

# Notice for TAIYO YUDEN products

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Should you have any question or inquiry on this matter, please contact our sales staff.

# コモンモードチョークコイル (DC、信号ライン用) リードタイプ COMMON MODE CHOKE COILS (FOR DC AND SIGNAL LINES) LEADED TYPE



OPERATING TEMP.	TLFタイプ: -25~+115°C
	CMタイプ: -25~+105°C

製品自己発熱含む (Including self-generated heat)

等価回路 Equivalent circuits	TLF9UB Type	CM□□RA/BU08RA 2Lines Type	CM08RB Type <sup>e</sup> CM05RB Type	CM08RB 4Lines Type



## 特長 FEATURES

- ・小形軽量、高信頼性
- ・基板への実装が容易

- ・High reliability, compact and lightweight
- ・Easily inserted into the PCB

## 用途 APPLICATIONS

- ・TLFタイプ: 低周波 (AM放送波) 帯域のノイズ対策 (多機能電話機、PBX、FAX等不要輻射電界及び放送波に対するイミュニティ対策)
- ・CM、BUタイプ: 高周波 (MHz) 帯域のノイズ対策

- ・TLF Type: Countermesure for noise in the low-frequency (AM) broad-casting band. Shields against radiated emissions in the broadcasting frequency for multi-functional telephone sets. PBXs, faxes, etc.
- ・CM/BU Type: Countermeasure for noise in the high-frequency (MHz) band

## 形名表記法 ORDERING CODE

### TLF Type

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6 7</b>
形式 TLF   ラインフィルタ	コアの長辺寸法 (mm) △9   9 △=スペース	形状 UB△   U字コア分割巻縦形 UBH   U字コア分割巻横形 △=スペース	公称インダクタンス (μH) 例   302   3000 203   20000	インダクタンス許容差 (%) W   $\begin{matrix} +100 \\ -10 \end{matrix}$	当社管理記号 △△   標準品 △=スペース



<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6 7</b>
Type TLF   Line filter	Dimensions of core (mm) △9   9 △=Blank space	Shape UB△   U core, vertically split wound UBH   U core, horizontally split wound △=Blank space	Nominal inductance (μH) example   302   3000 203   20000	Inductance tolerance (%) W   $\begin{matrix} +100 \\ -10 \end{matrix}$	Internal code △△   Standard product △=Blank space

