

AMP DISPLAY INC.

A Brighter Solution

**SPECIFICATIONS**

<b>CUSTOMER</b>	
<b>CUSTOMER PART NO.</b>	
<b>AMP PART NO.</b>	<b>AM-1024768LTZQW-00</b>
<b>APPROVED BY</b>	
<b>DATE</b>	

- Approved For Specifications
- Approved For Specifications & Sample

**AMP DISPLAY INC**

9856 SIXTH STREET RANCHO CUCAMONGA CA 91730  
 TEL: 909-980-13410 FAX: 909-980-1419  
 WWW.AMPDISPLAY.COM

<b>APPROVED BY</b>	<b>CHECKED BY</b>	<b>ORGANIZED BY</b>

## RECORD OF REVISION

Revision Date	Page	Contents	Editor
2012/03/08	--	New Release	Leo

## 1. Features

AM-1024768LTZQW-00 is 10" color TFT-LCD (Thin Film Transistor Liquid Crystal Display)module composed of LCD panel, driver ICs and LED backlight. By applying 1024×768images are displayed on the 10" diagonal screen. Display 16.2M colors by R.G.B signal input.

- (1) Construction: 10" a-Si TFT active matrix, White LED Backlight.
- (2) Resolution (pixel): 1024(R.G.B) X 768
- (3) Number of the Colors : 16.2M colors ( R , G , B 6 bit digital each)
- (4) LCD type : Normally Black
- (5) Viewing Direction: 160 degree (Horizontal.) 160 degree (Vertical)
- (6) Interface: LVDS interface

## 2. PHYSICAL SPECIFICATIONS

Item	Specifications	unit
LCD size	10 inch (Diagonal)	
Outline Dimension (Include connecter)	215.6 (W) x166.7 (H) x 2.9(D) (With FPC)	mm
Number of Pixel	1024(H) × 3 (RGB) × 768(V)	pixels
Pixel pitch	0.198(W) x 0.198(H)	mm
Pixel arrangement	RGB vertical stripe	
Display mode	Normally Black	
Surface treatment	AG	
Weight	125 (TYP)	g
Back-light	LED	
Power consumption	3.2 (Typ)	W

### 3. ABSOLUTE MAX. RATINGS

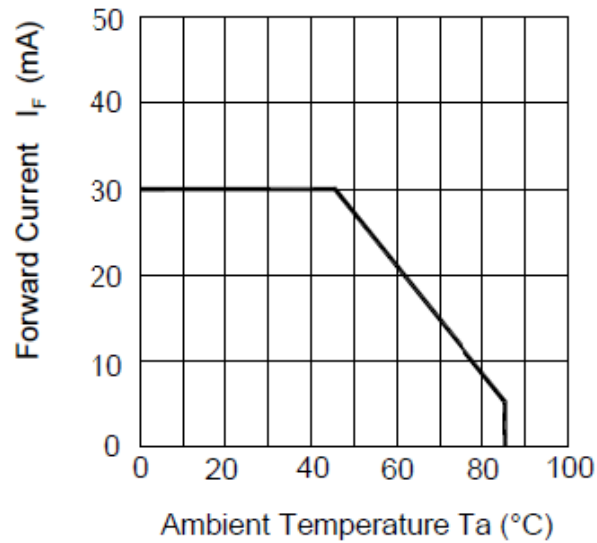
Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage For LCD	DVDD	-0.5	5	V	
Analog Supply Voltage	AVDD	-0.5	15	V	
Gate On Voltage	VGH	-0.3	42	V	
Gate Off Voltage	VGL	-20	0.3	V	
Gate On-Gate Off Voltage	VGH-VGL	-0.3	40	V	
Signal Input Voltage	RXIN0- ~ RXIN3+ RXIN0+ ~ RXIN3+ RXCLKIN-, RXCLKIN+	-0.5	5	V	
Operation Temperature	T <sub>op</sub>	-20	60	°C	Note1
Storage Temperature	T <sub>stg</sub>	-30	70	°C	
Forward Current ( per LED )	I <sub>f</sub>	-	30	mA	Note3
Reverse Voltage ( per LED )	VR	-	5	V	
Pulse forward current ( per LED )	I <sub>fp</sub>	-	100	mA	Note2

Note 1: If users use the product out of the environmental operation range (temperature and humidity), it will have visual quality concerns.

Note2 : I<sub>fp</sub> Conditions : Pulse Width ≤ 10msec ; Duty ≤ 1/10

Note3 : Operating must under the condition as below drawing.

(Ambient Temperature /Allowable Forward Current) Each LED.

