

**SHARP**

TECHNICAL LITERATURE

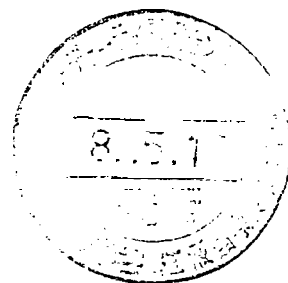
MODEL NO. LM80C31

DOC NO. LC96557

DATE May·15· 1996


\*\* The technical literature is subject to be chaged without notice \*\*

SHARP CORPORATION



PRESENTED

BY

  
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NARALCD Group

SHARP CORPORATION



## 1. Mechanical Specifications

Table 1

Parameter	Specifications	Unit
Outline dimensions	290.0 (W) X225.0 (H) X8.8MAX(D)	mm
Effective viewing Area	249.0 (W) X187.5(H)	mm
Display format	800(W) × 600(H) full dots	
Dot size	0.0775x RGB(W) × 0.2825(H)	mm
Dot Spacing	0.025	mm
*1 Base color	Normally black *2	.
Weight	Approx. 680	g

\*1 Due to the characteristics of the LC material ,the colors vary with environmental temperature.

\*2 Negative-type display

Display data 'H' : ON -> transmission

Display data 'L' : OFF -> light isolation

## 2. Absolute Maximum Ratings

(2-1) Electrical absolute maximum ratings

table 2

Parameter	Symbol	MIN.	MAX.	Unit	Remark
Supply voltage (Logic)	$V_{DD}-V_{SS}$	0	6.0	v	Ta=25 °C
Input voltage	$V_{IN}$	- 0.3	$V_{DD}+0.3$	v	Ta=25 °C

(2-2) Environmental conditions

Table 3

Item	Tstg		Topr		Remark
	MIN.	MAX.	MIN.	MAX.	
Ambient temperature	-25 °C	+60 °C	0 °C	+40 °C	Note(4)
Humidity	Note(1)		Note(1)		No condensation
Vibration	Note(2)		Note(2)		3 directions (X/Y/Z)
Shock	Note(3)		Note(3)		6 directions ( $\pm X \pm Y \pm Z$ )

Note(1)  $T_a \leq 40 \text{ °C} \cdot \cdot \cdot 95 \% \text{ RH MAX.}$   
 $T_a > 40 \text{ °C} \cdot \cdot \cdot$  Absolute humidity shall be less than  $T_a = 40 \text{ °C}/95\% \text{ RH.}$

Note(2)

Table 4

Frequency	10 Hz~57 Hz	57 Hz~500 Hz
Vibration level	—	9.8 $\text{m/s}^2$
Vibration width	0.075 mm	
Interval	10 Hz-500 Hz-10 Hz/11.0min	

2 hours for each direction of X/Y/Z(6 hours as total)

Note (3) Acceleration :  $490 \text{ m/s}^2$   
Pulse width : 11 ms  
3 times for each direction of  $\pm X / \pm Y / \pm Z$

Note (4) Care should be taken so that the LCD module may not be subjected to the temperature out of this specification.

### 3. Electrical Specifications

#### (3-1) Electrical characteristics

Table 5

Ta=25 °C, V<sub>DD</sub>=5.0 V ± 10 %

1/tFRM=120 Hz

Parameter	symbol	Condition	Min.	Typ.	Max.	Unit
Supply voltage(Logic)	V <sub>DD</sub> -V <sub>SS</sub>	Ta=0~40°C Note(1)	4.5	5.0	5.5	v
Contrast adjust voltage Note(4)	V <sub>CON</sub> -V <sub>SS</sub>	Ta=0~40°C Note(2)	(0.8)	(1.95)	(2.8)	v
Input signal voltage('H' level)	V <sub>IH</sub>	Ta=0~40°C V <sub>DD</sub> =5 ± 0.5 v	2	-	-	v
Input signal voltage('L' level)	V <sub>IL</sub>				0.8	v
Supply current(Logic)	I <sub>DD1</sub> (TYP)	Ta=25 °C Note(1, 2)	-	(200)	(300)	mA
	I <sub>DD1</sub> (MAX)	Ta=25 °C Note(3)	-	(300)	(450)	mA
Rush current	I <sub>rush</sub>	Ta=25 °C, Power on	(3.0 A(pk) × 50 ms +1.6 A(pk) × 50 μs max)			
Power consumption	Pd1(TYP)	Ta=25 °C Note(2)	-	(1 000)	(1 650)	mW
	Pd1(MAX)	Ta=25 °C Note(3)	-	(1 500)	(2 475)	mW

Note(1) Logic voltage(V<sub>DD</sub>) should be designed to 4.5 V MIN. under the peak value of Logic current(I<sub>DD</sub>) is in the following conditions. :

(a) Immediately after the rise of V<sub>DD</sub>. : (3.0 A × 50 ms)

(b) Under the situation that DISP signal is on and kept steady. : (1.6 A × 50 μs)

Note (2) Under the following conditions . :

V<sub>CON</sub> - V<sub>SS</sub> : (1.95) V

Frame frequency : 120 Hz

Display pattern : all digits white pattern.

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□  o o a n n n n o n n u u a o u a n a u n
□  □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □
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□  □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □

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Note(3) Under the following conditions. :

$V_{CON} - V_{SS}$  : (1.95) V

Frame frequency : 120 Hz

Display pattern : black/white stripe pattern

- a n n a a n n n n n n a n n n u n u o n
- m m m m m m m m m a m m m m m a m m m
- n a a a a a o n n n a n o n n a n n u n n
- m m m = m m m a m m n a m m m m m u n n

Note(4) Contrast adjustment voltage ' $V_{CON} - V_{SS}$ ' is transformed into the LCD voltage ' $V_{LCD}$ ' by following circuit built in LCD module.

