



## Product Specification for Reference Only

Issued Date: 31 Mar, 2015 \_\_\_\_\_

Rev. : M \_\_\_\_\_

Part Description: Ultrasonic Sensor \_\_\_\_\_

MURATA Part No.: MA300D1-1 \_\_\_\_\_

The product specification in this sheet is for reference only.  
The contents of this specification is subject to change.

You are requested to receive the latest specification and to return one copy of the specification to us with your receipt signature before going into mass production.

Product Promotion Sec.1  
Sensor Products Department 1  
Sensor Products Division  
Murata MFG. Co., Ltd.

### Specification of Ultrasonic Transducer

## Type: MA300D1-1

### 1. Scope

This product specification is applied to ultrasonic transducer used for multiple sheet feed detection that is inserted between transducers. Please contact us when using this product for any other applications than described in the above.

### 2. Part Number

2-1. Murata part number: **MA300D1-1**

2-2. Customer part number:

2-3. Customer drawing number:

### 3. Dimension

3-1. Dimensions as per Fig.1

3-2. Marking Production month code is marked.

Year	Month	1	2	3	4	5	6	7	8	9	10	11	12
2013		A	B	C	D	E	F	G	H	J	K	L	M
2014		N	P	Q	R	S	T	U	V	W	X	Y	Z
2015		a	b	c	d	e	f	g	h	j	k	l	m
2016		n	p	q	r	s	t	u	v	w	x	y	z

#### 4. Absolute Maximum Ratings

	Items	Specification	Note
4-1	Absolute Maximum Input Voltage	50 Vp-p	rectangle wave
4-2	Operating temperature range	-20 to +70 degC	
4-3	Storage temperature range	-30 to +70 degC	

#### 5. Specifications (\* Temperature 25+/-3 degree C, 45 to 60 % R.H, unless otherwise noted )

	Items	Specification	Note
5-1	Operation Frequency	300 kHz	
5-2	Overall Sensitivity	Min.1.5Vpp	Drive signal : 10Vp-p, 300kHz, 5pulses Drive interval : 300Hz (3.33ms) Gain of receiving circuit : 60dB Distance to target plate : 100mm in open space (Refer to Fig.2)
5-3	Directivity	Typ.7degree	at -6dB, half angle (Refer to Fig.3)
5-4	Capacitance	1300 pF +/- 20%	at 1kHz, 1Vrms
5-5	Insulation Resistance	Min.100 Mohm	at 100V DC

**6. Environmental tests** (Standard Test Condition:  $25 \pm 3$  deg C, 45 to 60 % R.H)**6.1 Shock Test**

After following test, tested products are exposed at nominal condition room.  
Then sensitivity is measured. Sensor characteristics should meet table.1.

Acceleration	:	sine $980 \text{ m/s}^2$ (100G), 6ms
Direction	:	3 directions
Shock time	:	3 times / directions

**6.2 Vibration Test**

After following test, tested products are exposed at nominal condition room.  
Then sensitivity is measured. Sensor characteristics should meet table.1.

Vibration frequency:	10 to 200 Hz
Sweep Period	: 15 min.
Acceleration	: $43.1 \text{ m/s}^2$ (4.4G)
Directions	: 3 directions
Time	: 96 hours / directions

**6.3 Drop Test**

After following test, tested products are exposed at nominal condition room.  
Then sensitivity is measured. Sensor characteristics should meet table.1.

Height	:	1 meter onto concrete floor
Times	:	3 times

**6.4 Terminal Strength**

After following test, tested products are exposed at nominal condition room.  
Then overall sensitivity is measured. Pull terminals in parallel to pin length.  
Sensor characteristics should meet table.1.

There should be no damage to terminals and pins

Force	:	9.8N
Time	:	1min.

**6.5 High Temperature Test**

After following test, tested products are exposed at nominal condition room at least 24 hours. Then sensitivity is measured. Sensor characteristics should meet table.1.

Temperature	:	+85 +/- 2 deg C
Time	:	240 hours

**6.6 Low Temperature Test**

After following test, tested products are exposed at nominal condition room at least 24 hours. Then sensitivity is measured. Sensor characteristics should meet table.1.

Temperature	:	-40 +/- 3 deg C
Time	:	240 hours

**6.7 Humidity Test**

After following test, tested products are exposed at nominal condition room at least 24 hours. Then sensitivity is measured. Sensor characteristics should meet table.1.

