CHI MEI
OPTOELECTRONICS CORP.

TFT LCD Approval Specification

MODEL NO.: V270W1 – L04

Customer: _____

Approved by: _____

Note:

LCD TV Head Division	
Director	

QRA Dept. Approval	TD Division Approval	DDII Approval	DDI Approval

LCD TV Marketing and Project Management Dept.	
Project Manager	

- CONTENTS -

Approval

REVISION HISTORY

Version	Date	Page (New)	Section	Description
Ver 1.0	August 1,03	All	All	Preliminary Specification is first issued.
Ver 2.0	Sep. 18,03	17	7.2	Contrast ratio:Typ. (600)→ 600
				Response time TR:Typ. (15)→ 15
				TF: Typ. (10)→ 10
				Gray to Gray: Typ (16.6)→ 16.6
				Center Luminance of White: Min. (450)→ 450
				Typ. (550)→ 550
				Average Luminance of White: Min. (400)→ 400
				Typ. (450)→ 450
				Color Chromaticity Min . Typ. Max. Min . Typ. Max.
				Red Rx (0.616)(0.646)(0.676)→ 0.616 0.646 0.676
				Ry (0.302)(0.332)(0.362)→0.302 0.332 0.362
				Green Gx (0.239)(0.269)(0.299)→ 0.239 0.269 0.299
				Gy (0.570)(0.600)(0.630)→ 0.570 0.600 0.630
				Blue Bx (0.112)(0.142)(0.172)→ 0.112 0.142 0.172
				By (0.042)(0.072)(0.102)→ 0.042 0.072 0.102
				Viewing Angle Horizontal θ x+ Typ. (85)→ 85
				θ x- Typ. (85)→ 85
				Vertical θ Y+ Typ. (85)→ 85
				θ Y- Typ. (85)→ 85
		5	2.1	Shock (Non-Operating) Max. Value (100)→ 100
				Vibration (Non-Operating) Max. Value (1.0)→ 1.0
Ver.2.1	Oct.16, 03	17	7.2	Viewing Angle Horizontal θ x+ Min.. 80
				θ x- Min. 80
				Vertical θ Y+ Min. 80
				θ Y- MIn. 80
	Nov.24, 03	25	11	Mechanical drawing is updated.

CHI MEI
OPTOELECTRONICS CORP.

1. GENERAL DESCRIPTION

1.1 OVERVIEW

V270W1- L04 is a 27" TFT Liquid Crystal Display module with 14-CCFL Backlight unit and 1ch-LVDS interface. This module supports 1280 x 720WXGA format and can display true 16.7M colors (8-bit/color). The inverter module for backlight is built-in.

1.2 FEATURES

- Ultra wide viewing angle – Super MVA technology

- High brightness (550 nits)

- High contrast ratio (600:1)

- Fast response time

- High color saturation NTSC 75%

- WXGA (1280 x 720 pixels) resolution, true HDTV format.

- DE (Data Enable) only mode

- LVDS (Low Voltage Differential Signaling) interface

1.3 APPLICATION

- TFT LCD TVs

1.4 GENERAL SPECIFICATIONS

Item	Specification	Unit	Note
Active Area	597.12(H) x 335.88 (V) (26.97" diagonal)	mm	(1)
Bezel Opening Area	603.22 (H) x 341.98 (V)	mm	
Driver Element	a-si TFT active matrix	-	-
Pixel Number	1280 x R.G.B. x 720	pixel	-
Pixel Pitch (Sub Pixel)	0.1555 (H) x 0.4665 (V)	mm	-
Pixel Arrangement	RGB vertical stripe	-	-
Display Colors	16.7M	color	-
Display Operation Mode	Transmissive mode / Normally black	-	-
Surface Treatment	Anti-glare with anti-reflective coating Hard coating (2H), Haze: 40% Reflection Rate: < 2%	-	-

1.5 MECHANICAL SPECIFICATIONS

Item			Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal(H)			637.55		mm	Module Size Depth(D)
	Vertical(V)			379.8		mm	
	Depth(D)	W/O INV	-		36	mm	
		W/I INV	40	40.5	41	mm	
Weight			-	4300		g	-

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

Note (2) Module Depth does not include connectors.

2. ABSOLUTE MAXIMUM RATINGS

2.1 ABSOLUTE RATINGS OF ENVIRONMENT

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)
Shock (Non-Operating)	S_{NOP}	-	100	G	(3), (5)
Vibration (Non-Operating)	V_{NOP}	-	1.0	G	(4), (5)

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

     (a) 90 %RH Max. (Ta $\leq$ 40 ºC).

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

     (c) No condensation.

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

Note (3) 2 ms, half sine wave, 1 time for ± X, ± Y, ± Z.

Note (4) 10 ~ 500 Hz, 10 min, 1 time each X, Y, Z.

Note (5) At testing Vibration and Shock, the fixture in holding the module has to be hard and rigid enough so that the module would not be twisted or bent by the fixture.

Relative Humidity (%RH)

Temperature (ºC)
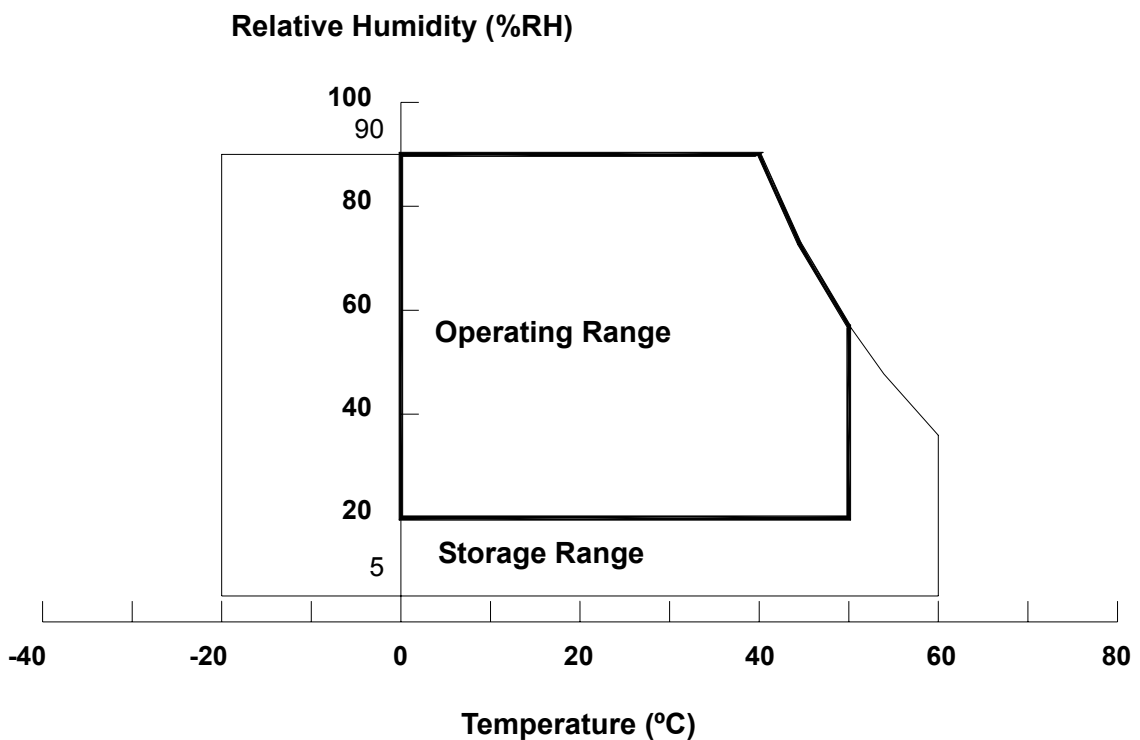
2.2 ELECTRICAL ABSOLUTE RATINGS

2.2.1 TFT LCD MODULE

Item	Symbol	Value Min.	Value Max.	Unit	Note
Power Supply Voltage	Vcc	-0.3	+6.0	V	(1)
Logic Input Voltage	V_{IN}	-0.3	4.3	V	

2.2.2 BACKLIGHT UNIT

Item	Symbo	Test	Min.	Type	Max.	Unit	Note
Lamp Voltage	V_L	—	0	—	3.0K	V_{RMS}	(1), (2), $I_L = 4.7$ mA
On/Off Control Voltage	V_{BLON}	—					
Internal/External PWM Select Voltage	V_{SEL}	—	-0.3	—	7	V	
Internal PWM Control Voltage	V_{IPWM}	—					
External PWM Control Voltage	V_{EPWM}	—					
Operating Temperature	T_{OP}	5∼95% RH	0	—	75	℃	(3)
Storage Temperature	T_{ST}	5∼95% RH	-30	—	80	℃	

Note (1) Permanent damage to the device may occur if maximum values are exceeded. Function operation

should be restricted to the conditions described under Normal Operating Conditions.

