TFT LCD Approval Specification

Model No : M185B1-PS1

Customer :_____

Approved by : _____

Note :

核准時間	部門	審核	角色	投票
2009-04-28 13:30:34	MTR 產品管理處	吳 2009.04.28 柏 勳	Director	Accept

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REVISION HISTORY

Version	Date	Section	Description
Ver. 2.0	Apr., 13 '09	-	M185B1- PS1 Approval Specifications was first issued.

1. GENERAL DESCRIPTION

1.1 OVERVIEW

The M185B1-PS1 is an 18.5" wide TFT LCD cell with driver ICs and a 60pins RSDS circuit board. The product supports 1366 x 768 WXGA mode. The backlight unit is not built in.

1.2 FEATURES

- Contrast ratio 1000:1
- Response time 5ms.
- WXGA (1366 x 768 pixels) resolution.
- RSDS (Reduced Swing Differential Signaling) Interface
- RoHS compliance.

1.3 APPLICATION

TFT LCD Monitor

TFT LCD TV

1.4 GENERAL SPECIFICATI0NS

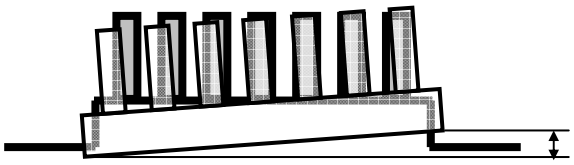
Item	Specification	Unit	Note
Diagonal Size	18.5"	inch	-
Active Area	409.8 (H) x 230.4 (V)	mm	(1)
Driver Element	a-si TFT active matrix	-	-
Pixel Number	1366 x R.G.B. x 768	pixel	-
Pixel Pitch	0.3 (H) x 0.3 (V)	mm	-
Pixel Arrangement	RGB vertical stripe	-	-
Transmissive Mode	Normally white	-	-
Surface Treatment	Hard coating (3H), Anti-glare (Haze 25%)	-	-

1.5 MECHANICAL SPECIFICATIONS

Item	Min.	Typ.	Max.	Unit	Note
Weight	-	-	414	g	-
I/F connector mounting position	The mounting inclination of the connector makes the screen center within ±0.5mm as the horizontal.			-	(2)

Note (1) Please refer to the attached drawings for more information of front and back outline dimensions.

(2) Connector mounting position



2. ABSOLUTE MAXIMUM RATINGS

2.1 ABSOLUTE RATINGS OF ENVIRONMENT (BASE ON CMO M185B1-L01)

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T_{ST}	-20	+60	ºC	(1)
Operating Ambient Temperature	T_{OP}	0	+50	ºC	(1), (2)

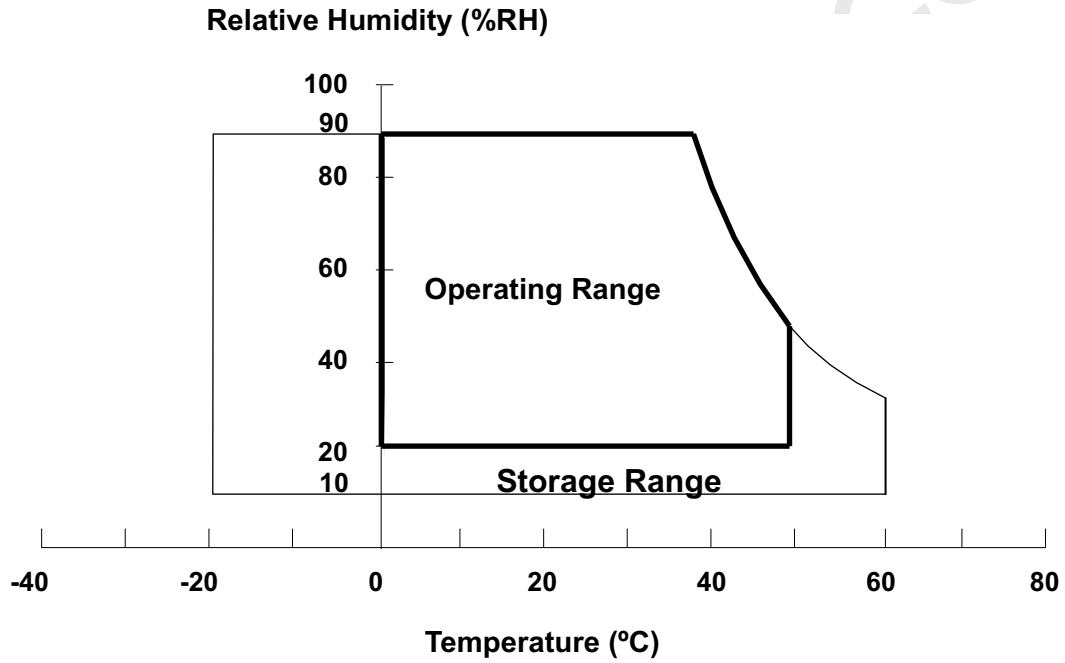
Note (1) Temperature and relative humidity range is shown in the figure below.

(a) 90 %RH Max. (Ta ≦ 40 ºC).

(b) Wet-bulb temperature should be 39 ºC Max. (Ta > 40 ºC).

(c) No condensation.

Note (2) The temperature of panel display surface area should be 0 ºC Min. and 60 ºC Max.



2.2 ABSOLUTE RATINGS OF ENVIRONMENT (OPEN CELL)

High temperature or humidity may reduce the performance of panel. Please store LCD panel within the specified storage conditions.

Storage Condition: With packing.

Storage temperature range: 25±5 ºC.

Storage humidity range: 50±10%RH.

Shelf life: 30days

2.3 ELECTRICAL ABSOLUTE RATINGS (OPEN CELL)

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power supply for digital circuit	VSD	-0.3	+4.3	V	(1)
Power supply for analog circuit	VSA	-0.3	+13.5	V	(1)
Gate on voltage with pulse modulation	VGHM	-0.3	+40.0	V	(1)
Gate off voltage	VGL	VGHM-40	+0.3	V	(1)

Note (1) Permanent damage might occur if the module is operated at conditions exceeding the maximum values.

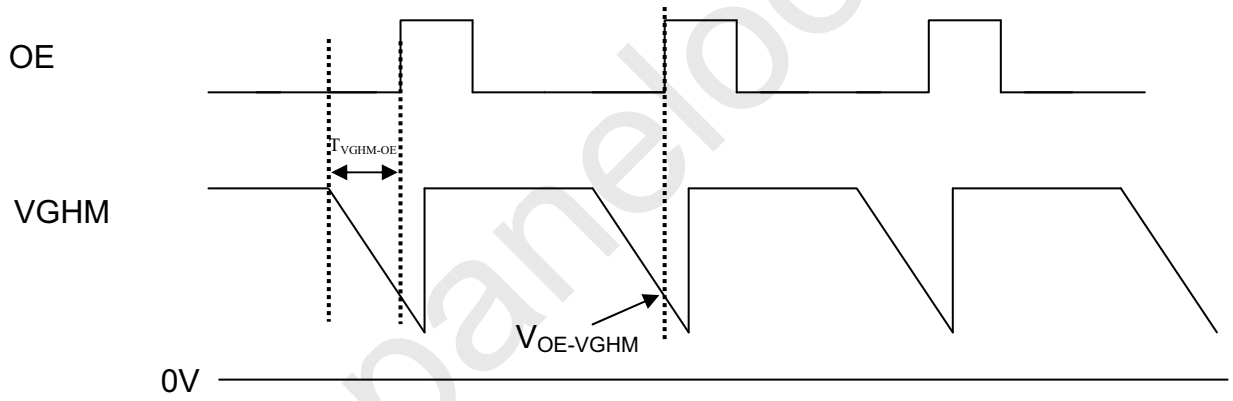
3. ELECTRICAL CHARACTERISTICS (OPEN CELL)

