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 2012. 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.

SMD COMMON MODE FILTERS FOR HIGH-SPEED DIFFERENTIAL SIGNAL LINES

REFLOW

FEATURES

- CM01 Series is Wire-wound Structured Type Commom Mode Choke Coil which provides highly effective noise suppression characteristics without distorting the wave pattern of High-speed Differential Signal interface.
- Developed 1210 case-size by utilizing our wire-wound technologies. This small and wire-wound structured product has little transmission loss and keeps high common impedance up to GHz range.
- CM01S600, CM01S900 : Suitable characteristics for super high speed differential signal such as USB3.0 and so on. Cutoff frequency is 8～10GHz.
- CM01H900 : Suitable characteristics for high speed differential signal such as HDMI, DVI, Displayport and so on. Cut-off frequency is 8GHz.
- CM01U900 : Suitable characteristics for differential signal such as USB2.0, LVDS, LAN and so on. Cut-off frequency is 3GHz. High rated current of this product makes it possible to replace 2012 size product for this product.
- CM01U161 : Suitable characteristics for differential signal such as USB2.0, LVDS, LAN and so on. Cut-off frequency is 3GHz. High common impedance of this product works effectively on noise suppression.

APPLICATIONS

- Radiated noise suppression in the High-speed Diffrential Signal interfaces [HDMI, Serial-ATA, IEEE1394, LVDS, and USB2.0] of LCD-TV, Blu-ray players, and PCs.
- Countermeasure for degradation of receiver sensitivity caused by high frequency noise from high-speed differential signal of Cellular phones, Data Cards and Smartphones.
- Common mode noise suppression raised from the power line and audio signal in a small device.

OPERATING TEMP.

- −40～125℃ (Including self-generated heat)

ORDERING CODE

C M 0 1 H 9 0 0 T

❶Type	
CM	Common mode choke coil

❷External Dimensions (L×W)	
01	1.2×1.0mm

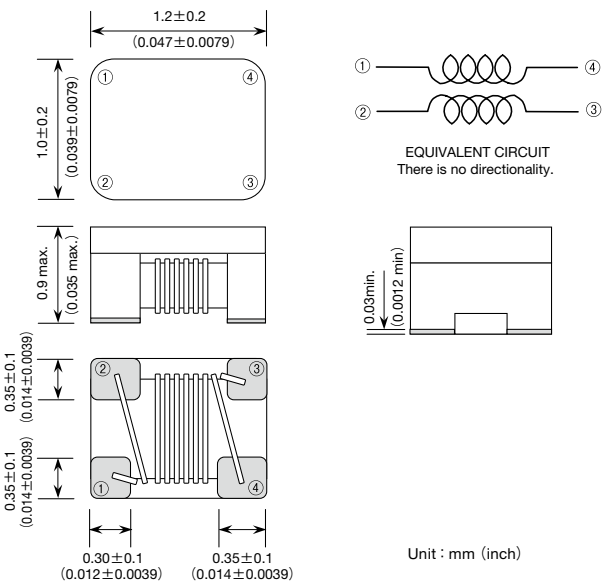
❸Product classification code	
S	USB3.0 correspondence
H	HDMI/Displayport correspondence
U	USB2.0/LAN correspondence

❹Impedance	
600	60Ω typical at 100MHz
900	90Ω typical at 100MHz
161	160Ω typical at 100MHz

