



# Chunghwa Picture Tubes, Ltd.

## Product Specification

To : Malata 萬利達

Date : 081024

**TFT LCD**  
**CLAA070MA0ACW**

ACCEPTED BY : (V0.0)

Tentative

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## 1. OVERVIEW

**CLAA070MA0ACW** is 7" color TFT-LCD (Thin Film Transistor Liquid Crystal Display) module composed of LCD panel, driver ICs , control circuit and LED backlight.

The 7" screen produces 800×RGB×600 resolution image. The LCD is drivered by a single input voltage (3.3 V).

General specification are summarized in the following table:

ITEM	SECIFICATION
Display Area (mm)	141.6(H)*106.2(V)
Number of Pixels	800(H) × 3(RGB) ×600(V)
Pixel Pitch (mm)	0.177 (H) × 0.177 (V)
Color Pixel Arrangement	RGB vertical stripe
Display Mode	Normally white, TN
Number of color	16M
Viewing Direction	6 o'clock
Response Time (Tr+Tf)	20 ms (typ)
Brightness (cd/m <sup>2</sup> )	250 nit (typ)
Viewing Angle (CR ≥ 10)	140 degree (Horizontal) 120 degree (Vertical)
Electrical Interface	TTL
Power Consumption (W)	TBD
Outline Dimension (mm)	154(H)*119.2(V)*5.1(D)
Module Weight (g)	TBD
Backlight	LED
Surface Treatment	Anti-Glare , Surface hardness: 3H

## 2. ABSOLUTE MAXIMUM RATINGS

The following values are maximum operation conditions. If exceeded, it may cause faulty operation or damage.

ITEM	SYMBOL	MIN.	MAX.	UNIT	NOTE
Digital Power Supply Voltage	VCC	-0.3	5	V	
Analog Power Supply Voltage	AVDD	-0.5	15	V	
Gate On Voltage	VGH	-0.3	40	V	
Gate Off Voltage	VGL	-20	0.3	V	
Forward Current (per LED)	If		30	mA	
Reverse Voltage (per LED)	VR		5	V	
Pulse forward current (per LED)	I <sub>fp</sub>		100	mA	Note1

【Note】 : \*1) I<sub>fp</sub> Conditions : Pulse Width  $\leq$  10msec ; Duty  $\leq$  1/10

### 3. ELECTRICAL CHARACTERISTICS

#### 3.1 TFT-LCD Power Supply Voltage

Ta=25°C

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
Digital Power Supply Voltage	VCC	3	3.3	3.6	V	
Analog Power Supply Voltage	AVDD	9.4	9.6	9.8	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	TBD	TBD	V	Note1
Gamma Voltage	V1	-	TBD	-	V	
	V2	-	TBD	-	V	
	V3	-	TBD	-	V	
	V4	-	TBD	-	V	
	V5	-	TBD	-	V	
	V6	-	TBD	-	V	
	V7	-	TBD	-	V	
	V8	-	TBD	-	V	
	V9	-	TBD	-	V	
	V10	-	TBD	-	V	
Input Signal Voltage	VIH	0.7VCC	-	VCC	V	
	VIL	GND	-	0.3VCC	V	

【Note】 : \*1) Please adjust VCOM to make the flicker level be minimum.

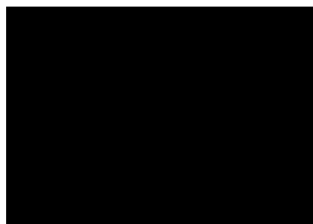
#### 3.2 TFT-LCD Current Consumption

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Gate on Power Supply Current	IVGH	VGH = 18V		TBD	TBD	mA	【Note1】
Gate off Power Supply Current	IVGL	VGL = -6V		TBD	TBD	mA	【Note1】
Digital Power Supply Current	IVCC	VCC = 3.3V		TBD	TBD	mA	【Note1】
Analog Power Supply Current	IAVDD	AVDD = 9.6V		TBD	TBD	mA	【Note1】
Total Power Consumption	PC			TBD	TBD	mW	【Note1】

