

SPEC No.	EL071065
----------	----------

ISSUE:	FEB. 01. 1995
--------	---------------

To: _____

PRELIMINARY

SPECIFICATIONS

Product Type : 8 BIT 2 CHANNEL D/A CONVERTER

Model No. : LH50511M

※This specifications contains 12 pages including the cover and appendix.
If you have any objections, please contact us before issuing purchasing order.

CUSTOMERS ACCEPTANCE

DATE: _____

BY: _____

PRESENTED

BY: *Y. Kusano*
Y. KUSANO
Dept. General Manager

REVIEWED BY:

PREPARED BY:

S. Yoshikawa *J. Masui*

Engineering Dept. 3
IC Development Center
Integrated Circuits Group
SHARP CORPORATION

CONTENTS

CONTENTS.....	1
1. GENERALATION	2
1-1. FEATURES	2
2. PIN DIAGRAM	2
3. BLOCK DIAGRAM	3
4. PIN DESCRIPTION	4
5. ELECTRICAL CHARACTERISTICS	5
5-1. ABSOLUTE MAXIMUM RATINGS	5
5-2. OPERATING CONDITIONS	5
5-3. ELECTRICAL CHARACTERISTICS	5
6. FUNCTIONAL OPERATION	6
7. TIMING DIAGRAM	6
8. USING LH50511M AS STANDARD D/A	7
6. PACKAGE SPECIFICATIONS	8

【Note】

This document contains confidential information such as copyright and know-how belonging to Sharp Corporation. The information herein shall therefore be used exclusively for the design of systems utilizing this product and may not be used for any other purpose.

This document shall not be reprinted or disclosed to any third party without the prior written consent of Sharp Corporation.

This product is designed to be used in electrical products such as office equipment, audio-visual equipment and other consumer products. You are requested to contact Sharp Corporation if you intend to use this product for specific applications such as automobiles, trains or aircraft which have critical control or safety requirements, antidisaster, anticrime systems or any other applications which require extremely high reliability. This product shall not be used in any medical equipment which affects human life.

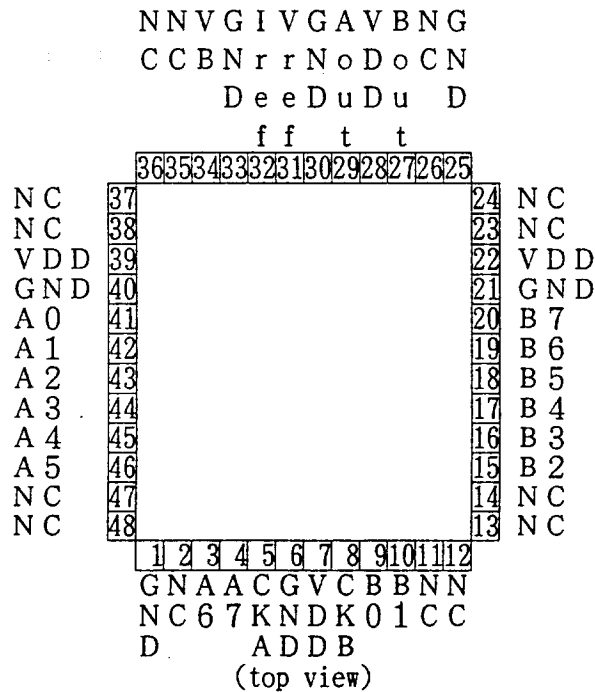
1. GENERATION

This is the industry's 8bit 2ch matrix current cell D/A converter using a high speed CMOS process.

