

To : _____

Specification of FUJITSU TFT-LCD module

FLC51UXC8V-10LA

Approval
Date : By :

This Product is designed, developed and manufactured as contemplated for general use, including without limitation, general office use, personal use, household use, and ordinary industrial use, but is not designed, developed and manufactured as contemplated for use accompanying fatal risks or dangers that, unless extremely high safety is secured, could lead directly to death, personal injury, severe physical damage or other loss (hereinafter "High Safety Required Use"), including without limitation, nuclear reaction control in nuclear facility, aircraft flight control, air traffic control, mass transport control, medical life support system, missile launch control in weapon system. If customer's product possibly falls under the category of High Safety Required Use, please consult with our sales representatives in charge before such use. In addition, Fujitsu shall not be liable against the Customer and/or any third party for any claims or damages arising in connection with the High Safety Required Use of the Product without permission.

Specification No. : Tech Bes LCD-00279

Issue Date : July 30, 2004

Issued by :



Katsunori. Tanaka
Project Director
LCD Products Div.

FUJITSU DISPLAY TECHNOLOGIES CORPORATION

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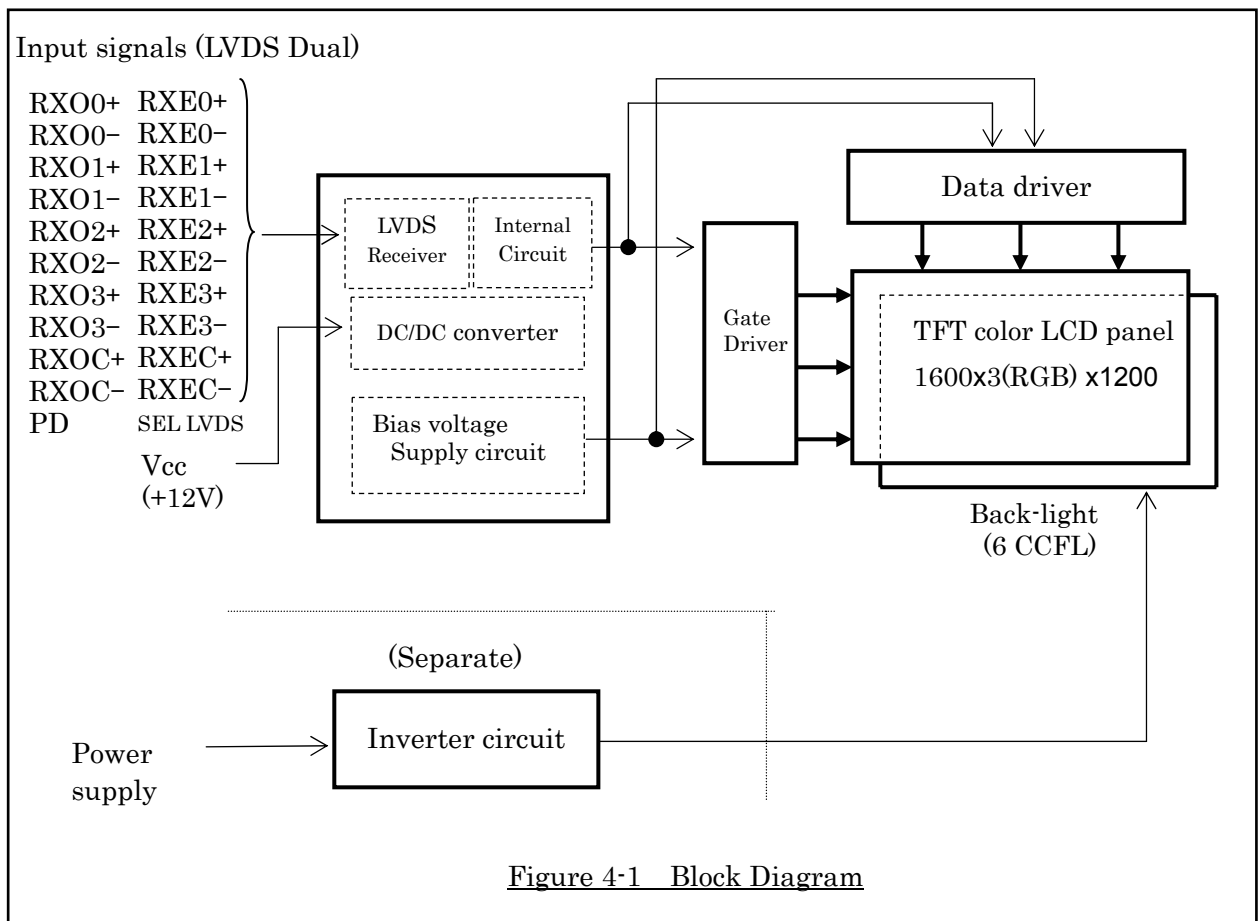
A

B

C

D

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5. MECHANICAL SPECIFICATIONS

Table 5-1 shows the mechanical specifications of this LCD module.

Table 5-1 Mechanical Specifications

Item	Specifications	Unit	Remark
Dimensions	432 x 331.5 x 25(TYP.)	mm	Edge type back-light is used. (φ 2.6 CCFLx6) For details on dimensions, See dimensional outline drawing. (At page 34,35) Excluding inverter.
Display Resolution	(1600x3) x 1200	—	
Display Dot Area	408.0 x 306.0	mm	
Dot Pitch	(0.085x3) x 0.255	mm	
Aspect Ratio	1:1	—	
Weight	3,500 (Max)	g	
FG-SG	Short circuit	—	

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A	6. ABSOLUTE MAXIMUM RATING Table 6-1 shows the absolute maximum rating of this LCD module. <u>Table 6-1 Absolute Maximum Rating</u> <table><tr><th>Item</th><th>Symbol</th><th>Condition</th><th>MIN.</th><th>TYP.</th><th>MAX.</th><th>Unit</th></tr><tr><td>Supply Voltage</td><td>V_{CC}</td><td>Ta=25°C</td><td>−0.3</td><td>—</td><td>14.0</td><td>V</td></tr><tr><td>Input Signal Voltage (LVDS signal, PD, SEL LVDS)</td><td>V_{IN}</td><td>Ta=25°C</td><td>−0.3</td><td>—</td><td>3.6</td><td>V</td></tr></table>							Item	Symbol	Condition	MIN.	TYP.	MAX.	Unit	Supply Voltage	V _{CC}	Ta=25°C	−0.3	—	14.0	V	Input Signal Voltage (LVDS signal, PD, SEL LVDS)	V _{IN}	Ta=25°C	−0.3	—	3.6	V	A
Item	Symbol	Condition	MIN.	TYP.	MAX.	Unit																							
Supply Voltage	V _{CC}	Ta=25°C	−0.3	—	14.0	V																							
Input Signal Voltage (LVDS signal, PD, SEL LVDS)	V _{IN}	Ta=25°C	−0.3	—	3.6	V																							
B								B																					
C	7. RECOMMENDED OPERATING CONDITIONS Table 7-1 shows the recommended operating conditions of this LCD module. <u>Table 7-1 Recommended Operating Conditions</u> <table><tr><th>Item</th><th>Symbol</th><th>MIN.</th><th>TYP.</th><th>MAX.</th><th>Unit</th></tr><tr><td>Supply Voltage (Logic)</td><td>V_{CC}</td><td>11.5</td><td>12.0</td><td>12.5</td><td>V</td></tr><tr><td>Ripple Voltage</td><td>V_{CC}</td><td>V_{RP}</td><td>—</td><td>—</td><td>0.1</td><td>V</td></tr></table>							Item	Symbol	MIN.	TYP.	MAX.	Unit	Supply Voltage (Logic)	V _{CC}	11.5	12.0	12.5	V	Ripple Voltage	V _{CC}	V _{RP}	—	—	0.1	V	C		
Item	Symbol	MIN.	TYP.	MAX.	Unit																								
Supply Voltage (Logic)	V _{CC}	11.5	12.0	12.5	V																								
Ripple Voltage	V _{CC}	V _{RP}	—	—	0.1	V																							
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8. ELECTRICAL SPECIFICATIONS

Table 8-1 shows the electrical specifications of this LCD module. Figure 8-1 shows the measurement circuit. Figure 8-2(A) shows the equivalent circuit of the logic signal input area. Figure 8-2(B) shows the equivalent circuit of the supply voltage Input area.

Table 8-1 Electrical Specifications

Item		Symbol	Condition	MIN.	TYP.	MAX.	Unit	Remark
Differential-input Voltage (High)		V _{IH}	V _{CM} =+1.2V	—	—	100	mV	
Differential-input Voltage (Low)		V _{IL}		−100	—	—	mV	
Supply Current		I _{CC}	V _{CC} =+12.0±0.5V V _{SS} =0V DCLK=81MHz 60Hz	—	500	1000	mA	*1
Supply Rush Current		I _{SCC}		—	—	3.0	A	*2
Supply Rush Current Duration (1A excess)		T _{SCC}		—	—	1	ms	
B A C K L I G H T (*3)	CCFL Turn on Voltage	V _S	f _L =50kHz, T _a =25°C	—	1600	1800	V _{rms}	*4
			f _L =50kHz, T _a =0°C	—	—	1850	V _{rms}	*4
	Lighting Voltage	V _L	f _L =50kHz I _L =6mA	—	800	—	V _{rms}	
	Lighting Frequency	f _L	V _L =800V _{rms}	30	50	60	KHz	
	Tube Current	I _L	f _L =50kHz V _L =800V _{rms}	3	6	7	mArms	*3

(*1) Typical current situation : Vertical gray scale pattern. Vcc=12.0V
Maximum current situation: White screen. Vcc=11.5V
Without rush current.