【Note】 : \*1) Typical : Under 64 gray pattern , Maximum : Under black pattern ◦



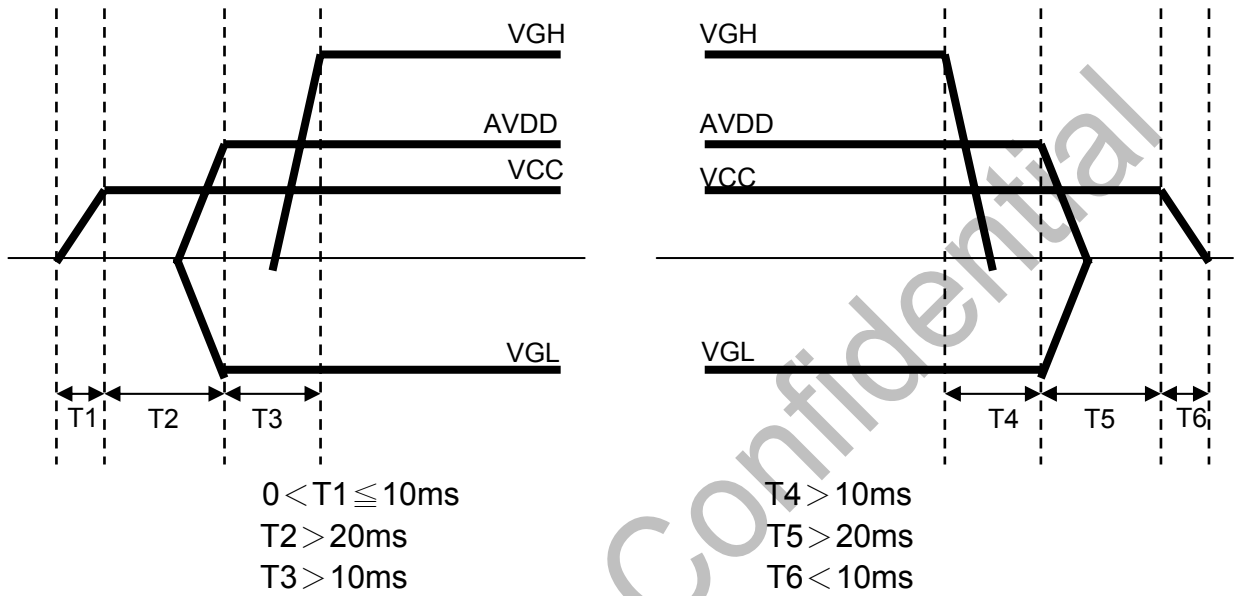
(a) 64 Gray Pattern



(b) Black Pattern

3.3 Power · Signal Sequence

Power On : VCC→AVDD/VGL→VGH  
 Power Off : VGH→AVDD/VGL→VCC



3.4 Backlight

Ta=25°C

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
LED current	IL				mA	
LED voltage	VL				V	
Power consumption	WL				W	

## 4. INTERFACE CONNECTION

### 4.1 Pin Assignment

Pin NO.	SYMBOL	DESCRIPTION
1	AGND	Analog Ground
2	AVDD	Analog Power
3	VCC	Digital Power
4	R0	Data Input(LSB)
5	R1	Data Input
6	R2	Data Input
7	R3	Data Input
8	R4	Data Input
9	R5	Data Input
10	R6	Data Input
11	R7	Data Input(MSB)
12	G0	Data Input(LSB)
13	G1	Data Input
14	G2	Data Input
15	G3	Data Input
16	G4	Data Input
17	G5	Data Input
18	G6	Data Input
19	G7	Data Input(MSB)
20	B0	Data Input(LSB)
21	B1	Data Input
22	B2	Data Input
23	B3	Data Input
24	B4	Data Input
25	B5	Data Input
26	B6	Data Input
27	B7	Data Input(MSB)
28	DCLK	Clock input
29	DE	Data Enable signal ◦ Active High to enable the data input bus
30	HSD	Horizontal sync input. Negative polarity
31	VSD	Vertical sync input. Negative polarity
32	MODE	DE/SYNC mode select. Normally pull high H: DE mode. L: HSD/VSD mode
33	RSTB	Global reset pin. Active low to enter reset state. Suggest to connecting with an RC reset circuit for stability. Normally pull high.(R=47K $\Omega$ , C=1 $\mu$ )
34	STBY	Standby mode, normally pull high STBYB="1", normal operation STBYB="0", timing control, source driver will turn off, all output are high-Z
35	SHLR	Left or Right Display Control
36	VCC	Digital Power
37	UPDN	Up / Down Display Control
38	GND	Digital Ground
39	AGND	Analog Ground
40	AVDD	Analog Power
41	VCOM	Common Voltage
42	DITH	Dithering function enable control. Normally pull high DITHB = "1", Disable internal dithering function DITHB = "0", Enable internal dithering function ◦ LSB0 and LSB1 connect to ground.
43	NC	Not connect
44	NC	Not connect
45	V10	Gamma correction voltage reference
46	V9	Gamma correction voltage reference
47	V8	Gamma correction voltage reference
48	V7	Gamma correction voltage reference



49	V6	Gamma correction voltage reference
50	V5	Gamma correction voltage reference
51	V4	Gamma correction voltage reference
52	V3	Gamma correction voltage reference
53	V2	Gamma correction voltage reference
54	V1	Gamma correction voltage reference
55	NC	Not connect
56	VGH	Positive Power for TFT
57	VCC	Digital Power
58	VGL	Negative Power for TFT
59	GND	Digital Ground
60	NC	Not connect

【Note】 : \*1) Function is controled by UPDN and SHLR.