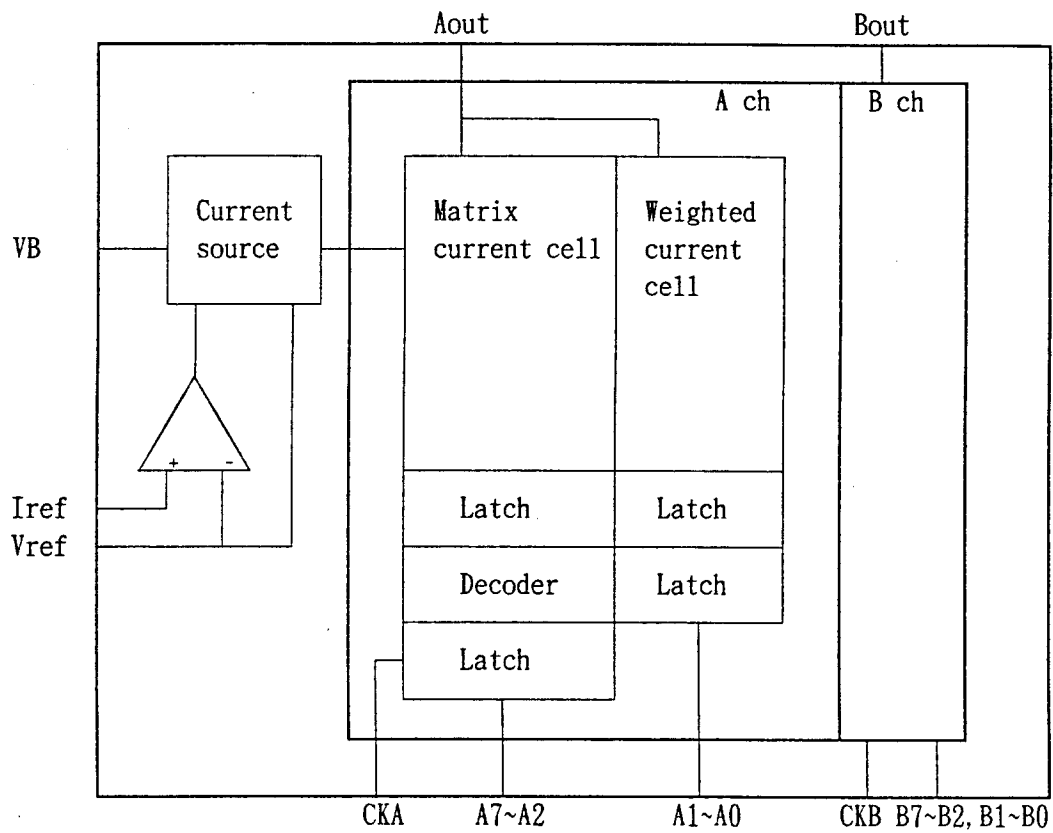
1-1. FEATURES

- Not designed or rated as radiation hardened.
- Packaging material : Plastic.
- Chip material and wafer substrate type : P type silicon.
- Number of pins and package type : 48-pin quad flat package.
- Process(structure) : Monolithic CMOS.
- Maximum conversion rate : 20 MSPS
- Settling time : 30 nsmax
- Loe power consumption : 180 mWtyp
- Current output : 13.3 mA
- Operating temperature : -20 ~ +70 °C

2. PIN DIAGRAM



3. BLOCK DIAGRAM



4. PIN DESCRIPTION

Pin No.	Symbol	I/O	Function
1	GND	-	Grounding pin.
2	NC	-	Non connection.
3	A6	I	Ach digital input.
4	A7	I	Ach digital input.
5	CKA	I	Ach clock input.
6	GND	-	Grounding pin.
7	VDD	-	Power supply.
8	CKB	I	Bch clock input.
9	B0	I	Bch digital input.
10	B1	I	Bch digital input.
11	NC	-	Non connection.
12	NC	-	Non connection.
13	NC	-	Non connection.
14	NC	-	Non connection.
15	B2	I	Bch digital input.
16	B3	I	Bch digital input.
17	B4	I	Bch digital input.
18	B5	I	Bch digital input.
19	B6	I	Bch digital input.
20	B7	I	Bch digital input.
21	GND	-	Grounding pin.
22	VDD	-	Power supply.
23	NC	-	Non connection.
24	NC	-	Non connection.
25	GND	-	Grounding pin.
26	NC	-	Non connection.
27	Bout	0	Bch current output.
28	VDD	-	Power supply.
29	Aout	0	Ach current output.
30	GND	-	Grounding pin.
31	Vref	I	Reference voltage.
32	Iref	0	Fullscale adjust regulation
33	GND	-	Grounding pin.
34	VB	0	Capacitance.
35	NC	-	Non connection.
36	NC	-	Non connection.
37	NC	-	Non connection.
38	NC	-	Non connection.
39	VDD	-	Power supply.
40	GND	-	Grounding pin.
41	A0	I	Ach digital input.
42	A1	I	Ach digital input.
43	A2	I	Ach digital input.
44	A3	I	Ach digital input.
45	A4	I	Ach digital input.
46	A5	I	Ach digital input.
47	NC	-	Non connection.
48	NC	-	Non connection.

