PRELIMINARY PRODUCT SPECIFICATION

SHARP

Integrated Circuits Group

LH5116H-10F

16K Static RAM

(Model Number: LH5116H4)

Spec. Issue Date: October 8, 2004
Spec No: EL16X050

SHARP

SPEC No.	EL16X050
ISSUE:	Oct. 8. 2004

To;

SPECIFICATIONS

Product Type 16k SRAM

LH5116H-10F

Model No. (LH5116H4)

*This specifications contains 17 pages including the cover and appendix.
If you have any objections, please contact us before issuing purchasing order.

CUSTOMER ACCEPTANCE

DATE:

BY:

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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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Contents

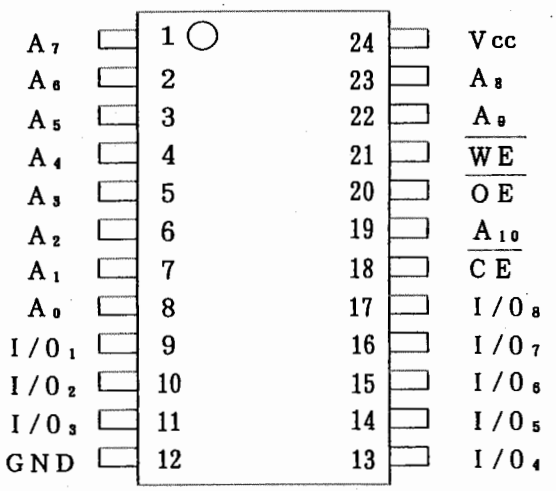
1. General Description

LH5116H-10F is a static RAM organized as 16,384bits(2,048words×8bits) fabricated with a CMOS silicon gate process.
It's main features include:

Features

- ○Access time ・・・・100ns (MAX.)
- ○Current consumption Operating ・・・・ 40mA (MAX.)
  Standby ・・・・ 1μA (MAX.)
  Data retention ・・・・ 0.2μA (V_{cc}=2V, Ta=25℃)
- ○Single 5V power supply ・・・・5V±10%
- ○Fully static operation (requiring no clock and refresh cycle)
- ○All inputs/outputs TTL compatible
- ○Three-state output
- ○Not designed or rated as radiation hardened.
- ○Standard 24Pin SK-DIP(DIP24-P-600)Package
- ○P-type bulk silicon
- ○Operating temperature is -40℃~+85℃

2. Pin Configuration



(Top View)

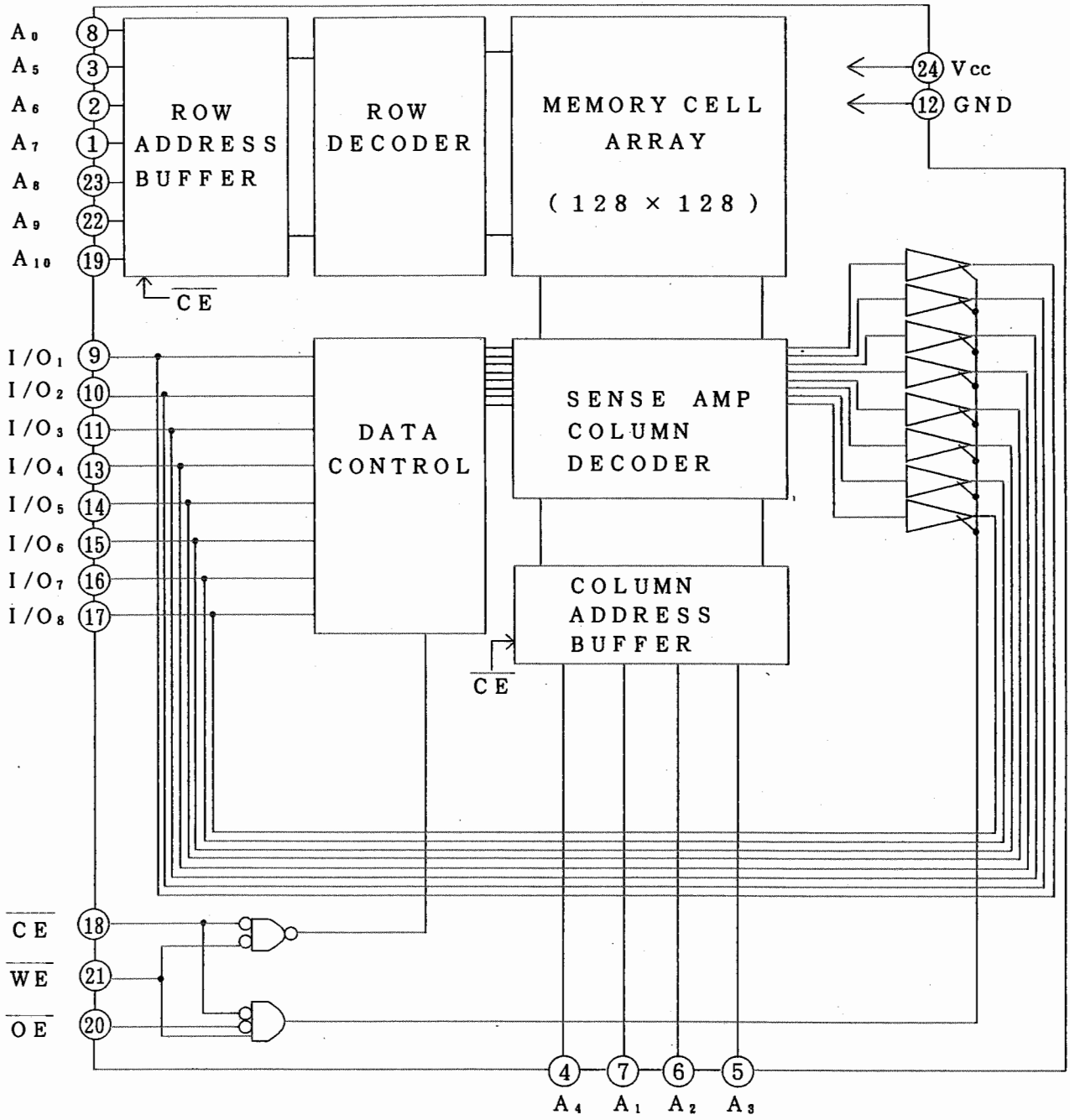
Pin Name	Signal
A_0 to A_{10}	Address input
$\overline{CE}$	Chip enable
$\overline{WE}$	Write enable
$\overline{OE}$	Output enable
I/O_1 to I/O_8	Data input/output
V_{cc}	Power supply
GND	Ground

