

# Notice for TAIYO YUDEN products

Please read this notice before using the TAIYO YUDEN products.

## REMINDERS

- Product information in this catalog is as of October 2009. All of the contents specified herein are subject to change without notice due to technical improvements, etc. Therefore, please check for the latest information carefully before practical application or usage of the Products.

Please note that Taiyo Yuden Co., Ltd. shall not be responsible for any defects in products or equipment incorporating such products, which are caused under the conditions other than those specified in this catalog or individual specification.

- Please contact Taiyo Yuden Co., Ltd. for further details of product specifications as the individual specification is available.
- Please conduct validation and verification of products in actual condition of mounting and operating environment before commercial shipment of the equipment.
- All electronic components or functional modules listed in this catalog are developed, designed and intended for use in general electronics equipment.(for AV, office automation, household, office supply, information service, telecommunications, (such as mobile phone or PC) etc.). Before incorporating the components or devices into any equipment in the field such as transportation,( automotive control, train control, ship control), transportation signal, disaster prevention, medical, public information network (telephone exchange, base station) etc. which may have direct influence to harm or injure a human body, please contact Taiyo Yuden Co., Ltd. for more detail in advance. Do not incorporate the products into any equipment in fields such as aerospace, aviation, nuclear control, submarine system, military, etc. where higher safety and reliability are especially required.

In addition, even electronic components or functional modules that are used for the general electronic equipment, if the equipment or the electric circuit require high safety or reliability function or performances, a sufficient reliability evaluation check for safety shall be performed before commercial shipment and moreover, due consideration to install a protective circuit is strongly recommended at customer's design stage.

- The contents of this catalog are applicable to the products which are purchased from our sales offices or distributors (so called "TAIYO YUDEN' s official sales channel").  
It is only applicable to the products purchased from any of TAIYO YUDEN' s official sales channel.
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- Caution for export  
Certain items in this catalog may require specific procedures for export according to "Foreign Exchange and Foreign Trade Control Law" of Japan, "U.S. Export Administration Regulations", and other applicable regulations. Should you have any question or inquiry on this matter, please contact our sales staff.  
Should you have any question or inquiry on this matter, please contact our sales staff.

# WOUND CHIP INDUCTORS FOR SIGNAL LINE (LB/LE SERIES M TYPE)



LB: REFLOW LE: WAVE REFLOW

## FEATURES

- **LBM2016 Series**  
High Q and narrow tolerance are achieved by adopting bottom-surface electrode structure. Wound Chip Inductors that are suitable for module design of signal line uses.
- **LEM2520 Series**  
A high-quality inductor that is simple to mass-produce and conforms to the same production process and basic construction as an axial lead type inductor.

## APPLICATIONS

- DSC/DVC/HDD, LCD, portable telephones, game equipment.  
Various audio-visual equipment, various communication equipment, etc.

## ORDERING CODE

L B M | 2 0 1 6 | T 1 0 0 | J △

①

① Type

LBM	Wound chip inductor for signal line
LEM	Wound chip inductor for signal line

②

② External Dimensions (mm)

2016	2.0×1.6
2520	2.5×2.0

③

③ Packaging

T	Tape & Reel
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④

④ Nominal Inductance (μH)

example	
R12	0.12
1R0	1.00
100	10.0

※R=decimal point

⑤

⑤ Inductance Tolerances

J	±5%
K	±10%

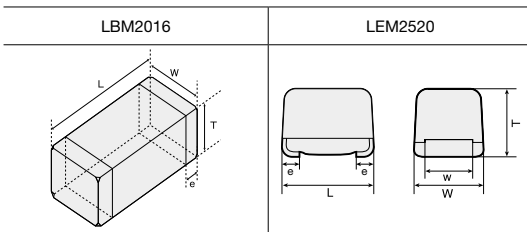
⑥

⑥ Internal code

△	Standard Products
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△=Blank space

## EXTERNAL DIMENSIONS/STANDARD QUANTITY



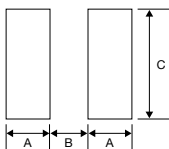
Type	L	W	T	e	W	Standard Quantity [pcs]	
						Paper Tape	Embossed Tape
LBM2016	2.0±0.2 (0.08±0.008)	1.6±0.2 (0.063±0.008)	1.6±0.2 (0.063±0.008)	0.5±0.2 (0.02±0.008)			
LEM2520	2.5±0.2 (0.098±0.008)	2.0±0.2 (0.079±0.008)	1.8±0.2 (0.071±0.008)	0.45 (0.018)	1.4±0.1 (0.055±0.004)		2000

Unit : mm (inch)

### Recommended Land Patterns

#### Surface Mounting

- Mounting and soldering conditions should be checked beforehand.
- Applicable soldering process to those products is reflow soldering only. (LB only)
- Recommended Land Patterns



Unit : mm

TYPE	A	B	C
LBM2016	0.7	0.8	1.8
LEM2520	0.9	1.5	1.5

## AVAILABLE CAPACITANCE RANGE

Range	Type	LBM2016		LEM2520	
		Idc [mA]	Rdc±30% [Ω]	Idc [mA]	Rdc±30% [Ω]
Ordinary type Inductance [μH]	0.12	610	0.13	520	0.37
	1.0	385	0.38	245	1.10
	10	215	1.20	155	3.50
	100	80	8.00	60	21.00
		100 μH		100 μH	

