

FEATURES

- Display Diagonal: 10.4"
- Display Format: 640 × 480
- Overall Dimensions:
267 (W) × 220 (H) × 22 (D) mm
- Active Area: 221.1 (W) × 158.3 (H) mm
- Dot Pitch: 0.33 (W) × 0.33 (H) mm

DESCRIPTION

The SHARP LJ64H052 EL display unit consists of a thin film EL panel, high voltage MOS-ICs for panel driving, and a display control circuit. By supplying 11 input signals of CMOS level and two DC power supplies of +5 V and +12 V, arbitrary graphs and characters can be displayed.

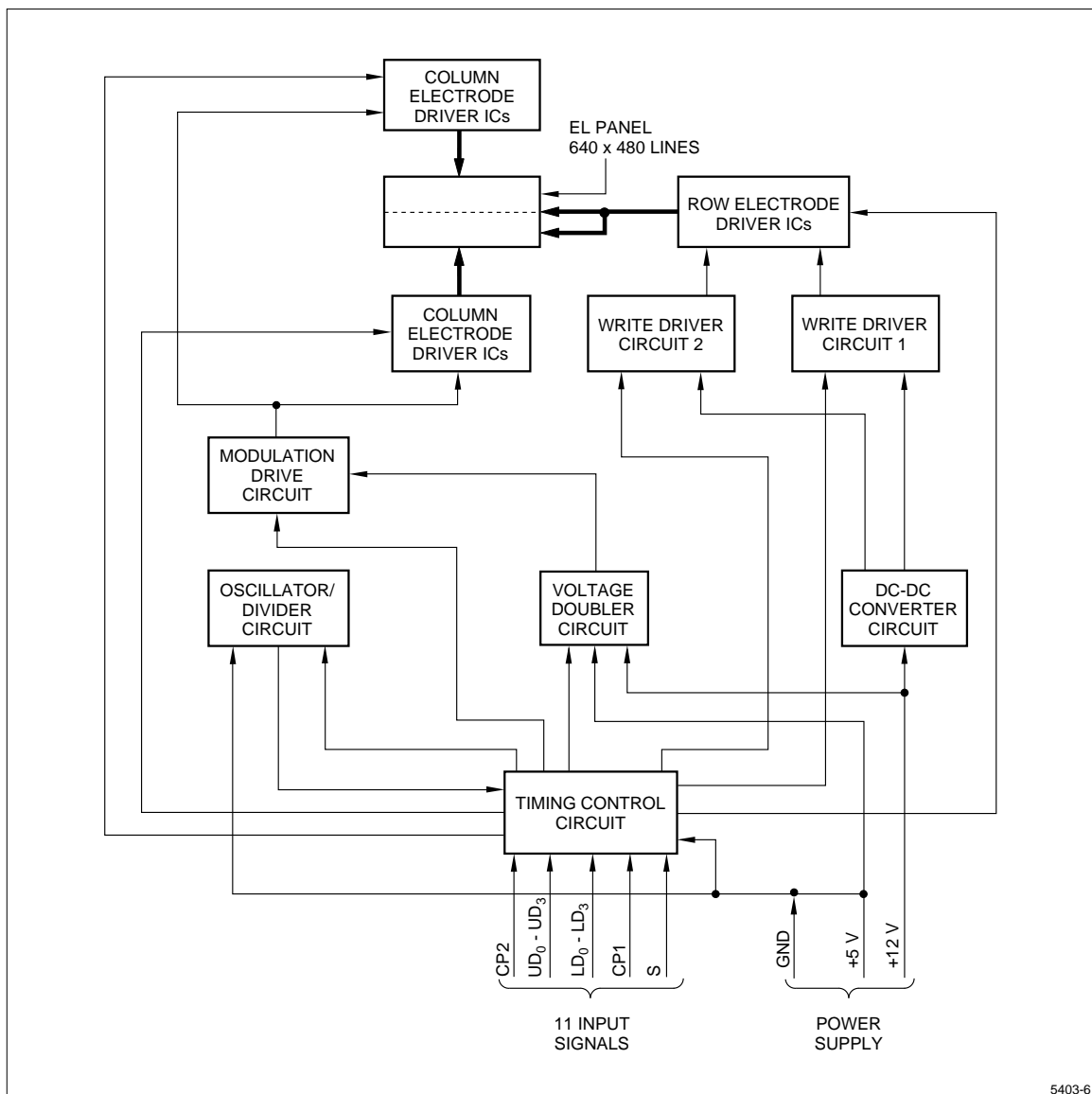


Figure 1. LJ64H052 Block Diagram

MECHANICAL SPECIFICATIONS

PARAMETER	SPECIFICATIONS	UNIT	NOTE
Outline Dimensions	267 (W) × 220 (H) × 22 (D)	mm	1
Number of Matrix Electrodes	640 (W) × 480 (H)	–	–
Active Area	211.1 (W) × 158.3 (H)	mm	–
Dot Pitch	0.33 (W) × 0.33 (H)	mm	–
Dot Pitch Ratio	1 (W) × 1 (H)	mm	–
Dot Size	0.225 (W) × 0.225 (H)	mm	–
Weight	680	g	–

NOTE:

