SHARP

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To;

SPECIFICATIONS

Product Type 16M bit MASK ROM

LH5B7R××

Model No. (LH53B16R00N)

※This specifications contains 14 pages including the cover and appendix.
If you have any objections, please contact us before issuing purchasing order.

CUSTOMERS ACCEPTANCE

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●When using the products covered herein, please observe the conditions written herein and the precautions outlined in the following paragraphs. In no event shall the company be liable for any damages resulting from failure to strictly adhere to these conditions and precautions.

(1) The products covered herein are designed and manufactured for the following application areas. When using the products covered herein for the equipment listed in Paragraph (2), even for the following application areas, be sure to observe the precautions given in Paragraph (2). Never use the products for the equipment listed in Paragraph (3).

- Office electronics
- Instrumentation and measuring equipment
- Machine tools
- Audiovisual equipment
- Home appliances
- Communication equipment other than for trunk lines

(2) Those contemplating using the products covered herein for the following equipment which demands high reliability, should first contact a sales representative of the company and then accept responsibility for incorporating into the design fail-safe operation, redundancy, and other appropriate measures for ensuring reliability and safety of the equipment and the overall system.

- Control and safety devices for airplanes, trains, automobiles, and other transportation equipment
- Mainframe computers
- Traffic control systems
- Gas leak detectors and automatic cutoff devices
- Rescue and security equipment
- Other safety devices and safety equipment, etc.

(3) Do not use the products covered herein for the following equipment which demands extremely high performance in terms of functionality, reliability, or accuracy.

- Aerospace equipment
- Communications equipment for trunk lines
- Control equipment for the nuclear power industry
- Medical equipment related to life support, etc.

(4) Please direct all queries and comments regarding the interpretation of the above three Paragraphs to a sales representative of the company.

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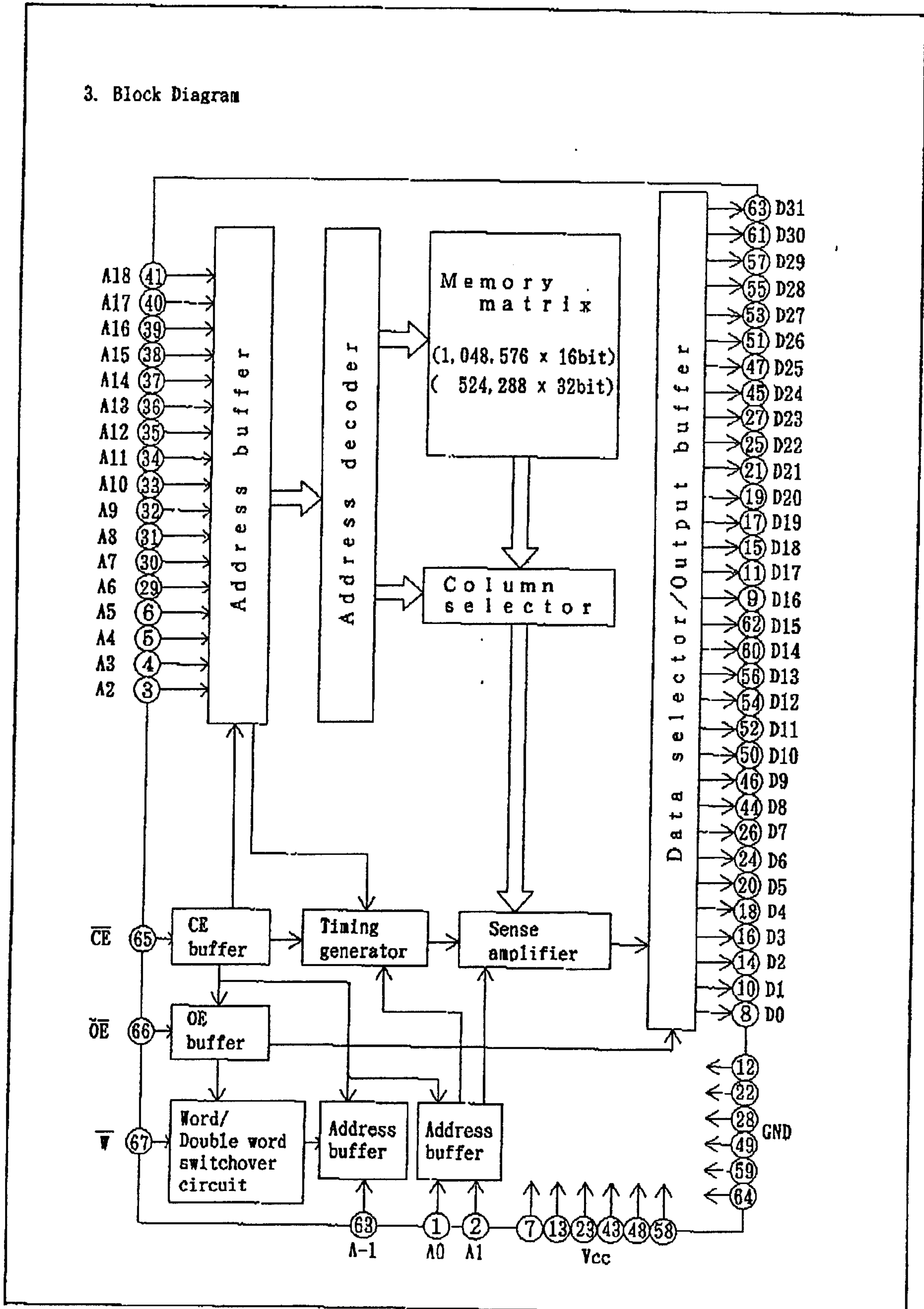
1. General Description

