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# Chunghwa Picture Tubes, Ltd.

## Product Specification

To : OD

Date : 100721

**TFT LCD**

**CLAA057VC01CT**

ACCEPTED BY : (V0.1)

Tentative

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Doc.No:	SPEC_CLAA057VC01CT_V0.1_OD_100721	Issue Date:	2010/05/14
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## 1. OVERVIEW

CLAA057VC01CT is 5.7" 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
Display Area (mm)		116.16(H) × 87.12(V)
Resolution		640(H) × 3(RGB) × 480(V)
Pixel Pitch (mm)		0.1815(H) × 0.1815(V)
Pixel Arrangement		R,G,B vertical stripe
Display Mode		Normally White
Number of Color		262K
Viewing Direction		6 o'clock
Response Time (Tr+Tf)		30ms(typ)
Contrast Ratio		300 : 1
Luminance (cd/m <sup>2</sup> )		180nit(typ)
NTSC		50%(typ)
Viewing Angle	CR > 10	140 degree (Horizontal) , 100 degree (Vertical)
Electrical Interface		TTL
Power Consumption (W)		1.4W(typ)
Outline Dimension(mm)		127(W) × 100(H) × 7.85(D)
Module Weight(g)		135g(typ)
Backlight		LED
Surface Treatment		Anti-Glare , Surface hardness: 3H

## 2. ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Min	Max	Unit	Remarks
Power Supply Voltage for LCD	Vcc	-0.3	5	V	
Power Supply Voltage for LED	VLED	GND	30	V	
ICC Rush Current	IRUSH	-	1	A	*2)
Gate Off Voltage	VEEG	-20	0.3	V	
Operating temperature	Topa	-30	85	°C	*1)
Storage temperature	Tstg	-40	90	°C	*1)

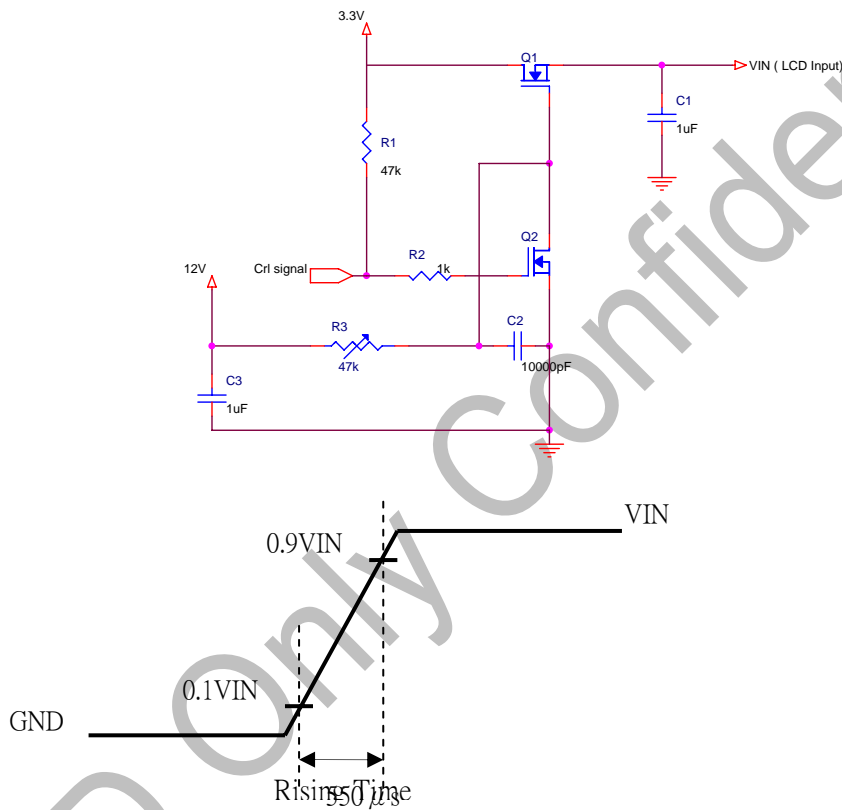
Remarks :

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

\*2) The input pulse-current measurement system is as below:

Control signal: High (+3.3V)→Low (GND)

Supply Voltage of rising time should be from R3 and C2 tune to 550 μs.



### 3. ELECTRICAL CHARACTERISTICS

#### 3.1 TFT-LCD Power Supply Voltage

Ta=25°C

Item	Symbol	Min	Typ	Max	Unit	Remarks
Power Supply Voltage For LCD	V <sub>CC</sub>	3.0	3.3	3.6	V	
Power Supply Voltage For LED	V <sub>LED</sub>	4.5	5	5.5	V	
Logic Input Voltage	V <sub>IH</sub>	V <sub>CC</sub> *0.7	--	V <sub>CC</sub>	V	
	V <sub>IL</sub>	GND	--	V <sub>CC</sub> *0.3	V	
ADJ Input Voltage	V <sub>IH</sub>	3.0	--	3.3	V	
	V <sub>IL</sub>	GND	--	0.3	V	

#### 3.2 TFT-LCD Power Supply Current

Ta=25°C

Item	Symbol	Conditions	Min	Typ	Max	Unit	Remarks
LCD Power Current	I <sub>CC</sub>	--	95	115	mA	*1)	
LED Power Current	I <sub>LED</sub>	--	210	240	mA	*2)	

Remarks :