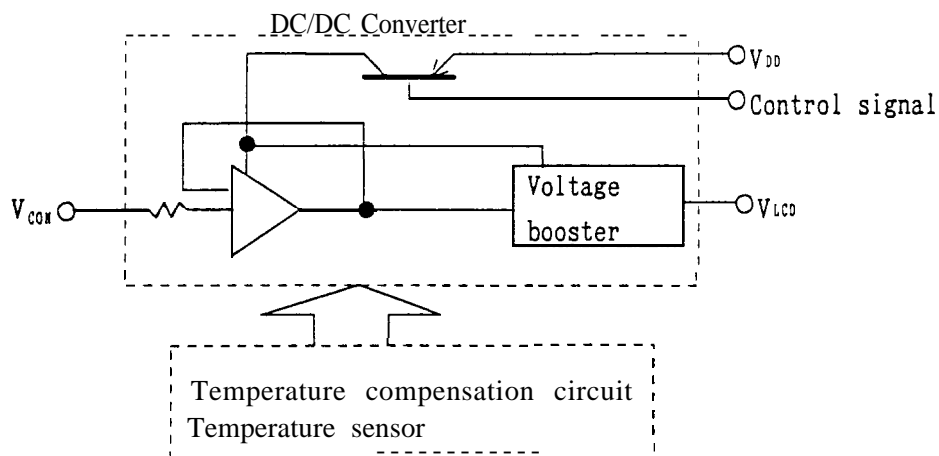
LCD driving voltage ' $V_{LCD}$ ' is adjusted automatically according to the change of ambient temperature range by the temperature compensation circuit.

Temperature compensation circuit built in LCD module have been set to obtain the optimum contrast under following driving condition.

Take care that voltage for optimum contrast is changed under the different condition.

Frame frequency : 120Hz, Duty ratio : 1/300 (an odd number frame) ,  $T_a = 25^\circ\text{C}$   
 1/328 (an even number frame)

※ The above is the condition of the module setting, not the electrical characteristics.



## (3-2) Interface signals

O LCD

Table 6

Pin No	Symbol	Description	Level
1	$V_{SS}$	Ground potential	
2	XCK	Data input clock signal	“ H ” -> “ L ”
3	$V_{EE}$	Ground potential	
4	$V_{SS}$	Ground potential	
5	LP	Input data latch signal	“ H ” -> “ L ”
6	YD	Scan start-up signal	“ H ”
7	$V_{SS}$	Ground potential	
8	$V_{SS}$	Ground potential	
9	$V_{NN}$	Power supply for logic and LCD	
10	DI SP	Display control signal	H (ON), L (OFF)
11	$V_{SS}$	Ground potential	
12	$V_{SS}$	Ground potential	
13	$V_{EE}$	Ground potential	
14	DL7	Display data signal (lower)	H (ON), L (OFF)
15	DL6	Display data signal (lower)	H (ON), L (OFF)
16	DL5	Display data signal (lower)	H (ON), L (OFF)
17	DL4	Display data signal (lower)	H (ON), L (OFF)
18	DL3	Display data signal (lower)	H (ON), L (OFF)
19	DL2	Display data signal (lower)	H (ON), L (OFF)
20	DL1	Display data signal (lower)	H (ON), L (OFF)
21	DLO	Display data signal (lower)	H (ON), L (OFF)
22	$V_{SS}$	Ground potential	
23	$V_{SS}$	Ground potential	
24	$V_{EE}$	Ground potential	
25	DU0	Display data signal (Upper)	H (ON), L (OFF)
26	DU1	Display data signal (Upper)	H (ON), L (OFF)
27	DU2	Display data signal (Upper)	H (ON), L (OFF)
28	DU3	Display data signal (Upper)	H (ON), L (OFF)
29	DU4	Display data signal (Upper)	H (ON), L (OFF)
30	DU5	Display data signal (Upper)	H (ON), L (OFF)
31	DU6	Display data signal (Upper)	H (ON), L (OFF)
32	DU7	Display data signal (Upper)	H (ON), L (OFF)
33	$V_{SS}$	Ground potential	
34	I $V_{SS}$	Ground Potential	
35	$V_{SS}$	Ground potential	
36	$V_{DD}$	Power supply for logic and LCD	
37	$V_{DD}$	Power supply for logic and LCD	
38	VCON	Contrast adjust voltage	
39	NC	-	-
40	$V_{SS}$	Ground potential	
41	$V_{SS}$	Ground potential	

O CCFT

Table 7

Pin No	Symbol	Description	Level
1	HV	High voltage line (from Inverter)	—
2	NC		—
3	GND	Ground line (from Inverter)	

O LCD

Used connector : IL-31 O-41 P-VF(JM)

Mating connector : IL-310 -41S-VF(JAE)

O CCFT

Used connector : BHR-03VS-1 ( JST)

Mating connector : SM03(4.0)B-BHS( JST)

Except above connector shall be out of guaranty.