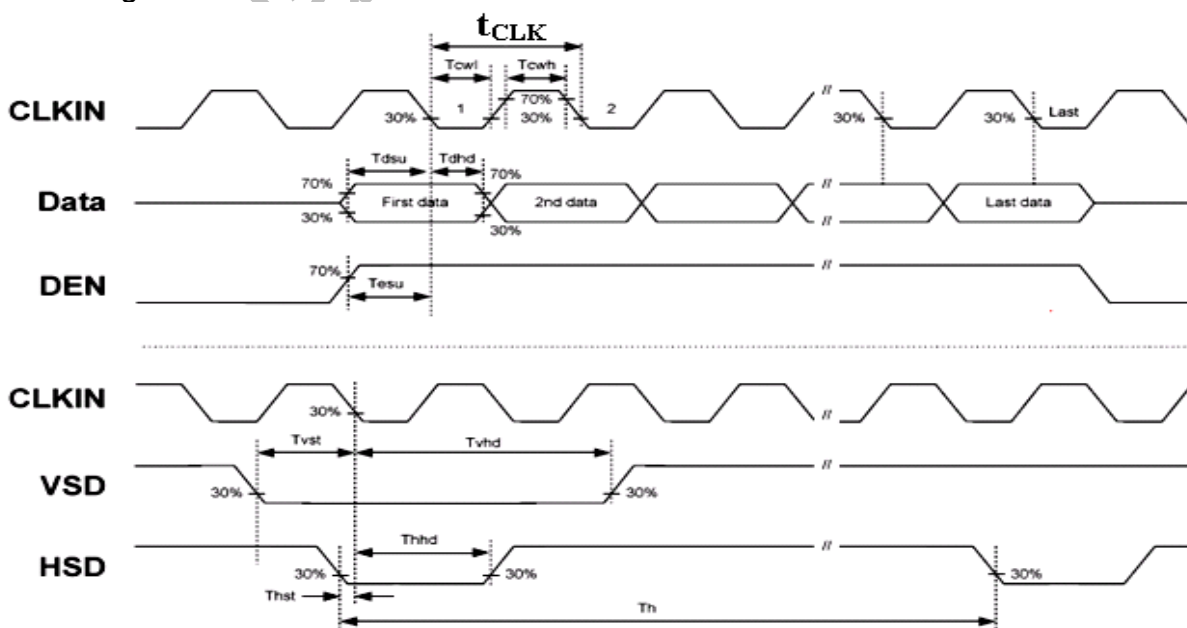
UPDN	SHLR	FUNCTION
0	1	Normal Display
0	0	Left / Right Contrary
1	1	Up / Down Reverse
1	0	Left / Right Contrary , Up / Down Reverse

