

# 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 2011. 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.
- Please note that Taiyo Yuden Co., Ltd. shall have no responsibility for any controversies or disputes that may occur in connection with a third party's intellectual property rights and other related rights arising from your usage of products in this catalog. Taiyo Yuden Co., Ltd. grants no license for such rights.
- 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.

# LEADED COMMON MODE CHOKE COILS FOR AC LINES



WAVE

## FEATURES

- TLH10UAH TYPE : Thin configuration (Hybrid choke, Height 10mmMAX)
- TLH10UA(B) TYPE : Ordinary configuration (Hybrid choke)
- TLF10UAH TYPE : Thin configuration (Height 10mmMAX)
- TLF9UA(H) K1 TYPE : Small-sized configuration
- TLF14CB(H) K1 TYPE : Ordinary configuration
- TLF24HB(H) K1 TYPE : Large current capacity for power supply line use

## APPLICATIONS

- As a preventive measure against noise terminal voltage or power supply noise in TV's SW power supplies, NC machines, computer systems, peripheral units, measuring instruments, and controllers.

## OPERATING TEMP.

-25°C ~ +105°C (Including self-generated heat)

## ORDERING CODE

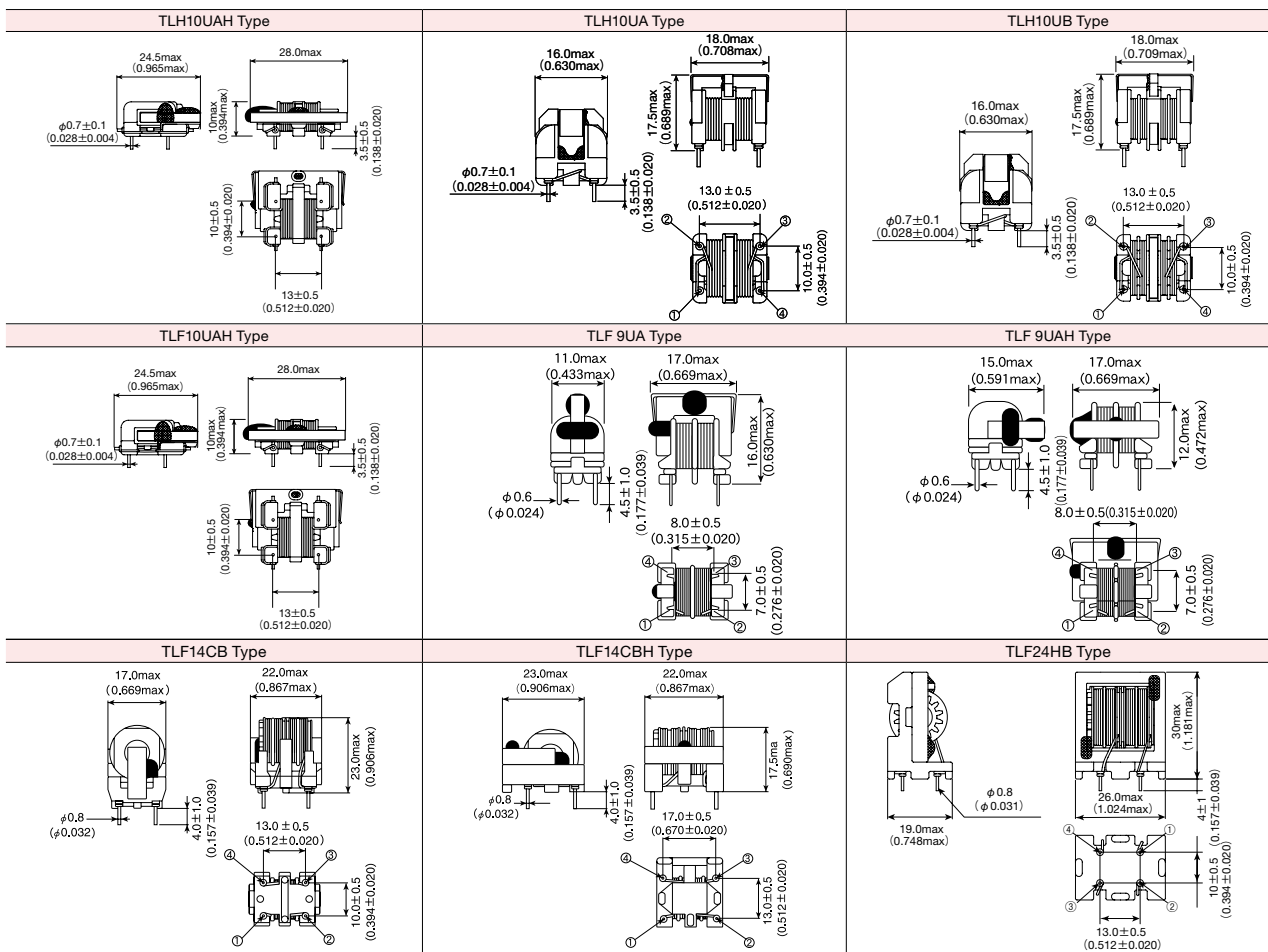
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1 Type		3 Shape		4 Nominal Inductance (μH)		5 Inductance tolerance (%)		6 Rated current (A)		7 Internal code	
TLF	Common mode choke	UA△	U core, vertical type	102	1000	△	Nominal Values or higher	R54	0.54	K1	Adhesive fixation
TLH	Hybrid choke	UAH	U core, horizontal type	103	10000	W	+100/-10	0R8	0.8		
		UB△	U core, vertically split wound			△=Blank space		※R=decimal point			
		CB△	Square type core vertically split wound								
		CBH	Square type core horizontally split wound								
		HB△	Double-square type core vertically split wound								
		HBH	Double-square type core horizontally split wound								