5. ELECTRICAL CHARACTERISTICS

5-1. ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

Item	Symbol	Rating	Unit
Power supply voltage	VDD	-0.3 ~ 7.0	V
Input voltage	V _I	-0.3 to V _{DD} +0.3	V
Storage temperature	T _{stg}	- 55 to +125	°C

5-2. OPERATING CONDITIONS (Ta=25°C)

Item	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	VDD	3.00	5.0	5.25	V
Reference voltage	V _{ref}		1.0		V
Reference resistance	R _{ref}		4.8		KΩ
Output load resistance	R _{out}		75		Ω
Operating temperature range	Topr	-20		70	°C
Logical "LOW" input voltage	V _{IL}			VDD×0.1	V
Logical "HIGH" input voltage	V _{IH}	VDD×0.85			V

5-3. ELECTRICAL CHARACTERISTICS (VDD=5.0V, Ta=25°C, Rref=75Ω)

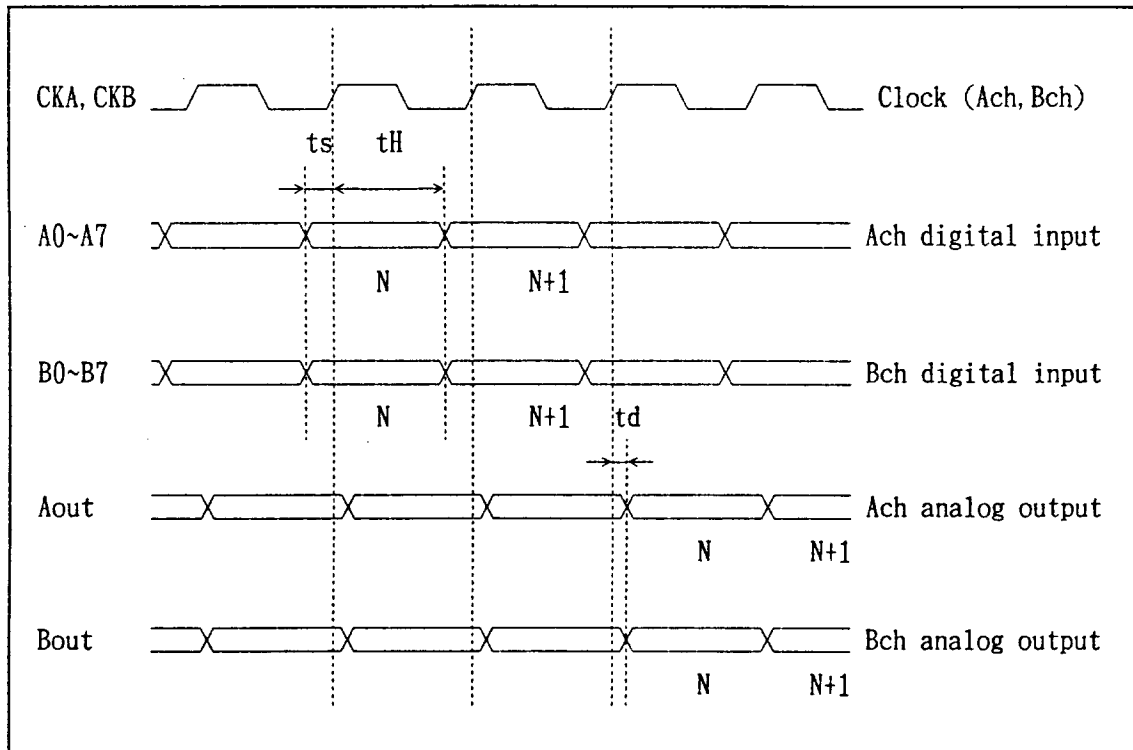
Item	Symbol	Min.	Typ.	Max.	Unit
Resolution	RES		8		Bit
Current consumption	I _{dd}		36.0		mA
Integral linearity	E _L			± 0.1	LSB
Differential linearity	E _D			± 0.5	LSB
Full-scale current	I _{FS}		13		mA
Set-up time	t _s	5.0			ns
Hold time	t _H	5.0			ns
Settling time	t _{sr}			30.0	ns
Delay time	t _d			10.0	ns
Maximum conversion rate	f _{MAX}			20.0	MHz