❺Packaging	
T	Taping

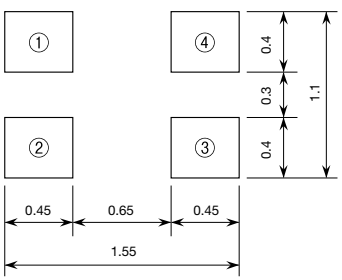
EXTERNAL DIMENSIONS/MINIMUM QUANTITY / LAND PATTERN DESIGN

●CM01TYPE



Type	Minimum Quantity (pcs.)
	Embossed tape
CM01[2 Lines] type	3000

●LAND PATTERN DESIGN



PART NUMBERS

●CM01 TYPE

Ordering	EHS	No. of Lines	Common Impedance [Ω] (at 100MHz)	DC resistance [Ω]	Rated current [mA]	Rated voltage [V] (D.C.)	Insulation resistance [MΩ]	Cut off frequency [GHz]	Characteristic impedance [Ω]
CM01S600T	RoHS	2	60typ. 43min.	0.4max.	300max.	20max.	100min.	10.0typ.	90typ.
CM01S900T	RoHS	2	90typ. 65min.	0.5max.	280max.	20max.	100min.	8.0typ.	90typ.
CM01H900T	RoHS	2	90typ. 65min.	0.5max.	280max.	20max.	100min.	8.0typ.	100typ.
CM01U900T	RoHS	2	90typ. 65min.	0.3max.	400max.	20max.	100min.	3.0typ.	—
CM01U161T	RoHS	2	160typ. 120min.	0.6max.	260max.	20max.	100min.	3.0typ.	—

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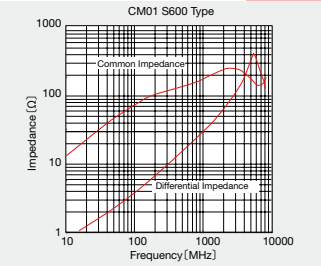
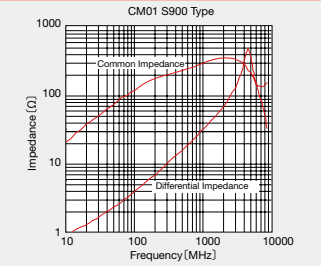
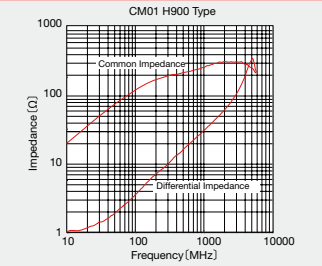
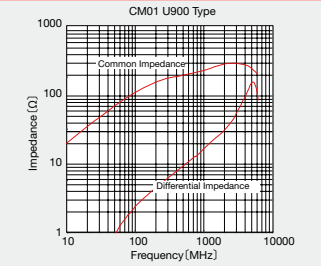
ELECTRICAL CHARACTERISTICS

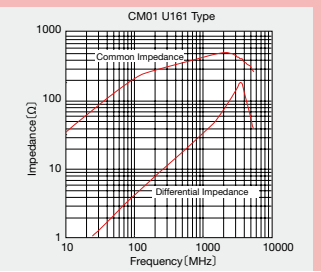
Impedance characteristics



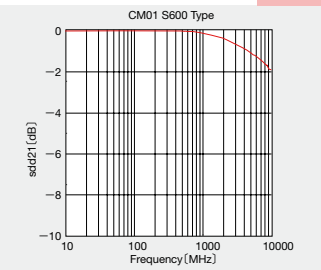


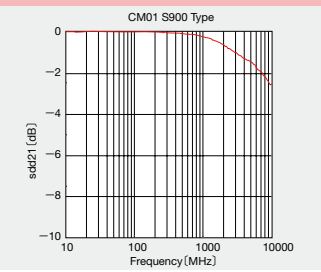


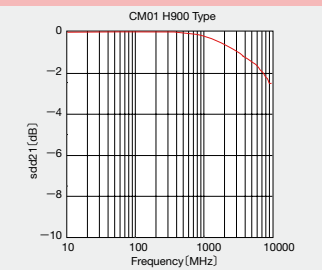


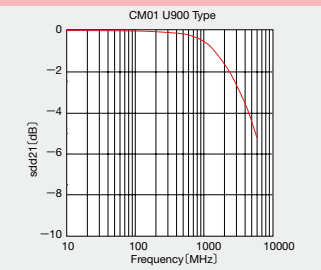


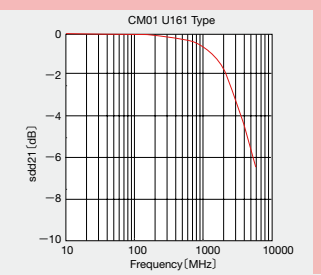
Transmission characteristic











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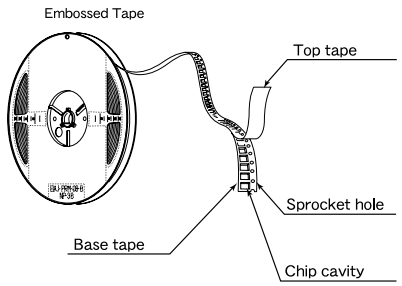
PACKAGING