\*1) Typical : 64 gray pattern ◦ Maximum : Black pattern ◦



64 Gray Pattern

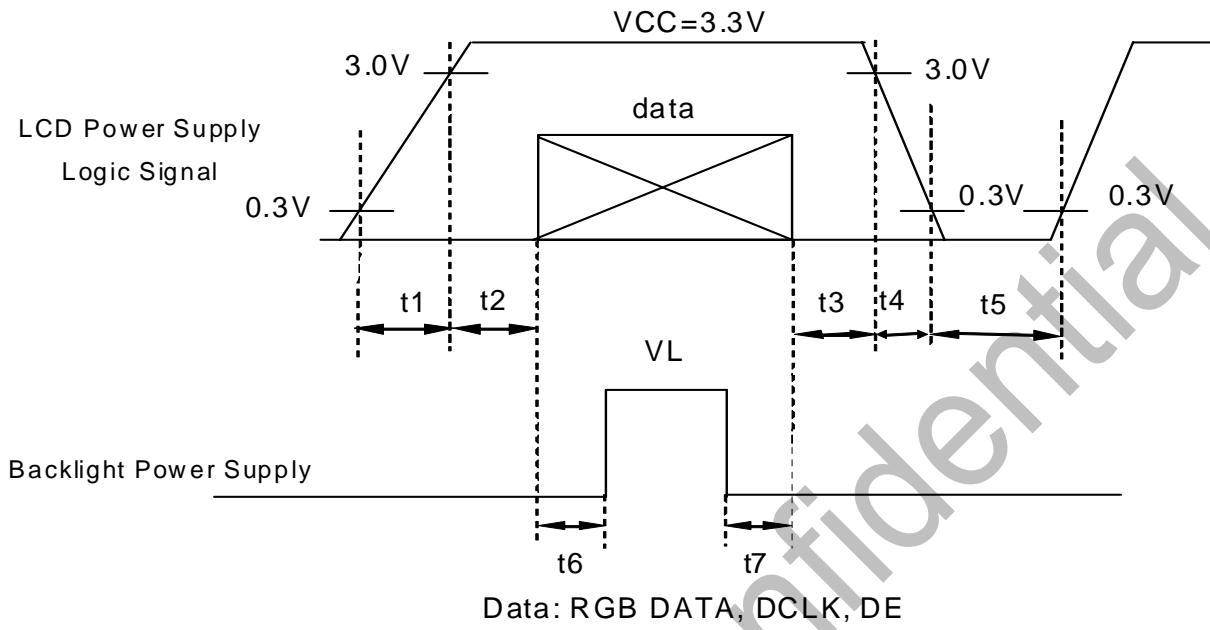


Black Pattern

\*2) Typical: VDD = 5V  
Maximum: VDD = 4.5V

3.3 Power 、 Signal sequence

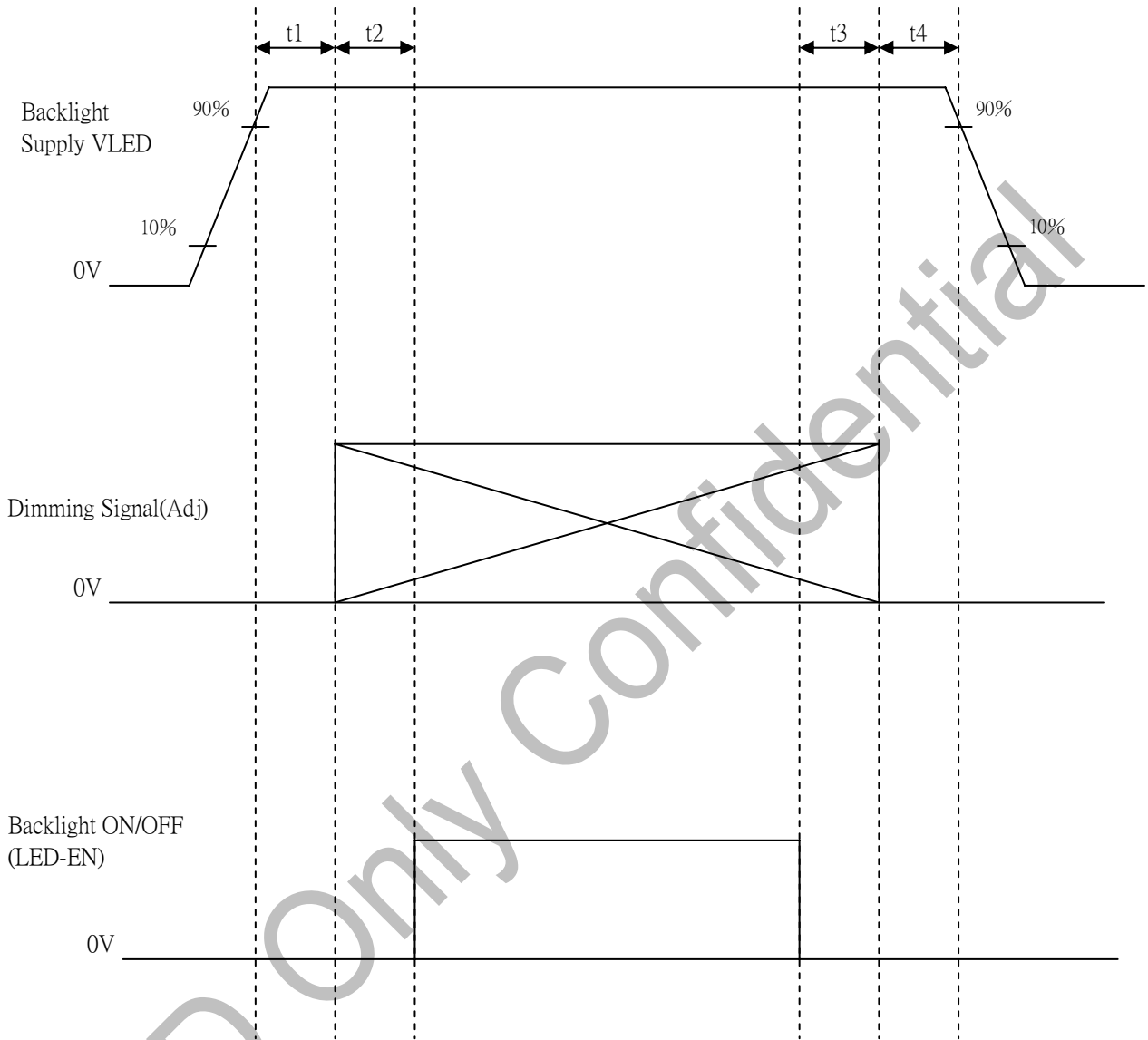
- 0.5 <math>t\_1 \le 10\text{ms}</math>      200ms <math>\le t\_5</math>
- 0 <math>t\_2 \le 50\text{ms}</math>      200ms <math>\le t\_6</math>
- 0 <math>t\_3 \le 50\text{ms}</math>      200ms <math>\le t\_7</math>
- 0 <math>t\_4 \le 10\text{ms}</math>



