Chunghwa Picture Tubes, Ltd.
Product Specification

To : **Hau Display**
Date : 20120329

TFT LCD
CLAA069LA0BCW

ACCEPTED BY : (V0.2)

APPROVED BY	CHECKED BY	PREPARED BY
鍾昭玟	劉志洪	鄭丹蘋

Prepared by :
Product Planning Management Division
Small & Medium TFT Product Business Unit
CHUNGHWA PICTURE TUBES, LTD.
1127 Hopin Rd., Padeh, Taoyuan, Taiwan 334, R.O.C.
TEL: +886-3-3675151 FAX: +886-3-377-3858

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REVISION STATUS

Revision Notice	Description	Page	Rev. Date
0.0	First revision	--	2010/4/20
0.1	Revised the Color Coordination.	P15	2010/07/13
0.2	Revised the Power consumption.	P4	2011/12/12
0.2	Revised the total Power consumption.	P6	2011/12/12
0.2	Revised the Power、Signal sequence	P7	2011/12/12
0.2	Revised the Remarks *2)	P10	2011/12/12
0.2	Revised the Mating connector.	P11	2011/12/12
0.2	Revised the CN2 suggested connector.	P16	2011/12/12
0.2	Revised the LED Lifetime	P8	2011/12/12
0.2	Revised the Color Coordination.	P17	2011/12/12

CONTENTS

1. OVERVIEW

CLAA069LA0BCW is 6.95" color TFT-LCD (Thin Film Transistor Liquid Crystal Display) module composed of LCD panel, driver IC, and LED backlight.

General specifications are summarized in the following table:

ITEM	SPECIFICATION
Panel Size	6.95 inch (panel diagonal)
Display Area (mm)	156.6(H)×81.6(V)
Number of Pixels	800(H) × 3 (RGB) × 480(V)
Pixel Pitch (mm)	0.19575 (H) × 0.170 (V)
Color Pixel Arrangement	RGB vertical stripe
Display Mode	Normally white
Number of colors	262K
Viewing Direction	6 o´clock(Max. contrast ratio, Gray level inversion)
Response Time (Tr+Tf)	20ms
Brightness (cd/m^2)	500nit (typ)
Viewing Angle (CR≧10)	140 degree(H)，120degree(V)
Electrical Interface(data)	TTL
Power consumption(W)	1.93W(typ)
Outline Dimension (in mm)	167.0(W) × 93.0(H) × 6(D)
Weight(g)	165g(typ)
BL unit	LED
Surface Treament	Anti-Glare，Surface hardness: 3H

2. ABSOLUTE MAXIMUM RATINGS

The following are maximun values which, if exceeded, may cause faulty operation or damage to the unit.

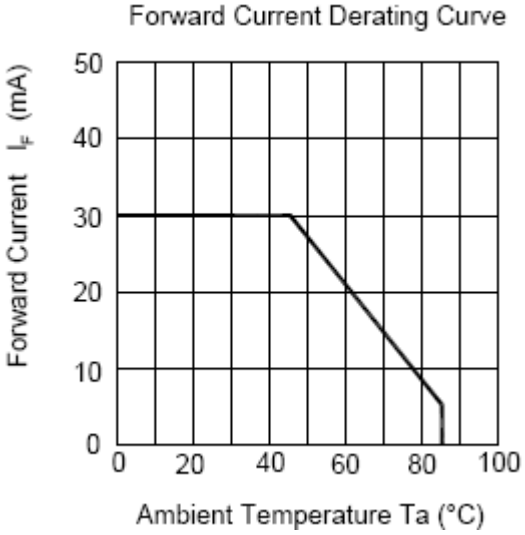
Item	Symbol	Min.	Max.	Unit	Note
Digital Supply Voltage	DVDD	-0.3	5	V	
Analog Supply Voltage	AVDD	-0.3	13.5	V	
Gate On Voltage	VDDG	-0.3	40	V	
Gate Off Voltage	VEEG	-20	0.3	V	
Operation Temperature	Topa	-30	85	℃	*1)
Storage Temperature	Tstg	-40	90	℃	*1)
Forward Current(per LED)	If	-	30	mA	
Reverse Voltage(per LED)	VR	-	5	V	
Pulse Forward Current(per LED)	Ifp	-	100	mA	*2)

Remarks：

*1) If the product were used out of the operation and storage range, it will have quality issue.

*2) Ifp Conditions ： Pulse Width≦10msec，Duty≦1/10。

*3) Each one of LED operation must be follow diagram of Ambient Temperature and Allowable Forward Current.



3. ELECTRICAL CHARACTERISTICS

(a) TFT-LCD Power Supply Voltage Ta=25℃

Item	Symbol	Min	Typ	Max	Unit	Remarks
Digital Power Supply Voltage	DVDD	3	3.3	3.6	V	
Analog Power Supply Voltage	AVDD	8.7	9.2	9.8	V	
Gate On Power Supply Voltage	VDDG	17	18	19	V	
Gate Off Power Supply Voltage	VEEG	-6.6	-6	-5.4	V	
Common Power Supply Voltage	VCOM	3.18	3.38	3.58	V	*1)
Gamma Voltage	VR 1	-	8.37	-	V	
	VR 2	-	6.89	-	V	
	VR 3	-	6.49	-	V	
	VR 4	-	6.15	-	V	
	VR 5	-	5.23	-	V	
	VR 6	-	3.71	-	V	
	VR 7	-	2.79	-	V	
	VR 8	-	2.45	-	V	
	VR 9	-	2.05	-	V	
	VR 10	-	0.57	-	V	
Input Signal Voltage	VIH	0.7DVDD	-	DVDD	V	
	VIL	GND	-	0.3DVDD	V	

Remarks：

*1) Please adjust VCOM to make the flicker level be minimum.

