

PREPARED BY: _____	DATE _____	<h1>SHARP</h1> <p>LIQUID CRYSTAL DISPLAY GROUP SHARP CORPORATION</p> <h2>SPECIFICATION</h2>	SPEC No. 04201A
APPROVED BY: _____	DATE _____		FILE No. _____
			ISSUE Feb. 5, 1992
			PAGE 17

“ DEVICE SPECIFICATION FOR

EL Display Unit

MODEL No. LJ64ZU35

CUSTOMERS APPROVAL

DATE _____

BY _____

PRESENTED BY T. Ohba

T. Ohba
 Department General Manager
 Engineering Department III
 DUTY Panel Development center
 SHARP CORPORATION

SHARP

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 _{IH}	+ 5.5	V
Interface signal (Logic "L")	V _{IL}	- 0.5	V
Supply voltage (Logic)	V _L	+ 7	V
Supply voltage (panel drive)	V _D	+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

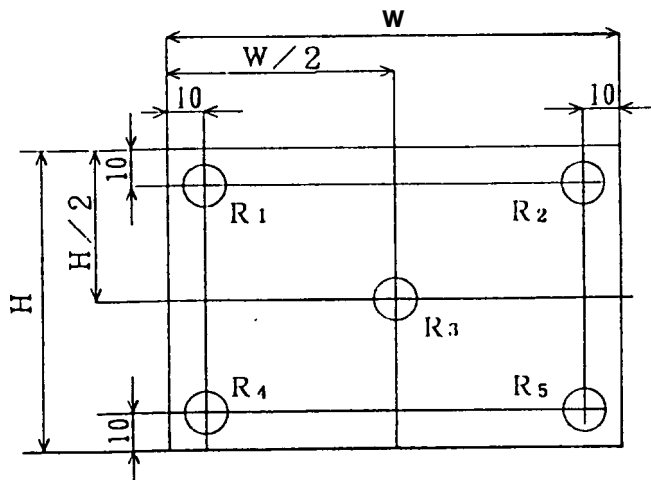


6. Optica Characteristics

(Ta = 25°C)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark	
Luminance	B 15	All dots lit	23	30	-	f·L	Note 1)	
OFF luminance	B 0	All dots turned off	-	-	1.0	f·L		
Luminance distribution	ΔB_{DIS}	All dots lit at B15	-	-	35	%		
		Luminance distribution is not specified for B1 to B14.						
Fill factor	 	 		0.54	-		Note 2)	
Viewing angle	 	 		160	-	°		

Note 1) Average luminance measured at the five circular windows (R₁~R₅) 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_{max} is the maximum luminance and B_{min} 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 _D	The signal controls sampling and transferring data signal.
Data signal	D ₀ ,D ₁ D ₂ ,D ₃	The signal 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 the timing of line-at-a-time scanning. The display data remain in effect while the logic is "H" and blanking while the logic is "L".
Vertical sync. signal	$\overline{V.D}$	The signal controls frame frequency. Typ. 60Hz Frame starts when the logic rises to "H" from "L".

Gray scale input signal

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

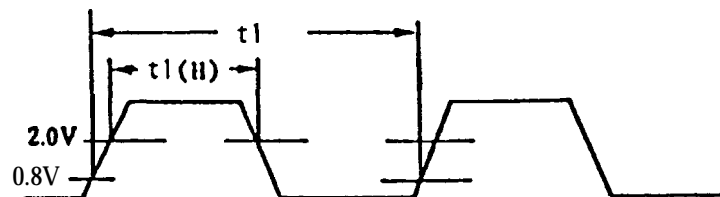
SHARP

7-2 Input signals timing characteristics

(Ta = 25°C)