2 Core dimensions (mm)	
△9	9
10	10
14	14
24	24

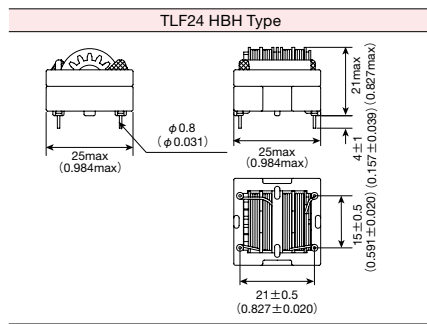
△=Blank space

## EXTERNAL DIMENSIONS/MINIMUM QUANTITY



Unit : mm (inch)

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Unit : mm (inch)

Type	Minimum Quantity (pcs.) Box
TLH Type	500
TLF Type	

## PART NUMBERS

### TLH10UAH Type (Hybrid choke)

Ordering code	EHS	Common Mode Inductance [mH]	Inductance Tolerance	Normal Mode Inductance [mH] (Typ.)	DC Resistance [Ω] (max.)	Rated current [A] (max.)	Rated voltage [V] (max.)	Applicable frequency [MHz] Reference
TLH10UAH872 0R7	RoHS	8.7	min.	0.70	1.00	0.7	AC250	0.1~10
TLH10UAH992 0R6	RoHS	9.9		0.85	1.35	0.6		
TLH10UAH123 0R5	RoHS	12.0		1.06	1.60	0.5		

### TLH10UA Type (Hybrid choke)

Ordering code	EHS	Common Mode Inductance [mH]	Inductance Tolerance	Normal Mode Inductance [mH] (Typ.)	DC Resistance [Ω] (max.)	Rated current [A] (max.)	Rated voltage [V] (max.)	Applicable frequency [MHz] Reference
TLH10UA 901 2R0	RoHS	0.9	min.	0.067	0.089	2.0	AC250	0.1~10
TLH10UA 112 1R8	RoHS	1.1		0.087	0.126	1.8		
TLH10UA 152 1R6	RoHS	1.5		0.126	0.171	1.6		
TLH10UA 212 1R4	RoHS	2.1		0.160	0.222	1.4		
TLH10UA 282 1R2	RoHS	2.8		0.215	0.272	1.2		
TLH10UA 432 1R0	RoHS	4.3		0.330	0.398	1.0		
TLH10UA 622 0R8	RoHS	6.2		0.430	0.578	0.8		
TLH10UA 872 0R7	RoHS	8.7		0.644	0.878	0.7		
TLH10UA 992 0R6	RoHS	9.9		0.836	1.138	0.6		
TLH10UA 143 0R5	RoHS	14.0		1.256	1.567	0.5		

### TLH10UB Type (Hybrid choke)

Ordering code	EHS	Common Mode Inductance [mH]	Inductance Tolerance	Normal Mode Inductance [mH] (Typ.)	DC Resistance [Ω] (max.)	Rated current [A] (max.)	Rated voltage [V] (max.)	Applicable frequency [MHz] Reference
TLH10UB 701 2R0	RoHS	0.7	min.	0.056	0.097	2.0	AC250	0.1~10
TLH10UB 112 1R7	RoHS	1.1		0.068	0.133	1.7		
TLH10UB 142 1R4	RoHS	1.4		0.113	0.214	1.4		
TLH10UB 232 1R2	RoHS	2.3		0.150	0.274	1.2		
TLH10UB 352 1R0	RoHS	3.5		0.232	0.422	1.0		
TLH10UB 442 0R8	RoHS	4.4		0.328	0.624	0.8		
TLH10UB 872 0R7	RoHS	8.7		0.580	0.982	0.7		
TLH10UB 972 0R6	RoHS	9.7		0.735	1.314	0.6		
TLH10UB 113 0R5	RoHS	11.0		0.877	1.577	0.5		