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- 10ms  $\leq$  t1
- 10ms  $\leq$  t2
- 0ms  $\leq$  t3
- 10ms  $\leq$  t4



## 3.4 Backlight

Item	Symbol	Condition	Min	Typ	Max	Unit	Remarks
LED Lifetime	-	Ta=25°C Each serial=20mA	30000			Hr	
		Ta=60°C Each serial=20mA	15000			Hr	

Remarks :

\*1) Definition LED lifetime : Luminance will decay less than 50%.

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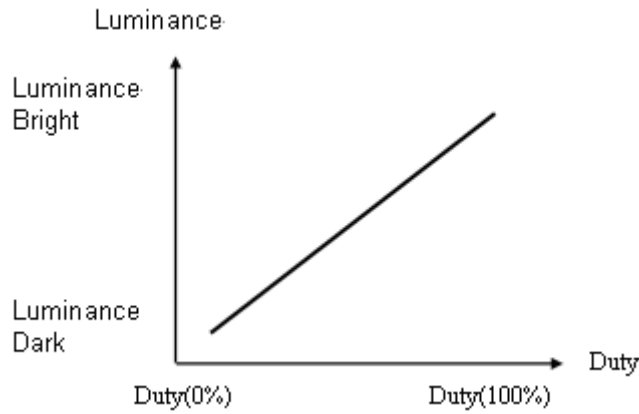
## 4. INTERFACE CONNECTION

CN1 : Starconn. 089N40-000R00-G2

Pin NO.	Symbol	Description
1	U/D	Up / Down Display Control
2	DMS	DE / SYNC Mode Selection
3	Hsync	Horizontal SYNC.
4	V <sub>LED</sub>	Power Supply for LED
5	V <sub>LED</sub>	Power Supply for LED
6	V <sub>LED</sub>	Power Supply for LED
7	V <sub>cc</sub>	Power Supply for LCD
8	Vsync	Vertical SYNC.
9	DE	Data Enable
10	X2	TSP control (Left)
11	Y1	TSP control (Up)
12	ADJ	Adjust for LED brightness
13	B5	Blue Data 5 (MSB)
14	B4	Blue Data 4
15	B3	Blue Data 3
16	V <sub>ss</sub>	Power Ground
17	B2	Blue Data 2
18	B1	Blue Data 1
19	B0	Blue Data 0 (LSB)
20	V <sub>ss</sub>	Power Ground
21	G5	Green Data 5 (MSB)
22	G4	Green Data 4
23	G3	Green Data 3
24	V <sub>ss</sub>	Power Ground
25	G2	Green Data 2
26	G1	Green Data 1
27	G0	Green Data 0 (LSB)
28	V <sub>ss</sub>	Power Ground
29	R5	Red Data 5 (MSB)
30	R4	Red Data 4
31	R3	Red Data 3
32	V <sub>ss</sub>	Power Ground
33	R2	Red Data 2
34	R1	Red Data 1
35	R0	Red Data 0 (LSB)
36	X1	TSP control (Right)
37	Y2	TSP control (Down)
38	DCLK	Clock Signals
39	V <sub>ss</sub>	Power Ground
40	L/R	Left / Right Display Control

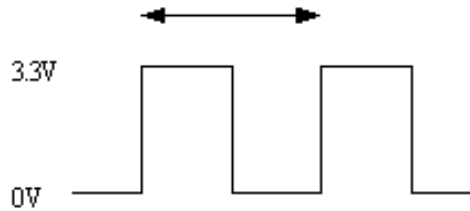
Remarks :

- \*1) VSS pin must be connected with GND. Don't let it be an empty pin.
- \*2) Adjust control pin (ADJ) controls brightness. The bigger pulse duty, the brighter luminance. °



\*3) ADJ signal=0~3.3V, operation frequency: 25KHZ±5KHz

$$F=25\text{KHz} \pm 5\text{KHz} \cdot T=0.04\text{ms}$$



The ADJ should pull-high if not adjust brightness, this pin can't floating. °

\*4) U/D & L/R Control Function

L/R	U/D	Function
1	0	Normal Display
0	0	Left / Right Contrary
1	1	Up / Down Reverse
0	1	Left / Right Contrary , Up / Down Reverse

\*5) DMS ( Selection DE / SYNC mode )