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**PART NUMBERS**

**LBM2016 TYPE**

Ordering code	EHS (Environmental Hazardous Substances)	Inductance (μH)	Inductance Tolerance	Q (min.)	Self-resonant frequency (MHz) min.	Resistance DC (Ω) (±30%)	Rated current (mA) (max.)	Measuring frequency (MHz)	
LB M2016TR12J	RoHS	0.12	±5%	30	600	0.13	610	25.2	
LB M2016TR15J	RoHS	0.15			550	0.15	570		
LB M2016TR18J	RoHS	0.18			500	0.15	560		
LB M2016TR22J	RoHS	0.22			450	0.20	520		
LB M2016TR27J	RoHS	0.27			425	0.21	510		
LB M2016TR33J	RoHS	0.33			400	0.21	490		
LB M2016TR39J	RoHS	0.39			375	0.26	440		
LB M2016TR47J	RoHS	0.47			350	0.26	430		
LB M2016TR56J	RoHS	0.56			300	0.29	410		
LB M2016TR68J	RoHS	0.68			270	0.32	400		
LB M2016TR82J	RoHS	0.82			250	0.34	390		
LB M2016T1R0J	RoHS	1.0			220	0.38	385		7.96
LB M2016T1R2J	RoHS	1.2			180	0.41	370		
LB M2016T1R5J	RoHS	1.5			135	0.47	350		
LB M2016T1R8J	RoHS	1.8			100	0.48	345		
LB M2016T2R2J	RoHS	2.2		75	0.54	340			
LB M2016T2R7J	RoHS	2.7		55	0.59	310			
LB M2016T3R3J	RoHS	3.3		48	0.68	290			
LB M2016T3R9J	RoHS	3.9		43	0.74	275			
LB M2016T4R7J	RoHS	4.7		40	0.78	270			
LB M2016T5R6J	RoHS	5.6		36	0.88	255	2.52		
LB M2016T6R8J	RoHS	6.8		33	0.97	240			
LB M2016T8R2J	RoHS	8.2		30	1.10	225			
LB M2016T100J	RoHS	10		27	1.20	215			
LB M2016T120J	RoHS	12		23	1.4	200			
LB M2016T150J	RoHS	15		20	1.5	190			
LB M2016T180J	RoHS	18		18	2.5	150			
LB M2016T220J	RoHS	22		17	2.8	140			
LB M2016T270J	RoHS	27		16	3.2	130			
LB M2016T330J	RoHS	33		15	3.6	125			
LB M2016T390J	RoHS	39	14	3.9	120	0.796			
LB M2016T470J	RoHS	47	13	4.1	115				
LB M2016T560J	RoHS	56	12	5.9	95				
LB M2016T680J	RoHS	68	11	7.0	90				
LB M2016T820J	RoHS	82	10	7.7	85				
LB M2016T101J	RoHS	100	15	9.0	8.0	80			

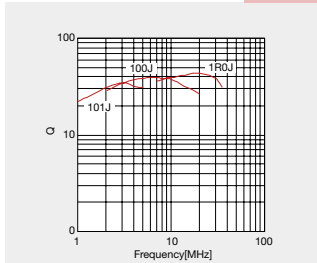
**LEM2520 TYPE**

Ordering code	EHS (Environmental Hazardous Substances)	Inductance (μH)	Inductance Tolerance	Q (min.)	Self-resonant frequency (MHz) min.	Resistance DC (Ω) (±30%)	Rated current (mA) (max.)	Measuring frequency (MHz)	
LEM 2520 TR12K	RoHS	0.12	±10%	30	600	0.37	520	25.2	
LEM 2520 TR15K	RoHS	0.15			550	0.42	480		
LEM 2520 TR18K	RoHS	0.18			500	0.46	460		
LEM 2520 TR22K	RoHS	0.22			450	0.52	430		
LEM 2520 TR27K	RoHS	0.27			425	0.56	420		
LEM 2520 TR33K	RoHS	0.33			400	0.60	400		
LEM 2520 TR39K	RoHS	0.39			375	0.65	375		
LEM 2520 TR47K	RoHS	0.47			350	0.68	350		
LEM 2520 TR56K	RoHS	0.56			300	0.75	325		
LEM 2520 TR68K	RoHS	0.68			270	0.85	300		
LEM 2520 TR82K	RoHS	0.82			250	1.00	260		7.96
LEM 2520 T1R0J	RoHS	1.0			220	1.10	245		
LEM 2520 T1R2J	RoHS	1.2			180	1.20	230		
LEM 2520 T1R5J	RoHS	1.5			135	1.30	220		
LEM 2520 T1R8J	RoHS	1.8			100	1.45	210		
LEM 2520 T2R2J	RoHS	2.2	75	1.55	200				
LEM 2520 T2R7J	RoHS	2.7	55	1.70	195				
LEM 2520 T3R3J	RoHS	3.3	48	1.90	185				
LEM 2520 T3R9J	RoHS	3.9	43	2.10	180				
LEM 2520 T4R7J	RoHS	4.7	40	2.30	175	2.52			
LEM 2520 T5R6J	RoHS	5.6	36	2.50	170				
LEM 2520 T6R8J	RoHS	6.8	33	2.70	165				
LEM 2520 T8R2J	RoHS	8.2	30	3.05	160				
LEM 2520 T100J	RoHS	10	27	3.50	155				
LEM 2520 T120J	RoHS	12	23	3.80	150				
LEM 2520 T150J	RoHS	15	20	4.40	140				
LEM 2520 T180J	RoHS	18	18	4.80	130				
LEM 2520 T220J	RoHS	22	17	5.50	125				
LEM 2520 T270J	RoHS	27	16	6.30	115				
LEM 2520 T330J	RoHS	33	15	7.10	110		0.796		
LEM 2520 T390J	RoHS	39	14	9.50	90				
LEM 2520 T470J	RoHS	47	13	11.10	80				
LEM 2520 T560J	RoHS	56	12	12.10	75				
LEM 2520 T680J	RoHS	68	11	16.60	70				
LEM 2520 T820J	RoHS	82	10	19.00	65				
LEM 2520 T101J	RoHS	100	15	9	21.00	60			

