Please read this notice before using the TAIYO YUDEN products.

# !\ REMINDERS

Product information in this catalog is as of October 2013. 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.

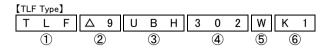
# LEADED COMMON MODE CHOKE COILS FOR DC AND SIGNAL LINES



WAVE

## ■PARTS NUMBER

\*Operating Temp.: -25~+105°C (Including self-generated heat)



△=Blank space

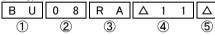
#### ①Series name

Code	Series name				
TLF	Common mode choke coil				
2Dimensions of	core				
Code	Dimensions of core[mm]				
△9	9				
3Shape					
Code	Shape				
UB△	U core, vertically split wound				
UBH	U core, horizontally split wound				

# 4 Nominal Inductance

911111111111111111111111111111111111111	gritorimiar irradocarios					
Code (example)	Nominal Inductance[ μ H]					
302	3000					
203	20000					
5Inductance tol	⑤Inductance tolerance					
Code	Inductance tolerance					
W	+100/-10%					
⑥Internal code						
Code	Internal code					
K1	Adhesive fixation					

#### [BU Type]



△=Blank space

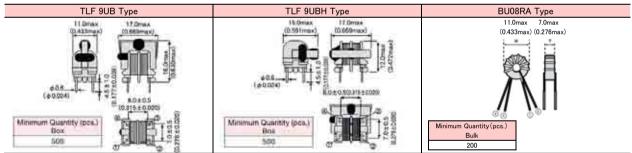
#### ①Series name

Code	Series name				
BU	Common mode choke coil				
②Dimensions of core					
Code	Dimensions of core[mm]				
08	8.0				
3Shape					
Code	Shape				
RA	Double-wire lead				
	·				

#### 4 Product classification code

Code	Product classification code
△01~△20	Product classification code
5 Internal code	
Code	Internal code
Δ	Standard

#### ■STANDARD EXTERNAL DIMENSIONS / MINIMUM QUANTITY



Unit:mm(inch)

## ■PARTS NUMBER

Parts number	EHS	Number of lines	Nominal inductance [mH]	Inductance tolerance	DC Resistance [Ω](max.)	Rated current [A] (max.)	Rated voltage [V] (D.C.)	Insulation resistance [MΩ] (min.)
TLF 9UBH302W K1	RoHS	2	3.0	+100/-10%	1.5	0.40	50	100
TLF 9UB 302W K1	R₀HS	2	3.0	+100/-10%	1.5	0.40	50	100
TLF 9UBH802W K1	RoHS	2	8.0	+100/-10%	3.0	0.30	50	100
TLF 9UB 802W K1	R₀HS	2	8.0	+100/-10%	3.0	0.30	50	100
TLF 9UBH203W K1	R₀HS	2	20.0	+100/-10%	6.5	0.18	50	100
TLF 9UB 203W K1	R₀HS	2	20.0	+100/-10%	6.5	0.18	50	100

Parts number	EHS	Number of lines	Nominal inductance [ μ H]	Inductance Measuring frequency [kHz]	Impedance $[\Omega]$ (typ.)	Impedance Measuring frequency [MHz]	DC Resistance [Ω] (max.)	Rated current [A] (max.)	Rated voltage [V] (D.C.)	Insulation resistance [MΩ] (min.)
BU08RA 11	RoHS	2	0.7~1.3	1	1000	250	0.013	4.0	50	100
BU08RA 16	RoHS	2	1.19~2.21	1	1200	200	0.011	3.0	50	100

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# LEADED COMMON MODE CHOKE COILS FOR DC AND SIGNAL LINES LEADED COMMON MODE CHOKE COILS FOR AC LINES

## **■**PACKAGING

1 Minimum Quantity			
BU Type			
Turna	Minimum Qua	antity[pcs]	
Туре	Вох	Bulk	
BU08RA□□	_	200	
TLH/TLF Type	Minimum Qua	antity[pcs]	
Туре	Вох		
TLH10UA□			
TLH10UB	1000		
TLF10UAH			
TLF9UA□		•	
	500		
TLF9UB□	500		
TLF9UB□ TLF14CB□	50	•	

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# LEADED COMMON MODE CHOKE COILS FOR DC AND SIGNAL LINES, LEADED COMMON MODE CHOKE COILS FOR AC LINES

