No. MLPGE13000

PRODUCT SPECIFICATION

P/N: AH 316M245001-T

Type: MULTILAYER ANTENNA

Soldering: Reflow only

Issue date: 29.Jan.2013

Applicable products to RoHS restriction

TAIYO YUDEN CO., LTD.

MULTILAYER ANTENNA

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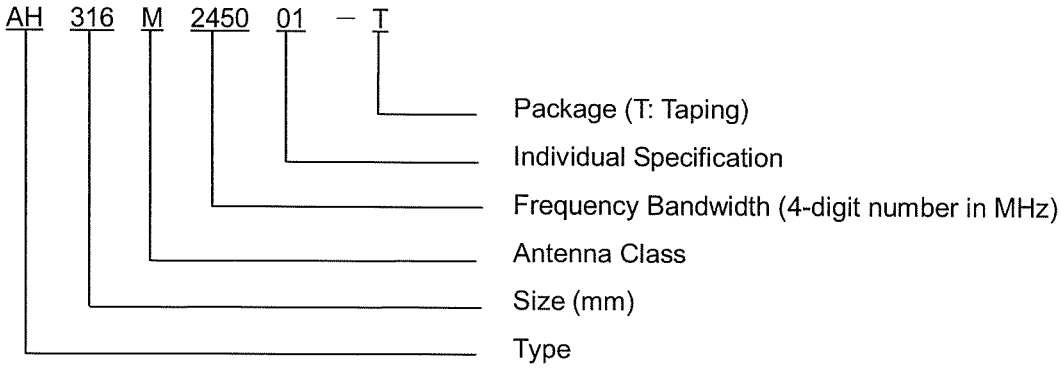
※RoHS compliance

- This product conforms to "RoHS compliance".
- "RoHS compliance" means that the product does not contain lead, cadmium, mercury, hexavalent chromium, PBB or PBDE referring to EU Directive 2002/95/EC, except other non-restricted substances or impurities which could not be technically removed at the refining process.

1.0 Scope

This specification covers the condition of multilayer antenna mounted on Taiyo Yuden evaluation board.

Part Numbering System



2.0 Environment Condition (Refer to Table-1 for the reliability assurance.)

2.1	Operating temperature range	: -20℃ to +80℃
2.2	Humidity	: 15 to 95%RH (Without dew condensation)
2.3	Storage temperature range (Single-unit antenna)	: -40℃ to +85℃
2.4	Storage temperature and humidity range (packing condition)	: -10℃ to +40℃, 15 to 85% RH

3.0 Electrical Characteristics

3.1	Input Impedance	: 50Ω(Specified value)
3.2	Frequency bandwidth	: 2400 to 2500MHz
3.3	Gain*1	: +1 dBi min. (Peak) : -2 dBi min. (Vertical polarization average gain of omni directional plane) : -7 dBi min. (Total average gain)
3.4	VSWR in bandwidth*2	: 3.0(Typical)

*1: Gain in 3.3 shall be the total average gain of vertical and horizontal polarizations in X-Y, Y-Z and X-Z planes on Taiyo Yuden evaluation board (Average of total measurement points).

*2: VSWR in bandwidth in 3.4 shall be VSWR mounted on Taiyo Yuden evaluation board.

4.0 Mechanical Specification

4.1 Shape Dimensions: Refer to Figure-1.

4.2 Dimensions of Evaluation Board, Land-patterns: Refer to Figure-2, 3.

5.0 Reliability Test

Reliability Test: Shall meet Reliability Test per Table-1.

6.0 Packaging Specification

Refer to pages 9 to 11.

7.0 Precautions

Refer to Precautions on page 8.