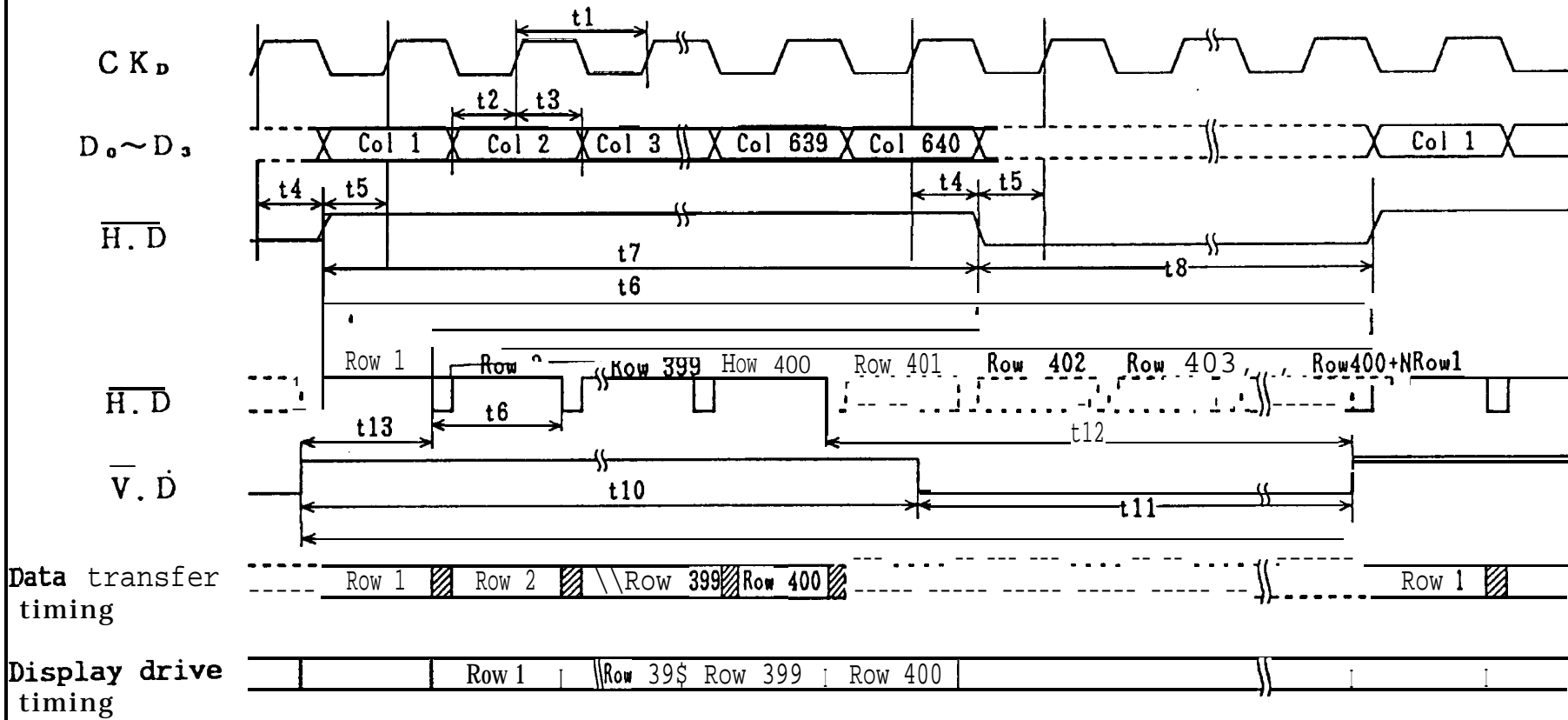
Parameter	Symbol	Min.	Typ.	Max.	Unit
Clock frequency	$1/t_1$	13.5		22.0	MHz
Clock duty Note 1)	$t_1(H)/t_1 \times 100$	45		55	%
Data set up time	t_2	10	-	-	nsec
Data hold time	t_3	10	-	-	nsec
H.D hold time	t_4	10			nsec
H.D set up time	t_5	10			nsec
Horizontal sync. signal cycle time	t_6	40		49	μ sec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

Note 1)



8. Timing Chart

Interface timing and display drive timing



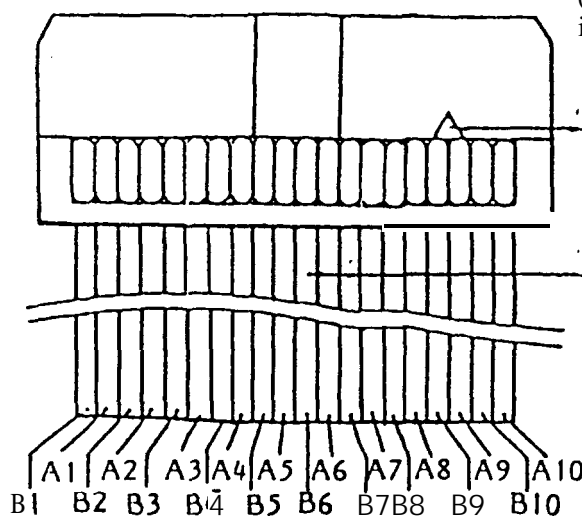
Note 1) Logic level is not necessary to be specified in dotted line portion.

