## ③ Dimensions (L × W)

Code	Type (inch)	Dimensions (L × W) [mm]
1608	1608 (0603)	1.6 × 0.8
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

## ④ Dimensions (T)

Code	Dimensions (T) [mm]
07	0.7
08	0.8
10	1.0
12	1.2
14	1.4
15	1.5
16	1.6
17	1.7
18	1.8

## ⑤ Packaging

Code	Packaging
T	Taping

## ⑥ Nominal inductance

Code (example)	Nominal inductance [μH]
R20	0.2
1R0	1.0
100	10
101	100

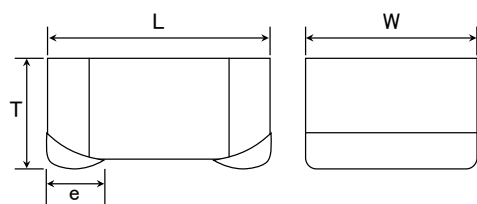
※R=Decimal point

## ⑦ Inductance tolerance

Code	Inductance tolerance
K	±10%
M	±20%

## ⑧ Internal code

■ STANDARD EXTERNAL DIMENSIONS / STANDARD QUANTITY

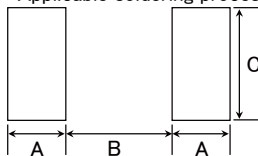


Recommended Land Patterns

Surface Mounting

• Mounting and soldering conditions should be checked beforehand.

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



Type	A	B	C
1608	0.55	0.70	1.00
2012	0.60	1.00	1.45
2016	0.60	1.00	1.80
2518	0.60	1.50	2.00
3225	0.85	1.70	2.70

Unit : mm

Type	L	W	T	e	Standard quantity [pcs]	
					Paper tape	Embossed tape
160807	1.6±0.2 (0.063±0.008)	0.8±0.2 (0.031±0.008)	0.7 max (0.028 max)	0.45±0.15 (0.016±0.006)	—	3000
160808	1.6±0.2 (0.063±0.008)	0.8±0.2 (0.031±0.008)	0.8±0.2 (0.031±0.008)	0.45±0.15 (0.016±0.006)	—	3000
201210	2.0±0.2 (0.079±0.008)	1.25±0.2 (0.049±0.008)	1.0 max (0.040 max)	0.5±0.2 (0.020±0.008)	—	3000
201214	2.0±0.2 (0.079±0.008)	1.25±0.2 (0.049±0.008)	1.4 max (0.056 max)	0.5±0.2 (0.020±0.008)	—	2000
201616	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
251810	2.5±0.2 (0.098±0.008)	1.8±0.2 (0.071±0.008)	1.0 max (0.040 max)	0.5±0.2 (0.020±0.008)	—	3000
251812	2.5±0.2 (0.098±0.008)	1.8±0.2 (0.071±0.008)	1.2 max (0.048 max)	0.5±0.2 (0.020±0.008)	—	3000
251815	2.5±0.2 (0.098±0.008)	1.8±0.2 (0.071±0.008)	1.5 max (0.060 max)	0.5±0.2 (0.020±0.008)	—	2000
251818	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
322517	3.2±0.2 (0.126±0.008)	2.5±0.2 (0.098±0.008)	1.7 max (0.068 max)	0.75±0.2 (0.03±0.008)	—	2000

Unit : mm (inch)

■ PART NUMBER

● 1608 (0603) type

New part number	Old part number (for reference)	EHS	Nominal inductance [ $\mu$ H]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [ $\Omega$ ] ( $\pm 30\%$ )	Rated current ※) [mA]		Measuring frequency [MHz]
							Saturation current Idc1	Temperature rise current Idc2	
LLQPB160807T1R0M	BR L1608T1R0M	RoHS	1.0	$\pm 20\%$	700	0.230	510	650	1.0
LLQPB160807T1R5M	BR L1608T1R5M	RoHS	1.5	$\pm 20\%$	600	0.280	440	590	1.0
LLQPB160807T2R2M	BR L1608T2R2M	RoHS	2.2	$\pm 20\%$	400	0.400	360	500	1.0
LLQPB160807T3R3M	BR L1608T3R3M	RoHS	3.3	$\pm 20\%$	300	0.650	290	390	1.0
LLQPB160807T4R7M	BR L1608T4R7M	RoHS	4.7	$\pm 20\%$	150	1.00	240	310	1.0
LLQPB160807T6R8M	BR L1608T6R8M	RoHS	6.8	$\pm 20\%$	100	1.64	200	250	1.0
LLQPB160807T100M	BR L1608T100M	RoHS	10	$\pm 20\%$	45	2.00	170	220	1.0
LLQPB160807T150M	BR L1608T150M	RoHS	15	$\pm 20\%$	32	2.56	150	200	1.0

New part number	Old part number (for reference)	EHS	Nominal inductance [ $\mu$ H]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [ $\Omega$ ] ( $\pm 30\%$ )	Rated current ※) [mA]		Measuring frequency [MHz]
							Saturation current Idc1	Temperature rise current Idc2	
LLQPB160808TR43M06	BR C1608TR43M 6	RoHS	0.43	$\pm 20\%$	740	0.082	1,400	1,100	6.0
LLQPB160808TR50M06	BR C1608TR50M 6	RoHS	0.50	$\pm 20\%$	710	0.090	1,200	1,050	6.0
LLQPB160808TR60M06	BR C1608TR60M 6	RoHS	0.60	$\pm 20\%$	630	0.099	1,100	940	6.0
LLQPB160808TR72M06	BR C1608TR72M 6	RoHS	0.72	$\pm 20\%$	600	0.144	1,000	810	6.0
LLQPB160808TR82M06	BR C1608TR82M 6	RoHS	0.82	$\pm 20\%$	560	0.176	950	730	6.0
LLQPB160808T1R0M06	BR C1608T1R0M 6	RoHS	1.0	$\pm 20\%$	550	0.188	890	680	6.0

