

LCD Unit Specification

FLC26VGC6S

1. Application

This specification is applied to the 10.4 type VGA supported TFT-LCD unit.

2. Product Name and Model Name

2-1. Product Name

LCD Unit

2-2. Model Name

FLC26VGC6S

3. Overview

This LCD unit is a display device with a display capacity of 640 x 3 (RGB) x 480 dots, and a screen size of 26 cm (10.4 inch) using a TFT active matrix type liquid crystal panel. This unit support VGA standard mode.

This LCD unit has a digital RGB interface and can display 262,144 colors. This LCD unit operates in non-interlace mode.

This side light back light is used in this LCD unit and has two cold cathode fluorescent tubes which are replaceable. A back light driving power source (DC/AC inverter) is not built in this LCD unit.

The power supply of this LCD unit is + 5V DC.

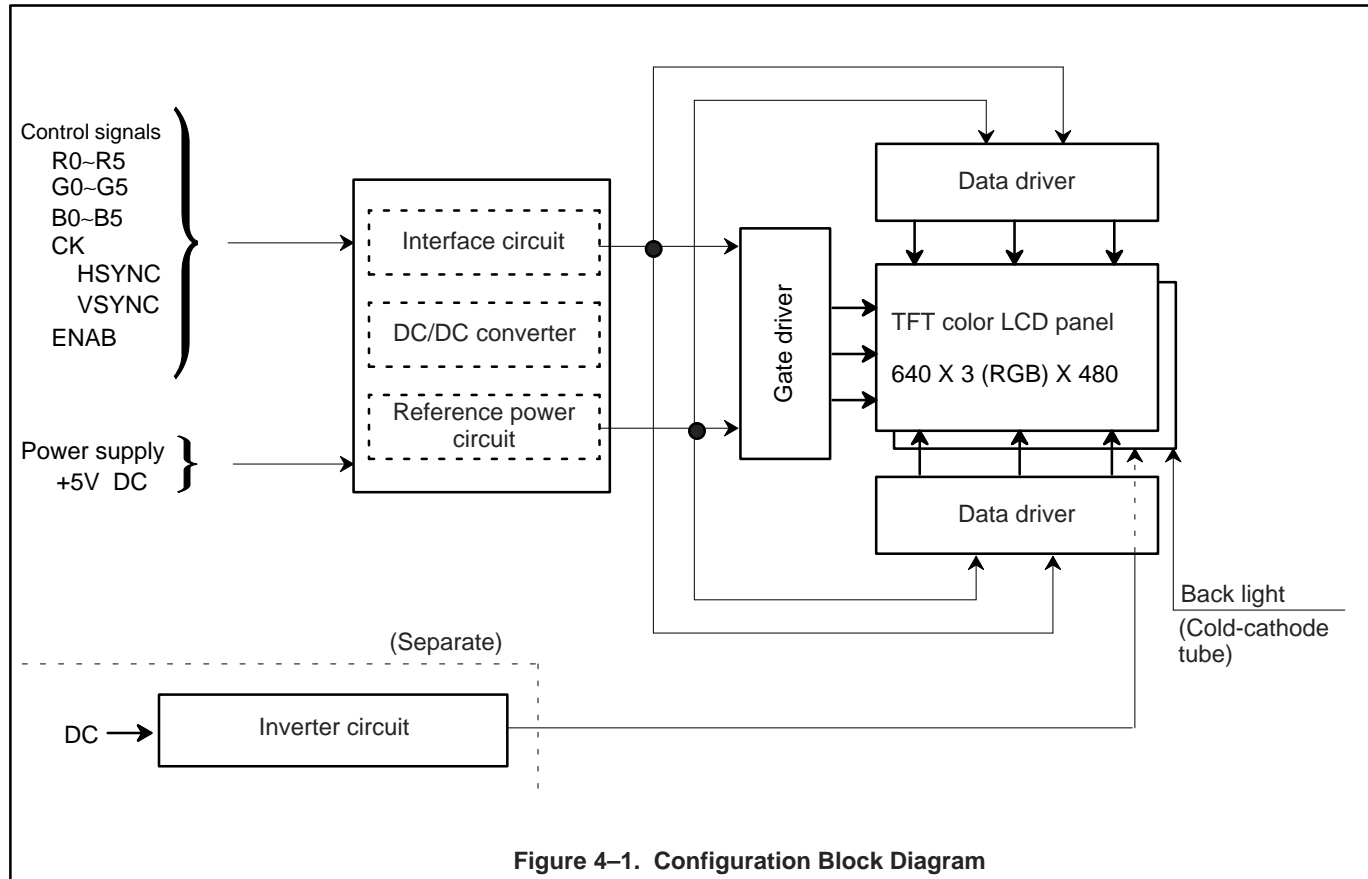
4. Configuration

This LCD unit consists of a TFT color LCD panel to which ICs for driving are mounted, a decorative plate which includes a printed board, a cold-cathode fluorescent tube back light, and an RGB interface printed board. The inverter to supply power to the back light is separate from this LCD unit.

Figure 4-1 shows the configuration block diagram of this LCD unit.

Continued on next page

4. Configuration (Continued)



5. Absolute Maximum Rating

Table 5-1 shows the absolute maximum rating of this LCD unit.

Table 5-1. Absolute Maximum Rating

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply Voltage	V_{CC}	$T_a=25^{\circ}\text{C}$	-0.3	—	6.0	V
Input Voltage	V_{IN}	"	-0.3	—	$V_{CC}+0.3$	V

6. Recommended Operating Conditions

Table 6-1 shows the recommended operating conditions of this LCD unit.

Table 6-1. Recommended Operating Condition

Item	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	V_{CC}	4.75	5.0	5.25	V
Ripple Voltage	(V_{CC}) V_{RP1}	—	—	100	mV _{P-P}

7. Electrical Specifications

Table 7-1 shows the electrical specifications of this LCD unit. Figure 7-2 shows the equivalent circuit of the logic signal input area.

Table 7-1. Electrical Specifications

Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Supply Current		I _{CC}	V _{CC} = +5±0.25V V _{SS} = 0V Ta = 25°C CK = 25.175MHz	—	200	450	mA
“H” Level Logic Input Voltage		V _{IH}		0.7V _{CC}	—	V _{CC}	V
“L” Level Logic Input Voltage		V _{IL}		0	—	0.3V _{CC}	V
Supply Rush Current (Note 1)		I _{SCC}		—	—	0.5	A
Supply Rush Current Duration (Note 1)		T _{SCC}		—	—	10	ms
Back Light (Note 2)	Breakdown Voltage	V _S	f _L = 30kHz	1150	—	—	Vrms
	Lighting Voltage	V _L	f _L = 30kHz	550	610	670	Vrms
	Lighting Frequency	f _L	V _L = 610Vrms	20	30	100	kHz
	Tube Current (Note 3)	I _L	V _L = 610V _{rms} f _L = 30kHz	4.0	5.0	6.0	mA

(Note 1) Rush current, when internal power supply (DC/DC converter) started to operate, is specified.
[Excluding charge current to capacitor of Vcc line]

(Note 2) The specification of the back light is applied when HIU-712A (Harrison Electric Co., LTD) is used for the inverter.

(Note 3) Current value per tube (1 tube/unit)

Measurement circuit is based on Figure 7-1.