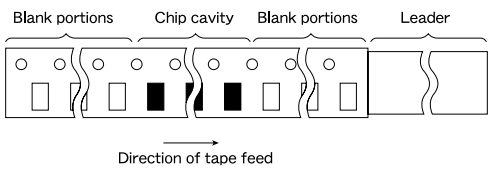
①Minimum Quantity

Type	Minimum Quantity (pcs.) Embossed tape
CM01 [2 Lines] type	3000
CM04RC [2 Lines] type	1500
CM04RC 02T	1000
CM04RC 08T	2500
CM04RC [4 Lines] type	1000
BU05MC [2 Lines] type	2500
BU05MC [3 Lines] type	2500

②Tape Material



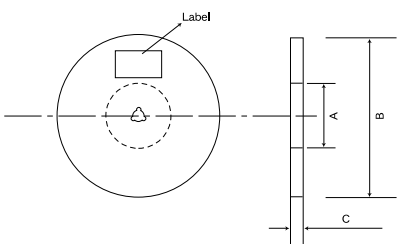
③Leader and Blank Portion



Type	Leader	Blank portions (Leader side)	Blank portions (Chip cavity side)
CM01	200～400 (7.87～15.75)	160～200 (6.30～7.87)	160 (6.30) or more
CM04RC	150 (5.89)	80 (3.14)	80 (3.14)
BU05MC	150 (5.89)	80 (3.14)	80 (3.14)

Unit : mm (inch)

④Reel size

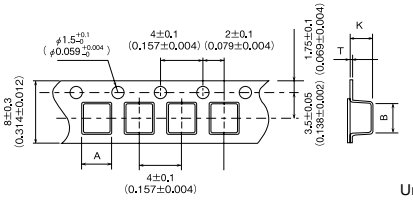


Type	A	B	C
CM01	φ60+1/−0 (φ2.36+0.039/−0)	φ180+0/−3 (φ7.09+0/−0.118)	10.0±1.5 (0.394±0.059)
CM04RC	φ100±1 (φ3.94±0.039)	φ330±2 (φ12.99±0.079)	18±1.5 (0.709±0.059)
BU05MC	φ80±1 (φ3.15±0.039)	φ330±2 (φ12.99±0.079)	13.5±1 (0.53±0.039)

Unit : mm (inch)

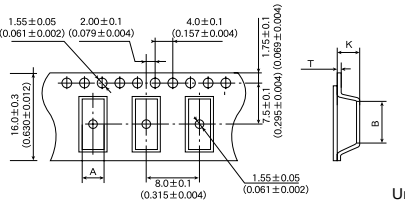
⑤Taping dimensions

● Embossed tape (CM01 type)



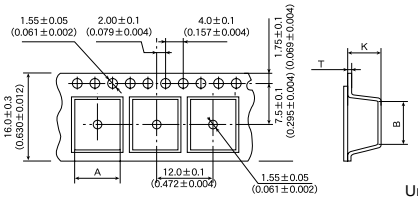
Unit: mm (inch)

● Embossed tape (CM04RC type) 8mm pitch (0.31 inches pitch)



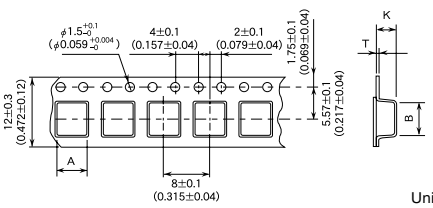
Unit: mm (inch)

● Embossed tape (CM04RC type) 12mm pitch (0.472 inches pitch)