3.1 TFT LCD OPEN CELL

Ta = 25 ± 2 ºC

Parameter	SYMBOL	Value			UNIT	Note
		MIN	TYP	MAX		
Power Supply Voltage for VSD	VSD	3.0	3.3	3.6	V	(1)
Power Supply Current for VSD	I_{VSD}	-	15	-	mA	(1)
Power Supply Voltage for VSA	VSA	12.7	13	13.3	V	(1)
Power Supply Current for VSA	I_{VSA}	-	160	-	mA	(1)
Gate off Voltage	VGL	-7.4	-6.8	-6.2	V	(1)
Gate off Current	I_{VGL}	-	-2	-	mA	(1)
Gate on Voltage	VGHM	23.1	23.8	24.5	V	(1)
Gate on Current	I_{VGHM}	-	8	-	mA	(1)
VCOM Voltage	VCOM	4.66	5.16	5.66	V	(1)
OE start point in VGHM	$V_{OE-VGHM}$	10.9	11.6	12.3	V	(1)
VGHM to OE start time	$T_{VGHM-OE}$	-	2	-	us	(1)

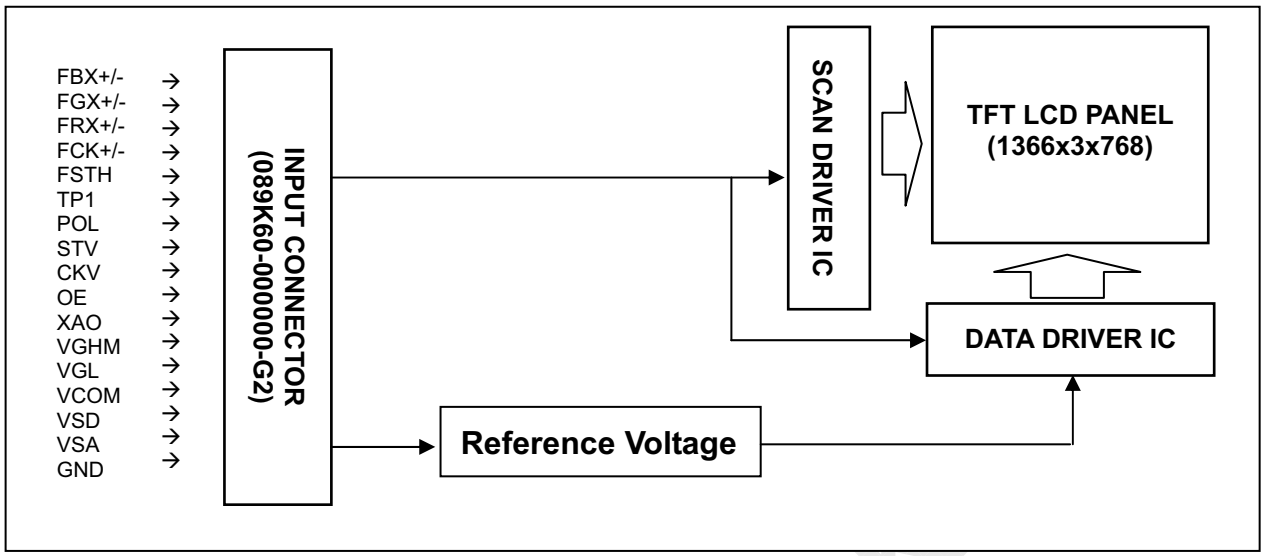
Note(1) The specified power supply is under the conditions at Ta = 25 ± 2 ºC, f_v =75Hz, whereas a power dissipation check pattern below is displayed.



Black Pattern

4. BLOCK DIAGRAM

4.1 TFT LCD MODULE



5. INPUT TERMINAL PIN ASSIGNMENT

5.1 TFT LCD MODULE

Pin	Name	Description
1	GND	Ground
2	NC	Should not be connect
3	NC	Should not be connect
4	NC	Should not be connect
5	NC	Should not be connect
6	NC	Should not be connect
7	NC	Should not be connect
8	NC	Should not be connect
9	NC	Should not be connect
10	NC	Should not be connect
11	NC	Should not be connect
12	NC	Should not be connect
13	NC	Should not be connect
14	NC	Should not be connect
15	NC	Should not be connect
16	NC	Should not be connect
17	NC	Should not be connect
18	NC	Should not be connect
19	NC	Should not be connect
20	NC	Should not be connect
21	NC	Should not be connect
22	NC	Should not be connect
23	GND	Ground
24	FB2P	Channel B2 (Front), Positive RSDS differential data input
25	FB2N	Channel B2 (Front), Negative RSDS differential data input
26	FB1P	Channel B1 (Front), Positive RSDS differential data input
27	FB1N	Channel B1 (Front), Negative RSDS differential data input
28	FB0P	Channel B0 (Front), Positive RSDS differential data input
29	FB0N	Channel B0 (Front), Negative RSDS differential data input
30	FG2P	Channel G2 (Front), Positive RSDS differential data input
31	FG2N	Channel G2 (Front), Negative RSDS differential data input
32	FG1P	Channel G1 (Front), Positive RSDS differential data input
33	FG1N	Channel G1 (Front), Negative RSDS differential data input
34	FG0P	Channel G0 (Front), Positive RSDS differential data input
35	FG0N	Channel G0 (Front), Negative RSDS differential data input
36	FCKP	(Front), Positive RSDS differential clock input
37	FCKN	(Front), Negative RSDS differential clock input
38	FR2P	Channel R2 (Front), Positive RSDS differential data input
39	FR2N	Channel R2 (Front), Negative RSDS differential data input
40	FR1P	Channel R1 (Front), Positive RSDS differential data input
41	FR1N	Channel R1 (Front), Negative RSDS differential data input
42	FR0P	Channel R0 (Front), Positive RSDS differential data input
43	FR0N	Channel R0 (Front), Negative RSDS differential data input
44	FSTH	(Front) data driver start pulse input
45	GND	Ground
46	TP1	STB, data driver latch signal input
47	POL	Data driver polarity inverting input
48	STV	Gate driver start pulse input
49	CKV	Gate driver shift register clock input
50	OE	Gate driver output enable control input

51	XAO	Gate driver output all-on control input
52	GND	Ground
53	VGHM	Gate on voltage with pulse modulation
54	GND	Ground
55	VGL	Gate off voltage
56	VCOM	DC common voltage with OP buffer output
57	VSD	Power supply for digital circuit, 3.3V
58	VSD	Power supply for digital circuit, 3.3V
59	VSA	Power supply for analog circuit
60	VSA	Power supply for analog circuit

Note (1) Connector Part No.: Starconn 089K60-000000-G2 or equivalent

5.2 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 6-bit gray scale data input for the color. The higher the binary input, the brighter the color. The table below provides the assignment of color versus data input.