## ■RELIABILITY DATA

1. Operating Tempe	erature Range			
	BU-RA Type			
Specified Value	TLH, TLF Type		−25~+ 105°C	
Test Method and Remarks	Including temperature rise due	e to self—genera	ited heat.	
2. Storage tempera	ture range			
Specified Value	BU-RA Type		−40~+ 85°C	
· 	TLH, TLF Type			
0.7.1				
3. Rated current	1			
Specified Value	BU-RA Type		Within the specified range	
	TLH, TLF Type			
Test Method and			of AC current within the temperature rise of 60°C of AC current within the temperature rise of 45°C	
Remarks			of DC current within the temperature rise of 45°C	
	1			
4. Inductance				
0 '6 1)/1	BU-RA Type			
Specified Value	TLH, TLF Type		Within the specified tolerance	
Test Method and Remarks	TLF9U:  Measuring equipment:  Measuring frequency:  Measuring voltage:  TLH, TLF (except TLF9U):  Measuring equipment:  Measuring frequency:	: 1kHz : 1Vrms	4A or its equivalent 4A or its equivalent	
	Measuring voltage :	: 0.1Vrms		
5. DC resistance				
5. DO 10010001100	BU-RA Type			
Specified Value	TLH, TLF Type		Within the specified tolerance	
Test Method and Remarks		: DC ohmmeter		
6. Terminal strengt	h tensile force			
C:EI \/-I	BU-RA Type		No observe Physics	
Specified Value	TLH, TLF Type		No abnormality	
Test Method and	1	•	ly in the direction to draw terminal 5N、10±1sec. d tensile force gradually in the direction to draw terminal.	
Remarks	TLH10UAH, TLF (except TLF9	OU): Apply the st	ated tensile force gradually in the direction to draw terminal.	
	force [N]	duration [s]		
	10	30±5		

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7.1						
7. Insulation resista	T					
Specified Value	BU-RA Type		100MΩ min.			
	TLH, TLF Type					
Test Method and	Applied voltage	: 50VDC (BU—RA,) : 500VDC (TLH, TLF (ex	ccept TLF9UB))			
Remarks	Duration	: 250VDC (TLF9UB) : 60sec.				
8. Insulation resista	nce between wire and	core				
0 15 1141	BU-RA Type					
Specified Value	TLH, TLF Type		100MΩ min.(except TLH, TLF10UAH Type)			
Test Method and Remarks	TLF : Applied voltage	: 500VDC (TLF (except : 250VDC (TLF9UB)	TLF9UB))			
	Duration	: 60 sec.				
9. Withstanding : be	tween wires					
Specified Value	BU-RA Type		Nie also some like			
	TLH, TLF Type		No abnormality			
Test Method and Remarks	Applied voltage : 250VDC (BU-RA) : 2000VAC (TLH, TLF (except TLF9UB))					
Remarks	: 500VDC (TLF9UB) Duration : 60sec.					
10. Withstanding : b	etween wires and core	•				
Specified Value	BU-RA Type					
· 	TLH, TLF Type		No abnormality(except TLH, TLF10UAH Type)			
Test Method and Remarks	TLF: Applied voltage  Duration	: 2000VAC (TLF (except : 500VDC (TLF9UB) : 60sec.	t TLF9UB))			
	Duration	: oosec.				
11 Data di celtar						
11. Rated voltage	DIL-DA To					
Specified Value	BU-RA Type		Within the specified range			
T . M .:	TLH, TLF Type	(FOLID) 0501// 5				
Test Method and Remarks	TLH, TLF (except TI BU-RA,TLF9UB	LF9UB) : 250VAC : 50VDC				
12. Resistance to v	1					
	BU-RA Type					
Specified Value	TLH, TLF Type		TLF9U : Inductance change : Within $\pm 5\%$ TLH, TLF (except TLF9U) : Appearance is no abnormality and within the specified range			
Test Method and Remarks	BU-RA,TLH, TLF : A Direction Frequency range Amplitude Mounting method Recovery	: 10 to 55 to 10Hz ( : 1.5mm (shall not e : soldering onto PC	xceed acceleration $196\text{m/s}^2$ ) board covery under the standard condition after the removal from test chamber, followed by the			

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13. Solderability					
Specified Value	BU-RA Type		At least 75% of terminal electrode is covered by new solder.		
Specified Value	TLH, TLF Type		At least 90% of terminal electrode is covered by new solder.		
Test Method and Remarks	TLH, TLF: Solder temperature Duration Immersion depth  TLH, TLF: Solder temperature Duration	: 235±0.5°C : 2±0.5sec. : Up to 1.5 to 2.0mn : 245±5°C : 4±1sec.	n from PBC mounted level.		
	Immersion depth	: Up to 1.0 to 1.5mm from PBC mounted level.			

14. Resistance to s	oldering heat		
Specified Value	BU-RA Type		Appearance : No abnormality Inductance change : Within ±15%
	TLH, TLF Type		TLF9UA : Inductance change : Within $\pm 5\%$ TLF14CB : Appearance is no abnormality and within the specified range
Test Method and Remarks	TLH, TLF: Solder temperature Duration Immersion depth Recovery TLH, TLF:	•	n from PBC mounted level. covery under the standard condition after the removal from test chamber, followed by the hin 2hrs.
nemarks	Solder temperature Duration Immersion depth Recovery	•	n from PBC mounted level. covery under the standard condition after the removal from test chamber, followed by the chin 2hrs.