3. Operating Mode

$\overline{CE}$	$\overline{WE}$	$\overline{OE}$	Mode	I/O_1 to I/O_8	Supply currenat
H	*	*	Deselect	High impedance	Standby (I_{SB})
L	L	*	Write	Data input	Operating (I_{CC})
L	H	L	Read	Data output	Operating (I_{CC})
L	*	H	Output disable	High impedance	Operating (I_{CC})

(* = H or L)

4. Block Diagram



5. Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Supply voltage(*1)	V_{CC}	−0.3 to +7.0	V
Input voltage (*1)	V_{IN}	−0.3 to V_{CC}+0.3	V
Operating temperature	Topr	−40 to +85	℃
Storage temperature	Tstg	−55 to +150	℃

Note)*1. Maximum applicable voltage on any pin with respect to GND.

6. Recommended DC Operating Conditions

(Ta=−40℃ to +85℃)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	V_{CC}	4.5	5.0	5.5	V
Input voltage	V_{IH}	2.2		V_{CC}+0.3	V
	V_{IL}	−0.3		0.8	V

7. DC Electrical Characteristics

(Ta=−40℃ to +85℃, V_{CC}=5V±10%)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input leakage Current	I_{LI}	V_{IN}=0V to V_{CC}	−1		1	μA
Output leakage Current	I_{LO}	$\overline{CE}=V_{IH}$, $V_{I/O}$=0V to V_{CC}	−1		1	μA
Operating Supply Current	I_{CC1}	$\overline{CE}$=0V other input is 0V to V_{CC} $I_{I/O}$=0mA, ($\overline{OE}=V_{CC}$)		25	30	mA
	I_{CC2}	$\overline{CE}=V_{IL}$ other input is V_{IL} to V_{IH} $I_{I/O}$=0mA, ($\overline{OE}=V_{IH}$)		30	40	mA
Standby Current	I_{SB}	$\overline{CE}\geqq V_{CC}-0.2V$ other input is 0V to V_{CC}			1	μA
					0.2(*2)	
Output voltage	V_{OL}	I_{OL}=2.1mA			0.4	V
	V_{OH}	I_{OH}=−1.0mA	2.4			V

Note)*2. Ta=25℃

8. AC Characterristics

AC Test Condition

Parameter	Conditions
Input pulse level	0.8~2.2 V
Input rise and fall time	10ns
I/O timing reference level	1.5V
Output load	1TTL+C_L (100pF) **

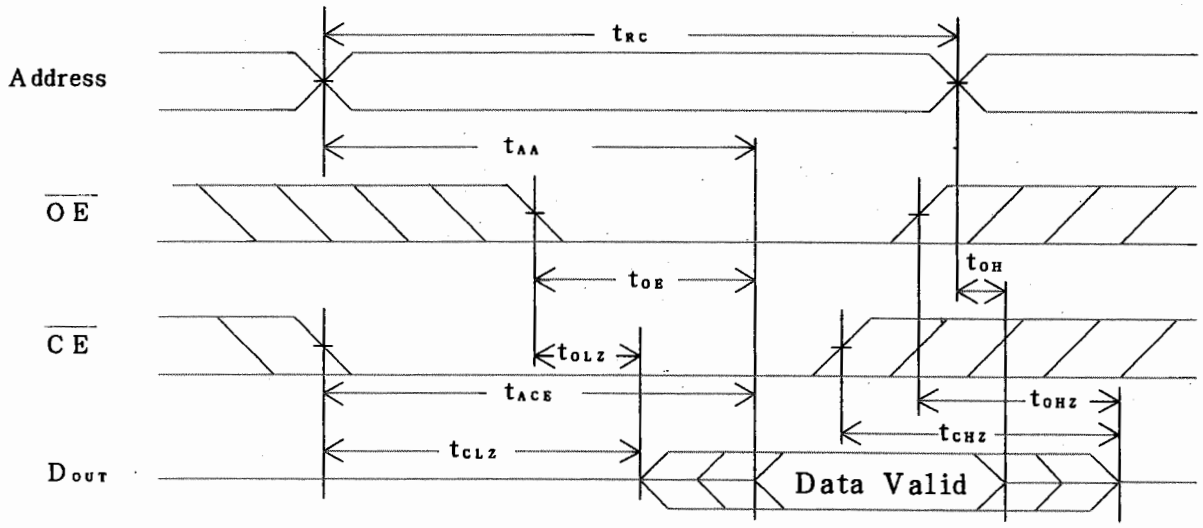
** Including scope and jig capacitance

Read Cycle

(Ta = -40℃ to +85℃, V_{CC} = 5V ±10%)

Parameter	Symbol	Min.	Max.	Unit	
Read cycle time	t_{RC}	100		ns	
Address access time	t_{AA}		100	ns	
Chip enable access time	t_{ACE}		100	ns	
Output enable access time	t_{OE}		40	ns	
Output hold time	t_{OH}	10		ns	
Output floating hold time with respect to $\overline{CE}$	t_{CLZ}	10		ns	*3
Output floating hold time with respect to $\overline{OE}$	t_{OLZ}	10		ns	*3
Output floating time with respect to $\overline{CE}$	t_{CHZ}	0	40	ns	*3
Output floating time with respect to $\overline{OE}$	t_{OHZ}	0	40	ns	*3

Timing Chart (*4)



Note) *3. Active output to High impedance and High impedance to output active tests specified for a ±200mV transition from steady levels into the test load.