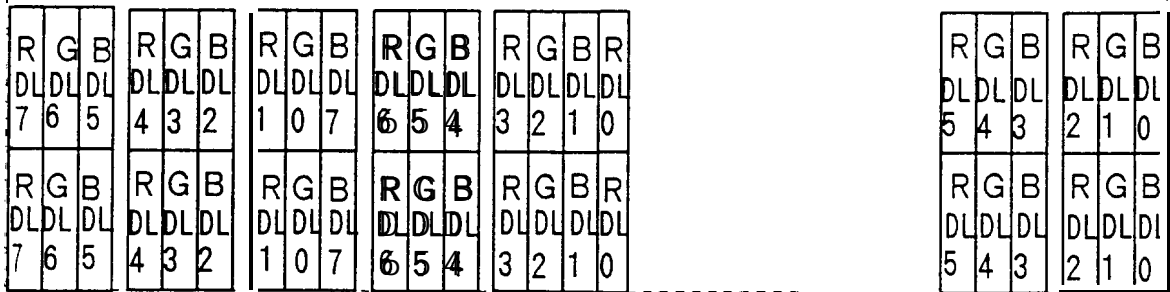
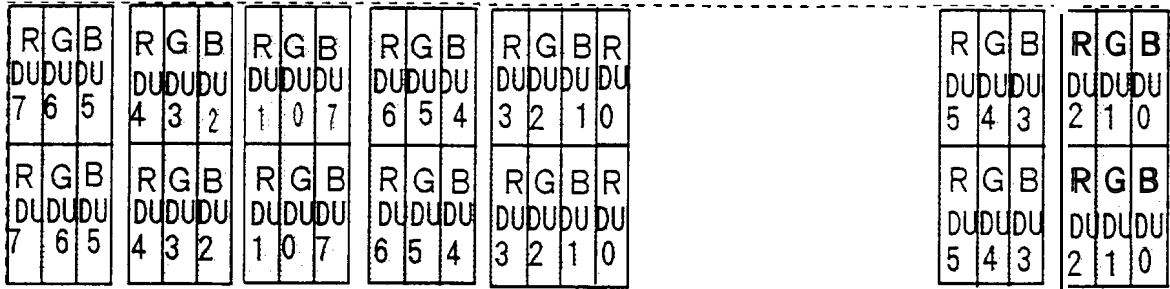
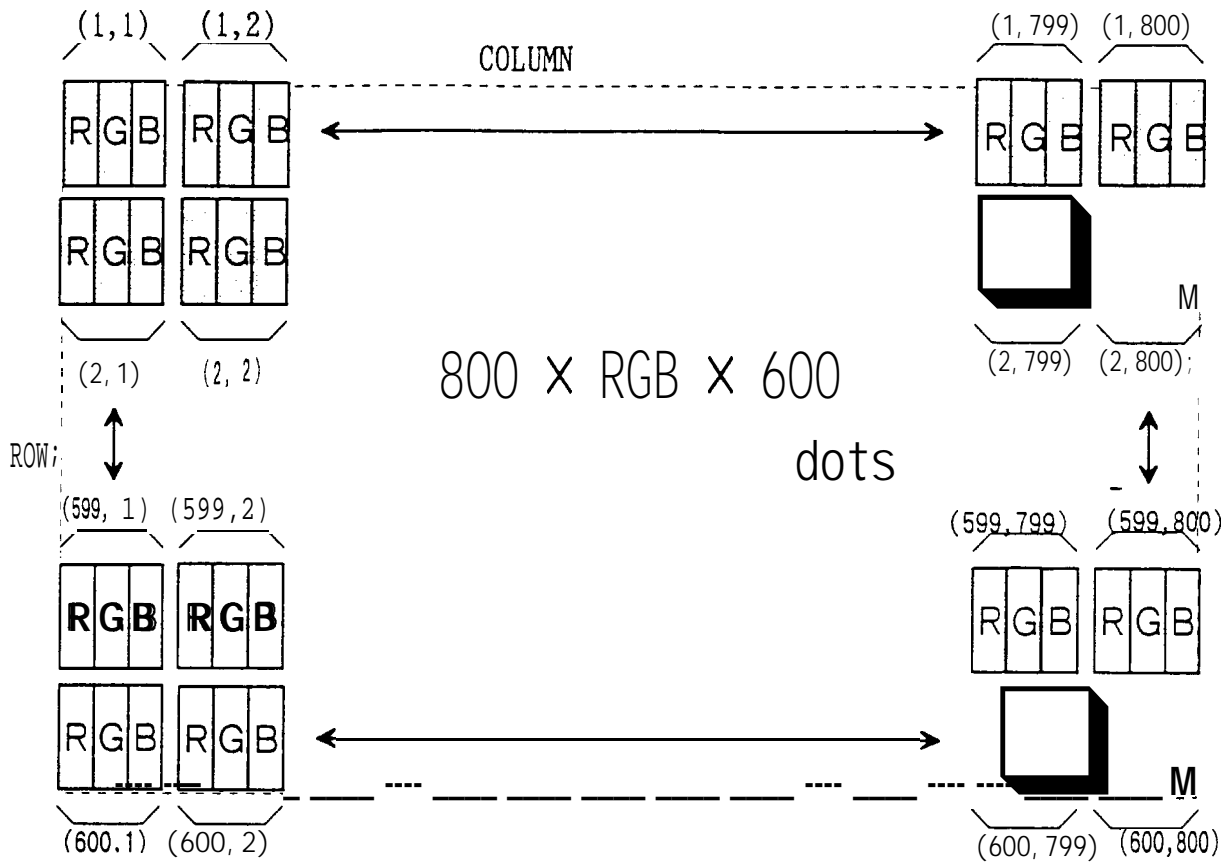




Fig. 1 Dot chart of display area

 : Upper SEG drivers  
 Upper data (DU0~7)  
 : Lower SEG drivers  
 Lower data (DL0~7)