Note (2) Specified values are for lamp (Refer to 3.2 for further information).

Note (3) Protect inverters from moisture condensation and freezing.

3. ELECTRICAL CHARACTERISTICS

3.1 TFT LCD MODULE

Ta = 25 ± 2 ºC

Parameter		Symbol	Value Min.	Value Typ.	Value Max.	Unit	Note
Power Supply Voltage		Vcc	4.5	5.0	5.5	V	-
Ripple Voltage		V_{RP}	-	-	200	mV	-
Rush Current		I_{RUSH}	-	2.1	3	A	(2)
Power Supply Current	White	Icc	-	1.4	-	A	(3)a
	Black		-	1	-	A	(3)b
	Vertical Stripe		-	1.2	-	A	(3)c
LVDS differential input high threshold voltage		V_{TH}	-	-	+100	mV	
LVDS differential input low threshold voltage		V_{TL}	-100	-	-	mV	
LVDS common input voltage		Vic	1.125	1.25	1.375	V	
Terminating Resistor		R_T	-	100	-	ohm	

Note (1) The module should be always operated within above ranges.

Note (2) Measurement Conditions:
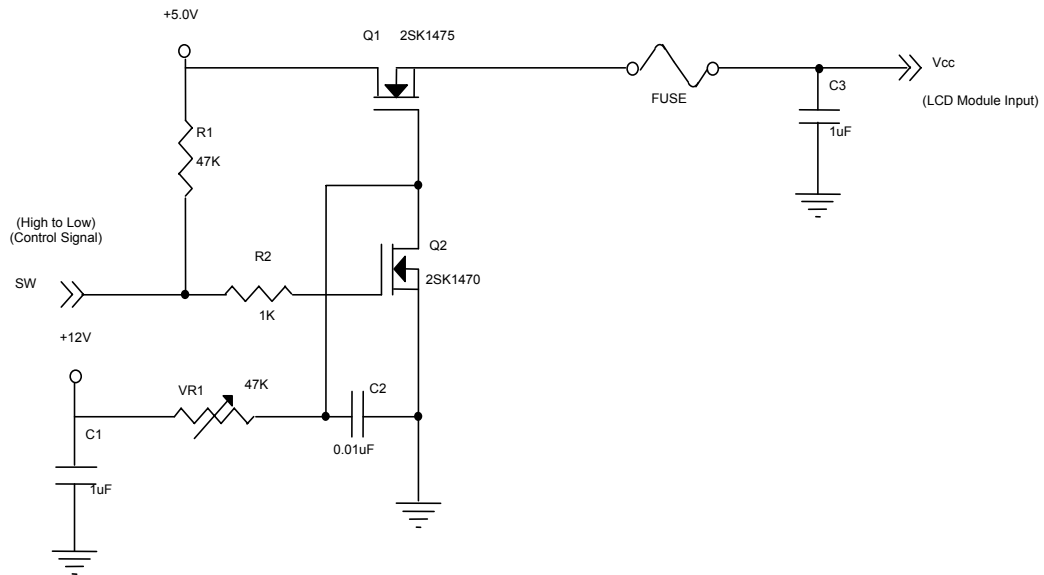
Vcc rising time is 470μs
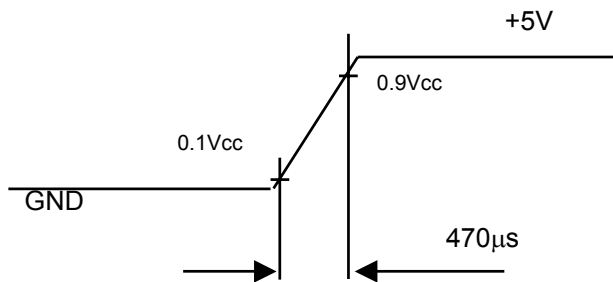
Note (3) The specified power supply current is under the conditions at Vcc = 5 V, Ta = 25 ± 2 °C, f_v = 60 Hz, whereas a power dissipation check pattern below is displayed.

a. White Pattern
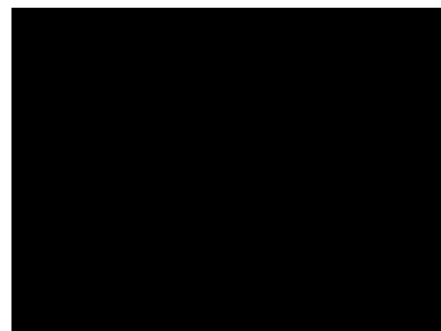

Active Area

b. Black Pattern

Active Area

CHI MEI
OPTOELECTRONICS CORP.

c. Vertical Stripe Pattern

Active Area
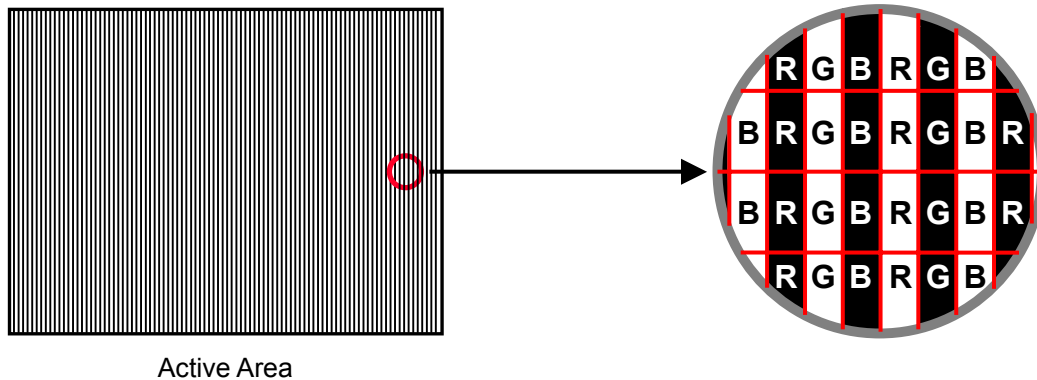
3.2 BACKLIGHT UNIT

Ta = 25 ± 2 ℃

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Lamp Input Voltage	V_L	1008	1120	1232	V_{RMS}	I_L = 4.7 mA
Lamp Current	I_L	4.4	4.7	5.0	mA_{RMS}	(1)
Lamp Turn On Voltage	V_S	1200	-	3000	V_{RMS}	(2), Ta = 25 ℃
		1790	-	3000	V_{RMS}	(2), Ta = 0 ℃
Operating Frequency	F_L	54	56	58	KHz	(3)
Lamp Life Time	L_{BL}	50K	-	-	Hrs	(5)
Power Consumption	P_L	-	92	-	W	(4), Inverter Input

Note (1) Lamp current is measured by utilizing high frequency current meters as shown below:

The information described in this technical specification is tentative and it is possible to be changed without prior notice. Please contact CMO 's representative while your product design is based on this specification. **Version 2.1**
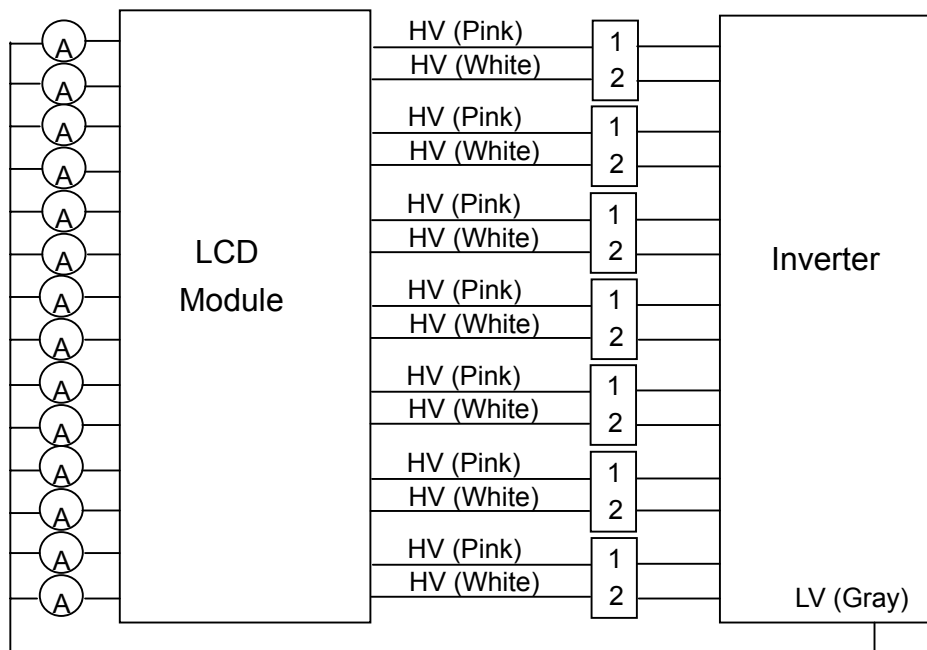
Note (2) The voltage shown above should be applied to the lamp for more than 1 second after startup. Otherwise the lamp may not be turned on.