Unit: mm (inch)

● Embossed tape (BU05MC type)

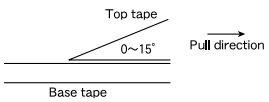


Unit: mm (inch)

Type	Lines	Insertion pitch	Chip cavity		tape thickness	
			A	B	K	T
CM01	2	4.0±0.1	1.16±0.1	1.41±0.1	0.98±0.1	0.3max.
CM04RC	2	8.0±0.1	5.7±0.1	9.65±0.1	5.2max	0.4±0.05
	3(02T)	12.0±0.1	9.8±0.1	7.7±0.1	5.0max	0.38±0.05
	3(08T)	8.0±0.1	5.7±0.1	9.8±0.1	3.1max	0.4±0.05
	4	12.0±0.1	10.3±0.1	10.3±0.1	5.0max	0.3±0.05
BU05MC	2	8.0±0.1	5.35±1.5	5.7±0.2	3.2±0.1	0.4±0.05
	3					

Unit : mm (inch)

⑥Top Tape Strength



● CM01
The top tape requires a peel-off force of 0.1 to 1.0N in the direction of the arrow as illutrated above.

● CM04RC, BU05MC
The top tape requires a peel-off force of 0.1 to 0.7N in the direction of the arrow as illutrated above.

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RELIABILITY DATA

1. Operating Temperature Range	
CM01	−40℃～+125℃
CM04RC	−25℃～+105℃
BU05MC	

【Test Method and Remarks】
Including self-generated heat

2. Storage Temperature Range	
CM01	−40℃～+85℃
CM04RC	
BU05MC	

【Test Method and Remarks】
−5 to +40℃ in taped packaging

3. Rated current	
CM01	Within the specified tolerance.
CM04RC	
BU05MC	

【Test Method and Remarks】
The maximum value of DC current within a specified rise of temperature individually.

4. Impedance	
CM01	Within the specified tolerance.
CM04RC	
BU05MC	

【Test Method and Remarks】
Measuring equipment : HP 4291A or its equivalent
Measuring frequency : Specified frequency

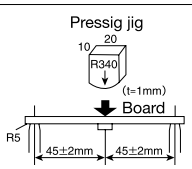
5. DC Resisitance	
CM01	Within the specified tolerance.
CM04RC	
BU05MC	

【Test Method and Remarks】
SMD transformer・Commom mode choke coil :
Measuring equipment : DC ohm meter

6. Resistance to flexure of substrate	
CM01	Within the specified tolerance.
CM04RC	Refer to the individual specification.
BU05MC	

【Test Method and Remarks】
According to JIS C 0051

	CM01	CM04RC・BU05MC
Warp	2mm	3mm
Pressing speed	0.5mm/sec.	
Duration	5±1sec.	



7. Dielectric resistance : between wires	
CM01	100MΩ min.
CM04RC	
BU05MC	

【Test Method and Remarks】
Applied voltage : Rated voltage
Duration : 60 sec.

8. Rated voltage	
CM01	Within the specification.
CM04RC	
BU05MC	

9. Withstanding voltage : between wires	
CM01	No abnormality.
CM04RC	
BU05MC	

【Test Method and Remarks】
Applied voltage : Regulation voltage, DC250V(CM04RC), DC125V(BU05MC)
Duration : 60 sec.

10. Resistance to vibration	
CM01	No abnormality observed in appearance
CM04RC	Refer to the individual specification.
BU05MC	

【Test Method and Remarks】
According to JIS C 0040
Directions : 2 hrs each in X, Y, and Z directions. Total : 6 hrs
Frequency range : 10 to 55 to 10 Hz (1 min.)
Amplitude : 1.5mm (Shall not exceed acceleration 196m/s^2)
Mounting method : soldering onto printed board
Recovery : At least 2 hrs of recovery under the standard condition after the test,followed by the measurement within 48 hrs.

RELIABILITY DATA

11. Solderability	
CM01	At least 90% of terminal electrode is covered by new solder.
CM04RC BU05MC	At least 75% of terminal electrode is covered by new solder.

