

Panasonic Liquid Crystal Display Co., Ltd.

VVX07F023B00

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Accepted by	Proposed by
 Date:	 <i>Tsutomu Abe</i>

Panasonic Liquid Crystal Display Co.,Ltd.	Date	Jun.21,2013	Sheet No.	IPS4 PS 2601 VVX07F023B00-4	Page	1-1/1
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RECORD OF REVISION

Date	The upper section : Previous revision The lower section : New revision		Summary
	Sheet No.	Page	
May.15,2013	IPS4PS 2606 VVX07F023B00-1	6-1/1	It updated TFT-LCD module for Electrical characteristics
	IPS4PS 2606 VVX07F023B00-2		
May.15,2013	IPS4PS 2607 VVX07F023B00-1	7-1/1	It rewrited block diagram about TFT LCD module .
	IPS4PS 2607 VVX07F023B00-2		
May.15,2013	IPS4PS 2608 VVX07F023B00-1	8-1/3	It rewrited I/F connector model number. It rewrited Pin No. 6 & 7 .
	IPS4PS 2608 VVX07F023B00-2		
May.15,2013	IPS4PS 2609 VVX07F023B00-1	9-5/6 9-6/6	It updated sincronization signal timing .
	IPS4PS 2609 VVX07F023B00-1		
May.15,2013	IPS4PS 2610 VVX07F023B00-1	10-1/1	It added 2 hole on base metal .
	IPS4PS 2610 VVX07F023B00-2		
May.21,2013	IPS4PS 2606 VVX07F023B00-2	6-1/1	It updated TFT-LCD module for Electrical characteristics.
	IPS4PS 2606 VVX07F023B00-3		
May.21,2013	IPS4PS 2610 VVX07F023B00-2	10-1/1	It added the dimension of 2 hole on base metal .
	IPS4PS 2610 VVX07F023B00-3		
Jun.21,2013	IPS4PS 2603 VVX07F023B00-3	3-1/1	Updated a thickness for Leakage improved tape.
	IPS4PS 2603 VVX07F023B00-4		
Jun.21,2013	IPS4PS 2606 VVX07F023B00-3	6-1/1	Power supply voltage changed from 5V to 4.4 V .
	IPS4PS 2606 VVX07F023B00-4		
Jun.21,2013	IPS4PS 2609 VVX07F023B00-3	9-1/6	It updated MIPI reciever timinig for error in writing.
	IPS4PS 2609 VVX07F023B00-4		

RECORD OF REVISION

Date	The upper section : Previous revision The lower section : New revision		Summary
	Sheet No.	Page	
Jun.21,2013	IPS4PS 2609 VVX07F023B00-3	9-5/6	It updated vertical frequency about min. & max . In the aftermath, max horizontal frequency was changed.
	IPS4PS 2609 VVX07F023B00-4		
Jun.21,2013	IPS4PS 2612 VVX07F023B00-3	11-1/3	Updated viewing angle & ambient light for condition of cosmetic inspection .
	IPS4PS 2611 VVX07F023B00-4		
Jun.21,2013	IPS4PS 2612 VVX07F023B00-3	11-2/3	It changed from $\phi 5$ to $\phi 15$.
	IPS4PS 2611 VVX07F023B00-4		
Jun.21,2013	IPS4PS 2612 VVX07F023B00-3	11-3/3	It updated the difinition of line shape and dot shape. It updated Mura inspection.
	IPS4PS 2611 VVX07F023B00-4		
Jun.21,2013	IPS4PS 2613 VVX07F023B00-3	13-1/2	It updated the pallet size.
	IPS4PS 2613 VVX07F023B00-4		
Jun.21,2013	-	14-1/1	It added reliability test .
	IPS4PS 2614 VVX07F023B00-4		
Jun.21,2013	IPS4PS 2610 VVX07F023B00-3	15-1/1	It added shading tape for light leakage improving , and pasted the PCB lot label on PCB.
	IPS4PS 2615 VVX07F023B00-4		

DESCRIPTION

The following specifications are applied to the following TFT LCD module.

Product Name : VVX07F023B00

General Specifications

Effective display area	: (H) 94.5 × (V) 151.2	(mm)
Number of pixels	: (H) 1,200 × (V) 1,920	(pixels)
Pixel pitch	: (H) 0.07875 × (V) 0.07875	(mm)
Color pixel arrangement	: R+G+B vertical stripe	
Display mode	: Transmissive mode Normally black mode	
Top polarizer type	: Low reflection (without Retardation Film)	
Number of colors	: 16,777,216	(colors)
Input signal	: MIPI 4 Lanes	
Backlight	: 24 pieces of LED	
External dimensions	: Typ. (H) 104.0 × (V) 161.37 × (t) 2.35max (PCB side 3.9max)(mm)	
	Not including FPC dimension	
Weight	: Typ. 72	(g)

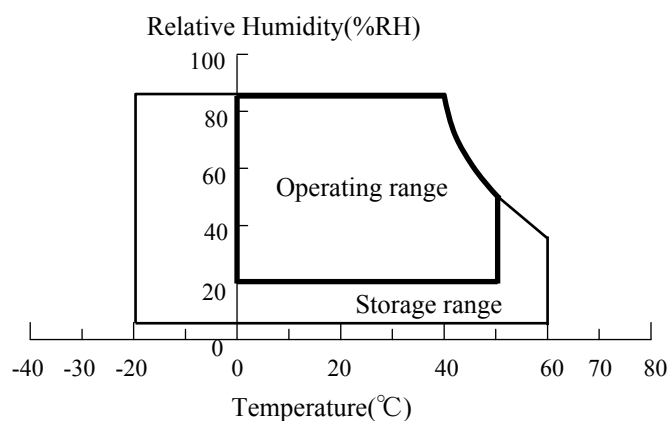
1. ABSOLUTE MAXIMUM RATINGS

1. 1 Environmental Absolute Maximum Ratings

ITEM	Operating		Storage		UNIT	NOTE
	Min.	Max.	Min.	Max.		
Temperature	0	50	-20	60	°C	1),3)
Humidity	2)		2)		%RH	1)
Vibration	-	-	4)		m/s ²	
Shock	-	-	5)		m/s ²	
Corrosive Gas	Not Acceptable		Not Acceptable		-	
Illumination at LCD Surface	-	50,000	-	50,000	lx	

Note 1) Temperature and Humidity should be applied to the glass surface of a IPS TFT LCD module, not to the system installed with a module.

- 2) $T_a \leq 40\text{ }^{\circ}\text{C}$ Relative humidity should be less than 85 %RH max. Dew is prohibited.
 $T_a > 40\text{ }^{\circ}\text{C}$ Relative humidity should be lower than the moisture of the 85 %RH at 40 °C.



- 3) The temperature of LCD front surface would be 65 °C in operating, it may affect the optical characteristics however it does not damage the function of the module.
- 4) Sine vibration (Non-OP) 3.5 G Zero-to peak, 30min One sweep, 10 to 500 Hz, all 3 axes (X, Y, Z) .
- 5) Shock (Non-OP) Half sine 30.6 G, duration time 18 ms. Velocity change :3.4 m/s

1. 2 Electrical Absolute Maximum Ratings

(1)TFT-LCD module

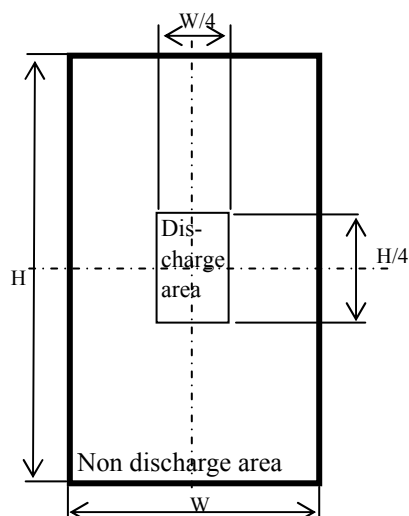
$V_{SS} = 0 \text{ V}$

ITEM	SYMBOL	Min.	Max.	UNIT	NOTE
Power Supply Voltage	VCC	-0.3	6.5	V	
Logic signals input voltage	VI	-0.3	3.6	V	1)
LED Power Supply Voltage	VLED	-0.3	6.0	V	
Electrostatic Durability	VESD1	± 8		kV	2)
	VESD2	± 200		V	3)

Note 1) It is applied to BL_PWM, BL_EN.

2) Non-operation, Air discharge, 150pF/ 330 ohms

It is applied to the center of a LCD panel and a bottom frame.



3) Non-operation, Contact discharge. Machine model 200pF / 0 ohm.

It is applied to the I/F connector pin.

2. INITIAL OPTICAL CHARACTERISTICS

The following optical characteristics are measured under stable conditions. It takes about 30 minutes to reach stable conditions. The measuring point is the center of display area unless otherwise noted.

The optical characteristics should be measured in a dark room or equivalent state.

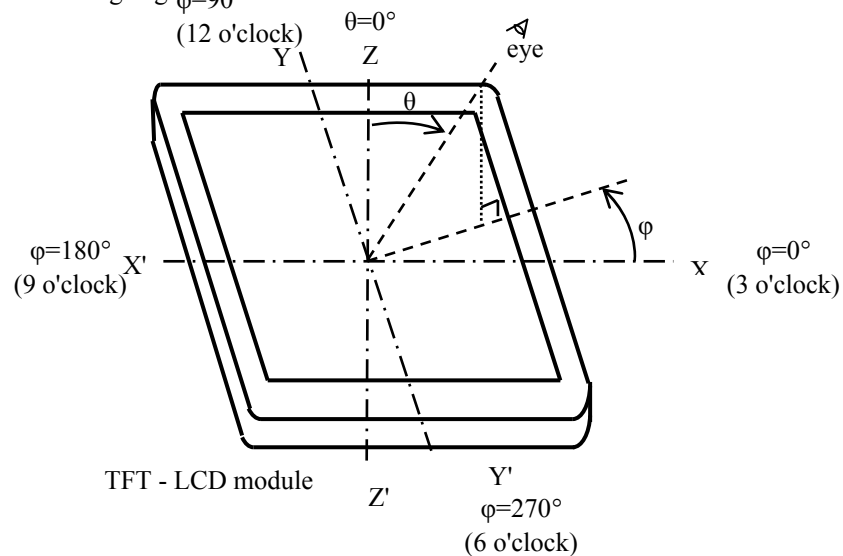
Measuring equipment : CS-1000A, or equivalent

Ambient Temperature =25 °C , f v=60 Hz ,

If=20mA (on duty 100%)