1. Details of outline dimensions are shown in the Outline Dimensions diagram.

ABSOLUTE MAXIMUM RATINGS ($t_A = 25^\circ\text{C}$)

SYMBOL	PARAMETER	RATING	UNIT
V_{IH}	Interface Signal (Logic 'H')	$V_L + 0.3$	V
V_{IL}	Interface Signal (Logic 'L')	-0.3	
V_L	Supply Voltage (Logic)	+7	
V_D	Supply Voltage (Panel Drive)	+14	

ENVIRONMENTAL CONDITIONS

PARAMETER	Tstg		Topr		CONDITION	NOTE
	MIN.	MAX.	MIN.	MAX.		
Ambient Temperature	-40°C	+80°C	-5°C	+55°C	–	1
Humidity	–		–		No condensation	2
Vibration	–		–		No operating	3 (Tstg only)
Shock	–		–		No operating	4 (Tstg only)

NOTES:

1. Survival: -20°C to +65°C. No permanent damage will occur.
2. $t_A \leq 40^\circ\text{C}$, 95% RH maximum.
 $t_A > 40^\circ\text{C}$, Absolute humidity shall be less than $t_A = 40^\circ\text{C}/95\%$ RH.
3. 5 to 55 Hz Frequency range: Sweep time: 15 minutes each axis. Dwell at resonance: 10 minutes each resonance.
Peak-to-peak amplitude: 3.17 mm over 5 to 10 Hz range, 1.52 mm over 10 to 25 Hz range, 0.38 mm over 25 to 55 Hz range.
55 to 500 Hz Frequency range: Sweep time: 120 minutes each axis. Dwell at resonance: 30 minutes each resonance.
Peak-to-peak amplitude: 30 m/s² peak acceleration.
4. Acceleration: 491 m/s² (50g). Pulse width: 11 ms. Three times for each direction of $\pm X/\pm Y/\pm Z$.

ELECTRICAL CHARACTERISTICS ($t_A = 25^\circ\text{C}$, Frame Frequency = 120 Hz)

SYMBOL	PARAMETER	MIN.	TYP.	MAX.	UNIT	NOTES
V_L	Supply Voltage (Logic)	+4.75	+5.0	+5.25	V	–
I_L	Supply Current (Logic, $V_L = +5\text{ V}$)	30	–	300	mA	–
V_D	Supply Voltage (Panel Drive)	+11.4	+12.0	+12.6	V	–
I_D	Supply Current (Panel Drive, $V_D = +12\text{ V}$)	–	–	1500	mA	1
P_T	Total Power ($V_L = +5\text{ V}$, $V_D = +12\text{ V}$)	–	12	–	W	–

NOTE:

- 10 mA in condition with no signals nor V_L supplying.

OPTICAL CHARACTERISTICS ($t_A = 25^\circ\text{C}$, Frame Frequency = 120 Hz)

SYMBOL	PARAMETER	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTES
L_{ON}	Luminance	All Dots Lit	137	200	–	cd/m^2	1
L_{OFF}	OFF Luminance	All Dots Turned Off	–	–	3.4	cd/m^2	
ΔL_{DIS}	Luminance Distribution	All Dots Lit	–	–	35	%	
–	Fill Factor	–	–	0.46	–	–	2
ΔL_{SD}	Shadowing Characteristics	Fixed Pattern	–	2	–	%	3
–	Viewing Angle	–	–	160	–	degrees	–

NOTES:

1. Average luminance measured at the dots in circular windows (R1 to R5) shown in Figure 3. (Circular window diameter: $\phi 13\text{ mm}$). The following formula defines the luminance distribution:

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

where L_{MAX} is the maximum luminance and L_{MIN} is the minimum luminance taken at the five locations shown in Figure 3.

2. The ratio of the emission area to the display area. SHARP's Electro-Luminescent has comparatively high fill factor; therefore, the visibility of display is excellent.
3. Shadowing characteristics means the variation of luminance according to the number of dots lit on a scanning line. Because of the addition of the shadowing compensation circuit, the display quality of SHARP's Electro-Luminescent is improved. The following formula defines the shadowing characteristics:

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

where L_L is the luminance at R6, L_N at R7 as shown in Figure 2.