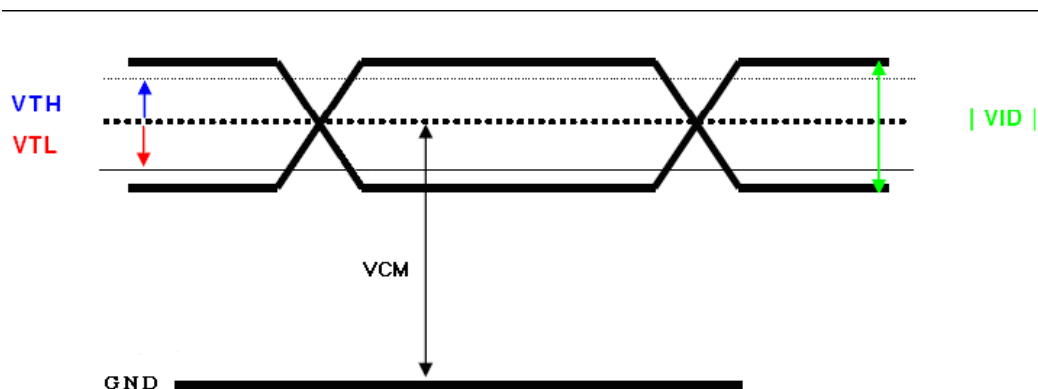


## 4. ELECTRICAL CHARACTERISTICS

### 4-1 TFT LCD Module

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Digital Power Supply Voltage For LCD	VDD DVDD_LVDS	3	3.3	3.6	V	
Logic Input Voltage (LVDS:IN+,IN-)	VCM	$\frac{ VID }{2}$	-	$2.4 - \frac{ VID }{2}$	V	*1)
	VID	200	-	600	mV	*1)
	VTH	-	-	100	mV	*1)
	VTL	-100	-	-	mV	
Analog Power Supply Voltage	AVDD	12.8	13	13.2	V	
Gate On Power Supply Voltage	VGH	17	18	19	V	
Gate Off Power Supply Voltage	VGL	-6.6	-6	-5.4	V	
Common Power Supply Voltage	VCOM	TBD	(5)	TBD	V	Note2

Note1: LVDS signal



Note2: Please adjust VCOM to make the flicker level be minimum

## 4-2 TFT- LCD Current Consumption

ITEM	SYMBOL	Condition	MIN	TYPE	MAX	UNIT	NOTE
Gate on power current	IVGH	VGH = 18V	-	0.7	1	mA	Note1
Gate off power current	IVGL	VGL = -6V	-	0.7	1	mA	Note1
Digital power current	IVDD	VDD = 3.3V	-	45	55	mA	Note1
Analog power current	IAVDD	AVDD = 13V	-	40	50	mA	Note1
Total Power Consumption	PC		-	534	666	mW	Note1

Note1: Typical: Under 256 gray pattern

Maximum: Under White pattern



256 gray pattern

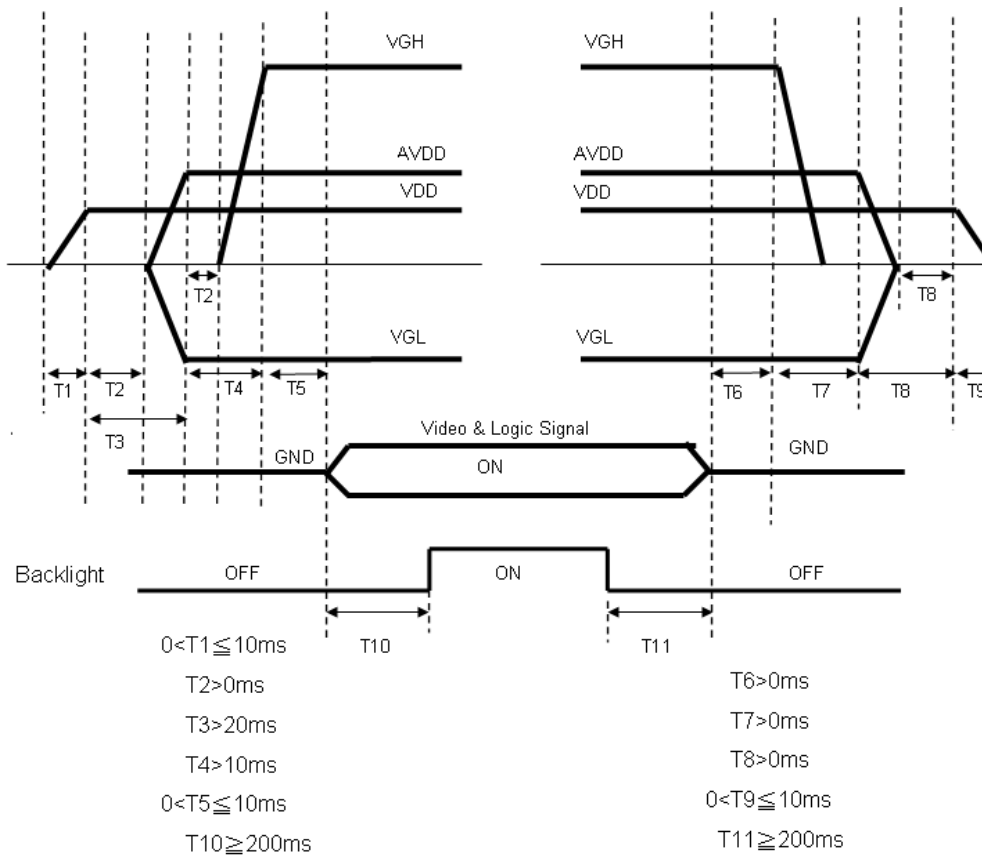


White Pattern

## 4-3 Power and Signal sequence

Power On : VDD\_AVDD/VGL\_VGH\_Video & Logic Signal\_Backlight

Power Off : Backlight\_Video & Logic Signal\_VGH\_AVDD/VGL\_VDD

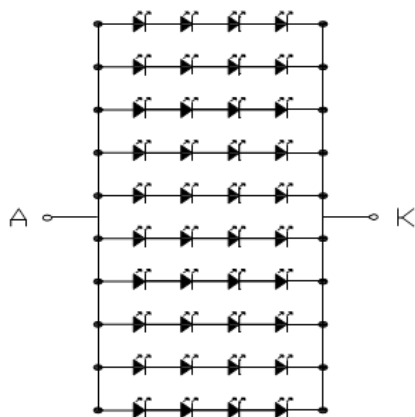


## 4-4 Backlight

ITEM	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT	NOTE
LED current	IL	Ta=25°C (20mA/serise)	--	200	--	mA	
LED voltage	VL	Ta=25°C (20mA/serise)	11.8	13	14.2	V	
Power consumption	WL	Ta=25°C (20mA/serise)	--	2.6	--	W	
LED Lifetime	-	Ta=25°C IF=20mA	20000			Hr	

Remarks :

\*1) LED Circuit Diagram



\*2) A : Anode( + ) , K : Cathode( - )

\*3) Suggestion: Using the constant current control to avoid the leakage light and brightness quality issue.

