

PREPARED BY: _____ DATE _____	<h1>S H A R P</h1> <p>L I Q U I D C R Y S T A L D I S P L A Y G R O U P S H A R P C O R P O R A T I O N</p> <h2>S P E C I F I C A T I O N</h2>	SPEC NO. L A - 0 5 B 0 2 A
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		APPLICABLE DIVISION “
		<input type="checkbox"/> DUTY DEVELOPMENT CENTER <input checked="" type="checkbox"/> TFT DEVELOPMENT CENTER <input checked="" type="checkbox"/> LCD PRODUCTS DEVELOPMENT CENTER <input type="checkbox"/> EL PRODUCTION DEPT.

SPECIFICATION FOR

EL Display Unit

MODEL No. L J 6 4 H 0 5 2

CUSTOMER'S APPROVAL

DATE \_\_\_\_\_

BY \_\_\_\_\_

PRESENTED  
 BY / *Hiro* \* *Kishishita*

H. Kishishita  
 Department General Manager  
 EL Production Department  
 Nara Factory  
 Liquid Crystal Display Group  
 SHARP CORPORATION



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## RECORDS OF REVISION

MODEL No.

DOC. FIRST ISSUE

LJ64H 052

IDENT. DATA No.

DATE	REF. PAGE PARAGRAPH DRAWING No.	EVISEC No.	SUMMARY	CHECK & APPROVAL
Sep. 21. '94	Page 7,8	△	Addition of input signals timing characterist its.	<i>b. Hoshino</i>

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## 1. Application

This data sheet is to introduce the **spec: fication** of EL display unit, **LJ64H052**.

## 2. Overview

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

## 3. Mechanical Specifications

Parameter	Specification			Unit
	Width	x Height	x Depth	
Outline dimensions	267	x 220	x 22 (Note 1)	mm
Number of <b>matrix</b> electrodes	640	x 480		--
Active area:	211.1	x 158.3		mm
Dot pitch	0.33	x 0.33		mm
Dot pitch ratio	1	x 1		mm
Dot size	0.225	x 0.225		mm
Weight	680			<b>g</b>

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

## 4. Absolute Maximum Ratings

## 4 - 1 Electrical absolute maximum ratings

(Ta=25 °C)

Parameter	Symbol	Rating	Unit
Interface signal (Logic "H")	$V_{IH}$	<b><math>V_{t}+0.3</math></b>	v
Interface signal (Logic "L")	$V_{IL}$	-0.3	v
Supply voltage (Logic)	$V_{t}$	+7	v
Supply voltage (panel drive)	$V_{D}$	<b>+14</b>	v



4-2 Environmental conditions

Parameter	Tstg		Topr		Remark
	Min.	Max.	Min.	Max.	
Ambient temperature	-40 ℃	+80 ℃	-5 ℃	+55 ℃	Note 1)
Humidity	Note 2)		Note 2)		No (condensation)
Vibration	Note 3)		—		No operating
Shock	Note 4)		—		No operating

Note 1) Survival : -20 ℃ to +65 ℃  
No permanent damage will occur.

Note 2)  $T_a \leq 40 \text{ }^\circ\text{C}$  ..... 95% R}{ Max  
 $T_a > 40 \text{ }^\circ\text{C}$  ..... Absolute humidity shall be less than  
 $T_a = 40 \text{ }^\circ\text{C} / 95\% \text{ RH.}$

Note 3) 5 ~ 55 Hz Frequency range  
Sweep time ; 15 min each axis  
Dwell at resonance; 10 min each resonance  
Peak-to-peak  
amplitude; 3.17 mm **over** 5 ~ 10 Hz range  
1.52 mm over 10 ~ 25 Hz range  
0.38 mm over 25 ~ 55 Hz range  
55 ~ 500 Hz Frequency range  
Sweep time ; 120 min each axis  
Dwell at resonance; 30 min each resonance  
Peak-to-peak  
amplitude; 30 m/s<sup>2</sup> peak acceleration

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

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## 5. Electrical Characteristics

(Ta=25 °C, Frame frequency=120Hz)

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)	—	1500	mA
Total power ( $V_L=+5$ V, $V_D=+12$ V)	$P_T$	—	12	—	w

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

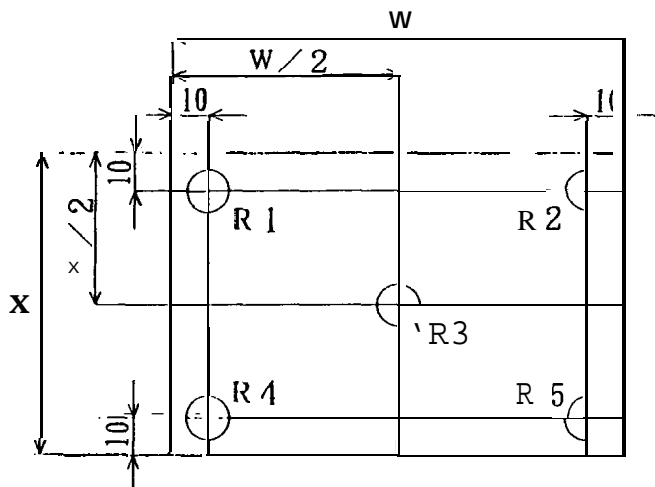
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## 6. Optical Characteristics