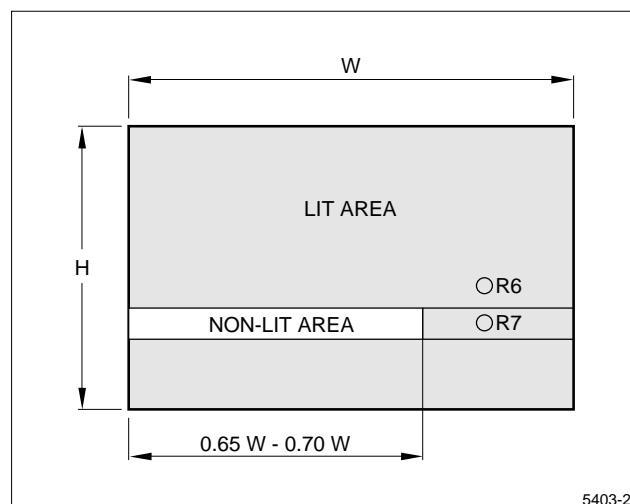


Figure 2. Shadowing Characteristics

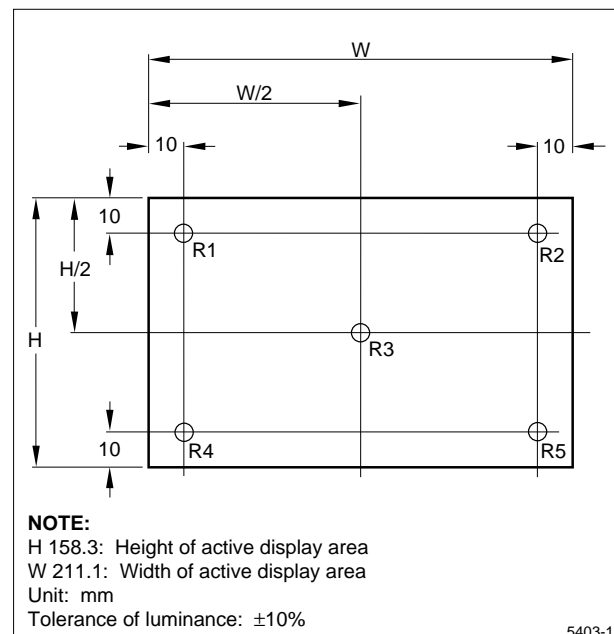


Figure 3. Luminance Measurements

TIMING CHARACTERISTICS

Input Signals

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

SYMBOL	PARAMETER	DESCRIPTION	
CP2	Data Input Clock Signal	Clock signal for inputting the display data into the EL unit.	
UD ₀ – UD ₃	Display Data Signal	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 – LD ₃		Data signal for the lower part of display.	
CP1	Input Data Latch Signal	This signal controls the 'timing of line-at-a-time scanning' and the 'latch timing of the data side shift register on falling edge.'	
S	Scan Start-Up Signal	This signal controls frame frequency. The contents of the display data signal are displayed on the first line in combination with this signal.	

Timing Characteristics of Input Signals (t_a = 25°C)

SYMBOL	PARAMETER	MIN	TYP	MAX	UNIT	NOTES
1/t _{FRM}	Frame Frequency	60	–	120	Hz	–
t _{CP2}	CP2 Clock Cycle	154	–	–	ns	–
t _{CWH}	High-Level Clock Width	60	–	–	ns	–
t _{CWL}	Low-Level Clock Width	60	–	–	ns	–
t _{CP1}	CP1 Clock Cycle	31	–	–	μs	–
t _{LWH}	High Level Latch Clock Width	60	–	–	ns	–
t _{SU}	Data Setup Time	50	–	–	ns	–
t _H	Data Hold Time	40	–	–	ns	–
t _{S21}	CP1 ↑ Clock Allowance Time from CP2 ↓	0	–	–	ns	–
t _{S12}	CP2 ↓ Clock Allowance Time from CP1 ↓	200	–	–	ns	–
t _R , t _F	Clock Rise/Fall Time	–	–	t _{RF}	ns	1

NOTE:

1. $t_{RF} = (t_{CP2} - t_{CWH} - t_{CWL})/2 \leq 30$ ns max.

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).