### TLF10UAH Type

Ordering code	EHS	Common Mode Inductance [mH]	Inductance Tolerance	DC Resistance [Ω] (max.)	Rated current [A] (max.)	Rated voltage [V] (max.)	Applicable frequency [MHz] Reference
TLF10UAH872 0R7	RoHS	8.7	min.	1.00	0.7	AC250	0.1~10
TLF10UAH992 0R6	RoHS	9.9		1.35	0.6		
TLF10UAH123 0R5	RoHS	12.0		1.60	0.5		

### TLF 9UA Type

Ordering code	EHS	Common Mode Inductance [mH]	Inductance Tolerance	DC Resistance [Ω] (max.)	Rated current [A] (max.)	Rated voltage [V] (max.)	Applicable frequency [MHz] Reference
TLF 9UA 102W0R8K1	RoHS	1.0	+100%/-10%	0.5	0.80	AC250	0.1~10
TLF 9UA 202WR54K1	RoHS	2.0		1.0	0.54		
TLF 9UA 302WR42K1	RoHS	3.0		1.5	0.42		
TLF 9UA 502WR32K1	RoHS	5.0		2.5	0.32		
TLF 9UA 802WR25K1	RoHS	8.0		4.0	0.25		
TLF 9UA 103WR23K1	RoHS	10.0		4.5	0.23		

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## PART NUMBERS

### ● TLF 9UAH Type

Ordering code	EHS	Common Mode Inductance [mH]	Inductance Tolerance	DC Resistance [ $\Omega$ ] (max.)	Rated current [A] (max.)	Rated voltage [V] (max.)	Applicable frequency [MHz] Reference
TLF 9UAH102W0R8K1	RoHS	1.0	+100%/−10%	0.5	0.80	AC250	0.1~10
TLF 9UAH202WR54K1	RoHS	2.0		1.0	0.54		
TLF 9UAH302WR42K1	RoHS	3.0		1.5	0.42		
TLF 9UAH502WR32K1	RoHS	5.0		2.5	0.32		
TLF 9UAH802WR25K1	RoHS	8.0		4.0	0.25		
TLF 9UAH103WR23K1	RoHS	10.0		4.5	0.23		

### ● TLF14CB Type

Ordering code	EHS	Common Mode Inductance [mH]	Inductance Tolerance	DC Resistance [ $\Omega$ ] (max.)	Rated current [A] (max.)	Rated voltage [V] (max.)	Applicable frequency [MHz] Reference
TLF14CB 102 1R5K1	RoHS	1.0	min.	0.10	1.5	AC250	0.1~10
TLF14CB 222 1R2K1	RoHS	2.2		0.18	1.2		
TLF14CB 332 1R0K1	RoHS	3.3		0.32	1.0		
TLF14CB 472 1R0K1	RoHS	4.7		0.38	1.0		
TLF14CB 562 0R8K1	RoHS	5.6		0.42	0.8		
TLF14CB 682 0R8K1	RoHS	6.8		0.60	0.8		
TLF14CB 103 0R7K1	RoHS	10.0		0.85	0.7		
TLF14CB 223 0R4K1	RoHS	22.0		1.7	0.4		
TLF14CB 333 0R3K1	RoHS	33.0		2.7	0.3		
TLF14CB 473 0R2K1	RoHS	47.0		3.6	0.2		
TLF14CB 563 0R2K1	RoHS	56.0		5.0	0.2		
TLF14CB 683 0R2K1	RoHS	68.0		6.5	0.2		