(b) TFT-LCD Power Supply Current Ta=25℃

Item	Symbol	Conditions	Min	Typ	Max	Unit	Remarks
Gate on Supply Voltage Current	IVDDG	VDDG =18V	-	0.5	1	mA	
Gate off Supply Voltage Current	IVEEG	VEEG= -6V	-	0.5	1	mA	
Digital Supply Voltage Current	IDVDD	DVDD = 3.3V	-	5	10	mA	
Analog Supply Voltage Current	IAVDD	AVDD = 9.2V	-	40	50	mA	
Total Power Consumption	PC		-	396.5	517	mW	

Remarks：

*1)Typical：64 gray pattern，Maximum：Black pattern。

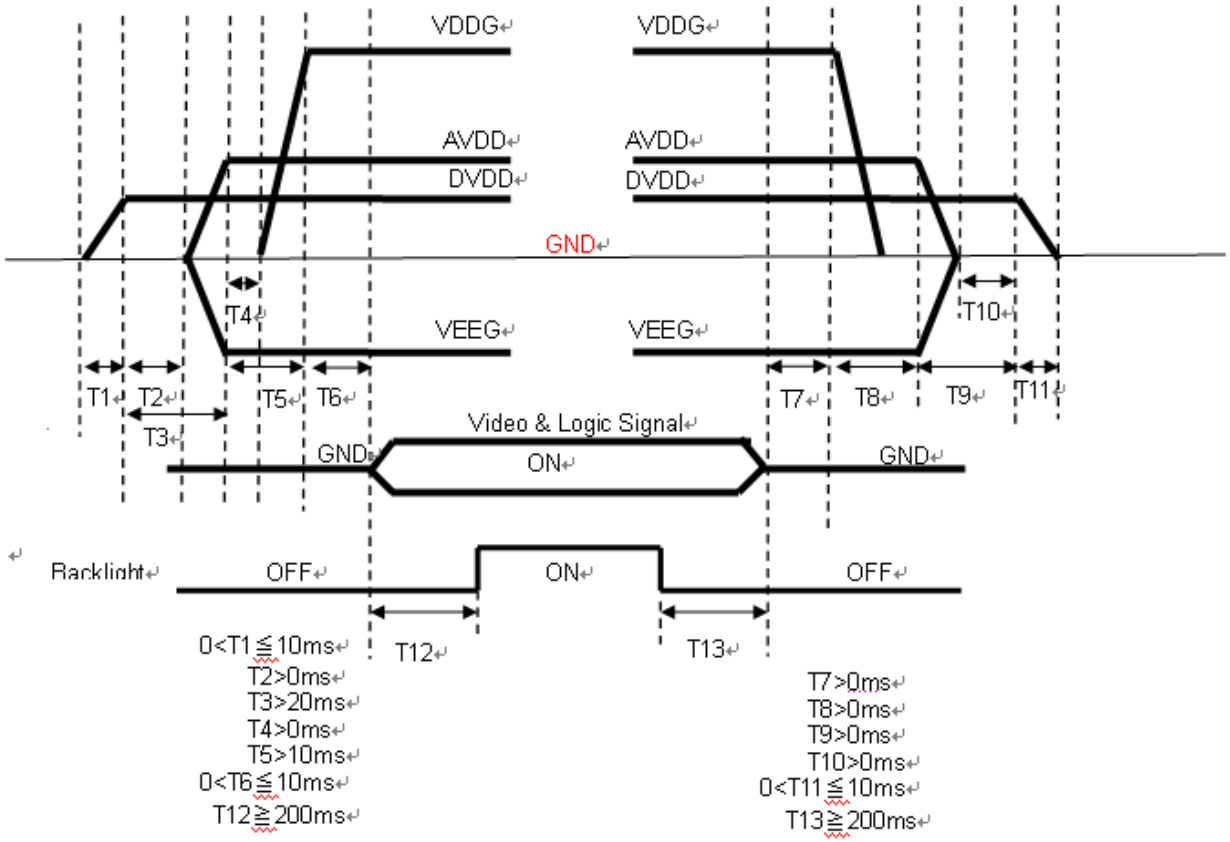
64 Gray Pattern

Black Pattern

(c) Power、Signal sequence

Power On：DVDD→AVDD/VEEG→VDDG→Video &Logic Signal

Power Off：Video &Logic Signal→VDDG→AVDD/VEEG→DVDD

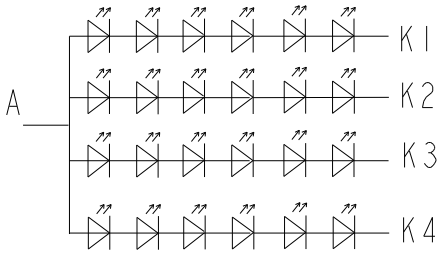


(d) Backlight

Item	Symbol	Condition	Min	Typ	Max	Unit	Remarks
LED current	IL	Ta=25℃ Each serial=20mA	--	80	--	mA	
LED voltage	VL	Ta=25℃ Each serial=20mA	17.4	19.2	21.0	V	
Power consumption	WL	Ta=25℃ Each serial=20mA	--	1.536	--	W	
LED Lifetime	-	Ta=25℃ Each serial=20mA	20000			Hr	
		Ta=25℃ Each serial=20mA	15000			Hr	