### 5. INPUT SIGNAL

#### 5.1 Timing Specification

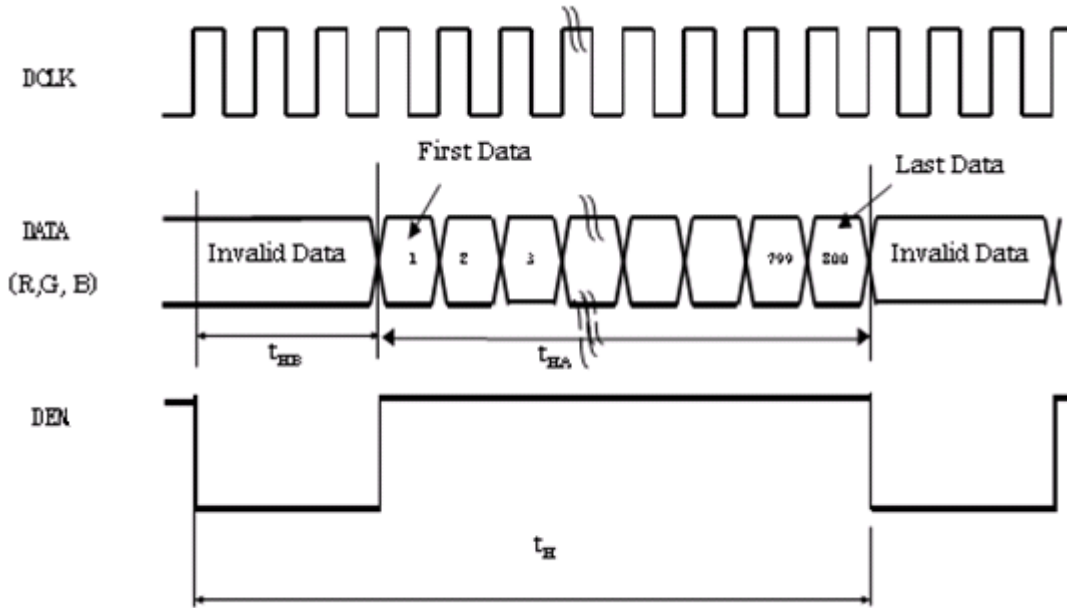
	ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
DCLK	Dot Clock	$1/t_{CLK}$	35	40	45	MHz	
	DCLK pulse duty	$T_{cwh}$	40	50	60	%	
DE	Setup Time	$T_{esu}$	8	-	-	ns	
	Hold time	$T_{ehd}$	8	-	-	ns	
	Horizontal Period	$t_H$	980	1000	1020	$t_{CLK}$	
	Horizontal Valid	$t_{HA}$	800				
	Horizontal Blank	$t_{HB}$	180	200	220	$t_{CLK}$	
	Vertical Period	$t_V$	650	660	670	$t_H$	
	Vertical Valid	$t_{VA}$	600				
	Vertical Blank	$t_{VB}$	50	60	70	$t_H$	
SYNC	HSYNC Setup Time	$T_{hst}$	8	-	-	ns	
	HSYNC Hold Time	$T_{hhd}$	8	-	-	ns	
	VSYNC Setup Time	$T_{vst}$	8	-	-	ns	
	VSYNC Hold Time	$T_{vhd}$	8	-	-	ns	
	Horizontal Period	$t_h$	980	1000	1020	$t_{CLK}$	
	Horizontal Pulse Width	$t_{hpw}$	-	40	-	$t_{CLK}$	$t_{hb} + t_{hpw} = 88DCLK$ is fixed
	Horizontal Back Porch	$t_{hb}$	-	48	-	$t_{CLK}$	
	Horizontal Front Porch	$t_{hfp}$	92	112	132	$t_{CLK}$	
	Horizontal Valid	$t_{hd}$	800				
	Vertical Period	$t_v$	650	660	670	$t_h$	
	Vertical Pulse Width	$t_{vpw}$	-	10	-	$t_h$	$t_{vpw} + t_{vb} = 32t_h$ is fixed
	Vertical Back Porch	$t_{vb}$	-	22	-	$t_h$	
	Vertical Front Porch	$t_{vfp}$	18	28	38	$t_h$	
	Vertical Valid	$t_{vd}$	600				
DATA	Setup Time	$T_{dsu}$	8	-	-	ns	
	Hold Time	$T_{dhd}$	8	-	-	ns	