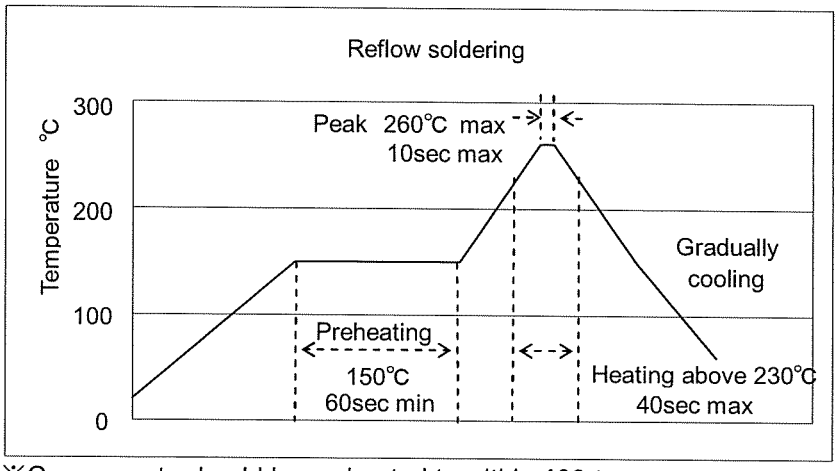
Table-1

Reliability Test

No.	Test Item	Test Method	Judgment Method *3
1	Humidity Test	Electrical characteristics shall be evaluated after product is kept in temperature of 60℃ and RH of 90% to 95% for 96 hours, and then left at normal temperature and humidity for 1 hour.	Shall meet less than 3.0 VSWR in bandwidth.
2	High Temperature Test	Electrical characteristics shall be evaluated after product is kept in temperature of 85℃ for 96 hours and left at normal temperature for 1 hour.	Shall meet less than 3.0 VSWR in bandwidth.
3	Low Temperature Test	Electrical characteristics shall be evaluated after product is kept in temperature of -40℃ for 96 hours, and left at normal temperature for 1 hour.	Shall meet less than 3.0 VSWR in bandwidth.
4	Thermal Shock	Electrical characteristics shall be evaluated after product is exposed to the thermal shock test cycle (-40℃/30min.⇔85℃ /30min.) for 10 times and left at normal temperature for 1 hour.	Shall meet less than 3.0 VSWR in bandwidth.
5	Solderability	Product shall be immersed in PO-Z-7 flux and preheated to 150℃, then submerged in solder bath (H63S) of 230±5℃ for 3±1 seconds. Then, the product shall be removed and its appearance shall be checked with a magnifier of 10 times.	The new solder shall cover at least 90% of terminal electrode.
6	Soldering Heat Resistance (Reflow)	Electrical characteristics shall be evaluated after applying twice of the reflow profile to the product, as shown in the next page.	Shall meet less than 3.0 VSWR in bandwidth..

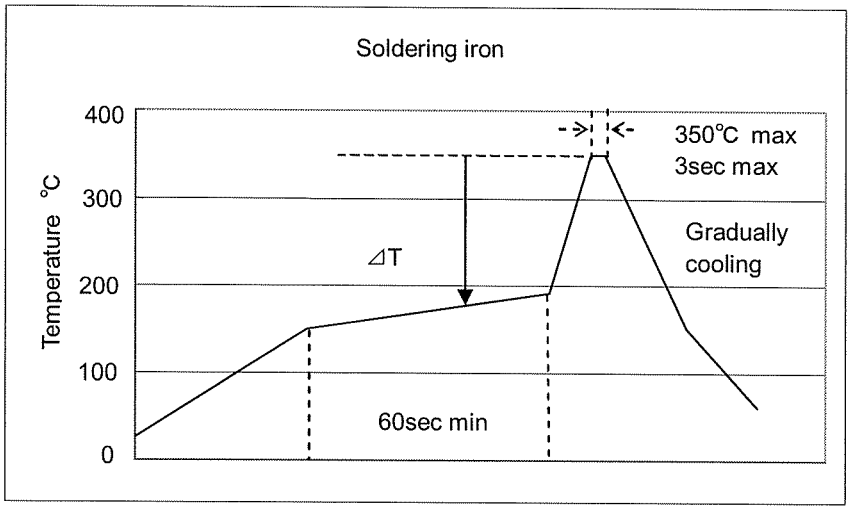
*3: VSWR in bandwidth shall be measured after the reliability test of chip antenna mounted on Taiyo Yuden reliability test board.