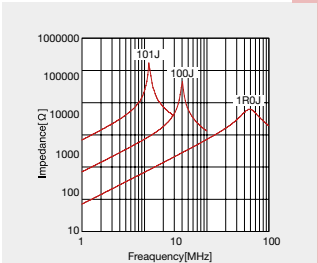
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● LBM2016

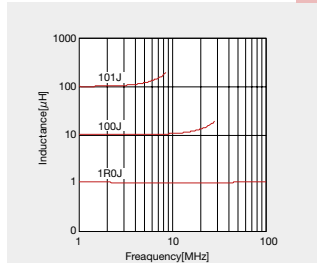
■ Q-vs-Frequency characteristics



■ Impedance-vs-Frequency characteristics

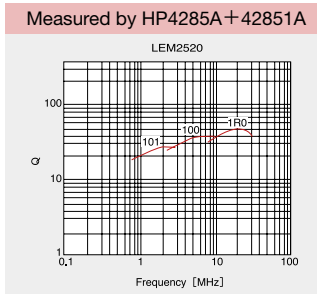


■ Inductance-vs-Frequency characteristics

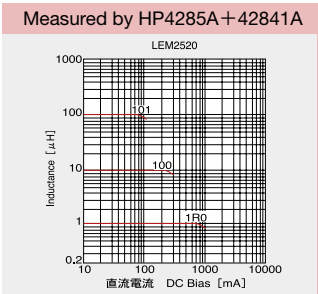


● LEM2520

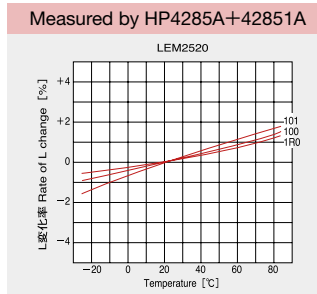
■ Q-vs-Frequency characteristics



■ DC Bias characteristics



■ Temperature characteristics



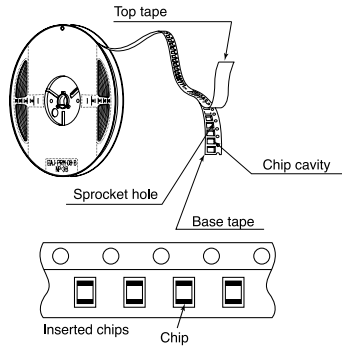
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① Minimum Quantity

Type	Standard Quantity [pcs]	
	Papar Tape	Embossed Tape
LBC3225/CBC3225	—	1000
LB3218	—	2000
LBR2518/LBC2518/LB251/CB2518/CBC2518/LEM2520	—	2000
LBM2016/LBC2016/LB2016/CB2016/CBC2016	—	2000
LB2012/LBC2012/LBR202/CB2012/CBC2012	—	3000
CBL2012	4000	—
LB1608	4000	—
LBMF1608/CBMF1608	—	3000

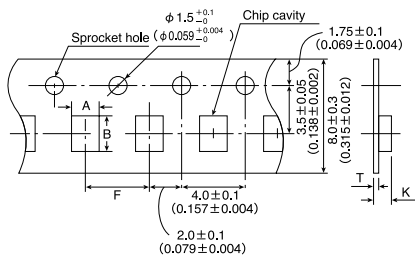
② Tape material

- Embossed tape



③ Taping Dimensions

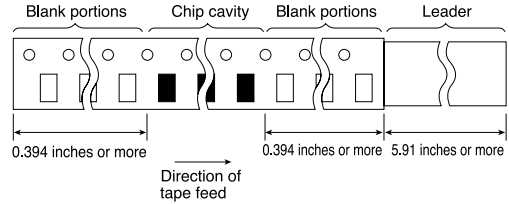
- Embossed Tape (0.315 inches wide)
- Card board carrier tape (0.315 inches wide)



