

PREPARED BY: _____	DATE _____	<h1>SHARP</h1> <p>LIQUID CRYSTAL DISPLAY GROUP SHARP CORPORATION</p> <h2>SPECIFICATION</h2>	SPEC No. 04201A
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“ DEVICE SPECIFICATION FOR

EL Display Unit

MODEL No. LJ64ZU35

CUSTOMERS APPROVAL

DATE \_\_\_\_\_

BY \_\_\_\_\_

PRESENTED BY T. Ohba

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 Engineering Department III  
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 SHARP CORPORATION

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1. Application

This data sheet is to introduce the specification of EL display unit, LJ64ZU35.

2. Overview

The Sharp EL display unit consists of a thin film EL panel, high voltage driver ICs for panel driving and a display control circuit. By supplying seven input signals of LS TTL level and two DC power supplies of +5V and +24V gray scale graphs and characters can be displayed.

3. Mechanical Specifications

Parameter	Specification	Unit
	Width x Height x Depth	
Outline (Main unit) dimensions (DC-DC conv.)	246 x 158 x 20.0 (34.0')	mm
	156 x 45 x 19.0	mm
Number of matrix electrodes	640 x 400	-
Effective display area	191.9 x 119.9 diagonal 226.3 (8.9 inches)	mm
Dot pitch	0.3 x 0.3	mm
Dot pitch ratio	1 : 1	-
Dot size	0.22X 0.22	mm
Weight (Main unit) (DC-DC conv.)	535 (600*)	g
	65	g

Note) \* with mounted DC-DC converter board.

4. Absolute Maximum Ratings

4-1 Electrical absolute maximum ratings

(Ta=25°C)

Parameter	Symbol	Rating	Unit
Interface signal (Logic "H")	V <sub>IH</sub>	+ 5.5	V
Interface signal (Logic "L")	V <sub>IL</sub>	- 0.5	V
Supply voltage (Logic)	V <sub>L</sub>	+ 7	V
Supply voltage (panel drive)	V <sub>D</sub>	+27	V

**SHARP****4-2 Environmental conditions**

Parameter	Tstg		Topr		Remark
	Min.	Max.	Min.	Max.	
Ambient temperature	-40°C	+80°C	-5°C	+55°C	
Humidity	Note 1		Note 1		No condensation
Vibration	Note 2				No operating
Shock	Note 3				No operating

Note 1)  $T_a \leq 40^\circ\text{C}$  . . . . . 95% RH Max.  
 $T_a > 40^\circ\text{C}$  . . . . . Absolute humidity shall be less than  
 $T_a = 40^\circ\text{C}/95\%$  RH.

Note 2) Conforms to JIS-C-5025 , condition A.  
 Frequency : 10 ~ 55Hz  
 Vibration width: 1.5mm  
 Interval : 10Hz ~ 55Hz ~ 10Hz  
 (1 min)  
 2 hours for each direction of X/Y/Z  
 (6 hours as total)

Note 3) Conforms to JIS-C-5026 , condition C.  
 Acceleration : 100C  
 Pulse width : 6ms  
 3 times for each direction of  $\pm X/\pm Y/\pm Z$ .

**5. Electrical Characteristics**

(Ta = 25°C)

Parameter	Symbol	Rating			Unit
		Min.	Typ.	Max.	
Supply voltage (Logic)	$V_L$	+4.75	+5.0	+5.25	V
Supply current (Logic, $V_L = +5V$ )	$I_L$	100	—	350	mA
Supply voltage (Panel drive)	$V_D$	+22.8	+24.0	+25.2	V
Supply current (Panel drive, $V_D = +24V$ )	$I_D$	100	—	900	mA
Total power ( $V_L = 5V, V_D = 24V$ )	$P_T$	—	16	—	W

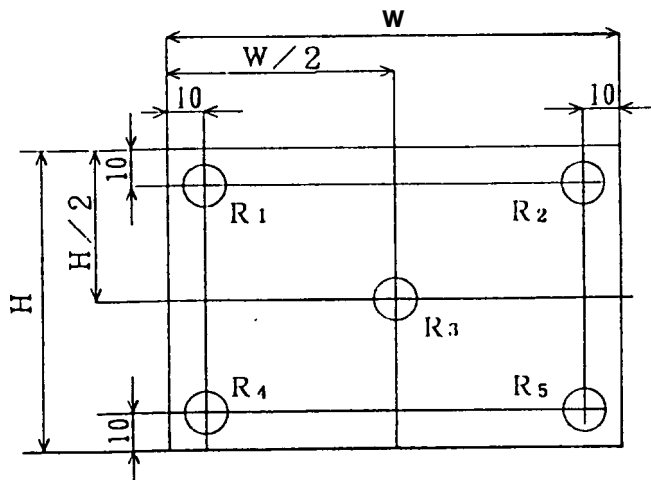


6. Optica Characteristics

(Ta = 25°C)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark	
Luminance	B15	All dots lit	<b>23</b>	<b>30</b>	-	f·L	Note 1)	
OFF luminance	B0	All dots turned off	-	-	1.0	f·L		
Luminance distribution	$\Delta B_{DIS}$	All dots lit at B15	-	-	<b>35</b>	%		
		Luminance distribution is not specified for B1 to B14.						
Fill factor				<b>0.54</b>	-		Note 2)	
Viewing angle				160	-	°		

