PRIME VIEW

PD104VT1

Version : ***0.2***

TECHNICAL SPECIFICATION

MODEL NO. : PD104VT1

☐Customer's Confirmation

Customer _____

By _____

☐PVI's Confirmation

Confirmed By _____

Prepared By _____

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Date : Apr 24, 2002

This technical specification is subject to change without notice.

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TECHNICAL SPECIFICATION

CONTENTS

1.Application

This data sheet applies to a color TFT LCD module, PD104VT1.

PD104VT1 module applies to OA product, car TV(must use Analog to Digital drive board), which require high quality flat panel display. If you must use in high reliability environment can't over reliability test condition

Prime View assume no responsibility for any damage resulting from the use of the device which dose not comply with the instructions and the precautions in these specification sheet.

2. Features

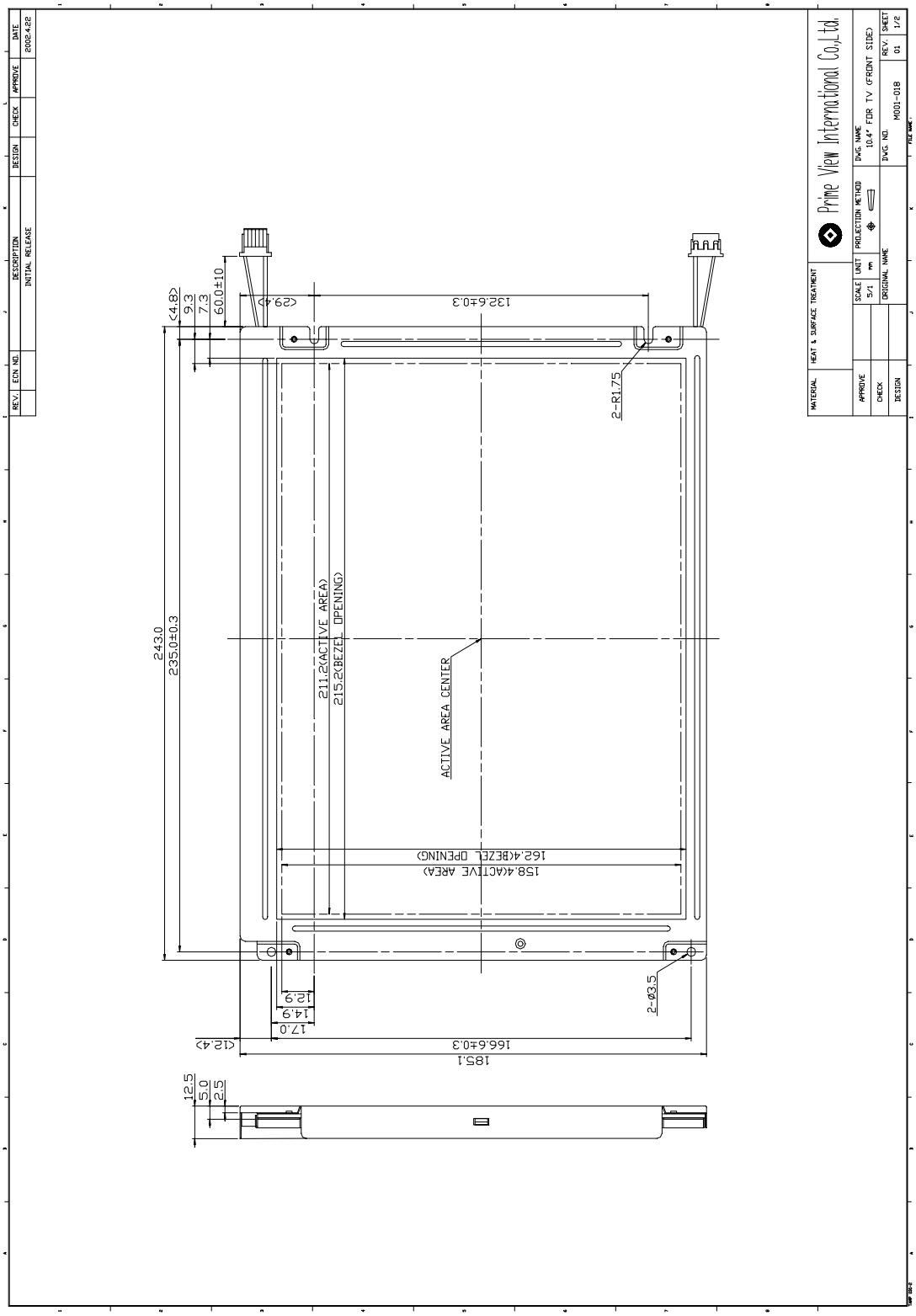
. Amorphous silicon TFT LCD panel with back-light unit
. Pixel in stripe configuration
. Slim and compact, designed for O/A application
. Display Colors：262,144 colors
. Optimum Viewing Direction：6 o'clock
. +3.3V DC supply voltage for TFT LCD panel driving
. Backlight driving DC/AC inverter not included in this module
. TTL transmission interface