6. FUNCTIONAL OPERATION

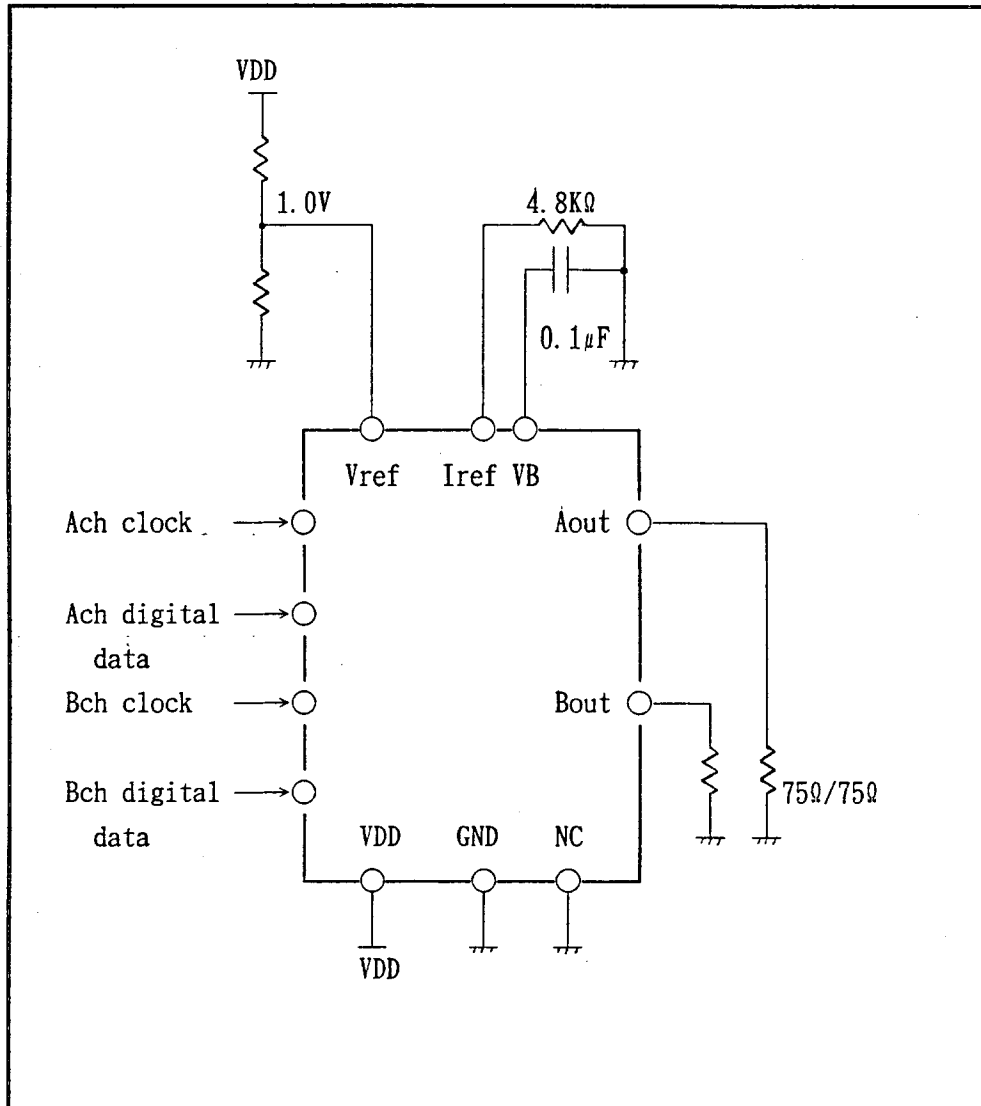
- On the rising edge of the clock, input digital data is latched and is shifted into a decoder for matrix current cell selection.
- On the rising edge of the next clock, the decoded data is latched.
- A current source cell is selected according to an input code, and then an analog current output is obtained.
- The analog current is output at 2-clock after the input data.

* A single-phase input with 50% duty ratio is enough for the clock.
 However, it should be designed so that "High" period is 10 ns or more at least.