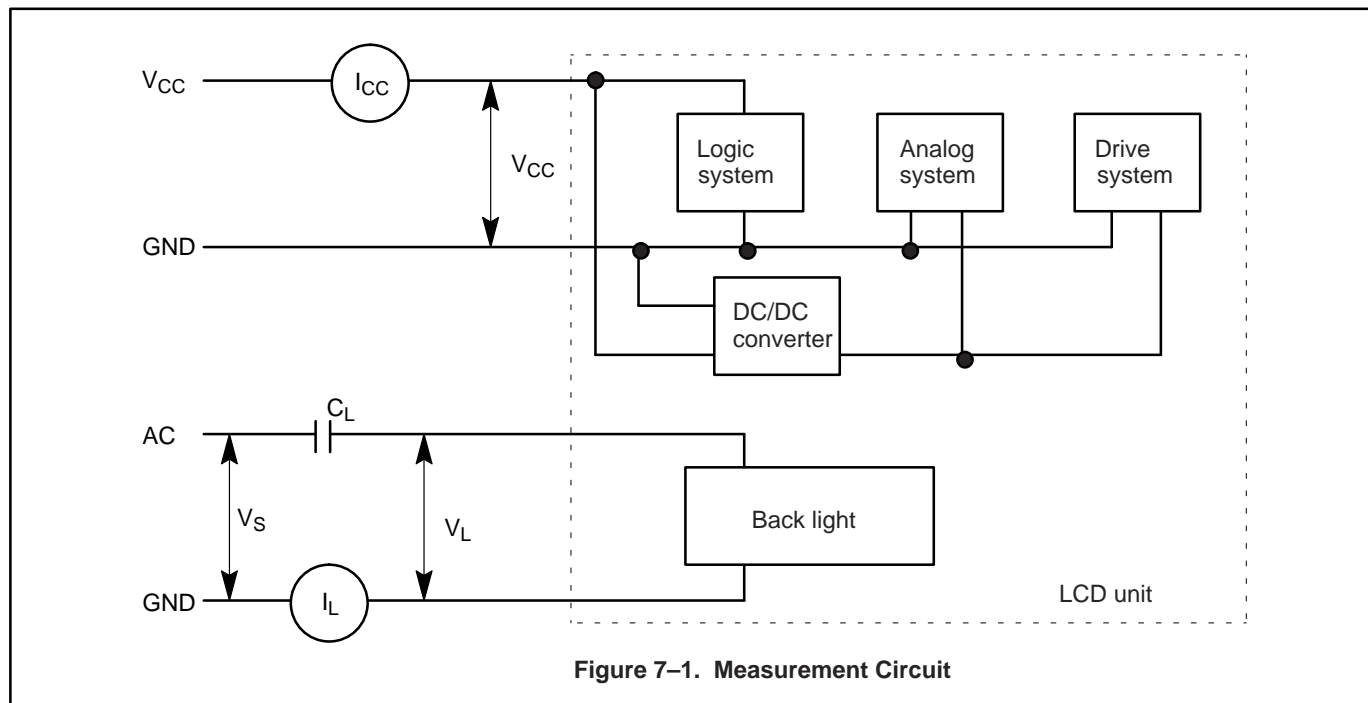
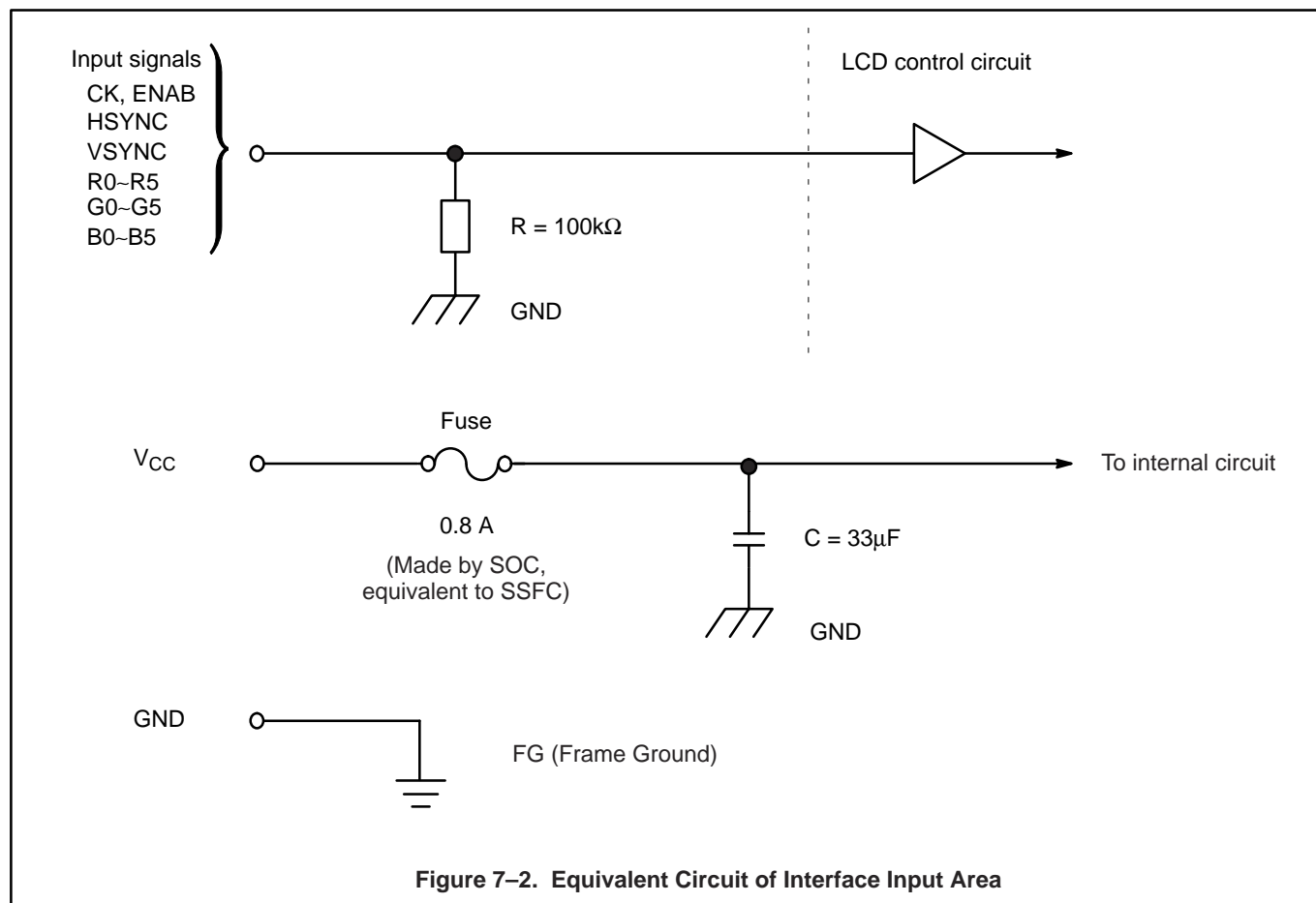


Figure 7-1. Measurement Circuit

Continued on next page

7. Electrical Specifications (Continued)



8. Mechanical Specifications

Table 8-1 shows the mechanical specifications of this LCD unit.

Table 8-1. Mechanical Specifications

Item	Specification	Unit	Remark
Dimension	274.5 x 188 x 13.7 max	mm	Note 1, Note 2
Display Capacity	(640 x 3) x 480	—	
Display Dot Area	211.18 x 158.38	mm	
Dot Pitch	0.11 x 0.33	mm	
Aspect Ratio	1:1	—	
Weight	800 max	g	Note 1

(Note 1) Excluding inverter.

(Note 2) For details on dimensions, see External View (Page 26/26).

9. Optical Specifications

Table 9-1 shows the optical specifications of this unit.

Table 9-1. Optical Specifications

Item	Symbol	Condition		Specification			Unit	Remark	Note
				Min.	Typ.	Max.			
Visual Angle	θ_V	CR \geq 10 Ta = 25°C	$\theta_R = 0^\circ$	50	—	—	deg	Vertical	(1) (2)
	θ_H	VR = 10k Ω	$\theta_U = 0^\circ$	80	—	—	deg	Horizontal	(4) (5) (6)
Contrast Ratio	CR	$\theta_U = 0^\circ, \theta_R = 0^\circ$ Ta = 25°C VR = 10k Ω		50	90	—	—	All white/all black *1	(1) (2) (5)
ON Response Time (White \rightarrow Black)	t_{on}	$\theta_U = 0^\circ$ $\theta_R = 0^\circ$	Ta = 25°C	—	15	50	ms		(1) (3) (5)
			Ta = 0°C	—	50	150	ms		
OFF Response Time (Black \rightarrow White)	t_{off}	$\theta_U = 0^\circ$ $\theta_R = 0^\circ$	Ta = 25°C	—	30	50	ms		(1) (3) (5)
			Ta = 0°C	—	100	150	ms		
Brightness	I	$\theta_U = 0^\circ, \theta_R = 0^\circ$ Ta = 25°C		50	70	—	cd/m ²	At all white display time *2 Note)	(1) (5)
Brightness Uniformity	ΔI	V _{CC} = 5v V _L = 610Vrms		75	—	—	%		(1) (7)
Chromaticity (White)	x	f _L = 30kHz I _f = 5mA		—	0.297	—	—		(1) (5)
	y	VR = 10k Ω		—	0.337	—	—		
LCD Panel Type				TFT Color					
Display Format				Normally White					
Display Colors				262,144 Colors					
Color of non-display area				Black					
Surface Treatment				Anti-glare Process (Haze Value: 5 ~ 13%)					
Visual Angle Direction				6 o'clock Direction					

*1) Contrast ratio is measured with a ϕ 20 spot diameter.

*2) Value at 30 minutes after lighting starts.

Note) Value when tube current of back light is 5 mA.

VR is the resistance value between VR2 ~ VR3 of visual angle direction adjustment VR.

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9. Optical Specifications (Continued)

Note 1: Definition of θ
Based on Figure 9-1.