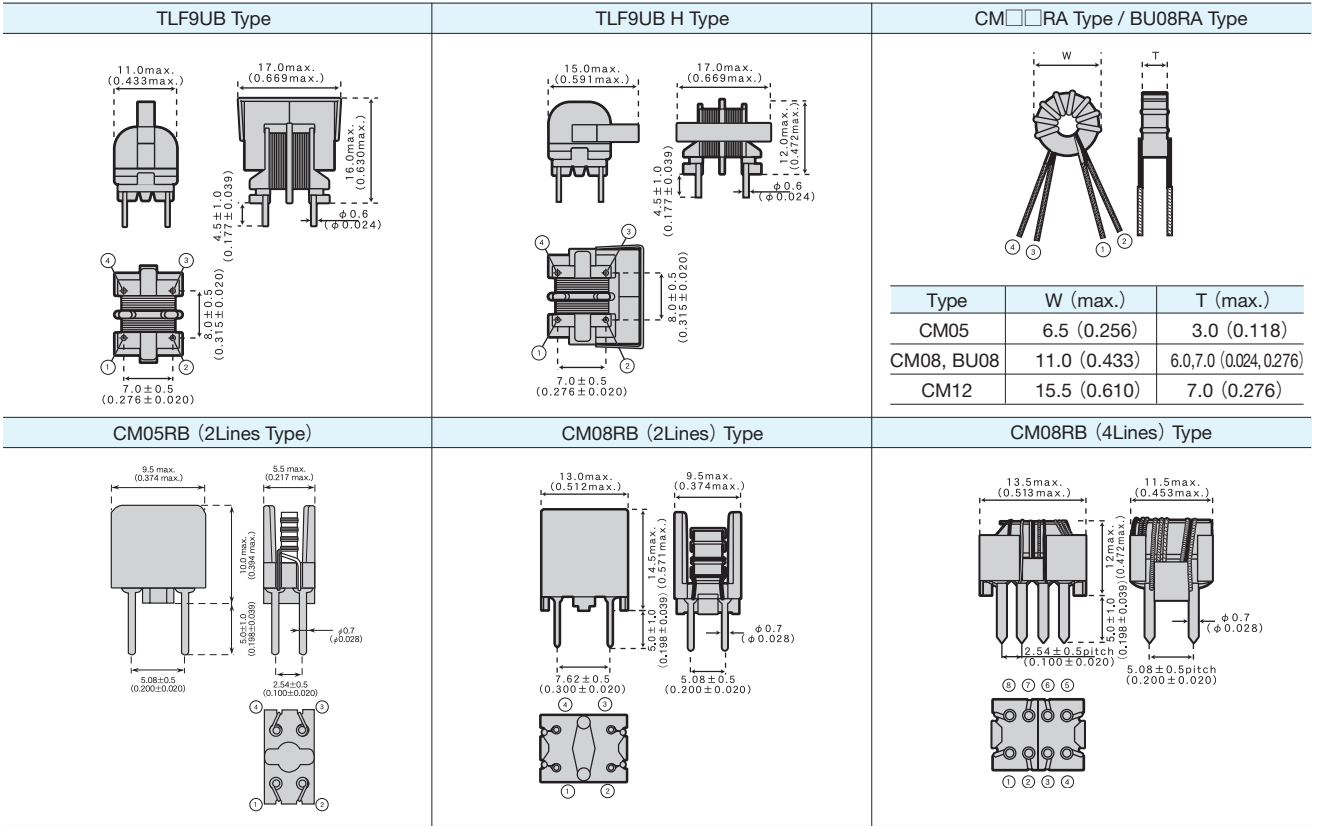
### CM-BU Type

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
形式 CM   コモンモードチョークコイル BU	コアの寸法 (mm) 05   4.8 08   8.0 12   12.0	形状 RA   複線リード直出し RB   ベース使用ピンタイプ	試作番号 01~20	当社管理記号 △   標準品 △=スペース



<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Type CM   Common mode choke coil BU	Core dimensions (mm) 05   4.8 08   8.0 12   12.0	Shape RA   Double-wire lead RB   Pin type with base	Product classification code 01~20	Internal code △   Standard product △=Blank space

# 外形寸法 EXTERNAL DIMENSIONS



Unit: mm (inch)

## アイテム一覧 PART NUMBERS

形名 Ordering code	EHS (Environmental Hazardous Substances)	ライン数 No. of lines	インダクタンス Inductance [ $\mu$ H] [ $\pm 10\%$ ]	直流抵抗 [ $\Omega$ ]DC resistance (max.)	定格電流 [A] Rated current (max.)	定格電圧 [V] Rated voltage D.C.	絶縁抵抗 [M $\Omega$ ] Insulation resistance (min.)	インピーダンス [K $\Omega$ ] 参考値 Impedance (Reference values)
TLF9UBH302W	RoHS	2	3000	1.5	0.4	50	100	$\geq 20$ (at 1MHz)
TLF9UB 302W	RoHS							
TLF9UBH802W	RoHS							
TLF9UB 802W	RoHS							
TLF9UBH203W	RoHS							
TLF9UB 203W	RoHS		20000	6.5	0.18		$\geq 150$ (at 500kHz)	