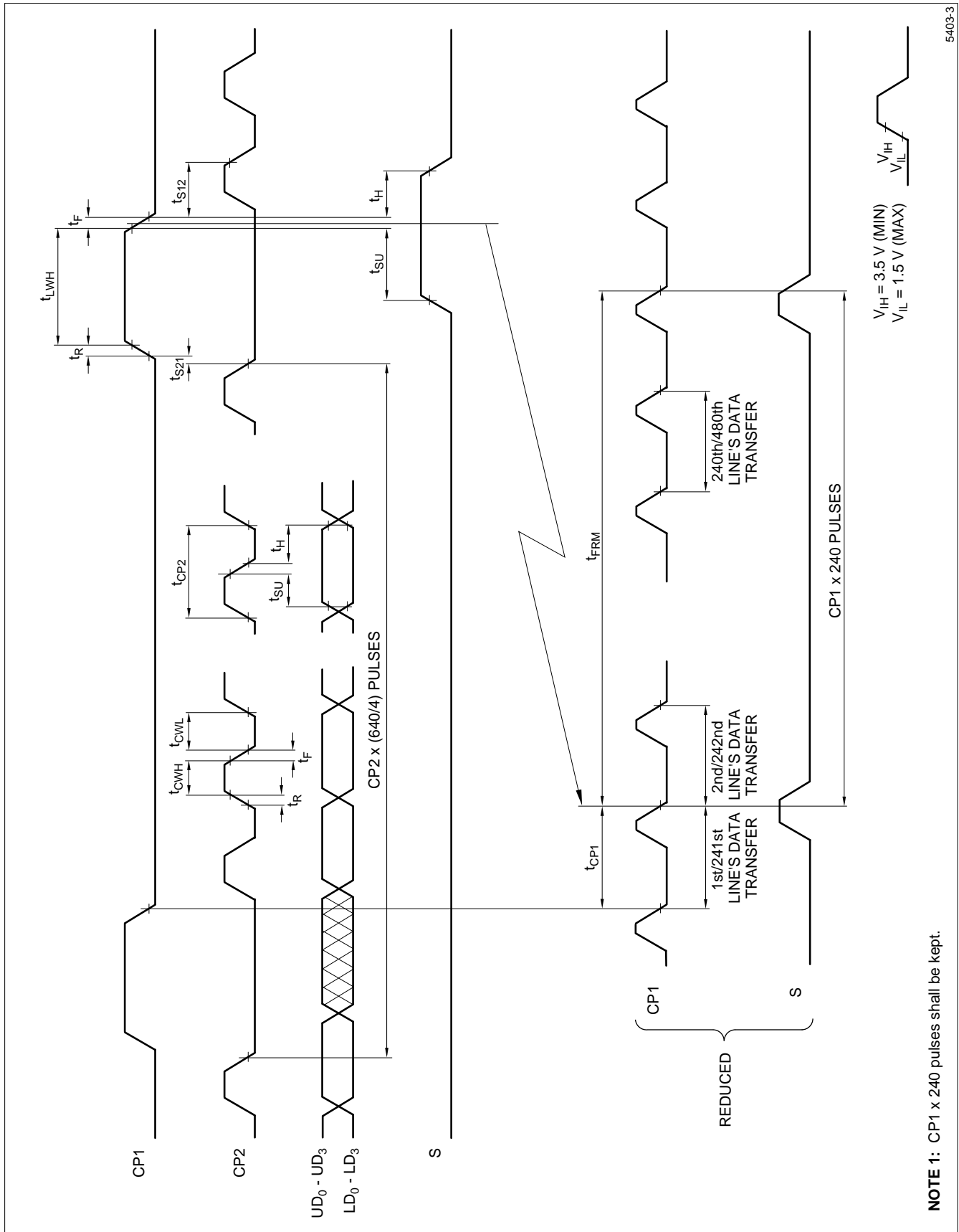
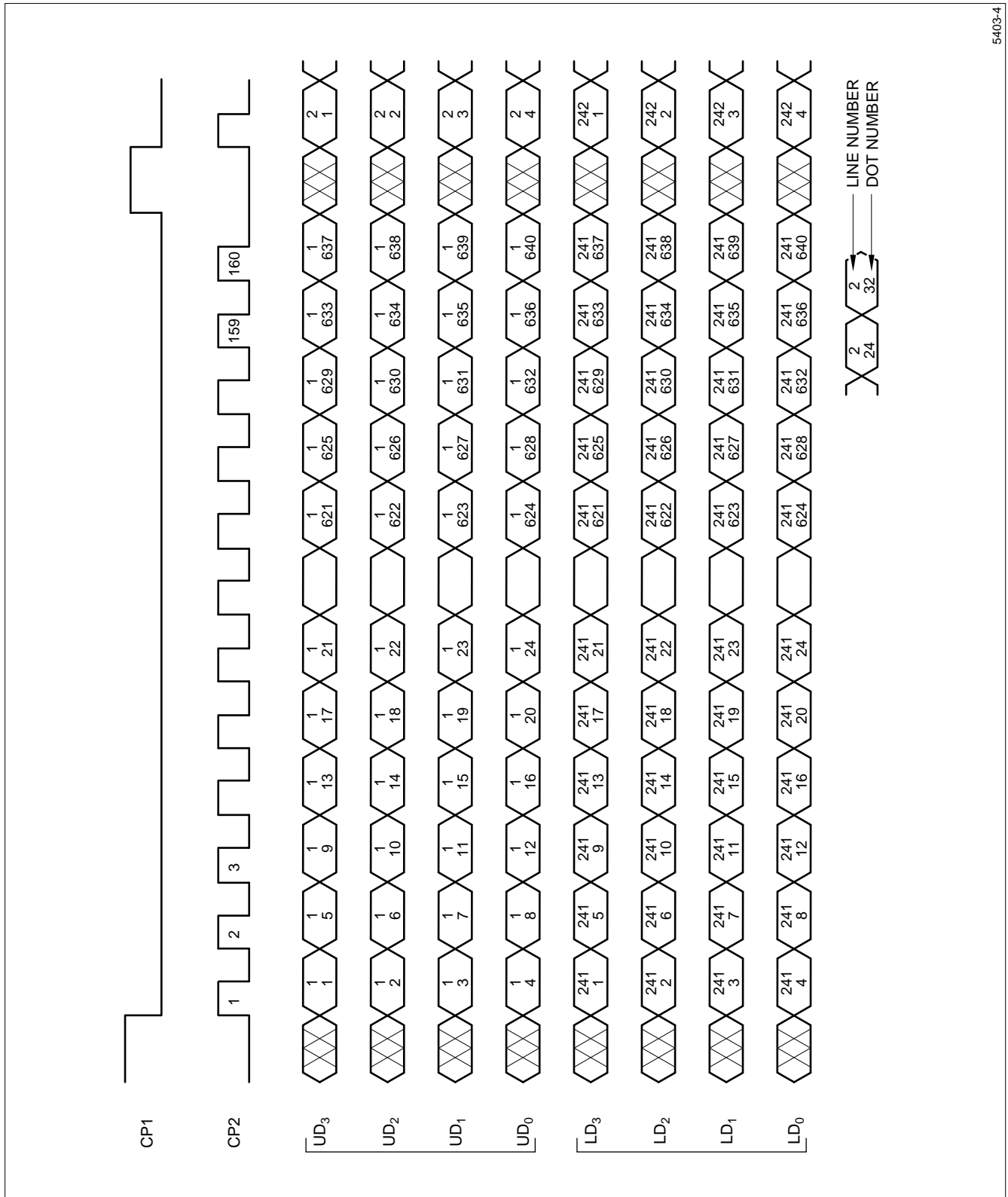


Figure 4. Input Signals Timing Chart

NOTE 1: CP1 x 240 pulses shall be kept.