Note (3) The lamp frequency may produce interference with horizontal synchronous frequency from the display, and this may cause line flow on the display. In order to avoid interference, the lamp frequency should be detached from the horizontal synchronous frequency and its harmonics as far as possible.

Note (4) $P_L = (\sum_{\text{lamp1-lamp14}} I_L \times V_L)/0.8$, P_L is based on the inverter efficiency, which is 80%.

Note (5) The lifetime of a lamp is defined as the time in which it continues to operate under the condition $Ta = 25 \pm 2 \,^{\circ}C$ and $I_L = (4.35) \sim (4.95)$ mArms until one of the following events occurs:

(a) When the brightness becomes equal or less than 50% of its original value.

(b) When the effective discharge length becomes equal or less than 80% of its original value. (Effective discharge length is defined as an area that has equal or more than 70% brightness compared to the brightness at the center point.)

Note (6) The waveform of the voltage output of inverter must be area-symmetric and the design of the inverter must have specifications for the modularized lamp. The performance of the Backlight, such as lifetime or brightness, is greatly influenced by the characteristics of the DC-AC inverter for the lamp. All the parameters of an inverter should be carefully designed to avoid producing too much current leakage from high voltage output of the inverter. When designing or ordering the inverter please make sure that a poor lighting caused by the mismatch of the Backlight and the inverter (miss-lighting, flicker, etc.) never occurs. If the above situation is confirmed, the module should be operated in the same manners when it is installed in your instrument.

4. BLOCK DIAGRAM

4.1 TFT LCD MODULE
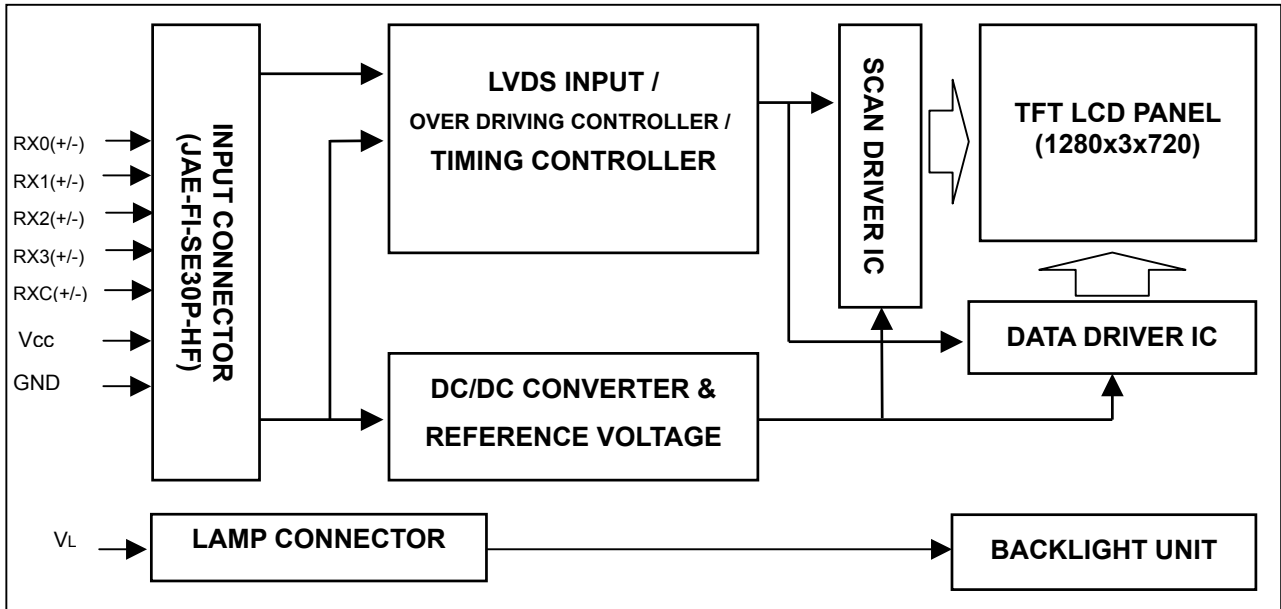
4.2 BACKLIGHT UNIT

Lamp connector

HV : BHR-03-VS-1(JST) *7

LV : ZHR-2 (JST) *1

Approval

5. INPUT TERMINAL PIN ASSIGNMENT

5.1 TFT LCD MODULE

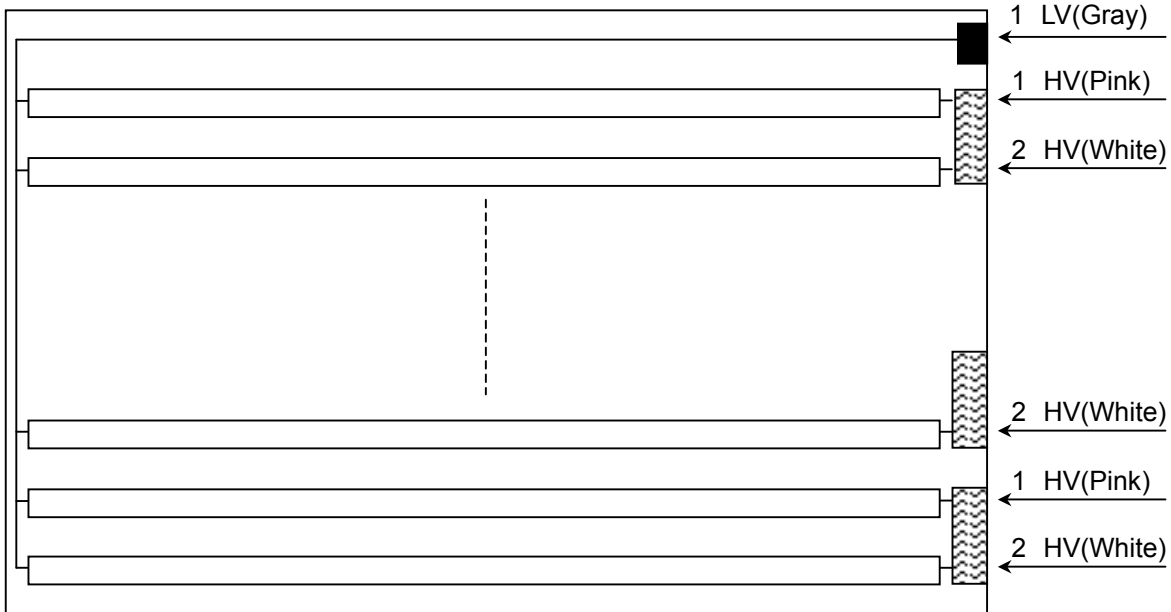| Pin	Name	Description
1	NC	No Connection
2	NC	No Connection
3	NC	No Connection
4	NC	No Connection
5	NC	No Connection
6	NC	No Connection
7	NC	No Connection
8	GND	Ground
9	RX3+	Positive LVDS differential data input. Channel 3
10	RX3-	Negative LVDS differential data input. Channel 3
11	RXCLK+	Positive LVDS differential clock input.
12	RXCLK-	Negative LVDS differential clock input.
13	GND	Ground
14	GND	Ground
15	RX2+	Positive LVDS differential data input. Channel 2
16	RX2-	Negative LVDS differential data input. Channel 2
17	RX1+	Positive LVDS differential data input. Channel 1
18	RX1-	Negative LVDS differential data input. Channel 1
19	RX0+	Positive LVDS differential data input. Channel 0
20	RX0-	Negative LVDS differential data input. Channel 0
21	GND	Ground
22	GND	Ground
23	GND	Ground
24	GND	Ground
I25	GND	Ground
26	VCC	+5.0V power supply
27	VCC	+5.0V power supply
28	VCC	+5.0V power supply
29	VCC	+5.0V power supply
30	VCC	+5.0V power supply

Note (1) Connector Part No.: FI-SE30P-HF (JAE)

Note (2) The first pixel is even.

