

SHARP CORPORATION

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*   TECHNICAL LITERATURE
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*           FOR
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*      EL Display Unit
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MODEL NO. LJ320U01

DATE Sep. 4, 1986

** The technical literature is subject to be changed without notice **

**SHARP CORPORATION
ELECTRONIC COMPONENTS GROUP**

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1. Application

This data sheet is to introduce the technical literature of EL display unit, LJ320U01.

2. Overview

The Sharp EL display unit consists of a thin film EL panel, high voltage MOS-ICs for panel driving and a display control circuit. By supplying four input signals of LS TTL level and DC power supplies of +5V, +15V, arbitrary graphs and characters can be displayed.

3. Mechanical Specifications

Parameter	Specification	Unit
Outline dimensions	178.5(W) × 148.5 (H) × 34 (D)	mm
Number of matrix electrodes	320 (W) × 240 (H)	—
Effective display area	119.9 (W) × 89.9 (H)	mm
Dot pitch	0.375(W) × 0.375 (H)	mm
Dot pitch ratio	1 (W) : 1 (H)	—
Dot size	0.275 (W) × 0.225 (H)	mm
Weight	~ 600	g

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 _{CC}	+7	V
Supply voltage (Panel drive)	V _D	+18	V

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4-2 Environmental conditions

Parameter	Tstg		Topr		Remark
	Min.	Max.	Min.	Max.	
Ambient temperature	-25°C	+70°C	0°	+55°C	
Humidity	Note 1		Note 1		No condensation
Vibration	Note 2				
Shock	Note 3				

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

Note 2) Conforms to JIS-C-5025 A-10, 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 A-7, condition C.
 Acceleration : 100G
 Pulse width : 6ms
 3 times for each direction of $\pm X/\pm Y/\pm Z$.

5. Electrical Characteristics

($T_a = 25^\circ\text{C}$)

Parameter	Symbol	Rating			Unit
		Min.	Typ.	Max.	
Supply voltage (Logic)	V_L	+4.75	+5.0	+5.25	V
Supply current (Logic, $V_L = +5\text{V}$)	I_L	350	—	700	mA
Supply voltage (Panel drive)	V_D	+14.25	+15.0	+15.75	V
Supply current (Panel drive, $V_D = +15\text{V}$)	I_D	200	—	550	mA

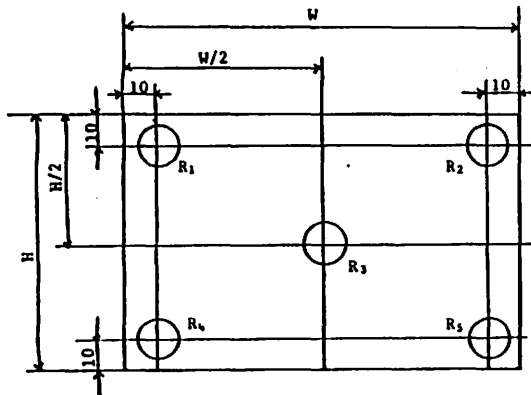
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6. Optical Characteristics

(Ta = 25°C)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Luminance	BON	All dots lit	20	-	-	f-L	Note 4)
OFF luminance	BOFF	All dots turned off	-	-	1.0	f-L	
Luminance distribution	ΔB_{DIS}	All dots lit	-	-	35	%	
Shadowing characteristics	ΔB_{SD}	fixed pattern	-	-	15	%	Note 5)

Note 4) Average luminance measured at the five circular windows (R₁ ~ R₅) shown in Fig. 1 (Circular window diameter: $\phi 13\text{mm}$)



H 89.9 : Height of effective display area
W 119.9 : Width of effective display area
Unit : mm
Tolerance: $\pm 10\%$

Fig. 1

The following formula defines the luminance distribution:

$$\Delta B_{DIS} = \left(1 - \frac{B_{min}}{B_{max}}\right) \times 100(\%)$$

where B_{max} is the maximum luminance and B_{min} is the minimum luminance taken at the five locations in Fig. 1.

Note 5) Shadowing characteristics means the variation of luminance according to the number of dots lit on a scanning line.

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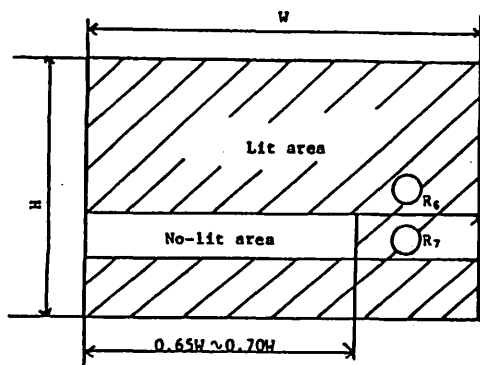


Fig. 2

* The shadowing characteristics is adjusted at data transfer clock frequency (CKD) 7 MHz, so when a different clock frequency is used, the shadowing characteristics differs.