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Figure 5. Data Transmission Timing Chart

Transmission Data and Relative Position on Panel

LINE ↓	DOT →					639	640
	1	2	3				
UD	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
	•	_____	_____	_____	- -	_____	_____
	•	_____	_____	_____	- -	_____	_____
	•	_____	_____	_____	- -	_____	_____
	239	239 - 1	239 - 2	239 - 3	- -	239 - 639	239 - 640
	240	240 - 1	240 - 2	240 - 3	- -	240 - 639	240 - 640
LD	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

INTERFACE SIGNALS AND POWER SUPPLY CONNECTORS

Assignment of Pins of Connector CN5

NUMBER	SIGNAL	NUMBER	SIGNAL
1	UD ₁	2	UD ₀
3	UD ₃	4	UD ₂
5	LD ₁	6	LD ₀
7	LD ₃	8	LD ₂
9	CP2	10	GND
11	CP1	12	GND
13	S	14	GND
15	GND	16	GND
17	+5 V	18	+5 V
19	+12 V	20	+12 V

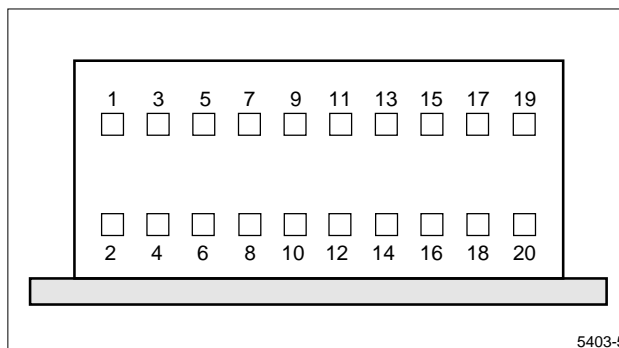


Figure 6. Arrangement of Pins of Connector CN5

Connectors

DESCRIPTION	MODEL NUMBER	MANUFACTURER
Unit-Side Pin Header	DF11-20DP-2DS or equivalents	Hirose Electric Co.
Fitting Socket (Crimp Contact)	DF11-20DS-2C or equivalents (DF11-2428SC)	

NOTES:

1. The length of the cable shall not exceed 50 cm.
2. This unit is not supplied with the fitting socket and the cable.

HANDLING INSTRUCTIONS

- Handle the unit carefully to avoid ESD. The operator and surroundings must be protected against ESD. Hold the mounting arms of four corners of the unit when you handle it.
- The Electro-Luminescent panel is made of glass. Use care when handling it to avoid breakage.
- Do not remove the display control board or disassemble the unit. To avoid damage due to static electricity, do not touch the ICs on the unit.

PRECAUTIONS

- Operate the unit within the rated operating conditions specified in this literature.
- When mounting the unit on your product, design your product to give the unit adequate ventilation.
- Do not operate the unit at high temperature with high humidity. Dew on the connector or on the circuits can damage the unit.
- Do not touch the display control board on the rear side of the unit while in operation. It generates AC pulse of approximately 200 V.
- To avoid the image retention caused by the luminance change due to time lapse, and to increase the panel life, avoid displaying a fixed pattern for a prolonged time and try to use all parts of the viewing area evenly. Also, it is recommended that the unit be used at the lowest ambient temperature possible. Temperature contributes to acceleration of the luminance change due to time lapse.