5.2 BACKLIGHT UNIT

Pin	Symbol	Description	Color
1	HV	High Voltage	Pink
2	HV	High Voltage	White

Note (1) Connector Part No.: BHR-03VS-1 (JST) or equivalent

Note (2) User's connector Part No.: SM02(8.0)B-BHS-1TB (JST) or equivalent

Pin	Symbol	Description	Color
1	LV	Low Voltage	Gray
2	NC	No Connection	

Note (1) Connector Part No.: ZHR-2 (JST) or equivalent

Note (2) User's connector Part No.: S2B-ZR-SM3A-TF (JST) or equivalent

The information described in this technical specification is tentative and it is possible to be changed without prior notice. Please contact CMO 's representative while your product design is based on this specification.   **Version 2.1**

5.3 BLOCK DIAGRAM OF INTERFACE

CNF1
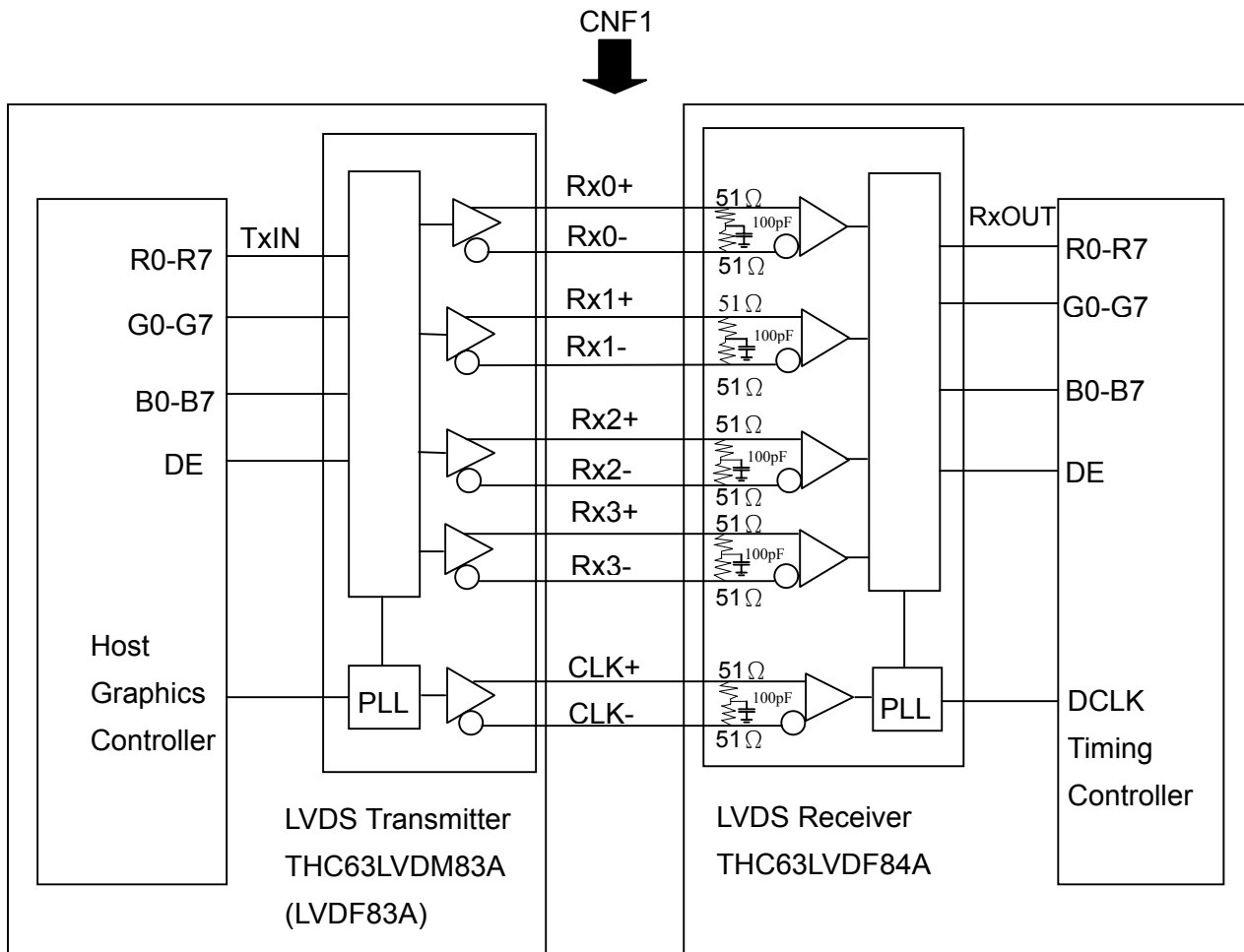
R0~R7   : Pixel R Data

G0~G7   : Pixel G Data

B0~B7   : Pixel B Data

DE   : Display timing signal

Notes: 1) The system must have the transmitter to drive the module.

2) LVDS cable impedance shall be 50 ohms per signal line or about 100 ohms per twist-pair line when it is

used differentially.

CHI MEI
OPTOELECTRONICS CORP.

Approval

5.4 LVDS INTERFACE

SIGNAL	TRANSMITTER THC63LVDM83A		INTERFACE CONNECTOR		RECEIVER THC63LVDF84A		TFT CONTROL INPUT
	PIN	INPUT	Host	TFT-LCD	PIN	OUTPUT	
R0	51	TxIN0			27	Rx OUT0	R0
R1	52	TxIN1			29	Rx OUT1	R1
R2	54	TxIN2	TA OUT0+	Rx 0+	30	Rx OUT2	R2
R3	55	TxIN3			32	Rx OUT3	R3
R4	56	TxIN4			33	Rx OUT4	R4
R5	3	TxIN6	TA OUT0-	Rx 0-	35	Rx OUT6	R5
G0	4	TxIN7			37	Rx OUT7	G0
G1	6	TxIN8			38	Rx OUT8	G1
G2	7	TxIN9			39	Rx OUT9	G2
G3	11	TxIN12	TA OUT1+	Rx 1+	43	Rx OUT12	G3
G4	12	TxIN13			45	Rx OUT13	G4
G5	14	TxIN14			46	Rx OUT14	G5
B0	15	TxIN15	TA OUT1-	Rx 1-	47	Rx OUT15	B0
B1	19	TxIN18			51	Rx OUT18	B1
B2	20	TxIN19			53	Rx OUT19	B2
B3	22	TxIN20			54	Rx OUT20	B3
B4	23	TxIN21	TA OUT2+	Rx 2+	55	Rx OUT21	B4
B5	24	TxIN22			1	Rx OUT22	B5
DE	30	TxIN26			6	Rx OUT26	DE
R6	50	TxIN27	TA OUT2-	Rx 2-	7	Rx OUT27	R6
R7	2	TxIN5			34	Rx OUT5	R7
G6	8	TxIN10			41	Rx OUT10	G6
G7	10	TxIN11			42	Rx OUT11	G7
B6	16	TxIN16	TA OUT3+	Rx 3+	49	Rx OUT16	B6
B7	18	TxIN17			50	Rx OUT17	B7
RSVD 1	25	TxIN23			2	Rx OUT23	Not connect
RSVD 2	27	TxIN24	TA OUT3-	Rx 3-	3	Rx OUT24	Not connect
RSVD 3	28	TxIN25			5	Rx OUT25	Not connect
DCLK	31	TxCLK IN	TxCLK OUT+ TxCLK OUT-	RxCLK IN+ RxCLK IN-	26	RxCLK OUT	DCLK

(24bit)

R0~R7: Pixel R Data (7; MSB, 0; LSB)

G0~G7: Pixel G Data (7; MSB, 0; LSB)

B0~B7: Pixel B Data (7; MSB, 0; LSB)

DE   : Display timing signal

Notes: 1)RSVD(reserved)pins on the transmitter shall be "H" or "L".

CHI MEI
OPTOELECTRONICS CORP.

5.5 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 8-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							
		R7	R6	R5	R4	R3	R2	R1	R0	R7	R6	G5	G4	G3	G2	G1	G0	R7	R6	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	0	0	0	0	0	0
	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
	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
	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
	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
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	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(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
	Red(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
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	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
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(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
	Green(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
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	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	0	1
	Blue(2)	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(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
	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) 0: Low Level Voltage, 1: High Level Voltage

CHI MEI
OPTOELECTRONICS CORP.

Approval

6. INTERFACE TIMING

6.1 INPUT SIGNAL TIMING SPECIFICATIONS

The input signal timing specifications are shown as the following table and timing diagram.