(Ta=25 °C, Frame frequency= 120 Hz)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Luminance	$L_{ON}$	All dots lit	137	200	—	cd/m <sup>2</sup>	Note 1)
OFF luminance	$L_{OFF}$	All dots turned off	—	—	3.4	cd/m <sup>2</sup>	
Luminance distribution	$\Delta L_{DIS}$	All dots lit	—	—	35	%	
Fill factor			—	0.46	—		Note 2)
Shadowing characteristics	$\Delta L_{SD}$	fixed pattern	—	2	—	%	Note 3)
Viewing angle			—	160	—	°	

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



H 158.3 : Height of active area

W 211.1 Width of active area

Unit : mm

Tolerance of  
luminance:  $\pm 10\%$

Fig.1

The following formula defines the luminance distribution:

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

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

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- Note 2) The ratio of the emission area to the display area of 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 SHARPS EL is improved.

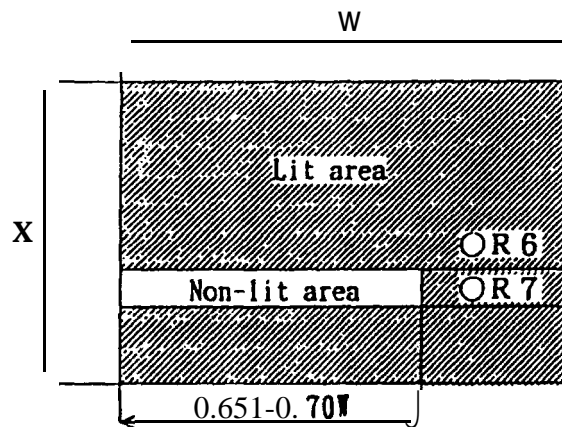


Fig. 2

The following formula defines the shadowing characteristics:

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

where  $L_i$  is the luminance at R6,  $L_N$  at R7.



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## 7. Timing Characteristics

## 7-1 Input signals

This unit is driven by line-at-a-time scanning method with following 11 CMOS level input signals.

Parameter	Symbol	Description	
Data input clock signal	CP2	Clock signal for inputting the display data into the EL unit.	
Display data signal	UD 0~3	Data signal for the upper part of display	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".
	LD 0-3	Data signal for the lower part of display	
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.	



7-'2 Input signals timing characteristics

(T a = 25 °C)

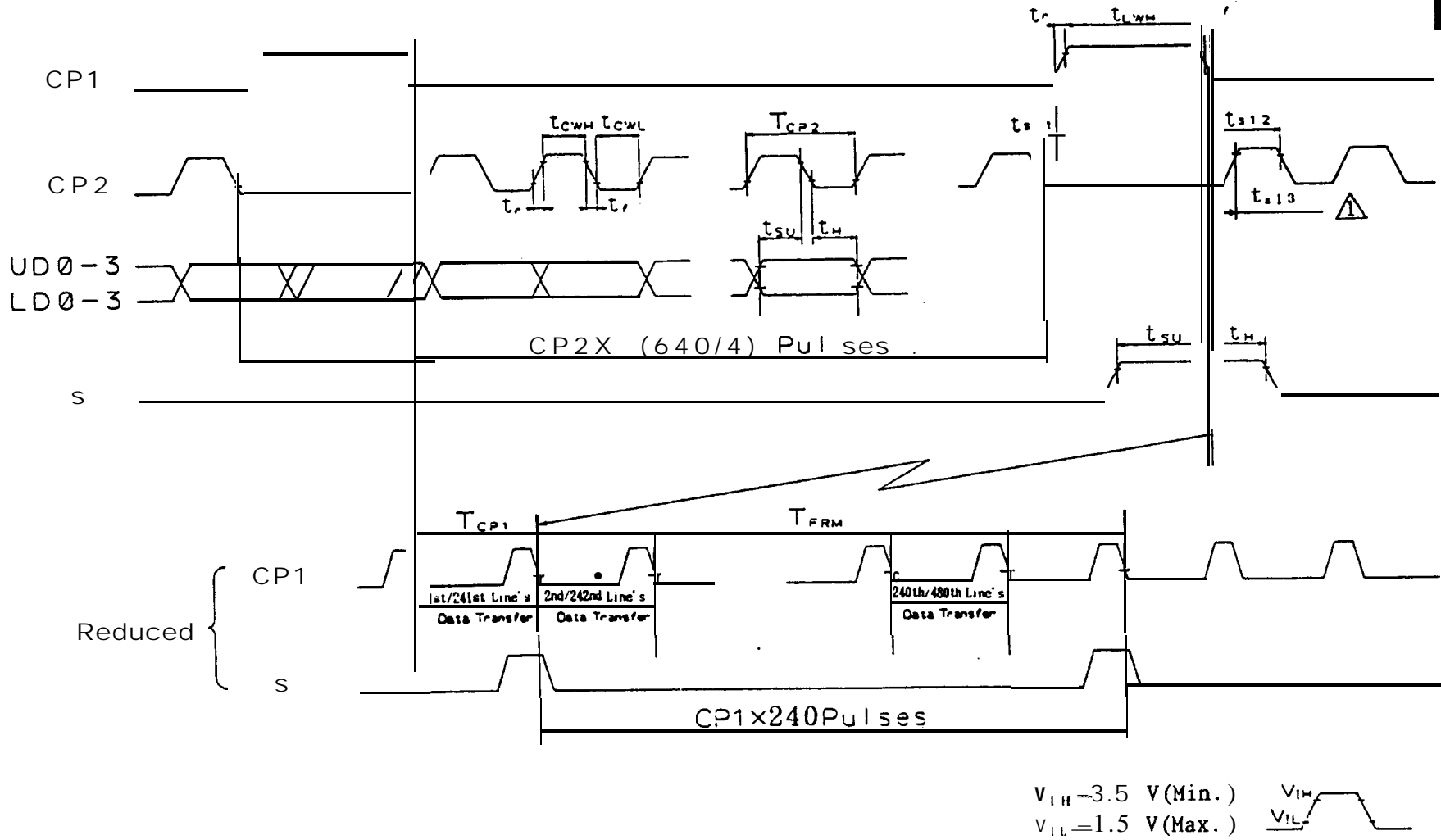
Parameter	Symbol	Min.	Typ.	Max.	unit
Frame frequency	$1/T_{FRM}$	60	-	120	Hz
CP2 clock cycle	$T_{CP2}$	154	-	-	ns
High level clock width	$t_{CWH}$	60	-	-	ns
Low level clock width	$t_{CWL}$	60	-	-	ns
CP1 clock cycle	$t_{CP1}$	31	-	-	μs
High level latch clock width	$t_{LWH}$	60	-	-	ns
Data set up time	$t_{SU}$	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	$t_r, t_f$	-	-	$t_r, *$	ns



