SHARP

LJ64HM01

EL Display Module

(Model Number: LJ64HM01)

Specifications

Spec No.: LA-09B02A

Dated: Mar. 28. 2002

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		PAGE 23
	SPECIFICATION	APPLICABLE DIVISION
		☐ DUTY DEVELOPMENT CENTER ☐ TFT DEVELOPMENT CENTER ☐ LCD PRODUCTS DEBELOPMENT CENTER ■ PRODUCTION DEPT.(EL Gr)

SPECIFICATION FOR

EL Display Module

MODEL No. LJ64HM01

☐ CUSTOMER'S APPROVAL

DATE _____

BY _____

PRESENTED

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RECORDS OF REVISION

MODEL No. LJ64HM01

DOC FIRST ISSUE

IDENT. DATA No.

DATE	REF. PAGE PARAGRAPH DRAWING No.	REVISED No.	SUMMARY	CHECK & APPROVAL
Nov.12,'97			New	M. Kawaguchi
Jan.30.'02	Page.1	1	Change mass in mechanical specifications.	
	Page.3,4	2	Add Note 4) Add the description about brightness measures.	
	Page.12	3	The change of tolerance of the active area.	M. Kawaguchi
	Page.15	4	Change of signal input block	
	Page.19	5	Add the items about the serial Number of EL module.	
	Page.20	6	Change of content.	

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1. Application

This data sheet is to introduce the specification of EL display module, LJ64HM01.

2. Overview

The Sharp EL display module consists of a thin film EL panel, high voltage ICs for panel driving and a display control circuit. By supplying nine input signals of CMOS level and two DC power supplies of +5 V and +12 V arbitrary graphs and characters can be displayed.

Note) Circuit scheme of the signal input block is shown at Page 15.

3. Mechanical Specifications

Parameter	Specification Width × Height × Depth	Unit
Outline dimensions	400 × 107 × 20 (Note 1)	mm
Number of matrix electrodes	640 × 128	—
Active area	358.3 × 71.6	mm
Dot pitch	0.56 × 0.56	mm
Dot pitch ratio	1 × 1	—
Dot size	0.415 × 0.415	mm
Mass	740 △1	g

Note 1) Details of outline dimensions are shown at Page 12.

4. Absolute Maximum Ratings

4-1 Electrical absolute maximum ratings

(Ta=25 ℃)

Parameter	Symbol	Rating	Unit
Interface signal (Logic "H")	V_{IH}	V_L+ 0.3	V
Interface signal (Logic "L")	V_{IL}	− 0.3	V
Supply voltage (Logic)	V_L	+ 7	V
Supply voltage (Panel drive)	V_D	+ 14	V

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4-2 Environmental conditions

Parameter	Tstg		Topr		Remark
	Min.	Max.	Min.	Max.	
Ambient temperature	−40 ℃	+85 ℃	−20 ℃	+65 ℃	Note 1)
Humidity	Note 2)		Note 2)		No condensation
Vibration	Note 3)				No operating
Shock	Note 4)				No operating

Note 1) Survival: −25 ℃ ～ +85 ℃ (for 10 minutes)
No permanent damage will occur.

Note 2) Ta≦40 ℃ ····· 95 %RH Max
Ta＞40 ℃ ····· Absolute humidity shall be less than Ta＝40 ℃ / 95 %RH.

Note 3) Frequency 10 ～ 55 Hz
Sweep time ; 120 min each axis
Peak-to-peak amplitude :
10 ～ 55 Hz ; Vibration width : 1.5 mm
Interval ; 10 ～ 55 ～ 10 Hz
(1 min)
※ Comply with the mentioned condition in Page 12.

Note 4) Acceleration ; 491 m/s^2
Pulse width ; 11 ms
3 times for each direction of ±X/±Y/±Z.

5. Electrical Characteristics

(Ta= 25℃)

Parameter	Symbol	Rating			Unit
		Min.	Typ.	Max.	
Supply voltage (Logic)	V_L	+ 4.75	+ 5.0	+ 5.25	V
Supply current (Logic,V_L=+5 V)	I_L	30	−	300	mA
Supply voltage (Panel drive)	V_D	+ 11.4	+12.0	+12.6	V
Supply current (Panel drive,V_D=+12 V)	I_D	(※1)	−	1800	mA
Total power (V_L=+5 V, V_D=+12 V)	P_T	−	14	−	W

(※1) 10 mA in condition with no signals nor V_L supplying.

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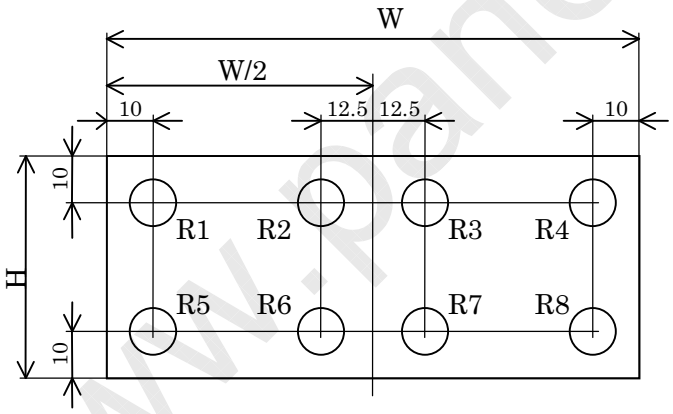
6. Optical Characteristics

(Ta= 25℃, V_L= 5.0V, V_D= 12.0V)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Areal luminance at 240Hz	L_{ON}	All dots lit	143 (260)※	220 (400)※	—	cd/m²	Note 1)
Areal luminance at 180Hz	L_{ON}	All dots lit	113 (205)※	165 (300)※	—	cd/m²	
OFF luminance	L_{OFF}	All dots turned off	—	—	1.9 (3.4)※	cd/m²	Note 4) △2
Luminance distribution	△ L_{DIS}	All dots lit	—	—	35	%	
Fill factor			—	0.55	—		Note 2)
Shadowing characteristics	△ L_{SD}	fixed pattern	—	2	—	%	Note 3)
Viewing angle			—	160	—	°	

※ This value is the point luminance.

Note 1) Average luminance measured in circular windows (R1～R8) shown in Fig.1 (Circular window diameter: ϕ 13 mm)



H = 71.6 : Height of active area
W = 358.3 : Width of active area
Unit : mm
Tolerance : ±10 %

Fig.1

The following formula defines the luminance distribution:

$$\Delta L_{DIS} = \left(1 - \frac{L_{MIN}}{L_{MAX}}\right) \times 100(\%)$$

where L_{MAX} is the maximum luminance and L_{MIN} is the minimum luminance taken at the eight locations in Fig.1.