(*2) These items prescribe the rush current for starting internal DC/DC. Charging current to capacitors of Vcc is not prescribed.

(*3) Tube current (I_L) shows the value of the current that is consumed at one lamp.
This LCD module has 6 lamps. Each 3 lamps are placed at upper side and lower side of the display.
3 lamps are connected in parallel. Each low voltage terminals are connected with separate Cable to Back-light connector.

(*4) The voltage above this value should be applied to the lamp for more than 1 second to startup.
Otherwise the lamp may not be turned on.

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Note 1) Definition of Viewing Angle (1)

Based on Figure 9-1.

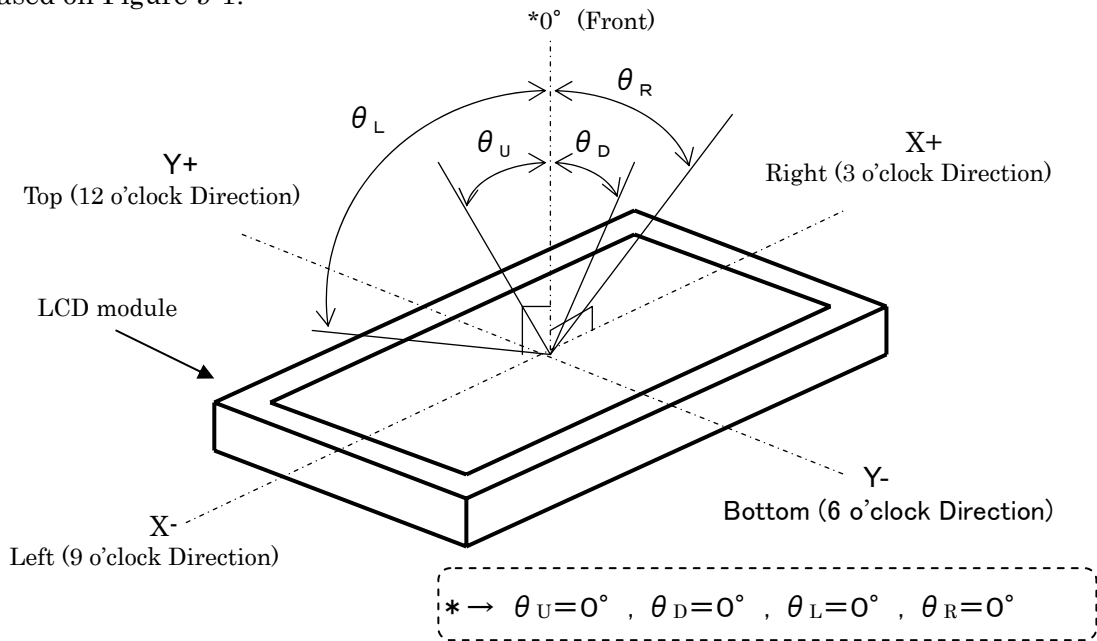


Figure 9-1 Definition of Viewing Angle (1)

Note 2) Definition of Viewing Angle (2)

Based on Figure 9-2.

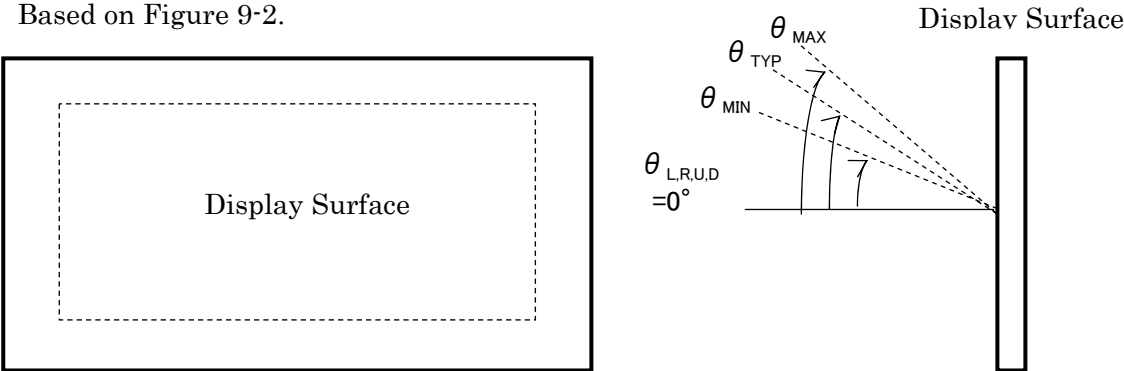


Figure 9-2 Definition of Viewing Angle (2)

Note 3) Definition of Contrast Ratio (CR)

Determined by Formula (1) based on Figure 9-3 Voltage-Brightness characteristics.

$$= \frac{L_W (\text{Brightness at white})}{L_B (\text{Brightness at black})} \dots\dots(1)$$

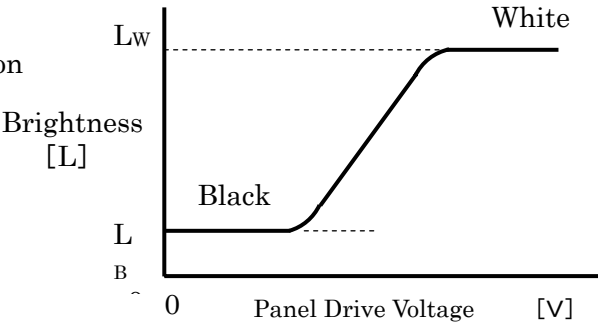


Figure 9-3 Voltage-Brightness Characteristics

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②Note 4) Definition of Response Time

Based on Figure 9-4.

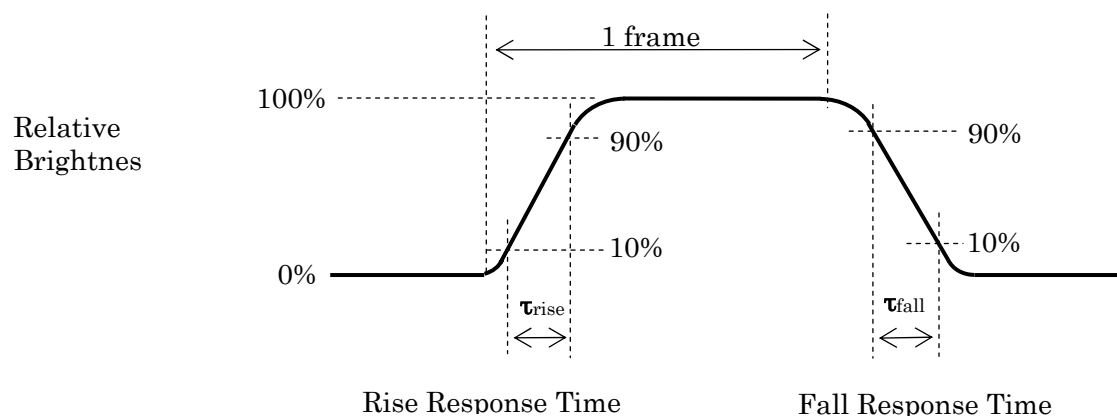


Figure 9-4 Definition of Response Time

Note 5) Contrast Ratio and Response Measurement System

Based on Figure 9-5.