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

SHARP

9. interface Signals and Power Supply Connectors

Terminal No.		Terminal No.	
A - 1	D ₁ (Data signal)	B - 1	D ₀ (Data signal)
A - 2	D ₃ (Data signal)	B - 2	D ₂ (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 _b (+24V)	B - 8	V _b (+24V)
A - 9	V _L (+5V)	B - 9	V _L (+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.)

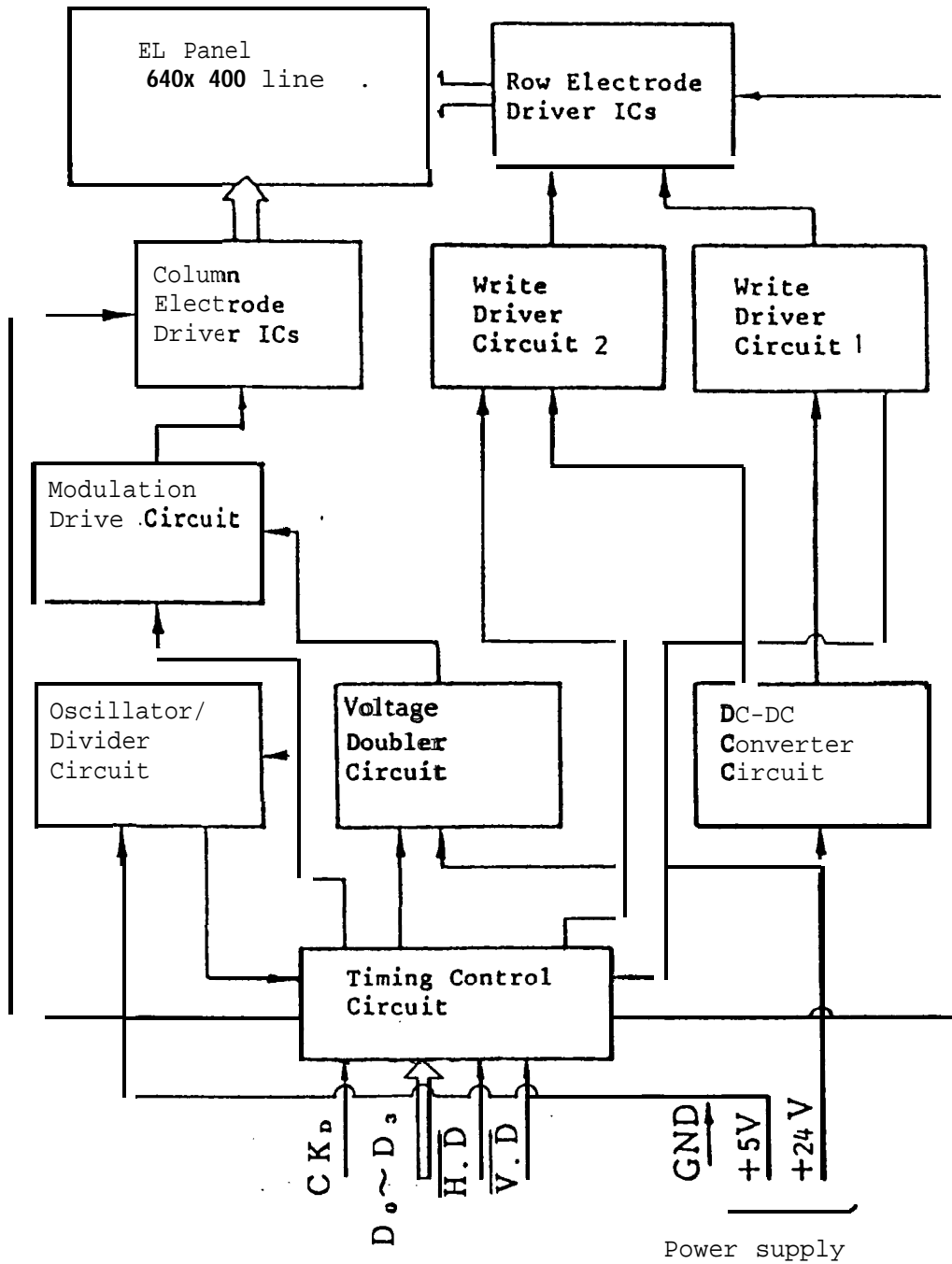
SHARP**Connectors**

	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

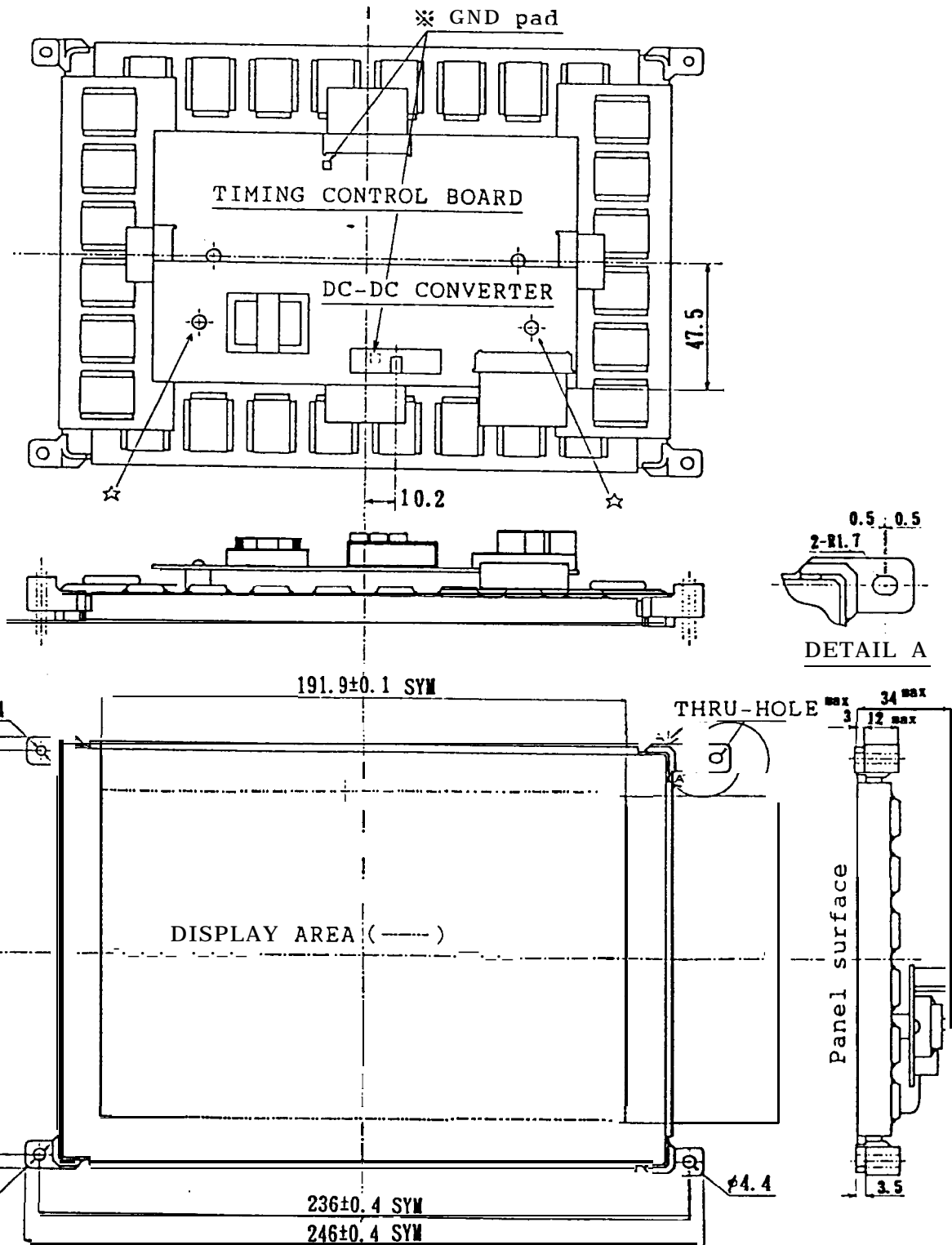


7 input signals



11. Outline of the unit configuration

This unit is shipped with the form drawing below.