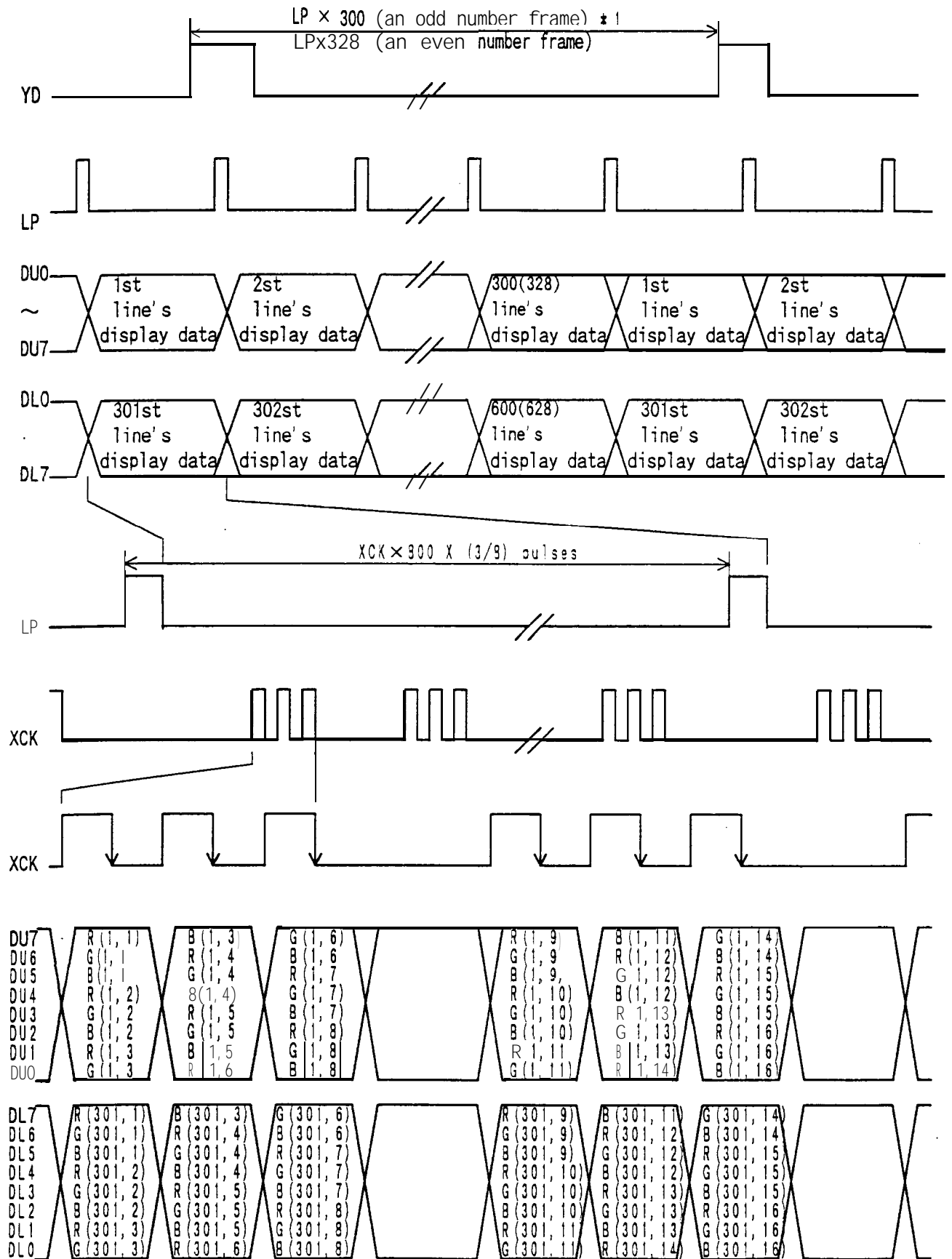


Fig. 2 Data input timing chart

\*1 The above is the condition of the module setting, not the electrical characteristics.