Recommended Soldering Profiles for Lead-free Solder Paste



※Components should be preheated to within **100 to 130℃** from soldering temperature.

※Assured to be reflow soldering for 2 times



※**⊿T≦190℃（3216Type max），⊿T≦130℃（3225Type min）**

※It is recommended to use 20W soldering iron and the tip is 1ϕ or less.

※The soldering iron should not directly touch the components.

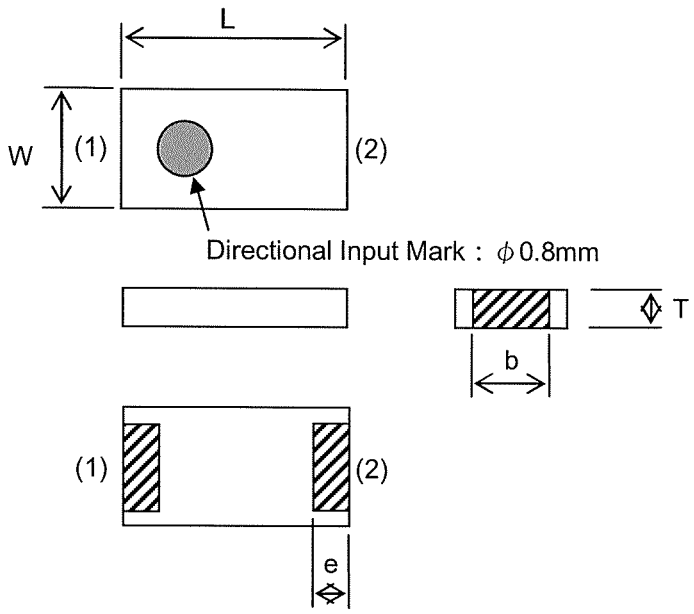
※Assured to be soldering iron for **1 time.**

Note: The above profiles are the maximum allowable soldering condition, therefore these profiles are not always recommended.