ITEM		SYMBOL	CONDITION	Min.	Typ.	Max.	UNIT	NOTE
Contrast ratio		CR	$\theta = 0^\circ$ 1)	600	1000	-	-	1),2)
Response time (Rise + Fall)		Tr + Tf	$\theta = 0^\circ$ 1)	-	-	30	ms	1),3)
Brightness of white		Bwh		330	(430)	-	cd/m ²	1)
Brightness uniformity		Buni(9points)		-	-	1.30	-	1),4)
Color chromaticity (CIE)	Red	x		0.600	0.630	0.660	-	1) 【Gray scale =255】
		y		0.320	0.350	0.380		
	Green	x		0.300	0.330	0.360		
		y		0.560	0.590	0.620		
	Blue	x		0.120	0.150	0.180		
		y		0.070	0.100	0.130		
	White	x		0.280	0.310	0.340		
		y		0.310	0.340	0.370		
View Angle (Contrast ratio)	Right	-	$\theta=80^\circ, \phi=0^\circ$	100	-	-	-	1)
	Left	-	$\theta=80^\circ, \phi=180^\circ$	100	-	-		
	Top	-	$\theta=80^\circ, \phi=90^\circ$	100	-	-		
	Bottom	-	$\theta=80^\circ, \phi=270^\circ$	100	-	-		
NTSC		-	$\theta = 0^\circ$ 1)	55	60	-	%	1)
W,R,G,B Gamma		-	$\theta = 0^\circ$	1.9	2.2	2.5	-	1)
Cross talk		-	$\theta = 0^\circ$	-	-	5.0	%	1),5)
Leakage light		-	$\theta = 45^\circ$	No serious Light leakage			-	

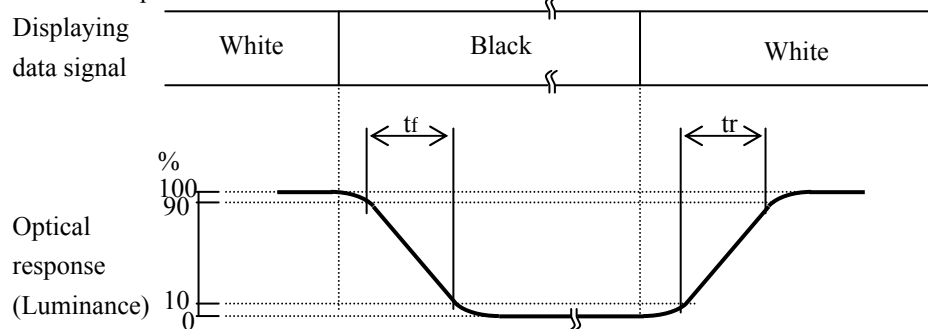
Note 1) Definition of viewing angle $\phi=90^\circ$



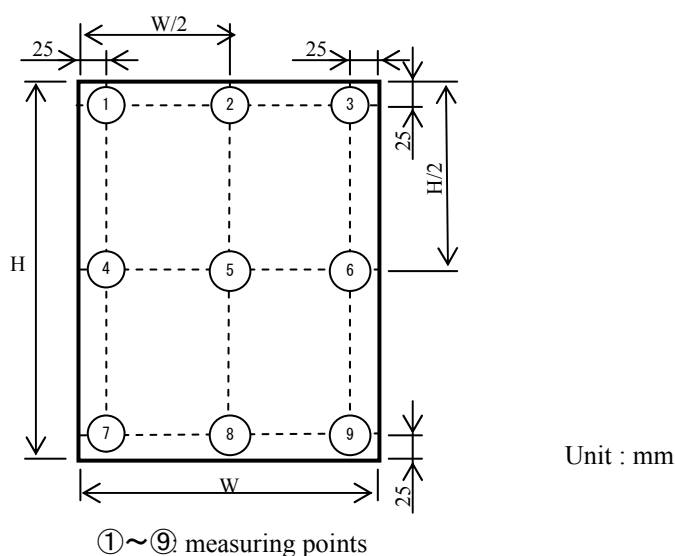
2) Definition of contrast ratio (CR)

$$CR = \frac{\text{(Luminance at displaying WHITE)}}{\text{(Luminance at displaying BLACK)}}$$

3) Definition of response time

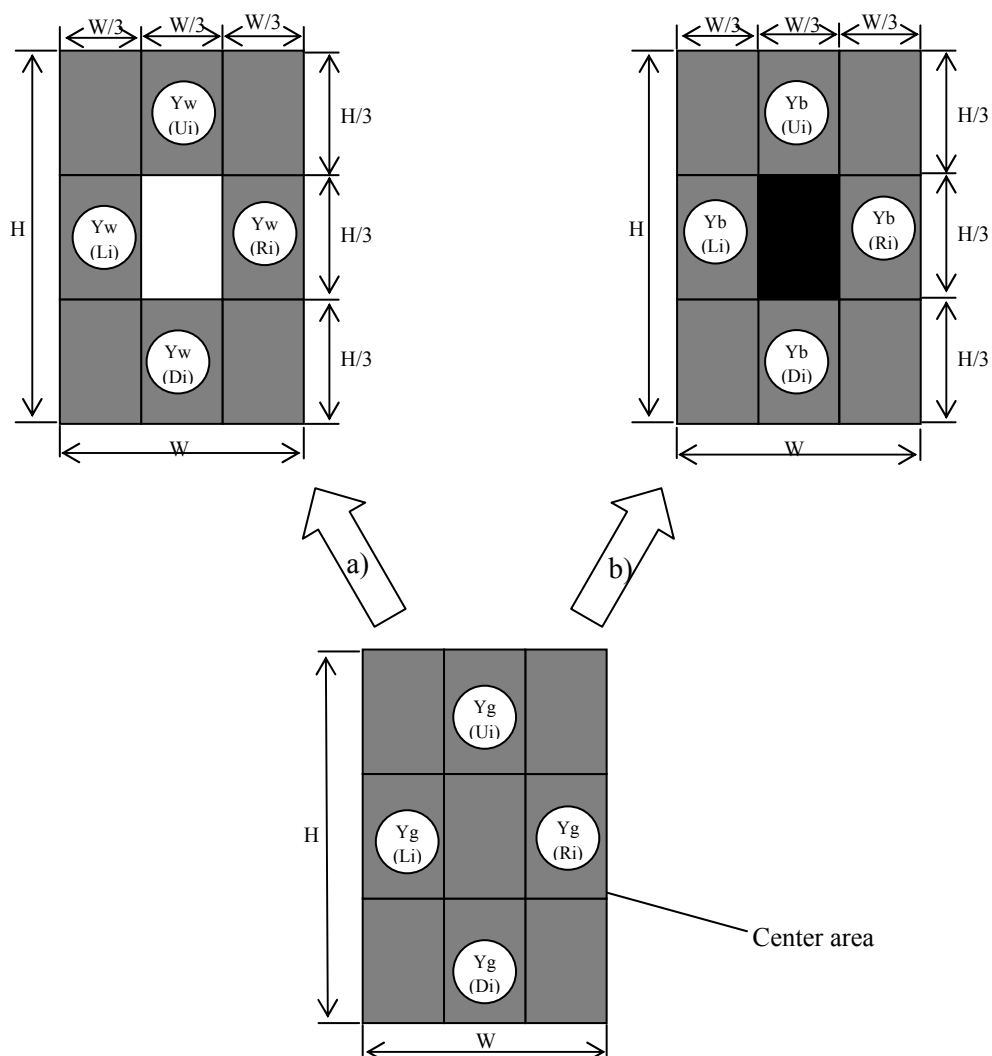


4) Definition of Uniformity



$$\text{Buni (9 Points)} = \max(\text{①} \sim \text{⑨}) / \min(\text{①} \sim \text{⑨})$$

Note 5) Definition of Cross talk



a) Center area : White

$$CT = \frac{|Y_w(X_i) - Y_g(X_i)|}{Y_g(X_i)} \times 100\%$$

b) Center area : Black

$$CT = \frac{|Y_b(X_i) - Y_g(X_i)|}{Y_g(X_i)} \times 100\%$$

Note: $X=U,D,L$ and R , i = Gray scale 127

3. ELECTRICAL CHARACTERISTICS

3. 1 TFT-LCD module

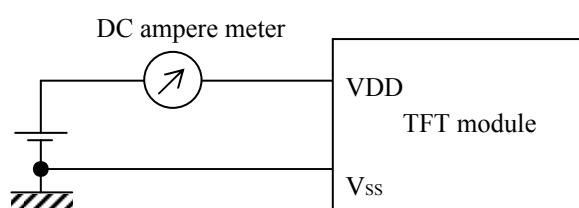
Ta = 25 °C , Vss = 0 V

ITEM		SYMBOL	Min.	Typ.	Max.	UNIT	NOTE
Power supply voltage		VDD	3.0	-	4.4	V	
LED Power supply voltage		VLED	3.0	-	5.5	V	
Power supply current		IDD	-	0.16	0.35	A	1),2)
Power consumption of Panel logic			-	0.55	1.2	W	1),2)
Ripple voltage of power supply		V _{DDR}	-	-	100	mV	
Logic signals input voltage	High	V _{IH}	1.5	-	-	V	BL_PWM,BL_E N
	Low	V _{IL}	-	-	0.5	V	

Note 1) Typ. : display pattern is white raster.

Max. : display pattern is pixel checker pattern. (white and black)

2) Power supply voltage is 3.4V



3. 2 Backlight unit

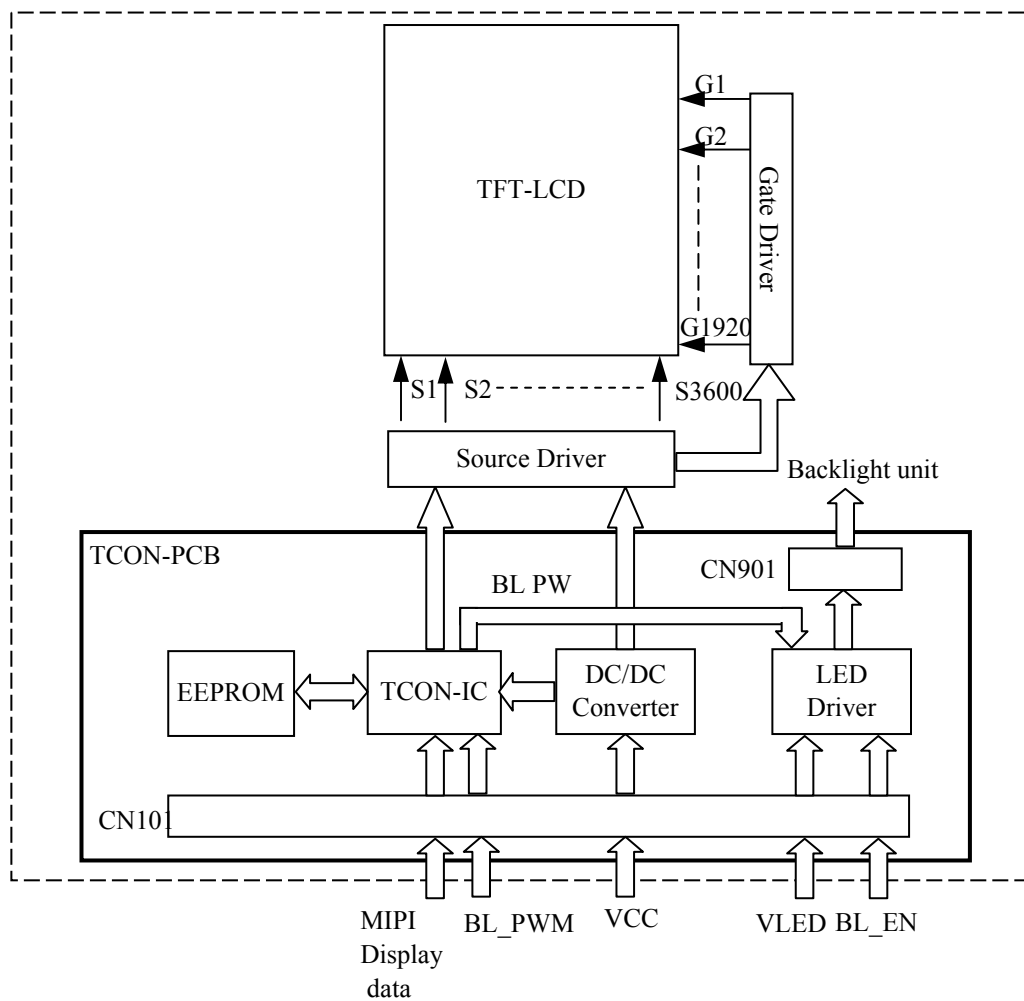
ITEM		SYMBOL	Min.	Typ.	Max.	UNIT	NOTE
Power Consumption		Pbl	-	1.44	-	W	1), 2)
PWM	Duty	PD	5	-	100	%	
	Frequency	PF	100	-	20k	Hz	

