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 2015. 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℃(Including self-generated heat)

【TLF Type】

T	L	F	△	9	U	B	H	3	0	2	W	K	1
①			②		③			④			⑤	⑥	

△=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

④Nominal inductance

Code (example)	Nominal inductance[μH]
302	3000
203	20000

⑤Inductance tolerance

Code	Inductance tolerance
W	+100/−10%

⑥Internal code

Code	Internal code
K1	Adhesive fixation

【BU Type】

B	U	0	8	R	A	△	1	1	△
①		②		③		④			⑤

△=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

④Product classification code

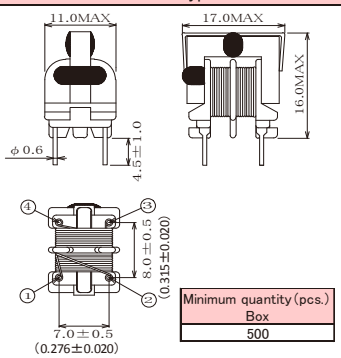
Code	Product classification code
△01〜△20	Product classification code

⑤Internal code

Code	Internal code
△	Standard

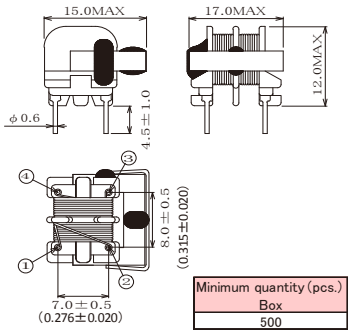
■STANDARD EXTERNAL DIMENSIONS / MINIMUM QUANTITY

TLF 9UB Type



Minimum quantity(pcs.) Box
500

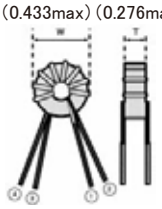
TLF 9UBH Type



Minimum quantity(pcs.) Box
500

BU08RA Type

11.0max (0.433max) 7.0max (0.276max)



Minimum quantity(pcs.) Bulk
200

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	RoHS	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	RoHS	2	8.0	+100/−10%	3.0	0.30	50	100
TLF 9UBH203W K1	RoHS	2	20.0	+100/−10%	6.5	0.18	50	100
TLF 9UB 203W K1	RoHS	2	20.0	+100/−10%	6.5	0.18	50	100

Parts number	EHS	Number of lines	Nominal inductance [μH]	Inductance Measuring frequency [kHz]	Impedance [Ω](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

▶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/) .

■PACKAGING

①Minimum Quantity

●BU Type

Type	Minimum Quantity[pcs]	
	Box	Bulk
BU08RA☐☐	—	200

●TLH/TLF Type

Type	Minimum Quantity[pcs]
	Box
TLH10UA☐	1000
TLH10UB	
TLF10UAH	
TLF9UA☐	500
TLF9UB☐	
TLF14CB☐	
TLF24HB☐	

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

■RELIABILITY DATA

1. Operating Temperature Range		
Specified Value	BU−RA Type TLH, TLF Type	−25～＋ 105℃
Test Method and Remarks	Including temperature rise due to self−generated heat.	

2. Storage temperature range		
Specified Value	BU−RA Type TLH, TLF Type	−40～＋ 85℃

3. Rated current		
Specified Value	BU−RA Type TLH, TLF Type	Within the specified range
Test Method and Remarks	TLH10U, TLF10UA : The maximum value of AC current within the temperature rise of 60℃ TLF9UA, 14CB、24HB : The maximum value of AC current within the temperature rise of 45℃ TLF9UB : The maximum value of DC current within the temperature rise of 45℃	

4. Inductance		
Specified Value	BU−RA Type TLH, TLF Type	Within the specified tolerance
Test Method and Remarks	BU-RA Measuring equipment : HP4262A TLF9U : Measuring equipment : LCR meter 4284A or its equivalent Measuring frequency : 1kHz Measuring voltage : 1Vrms TLH、TLF(except TLF9U) : Measuring equipment : LCR meter 4284A or its equivalent Measuring frequency : 1kHz Measuring voltage : 0.1Vrms	

5. DC resistance		
Specified Value	BU−RA Type TLH, TLF Type	Within the specified tolerance
Test Method and Remarks	Measuring equipment : DC ohmmeter	

6. Terminal strength tensile force		
Specified Value	BU−RA Type TLH, TLF Type	No abnormality

Test Method and Remarks

BU-RA: Apply the stated tensile force gradually in the direction to draw terminal 5N、10±1sec.