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Note 2) The ratio of the emission to area the display area. …… SHARP's EL has comparatively high fill factor, and therefore, the visibility of display is excellent.

Note 3) Shadowing characteristics means the variation of luminance according to the number of dots lit on a scanning line.

Thanks to the addition of the shadowing compensation circuit, the display quality of SHARP's EL is improved.

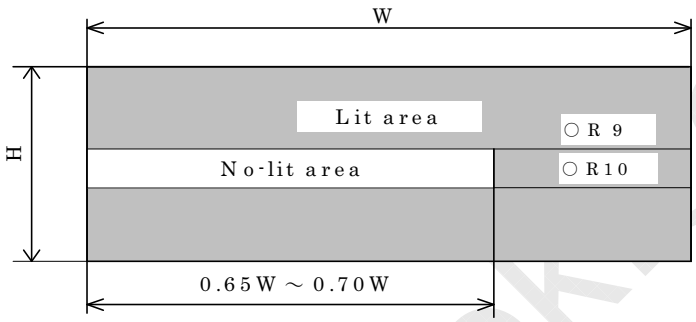

Fig.2

The following formula defines the shadowing characteristics:

$$\Delta L_{SD} = \left(\frac{L_N}{L_L} - 1 \right) \times 100(\%)$$

where L_L is the luminance at R9, L_N at R10.

△2 Note 4) Brightness measures

We measure brightness using sharp's examination device that is proofread by standard-machine:BM-5A (TOPCON).

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7. Timing characteristics

7-1 Input signals

This module is driven by line-at-a-time scanning method with following 9 CMOS level input signals.

Parameter	Symbol	Description	
Data input clock signal	CP2	Clock signal for inputting the display data into the EL module.	
Display data signal	D0～3	Data signal	The signals are sampled at every falling edge of the data input clock signal. The display is "ON" while the logic is "H" and "OFF" while the logic is "L".
Input data latch signal	CP1	This signal controls the "timing of line-at-a- time scanning" and the "latch timing of the data side shift register on falling edge".	
Scan start-up signal	S	This signal controls frame frequency. And the contents of the display data signal are displayed on the first line by combination with this signal.	
Display reset signal	RST	When this signal is "H", EL enables, and the time of "L" disables.	
Line select signal	LINE	This signal changes a normal drive and the dual line drive. It is the dual line drive when this signal is "H". （640 × 64） It is a normal drive when this signal is "L". （640 × 128）	

Note 1) Dual line drive ･･･ Two lines are driven at the same time.

Note 2) Change the line switching signal while the display reset signal is "L".

Line select sequence is shown at Page 17.

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7-2 Input signals timing characteristics

7-2-1 Dual line drive (640 × 64) (Ta= 25℃, V_L= 5.0V, V_D= 12.0V)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Frame frequency	$1/T_{FRM}$	60	—	240	Hz
CP2 clock cycle	T_{CP2}	154	—	—	ns
High level clock width	t_{CWH}	60	—	—	ns
Low level clock width	t_{CWL}	60	—	—	ns
CP1 clock cycle	T_{CP1}	40	—	—	μs
High level latch clock width	t_{LWH}	60	—	—	ns
Data set up time	t_{SU}	50	—	—	ns
Data hold time	t_H	40	—	—	ns
CP1 ↑ clock allowance time from CP2 ↓	t_{S21}	0	—	—	ns
CP2 ↓ clock allowance time from CP1 ↓	t_{S12}	200	—	—	ns
CP2 ↑ clock allowance time from CP1 ↓	t_{S13}	100	—	—	ns
Clock rise/fall time	t_r,t_f	—	—	t_{rf} *	ns

* $t_{rf} = (T_{CP2} - t_{CWH} - t_{CWL}) / 2 \leqq 30$ ns

7-2-2 Normal drive (640 × 128) (Ta= 25℃, V_L= 5.0V, V_D= 12.0V)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Frame frequency	$1/T_{FRM}$	60	—	180	Hz
CP2 clock cycle	T_{CP2}	154	—	—	ns
High level clock width	t_{CWH}	60	—	—	ns
Low level clock width	t_{CWL}	60	—	—	ns
CP1 clock cycle	T_{CP1}	40	—	—	μs
High level latch clock width	t_{LWH}	60	—	—	ns
Data set up time	t_{SU}	50	—	—	ns
Data hold time	t_H	40	—	—	ns
CP1 ↑ clock allowance time from CP2 ↓	t_{S21}	0	—	—	ns
CP2 ↓ clock allowance time from CP1 ↓	t_{S12}	200	—	—	ns
CP2 ↑ clock allowance time from CP1 ↓	t_{S13}	100	—	—	ns
Clock rise/fall time	t_r,t_f	—	—	t_{rf} *	ns