Figure -1

Part number: AH_316M2450001-T

Form Shape dimension



Code	L	W	T	e	b
Size	3.2±0.15	1.6±0.15	0.5±0.1	0.5±0.2	1.0 min

Unit: mm

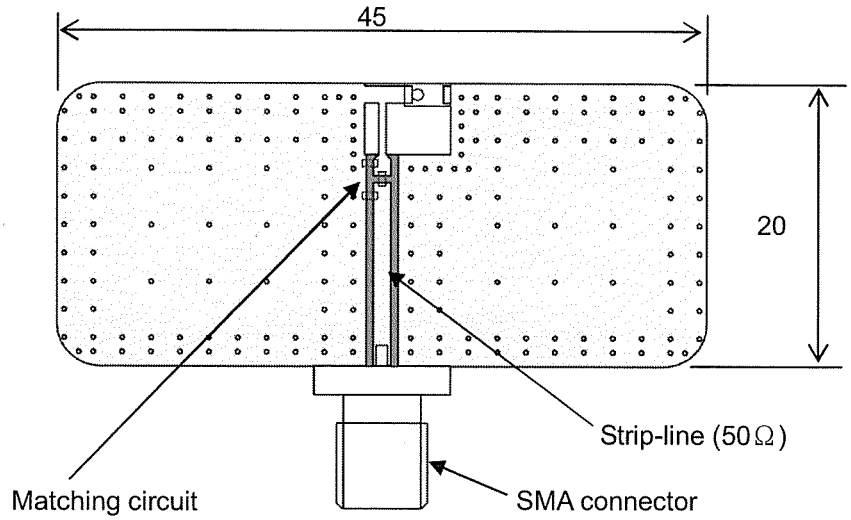
Pin alignment

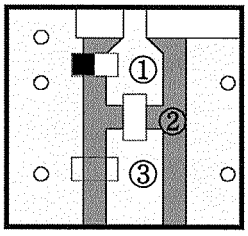
(1)	(2)
FEED	GND

Figure -2
Evaluation Board Dimensions

- Board material: FR-4
- Thickness of base material: 0.8mm
- Electrode pattern: Double face
- Thickness of electrode: 35 μm
- Land part: Refer to Figure-3