### ● TLF14CBH Type

Ordering code	EHS	Common Mode Inductance [mH]	Inductance Tolerance	DC Resistance [ $\Omega$ ] (max.)	Rated current [A] (max.)	Rated voltage [V] (max.)	Applicable frequency [MHz] Reference
TLF14CBH102 1R5K1	RoHS	1.0	min.	0.10	1.5	AC250	0.1~10
TLF14CBH222 1R2K1	RoHS	2.2		0.18	1.2		
TLF14CBH332 1R0K1	RoHS	3.3		0.32	1.0		
TLF14CBH472 1R0K1	RoHS	4.7		0.38	1.0		
TLF14CBH562 0R8K1	RoHS	5.6		0.42	0.8		
TLF14CBH682 0R8K1	RoHS	6.8		0.60	0.8		
TLF14CBH103 0R7K1	RoHS	10.0		0.85	0.7		
TLF14CBH223 0R4K1	RoHS	22.0		1.7	0.4		
TLF14CBH333 0R3K1	RoHS	33.0		2.7	0.3		
TLF14CBH473 0R2K1	RoHS	47.0		3.6	0.2		
TLF14CBH563 0R2K1	RoHS	56.0		5.0	0.2		
TLF14CBH683 0R2K1	RoHS	68.0		6.5	0.2		

### ● TLF24HB Type

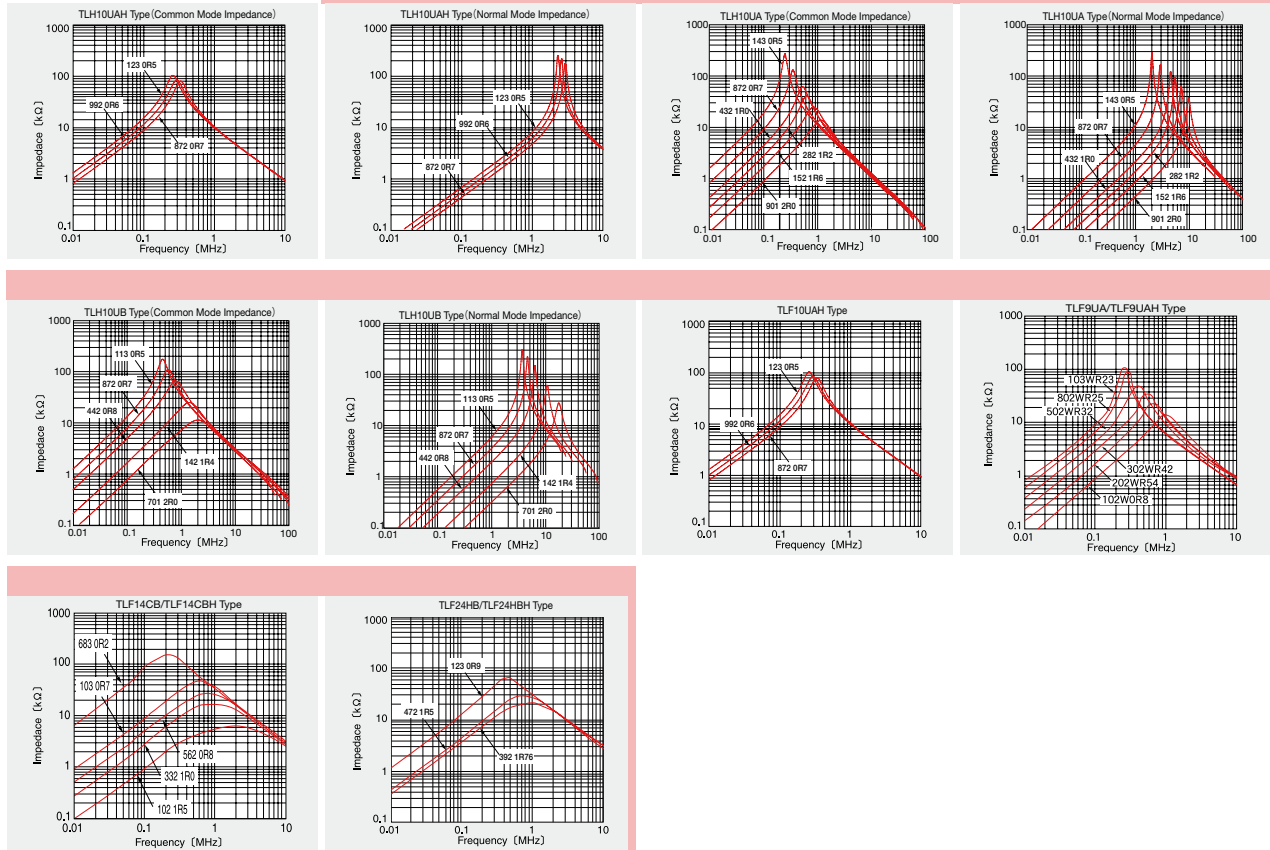
Ordering code	EHS	Common Mode Inductance [mH]	Inductance Tolerance	DC Resistance [ $\Omega$ ] (max.)	Rated current [A] (max.)	Rated voltage [V] (max.)	Applicable frequency [MHz] Reference
TLF24HB 122 3R0K1	RoHS	1.2	min.	0.045	3.0	AC250	0.1~10
TLF24HB 222 2R2K1	RoHS	2.2		0.080	2.2		
TLF24HB 272 2R0K1	RoHS	2.7		0.090	2.0		
TLF24HB 332 1R8K1	RoHS	3.3		0.120	1.8		
TLF24HB 392 1R5K1	RoHS	3.9		0.130	1.5		
TLF24HB 562 1R4K1	RoHS	5.6		0.187	1.4		
TLF24HB 682 1R2K1	RoHS	6.8		0.254	1.2		
TLF24HB 822 1R0K1	RoHS	8.2		0.275	1.0		
TLF24HB 103 1R0K1	RoHS	10.0		0.345	1.0		
TLF24HB 123 0R9K1	RoHS	12.0		0.350	0.9		
TLF24HB 183 0R8K1	RoHS	18.0		0.550	0.8		
TLF24HB 273 0R6K1	RoHS	27.0		0.880	0.6		
TLF24HB 333 0R5K1	RoHS	33.0		1.150	0.5		