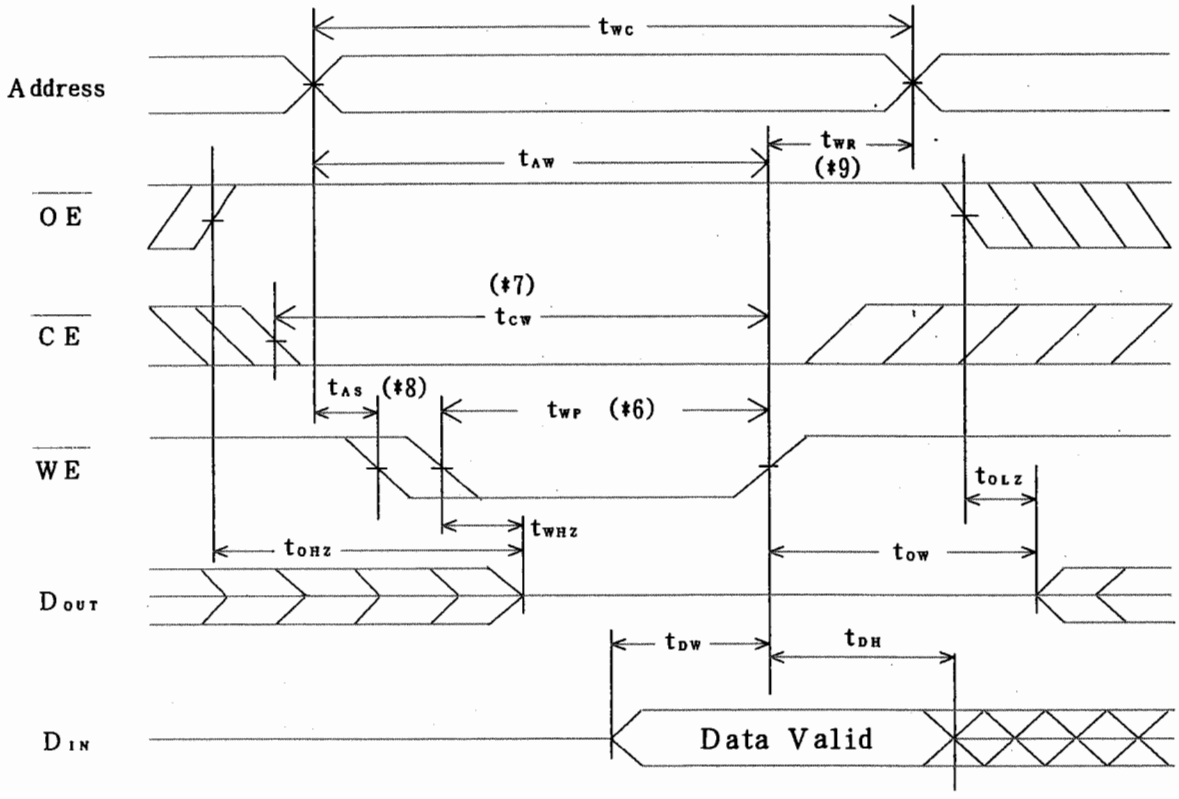
*4. $\overline{WE}$ is 'High' level during the read cycle.

Write cycle

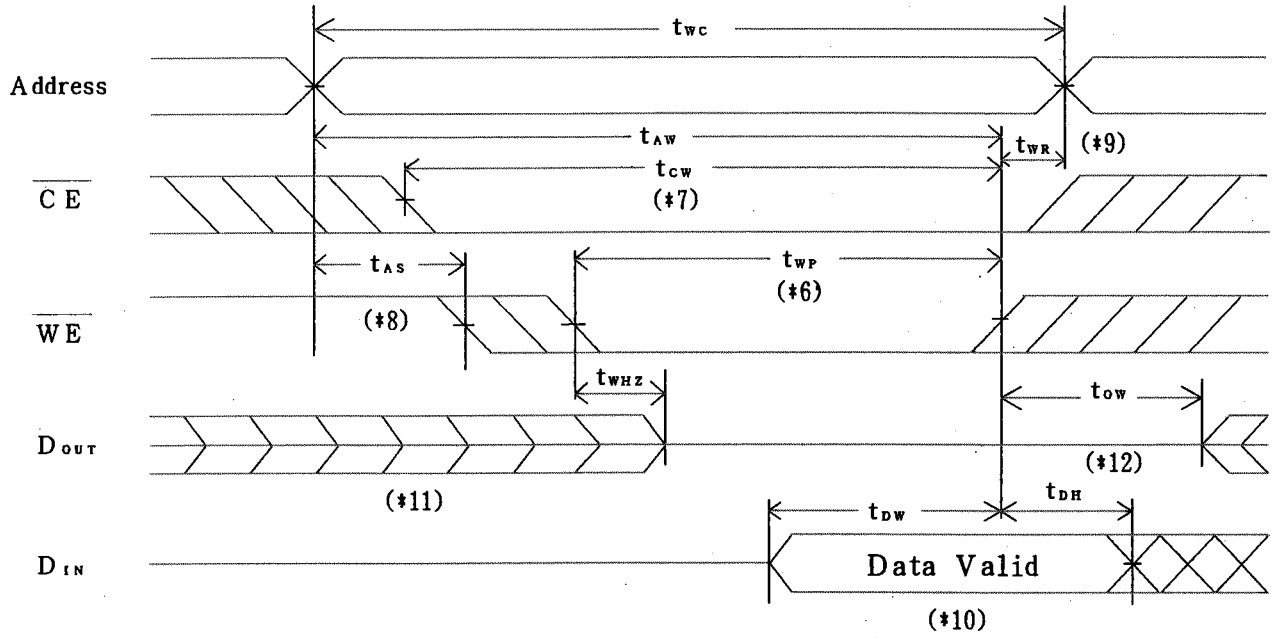
(T_a=−40℃ to +85℃, V_{CC}=5V±10%)