SIGNAL INPUT BLOCK CIRCUIT

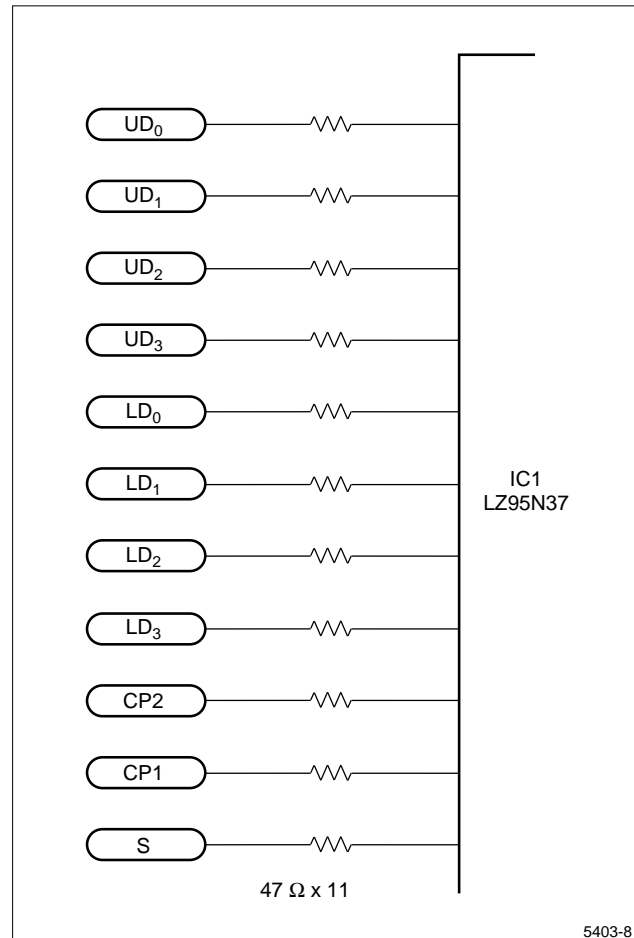


Figure 7. Signal Input Block

POWER SUPPLY INPUT CIRCUIT

Over Current Protection

This unit uses fuses in the power supply input circuit to protect against over current in the internal circuit. Fuses may also blow if the specifications are not adhered to or in the event of a short circuit.

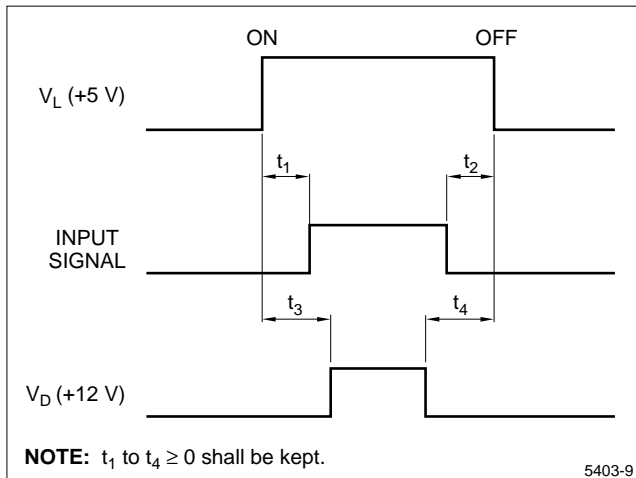


Figure 8. Power On/Off Sequence

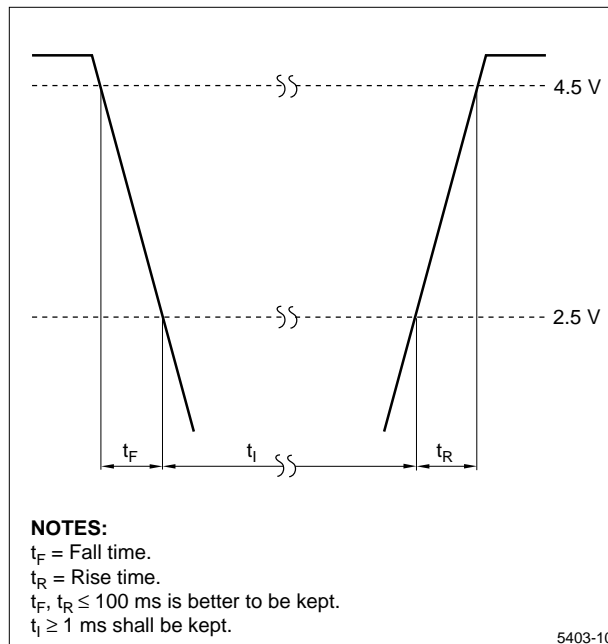


Figure 9. Rise Time/Fall Time

Fuse Specifications

PART NUMBER	MODEL NUMBER	RATINGS	MELT TYPE	MANUFACTURER	AUTHORIZATION STANDARD	NOTE
F1	TR-5 19374 or equivalents	800 mA	Slow	Wickmann	UL, CSA	1
F2		1.6 A				
F3		1.6 A				

NOTE:

- Fuses are not open if current capacity of power supply is small. Fuses are open by surge current if current capacity of power supply is high or supply power to the unit uses relays.