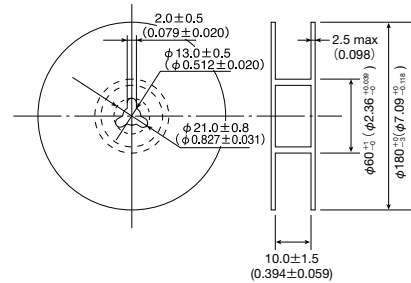
Type	Chip cavity		Insertion pitch F	Tape thickness	
	A	B		T	K
LBM 2016	1.75 ± 0.1 (0.069 ± 0.004)	2.1 ± 0.1 (0.083 ± 0.004)	4.0 ± 0.1 (0.157 ± 0.004)	0.3 ± 0.05 (0.012 ± 0.002)	1.9max. (0.074)
LEM 2520	2.3 ± 0.1 (0.091 ± 0.004)	2.7 ± 0.1 (0.106 ± 0.004)	4.0 ± 0.1 (0.157 ± 0.004)	0.3 ± 0.05 (0.012 ± 0.002)	2.1 ± 0.1 (0.083 ± 0.004)
LBC3225/ CBC3225	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. (0.157)
LB3218	2.1 ± 0.1 (0.084 ± 0.004)	3.5 ± 0.1 (0.014 ± 0.004)	4.0 ± 0.1 (0.157 ± 0.004)	0.3 ± 0.05 (0.012 ± 0.002)	2.2max. (0.086)
LB2518 / CB2518 LBC2518 / CBC2518 LBR2518	2.15 ± 0.1 (0.085 ± 0.004)	2.7 ± 0.1 (0.107 ± 0.004)	4.0 ± 0.1 (0.157 ± 0.004)	0.3 ± 0.05 (0.012 ± 0.002)	2.2max. (0.086)
LB2016/ CB2016 LBC2016 / CBC2016	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. (0.074)
LB2012 / CB2012 LBC2012 / CBC2012 LBR2012	1.45 ± 0.1 (0.058 ± 0.004)	2.25 ± 0.1 (0.09 ± 0.004)	4.0 ± 0.1 (0.157 ± 0.004)	0.25 ± 0.05 (0.010 ± 0.002)	1.45max. (0.057)
CBL2012	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. (0.044)	1.1max. (0.044)
LB1608	1.0 ± 0.1 (0.059 ± 0.004)	1.8 ± 0.1 (0.072 ± 0.004)	4.0 ± 0.1 (0.157 ± 0.004)	1.1max. (0.044)	1.1max. (0.044)
LBMF1608 / CBMF1608	1.1 ± 0.1 (0.04 ± 0.004)	1.9 ± 0.1 (0.076 ± 0.004)	4.0 ± 0.1 (0.157 ± 0.004)	0.25 ± 0.05 (0.010 ± 0.002)	1.2max. (0.047)

Unit : mm (inch)

④ Leader and Blank Portion

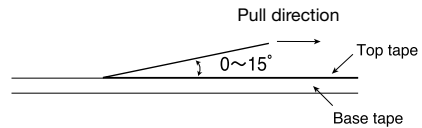


⑤ Reel Size



⑥ Top Tape Strength

The top tape requires a peel-off force 0.1 to 0.7N in the direction of the arrow as illustrated below.



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## RELIABILITY DATA

1. Operating temperature Range						
LEM2520						-40~+85°C
LB3218	LB2518	LB2016	LB2012	LB1608	LBMF1608	-25~+105°C (Including self-generated heat)
LBC3225	LBC2518	LBC2016	LBC2012			
LBR2518	LBR2012					
CB2518	CB2016	CB2012				
CBC3225	CBC2518	CBC2016	CBC2012			
CBL2012						
CBMF1608						
LBM2016						

2. Storage						
LEM2520						-40~+85°C
LB3218	LB2518	LB2016	LB2012	LB1608	LBMF1608	
LBC3225	LBC2518	LBC2016	LBC2012			
LBR2518	LBR2012					
CB2518	CB2016	CB2012				
CBC3225	CBC2518	CBC2016	CBC2012			
CBL2012						
CBMF1608						
LBM2016						

3. Rated Current						
LEM2520						Within the specified tolerance
LB3218	LB2518	LB2016	LB2012	LB1608	LBMF1608	
LBC3225	LBC2518	LBC2016	LBC2012			
LBR2518	LBR2012					
CB2518	CB2016	CB2012				
CBC3225	CBC2518	CBC2016	CBC2012			
CBL2012						
CBMF1608						
LBM2016						

**【Test Methods and Remarks】**

LEM Series The maximum DC value having inductance decrease within 10% and temperature increase within 20°C by the application of DC bias.

4. Inductance						
LEM2520						Within the specified tolerance
LB3218	LB2518	LB2016	LB2012	LB1608	LBMF1608	
LBC3225	LBC2518	LBC2016	LBC2012			
LBR2518	LBR2012					
CB2518	CB2016	CB2012				
CBC3225	CBC2518	CBC2016	CBC2012			
CBL2012						
CBMF1608						
LBM2016						

**【Test Methods and Remarks】**

LEM Series R12~101

Measuring equipment : LCR Meter (HP4285A+42851A or its equivalent)

Measuring frequency : Specified frequency

LB · LBC · LBR · CB · CBC · CBL · LBMF · CBMF · LBM Series

Measuring equipment : LCR Meter (HP4285A or its equivalent)

5. Q						
LEM2520						Within the specified tolerance
LB3218	LB2518	LB2016	LB2012	LB1608	LBMF1608	Within the specified tolerance
LBC3225	LBC2518	LBC2016	LBC2012			
LBR2518	LBR2012					
CB2518	CB2016	CB2012				
CBC3225	CBC2518	CBC2016	CBC2012			
CBL2012						
CBMF1608						
LBM2016						

**【Test Methods and Remarks】**

LEM Series R12~101 Measuring equipment : LCR Meter (HP4285A+42851A or its equivalent)

Measuring frequency : Specified frequency

LBM Series Measuring equipment : LCR Meter (HP4285A or its equivalent)