Note 1) Average luminance measured at the five circular windows (R<sub>1</sub>~R<sub>5</sub>) shown in Fig. 1 (Circular window diameter:  $\phi 1.3\text{mm}$ )



Tolerance :  $\pm 10\%$

H 119.9 : Height of effective display area  
W 191.9 : Width of effective display area  
Unit : mm

Fig. 1

The following formula defines the luminance distribution:

$$\Delta B_{DIS} = \left( \frac{B_{max} - B_{min}}{B_{max}} \right) \times 100(\%)$$

where B<sub>max</sub> is the maximum luminance and B<sub>min</sub> is the minimum luminance taken at the five locations in Fig. 1.

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



## 7. Timing Characteristics

### 7-1 Input signals

This unit is driven by line-at-a-time scanning method with the following **seven input** signals fed at LS TTL level:

Parameter	Symbol	Description
Data transfer clock	CK <sub>D</sub>	The signal controls sampling and transferring data signal.
Data signal	D <sub>0</sub> ,D <sub>1</sub> D <sub>2</sub> ,D <sub>3</sub>	The <b>signal</b> are sampled at every rising edge of data transfer clock and are transferred in the direction of sequential row from the right end to left end,
Horizontal sync. signal	$\overline{H.D}$	The signal controls <b>the</b> timing of <b>line-at-a-time</b> scanning. The display data remain in effect while the <b>logic</b> is "H" and blanking while the <b>logic</b> is "L".
Vertical sync. signal	$\overline{V.D}$	The signal controls frame frequency. <b>Typ. 60Hz</b> Frame starts when the <b>logic</b> rises to "H" from "L".

### Gray scale input signal

gray code	D3	D2	D <sub>1</sub>	D <sub>0</sub>	
B 15	1	1	1	1	
B 14	1	1	<b>1</b>	<b>0</b>	
B 13	1	1	0	<b>1</b>	
B 12	1	1	0	<b>0</b>	
B 11	1	0	1	<b>1</b>	
B 10	1	0	<b>1</b>	<b>0</b>	
<b>B 9</b>	<b>1</b>	0	0	<b>1</b>	
B 8	<b>1</b>	0	0	<b>0</b>	
<b>B 7</b>	0	<b>1</b>	<b>1</b>	1	
<b>B 6</b>	0	<b>1</b>	<b>1</b>	0	
<b>B 5</b>	0	<b>1</b>	0	1	
B 4	0	<b>1</b>	0	0	
B 3	0	0	<b>1</b>	<b>1</b>	
<b>B 2</b>	<b>0</b>	0	<b>1</b>	0	
<b>B 1</b>	<b>0</b>	0	<b>0</b>	<b>1</b>	
<b>B 0</b>	0	0	<b>0</b>	<b>0</b>	

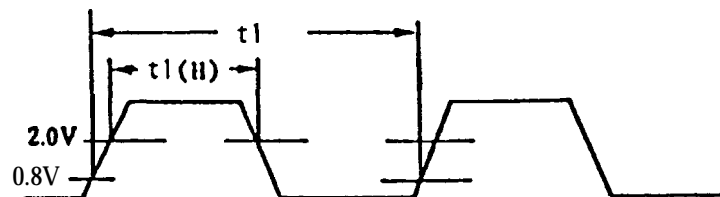
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## 7-2 Input signals timing characteristics

(Ta = 25°C)