3.Mechanical Specifications

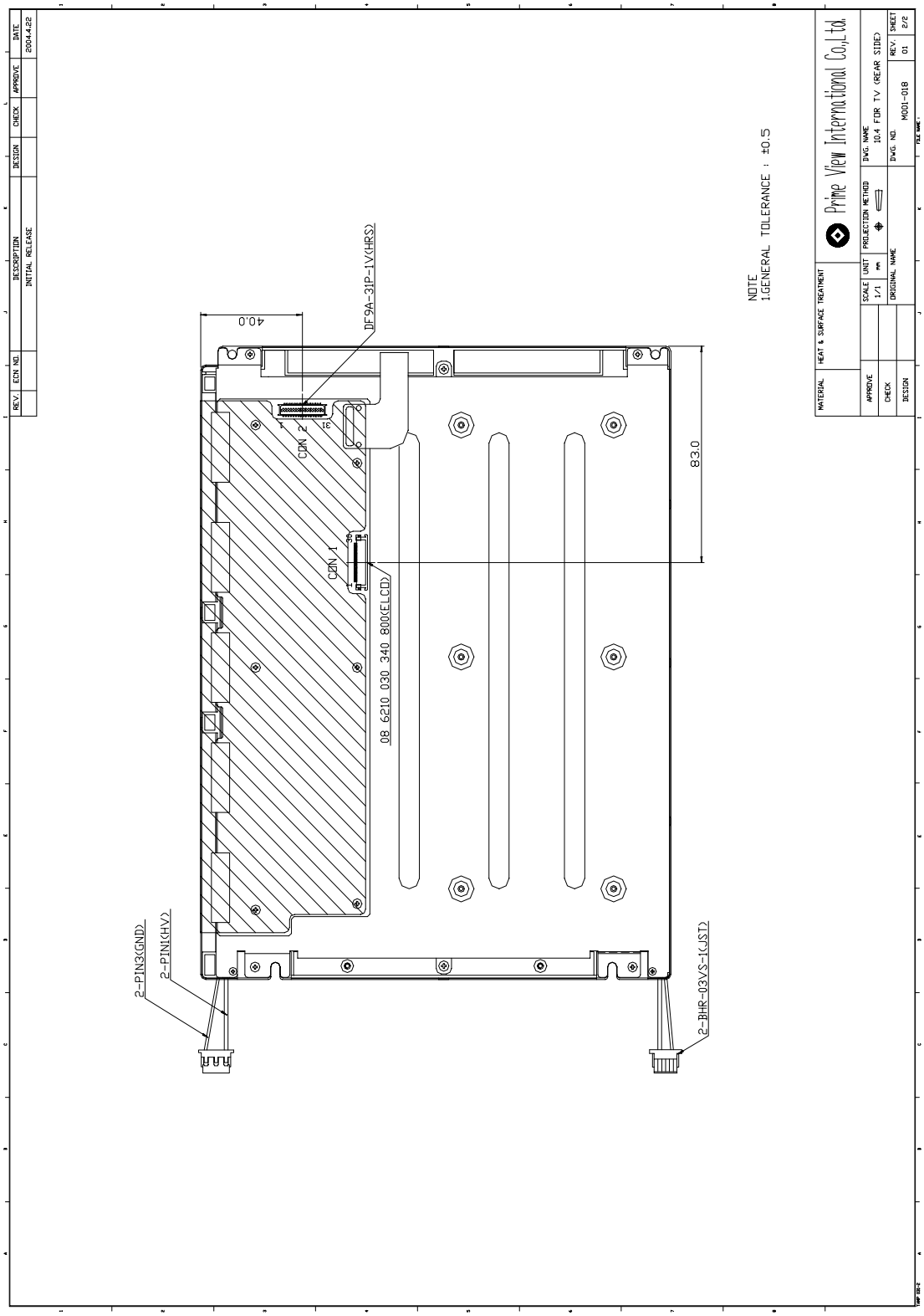
Parameter	Specifications	Unit
Screen Size	26.4(diagonal)	cm
	10.4 (diagonal)	inch
Display Format	640× (R, G, B)× 480	dot
Display Colors	262,144	
Active Area	211.2(H)× 158.4(V)	mm
Pixel Pitch	0.330(H)× 0.330(V)	mm
Pixel Configuration	Stripe	
Outline Dimension	243.0(w)× 185.1 (H)× 12.5 (typ.) (D)	mm
Weight	490(typ.),	g
Back-light	CCFL, 2 tubes	
Surface treatment	Anti-glare and hard-coating	
Display mode	Normally white	

4.Mechanical Drawing of TFT-LCD Module

Outline Drawing : Front View (unit mm)



Outline Drawing : Rear View (unit mm)



Note1:Con 1 mode ELCO , 6210-30PIN
Note2:Con 2 mode DF9A-31P-1V(HRS)

5.Input / Output Terminals

5-1) TFT-LCD Panel Driving

Connector type : ELCO , 6210-30PIN , PIN No 30 pin,pitch=0.5mm

Pin No.	Symbol	Function	Remark
1	CLK	Clock Signal for Sampling Image Digital Data	
2	Hsync	Horizontal Synchronous Signal	
3	Vsync	Vertical Synchronous Signal	
4	GND	Ground (0V)	
5	R0	Red Image Data Signal (LSB)	
6	R1	Red Image Data Signal	
7	R2	Red Image Data Signal	
8	R3	Red Image Data Signal	
9	R4	Red Image Data Signal	
10	R5	Red Image Data Signal (MSB)	
11	GND	Ground (0V)	
12	G0	Green Image Data Signal (LSB)	
13	G1	Green Image Data Signal	
14	G2	Green Image Data Signal	
15	G3	Green Image Data Signal	
16	G4	Green Image Data Signal	
17	G5	Green Image Data Signal (MSB)	
18	GND	Ground (0V)	
19	B0	Blue Image Data Signal (LSB)	
20	B1	Blue Image Data Signal	
21	B2	Blue Image Data Signal	
22	B3	Blue Image Data Signal	
23	B4	Blue Image Data Signal	
24	B5	Blue Image Data Signal (MSB)	
25	GND	Ground (0V)	
26	NC	No connection	
27	VCC	DC +3.3V Power Supply	
28	VCC	DC +3.3V Power Supply	
29	NC	No connection	
30	NC	No connection	

5-2) Backlight driving

Connector type:BHR-03VS-1 (JST) , PIN No 3pin, pitch=4mm

Pin No	Symbol	Description	Remark
1	VL1	Input terminal (Hi voltage side)	Wire color : Pink
2	NC	No Connection	
3	VL2	Input terminal (Low voltage side)	Wire Color : White Note 5-1

Note 5-1 : Low voltage side of backlight inverter connects with ground of inverter circuits.

6.Absolute Maximum Ratings:

GND=0V, Ta=25℃

Parameters	Symbol	MIN.	MAX.	Unit	Remark
Supply Voltage	Vcc	-0.3	+4.0	V	
Input Signal Voltage	V_{IN}	-0.3	VDD+0.3	V	
Backlight Driving Voltage	V_L	-	2000	V	
Backlight Driving Frequency	F_L	0	100	KHz	
Storage Temperature	T_{ST}	-10	+70	℃	Note 6-1
Operating Temperature	T_{OP}	0	+60	℃	

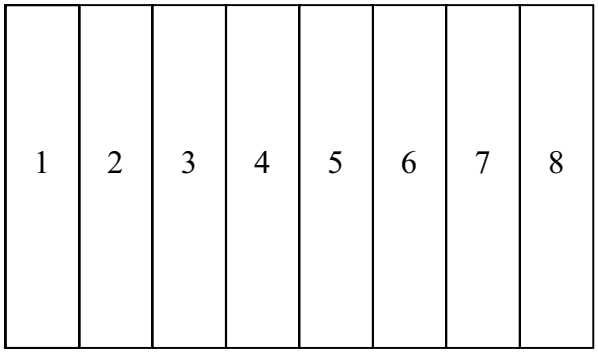
Note 6-1: Humidity : 85% RH Max. at Ta ≤ 50℃.
Maximum wet-bulb temperature is at 39℃ or less at Ta > 40℃ and no condensation.