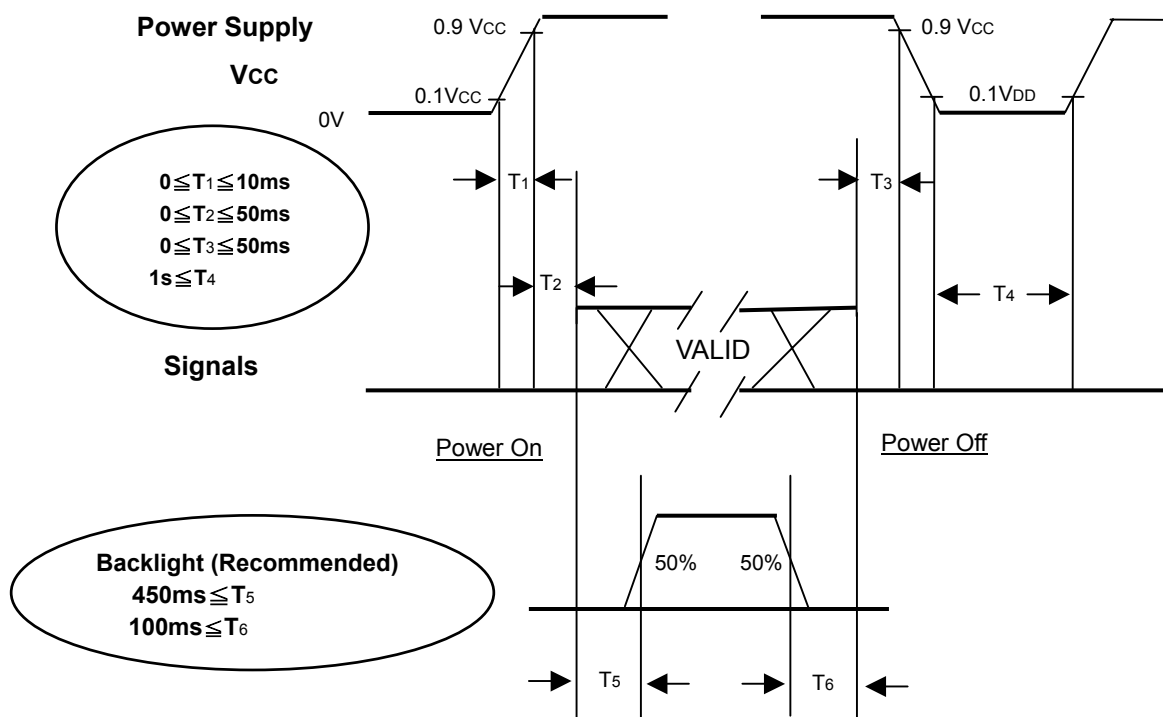| Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
Clock	Frequency	1/Tc	70	74.25	80	MHZ	-
Vertical Active Display Term	Frame Rate	Fr	48	60	-	Hz	Tv=Tvd+Tvb
	Total	Tv	730	750	850	Th	-
	Display	Tvd	720	720	720	Th	-
	Blank	Tvb	10	30	130	Th	-
Horizontal Active Display Term	Total	Th	1450	1650	2000	Tc	Th=Thd+Thb
	Display	Thd	1280	1280	1280	Tc	-
	Blank	Thb	170	370	720	Tc	-

Note: Because of this module is operated by DE only mode, Hsync and Vsync input signals should be set

to low logic level or ground. Otherwise, this module would operate abnormally.

INPUT SIGNAL TIMING DIAGRAM
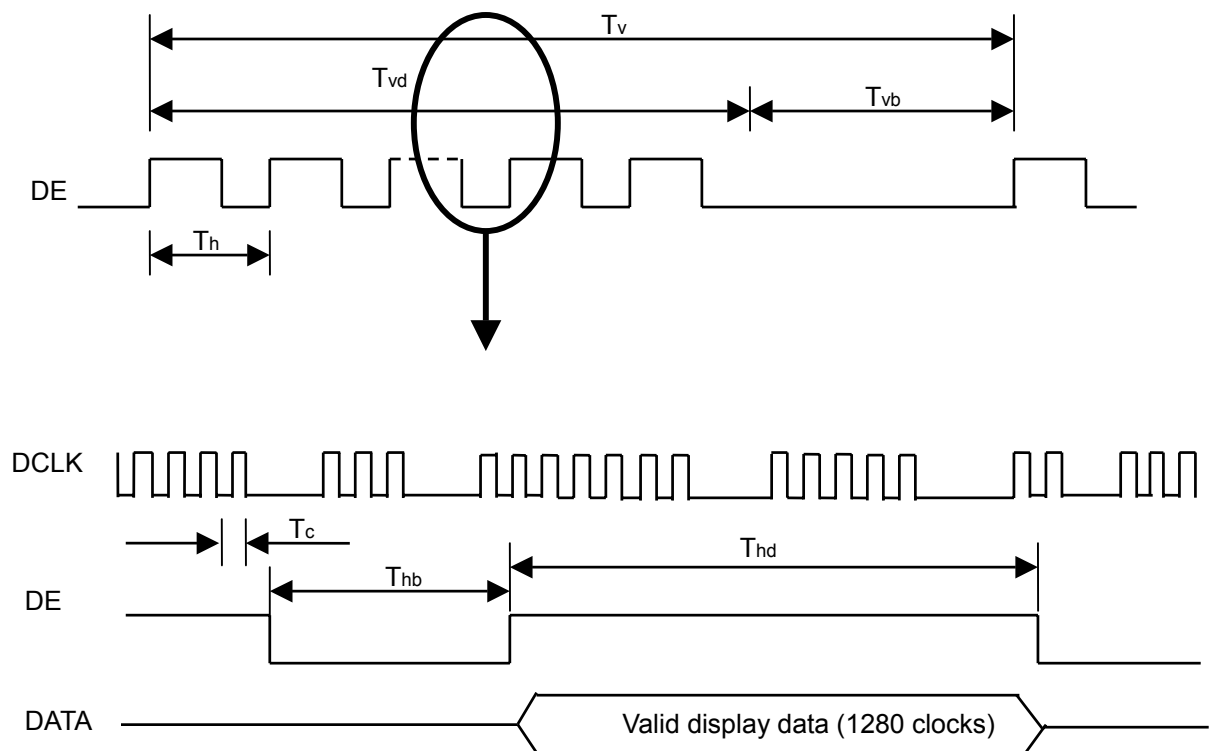
6.2 POWER ON/OFF SEQUENCE

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

Power Supply

Vcc

$0 \leqq T_1 \leqq 10ms$
$0 \leqq T_2 \leqq 50ms$
$0 \leqq T_3 \leqq 50ms$
$1s \leqq T_4$

Signals

0.9 Vcc

0.1Vcc

0V

T_1 T_3

T_2 T_4

VALID

Power On   Power Off

0.9 Vcc

0.1VDD

Backlight (Recommended)
$450ms \leqq T_5$
$100ms \leqq T_6$

50%   50%

T_5 T_6

Power ON/OFF Sequence

Note.

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

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

(3) In case of vcc = 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 of and on period.

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

7. OPTICAL CHARACTERISTICS

7.1 TEST CONDITIONS

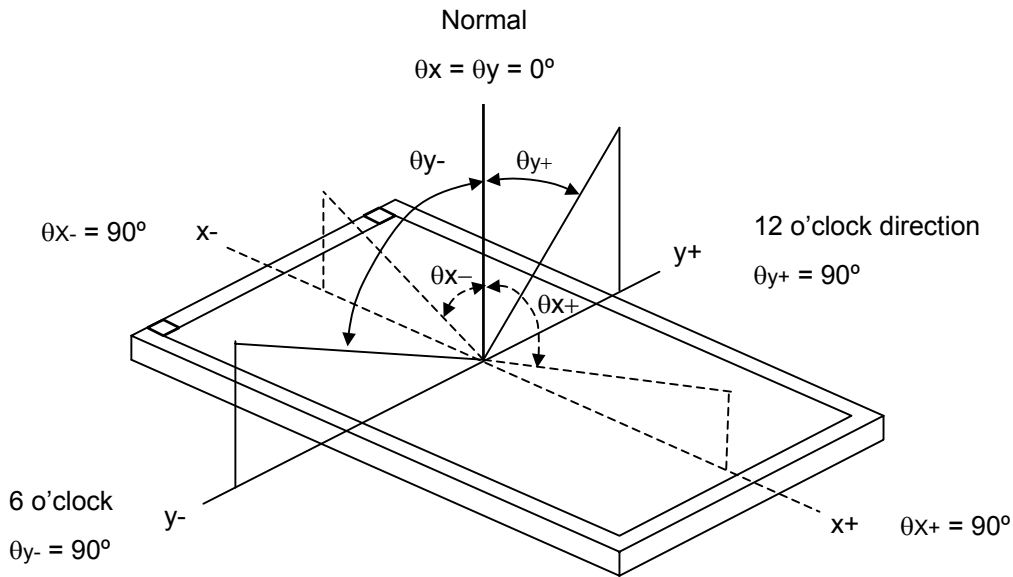| Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	^{o}C
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	V_{CC}	5.0	V
Input Signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		
Inverter Current	I_L	4.7	mA
Inverter Driving Frequency	F_L	56	KHz
Inverter	--		

7.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown in 7.2. The following items should

be measured under the test conditions described in 7.1 and stable environment shown in Note (7).