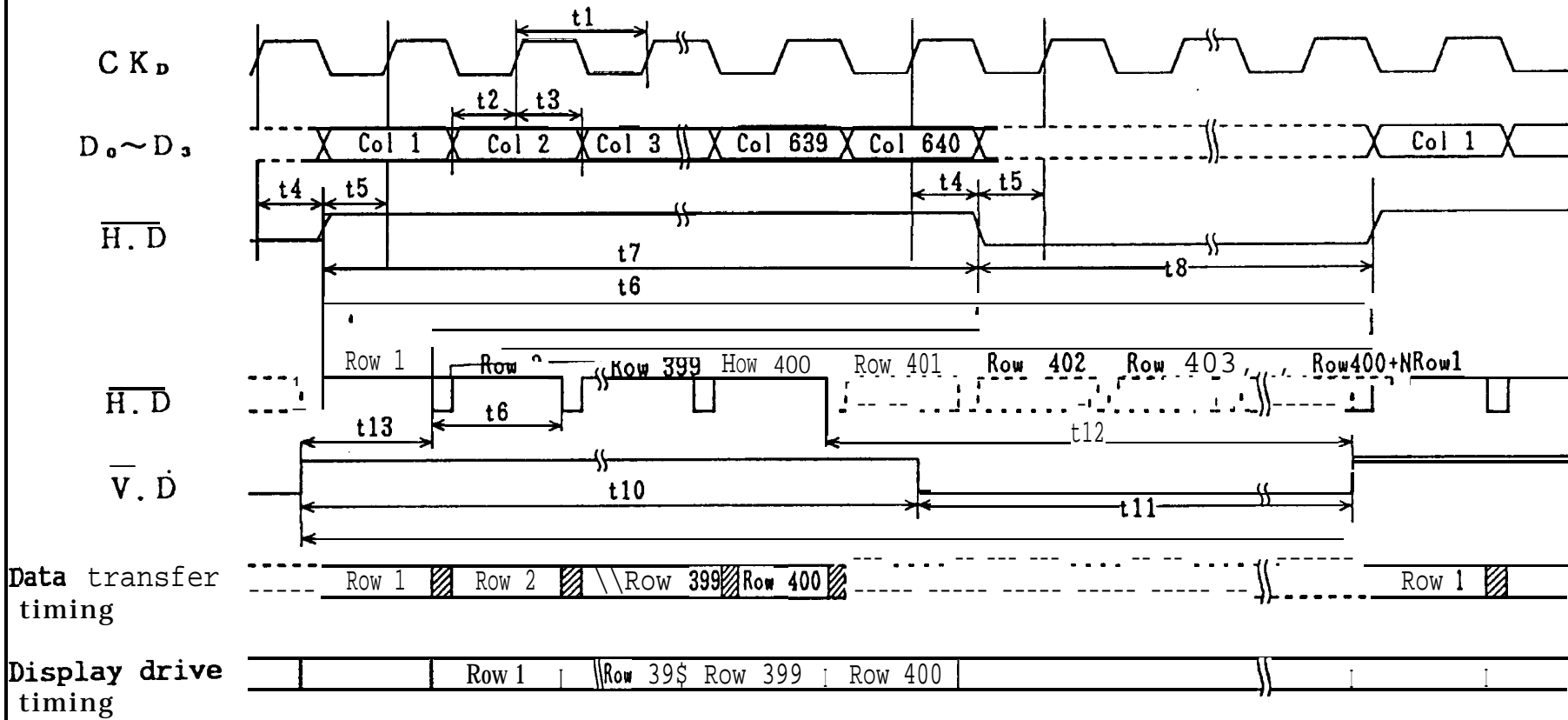
Parameter	Symbol	Min.	Typ.	Max.	Unit
Clock frequency	$1/t_1$	13.5		22.0	MHz
Clock duty Note 1)	$t_1(H)/t_1 \times 100$	45		55	%
Data set up time	$t_2$	10	-	-	nsec
Data hold time	$t_3$	10	-	-	nsec
H.D hold time	$t_4$	10			nsec
H.D set up time	$t_5$	10			nsec
Horizontal sync. signal cycle time	$t_6$	40		49	$\mu$ sec
Horizontal sync. signal valid time (Valid time of display data)	$t_7$	640Xt <sub>1</sub>			$\mu$ sec
Horizontal sync. signal blanking time (Invalid time of display data)	$t_8$	1	-		$\mu$ sec
Frame frequency	$1/t_9$	50	60	62	Hz
Vertical sync. signal valid time	$t_{10}$	$t_6$	$400Xt_6$		$\mu$ sec
Vertical sync. signal blanking time	$t_{11}$	1	-	$t_9-t_6$	$\mu$ sec
Vertical sync. signal rise wait time	$t_{12}$	$4X40$	-		$\mu$ sec
Vertical sync. rise timing	$t_{13}$	40	-	$t_7+35$	$\mu$ sec

Note 1)



### 8. Timing Chart

Interface timing and display drive timing



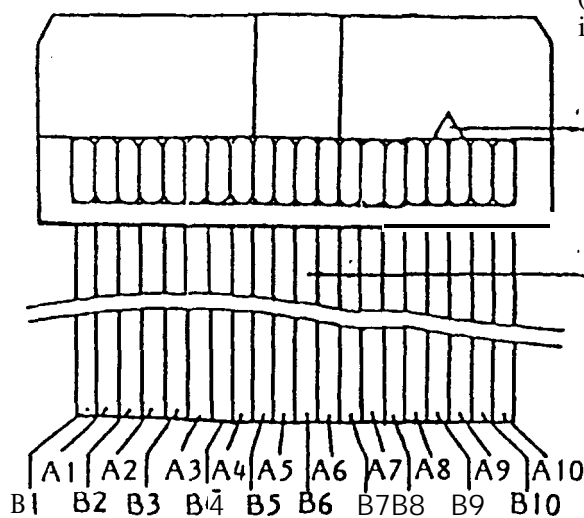
Note 1) Logic level is not necessary to be specified in dotted line portion.