(unit : mm)



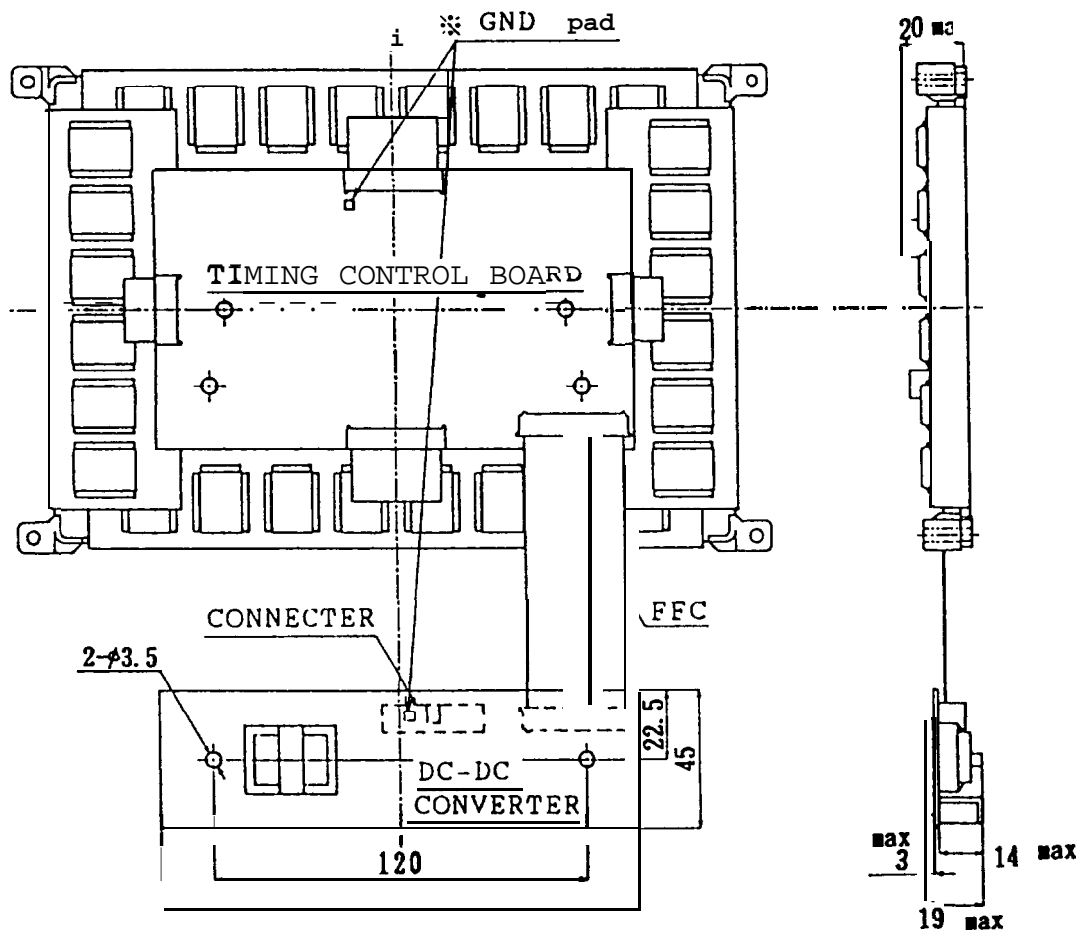
And, if you want the unit to be thinner, take off two screws indicated by ☆ in the figure in P.10, and you can divide the DC-DC converter board from the unit. In this case, the outline of the unit configuration is drawn below.

(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[®] SMCD-25xL-ADx15-P1.25-S6.0 (L ≤ 150mm)

Maker SUMITOMO ELECTRIC INDUSTRIES



(unit : mm)

SHARP

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 "