### ● TLF24HBH Type

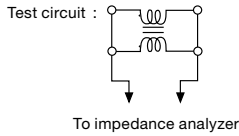
Ordering code	EHS	Common Mode Inductance [mH]	Inductance Tolerance	DC Resistance [ $\Omega$ ] (max.)	Rated current [A] (max.)	Rated voltage [V] (max.)	Applicable frequency [MHz] Reference
TLF24HBH122 3R0K1	RoHS	1.2	min.	0.045	3.0	AC250	0.1~10
TLF24HBH222 2R2K1	RoHS	2.2		0.080	2.2		
TLF24HBH272 2R0K1	RoHS	2.7		0.090	2.0		
TLF24HBH332 1R8K1	RoHS	3.3		0.120	1.8		
TLF24HBH392 1R5K1	RoHS	3.9		0.130	1.5		
TLF24HBH562 1R4K1	RoHS	5.6		0.187	1.4		
TLF24HBH682 1R2K1	RoHS	6.8		0.254	1.2		
TLF24HBH822 1R0K1	RoHS	8.2		0.275	1.0		
TLF24HBH103 1R0K1	RoHS	10.0		0.345	1.0		
TLF24HBH123 0R9K1	RoHS	12.0		0.350	0.9		
TLF24HBH183 0R8K1	RoHS	18.0		0.550	0.8		
TLF24HBH273 0R6K1	RoHS	27.0		0.880	0.6		
TLF24HBH333 0R5K1	RoHS	33.0		1.150	0.5		

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Impedance-Frequency characteristic



Test conditions  
Equipment : HP-4294A



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**PACKAGING**

Minimum Quantity

● CM/BU Type

Type	Minimum Quantity (pcs.)	
	Box	Bulk
CM05RA06	—	500
CM05RB□□	1000	—
CM08RA□□	—	250
CM08RB□□	500	—
CM12RA02	—	100
BU08RA□□	—	200

● TL Type

Type	Minimum Quantity (pcs.) Box
TLH10UA□	500
TLH10UB	
TLF10UAH	
TLF9UA□	
TLF9UB□	
TLF14CB□	
TLF24HB□	

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## RELIABILITY DATA

### 1. Operating Temperature Range

CM-RA/BU-RA Type	-25~+105°C
CM-RB Type	
TLH, TLF Type	

#### [Test method and remarks]

Including temperature rise due to self-generated heat.

### 2. Storage temperature range

CM-RA/BU-RA Type	-40~+85°C
CM-RB Type	
TLH, TLF Type	

### 3. Rated current

CM-RA/BU-RA Type	Within the specified range
CM-RB Type	
TLH, TLF Type	

#### [Test method and remarks]

CM: The maximum value of DC current within a specified rise of temperature individually.  
 TLH10U, TLF10UAH: The maximum value of AC current within the temperature rise of 60°C  
 TLF9UA, 14CB: The maximum value of AC current within the temperature rise of 45°C  
 TLF9UB: The maximum value of DC current within the temperature rise of 45°C

### 4. Inductance

CM-RA/BU-RA Type	Within the specified tolerance
CM-RB Type	
TLH, TLF Type	

#### [Test method and remarks]

##### CM:

Measuring equipment : 4263A (HP) or its equivalent  
 Measuring frequency : 1kHz

##### TLF9U :

Measuring equipment : Impedance analyzer (HP4192A) or its equivalent  
 Measuring frequency : 1kHz  
 Measuring voltage : 0.35Vosc

##### TLH, TLF (except TLF9U) :

Measuring equipment : LCR meter 4284A or its equivalent  
 Measuring frequency : 1kHz  
 Measuring voltage : 1.0V

### 5. DC resistance

CM-RA/BU-RA Type	Within the specified tolerance
CM-RB Type	
TLH, TLF Type	

#### [Test method and remarks]

CM, TLH, TLF : Measuring equipment : DC ohmmeter

### 6. Terminal strength tensile force

CM-RA/BU-RA Type	No abnormality
CM-RB Type	
TLH, TLF Type	

#### [Test method and remarks]

CM : Fix the component in the direction to draw terminal and gradually apply tensile force as detailed in individual specifications.