Note 1) This characteristics should be applied putting on the LED about 60 minutes later with ambient temperature.
(Ta = 25 °C ± 2 °C)

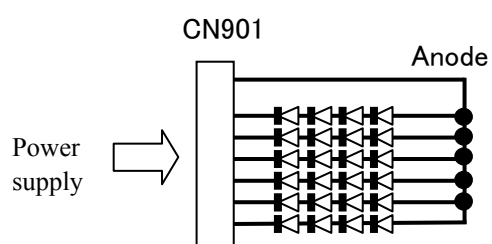
2) This value is not include LED driver loss.

4. BLOCK DIAGRAM

4.1 TFT-LCD module



4.2 Backlight unit



5. INTERFACE PIN ASSIGNMENT

5.1 TFT-LCD module

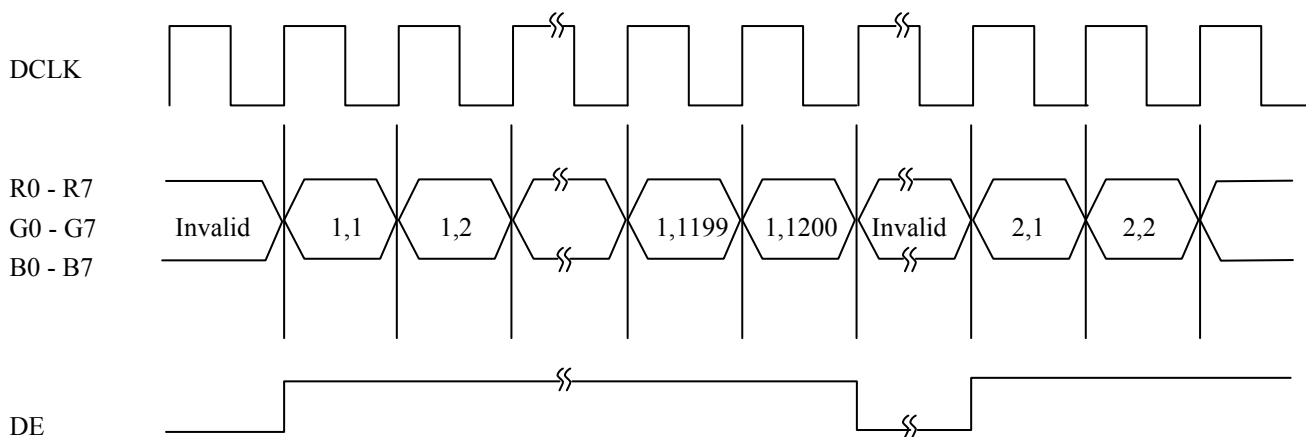
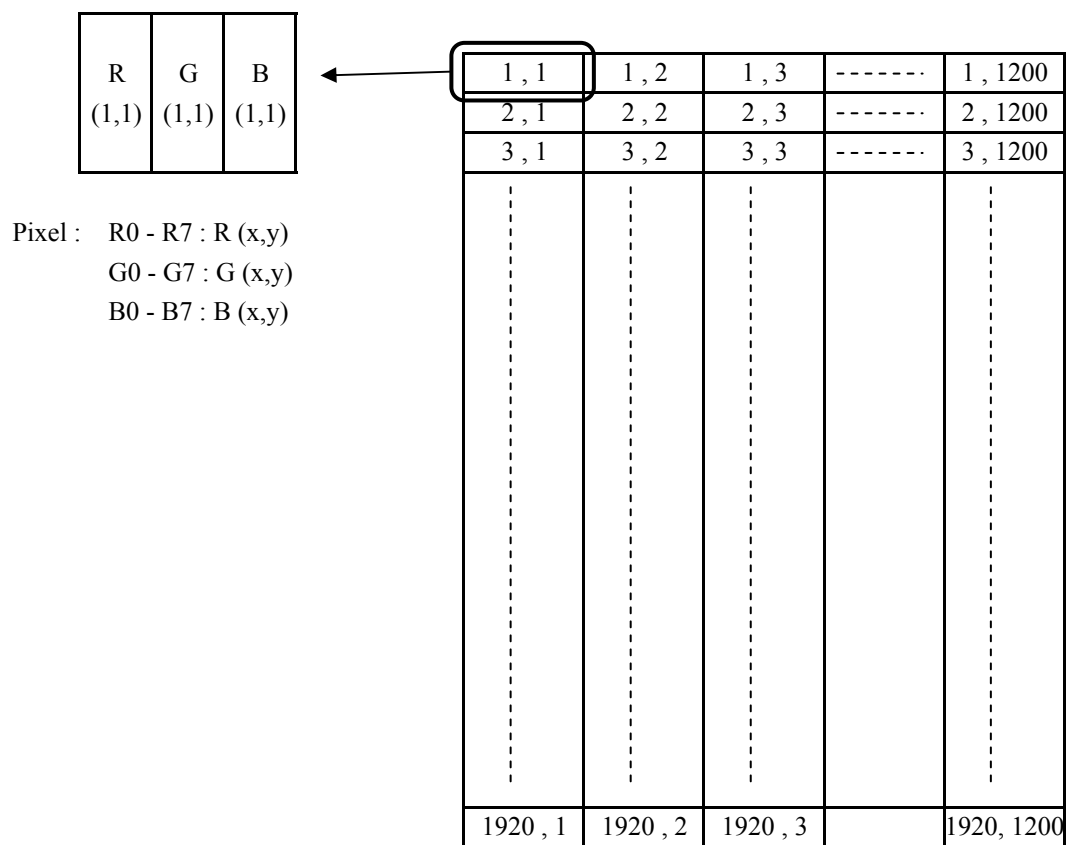
CN701:DDK (FF12-31A-R11B)

PIN No.	SYMBOL	DESCRIPTION	Note
1	VDD	Power Supply(+3.0~5.5V)	1)
2	VDD		
3	VDD		
4	BIST	Keep open or connect to GND	3)
5	GND	GND(0V)	3)
6	NC		
7	NC		
8	GND	GND(0V)	
9	MIPI_2N	MIPI data pair 2 negative signal	
10	MIPI_2P	MIPI data pair 2 positive signal	
11	GND	GND(0V)	
12	MIPI_1N	MIPI data pair 1 negative signal	
13	MIPI_1P	MIPI data pair 1 positive signal	
14	GND	GND(0V)	
15	MIPI_CLKN	MIPI Clock negative signal	
16	MIPI_CLKP	MIPI Clock positive signal	
17	GND	GND(0V)	
18	MIPI_0N	MIPI data pair 0 negative signal	
19	MIPI_0P	MIPI data pair 0 positive signal	
20	GND	GND(0V)	
21	MIPI_3N	MIPI data pair 3 negative signal	
22	MIPI_3P	MIPI data pair 3 positive signal	
23	GND	GND(0V)	

PIN No.	SYMBOL	DESCRIPTION	Note
24	NC	No Connect	
25	BL_PWM	PWM input to backlight LED driver	
26	BL_EN	LED enable input	
27	GND	GND(0V)	
28	VLED	LED Power Supply(+3.0~5.5V)	2)
29	VLED		
30	VLED		
31	VLED		

- Notes 1) All VDD pins shall be connected to +3.0~5.5V.
 2) All VLED pins shall be connected to +3.0~5.5V.
 3) Factory use only, keep open.
 4) Support video mode interface timing
 •Non-burst mode with sync pulses
 •Non-burst mode with sync events
 •Burst mode
 Support RGB data type
 24bitRGB, 8-8-8 format

5. 2 Correspondence between input data and display image



5.3 Relationship between display colors and input signals

Input Color		Red Data								Green Data								Blue Data							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
		MSB								LSB								MSB							
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
	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(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(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
	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
	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
	Red (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
	Red (2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(254)	1	1	1	1	1	1	1	1	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
	Green (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
	Green (2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
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	Green(254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	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
	Blue (1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	Blue (2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
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	Blue (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 1) Definition of gray scale :

Color(n) · · · · Number in parenthesis indicates gray scale level.

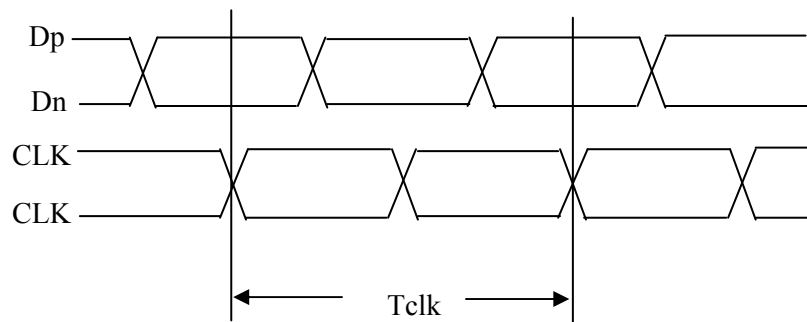
Larger n corresponds to brighter level.