The SHARP LH5B7Rxx(LH53B16R00N) is a 16Mbit CMOS mask ROM (mask-programmable read-only memory), produced by the silicon gate CMOS process.

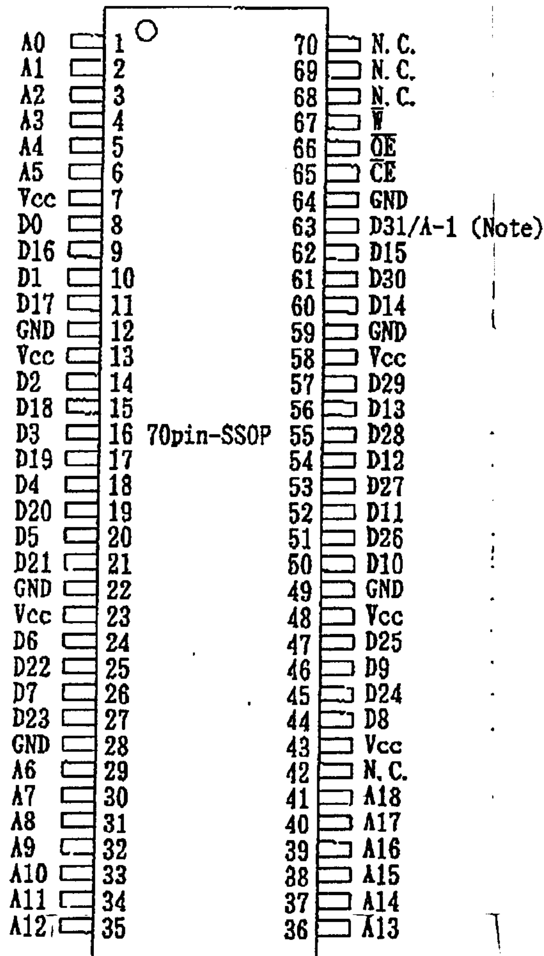
2. Features

- Memory organization selection
  1,048,576 × 16-bit (Word mode : $\overline{W}=V_{IL}$)
  524,288 × 32-bit (Double Word mode : $\overline{W}=V_{IH}$)
- Single +5V Power supply
- Static operation
- Input/Output TTL compatible
- 3-state output
- Access time: 120ns (max.)
  Access time in page mode: 50ns (max.)
- Addressable page: 4 Double words or 8 words
- 70Pin-SSOP
- Supply current
  Operating: 180mA (max.)
  Standby : 300μA (max.)
- Others
  Non programmable
  Not designed or rated as radiation hardened
  CMOS process(P type silicon substrate)

3. Block Diagram



4. Pin Connections



(Note)
The D31/A-1 pin becomes LSB address input (A-1) when the W pin is set to be low in word mode, and data output (D31) when set to be high in double word mode.