6. DC Resistance						
LEM2520						Within the specified tolerance
LB3218	LB2518	LB2016	LB2012	LB1608	LBMF1608	
LBC3225	LBC2518	LBC2016	LBC2012			
LBR2518	LBR2012					
CB2518	CB2016	CB2012				
CBC3225	CBC2518	CBC2016	CBC2012			
CBL2012						
CBMF1608						
LBM2016						

**【Test Methods and Remarks】**

LEM · LB · LBC · LBR · CB · CBC · CBL · LBM · LBMF · CBMF Series Measuring equipment : DC Ohmmeter (HIOKI 3227 or its equivalent)

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## RELIABILITY DATA

### 7. Self-Resonant Frequency

LEM2520						Within the specified tolerance
LB3218	LB2518	LB2016	LB2012	LB1608	LBMF1608	
LBC3225	LBC2518	LBC2016	LBC2012			
LBR2518	LBR2012					
CB2518	CB2016	CB2012				
CBC3225	CBC2518	CBC2016	CBC2012			
CBL2012						
CBMF1608						
LBM2016						

#### [Test Methods and Remarks]

LEM2520 Measuring equipment : Impedance analyzer (HP4291A or its equivalent)  
 LB · LBC · LBR · CB · CBC · CBL · LBMF · CBMF Series Measuring equipment : Impedance analyzer (HP4291A or its equivalent)  
 LBM Series Measuring equipment : Network analyzer (HP8720B or its equivalent)

### 8. Temperature Characteristic

LEM2520						Inductance change: Within ±5%
LB3218	LB2518	LB2016	LB2012	LB1608	LBMF1608	Inductance change: Within ±15% LBMF1608 · LB3218 Inductance change: Within ±20%
LBC3225	LBC2518	LBC2016	LBC2012			LBC3225 · LBC2518 · LBC2016 Inductance change: Within ±20% LBC2012 Inductance change: Within ±30%
LBR2518	LBR2012					Inductance change: Within ±15%
CB2518	CB2016	CB2012				Inductance change: Within ±15%
CBC3225	CBC2518	CBC2016	CBC2012			CBC3225 · CBC2518 · CBC2016 Inductance change: Within ±20% CBC2012 Inductance change: Within ±30%
CBL2012						Inductance change: Within ±15%
CBMF1608						Inductance change: Within ±20%
LBM2016						Inductance change: Within ±5%

#### [Test Methods and Remarks]

Change of maximum inductance deviation in step 1-5

Step	1	2	3	4	5
Temperature (°C)	20	-25	20 (Reference temperature)	+85 (Maximum operating temperature)	20

### 9. Resistance to Flexure of Substrate

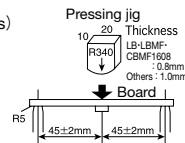
LEM2520						No damage.
LB3218	LB2518	LB2016	LB2012	LB1608	LBMF1608	
LBC3225	LBC2518	LBC2016	LBC2012			
LBR2518	LBR2012					
CB2518	CB2016	CB2012				
CBC3225	CBC2518	CBC2016	CBC2012			
CBL2012						
CBMF1608						
LBM2016						

#### [Test Methods and Remarks]

Warp : 2mm (LB · LBC · LBR · CB · CBC · CBL · LBM · LBMF · CBMF Series)  
 3mm (LEM2520)

Test substrate: Printed board

According to JIS C0051



### 10. Body Strength

LEM2520						No damage.
LB3218	LB2518	LB2016	LB2012	LB1608	LBMF1608	
LBC3225	LBC2518	LBC2016	LBC2012			
LBR2518	LBR2012					
CB2518	CB2016	CB2012				
CBC3225	CBC2518	CBC2016	CBC2012			
CBL2012						
CBMF1608						
LBM2016						

#### [Test Methods and Remarks]

LB · LBC · LBR · CB · CBC · CBL · LBM · LEM2520 Applied force : 10N

Duration : 10sec.

LB1608 · LBMF1608 · CBMF1608 Applied force : 5N

Duration : 10sec.

### 11. Self Resonant Frequency

LEM2520						Inductance change : Within—10%
LB3218	LB2518	LB2016	LB2012	LB1608	LBMF1608	
LBC3225	LBC2518	LBC2016	LBC2012			
LBR2518	LBR2012					
CB2518	CB2016	CB2012				
CBC3225	CBC2518	CBC2016	CBC2012			
CBL2012						
CBMF1608						
LBM2016						

#### [Test Methods and Remarks]

Measure inductance with application of rated current using LCR metre to compare it with the initial value.

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## RELIABILITY DATA

12. Adhesion of terminal electrode						
LEM2520						
LB3218	LB2518	LB2016	LB2012	LB1608	LBMF1608	No abnormality.
LBC3225	LBC2518	LBC2016	LBC2012			
LBR2518	LBR2012					
CB2518	CB2016	CB2012				
CBC3225	CBC2518	CBC2016	CBC2012			
CBL2012						
CBMF1608						
LBM2016						

**[Test Methods and Remarks]**

LB · LBC · LBR · CB · CBC · CBL · LBM · LBMF · CBF · LEM2520      Applied force : 10N to X and Y directions  
 Duration : 5 sec.  
 Test substrate : Printed board

LB1608 · CBF1608 · LBMF1608      Applied force : 5N to X and Y directions  
 Duration : 5 sec.  
 Test substrate : Printed board

13. Resistance to vibration							
LEM2520						Inductance change: Within ±5%      No significant abnormality in appearance.	
LB3218	LB2518	LB2016	LB2012	LB1608	LBMF1608	Inductance change: Within ±10%      No significant abnormality in appearance.	
LBC3225	LBC2518	LBC2016	LBC2012				
LBR2518	LBR2012						
CB2518	CB2016	CB2012					
CBC3225	CBC2518	CBC2016	CBC2012				
CBL2012							
CBMF1608							
LBM2016							Inductance change: Within ±5%      No significant abnormality in appearance.