* $t_{rf} = (T_{CP2} - t_{CWH} - t_{CWL}) / 2 \leqq 30$ ns

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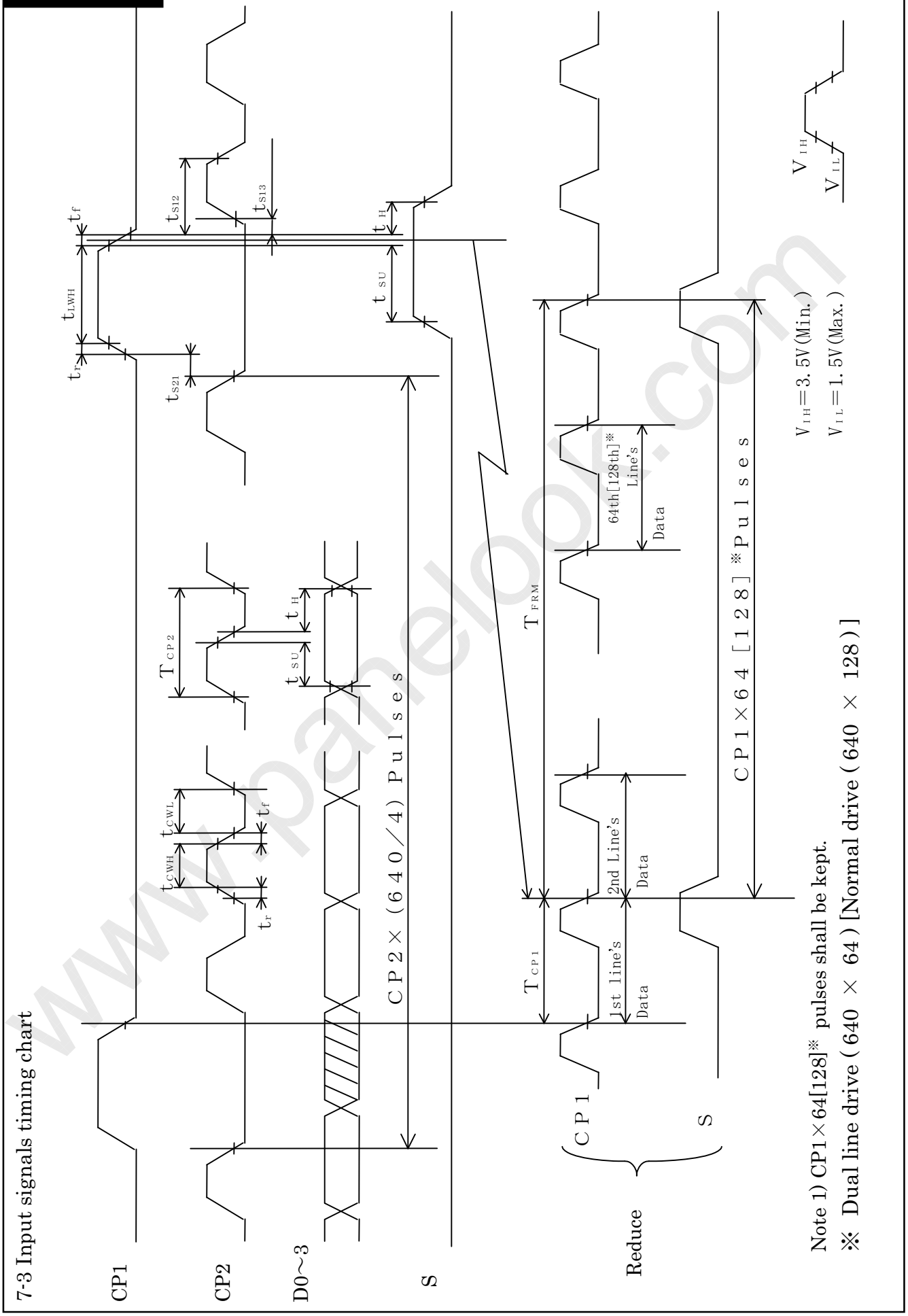
7-3 Input signals timing chart



Note 1) CP1×64[128]※ pulses shall be kept.

※ Dual line drive (640 × 64) [Normal drive (640 × 128)]

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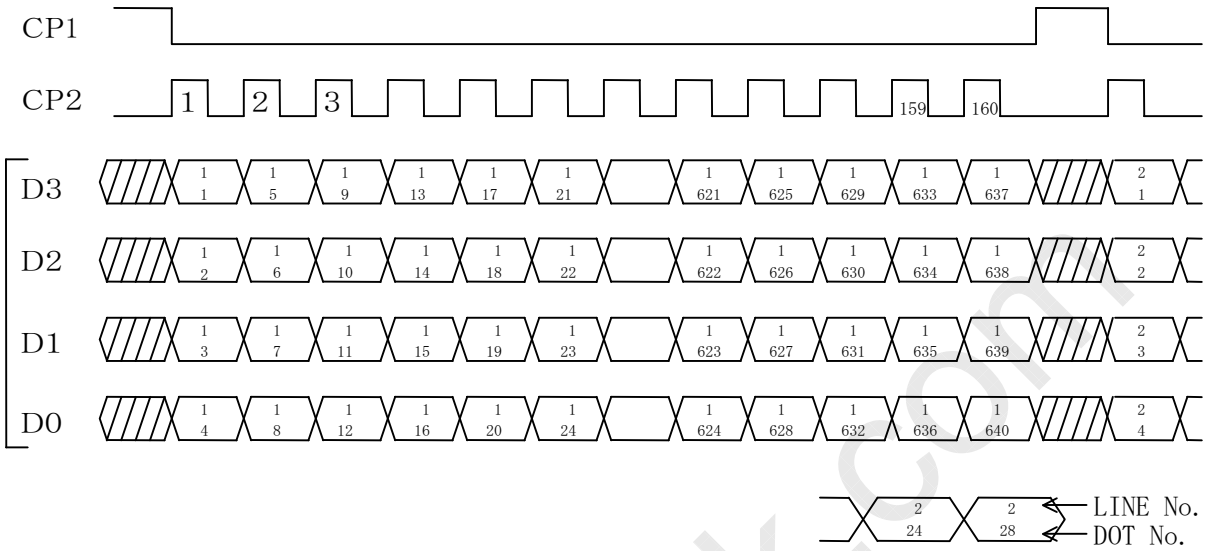
7-4 Data transmission timing



7-5 Transmission data and relative position on panel

LINE \ DOT	1	2	3		639	640
1[1]	1[1]－1	1[1]－2	1[1]－3		1[1]－639	1[1]－640
1[2]	1[2]－1	1[2]－2	1[2]－3		1[2]－639	1[2]－640
2[3]	2[3]－1	2[3]－2	2[3]－3		2[3]－639	2[3]－640
D ・						
・						
・						
64[127]	64[127]－1	64[127]－2	64[127]－3		64[127]－639	64[127]－640
64[128]	64[128]－1	64[128]－2	64[128]－3		64[128]－639	64[128]－640

※ Dual line drive (640 × 64) [Normal drive (640 × 128)]

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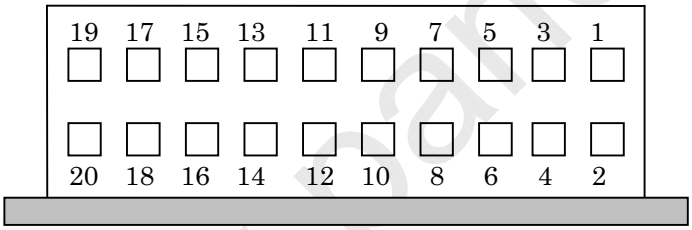
8. Input connectors

8-1. Interface signals and power supply connectors

CN4

No.	SIGNAL	No.	SIGNAL
1	+12V	2	+12V
3	+ 5V	4	+ 5V
5	GND	6	GND
7	S	8	GND
9	CP1	10	GND
11	CP2	12	GND
13	D3	14	D2
15	D1	16	D0
17	LINE	18	GND
19	RST	20	GND

PIN ASSIGNMENT



Connectors

	Model No.	Maker
Module-side pin header	HIF3FC-20PA-2.54DS or equivalents	HIROSE ELECTRIC CO.
Fitting socket	HIF3BA-20D-2.54R or equivalents	HIROSE ELECTRIC CO.