Parameter	symbol	Min.	Max.	Unit	
Write cycle time	t_{WC}	100		ns	
Chip enable to write	t_{CW}	80		ns	
Address valid time	t_{AW}	80		ns	
Address setup time	t_{AS}	0		ns	
Write pulse width	t_{WP}	60		ns	
Write recovery time	t_{WR}	10		ns	
Input data setup time	t_{DW}	30		ns	
Input data hold time	t_{DH}	10		ns	
Output floating hold time with respect to $\overline{WE}$	t_{OW}	10		ns	*5
Output floating time with respect to $\overline{WE}$	t_{WHZ}	0	30	ns	*5
Output floating time with respect to $\overline{OE}$	t_{OHZ}	0	40	ns	*5

Timing Chart − ($\overline{OE}$ Controlled)



Timing Chart – ($\overline{OE}$ Low fixed)



Note) * 5. Active output to High impedance and High impedance to output active tests specified for a ±200mV transition from steady state levels into the test load.

* 6. The writing occurs during a overlapping period of $\overline{CE}$ = 'Low', and $\overline{WE}$ = 'Low' (t_{WP}).

* 7. t_{CW} is defined as the time from the last occuring transition, either $\overline{CE}$ Low transition to the time when the writing is finished.

* 8. t_{AS} is defined as the time from address change to writing start.

* 9. t_{WR} is defined as the time from writing finish to address change.

*10. When I/O pins are in the output state, input signals with the opposite logic level must not be applied.

*11. If $\overline{CE}$ Low transition occurs at the same time or after $\overline{WE}$ Low transition, the outputs will remain High impedance.

*12. If $\overline{CE}$ High transition occurs at the same time or before $\overline{WE}$ High transition, the outputs will remain High impedance.

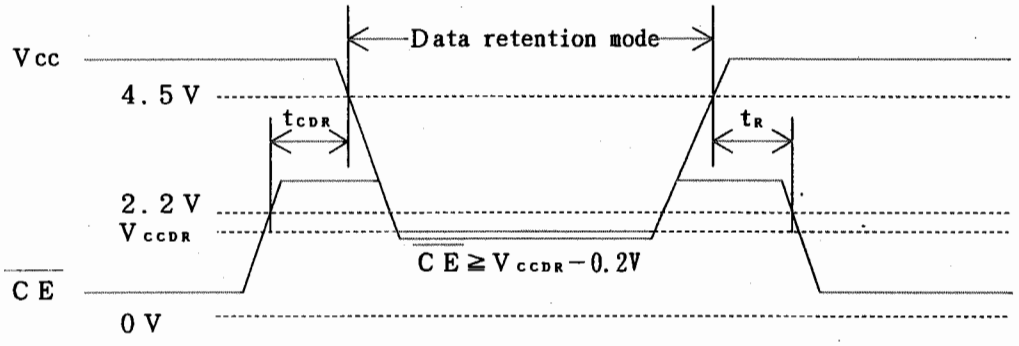
9. Low Voltage Data Retention Characteristics

(Ta=−40℃ to +85℃)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Data retention supply voltage	V_{CCDR}	$\overline{CE} \geq V_{CCDR} - 0.2V$	2			V
Data retention supply current	I_{CCDR}	$V_{CCDR} = 2.0V$ $\overline{CE} \geq V_{CCDR} - 0.2V$			1.0 0.2(*13)	μA
Chip enable setup time	t_{CDR}		0			ns
Chip enable hold time	t_R		t_{RC}(*14)			ns

Note) *13. Ta=25℃
*14. Read cycle time

Timing Chart



10. Pin Capacitance

(Ta=25℃, f=1MHz)

Parameter	Symbol	Condition	Min.	Max.	Unit	
Input capacitance	C_{IN}	$V_{IN} = 0V$		7	pF	*15
I/O capacitance	$C_{I/O}$	$V_{I/O} = 0V$		10	pF	*15

Note) *15. This parameter is sample and not 100% tested.

11 Package and packing specification

[Applicability]

This specification applies to IC package of the LEAD-FREE delivered as a standard specification.

1. Storage Conditions.

- Normal temperature : 5～40℃
- Normal humidity : 80%(Relative humidity) max.

*"Humidity" means "Relative humidity"

2. Baking Condition.

Baking is no necessity.