Note 2)  $N \geq 4$  shall be kept.

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## 9. interface Signals and Power Supply Connectors

Terminal No.		Terminal No.	
A - 1	D <sub>1</sub> ( Data signal )	B - 1	D <sub>0</sub> ( Data signal )
A - 2	D <sub>3</sub> ( Data signal )	B - 2	D <sub>2</sub> ( Data signal )
A - 3	NC	B - 3	NC
A - 4	CKD ( Data transfer clock )	B - 4	GND
A - 5	$\overline{H.D}$ ( Horizontal sync. signal )	B - 5	GND
A - 8	$\overline{V.D}$ ( Vertical sync. signal )	B - 6	GND
A - 7	GND	B - 7	GND
h - 8	V <sub>b</sub> ( +24V )	B - 8	V <sub>b</sub> ( +24V )
A - 9	V <sub>L</sub> ( +5V )	B - 9	V <sub>L</sub> ( +5V )
A - 10	NC	B - 10	NC

Unit-side pin header  
(20-pin board)Fitting socket  
(20-pin solderless type,  
it's not included in the unit.)

Polarity mark

Flat ribbon cable

(Not included in the unit.)





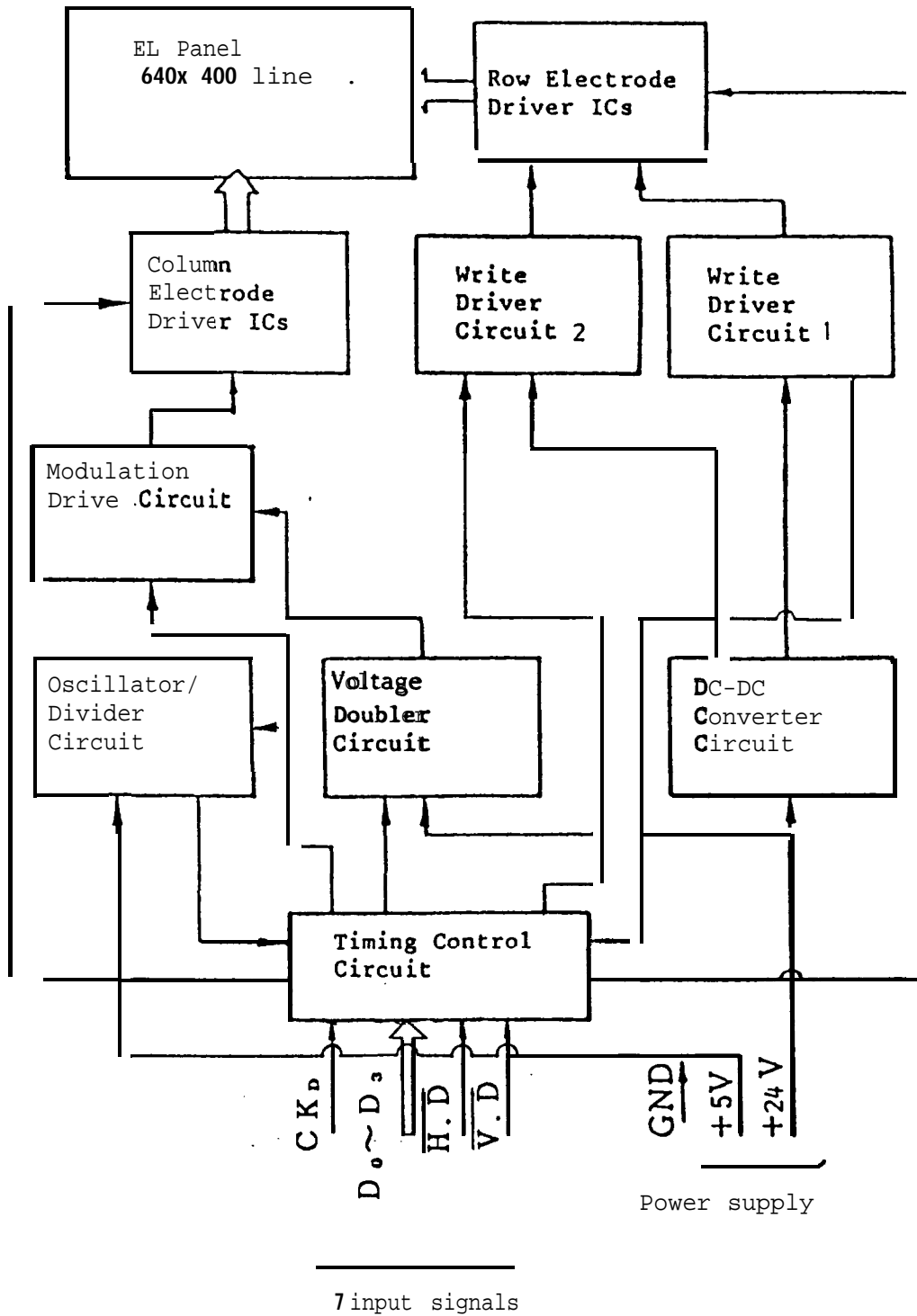
**Connectors**

	Model No.	Maker
Unit-side pin header	HIF3FC-20PA-2.54DS or equivalents	HIROSE ELECTRIC CO.
Socket	HIF3BA-20D-2.54R or equivalents	- ditto -

Note 1) "The length of the cable shall not exceed 50cm.