Remarks：

*1)LED Circuit Diagram：



*2) A：Anode(＋)，K：Cathode(－)

*3) LED control must use the constant current control to avoid the leakage light and brightness quality issue.

*4) Definition LED lifetime：Luminance will decay less than 50%.

4. INTERFACE CONNECTION

(a) CN1(Input signal)

Pin NO.	SYMBOL	DESCRIPTION
1	GND	Power Ground
2	DIO1	Horizontal start Pulse Signal I/O
3	NC	NC
4	VR 1	Gamma Voltage Level 1
5	VR 2	Gamma Voltage Level 2
6	VR 3	Gamma Voltage Level 3
7	VR 4	Gamma Voltage Level 4
8	VR 5	Gamma Voltage Level 5
9	VR 6	Gamma Voltage Level 6
10	VR 7	Gamma Voltage Level 7
11	VR 8	Gamma Voltage Level 8
12	VR 9	Gamma Voltage Level 9
13	VR 10	Gamma Voltage Level 10
14	D00	Red Data (LSB)
15	D01	Red Data
16	D02	Red Data
17	D03	Red Data
18	D04	Red Data
19	D05	Red Data (MSB)
20	D10	Green Data (LSB)
21	D11	Green Data
22	D12	Green Data
23	D13	Green Data
24	D14	Green Data
25	D15	Green Data (MSB)
26	D20	Blue Data (LSB)
27	D21	Blue Data
28	D22	Blue Data
29	D23	Blue Data
30	D24	Blue Data
31	D25	Blue Data (MSB)
32	LD	Latch The Polarity of Output and Switch The New Data to Output
33	SHL	Select Left / Right Shift
34	AVDD	Power Supply for Analog Circuit
35	AVDD	Power Supply for Analog Circuit
36	GND	Power Ground
37	GND	Power Ground
38	CLK	Horizontal Clock
39	DVDD	Digtal Power +3.3V
40	DIO2	Horizontal start Pulse Signal I/O
41	GND	Power Ground
42	GND	Power Ground
43	GND	Power Ground
44	STV2	Vertical start Pulse Signal I/O
45	UD	Up / Down Control Pin
46	OEV	Output Enable
47	VCLK	Vertical Clock
48	GND	Power Ground
49	GND	Power Ground

50	POL	Polarity Selection
51	XON	Gate Output all-on control
52	NC	NC
53	VEEG	Gate OFF Voltage -6V
54	NC	NC
55	VDDG	Gate ON Voltage +18V
56	NC	NC
57	STV1	Vertical start Pulse Signal I/O
58	NC	NC
59	VCOM	Common Voltage
60	VCOM	Common Voltage

Remarks：

*1)GND Pin must connect to ground and don't float it.

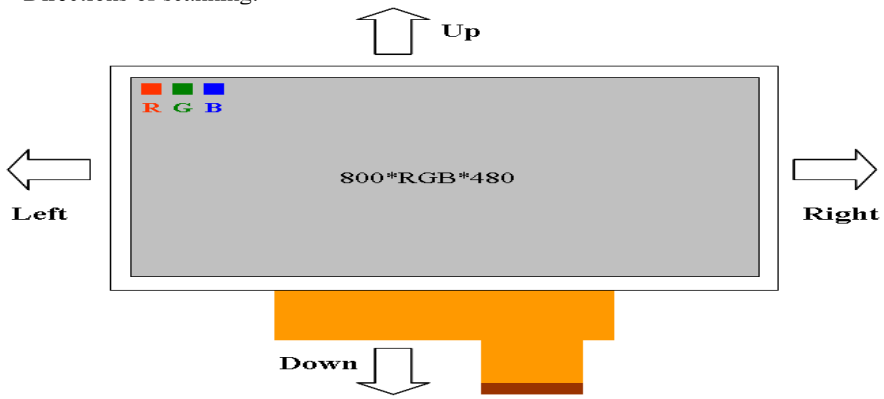
*2) SHL：Select left or right

SHL	DIO1	DIO2	SHIFT
DVDD	Input	Output	Right
GND	Output	Input	Left

UD：Shift up or down control

UD	STV1	STV2	SHIFT
DVDD	Input	Output	UP
GND	Output	Input	Down

Directions of scanning:



3) XON: Gate Output all-on control

XON=GND, all Gate outputs are all-on at the same time.