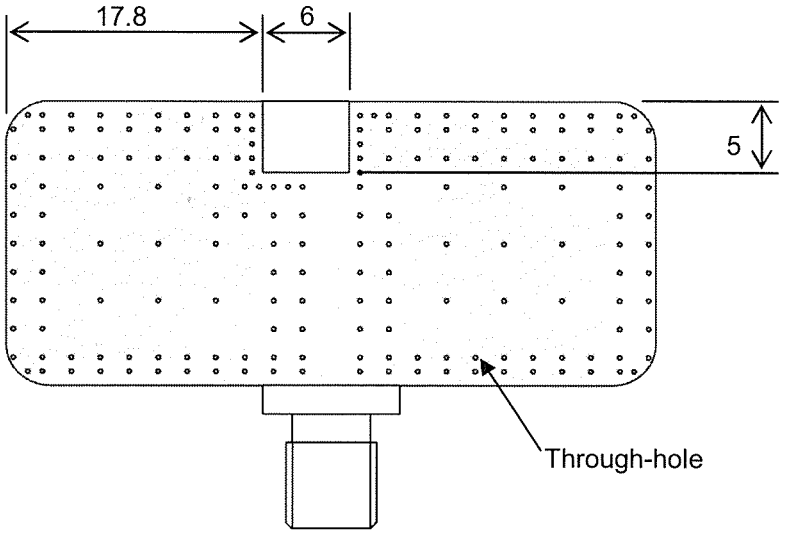
Pattern of antenna mounting face





① 4.3nH: HK1005 4N3S
② 2.7pF: EVK105CH2R7JW
③ –

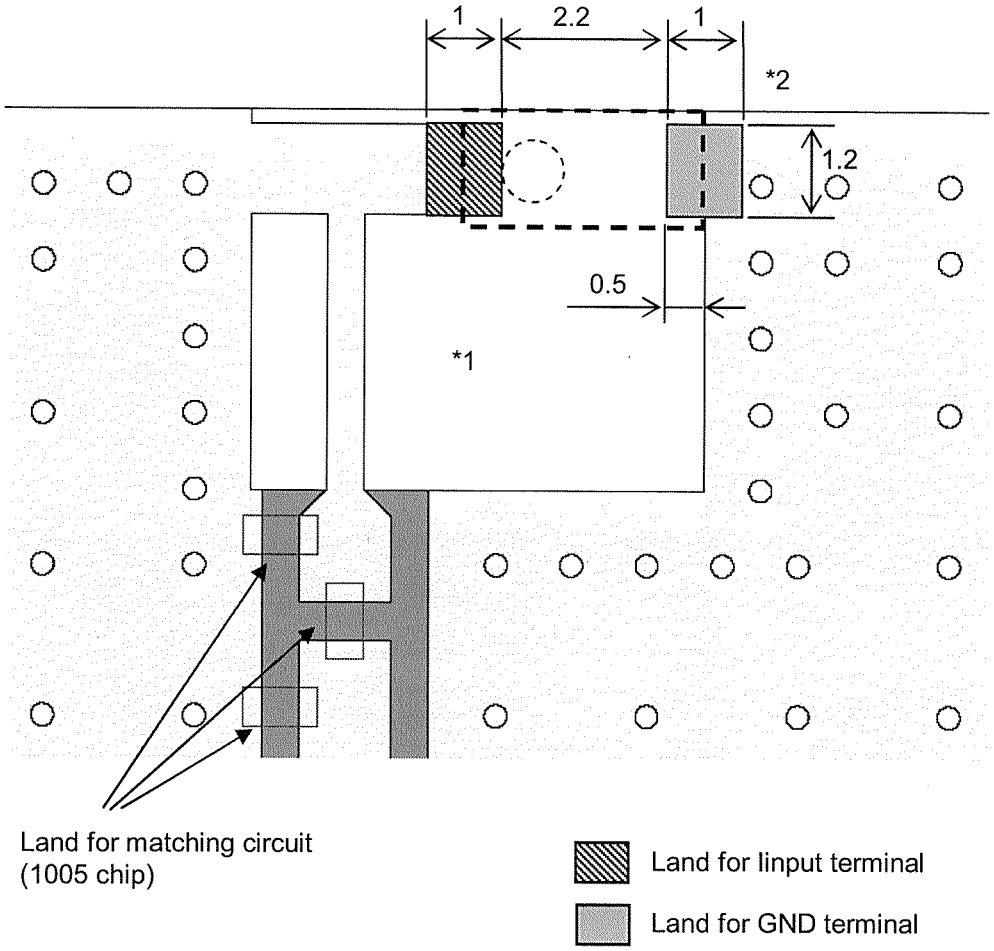
Pattern of the reverse face



Unit: mm

Figure -3

Antenna Land Patterns



Unit: mm

*1: Do not arrange the surface pattern and internal layer pattern on antenna mounting area and its surrounding area.(Refer to our company evaluation circuit board.)

*2: Soldering area shall be ensured by the solder resist.

Precautions

1. Do not use the product in the following environment. It may cause deterioration of the characteristics.
   - Areas exposed to particular gases, such as C12, NH3, SOx and NOx.
   - Areas exposed to volatile or combustible gases.
   - Areas exposed to excessive dust.
   - Areas exposed to water.
   - Areas exposed to direct sunlight.
   - Areas exposed to freezing temperature.
   - Areas exposed to dew condensation due to high humidity.
2. Product is made from ceramics element. Do not apply excessive pressure and shock.
3. Do not apply excessive pressure and shock when transporting and handling print circuit board with the product mounted.
4. Be careful when handling (do not fall and hit) the product. Characteristics may be changed when electrode is damaged or chipped out.

   Do not touch the product with bare hands. It may cause solderability declines.
5. Please store the product under the following condition.

   Temperature: -10℃ to +40 ℃

   Humidity: 15 to 85% RH

   Use the product within six months after the delivery. After the six months, confirm solderability before use.
6. When arranging the mounting position of the product, avoid the area where stresses are applied to the warp or deflection of the circuit board.

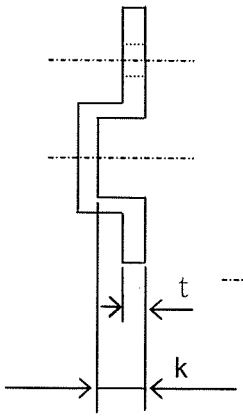
   Do not apply warp or stress to the board. When the board is bend during the process after the product is soldered, or during the board is handled, it may cause electrode peeling or chip cracks. The process after soldering the product includes cutting of circuit board, break board checker, mounting of other components, installation to chassis, and flow soldering to the back of reflow soldered board, etc.

   Separation of the sheet board should not be done manually, but by using the appropriate devices.
7. Do not apply excessive stress and shock when mounting the product on printed circuit board, in order to prevent from breaking or chipped out.
8. Use flux containing less than 0.1% wt (cl conversion) of halogen material for soldering, in order to prevent the corrosion of electrodes and the decline of insulation resistance.
9. Component shall be preheated to within 100℃ from soldering temperature, in order to prevent breaks of the product.
10. Ultrasonic cleaning may cause cracks on the product or its soldered part by the ultrasonic vibration, or lower the strength of terminal electrode. Prior confirmation of the cleaning condition is required.