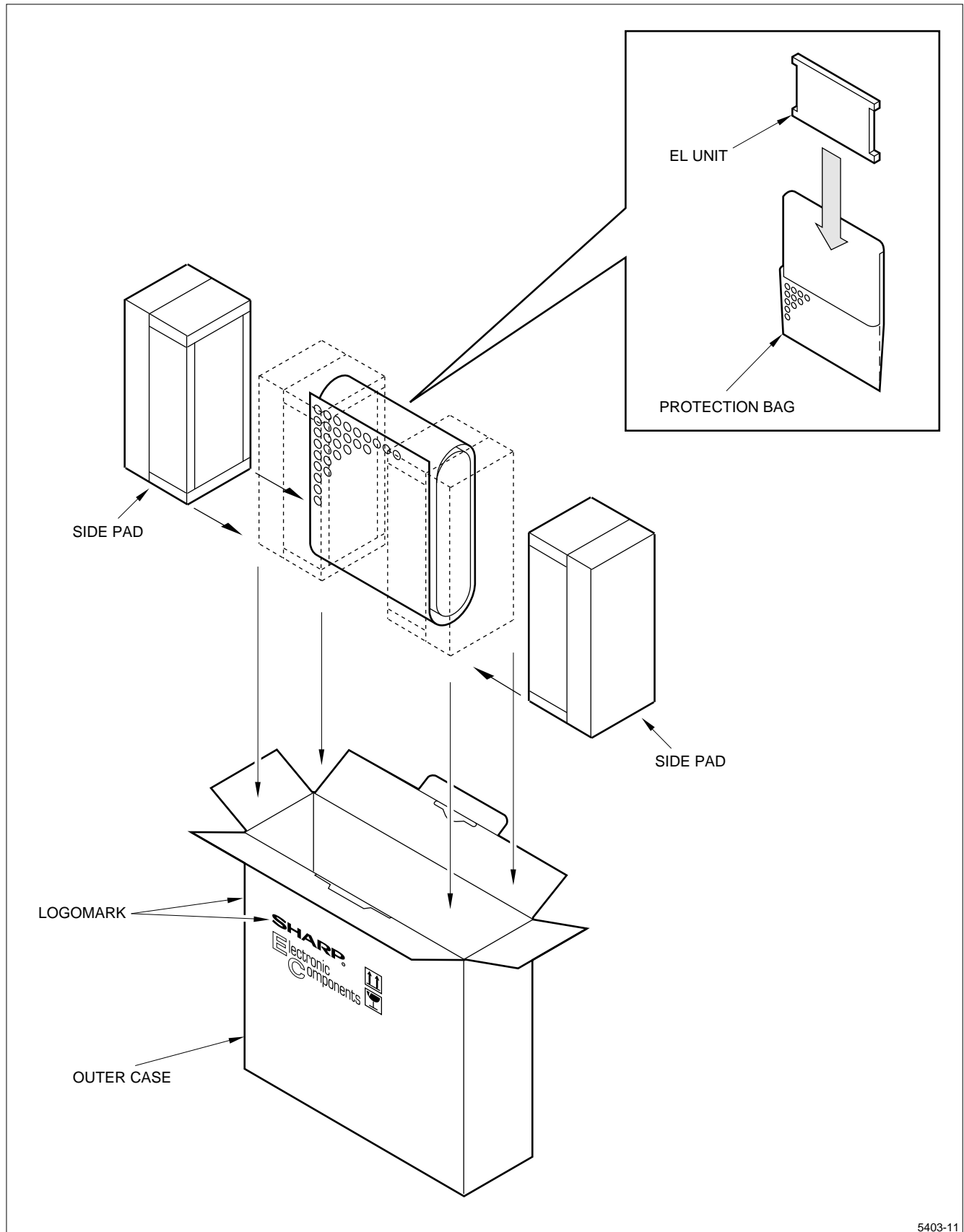
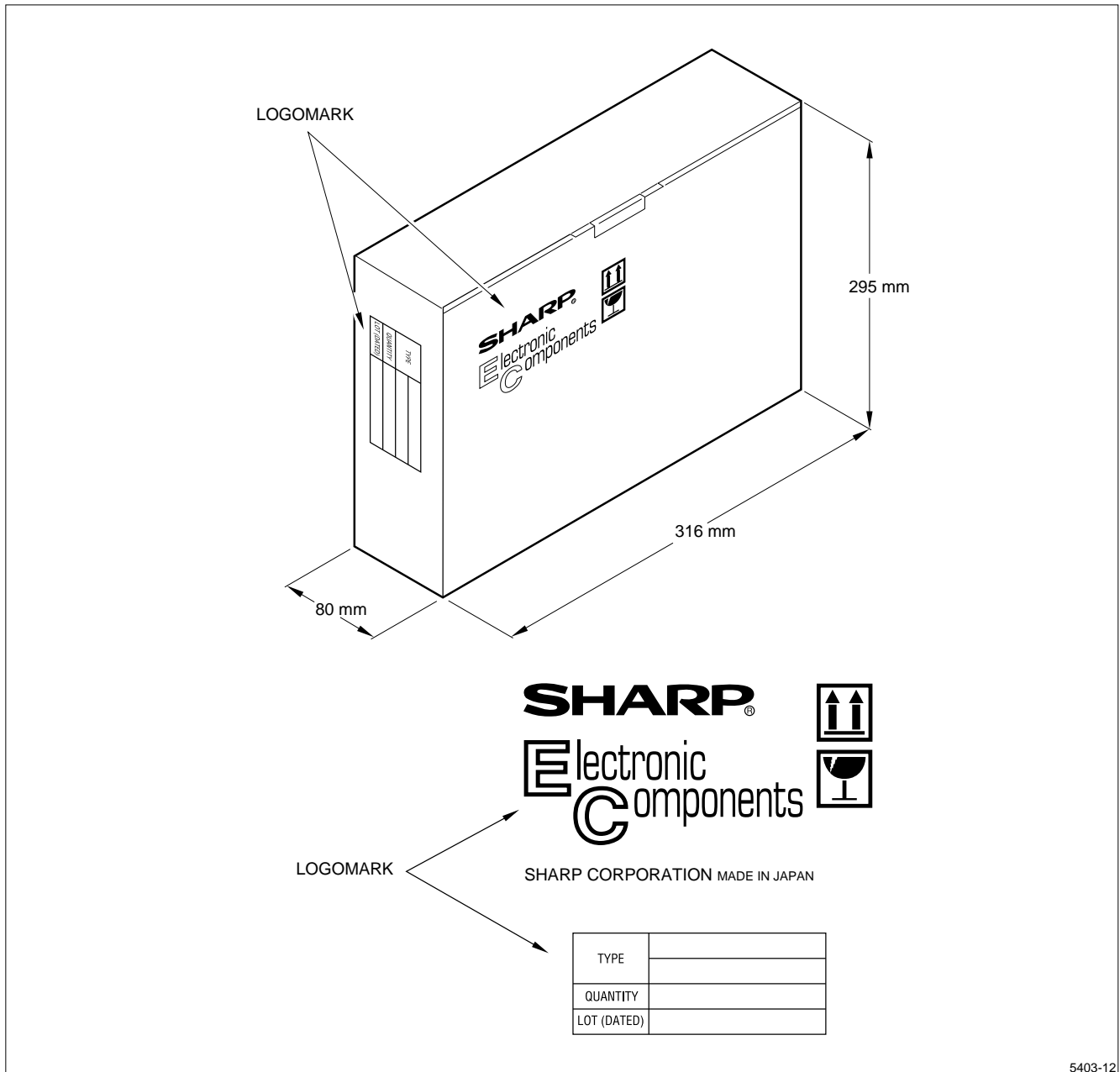