\*  $t_{r,f} = (T_{CP2} - t_{CWH} - t_{CWL}) / 2 \leq 30 \text{ ns max}$

Note ) The vertical blanking time ( $T_{FRM} - T_{CP1} \times 240$ ) shall be minimized to avoid the flickering lines around the center of the display. (around 240th and 241st horizontal lines)

7-3 Input signals timing chart.

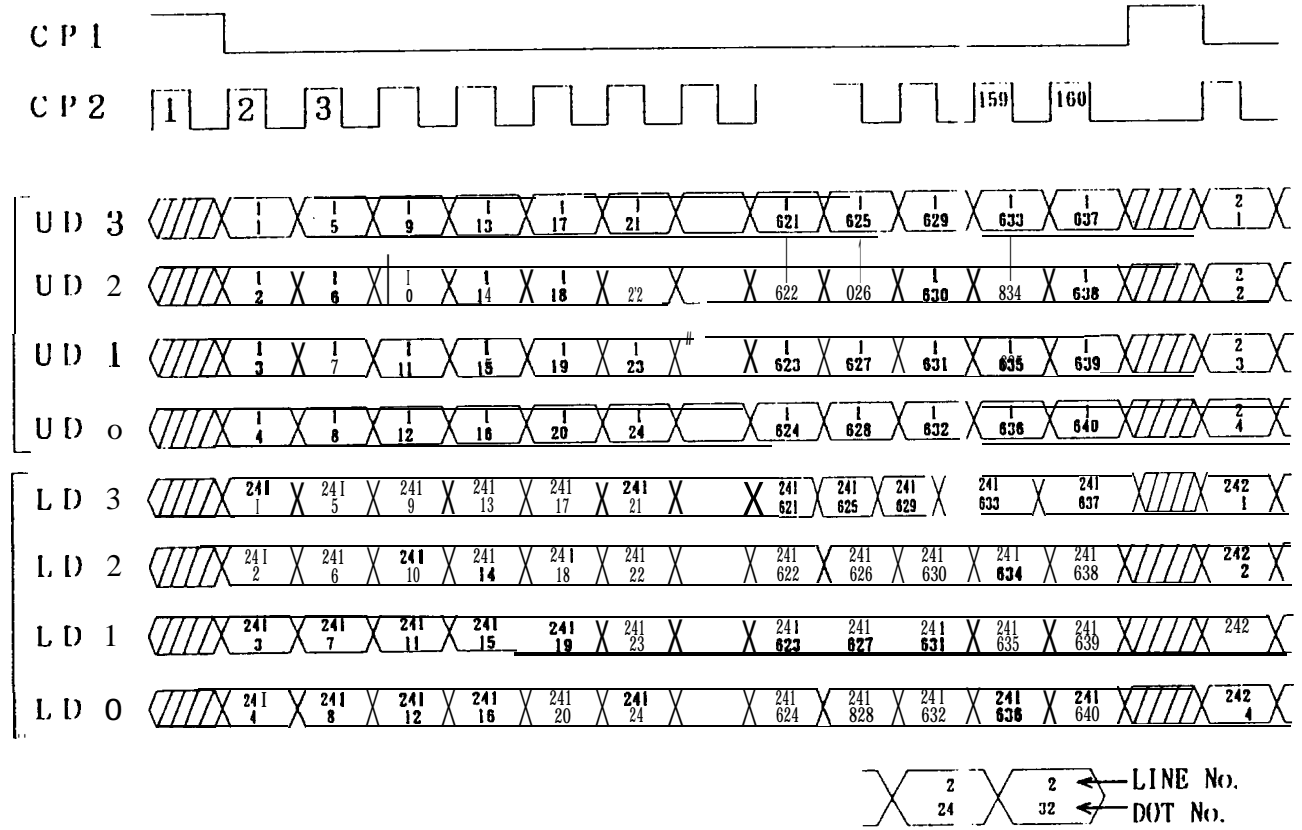


$V_{IH} = 3.5$  V (Min.)  $V_{IL} = 1.5$  V (Max.)