<Caution>

- This module is not supplied with the fitting socket and the cable.
- The length of the cable shall not exceed 50 cm.
- Please connect all of each terminal of the above-mentioned input signal, supply voltage, and GND.

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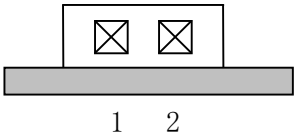
8-2. Luminance Control Connector (CN 5)

By attaching the external potentiometer to CN5, the luminance of the module becomes controllable.

CN 5

Terminal No.	Signal name
1	LCL
2	LCH

Module-side pin header
: DF1B-2P-2.5DS/HIROSE ELECTRIC CO.
or equivalents



The value of the potentiometer : 200KΩ
The range of the luminance control : about 95% (200KΩ) ~ 70% (0Ω)

<Caution>

- This module is not supplied with the fitting socket and the potentiometer.
- Never put on or remove the connector during the EL module is under operation. Otherwise, the fuse might be melted down. And please pay attention to the wiring from CN5, because there is a possibility that abnormal high voltage is impressed to the EL panel when this wiring touches GND.
- If you use the luminance control function, the optical characteristics on page 3 are not applied. And if you use the function, the image retention caused by the luminance change or the fixed pattern may be easy to stand out.

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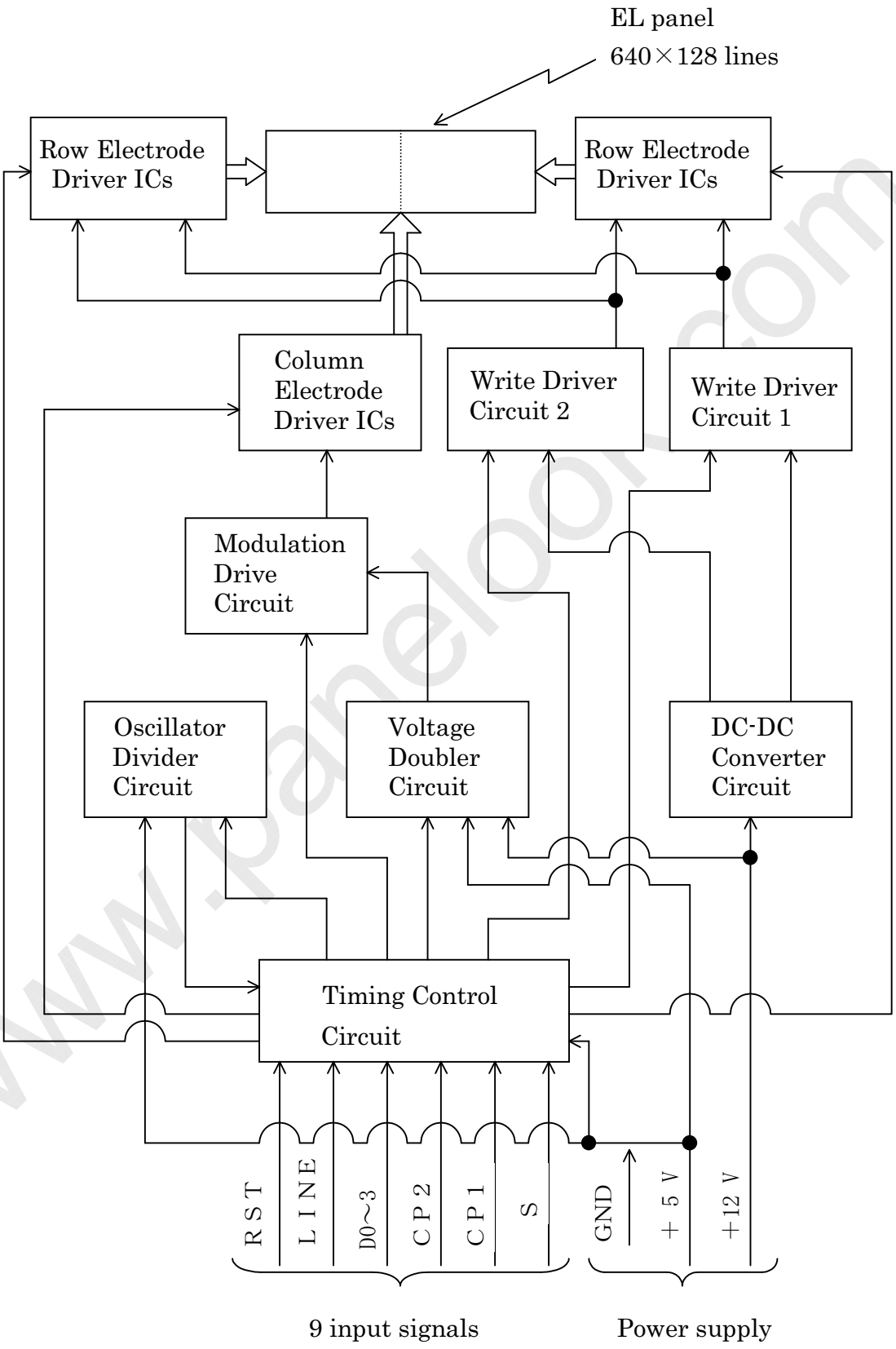
9. Functional Block Diagram