TLH10UA, TLH10UB, TLF9U : Apply the stated tensile force gradually in the direction to draw terminal.

force [N]	duration [s]
5	30±5

TLH10UAH, TLF (except TLF9U): Apply the stated tensile force gradually in the direction to draw terminal.

force [N]	duration [s]
10	30±5

7. Insulation resistance between wires		
Specified Value	BU−RA Type	100MΩ min.
	TLH, TLF Type	
Test Method and Remarks	Applied voltage : 50VDC (BU−RA,) : 500VDC (TLH, TLF (except TLF9UB)) : 250VDC (TLF9UB) Duration : 60sec.	

8. Insulation resistance between wire and core		
Specified Value	BU−RA Type	
	TLH, TLF Type	100MΩ min.(except TLH, TLF10UAH Type)
Test Method and Remarks	TLF : Applied voltage : 500VDC (TLF (except TLF9UB)) : 250VDC (TLF9UB) Duration : 60 sec.	

9. Withstanding : between wires		
Specified Value	BU−RA Type	No abnormality
	TLH, TLF Type	
Test Method and Remarks	Applied voltage : 250VDC (BU−RA) : 2000VAC (TLH, TLF (except TLF9UB)) : 500VDC (TLF9UB) Duration : 60sec	

10. Withstanding : between wires and core		
Specified Value	BU−RA 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		
Specified Value	BU−RA Type	Within the specified range
	TLH, TLF Type	
Test Method and Remarks	TLH, TLF (except TLF9UB) : 250VAC BU-RA,TLF9UB : 50VDC	

12. Resistance to vibration		
Specified Value	BU−RA Type	Appearance : No abnormality Inductance change : Within ±15%
	TLH, TLF Type	TLF9U : Inductance change : Within ±5% TLH, TLF (except TLF9U) : Appearance is no abnormality and within the specified range
Test Method and Remarks	BU-RA,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^2) Mounting method : soldering onto PC board Recovery : At least 1hr of recovery under the standard condition after the removal from test chamber, followed by the measurement within 2hrs.	

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

14. Resistance to soldering heat		
Specified Value	BU−RA Type	Appearance : No abnormality Inductance change : Within ±15%
	TLH, TLF Type	TLF9UA : Inductance change : Within ±5% TLF14CB : Appearance is no abnormality and within the specified range
Test Method and Remarks	TLH, TLF : Solder temperature : 260±5℃ Duration : 5±0.5sec. Immersion depth : Up to 1.5 to 2.0mm 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. TLH, TLF : Solder temperature : 260±5℃ Duration : 10±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		
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℃～+85℃、keep each 30min 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		
Specified Value	BU−RA Type	
	TLH, TLF Type	TLF9UA : Inductance change : Within ±15% TLH, TLF (except TLF9UA) : Withstanding voltage : No abnormality Insulation resistance : No abnormality
Test Method and Remarks	TLH, TLF : Temperature : 60±2℃ : 40±2℃ (※except TLF9U) 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.	

17. Loading under damp heat

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

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, TL F : Temperature : 85±2℃ (※ BU-RA) : 105±3℃ (※ TLF･TLH) Duration : 500 hrs Recovery : At least 1hr of recovery under the standard removal from test chamber followed by the measurement within 2 hrs.	

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

■PRECAUTIONS

1. Circuit Design	
Precautions	◆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 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	
Precautions	◆Design 1. Please design insertion pitches as matching to that of leads of the component on PCBs.
Technical considerations	◆Design 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.

3. Soldering	
Precautions	◆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 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.
Technical considerations	◆Lead free soldering 1. If products are used beyond the range of the recommended conditions, heat stresses may deform the products, and consequently degrade the reliability of the products. ◆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	
Precautions	◆Cleaning conditions 1. TLF type Please contact any of our offices for about a cleaning.

5. Handling	
Precautions	◆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 Please do not add any shock or power to a product in transportation. ◆Packing 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 / fragile item).
Technical considerations	◆Handling 1. There is a case that a characteristic varies with magnetic influence. ◆Mechanical considerations 1. There is a case to be damaged by a mechanical shock. 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.

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