New part number	Old part number (for reference)	EHS	Nominal inductance [ $\mu$ H]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [ $\Omega$ ] ( $\pm 30\%$ )	Rated current ※) [mA]		Measuring frequency [MHz]
							Saturation current Idc1	Temperature rise current Idc2	
LLQPB160808TR20M	BR C1608TR20M	RoHS	0.20	$\pm 20\%$	400	0.060	1,750	980	7.96
LLQPB160808TR35M	BR C1608TR35M	RoHS	0.35	$\pm 20\%$	300	0.080	1,400	810	7.96
LLQPB160808TR45M	BR C1608TR45M	RoHS	0.45	$\pm 20\%$	200	0.090	1,250	800	7.96
LLQPB160808TR56M	BR C1608TR56M	RoHS	0.56	$\pm 20\%$	170	0.095	1,150	760	7.96
LLQPB160808TR77M	BR C1608TR77M	RoHS	0.77	$\pm 20\%$	150	0.110	1,000	660	7.96
LLQPB160808T1R0M	BR C1608T1R0M	RoHS	1.0	$\pm 20\%$	140	0.180	850	520	7.96
LLQPB160808T1R5M	BR C1608T1R5M	RoHS	1.5	$\pm 20\%$	120	0.300	700	410	7.96
LLQPB160808T2R2M	BR C1608T2R2M	RoHS	2.2	$\pm 20\%$	100	0.550	550	280	7.96

● 2012 (0805) type

New part number	Old part number (for reference)	EHS	Nominal inductance [ $\mu$ H]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [ $\Omega$ ] ( $\pm 30\%$ )	Rated current ※) [mA]		Measuring frequency [MHz]
							Saturation current Idc1	Temperature rise current Idc2	
LLQPB201210TR47M06	BR L2012TR47M 6	RoHS	0.47	$\pm 20\%$	500	0.048	1,500	1,900	6.0
LLQPB201210T1R0M06	BR L2012T1R0M 6	RoHS	1.0	$\pm 20\%$	400	0.108	1,050	1,230	6.0
LLQPB201210T2R2MD6	BR L2012T2R2MD6	RoHS	2.2	$\pm 20\%$	250	0.184	680	950	6.0

New part number	Old part number (for reference)	EHS	Nominal inductance [ $\mu$ H]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [ $\Omega$ ] ( $\pm 30\%$ )	Rated current ※) [mA]		Measuring frequency [MHz]
							Saturation current Idc1	Temperature rise current Idc2	
LLQPB201210TR47M	BR L2012TR47M	RoHS	0.47	$\pm 20\%$	350	0.090	1,100	1,050	7.96
LLQPB201210T1R0M	BR L2012T1R0M	RoHS	1.0	$\pm 20\%$	300	0.135	850	850	7.96
LLQPB201210T1R5M	BR L2012T1R5M	RoHS	1.5	$\pm 20\%$	250	0.180	700	750	7.96
LLQPB201210T2R2M	BR L2012T2R2M	RoHS	2.2	$\pm 20\%$	200	0.300	600	550	7.96
LLQPB201210T3R3M	BR L2012T3R3M	RoHS	3.3	$\pm 20\%$	190	0.500	490	440	7.96
LLQPB201210T4R7M	BR L2012T4R7M	RoHS	4.7	$\pm 20\%$	150	0.550	340	400	7.96
LLQPB201210T6R8M	BR L2012T6R8M	RoHS	6.8	$\pm 20\%$	60	0.750	290	350	7.96
LLQPB201210T100M	BR L2012T100M	RoHS	10	$\pm 20\%$	30	0.850	270	330	2.52
LLQPB201210T150M	BR L2012T150M	RoHS	15	$\pm 20\%$	15	1.00	220	300	2.52
LLQPB201210T220M	BR L2012T220M	RoHS	22	$\pm 20\%$	13	1.30	190	270	2.52
LLQPB201210T330M	BR L2012T330M	RoHS	33	$\pm 20\%$	8.0	2.00	150	220	2.52
LLQPB201210T470M	BR L2012T470M	RoHS	47	$\pm 20\%$	7.0	3.50	125	160	2.52
LLQPB201210T680M	BR L2012T680M	RoHS	68	$\pm 20\%$	6.5	5.80	100	110	2.52
LLQPB201210T101M	BR L2012T101M	RoHS	100	$\pm 20\%$	6.0	7.70	85	85	0.796

New part number	Old part number (for reference)	EHS	Nominal inductance [ $\mu$ H]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [ $\Omega$ ] ( $\pm 30\%$ )	Rated current ※) [mA]		Measuring frequency [MHz]
							Saturation current Idc1	Temperature rise current Idc2	
LLQPB201214T1R0M	BR C2012T1R0M	RoHS	1.0	$\pm 20\%$	490	0.060	1,500	1,400	1.0
LLQPB201214T1R5MD	BR C2012T1R5MD	RoHS	1.5	$\pm 20\%$	390	0.090	1,200	1,100	1.0
LLQPB201214T2R2MD	BR C2012T2R2MD	RoHS	2.2	$\pm 20\%$	350	0.110	1,100	1,000	1.0
LLQPB201214T3R3MD	BR C2012T3R3MD	RoHS	3.3	$\pm 20\%$	300	0.170	800	870	1.0
LLQPB201214T4R7MD	BR C2012T4R7MD	RoHS	4.7	$\pm 20\%$	250	0.265	700	600	1.0

※) 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 by 40°C. (at 20°C)  
 ※) The rated current value is following either Idc1 or Idc2, which is the lower one.