Item			Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio			CR		400	600	-	-	Note(2)
Response Time			T_R		-	15	25	ms	Note(3)
			T_F		-	10	20	ms	
			Gray to gray			16.6		ms	Note(4)
Center Luminance of White			L_C		450	550	-	cd/m^2	Note(5)
Average Luminance of White			L_{AVE}		400	450	-	cd/m^2	
White Variation			δW	θ_x=0°, θ_Y =0°	-	-	1.6	-	Note(8)
Cross Talk			CT	Viewing Normal Angle	-	-	4.0	%	Note(6)
Color Chromaticity	Red		Rx		0.616	0.646	0.676	-	
			Ry		0.302	0.332	0.362	-	
	Green		Gx		0.239	0.269	0.299	-	
			Gy		0.570	0.600	0.630	-	
	Blue		Bx		0.112	0.142	0.172	-	
			By		0.042	0.072	0.102	-	
	White		Wx		0.255	0.285	0.315	-	9, 300K
			Wy		0.263	0.293	0.323	-	
Viewing Angle	Horizontal		θ_x+	CR≥10	80	85	-	Deg.	No gray scale inversion
			θ_x-		80	85	-		
	Vertical		θ_Y+		80	85	-		
			θ_Y-		80	85	-		

The information described in this technical specification is tentative and it is possible to be changed without prior notice. Please contact CMO 's representative while your product design is based on this specification. **Version 2.1**

Note (1) Definition of Viewing Angle (θx, θy):

Viewing angles are measured by Eldim EZ-Contrast 160R

Normal

$\theta x = \theta y = 0°$

$\theta y-$ $\theta y+$

$\theta x- = 90°$ x-

12 o'clock direction

$\theta y+ = 90°$

y+

$\theta x-$

$\theta x+$

6 o'clock   y-

x+ $\theta x+ = 90°$

$\theta y- = 90°$

Note (2) Definition of Contrast Ratio (CR):

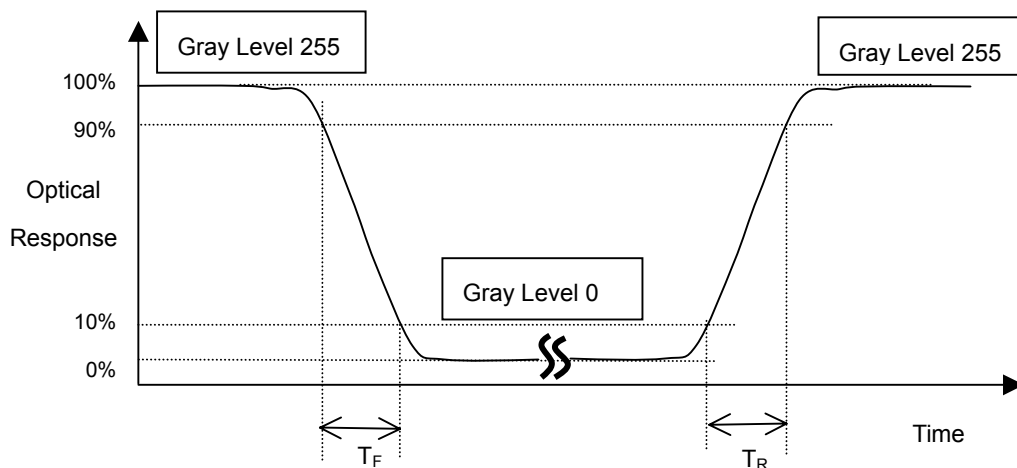The contrast ratio can be calculated by the following expression.

Contrast Ratio (CR) = L255 / L0

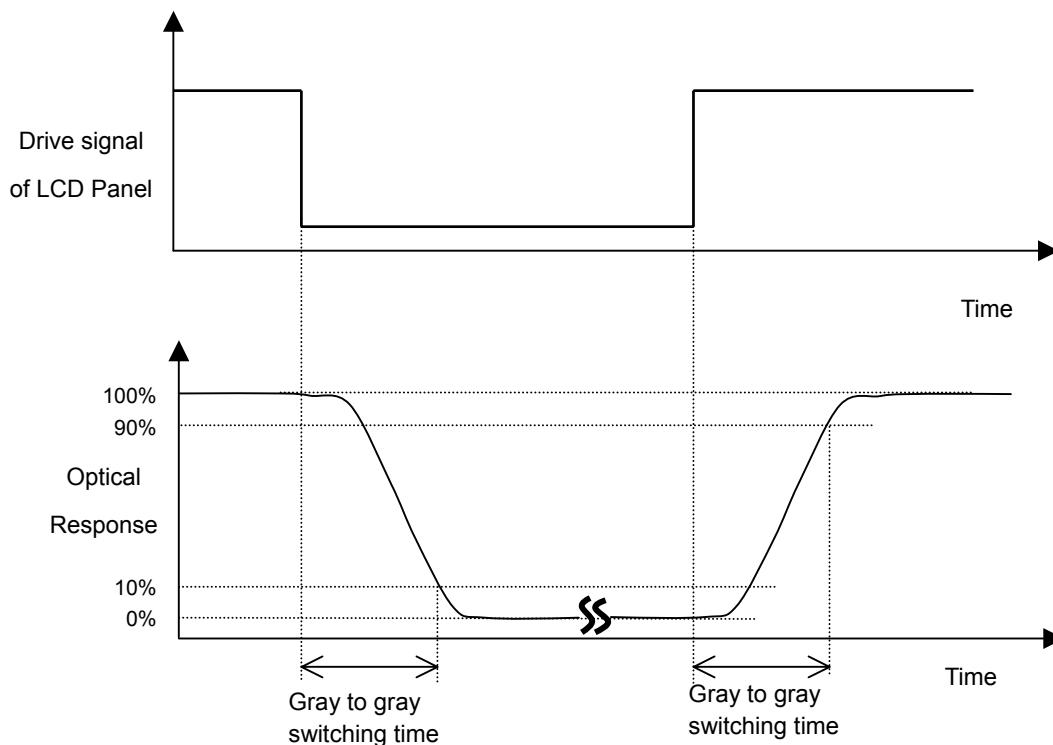L255: Luminance of gray level 255

L 0: Luminance of gray level 0

CR = CR (5)

CR (X) is corresponding to the Contrast Ratio of the point X at the figure in Note (8).

Note (3) Definition of Response Time (T_R, T_F):

Gray Level 255

Gray Level 255

100%

90%

Optical

Response

Gray Level 0

10%

0%

T_F

T_R

Time

Note (4) Definition of Gray to Gray Switching Time:

Drive signal of LCD Panel — Time

Optical Response — Time

Gray to gray switching time

Gray to gray switching time

The driving signal means the signal of gray level 0,63,127,191,255.

Note (5) Definition of Luminance of White (L_C, L_{AVE}):

Measure the luminance of gray level 255 at center point and 5 points

L_C = L (5)

L_{AVE} = [L (1)+ L (2)+ L (3)+ L (4)+ L (5)] / 5

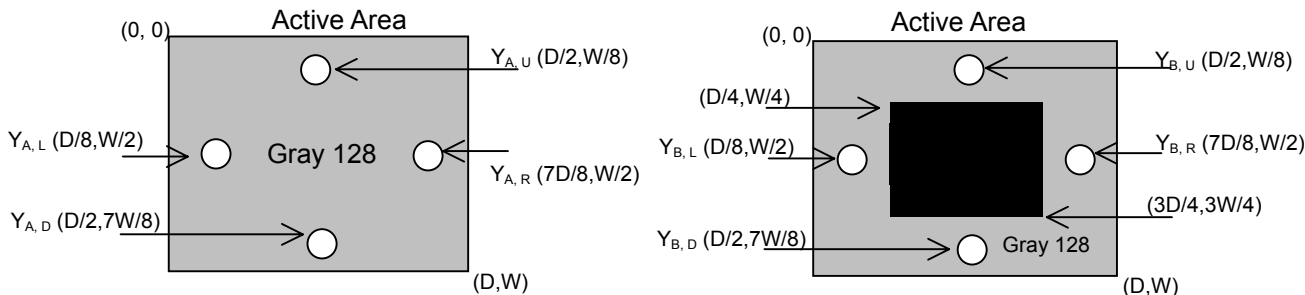L (x) is corresponding to the luminance of the point X at the figure in Note (8).