Temperature	:	+60 +/- 2 deg C
Humidity	:	90 to 95 % R.H.
Time	:	240 hours

**6.8 Heat Cycle Test**

After following test, tested products are exposed at nominal condition room at least 24 hours. Then sensitivity is measured. Sensor characteristics should meet table.1.

Temperature	:	+85 +/- 3 deg C, 30 minute
		-40 +/- 3 deg C, 30 minute
Cycles	:	100 cycles

### 6.9 Endurance Test

After following test, tested products are exposed at nominal condition room at least 24 hours. Then sensitivity is measured. Sensor characteristics should meet table.1.

Temperature	:	+70 +/- 3 deg C,
Input voltage	:	12Vp-p rectangle wave
Frequency	:	300 kHz
Time	:	500 hours

Table. 1.

Item	Judgment
Overall sensitivity	Within +/-3 dB compared with Initial sensitivity

## 7. Caution

### 7-1 Limitation of Applications

Please don't use for the applications listed below which require especially high reliability for the prevention of defects which might directly cause damage to the third party's life, body or property.

- 1) Aircraft equipment
- 2) Aerospace equipment
- 3) Undersea equipment
- 4) Power plant control equipment
- 5) Medical equipment
- 6) Transportation equipment (vehicles, trains, ships, etc.)
- 7) Traffic signal equipment
- 8) Disaster prevention / crime prevention equipment
- 9) Data-processing equipment
- 10) Application of similar complexity and/or reliability requirement to the applications listed in the above

### 7-2 Fail-safe

Be sure to provide an appropriate fail-safe function on your product to prevent a second damage that may be caused by the abnormal function or the failure of our product.

## 8. Caution in use

### 8-1 Notice in design and usage

- 1) Please do not apply D.C. voltage to the transducer to avoid depolarization, or silver migration of electrode on piezoelectric ceramic.
- 2) The transducer may generate surge voltage by mechanical or thermal shock. Care should be taken to protect from it in designing your application circuit.
- 3) Please do not use the transducer in liquid as like water, organic solvent, etc. It will cause of malfunction.
- 4) It is not recommended to drive transducer with 6 drive pulses or more. It will make transducer unstable excitation and unstable sensitivity.
- 5) Please do not apply excessive mechanical shock to transducer to avoid piezoelectric ceramic breakage. When you drop it, please don't use and discard it.
- 6) Please do not apply excessive force on the rear of transducer to avoid damage to sensor housing case, lead wire, piezoelectric element, and other sensor components.
- 7) Avoid sudden changes in temperature. It may cause of depolarization of piezoelectric element.
- 8) Avoid sudden changes in humidity. It may cause of poor solderability.
- 9) To reduce noise signal come from another device and circuit pattern, please connect (+) indicated terminal to the signal line, and connect other terminal to GND.
- 10) Care should be taken when select the material to hold, or cover backside of transducer. If it contains sulfur or sulfide, electrode on piezo-electric element may corroded and because of malfunction.
- 11) The transducer described in this specification is not water-proof type. Please don't expose to water, organic solvent, chemical liquid and corrosive gases.
- 12) The decay time of transducer is not guaranteed. Please don't use for distance measuring apparatus, and/or equipments measure the sound traveling time.

### 8-2 Notice in storage

- 1) The products should not be used or stored in a corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt or the like are present. Store the products in the room where is normal temperature and humidity, and avoid the sunlight, sudden changes in temperature and humidity. It may cause of failure or malfunction in such condition.
- 2) Store the products where the temperature and relative humidity do not exceed -10 to 40 degrees centigrade, and 30 to 80%RH. Use the products within 6 months after receiving.

8-3 Notice in soldering and mounting

- 1) Please hold the transducer with soft materials to avoid vibration leakage.
- 2) Please do not clean with water or organic solvent. Liquid penetration will make malfunction.
- 3) Please do not apply excessive force to terminals when soldering. It will make damage to sensor housing case, lead wire, piezoelectric element, and other sensor components.
- 4) Please use soldering iron when you mount sensor on the circuit board. Please do not solder the transducer with flow or reflow soldering. Do not exceed the soldering iron temperature 350 deg C and 3 sec.