■ PART NUMBER

● 2016 (0806) type

New part number	Old part number (for reference)	EHS	Nominal inductance [ $\mu$ H]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [ $\Omega$ ] ( $\pm 30\%$ )	Rated current ※) [mA]		Measuring frequency [MHz]
							Saturation current Idc1	Temperature rise current Idc2	
LLQPB201616T1R0M	BR C2016T1R0M	RoHS	1.0	$\pm 20\%$	450	0.085	1,350	1,100	0.10
LLQPB201616T1R5M	BR C2016T1R5M	RoHS	1.5	$\pm 20\%$	370	0.150	1,100	820	0.10
LLQPB201616T2R2M	BR C2016T2R2M	RoHS	2.2	$\pm 20\%$	250	0.180	910	760	0.10
LLQPB201616T3R3M	BR C2016T3R3M	RoHS	3.3	$\pm 20\%$	140	0.220	740	680	0.10
LLQPB201616T4R7M	BR C2016T4R7M	RoHS	4.7	$\pm 20\%$	78	0.270	660	610	0.10
LLQPB201616T6R8M	BR C2016T6R8M	RoHS	6.8	$\pm 20\%$	39	0.330	550	560	0.10
LLQPB201616T100K	BR C2016T100K	RoHS	10	$\pm 10\%$	35	0.400	450	520	0.10
LLQPB201616T100M	BR C2016T100M	RoHS	10	$\pm 20\%$	35	0.400	450	520	0.10
LLQPB201616T150K	BR C2016T150K	RoHS	15	$\pm 10\%$	28	0.600	400	410	0.10
LLQPB201616T150M	BR C2016T150M	RoHS	15	$\pm 20\%$	28	0.600	400	410	0.10
LLQPB201616T220K	BR C2016T220K	RoHS	22	$\pm 10\%$	24	1.00	310	310	0.10
LLQPB201616T220M	BR C2016T220M	RoHS	22	$\pm 20\%$	24	1.00	310	310	0.10
LLQPB201616T330K	BR C2016T330K	RoHS	33	$\pm 10\%$	13	1.70	270	240	0.10
LLQPB201616T330M	BR C2016T330M	RoHS	33	$\pm 20\%$	13	1.70	270	240	0.10
LLQPB201616T470K	BR C2016T470K	RoHS	47	$\pm 10\%$	11	2.20	210	210	0.10
LLQPB201616T470M	BR C2016T470M	RoHS	47	$\pm 20\%$	11	2.20	210	210	0.10
LLQPB201616T680K	BR C2016T680K	RoHS	68	$\pm 10\%$	8	2.80	200	190	0.10
LLQPB201616T680M	BR C2016T680M	RoHS	68	$\pm 20\%$	8	2.80	200	190	0.10
LLQPB201616T101K	BR C2016T101K	RoHS	100	$\pm 10\%$	7	3.40	140	170	0.10
LLQPB201616T101M	BR C2016T101M	RoHS	100	$\pm 20\%$	7	3.40	140	170	0.10

● 2518 (1007) type

New part number	Old part number (for reference)	EHS	Nominal inductance [ $\mu$ H]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [ $\Omega$ ] ( $\pm 30\%$ )	Rated current ※) [mA]		Measuring frequency [MHz]
							Saturation current Idc1	Temperature rise current Idc2	
LLQPB251810T1R0M	BRFL2518T1R0M	RoHS	1.0	$\pm 20\%$	130	0.090	1,200	1,200	1.0
LLQPB251810T1R5M	BRFL2518T1R5M	RoHS	1.5	$\pm 20\%$	100	0.110	1,100	1,000	1.0
LLQPB251810T2R2M	BRFL2518T2R2M	RoHS	2.2	$\pm 20\%$	80	0.130	850	950	1.0
LLQPB251810T3R3M	BRFL2518T3R3M	RoHS	3.3	$\pm 20\%$	70	0.220	700	700	1.0
LLQPB251810T4R7M	BRFL2518T4R7M	RoHS	4.7	$\pm 20\%$	60	0.330	650	650	1.0

New part number	Old part number (for reference)	EHS	Nominal inductance [ $\mu$ H]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [ $\Omega$ ] ( $\pm 30\%$ )	Rated current ※) [mA]		Measuring frequency [MHz]
							Saturation current Idc1	Temperature rise current Idc2	
LLQPB251812T1R0M	BR L2518T1R0M	RoHS	1.0	$\pm 20\%$	130	0.080	1,600	1,000	7.96
LLQPB251812T1R5M	BR L2518T1R5M	RoHS	1.5	$\pm 20\%$	100	0.100	1,200	920	7.96
LLQPB251812T2R2M	BR L2518T2R2M	RoHS	2.2	$\pm 20\%$	80	0.135	1,000	850	7.96
LLQPB251812T3R3M	BR L2518T3R3M	RoHS	3.3	$\pm 20\%$	70	0.300	800	580	7.96
LLQPB251812T4R7M	BR L2518T4R7M	RoHS	4.7	$\pm 20\%$	60	0.400	700	470	7.96

New part number	Old part number (for reference)	EHS	Nominal inductance [ $\mu$ H]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [ $\Omega$ ] ( $\pm 30\%$ )	Rated current ※) [mA]		Measuring frequency [MHz]
							Saturation current Idc1	Temperature rise current Idc2	
LLQPB251815T1R0M	BRHL2518T1R0M	RoHS	1.0	$\pm 20\%$	400	0.055	2,000	1,400	1.0
LLQPB251815T1R5M	BRHL2518T1R5M	RoHS	1.5	$\pm 20\%$	350	0.085	1,700	1,100	1.0
LLQPB251815T2R2M	BRHL2518T2R2M	RoHS	2.2	$\pm 20\%$	300	0.115	1,500	1,000	1.0
LLQPB251815T3R3MD	BRHL2518T3R3MD	RoHS	3.3	$\pm 20\%$	200	0.165	1,200	800	1.0
LLQPB251815T4R7MD	BRHL2518T4R7MD	RoHS	4.7	$\pm 20\%$	150	0.245	1,100	750	1.0