形名 Ordering code	EHS (Environmental Hazardous Substances)	ライン No. of lines	インダクタンス[ $\mu$ H] Inductance [at 1kHz]	インピーダンス[ $\Omega$ ] Impedance (typical)	直流抵抗 [ $\Omega$ ] DC resistance (max.)	定格電流 [A] Rated current (max.)	定格電圧 [V] Rated voltage D.C.	絶縁抵抗 [M $\Omega$ ] Insulation resistance (min.)
CM05RA 06	RoHS	2	0.7min	700 (at 200MHz)	0.050	1.5	50	100
BU08RA 11	RoHS		0.7~1.3	1000 (at 250MHz)	0.013	4.0		
BU08RA 16	RoHS		1.19~2.21	1200 (at 200MHz)	0.011	3.0		
CM08RA 17	RoHS		15.0min	2000 (at 80MHz)	0.040	2.4		
CM08RA 20	RoHS		6.0min	500 (at 200MHz)	0.020	5.5		
CM12RA 02	RoHS		10.0min	2000 (at 80MHz)	0.040	3.0		
CM05RB 01	RoHS		7.0min	700 (at 70MHz)	0.050	2.0		
CM05RB 03	RoHS		15.0min	1400 (at 100MHz)	0.060	1.5		
CM08RB 01	RoHS		40.0min	2500 (at 30MHz)	0.040	2.0		
CM08RB 02	RoHS		15.0min	2000 (at 50MHz)	0.040	2.4		
CM08RB 04	RoHS	110.0min	2000 (at 70MHz)	0.040	3.0			
CM08RB 05	RoHS	6.0min	450 (at 100MHz)	0.020	4.0			
CM08RB 03	RoHS	4	15.0min	1000 (at 50MHz)	0.050	2.0		

セクションガイド  
Selection Guide

アイテム一覧  
Part Numbers

特性図  
Electrical Characteristics

梱包  
Packaging

信頼性  
Reliability Data

使用上の注意  
Precautions

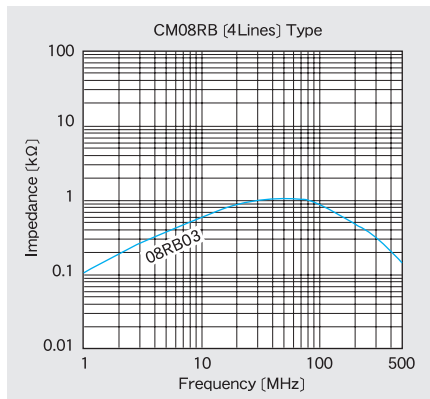
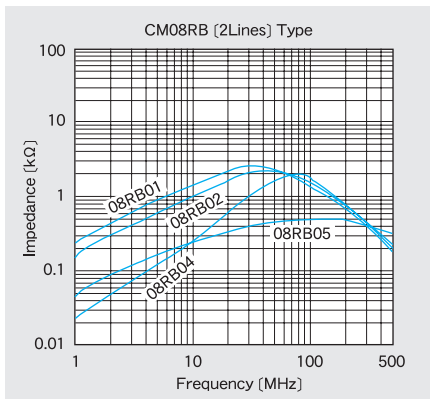
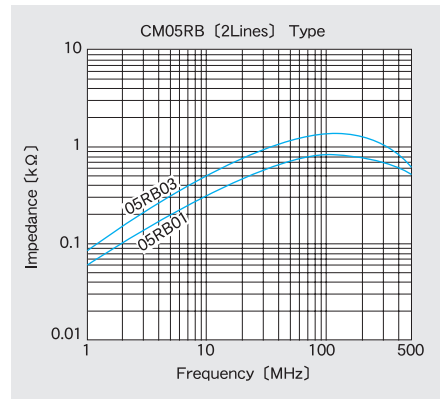
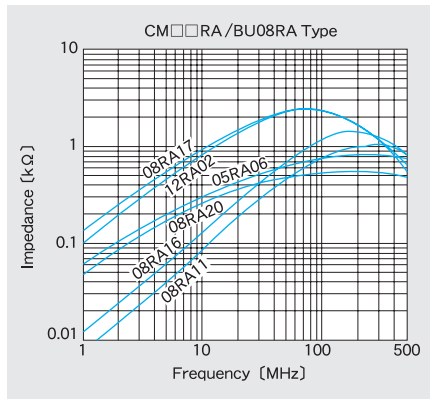
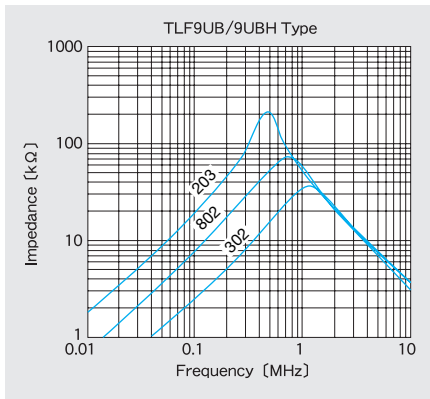


etc

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TAIYO YUDEN 2009

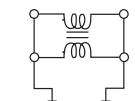
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(測定条件) Measuring conditions