\*4) Definition of Led lifetime : Luminance < Initial luminance 50%.

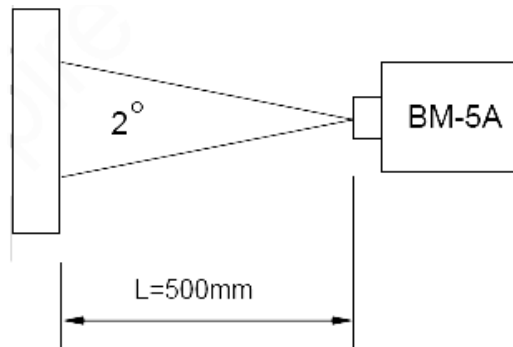
## 5. Optical Specifications

### 5-1 Optical specification

ITEM	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT	NOTE	
Contrast Ratio	CR	Point-5	600	800		--	1, 2, 3	
Luminance(CEN)	Lw	Point-5	200	260		cd/m <sup>2</sup>	1, 3	
Luminance Uniformity	ΔL		70	80		%	1, 3	
Response Time (White - Black)	Tr +Tf	Point-5	-	25	30	ms	1, 3, 5	
NTSC	-	Point-5		50	-	%	1, 3	
Viewing Angle	Left	Deg.	CR ≥ 10 Point-5	80	--	°	1, 3	
	Right	Deg.		80				
	Upper	Deg.		80				
	Lower	Deg.		80	--	°		
Color Coordinate	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)		

**Note1: Measure condition :**

25°C±2°C , 60±10%RH , under 10 Lux in the dark room.BM-5A (TOPCON) , viewing angle2° , IL=200 Ma ( Backing current ) , measurement after lighting on 10 min(s).



**Note2: Definition of contrast ratio :**

Contrast Ratio (CR)= (White) Luminance of ON ÷ (Black) Luminance of OFF

**Note3: Definition of luminance :**

Measure white luminance on the point 5 as figure.6-1 Definition of Luminance Uniformity: Measure white luminance on the point1~9 as figure.5-1

$$\Delta L = [L(\text{MIN})/L(\text{MAX})] \times 100$$



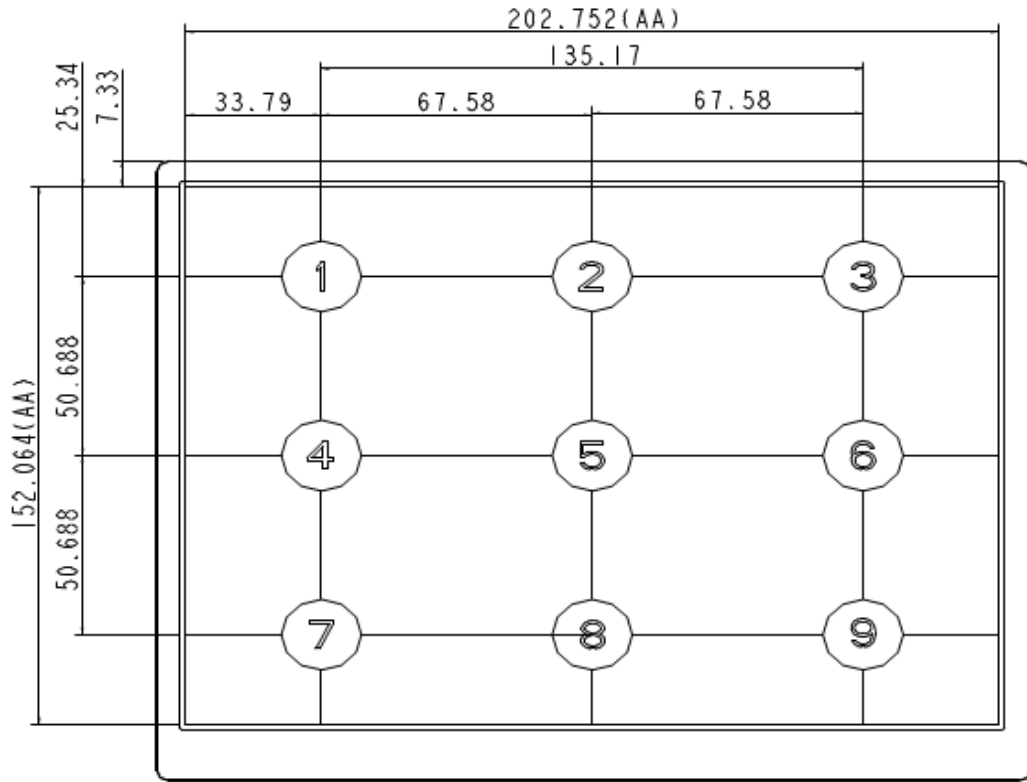


Fig.5-1 Measuring point

Note 4: Definition of Viewing Angle( $\theta, \Psi$ ), refer to Fig.5-2 as below :

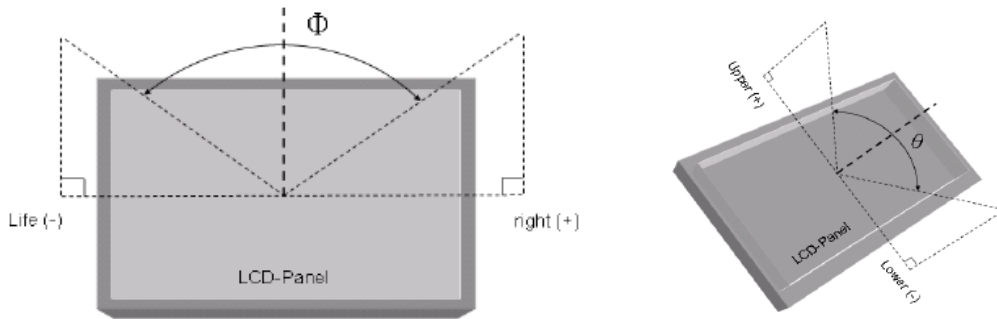


Fig.5-2 Definition of Viewing Angle

Note5: Definition of Response Time.(White-Black)