The following formula defines the shadowing characteristics:

$$\Delta B_{SD} = \left(\frac{B_N}{B_L} - 1 \right) \times 100(\%)$$

where B_L is the luminance at R_6 , B_N at R_7 .

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7. Timing Characteristics

7-1 Input signals

This unit is driven by line-at-a-time scanning method with the following four 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 _{IN}	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. The display is on while the logic is "H" and off while the logic is "L".
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".

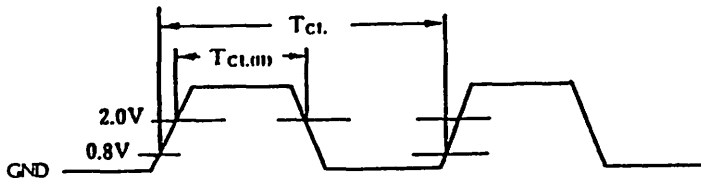
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7-2 Input signals timing characteristics

(Ta = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Clock frequency	$1/T_{CL}$	4.4	-	7.5	MHz
Clock duty Note 1)	$T_{CL(H)}/T_{CL} \times 100$	45	-	55	%
Horizontal sync. signal cycle time	T_H	62	-	75	μsec
Horizontal sync. signal blanking time	t_{HB}	2	-	-	μsec
Vertical sync. signal blanking time	t_{VB}	1	-	$N \times T_H$	μsec
Vertical sync. signal valid time Note 2)	t_{VA}	$240 \times T_H$	-	-	μsec
Frame frequency	$1/T_v$	50	60	63	Hz
Data signal delay time required	t_{DD}	0.01	-	T_{CL}	μsec
Horizontal sync. signal delay time required	t_{HD}	0.01	-	$T_{CL}/2$	μsec
Vertical sync. signal rise wait time	t_{VR}	4×62	-	-	μsec
Vertical sync. rise timing	t_{VH}	62	-	$T_H - t_{HB} + 50$	μsec

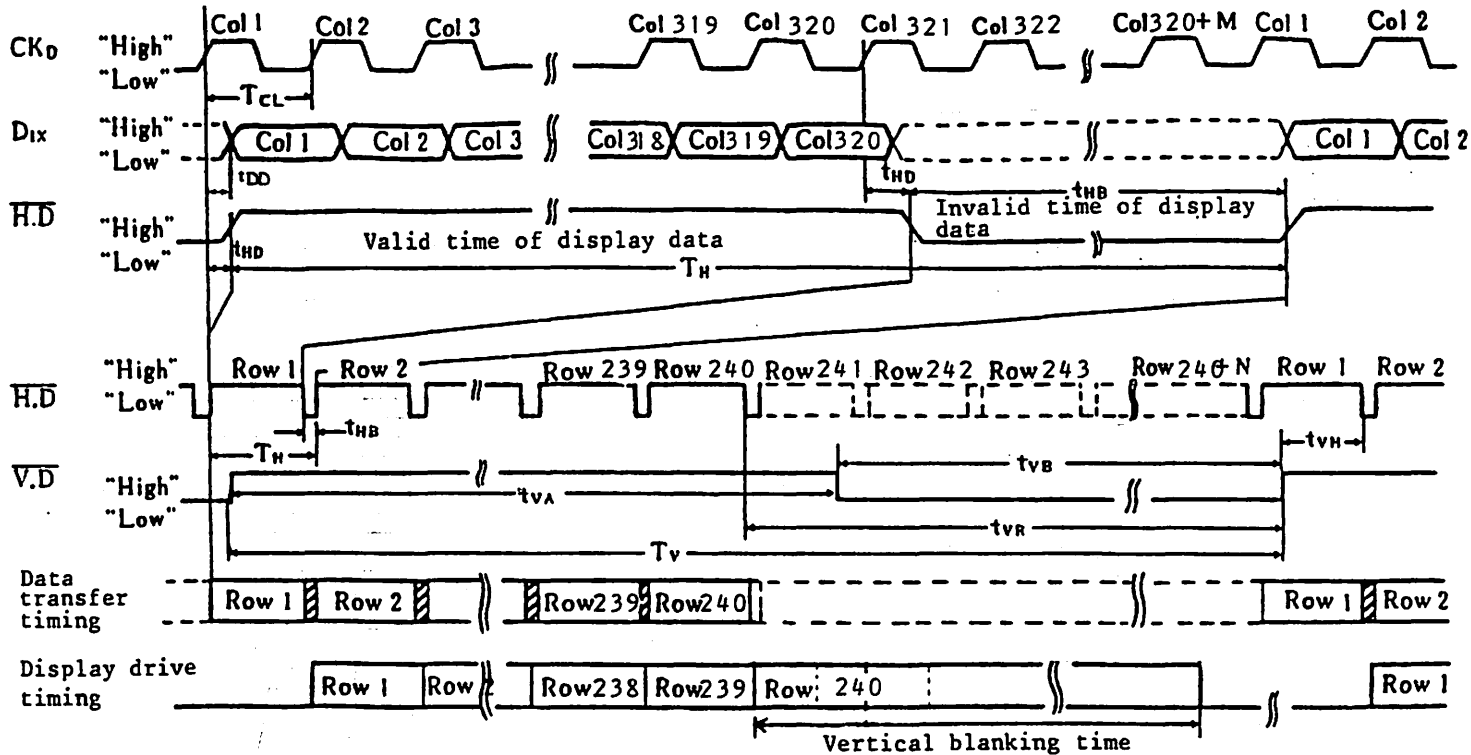
Note 6)