**[Test Methods and Remarks]**

LEM · LB · LBC · LBR · CB · CBC · CBL · LBM · LBMF · CBF : 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.  
 LEM : Recovery  
 At least 1 hr of recovery under the standard condition after the test, followed by the measurement within 2 hrs.

14. Drop test						
LEM2520						Inductance change: Within ±5%      No significant abnormality in appearance.
LB3218	LB2518	LB2016	LB2012	LB1608	LBMF1608	/
LBC3225	LBC2518	LBC2016	LBC2012			
LBR2518	LBR2012					
CB2518	CB2016	CB2012				
CBC3225	CBC2518	CBC2016	CBC2012			
CBL2012						
CBMF1608						
LBM2016						

**[Test Methods and Remarks]**

LEM :  
 Acceleration : 980m/sec<sup>2</sup>  
 Duration : 6msec  
 Number of times : 6 sides × 3 times  
 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.  
 LEM : Recovery  
 At least 1 hr of recovery under the standard condition after the test, followed by the measurement within 2 hrs.

15. Solderability						
LEM2520						At least 90% of surface of terminal electrode is covered by new
LB3218	LB2518	LB2016	LB2012	LB1608	LBMF1608	
LBC3225	LBC2518	LBC2016	LBC2012			
LBR2518	LBR2012					
CB2518	CB2016	CB2012				
CBC3225	CBC2518	CBC2016	CBC2012			
CBL2012						
CBMF1608						
LBM2016						

**[Test Methods and Remarks]**

LEM :  
 Solder temperature : 230±5°C  
 Duration : 5±0.5sec.  
 Flux : Methanol solution with 25% of colophony

LB · LBC · LBR · CB · CBC · CBL · LBM · LBMF · CBF :  
 Solder temperature : 245±5°C  
 Duration : 5±0.5sec  
 Flux : Methanol solution with 25% of colophony

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## RELIABILITY DATA

16. Resistance to soldering heat						
LEM2520						
No significant abnormality in appearance.						
LB3218	LB2518	LB2016	LB2012	LB1608	LBMF1608	
LB3218, LB2518, LB2016, LB2012, LB1608						
Inductance change: Within $\pm 10\%$ No significant abnormality in appearance.						
LBMF1608						
Inductance change: Within $\pm 20\%$ No significant abnormality in appearance.						
LBC3225	LBC2518	LBC2016	LBC2012			
LBR2518	LBR2012					
CB2518	CB2016	CB2012				
CBC3225	CBC2518	CBC2016	CBC2012			
CBL2012						
CBMF1608						
Inductance change: Within $\pm 20\%$ No significant abnormality in appearance.						
LBM2016						
Inductance change: Within $\pm 5\%$ No significant abnormality in appearance.						

**[Test Methods and Remarks]**

LEM :

Reflow condition 3 times of reflow over at  $220 \pm 5^\circ\text{C}$  for 40sec. MAX, With Peak temperature at  $240 \pm 5^\circ\text{C}$  for 5 sec. MAX. (Refer to a Profile of chart below.)

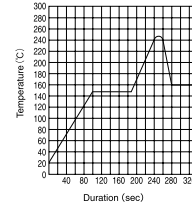
Flow condition

Solder temperature :  $260 \pm 5^\circ\text{C}$

Duration :  $10 \pm 1$ sec. Once

LB · LBC · LBR · CB · CBC · CBL · LBM · LBMF · CBF :

3 times of reflow oven at  $230^\circ\text{C}$  MIN for 40sec. with peak temperature at  $260^\circ\text{C}$  for 5sec.



17. Resistance to solvent						
LEM2520						
LB3218	LB2518	LB2016	LB2012	LB1608	LBMF1608	
LBC3225	LBC2518	LBC2016	LBC2012			
LBR2518	LBR2012					
CB2518	CB2016	CB2012				
CBC3225	CBC2518	CBC2016	CBC2012			
CBL2012						
CBMF1608						
LBM2016						
No significant abnormality in appearance						

**[Test Methods and Remarks]**

Solvent temperature : Room temperature

Type of solvent : Isopropyl alcohol

(LEM2520 · LB · LBC · LBR · CB · CBC · CBL · LBM · LBMF · CBF)

Cleaning conditions : 90s. Immersion and cleaning.

(LEM2520 · LB · LBC · LBR · CB · CBC · CBL · LBM · LBMF · CBF)

## 18. Thermal shock

LEM2520						
Inductance change : Within $\pm 10\%$						
Q → R12~4R7 : 30 min.						
5R6~330 : 25 min.						
390~820 : 20 min.						
101 : 15 min.						
LB3218	LB2518	LB2016	LB2012	LB1608	LBMF1608	
LBC3225	LBC2518	LBC2016	LBC2012			
LBR2518	LBR2012					
CB2518	CB2016	CB2012				
CBC3225	CBC2518	CBC2016	CBC2012			
CBL2012						
CBMF1608						
LBM2016						
Inductance change: Within $\pm 10\%$ No significant abnormality in appearance.						