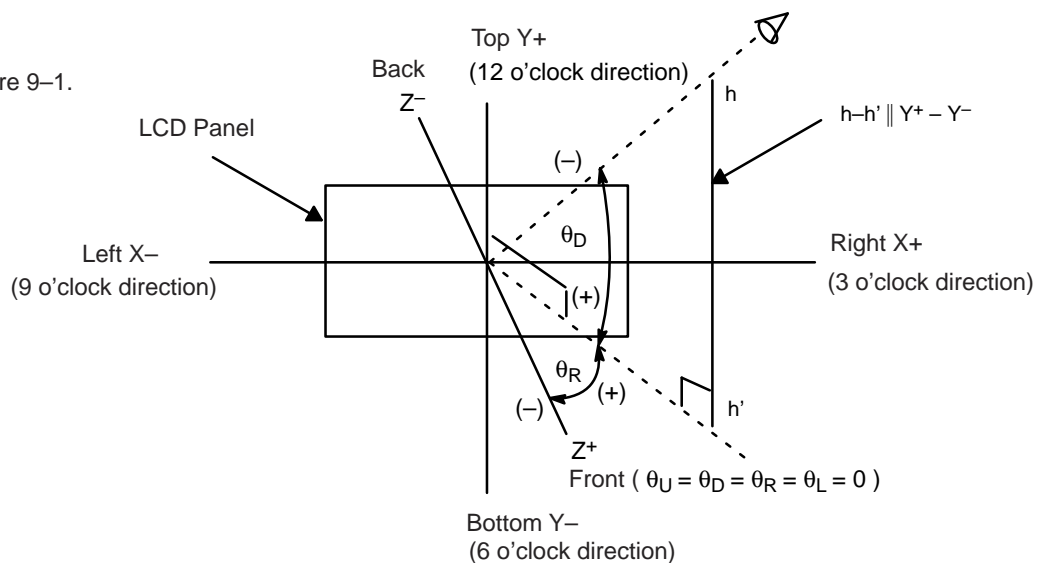


Figure 9-1. Definition of θ

Note 2: Definition of Contrast Ratio (CR)
Determine by formula (1) based on Figure 9-2 Voltage – Brightness Characteristics.

$$CR = \frac{B_W \text{ (Brightness at white display)}}{B_B \text{ (Brightness at black display)}}$$

— (1)

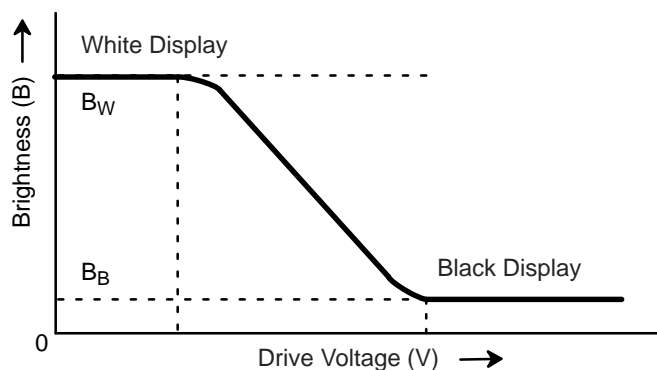


Figure 9-2. Voltage – Brightness Characteristics

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9. Optical Specifications (Continued)

Note 3: Definition of response
Based on Figure 9–3.

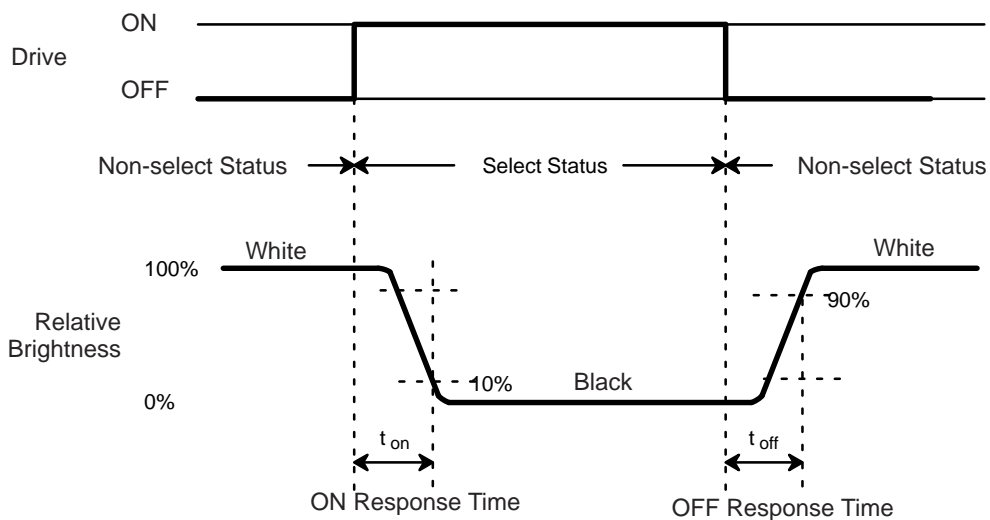


Figure 9–3. Definition of Response

Note 4: Definition of Visual Angle
Based on Figure 9–4.

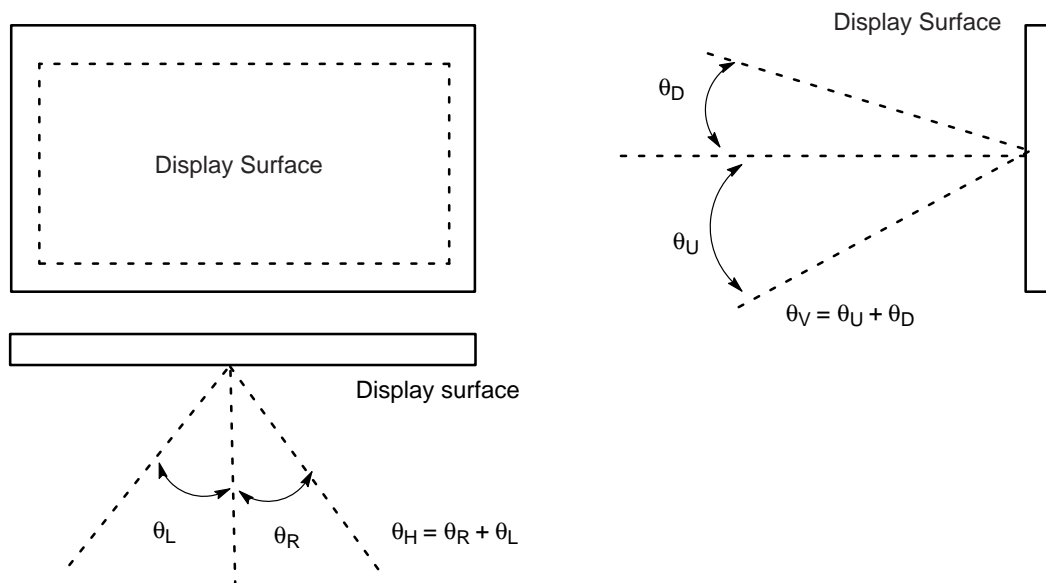


Figure 9–4. Definition of Visual Angle

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9. Optical Specifications (Continued)

Note 5: Contrast Ratio and Response Measurement System
Based on Figure 9-5.