5. Pin Description

Pin	Description
A-1 ~ A1	Address input (page mode operation)
A2 ~ A18	Address input
D0 ~ D31	Data output
W	x16bit/x32bit(word/double word) mode select input (Note)
CE	Chip enable input (Note)
OE	Output enable input (Note)
Vcc	Power pin (+5V)
GND	Ground
N.C.	Non connection

(Note)

CE	OE	W	A-1 (D31)	Data output D0~D15-pin	Data output D16~D31-pin	Address input LSB	Address input MSB	Supply current
H	X	X	X	High Impedance	High Impedance	–	–	Standby
L	H	X	X	High Impedance	High Impedance	–	–	Operating
L	L	H	–	D0~D15	D16~D31	A0	A18	Operating
L	L	L	L	D0~D15	High Impedance	A-1	A18	Operating
L	L	L	H	D16~D31	High Impedance	A-1	A18	Operating

X:Don't Care

6. Absolute Maximum Ratings

Item	Symbol	Rating	Unit
Supply voltage	V_{CC}	−0.3 ~ +7.0	V
Input voltage	V_{IN}	−0.3 ~ Vcc+0.3	V
Output voltage	V_{OUT}	−0.3 ~ Vcc+0.3	V
Operating temperature	T_{OPR}	0 ~ +70	℃
Storage temperature	T_{STG}	−65 ~ +150	℃

7. Operating Ranges

Ta=0~+70℃

Item	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	V_{CC}	4.5	5.0	5.5	V

8. D.C. Electrical Characteristics

Vcc=5V±10%, Ta=0~+70℃

Item	Symbol	Test conditions	Min.	Max.	Unit	Note
Input high voltage	V_{IH}		2.2	Vcc+0.3	V	
Input low voltage	V_{IL}		-0.3	0.8	V	
Output high voltage	V_{OH}	I_{OH}=-400μA	2.4		V	
Output low voltage	V_{OL}	I_{OL}=2.0mA		0.4	V	
Input leakage current	$\|I_{LI}\|$	V_{IN}=0V~Vcc		10	μA	
Output leakage current	$\|I_{LO}\|$	V_{OUT}=0V~Vcc		10	μA	1
Supply current(Operating)	I_{CC1}	t_{RC}=120ns		180	mA	2
Supply current (standby)	I_{SB1}	$\overline{CE}=V_{IH}$		2	mA	
	I_{SB2}	$\overline{CE}$=Vcc-0.2V		300	μA	
Input capacitance	C_{IN}	f=1MHz, Ta=25℃		10	pF	
Output capacitance	C_{OUT}			10	pF	

Note1: $\overline{CE} = V_{IH}$
$\overline{OE} = V_{IH}$ (Output is open)
Note2: $V_{IN} = V_{IH}, V_{IL}$
$\overline{CE} = V_{IL}$ (Output is open)

9. A.C. Electrical Characteristics

Vcc=5V±10%, Ta=0~+70℃

Item	Symbol	Min.	Max.	Unit
Read cycle time	t_{RC}	120		ns
Address access time	t_{AA}		120	ns
Chip enable access time	t_{ACE}		120	ns
Page address access time	t_{APA}		50	ns
Output enable delay time	t_{OE}		50	ns
Output hold time	t_{OH}	5		ns
Output floating time	t_{CHZ}		40 (Note)	ns
	t_{OHZ}			