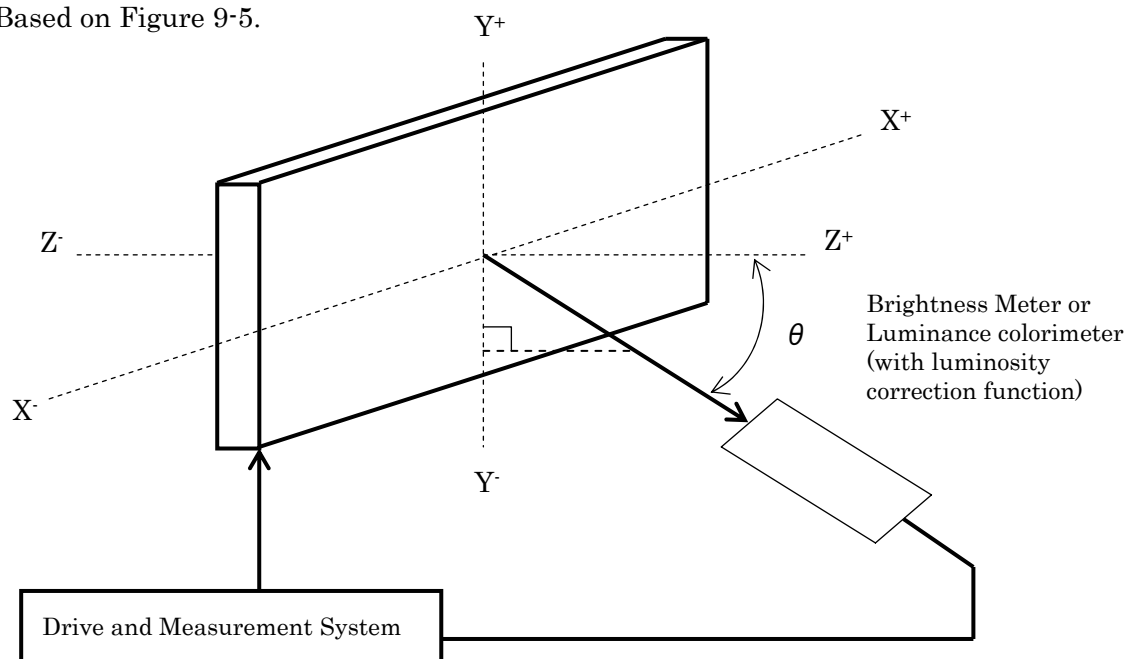


Figure 9-5 Contrast Ratio and Response Time Measurement System

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Note 6) Definition of Optimum Viewing Angle

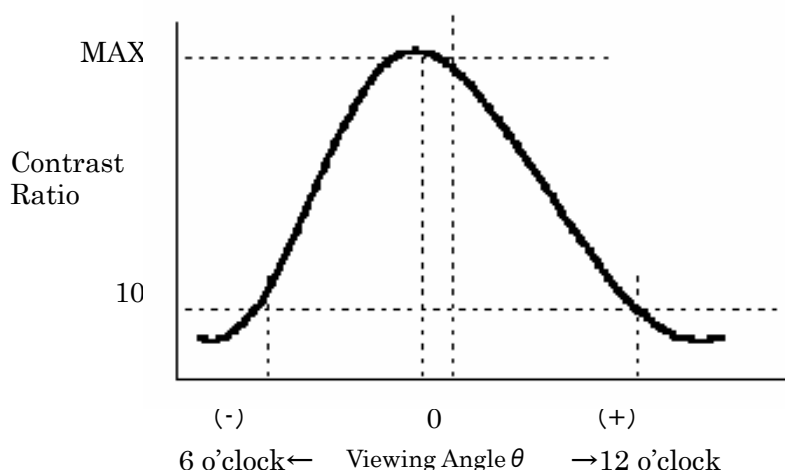


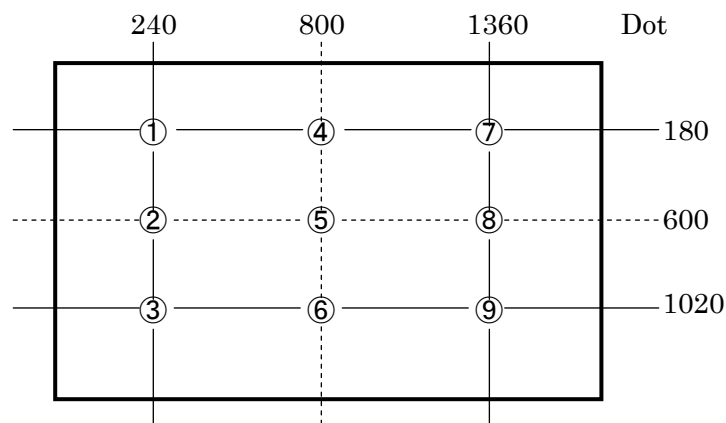
Figure 9-6 Definition of Viewing Angle

Note 7) Definition of Brightness Uniformity

Brightness uniformity is defined by the following formula.

Brightness (I1~I9) are measured at the following 9 points (①~⑨) on the display area that is shown in Figure 9-7.

$$\text{Brightness Uniformity } (\Delta L) = \frac{|\text{Min. In }|}{|\text{Max. In }|} \times 100 (\%) , n = 1 \text{ to } 9$$



Note) Each measurement point (①~⑨) defines the center spot of view of Brightness Meter.
The tolerance of measurement position is $\pm 3\text{mm}$.

Figure 9-7 Measurement Points

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10. INTERFACE SPECIFICATIONS							
10-1 Signal descriptions							
Table 10-1 shows the description and configuration of interface signals (CN1).							
Table 10-1 Interface signals (CN1)							
Pin No.		Symbol		I/O		Function	
1		Vcc		—		+12V power supply	
2		Vcc		—		+12V power supply	
3		Vcc		—		+12V power supply	
4		TST		—		Test pin *2	
5		PD		I		LVDS Core Power Down	
6		SEL LVDS		I		Select LVDS data order *1	
7		GND		—		Ground	
8		Rx E3+		I		Positive differential input	
9		Rx E3-		I		Negative differential input	
10		Rx EC+		I		Positive differential input	
11		Rx EC-		I		Negative differential input	
12		Rx E2+		I		Positive differential input	
13		Rx E2-		I		Negative differential input	
14		GND		—		Ground	
15		Rx E1+		I		Positive differential input	
16		Rx E1-		I		Negative differential input	
17		GND		—		Ground	
18		Rx E0+		I		Positive differential input	
19		Rx E0-		I		Negative differential input	
20		Rx O3+		I		Positive differential input	
21		Rx O3-		I		Negative differential input	
22		Rx OC+		I		Positive differential input	
23		Rx OC-		I		Negative differential input	
24		GND		—		Ground	
25		Rx O2+		I		Positive differential input	
26		Rx O2-		I		Negative differential input	
27		Rx O1+		I		Positive differential input	
28		Rx O1-		I		Negative differential input	
29		Rx O0+		I		Positive differential input	
30		Rx O0-		I		Negative differential input	
Connector : FI-X30SSL-HF (Japan Aviation Electronics)							
User's connector : FI-X30M (Japan Aviation Electronics)							
FI-X30H							
FI-X30C, FI-X30C2L							
*1: 3.3V CMOS Signal input. (High or Low)							
*2: Keep open. (Internal test use only.)							
*3: When using a connector other than the recommended one, a defect in the initial stage or a problem concerning long term reliability may occur.							
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Table 10-2 LVDS Data Assignment

- Input odd or even data depending on the display position of the LCD module.

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Table 10-3 Color Data Assignment

Color			R Input data								G Input data								B Input data							
	Odd Even		R7 R6 R5 R4 R3 R2 R1 R0	G7 G6 G5 G4 G3 G2 G1 G0	B7 B6 B5 B4 B3 B2 B1 B0																					
			R7 R6 R5 R4 R3 R2 R1 R0	G7 G6 G5 G4 G3 G2 G1 G0	B7 B6 B5 B4 B3 B2 B1 B0																					
Basic Color	Black		0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0																					
	Blue		0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	1 1 1 1 1 1 1 1																					
	Green		0 0 0 0 0 0 0 0	1 1 1 1 1 1 1 1	0 0 0 0 0 0 0 0																					
	Cyan		0 0 0 0 0 0 0 0	1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1																					
	Red		1 1 1 1 1 1 1 1	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0																					
	Magenta		1 1 1 1 1 1 1 1	0 0 0 0 0 0 0 0	1 1 1 1 1 1 1 1																					
	Yellow		1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1	0 0 0 0 0 0 0 0																					
	White		1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1																					
Red	Black	0	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0																					
	↑	1	0 0 0 0 0 0 0 1	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0																					
	↑	:	: : : : : : :	: : : : : : :	: : : : : : :																					
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	Brighter	253	1 1 1 1 1 1 0 1	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0																					
	↓	254	1 1 1 1 1 1 1 0	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0																					
Red	255	1 1 1 1 1 1 1 1	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0																						
Green	Black	0	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0																					
	↑	1	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 1	0 0 0 0 0 0 0 0																					
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	Brighter	253	0 0 0 0 0 0 0 0	1 1 1 1 1 1 0 1	0 0 0 0 0 0 0 0																					
	↓	254	0 0 0 0 0 0 0 0	1 1 1 1 1 1 1 0	0 0 0 0 0 0 0 0																					
Green	255	0 0 0 0 0 0 0 0	1 1 1 1 1 1 1 1	0 0 0 0 0 0 0 0																						
Blue	Black	0	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0																					
	↑	1	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 1																					
	↑	:	: : : : ~ : : :	: : : : : : :	: : : : : : :																					
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	↓	:	: : : : ~ : : :	: : : : : : :	: : : : : : :																					
	Brighter	253	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	1 1 1 1 1 1 0 1																					
	↓	254	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	1 1 1 1 1 1 1 0																					
Blue	255	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	1 1 1 1 1 1 1 1																						

Note 3) Color data consist of 8 bit red, green and blue data of odd and even number pixel data. Total data number is 48 signals. This module is able to display 16,777,216 colors because each red, green and blue data is controlled independently.

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10-4 Input Signal Timing

Table 10-4 and Figure 10-1 shows the Input Signal Timing at LVDS transmitter.