New part number	Old part number (for reference)	EHS	Nominal inductance [ $\mu$ H]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [ $\Omega$ ] ( $\pm 30\%$ )	Rated current ※) [mA]		Measuring frequency [MHz]
							Saturation current Idc1	Temperature rise current Idc2	
LLQPB251818T1R0M	BR C2518T1R0M	RoHS	1.0	$\pm 20\%$	280	0.050	2,550	1,650	1.0
LLQPB251818T1R5M	BR C2518T1R5M	RoHS	1.5	$\pm 20\%$	230	0.080	2,100	1,300	1.0
LLQPB251818T2R2M	BR C2518T2R2M	RoHS	2.2	$\pm 20\%$	200	0.120	1,800	1,000	1.0
LLQPB251818T3R3M	BR C2518T3R3M	RoHS	3.3	$\pm 20\%$	150	0.175	1,450	860	1.0
LLQPB251818T4R7M	BR C2518T4R7M	RoHS	4.7	$\pm 20\%$	100	0.230	1,250	750	1.0
LLQPB251818T6R8M	BR C2518T6R8M	RoHS	6.8	$\pm 20\%$	45	0.280	1,050	680	1.0
LLQPB251818T100K	BR C2518T100K	RoHS	10	$\pm 10\%$	20	0.350	890	610	1.0
LLQPB251818T100M	BR C2518T100M	RoHS	10	$\pm 20\%$	20	0.350	890	610	1.0
LLQPB251818T150K	BR C2518T150K	RoHS	15	$\pm 10\%$	13	0.430	760	550	1.0
LLQPB251818T150M	BR C2518T150M	RoHS	15	$\pm 20\%$	13	0.430	760	550	1.0
LLQPB251818T220K	BR C2518T220K	RoHS	22	$\pm 10\%$	10	0.560	640	490	1.0
LLQPB251818T220M	BR C2518T220M	RoHS	22	$\pm 20\%$	10	0.560	640	490	1.0
LLQPB251818T330K	BR C2518T330K	RoHS	33	$\pm 10\%$	8	0.850	560	390	1.0
LLQPB251818T330M	BR C2518T330M	RoHS	33	$\pm 20\%$	8	0.850	560	390	1.0
LLQPB251818T470K	BR C2518T470K	RoHS	47	$\pm 10\%$	6.5	1.45	410	300	1.0
LLQPB251818T470M	BR C2518T470M	RoHS	47	$\pm 20\%$	6.5	1.45	410	300	1.0
LLQPB251818T680K	BR C2518T680K	RoHS	68	$\pm 10\%$	5.5	2.40	340	230	1.0
LLQPB251818T680M	BR C2518T680M	RoHS	68	$\pm 20\%$	5.5	2.40	340	230	1.0
LLQPB251818T101K	BR C2518T101K	RoHS	100	$\pm 10\%$	4.5	3.60	300	190	1.0
LLQPB251818T101M	BR C2518T101M	RoHS	100	$\pm 20\%$	4.5	3.60	300	190	1.0

※) 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 by 40°C. (at 20°C)

※) The rated current value is following either Idc1 or Idc2, which is the lower one.

## PART NUMBER

## 3225(1210) type

New part number	Old part number (for reference)	EHS	Nominal inductance [ $\mu$ H]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [ $\Omega$ ] ( $\pm 30\%$ )	Rated current ※) [mA]		Measuring frequency [MHz]
							Saturation current Idc1	Temperature rise current Idc2	
LLQPB322517TR27M	BR L3225TR27M	RoHS	0.27	$\pm 20\%$	390	0.022	4,500	2,850	7.96
LLQPB322517TR36M	BR L3225TR36M	RoHS	0.36	$\pm 20\%$	350	0.025	4,300	2,750	7.96
LLQPB322517TR51M	BR L3225TR51M	RoHS	0.51	$\pm 20\%$	270	0.029	3,600	2,550	7.96

New part number	Old part number (for reference)	EHS	Nominal inductance [ $\mu$ H]	Inductance tolerance	Self-resonant frequency [MHz] (min.)	DC Resistance [ $\Omega$ ] ( $\pm 20\%$ )	Rated current ※) [mA]		Measuring frequency [MHz]
							Saturation current Idc1	Temperature rise current Idc2	
LLQPB322517T1R0M	BR L3225T1R0M	RoHS	1.0	$\pm 20\%$	220	0.043	2,400	2,200	0.1
LLQPB322517T1R5M	BR L3225T1R5M	RoHS	1.5	$\pm 20\%$	170	0.045	2,200	1,750	0.1
LLQPB322517T2R2M	BR L3225T2R2M	RoHS	2.2	$\pm 20\%$	150	0.065	1,850	1,600	0.1
LLQPB322517T3R3M	BR L3225T3R3M	RoHS	3.3	$\pm 20\%$	140	0.120	1,450	1,200	0.1
LLQPB322517T4R7M	BR L3225T4R7M	RoHS	4.7	$\pm 20\%$	120	0.180	1,300	1,000	0.1
LLQPB322517T6R8M	BR L3225T6R8M	RoHS	6.8	$\pm 20\%$	90	0.270	1,050	770	0.1
LLQPB322517T100K	BR L3225T100K	RoHS	10	$\pm 10\%$	70	0.350	900	700	0.1
LLQPB322517T100M	BR L3225T100M	RoHS	10	$\pm 20\%$	70	0.350	900	700	0.1
LLQPB322517T150K	BR L3225T150K	RoHS	15	$\pm 10\%$	20	0.570	700	530	0.1
LLQPB322517T150M	BR L3225T150M	RoHS	15	$\pm 20\%$	20	0.570	700	530	0.1
LLQPB322517T220K	BR L3225T220K	RoHS	22	$\pm 10\%$	13	0.690	550	470	0.1
LLQPB322517T220M	BR L3225T220M	RoHS	22	$\pm 20\%$	13	0.690	550	470	0.1
LLQPB322517T330K	BR L3225T330K	RoHS	33	$\pm 10\%$	9	0.840	470	420	0.1
LLQPB322517T330M	BR L3225T330M	RoHS	33	$\pm 20\%$	9	0.840	470	420	0.1
LLQPB322517T470K	BR L3225T470K	RoHS	47	$\pm 10\%$	7	1.00	420	390	0.1
LLQPB322517T470M	BR L3225T470M	RoHS	47	$\pm 20\%$	7	1.00	420	390	0.1
LLQPB322517T680K	BR L3225T680K	RoHS	68	$\pm 10\%$	6	1.40	330	300	0.1
LLQPB322517T680M	BR L3225T680M	RoHS	68	$\pm 20\%$	6	1.40	330	300	0.1
LLQPB322517T101K	BR L3225T101K	RoHS	100	$\pm 10\%$	5	2.50	270	250	0.1
LLQPB322517T101M	BR L3225T101M	RoHS	100	$\pm 20\%$	5	2.50	270	250	0.1

※) 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 by 40°C. (at 20°C)

※) The rated current value is following either Idc1 or Idc2, which is the lower one.