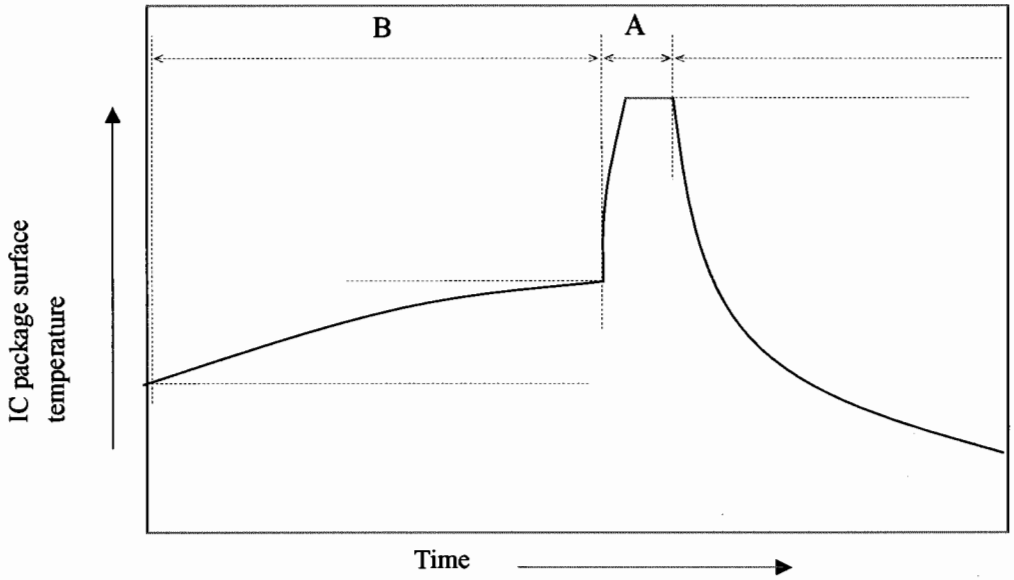
3. Mounting conditions.

Please mount the ICs as follows in order to prevent the IC quality deteriorating.

1-1. Soldering conditions. (The following conditions apply only to one-time soldering.)

(1) Solder dipping. (one-time dipping only)

- Temperature and period :
  - A) Peak temperature. 260℃ max. for 10 seconds Max.
  - B) Preheat temperature of 120 to 150℃ for 120±60 seconds
- Measuring point :
  - A) Solder bath.
  - B) IC package surface.
- Temperature profile :



(2) Manual soldering (soldering iron) (one-time soldering only)

Soldering iron should only touch the IC's outer leads.

- Temperature and period :
  350℃ max. for 3 seconds / pin max.
  (Soldering iron should only touch the IC's outer leads.)
- Measuring point : Soldering iron tip.

4. Condition for removal of residual flux.

(1) Ultrasonic washing power : 25 watts / liter max.
(2) Washing time : Total 1 minute max.
(3) Solvent temperature : 15～40℃

5. Package outline specification.

Refer to the attached drawing.

(Plastic body dimensions do not include burr of resin.)

The contents of LEAD-FREE TYPE application of the specifications. (*2)

6. Markings.

6-1.Marking details. (The information on the package should be given as follows.)

(1) Product name : LH5116H-10F

(2) Company name : SHARP

(3) Date code : (Example) YYWW XXX

YY → Denotes the production year. (Last two digits of the year.)

WW → Denotes the production week. (01・02・～・52・53)

XXX → Denotes the production ref. code (1～3 digits).

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

6-2.Marking layout.

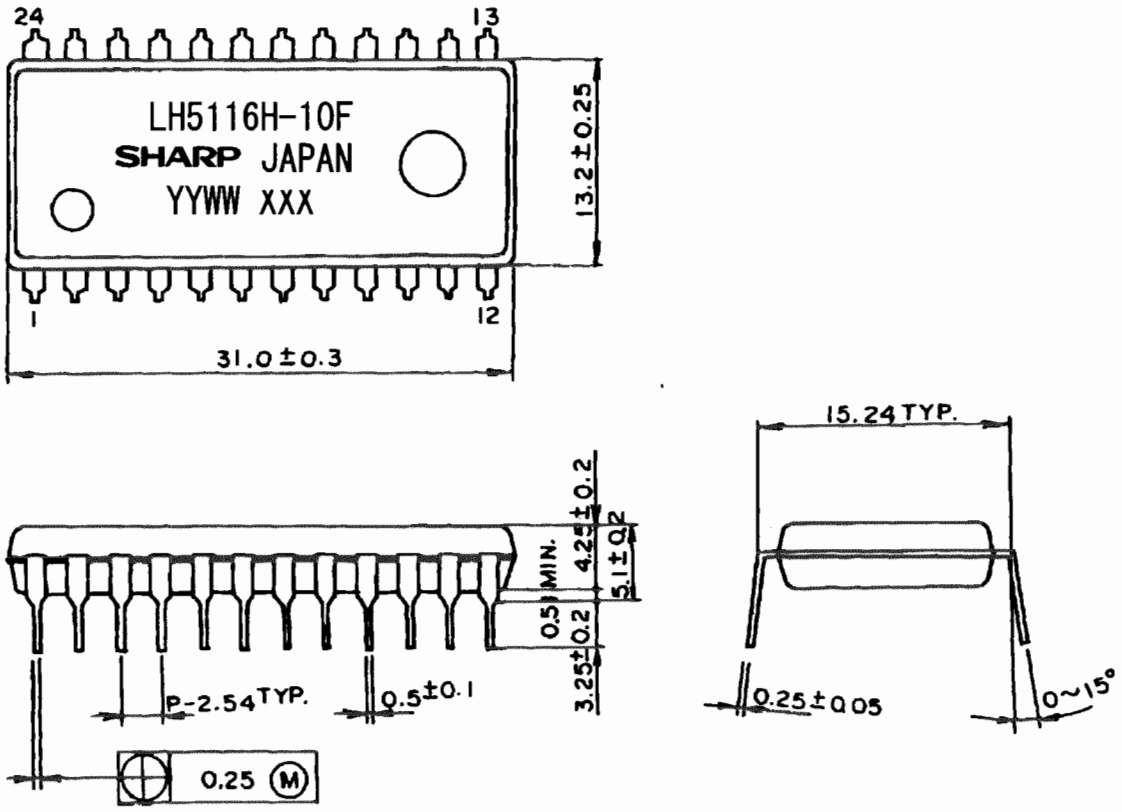
The layout is shown in the attached drawing.

(However, this layout does not specify the size of the marking character and marking position.)

*2 The contents of LEAD-FREE TYPE application of the specifications.