7.Electrical Characteristics

7-1) Recommended Operating Conditions: GND = 0V，Ta = 25℃

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Supply Voltage	VDD	3.0	3.3	3.6	V	
Current Dissipation	I_{DD}	-	350	450	mA	Note 7-1
Lamp Current	I_{FL}	3.0	7.0	8.0	mA	Per CCFL Note 7-2 Note 7-4
Lamp Voltage	V_L	540	580	650	Vrms	Note 7-2
Lamp Initial Voltage	V_{SFL}	-	-	875	Vrms	at Ta=25°C Note 7-3
		-	-	1300		at Ta=0°C Note 7-3
Lamp Driving Frequency	F_L	30	55	60	KHz	
Lamp Life Time		20000	25000		Hrs	Note 7-5

Note 7-1 : To test the current dissipation of VDD, using the “color bars” testing pattern shown as below



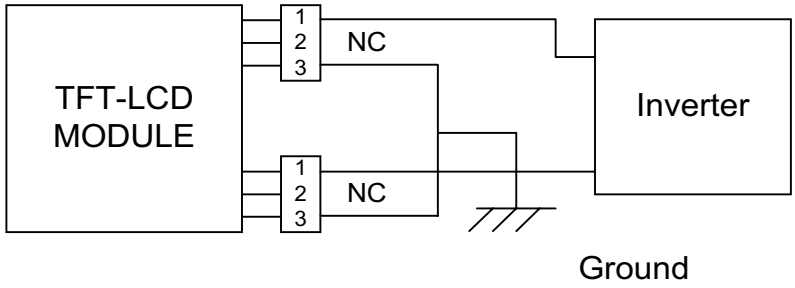
1. White
2. Yellow
3. Cyan
4. Green
5. Magenta
6. Red
7. Blue
8. Black

Idd current dissipation testing pattern

Note 7-2 : The back-light driving waveform should be as closed to sine-wave as possible.
In order to satisfy the quality of B/L , no matter use what kind of inverter , the output lamp current must between Min. and Max. to avoid the abnormal display image caused by B/L.

Note 7-3 : Not including the efficiency of backlight DC/AC inverter
Note 7-4 : Lamp current is measured with current meter for high frequency as shown below

Lamp current dissipation testing configuration



Note1:Pin 1 is high voltage,Pin 2 NC, Pin 3 ground.
Note2:One Lamp Current is 7mA.Two Lamp 14mA.

Note 7-5: The life time is determined as the time at which brightness of lamp is 50% compare to that of initial value at the typical lamp current.

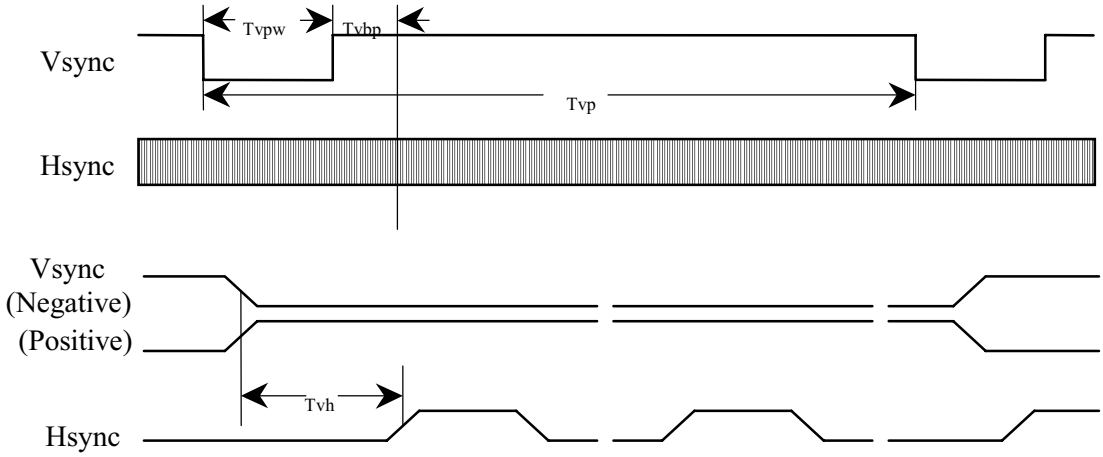
7-3) Input / Output signal timing chart

Parameters		Symbol	Min.	Typ.	Max.	Unit	Note
	Frequency	Fc=1/Tc		25.175		MHz	Note 7-3
Clock	High Time	Tckh	10			ns	
	Low Time	Tckl	10			ns	
	Periodic = Line	Thp		31.778		μs	Note 7-3
Hsync				800	1024	clock	Note 7-3
	Pulse Width	Thpw	2	96	200	clock	
	Back Porch	Thbp	2	49	64	clock	
			515	525	1024	line	Note 7-3
Vsync	Pulse Width	Tvpw	1	2		line	
	Back Porch	Tvbp	1	33	64	line	
Data	Setup Time	Tds	10			ns	
	Hold Time	Tdh	10			ns	
	Periodic = Line	Tep		800	1024	clock	
	Pulse Width (H)	Tepw	2	640	800	clock	
Horizontal Display Periodic		Thd	640	640	640	clock	
Hsync-CLK Phase Difference		Thc	10		Tc-10	ns	
Vsync-Hsync Phase Difference		Tvh	1		Thp-1	clock	

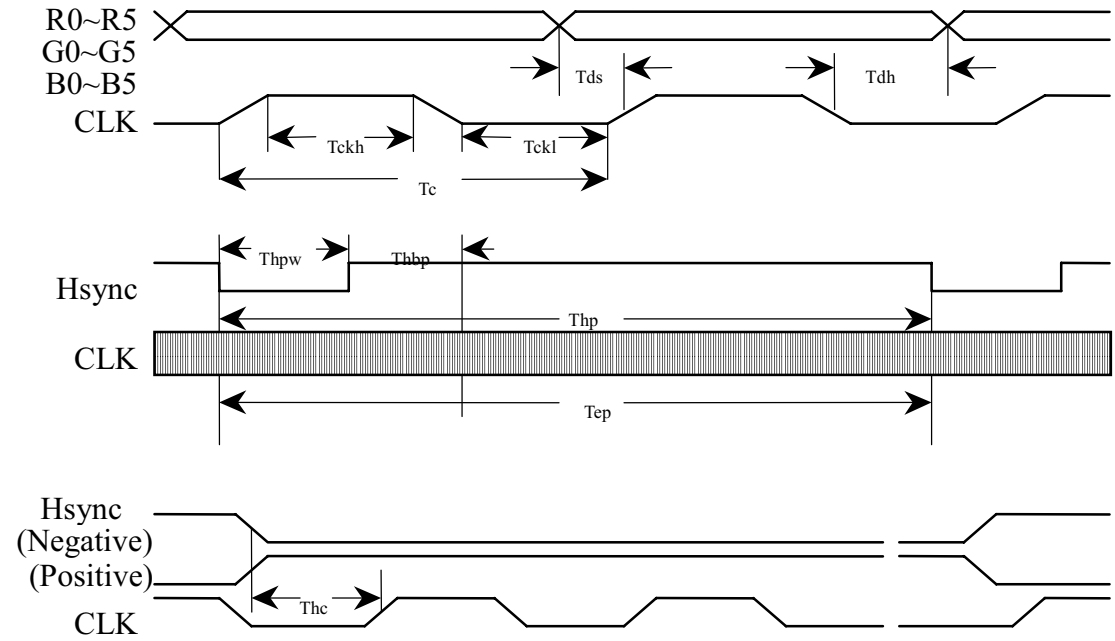
Note 7-3 : Tc is the period of sampling clock. In case of low-frequency, the image-flicker may occur.