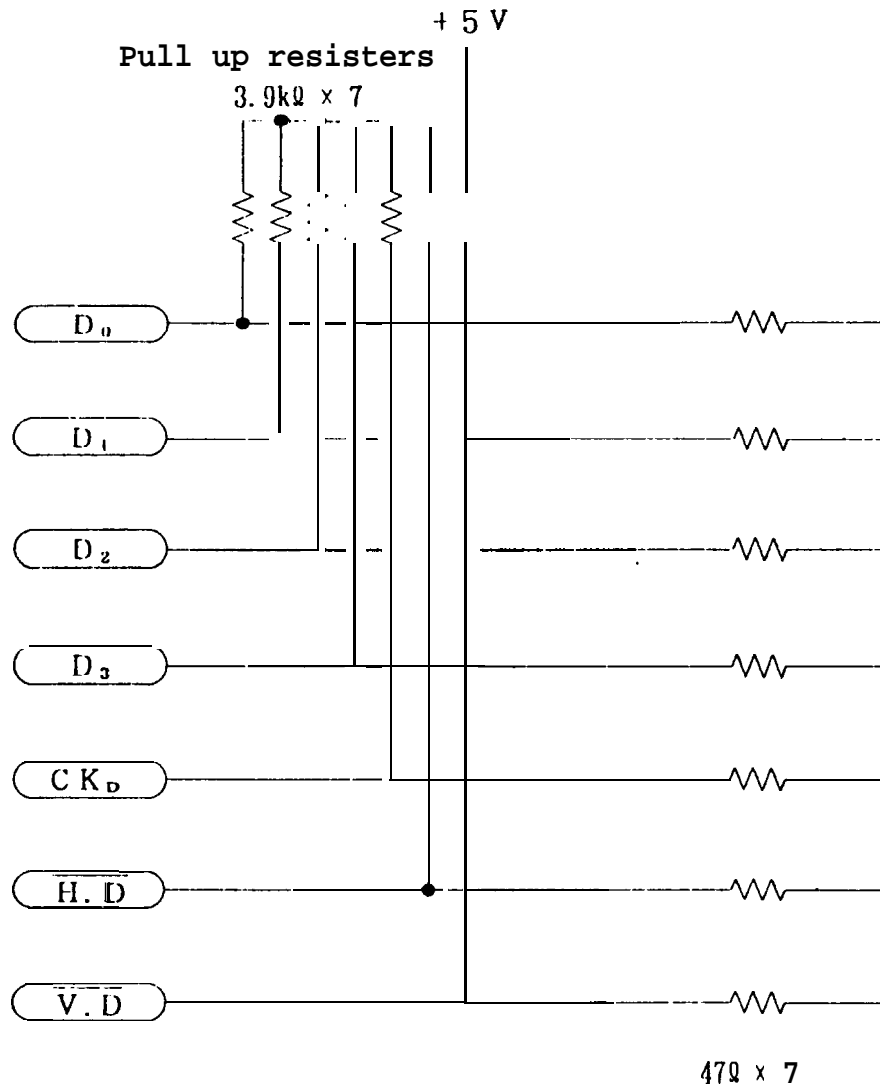
✕ GND pad) with a metal case.

Others

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

SHARP

13. Circuit scheme of the signal Input block



SHARP

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

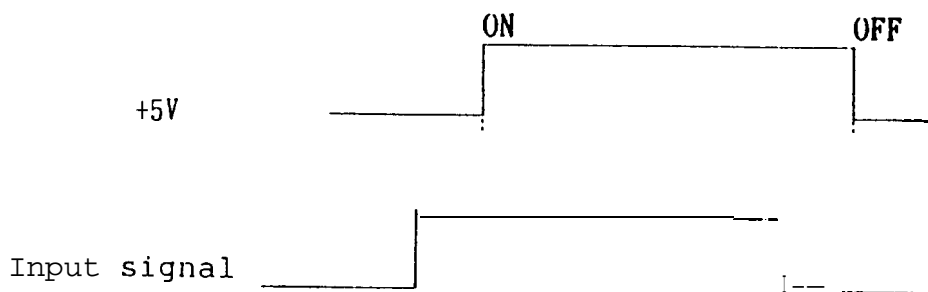
Parts No.	Model No.	Ratings	Melt type	Authorizaition
F 1	TR-5 19374*	500mA	slow	UL, CSA
F 2	TR-5 19374*	1.0 A	slow	UL, CSA
F 3	TR-5 19374'	800mA	slow	UL, CSA