#### 5.2 Timing Chart

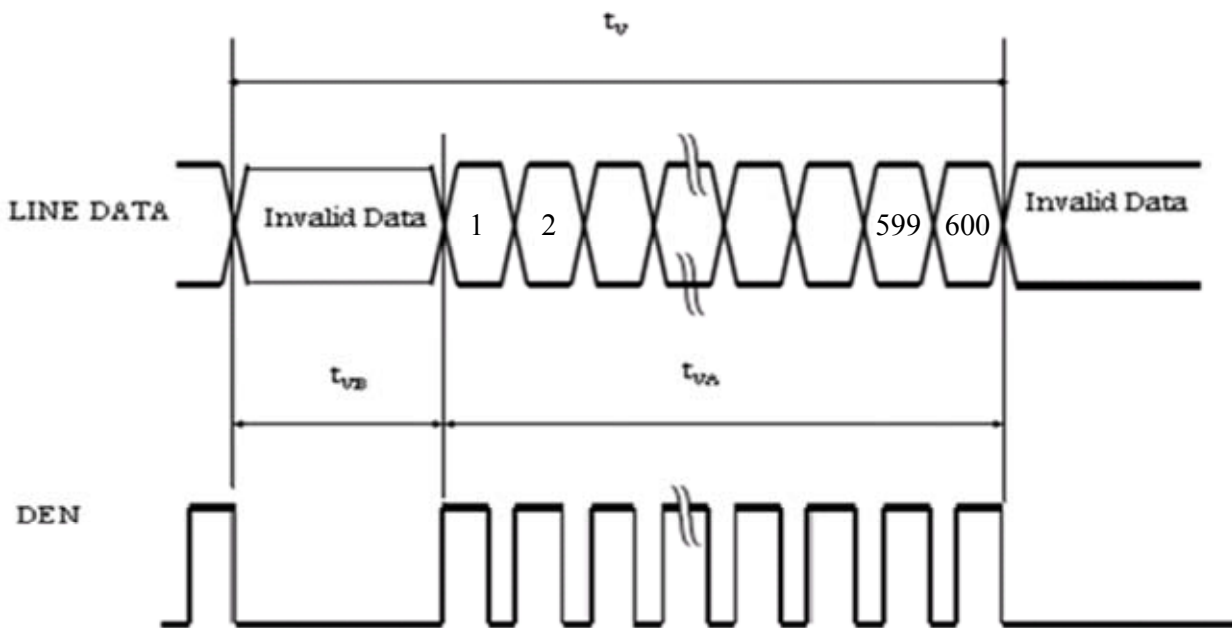


**DE mode**

(1)Horizontal Timing :

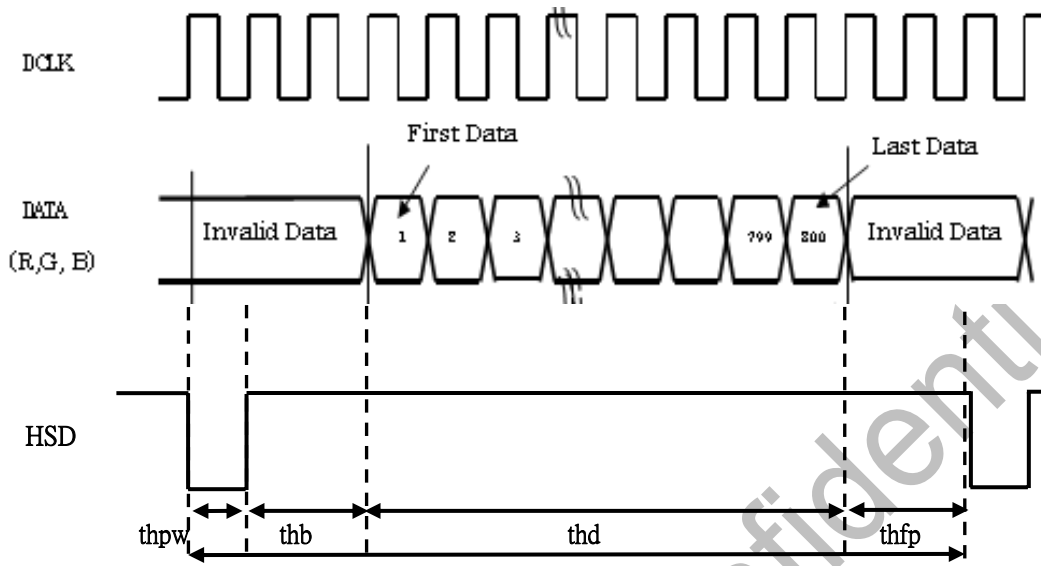


(2)Vertical Timing :