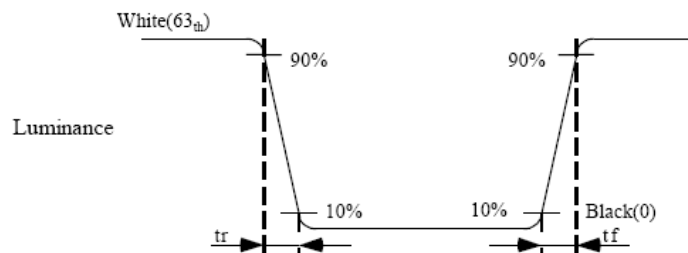


Fig.5-3 Definition of Response Time (White-Black)

## 6. INTERFACE

### 6-1 CN1 (Input Signal) 20477-040E (IPEX)

PIN NO	SYMBOL	DESCRIPTION
1	VCOM	Common voltage
2	DVDD	Digital power
3	DVDD	Digital power
4	NC	Not connect
5	RESET	Global reset pin. Active low to enter reset state. Suggest to connecting with an RC reset circuit for stability. Normally pull high. (R=10KΩ · C=1μF)
6	STBYB	Standby mode, normally pull high STBYB="1", normal operation STBYB="0", timing control, source driver will turn off, all output are high-Z
7	GND	Ground
8	RXIN0-	Negative LVDS differential data inputs
9	RXIN0+	Positive LVDS differential data inputs
10	GND	Ground
11	RXIN1-	Negative LVDS differential data inputs
12	RXIN1+	Positive LVDS differential data inputs
13	GND	Ground
14	RXIN2-	Negative LVDS differential data inputs
15	RXIN2+	Positive LVDS differential data inputs
16	GND	Ground
17	RXCLKIN-	Negative LVDS differential clock inputs
18	RXCLKIN+	Positive LVDS differential clock inputs
19	GND	Ground
20	RXIN3-	Negative LVDS differential data inputs
21	RXIN3+	Positive LVDS differential data inputs
22	GND	Ground
23	NC	Not connect
24	NC	Not connect
25	GND	Ground
26	NBW	Normally black or normally white setting NBW = H : Normally black NBW = L : Normally white
27	XON	Gate Output all-on control ( Note1)
28	SELB	6-bit/8-bit input select SELB = L , 8-bit ; SELB = H , 6-bit
29	AVDD	Power for Analog Circuit
30	GND	Ground
31	LED-	LED Cathode
32	LED-	LED Cathode
33	L/R	Horizontal inversion (Note2)
34	U/D	Vertical inversion (Note2)
35	VGL	Negative power for TFT
36	NC	Not connect
37	NC	Not connect
38	VGH	Positive power for TFT
39	LED+	LED Anode
40	LED+	LED Anode

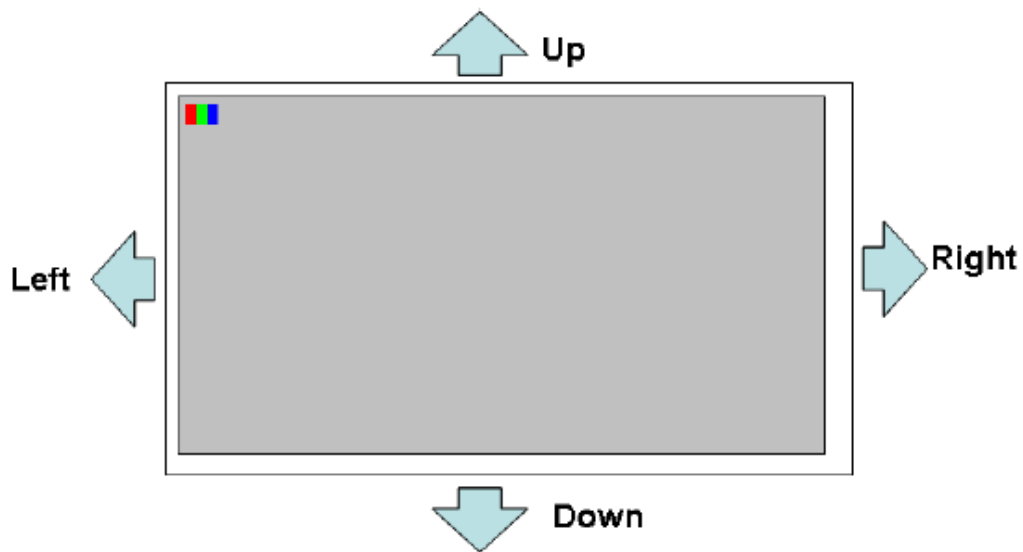
Note: 1) XON: Gate Output all-on control

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

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

2) U/D and L/R control function

U/D	L/R	FUNCTION
0	1	Normal display
0	0	Inverse Left and Right
1	1	Inverse Up and Down
1	0	Inverse Left and Right Inverse Up and Down