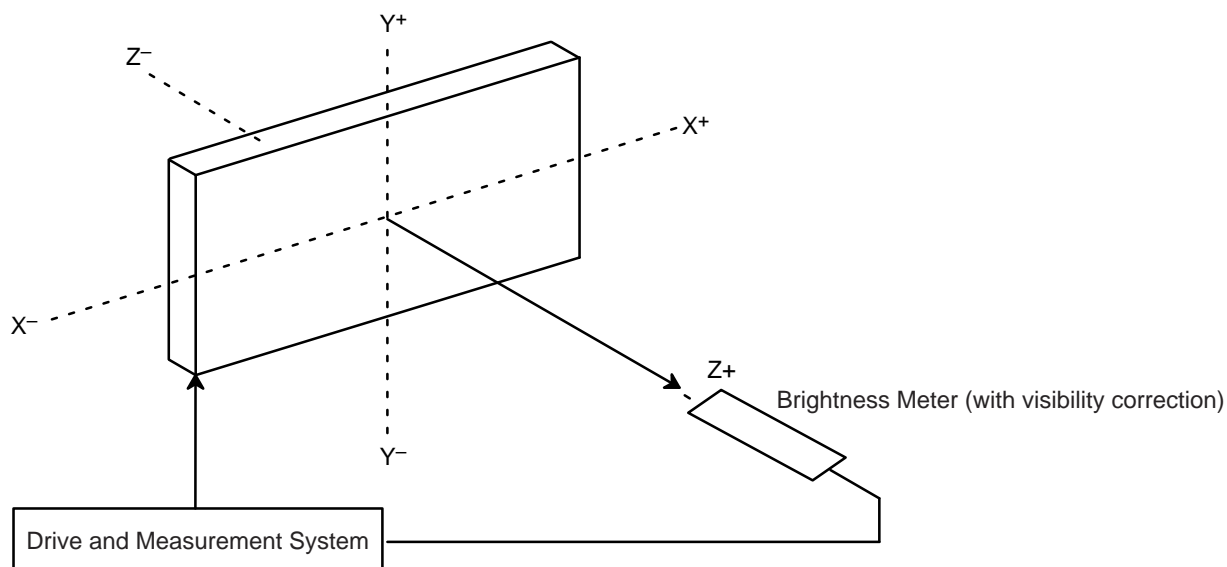


Figure 9-5. Contrast Ratio and Response Measurement System

Note 6: Definition of Visual Angle Direction

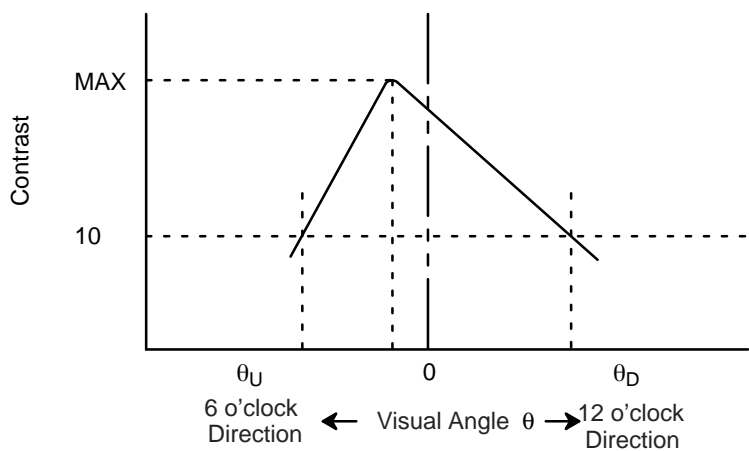


Figure 9-6. Definition of Visual Angle Direction

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9. Optical Specifications (Continued)

Note 7: Definition of Brightness Uniformity

Brightness uniformity is defined by the following formula using brightness measurement values at the following 9 points (① ~ ⑨).

$$\text{Definition Formula : } \frac{\text{Minimum brightness of ① ~ ⑨}}{\text{Maximum brightness of ① ~ ⑨}} \times 100 (\%)$$

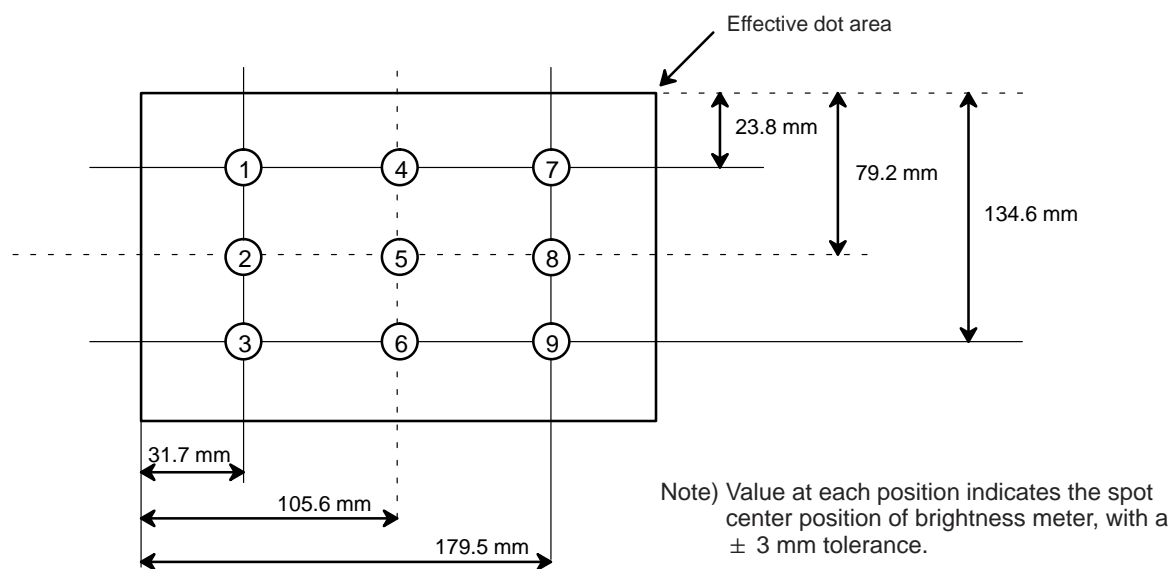


Figure 9-7. Brightness Uniformity Definition Position

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10. Interface Specifications

10-1 Interface Signal Array

Table 10-1 ~ 4 show the type and array of interface signals (CN1 ~ CN4). Data signal lights when it is "H". The NC terminal is an open terminal not connected to internal circuits.

Table 10-1. Interface Signals (CN1)

Terminal No.	Signal Name	Polarity	Function
1	G5	Positive	GREEN Data Signal (MSB)
2	G4	Positive	GREEN Data Signal
3	G3	Positive	GREEN Data Signal
4	GND	—	Ground
5	G2	Positive	GREEN Data Signal
6	G1	Positive	GREEN Data Signal
7	G0	Positive	GREEN Data Signal (LSB)
8	GND	—	Ground
9	R5	Positive	RED Data Signal (MSB)
10	R4	Positive	RED Data Signal
11	R3	Positive	RED Data Signal
12	GND	—	Ground
13	R2	Positive	RED Data Signal
14	R1	Positive	RED Data Signal
15	R0	Positive	RED Data Signal (LSB)

Connector Used: 53261-1510, Adaptive Connector: 51021-1510, Manufacturer: Japan Molex

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10-1 Interface Signal Array (Continued)

Table 10-2. Interface Signals (CN2)

Terminal No.	Signal Name	Polarity	Function
1	VSYNC	See Table 10-3	Vertical Synchronizing Signal
2	HSYNC	See Table 10-3	Horizontal Synchronizing Signal
3	GND	—	Ground
4	CK	↓	Dot Clock Signal
5	GND	—	Ground
6	ENAB	Positive	Data Enable Signal
7	GND	—	Ground
8	B5	Positive	BLUE Signal (MSB)
9	B4	Positive	BLUE Signal
10	B3	Positive	BLUE Signal
11	GND	—	Ground
12	B2	Positive	BLUE Signal
13	B1	Positive	BLUE Signal
14	B0	Positive	BLUE Signal (LSB)

Connector Used: 53261-1410, Adaptive Connector: 51021-1410, Manufacturer: Japan Molex

Table 10-3. Polarity of HSYNC and VSYNC

Display mode	480 lines	400 lines	350 lines
HSYNC	Negative	Negative	Positive
VSYNC	Negative	Positive	Negative

Table 10-4. Interface Signals (CN3)

Terminal No.	Signal Name	Function
1	GND	Ground
2	GND	Ground
3	GND	Ground
4	V _{CC}	+5V (Input power supply)
5	V _{CC}	+5V (Input power supply)

Connector Used: 53261-0510, Adaptive Connector: 51021-0510, Manufacturer: Japan Molex

Continued on next page

10-1 Interface Signal Array (Continued)

Table 10-5. Interface Signals (CN4)

Terminal No.	Signal Name	Function	
1	GND	Ground	
2	VR1	Visual angle direction adjustment VR connecting terminal	(Note 2)
3	VR2	Visual angle direction adjustment VR connecting terminal	
4	VR3	Visual angle direction adjustment VR connecting terminal	
5	GND	Ground	

Connector Used: LZ-5P-SL-SMT, Adaptive Connector: LZ-5S-SC3, Manufacturer: Japan Aviation Electronics Industry