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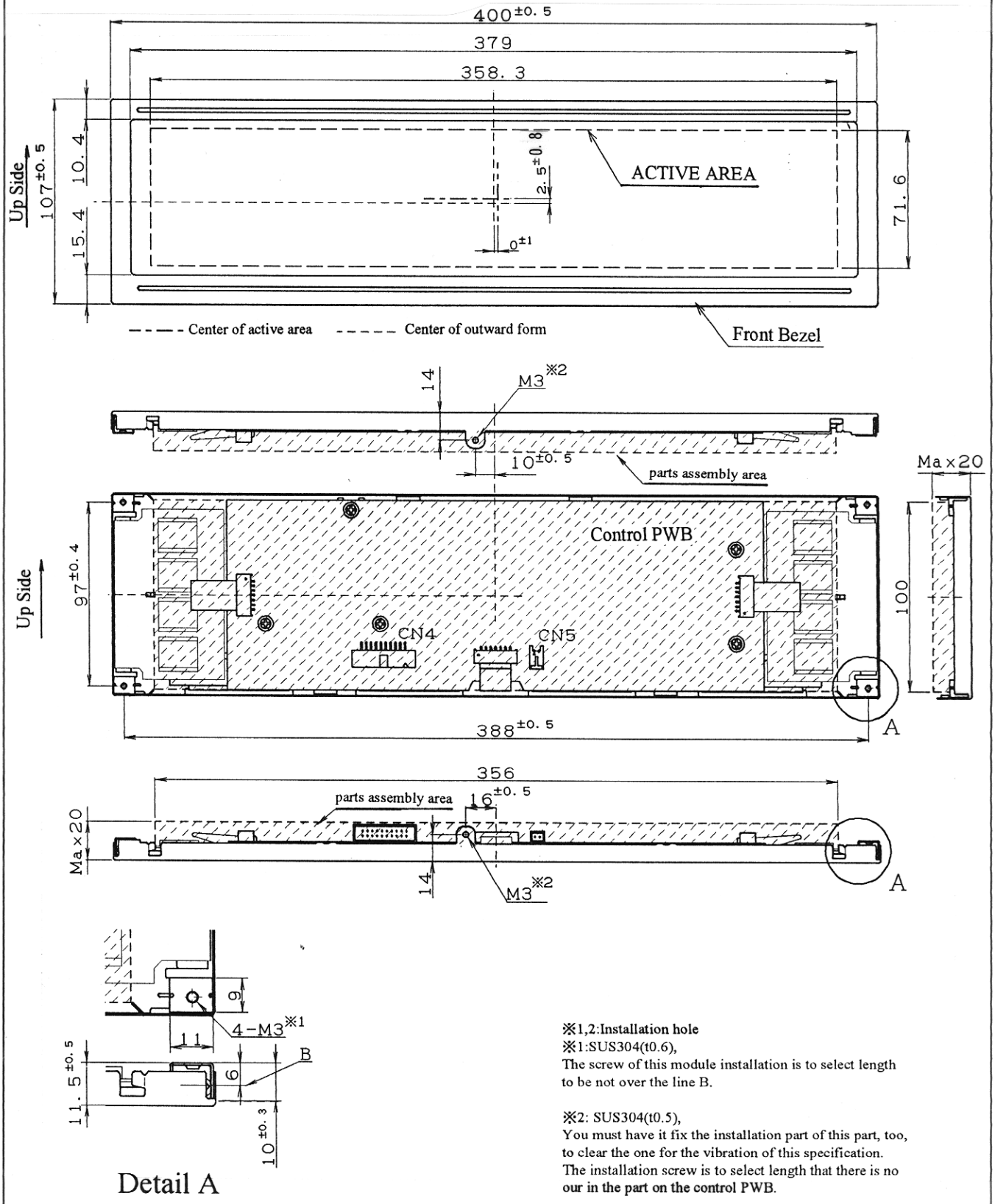
10. Outline of the module configuration ⚠3

This module is shipped with the form drawing below.



※1,2:Installation hole
※1:SUS304(t0.6),
The screw of this module installation is to select length to be not over the line B.

※2: SUS304(t0.5),
You must have it fix the installation part of this part, too, to clear the one for the vibration of this specification.
The installation screw is to select length that there is no our in the part on the control PWB.

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11. Handling Instructions and Cautions for Operation

1. Handle the module with care of ESD, The operator and the place around him must be guard against ESD. Especially, please note that the module might be destroyed by ESD when you directly touch the IC or the wiring pattern in the EL display module.
2. Since the EL panel is made of glass, care shall be taken to avoid the breakage caused by dropping or bumping it.
3. Please avoid detaching and decomposing the display control PWB or the flat cable because these cause the breakdown.
4. Do not insert nor extract the input cable when the power is supplied.
5. Do not touch the display control PWB on the rear side of the module while in operation. There is risk of electric shock, because it generates AC pulses of about 200V. And even after the power off, do not touch components on the PWB because high voltage might be contained in circuits.
6. Consider that a frame and GND of the display control PWB are connected with the screw when you design your product.
7. Please use the module within the rated operational voltage and temperature specified in this literature, because the breakdown is caused by using which exceeds regulated operation voltage and temperature. The operation temperature is specified by ambient temperature. Test carefully the inner temperature of your product (module ambient temperature), and decide operational temperature of your products.
8. Please avoid the operation in water dew because if water dew covers connectors or circuits even a little, if may cause miss-operation and sometimes it breaks the module.
9. If your product is used in dusty air, or covered by oil dew, or by acid/ alkaline mist, protect PWB of the module by filter etc.
10. Do not use the module in corrosive gas. Do not use packing that contains sulfur, or spacer that contains sulfur rubber for mounting filter.
11. To avoid the image retention caused by the luminance change due to time lapse, and to extend the panel life, please pay attention to the design of display, so that a fixed pattern may not be displayed as possible as you can, and by using all parts of the viewing area evenly. Also, we would recommend to use the module at the ambient temperature as low as you can because the temperature is one of the causes of acceleration of the luminance change due to time lapse.
12. To prevent smoke or fire in abnormal status, this module installs the fuses. But the fuses may not be melt down, and the temperature of the parts can rise, depending on the conditions of the usage, characteristic of power supply's current capacity, or defect mode. Therefore, take care that combustibles shall be set away from the module.

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13. When you return the module to us, and you are forced to pack it in different manner with our specification, use enough amount of packing cushion to prevent stress to the panel.
14. Please observe the notes for usual electronic components strictly.

Others

If any problem should arise from this specification, the supplier and user should work out a mutually acceptable solution.