Table 10-4 Timing Characteristics

(Ta=0~45°C, Vcc=12±0.5V)

Item		Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK signal (Clock)	Period	Tc	11.765	12.345	20.000	ns	
	Frequency	1/Tc	50.000	81.000	85.000	MHz	
	Duty	Tch/Tc	45	50	55	%	
	High time	TclkH	3.5	—	—	ns	
	Low time	TclkL	3.5	—	—	ns	
DCLK-Data Timing	Setup time	Tset	3	—	—	ns	
	Hold time	Thold	2	—	—	ns	
ENAB signal	Horizontal Period	Th	865*1	1080	1130*1	DCLK	*2
	Hor. Period	Th	13.0	13.3	14.65	μs	
	Hor. Display period	Thd	800	800	800	DCLK	
	Vertical Period	Tv	1207*1	1250	1280*1	Th	
	Ver. Frequency	1/Tv	50	60	62	Hz	
		Tvd	1200	1200	1200	Hz	
	Ver. Display period					Th	
	Data-ENAB timing	Tdn	—	0	—	DCLK	*3

*1)•horizontal display position is specified by the rise of ENAB.

The data latched at falling edge of DCLK after rise of ENAB is displayed at the left edge of the display area.

- Vertical display position is specified by the rise of ENAB after low level continuation over 5500 DCLK.

The data latched at the rise of ENAB is displayed at the top line of the display area.

*2)• If the “High” level period of ENAB is less than 800 DCLK, black color is displayed at the rest of the display area.

*3)• If ENAB does not synchronize with the effective display data, the display position does not fit to the display area.

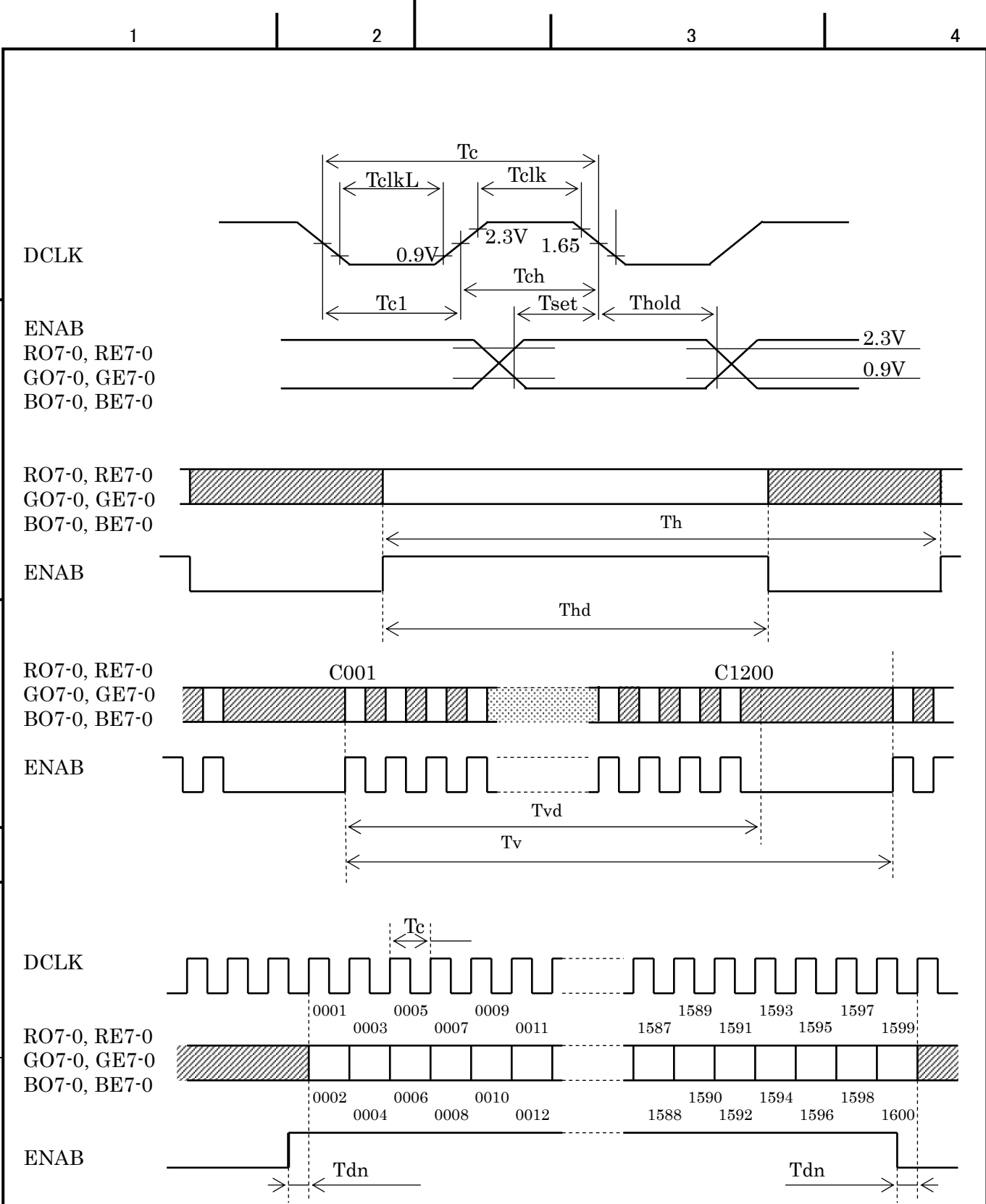


Figure 10-1 Input Signal Timing Chart

						TITLE			
						FLC51UXC8V-10LA			
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						Tech Bes LCD-00279			
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10-4 Correspondence between Data and Display Position

Figure 10-2 shows the Correspondence between Data and Display Position.

	S0001		S0002		S0003		S0004		S0005		S0006		S0007		-----										S4799		S4800	
C001	RO 0001	GO 0001	BO 0001	RE 0002	GE 0002	BE 0002	RO 0003	GO 0003											GE 1600	BE 1600								
C1200	RO 0001	GO 0001	BO 0001	RE 0002	GE 0002	BE 0002	RO 0003	GO 0003											GE 1600	BE 1600								

Figure 10-2 Correspondence Data and Display Position

10-5 Power Supply Sequence

The sequence of input signals and On/Off of the power supply of this LCD module should be in the specification shown in Figure 10-3 to prevent latch-up of the driver ICs and DC driving of the LCD panel.

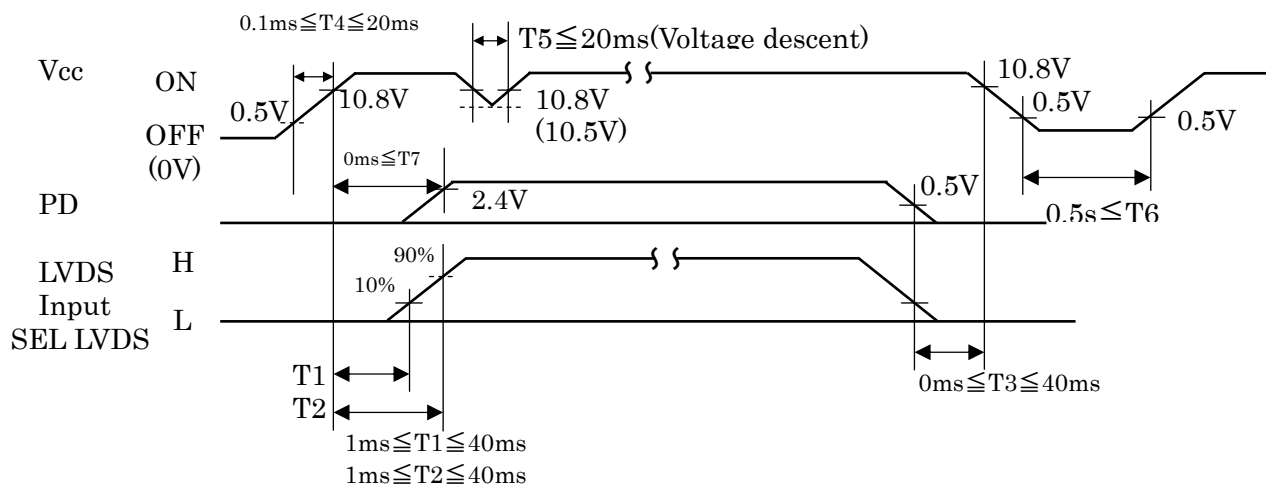


Figure 10-3 Power Supply Sequence(Logic)

Note) If Power Supply Sequence not followed, the CMOS-IC may cause a latch-up, or DC voltage may be applied to the liquid crystal, which cause a failure or serious deterioration in display quality.

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11. BACK-LIGHT SPECIFICATION

11-1 Pin configuration for Back-light

Table 11-1 shows the description and Pin assignment of the connectors (CN-A to D) for the Back-light of this LCD module.