2) Data : 1 : High, 0 : Low

6. INTERFACE TIMING

6.1 MIPI receiver timing

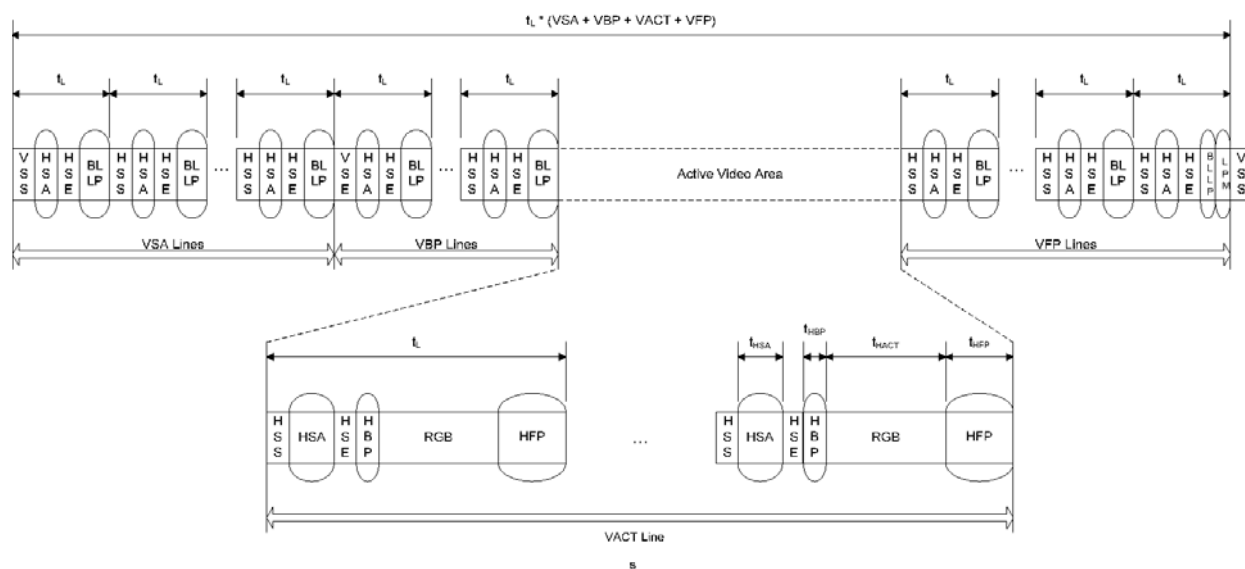
(1) High Speed CLK Timing



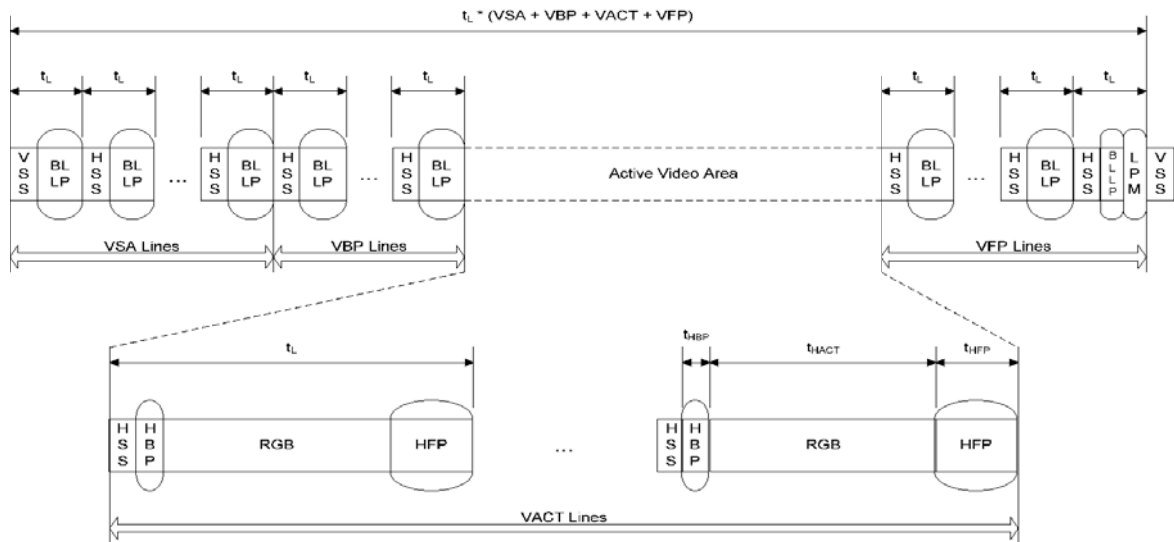
	Min	Max
Tclk	6.02ns (166MHz)	12.5ns (80MHz)

(2) Data Transmission Timing

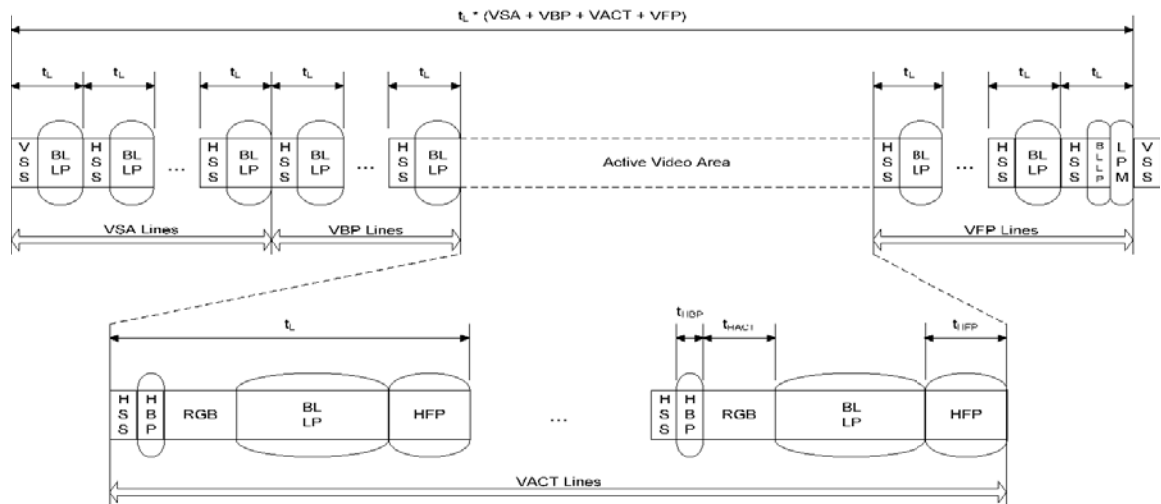
(i) Non-Burst Transmission with Sync Start and End (Pulse Mode)



(ii) Non-Burst Transmission with Sync Events (Event Mode)



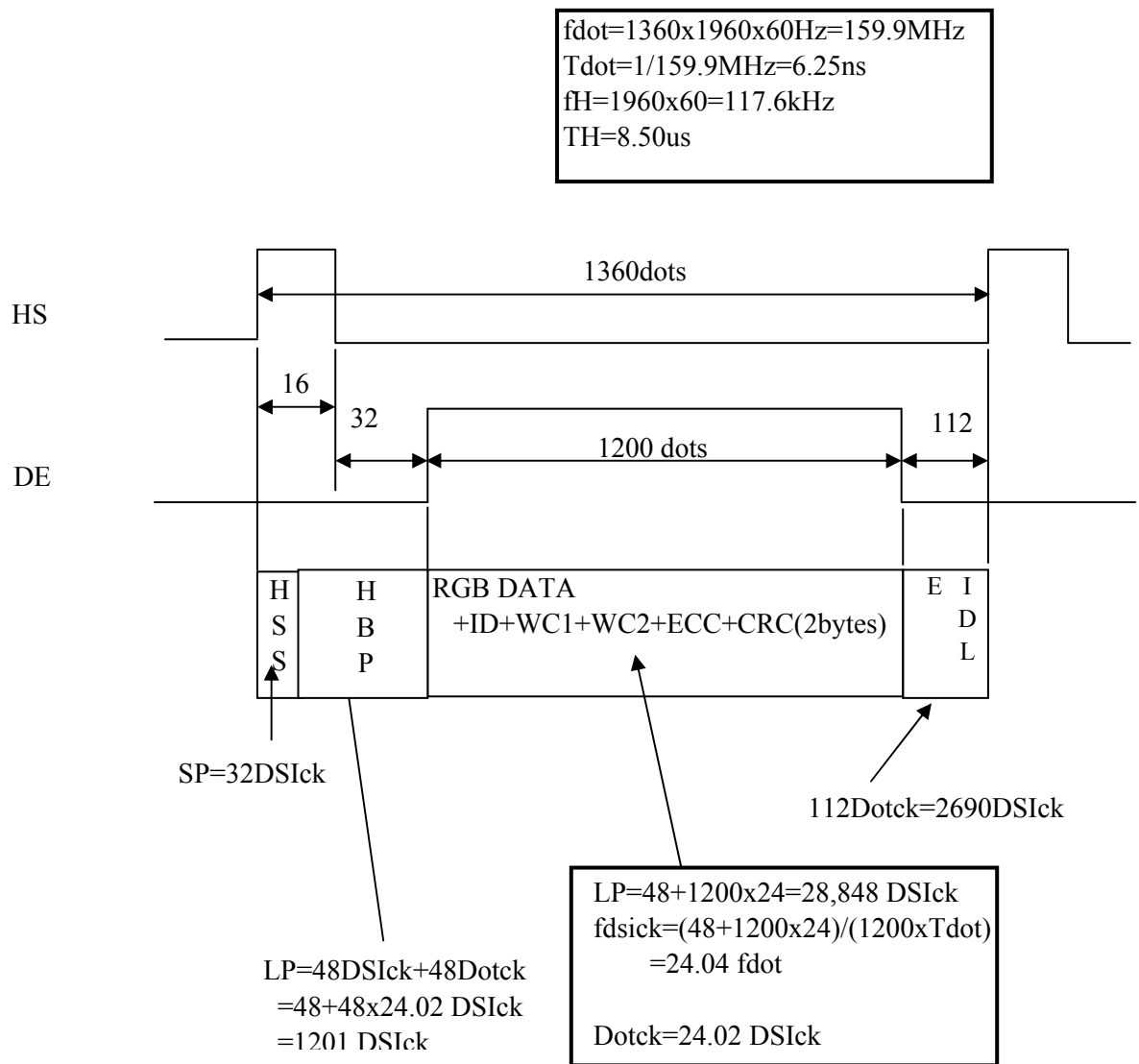
(iii) Burst Mode



(iv) Supplemental Information

- (1) HFP in any above three modes can be replaced with LP-11 state (Idle mode).
Length of LP-11 state and transition period from LP-11 state to HS (THS-SETTLE) and the period from HS to LP-11 (THS-TRAIL+THS-EXIT) shall meet the specification of the timing specified in the D-PHY standard of the MIPI interface.
- (2) Data can be transferred in any mode of above three without telling the panel which mode is used.
- (3) No EoT packet(not EoT protocol) is required.
- (4) The line frequency (fH) and frame frequency (fV) of the timing in any above three modes shall fall in the range between Min and Max value specified in the table in the section 6.2.
- (5) No command is needed to be issued to light on the panel.