9.  **Note**

- 1) Please make sure that your product has been evaluated in view of your specifications with our product being mounted to your product.
- 2) You are requested not to use our product deviating from the agreed specifications.
- 3) We consider it not to appropriate to include any terms and conditions with regard to the business transaction in the product specifications, drawings or other technical documents. Therefore, if your technical documents as above include such terms and conditions such as warranty clause, product liability clause, or intellectual property infringement liability clause, they will be deemed to be invalid.

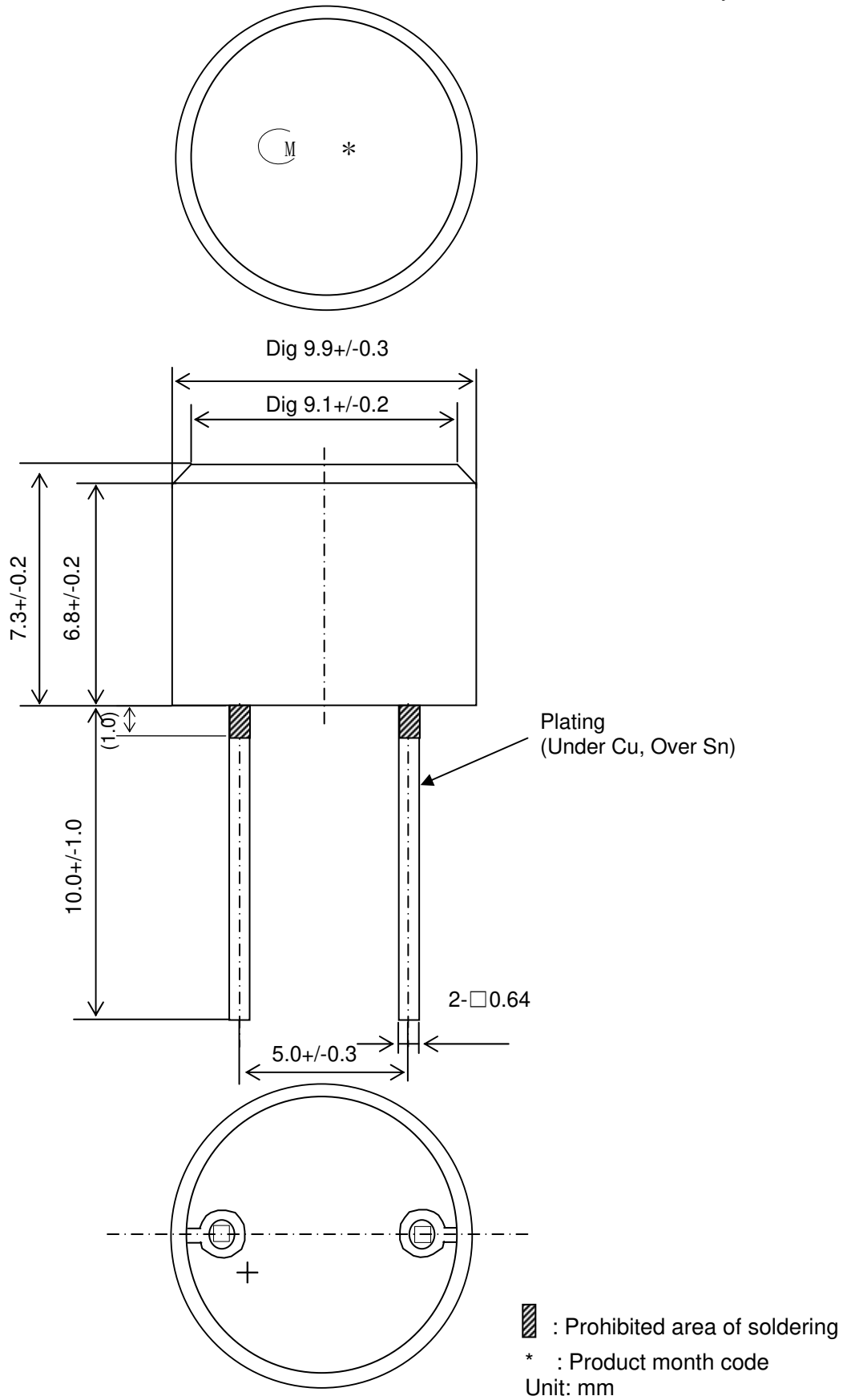


Fig. 1 Dimensions



Overall sensitivity measuring system

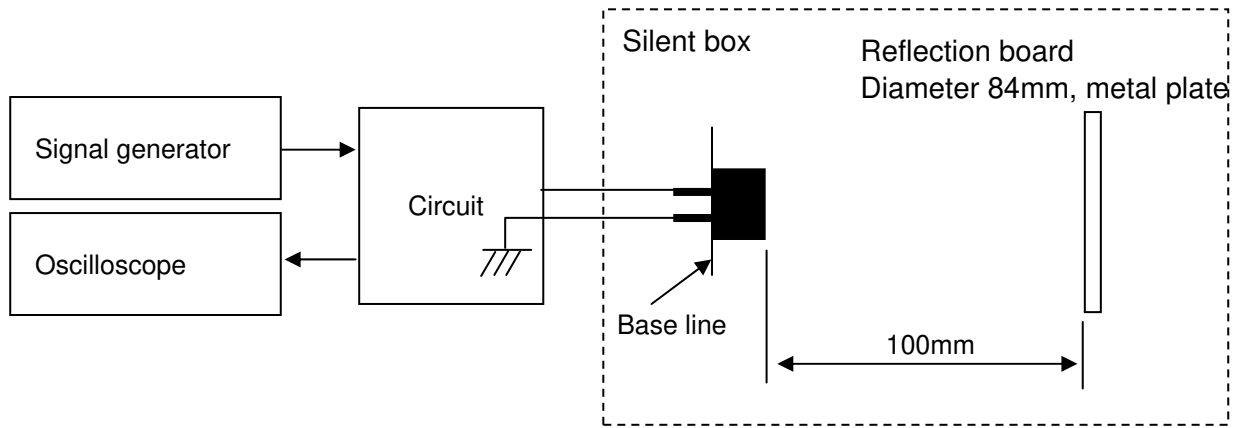


Fig.2-1 Measuring system

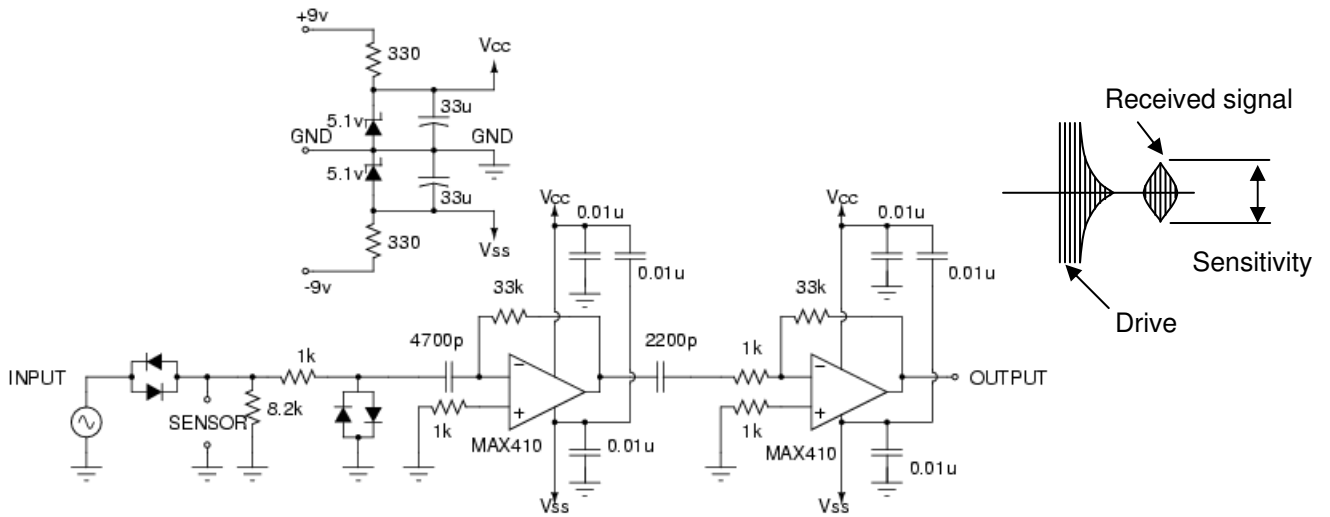


Fig.2-2 Circuit

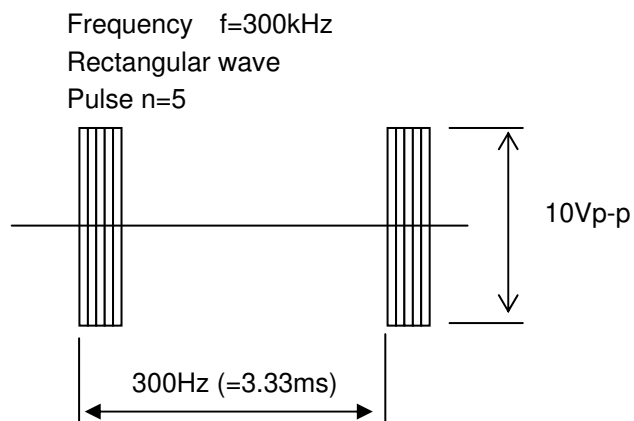


Fig.2-3 Drive signal

Directivity