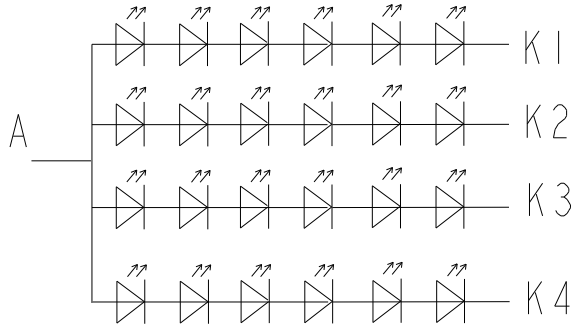
XON=DVDD, Gate output don't care this signal.

(b).CN2 (Backlight)

Mating connector: FR03-S10DHF-2-E3000(CONN-TECK)

Pin No.	Symbol	Function
1	A	Anode
2	A	Anode
3	A	Anode
4	NC	NC
5	K1	Cathode
6	K2	Cathode
7	K3	Cathode
8	K4	Cathode
9	NC	NC
10	NC	NC

CN2 Circuit Diagram：



5. INPUT SIGNAL

(1) Timing Specification

Horizontal Timing spec：

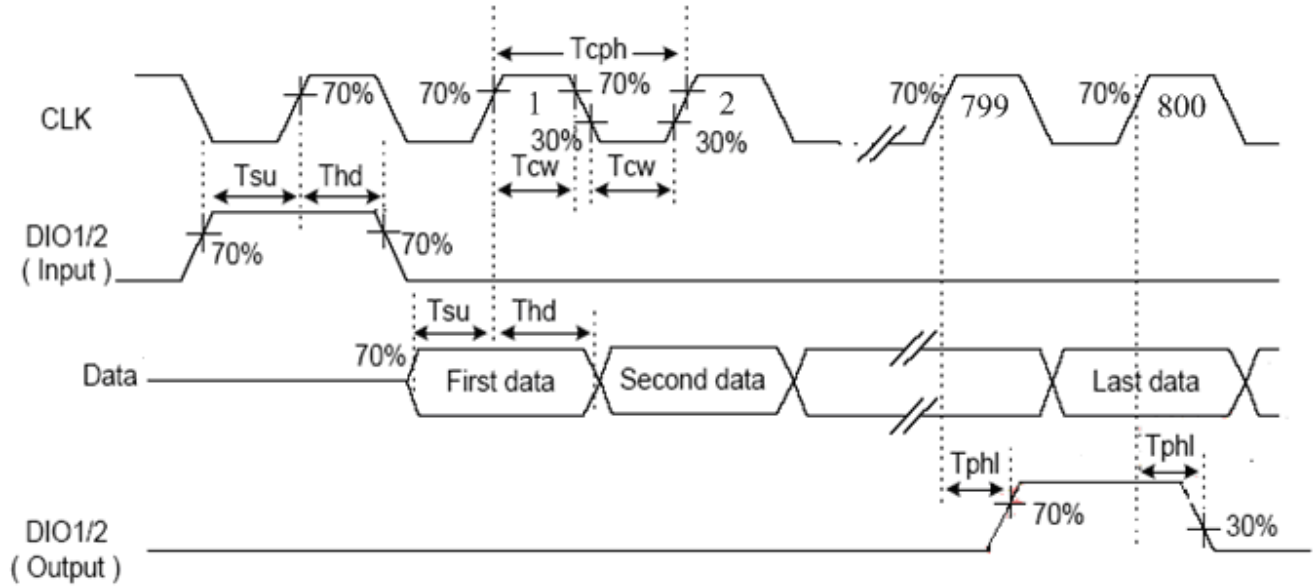
Item	Symbol	Min.	Typ.	Max.	Unit
CLK Frequency	1/Tcph	25	32	40	MHz
CLK Pulse Width	Tcw	40%	-	60%	Tcph
Data Set-up Time	Tsu	4	-	-	ns
Data Hold Time	Thd	2	-	-	ns
Propagation Delay of DIO2/1	Tphl	6	10	15	ns
Time That The Last Data to LD	Tld	1	-	-	Tcph
Pulse Width of LD	Twld	2	-	-	Tcph
Time That LD to DIO1/2	Tlds	5	-	-	Tcph
POL Set-up Time	Tpsu	6	-	-	ns
POL Hold Time	Tphd	6	-	-	ns