Color		Data Signal																	
		Red						Green						Blue					
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	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
Gray Scale Of Red	Red(0) / Dark	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	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(61)	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale Of Green	Green(0) / Dark	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	1	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
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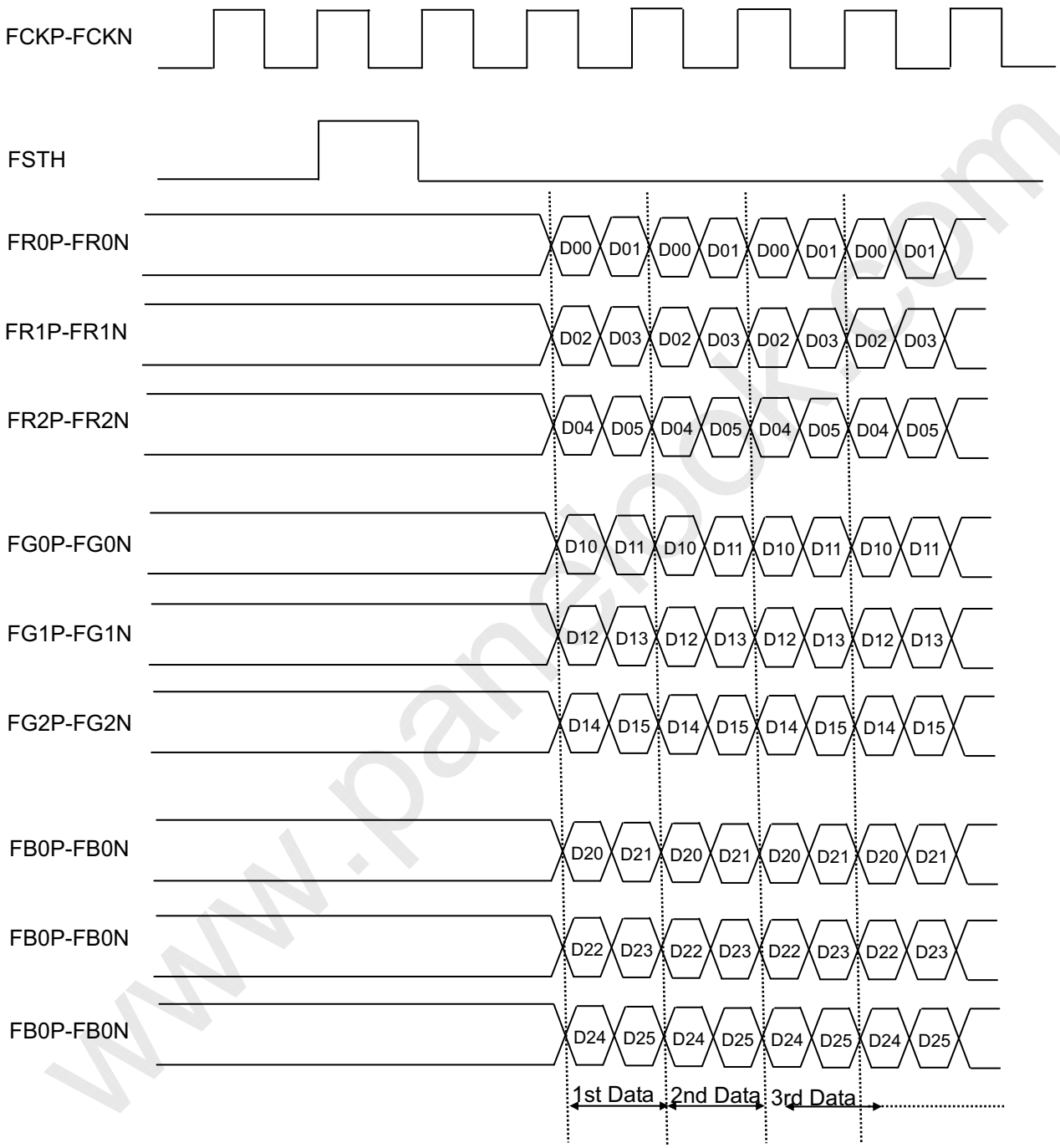
	Green(61)	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0
	Green(62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	Green(63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Gray Scale Of Blue	Blue(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(61)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1
	Blue(62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	Blue(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

Note (1) 0: Low Level Voltage, 1: High Level Voltage

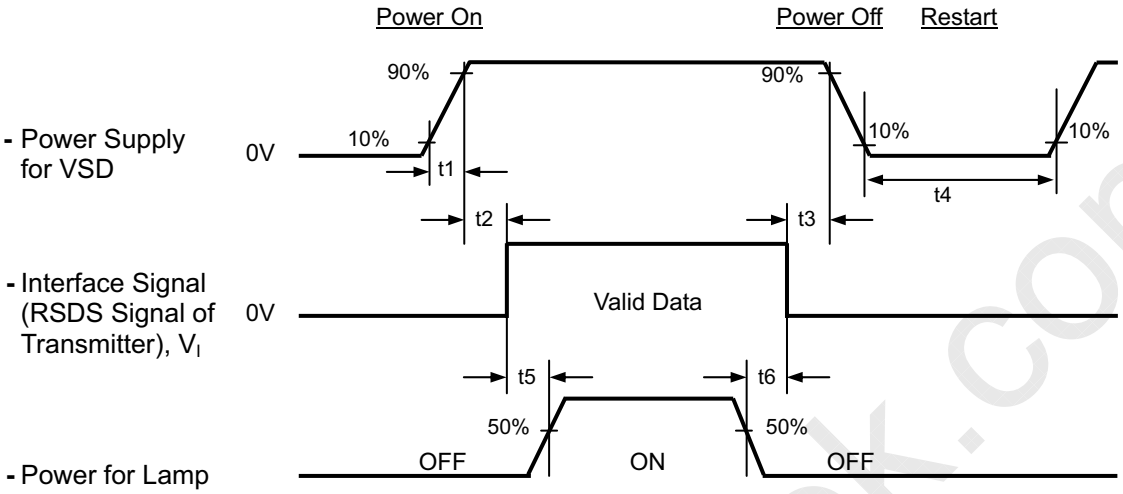
6. INTERFACE TIMING

6.1 INPUT SIGNAL TIMING SPECIFICATIONS



6.2 POWER ON/OFF SEQUENCE

To prevent a latch-up or DC operation of LCD module, the power on/off sequence should be as the diagram below.



Timing Specifications:

0.5< t1 ≦ 10 msec

0 < t2 ≦ 50 msec

0 < t3 ≦ 50 msec

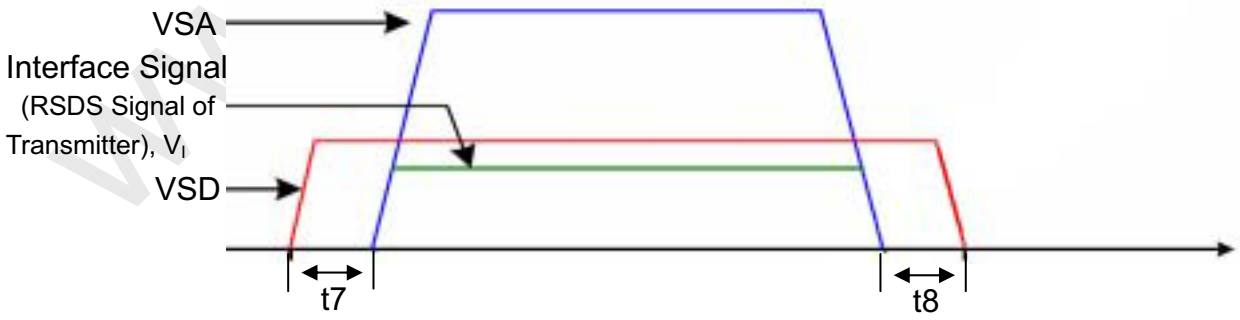
t4 ≧ 500 msec

t5 ≧ 450 msec

t6 ≧ 90 msec

When power on : VSD → VSA, Signal

When power off : Signal, VSA→ VSD



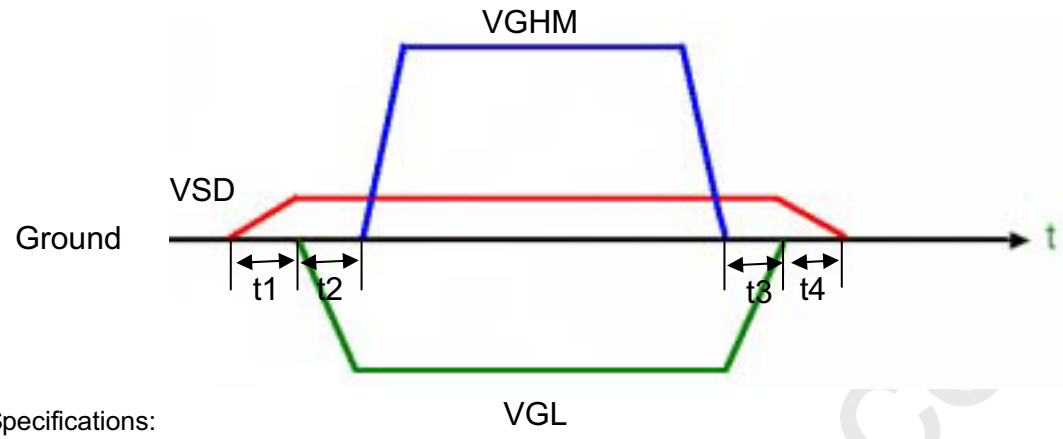
Timing Specifications:

0< t7

0≦t8

When power on : VSD → VGL → VGHM

When power off : VGHM → VGL → VSD



Timing Specifications:

0< t1

0<t2

0≦t3

0≦t4

Note.