Table 11-1 Pin Assignment of CN-A to CN-D

No.	Pin No.	Symbol	Function	Cable Color
CN-A	1	V _{H1}	Power supply (High voltage)	Pink
	2	V _{H2}	Power supply (High voltage)	Orange
	3	-	NC	
	4	V _{L1}	Power supply (Low voltage)	Blue
	5	V _{L2}	Power supply (Low voltage)	Gray
CN-B	1	V _{H3}	Power supply (High voltage)	Red
	2	V _{L3}	Power supply (Low voltage)	White
CN-C	1	V _{H4}	Power supply (High voltage)	Pink
	2	V _{H5}	Power supply (High voltage)	Orange
	3	-	NC	
	4	V _{L4}	Power supply (Low voltage)	Blue
	5	V _{L5}	Power supply (Low voltage)	Gray
CN-D	1	V _{H6}	Power supply (High voltage)	Red
	2	V _{L6}	Power supply (Low voltage)	White

Connector : Housing(CN-A, CN-C):BHR-05VS-1
(CN-B, CN-D):BHSR-02VS-1

Contact : SBH-001T-P0.5
SBHS-002T-P0.5

User's Connector : Post with base: SM04(9-E2)B-BHS-1
SM02B-BHSS-1-TB

Supplier : Japan Solder less Terminal manufacturing Company LTD. (J.S.T.)

11-2 CCFL

Supplier: SANKEN ELECTRONICS Co.LTD. Part No.: SS26E4175E8550C2882710S

11-3 Life

The life of the back-light is a minimum of 50,000 hours at the following conditions.

(1) Working conditions

- ①Ambient temperature: $25 \pm 5^{\circ}\text{C}$
- ②Tube current (I_L) : (6mA or less)

(2) Definition of life

- ①Brightness becomes 50% or less than the minimum brightness value shown in Table 9-1.
- ②Flashing.

11-4 Lamp assembly set (for replacement)

Lamp assembly set (with charge) is prepared for replacing old lamp to new one.
This set consists of an upper lamp assembly and a lower lamp assembly.
Type number: FLCL-38

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12. APPEARANCE SPECIFICATIONS										
12-1 Appearance										
12-1-1 Appearance specification										
A	No.	Item		Judgment method and standard						
	1	Bright spot (high and Low)		≤ 6 dots (Note 1)						
	2	Bright spot connection (high and low)		≤ 2 pair (Note 1)						
	3	Total of bright spot		≤ 6 dots						
	4	Dark spot		≤ 10 dots (Note 2)						
	5	Dark spot connection		≤ 4 pairs (Note 2)						
	6	Total of dark spot		≤ 10 dots (Note 2)						
	B	7	Total of dot defect (bright and dark)		≤ 10 dots					
		8	Distance of bright spot	high-high	≥ 15 mm					
				others	≥ 5 mm					
C	9	Distance of dark spot		≥ 5 mm						
	10	Scratch on polarizer, line shape	$W \leq 0.03$		—————		Ignore			
			$0.03 < W \leq 0.05$	$L \leq 6$		Ignore				
				$6 < L \leq 12$		≤ 7				
			$0.05 < W \leq 0.10$	$12 < L$		0				
				$L \leq 0.6$		Ignore				
				$0.6 < L \leq 5$		≤ 5				
			$0.10 < W$	$5 < L$		0				
				—————		0				
	11	Dent on polarizer, dot shape	$D \leq 0.3$		Ignore					
$0.3 < D \leq 0.4$			≤ 9							
$0.4 < D$			0							
12	Bubble in polarizer	$D \leq 0.3$		Ignore						
		$0.3 < D \leq 0.5$		≤ 4						
		$0.5 < D$		0						
13	Black white spot (Foreign circular matter)	$D \leq 0.15$		Ignore						
		$0.15 < D \leq 0.5$		≤ 5						
		$0.5 < D$		0						
14	Light leakage by foreign articles	$D \leq 0.3$		Ignore						
		$0.3 < D \leq 0.6$		≤ 5						
		$0.6 < D$		0						
D	15	Lints, black/white line	$W \leq 0.03$		—————		Ignore			
			$0.03 < W \leq 0.05$	$L \leq 6$		Ignore				
				$6 < L \leq 12$		≤ 6				
			$0.05 < W \leq 0.10$	$12 < L$		0				
				$L \leq 0.6$		Ignore				
				$0.6 < L \leq 5$		≤ 3				
	$0.10 < W$	$5 < L$		0						
$(W+L)/2=D$		Conform to No.13								
16	Mura	Invisible under 6% ND filter from center of display. (Display pattern: Black, White, 50%gray)								
D: Average diameter [mm], W: Width [mm], L: Length [mm], S=(bright spot size)/(dot size)										
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A

12-1-2 Light leakage outside the active area.

The light leakage that occurs minimum of 2.0mm outside the peripheral of the active area is overlooked.

A leakage of light may occur between the BM section and the bezel at the peripheral of the active area.

A

B

12-2 Dot defects (Bright spots, Dark spots)

12-2-1 Zone

- Inside display dot area (408.0 X 306.0mm)
- Display dot area means active area.
- One pixel consists of 3 dots (red, green and blue).
- Foreign particle and scratch unharmed to display image, such as the foreign particle under polarizer film but outside of the display area and scratch on metal bezel, backlight module or polarizer film out of the display area, etc., are not counted.

B

C

12-2-2 Bright spots

(1) Bright spots by the defect of TFT.

- Visible under bias of 2% ND filterHigh bright spot R・G
- Visible under 5% but invisible under 2% ND filterLow bright spot R・G・B
- Invisible under bias of 5% ND filter.....Not counted

(2) Bright spots by the light passing through tears, breaks, etc in color filter.

- Exceed size of a half dot.....High bright spot
- A half dot or lessNot counted

(3) Bright spots by the light passing through tears, breaks, etc in chromium mask.

- Exceed 50μmHigh bright spot
- 50μm or lessNot counted

C

D

12-2-3 Test condition

- Inspector must observe the LCD screen from the normal direction under the illumination by a single 20W fluorescent lamp. The distance between the LCD screen and the inspector should be a height of 50cm above the worktable.
- The vertical illuminance is 300 to 600lux (reference value).
- Bright spot should be counted under entire black screen.
- Dark spot should be counted under entire white screen.
- Input signal timing should be typical value.

(Note1) Please do not mistake a single bright spot for a bright spot connection due to Cs(supplemental capacitance) line at the center of each dot.

(Note2) If a pixel is dark partially, it connects into the number of dark spots in accordance with following rule.

(a) $A < 1/3$: Not count. Only one of 4 dark connection is allowed.

(b) $1/3 \leq A < 2/3$: Considered as 0.5 dot.

(c) $2/3 \leq A$: Considered as 1 dot.

(A=Dark spot size/dot size)

D

E

(Note1) Please do not mistake a single bright spot for a bright spot connection due to Cs(supplemental capacitance) line at the center of each dot.

(Note2) If a pixel is dark partially, it connects into the number of dark spots in accordance with following rule.

(a) $A < 1/3$: Not count. Only one of 4 dark connection is allowed.

(b) $1/3 \leq A < 2/3$: Considered as 0.5 dot.

(c) $2/3 \leq A$: Considered as 1 dot.

(A=Dark spot size/dot size)

E

F

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13. ENVIRONMENTAL SPECIFICATIONS

Table 13-1 show the environmental specifications.

Table 13-1 Environmental specifications

Item	Condition		Remark
Temperature	Operation	0~45°C	Temperature on surface of LCD panel should be under54°C.
	Storage	-20~60°C	
Humidity	Operation	20~85%RH	Maximum wet-bulb temperature should not exceed 29°C. No condensation.
	Storage	5~85%RH	
Vibration	Non-operation	10~500Hz, 1octave/20minute, 2G, 1.5mm max, 1hour each X, Y and Z directions	For single module without package.
Shock	Non-operation	30G, 6ms, 1time each ±X, ±Y and ±Z directions.	

NOTE: Table 13-2 and Figure 13-1 show the shock resistance standard when module is packaged.

Table 13-2 Shock resistance standard when module is packaged

Dropping location	Dropping height	Count
A~J	60cm	1 time

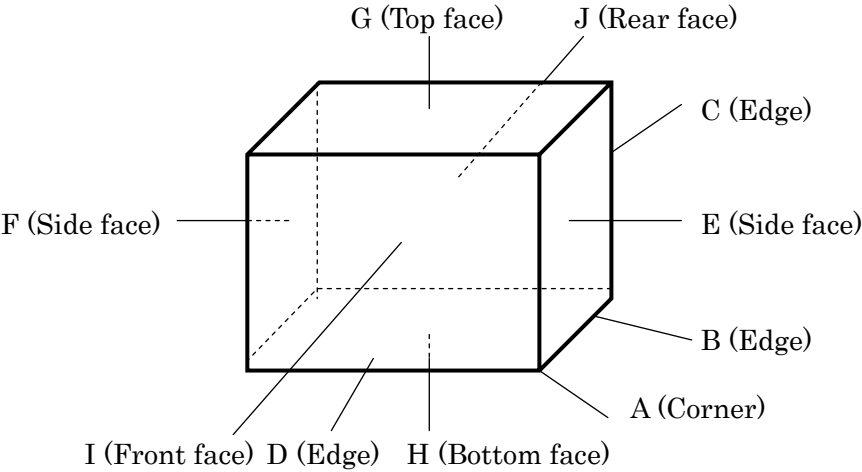


Figure 13-1 Direction to apply shock to package

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14. INDICATIONS

This module has the following indications.