7-4) Display Time Range

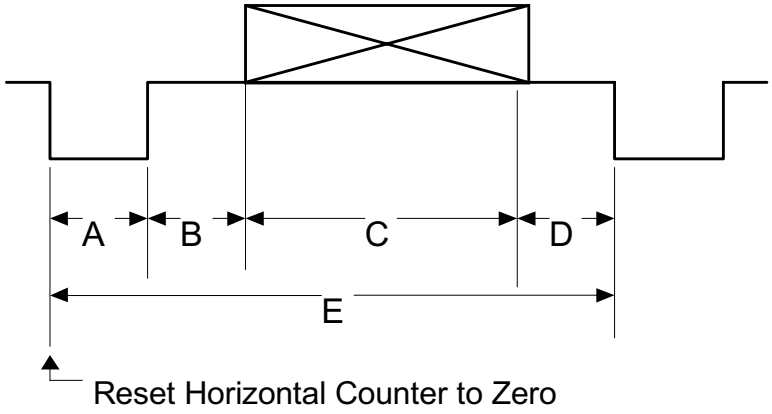
(1) Vertical Timing :



(2) Horizontal Timing :

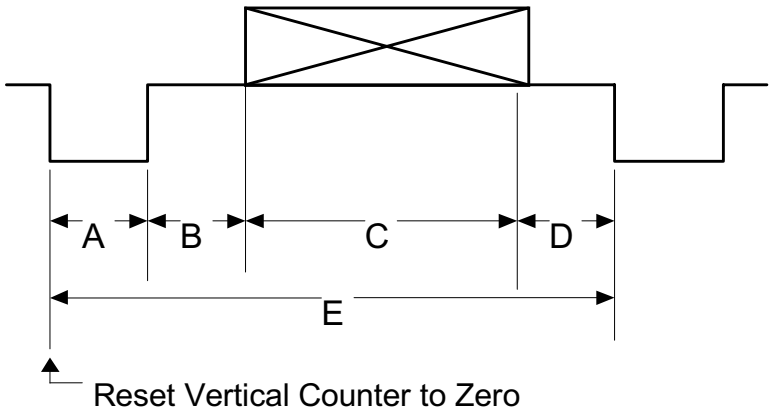


(3). Detail of Horizontal Timing :



Item	Description	Clock Cycles	Time
A	Horizontal Width	96	3.813 μs
B	Horizontal B-Porch	49	1.907 μs
C	Horizontal Display	640	25.422 μs
D	Horizontal F-Porch	16	0.636 μs
E	Horizontal Total	800	31.778 μs

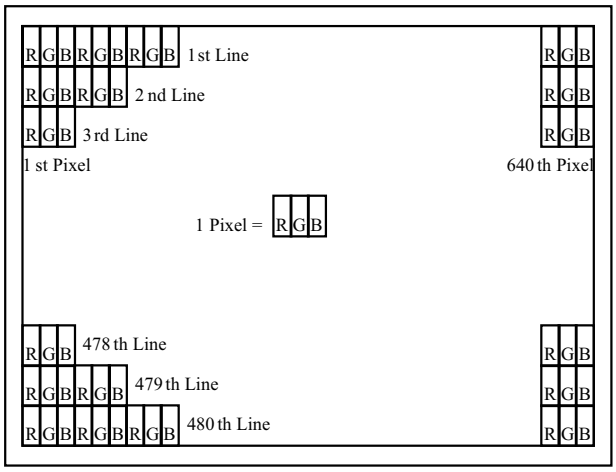
(4). Detail of Vertical Timing :



Item	Description	Horizontal Lines	Time
A	Vertical Width	2	63.5 μs
B	Vertical B-Porch	33	1.049 ms
C	Vertical Display	480	15.253 ms
D	Vertical F-Porch	10	317.8 μs
E	Vertical Total	525	16.683 ms

7-5) Pixel Arrangement

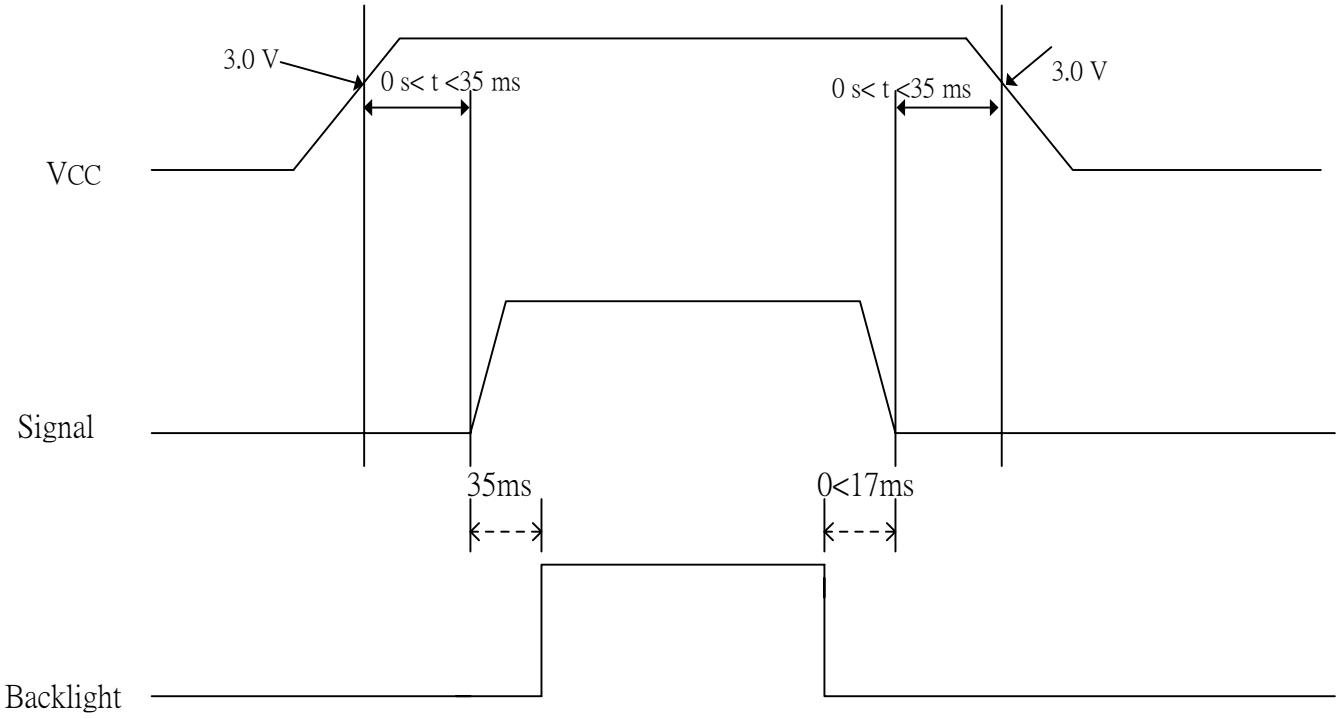
The LCD module pixel arrangement is the stripe.