15. Thermal shock		
Specified Value	BU-RA Type	Appearance : No abnormality Inductance change : Within ±15%
	TLH, TLF Type	TLF9UA : Inductance change : Within ±15% TLH, TLF (except TLF9UA) : Withstanding voltage : No abnormality Insulation resistance : No abnormality
Test Method and Remarks	BU-RA,TLH, TLF: According to JIS C 0025 Conditions for 1 cycle -25°C~+85°C, keep each 30min  Number of cycles : 10 Recovery : At least 1hr of recovery measurement within 2	very under the standard condition after the removal from test chamber, followed by the 2 hrs.

16. Damp heat			
Specified Value	BU-RA 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	Humidity	TLH, TLF: Temperature : 60±2°C : 40±2°C (※except TLF9U)  Humidity : 90~95%RH  Duration : 500 hrs	

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17. Loading under o	lamp heat		
Specified Value	BU-RA Type		Appearance : No abnormality Inductance change : Within ±15%
	TLH, TLF Type		Withstanding voltage : No abnormality Insulation resistance : No abnormality
	BU-RA: Temperature Humidity Applied current Recovery	: 40±2°C : 90~95%RH : 500 hrs Apply rated current across windings (※except TLF9U) : At least 1hr of recovery under the standard removal from test chamber followed by the measurement within 2 hrs.	
Test Method and Remarks	TLH, TLF : Temperature Humidity	: 60±2°C : 40±2°C (※except TI : 90∼95%RH	LF9U )
	Duration  Applied voltage	: 100 hrs : 500 hrs Apply rated current across windings (※except TLF9U ) : Apply the following specified voltage between windings.  TLF9UA 250VAC TLF9UB 50VDC	
	Recovery		ry under the standard removal from test chamber followed by the measurement within 2 hrs.

18. Low temperature life test				
Specified Value	BU-RA Type	Appearance : No abnormality Inductance change : Within ±15%		
	TLH, TLF Type	TLF9U : Inductance change : Within ±15% TLH, TLF (except TLF9U) : Withstanding voltage : No abnormality Insulation resistance : No abnormality		
Test Method and Remarks	BU-RA,TLH, TLF: Temperature : -25±2°C			

Specified Value	BU-RA Type		Appearance : No abnormality Inductance change : Within ±15%
	TLH, TLF Type		TLF9U : Inductance change : Within ±15% TLH, TLF (except TLF9U) : Withstanding voltage : No abnormality Insulation resistance : No abnormality
Test Method and Remarks	BU-RA,TLH, TI Temperature  Duration Recovery	: 85±2°C (※ BU-RA) : 105±3°C (※ TLF•TLH) : 500 hrs	nder the standard removal from test chamber followed by the measurement within 2 hrs.

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# LEADED COMMON MODE CHOKE COILS FOR DC AND SIGNAL LINES, LEADED COMMON MODE CHOKE COILS FOR AC LINES

#### **■**PRECAUTIONS

## 1. Circuit Design Operating environment 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 Precautions 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. 2. PCB Design Design Precautions 1. Please design insertion pitches as matching to that of leads of the component on PCBs. ◆Design Technical 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 considerations cause breakage of the terminals or cracking of terminal roots covered with resin as excess stress travels through the terminal legs. 3. Soldering ◆Wave soldering 1. Please refer to the specifications in the catalog for a wave soldering. 2. Do not immerse the entire inductor in the flux during the soldering operation. Lead free soldering 1. When using products with lead free soldering, we request to use them after confirming of adhesion, temperature of resistance to Precautions soldering heat, etc. sufficiently. Recommended conditions for using a soldering iron 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 directly touch the product. ◆Lead free soldering 1. If products are used beyond the range of the recommended conditions, heat stresses may deform the products, and consequently Technical degrade the reliability of the products. considerations ◆Recommended conditions for using a soldering iron 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. 4. Cleaning ◆Cleaning conditions Precautions 1. TLF type Please contact any of our offices for about a cleaning. 5. Handling Handling 1. Keep the product away from all magnets and magnetic objects. Mechanical considerations 1. Please do not give the product any excessive mechanical shocks. 2. TLF type Precautions Please do not add any shock or power to a product in transportation. 1. Please do not give the product any excessive mechanical shocks. In loading, please pay attention to handling indication mentioned in a packing box (a loading direction / number of maximum loading / ◆Handling 1. There is a case that a characteristic varies with magnetic influence. Mechanical considerations Technical 1. There is a case to be damaged by a mechanical shock. considerations 2. TLF type There is a case to be broken by a fall. **◆**Packing

1. There is a case that a lead route turns at by a fall or an excessive shock.

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#### 6. Storage conditions ◆Storage 1. To maintain the solderability of terminal electrodes and to keep the packing material in good condition, temperature and humidity in the storage area should be controlled. Recommended conditions Ambient temperature : 0~40°C Precautions Humidity: Below 70% RH The ambient temperature must be kept below 30°C. Even under ideal storage conditions, the solderbility of electrodes decreases gradually, so the products should be mounted within one year from the time of delivery. In case of storage over 6 months, solderability shall be checked before actual usage. **♦**Storage Technical 1. Under a high temperature and humidity environment, problems such as reduced solderability caused by oxidation of terminal electrodes considerations and deterioration of taping/packaging materials may take place.