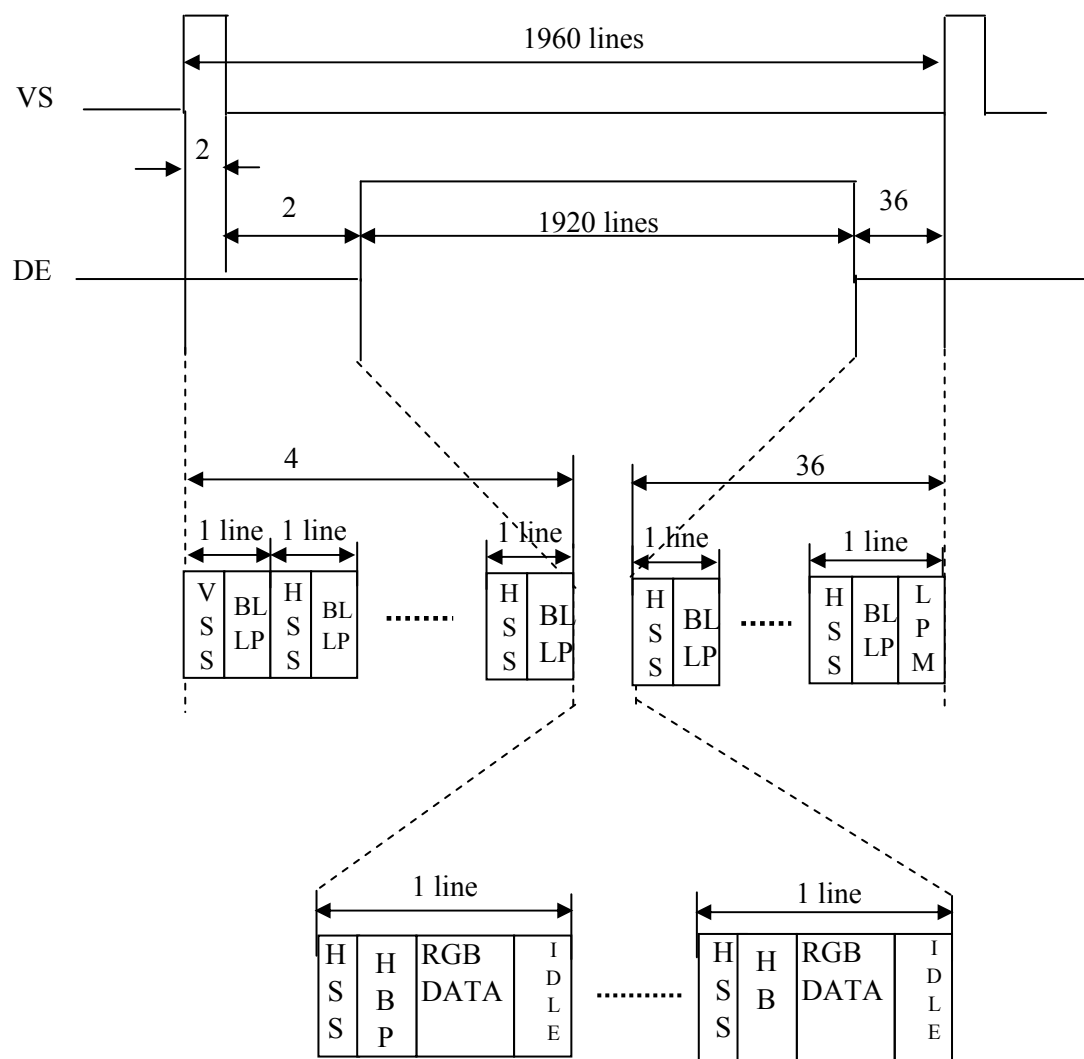
(v) An Example of Non-Burst Event Mode DSI Timing (Line Period)



$$f_{dsick}=24.04 \times 159.9 \text{MHz}=3,84399 \text{GHz}$$
$$\text{Data transfer Rate/Lane}=f_{dsick}/4=961 \text{Mbps(MHz)}$$

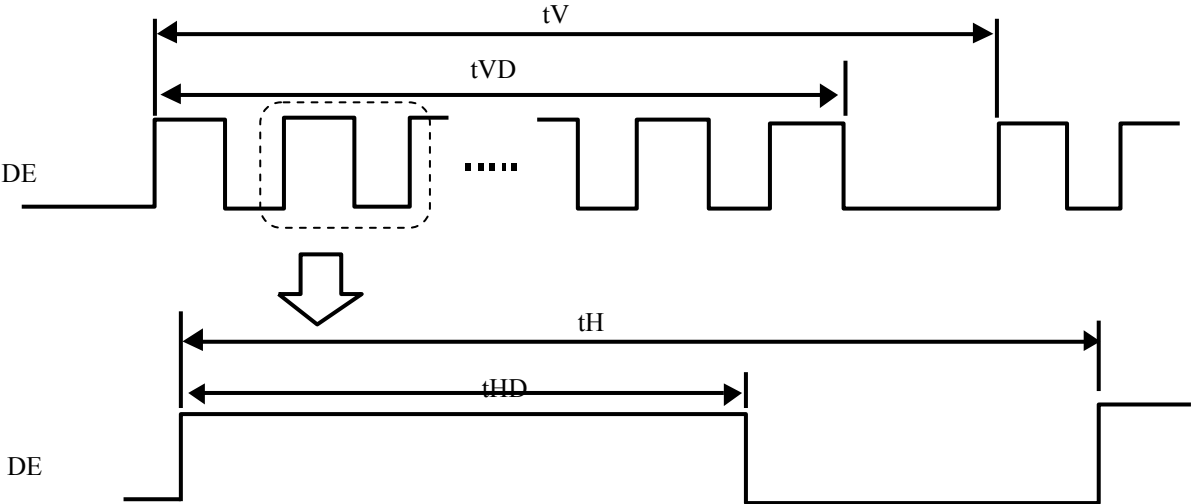
SP:Short Packet
LP:Long Packet

(vi) An Example of Non-Burst Event Mode DSI Timing (Frame Period)



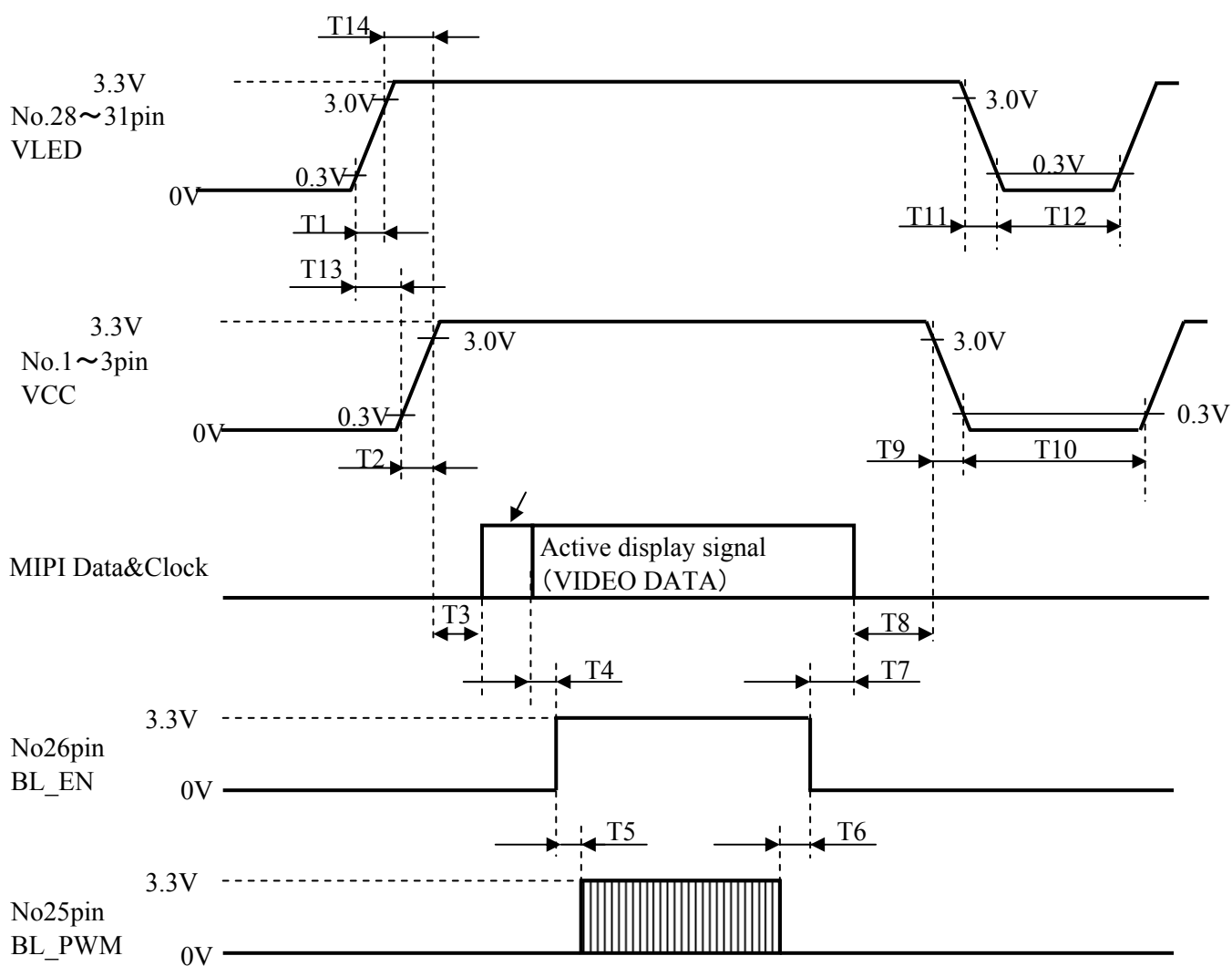
1 Line = 32,771 DSIck
 $TH = 32771 / 3.84399\text{GHz} = 8.5\mu\text{s}$
 $TV = 1960 \times TH$
 $= 1960 \times 8.5\mu\text{s}$
 $= 16.7\text{ms}$
 $fV = 1 / TV = 60\text{Hz}$

6.2 SYNCHRONIZATION SIGNAL TIMING



ITEM		SYMBOL	Min.	Typ.	Max.	UNIT	NOTE
DE	Vertical Frequency	fV	40	60	62	Hz	
	Vertical Period	tV	1940	1960	4095	tH	
	Vertical Valid	tVD	1920			tH	
	Horizontal Frequency	fH	116.4	117.6	120.3	kHz	
	Horizontal Period	tH	1264	1360	4095	tCLK	
	Horizontal Valid	tHD	1200			tCLK	

Timing between interface signals and power supply



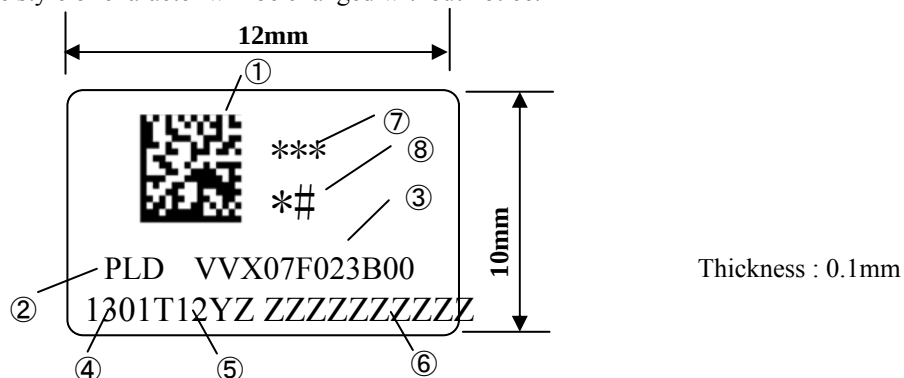
SYMBOL	Min.	Typ.	Max.	UNIT	Note
T1	1	-	(10)	ms	
T2	1	-	(10)	ms	
T3	400	-	-	ms	
T4	0	-	-	ms	
T5	50	-	-	ms	
T6	0	-	-	ms	
T7	50	-	-	ms	
T8	0	-	-	ms	
T9	3	-	-	ms	
T10	400	-	-	ms	
T11	3	-	-	ms	
T12	300	-	-	ms	
T13	0	-	-	ms	
T14	0	-	-	ms	