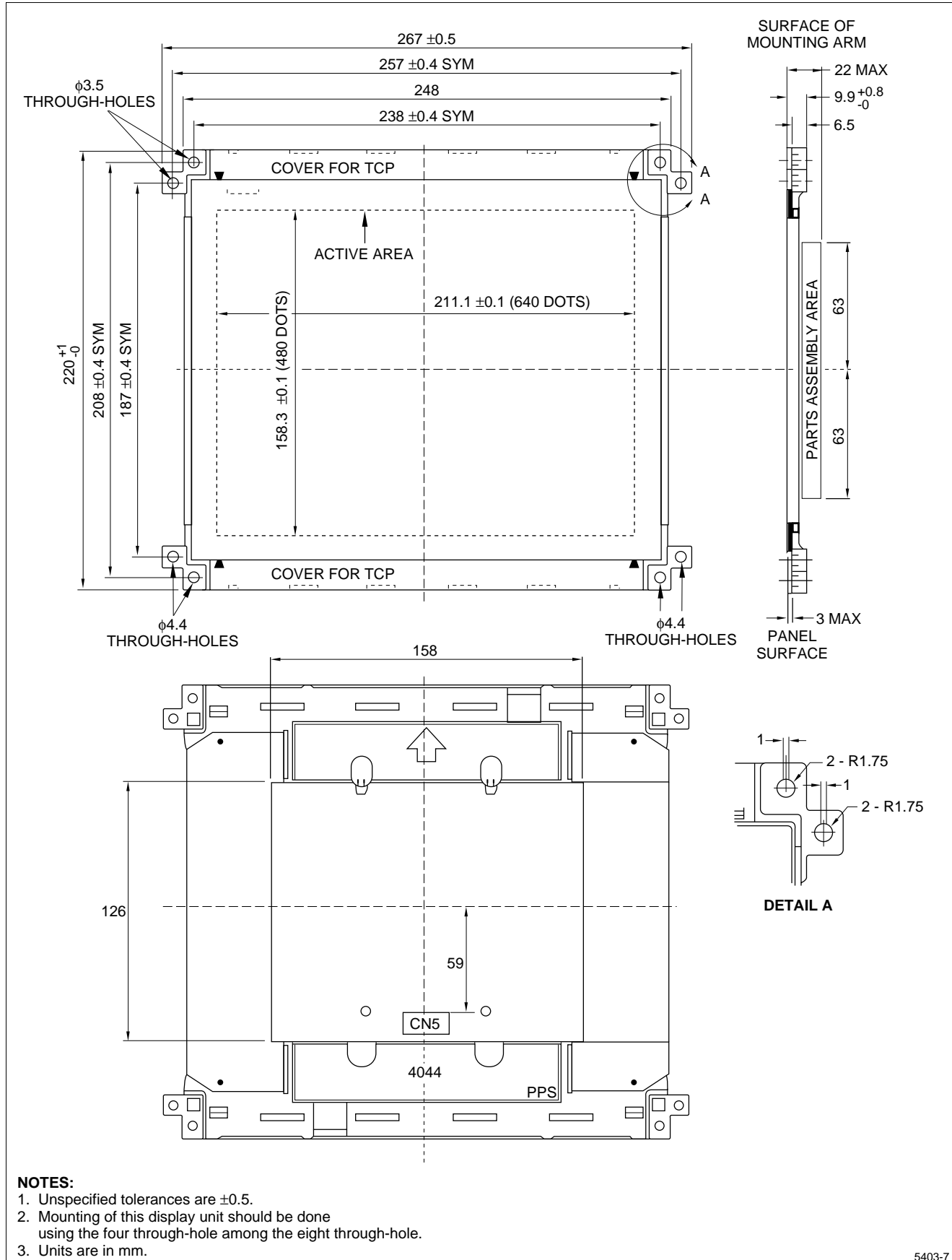
Figure 10. Packing Specifications



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Figure 11. Label Location

OUTLINE DIMENSIONS



- NOTES:**
1. Unspecified tolerances are ± 0.5 .
 2. Mounting of this display unit should be done using the four through-hole among the eight through-hole.
 3. Units are in mm.

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