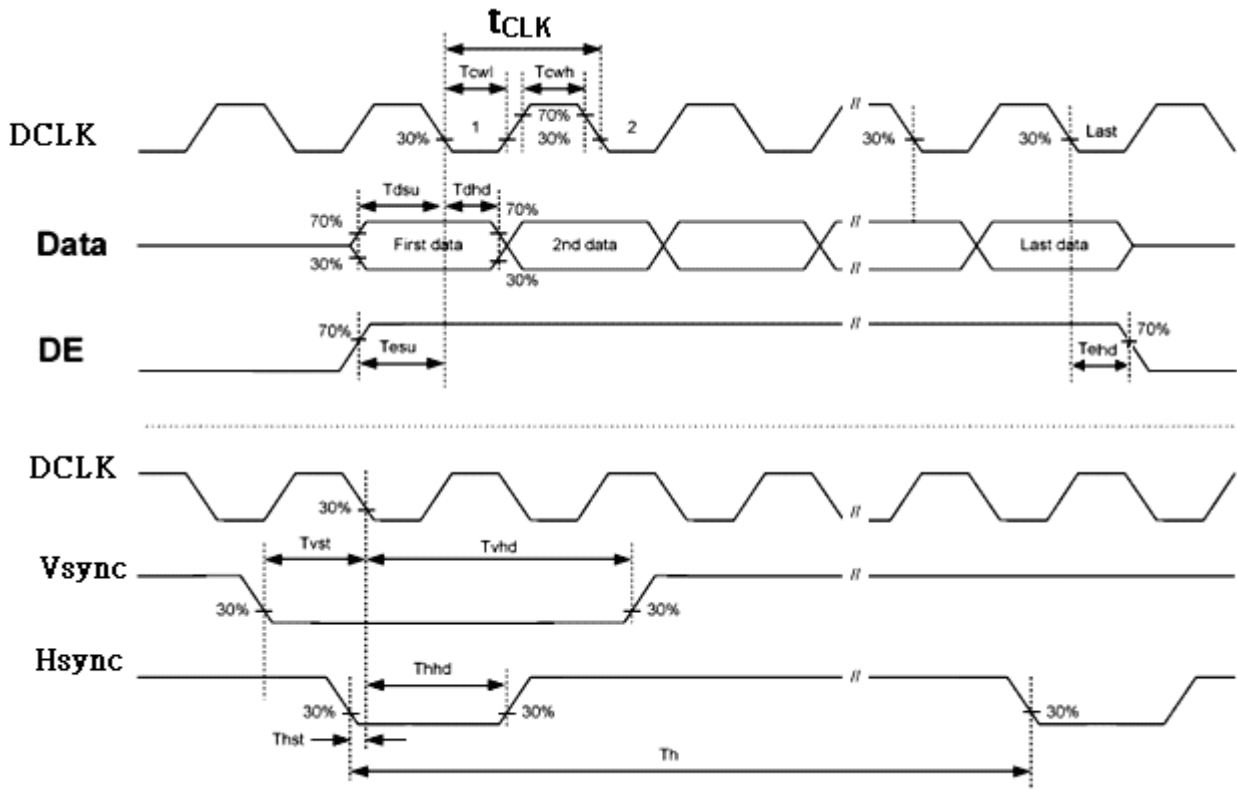
DMS	Function
1	DE Mode
0	SYNC Mode

## 5. INPUT SIGNAL (DE ONLY MODE)

### 5.1 Timing specification

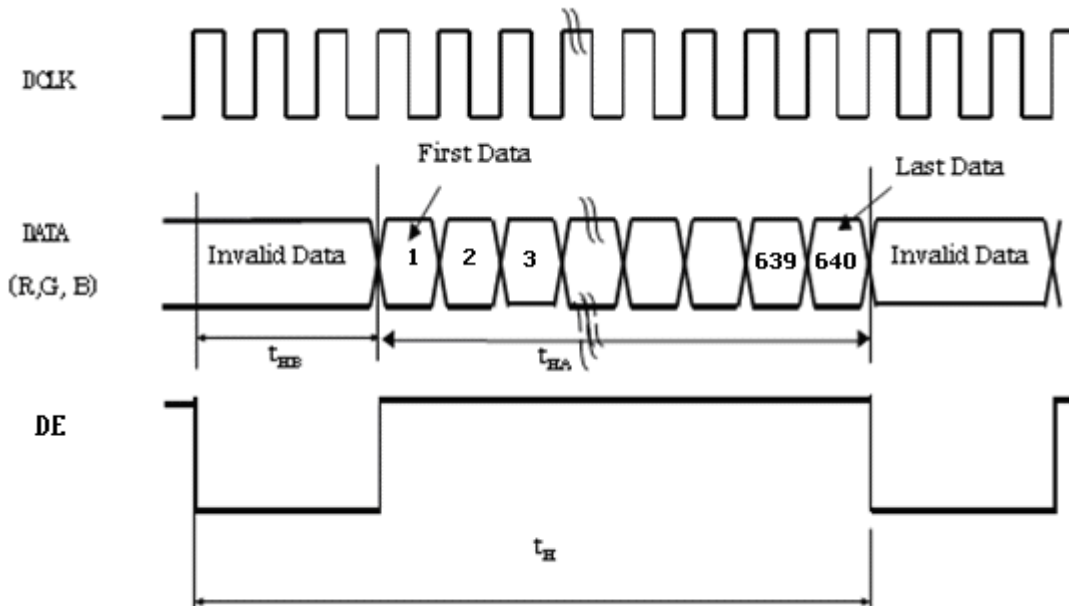
	Item	Symbol	Min.	Typ.	Max.	Unit	Remarks
DCLK	Dot Clock	$1/t_{CLK}$	23	25	30	MHz	
	DCLK pulse duty	Tcwh	40	50	60	%	
DE	Setup Time	Tesu	8	-	-	ns	
	Hold time	Tehd	8	-	-	ns	
	Horizontal Period	$t_H$	750	800	900	$t_{CLK}$	
	Horizontal Valid	$t_{HA}$	640			$t_{CLK}$	
	Horizontal Blank	$t_{HB}$	110	160	260	$t_{CLK}$	
	Vertical Period	$t_V$	515	525	560	$t_H$	
	Vertical Valid	$t_{VA}$	480			$t_H$	
	Vertical Blank	$t_{VB}$	35	45	80	$t_H$	
SYNC	HSYNC Setup Time	Thst	8	-	-	ns	
	HSYNC Hold Time	Thhd	8	-	-	ns	
	VSYNC Setup Time	Tvst	8	-	-	ns	
	VSYNC Hold Time	Tvhd	8	-	-	ns	
	Horizontal Period	th	750	800	900	$t_{CLK}$	
	Horizontal Pulse Width	thpw	1	48	-	$t_{CLK}$	thb + thpw=88DCLK is fixed
	Horizontal Back Porch	thb	-	40	-	$t_{CLK}$	
	Horizontal Front Porch	thfp	22	72	172	$t_{CLK}$	
	Horizontal Valid	thd	640			$t_{CLK}$	
	Vertical Period	tv	515	525	560	th	
	Vertical Pulse Width	tvpw	1	3	-	th	tvpw + tvb = 32th is fixed
	Vertical Back Porch	tvb	-	29	-	th	
	Vertical Front Porch	tvfp	3	13	48	th	
Vertical Valid	tvd	480			th		
DATA	Setup Time	Tdsu	8	-	-	ns	
	Hold Time	Tdhd	8	-	-	ns	