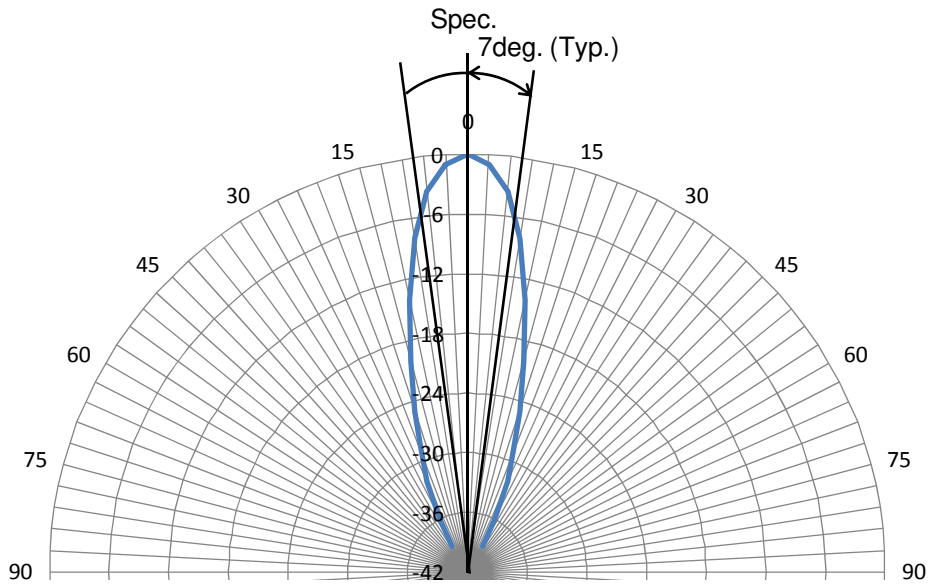


Fig.3 Directivity (Reference only)

(note)

Directivity is defined the half-angle of the half sensitivity (-6dB) against peak sensitivity.

10. 梱包(Package)

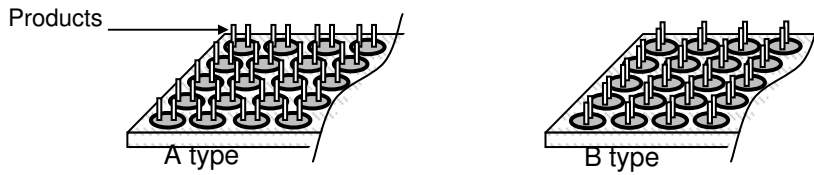


Fig.4-1 ホルダーにセンサを詰めた状態  
Sensor in holder

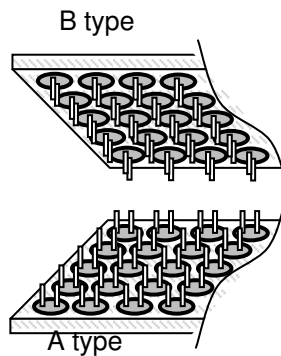


Fig.4-2 ホルダーを重ね合わせる  
HolderA(B) superpose on HolderB(A).

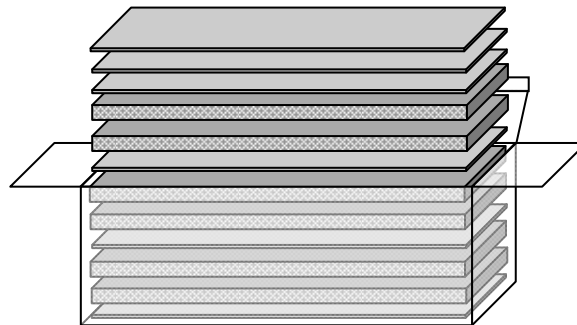


Fig.4-3 ホルダーを箱に入れた状態  
The holders in a Unit Box.