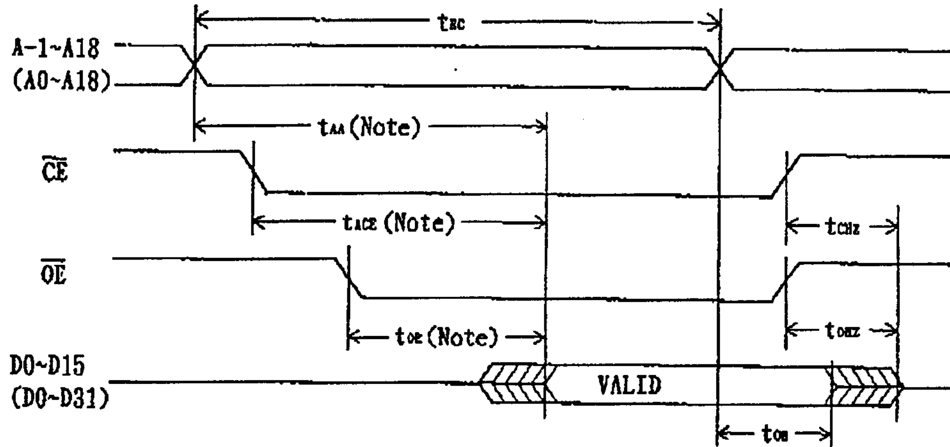
Test Condition

Input voltage amplitude	:	0.4V ~ 2.6V
Input signal rise time	:	10ns
Input signal fall time	:	10ns
Input/Output reference level	:	1.5V
Output load condition	:	1TTL + 100pF

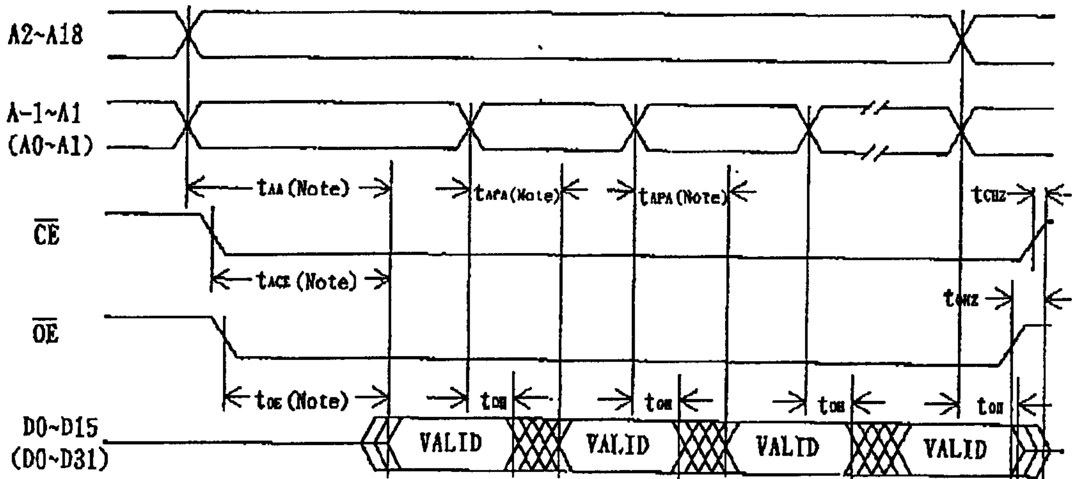
(Note) Determined by the time for the output to be opened.
(irrespective of output voltage)

10. Timing Chart

i)Read cycle



ii)Page mode read cycle



Note: The output data becomes valid when the last interval. t_{AA} , t_{ACE} , t_{APA} or T_{OE} have concluded.

11. Note

It is recommended that a decoupling capacitor be connected between Vcc and GND-Pin.

12 Package and packing specification

1. Package Outline Specification
   Refer to drawing No. AA1116

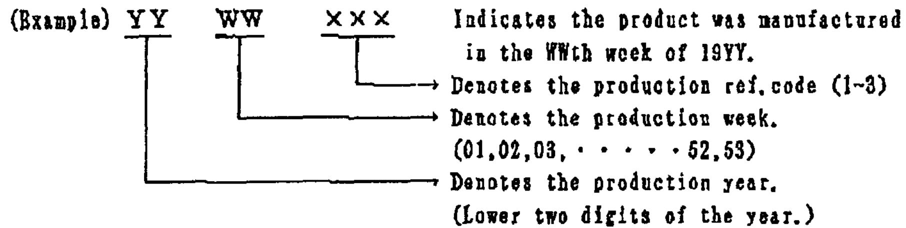
2. Markings

2-1. Marking contents

(1) Product name : □□□□□□□□

(2) Company name : SHARP

(3) Date code



(4) The marking of "JAPAN" indicates the country of origin.