5.2 Timing Chart

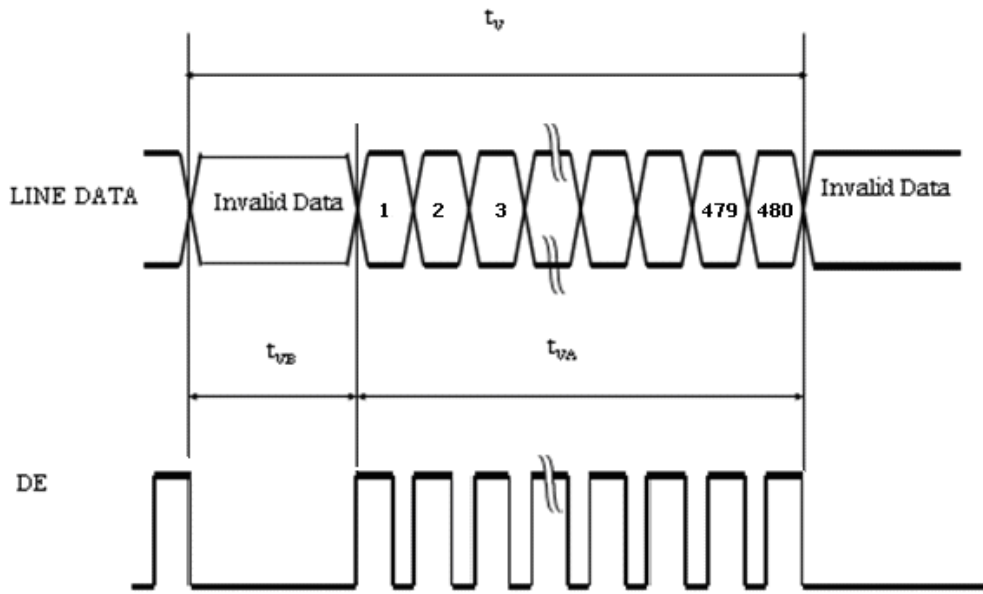


DE mode :

Horizontal Input Timing :

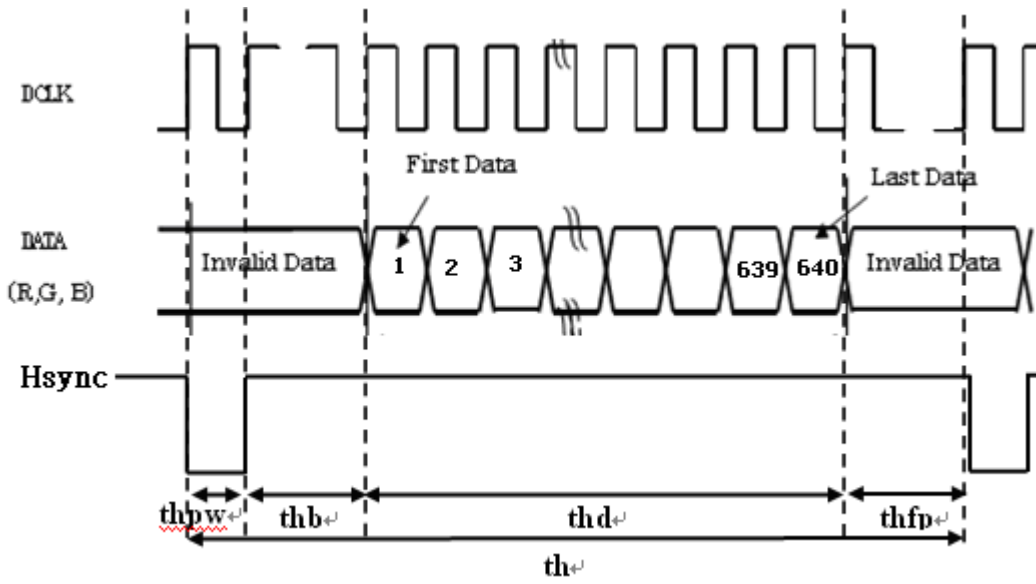


Vertical Input Timing :