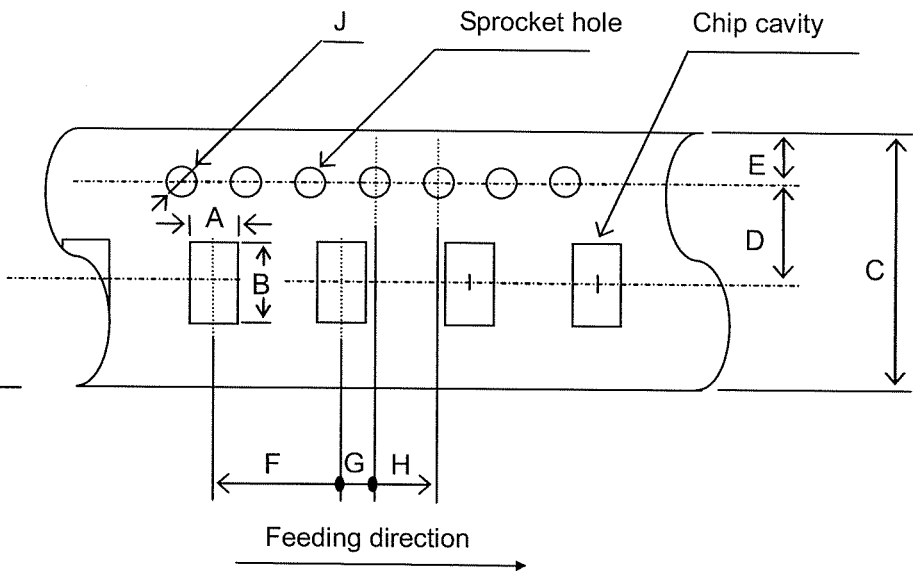
Tape Packaging (T)

◎Plastic tape shall be used for tape packaging.

Plastic tape



Tape Size



Dimensions

Code	A*	B*	C	D	E	F	G
Size	1.9±0.2	3.5±0.2	8.0±0.2	3.5±0.1	1.75±0.1	4.0±0.1	2.0±0.1

[Unit: mm]

Dimensions

Code	H	J	K*	t
Size	4.0±0.1	ϕ1.5 $^{+0.1}_{-0}$	0.85 max.	0.3 max.

*A, B, K: Sufficient clearance [Unit: mm]

Reel Dimensions

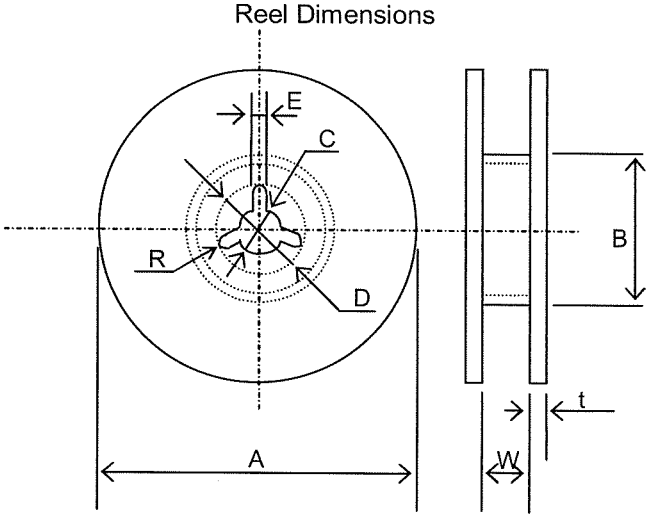
Code	A	B	C
Size	ϕ178±2.0	ϕ50 min.	ϕ13.0±0.2