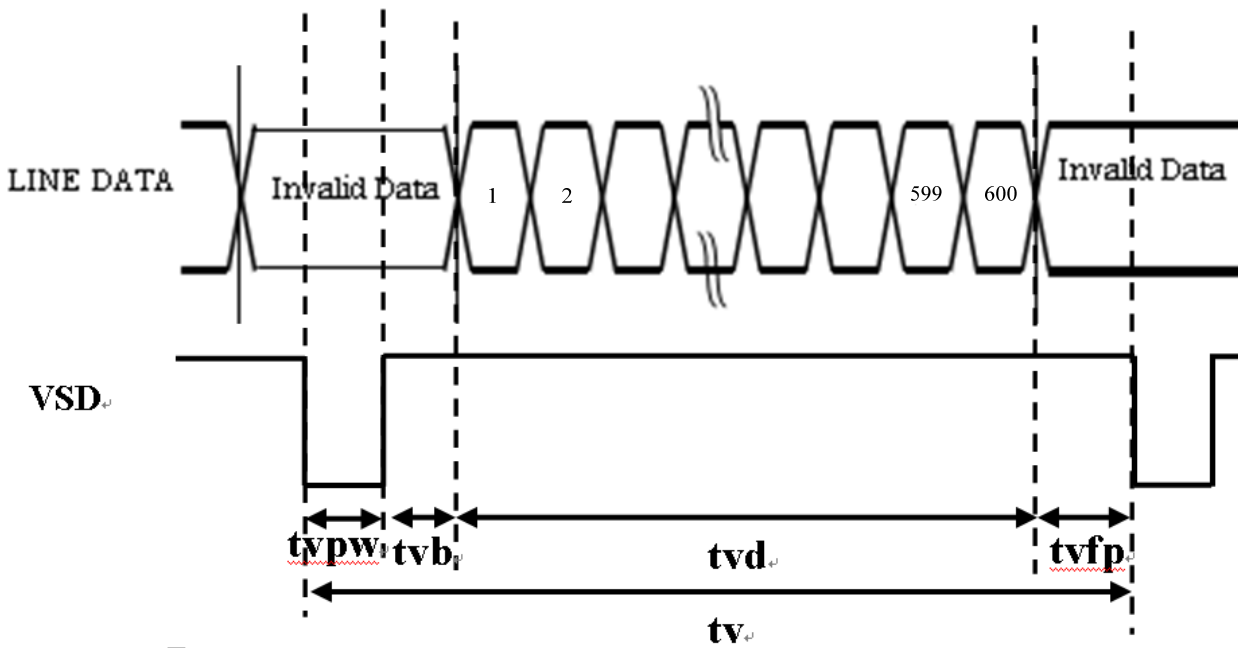


**SYNC mode**

(1)Horizontal Timing :



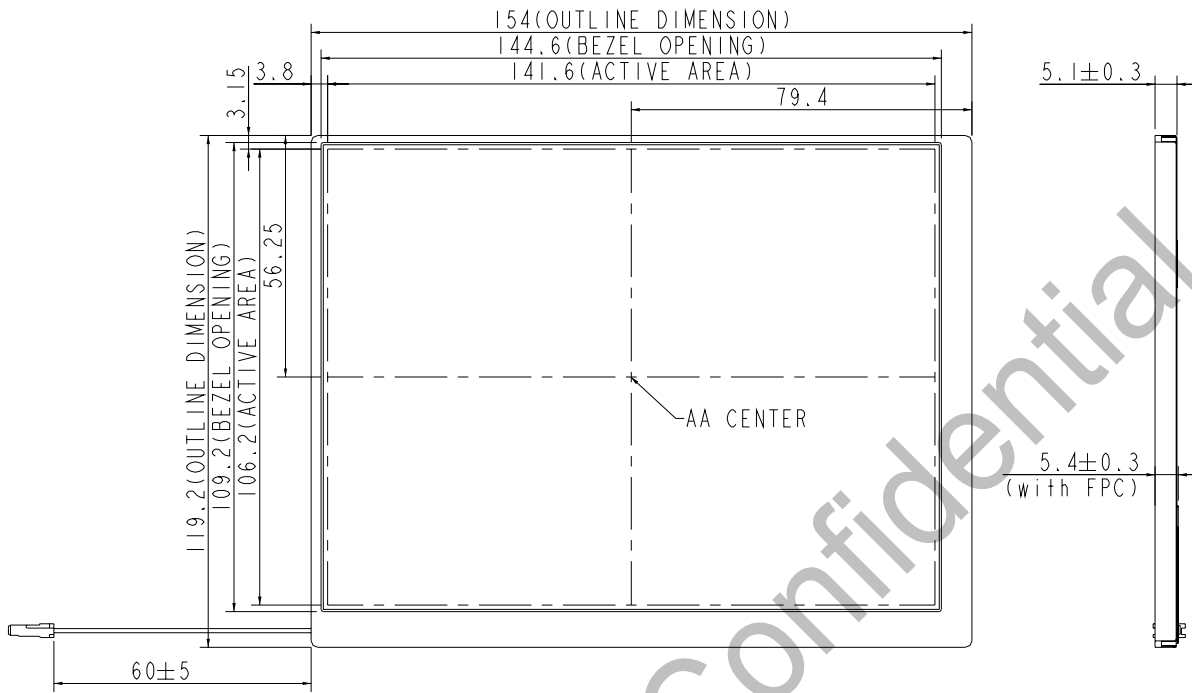
(2)Vertical Timing :