【Test Method and Remarks】

	CM01	CM04RC・BU05MC
Solder temperature	245±5℃	235±5℃
Duration	3±1sec.	2±0.5sec.
Immersion depth	—	Up to 0.5mm from terminal root

12. Resistance to solder Heat	
CM01	Within the specified tolerance.
CM04RC BU05MC	Refer to the individual specification.

【Test Method and Remarks】

	CM01	CM04RC・BU05MC
Reflow soldering	Preheating : 150 to 180℃ 1 to 2min Peak : 255±5℃ 5sec. 230±5℃ 30～40sec. Number of reflow : Within 2 times	Preheating : 100 to 150℃ 1 to 2min Peak : 230 to 240℃ within 5sec. More than 200℃ within 40sec. Number of reflow : Within 2 times
Manual soldering	—	Solder temperature : 350±5℃ Duration : 3±1sec. Recovery : 1 to 2hrs of recovery under the standard condition after the test.

13. Thermal shock	
CM01	Within the specified tolerance.
CM04RC BU05MC	Refer to the individual specification.

【Test Method and Remarks】
Accoding to JIS C 0025
Conditions of 1 cycle

Step	Temperature (℃)		Time (min)	
	CM01	CM04RC・BU05MC	CM01	CM04RC・BU05MC
1	−40±3℃	−25±3℃	30±3	
2	Room Temp.	Room Temp.	3	
3	85±2℃	85±3℃	30±3	
4	Room Temp.	Room Temp.	3	

Number of cycle : CM01 : 100 cycle
CM04RC・BU05MC : 10 cycle
Recovery : Recovery under the standard condition after removal from test chamber.
CM01 : Should be measured within 2 to 48hours.
CM04RC・BU05MC : Leave within 1 to 2 hours.

14. Loading under damp heat	
CM01	Within the specified tolerance.
CM04RC BU05MC	Refer to the individual specification.

【Test Method and Remarks】

	CM01	CM04RC・BU05MC
Temperature	60±2℃	40±3℃
Humidity	90～95%RH	
Applied current	Rated current	
Duration	1000±24hrs	

Recovery : Recovery under the standard condition after removal from test chamber.
CM01 : Should be measured within 2 to 48hours.
CM04RC・BU05MC : Leave within 1 to 2 hours.

15. High temperature life test	
CM01	—
CM04RC BU05MC	Refer to the individual specification.

【Test Method and Remarks】

	CM04RC・BU05MC
Temperature	85±3℃
Duration	1000±24hrs

Recovery : Recovery under the standard condition after removal from test chamber.
CM01 : Should be measured within 2 to 48hours.
CM04RC・BU05MC : Leave within 1 to 2 hours.

16. Low Temperature life Test	
CM01	Within the specified tolerance.
CM04RC BU05MC	Refer to the individual specification.

【Test Method and Remarks】

	CM01	CM04RC・BU05MC
Temperature	−40±2℃	−40±3℃
Applied current	1000±24hrs	

Recovery : Recovery under the standard condition after removal from test chamber.
CM01 : Should be measured within 2 to 48hours.
CM04RC・BU05MC : Leave within 1 to 2 hours.

17. Loading at high temperature life test	
CM01	Within the specified tolerance.
CM04RC	–
BU05MC	

【Test Method and Remarks】

	CM01
Temperature	105±2℃
Applied current	Rated current
Duration	1000±24hrs

Recovery : Recovery under the standard condition after removal from test chamber.
CM01 : Should be measured within 2 to 48hours.
CM04RC・BU05MC : Leave within 1 to 2 hours.

Note on standard condition :
"standard condition" referred to herein is defined as follows:
5 to 35℃ of temperature, 45 to 85% relative humidity and 86 to 106kPa of air pressure.
When there are questions concerning measurement results:
In order to provide correlation data, the test shall be conducted under condition of 20±2℃ of temperature, 45 to 85% relative humidity and 86 to 106kPa of air pressure.
Unless otherwise specified, all the tests are conducted under the "standard condition."