# Wire-wound Ferrite Power Inductors LSQPB/LLQPB series

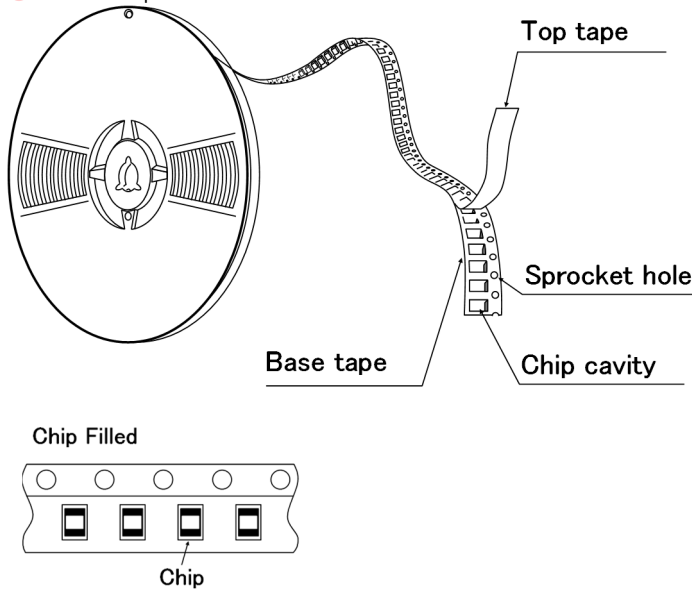
## PACKAGING

### ① Minimum Quantity

Type	Standard Quantity [pcs]	
	Paper Tape	Embossed Tape
160807	—	3,000
160808	—	3,000
201210	—	3,000
201214	—	2,000
201616	—	2,000
251810	—	3,000
251812	—	3,000
251815	—	2,000
251818	—	2,000
322517	—	2,000

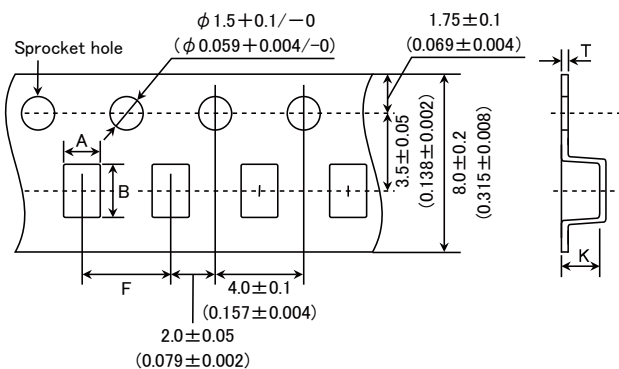
### ② Tape Material

#### ● Embossed tape



### ③ Taping dimensions

#### ● Embossed Tape 8mm wide (0.315 inches wide)

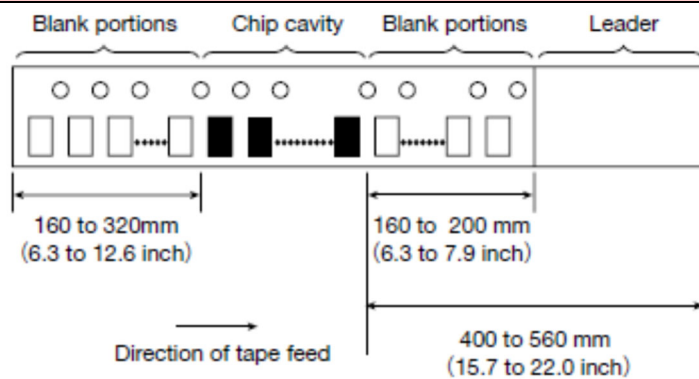


► This catalog contains the typical specification only due to the limitation of space. When you consider the purchase of our products, please check our specification. For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our Web site (<http://www.ty-top.com/>).