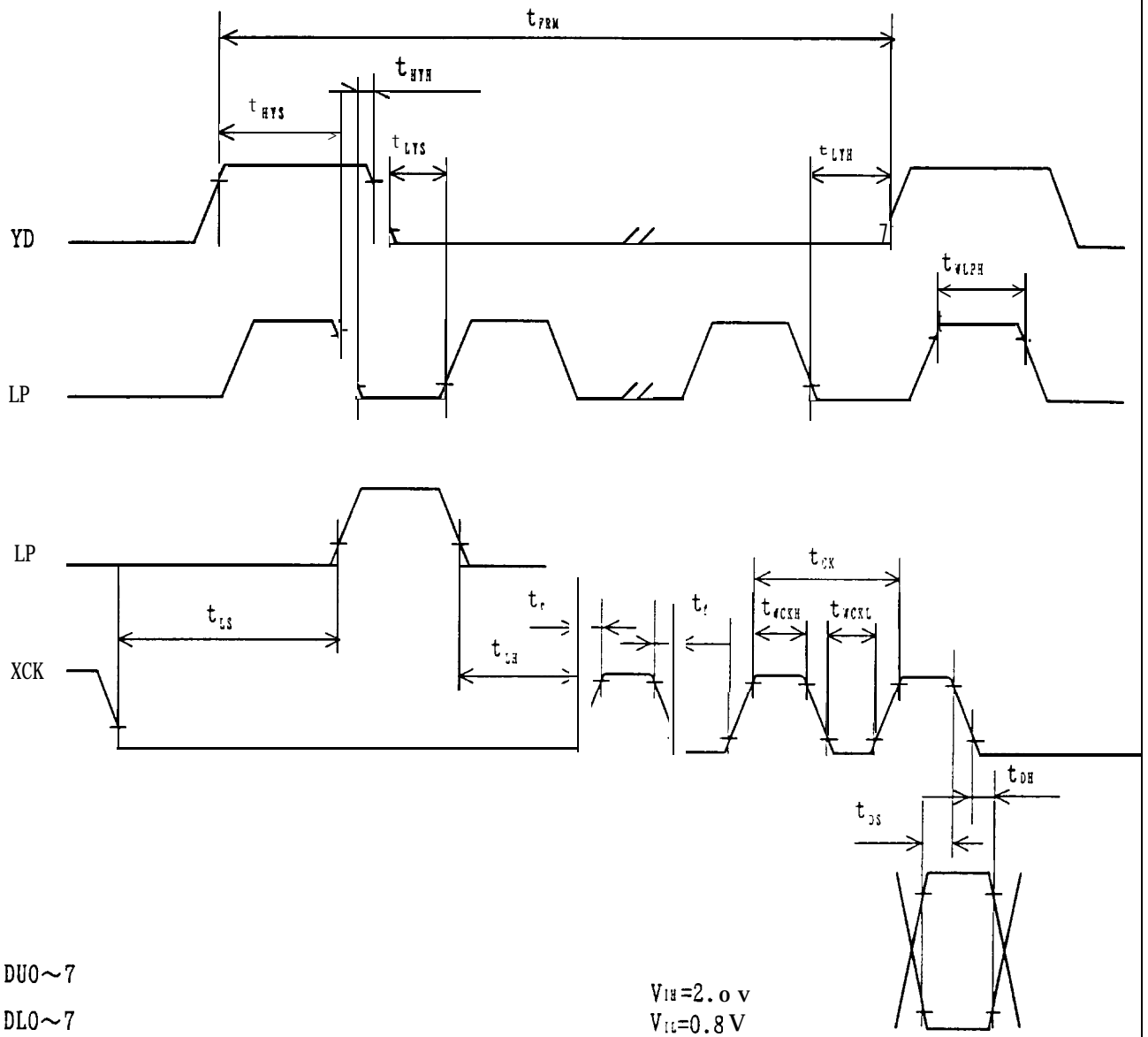


Fig. 3 Interface timing chart

Table 8 Interface timing ratings

Ta=25 °C , V<sub>DD</sub>=5.0 V ± 10%

Item	Symbol	Rating			Unit
		MIN.	TYP.	MAX.	
Frame cycle	t <sub>FRM</sub>	(8.33)		(16.94)	ms
XCK signal clock cycle	t <sub>CK</sub>	(50)			ns
‘H’ level clock width	t <sub>WCKH</sub>	(25)			ns
‘L’ level clock width	t <sub>WCKL</sub>	(15)			ns
LP signal ‘H’ level pulse width	t <sub>WLPH</sub>	(200)			ns
Data set up time	t <sub>DS</sub>	(20)			ns
Data hold time	t <sub>DH</sub>	(20)			ns
YD signal ‘H’ level set up time	t <sub>HYS</sub>	(100)			ns
‘H’ level hold time	t <sub>HFH</sub>	(100)			ns
‘L’ level set up time	t <sub>LVS</sub>	(100)			ns
‘L’ level hold time	t <sub>LVH</sub>	(40)			ns
LP ↑ allowance time from X <sub>CK</sub> ↓	t <sub>LS</sub>	(200)			ns
XCK ↑ allowance time from LP ↓	t <sub>LH</sub>	(200)			ns
Input signal rise/fall time *1	t <sub>r</sub> , t <sub>f</sub>			(13)	ns

\*1 When LCD module is operated by high speed of XCK(Shift clock),  
(t<sub>WCK</sub>-t<sub>WCKH</sub>-t<sub>WCKL</sub>)/2 is maximum.

\* The intervals of one LP fall and the next must be always the same, and LPs must be input continuously.

The interval must be 70 μs MAX.