LEAD FINISH or BALL TYPE	LEAD-FREE TYPE (Sn-Bi)
DATE CODE	They are those with an underline.
The word of " LEAD FREE" is printed on the packing label	Printed

(Note) It is those with an underline printing in a date code because of a LEAD-FREE type.



DIP024-P-0600-AA851

LEAD TYPE	LEAD FINISH	LEAD MATERIAL
	Sn-Bi PLATING	42Alloy

NAME	DIP024-P-0600			NOTE : Plastic body dimensions do not include burr of resin.
DRAWING NO.	AA851	UNIT	mm	

7.Packing specifications.

7-1. Packing materials.

Material name	Material specifications	Purpose
Magazine	Anti-static treated plastic (17 devices/magazine)	Packing of devices.
Stopper	Plastic or rubber	Securing of devices.
Label	Paper (1piece/inner carton)	Indication of product name, quantity and packed date.
Inner carton	Cardboard (680 devices/carton max.)	Packing the magazines.
Outer carton	Cardboard (2720 devices/carton max.)	Outer packing.

(Devices must be inserted into the magazine in the same direction.)

7-2.Outline dimension of magazine.
Refer to the attached drawing.

7-3. Outline dimension of carton.
Refer to the attached drawing.

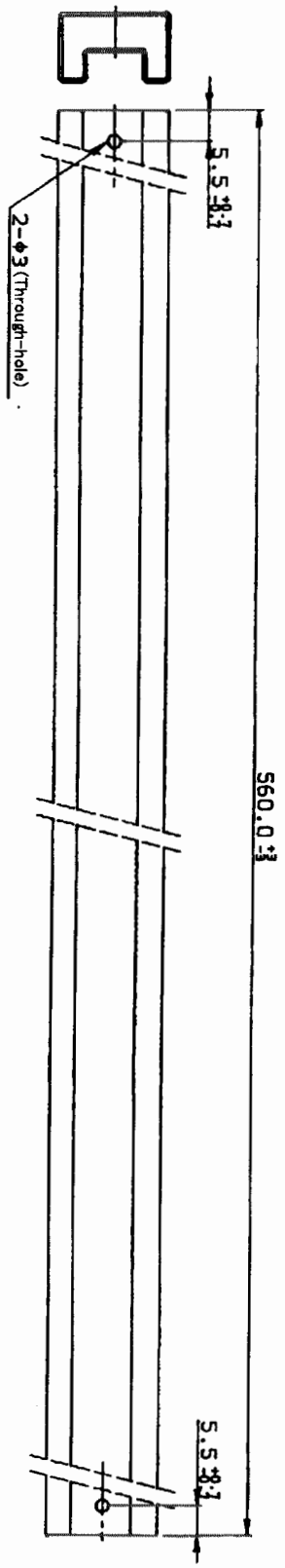
8.Precautions for use.

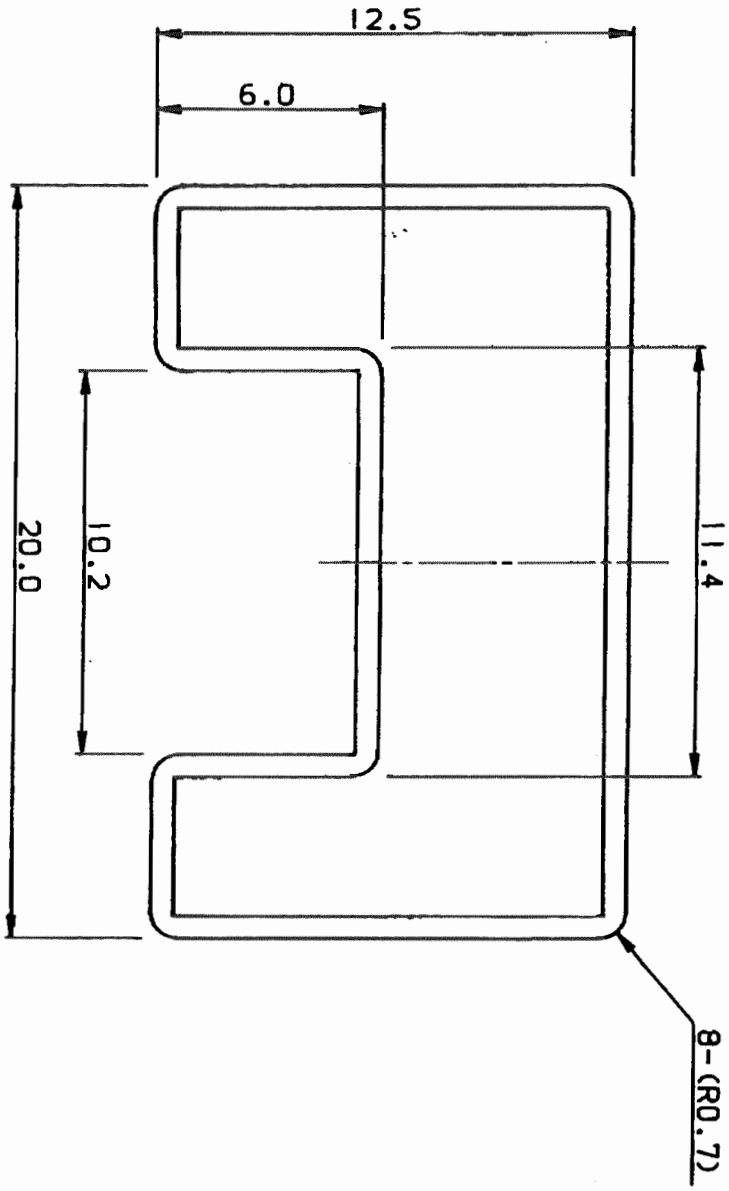
(1) Opening must be done on an anti-ESD treated workbench. All workers must also have undergone anti-ESD treatment.

