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.
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COMMON MODE CHOKE COILS (FOR DC AND SIGNAL LINES) LEADED TYPE

WAVE

FEATURES

- Highly reliable, compact and lightweight
- Easily inserted into the PCB

APPLICATIONS

- TLF Type :
  Countermeasure 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

OPERATING TEMP.

TLF Type	−25℃～+105℃
CM Type	−25℃～+105℃

(Including self-generated heat)

ORDERING CODE

【TLF Type】

T L F △ 9 U B H 3 0 2 W ○ ○

❶Type	
TLF	Line filter

❷Dimensions of core	
△9	9mm

△=Blank space

❸Shape	
UB△	U core, vertically split wound
UBH	U core, horizontally split wound

△=Blank space

❹Nominal inductance (μH)	
example	
302	3000
203	20000

❺Inductance tolerance (%)	
W	+100 −10

❻❼Internal code	
△△	Standard product

△=Blank space

【CM-BU Type】

C M 0 5 R A 0 6 ○

❶Type	
CM	Common mode choke coile
BU	

❷Core dimensions (mm)	
05	4.8
08	8.0
12	12.0

❸Shape	
RA	Double-wire lead
RB	Pin type with base

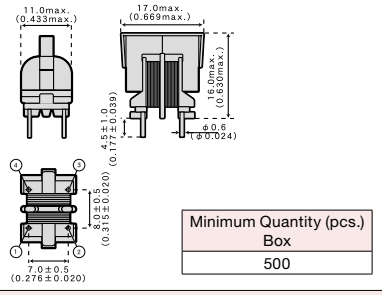
❹Product classification code
01～20

❺Internal code	
△	Standard product

△=Blank space

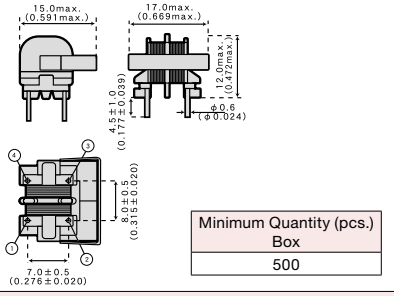
EXTERNAL DIMENSIONS/MINIMUM QUANTITY

TLF9UB Type



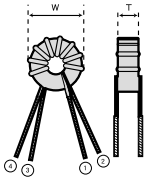
Minimum Quantity (pcs.)
Box
500

TLF9UB H Type



Minimum Quantity (pcs.)
Box
500

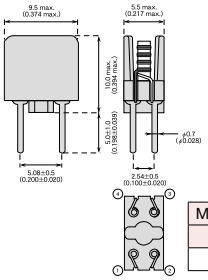
CM□□RA Type / BU08RA Type



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

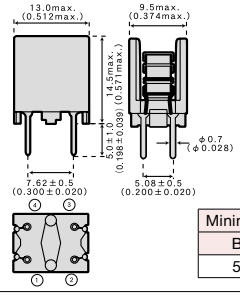
Type	W (max.)	T (max.)
CM05	6.5 (0.256)	3.0 (0.118)
CM08,BU08	11.0 (0.433)	6.0, 7.0 (0.024, 0.276)
CM12	15.5 (0.610)	7.0 (0.276)

CM05RB (2Lines Type)



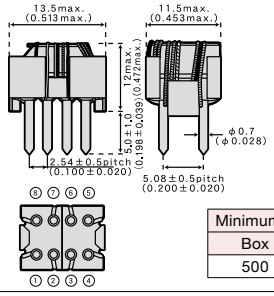
Minimum Quantity (pcs.)	
Box	Bulk
1000	—

CM08RB (2Lines) Type



Minimum Quantity (pcs.)	
Box	Bulk
500	—

CM08RB (4Lines) Type



Minimum Quantity (pcs.)	
Box	Bulk
500	—

Unit : mm (inch)

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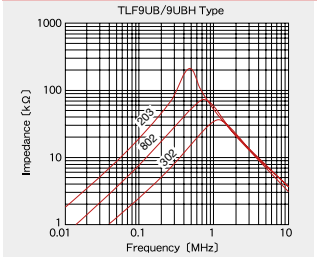
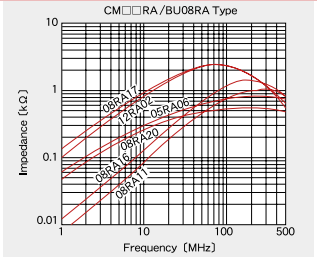
PART NUMBERS

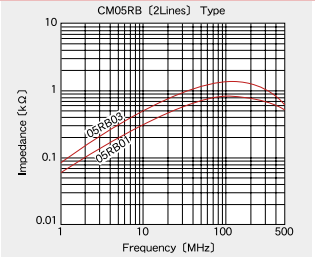
Ordering code		EHS (Environmental Hazardous Substances)	No. of lines	Inductance [μH] [$^{+100}_{-10}$ %]	DC resistance [Ω] (max.)	Rated current [A] (max.)	Rated voltage [V] D.C.	Insulation resistance [MΩ] (min.)	Impedance [KΩ] (Reference values)
TLF9UBH302W		RoHS	2	3000	1.5	0.4	50	100	≧20 (at 1MHz)
TLF9UB 302W		RoHS							
TLF9UBH802W		RoHS		8000	3.0	0.3			≧40 (at 700kHz)
TLF9UB 802W		RoHS							
TLF9UBH203W		RoHS		20000	6.5	0.18			≧150 (at 500kHz)
TLF9UB 203W		RoHS							