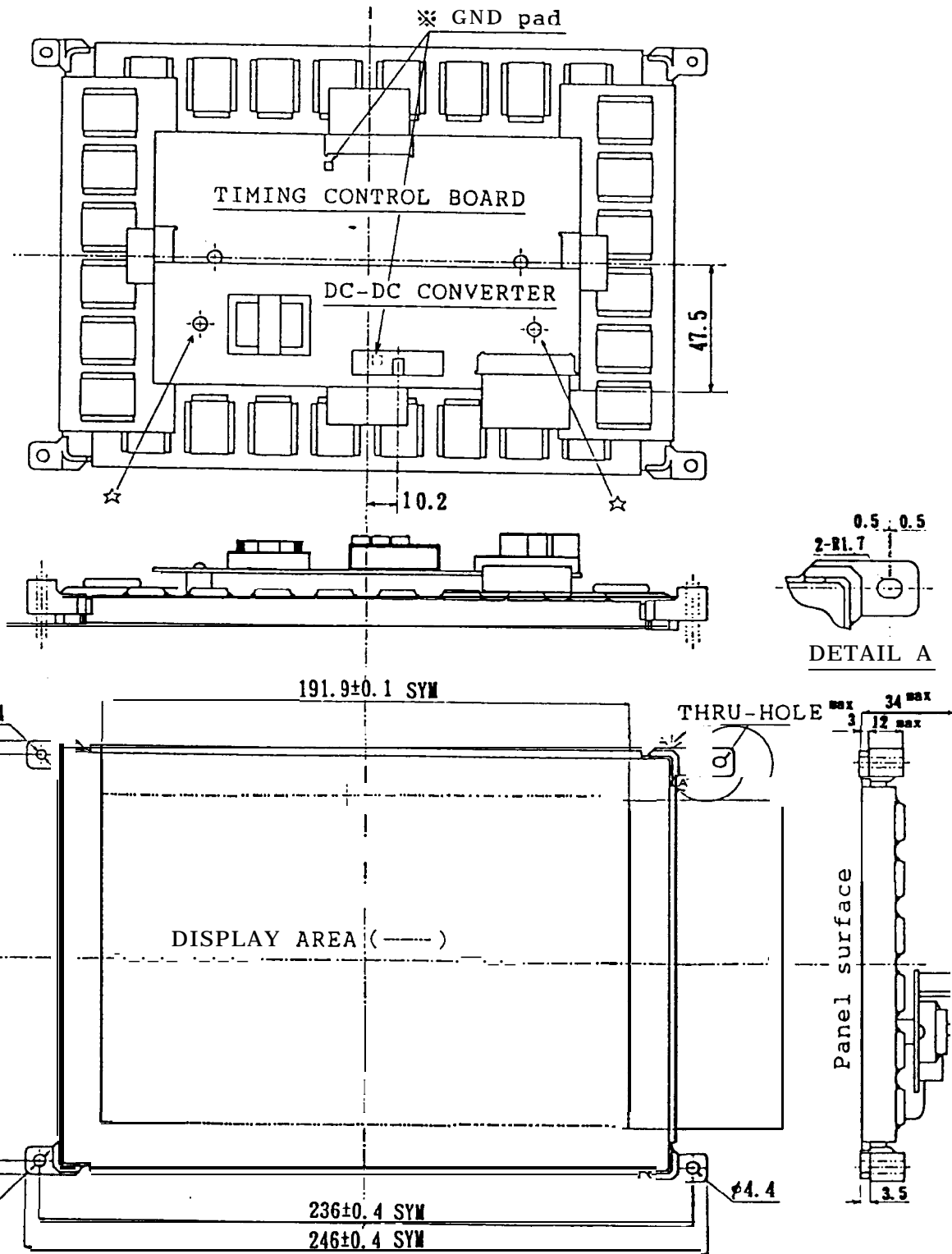
10. Functional Block Diagram





11. Outline of the unit configuration

This unit is shipped with the form drawing below.