Note 7) The condition of $t_{VA} \geq 240 \times T_H$ shall be strictly obeyed. Negligence of this condition can cause troubles of the unit even if the other conditions listed above are followed.

8. Timing Chart

Interface Timing and Display Drive Timing



Note 8) Logic level is not necessary to be specified in dotted line portion.

Note 9) $t_{HB} \geq 2\mu\text{sec}$ shall be kept. ($t_{HB} = M \times T_{cL}$)

Note 10) $N \times T_H \mu\text{sec} \geq 4 \times 62 \mu\text{sec}$ shall be kept.

Note 11) The condition of $t_{VA} \geq 240 \times T_H \mu\text{sec}$ shall be strictly obeyed.

Note 12) Avoid to keep the $\overline{H.D}$ input signal at Logic "H" or High Impedance for a period exceed 10 sec. in the condition that the logic power $V_L, +5V$ is supplied.

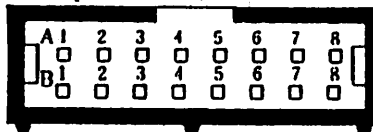
It may cause troubles of the units.

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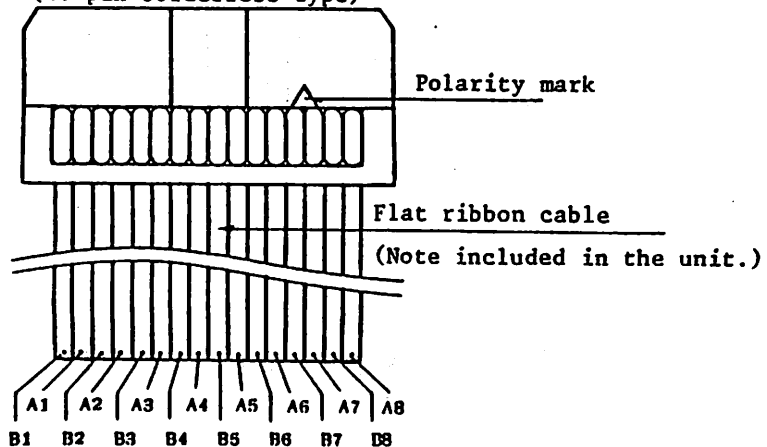
9. Interface Signals and Power Supply Connectors

Terminal No.	Signal Name	Terminal No.	Signal Name
A-1	Data signal (D_{IN})	B-1	GND
A-2	Data transfer clock (CK_D)	B-2	GND
A-3	Horizontal sync. signal ($\overline{H.D}$)	B-3	GND
A-4	Vertical sync. signal ($\overline{V.D}$)	B-4	GND
A-5	GND	B-5	GND
A-6	GND	B-6	GND
A-7	$V_L(+5V)$	B-7	$V_L(+5V)$
A-8	$V_D(+15V)$	B-8	$V_D(+15V)$

Unit-side pin header
(16-pin board)



Accessory socket
(16-pin solderless type)



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Connectors

	Model No.	Maker
Unit-side pin header	HIF3F-16PA-2.54DS or equivalents	HIROSE ELECTRIC CO.
Socket (accessory)	HIF3BA-16D-2.54R or equivalents	- ditto -

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

Note 2) The unit is supplied with the socket without cable.