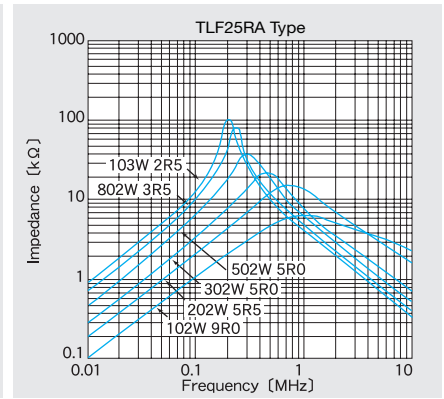
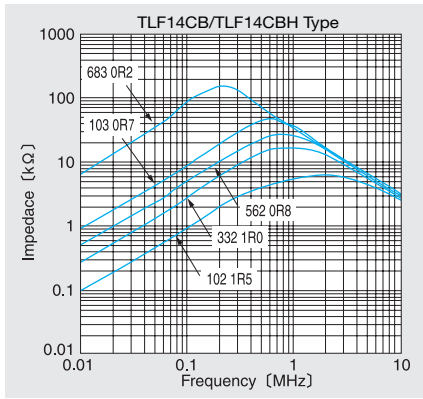
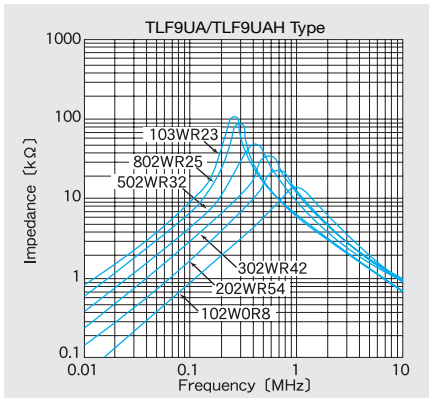
使用測定器 Equipment : HP 4291A Vosc: 0.5V (CM/BU type)  
 HP 4192A Vosc: 0.35V(TLF type)

測定回路 Measuring circuit



インピーダンス アナライザーへ To impedance analyzer

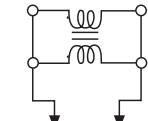
# インピーダンス—周波数特性 IMPEDANCE-FREQUENCY CHARACTERISTIC



(測定条件)

使用測定器 : HP-4192A  
Vosc=0.35V

測定回路



インピーダンス  
アナライザへ

Test conditions

Equipment : HP-4192A  
Vosc=0.35V

Test circuit

To impedance analyzer

## 梱包 PACKAGING

最小受注単位数 Minimum Quantity  
CM / BU Type

Type	最小受注単位数 (pcs.) Minimum Quantity	
	箱づめ Box	袋づめ Bulk
CM05RA06	—	500
CM05RB□□	1000	—
CM08RA□□	—	250
CM08RB□□	500	—
CM12RA02	—	100
BU08RA□□	—	200

TLF Type

Type	最小受注単位数 (pcs.) Minimum Quantity
	箱づめ Box
TLF9UA□	500
TLF9UB□	500
TLF14CB□	500
TLF25RA	200