**[Test Methods and Remarks]**

LEM : Conditions for 1cycle

Step	Temperature (°C)	Duration (min)
1	-40	30
2	+85	30

Number of cycle : 100 cycle

Recovery : At least 1 hr of recovery under the standard condition after the test, followed by the measurement within 2 hrs.

LB · LBC · LBR · CB · CBC · CBL · LBM · LBMF · CBF :  $-40 \sim +85^\circ\text{C}$ , 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.

## 19. Damp heat

LEM2520						
Inductance change : Within $\pm 10\%$						
Q → R12~4R7 : 30 min.						
5R6~330 : 25 min.						
390~820 : 20 min.						
101 : 15 min.						
LB3218	LB2518	LB2016	LB2012	LB1608	LBMF1608	
LBC3225	LBC2518	LBC2016	LBC2012			
LBR2518	LBR2012					
CB2518	CB2016	CB2012				
CBC3225	CBC2518	CBC2016	CBC2012			
CBL2012						
CBMF1608						
LBM2016						
Inductance change: Within $\pm 10\%$ No significant abnormality in appearance.						

**[Test Methods and Remarks]**

Temperature :  $60 \pm 2^\circ\text{C}$

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.

LEM : Recovery

At least 1 hr of recovery under the standard condition after the test, followed by the measurement within 2 hrs.

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**RELIABILITY DATA**

**20.Loading under damp heat**

LEM2520						Inductance change :Within±10% Q→ R12~4R7 : 30 min. 5R6~330 : 25 min. 390~820 : 20 min. 101 : 15 min.	
LB3218	LB2518	LB2016	LB2012	LB1608	LBMF1608	Inductance change:Within±10%      No significant abnormality in appearance.	
LBC3225	LBC2518	LBC2016	LBC2012				
LBR2518	LBR2012						
CB2518	CB2016	CB2012					
CBC3225	CBC2518	CBC2016	CBC2012				
CBL2012							
CBMF1608							
LBM2016							
[Test Methods and Remarks] LEM·LB·LBC·LBR·CB·CBC·CBL·LBM·LBMF·CBMF : Temperature : 60±2°C 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. LEM : Recovery At least 1 hr of recovery under the standard condition after the test, followed by the measurement within 2 hrs.							

**21.High temperature life test**

LEM2520						Inductance change :Within±10% Q→ R12~4R7 : 30 min. 5R6~330 : 25 min. 390~820 : 20 min. 101 : 15 min.	
LB3218	LB2518	LB2016	LB2012	LB1608	LBMF1608	Inductance change:Within±10%      No significant abnormality in appearance.	
LBC3225	LBC2518	LBC2016	LBC2012				
LBR2518	LBR2012						
CB2518	CB2016	CB2012					
CBC3225	CBC2518	CBC2016	CBC2012				
CBL2012							
CBMF1608							
LBM2016							
[Test Methods and Remarks] LEM·CB·CBC·CBL·LBM·CBMF : Temperature : 85±2°C Duration : 1000 hrs Recovery : At least 2 hrs of recovery under the standard condition after the test, followed by the measurement within 48 hrs. LEM : Recovery At least 1 hr of recovery under the standard condition after the test, followed by the measurement within 2 hrs.							

**22.Loading at high temperature**

LEM2520							
LB3218	LB2518	LB2016	LB2012	LB1608	LBMF1608	Inductance change:Within±10%      No significant abnormality in appearance.	
LBC3225	LBC2518	LBC2016	LBC2012				
LBR2518	LBR2012						
CB2518	CB2016	CB2012					
CBC3225	CBC2518	CBC2016	CBC2012				
CBL2012							
CBMF1608							
LBM2016							
[Test Methods and Remarks] LB·LBC·LBR·LBMF : Temperature : 85±2°C 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.							

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## RELIABILITY DATA

### 23. Low temperature life test

LEM2520						Inductance change :Within±10% Q→ R12~4R7 : 30 min. 5R6~330 : 25 min. 390~820 : 20 min. 101 : 15 min.
LB3218	LB2518	LB2016	LB2012	LB1608	LBMF1608	Inductance change:Within±10%      No significant abnormality in appearance.
LBC3225	LBC2518	LBC2016	LBC2012			
LBR2518	LBR2012					
CB2518	CB2016	CB2012				
CBC3225	CBC2518	CBC2016	CBC2012			
CBL2012						
CBMF1608						
LBM2016						

#### [Test Methods and Remarks]

LEM · LB · LBC · LBR · CB · CBC · CBL · LBM · LBMF · CBF

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.

LEM : Recovery

At least 1 hr of recovery under the standard condition after the test, followed by the measurement within 2 hrs.