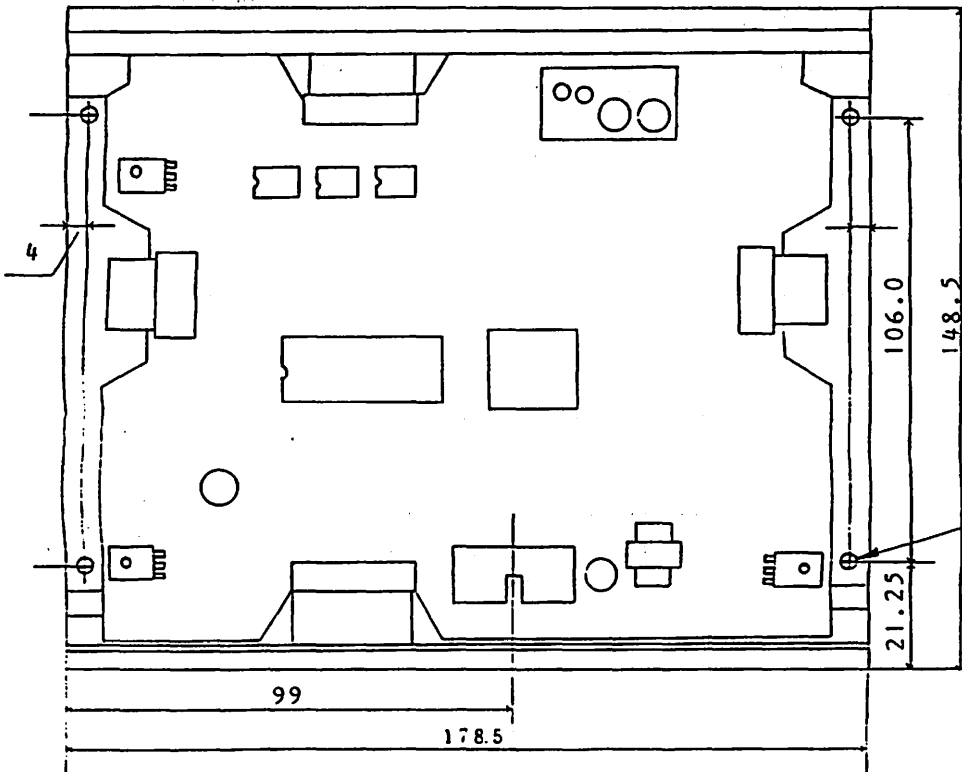
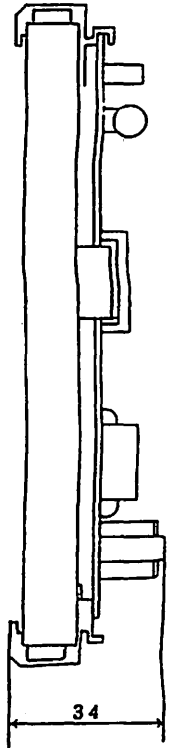
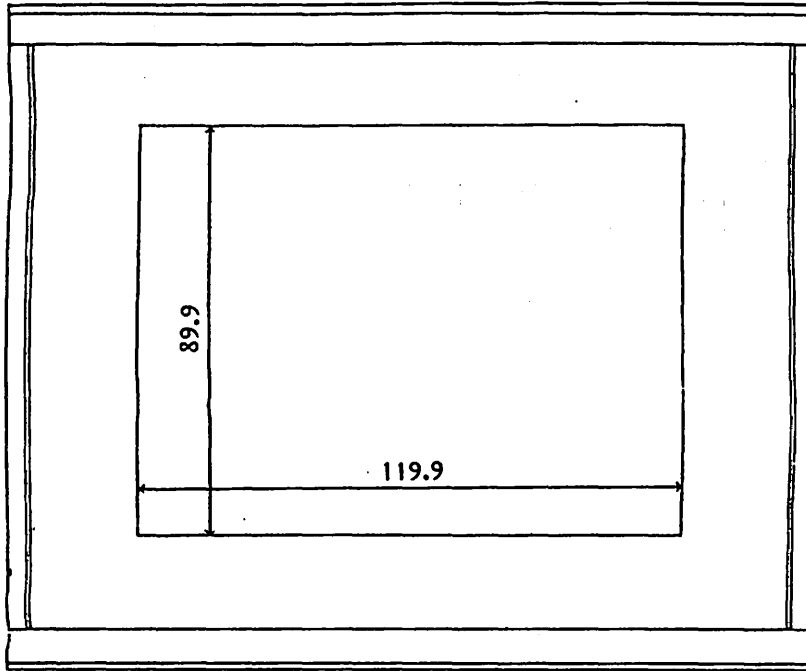
10. Handling Instructions and Cautions for Operation

Handling Instructions

1. Mounting of the unit on your product shall be done by using the grooves and the mounting tabs of the unit.
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 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.
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 16 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.



Mounting holes
4-M3x2(MAX3.5)