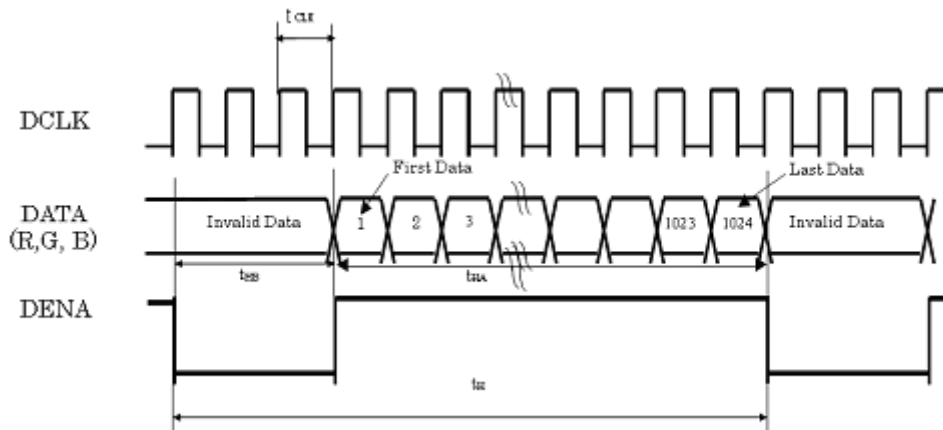
## 7. INPUT SIGNAL (DE ONLY MODE)

### 7-1 Timing Specification

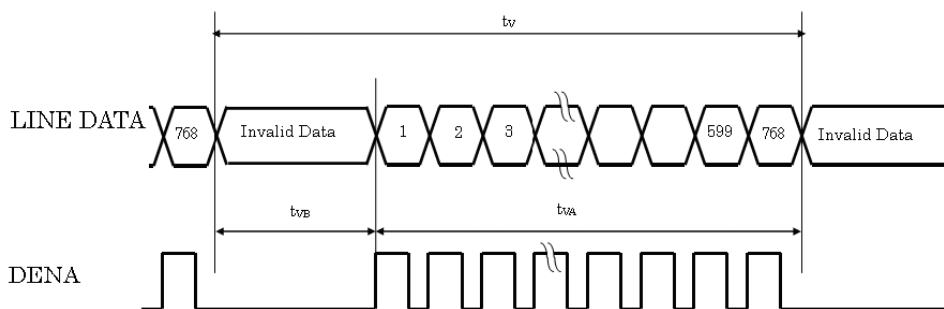
ITEM		SYMBOL	MIN	TYP	MAX	UNIT	
LVDS input signal sequence	CLK Frequency	tclk	58	65	71	MHz	
LCD input signal sequence ( Input LVDS Transmitter )	Horizontal	Horizontal total Time	$t_H$	1324	1344	1350	tCLK
		Horizontal effective Time	$t_{HA}$	1024			tCLK
		Horizontal Blank Time	$t_{HB}$	300	320	326	tCLK
	Vertical	Vertical total Time	$t_V$	796	806	810	$t_H$
		Vertical effective Time	$t_{VA}$	768			$t_H$
		Vertical Blank Time	$t_{VB}$	28	38	42	$t_H$