### 24. Standard condition

LEM2520						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.
LB3218	LB2518	LB2016	LB2012	LB1608	LBMF1608	
LBC3225	LBC2518	LBC2016	LBC2012			
LBR2518	LBR2012					
CB2518	CB2016	CB2012				
CBC3225	CBC2518	CBC2016	CBC2012			
CBL2012						
CBMF1608						
LBM2016						

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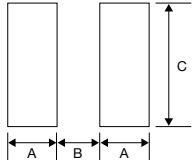
## PRECAUTIONS

### LEM Type, LB Type, CB Type

#### 1. Circuit Design

Precautions	<p>◆Operating environment</p> <p>1. The products described in this specification are intended for use in general electronic equipment,(office supply equipment, telecommunications systems, measuring equipment, and household equipment). They are not intended for use in mission-critical equipment or systems requiring special quality and high reliability (traffic systems, safety equipment, aerospace systems, nuclear control systems and medical equipment including life-support systems,) where product failure might result in loss of life, injury or damage. For such uses, contact TAIYO YUDEN Sales Department in advance.</p>
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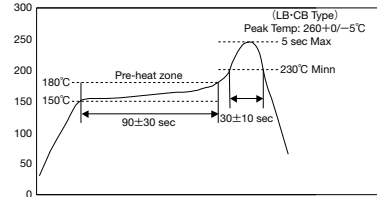
#### 2. PCB Design

Precautions	<p>◆Land pattern design</p> <p>1. Please contact any of our offices for a land pattern, and refer to a recommended land pattern of a right figure or specifications.</p>																																								
Technical considerations	<p>PRECAUTIONS [Recommended Land Patterns] Surface Mounting</p> <ul style="list-style-type: none"> <li>Mounting and soldering conditions should be checked beforehand.</li> <li>Applicable soldering process to those products is reflow soldering only.</li> <li>Recommended Land Patterns</li> </ul>  <table border="1" style="float: right; margin-left: 20px;"> <thead> <tr> <th colspan="4">Unit : mm</th> </tr> <tr> <th>TYPE</th> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>1608</td> <td>0.55</td> <td>0.7</td> <td>1.0</td> </tr> <tr> <td>MF1608</td> <td>0.55</td> <td>0.8</td> <td>0.9</td> </tr> <tr> <td>2012</td> <td>0.7</td> <td>0.8</td> <td>1.45</td> </tr> <tr> <td>2016</td> <td>0.7</td> <td>0.8</td> <td>1.8</td> </tr> <tr> <td>2518</td> <td>0.8</td> <td>1.2</td> <td>2.0</td> </tr> <tr> <td>LEM2520</td> <td>0.9</td> <td>1.5</td> <td>1.5</td> </tr> <tr> <td>3218</td> <td>1.0</td> <td>1.6</td> <td>2.0</td> </tr> <tr> <td>3225</td> <td>1.0</td> <td>1.6</td> <td>2.7</td> </tr> </tbody> </table>	Unit : mm				TYPE	A	B	C	1608	0.55	0.7	1.0	MF1608	0.55	0.8	0.9	2012	0.7	0.8	1.45	2016	0.7	0.8	1.8	2518	0.8	1.2	2.0	LEM2520	0.9	1.5	1.5	3218	1.0	1.6	2.0	3225	1.0	1.6	2.7
Unit : mm																																									
TYPE	A	B	C																																						
1608	0.55	0.7	1.0																																						
MF1608	0.55	0.8	0.9																																						
2012	0.7	0.8	1.45																																						
2016	0.7	0.8	1.8																																						
2518	0.8	1.2	2.0																																						
LEM2520	0.9	1.5	1.5																																						
3218	1.0	1.6	2.0																																						
3225	1.0	1.6	2.7																																						

#### 3. Considerations for automatic placement

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

#### 4. Soldering

Precautions	<p>◆Wave soldering (LEM Type only)</p> <p>1. For wave soldering, please apply conditions meeting the range of the specified conditions in our catalog or the relevant specifications.</p> <p>◆Reflow soldering (LB and CB Types)</p> <p>1. For reflow soldering with either leaded or lead-free solder, the profile specified in "point for controlling" is recommended.</p> <p>◆Reflow soldering (LEM)</p> <p>1. For reflow soldering, please apply conditions meeting the range of the specified conditions in our catalog or the relevant specifications.</p> <p>◆Recommended conditions for using a soldering iron</p> <p>1. Put the soldering iron on the land-pattern. Soldering iron's temperature-Below 350°C Duration-3 seconds or less. The soldering iron should not come in contact with inductor directly.</p>
Technical considerations	<p>◆Wave soldering (LEM Type only)</p> <p>1. Components can be damaged by excessive heat where soldering conditions exceed the specified range.</p> <p>◆Reflow soldering (LB and CB Types)</p> <p>1. Reflow profile</p>  <p>◆Recommended conditions for using a soldering iron</p> <p>1. Components can be damaged by excessive heat where soldering conditions exceed the specified range.</p>

#### 5. Cleaning

Precautions	<p>◆Cleaning conditions</p> <p>1. LEM Type, LB Type, CB Type Washing by supersonic waves shall be avoided.</p>
Technical considerations	<p>◆Cleaning conditions</p> <p>1. LEM Type, LB Type, CB Type If washing by supersonic waves, supersonic waves may cause broken products.</p>

#### 6. Handling

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

#### 7. Storage conditions

Precautions	<p>◆Storage</p> <p>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.</p> <ul style="list-style-type: none"> <li>Recommended conditions Ambient temperature : 0~40°C / Humidity : Below 70% RH</li> </ul> <p>The ambient temperature must be kept below 30°C Even under ideal storage conditions, solderability of products electrodes may decrease as time passes. For this reason, LE type inductors should be used within one year from the time of delivery.</p> <p>LB type : Should be used within 6 months from the time of delivery.</p> <p>LE type : In case of storage over 6 months, solderability shall be checked before actual usage.</p>
Technical considerations	<p>◆Storage</p> <p>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.</p>

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