Note 1) CP1 x 240 pulses shall be kept.

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## 7-4 Data transmission timing.



## 7-5 Transmission data and relative position on panel.

LINE ↓	DOT →				639	640
	1	2	3			
u D	1	1-1	1-2	1-3	1-639	1-640
	2	2-1	2-2	2-3	2-639	2-640
	3	3-1	3-2	3-3	3-639	3-640
L D	239	239-1	239-2	239-3	239-639	239-640
	240	240-1	240-2	240-3	240-639	240-640
	241	241-1	241-2	241-3	241-639	241-640
	242	242-1	242-2	242-3	242-639	242-640
	243	243-1	243-2	243-3	243-639	243-640
	479	479-1	479-2	479-3	479-639	479-640
	480	480-1	480-2	480-3	480-639	480-640

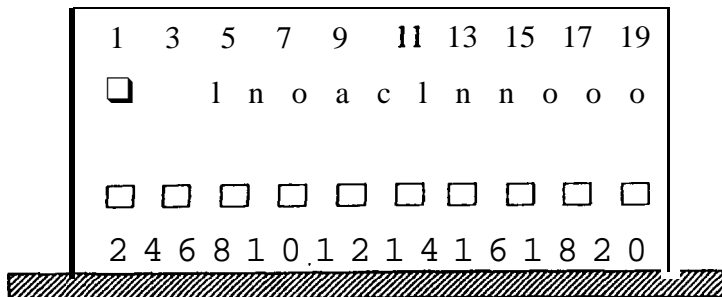
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8. Interface signals and power **supply** connectors

Assignment of pins of connector CN5

No.	SIGNAL	No.	SIGNAL
1	UD 1	2	UDO
3	UD3	4	UD2
5	LD 1	6	LDO
7	LD3	8	LD 2
9	CP 2	10	GND
11	CP 1	12	GND
13	s	14	GND
15	GND	16	GND
17	+ 5 V	18	+ 5 V
19	+ 1 2 V	20	+ 1 2 V

Arrangement of pins of connector CN5



Connectors

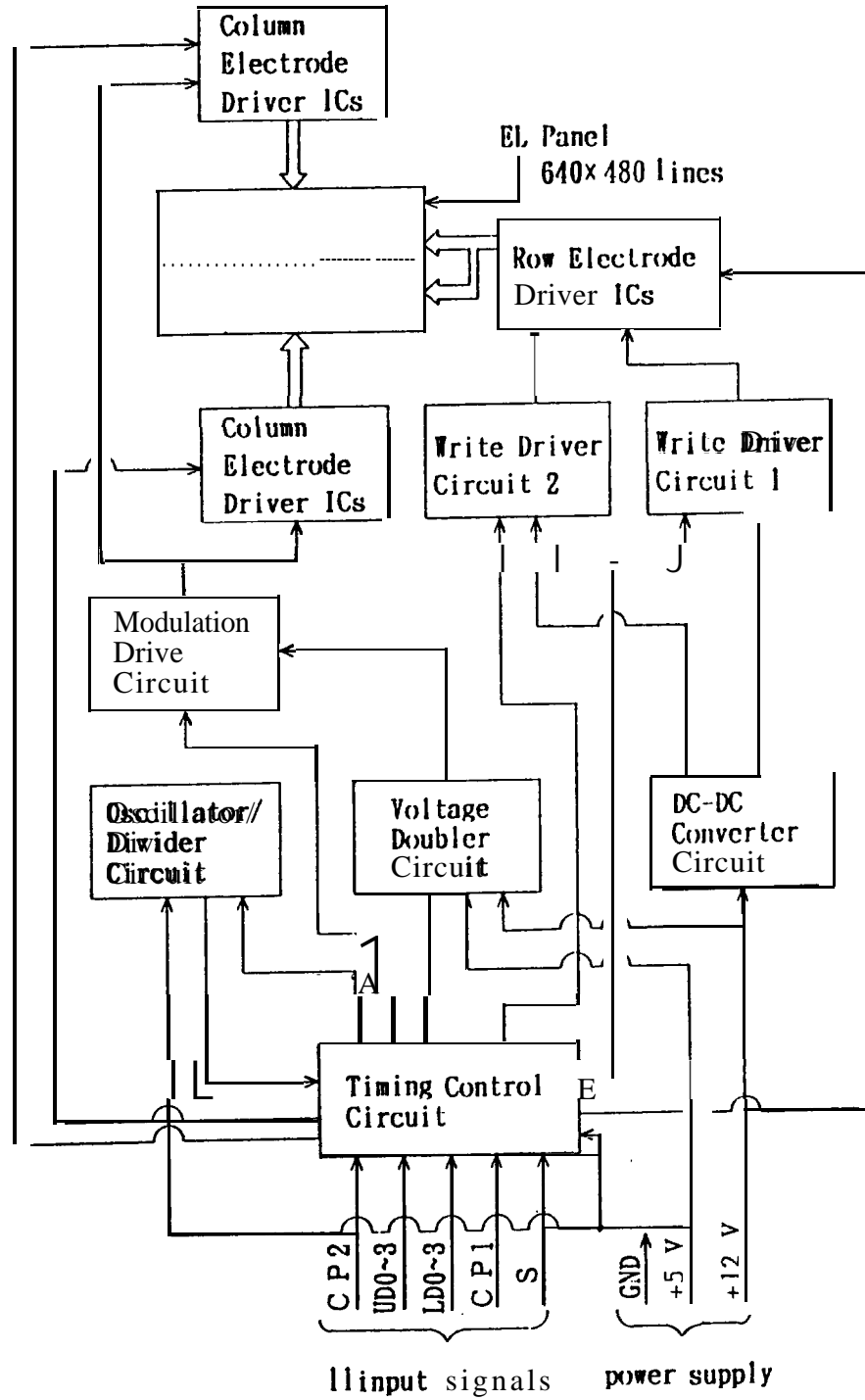
	Mode 1 No.	Maker
Unit-side pin header	DF11-20DP-2DS or equivalents	HISOSE ELECTRIC CO.
Fitting socket (crimp contact)	DF11-20DS-2C or equivalents (DF11-2428SC)	HISOSE ELECTRIC CO.