7-6) Display Color and Gray Scale Reference

Color		Input Color Data																	
		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 (63)	1	1	1	1	1	1	0	0	0	0	0	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
	Blue (63)	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
Red	Red (00)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red (01)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red (02)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker																		
	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
	Brighter																		
	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
Green	Green (00)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green (01)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Green (02)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	Darker																		
	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
	Brighter																		
	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
Blue	Blue (00)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue (01)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue (02)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	Darker																		
	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
	Brighter																		
	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

8. Power On Sequence



1. The supply voltage for input signals should be same as $V_{CC.}$

2. When the power is off , please keep whole signals (Hsync, Vsync, CLK, Data) low level or high impedance

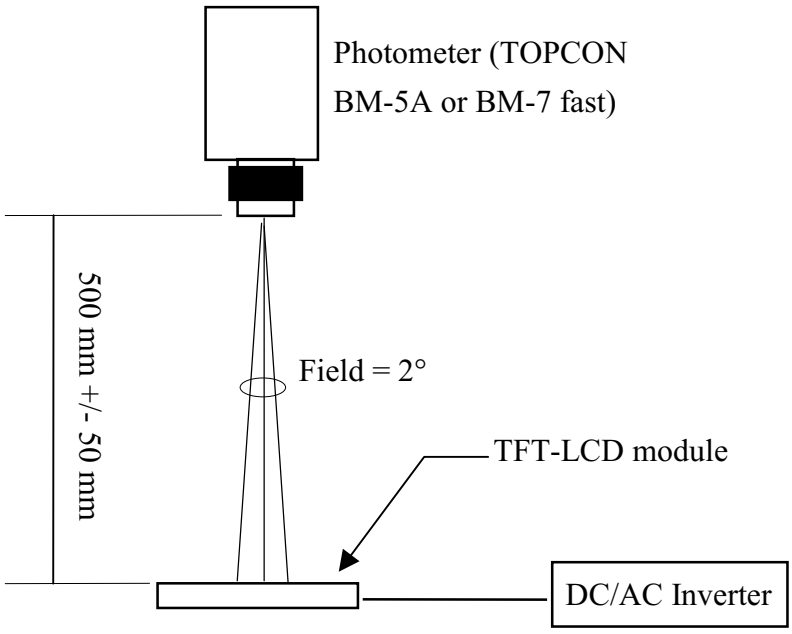
9. Optical Characteristics

9-1) Specification:

Ta=25℃

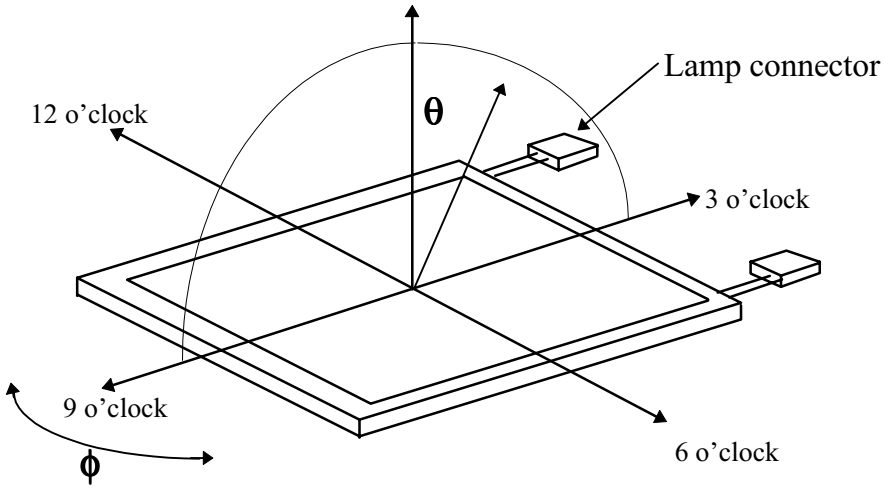
Parameter		Symbol	Condition	MIN.	TYP.	MAX.	Unit	Remarks
Viewing Angle	Horizontal	θ	CR＞10	± 45	± 55		deg	Note 9-3
	Vertical	θ (to 12 o'clock)		10	15	-	deg	
		θ (to 6 o'clock)		25	40	-	deg	
Contrast Ratio		CR		100	180	-	-	Note 9-1
Response time	Rise	Tr	θ =0°	-	15		ms	Note 9-4
	Fall	Tf		-	25		ms	
Brightness			θ =0°/ φ =0	250	350		cd/㎡	Note 9-2
Luminance Uniformity		U		55	80	-	%	Note 9-6
Lamp Life Time				20000	25000	-	hr	
White Chromaticity		x		0.290	0.340	0.390	-	
		y		0.290	0.340	0.390	-	
Cross Talk			θ =0°	-	-	3.5	%	Note 9-5

All the optical measurement shall be executed 30 minutes after backlight being turn-on. The optical characteristics shall be measured in dark room (ambient illumination on panel surface less than 1 Lux). The measuring configuration shows as following figure.



Optical characteristics measuring configuration

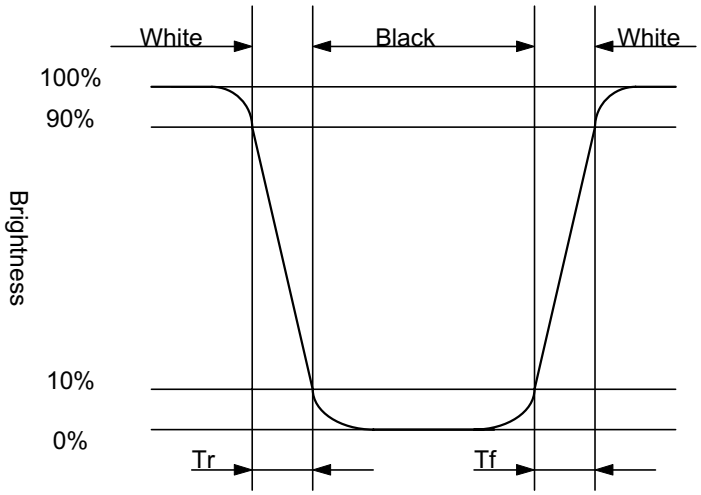
Note 9-1`：The definitions of viewing angles are as follow



Note 9-2 : The definition of contrast ratio $CR = \frac{\text{Luminance at gray level 63}}{\text{Luminance at gray level 0}}$

Note 9-3 : Topcon BM-5A luminance meter 2° field of view is used in the testing (after 30 minutes' operation). The typical luminance value is measured at lamp current 14.0 mA.