Item	Specified Value				Test method and remarks												
	CM-RA/ BU-RA Type	CM-RB Type	TLF9U TLF14CB	TLF25RA													
1. Operating Temperature Range	-25~+105°C		TLF9U : -25~+115°C TLF14CB : -20~+105°C	-25~+105°C	Including temperature rise due to self-generated heat.												
2. Storage temperature range	-40~+85°C																
3. Rated current	Within the specified range				<p>CM :</p> <p>The maximum DC value having temperature increase within specified temperature, as detailed in individual specification.</p> <p>TLF9UA, 14CB, 25RA :</p> <p>The maximum AC value having temperature increase within 45°C by the application of AC current.</p> <p>TLF9UB :</p> <p>The maximum DC value having temperature increase within 45°C by the application of DC current.</p>												
4. Inductance	Within the specified tolerance				<p>CM :</p> <p>Measuring equipment : 4262A (HP) or its equivalent Measuring frequency : 1kHz</p> <p>TLF9U, 25RA :</p> <p>Measuring equipment : Impedance analyzer (HP4192A) or its equivalent Measuring frequency : 1kHz Measuring voltage : 0.35Vosc</p> <p>TLF14CB :</p> <p>Measuring equipment : LCR meter 4284A or its equivalent Measuring frequency : 1kHz Measuring voltage : 1.0V</p>												
5. DC resistance	Within the specified tolerance				<p>CM, TLF :</p> <p>Measuring equipment : DC ohmmeter</p>												
6. Terminal strength tensile force	No abnormality				<p>CM :</p> <p>Fix the component in the direction to draw terminal and gradually apply tensile force as detailed in individual specifications.</p> <p>TLF9U :</p> <p>Apply the stated tensile force gradually in the direction to draw terminal.</p> <table border="1"> <thead> <tr> <th>Nominal wire diameter tensile <math>\phi</math> d (mm)</th> <th>force (N)</th> <th>duration (S)</th> </tr> </thead> <tbody> <tr> <td><math>\phi</math> 0.6</td> <td>5</td> <td>30±5</td> </tr> </tbody> </table> <p>TLF14CB :</p> <p>Apply the stated tensile force gradually in the direction to draw terminal.</p> <table border="1"> <thead> <tr> <th>Nominal wire diameter tensile <math>\phi</math> d (mm)</th> <th>force (N)</th> <th>duration (S)</th> </tr> </thead> <tbody> <tr> <td><math>\phi</math> 0.8</td> <td>10</td> <td>30±5</td> </tr> </tbody> </table> <p>TLF25RA :</p> <p>Apply the tensile force of 10N in the direction to draw terminal for 5 seconds.</p>	Nominal wire diameter tensile $\phi$ d (mm)	force (N)	duration (S)	$\phi$ 0.6	5	30±5	Nominal wire diameter tensile $\phi$ d (mm)	force (N)	duration (S)	$\phi$ 0.8	10	30±5
Nominal wire diameter tensile $\phi$ d (mm)	force (N)	duration (S)															
$\phi$ 0.6	5	30±5															
Nominal wire diameter tensile $\phi$ d (mm)	force (N)	duration (S)															
$\phi$ 0.8	10	30±5															
7. Temperature rise	Refer to individual specification		45°C max.		<p>TLF :</p> <p>Resistance substitution method Applied current : Rated current Duration : 1 hr</p>												
8. Insulation resistance between wires	100M $\Omega$ min.				<p>CM・TLF :</p> <p>Applied voltage : Rated voltage (CM-RA/BU-RA, CM-RB) : 500VDC (TLF9UA, 14CB, 25RA) : 250VDC (TLF 9UB) Duration : 60sec.</p>												
9. Insulation resistance between wire and core			100M $\Omega$ min.		<p>TLF :</p> <p>Applied voltage : 500VDC (TLF9UA, 14CB) : 250VDC (TLF 9UB) Duration : 60 sec.</p>												