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

**Note 2**) This unit is not supplied with the fitting socket and the cable.



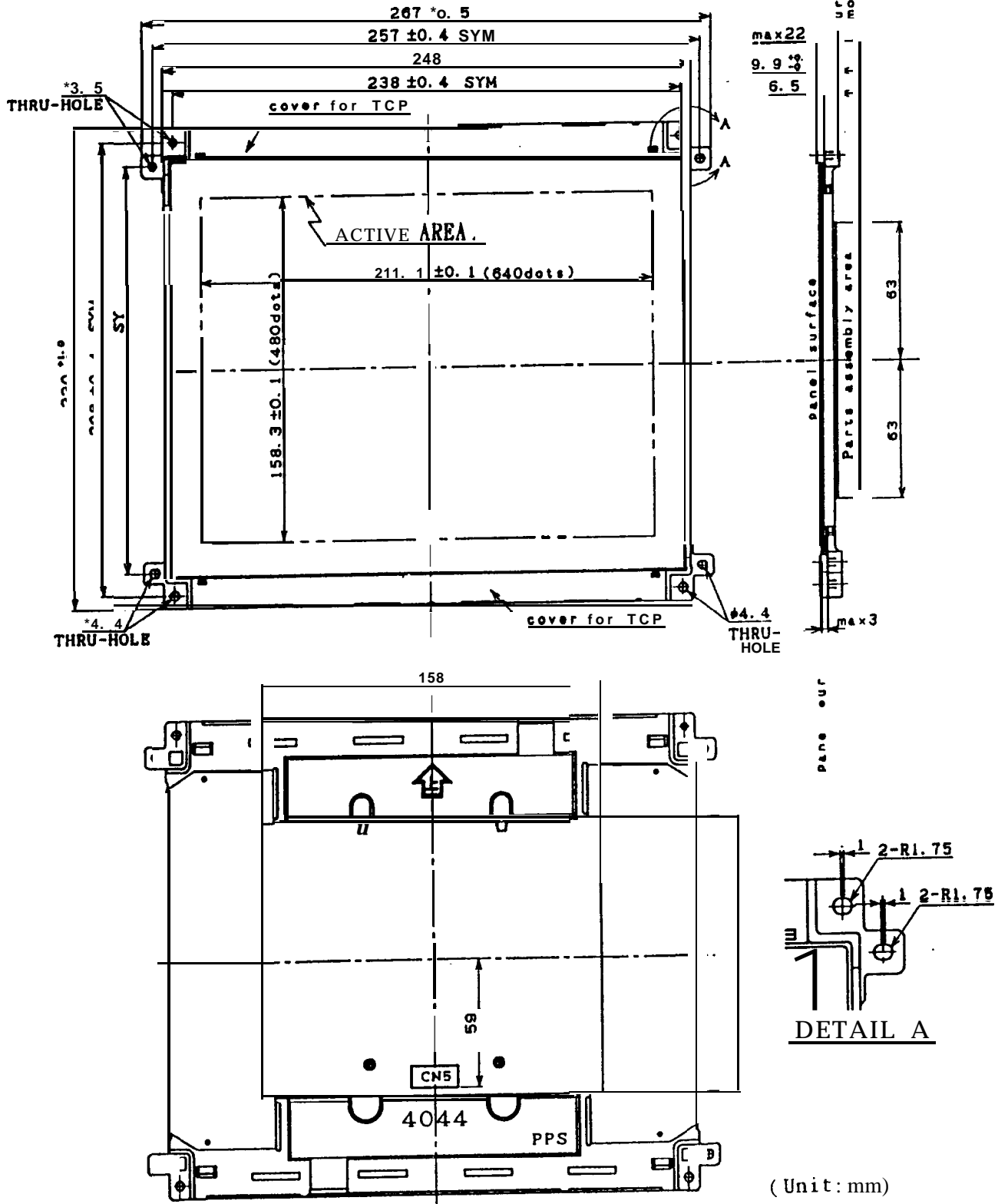
9. Functional Block Diagram





10. Outline of the unit configuration

This unit is shipped with the form drawing below.