Note (6) Definition of Cross Talk (CT):
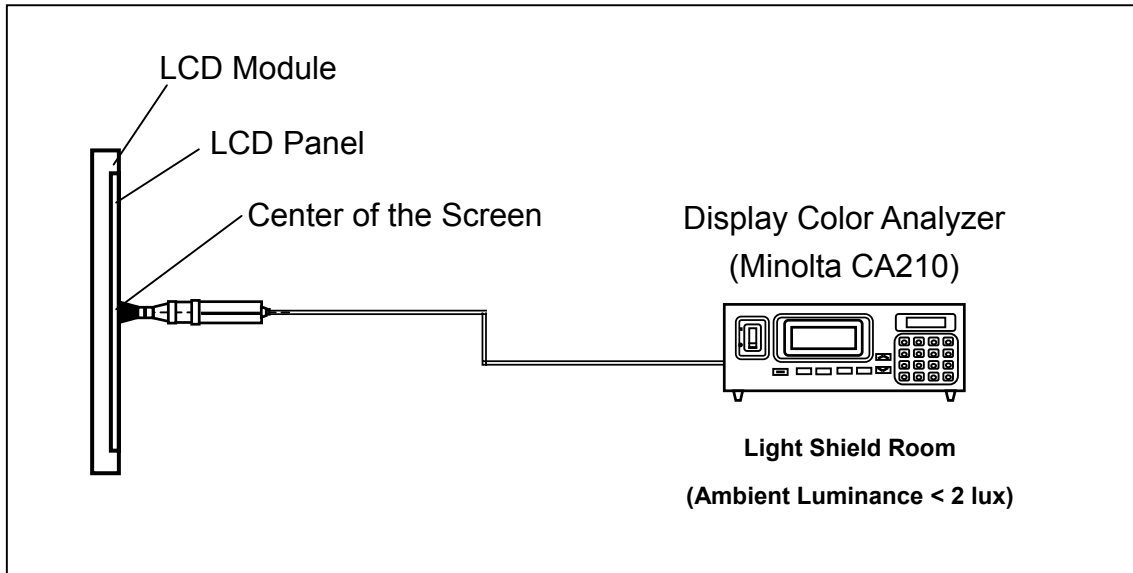
CT = | Y_B – Y_A | / Y_A × 100 (%)

Where:

Y_A = Luminance of measured location without gray level 0 pattern (cd/m^2)

Y_B = Luminance of measured location with gray level 0 pattern (cd/m^2)

Active Area

(0, 0)

$Y_{A, U}$ (D/2,W/8)

$Y_{A, L}$ (D/8,W/2)   Gray 128

$Y_{A, R}$ (7D/8,W/2)

$Y_{A, D}$ (D/2,7W/8)

(D,W)

Active Area

(0, 0)

$Y_{B, U}$ (D/2,W/8)

(D/4,W/4)

$Y_{B, L}$ (D/8,W/2)

$Y_{B, R}$ (7D/8,W/2)

(3D/4,3W/4)

$Y_{B, D}$ (D/2,7W/8)   Gray 128
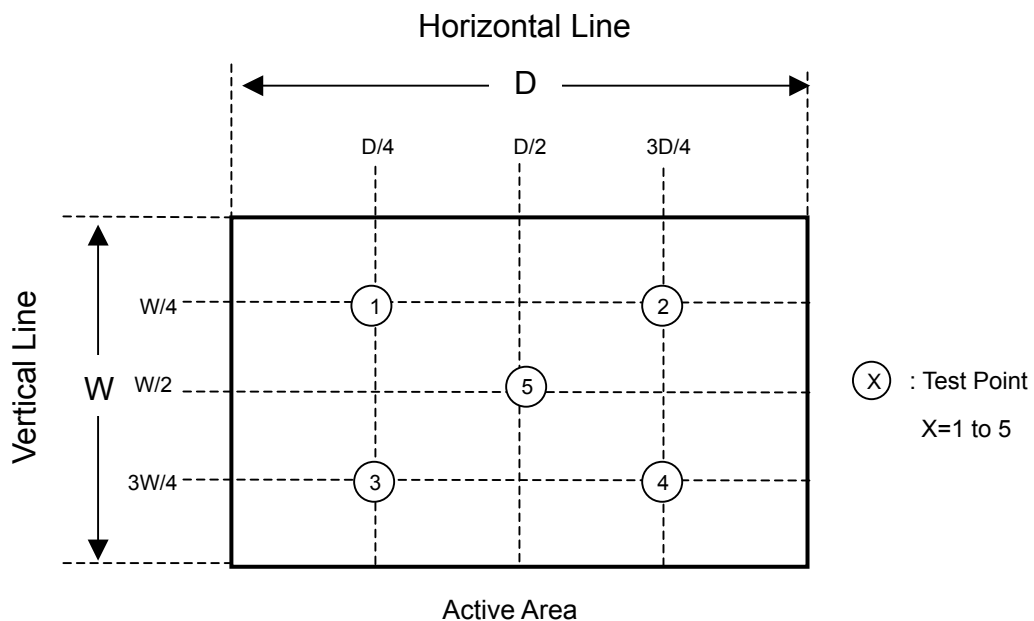
(D,W)

Note (7) Measurement Setup:

The LCD module should be stabilized at given temperature for 1hour to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 1 hour in a windless room.

LCD Module

LCD Panel

Center of the Screen

Display Color Analyzer
(Minolta CA210)

Light Shield Room

(Ambient Luminance < 2 lux)

Note (8) Definition of White Variation (δW):

Measure the luminance of gray level 255 at 5 points

δW = Maximum [L (1), L (2), L (3), L (4), L (5)] / Minimum [L (1), L (2), L (3), L (4), L (5)]

Horizontal Line

D

D/4   D/2   3D/4

Vertical Line

W

W/4

W/2

3W/4

① ②

⑤

③ ④

Ⓧ : Test Point

X=1 to 5

Active Area

8. PACKAGING

8.1 PACKING SPECIFICATIONS

(1) 4 LCD TV Modules / Carton

(2) Carton Dimensions: 742(L) X 327 (W) X 510 (H)

(3) Weight: Approximately 19Kg (4 Modules Per Carton)

8.2 PACKING METHOD

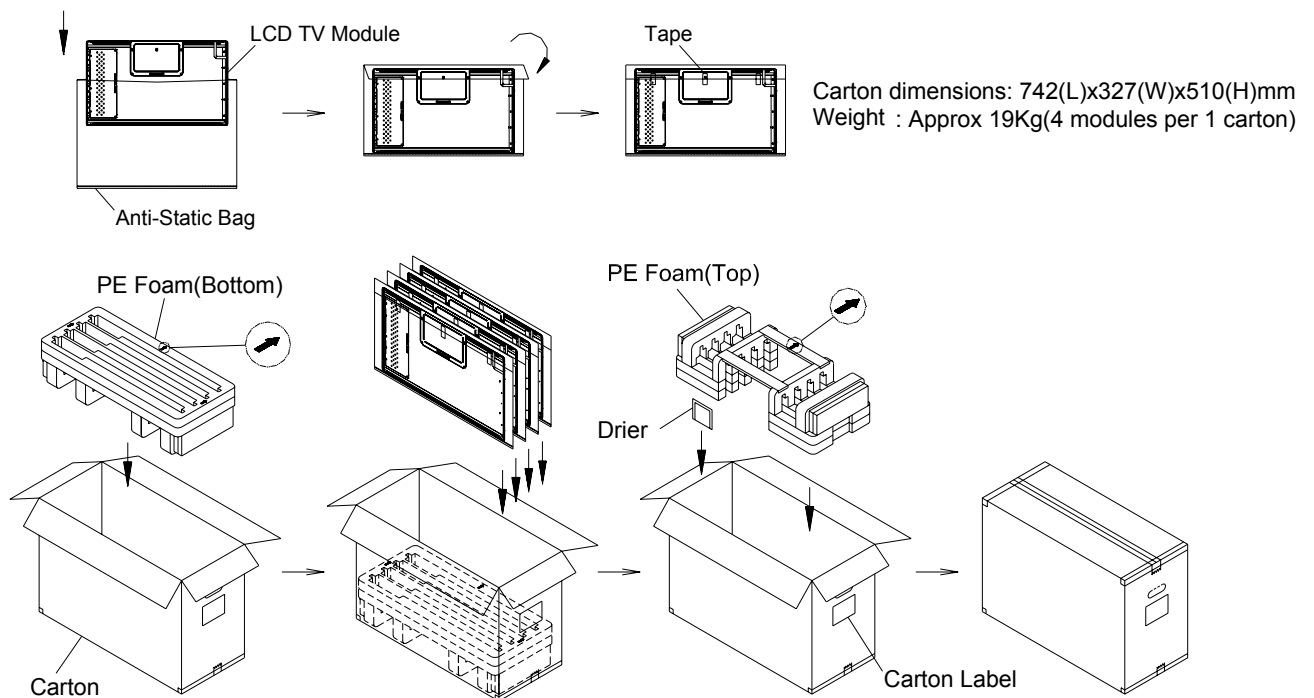Figures 8-1 and 8-2 are the packing method