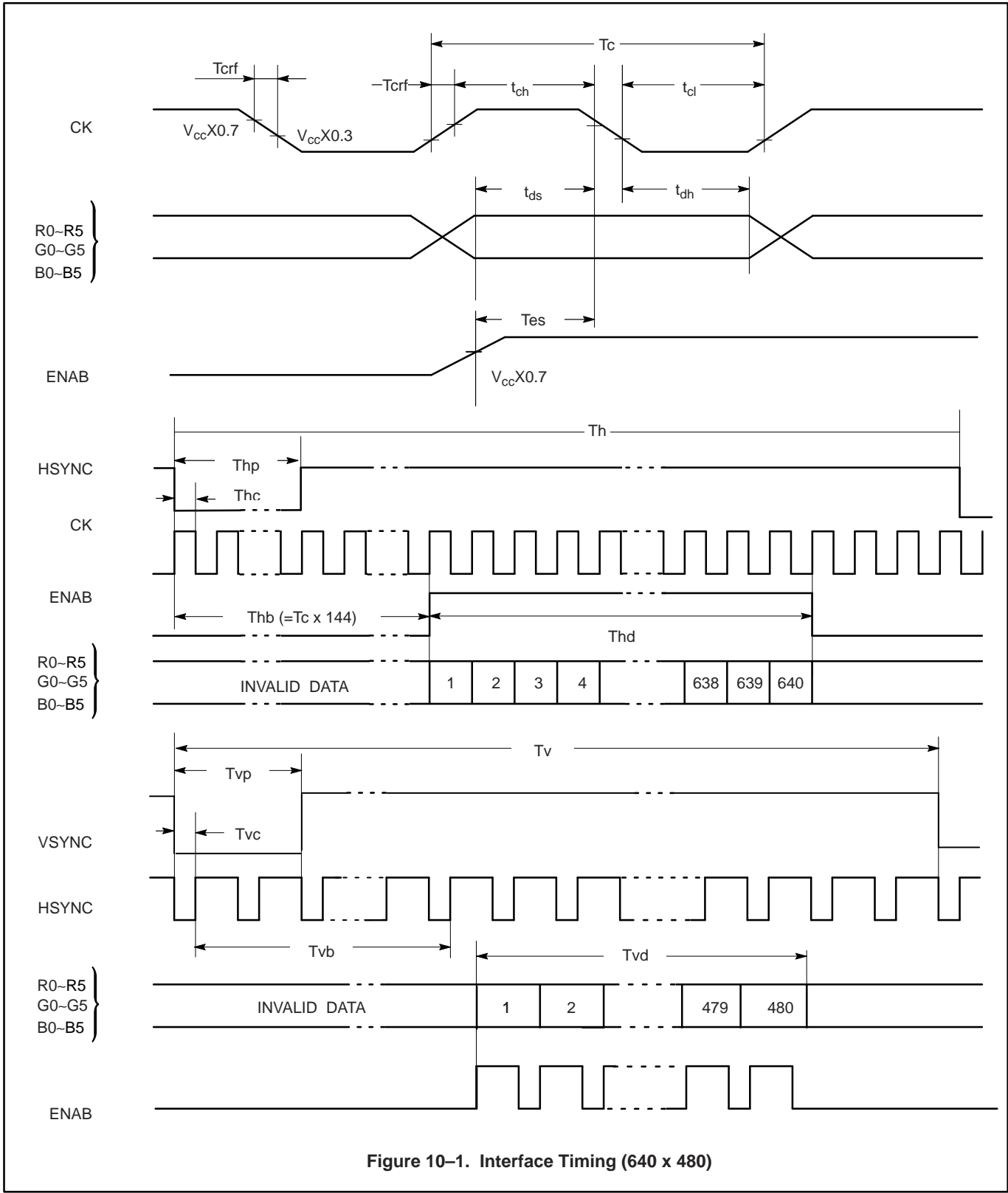
Note 2: Resistance value is 20 k Ω

When resistance value between VR2 ~ VR3 is large, it is dark.

When resistance value between VR2 ~ VR3 is small, it is bright.

10-2 Interface Timing

Based on Figure 10-1, 10-2, and 10-3.



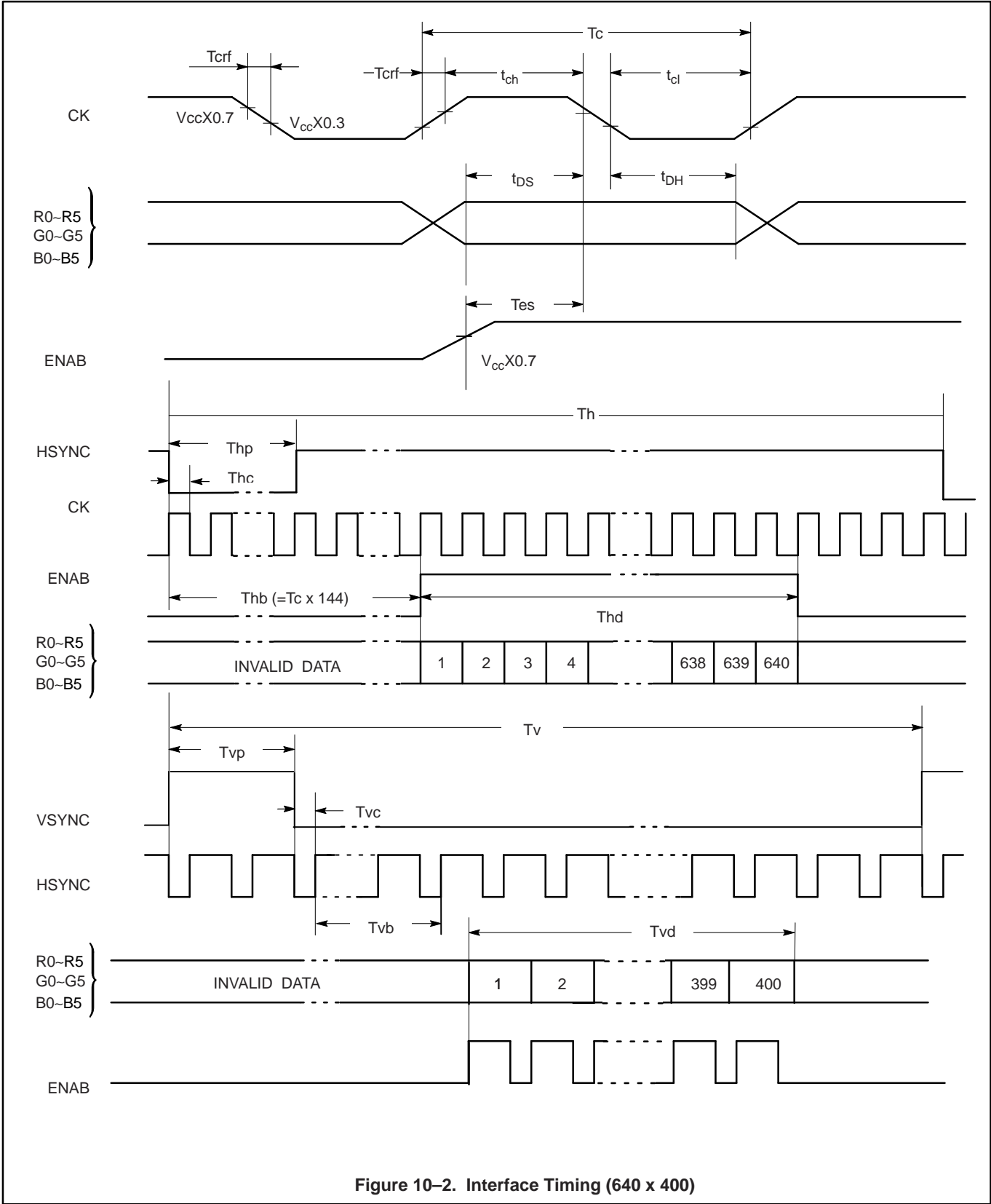


Figure 10-2. Interface Timing (640 x 400)