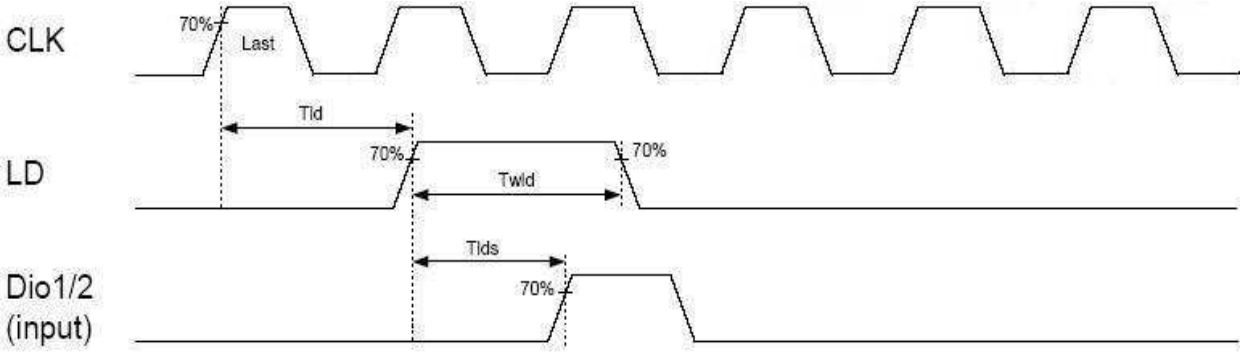
Vertical Timing

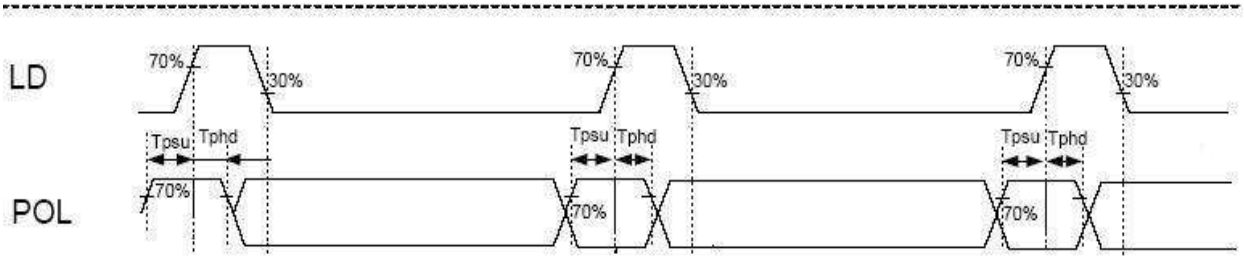
Item	Symbol	Min.	Typ.	Max.	Unit
VCLK Frequency	$1/T_{CPV}$	-	-	200	Khz
VCLK Pulse Width	T_{CPVH} / T_{CPVL}	2.5	-	-	us
STV1/2 Set-up Time	T_{SU}	700	-	-	ns
STV1/2 Hold Time	T_{HD}	700	-	-	ns
Output delay time of STV1/2	T_{PD1}	-	-	0.8	us
OEV Set-up Time	T_{OESU}	0.5	-	2	us
OEV Hold Time	T_{OEHD}	0.5	-	2	us
OEV pulse width	T_{OEW}	1	-	4	us

(2) Timing Sequence (Timing chart)