2-2. Marking layout
   Refer to drawing No. AA1116
   (This layout do not define the dimensions of marking character and marking position.)

3. Packing Specification (Dry packing for surface mount packages)
   Dry packing is used for the purpose of maintaining IC quality after mounting packages on the PCB (Printed Circuit Board).
   When the epoxy resin which is used for plastic packages is stored at high humidity, it may absorb 0.15% or more of its weight in moisture. If the surface mount type package for a relatively large chip absorbs a large amount of moisture between the epoxy resin and insert material (e.g. chip, lead frame) this moisture may suddenly vaporize into steam when the entire package is heated during the soldering process (e.g. VPS). This causes expansion and results in separation between the resin and insert material, and sometimes cracking of the package.
   This dry packing is designed to prevent the above problem from occurring in surface mount packages.

3-1. Packing Materials

Material Name	Material Specificaiton	Purpose
Magazine	Anti-static treated plastic (15devices/magazine)	Packing of device
Stopper	Plastic or rubber	Fixing of device
Cap	Plastic (2caps/bag)	Fixing of Magazine
Laminated aluminum bag	Aluminum polyethylene (1bag/case)	Drying of device
Desiccant	Silica gel	Drying of device
Inner case	Card board (600devices/case)	Packaging of device
Label	Paper	Indicates part number, quantity and date of manufacture
Outer case	Card board	Outer packing of Magazine

(Devices shall be inserted into a magazine (sleeve) in the same direction.)

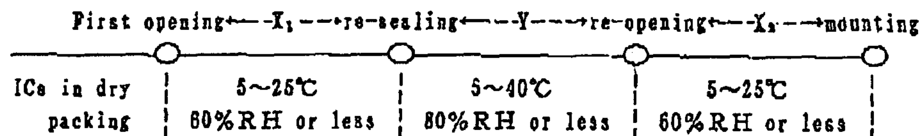
3－2. Outline dimension of magazine (sleeve)
Refer to attached drawing

4. Storage and Opening of Dry Packing

4－1. Store under conditions shown below before opening the dry packing
(1) Temperature range : 5～40℃
(2) Humidity : 80% RH or less

4－2. Notes on opening the dry packing
(1) Before opening the dry packing, prepare a working table which is grounded against ESD and use a grounding strap.
(2) The magazine has been treated to be conductive or anti-static. If the device is transferred to another magazine, use a equivalent magazine.
(3) A stopper is included with the magazine. Before storage, make sure the stopper is inserted.

4－3. Storage after opening the dry packing
Perform the following to prevent absorption of moisture after opening.
(1) After opening the dry packing, store the ICs in an environment with a temperature of 5～25℃ and a relative humidity of 60% or less and mount ICs within 4 days after opening dry packing.
(2) To re-store the ICs for an extended period of time within 4 days after opening the dry packing, use a dry box or re-seal the ICs in the dry packing with desiccant (whoes indicater is blue), and store in an environment with a temperature of 5～40℃ and a relative humidity of 80% or less, and mount ICs within 2 weeks.
(3) Total period of storage after first opening and re-opening is within 4 days, and store the ICs in the same environment as section 4-3.(1).



X_1+X_2	: within 4 days
Y	: within 2 weeks

4－4. Baking (drying) before mounting
(1) Baking is necessary
(A) If the humidity indicator in the desiccant becomes pink
(B) If the procedure in section 4－3 could not be performed
(2) Recommended baking conditions
If the above conditions (A) and (B) are applicable, bake it before mounting. The recommended conditions are 16～24 hours at 120℃ or 5～10 hours at 150℃. Note that the standard magazine can not be baked. Use the heat resistant magazine.
(3) Storage after baking
After baking ICs, store the ICs in the same environment as section 4-3.(1).

5. Surface Mount Conditions

Please perform the following conditions when mounting ICs not to deteriorate IC quality.

5 − 1. Soldering conditions (The following conditions are valid only for one time soldering.)