Note 9-4: Definition of Response Time T_r and T_f:



Note 9-5: The uniformity of LCD is defined as

$$U = \frac{\text{The Minimum Brightness of the 13 testing Points}}{\text{The Maximum Brightness of the 13 testing Points}}$$

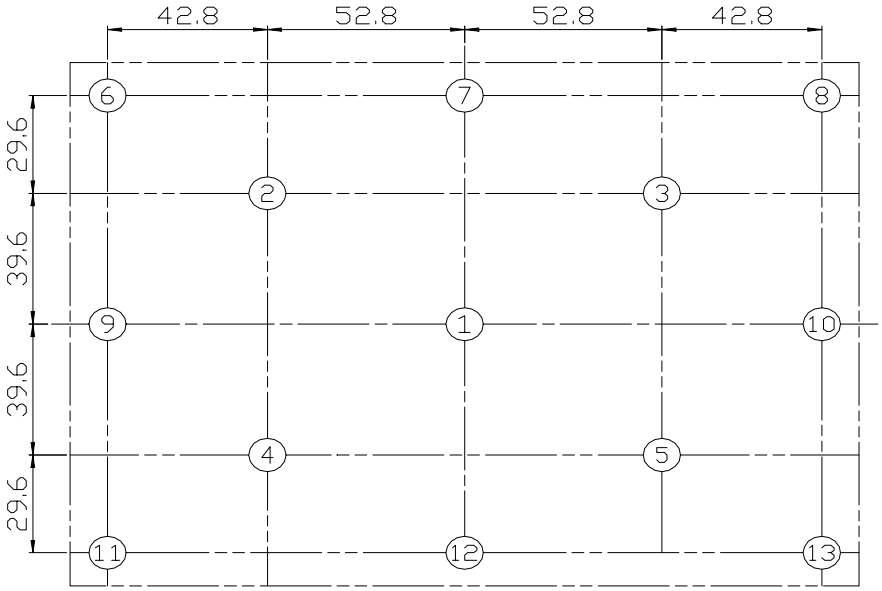
Luminance meter : BM-5A or BM-7 fast(TOPCON)

Measurement distance : 500 mm +/- 50 mm

Ambient illumination : < 1 Lux

Measuring direction : Perpendicular to the surface of module

The test pattern is white (Gray Level 63).



Note 8-6: Cross Talk (CTK) = $\frac{|YA-YB|}{YA} \times 100\%$

YA: Brightness of Pattern A

YB: Brightness of Pattern B

Luminance meter : BM 5A (TOPCON)

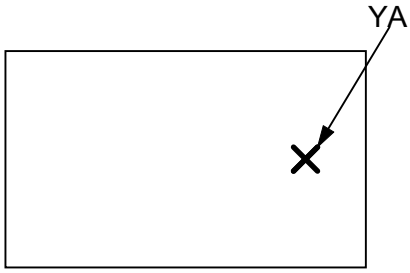
Measurement distance : 500 mm +/- 50 mm

Ambient illumination : < 1 Lux

Measuring direction : Perpendicular to the surface of module

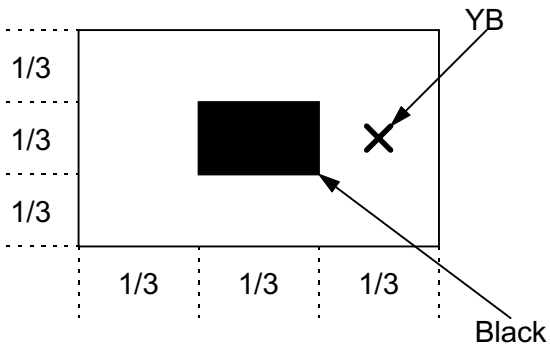
Pattern A

(Gray Level 31)



Pattern B

(Gray Level 31, central black box exclusive)



(Gray Level 0)

✕: Measuring Point (A and B are at the same point.)