TLF9U : Apply the stated tensile force gradually in the direction to draw terminal.

TLH, TLF (except TLF9U): Apply the stated tensile force gradually in the direction to draw terminal.

Nominal wire diameter tensile φ d [mm]	force [N]	duration [s]
φ 0.6	5	30±5

Nominal wire diameter tensile φ d [mm]	force [N]	duration [s]
φ 0.8	10	30±5

### 7. Insulation resistance between wires

CM-RA/BU-RA Type	100MΩ min.
CM-RB Type	
TLH, TLF Type	

#### [Test method and remarks]

CM, TLH, TLF : Applied voltage : Rated voltage (CM-RA/BU-RA, CM-RB)  
 : 500VDC (TLH, TLF (except TLF9UB))  
 : 250VDC (TLF9UB)  
 Duration : 60sec.

### 8. Insulation resistance between wire and core

CM-RA/BU-RA Type	100MΩ min. (except TLH, TLF10UAH Type)
CM-RB Type	
TLH, TLF Type	

#### [Test method and remarks]

TLF : Applied voltage : 500VDC (TLF (except TLF9UB))  
 : 250VDC (TLF9UB)  
 Duration : 60 sec.

### 9. Withstanding : between wires

CM-RA/BU-RA Type	No abnormality
CM-RB Type	
TLH, TLF Type	

#### [Test method and remarks]

CM, TLH, TLF : Applied voltage : 250VDC (CM-RA/BU-RA, CM-RB)  
 : 2000VAC (TLH, TLF (except TLF9UB))  
 : 500VDC (TLF9UB)  
 Duration : 60sec.