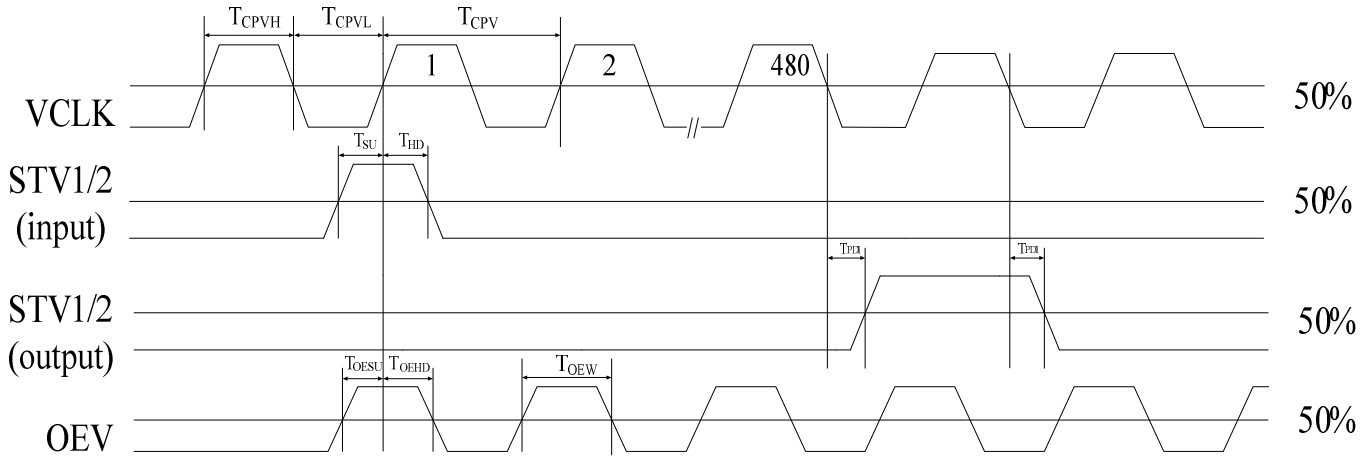
Horizontal Timing





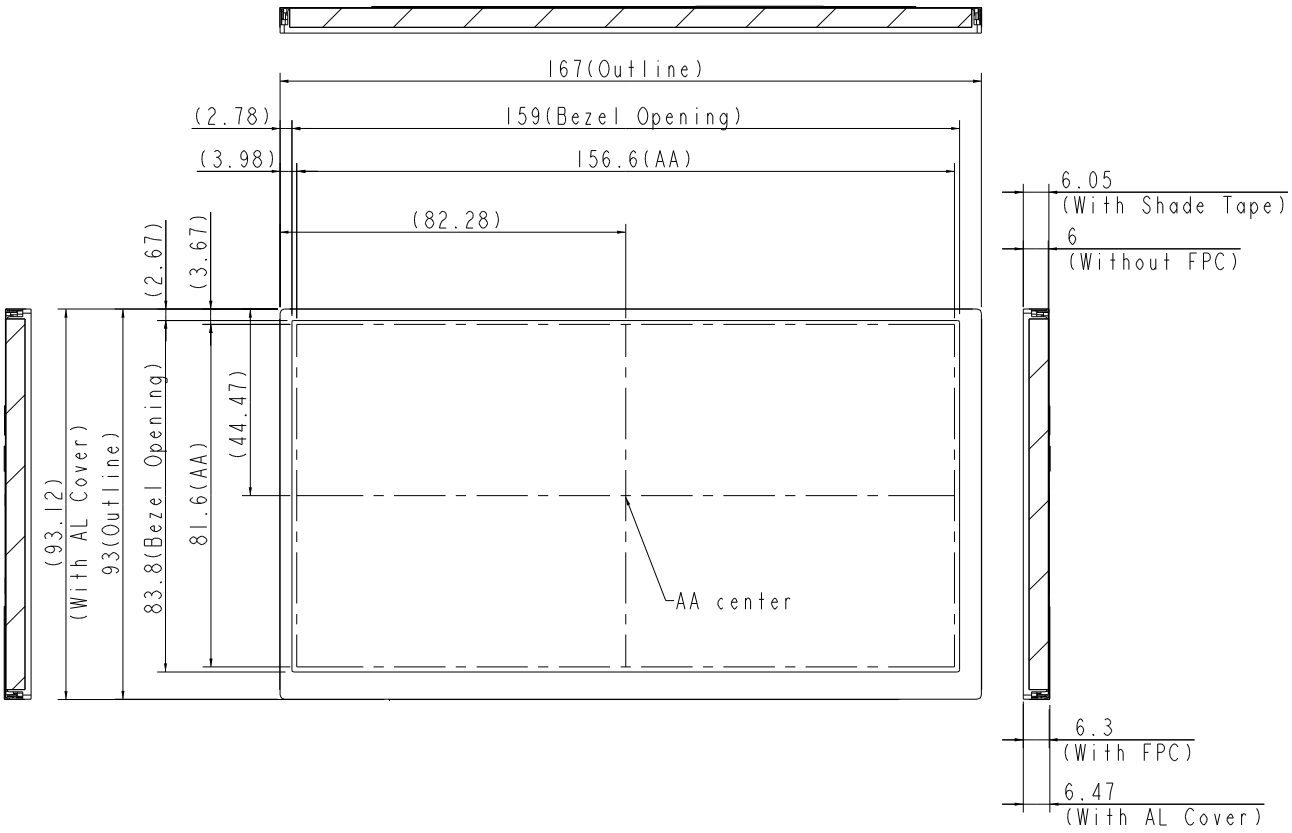


Vertical Timing Sequence

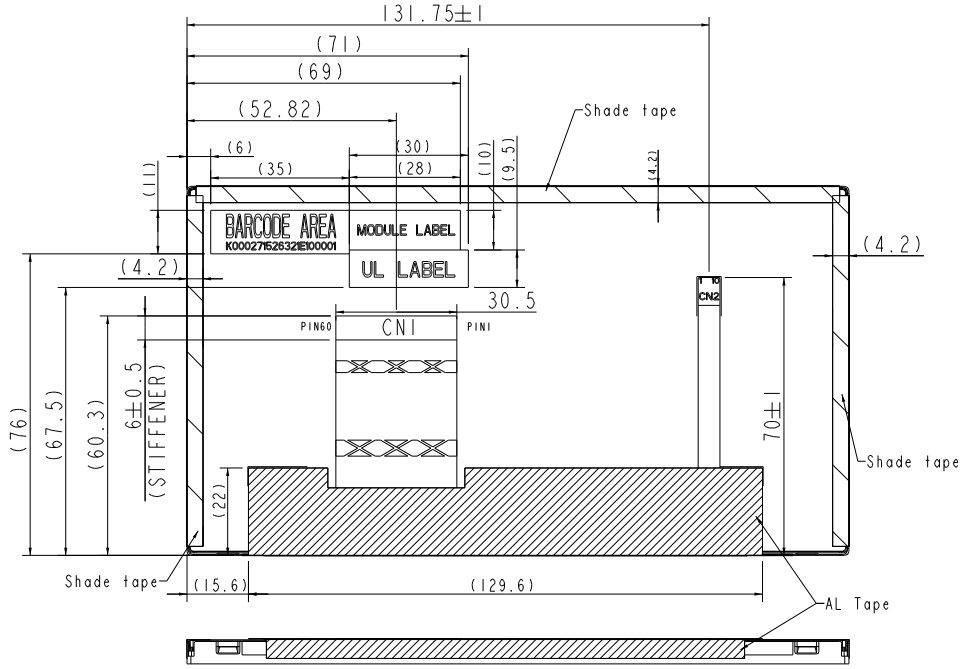


6. MECHANICAL DIMENSION

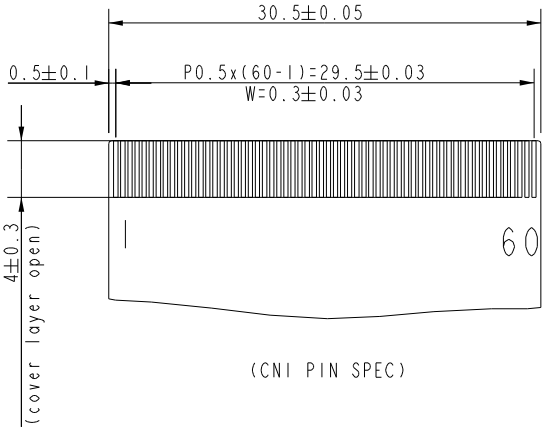
(1) Front View



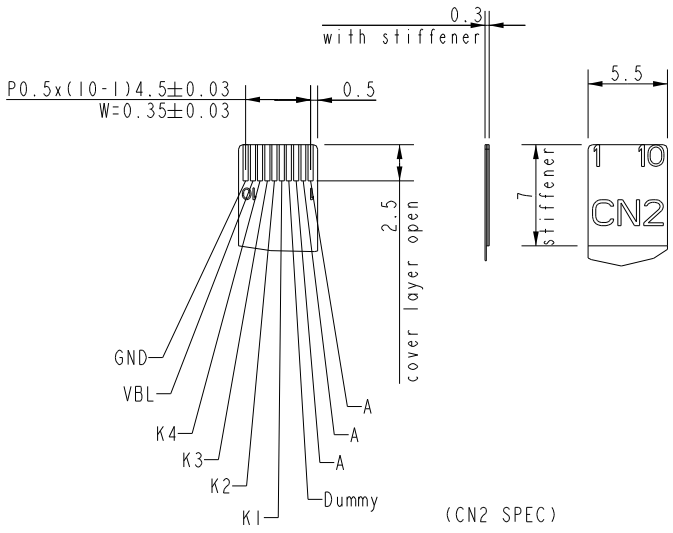
(2) Rear View



(3)connector



(CN1 PIN SPEC)



(CN2 SPEC)

NOTE:

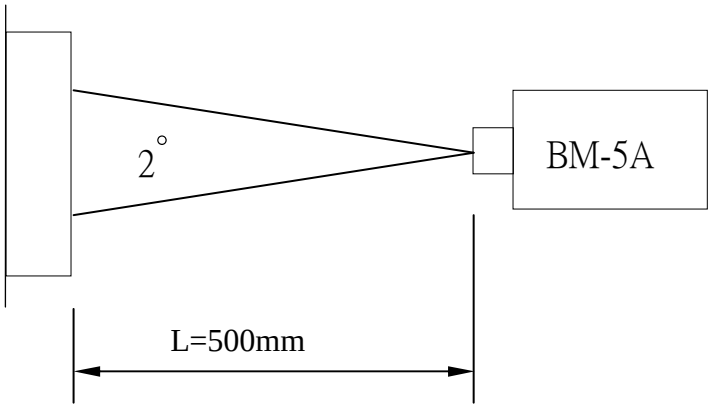
1.General tolerance=±0.3mm
2.CN1 suggested connector(60pin):
STARCONN 089K60-000100-G2-R(or other compatible connectors)
3.CN2 suggested connector(10pin):
CONN-TECK FR03-S10DHF-2-E3000(or other compatible connectors

7. OPTICAL CHARACTERISTICS

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Remarks