Code	D	E	W
Size	ϕ21.0±0.8	2.0±0.5	10.0±1.5

Code	t	R
Size	3.0max.	1.0

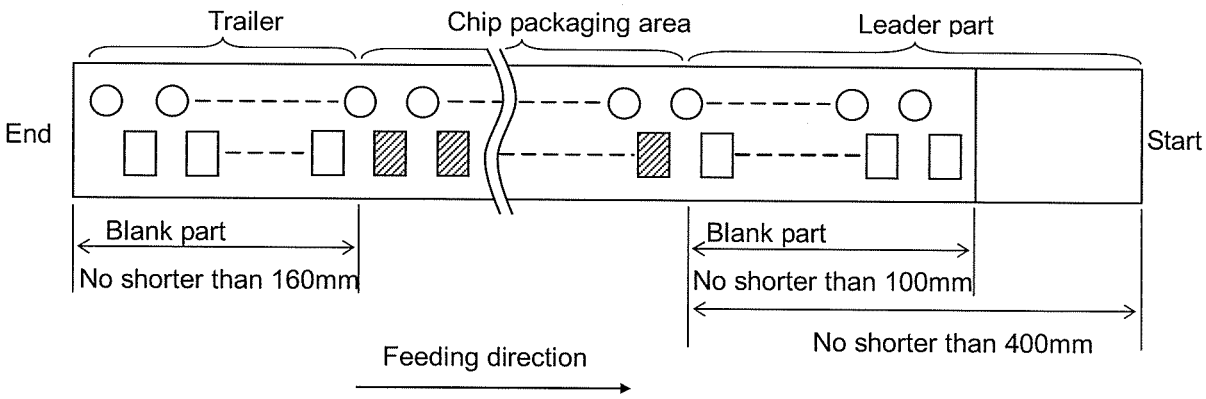
[Unit: mm]

Reel Dimensions

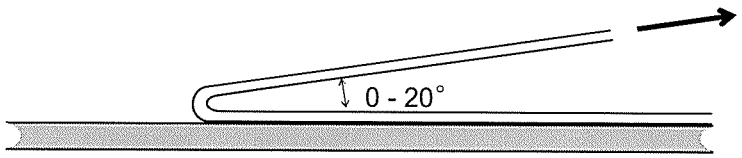


1. Tape shall be wound clockwise.
   The sprocket holes shall be the right side as the tape is pulled toward the user.
2. For chip packaging, blank spaces shall be provided on tape as shown below.

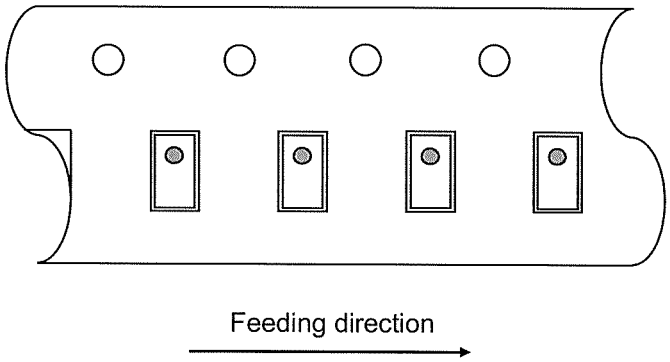
- Leader part 400mm min.
- Leader part (Blank part) 100mm min.
- Trailer (Blank part) 160mm min.