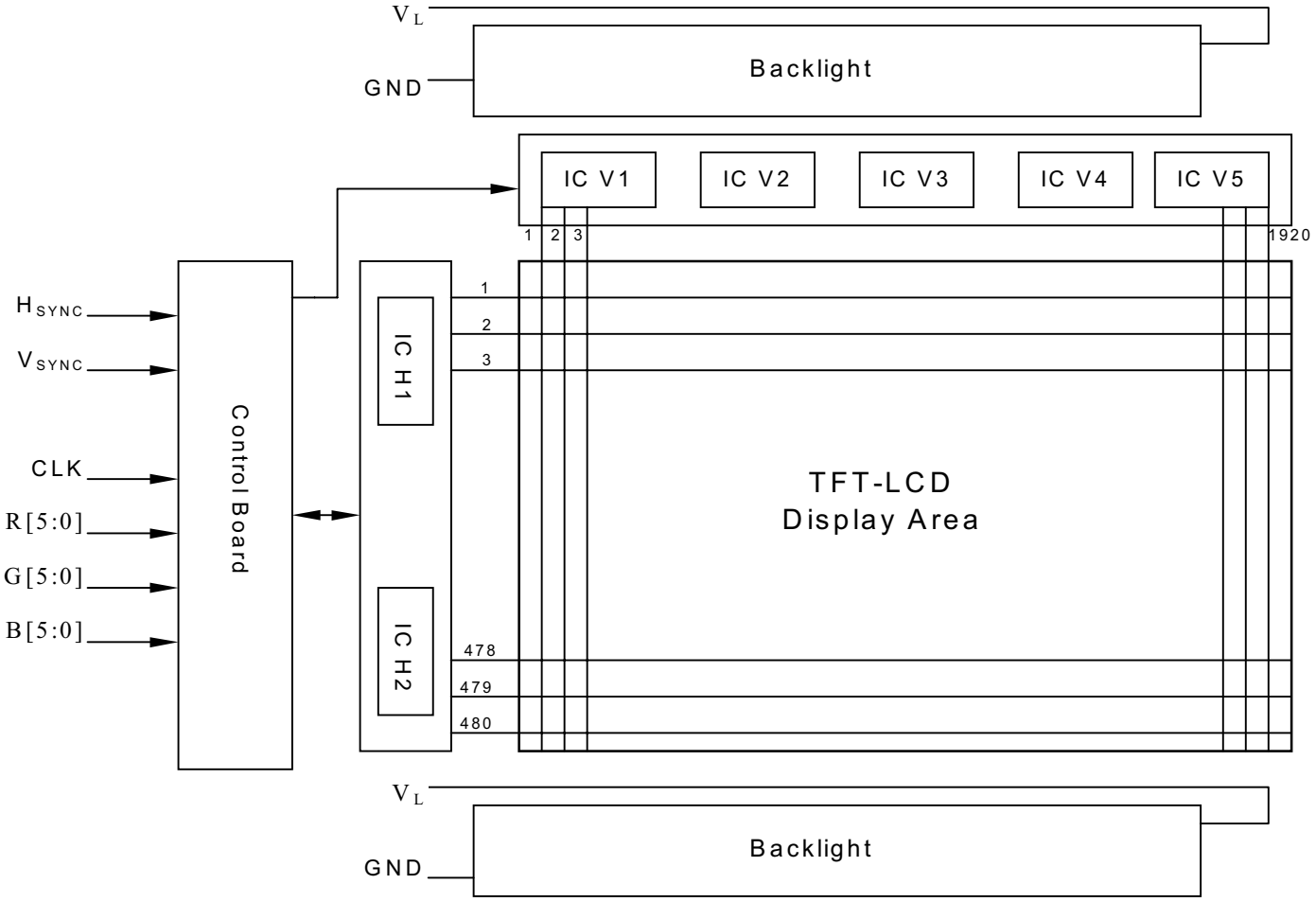
10. Reliability Test

No	Test Item	Test Condition	Remark
1	High Temperature Storage Test	Ta = +70℃, 240 hrs	
2	Low Temperature Storage Test	Ta = -10℃, 240 hrs	
3	High Temperature Operation Test	Ta = +60℃,240 hrs	
4	Low Temperature Operation Test	Ta = 0℃, 240 hrs	
5	High Temperature & High Humidity Operation Test	Ta = +50℃, 85%RH, 240 hrs (No Condensation)	
6	Thermal Cycling Test (non-operating)	0℃←→+25℃←→+60℃, 50 Cycles 1Hr 0.5Hr 1Hr	
7	Vibration Test (non-operating)	Frequency：10 ~ 57 H_Z, Amplitude：1.5 mm 58~500Hz, 1G Sweep time: 11 min Test Period: 3 hrs (1 hr for each direction of X, Y, Z)	
8	Shock Test (non-operating)	80G, 6ms, X,Y, Z 1 times for each direction	
9	Electrostatic Discharge Test (non-operating)	150pF, 330Ω Air: ±15KV; Contact: ±8KV 10 times/point, 9 points/panel face	