(2) The magazines have undergone anti-ESD treatment.

(3) Be sure to fit stoppers to both ends of the magazine when storing to prevent the devices from slipping out.

(4) The devices should be stored at a temperature of 5~35℃(normal temperature) and maximum relative humidity of 75%, and should be mounted within one year of the date of delivery.

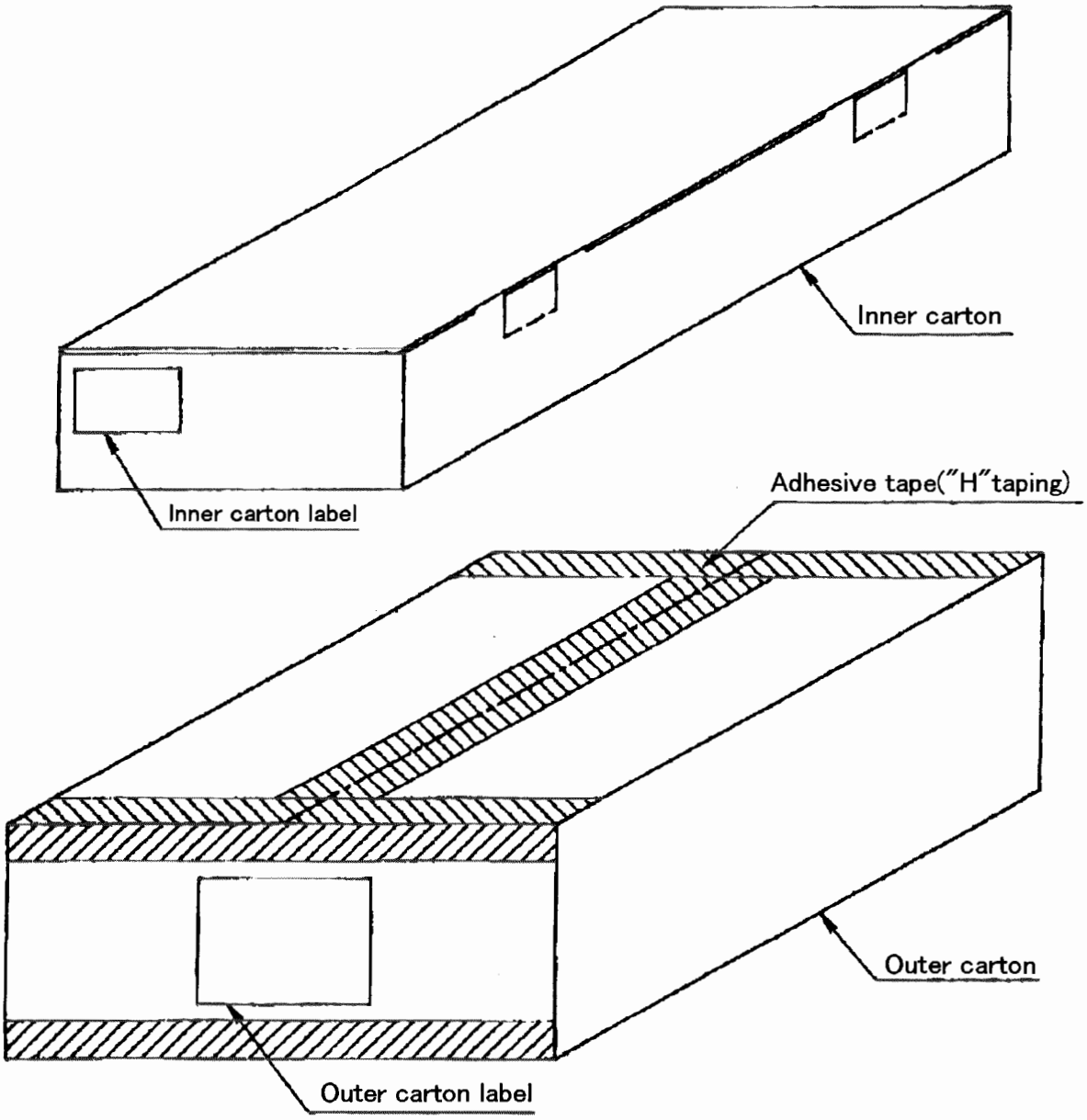




注記 ：片側ピンストッパー、片側ゴムストッパーとする。
指示無き寸法公差は全て±0.4mm とする。

NOTES : One end of the magazine(sleeve) is plugged by a rubber stopper, and the other end is plugged by plastic pin-stopper.
All tolerances are ±0.4mm unless otherwise specified.