7. TIMING DIAGRAM



8. USING LH50511M AS STANDARD D/A



Package and packing specification																												
<p>1. Package Outline Specification Refer to drawing No. AA1035</p> <p>2. Markings</p> <p>2-1. Marking contents</p> <p>(1) Product name : LH50511M (2) Company name : SHARP (3) Date code</p> <div style="margin-left: 40px;"> <p>(Example) YY WW X</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>└──┬──┘</p> <p>└──┬──┘</p> <p>└──┬──┘</p> </div> <div style="text-align: center;"> <p>└──┬──┘</p> <p>└──┬──┘</p> <p>└──┬──┘</p> </div> <div style="text-align: center;"> <p>└──┬──┘</p> <p>└──┬──┘</p> <p>└──┬──┘</p> </div> </div> <div style="margin-left: 100px;"> <p>Indicates the product was manufactured in the WWth week of 19YY.</p> <p>Denotes the production ref. code.</p> <p>Denotes the production week. (01,02,03, 52,53)</p> <p>Denotes the production year. (Lower two digits of the year.)</p> </div> </div> <p>(4) The marking of "JAPAN" indicates the country of origin.</p> <p>2-2. Marking layout Refer to drawing No. AA1035 (This layout do not define the dimensions of marking character and marking position.)</p> <p>3. Packing Specification</p> <p>3-1. Packing materials</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-left: 20px;"> <thead> <tr> <th style="width: 20%;">Material Name</th> <th style="width: 40%;">Material Specification</th> <th style="width: 40%;">Purpose</th> </tr> </thead> <tbody> <tr> <td>Tray</td> <td>Conductive plastic (80devices/tray)</td> <td>Fixing of device</td> </tr> <tr> <td>Upper cover tray</td> <td>Conductive plastic (1tray/case)</td> <td>Fixing of device</td> </tr> <tr> <td>Laminated aluminum bag</td> <td>Aluminum polyethylene (1bag/case)</td> <td>Drying of device</td> </tr> <tr> <td>Desiccant</td> <td>Silica gel</td> <td>Drying of device</td> </tr> <tr> <td>Rubber band</td> <td>Rubber (6 pcs)</td> <td>Device tray fixing</td> </tr> <tr> <td>Inner case</td> <td>Card board (800devices/case)</td> <td>Packaging of device</td> </tr> <tr> <td>Label</td> <td>Paper</td> <td>Indicates part number, quantity and date of manufacture</td> </tr> <tr> <td>Outer case</td> <td>Cardboard</td> <td>Outer packing of device case</td> </tr> </tbody> </table> <p style="margin-left: 20px;">(Devices shall be placed into a tray in the same direction.)</p> <p>3-2. Outline dimension of tray Refer to attached drawing</p> <p>4. Precaution For Unpacking</p> <p>(1) Unpacking should be done on the stand as well as human body treated with anti-ESD.</p> <p>(2) Conductive treatment or anti-ESD treatment is given to a dray. Use the equivalent tray, if it is changed to another one.</p>	Material Name	Material Specification	Purpose	Tray	Conductive plastic (80devices/tray)	Fixing of device	Upper cover tray	Conductive plastic (1tray/case)	Fixing of device	Laminated aluminum bag	Aluminum polyethylene (1bag/case)	Drying of device	Desiccant	Silica gel	Drying of device	Rubber band	Rubber (6 pcs)	Device tray fixing	Inner case	Card board (800devices/case)	Packaging of device	Label	Paper	Indicates part number, quantity and date of manufacture	Outer case	Cardboard	Outer packing of device case	
Material Name	Material Specification	Purpose																										
Tray	Conductive plastic (80devices/tray)	Fixing of device																										
Upper cover tray	Conductive plastic (1tray/case)	Fixing of device																										
Laminated aluminum bag	Aluminum polyethylene (1bag/case)	Drying of device																										
Desiccant	Silica gel	Drying of device																										
Rubber band	Rubber (6 pcs)	Device tray fixing																										
Inner case	Card board (800devices/case)	Packaging of device																										
Label	Paper	Indicates part number, quantity and date of manufacture																										
Outer case	Cardboard	Outer packing of device case																										
ISSUE DATE	'94.12.15	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;"> <p><i>T. Masuda</i></p> </div> <div style="text-align: center;"> <p><i>C. Mitani</i></p> </div> <div style="text-align: center;"> <p><i>H. Tomokuni</i></p> </div> </div>	(NOTE)																									
ISSUE NUMBER	H41215-11			(DOCUMENT No.1035-TNE)																								
S/C NUMBER	LH50511M																											