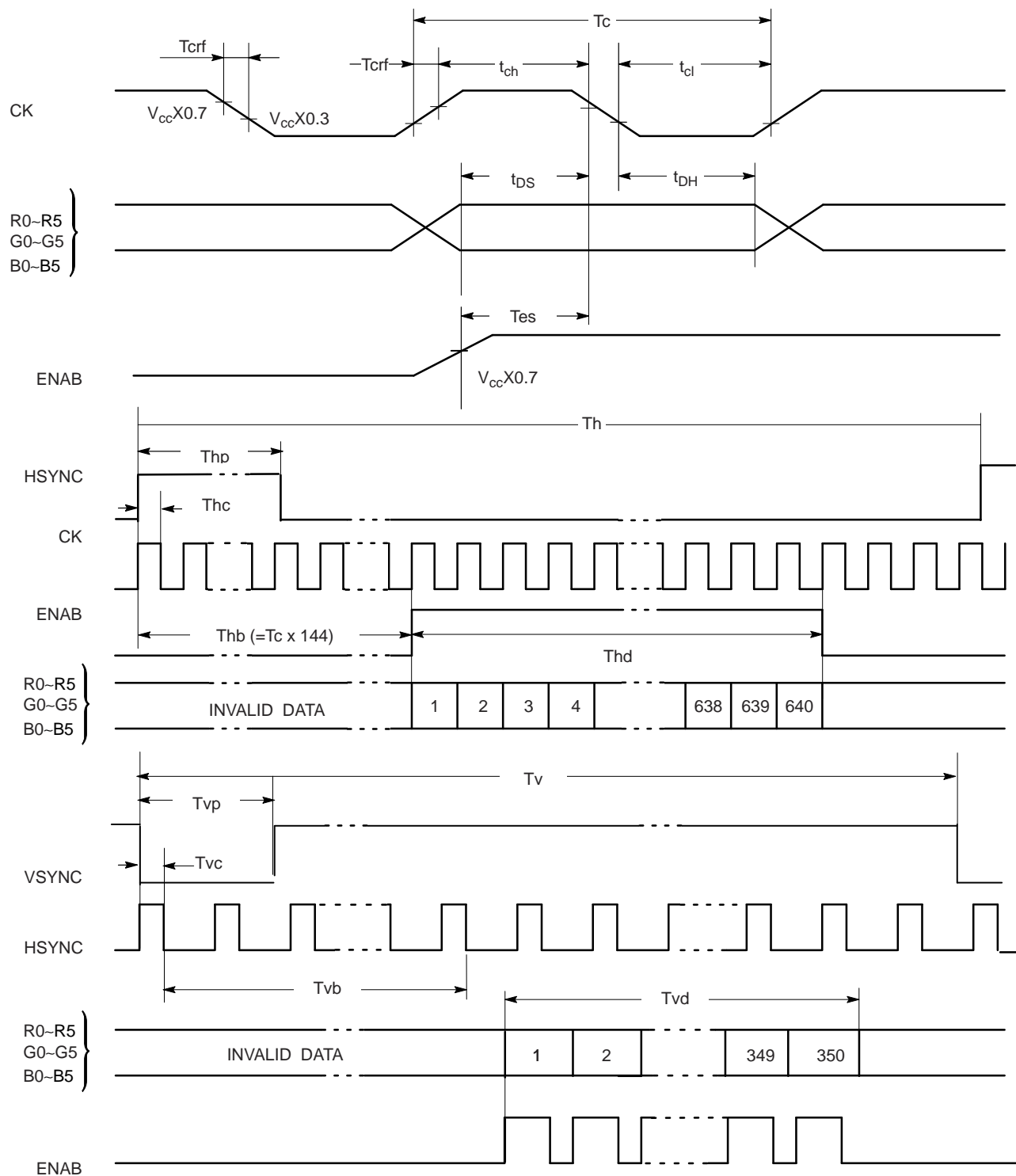


Figure 10-3. Interface Timing (640 x 350)

10-3 Switching Characteristics

Based on Table 10-6

Table 10-6. Switching Characteristics

(Ta=0~50 °C, V_{CC}= 5.0 ± 5%)

Item		Symbol	Mode	Min.	Typ.	Max.	Unit	Remark
Clock (CK)	Frequency	1/Tc	—	23.916	25.175	26.43	MHz	
	Rise Fall Time	Tcrf	—	—	—	5	ns	
	Clock Pulse (H Level)	Tch	—	5	—	—	ns	
	Clock Pulse (L Level)	Tcl	—	10	—	—	ns	
Horizontal synchronous signal (HSYNC)	Cycle	Th	—	30.00	31.78	36.00	μs	
			—	770	800	900	Clock	
	Pulse Width	Thp	—	2	96	—	Clock	
	Back Porch	Thb	—	Thp +10	144	Th-642	Clock	Note 1
	Display Cycle	Thd	—	—	640	—	Clock	
Vertical Synchronous Signal (VSYNC)	Cycle	Tv	480	515	525	560	Line	
		Tv	400	445	449	480	Line	
		Tv	350	447	449	510	Line	
	HSYNC-VSYNC timing	Tvhs	—	0	Thp	Th-Thp	μs	
	Pulse Width	Tvp	—	1	2	—	Line	
	Back Porch	Tvb	480	Tvp+1	33	Tv-483	Line	
		Tvb	400	—	34	—	Line	Note 1
	Display Cycle	Tvb	350	—	61	—	Line	
		Tvd	480	—	480	—	Line	Note 1,3
		Tvd	400	—	400	—	Line	Note 1
		Tvd	350	—	350	—	Line	Note1
Enable Signal (ENAB)	Setup Time	Tes	—	5	—	Tc-10	ns	
	Pulse Width	Tep	—	2	640	Th-2	Clock	Note 2
Data	Setup Time	Tds	—	5	—	—	ns	
	Hold Time	Tdh	—	10	—	—	ns	

(Note 1) The horizontal and vertical display position are specified by the rise of the enable signal (ENAB). The variable range of back porch must be in the range shown in Table 10-6. However the vertical back porch of 400 and 350 lines mode must be fixed.

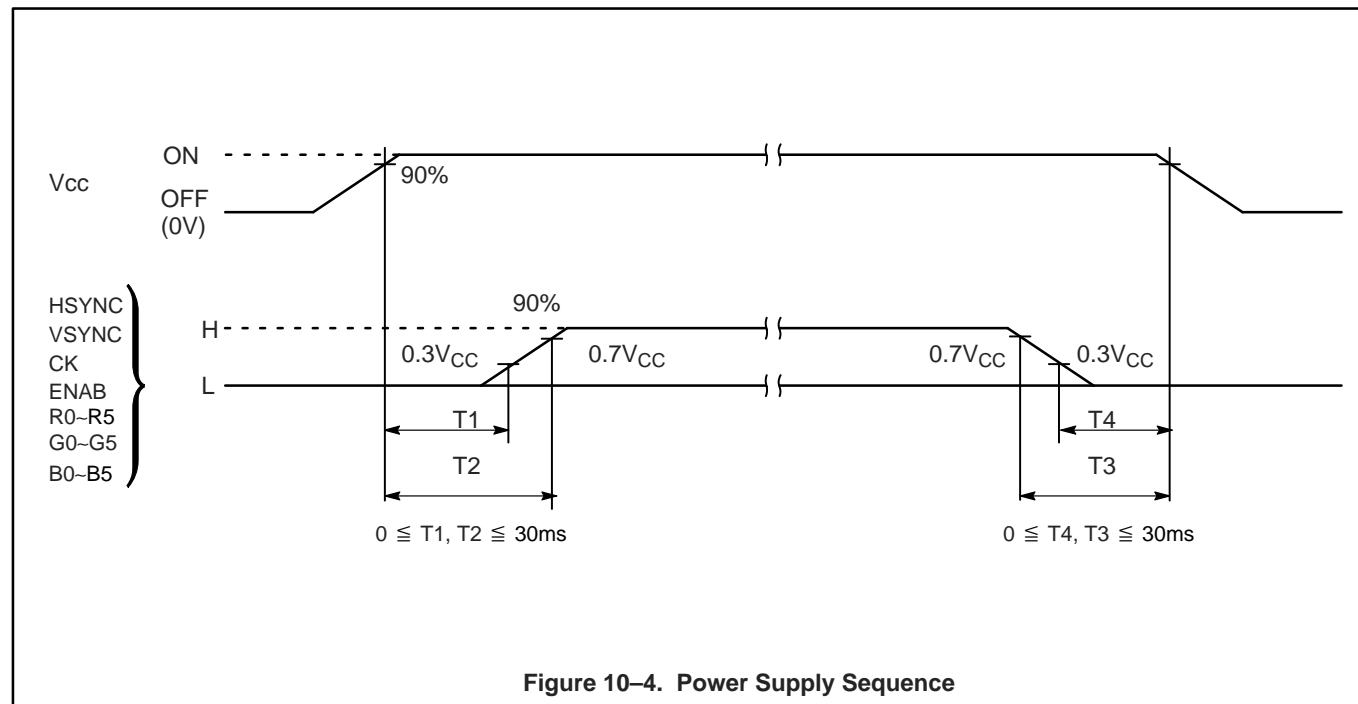
(Note 2) If the pulse width of the enable signal (ENAB) is shorter than 640 clocks, the remaining pixels are displayed black.

(Note 3) In case of the 480 line mode, if the numbers of the enable signal (ENAB) don't reach 480 and the enable signal (ENAB) is "L", the remaining lines are automatically displayed black.

(Note 4) If the effective display data and the enable signal (ENAB) don't synchronize, the screen position is deviated from a normal display.

10-4 Power Supply Sequence

ON/OFF the LCD unit power supply must be in the sequence shown in NO TAG to prevent latchup of the driver IC and to prevent DC drive to the panel.



10-5 Correspondence Between Data and Display Position

Figure 10-5 shows the correspondence between data and the display position.

