

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.

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

COMMON MODE CHOKE COILS (FOR AC LINES) LEADED TYPE



WAVE

FEATURES

- TLF 9UA (H) Type : Small-sized configuration
- TLF14CB (H) Type : Ordinary configuration

APPLICATIONS

- As a preventive measure against noise terminal voltage or power supply noise in TV or VTR units, SW power supplies, NC machines, computer systems, peripheral units, measuring instruments, and controllers.
- TLF 9UA (H) Type : low-current applications
- TLF14CB (H) Type : equipment with several tens of watts of input power

OPERATING TEMP.

TLF9U Type	-25°C~+105°C
TLF14CB Type	-25°C~+105°C

(Including self-generated heat)

ORDERING CODE

T L F \triangle 9 U A H 1 0 2 W 0 R 8 \bigcirc \bigcirc

1 Type
TLF Line filter

2 Core dimensions (mm)

\triangle 9	9
14	14

 \triangle =Blank space

3 Nominal Inductance (μ H)

example	
102	1000
103	10000

4 Inductance tolerance (%)

\triangle	Nominal Values or higher
W	+100 -10

 \triangle =Blank space

5 Rated current (A)

R54	0.54
0R8	0.8

 ※R=decimal point

6 Internal code

\triangle	Standard Product
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7 Product classification code

\triangle	Standard
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 \triangle =Blank space

8 Shape

UA \triangle	U core, vertical type
UAH	U core, horizontal type
CB \triangle	Square type core vertically split wound
CBH	Square type core horizontally split wound

 \triangle =Blank space

EXTERNAL DIMENSIONS/MINIMUM QUANTITY

Type	Minimum Quantity Box
TLF9UA \square	500
TLF14CB \square	500

Type	Dimensions (mm)
TLF14CB Type	
TLF14CBH Type	
TLF9UA Type	
TLF9UA H Type	

Unit : mm (inch)

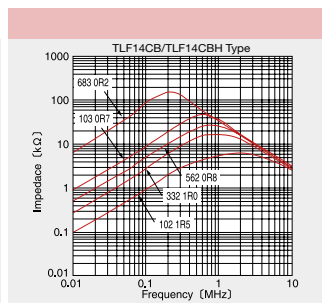
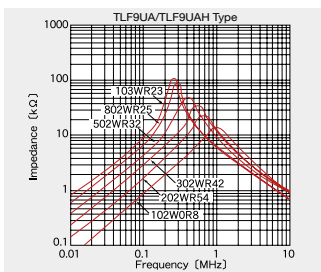
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PART NUMBERS

Type	Ordering code	EHS (Environmental Hazardous Substances)	Inductance [mH]	Inductance Tolerance	DC resistance [Ω] (max.)	Rated current [A] (max.)	Rated voltage [V] (max.)	Withstanding voltage [V] (min.) [1 minute]	Applicable frequency [MHz] Reference Value
TLF9UA	TLF9UA 102 W0R8	RoHS	1	+100%/−10%	0.5	0.80	AC250	AC2000	0.1~10
	TLF9UA 202 WR54	RoHS	2	+100%/−10%	1.0	0.54			
	TLF9UA 302 WR42	RoHS	3	+100%/−10%	1.5	0.42			
	TLF9UA 502 WR32	RoHS	5	+100%/−10%	2.5	0.32			
	TLF9UA 802 WR25	RoHS	8	+100%/−10%	4.0	0.25			
TLF9UA 103 WR23	RoHS	10	+100%/−10%	4.5	0.23				
TLF9UAH	TLF9UA H102 W0R8	RoHS	1	+100%/−10%	0.5	0.80			
	TLF9UA H202 WR54	RoHS	2	+100%/−10%	1.0	0.54			
	TLF9UA H302 WR42	RoHS	3	+100%/−10%	1.5	0.42			
	TLF9UA H502 WR32	RoHS	5	+100%/−10%	2.5	0.32			
	TLF9UA H802 WR25	RoHS	8	+100%/−10%	4.0	0.25			
TLF9UA H103 WR23	RoHS	10	+100%/−10%	4.5	0.23				
TLF14CB	TLF14CB 102 1R5	RoHS	1.0	min	0.1	1.5			
	TLF14CB 222 1R2	RoHS	2.2	min	0.18	1.2			
	TLF14CB 332 1R0	RoHS	3.3	min	0.32	1.0			
	TLF14CB 472 1R0	RoHS	4.7	min	0.38	1.0			
	TLF14CB 562 0R8	RoHS	5.6	min	0.42	0.8			
	TLF14CB 682 0R8	RoHS	6.8	min	0.6	0.8			
	TLF14CB 103 0R7	RoHS	10	min	0.85	0.7			
	TLF14CB 223 0R4	RoHS	22	min	1.7	0.4			
	TLF14CB 333 0R3	RoHS	33	min	2.7	0.3			
	TLF14CB 473 0R2	RoHS	47	min	3.6	0.2			
	TLF14CB 563 0R2	RoHS	56	min	5	0.2			
	TLF14CB 683 0R2	RoHS	68	min	6.5	0.2			
	TLF14CBH102 1R5	RoHS	1.0	min	0.1	1.5			
	TLF14CBH222 1R2	RoHS	2.2	min	0.18	1.2			
TLF14CBH332 1R0	RoHS	3.3	min	0.32	1.0				
TLF14CBH472 1R0	RoHS	4.7	min	0.38	1.0				
TLF14CBH562 0R8	RoHS	5.6	min	0.42	0.8				
TLF14CBH682 0R8	RoHS	6.8	min	0.6	0.8				
TLF14CBH103 0R7	RoHS	10	min	0.85	0.7				
TLF14CBH223 0R4	RoHS	22	min	1.7	0.4				
TLF14CBH333 0R3	RoHS	33	min	2.7	0.3				
TLF14CBH473 0R2	RoHS	47	min	3.6	0.2				
TLF14CBH563 0R2	RoHS	56	min	5	0.2				
TLF14CBH683 0R2	RoHS	68	min	6.5	0.2				