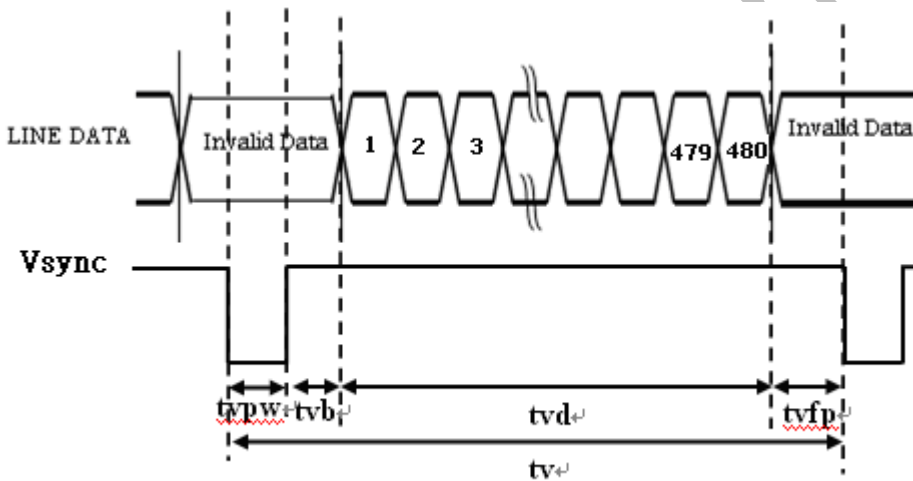


SYNC mode

Horizontal Input Timing :



Vertical Input Timing :





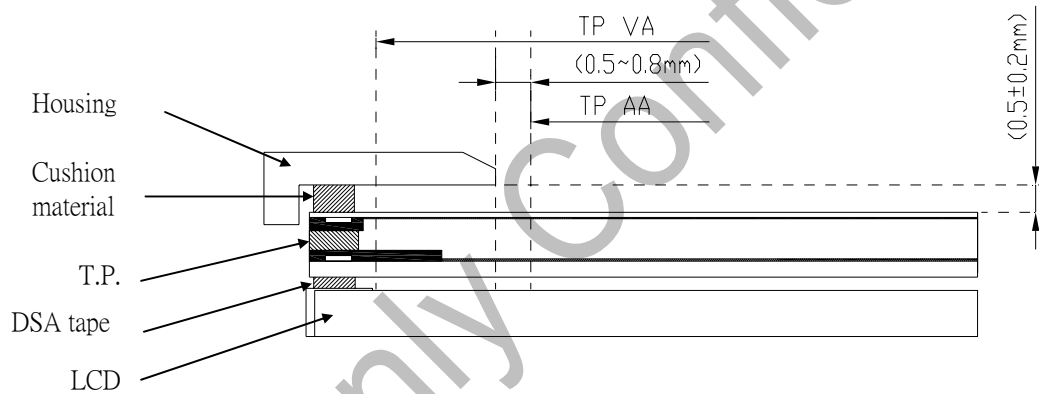
## 6. TOUCH PANEL

### 6.1 Specification

Item	Min	Typ	Max	Unit	Remarks
Operating Voltage	--	5	--	V	DC
Activation Force	--	--	80	gf	Stylus pen (R 0.8mm) or finger (R 8.0mm)
Linearity Tolerance	-1.5	--	1.5	%	load 250g
Terminal Resistance	X	150	--	700	At the connector
	Y	450	--	1200	
Insulation Resistance	20	--		M $\Omega$	DC 25V
Surface Treatment	Anti-Glare · 3H			--	

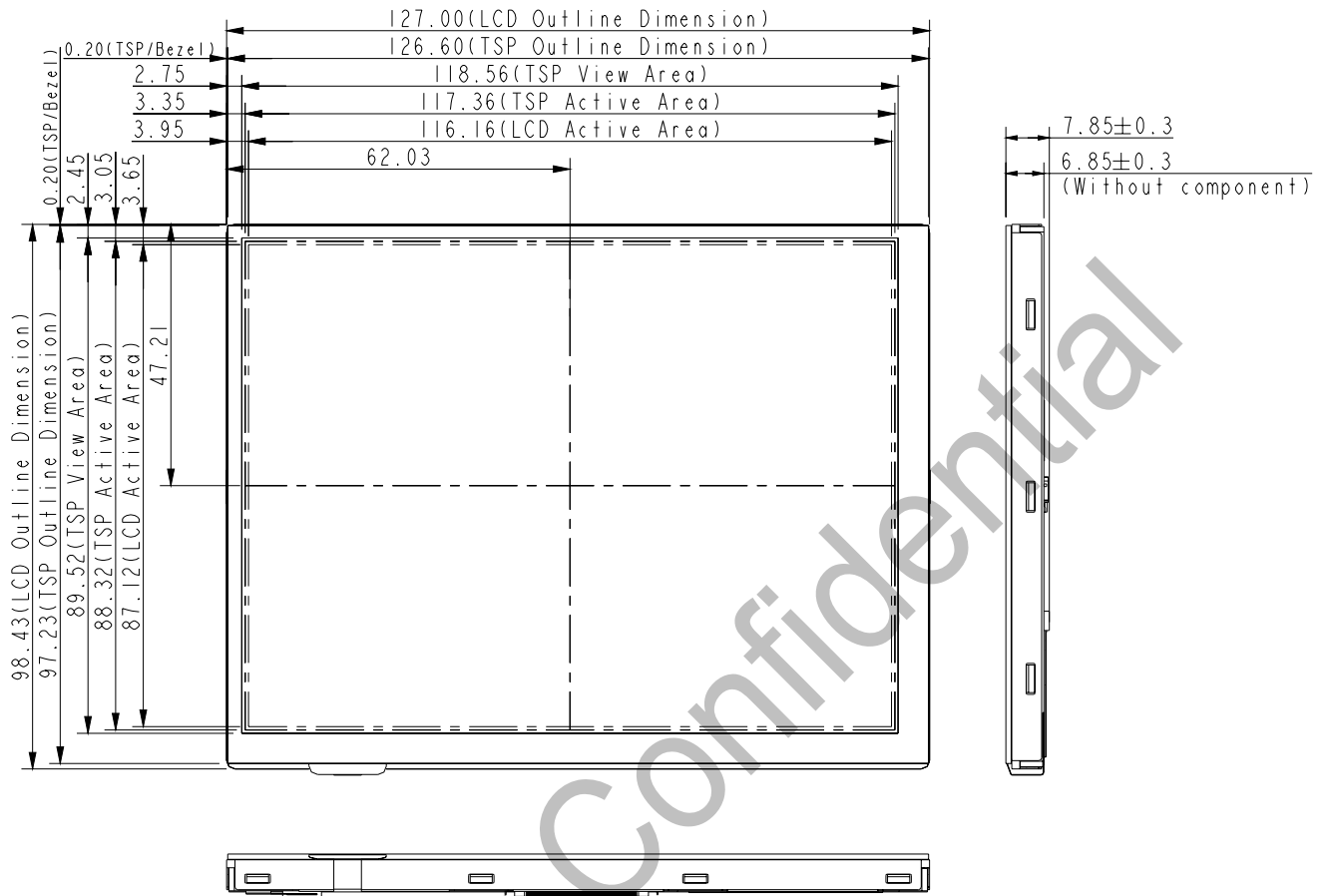
### 6.2 Design guideline for Housing and cushion material