5. Surface Mount Conditions

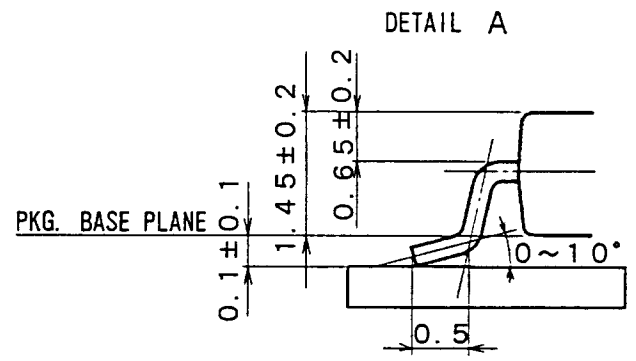
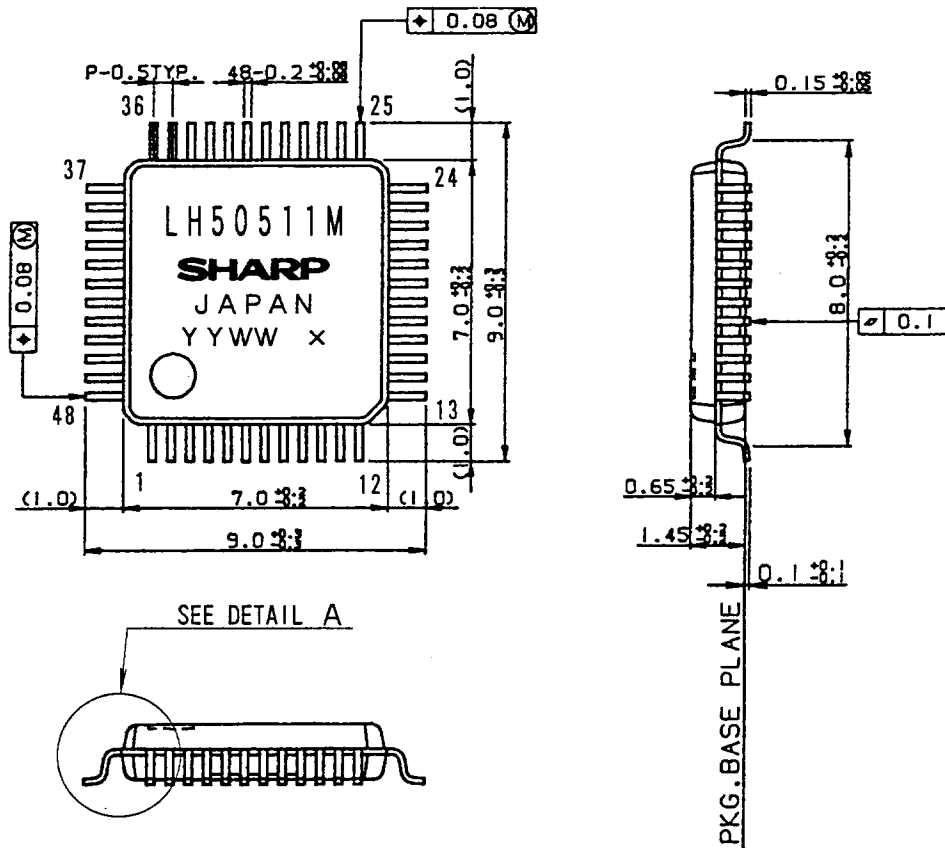
Please perform the following conditions when mounting ICs not to deteriorate IC quality.