Note 1) Unspecified tolerance to be ±0.5.

Note 2) Mounting of this display unit should be done using the 4 thruhole among the 8 thruhole.

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## 11. 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 cover for TCP shall not be removed nor the unit shall be disassembled. ICs mounted on the unit shall never be touched by **fingers/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. The display control board on the rear side of the unit shall never be touched while in operation. It generates AC pulse of approx. 200 V.
4. **To** avoid the image retention caused by the luminance change due to time lapse, **and to** increase 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 unit 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.

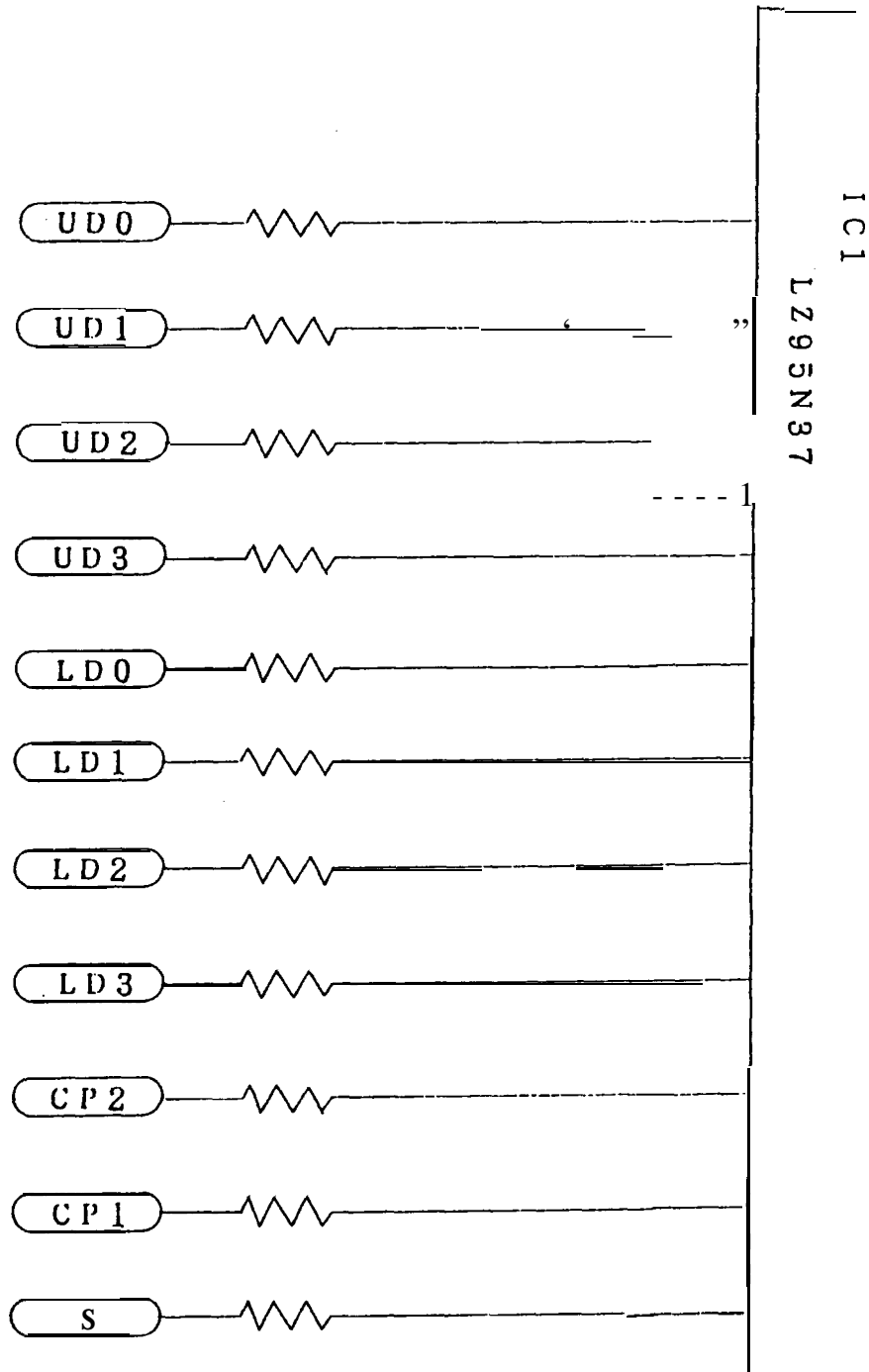
### Others

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



47 Ω × 11

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## 13. 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 short circuit.