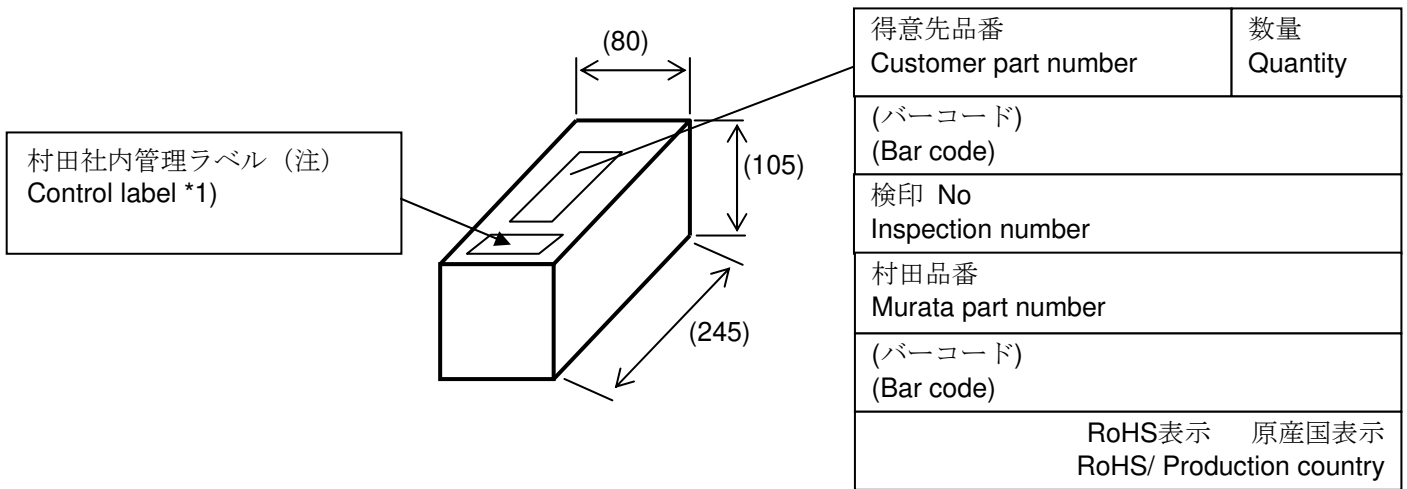
10-1. 梱包数 Package quantity

ホルダー Holder (ウレタンフォーム/ Urethane form)	Max. 90pcs × 6 tiers
箱 Carton Box (ボール紙/Carton box)	Max. 540pcs (78 x 242 x 103mm)

10-2. 個装ラベル Individual label (C3 label)

貴社品番、村田品番、数量、検印No. をトムソン箱に貼りつける

Customer Part Number/ Murata Part Number/ Quantity in box/ Inspection number



(注) 村田社内管理ラベルと個装ラベルの内容は必ずしも同じではありません。お客様におかれましては、個装ラベルの情報を参照ください。  
\*1) The Control label is only for Murata internal use. Please refer C3 label for the information of products in carton box.

Fig.4-4 個装ラベル表示  
Carton box label

10-3. 外装箱Outer box information (段ボール/ Card board)

箱形状 Dimension	265 × 410 × 235 mm
内装箱 Quantity of carton box	10 boxes
製品個数 Quantity of total products	5400 pcs

10-4. 外装箱ラベルOuter box label (D label)

貴社名、貴社品番、村田品番、数量を外装箱に貼りつける。

Customer name/ Customer Part Number/ Murata Part Number/ Quantity of total products in box

貴社名 Customer name	出荷日 Ship date
貴社品番 Customer part number	
村田品番 Murata part number	
数量 Quantity	
(バーコード) (Bar code)	
(バーコード) (Bar code)	
(バーコード) (Bar code)	
RoHS表示 RoHS indication	
原産国表示 Production country	

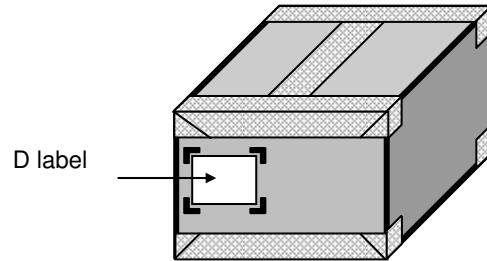


Fig.4-5 出荷時荷姿  
Outer box