### 7-2 Timing sequence (Timing chart)

#### 7-2-1 Horizontal Timing Sequence

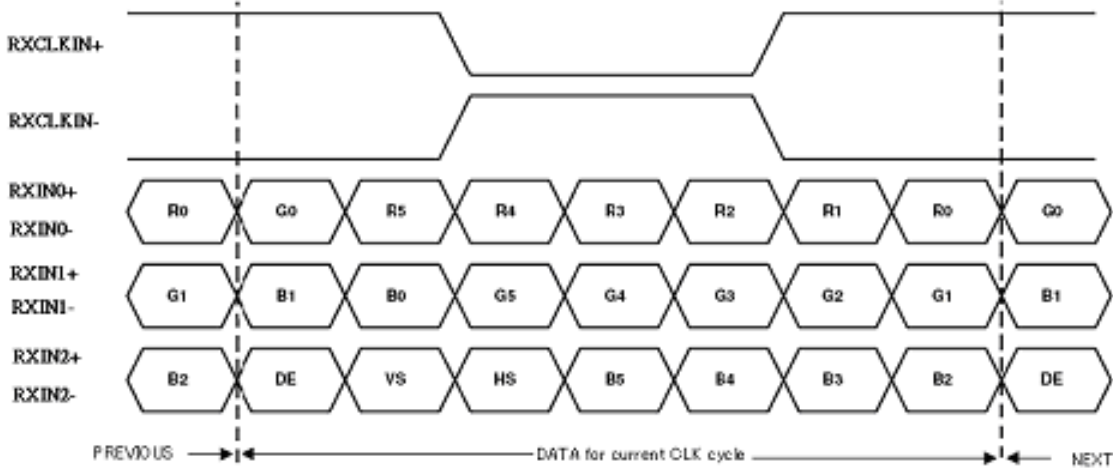


#### 7-2-2 Vertical Timing Sequence

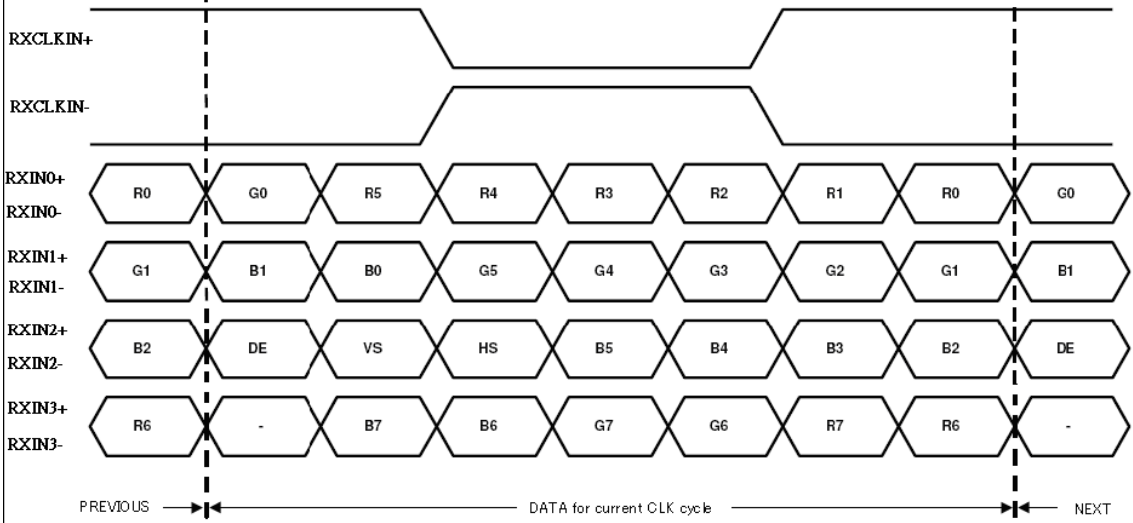


7-2-3 LVDS Input Data mapping

6 Bit LVDS input



8 Bit LVDS input



## 8. RELIABILITY TEST CONDITIONS

### 8-1 Temperature and humidity

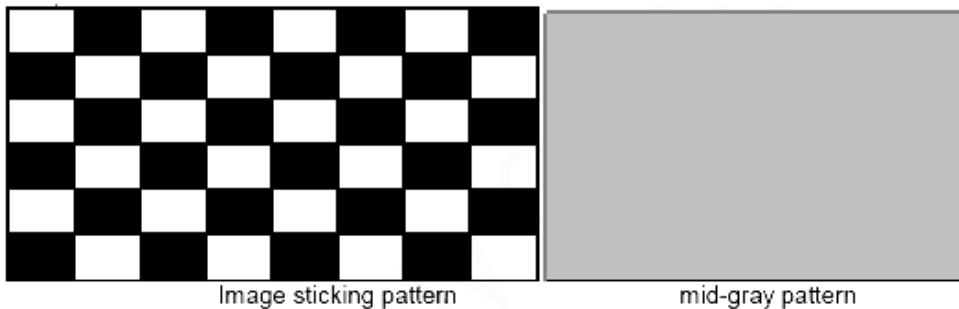
TEST ITEMS	CONDITIONS	NOTE
High Temperature Operation	60 °C ;240hrs	
High Temperature Storage	70 °C ; 240hrs	
High Temperature High Humidity Operation	40 °C ; 90%RH ;240hrs	
Low Temperature Operation	-20 °C ; 240hrs	
Low Temperature Storage	-30 °C ; 240hrs	
Thermal Shock	-30 °C (0.5hr) ~ 70 °C (0.5hr) ; 200 Cycles	Non-Operating
Image Sticking	25 °C ; 4hrs	Note 1

Note 1 :

Condition of Image Sticking test : 25 °C ± 2 °C

Operation with test pattern sustained for 4 hrs, then change to gray pattern immediately.

After 5 mins, the mura must be disappeared completely .



### 8-2 Shock and Vibration

TEST ITEMS	CONDITIONS
Shock (Non-operation)	<ul style="list-style-type: none"> <li>● Shock level : 980m/s<sup>2</sup>(equal to 100G).</li> <li>● Waveform : 1/2 Sine wave,6msec</li> <li>● ±X · ±Y · ±Z · each axis 1 times</li> </ul>
Vibration (Non-operation)	<ul style="list-style-type: none"> <li>● Frequency range:8~33.3Hz</li> <li>● Stoke : 1.3 mm</li> <li>● Vibration: sinusoidal wave, perpendicular axis(x, z axis: 2Hrs y axis: 4Hrs).               <ol style="list-style-type: none"> <li>1. Sweep: 2.9G,33.3 Hz -400 Hz</li> <li>2. Cycle: 15 min</li> </ol> </li> </ul>

**8-3 Electrostatic Discharge**

TEST ITEM	CONDITIONS
ESD	[MM] 200pF, 0Ω, ±200V, once for each terminal [HM] 150pF, 330Ω, ±8 & 15kV, 25 times/point, 4points/panel(Air mode) [HM] 150pF, 330Ω, ±8 & 15kV,25 times/point(Contact mode)

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-uniform

## **9. Inspection Specifications**

### **9-1 Scope**

Specifications contain

9-1-1 Display Quality Evaluation

9-1-2 Mechanics Specification

### **9-2 Sampling Plan**

Unless there is other agreement, the sampling plan for incoming inspection shall follow MIL-STD-105E LEVEL II.

9-2-1 Lot size: Quantity per shipment as one lot (different model as different lot ).

9-2-2 Sampling type: Normal inspection, single sampling.

9-2-3 Sampling level: Level II.

9-2-4 AQL: Acceptable Quality Level

Major defect: AQL=0.65

Minor defect: AQL=1.0

### **9-3 Panel Inspection Condition**

9-3-1 Environment:

Room Temperature:  $25\pm 5^{\circ}\text{C}$ .

Humidity:  $65\pm 5\%$  RH.

Illumination: 300 ~ 700 Lux.

9-3-2 Inspection Distance:

35-40 cm

9-3-3 Inspection Angle:

The vision of inspector should be perpendicular to the surface of the Module.

9-3-4 Inspection time :

Perceptibility Test Time: 20 seconds max.



## 9-4 Display Quality

### 9-4-1 Function Related:

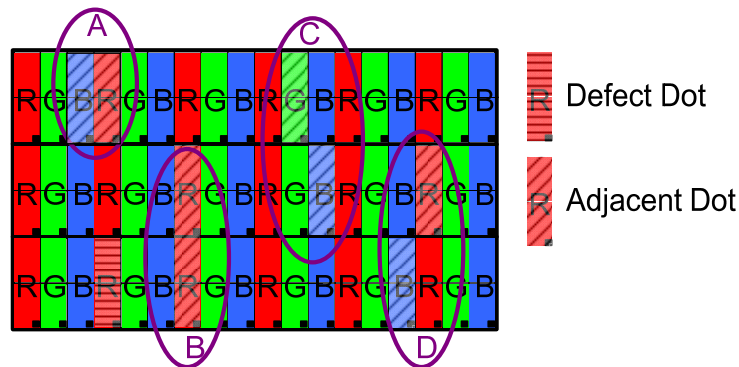
The function defects of line defect, abnormal display, and no display are considered Major defect.