(1) The supply voltage of the external system for the module input should be the same as the definition of VSD.

(2) Apply the lamp voltage within the LCD operation range. When the backlight turns on before the LCD operation of the LCD turns off, the display may momentarily become abnormal screen.

(3) In case of VSD = off level, please keep the level of input signals on the low or keep a high impedance.

(4) T4 should be measured after the module has been fully discharged between power off and on period.

(5) Interface signal shall not be kept at high impedance when the power is on.

(6) The company will not guarantee or compensate for the product damage caused by not following the Power Sequence.

7. Driver DC CHARACTERISTICS

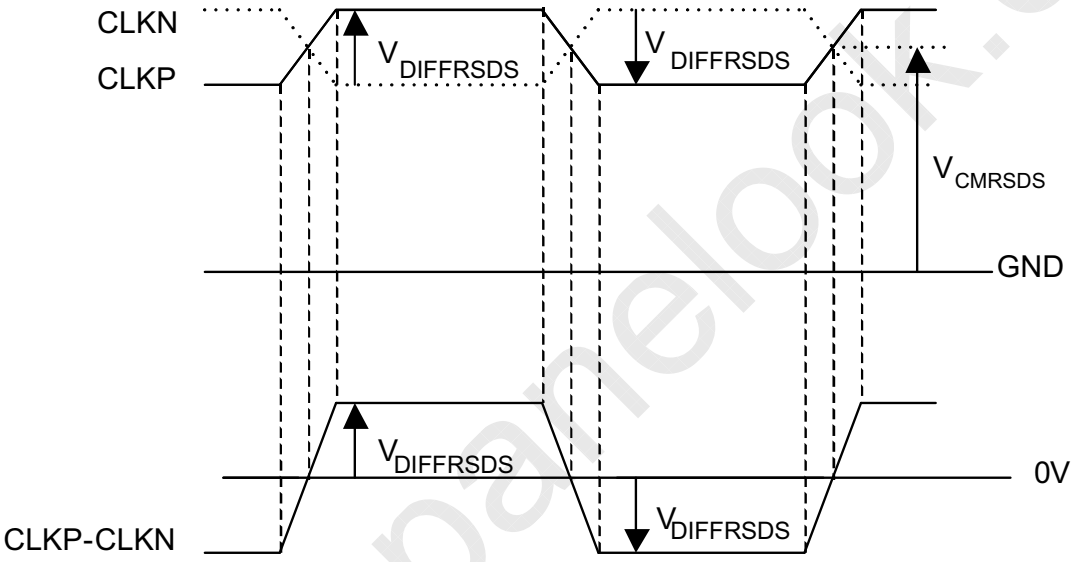
7.1 ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Condition	Spec			Unit
			Min.	Typ.	Max.	
RSDS input "Low" Voltage	$V_{DIFFRSDS}$	V_{CMRSDS} = + 1.2 V (1)	-	-200	-100	mV
RSDS input "High" Voltage	$V_{DIFFRSDS}$		100	200	-	mV
RSDS reference voltage	V_{CMRSDS}	$V_{DIFFRSDS}$ = + 200 mV (2)	0.4	1.2	VSD-1.2	V

Note:

(1) VCMRSDS = (VCLKP + VCLKN) / 2 or VCMRSDS = (VDxxP + VDxxN) / 2

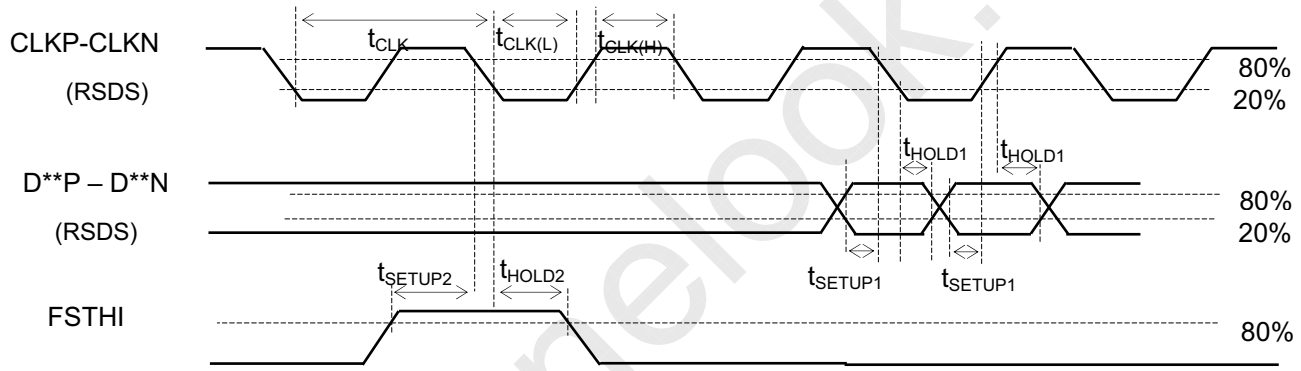
(2) VDIFFRSDS = VCLKP - VCLKN or VDIFFRSDS = VDxxP – VDxxN

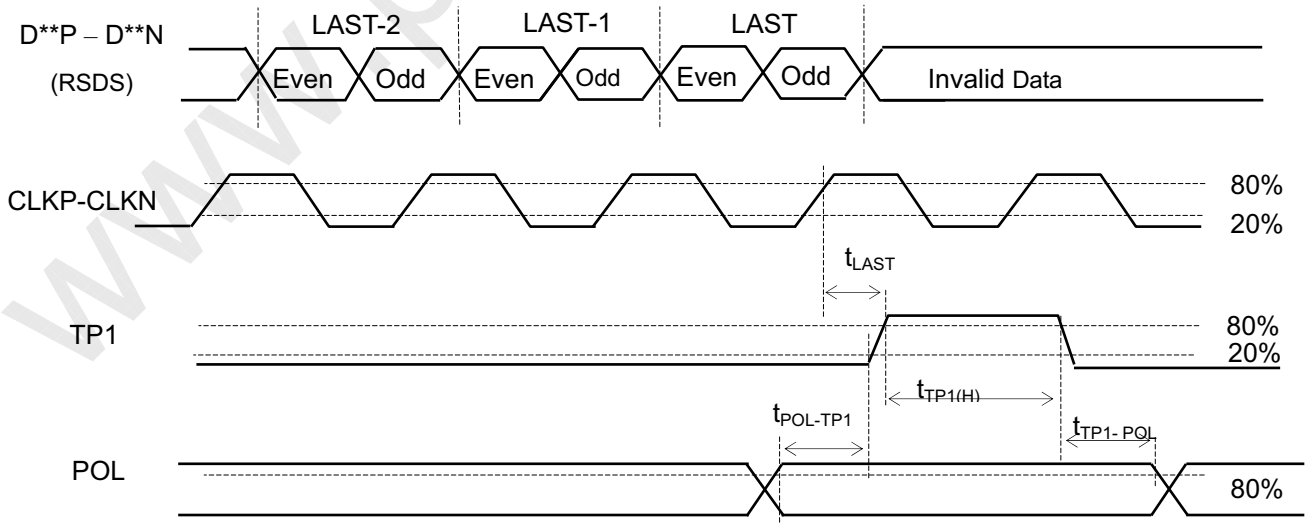


8. Driver AC CHARACTERISTICS

Parameter	Symbol	Condition	Spec			Unit
			Min.	Typ.	Max.	
Clock pulse width	t_{CLK}	-	10	10.65*	-	ns
Clock pulse low period	$t_{CLK(L)}$	-	5	5.127*	-	ns
Clock pulse high period	$t_{CLK(H)}$	-	5	5.610*	-	ns
RSDS data setup time	t_{SETUP1}	-	2.6	3.64*	-	ns
RSDS data hold time	t_{HOLD1}	-	1.5	1.84*	-	ns
Start pulse setup time	t_{SETUP2}	-	2.3	5.12*	-	ns
Start pulse hold time	t_{HOLD2}	-	1.8	4.24*	-	ns
TP1 high period	$t_{TP1(H)}$	-	15	-	-	CLK
Last data CLK to TP1 high	t_{LAST}	-	1	-	-	CLK
TP1 high to FSTH high	t_{NEXT}	-	6	-	-	CLK
POL to TP1 setup time	$t_{POL-TP1}$	POL toggle to TP1 rising	3	7.32*	-	ns
TP1 to POL hold time	$t_{TP1-POL}$	TP1 falling to POL toggle	2	8.84*	-	ns