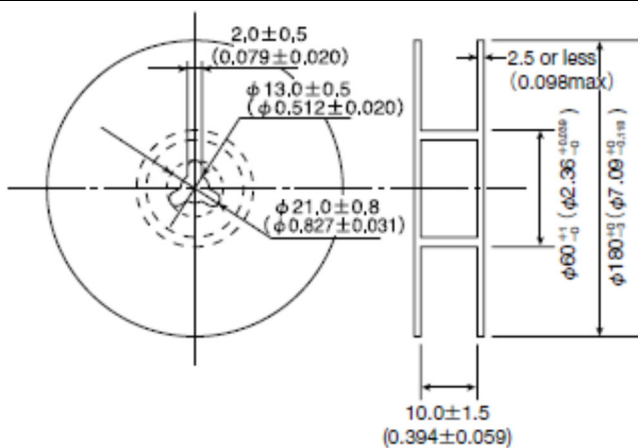
Type	Chip cavity		Insertion pitch	Tape thickness	
	A	B		T	K
160807	1.1±0.1 (0.043±0.004)	1.9±0.1 (0.075±0.004)	4.0±0.1 (0.157±0.004)	0.2±0.05 (0.008±0.002)	0.9 max (0.035 max)
160808	1.1±0.1 (0.043±0.004)	1.9±0.1 (0.075±0.004)	4.0±0.1 (0.157±0.004)	0.25±0.05 (0.010±0.002)	1.2 max (0.047 max)
201210	1.45±0.1 (0.057±0.004)	2.2±0.1 (0.087±0.004)	4.0±0.1 (0.157±0.004)	0.25±0.05 (0.010±0.002)	1.2 max (0.047 max)
201214	1.45±0.1 (0.057±0.004)	2.37±0.1 (0.093±0.004)	4.0±0.1 (0.157±0.004)	0.25±0.05 (0.010±0.002)	1.59 max (0.063 max)
201616	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)	1.9 max (0.075 max)
251810	2.3±0.1 (0.091±0.004)	2.8±0.1 (0.110±0.004)	4.0±0.1 (0.157±0.004)	0.25±0.05 (0.010±0.002)	1.3 max (0.051 max)
251812	2.3±0.1 (0.091±0.004)	2.8±0.1 (0.110±0.004)	4.0±0.1 (0.157±0.004)	0.3±0.05 (0.012±0.002)	1.45 max (0.057 max)
251815	2.1±0.1 (0.083±0.004)	2.8±0.1 (0.110±0.004)	4.0±0.1 (0.157±0.004)	0.3±0.05 (0.012±0.002)	1.7 max (0.067 max)
251818	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)	2.2 max (0.087 max)
322517	2.8±0.1 (0.110±0.004)	3.5±0.1 (0.138±0.004)	4.0±0.1 (0.157±0.004)	0.25±0.05 (0.010±0.002)	1.9 max (0.075 max)

Unit : mm (inch)

#### ④ Leader and Blank portion

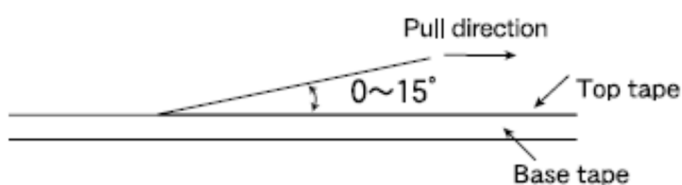


#### ⑤ Reel size



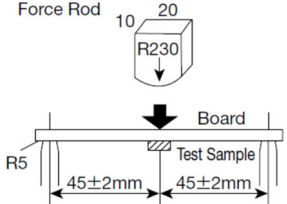
#### ⑥ Top Tape Strength

The top tape requires a peel-off force of 0.1 to 1.0N in the direction of the arrow as illustrated below.



**Wire-wound Ferrite Power Inductors LSQPB series for General Electronic Equipment for Consumer**  
**Wire-wound Ferrite Power Inductors LLQPB series**  
**for Medical Devices classified as GHTF Classes A or B (Japan Classes I or II)**

■ RELIABILITY DATA

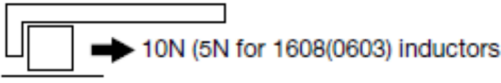
1. Operating Temperature Range	
Specified Value	-40~+105°C
Test Methods and Remarks	Including self-generated heat
2. Storage Temperature Range (after soldering)	
Specified Value	-40~+85°C
Test Methods and Remarks	Please refer the term of "7.Storage conditions" in Precautions.
3. Rated current	
Specified Value	Within the specified tolerance
4. Inductance	
Specified Value	Within the specified tolerance
Test Methods and Remarks	Measuring equipment : LCR Meter (HP 4285A or equivalent) Measuring frequency : Specified frequency
5. DC Resistance	
Specified Value	Within the specified tolerance
Test Methods and Remarks	Measuring equipment : DC ohmmeter (HIOKI 3227 or equivalent)
6. Self resonance frequency	
Specified Value	Within the specified tolerance
Test Methods and Remarks	Measuring equipment : Impedance analyzer/material analyzer (HP4291A or equivalent HP4191A, 4192A or equivalent)
7. Temperature characteristic	
Specified Value	Inductance change : Within $\pm 15\%$
Test Methods and Remarks	Based on the inductance at 20°C and Measured at the ambient of -40°C~+85°C.
8. Resistance to the bendability	
Specified Value	No damage.
Test Methods and Remarks	The given sample is soldered on the board and then the back side of the board is pushed until it bends 2mm like the figure. Dimension of the board : 100 × 40 × 1.0mm (0.8mm thickness for 1608(0603) inductors) Material of the board : Glass epoxy-resin Thickness of soldering paste : 0.12mm 

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

### 9. Body strength

Specified Value	No damage.
Test Methods and Remarks	2012~ Applied orce : 10N Duration : 10sec. 1608 size Applied force : 5N Duration : 10sec.

### 10. Adhesion of terminal electrodes

Specified Value	Not to removed from the board.
Test Methods and Remarks	The given sample is soldered to the board and then it is kept for 5sec with 10N stress (5N for 1608(0603) inductors) like the figure. 

### 11. Resistance to vibration

Specified Value	Inductance change : Within $\pm 10\%$ No significant abnormality in appearance.														
Test Methods and Remarks	The given sample is soldered to the board and then it is tested depending on the conditions of the following table. <table border="1" data-bbox="295 772 1173 952"> <tr> <td>Vibration Frequency</td> <td colspan="2">10~55Hz</td> </tr> <tr> <td>Total Amplitude</td> <td colspan="2">1.5mm (May not exceed acceleration 196m/s<sup>2</sup>)</td> </tr> <tr> <td>Sweeping Method</td> <td colspan="2">10Hz to 55Hz to 10Hz for 1min.</td> </tr> <tr> <td rowspan="3">Time</td> <td>X</td> <td rowspan="3">For 2 hours on each X, Y, and Z axis.</td> </tr> <tr> <td>Y</td> </tr> <tr> <td>Z</td> </tr> </table> <p>Recovery : At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48hrs.</p>	Vibration Frequency	10~55Hz		Total Amplitude	1.5mm (May not exceed acceleration 196m/s <sup>2</sup> )		Sweeping Method	10Hz to 55Hz to 10Hz for 1min.		Time	X	For 2 hours on each X, Y, and Z axis.	Y	Z
Vibration Frequency	10~55Hz														
Total Amplitude	1.5mm (May not exceed acceleration 196m/s <sup>2</sup> )														
Sweeping Method	10Hz to 55Hz to 10Hz for 1min.														
Time	X	For 2 hours on each X, Y, and Z axis.													
	Y														
	Z														