- (1). The Cushion material must be elastic material.
- (2). The Cushion material on touch-panel must be outside of Touch Panel VA.
- (3). The housing must be outside of Touch Panel AA.
- (4). The housing is forbidden to contact the touch panel for abnormal function.
- (5). Example of housing design :



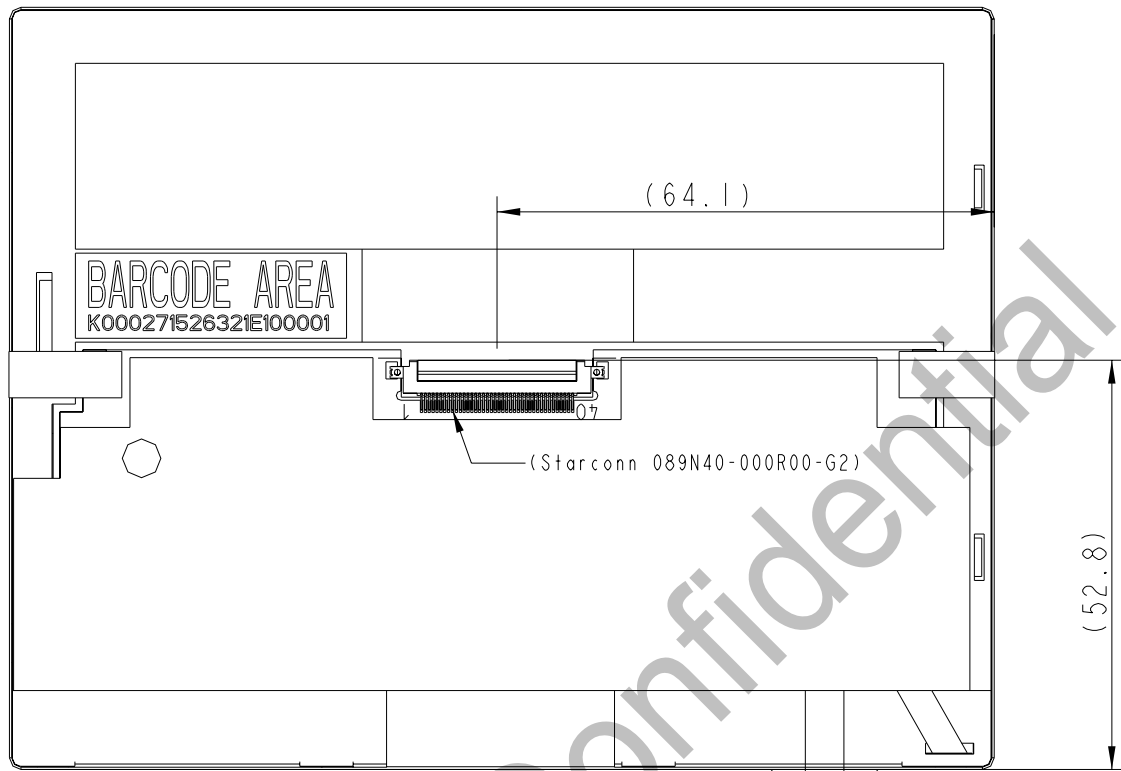
### 7. MECHANICAL DIMENSION

#### 7.1 Front View



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7.2 Rear View



General tolerance  $\pm 0.3$  mm

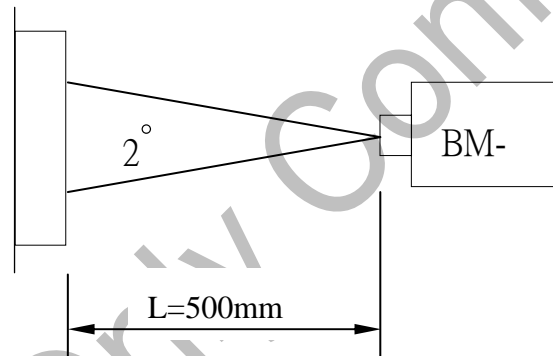
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## 8. OPTICAL CHARACTERISTICS

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Remarks	
Contrast	CR	Point-5	200	300	--	--	*1)*2)*3)	
Luminance	Center point	Lw	145	180	--	cd/m <sup>2</sup>	*2)*3)	
	Uniformity	$\Delta L$	70	80	--	%	*2)*3)	
Response Time (White - Black)	Tr+ Tf		--	20	--	ms	*1)*3)*5)	
NTSC	-	Point-5	40	50		%	*1)*3)	
View angle	Horizontal	$\emptyset$	CR $\geq$ 10 Point-5	120	140	--	$^{\circ}$	*1)*2)*4)
	Vertical	$\theta$		80	100	--	$^{\circ}$	*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°C  $\pm$  2°C , 60  $\pm$  10%RH , under 10 Lux in dark room . BM-5A (TOPCON) , view cone=2° , VCC=3.3V , Vadj=3.3V Duty 100% , after 10 minutes operation .