( unit : mm )



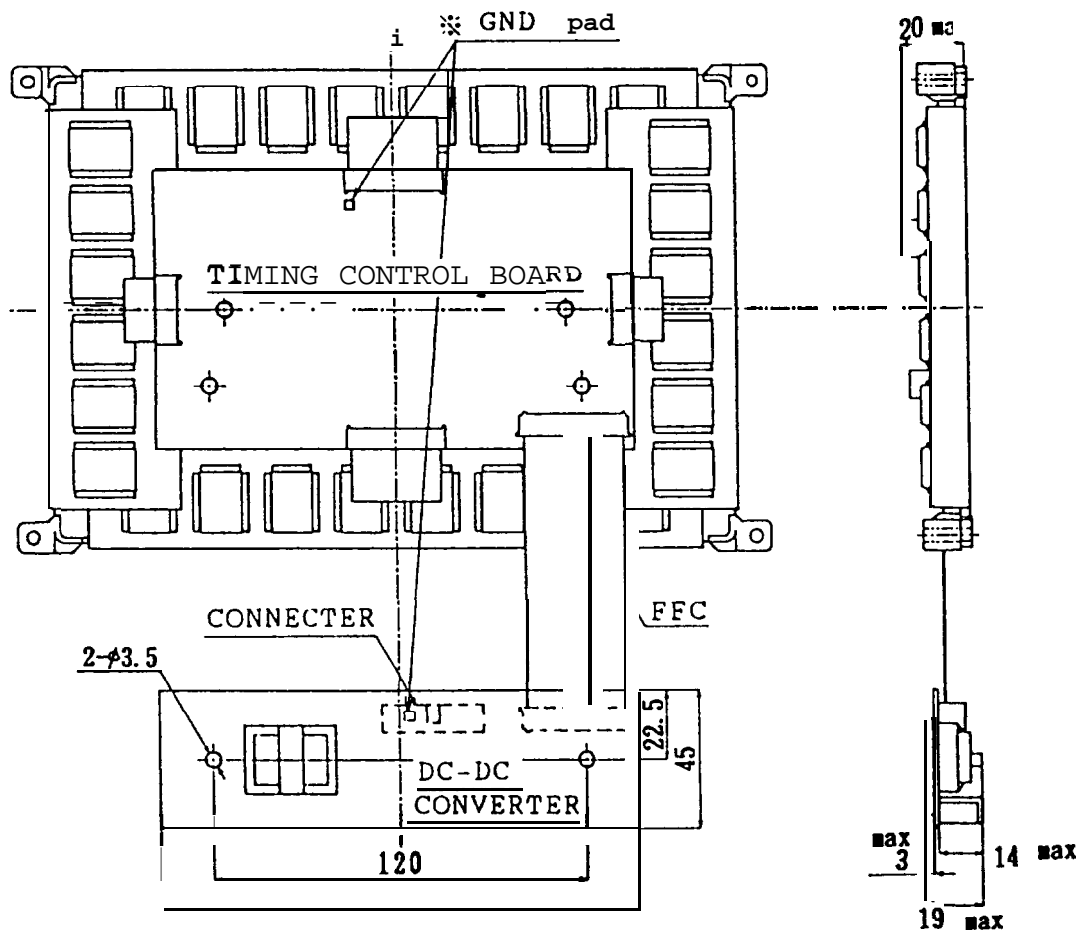
And, if you want the unit to be thinner, take off two screws indicated by ☆ in the figure in P.10, and you can divide the DC-DC converter board from the unit. In this case, the outline of the unit configuration is drawn below.

(Cautions)

1. Be careful against the ESD when you take off the K-DC converter.
2. The DC-CC converter outputs +250VDC and -200VDC. Pay attention this when you build it in your system.
3. Length allowance of the FFC connecting the DC-DC converter board to the timing control board is up to 150mm (5.9inches). Use the FFC listing below or equivalents.

Sumicard<sup>®</sup> SMCD-25xL-ADx15-P1.25-S6.0 ( L ≤ 150mm )

Maker SUMITOMO ELECTRIC INDUSTRIES



( unit : mm )

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## 12. Handling Instructions and Cautions for Operation

### Handling Instructions

1. handle the unit with care of ESD, The operator and the place around him must be guard against ESD.  
Hold the mounting arms of 4 corners of the unit when you handle it.
2. Since the EL panel is made of glass, care shall be taken to avoid the breakage caused by dropping or bumping it.
3. The display control board or the frame of the unit shall not be removed nor the unit shall be disassembled. ICS mounted on the unit shall never be touched by finger/hands to prevent the breakage due to static electricity.