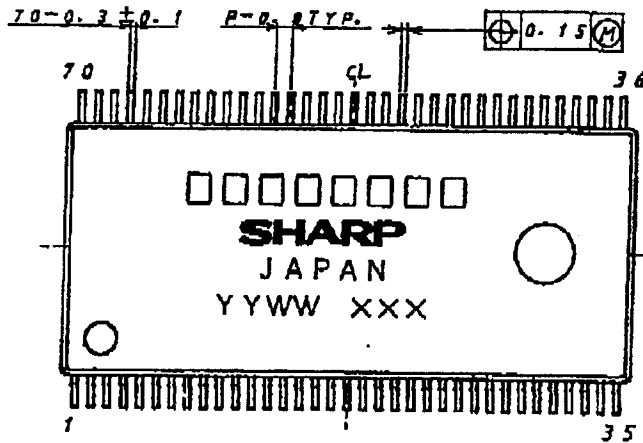
Mounting Method	Temperature and Duration	Measurement Point
Reflow soldering (air)	Peak temperature of 240℃, duration less than 15 seconds above 230℃, temperature increase rate of 1~4℃/second	IC surface
Vapor phase solderring	215℃ or less, duration less than 40 seconds above 200℃	Steam
Manual soldering (soldering iron)	260℃ or less, duration less than 10 seconds	IC outer lead surface

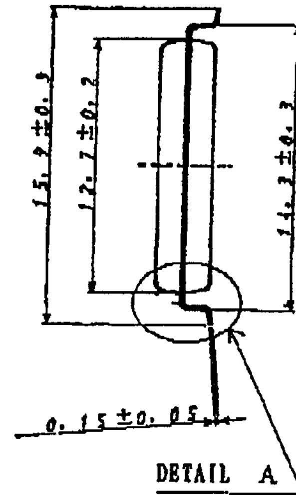
5 − 2. Conditions for removal of residual flux

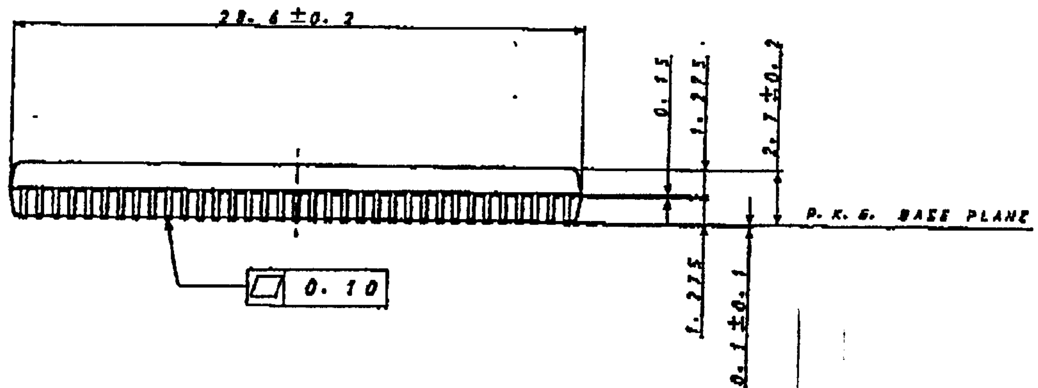
(1) Ultrasonic washing power : 25 Watts/liter or less

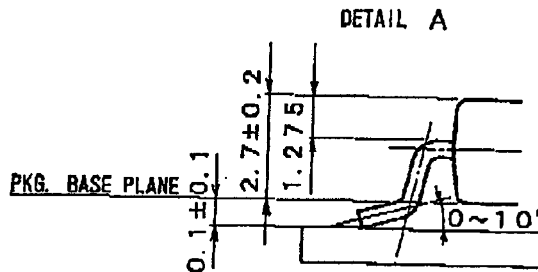
(2) Washing time : Total 1 minute maximum