**6. MECHANICAL DIMENSION**

6.1 Front Side

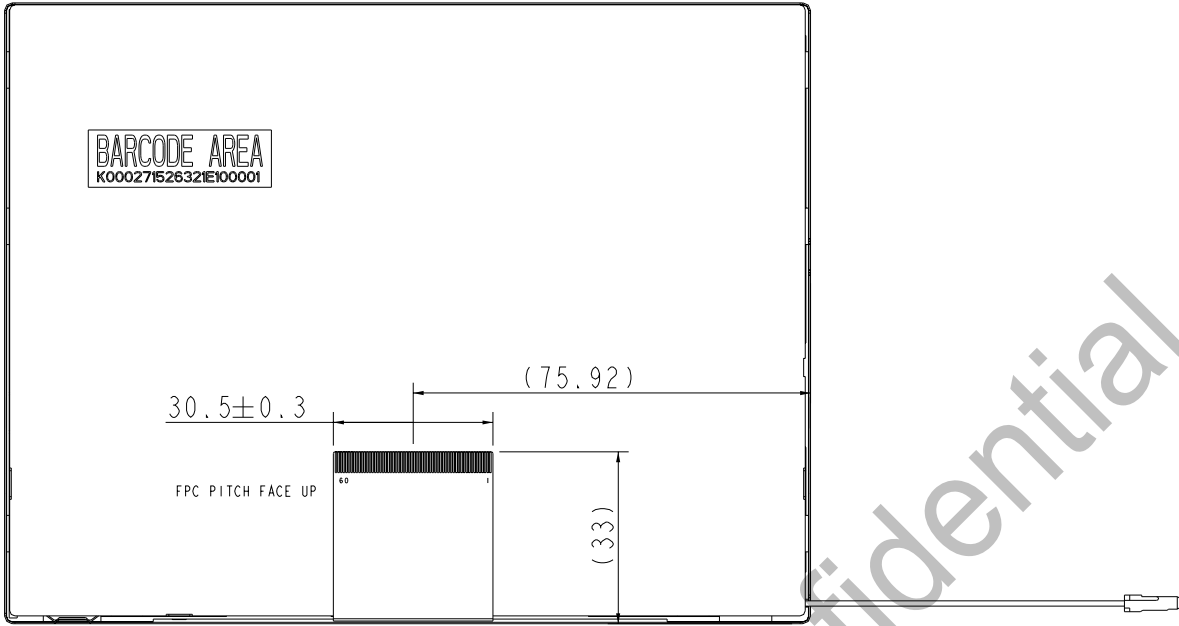
[Unit : mm]



NOTE : General Tolerance = ±0.3

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6.2 Rear Side



NOTE : General Tolerance =  $\pm 0.3$

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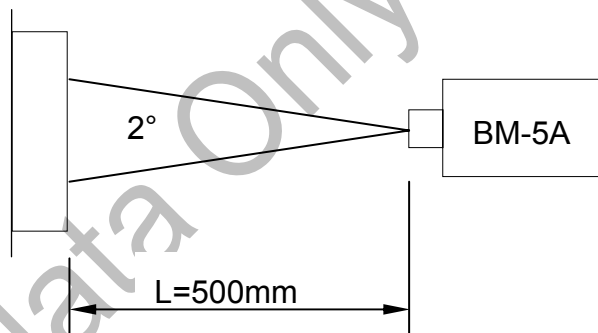
## 7. OPTICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE	
Contrast (CEN)	CR	Point-5		500	-	-	*1)*2)*3)	
Luminance (CEN)	Lw	Point-5		250		cd/m <sup>2</sup>	*1)*3)	
Luminance Uniformity	$\Delta L$		70	80	-	%	*1)*3)	
Response Time (White - Black)	Tr +Tf	Point-5	-	20		ms	*1)*3)*5)	
View angle	Horizontal	CR $\geq$ 10 Point-5		140	-	$^{\circ}$	*1)*2)*4)	
	Vertical			120	-	$^{\circ}$	*1)*2)*4)	
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)		
	Green	Gx Gy		(TBD)	(TBD)	(TBD)		
	Blue	Bx By		(TBD)	(TBD)	(TBD)		

**【Note】 :**

These items are measured by BM-5A (TOPCON) in the dark room. (no ambient light).

\*1) condition of measurement : 25 °C  $\pm$  2 °C , 60  $\pm$  10%RH , dark room below 10 Lux , viewing cone=2° , VCC=3.3V or IL=120mA , after 10 minutes operation .



\*2) Definition of contrast ratio :

$$\text{Contrast Ratio (CR)} = (\text{White}) \text{ Luminance of ON} \div (\text{Black}) \text{ Luminance of OFF}$$

\*3) Definition of Luminance Uniformity :

Measure maximum luminance L(MAX) and minimum luminance L(MIN) on the 9 points as Fig.8-1 (#1~#9point).

Luminance Uniformity is calculated with the following formula :