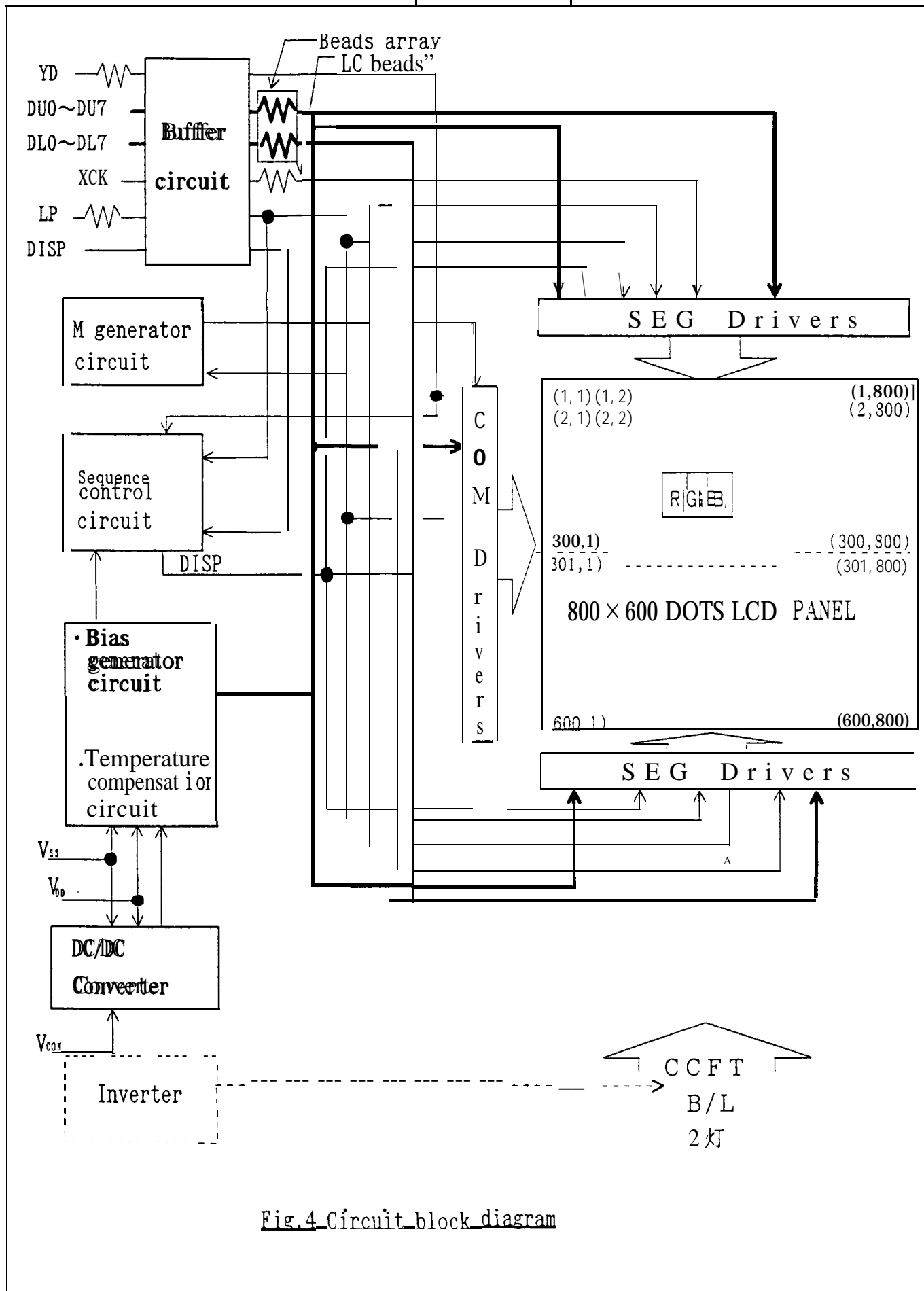
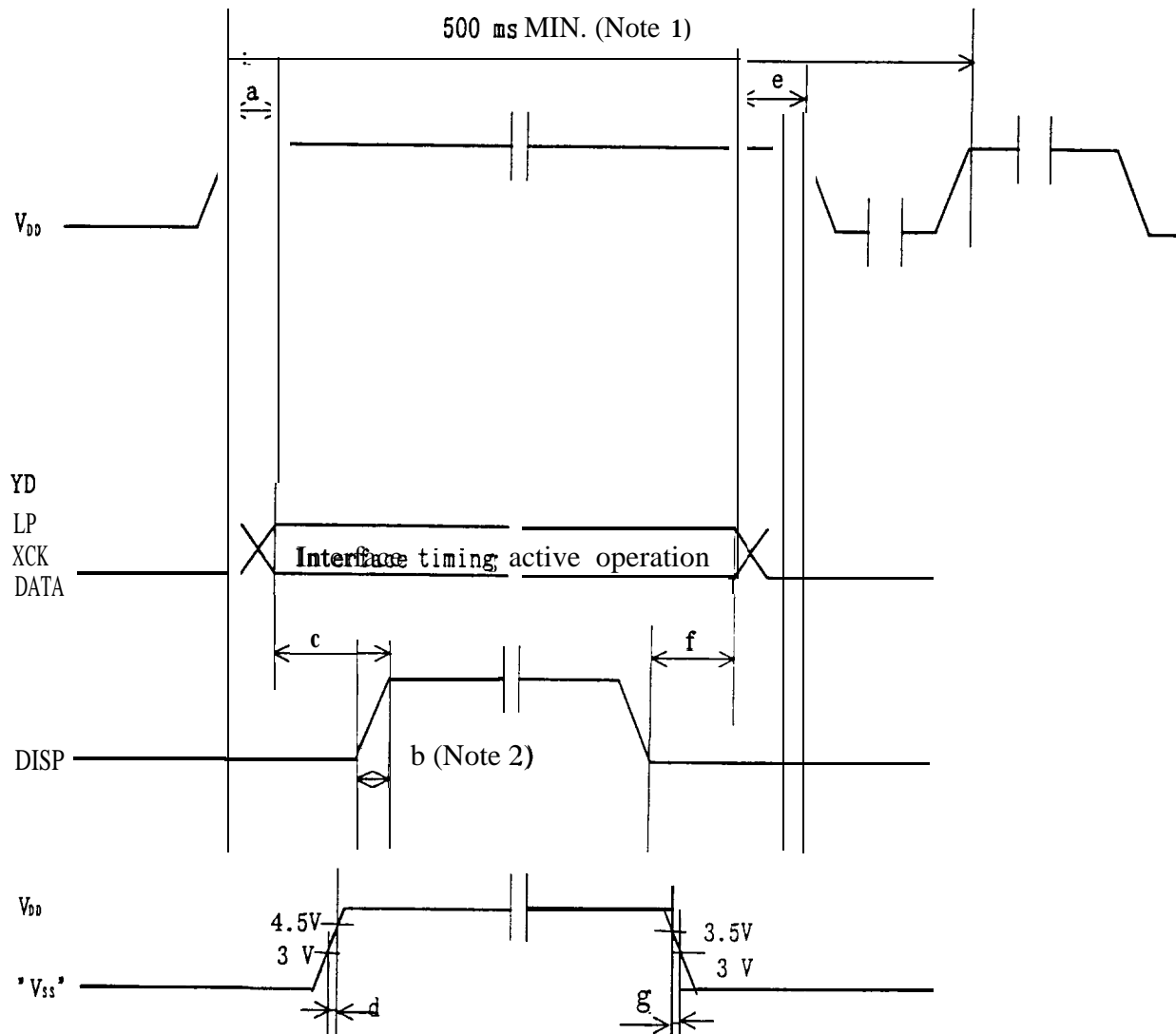