### 9-4-2 Bright/Dark Dots:

Defect Type / Specification	G0 Grade	A Grade
Bright Dots	0	$N \leq 3$
Dark Dots	0	$N \leq 4$
Total Bright and Dark Dots	0	$N \leq 6$

#### [Note 1]

Judge defect dot and adjacent dot as follows :

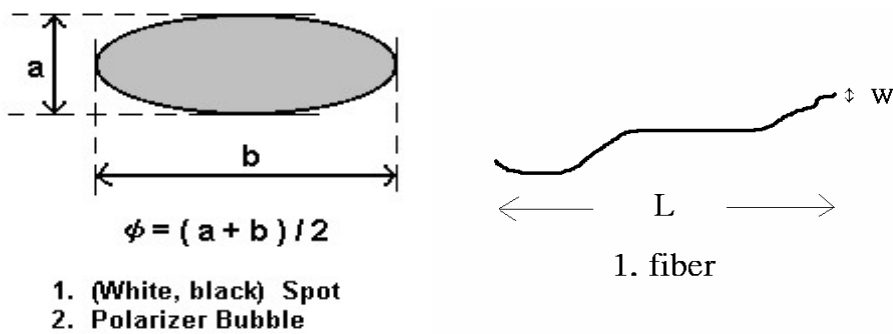


- (1) One pixel consists of 3 sub-pixels, including R,G, and B dot.(Sub-pixel = Dot)
- (2) The definition of dot: The size of a defective dot over 1/2 of whole dot is regarded as one defective dot.
- (3) Allow above (as A, B, C and D status) adjacent defect dots, including bright and dark adjacent dot. And they will be counted 2 defect dots in total quantity.
- (4) Defects on the Black Matrix, out of Display area, are not considered as a defect or counted.
- (5) There should be no distinct non-uniformity visible through 3% ND Filter within 2 sec inspection times.

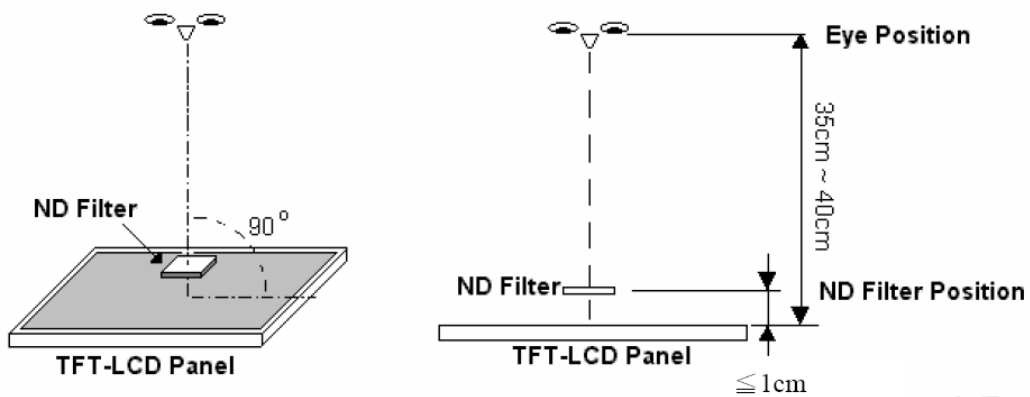
9-4-3 Visual Inspection specifications:

Defect Type	Specification	Count(N)
Dot Shape (Particle, Scratch and Bubbles in display area)	$D \leq 0.25\text{mm}$	Ignored
	$0.25\text{mm} < D \leq 0.5\text{mm}$	$N \leq 3$
	$D > 0.5\text{mm}$	$N=0$
Line Shape (Particles, Scratch, Lint and Bubbles in display area)	$W \leq 0.07\text{mm}$	Ignored
	$0.07\text{mm} < W \leq 0.1\text{mm}$ , $L \leq 5\text{mm}$	$N \leq 3$
	$W > 0.1\text{mm}$ , $L > 5\text{mm}$	$N=0$

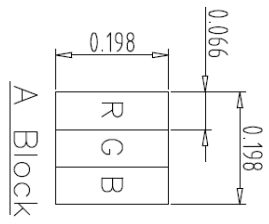
[Note 2] W : Width[mm], L : Length[mm], N : Number,  $\phi$  : Average Diameter



[Note 3] Bright dot is defined through 3% transmission ND Filter as following.