### Cautions for Operation

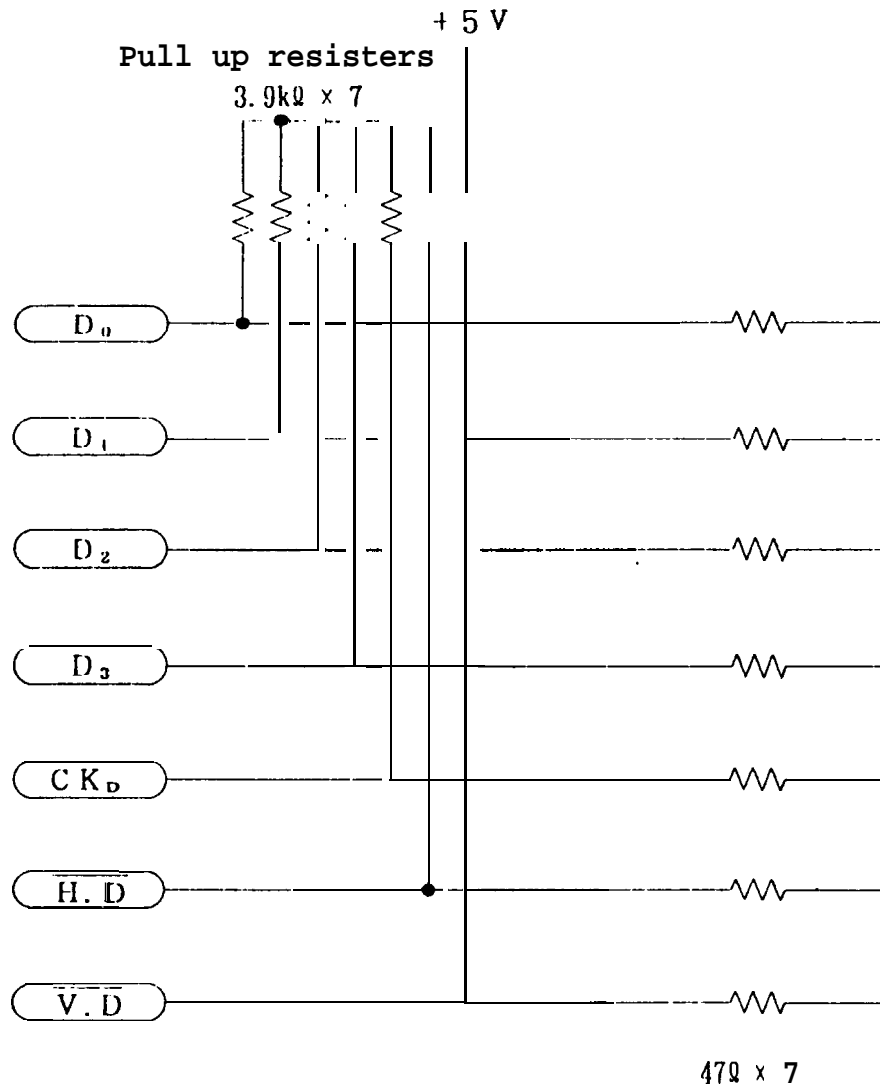
1. The unit shall be operated within the rated operating conditions specified in this literature.  
When you mount the unit on your product, design your product making the unit breathable.
2. Operation of the unit at high temperature with high humidity shall be strictly avoided.  
Dew on the connector or on the circuits will cause malfunction, which can lead damage to the unit.
3. Cable for the interface and power supplies shall be flat ribbon cable of 20 wires of 1.27mm pitch (conductor AWG #28) or its equivalent.
4. The display control board on the rear side of the unit shall never be touched while in operation. It generates AC pulse of approx. 200V.
5. When the same pattern is continuously displayed for a long time, luminance variation may be noticed in the low luminance area.
6. This unit may occur the visible noise in case you set up it in a metal case.  
It is caused by the capacitance coupling between panel electrodes and a metal case.  
In such a case, you should connect the wire from unit's GND (page 10 "X GND pad) with a metal case.

### Others

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

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## 13. Circuit scheme of the signal Input block



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## 14. Power supply input circuit

## (a) Over current protection

This unit 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 snort circuit.

Fuse specifications

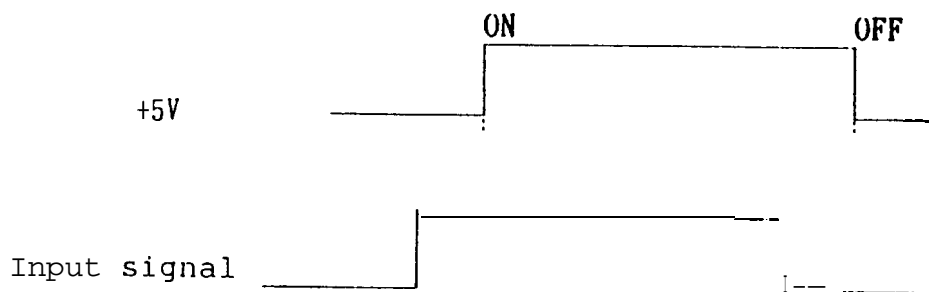
Parts No.	Model No.	Ratings	Melt type	Authorizaition
F 1	TR-5 19374*	500mA	slow	UL, CSA
F 2	TR-5 19374*	1.0 A	slow	UL, CSA
F 3	TR-5 19374'	800mA	slow	UL, CSA