- (1) Product name : **LCD unit.** (See Figure 14-2)
- (2) Model Number : **FLC51UXC8V-10LA** (See Figure 14-2)
- (3) Product Drawing Number : **NA19025-C471** (See Figure 14-2)
- (4) Manufacturing Number : **4 9 0 0 0 0 1**
- Serial number
(To be reset every month on 1st.)
- Manufacturing month
(Oct. = X, Nov. =Y, Dec. =Z)
- Last digit of manufacturing year.
- (5) Version number : **01A** (Example)
-1st 2 digits "01" means operational version.
-3rd alphabet means functional version.
- (6) Manufacturer Country Name : **MADE IN JAPAN**
- (7) Company Name : **FUJITSU DISPLAY TECHNOLOGIES CORPORATION**
- (8) Disposal method of cold-cathode tubes. (See Figure 14-1)
- (9) Caution when changing cold-cathode tubes. (See Figure 14-1)

・ WHEN CHANGING COLD CATHODE FLUORESCENT LAMPS, FOLLOW OPERATING SPECIFICATIONS. ESPECIALLY BE CAREFUL ABOUT THE LAMP'S SIDE-EDGE.
・ 蛍光管の交換は作業仕様書に従って行って下さい。特に蛍光管ホルダ側面のエッジに気をつけて下さい。

・ THIS TFT COLOR LCD CONTAINS COLD CATHODE FLUORESCENT LAMPS. PLEASE FOLLOW LOCAL ORDINANCES OR REGULATIONS FOR ITS DISPOSAL.
・ 当該液晶ディスプレイユニットには蛍光管が組み込まれていますので、地方自治体の条例または規則に従って廃棄して下さい。

Figure 14-1

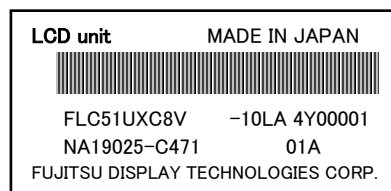


Figure 14-2

15. PACKAGING

15-1 Packing specifications

- (1) 4LCD modules/1package.
(2) Weight: approximately 17kg/1package.
(3) Outline dimensions: 576mm(W)x316mm(D)x488mm(H)

15-2 Packing method

Figure 15-1,2 shows the packing method.

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A

Protective sheet

Front side

B



Rear side

C



Anti-Electric Bag

Front side

D

A

B

C

D

E

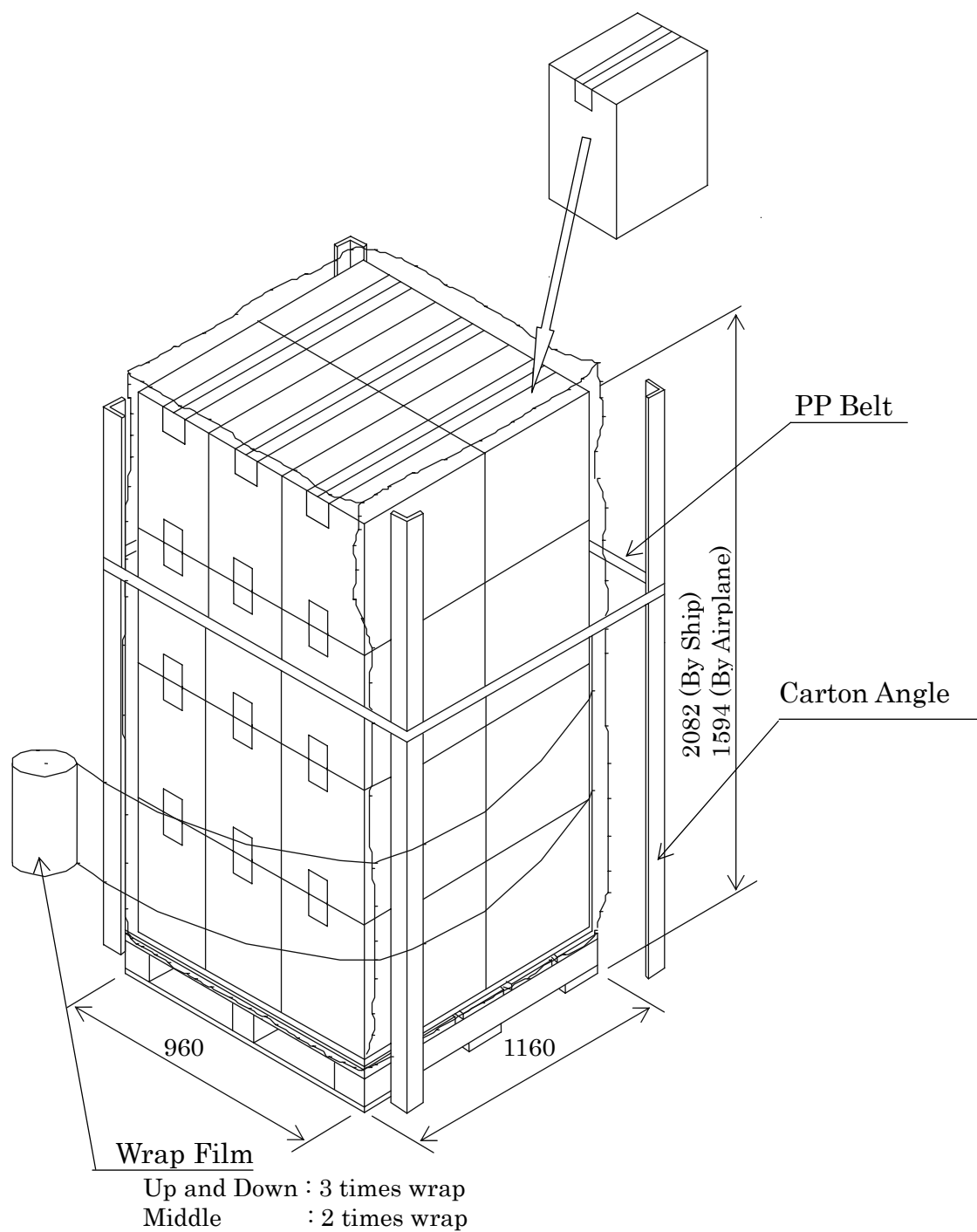
Fig.15-2 (a) Packaging Method

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Note:1) 6 boxes $\times$ 4 layers (maximum 24 boxes) : by ship
6 boxes $\times$ 3 layers (maximum 18 boxes) : by airplane
Note:2) This drawing shows marine transportation specification.

Fig.15-2 (c) Packaging Method

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A



C

D

E

D

D

E

F

		1		2		3		4																																																													
A	16.WARRANTY The warranty period is one year after shipping. Products which fail during this period are repaired or replaced without charge, unless the failure is caused by user.									A																																																											
	17.PRECAUTIONS Adhere to the following precautions to use this LCD module properly.																																																																				
B	(1) Handling of LCD panel ① Do not apply any strong mechanical shock to the LCD panel. Since the LCD panel is made of glass, excessive shock may damage the panel or cause a malfunction.									B																																																											
	② Do not press hard on the LCD panel surface. In the LCD panel, the gap between two glass plates is kept perfectly even to maintain display properties and reliability. The hard pressure on the LCD panel may cause the following problems. If the pressure is over 2kg/cm ² , the problem don't return to normal Condition. ① Ununiformity of color ② Disorder of orientation of liquid crystal Problem ① returns to normal condition after a while. Problem ② returns to normal condition by turning the power off and turning on again. However these operations should be avoided to insure reliability.																																																																				
C	③ Do not scratch the polarizer film on the LCD panel surface. ・Do not press or rub the display surface with a hard tool, tweezers, etc. ・For handling, use cotton or conductive gloves so that the display surface is not soiled. ・If dust or dirt soils the display surface, clean it as follows with a soft cloth (deerskin, etc.) [Dust] Wipe off with a soft cloth. (do not rub.) [Dirt] Apply clear water to a soft cloth and squeeze hard out of water drops, then lightly wipe off the specified parts. Only if the dirt is hardly wiped off, use isopropyl alcohol or ethanol. Be careful not to splash the water or the solvents on the edge of polarizer and in the LCD unit. The polarizer possibly exfoliates due to the solvent and water penetrated between the polarizer and the LCD panel. Do not use unspecified solvent such as ketone (acetone, etc.) and aromatics (xylene, toluene, etc.)									C																																																											
D	(Caution) Be careful not to allow the water or solvent to enter the module. ・If saliva or water drops are left for a long period of time, the part may become deformed or discolored. Wipe off immediately in the same way as for dirt. ・Do not allow oil to adhere to the module since excessive oil is hard to clean.																																																																				
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A

④ **Do not place or contact objects on the display surface for a long period of time.**
 This may make some parts of the LCD module distorted and the quality of display may deteriorate.