Note 1(*): Frame rate 75Hz



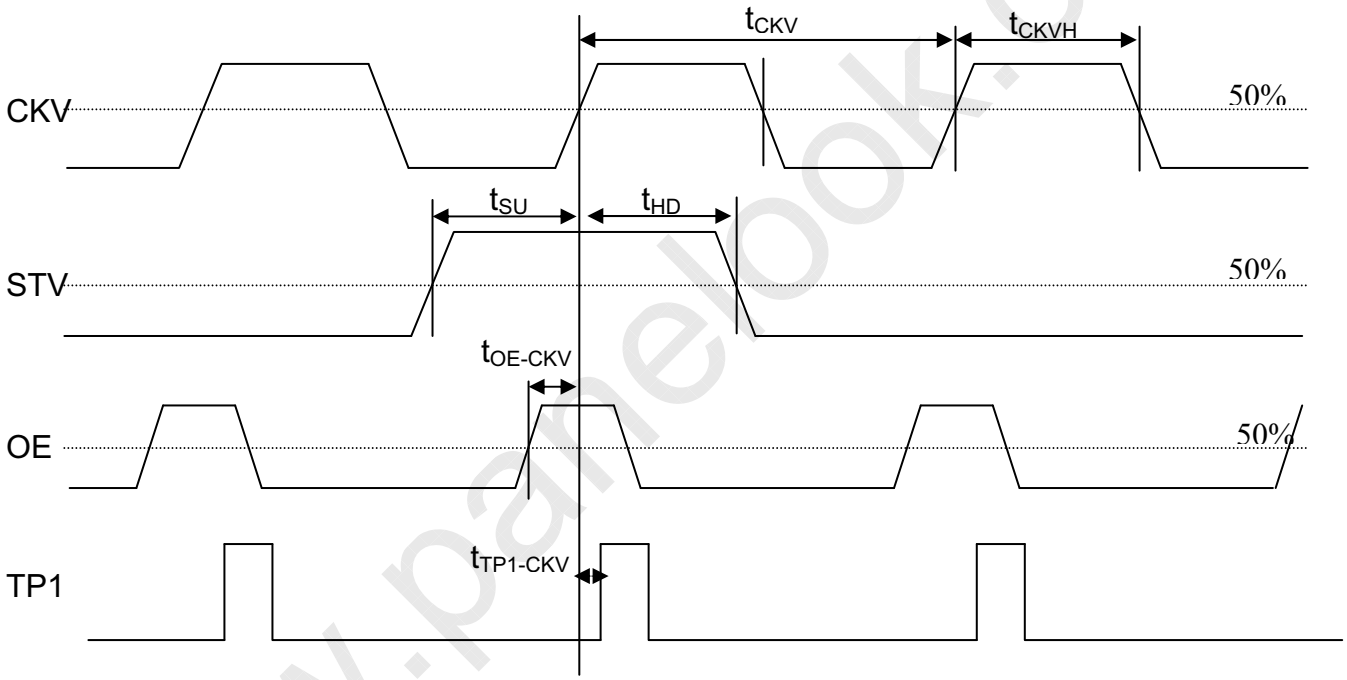


9. VERTICAL TIMING

Parameter	Symbol	Condition	Spec			Unit
			Min.	Typ.	Max.	
CKV period	t_{CKV}	-	5	16.52*	-	μs
CKV pulse width	t_{CKVH}, t_{CKVL}	50% duty cycle	2.5	9.29*	-	
OE pulse width	t_{OE}	-	1	2.23*	-	
STV to CKV setup time	t_{SU}	-	0.7	7.20*	-	us
CKV to STV hold time	t_{HD}	-	0.7	9.28*	-	us
OE to CKV time	t_{OE-CKV}	-	-	1.04*	-	μs
CKV to TP1	$T_{ckv-TP1}$	-	0	40*	-	ns

Note 1: OE, TP1 frequency same as CKV

Note 2(*): Frame rate 75Hz



10. OPTICAL CHARACTERISTICS

10.1 TEST CONDITIONS

Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	°C
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	V_{CC}	5.0	V
Input Signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		
Inverter Current	I_L	7.0±0.5	mA
Inverter Driving Frequency	F_L	55±5	KHz
Inverter	Darfon VK.13165.101		

10.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown as below. The following items should be measured under the test conditions described in 7.1 and stable environment shown in Note (6).

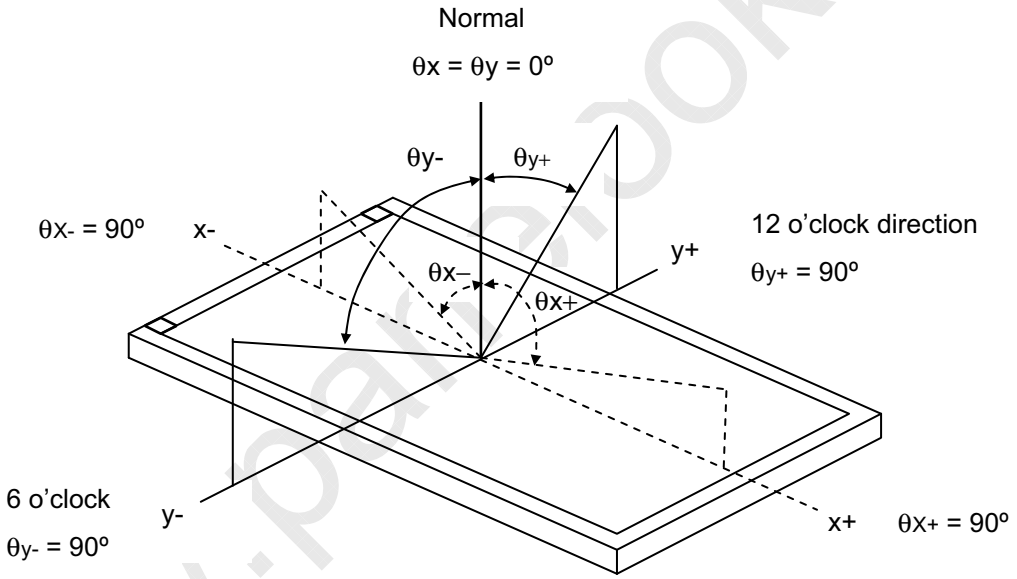
Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Color Chromaticity	Red	Rcx	θ_x=0°, θ_Y =0° CS-1000T Standard light source "C"	Typ -0.03	0.652	Typ +0.03	-	(0),(6)
		Rcy			0.330		-	
	Green	Gcx			0.275		-	
		Gcy			0.590		-	
	Blue	Bcx			0.148		-	
		Bcy			0.107		-	
	White	Wcx			0.320		-	
		Wcy			0.360		-	
Center Transmittance		T%	θ_x=0°, θ_Y =0° CS-1000T, CMO BLU	5.4	6.0	-	%	(1), (5)
Contrast Ratio		CR		630	1000	-	-	(1), (3)
Response Time		T_R	θ_x=0°, θ_Y =0°	-	1.3	3.2	ms	(4)
		T_F		-	3.7	6.8	ms	
Transmittance uniformity		δT	θ_x=0°, θ_Y =0° CS-1000T	-	1.3	1.42	-	(1), (7)
Viewing Angle	Horizontal	θ_x+	CR≥10 BM-5A	75	85	-	Deg.	(1), (2) (6)
		θ_x-		75	85	-		
	Vertical	θ_Y+		70	80	-		
		θ_Y-		70	80	-		

Note (0) Light source is the standard light source “C” which is defined by CIE and driving voltages are based on suitable gamma voltages. The calculating method is as following：

1. Measure Module’s and BLU’s spectrums. White is without signal input and R, G, B are with signal input. BLU(for M185B1-L01) is supplied by CMO.
2. Calculate cell’s spectrum.
3. Calculate cell’s chromaticity by using the spectrum of standard light source “C”

Note (1) Light source is the BLU which is supplied by CMO and driving voltages are based on suitable gamma voltages.