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

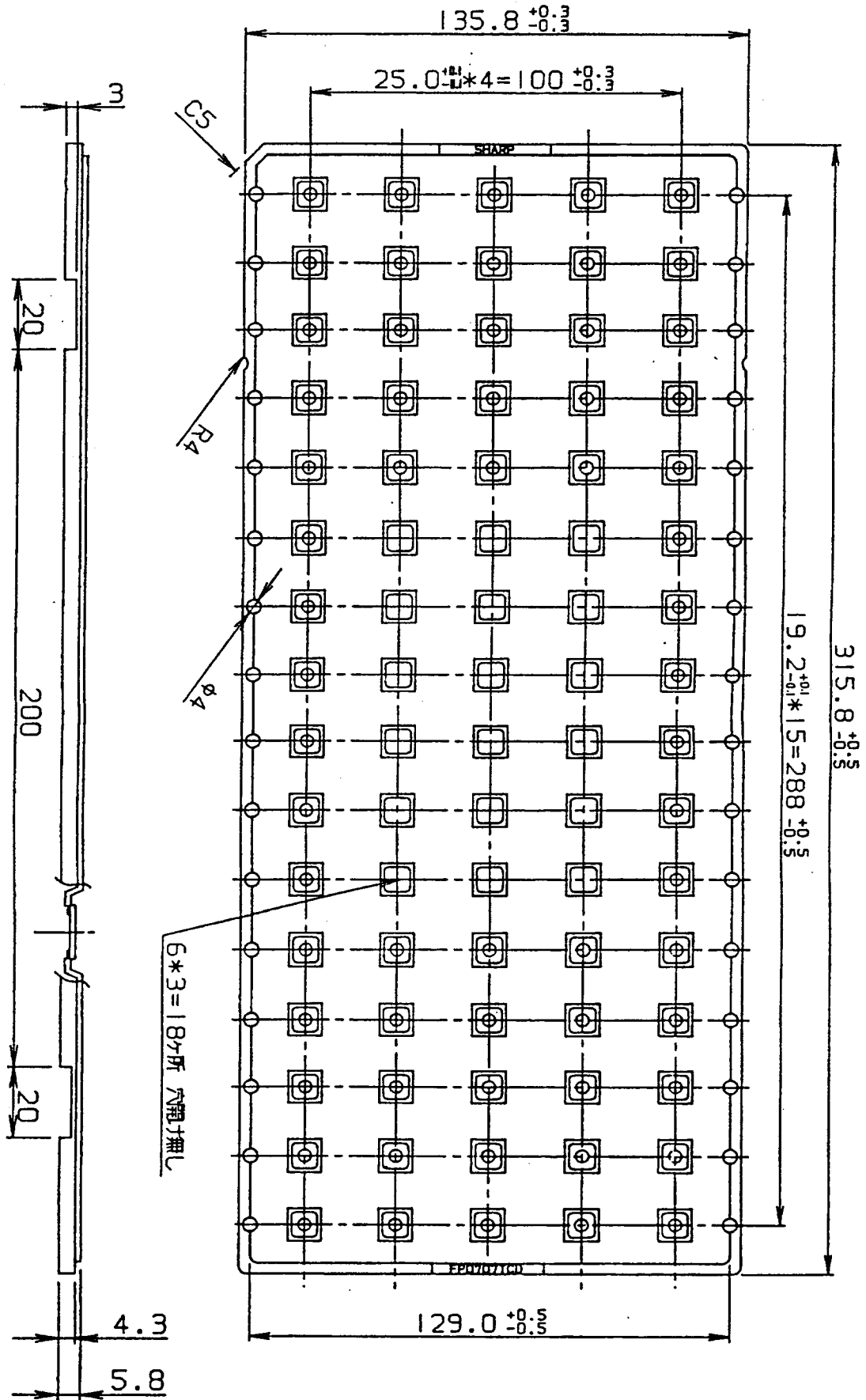
Mounting Method	Temperature and Duration	Measurement Point
Reflow soldering (air)	Peak temperature of 240°C, duration less than 15 seconds above 230°C, temperature increase rate of 1~4°C/second	IC surface
Vapor phase soldering	215°C or less, duration less than 40 seconds above 200°C	Steam
Manual soldering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



名称 NAME	リード仕上 LEAD FINISH	TIN-LEAD PLATING	単位 UNIT	備考
QFP48-P-0707			mm	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。
シャープ株式会社 SHARP CORP.	IC事業本部 IC GROUP	DRAWING NO.	AA1035	NOTE Plastic body dimensions do not include burr of resin.



名称 NAME	FP0707TCD	単位 UNIT	mm	備考 NOTE
シャープ株式会社 IC事業本部 SHARP CORP. IC GROUP		DRAWING NO.		CV536