名称 Name	DP600SPK-A2			備考 Note
Drawing no.	CV651	単位 Unit	mm	



L × W× H

Inner carton - Outer dimensions : 580×170×70

Outer carton - Outer dimensions : 600×360×185

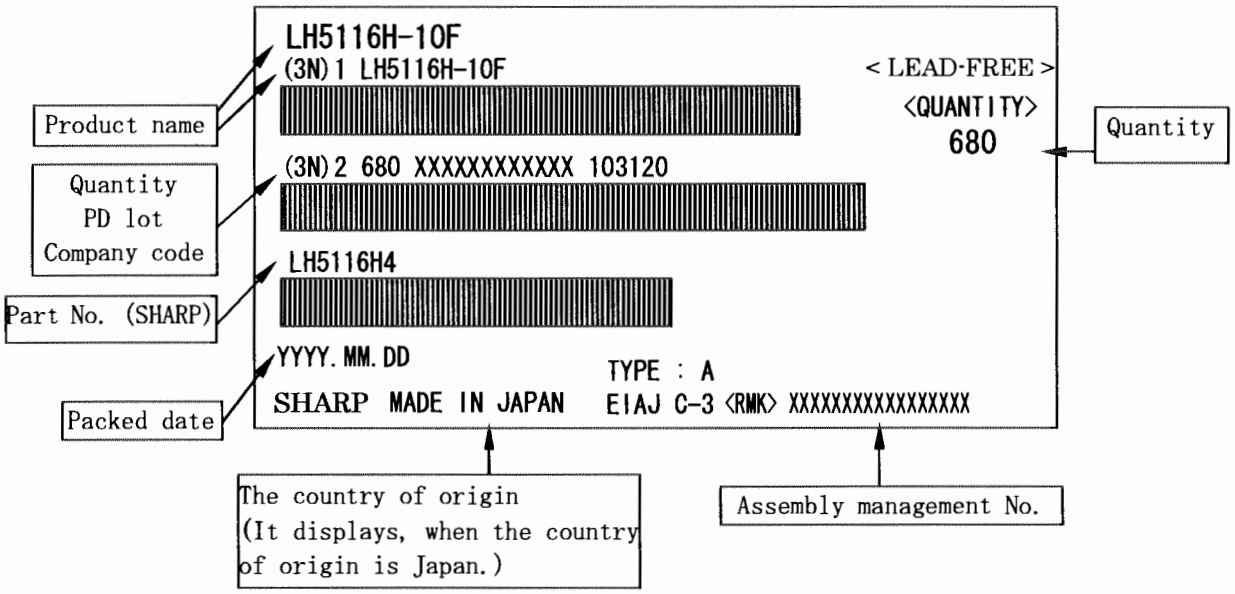
名称 NAME	DIP 600 Packing specifications		
DRAWING NO.	BJ383	単位 UNIT	mm

備考 出荷数量が端数の場合、本仕様と異なることがあります。

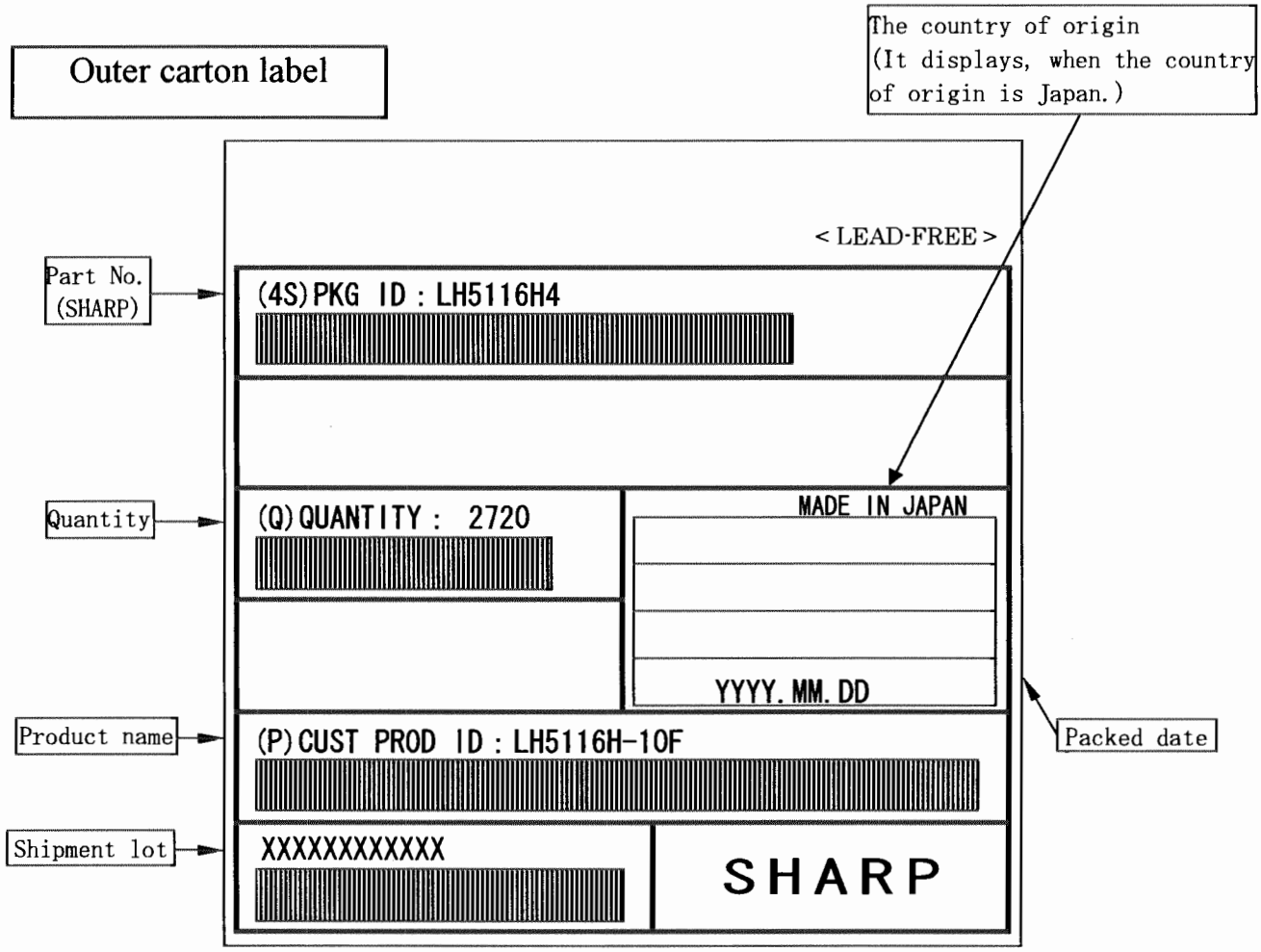
NOTE There is a possibility different from this specification when the number of shipments is fractions.

(Note) The <LEAD-FREE> display shows a lead-free article.

Inner carton label



Outer carton label



(Former) EIAJ B Standard conforming

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