* : or equivalent

Maker : Wickmann

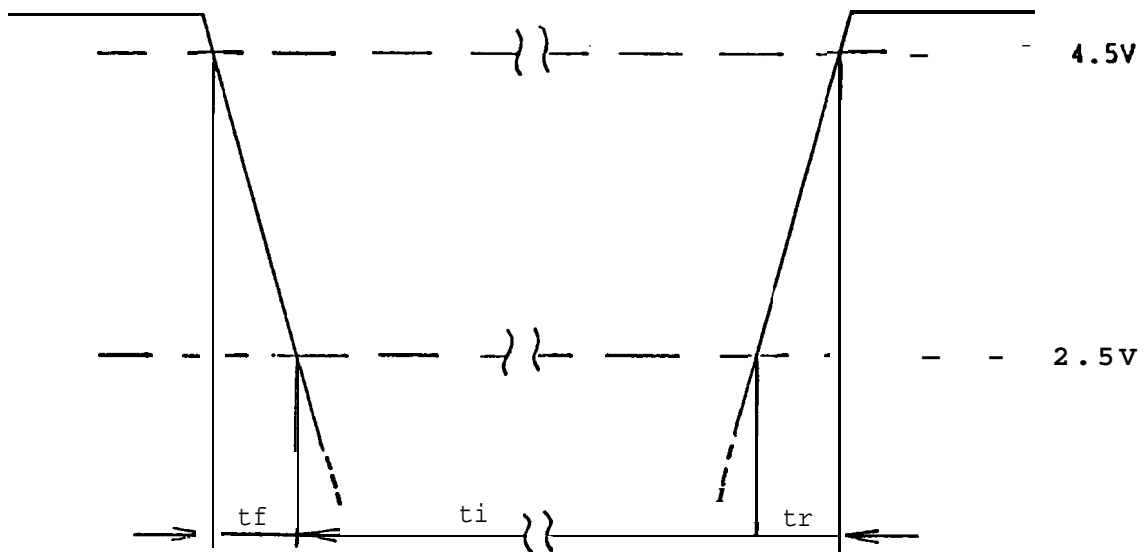
Note) Fuses is not open in case of current capacity used supply power is small. Or fuses is open by surge current in case of current capacity used supply power is big. In consequence please you thoroughly investigate the unit.

(b) Recommendation : Power ON/OFF sequence



SHARP

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

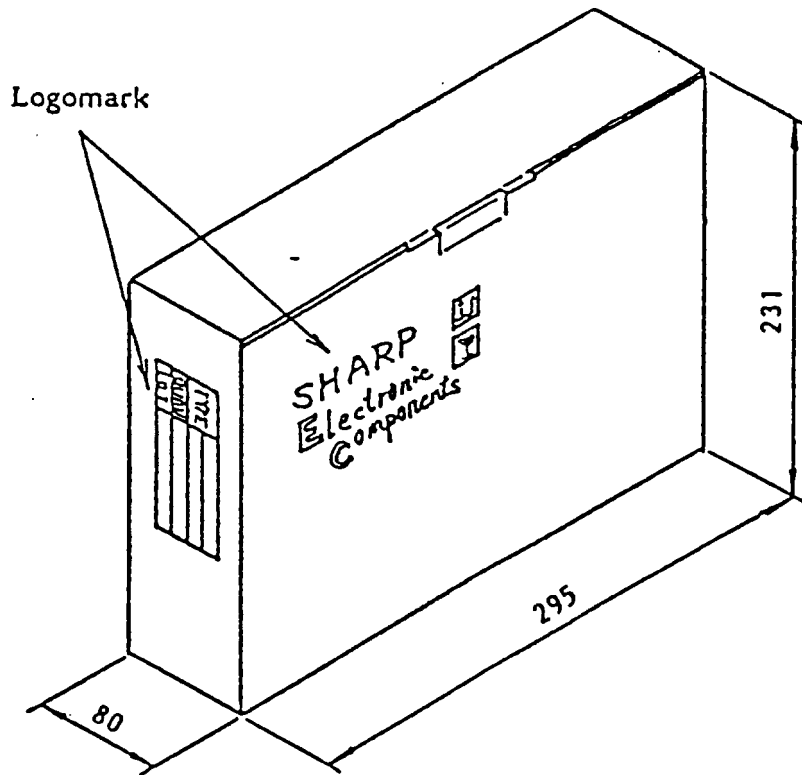


t_f = falling down time t_r = rising up time

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

SHARP

15. packing Specification



SHARP®

Electronic Components

SHARP CORPORATION MADE IN JAPAN



Logomark

TYPE	
QUANTITY	
LOT (DATE)	

SHARP