7. LABEL FORMAT

7.1 Label

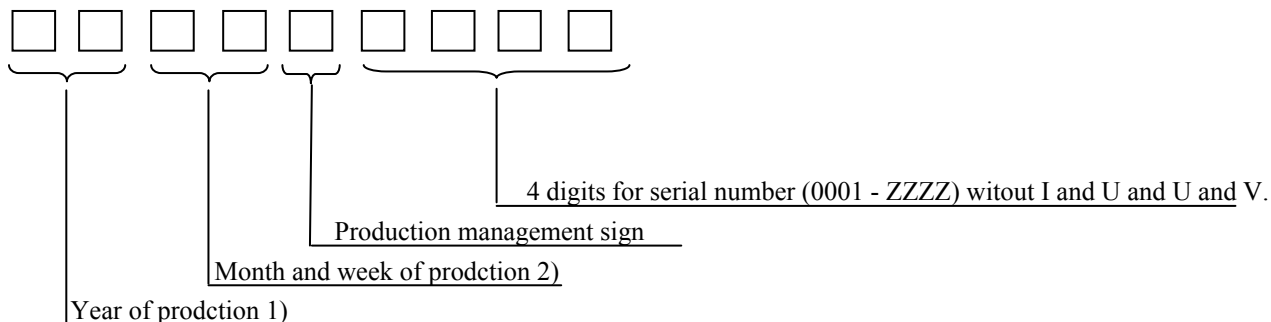
The label is on the metallic bezel as shown in 7. External Dimensional.

The style of character will be changed without notice.



- ① Contents of ②~⑥ are indicated by bar codes. 【Express by the data matrix】
- ② PLD
- ③ Production name : VVX07F023B00
- ④ Please refer to 8.2.
- ⑤ Please refer to 8.2.
- ⑥,⑦,⑧ A cord for production of PLD inside management.

7.2 Lot mark



1)

Mark	Year
13	2013
14	2014
15	2015

2)

- 01 , The 1st week of year
- 02 , The 2nd week of year
- 03 , The 3rd week of year
- 04 , The 4th week of year
- 05 , The 5th week of year
- 06 , The 6th week of year
-
- 52 , The 52th week of year

8. COSMETIC SPECIFICATIONS

8.1 Condition for cosmetic inspection

(1) Viewing zone

- a) The figure shows the correspondence between eyes (of inspector) and TFT-LCD module.

$$\theta \leq 45^\circ$$

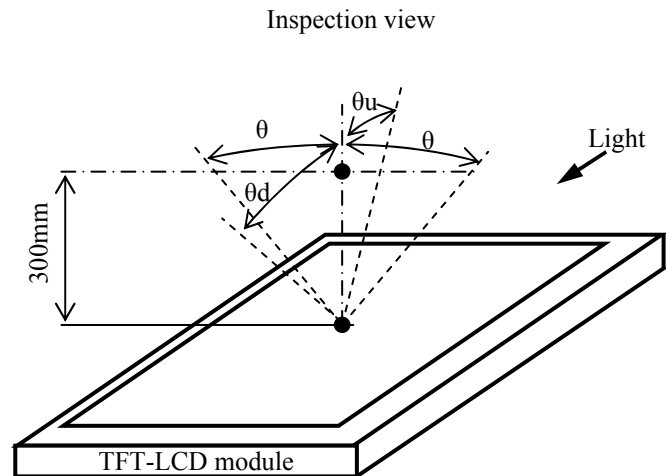
$$\theta_u \leq 15^\circ$$

$$\theta_d \leq 35^\circ$$

- b) Inspection should be executed only from front side and only display area(A,B,C-zone).
Cosmetic of C-zone are ignore.
(refer to 9.2 Definition of zone)

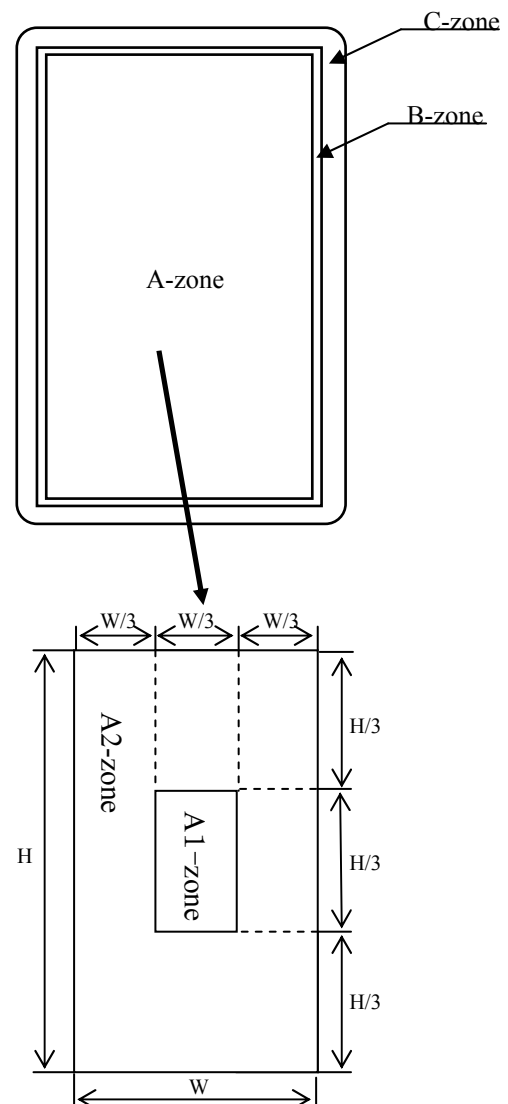
(2) Environmental

- a) Temperature : 25 degrees
b) Ambient light : about 300-800 lx
c) Backlight : when non-operating inspection, backlight should be off .



8.2 Definition of zone

- A-zone : Active display area (pixel area)
- A1-zone : Center area of active display area (pixel area)
- A2-zone : Active display area (pixel area) without A1-zone
- B-zone : Top polarizer area
- C-zone : Not including A-zone and B-zone



8.3 Cosmetic specifications

When displaying conditions are not stable (ex. at turn on or off), the following specifications are not applied.

	No	ITEM			Max. acceptable number	Unit	Note
Operating inspection	1	Dot defect	Bright mode	1-dot	0	pcs	1),2)
			High-Level partial Bright	1-dot	1	pcs	1),3),11)
			Dot of Green Low-Level	2-dots	0		
			partial Bright	1-dot	4	pcs	1),3)
			Dot of Green Partial Bright	2-dots	0		
			mode of Red&Blue	1-dot	4	pcs	1),3)
				2-dots	0		
			total		4	pcs	-
			Below Partial Bright mode		Ignore	-	1),4)
	2	Line defect			Serious one is not allowed	-	-
	3	Uneven brightness					
	4	Stain inclusion Line shape W : width (mm) L : length (mm)	W≤0.02	L:Ignore	Ignore	pcs	5),8)
			0.02 < W ≤0.08	L≤3.0	2		
				3.0 < L	0		
			W > 0.08	—	(See dot shape)		
	5	Scratch on polarizer Line shape W : width (mm) L : length (mm)	W≤0.02	L:Ignore	Ignore	pcs	5),9)
			0.02 < W ≤0.08	L≤3.0	2		
3.0 < L				0			
W > 0.08			—	(See dot shape)			
6	Black Dot defect	1-dot		4	pcs	1),6),7)	
		2-dots		0			
		Density		0			
7	•Stain inclusion Dot shape D : ave. dia (mm) •Scratch onpolarizer Dot shape D : ave. dia (mm)	D≤0.1		Ignore		8),9),13)	
		0.1 < D≤0.25		4			
		0.25 < D		0			
Non operating inspection	8	Wrinkles on polarizer			Serious one is not allowed.	-	-

Note 1) Dot defect : defect area > 1/2 dot.

2) Limit pattern R : 200 , G : 200 , B : 200 *Total : 256 stair

3) High Level partial Bright Dot of Green : $160 < \text{brightness} < 200$

Low Level partial Bright Dot of Green : $96 < \text{brightness} \leq 160$

Partial Bright Dot of Red & Blue : $160 < \text{brightness} < 200$ *Total : 256 stair

4) Below Partial Bright Mode is less than R : 160 , G : 96 , B : 160 *Total : 256 stair

5) Number of defect dots inside $\phi 20\text{mm}$ (There is the distance between defects more than 20mm.)

6) Black of dot is less than 70% at white. (visible to eye)

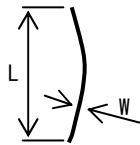
7) Number of defect dots inside $\phi 15\text{mm}$ (There is the distance between defects more than 15mm.)

8) Those stains which can be wiped out easily are acceptable.

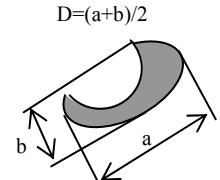
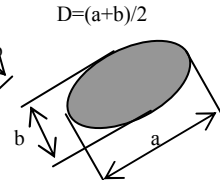
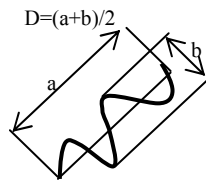
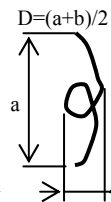
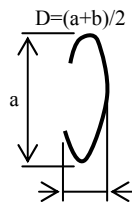
Panasonic Liquid Crystal Display Co.,Ltd.	Date	Jun.21,2013	Sheet No.	IPS4 PS 2611 VVX07F023B00-4	Page	11-2/3
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- 9) Polarizer area inside of B-zone is not applied.
- 10) No major (serious) defects when viewed in gray scale mode.
- 11) Only A2-zone
- 12) The definition of line shape and dot shape .

Line shape:



Dot shape:



- 13) Number of defect dots inside $\phi 5\text{mm}$ (There is the distance between defects more than 5mm.)

8.4 Mura inspection

Mura Judge using 6% ND filter as following condition:

- 1) Ambient light: 300 lux
- 2) Use ND filter(6%). The position of ND filter is on TFT-LCD module.
- 3) View Distance: $300 \pm 50\text{mm}$
- 4) Checking angle: $\theta \leq 5^\circ$ (Curtain mura and band mura : $\theta \leq 45^\circ$)
- 5) Checking time: 3sec
- 6) Checking pattern : Gray rasuter 126 stair

8.5 Particle/Dimple/Stain inspection

- 1) Not visible over a touch panel (Non-OP) is ignore.

It should be judge using touch panel less than transmission 90%

- 2) Not visible at operation is ignore.

9. PRECAUTION

Please pay attention to the followings when a TFT module with a backlight unit is used, handled and mounted.