Contrast		CR	Point-5	300	400	--	--	*1)*2)*3)
Luminance	Center point	Lw		400	500	--	cd/m^2	*2)*3)
	Uniformity	ΔL		70	80	--	%	*2)*3)
Response Time (White - Black)		Tr+ Tf		--	20	35	ms	*1)*3)*5)
NTSC		-	Point-5	60	70		%	*1)*3)
View angle	Horizontal	R	CR≧10 Point-5	65	75	--	°	*1)*2)*4)
		L		65	75	--	°	*1)*2)*4)
	Vertical	U		45	60		°	*1)*2)*4)
		D		55	70		°	*1)*2)*4)
Color Coordination	White	Wx Wy	Point-5	0.273 0.289	0.313 0.329	0.353 0.369	--	*1)*3)
	Red	Rx Ry		TBD TBD	TBD TBD	TBD TBD		
	Green	Gx Gy		TBD TBD	TBD TBD	TBD TBD		
	Blue	Bx By		TBD TBD	TBD TBD	TBD TBD		

Remarks：

*1) Measuring conditions：25℃±2℃，60±10%RH，under 10 Lux in dark room。BM-5A (TOPCON)，view cone=2°，VCC=3.3V，IL=80 mA（Each serial=20mA），after 10 minutes operation。