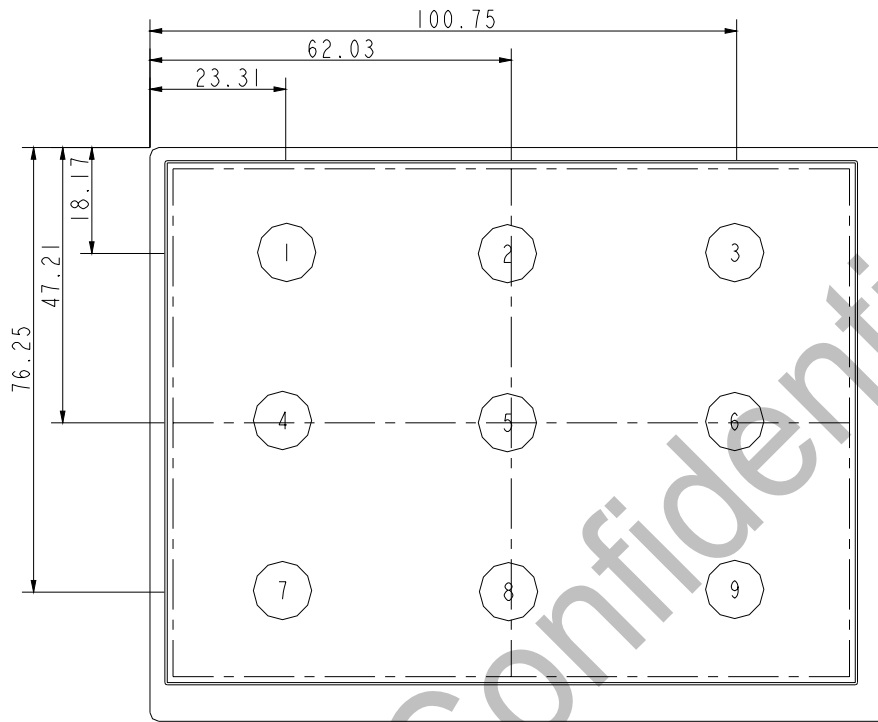


\*2) Contrast : CR= On (White Luminance) / Off (Black Luminance)

\*3) Luminance and Uniformity :

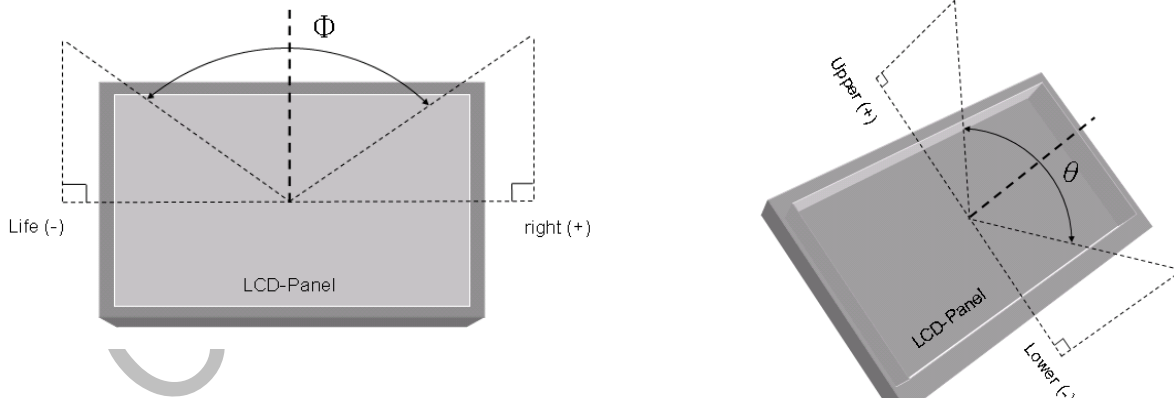
The center point of the Luminance : No 5 point.

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



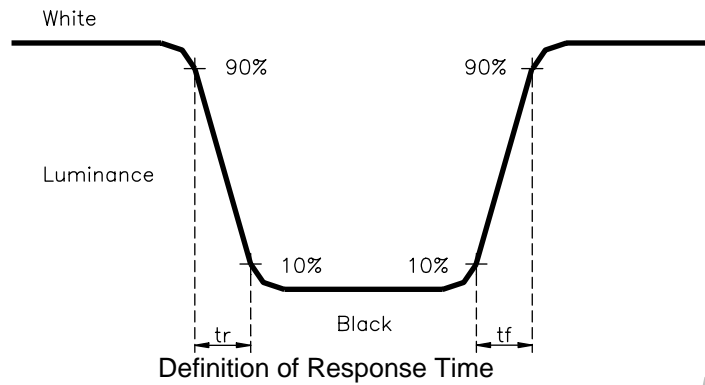
Measuring point

\*4) Viewing Angle ( $\theta \cdot \psi$ ) : (Measuring Device : EZ-CONTRAST)



Definition of View Angle

## \*4) Response Time (White - Black)

**9. RELIABILITY TEST**

## 9.1 Temperature and Humidity

Item	Condition
High Temperature Operation	85° C , 240hrs
High Temperature Storage	95° 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 (0.5 hr) ~ 85° C (0.5 hr), 200 CYCLE

## 9.2 Shock and Vibration

Item	Condition
Shock (Non-Operation)	100G 6msec 1/2 Sine wave, $\pm X$ , $\pm Y$ , $\pm Z$ , each axis 3times.
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

## 9.3 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 ◦

## 9.4 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.

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