Fig.4 Circuit block diagram

Supply voltage sequence condition



Power ON	
Symbol	Allowable value
a	0 ms MIN. 1 s MAX.
b	- 100 ns MAX.
c	0 ms MIN. -
d	- 10 ms MAX.

Power OFF	
Symbol	Allowable value
e	0 ms MIN. 1 s MAX.
f	0 ms MIN. 1 s MAX.
g	1 ms MIN. -

(Note 1) Power ON/OFF cycle time.

All signals and power line shall be in accordance with above sequence in case of power ON/OFF.

(Note 2) Before DISP rises up, the signals of YD, LP, XCK, DATA must be input, and the above condition of 'a' must be satisfied. After DISP rises up, the signals which comply with the interface timing in Fig.2, Fig.3, and Table 8, must be input.

#### 4. Characteristics of Backlight

The ratings are given on condition that the following condition are satisfied.

##### (4-1) Rating(Note)

Parameter	Min.	Typ.	Max.	Unit
Brightness	(150)	(200)		cd/m <sup>2</sup>

##### (4-2) Measurement circuit :

CXA-M10L(TDK) (at IL = 6.0 mArms)

##### (4-3) Measurement equipment :

BM - 7 (TOPCON Corporation)

##### (4-4) Measurement conditions :

(4-4-1) Measurement circuit voltage : DC = 12.0 V, at primary side

(4-4-2) LCD : all digits WHITE,  $V_{DD} = 5.0$  V,  $V_{CON} - V_{SS} = V_{max}$

DU0~7 = 'H' (White) , DL0~7= 'H' (White) , Frame frequency 120 Hz

(4-4-3) Ambient temperature : 25 °C

Measurement shall be executed 30 minutes after turning on.

##### (4-5) Used lamp : HMBT24D62W264C/AX (HARISON ELECTRIC. ,LTD):2 PCS

##### (4-5-1) Rating (1pc)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Lamp current	$I_L$	-	(6.0)	(6.3)	mArms	Note(1)
Lamp voltage	$V_L$	-	(540)	-	Vrms	
Lamp power consumption	$P_L$	-	(3.2)	-	W	[Note(2)]
Lamp frequency	$F_L$	(20)	-	(50)	kHz	
Kick-off voltage	$V_s$	-	-	(1 100)	Vrms	Ta=25 °C
		-	-	(1 300)	Vrms	Ta=0 °C Note(3)
Lamp life time	$L_L$	(10 000)	-	-	h	Note(4)

within no conductor closed (CCFT only)

Note(1) It is recommended that  $I_L$  be not more than maximum current so that heat radiation of CCFT back light may least affect the display quality.

Note(2) Power consumption excluded inverter loss.

Note(3) The circuit voltage ( $V_s$ ) of inverter should be designed to have some margin, because  $V_s$  may be increased due to the leak current in case of the LCD module.

Note(4) Average life time of CCFT will be decreased when LCD is operating at lower temperature.

##### (4-5-2) Operating life

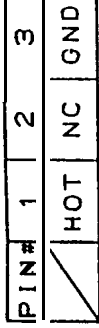
The operating life time is 10 000 hours or more at 6.0 mA.

(Operating life with CXA-M10L or equivalent. )