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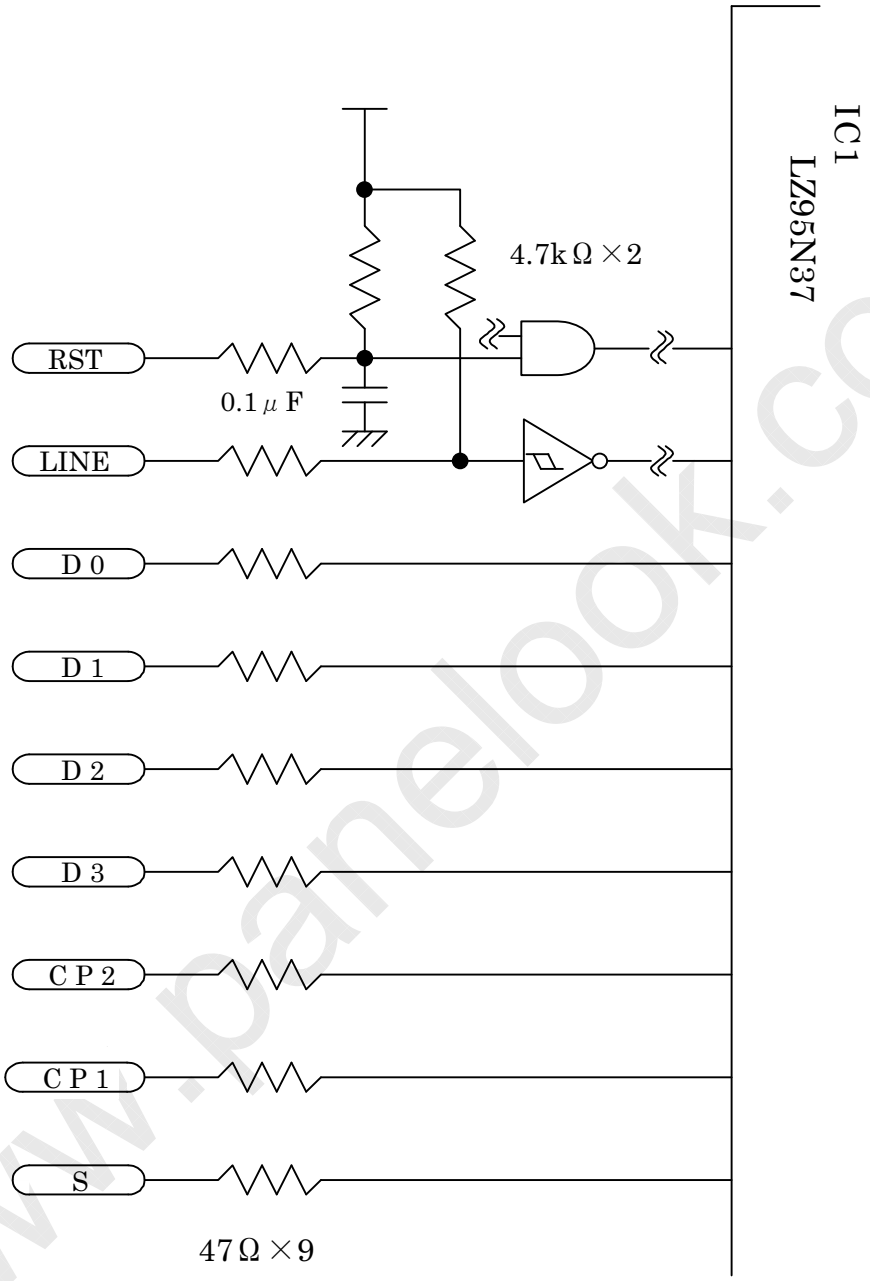
12. Circuit scheme of the signal input block ⚠4



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13. Power supply input circuit

(a) Over current protection

This module equips fuses in power supply input circuit protecting fire accident rising from over current in internal circuit, so the fuse may melt down when the specifications are not kept or in case of short circuit.

Fuse specifications

Parts No.	Model No.	Ratings	Melt type	Authorization Standard	Supply voltage
F1	SSTC	800mA	slow	UL.CSA	5 V
F2	SSTC	1 A	slow	〃	12 V
F3	SSTC	2 A	slow	〃	12 V

Maker : S.O.C

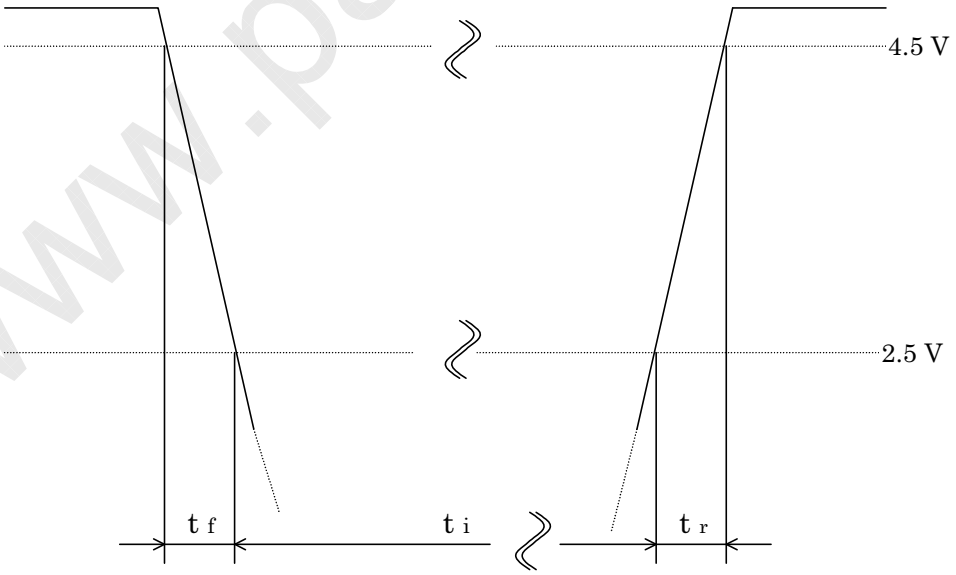
Note) Fuses is not open in the case current capacity of power supply is small.

On the other hand fuses is open by surge current in case of current capacity of power supply is big or supply power to the module using relays. In consequence please you thoroughly investigate the module.

(ref : Please choose the power supply which can send 1.5～2 times electric current as much as fuse's ratings in unusual case.)

(b) Take account of the shame below for 5V DC input

Rising up time and falling down time of 5V DC



t_f = falling down time t_r = rising up time

(1) t_r, $t_f \leqq$ 100 ms is better to be kept.

(2) $t_i \geqq$ 1 ms shall be kept.