(3) Solvent temperature : 15~40℃

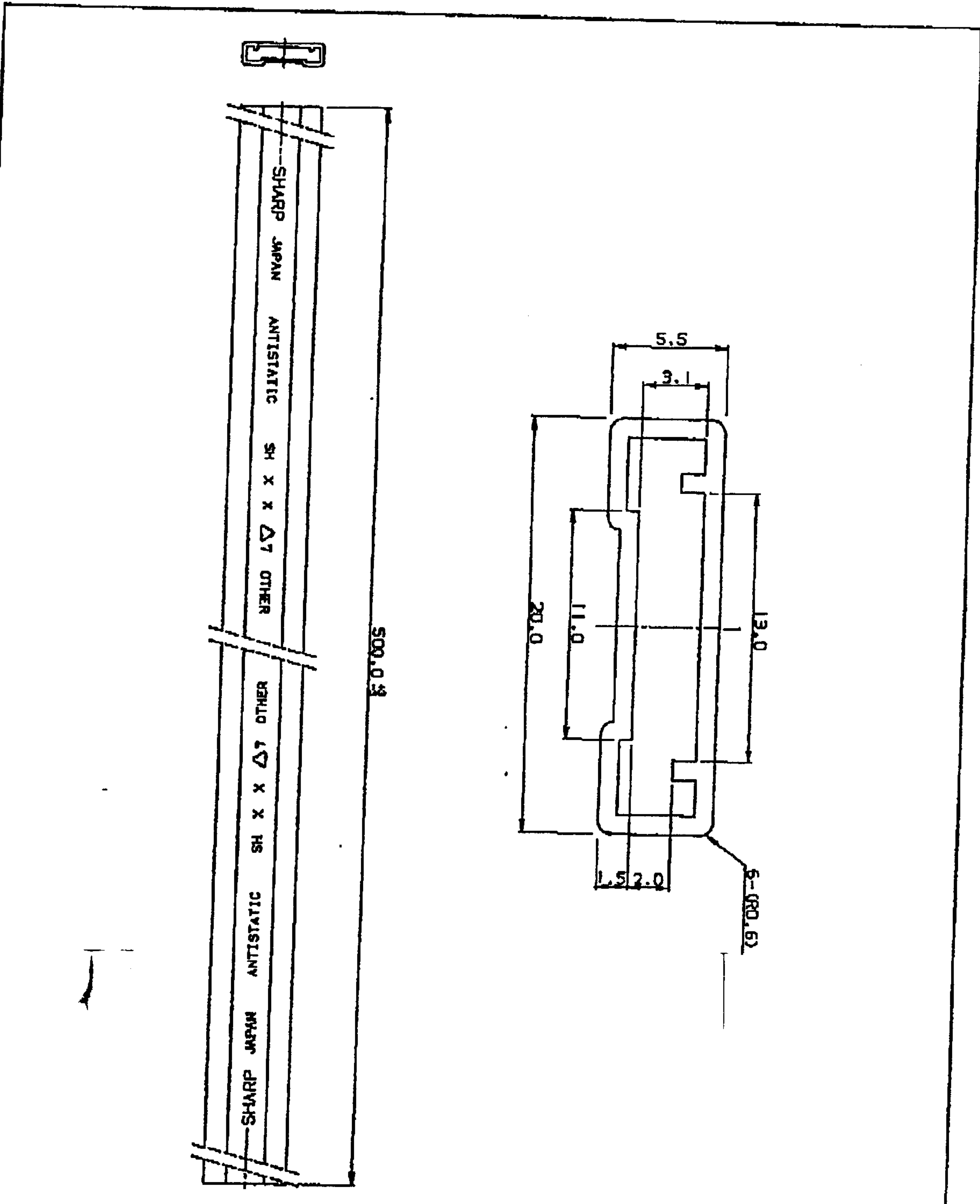








名称 NAME	SSOP70-P-500	リード仕上 LEAD FINISH	TIN-LEAD PLATING	備考 NOTE	プラスチックパッケージ外形寸法は、バリを含まないものとする。 Plastic body dimensions do not include burr of resin.
DRAWING NO.	AA1116	単位 UNIT	mm		



注記 ：マガジン(スリーブ)両側のストッパーは、ゴムストッパーとする。
指示無き寸法公差は全て±0．4mmとする。

NOTES : Stopper which is set at the both ends of magazine (sleeve) is made of rubber.
All tolerances are ±0.4mm unless otherwise specified.

名称 NAME	SOP500SPN-A2			備考 NOTE
DRAWING NO.	CV727	単位 UNIT	mm	