\* : or equivalents

Maker : Wickmann

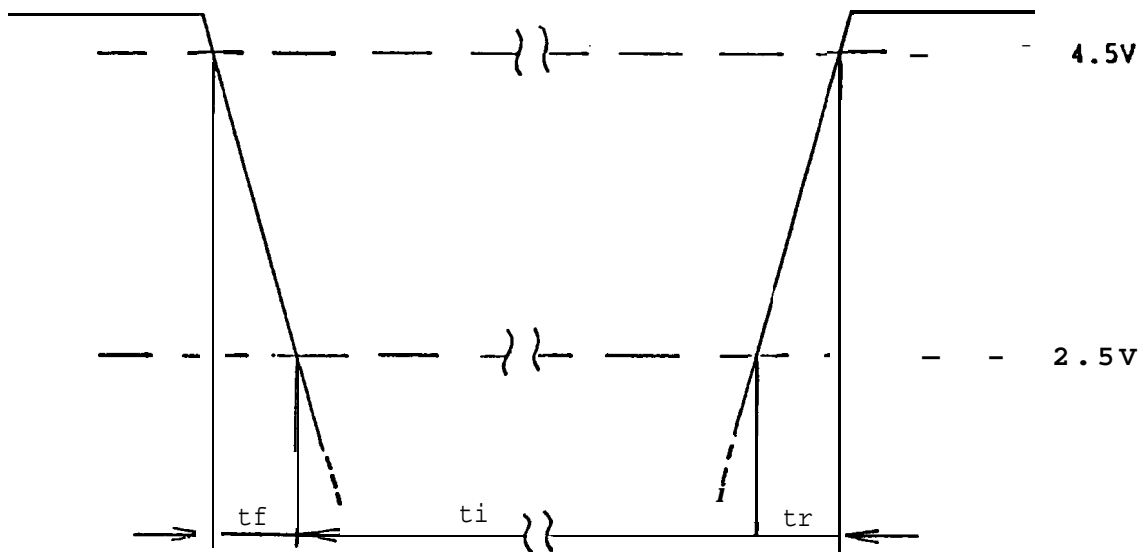
Note) Fuses is not open in case of current capacity used supply power is small. Or fuses is open by surge current in case of current capacity used supply power is big. In consequence please you thoroughly investigate the unit.

## (b) Recommendation : Power ON/OFF sequence



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(c) Take account of the **scheme below for 5VDC input**  
rising up time and falling down time of 5VDC



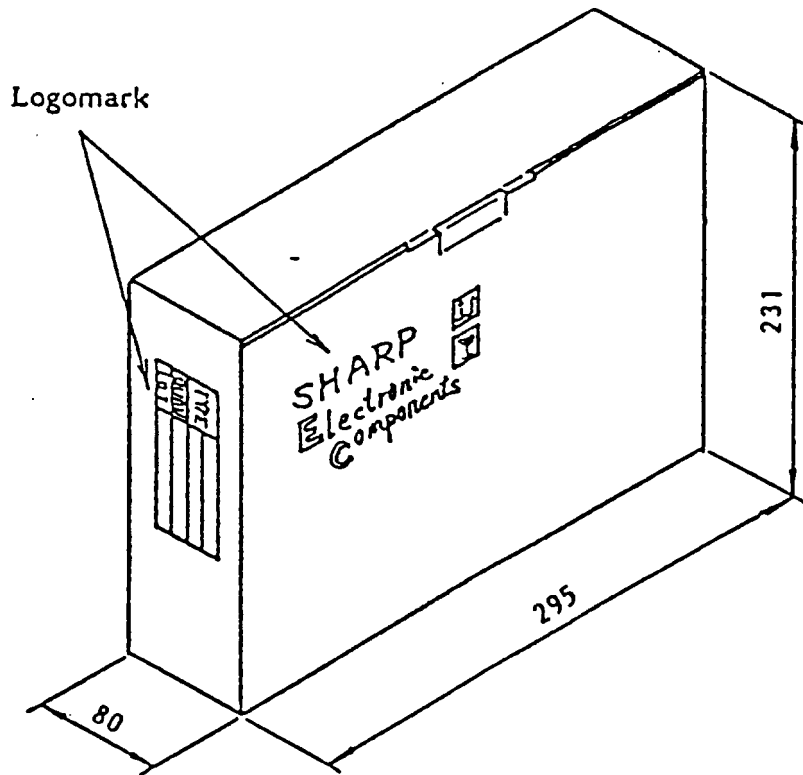
$t_f$  = falling down time  $t_r$  = rising up time

- (1)  $t_f, t_r \leq 100$  ms is better to be kept:  
 (2)  $t_i \geq 1$  ms shall be kept.





15. packing Specification



Logomark

**SHARP®**

**Electronic Components**

SHARP CORPORATION MADE IN JAPAN

TYPE	
QUANTITY	
LOT (DATE)	

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