9.1 Precaution to handling and mounting

- (1) Applying strong force to a part of the module may cause partial deformation of frame or mold, and cause damage to the display.
- (2) The module should gently and firmly be held by both hands. Never hold by just one hand in order to avoid any internal damage. Never drop or hit the module.
- (3) Uneven force such as twisted stress should not be applied to a module when a module is mounted on the cover case. The cover case must have sufficient strength so that external force can not be transmitted directly to a module.
- (4) It is recommended to leave a space between a module and a holding board of a module so that partial force is not applied to a module.

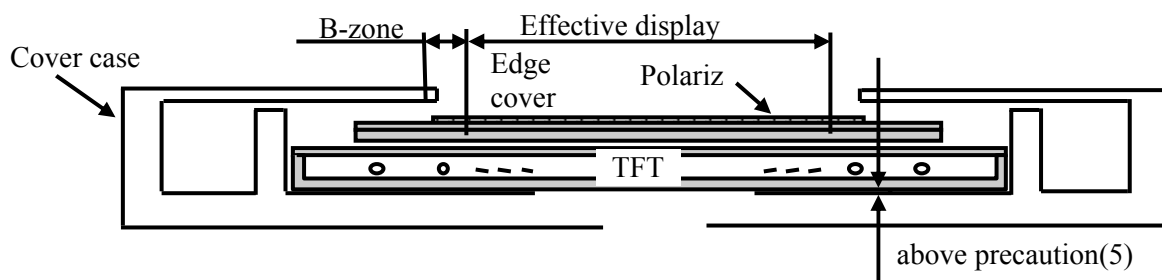


Fig.1 Cross sectional view of a monitor set

- (5) The edge of a cover case should be located inside more than 1mm from the edge of a module frame.
- (6) A transparent protective plate should be added on the display area of a module in order to protect a polarizer and TFT cell. The transparent protective plate should have sufficient strength so that the plate can not touch a module by external force.
- (7) Materials included acetic acid and choline should not be used for a cover case as well as other parts and boards near a module. Acetic acid attacks a polarizer. Choline attacks electric circuits due to electro-chemical reaction.
- (8) The polarizer on a TFT cell should carefully be handled due to its softness, and should not be touched, pushed or rubbed with glass, tweezers or anything harder than HB pencil lead. The surface of a polarizer should not be touched and rubbed with bare hand, greasy clothes or dusty clothes.
- (9) The surface of a polarizer should be gently wiped with absorbent cotton, chamois or other soft materials slightly contained petroleum benzene when the surface becomes dirty. Normal-hexane or Isopropyl alcohol as cleaning chemicals is recommended in order to clean adhesives which fix front/rear polarizers on a TFT cell. Other cleaning chemicals such as acetone, toluen and alcohol should not be used to clean adhesives because they cause chemical damage to a polarizer.
- (10) Saliva or water drops should be immediately wiped off. Otherwise, the portion of a polarizer may be deformed and its color may be faded.
- (11) The module should not be opened or modified. It may cause not to operate properly.
- (12) Metallic of a module should not be handled with bare hand or dirty gloves. Otherwise, color of a metallic frame may become dirty during its storage. It is recommended to use clean soft gloves and clean finger stalls when a module is handled at incoming inspection process and production (assembly) process.
- (13) FPC for LED line and Data line should not be pulled and held.

9.2 Precaution to operation

- (1) The ambient temperature near the operated module should be satisfied with the absolute maximum ratings. Unless it meets the specifications, sufficient cooling system should be adopted to system.
- (2) The spike noise causes the mis-operation of a module. The level of spike noise should be as follows:
$$-200\text{mV} \leq \text{over- and under- shoot of VDD} \leq +200\text{mV}$$

VDD including over- and under- shoot should be satisfied with the absolute maximum ratings.
- (3) Optical response time, luminance and chromaticity depend on the temperature of a TFT module.
- (4) Sudden temperature change may cause dew on and/or in the a module. Dew makes damage to a polarizer and/or electrical contacting portion. Dew causes fading of displayed quality.
- (5) Fixed patterns displayed on a module for a long time may cause after-image. It will be recovered soon.
- (6) A module has high frequency circuits. Sufficient suppression to electromagnetic interference should be done by system manufacturers. Grounding and shielding methods may be effective to minimize the interference.
- (7) Noise may be heard when a backlight is operated. If necessary, sufficient suppression should be done by system manufacturers.
- (8) The module should not be connected or removed while a main system works.
- (9) Inserting or pulling I/F connectors causes any trouble when power supply and signal data are on-state.
I/F connectors should be inserted and pulled after power supply and signal data are turned off.

9.3 Electrostatic discharge control

- (1) Since a module consists of a TFT cell and electronic circuits with CMOS-ICs, which are very weak to electrostatic discharge, persons who are handling a module should be grounded through adequate methods such as a list band.
I/F connector pins should not be touched directly with bare hands.
- (2) Protection film for a polarizer on a module should be slowly peeled off so that the electrostatic charge can be minimized.

9.4 Precaution to strong light exposure

- (1) A module should not be exposed under strong light. Otherwise, characteristics of a polarizer and color filter in a module may be degraded.

9.5 Precaution to storage

When modules for replacement are stored for a long time, following precautions should be taken care of:

- (1) Modules should be stored in a dark place. It is prohibited to apply sunlight or fluorescent light during storage.
Modules should be stored at 0 to 35°C at normal humidity (60%RH or less).
- (2) The surface of polarizers should not come in contact with any other object. It is recommended that modules should be stored in the Panasonic Liquid Crystal Display's shipping box.

9.6 Precaution to handling protection film

- (1) The protection film for polarizers should be peeled off slowly and carefully by persons who are electrically grounded with adequate methods such as a list band. Besides, ionized air should be blown over during peeling action. Dusts on a polarizer should be blown off by an ionized nitrogen gun and so on.
- (2) The protection film should be peeling off without rubbing it to the polarizer. Because, if the film is rubbed together with the polarizer, since the film is attached to the polarizer with a small amount of adhesive, the adhesive may remain on a polarizer.

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- (3) The module with protection film should be stored on the conditions explained in 10.5 (1). However, in case that the storage time is too long, adhesive may remain on a polarizer even after a protection film is peeled off. Besides, in case that a module is stored at higher temperature and/or higher humidity, adhesive may remain on a polarizer. The remained adhesive may cause non-uniformity of display image.
- (4) The adhesive can be removed easily with Normal-Hexane or Isopropyl alcohol. The remained adhesive or its vestige on the polarizer should be wiped off with absorbent cotton or other soft materials such as chamois slightly contained Normal-Hexane or Isopropyl alcohol.

9.7 Safety

- (1) Since a TFT cell is made of glass, handling to the broken module should be taken care sufficiently in order not to be injured. Hands touched liquid crystal from a broken cell should be washed sufficiently.
- (2) The module should not be taken apart during operation so that backlight drives.

9.8 Environmental protection

- (1) Flexible printed circuits and printed circuits board used in a module contain small amount of lead. Please follow local ordinance or regulations for its disposal.

9.9 Use restrictions and limitations

- (1) This product is not authorized for use in life support devices or systems, military applications or other applications which pose a significant risk of personal injury.
- (2) In no event shall Panasonic Liquid Crystal Display Co.,Ltd. be liable for any incidental, indirect or consequential damages in connection with the installation or use of this product, even if informed of the possibility thereof in advance. These limitations apply to all causes of action in the aggregate, including without limitation breach of contract, breach of warranty, negligence, strict liability, misrepresentation and other torts.

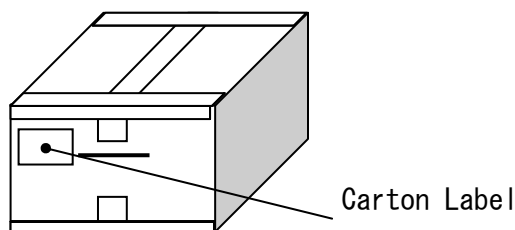
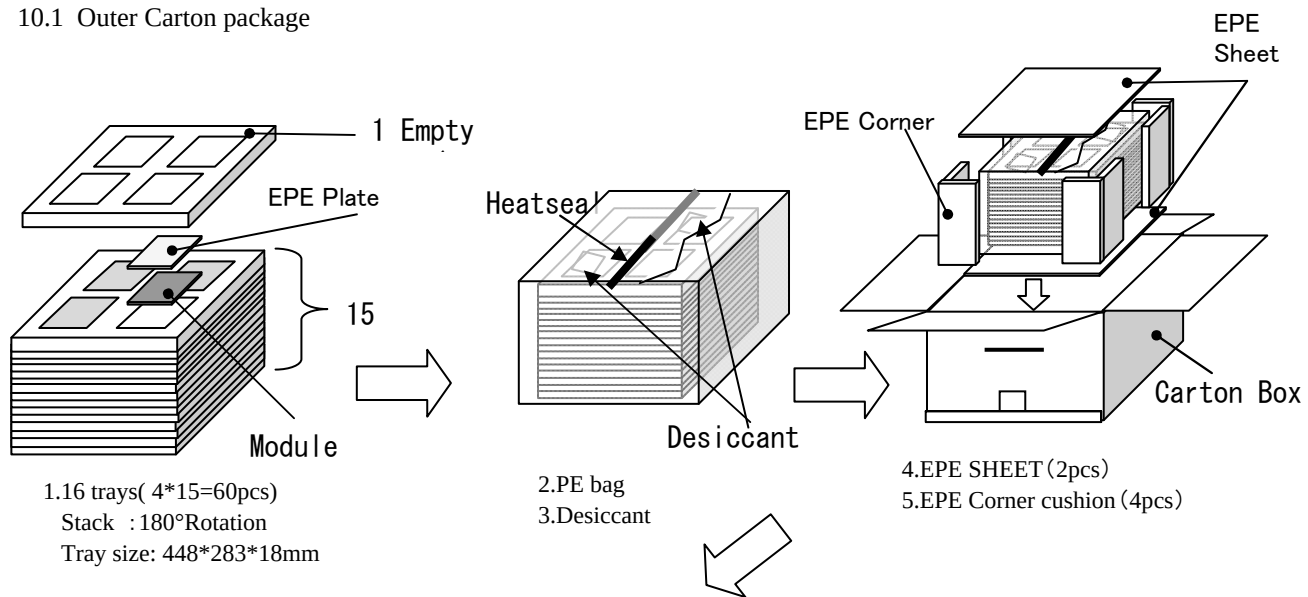
9.10 Others

- (1) Electrical components which may not affect electrical performance are subjective to change without notice because of their availability.