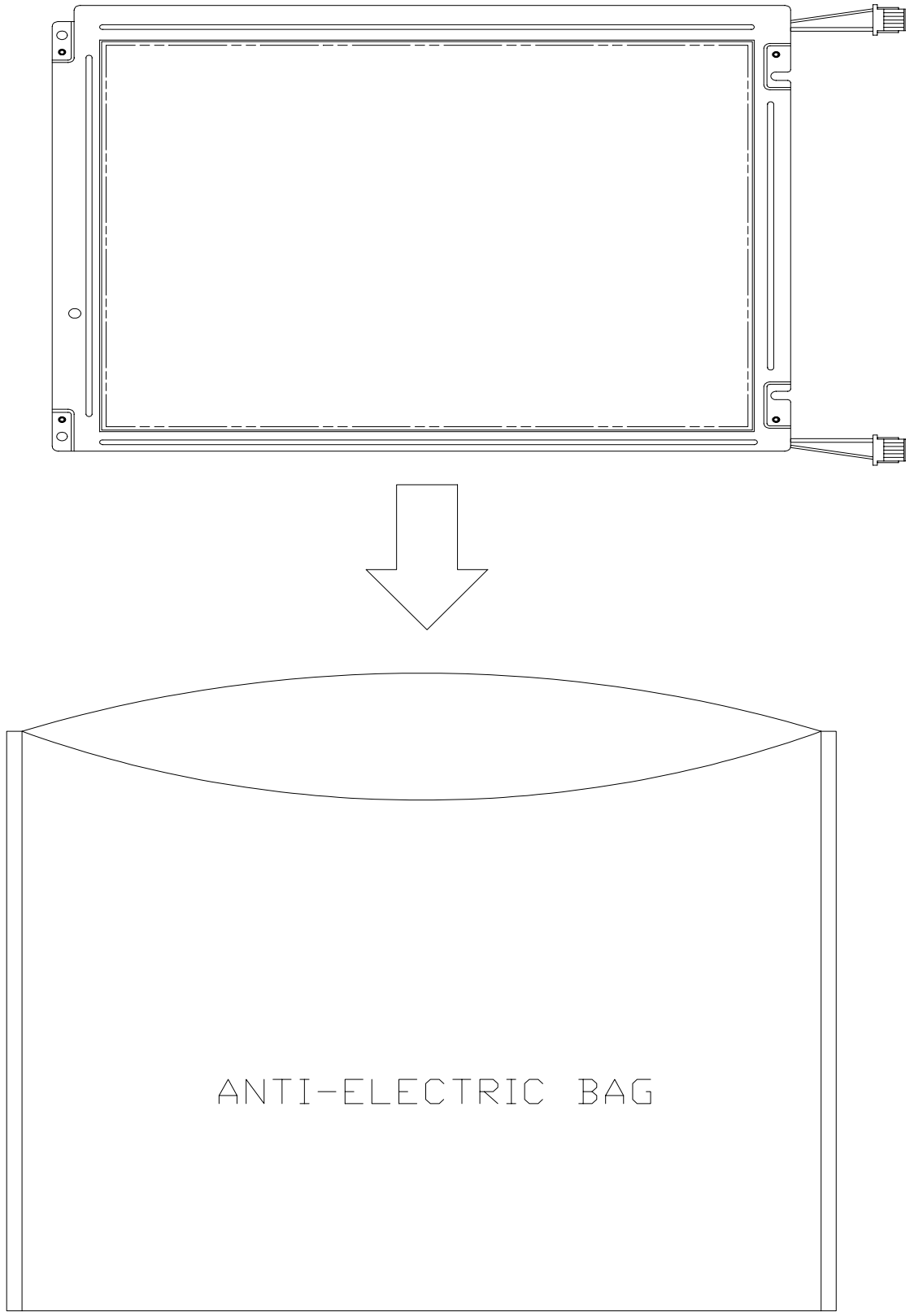
Ta: ambient temperature

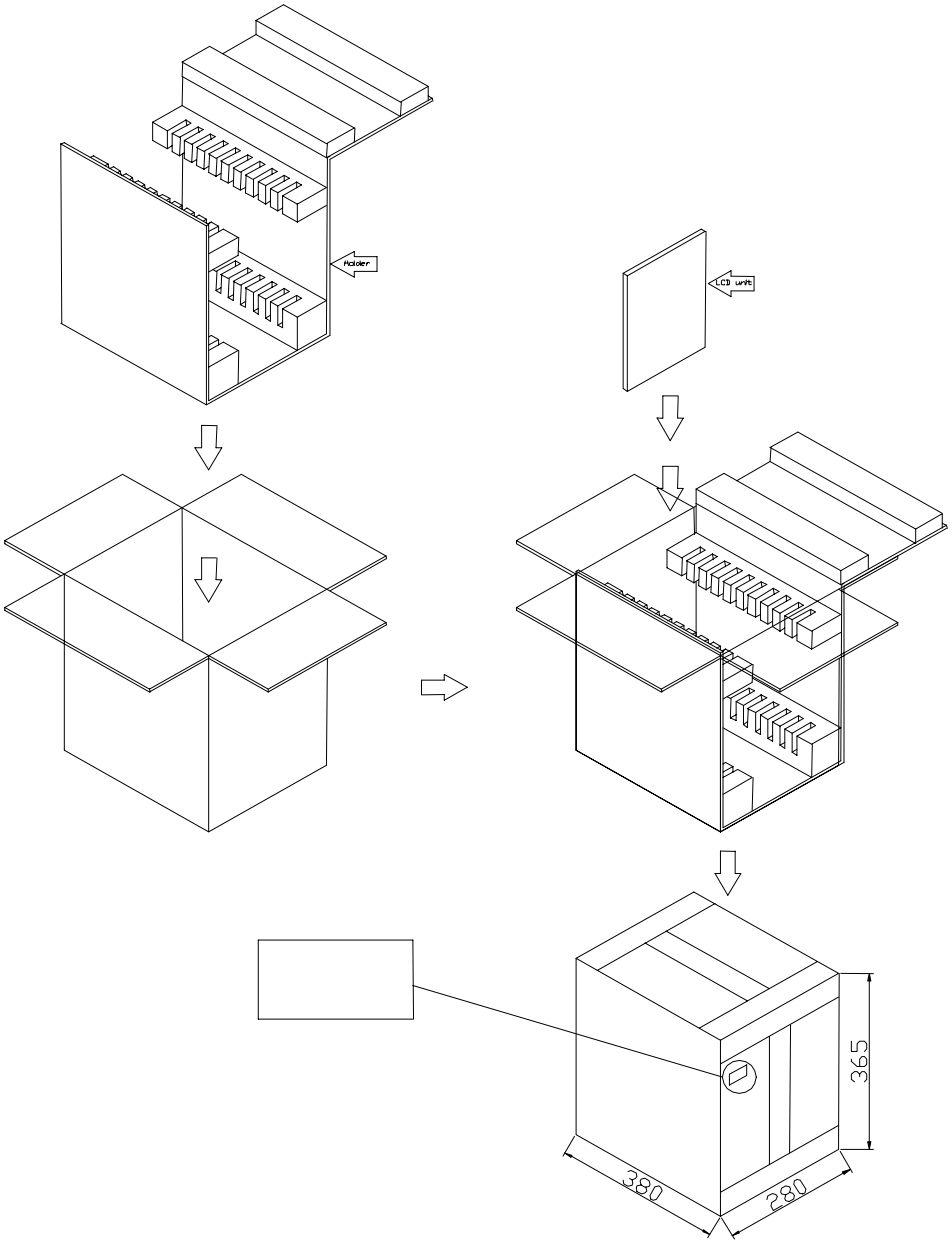
[Judgement Criteria]
Under the display quality test conditions with normal operation state , there should be no change which may affect practical display function.

11. Block Diagram

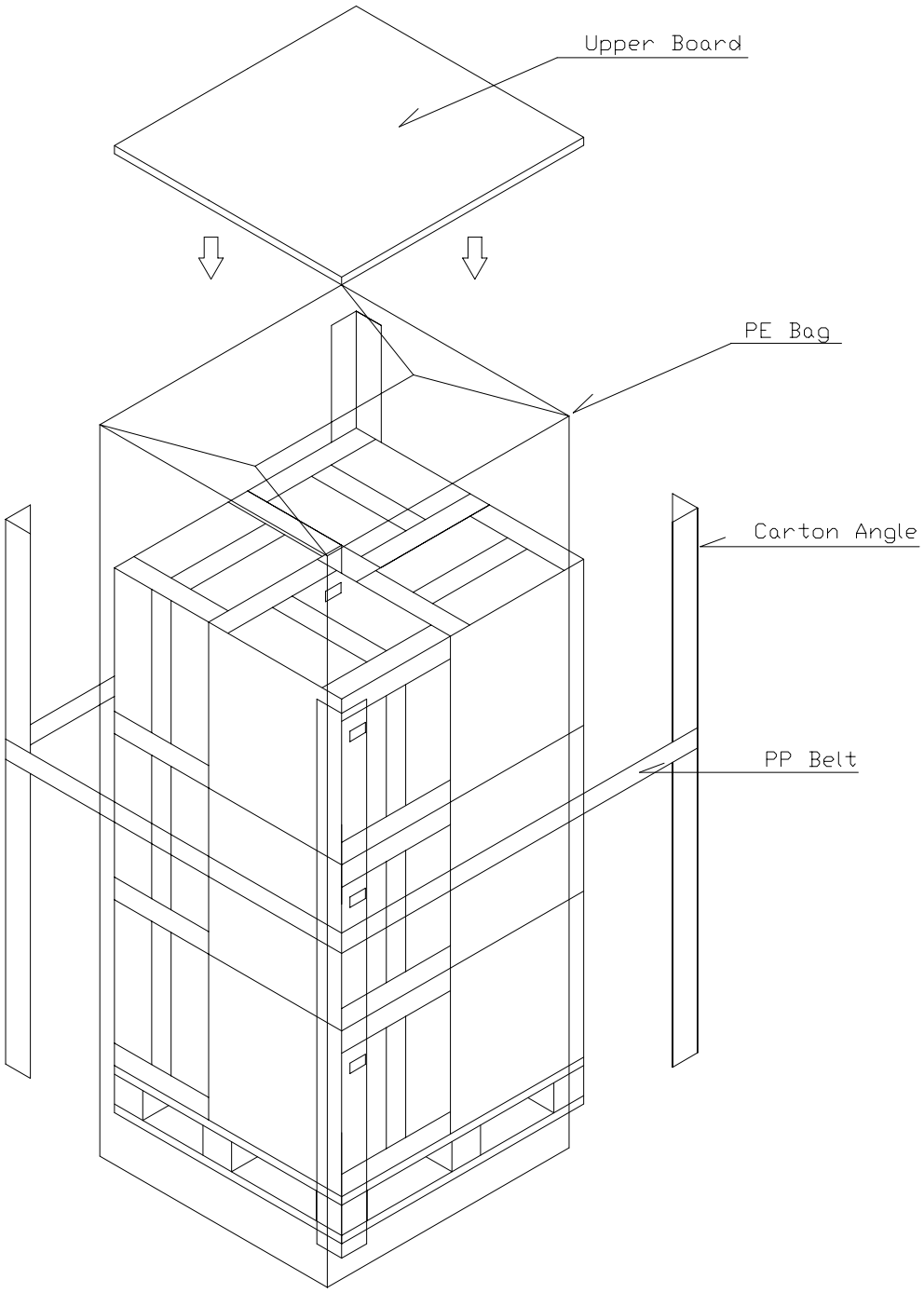


12. Packing Diagram





3RD ANGLE PROJECTION	MATERIAL		NAME Packing Method
APVD		SCALE 2=1	MODEL NO.
CHKD		SHEET 1/1	
DWN	David Liu	UNIT M/M	DWG NO.
		DATE	
			PART NO.



3RD ANGLE PROJECTION	MATERIAL		NAME Packing Method
APVD		SCALE 2=1	MODEL NO.
CHKD		SHEET 1/1	
DWN	David Liu	UNIT M/M	DWG NO.
		DATE	
			PART NO.

Revision History

Rev.	Issued Date	Revised Contents
Preliminary (0.2)	Apr. 24, 2002	NEW