ELECTRICAL CHARACTERISTICS

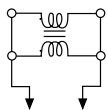
Impedance-Frequency characteristic



Test conditions

Equipment : HP-4192A Vosc-0.35V

Test circuit :



To impedance analyzer

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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

● TLF Type

Type	Minimum Quantity (pcs.)	
	Box	
TLF9UA□	500	
TLF9UB□	500	
TLF14CB□	500	

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RELIABILITY DATA

1. Operating Temperature Range

CM-RA/BU-RA Type	-25~+105°C
CM-RB Type	
TLF9U, TLF14CB	TLF9U : -25~+105°C, TLF14CB : -25~+105°C

[Test method and remarks]
Including temperature rise due to self-generated heat.

2. Storage temperature range

CM-RA/BU-RA Type	
CM-RB Type	-40~+85°C
TLF9U, TLF14CB	

3. Rated current

CM-RA/BU-RA Type	
CM-RB Type	Within the specified range
TLF9U, TLF14CB	

[Test method and remarks]
CM : The maximum DC value having temperature increase within specified temperature, as detailed in individual specification.
TLF9UA, 14CB : The maximum AC value having temperature increase within 45°C by the application of AC current.
TLF9UB : The maximum DC value having temperature increase within 45°C by the application of DC current.

4. Inductance

CM-RA/BU-RA Type	
CM-RB Type	Within the specified tolerance
TLF9U, TLF14CB	

[Test method and remarks]
CM :
Measuring equipment : 4263A (HP) or its equivalent
Measuring frequency : 1kHz

TLF9UA :
Measuring equipment : Impedance analyzer (HP4192A) or its equivalent
Measuring frequency : 1kHz
Measuring voltage : 0.35Vosc

TLF14CB :
Measuring equipment : LCR meter 4284A or its equivalent
Measuring frequency : 1kHz
Measuring voltage : 1.0V

5. DC resistance

CM-RA/BU-RA Type	
CM-RB Type	Within the specified tolerance
TLF9U, TLF14CB	

[Test method and remarks]
CM·TLF : Measuring equipment : DC ohmmeter

6. Terminal strength tensile force

CM-RA/BU-RA Type	
CM-RB Type	No abnormality
TLF9U, TLF14CB	

[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.

TLF14CB : Apply the stated tensile force gradually in the direction to draw terminal.

Nominal wire diameter tensile φd [mm]	force [N]	duration [s]
φ0.6	5	30±5

Nominal wire diameter tensile φd [mm]	force [N]	duration [s]
φ0.8	10	30±5

7. Temperature rise

CM-RA/BU-RA Type	
CM-RB Type	Refer to individual specification
TLF9U, TLF14CB	45°C max.