3. Top cover tape shall not cover the sprocket holes.
4. Tape shall not be seamed.
5. Tensile strength of tape shall be at least 5N (0.51kgf).
6. The number of missing component shall not exceed 1 piece per reel.
7. A reel shall contain 3,000 pieces of component.
8. Part name, quantity and control number shall be printed on the label of each reel.
9. Peel strength of top cover tape shall be 0.1 to 1.0N as it is pulled at angle of 0° to 20°

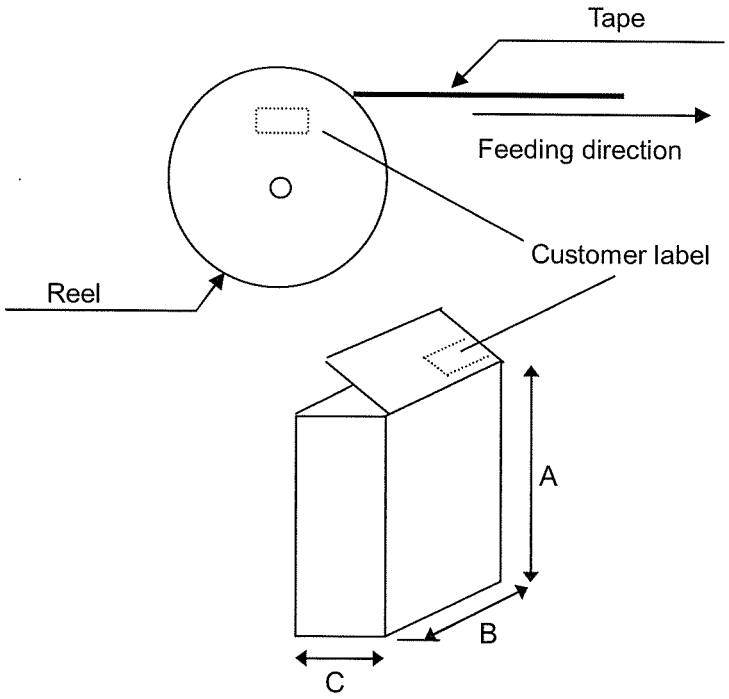


10. Components shall be set in tape cavities with the direction markings on the sprocket whole side.



Tape Packaging (T)

[Packaging Specification]



Customer label description

1. Manufacturer Name
2. Customer Parts No.
3. Taiyo Yuden Parts No.
4. Quantity
5. Control No.
   (Shipping Lot No.)
6. Manufacturing site
   (MADE IN ○○○)

Code	A	B	C	Reel
Size	190	185	70	5 reels max.
			140	10 reels max.

[Unit: mm] (The size is only for reference.)

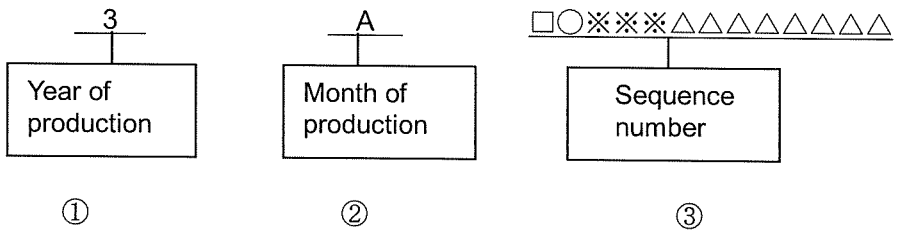
Material: Paper

Packaging unit: Maximum 5 reels or 10 reels in a box.

・Label attached: all products shall meet the specification.

Composition of the Shipping Lot Number

(ex.)



①Year of production (The last numeral of the Christian era. (ex.)2013year→3)

②Month of production (It is due to the table below.)

③Sequence number is alphanumeric including space.

month	1	2	3	4	5	6	7	8	9	10	11	12
code	A	B	C	D	E	F	G	H	J	K	L	M

Operating conditions for guarantee of this product are as shown in the specification.
Please note that Taiyo Yuden Co., Ltd. shall not be responsible for a failure and/or abnormality which are caused by use under the conditions other than the aforesaid operating conditions.

- All electronic components listed in this specification 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.
- Please conduct validation and verification of products in actual condition of mounting and operating environment before commercial shipment of the equipment.
- The contents of this specification 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 specification. Taiyo Yuden Co., Ltd. grants no license for such rights.
- Caution for export

  Certain items in this specification 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.