Fuse specifications

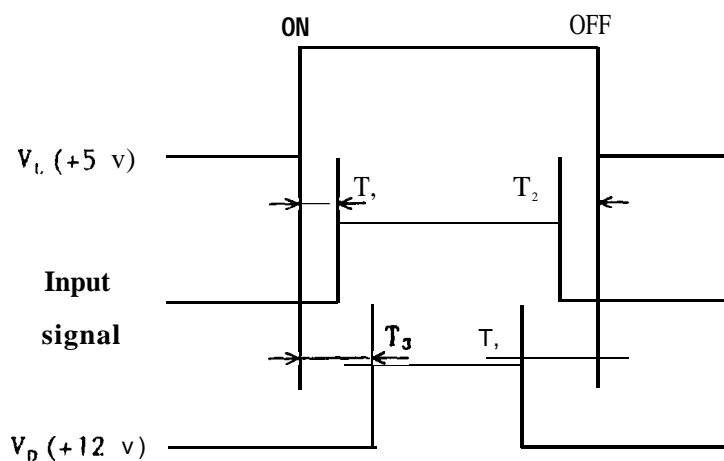
Parts No.	Model No.	Ratings	Melt type	Authorization Standard
F 1	TR-5 19374 兼	800 mA	s l o w	UL,CSA
F 2	TR-5 19374 兼	1.6 A	slow	"
F 3	TR-5 19374 兼	1.6 A	slow	"

? : or equivalents

Maker : Wickmann

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 unit using relays. In consequence please you thoroughly investigate the unit.

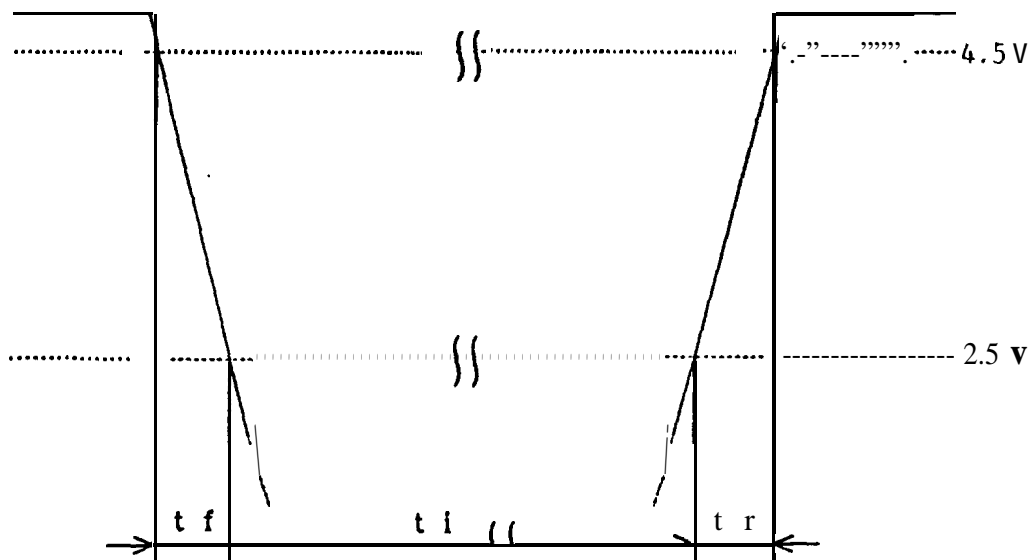
## (b) Power on/off sequence



Note)  $T_{1-4} \geq 0$  shall be kept.