[Test method and remarks]
TLF : Resistance substitution method
Applied current : Rated current
Duration : 1 hour

8. Insulation resistance between wires

CM-RA/BU-RA Type	
CM-RB Type	100MΩ min.
TLF9U, TLF14CB	

[Test method and remarks]
CM·TLF : Applied voltage : Rated voltage (CM-RA/BU-RA, CM-RB)
: 500VDC (TLF9UA, 14CB)
: 250VDC (TLF9UB)
Duration : 60sec.

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RELIABILITY DATA

9. Insulation resistance between wire and core	
CM-RA/BU-RA Type	
CM-RB Type	
TLF9U, TLF14CB	100MΩ min.
【Test method and remarks】	
TLF : Applied voltage : 500VDC (TLF9UA, 14CB) : 250VDC (TLF9UB)	
Duration : 60 sec.	
10. Withstanding : between wires	
CM-RA/BU-RA Type	
CM-RB Type	No abnormality
TLF9U, TLF14CB	
【Test method and remarks】	
CM・TLF : Applied voltage : 250VDC (CM-RA/BU-RA, CM-RB) : 2000VAC (TLF9UA, 14CB) : 500VDC (TLF9UB)	
Duration : 60sec.	
11. Withstanding : between wires and core	
CM-RA/BU-RA Type	
CM-RB Type	
TLF9U, TLF14CB	No abnormality
【Test method and remarks】	
TLF : Applied voltage : 2000VAC (TLF9UA, 14CB) : 500VDC (TLF9UB)	
Duration : 60sec.	
12. Rated voltage	
CM-RA/BU-RA Type	
CM-RB Type	Within the specified range
TLF9U, TLF14CB	
【Test method and remarks】	
TLF9UA, 14CB : 250VAC TLF9UB : 50VDC	
13. Resistance to vibration	
CM-RA/BU-RA Type	
CM-RB Type	Appearance : No abnormality Inductance change : Within ±15%
TLF9U, TLF14CB	TLF9U : Inductance change : Within ±5% TLF14CB : Within the specified range
【Test method and remarks】	
CM・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 : 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	
CM-RA/BU-RA Type	At least 75% of terminal electrode is covered by new solder.
CM-RB Type	
TLF9U, TLF14CB	Solder shall be uniformly adhered onto immersed surfaces.
【Test method and remarks】	
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) : 3±0.5sec. (14CB) Immersion depth : Up to 1.0 to 1.5mm from PBC mounted level.	
15. Resistance to soldering heat	
CM-RA/BU-RA Type	Appearance : No abnormality Inductance change : Refer to individual specification
CM-RB Type	
TLF9U, TLF14CB	TLF9UA : Inductance change : Within ±5% TLF14CB : Within the specified range
【Test method and remarks】	
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 : 10±1sec. (9U, 14CB) 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.	

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RELIABILITY DATA

16. Thermal shock					
CM-RA/BU-RA Type	Appearance : No abnormality Inductance change : Refer to individual specification				
CM-RB Type					
TLF9U, TLF14CB	TLF9UA : Inductance change : Within $\pm 15\%$ TLF14CB : Withstanding voltage : No abnormality Insulation resistance : No abnormality				
[Test method and remarks]					
CM, TLF : According to JIS C 0025 Conditions for 1 cycle					
Step	Temperature [°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.					
17. Damp heat					
CM-RA/BU-RA Type					
CM-RB Type					
TLF9U, TLF14CB	TLF9UA : Inductance change : Within $\pm 15\%$ TLF14CB : Withstanding voltage : No abnormality Insulation resistance : No abnormality				
[Test method and remarks]					
TLF : Temperature : 60 \pm 2°C 40 \pm 2°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.					
18. Loading under damp heat					
CM-RA/BU-RA Type	Appearance : No abnormality Inductance change : Refer to individual specification				
CM-RB Type					
TLF9U, TLF14CB	Withstanding voltage : No abnormality Insulation resistance : No abnormality				
[Test method and remarks]					
CM : Temperature : 40 \pm 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 \pm 2°C 40 \pm 2°C (※TLF14CB) Humidity : 90~95%RH Duration : 100 hrs 500 hrs Apply rated current across windings (※TLF14CB) Applied voltage : Apply the following specified voltage between windings.					
	<table border="1"> <tr> <td>TLF9UA</td> <td>250VAC</td> </tr> <tr> <td>TLF9UB</td> <td>50VDC</td> </tr> </table>	TLF9UA	250VAC	TLF9UB	50VDC
TLF9UA	250VAC				
TLF9UB	50VDC				
Recovery : At least 1hr of recovery under the standard removal from test chamber followed by the measurement within 2 hrs.					
19. Loading at high temperature					
CM-RA/BU-RA Type					
CM-RB Type					
TLF9U, TLF14CB	Withstanding voltage : No abnormality Insulation resistance : No abnormality				
[Test method and remarks]					
TLF : Temperature : 85 \pm 2°C Duration : 100 hrs 500 hrs Apply rated current across windings (※TLF14CB) Applied voltage : Apply the following specified voltage between windings.					
	<table border="1"> <tr> <td>TLF9UA</td> <td>250VAC</td> </tr> <tr> <td>TLF9UB</td> <td>50VDC</td> </tr> </table>	TLF9UA	250VAC	TLF9UB	50VDC
TLF9UA	250VAC				
TLF9UB	50VDC				
Recovery : At least 1hr of recovery under the standard removal from test chamber followed by the measurement within 2 hrs.					
20. Low temperature life test					
CM-RA/BU-RA Type	Appearance : No abnormality Inductance change : Refer to individual specification				
CM-RB Type					
TLF9U, TLF14CB	TLF9UA : Inductance change : Within $\pm 15\%$ TLF14CB : Withstanding voltage : No abnormality Insulation resistance : No abnormality				
[Test method and remarks]					
CM : Temperature : -40 \pm 3°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°C -40 \pm 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.					