Item	Specified Value				Test method and remarks
	CM—RA/ BU—RA Type	CM—RB Type	TLF9U TLF14CB	TLF25RA	
10. Withstanding : between wires	No abnormality				CM・TLF : Applied voltage : 250VDC (CM—RA/BU—RA, CM—RB) : 2000VAC (TLF9UA, 14CB, 25RA) : 500VDC (TLF 9UB) Duration : 60sec.
11. Withstanding : between wires and core			No abnormality		TLF : Applied voltage : 2000VAC (TLF9UA, 14CB) : 500VDC (TLF9UB) Duration : 60sec.
12. Rated voltage	Within the specified range				TLF9UA, 14CB, 25RA : 250VAC TLF9UB : 50VDC
13. Resistance to vibration		Appearance : No abnormality Inductance change : Within ±15%	TLF9U Inductance change : Within ±5%  TLF14CB Within the specified range		CM, TLF : According to JIS C0040 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 <sup>2</sup> /s) 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. (TLF9U, 14CB)
14. Solderability	At least 75% of terminal electrode is covered by new solder.		Solder shall be uniformly adhered onto im- mersed surfaces.		CM : Solder temperature : 235±5°C Duration : 2±0.5sec. Immersion depth : According to detailed specification.  TLF : Solder temperature : 230±5°C Duration : 2±0.5sec. (9U, 25RA) : 3±0.5sec. (14CB) Immersion depth : Up to 1.0 to 1.5mm from PBC mount- ed level.
15. Resistance to soldering heat	Appearance : No abnormality Impedance change : Refer to individual specifi- cation		TLF9UA・TLF25RA : Inductance change : Within ±5%  TLF14CB Within the specified range		CM : Solder temperature : 260±5°C Duration : 5±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.  TLF : Solder temperature : 260±5°C Duration : 5±1sec. (25RA) : 10±1sec. (9U, 14CB) Immersion depth : Up to 1.0 to 1.5mm from PBC mount- ed level. Recovery : At least 1hr of recovery under the standard condition after the removal from test chamber, followed by the measurement within 2hrs.



Item	Specified Value				Test method and remarks															
	CM-RA/ BU-RA Type	CM-RB Type	TLF9U TLF14CB	TLF25RA																
16. Thermal shock	Appearance : No abnormality Impedance change : Refer to individual specification		TLF9UA · TLF25RA : Inductance change : Within ±15%  TLF14CB : · Withstanding voltage : No abnormality · Insulation resistance : No abnormality		CM, TLF : According to JIS C0025 Conditions for 1 cycle <table border="1"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Duration (min)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-25±3</td> <td>30±3</td> </tr> <tr> <td>2</td> <td>Room Temperature</td> <td>Within 3</td> </tr> <tr> <td>3</td> <td>+85±2</td> <td>30±3</td> </tr> <tr> <td>4</td> <td>Room Temperature</td> <td>Within 3</td> </tr> </tbody> </table> 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.	Step	Temperature (°C)	Duration (min)	1	-25±3	30±3	2	Room Temperature	Within 3	3	+85±2	30±3	4	Room Temperature	Within 3
Step	Temperature (°C)	Duration (min)																		
1	-25±3	30±3																		
2	Room Temperature	Within 3																		
3	+85±2	30±3																		
4	Room Temperature	Within 3																		
17. Damp heat			TLF9UA · TLF25RA : Inductance change : Within ±15%  TLF14CB : Withstanding voltage : No abnormality Insulation resistance : No abnormality		TLF : Temperature : 60±2°C ※TLF14CB Temperature : 40±2°C 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.															
18. Loading under damp heat	Appearance : No abnormality Inductance change : Refer to individual specification		Withstanding voltage : No abnormality Insulation resistance : No abnormality		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.  TLF : Temperature : 60±2°C ※TLF14CB Temperature : 40±2°C Humidity : 90~95%RH Duration : 100 hrs Applied voltage : Apply the following specified voltage between windings. <table border="1"> <tbody> <tr> <td>TLF9UA, 25RA</td> <td>250VAC</td> </tr> <tr> <td>TLF9UB</td> <td>50VDC</td> </tr> </tbody> </table> ※TLF14CB Duration : 500 hrs Apply rated current across windings Recovery : At least 1hr of recovery under the standard removal from test chamber followed by the measurement within 2 hrs.	TLF9UA, 25RA	250VAC	TLF9UB	50VDC											
TLF9UA, 25RA	250VAC																			
TLF9UB	50VDC																			
19. Loading at high temperature			Withstanding voltage : No abnormality Insulation resistance : No abnormality		TLF : Temperature : 85±2°C Duration : 100 hrs Applied voltage : Apply the following specified voltage between windings. <table border="1"> <tbody> <tr> <td>TLF9UA, 25RA</td> <td>250VAC</td> </tr> <tr> <td>TLF9UB</td> <td>50VDC</td> </tr> </tbody> </table> ※TLF14CB Duration : 500 hrs Apply rated current across windings Recovery : At least 1hr of recovery under the standard removal from test chamber followed by the measurement within 2 hrs.	TLF9UA, 25RA	250VAC	TLF9UB	50VDC											
TLF9UA, 25RA	250VAC																			
TLF9UB	50VDC																			