Note (2) Definition of Viewing Angle (θx, θy):



Note (3) : Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

Contrast Ratio (CR) = L255 / L0

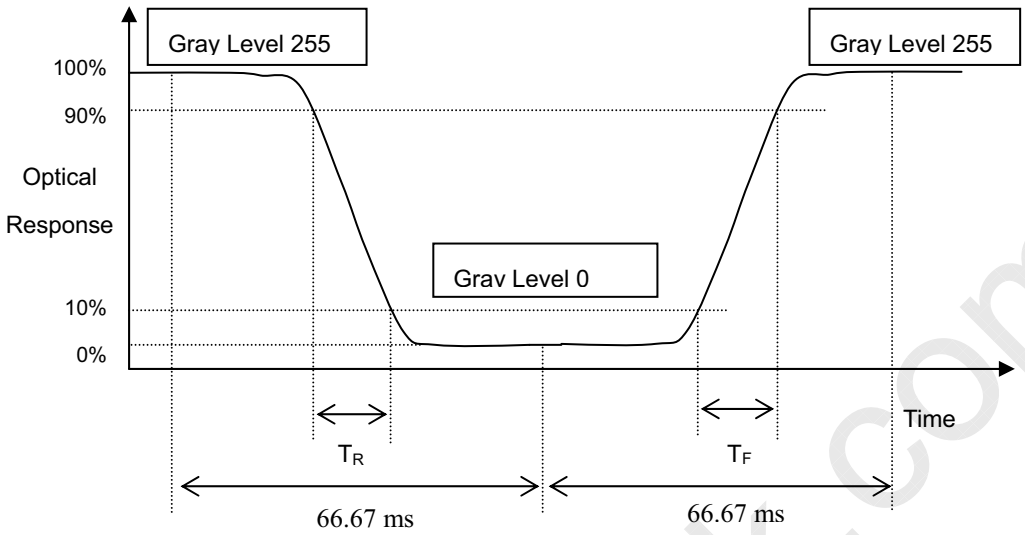
L255: Luminance of gray level 255

L 0: Luminance of gray level 0

CR = CR (5)

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (7).

Note (4) Definition of Response Time (T_R, T_F):



Note (5) Definition of Transmittance (T%):

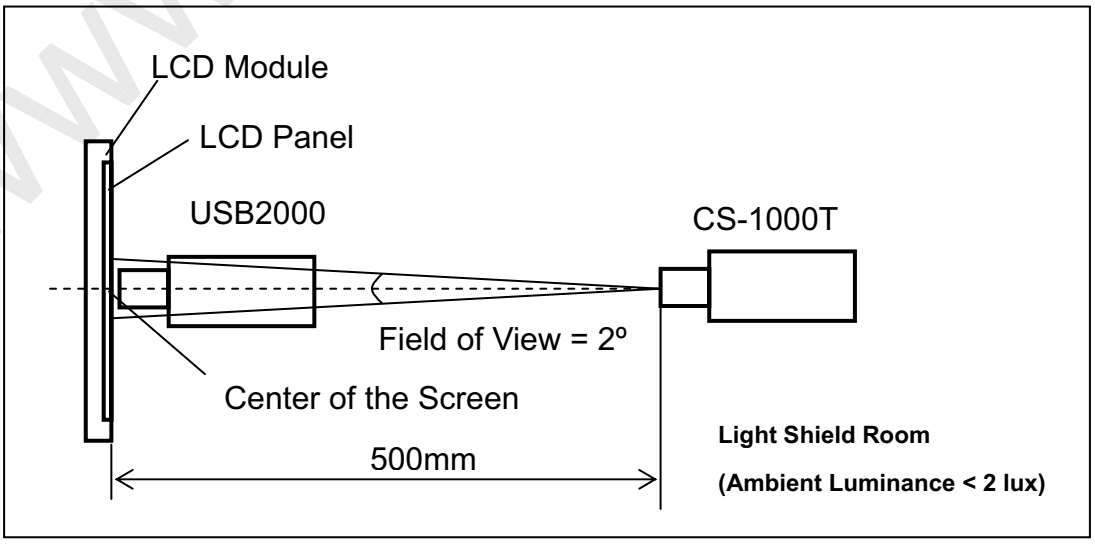
Module is without signal input.

$$\text{Transmittance} = \frac{\text{Luminance of LCD module L(5)}}{\text{Luminance of backlight } L_{BLU}(5)} * 100\%$$

L (X) and L_{BLU}(X)is corresponding to the luminance of the point X at Figure in Note (7).

Note (6) Measurement Setup:

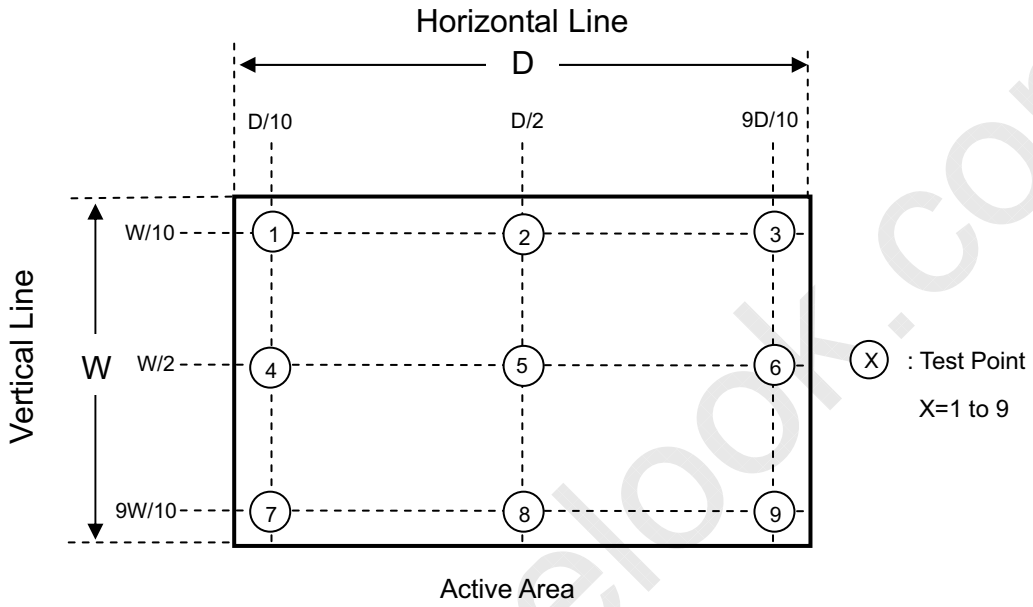
The LCD module should be stabilized at given temperature for 30minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 30minutes in a windless room.



Note (7) : Definition of Transmittance Variation (δT%):