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21. High Temperature life test		
CM-RA/BU-RA Type	Appearance : No abnormality	Inductance change : Refer to individual specification
CM-RB Type		
TLF9U, TLF14CB	TLF9U : Inductance change : Within $\pm 15\%$	Insulation resistance : No abnormality
	TLF14CB : Withstanding voltage : No abnormality	

[Test method and remarks]

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 : $85 \pm 2^\circ\text{C}$
 : $105 \pm 3^\circ\text{C}$ (*: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, TLF Type

1. Circuit Design	
Precautions	<ul style="list-style-type: none"> ◆ Operating environment <ol style="list-style-type: none"> 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	<ul style="list-style-type: none"> ◆ Design <ol style="list-style-type: none"> 1. Please design insertion pitches of a base in the pitches that fitted a terminal interval.
Technical considerations	<ul style="list-style-type: none"> ◆ Design <ol style="list-style-type: none"> 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	<ul style="list-style-type: none"> ◆ Wave soldering <ol style="list-style-type: none"> 1. Please refer to the specifications in the catalog for a wave soldering. 2. Do not immerse the entire Inductors in the flux during the soldering operation. ◆ Lead free soldering <ol style="list-style-type: none"> 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 <ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> ◆ Lead free soldering <ol style="list-style-type: none"> 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.
4. Cleaning	
Precautions	<ul style="list-style-type: none"> ◆ Cleaning conditions <ol style="list-style-type: none"> 1. TLF type Please contact any of our offices for about a cleaning.
5. Handling	
Precautions	<ul style="list-style-type: none"> ◆ Handling <ol style="list-style-type: none"> 1. Keep the product away from all magnets and magnetic objects. ◆ Mechanical considerations <ol style="list-style-type: none"> 1. Please do not give the product any excessive mechanical shocks. 2. TLF type <ol style="list-style-type: none"> 1. Please do not add any shock or and power to a product in transportation. ◆ Packing <ol style="list-style-type: none"> 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	<ul style="list-style-type: none"> ◆ Handling <ol style="list-style-type: none"> 1. There is a case that a characteristic varies with magnetic influence. ◆ Mechanical considerations <ol style="list-style-type: none"> 1. There is a case to be damaged by a mechanical shock. 2. TLF type <ol style="list-style-type: none"> 1. There is a case to be broken by a fall. ◆ Packing <ol style="list-style-type: none"> 1. There is a case that a lead route turns at by a fall or an excessive shock.
6. Storage conditions	
Precautions	<ul style="list-style-type: none"> ◆ Storage <ol style="list-style-type: none"> 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"> • Recommended conditions Ambient temperature: 0~40°C Humidity : Below 70% RH 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 style="margin-left: 20px;">In case of storage over 6 months, solderability shall be checked before actual usage.</p>
Technical considerations	<ul style="list-style-type: none"> ◆ Storage <ol style="list-style-type: none"> 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.

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