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## RELIABILITY DATA

10. Withstanding : between wires and core		
CM-RA/BU-RA Type		
CM-RB Type		
TLH, TLF Type	No abnormality(except TLH, TLF10UAH Type)	
[Test method and remarks]		
TLF	: Applied voltage : 2000VAC (TLF (except TLF9UB)) : 500VDC (TLF9UB)	
Duration	: 60sec.	
11. Rated voltage		
CM-RA/BU-RA Type		
CM-RB Type	Within the specified range	
TLH, TLF Type		
[Test method and remarks]		
TLH, TLF (except TLF9UB)	: 250VAC	
TLF9UB	: 50VDC	
12. Resistance to vibration		
CM-RA/BU-RA Type		
CM-RB Type	Appearance : No abnormality	Inductance change : Within $\pm 15\%$
TLH, TLF Type	TLF9U : Inductance change : Within $\pm 5\%$	TLH, TLF (except TLF9U) : Within the specified range
[Test method and remarks]		
CM, TLH, TLF : According to JIS C 0040		
Direction : 2hrs each in X, Y and Z direction Total : 6hrs		
Frequency range : 10 to 55 to 10Hz (1 min.)		
Amplitude : 1.5mm (shall not exceed acceleration 196m/s <sup>2</sup> )		
Mounting method : soldering onto PC board		
Recovery : 2 to 24 hrs of recovery under the standard condition after the test. (CM-RB)		
: At least 1hr of recovery under the standard condition after the removal from test chamber, followed by the measurement within 2hrs. (TLH, TLF)		
13. Solderability		
CM-RA/BU-RA Type	At least 75% of terminal electrode is covered by new solder.	
CM-RB Type		
TLH, TLF Type	Solder shall be uniformly adhered onto immersed surfaces.	
[Test method and remarks]		
CM	: Solder temperature : 235 $\pm$ 5 $^{\circ}$ C	
Duration	: 2 $\pm$ 0.5sec.	
Immersion depth	: According to detailed specification.	
TLH, TLF	: Solder temperature : 245 $\pm$ 5 $^{\circ}$ C	
Duration	: 4 $\pm$ 1sec.	
Immersion depth	: Up to 1.0 to 1.5mm from PBC mounted level.	
14. Resistance to soldering heat		
CM-RA/BU-RA Type	Appearance : No abnormality Inductance change : Refer to individual specification	
CM-RB Type		
TLH, TLF Type	TLF9UA : Inductance change : Within $\pm 5\%$	TLF14CB : Within the specified range
[Test method and remarks]		
CM	: Solder temperature : 260 $\pm$ 5 $^{\circ}$ C	
Duration	: 5 $\pm$ 0.5sec.	
Immersion depth	: Up to 2~2.5mm from terminal root.	
Recovery	: 1 to 2 hrs of recovery under the standard condition after the test.	
TLH, TLF	: Solder temperature : 260 $\pm$ 5 $^{\circ}$ C	
Duration	: 10 $\pm$ 1sec.	
Immersion depth	: Up to 1.0 to 1.5mm from PBC mounted level.	
Recovery	: At least 1hr of recovery under the standard condition after the removal from test chamber, followed by the measurement within 2hrs.	
15. Thermal shock		
CM-RA/BU-RA Type	Appearance : No abnormality Inductance change : Refer to individual specification	
CM-RB Type		
TLH, TLF Type	TLF9UA : Inductance change : Within $\pm 15\%$	TLH, TLF (except TLF9UA) : Withstanding voltage : No abnormality Insulation resistance : No abnormality
[Test method and remarks]		
CM, TLH, TLF :		
According to JIS C 0025		
Conditions for 1 cycle		
Step	Temperature ( $^{\circ}$ C)	Duration (min)
1	-25 $\pm$ 3	30 $\pm$ 3
2	Room Temperature	Within 3
3	+85 $\pm$ 2	30 $\pm$ 3
4	Room Temperature	Within 3
Number of cycles : 10		
Recovery : At least 1hr of recovery under the standard condition after the removal from test chamber, followed by the measurement within 2 hrs.		
16. Damp heat		
CM-RA/BU-RA Type		
CM-RB Type		
TLH, TLF Type	TLF9UA : Inductance change : Within $\pm 15\%$	TLH, TLF (except TLF9UA) : Withstanding voltage : No abnormality Insulation resistance : No abnormality
[Test method and remarks]		
TLH, TLF	: Temperature : 60 $\pm$ 2 $^{\circ}$ C	
	: 40 $\pm$ 2 $^{\circ}$ C (※TLF14CB)	
Humidity	: 90~95%RH	
Duration	: 500 hrs	
Recovery	: At least 1hr of recovery under the standard removal from test chamber followed by the measurement within 2 hrs.	

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## RELIABILITY DATA

### 17. Loading under damp heat

CM-RA/BU-RA Type	Appearance : No abnormality	Inductance change : Refer to individual specification				
CM-RB Type						
TLH, TLF Type	Withstanding voltage : No abnormality	Insulation resistance : No abnormality				
[Test method and remarks]						
CM	Temperature : 40±2°C Humidity : 90~95%RH Duration : 500 (+12, -0) hrs Applied current : Rated current Recovery : 1 to 2hrs of recovery under the standard condition after the removal from test chamber.					
TLH, TLF	Temperature : 60±2°C : 40±2°C (※TLF14CB) Humidity : 90~95%RH Duration : 100 hrs Applied voltage : 500 hrs Apply rated current across windings (※TLF14CB) : Apply the following specified voltage between windings. <table border="1" style="margin-left: 20px;"> <tr> <td>TLF9UA</td> <td>250VAC</td> </tr> <tr> <td>TLF9UB</td> <td>50VDC</td> </tr> </table> Recovery : At least 1hr of recovery under the standard removal from test chamber followed by the measurement within 2 hrs.		TLF9UA	250VAC	TLF9UB	50VDC
TLF9UA	250VAC					
TLF9UB	50VDC					

### 18. Low temperature life test

CM-RA/BU-RA Type	Appearance : No abnormality	Inductance change : Refer to individual specification
CM-RB Type		
TLH, TLF Type	TLF9U : Inductance change : Within ±15%	TLH, TLF (except TLF9U) : Withstanding voltage : No abnormality
		Insulation resistance : No abnormality
[Test method and remarks]		
CM	Temperature : -40±3°C Duration : 500 (+12, -0) hrs Recovery : 1 to 2hrs of recovery under the standard condition after the removal from test chamber.	
TLH, TLF	Temperature : -25±2°C : -40±2°C (※TLF14CB) Duration : 500 hrs Recovery : At least 1hr of recovery under the standard removal from test chamber followed by the measurement within 2 hrs.	