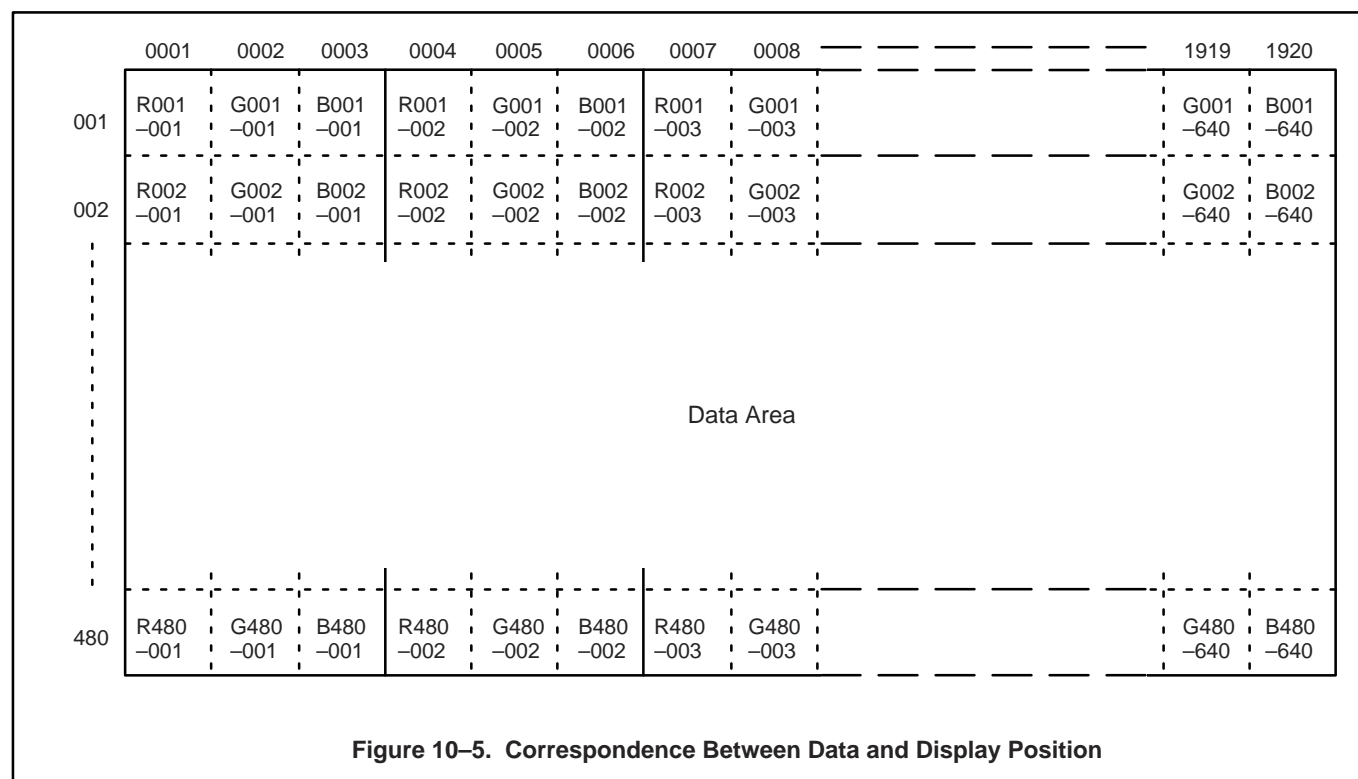


Figure 10-5. Correspondence Between Data and Display Position

11. Back Light Specifications

11-1 Back Light Terminal Array

Table 11-1 (CN-5) shows the type and array of signals for the back light.

Table 11-1. Signals for Back Light (CN-5)

Terminal No.	Signal Name	Funtion	Remark
1	V _{FL}	Power supply for cold-cathode fluorescent tube (High voltage side)	Cable Color: Pink
2	NC		
3	V _{FL}	Power supply for cold-cathode fluorescent tube (Low voltage side)	Cable Color: White

Connector Used: BHR-03VS-1, Adaptive Connector: SM03 (4.0) B-BHS-1-TB, Manufacturer: Japan Solderless Terminal

11-2 Life

The life of the back light is MIN 10,000 hours when the following conditions are met.

(1) Working Conditions

- ① Ambient Temperature: 25 ± 5°C
- ② Tube Current (I_L): 5mA or less

(2) Definition of Life (when one of following occurs)

- ① Brightness became 50% or less of the minimum brightness value shown in Table 9-1 Optical Specification in Section 9.
- ② Breakdown voltage in Table 7-1 Electrical Specification in Section 7 became 1500 Vrms or more.
- ③ Flashing occurred under life guarantee conditions.

12. Appearance Specifications

12-1 Appearance

		Allowable number of pieces: N		Length: L (mm)	Average Diameter: D (mm)
No.	Item	Judgment Method and Standard		Remark	
1	Foreign Matter	Black Particle	$0.5 > D$ $N \leq 4$	Identified when lighting. Defective Inside Cell	
		Fiber	$3.0 > L$ $N \leq 4$		
2	Scratch	Scratch on polarizing plate	$10.0 > L$ $N \leq 6$		
3	Nick	Nick on polarizing plate	$0.5 > D$ $N \leq 6$		

Visually inspect appearance keeping your eyes 35 cm or more from the panel, using one 20W fluorescent light illumination 50 cm above the work table. At this time, the illuminance in the vertical direction to the fluorescent light is 400 ~ 600 lx (reference value).

12-2 Luminescent Spot Standard

12-2-1 Zone

Inside display dot area
(211.18 x 158.38 mm)

12-2-2 Luminescent Spots

(1) Luminescent Spot Classification (Based on brightness samples)

- Visible with 2% ND¹ . . . High luminescent spot R ● G
- Visible with 5% ND¹ filter but not visible with 2% ND filter . . . Low luminescent spot R ● G ● B
- Not visible with 5% ND¹ filter . . . Not counted

(2) Tear of Color Filter

- Tear exceed 1/2 dot . . . High luminescent spot
- Tear 1/2 dot or less . . . Not counted

(3) Tear of Chrome Mask

- Tear exceed 50 μm ø . . . High luminescent spot
- Tear about 50 μm ø level . . . Low luminescent spot
- Tear less than low luminescent spot is not counted.

NOTES:

1. ND, Neutral Density filter. An optical filter manufactured by Fuji.

12-2-3 Number of Luminescent Spots Standard

Brightness Classification	High Luminescent Spots	High and Low Luminescent Spots
Number of Defects	12 or less	25 or less

(Note 1) Display when counting number of luminescent spots must be all black.

(Note 2) Number of high luminescent spots of green (G) must be up to 4.

(Note 3) Number of two low luminescent spots connection must be up to 5.

(Note 4) Number of three luminescent spots connection and two high luminescent spots connection must be 0.

(Note 5) Number of a high luminescent spot and a low luminescent spot connection must be up to 2.

12-2-4 Distance Between Luminescent Spots

- High Luminescent Spots R and G . . . 15 mm or more: good product
- High Luminescent Spot and Low Luminescent Spot . . . 5 mm or more: good product

12-2-5 Black Spots

	Total
Number of Defects	10 or less

(Note 1) Display when counting black spots must be all white.

(Note 2) Connection must be up to 2 dots.

(Note 3) Distance between defects must be 5 mm or more.

(Note 4) If a pixel is partly a black spot, count the number of black spots as follows.

- $A < 1/3$: not counted, the number of 4 connections must be 1 or 0.
 - $1/3 \leq A < 2/3$: regarded as 0.5
 - $2/3 \leq A$: regarded as 1
- (A = area of black spot / pixel area)

13. Environmental Specifications

Table 13-1 shows the environmental specifications.

Table 13-1. Environmental Specifications

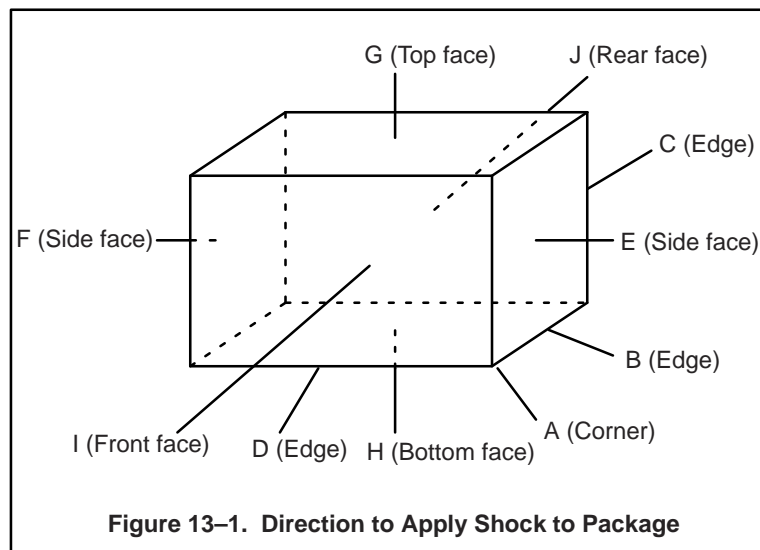
Item	Standard		Remark
Temperature	Operation	0 ~ 50 °C	Temperature on surface of LCD panel (display area)
	Storage	-20 ~ 60 °C	
Humidity	Operation	20 ~ 85 %RH	Maximum wet-bulb temperature must not exceed 29 °C. No condensation.
	Storage	5 ~ 85 %RH	
Vibration	Operation	10 ~ 500 Hz, 0.25 G peak 1 hour each in X, Y and Z directions 1 cycle about 20 minutes.	For single unit
Shock	Non-operation	15G, 6ms Once each in X, Y and Z directions	For single unit For specifications when the unit is packaged, see (Note).