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

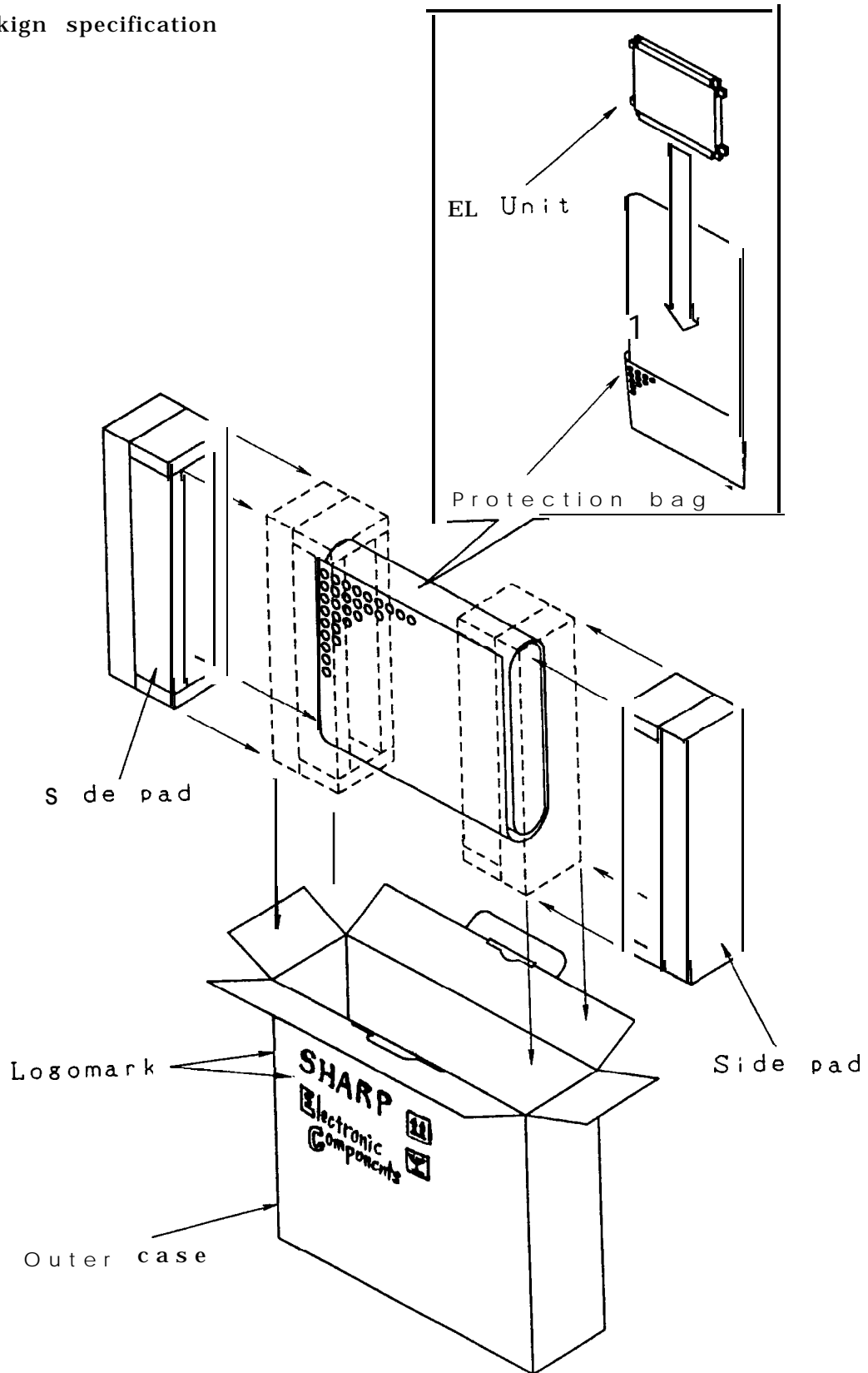


$t_f$  = falling **down** time  $t_r$  = rising up time

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

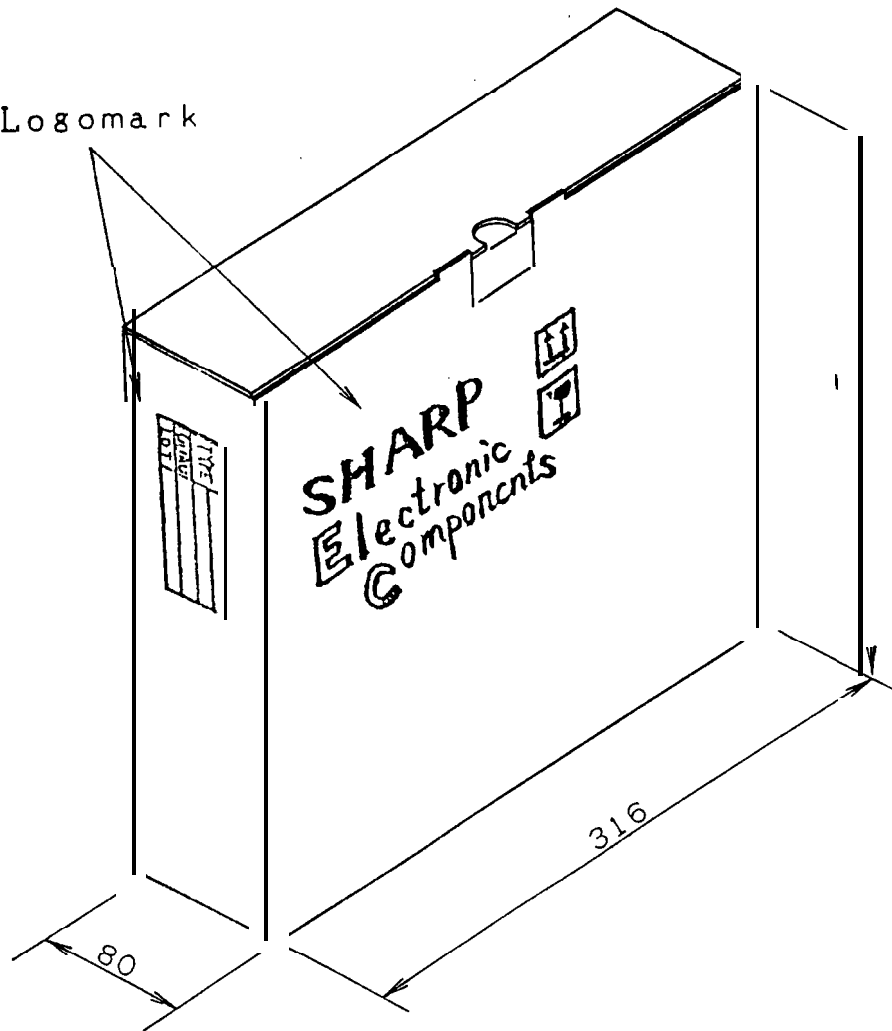
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14. Packign specification



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**Electronic Components**



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SHARP CORP. ATON MADE IN JAPAN

TYPE	
QUANTITY	
LOT (DATE)	