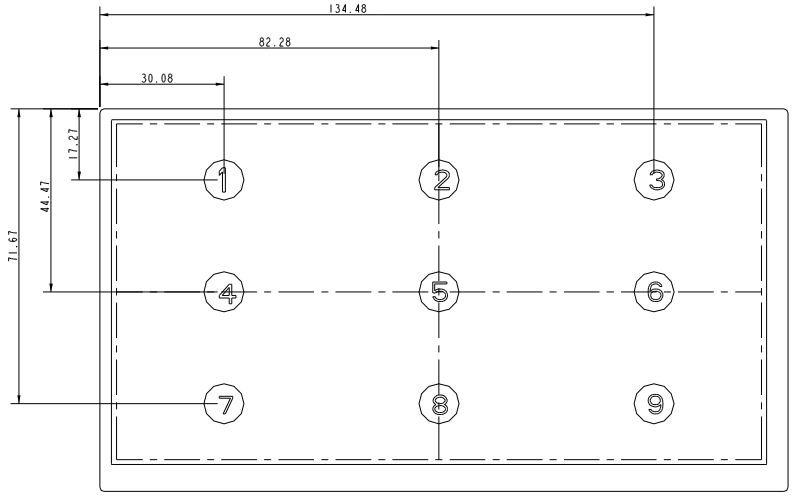


*2) Contrast：CR= On (White Luminance) / Off (Black Luminance)

*3) Luminance and Uniformity：

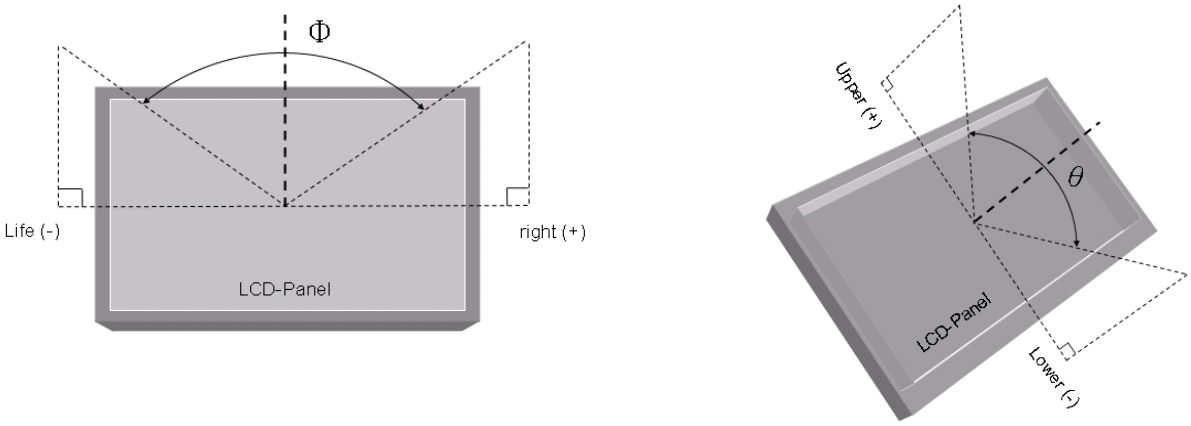
The center point of the Luminance：No 5 point.

Uniformity：△L = [L(MIN)/L(MAX)]×100。



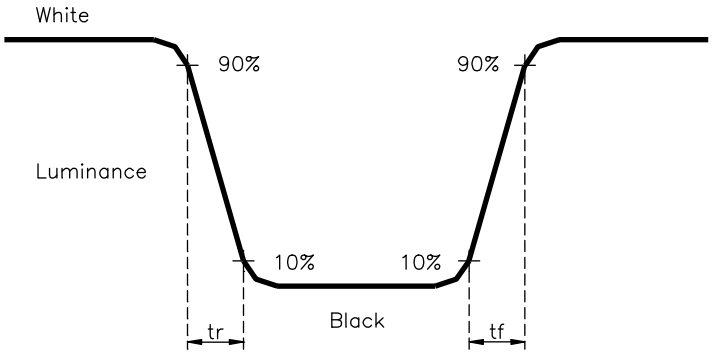
Measuring point

*4) Viewing Angle (θ，ψ)：(Measuring Device：EZ-CONTRAST)



Definition of View Angle

*4)Response time(White - Black)



Definition of Response Time

8. Reliability Test

(1) Temperature and Humidity

Item	Condition	Remarks
High Temperature Operation	85° C , 240hrs	*1)
High Temperature Storage	90° C , 240hrs	
High Temperature and High Humidity Operation	60° C , 90% RH, 240hrs(No condensation)	
Low Temperature Operation	-30° C , 240hrs	
Low Temperature Storage	-40° C ；240hrs	
Thermal Shock	-30° C (1 hr)～85° C (1 hr), 200 CYCLE	

Remark：

(1) Panel surface temperature

(2) Shock and Vibration

Item	Condition
Shock (Non-Operation)	100G 6msec 1/2 Sine wave,. ±X，±Y，±Z，each axis 1 time.
Vibration (Non-Operation)	Frequency range：8～33.3Hz Stroke：1.3mm Sweep：2.9G，33.3~40Hz Vibration：X，Z 2hrs each axis。Y 4hrs each axis。Sin wave。 Cycle time：15min

(3)ESD

Item	Condition	Remarks
E S D	150pF，330Ω，±8KV&±15KV air & contact test	*1)
	200pF，0Ω，±200V contact test	*2)

Remarks：

*1) LCD glass and metal bezel。

*2) IF connector pins。

(4) Judgment Standard

The judgment of the above test should be made as follow:

Pass: Normal display image with no obvious non-uniformity and no line defect. Partial transformation of the module parts should be ignored.

Fail: No display image, obvious non-uniformity, or line defects.