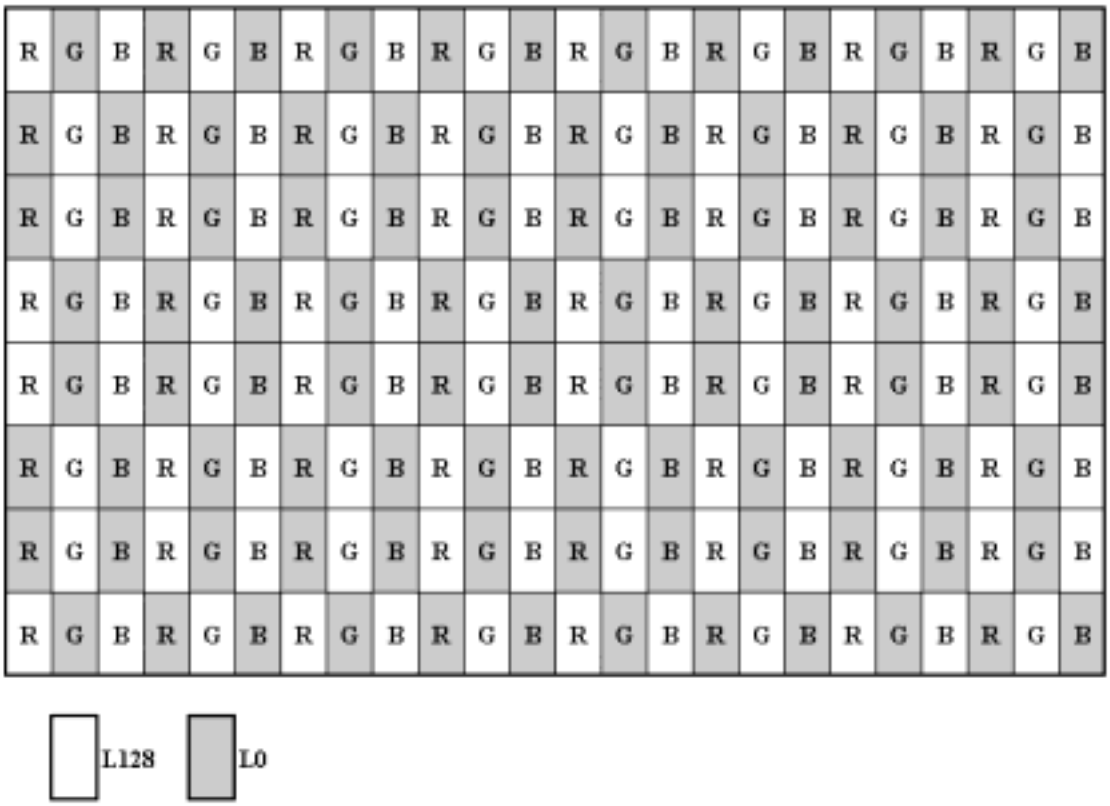
Measure the transmittance at 9 points

$$\delta T\% = \frac{\text{Maximum [T\%(1), T\%(2), … T\%(9)]}}{\text{Minimum [T\%(1), T\%(2), … T\%(9)]}}$$



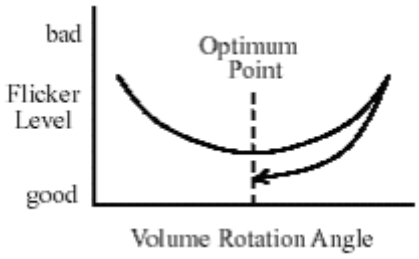
10.3 Flicker Adjustment

(1) Adjustment Pattern: 2H1V checker pattern as follows.



(2) Adjustment Method:

Flicker should be adjusted to the point with least flickering of the whole screen. After making it surely overrun at once, it should be adjusted to the optimum point.



11. PACKAGING

11.1 PACKING SPECIFICATIONS

(1) 27 open cells / 1 Box

(2) Box dimensions: 570 (L) X 450 (W) X 315 (H) mm

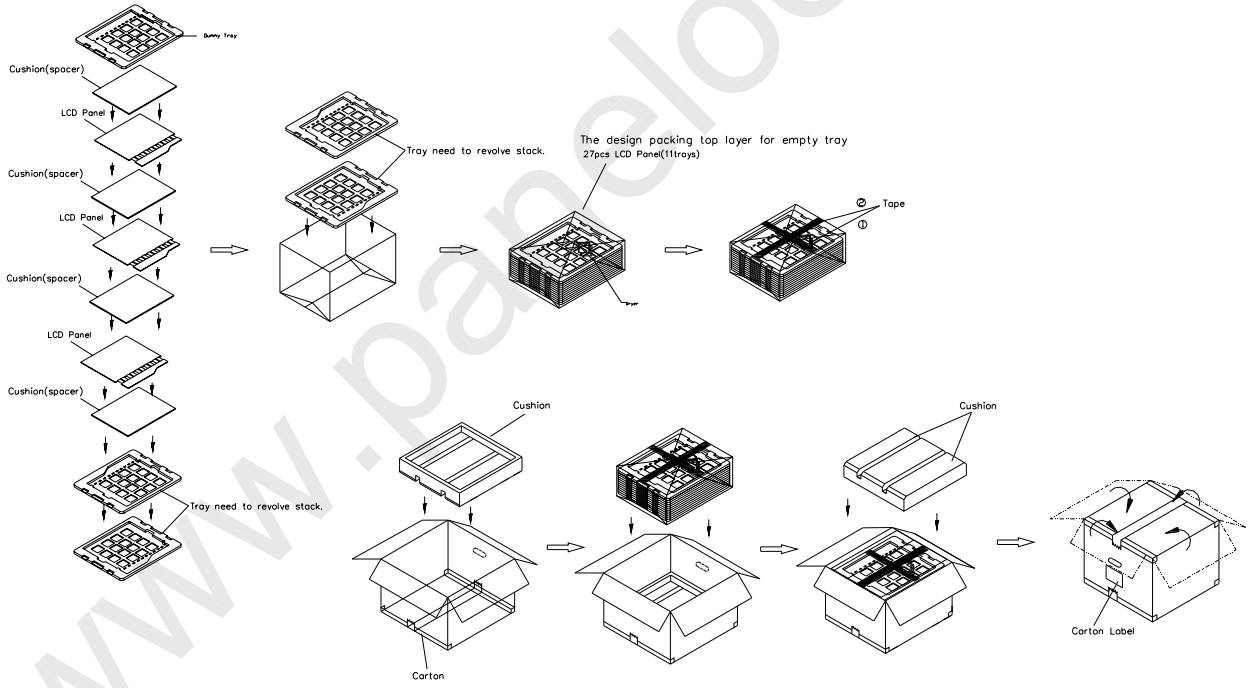
(3) Weight: approximately 19.8Kg (27 open cells per box)

11.2 PACKING METHOD

(1) Carton Packing should have no failure in the following reliability test items

Test Item	Test Conditions	Note
Packing Vibration	ISTA STANDARD Random, Frequency Range: 1 – 200 Hz Top & Bottom: 30 minutes (+Z), 10 min (-Z), Right & Left: 10 minutes (X) Back & Forth 10 minutes (Y)	Non Operation

(2) Packing method.