Figure.8-1 packing method

Corner Protector:L1020*50mm*50mm

Pallet:L1100*W1100*H135mm

Bottom Cap:L1100*W1100*H120mm

Pallet Stack:L1100*W1100*H1163mm
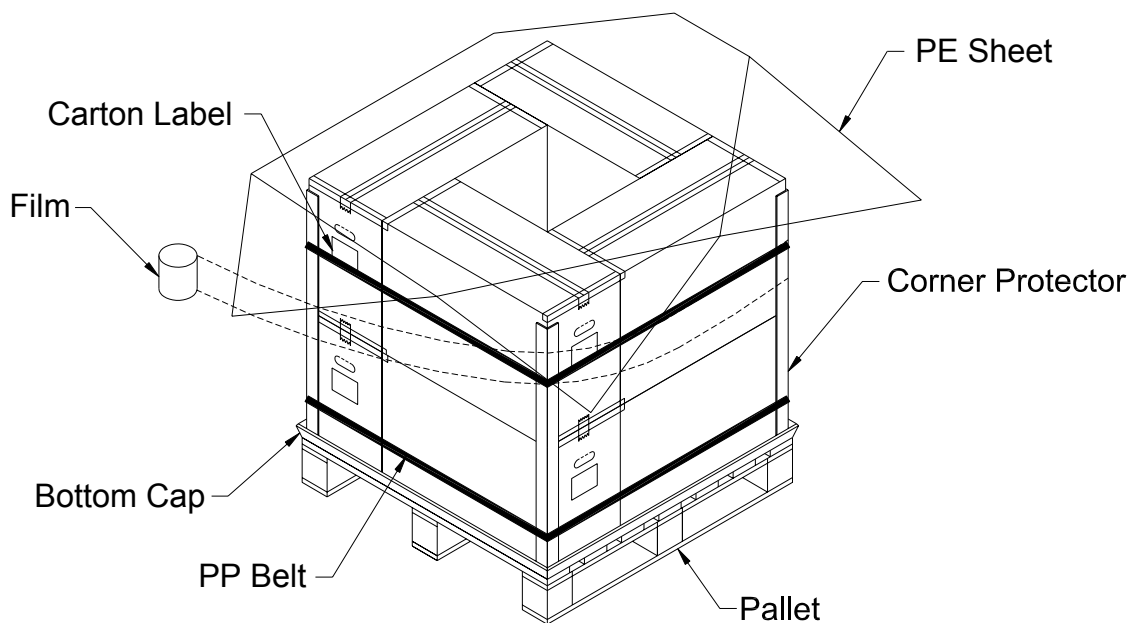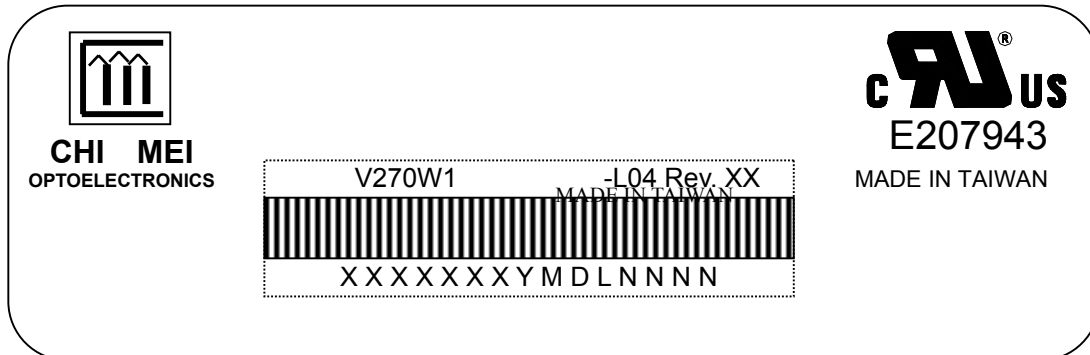
Gross Weight:180kg
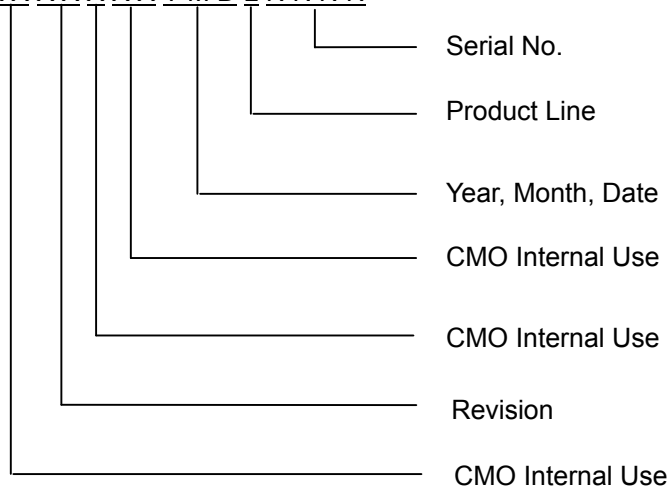

Figure. 8-2 packing method

9. DEFINITION OF LABELS

9.1 CMO MODULE LABEL

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

(a) Model Name: V270W1-L04

(b) Revision: Rev. XX, for example: A0, A1… B1, B2… or C1, C2…etc.

(c) Serial ID: X X X X X X X Y M D L N N N N

- Serial No.
- Product Line
- Year, Month, Date
- CMO Internal Use
- CMO Internal Use
- Revision
- CMO Internal Use

Serial ID includes the information as below:

(a) Manufactured Date: Year: 1~9, for 2000~2009

Month: 1~9, A~C, for Jan. ~ Dec.

Day: 1~9, A~Y, for 1st to 31st, exclude I ,O, and U.

(b) Revision Code: Cover all the change

(c) Serial No.: Manufacturing sequence of product

(d) Product Line: 1 -> Line1, 2 -> Line 2, …etc.

10. PRECAUTIONS

10.1 ASSEMBLY AND HANDLING PRECAUTIONS

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

(2) It is recommended to assemble or to install a module into the user's system in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.

(3) Do not apply pressure or impulse to the module to prevent the damage of LCD panel and Backlight.

(4) Always follow the correct power-on sequence when the LCD module is turned on. This can prevent the damage and latch-up of the CMOS LSI chips.

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

(6) Do not disassemble the module.

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

(8) Moisture can easily penetrate into LCD module and may cause the damage during operation.

(9) High temperature or humidity may deteriorate the performance of LCD module. Please store LCD modules in the specified storage conditions.

(10) When ambient temperature is lower than 10ºC, the display quality might be reduced. For example, the response time will become slow, and the starting voltage of CCFL will be higher than that of room temperature.

10.2 SAFETY PRECAUTIONS

(1) The startup voltage of a Backlight is approximately 1000 Volts. It may cause an electrical shock while assembling with the inverter. Do not disassemble the module or insert anything into the Backlight unit.

(2) 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.

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

The information described in this technical specification is tentative and it is possible to be changed without prior notice. Please contact CMO 's representative while your product design is based on this specification.   **Version 2.1**

CHI MEI
OPTOELECTRONICS CORP.

Approval

11. MECHANICAL CHARACTERISTICS

The information described in this technical specification is tentative and it is possible to be changed without prior notice. Please contact CMO 's representative while your product design is based on this specification.   **Version 2.1**

The information described in this technical specification is tentative and it is possible to be changed without prior notice. Please contact CMO 's representative while your product design is based on this specification. **Version 2.1**