### 19. High Temperature life test

CM-RA/BU-RA Type	Appearance : No abnormality	Inductance change : Refer to individual specification
CM-RB Type		
TLH, TLF Type	TLF9U : Inductance change : Within ±15%	TLH, TLF (except TLF9U) : Withstanding voltage : No abnormality
		Insulation resistance : No abnormality
[Test method and remarks]		
CM	Temperature : 85±2°C Duration : 500 (+12, -0) hrs Recovery : 1 to 2hrs of recovery under the standard condition after the removal from test chamber.	
TLH, TLF	Temperature : 85±2°C : 105±3°C (※TLF14CB) Duration : 500 hrs Recovery : At least 1hr of recovery under the standard removal from test chamber followed by the measurement within 2 hrs.	

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## PRECAUTIONS

CM-RA Type, CM-RB Type, TLH, TLF Type

1. Circuit Design	
Precautions	<ul style="list-style-type: none"> <li>◆ Operating environment               <ol style="list-style-type: none"> <li>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.</li> </ol> </li> </ul>
2. PCB Design	
Precautions	<ul style="list-style-type: none"> <li>◆ Design               <ol style="list-style-type: none"> <li>1. Please design insertion pitches as matching to that of leads of the component on PCBs.</li> </ol> </li> </ul>
Technical considerations	<ul style="list-style-type: none"> <li>◆ Design               <ol style="list-style-type: none"> <li>1. When Inductors are mounted onto a PC board, hole dimensions on the board should match the lead pitch of the component, if not, it will cause breakage of the terminals or cracking of terminal roots covered with resin as excess stress travels through the terminal legs.</li> </ol> </li> </ul>
3. Soldering	
Precautions	<ul style="list-style-type: none"> <li>◆ Wave soldering               <ol style="list-style-type: none"> <li>1. Please refer to the specifications in the catalog for a wave soldering.</li> <li>2. Do not immerse the entire inductor in the flux during the soldering operation.</li> </ol> </li> <li>◆ Lead free soldering               <ol style="list-style-type: none"> <li>1. When using products with lead free soldering, we request to use them after confirming of adhesion, temperature of resistance to soldering heat, etc. sufficiently.</li> </ol> </li> <li>◆ Recommended conditions for using a soldering iron               <ul style="list-style-type: none"> <li>• Put the soldering iron on the land-pattern.</li> <li>• Soldering iron's temperature - Below 350°C</li> <li>• Duration - 3 seconds or less</li> <li>• The soldering iron should not directly touch the product.</li> </ul> </li> </ul>
Technical considerations	<ul style="list-style-type: none"> <li>◆ Lead free soldering               <ol style="list-style-type: none"> <li>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.</li> </ol> </li> </ul>
4. Cleaning	
Precautions	<ul style="list-style-type: none"> <li>◆ Cleaning conditions               <ol style="list-style-type: none"> <li>1. TLF type                   <ul style="list-style-type: none"> <li>Please contact any of our offices for about a cleaning.</li> </ul> </li> </ol> </li> </ul>
5. Handling	
Precautions	<ul style="list-style-type: none"> <li>◆ Handling               <ol style="list-style-type: none"> <li>1. Keep the product away from all magnets and magnetic objects.</li> </ol> </li> <li>◆ Mechanical considerations               <ol style="list-style-type: none"> <li>1. Please do not give the product any excessive mechanical shocks.</li> <li>2. TLF type                   <ul style="list-style-type: none"> <li>Please do not add any shock or power to a product in transportation.</li> </ul> </li> </ol> </li> <li>◆ Packing               <ol style="list-style-type: none"> <li>1. Please do not give the product any excessive mechanical shocks.                   <ul style="list-style-type: none"> <li>In loading, please pay attention to handling indication mentioned in a packing box (a loading direction / number of maximum loading / fragile item).</li> </ul> </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>◆ Mechanical considerations               <ol style="list-style-type: none"> <li>1. There is a case to be damaged by a mechanical shock.</li> <li>2. TLF type                   <ul style="list-style-type: none"> <li>There is a case to be broken by a fall.</li> </ul> </li> </ol> </li> <li>◆ Packing               <ol style="list-style-type: none"> <li>1. There is a case that a lead route turns at by a fall or an excessive shock.</li> </ol> </li> </ul>
6. 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> </ul> </li> </ol> <p>The ambient temperature must be kept below 30°C. Even under ideal storage conditions, the solderability of electrodes decreases gradually, so the products should be mounted within one year from the time of delivery.</p> <p>In case of storage over 6 months, solderability shall be checked before actual usage.</p> </li></ul>
Technical considerations	<ul style="list-style-type: none"> <li>◆ Storage               <ol style="list-style-type: none"> <li>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.</li> </ol> </li> </ul>

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