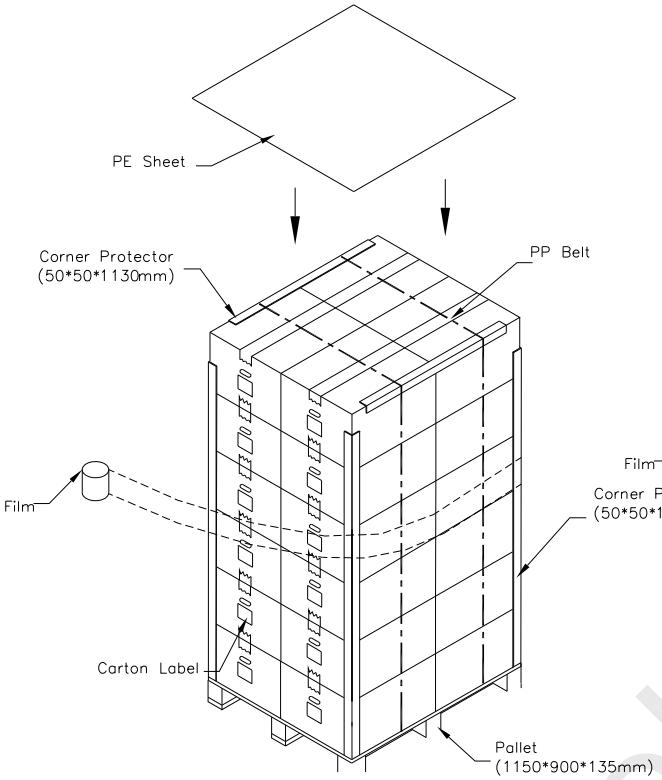


(1) 27 LCD Cells+PCB/1 box

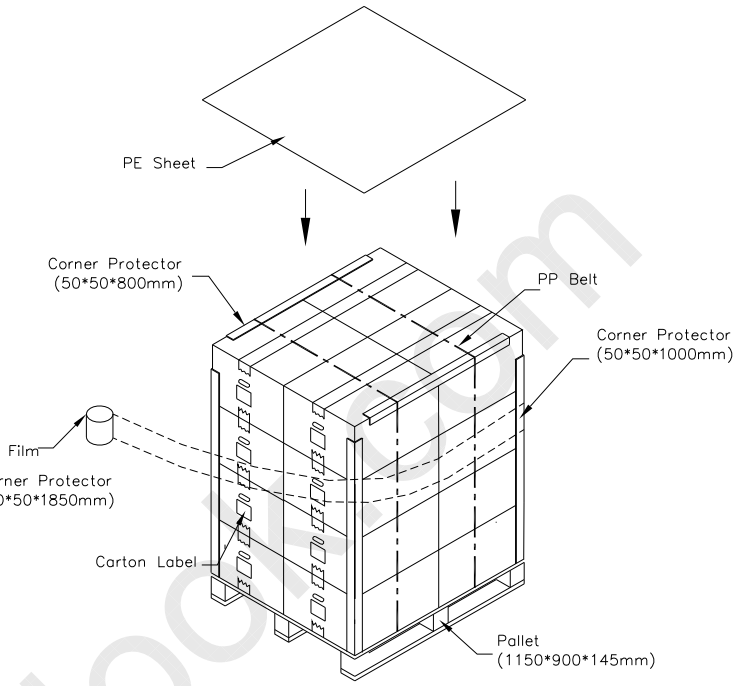
(2) Carton dimensions : 570(L)x450(W)x315(H)mm

(3) Weight :approximately 19.8kg(27 Cells per Carton).

Sea and Land Transportation



Air Transportation



12. DEFINITION OF LABELS

12.1 CMO OPEN CELL LABEL

The barcode nameplate is pasted on each OPEN CELL as illustration for CMO internal control.

Barcode definition:

Serial ID: CM-18B11-X-X-X-XX-L-XX-L-YMD-NNNN

Code	Meaning	Description
CM	Supplier code	CMO=CM
18B11	Model number	M185B1-PS1=18B11
X	Revision code	C1:1, C2:2,…
X	Source driver IC code	Century=1, CLL=2, Demos=3, Epson=4, Fujitsu=5, Himax=6, Hitachi=7, Hynix=8, LDI=9, Matsushita=A, NEC=B, Novatec=C, OKI=D, Philips=E, Renasas=F, Samsung=G, Sanyo=H, Sharp=I, TI=J, Topro=K, Toshiba=L, Windbond=M
X	Gate driver IC code	
XX	Cell location	Tainan, Taiwan=TN
L	Cell line #	0~12=1~C
XX	Module location	Tainan, Taiwan=TN
L	Module line #	0~12=1~C
YMD	Year, month, day	Year: 2001=1, 2002=2, 2003=3, 2004=4… Month: 1~12=1, 2, 3, ~, 9, A, B, C Day: 1~31= 1, 2, 3, ~, 9, A, B, C, ~, T, U, V
NNNN	Serial number	Manufacturing sequence of product

12.2 CARTON LABEL

The barcode nameplate is pasted on each box as illustration, and its definitions are as following explanation

Model Name: M185B1 –PS1

Carton ID: CMO internal control

Quantities: 27 pcs

13. PRECAUTIONS

13.1 ASSEMBLY AND HANDLING PRECAUTIONS

(1) Do not apply rough force such as bending or twisting to the product during assembly.

(2) To assemble backlight or install module into user's system can be only in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.

(3) It's not permitted to have pressure or impulse on the module because the LCD panel will be damaged.

(4) Always follow the correct power sequence when the product is connecting and operating. This can prevent damage to the CMOS LSI chips during latch-up.

(5) Do not pull the I/F connector in or out while the module is operating.

(6) Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.

(7) It is dangerous that moisture come into or contacted the product, because moisture may damage the product when it is operating.

(8) High temperature or humidity may reduce the performance of module. Please store this product within the specified storage conditions.

(9) When ambient temperature is lower than 10ºC may reduce the display quality. For example, the response time will become slowly.

13.2 SAFETY PRECAUTIONS

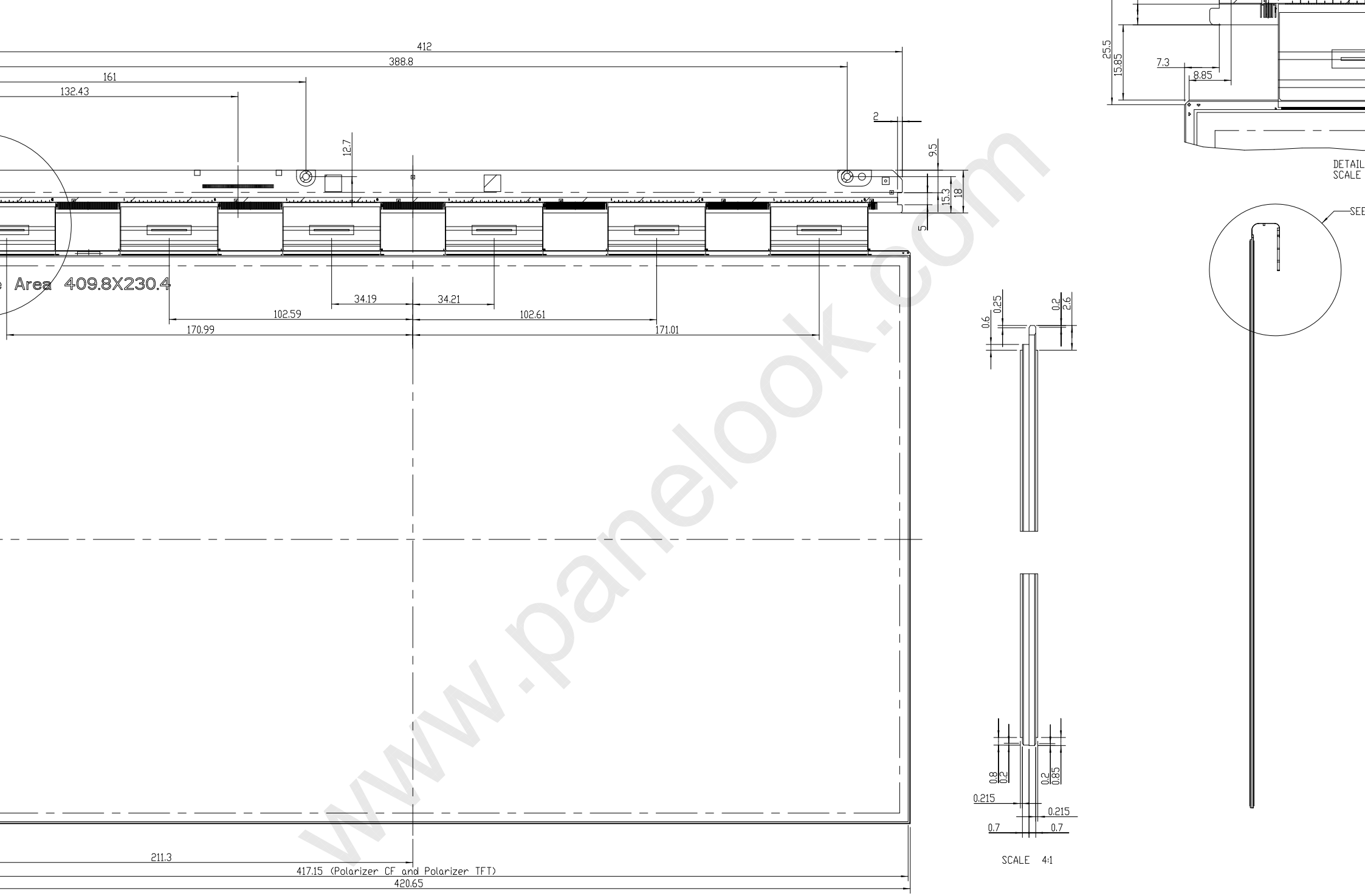
(1) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.

(2) After the product's end of life, it is not harmful in case of normal operation and storage.

13.3 OTHER

(1) When fixed patterns are displayed for a long time, remnant image is likely to occur.

14. PANEL DRAWING



DETAIL
SCALE

SCALE 4:1