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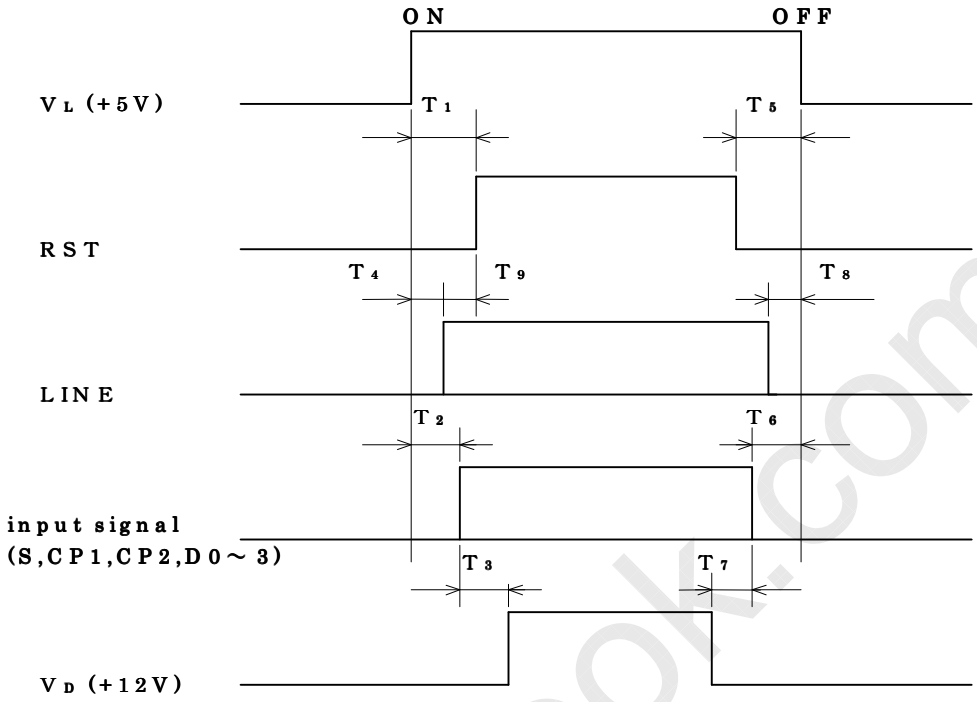
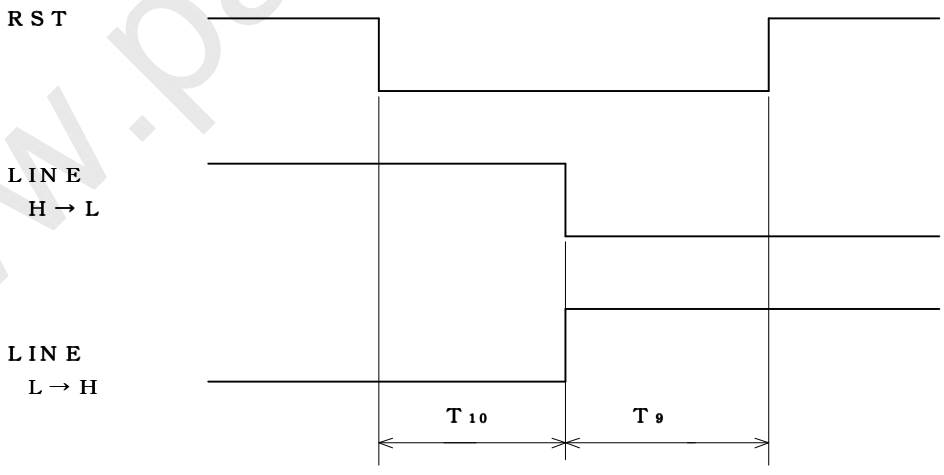
(c) Power on/off sequence



Note) $8ms \leqq T_1 \leqq 50ms$、$T_{2\sim8} \geqq 0$、$T_9 \geqq 8ms$ shall be kept.

(d) Line select sequence



Note) T_9、$T_{10} \geqq 8ms$ shall be kept.

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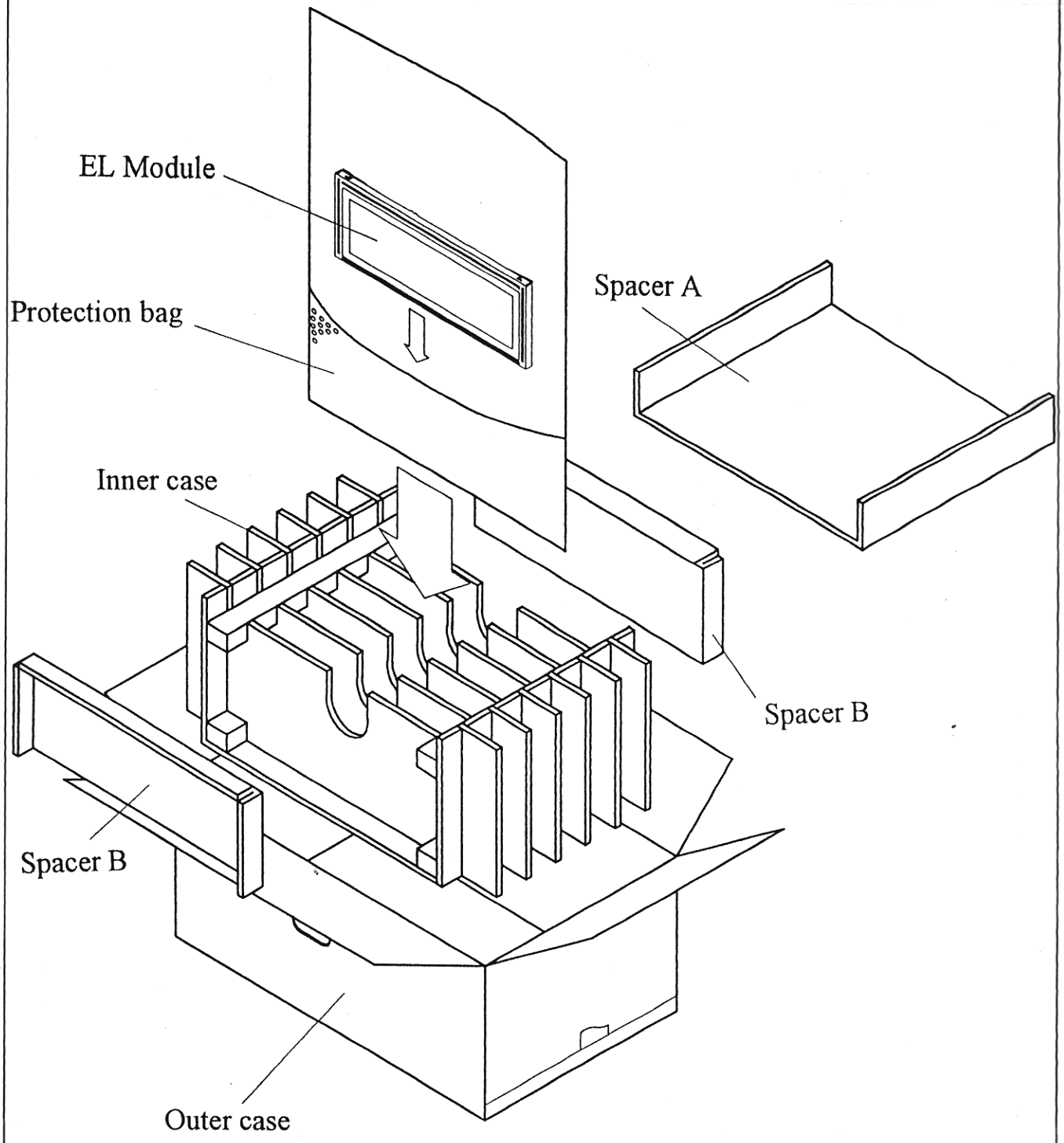
14. Packing specification