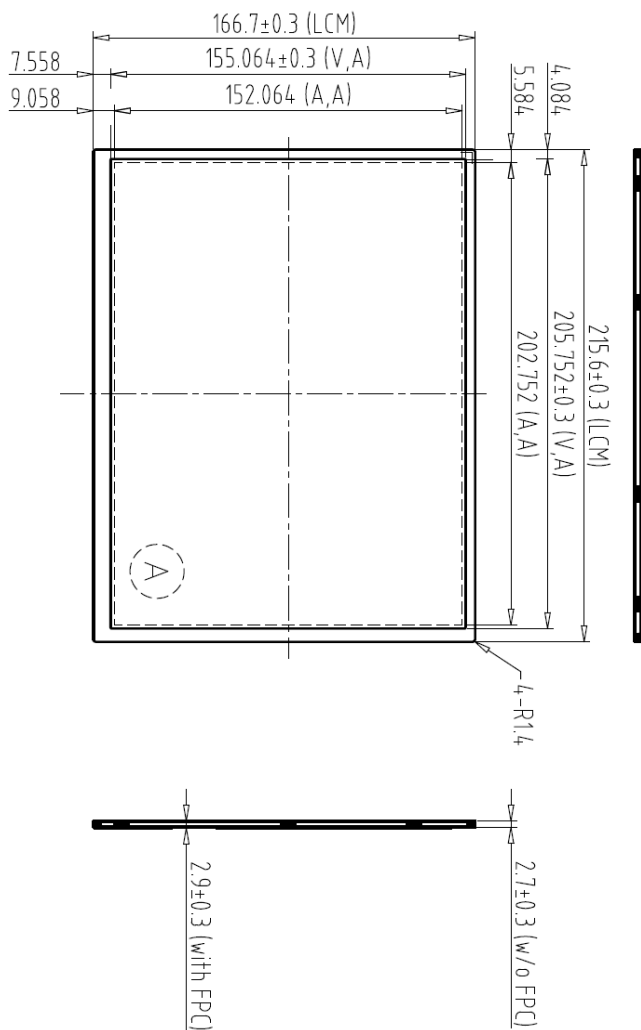


# 10. MECHANICAL DIMENSION



1	VCOM	21	RXIN3+
2	DVDD	22	GND
3	DVDD	23	NC
4	NC	24	NC
5	RESET	25	GND
6	STBYB	26	NBW
7	GND	27	XON
8	RXIN0-	28	SELB
9	RXIN0+	29	AVDD
10	GND	30	GND
11	RXIN1-	31	LED-
12	RXIN1+	32	LED-
13	GND	33	L/R
14	RXIN2-	34	U/D
15	RXIN2+	35	VGL
16	GND	36	NC
17	RXCLKIN-	37	NC
18	RXCLKIN+	38	VGH
19	GND	39	LED+
20	RXIN3-	40	LED+

- Note:
1. Unless indicated, Tolerance "±0.3"
  2. UV Glue For OLB Protection.
  3. CN1:20477-040E or Equivalent

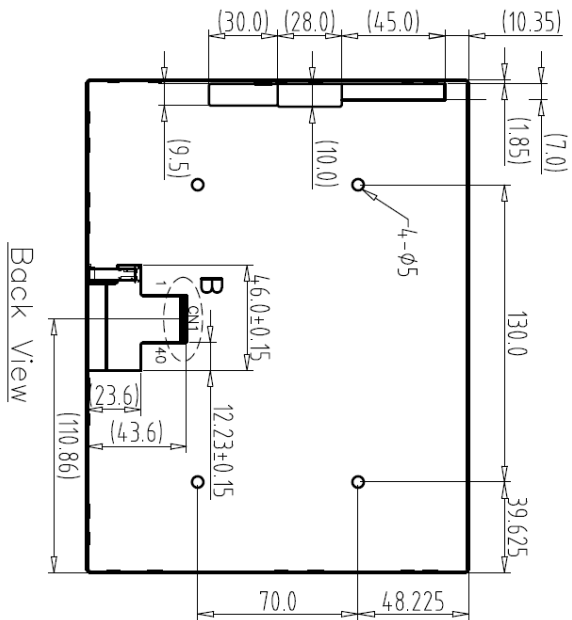


REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	12-15-12	Henry

1		7		TOLERANCE GRADE(A)	A	B	DIM.	MM	DWG.	DATE
2		8					IE NO.		Henry	02-15-12
3		9					PARTS NO. LCM		CHEK	DATE
4		10					1024768L		APPD.	
5		11								
6		12								

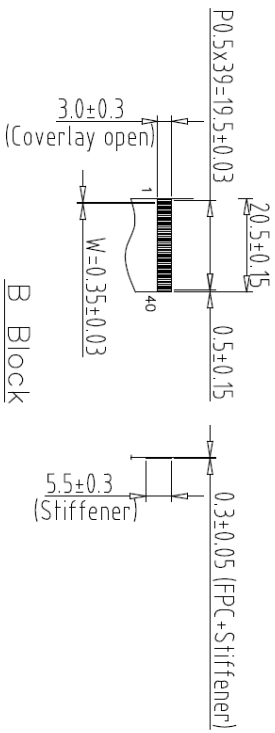
**MM** 晶采光電科技  
**1024768L**  
 (10.0")  
 DWG. NO. \*120236MA  
 SHEET 1 OF 1

REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	02-15-12	EMILY



1	VCOM	21	RXIN3+
2	DVDD	22	GND
3	DVDD	23	NC
4	NC	24	NC
5	RESET	25	GND
6	STBYB	26	NBW
7	GND	27	XON
8	RXIN0-	28	SELB
9	RXIN0+	29	AVDD
10	GND	30	GND
11	RXIN1-	31	LED-
12	RXIN1+	32	LED-
13	GND	33	L/R
14	RXIN2-	34	U/D
15	RXIN2+	35	VGL
16	GND	36	NC
17	RXCLKIN-	37	NC
18	RXCLKIN+	38	VGH
19	GND	39	LED+
20	RXIN3-	40	LED+

- Note:
1. Unless indicated, Tolerance "±0.3"
  2. UV Glue For OLB Protection.
  3. CN1:20477-040E or Equivalent



1		7		TOLERANCE GRADE(A)	A	B	DIM.	MM	DWN.	DATE	TITLE
2		8					IF NO.		Henry	02-15-12	1024768L
3		9					PARTS NO.		CHK.	DATE	(10.0")
4		10					NO. LCM-1		APPD.	DATE	DWG. NO.
5		11					1024768L			DATE	*120237MA
6		12								DATE	SHEET 1 OF 1