Item	Specified Value				Test method and remarks
	CM-RA/ BU-RA Type	CM-RB Type	TLF9U TLF14CB	TLF25RA	
20.Low temperature life test	Appearance : No abnormality Inductance change : Refer to individual specification		TLF9U・TLF25RA : Inductance change : Within $\pm 15\%$  TLF14CB : ・ Withstanding voltage : No abnormality ・ Insulation resistance : No abnormality		CM : Temperature : $-40 \pm 3^{\circ}\text{C}$ Duration : 500 (+12, -0) hrs Recovery : 1 to 2hrs of recovery under the standard condition after the removal from test chamber. (CM-RA) : 1 to 2hrs of recovery under the standard condition after the removal from test chamber. (CM-RB)  TLF : Temperature : $-25 \pm 2^{\circ}\text{C}$ ※TLF14CB Temperature : $-40 \pm 2^{\circ}\text{C}$ Duration : 500 hrs Recovery : At least 1hr of recovery under the standard removal from test chamber followed by the measurement within 2 hrs.
21.High Temperature life test	Appearance : No abnormality Inductance change : Refer to individual specification		TLF9U・TLF25RA : Inductance change : Within $\pm 15\%$  TLF14CB : ・ Withstanding voltage : No abnormality ・ Insulation resistance : No abnormality		CM : Temperature : $85 \pm 2^{\circ}\text{C}$ Duration : 500 (+12, -0) hrs Recovery : 1 to 2hrs of recovery under the standard condition after the removal from test chamber. (CM-RA) : 1 to 2hrs of recovery under the standard condition after the removal from test chamber. (CM-RB)  TLF : Temperature : $85 \pm 2^{\circ}\text{C}$ ※TLF14CB Temperature : $105 \pm 3^{\circ}\text{C}$ Duration : 500 hrs Recovery : At least 1hr of recovery under the standard removal from test chamber followed by the measurement within 2 hrs.

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

Stages	Precautions	Technical considerations
1.Circuit Design	<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>	
2.PCB Design	<p>Design</p> <p>1.Please design insertion pitches of a base in the pitches that fitted a terminal interval.</p>	<p>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.</p>
3.Soldering	<p>Wave soldering</p> <p>1.Please refer to the specifications in the catalog for a wave soldering.</p> <p>2.Do not immerse the entire Inductors in the flux during the soldering operation.</p> <p>Lead free soldering</p> <p>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.</p> <p>Recommended conditions for using a soldering iron</p> <p>Put the soldering iron on the land-pattern.</p> <p>Soldering iron's temperature - Below 350 °C</p> <p>Duration - 3 seconds or less</p> <p>The soldering iron should not directly touch the product.</p>	<p>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.</p>
4.Cleaning	<p>Cleaning conditions</p> <p>1.TLF type</p> <p>Please contact any of our offices for about a cleaning,</p>	
5.Handling	<p>Handling</p> <p>1.Keep the product away from all magnets and magnetic objects.</p> <p>Mechanical considerations</p> <p>1.Please do not give the product any excessive mechanical shocks.</p> <p>2.TLF type</p> <p>Please do not add any shock or and power to a product in transportation.</p> <p>Packing</p> <p>1.Please do not give the product any excessive mechanical shocks.</p> <p>In loading, please pay attention to handling indication mentioned in a packing box (a loading direction / number of maximum loading / fragile item).</p>	<p>1.There is a case that a characteristic varies with magnetic influence.</p> <p>1.There is a case to be damaged by a mechanical shock.</p> <p>2.TLF type</p> <p>There is a case to be broken by a fall.</p> <p>1.There is a case that a lead route turns at by a fall or an excessive shock.</p>
6.Storage conditions	<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> <p>·Recommended conditions</p> <p>Ambient temperature 0~40°C</p> <p>Humidity Below 70% RH</p> <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, product should be used 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>	<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>