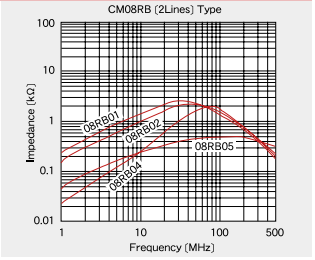
Ordering code			EHS (Environmental Hazardous Substances)	No.of lines	Inductance [μH] [at 1kHz]	Impedance [Ω] (typical)	DC resistance [Ω] (max.)	Rated current [A] (max.)	Rated voltage [V] D.C.	Insulation resistance [MΩ] (min.)
CM05RA	06		RoHS	2	0.7 min.	700 (at 200MHz)	0.050	1.5	50	100
BU08RA	11		RoHS		0.7～1.3	1000 (at 250MHz)	0.013	4.0		
	16		RoHS		1.19～2.21	1200 (at 200MHz)	0.011	3.0		
CM08RA	17		RoHS		15.0 min.	2000 (at 80MHz)	0.040	2.4		
	20		RoHS		6.0 min.	500 (at 200MHz)	0.020	5.5		
CM12RA	02		RoHS		10.0 min.	2000 (at 80MHz)	0.040	3.0		
CM05RB	01		RoHS		7.0 min.	700 (at 70MHz)	0.050	2.0		
	03		RoHS		15.0 min.	1400 (at 100MHz)	0.060	1.5		
CM08RB	01		RoHS		40.0 min.	2500 (at 30MHz)	0.040	2.0		
	02		RoHS		15.0 min.	2000 (at 50MHz)	0.040	2.4		
	04		RoHS		110.0 min.	2000 (at 70MHz)	0.040	3.0		
	05		RoHS		6.0 min.	450 (at 100MHz)	0.020	4.0		
	03		RoHS	4	15.0 min.	1000 (at 50MHz)	0.050	2.0		

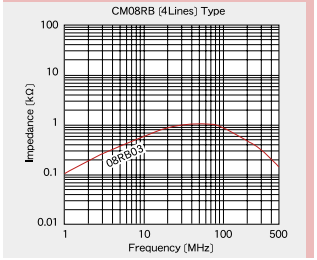
ELECTRICAL CHARACTERISTICS





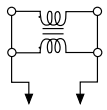






Measuring conditions
Equipment : HP4291A Vosc: 0.5V (CM/BU type)
HP4192A Vosc: 0.35V (TLF type)

Measuring 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℃
CM-RB Type	
TLF9U, TLF14CB	TLF9U : −25～+105℃, TLF14CB : −25～+105℃

【Test method and remarks】
Including temperature rise due to self-generated heat.

2. Storage temperature range	
CM-RA/BU-RA Type	−40～+85℃
CM-RB Type	
TLF9U, TLF14CB	

3. Rated current	
CM-RA/BU-RA Type	Within the specified range
CM-RB Type	
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℃ by the application of AC current.
TLF9UB : The maximum DC value having temperature increase within 45℃ by the application of DC current.

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

【Test method and remarks】
CM・TLF : Measuring equipment : DC ohmmeter

6. Terminal strength tensile force	
CM-RA/BU-RA Type	No abnormality
CM-RB Type	
TLF9U, TLF14CB	

【Test method and remarks】
CM : Fix the component in the direction to draw terminal and gradually apply tensile force as detailed in indiviual specifications.

TLF9U : 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

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

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

7. Temperature rise	
CM-RA/BU-RA Type	Refer to individual specification
CM-RB Type	
TLF9U, TLF14CB	45℃ 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	100MΩ min.
CM-RB Type	
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℃
Duration : 2±0.5sec.
Immersion depth : According to detailed specification.

TLF : Solder temperature : 230±5℃
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℃
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℃
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. Thermnal shock	
CM-RA/BU-RA Type	Appearance : No abnormality　　Inductance change : Refer to individual specification
CM-RB Type	
TLF9U, TLF14CB	TLF9UA : Inductance change : Within ±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〔℃〕	Durration〔min〕
1	−25±3	30±3
2	Room Temperature	Within 3
3	+85±2	30±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 ±15% TLF14CB : Withstanding voltage : No abnormality　　Insulation resistance : No abnormality

【Test method and remarks】
TLF : Temperature : 60±2℃
40±2℃ (※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±2℃
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℃
40±2℃ (※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.

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±2℃
Duration : 100 hrs
500 hrs Apply rated current across windings (※TLF14CB)
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.

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 ±15% TLF14CB: Withstanding voltage : No abnormality　　Insulation resistance : No abnormality

【Test method and remarks】
CM : Temperature : −40±3℃
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±2℃
: −40±2℃ (※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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RELIABILITY DATA

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 ±15% TLF14CB : Withstanding voltage : No abnormality	Insulation resistance : No abnormality

【Test method and remarks】

CM : Temperature : 85±2℃
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±2℃
: 105±3℃ (※TLF14CB)
Duration : 500 hrs
Recovery : At least 1hr of recovery under the standard removal from test chamber followed by the measurement within 2 hrs.

PRECAUTIONS

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

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 of a base in the pitches that fitted a terminal interval.
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 Inductors 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℃ ・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.

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 and 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, solderability of products electrodes may decrease as time passes. For this reason, product should be used 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.

* This catalog contains the typical specification only due to the limitation of space. When you consider 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/) or CD catalogs.