A

B

(2) Handling of LCD module

① **Do not pull the cold-cathode tube cable strongly.**
 If the cable is pulled with the strength of 2kg or more, the cable may be damaged or may lose reliability.

② **Assemble the module into user's system in a dust free environment.**
 Conductive foreign matter adheres to the module may cause failures.

③ **Take anti-electrostatic measures for assembling the module.**
 Since the LCD module contains CMOS-ICs, the following points should be observed.

- For assembling the module, operator should be grounded and wear cotton or conductive gloves.
- Floor of work area and work table to assemble the LCD module should be covered with electrostatic shielding in order to discharge static electricity via an earth wire.
- If necessary, ground operation tools (soldering iron, radio pliers, tweezers, etc.).
- Do not take the module out of the conductive bag until the module is assembled.
- Do not assemble the module under low humidity (50%RH or less).

④ **Do not pull the connecting cable on the rear face of the LCD module strongly.**

⑤ **Do not disassemble or remodel the LCD module.**
 Disassembly or remodeling of the LCD module may result in malfunctions or deterioration of the display quality and reliability.

B

C

(3) Precautions in regards of operating the LCD module

① **Adhere to the specified power supply sequence.**
 If not followed, the CMOS-IC may cause a latch-up, or DC voltage may be applied to the liquid crystal, which cause a failure or serious deterioration in display quality.

② **Do not operate the LCD module when condensation occurs.**
 If the LCD module is operated when condensation is on the terminals of the LCD panel, the terminals cause electrochemical reaction, and may reach disconnection. Condensation easily occurs especially when the module is moved from cold environment to warm environment.

C

D

(3) Precautions in regards of operating the LCD module

① **Adhere to the specified power supply sequence.**
 If not followed, the CMOS-IC may cause a latch-up, or DC voltage may be applied to the liquid crystal, which cause a failure or serious deterioration in display quality.

② **Do not operate the LCD module when condensation occurs.**
 If the LCD module is operated when condensation is on the terminals of the LCD panel, the terminals cause electrochemical reaction, and may reach disconnection. Condensation easily occurs especially when the module is moved from cold environment to warm environment.

D

E

E

F

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A

- B

If control signals (DCLK, ENAB) are not input, or if the timing is out of the specified timing, DC voltage may be applied to the liquid crystal and, as a result, cause image sticking or deterioration of contrast.

C

- D

DOCUMENT CONTROL SECTION

- F

F

(8) Return method of the LCD unit requested for repair or analysis of the problem

- When the LCD unit is packaged and returned, adhere to the following procedures not to damage the LCD panel or the backlight cables. (Fig. 18-1(a)~(b))

When the LCD unit is returned without following the specified packaging procedures, FDTC will not take responsibility for the damages caused by the failure of the packaging method.

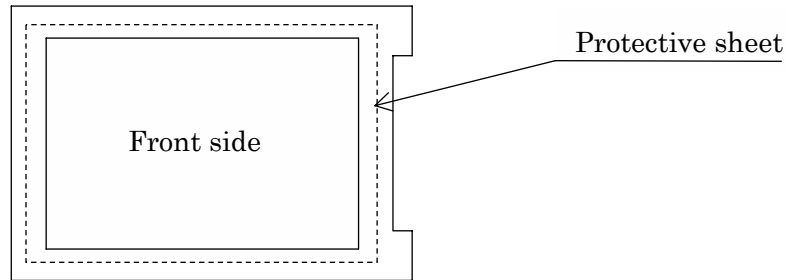
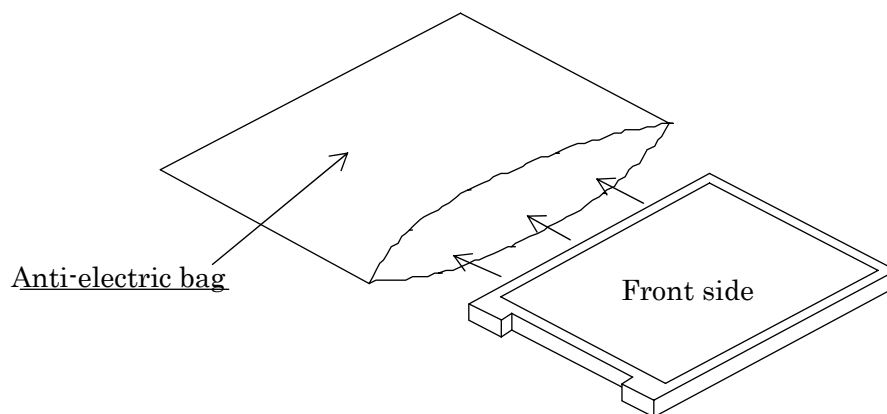
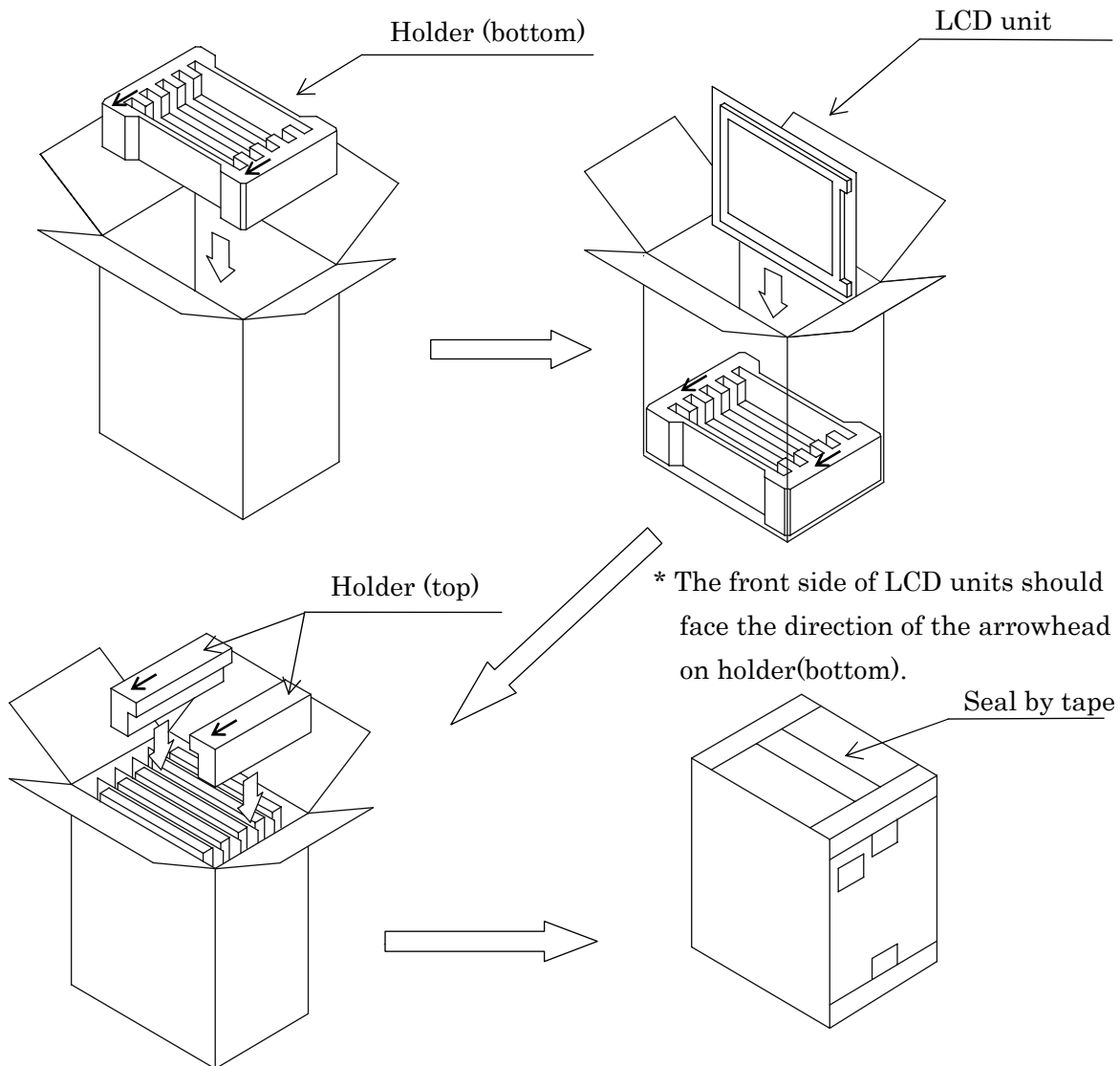
①Attach protective sheet.**②Put the LCD unit into the anti-electric bag**

Fig. 17-1(a) Packaging method

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③ Storage into the container box

- When using the container box manufactured by FDTC



* The direction of the arrowhead on holder (top) should face the front side of the LCD units.

The arrowheads are shown on the holders.

Fig. 17-1(b) Packaging method

- When not using the container box manufactured by FDTC

Please pack the LCD units one by one and make sure not to damage the LCD unit when transporting.