### 12. Solderability

Specified Value	At least 90% area of the electrodes is covered by new solder.				
Test Methods and Remarks	Test Method and Remarks】 The given sample is dipped into the flux and then it is tested depending on the conditions of the following table. Flux : Ethanol solution containing rosin 25%. <table border="1" data-bbox="295 1176 710 1232"> <tr> <td>Solder Temperature</td> <td>245<math>\pm</math>5<math>^{\circ}</math>C</td> </tr> <tr> <td>Time</td> <td>5<math>\pm</math>0.5 sec.</td> </tr> </table>	Solder Temperature	245 $\pm$ 5 $^{\circ}$ C	Time	5 $\pm$ 0.5 sec.
Solder Temperature	245 $\pm$ 5 $^{\circ}$ C				
Time	5 $\pm$ 0.5 sec.				

### 13. Resistance to soldering heat

Specified Value	Inductance change : Within $\pm 10\%$ No significant abnormality in appearance.
Test Methods and Remarks	3 times reflow having the temperature profile of 5sec of 260 $\pm$ 0/ $-5^{\circ}$ C and 40sec of more than 230 $^{\circ}$ C. Test board thickness : 1.0mm Test board material : Glass epoxy-resin Recovery : At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48hrs.

### 14. Thermal shock

Specified Value	Inductance change : Within $\pm 10\%$ No significant abnormality in appearance.																		
Test Methods and Remarks	The given sample is soldered to the board and then its Inductance is measured after 100cycles of the following conditions. <table border="1" data-bbox="295 1668 901 1836"> <thead> <tr> <th colspan="3">Conditions of 1 cycle</th> </tr> <tr> <th>Step</th> <th>Temperature (<math>^{\circ}</math>C)</th> <th>Duration (min)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-40<math>\pm</math>3</td> <td>30<math>\pm</math>3</td> </tr> <tr> <td>2</td> <td>Room temperature</td> <td>Within 3</td> </tr> <tr> <td>3</td> <td>+85<math>\pm</math>2</td> <td>30<math>\pm</math>3</td> </tr> <tr> <td>4</td> <td>Room temperature</td> <td>Within 3</td> </tr> </tbody> </table> <p>Recovery : At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48 hrs.</p>	Conditions of 1 cycle			Step	Temperature ( $^{\circ}$ C)	Duration (min)	1	-40 $\pm$ 3	30 $\pm$ 3	2	Room temperature	Within 3	3	+85 $\pm$ 2	30 $\pm$ 3	4	Room temperature	Within 3
Conditions of 1 cycle																			
Step	Temperature ( $^{\circ}$ C)	Duration (min)																	
1	-40 $\pm$ 3	30 $\pm$ 3																	
2	Room temperature	Within 3																	
3	+85 $\pm$ 2	30 $\pm$ 3																	
4	Room temperature	Within 3																	

**15. Damp heat**

Specified Value	Inductance change : Within $\pm 10\%$ No significant abnormality in appearance.
Test Methods and Remarks	The given sample is soldered to the board and then it is kept at the following conditions.
	Temperature $60 \pm 2^\circ\text{C}$
	Humidity 90~95%RH
	Time 1000 hours.
	Recovery : At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48 hrs.

**16. Loading under damp heat**

Specified Value	Inductance change : Within $\pm 10\%$ No significant abnormality in appearance.
Test Methods and Remarks	The given sample is soldered to the board and then it is kept at the following conditions.
	Temperature $60 \pm 2^\circ\text{C}$
	Humidity 90~95%RH
	Applied current Rated current
	Time 1000hours.
	Recovery : At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48 hrs.

**17. Low temperature life test**

Specified Value	Inductance change : Within $\pm 10\%$ No significant abnormality in appearance.
Test Methods and Remarks	The given sample is soldered to the board and then it is kept at the following conditions.
	Temperature $-40 \pm 2^\circ\text{C}$
	Duration 1000hours
	Recovery : At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48 hrs.

**18. High temperature life test**

Specified Value	Inductance change : Within $\pm 10\%$ No significant abnormality in appearance.
Test Methods and Remarks	The given sample is soldered to the board and then it is kept at the following conditions.
	Temperature $85 \pm 2^\circ\text{C}$
	Duration 1000hours
	Recovery : At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48 hrs.

**19. Standard conditions**

Specified Value	Standard test condition : Unless otherwise specified, temperature is $20 \pm 15^\circ\text{C}$ and $65 \pm 20\%$ of relative humidity. When there is any question concerning measurement result: In order to provide correlation data, the test shall be condition of $20 \pm 2^\circ\text{C}$ of temperature, $65 \pm 5\%$ relative humidity. Inductance is in accordance with our measured value.
-----------------	--

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

# Wire-wound Ferrite Power Inductors LSQPB/LLQPB series

## ■ PRECAUTIONS

### 1. Circuit Design

Precautions	<ul style="list-style-type: none"> <li>◆ Verification of operating environment, electrical rating and performance               <ol style="list-style-type: none"> <li>1. A malfunction in medical equipment, spacecraft, nuclear reactors, etc. may cause serious harm to human life or have severe social ramifications. As such, any inductors to be used in such equipment may require higher safety and/or reliability considerations and should be clearly differentiated from components used in general purpose applications.</li> <li>2. When inductors are used in places where dew condensation develops and/or where corrosive gas such as hydrogen sulfide, sulfurous acid, or chlorine exists in the air, characteristic deterioration may occur. Please do not use inductors under such environmental conditions.</li> </ol> </li> <li>◆ Operating Current (Verification of Rated current)               <ol style="list-style-type: none"> <li>1. The operating current including inrush current for inductors must always be lower than their rated values.</li> <li>2. Do not apply current in excess of the rated value because the inductance may be reduced due to the magnetic saturation effect.</li> </ol> </li> <li>◆ Temperature rise               <p>Temperature rise of power choke coil depends on the installation condition in end products. Make sure that temperature rise of power choke coils in actual end products is within the specified temperature range.</p> </li> </ul>
-------------	---