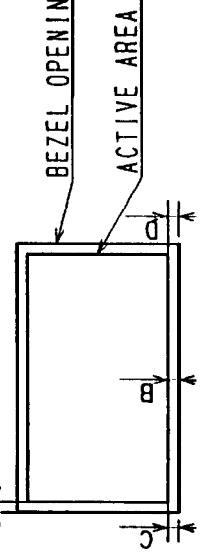
UL3579 AWG #26

② CCFT CONNECTOR

BHR-03VS-1 (JST)  
 <PIN LAYOUT>

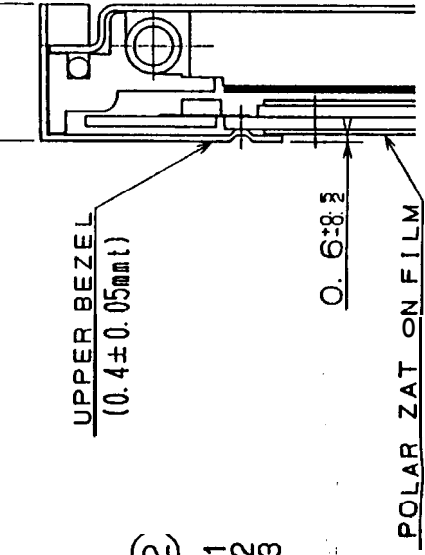


BEZEL/DISPLAY POSIT ON



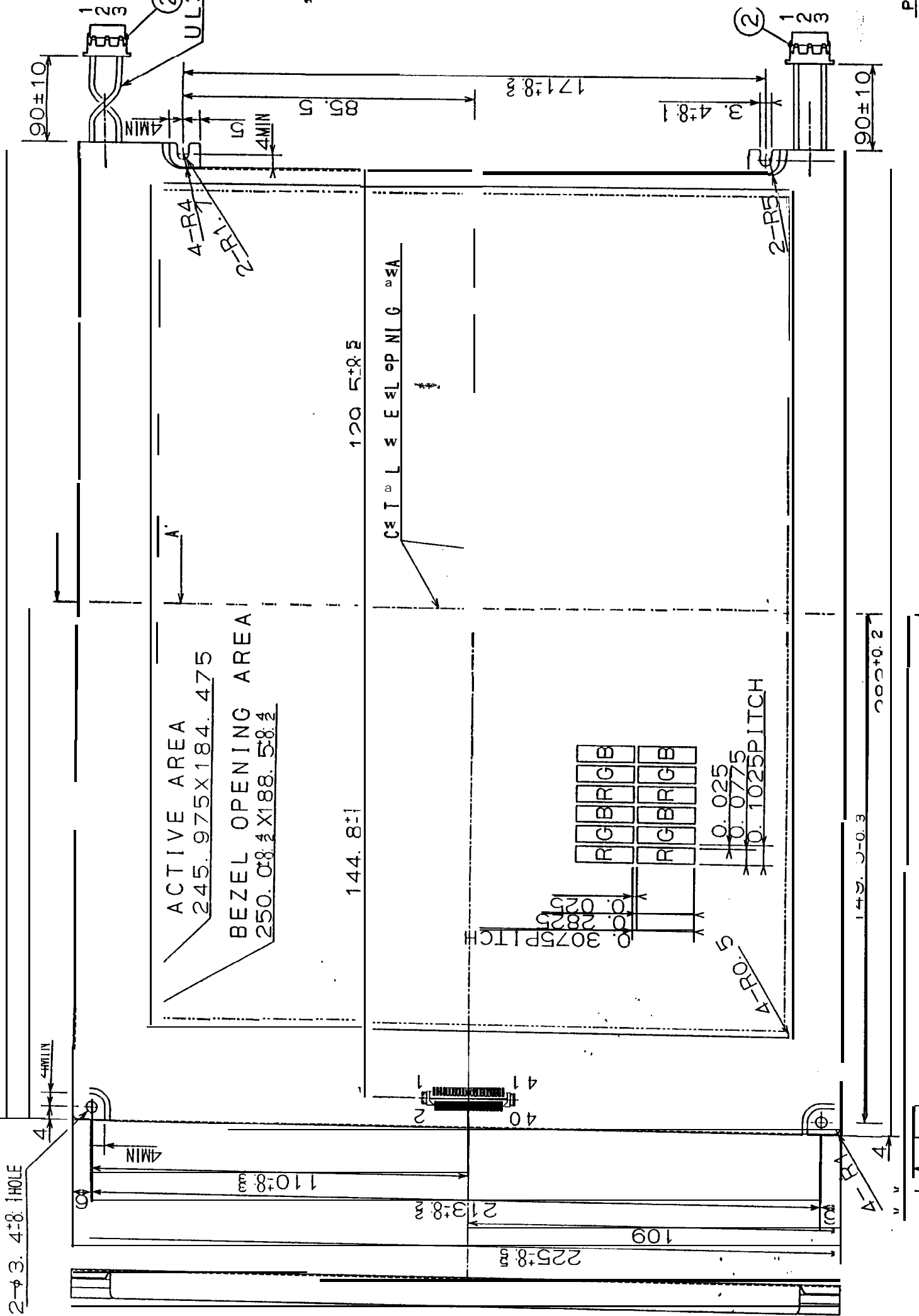
- 1) TOLERANCE X-DIRECTION A:  $2 \pm 0.8$
- 2) TOLERANCE Y-DIRECTION B:  $2 \pm 0.8$
- 3) OBLIQUITY OF DISPLAY AREA IC-D < 0.8

UPPER BEZEL  
 (0.4 ± 0.05mm)



POLAR ZAT ON FILM  
 A-A' SECT  
 指示なき寸法公差は ±0.5  
 UNSPECIFIED TOL TO BE

2φ3.4±0.5



① INTERFACE CONNECTOR

IL-310-41P-VF (JAE)  
 <P N LAYOUT>

PIN#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	VSS	XCK	VSS	VSS	LP	YD	VSS	VSS	VDD	D15	VSS	VSS	D17	D16	D16
16	D15	D14	D13	D12	D11	D10	VSS	D10	D11	D12	D13	D14	D15	D16	D16
32	D15	VSS	VSS	VDD	VDD	VDD	VDD	VDD	VDD	VDD	VDD	VDD	VDD	VDD	VDD
41	VSS	VSS	VSS	VSS	VSS	VSS	VSS	VSS	VSS	VSS	VSS	VSS	VSS	VSS	VSS

Excluded the allowance of deformation.

年月日	改定	記号	理由	担当者	承認者	年月日	理由

年	月	日	改定	記号	理由	担当者	承認者

年	月	日	改定	記号	理由	担当者	承認者

年月日	改定	記号	理由	担当者	承認者	年月日	理由



名 稱 LUU MODULE  
 記 号 800RGBx600 P0.3075  
 部品コード  
 作 成 日 付 1996. 5. 15  
 図 番 0180C3108010  
 DRAWING No.