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A

A

B

B

C

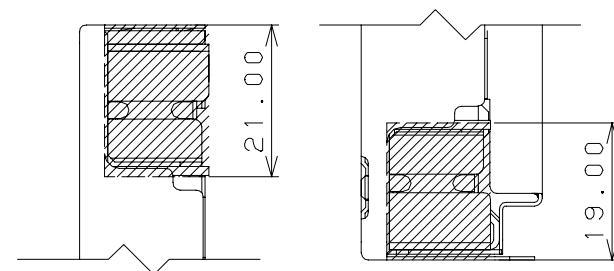
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D

D

E

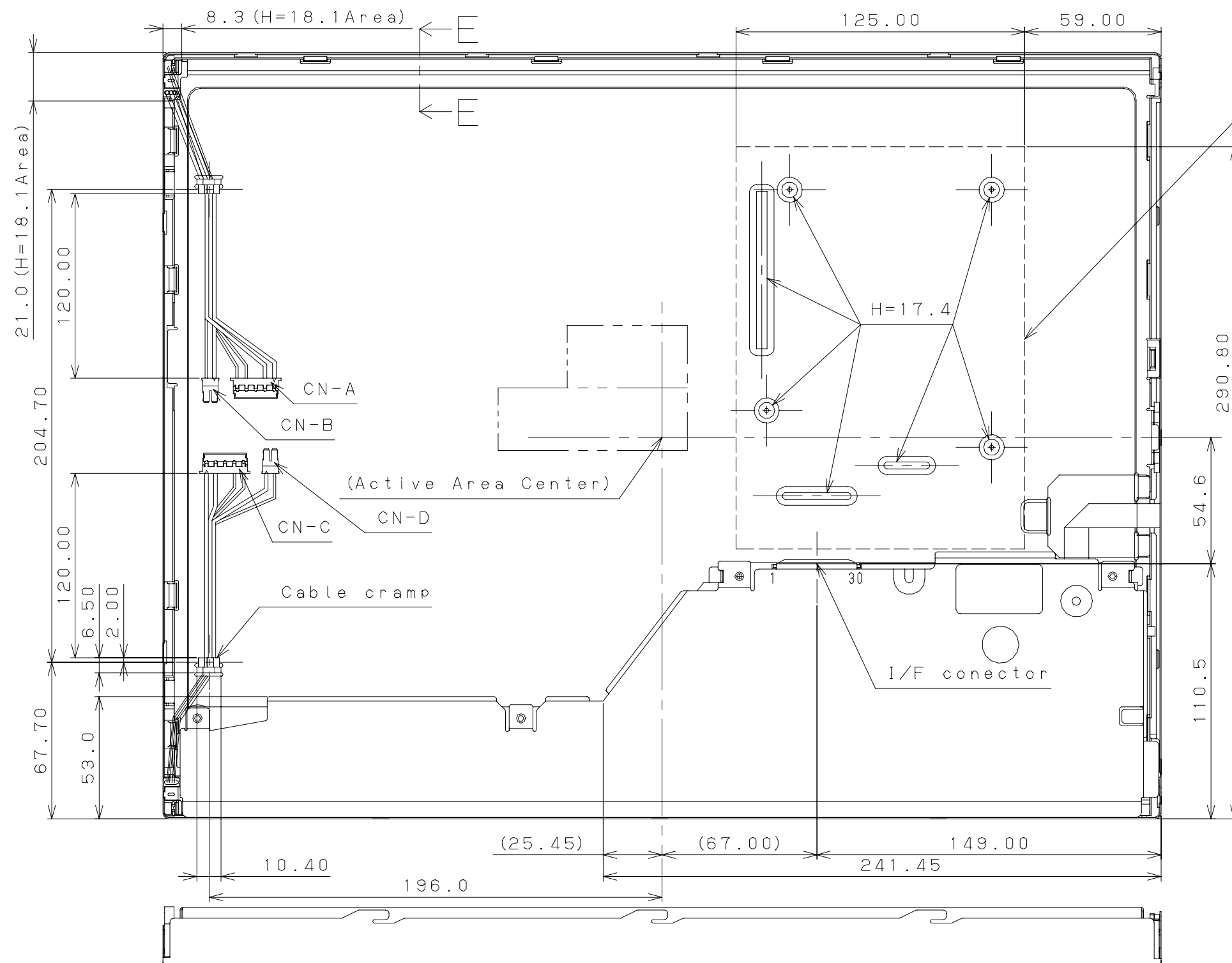
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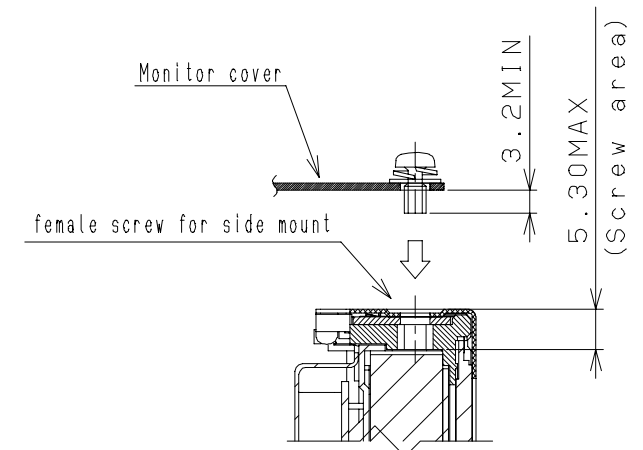
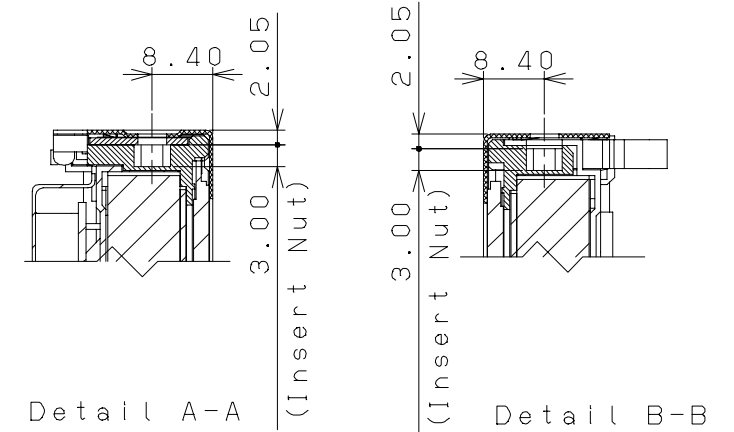
Detail F, G

1) Unspecified tolerance to be ± 0.5 .

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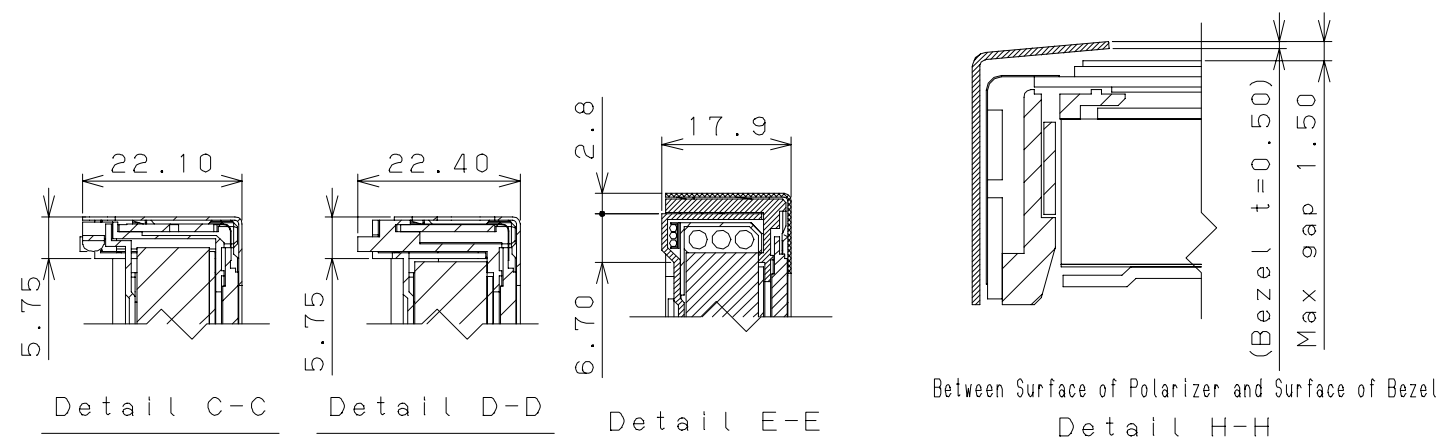


fast response time driving Area
(H=25.0MAX)



- Note 1) Fixing screw of LCD module must have screw part length of more than 3.2mm with unfixing condition. Otherwise fixing screw may not be fixed screwed.
- 2) The maximum length of the screw insertion to the side of the LCD module is 5.3mm. If the length of the screw is more than 5.3mm, then the screw may damage the light guide plate which can cause abnormality of display.

Fig. Notice for side mount fixing screw



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