### 2. PCB Design

Precautions	<ul style="list-style-type: none"> <li>◆ Land pattern design               <ol style="list-style-type: none"> <li>1. Please refer to a recommended land pattern.</li> </ol> </li> </ul>
Technical considerations	<ul style="list-style-type: none"> <li>◆ Land pattern design</li> <li>Surface Mounting               <ol style="list-style-type: none"> <li>1. The conditions of the picking and placing should be checked in advance.</li> <li>2. The products are only for reflow soldering.</li> </ol> </li> </ul>

### 3. Considerations for automatic placement

Precautions	<ul style="list-style-type: none"> <li>◆ Adjustment of mounting machine               <ol style="list-style-type: none"> <li>1. Excessive physical impact should not be imposed on the products for picking and placing onto the PC boards.</li> <li>2. Mounting and soldering conditions should be checked in advance.</li> </ol> </li> </ul>
Technical considerations	<ul style="list-style-type: none"> <li>◆ Adjustment of mounting machine               <p>The products might be broken if too much stress is given for the picking and placing.</p> </li> </ul>

### 4. Soldering

Precautions	<ul style="list-style-type: none"> <li>◆ Reflow soldering               <ol style="list-style-type: none"> <li>1. Please apply our recommended soldering conditions on the specification as much as possible.</li> <li>2. The products are only for reflow soldering.</li> <li>3. Please do not give any stress to a product until it returns in room temperature after reflow soldering.</li> </ol> </li> <li>◆ Recommended conditions for using a soldering iron. (Excluding 1608 type)               <p>Touch a soldering iron to the land pattern not to the product directly. The temperature of a soldering iron is less than 350degC. The soldering is for 3 seconds or less.</p> </li> </ul>
Technical considerations	<ul style="list-style-type: none"> <li>◆ Reflow soldering               <ol style="list-style-type: none"> <li>1. The product might break or might make the tombstoning, if the soldering conditions are too far from our recommended conditions.</li> </ol> </li> </ul> <p style="text-align: center;">Temperature [°C]</p> <p style="text-align: center;">Heating Time [sec]</p>

### 5. Cleaning

Precautions	<ul style="list-style-type: none"> <li>◆ Cleaning conditions               <ol style="list-style-type: none"> <li>1. Please don't wash by the ultra-sonic waves.</li> </ol> </li> </ul>
Technical considerations	<ul style="list-style-type: none"> <li>◆ Cleaning conditions               <ol style="list-style-type: none"> <li>1. Washing by the ultra-sonic waves might break the product.</li> </ol> </li> </ul>

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

## 6. Handling

Precautions	<ul style="list-style-type: none"> <li>◆ Handling               <ol style="list-style-type: none"> <li>1. Keep the product away from any magnets.</li> </ol> </li> <li>◆ Cutting the PC boards               <ol style="list-style-type: none"> <li>1. Please don't give any stress of the bending or the twisting for the cutting process of PC boards.</li> <li>2. Please don't give any shock and stress to the products in transportation.</li> </ol> </li> <li>◆ Mechanical considerations               <ol style="list-style-type: none"> <li>1. Please don't give too much shock to the product.</li> <li>2. Please don't give any shock and stress to the products in transportation.</li> </ol> </li> <li>◆ The stress for picking and placing               <ol style="list-style-type: none"> <li>1. Please don't give any shock into an exposed ferrite core.</li> </ol> </li> <li>◆ Packing               <ol style="list-style-type: none"> <li>1. Please don't pile the packing boxes up as much as possible.</li> </ol> </li> </ul>
Technical considerations	<ul style="list-style-type: none"> <li>◆ Handling               <ol style="list-style-type: none"> <li>1. There is a case that a characteristic varies with magnetic influence.</li> </ol> </li> <li>◆ Cutting the PC boards               <ol style="list-style-type: none"> <li>1. Please don't give the bending stress or the twisting stress to the products because they might break in such cases.</li> </ol> </li> <li>◆ Mechanical considerations               <ol style="list-style-type: none"> <li>1. The mechanical shock might break the products.</li> <li>2. The products might break depending on the handling in transportation.</li> </ol> </li> <li>◆ Pick-up pressure               <ol style="list-style-type: none"> <li>1. The electrical characteristics of the products might be shifted by too much physical shock and stress.</li> </ol> </li> <li>◆ Packing               <ol style="list-style-type: none"> <li>1. The products and the tape might break, if the packing boxes are piled up.</li> </ol> </li> </ul>

## 7. Storage conditions

Precautions	<ul style="list-style-type: none"> <li>◆ Storage               <ol style="list-style-type: none"> <li>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.                   <ul style="list-style-type: none"> <li>▪ Recommended conditions                       <ul style="list-style-type: none"> <li>Ambient temperature : 0~40°C</li> <li>Humidity : Below 70% RH</li> </ul> </li> <li>▪ The ambient temperature must be kept below 30°C. Even under ideal storage conditions, solderability of products electrodes may decrease as time passes.                           <ul style="list-style-type: none"> <li>For this reason, product should be used within 6 months from the time of delivery.</li> <li>In case of storage over 6 months, solderability shall be checked before actual usage.</li> </ul> </li> </ul> </li> </ol> </li> </ul>
Technical considerations	<ul style="list-style-type: none"> <li>◆ Storage               <ol style="list-style-type: none"> <li>1. The ambient of high temperature or high humidity might accelerate to make the solderability and the tape worse.</li> </ol> </li> </ul>