$$\Delta L = ( L(\text{MIN}) \div L(\text{MAX}) ) \times 100\%$$

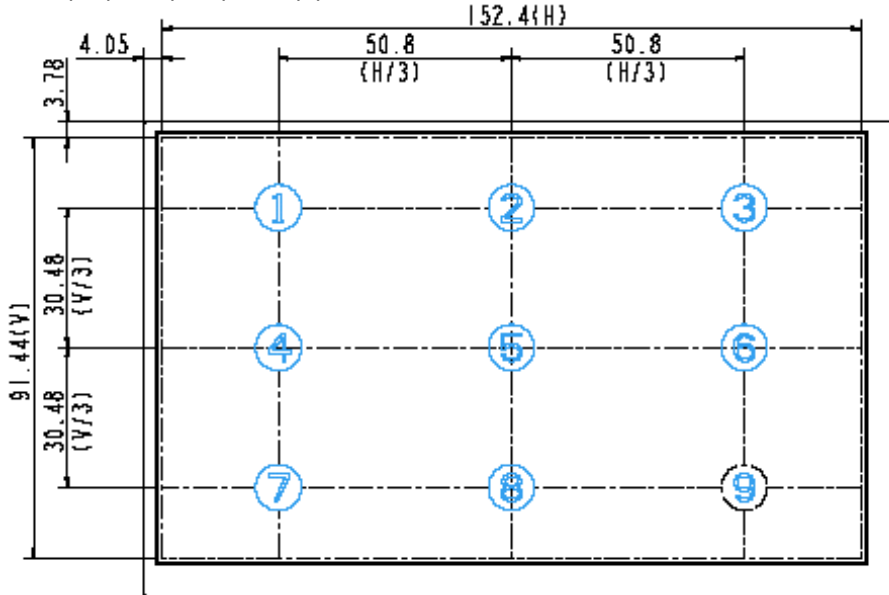


Fig.8-1 Measuring point(TBD)

\*4) Definition of Viewing Angle( $\theta, \psi$ ), refer to Fig.8-2 as below :

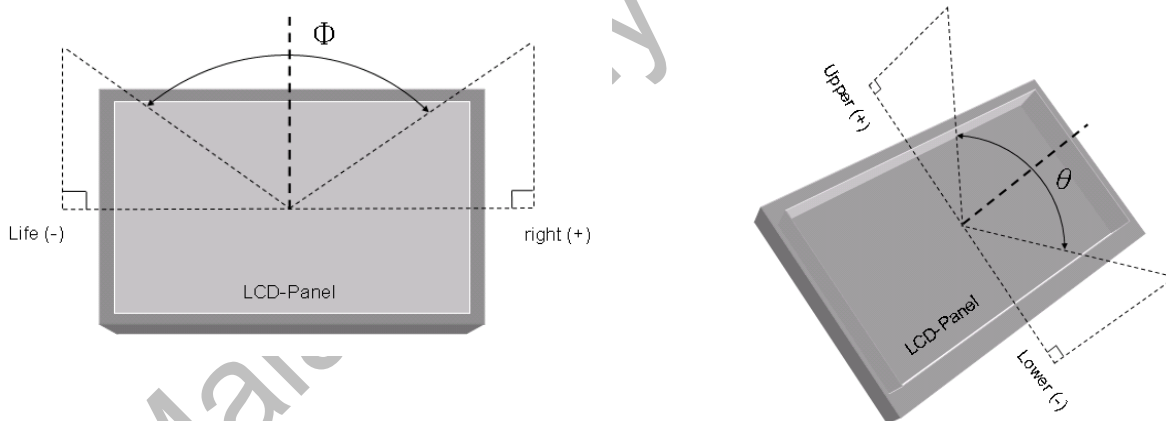


Fig.8-2 Definition of Viewing Angle

\*5) Definition of Response Time.

The response time is defined as the time interval between the 10% and 90% amplitudes. Refer to Fig.8-3 as below.

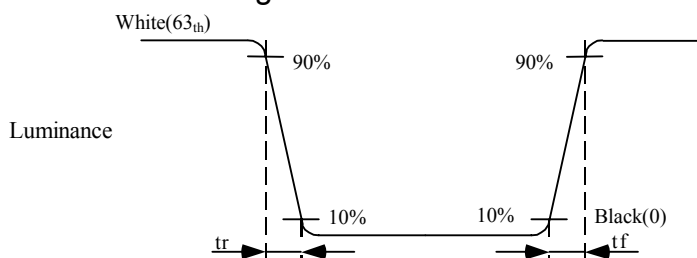


Fig.8-3 Definition of Response Time



## 8. RELIABILITY TEST

### 8.1 Temperature and Humidity

TEST ITEMS	CONDITIONS
High Temperature Operation	70°C; 240hrs
High Temperature High Humidity Operation	60°C; 90%RH; 240hrs
High Temperature Storage	80°C; 240hrs
Low Temperature Operation	-20°C; 240hrs
Low Temperature Storage	-30°C; 240hrs
Thermal Shock (No operation)	-30°C (0.5hr) ~ 80°C (0.5hr); 200 Cycles

### 8.2 Shock and Vibration

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: half sinusoidal wave,6ms.</li> <li>● Number of shocks: one shock input in each direction of three mutually perpendicular axes for a total of three shock inputs.</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(both x, y,z axis: 2Hrs).</li> <li>● Sweep: 2.9G,33.3 Hz -400 Hz</li> <li>● Cycle: 15 min</li> </ul>

### 8.3 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.