5 pcs./package



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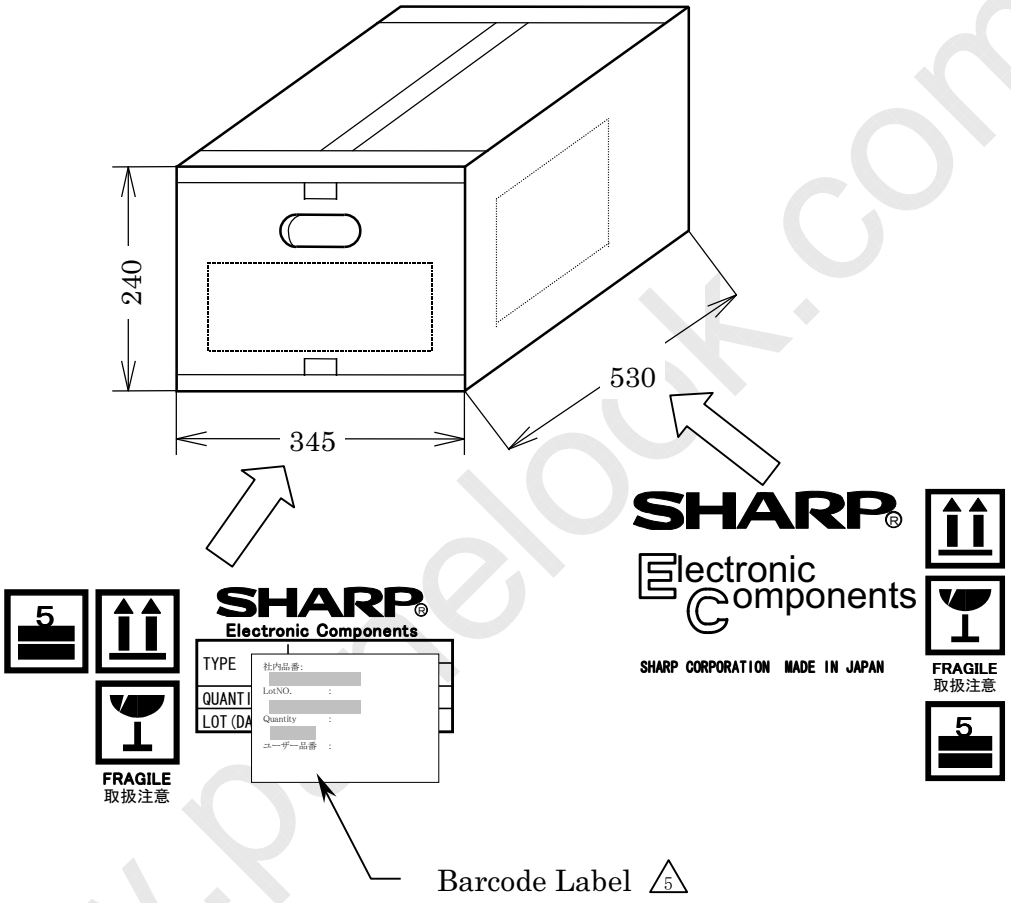
Outline



(Unit : mm)

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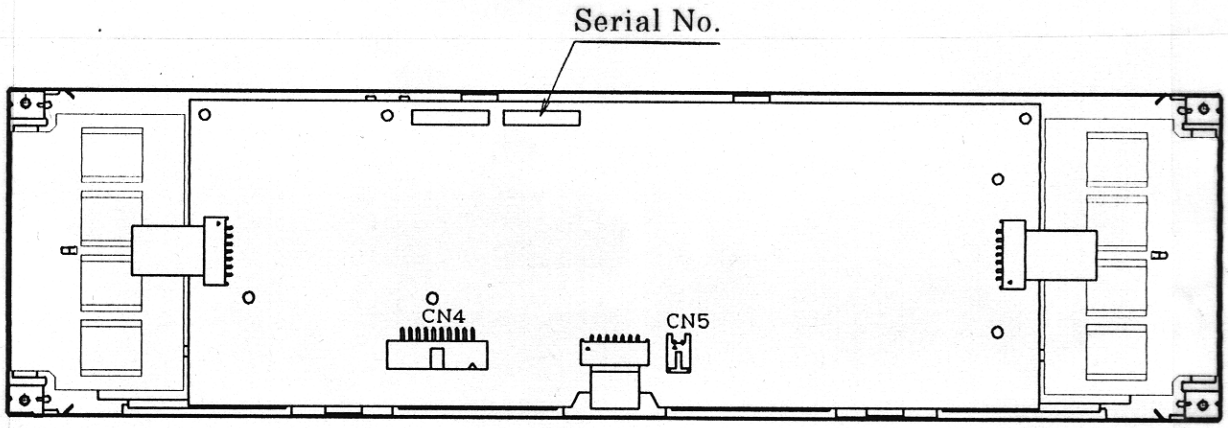
15. Serial number

(1) Position



⚠6 (2) Content

Serial number of all models.

Production month (Jan.→01,Feb.→02·····Dec.→12)

Production year (Two last digit writing at A.D.)

SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE.

Suggested applications (if any) are for standard use; See Important Restrictions for limitations on special applications. See Limited Warranty for SHARP's product warranty. The Limited Warranty is in lieu, and exclusive of, all other warranties, express or implied. ALL EXPRESS AND IMPLIED WARRANTIES, INCLUDING THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR USE AND FITNESS FOR A PARTICULAR PURPOSE, ARE SPECIFICALLY EXCLUDED. In no event will SHARP be liable, or in any way responsible, for any incidental or consequential economic or property damage.

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