(Note) Table 13-2 and Figure 13-1 show the shock resistance standard when the unit is packaged.

Continued on next page

Table 13–2. Shock Resistance Standard When Unit is Packaged

Dropping Location	Dropping Height	Count
A, B, C, D	55cm	Once each
E, F, G, H, I, J	65cm	



14. Indications

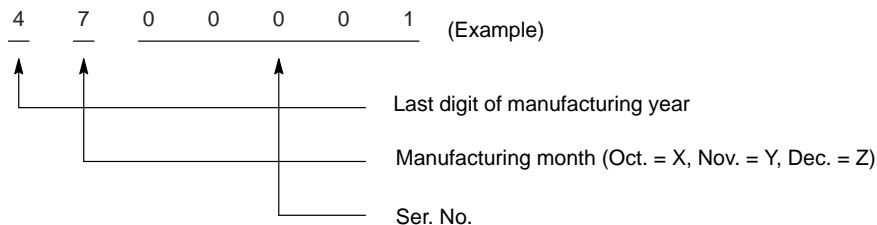
This unit has the following indications.

(1) **Product Name:** LCD Unit

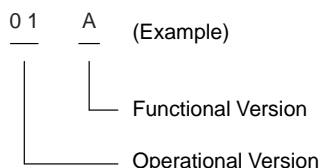
(2) **Product Model:** FLC26VGC6S

(3) **Product Drawing No.:** NA19014-C951

(4) **Manufacturing No.:**



(5) **Version No.:** 01 A



(6) **Manufactured Country Name:** Japan

(7) **Company Name:** Fujitsu Ltd.

(8) **Disposal method of cold-cathode fluorescent tube**

15. Packaging Specifications

Specified separately in the packaging specifications.

16. Warranty

- (1) The warranty period is one year after shipment. Products that fail during this period are repaired or replaced without charge, unless the failure is caused by the user.

17. Precautions

Adhere to the following precautions to correctly use this LCD unit.

(1) Handling of LCD Panel

- ① The LCD panel is made of glass. Do not apply any strong mechanical shock to it.

Excessive shock may damage the panel or cause a malfunction.

- ② Do not press hard on the LCD panel surface.

In the LCD panel, the gap between two glass plates is kept extremely even to maintain the display characteristics and reliability. If this panel is pressed hard, the following occurs.

- (a) ununiform color, (b) orientation of liquid crystal becomes disorderly

Problem (a) returns to normal after a while. Problem (b) returns to normal if the power is shut off once then turned on again. However, these occurrences must be avoided to insure reliability.

Continued on next page

17. Precautions (Continued)

- ③ Do not scratch the polarizing plate on the LCD panel surface.

The polarizing plate is made of a soft film. Therefore the following must be adhered to.

- Do not press or rub the display surface with a hard tool, pincet, etc.
- For handling, use cotton or conductive gloves so that the display surface is not contaminated.
- If the display surface is contaminated by dust and dirt, clean it as follows with a soft cloth.

[Dust] Wipe off with a soft cloth (do not rub).

[Dirt] Lightly wipe off with a soft cloth soaked in the specified solvent.

Specified solvent: isopropyl alcohol

Do not use water and such solvents as ketones (acetone, etc.) and aromatic hydrocarbons (xylene, toluene, etc.)

[Note] Be careful not to let the specified solvent enter the unit.

- If saliva or water drops are left for a long time, the area may become deformed or discolored. Wipe these off immediately in the same way as [dirt].
 - Do not let oil adhere to the unit, since cleaning oil is difficult.
- ④ Do not place or contact objects on the display surface, since this may leave traces.

(2) Handling of LCD Unit

- ① Do not strongly pull the cold-cathode fluorescent tube cable.

If the cable is pulled with a 2kg or stronger force, the cable may be damaged or reliability may decrease. Pull within the specified value of force.

- ② Assemble the device in a dust free environment.

If conductive foreign matter adheres to the unit, failures may occur.

- ③ Take anti-static measure when assembling the device.

Since the LCD unit uses a CMOS-IC, the following considerations are necessary.

- Do not take the unit out of the conductive bag until the time when the device is assembled.
- When assembling the device, the operator must be grounded, wearing cotton or conductive gloves.
- For the area to assemble the device, place an earth mat on the floor and work table, and discharge static electricity by an earth wire.
- If necessary, ground operation tools (soldering iron, radio pliers, pincet, etc.).
- Assemble the device in a humidity-controlled environment (50 ~ 60%).
Do not work in an environment where the humidity is extremely low (50% RH or less).

- ④ Do not strongly pull the connecting cable on the rear face of the LCD unit.

If the FPC cable is strongly pulled, failures may occur.

- ⑤ Do not disassemble or remodel the LCD unit.

If this LCD unit is disassembled or remodeled, the display quality and reliability may not be assured.

(3) Precautions When Operating LCD Unit

- ① Signal input terminals not being used must be connected to Vcc or Vss, so that the desired logic functions are implemented.
- ② Adhere to the specified power supply sequence.

If ① and ② are not followed, the CMOS-IC may cause a latchup, or the DC voltage may be applied to the liquid crystal, and failure or a serious display quality deterioration may occur.

Continued on next page

17. Precautions (Continued)

- ③ Do not operate the LCD unit when condensation is present.

If the LCD unit is operated when condensation occurs to the output terminals of the LCD area, the terminal area causes an electro-chemical reaction, which may cause disconnection.

Condensation easily occurs particularly when the unit is moved from a cold to warm environment.

- ④ Do not operate the LCD unit with the drive voltage exceeding the specified voltage.

If the LCD unit is operated with the drive voltage exceeding the specified voltage, the IC may be damaged or the life of the liquid crystal may be shortened considerably.

- ⑤ Use the LCD unit within the specified operating temperature range.

If the LCD unit is used at a lower temperature than the specified operating temperature, the response speed decreases considerably.

- ⑥ Always input the control signals.

If control signals (CK, ENAB, HSYNC, VSYNC) are not input or if the timing of these signals is different from the specification, a black display is performed by the clock generated by the internal oscillation circuit to prevent DC drive to the panel. However, the display in this status does not satisfy the desired display quality.

(4) Precautions When Designing Device Mounting

- ① Do not press the display surface and base face of the LCD unit.

If the display surface must be very strongly pressed due to the device mounting design, the desired display quality and reliability may not be assured. If the back light base must be pressed due to the mounting design, brightness uniformity and reliability of the cold-cathode fluorescent tube may not be assured.

- ② Consider the device mounting design, so that twisting and bowing do not occur to the LCD unit.

Outstanding twisting and bowing may damage the display quality and reliability.

- ③ Do not extend the power cable length between the LCD unit and inverter.

The back light may not light or flickering may occur.

- ④ Do not contact the cable of the cold-cathode tube and the metal plate.

Leakage may occur and the specified brightness may not be obtained.

(5) Storage Method

- ① Do not store the LCD unit in organic solvent and in a corrosive gas atmosphere.

In an organic solvent atmosphere, the polarizing plate discolors and the display quality deteriorates. In a corrosive gas environment, various problems may occur.

- ② Store the LCD unit in a Fujitsu package or in a unitary package.

When storing, Fujitsu packages can be stacked to a maximum of 3, and unitary packages can be stacked to a maximum of 6.

The LCD unit inside a unitary package is in an anti-static bag. Keep the unit in that status.

- ③ It is recommended that the storage environment be a humidity-controlled cool dark location.

Recommended Storage Environment:

- Place Dark (avoid direct sunlight)
 - Temperature 10 ~ 35°C
 - Humidity 50 ~ 60 % RH
- ④ If the LCD unit is left or used in an environment of 60°C or more, the polarizing plate may deteriorate and contrast may decrease.
- ⑤ If the LCD unit is left or used in an environment of -20°C or lower, the liquid crystal may solidify and the LCD panel may be damaged.

Continued on next page

17. Precautions (Continued)

(6) Disposal Method

① LCD Unit

Components can be classified into metal, resin and glass.

The material name or its abbreviation is written on the resin components. Mercury is in the cold-cathode tube used as the light source of the back light. Dispose of the tube according to the related laws.

② Packaging Material

Except for the anti-static bag, packaging material is completely made of paper which can be recycled.

(7) Other

① If the LCD panel is damaged, do not inhale or allow the liquid crystal to enter the mouth.

If the liquid crystal contacts the body or cloth, immediately wash it off with soap. Follow precautions for regular electronic components.

② Flux may remain on the printed board used for the LCD unit.

Since parts are mounted with a non-cleaning system, a small amount of flux may remain.

18. Other

If the content is to be changed, both parties must discuss the matter before changing a specification. If the content of this specification is questionable, the problem must be solved based on discussions of both parties.