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10. PACKING

10.1 Outer Carton package

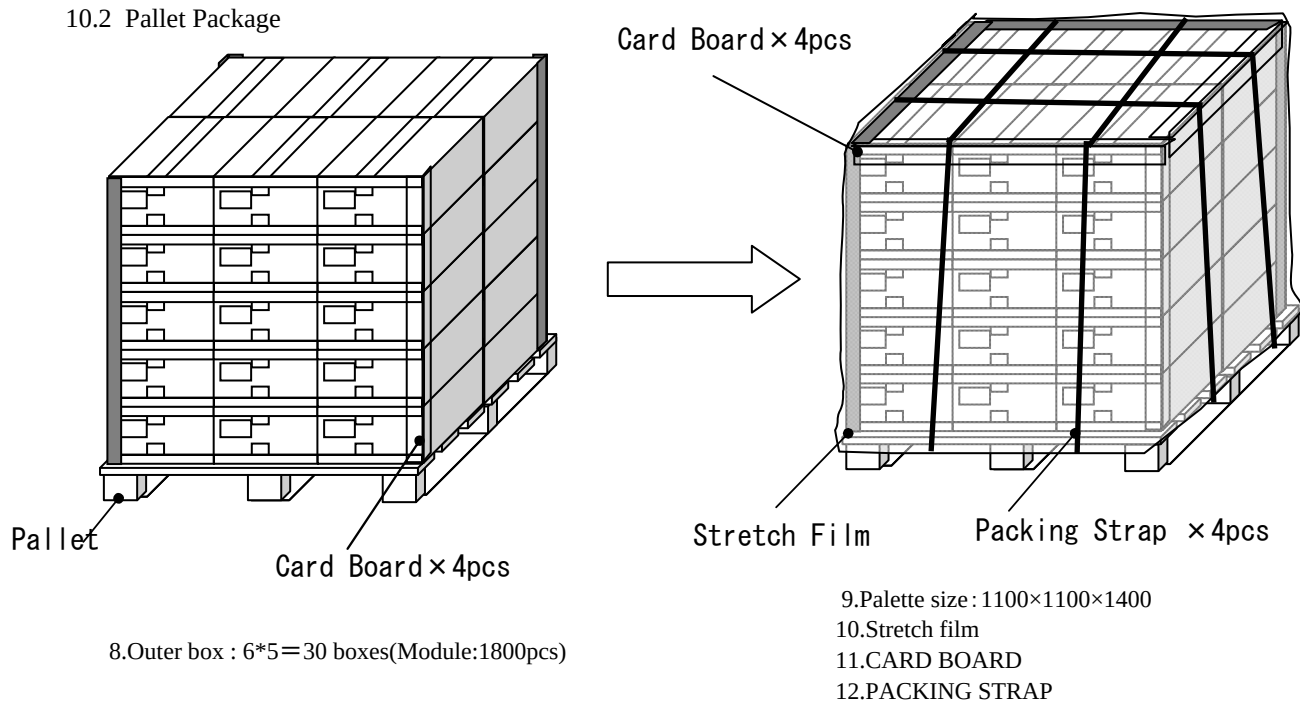


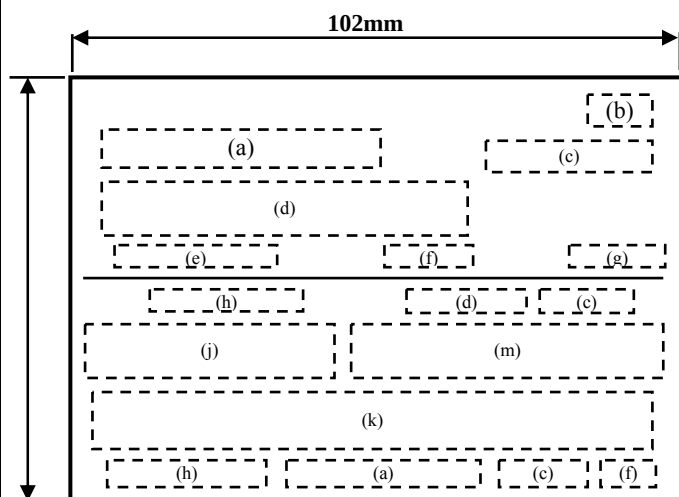
- 6.Corrugated cardboard box (AB/F)
Inner size: 515*350*230mm
7.CARTON LABEL

CARTON LABEL Ex.



10.2 Pallet Package





Code	Contents of Printing																																																																																																								
(a)	PLD internal code.																																																																																																								
(b)	The place of issuing label.																																																																																																								
(c)	Quantity of the product (pcs)																																																																																																								
(d)	This shows product name.(VVX07F023B00)																																																																																																								
(e)	Lot of registration																																																																																																								
(f)	Revision (Rev.A:Himeji Panel)																																																																																																								
(g)	PLD internal code.																																																																																																								
(h)	Serial No. of identification tag Serial No. is defined as follows. 3 7 11 B 0001 Serial No. (0001 ~ 9999 and A000 ~ Z9999) must be continuous. Do not reset. Date (Refer to the table 1.) The production base Month (Refer to the table 2.) Year (Last 1digit of AD) Table 1 Date ※Do not use I.O. <table><tr><td>Date</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td></tr><tr><td>Code</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>A</td><td>B</td><td>C</td></tr><tr><td>Date</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td><td>21</td><td>22</td><td>23</td><td>24</td></tr><tr><td>Code</td><td>D</td><td>E</td><td>F</td><td>G</td><td>H</td><td>J</td><td>K</td><td>L</td><td>M</td><td>N</td><td>P</td><td>Q</td></tr><tr><td>Date</td><td>25</td><td>26</td><td>27</td><td>28</td><td>29</td><td>30</td><td>31</td><td colspan="5"></td></tr><tr><td>Code</td><td>R</td><td>S</td><td>T</td><td>U</td><td>V</td><td>W</td><td>X</td><td colspan="5"></td></tr></table> Table 2 Month ※Do not use I.O. <table><tr><td>Month</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td></tr><tr><td>Code</td><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td><td>F</td><td>G</td><td>H</td><td>J</td><td>K</td><td>L</td><td>M</td></tr></table>	Date	1	2	3	4	5	6	7	8	9	10	11	12	Code	1	2	3	4	5	6	7	8	9	A	B	C	Date	13	14	15	16	17	18	19	20	21	22	23	24	Code	D	E	F	G	H	J	K	L	M	N	P	Q	Date	25	26	27	28	29	30	31						Code	R	S	T	U	V	W	X						Month	1	2	3	4	5	6	7	8	9	10	11	12	Code	A	B	C	D	E	F	G	H	J	K	L	M
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(k)	Bar codes correspond to (h), (a),(c) and (f).																																																																																																								
(m)	Bar codes correspond to (d), (c).																																																																																																								

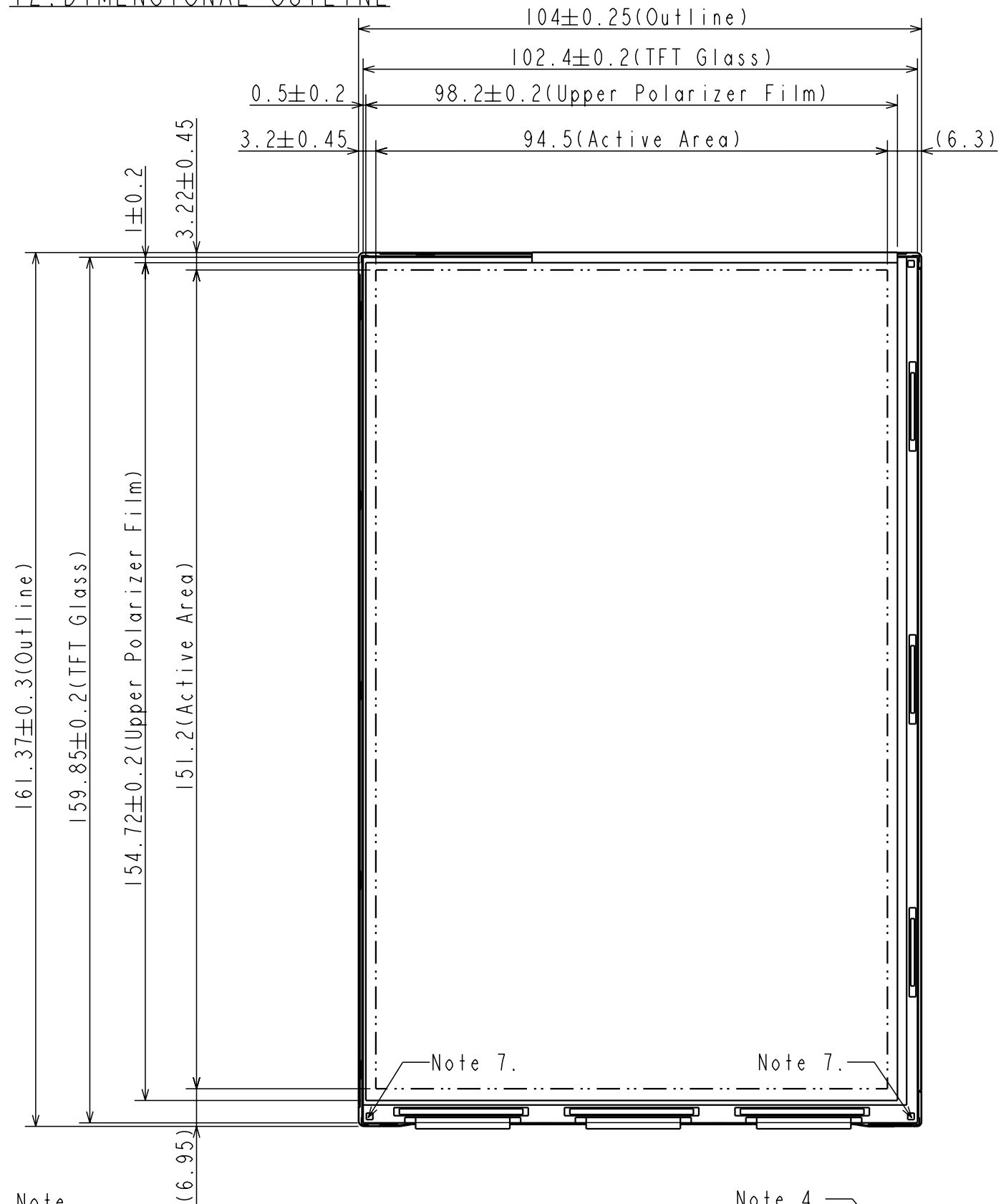
11. Reliability test

No.	Item	condition	Quantity	Period	Note
				determination	
1	Low Temperature / Operating	Ta= 0℃	3	240h	1), 2), 3)
2	High Temperature / Operating	Ta= 50℃	3	240h	1), 2), 3)
3	High Temperature High Humidity / Operating	40℃ 90%RH	3	240h	1)
4	Low Temperature / Storage	Ta= -20℃	3	240h	1), 2), 3)
5	High Temperature / Storage	Ta= 60℃	3	240h	1), 2), 3)
6	High Temperature High Humidity / Storage	60℃ 90%RH	3	240h	1)
7	Heat shock	-30 / 70℃ 30min / 30min	3	50cy.	1)

Judgement

- 1) There shall be no abnormality in the functions.
- 2) There shall be no abnormality in the the display.
- 3) Appearance and display quality should not have distinguished degradation.

12. DIMENSIONAL OUTLINE



Note

1. Undesignated tolerances of dimension are $\pm 0.5\text{mm}$.
2. This is the 1F connector "DDK FF12-31A-R11B"
3. This is the 2D production label.
4. This thickness is from upper polarizer surface to PCB parts top.
5. The dimension with () is reference.
6. Please separate the protection film of upper polarizer.
7. LCD alignment mark may be overcoated by resin.
8. This is the PCB label.

Note 4.

3.63 (Max 3.90)