PRECAUTIONS

CM04RC, BU05MC, CM01

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

◆Land pattern design

1. Please contact any of our offices for a land pattern, and refer to a recommended land pattern of specifications.

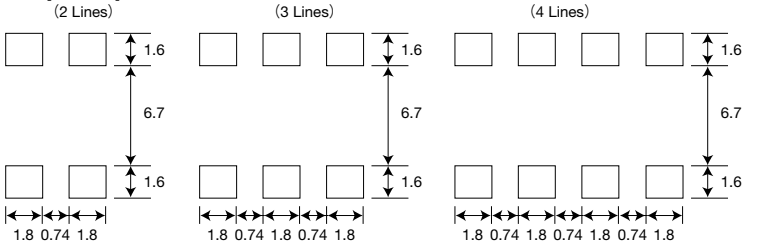
Technical considerations

◆Land pattern design

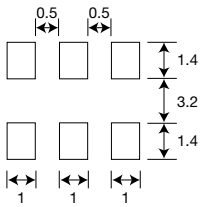
Surface Mounting

- Mounting and soldering conditions should be checked beforehand.
- Applicable soldering process to these products is reflow soldering only.
- Recommended Land Patterns

【CM04RC】

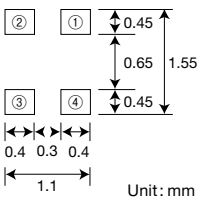


【BU05MC】



【CM01】

Refer to the external dimension drawing for the pin location.



Unit: mm

3. Considerations for automatic placement

Precautions

◆Adjustment of mounting machine

1. Excessive impact load should not be imposed on the products when mounting onto the PC boards.
2. Mounting and soldering conditions should be checked beforehand.

Technical considerations

◆Adjustment of mounting machine

1. When installing products, care should be taken not to apply distortion stress as it may deform the products.

4. Soldering

Precautions

◆Reflow soldering

1. Please contact any of our offices for a reflow soldering, and refer to the recommended condition specified.
2. This product can be used reflow soldering only.
3. Please do not add any stress to a product until it returns in normal temperature after reflow soldering.

◆Lead free soldering

1. When using products with lead free soldering, we request to use them after confirming adhesion, temperature of resistance to soldering heat, soldering etc sufficiently.

◆Recommended conditions for using a soldering iron

【CM04RC, BU05MC】

- 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 inductor.

【CM01】

- Please do not conduct an adjustment with a soldering iron because the wire would be broken due to its thinness.

Technical considerations

◆Reflow 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.

5. Cleaning

Precautions

◆Cleaning conditions

1. Please contact any of our offices for a cleaning.

6. Handling

Precautions

◆Handling

1. Keep the product away from all magnets and magnetic objects.

◆Breakaway PC boards (splitting along perforations)

1. When splitting the PC board after mounting product, care should be taken not to give any stresses of deflection or twisting to the board.
2. Board separation should not be done manually, but by using the appropriate devices.

◆Mechanical considerations

1. Please do not give the product any excessive mechanical shocks.
2. Please do not add any shock and power to a product in transportation.

◆Pick-up pressure

1. Please do not push to add any pressure to a winding part. Please do not give any shock and push onto an exposed part of ferrite cores.

◆Packing

1. Please avoid accumulation of a packing box as much as possible.

Technical considerations

◆Handling

1. There is a case that a characteristic varies with magnetic influence.

◆Breakaway PC boards (splitting along perforations)

1. The position of the product on PCBs shall be carefully considereed to minimize the stress caused from splitting of the PCBs.

◆Mechanical considerations

1. There is a case to be damaged by a mechanical shock.
2. There is a case to be broken by the handling in transportation.

◆Pick-up pressure

1. An excessive shock or stress may cause a damage to the product or a detrioration of a characteristic.

◆Packing

1. If packing boxes are accumulated, that could cause a deformation on packing tapes or a damage on the products.

7. 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 solderability of electrodes may decrease gradually. For this reason, the products 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 oftaping/packaging materials may take place.

* 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/) or CD catalogs.