



# Chunghwa Picture Tubes, Ltd.

## Product Specification

To :

Date : 20061016

**TFT LCD**  
*CLAA070VC05T*

ACCEPTED BY :

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## REVISION STATUS

Revision Notice	Description	Page	Rev. Date
0.1	First revision	--	2006.05.22
	Change Power consumption	4	
	Change Power Supply Voltage For LED	6	
	Change Logic Input Voltage		
	Change Power Supply Voltage For LCD	7	
	Change Remark*2)		
	Change CN1 : Interface For Input Signal	8	
	Change Mechanical Dimension	14	
	Change Response Time	16	
	Change Viewing Angle	16	
	Change Remark*1)	16	
	Change Remark*3) figure9-1	17	
	0.2	Change power consumption	
Add to signal input voltage		5	
Delete note of static electricity		5	
Delete note of ICC rush current		5	
Change electrical characteristics		6	
Change PIN 35 description		8	
Change Remarks *1)		9	
Add Remarks *2) figure		9	
Change Remarks *3)		9	
Add Remarks *5) *6) ◦		9	
Change timing specification		10	
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Add to Operating Voltage and Linearity Force		13	
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### 1. OVERVIEW

CLAA070VC05T is 7" color TFT-LCD(Thin Film Transistor Liquid Crystal Display)module which integrates Touch-Screen.Composed of LCD panel,driver ICs,control circuit,and LED backlight.

The 7.0"screen produces a high resolution image that is composed of 800×480 pixel elements in a stripe arrangement.Display 262K colors by 6 Bit R.G.B signal input.

General specifications are summarized in the following table :

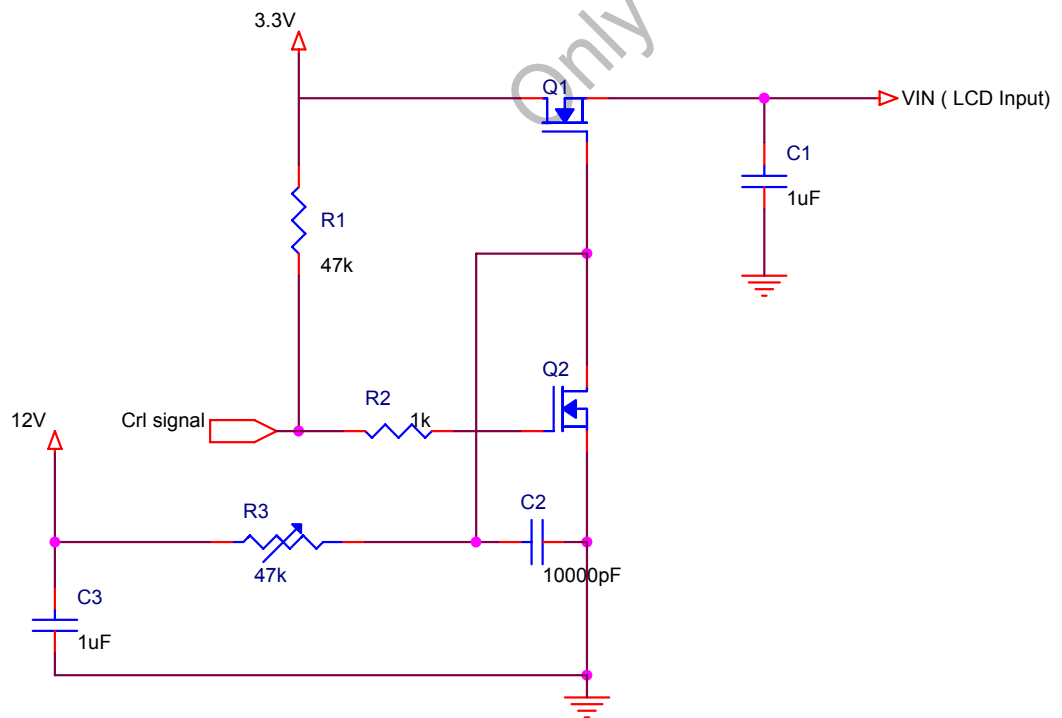
ITEM	SPECIFICATION
Panel Size	7 inch(panel diagonal)
Display Area (mm)	152.4(W)×91.44(H)
Number of Pixels	800(H)×3(RGB)×480(V)
Pixel Pitch (mm)	0.1905(H)×0.1905(V)
Color Pixel Arrangement	RGB vertical stripe
Display Mode	Normally white
Number of colors	262,144
Viewing Direction	6 o'clock
Response Time (Tr+Tf)	20ms
Brightness(cd/m <sup>2</sup> )	250nit(typ)
NTSC ratio	50%
Viewing Angle(BL on,CR≥10)	140 degree(H) · 110degree(V)
Electrical Interface(data)	TTL
Power consumption	2.81W(Typ)
Outline Dimension(in mm)	165(W)×104(H)×6(D)
Weight(g)	162g(Typ)
BL unit	LED
Surface Treatment	Anti-Glare · Hardness:3H
Touch Panel Type	4 wire resistive

## 2. ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	V <sub>cc</sub>	-0.5	5.0	V	
Signal Input Voltage	DCLK,DE,R0,G0,B0~R5,G5,B5	-0.5	V <sub>cc</sub> + 0.5	V	
Static Electricity	VESDc	-200	+200	V	*2)
	VESDm	-15K	+15K	V	
ICC Rush Current	IRUSH	-	1	A	*3)
Operation Temperature	T <sub>op</sub>	-30	85	°C	*1)
Storage Temperature	T <sub>stg</sub>	-40	95	°C	*1)

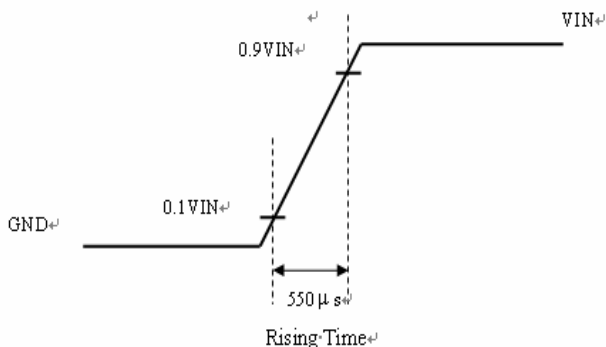
Remarks :

- \*1) If users use the product out off the environment operation range ( temperature and humidity ) ,it will concern for visual quality.
- \*2) Test Condition: IEC 61000-4-2 ,  
VESDc : Contact discharge to input connector  
VESDm : Contact discharge to module
- \*3) The input pulse-current measurement system as below :



Control signal:High(+3.3V)→Low(GND)

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



### 3. ELECTRICAL CHARACTERISTICS

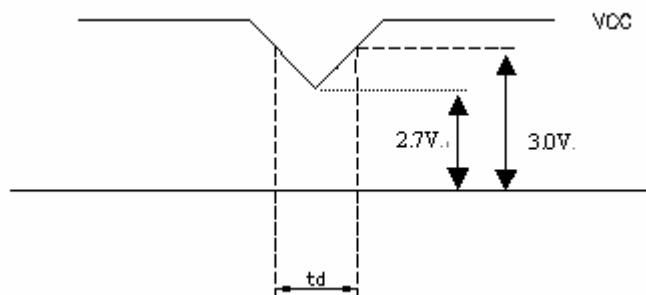
#### 3.1 TFT LCD

Ta=25°C

Item	Symbol	Min.	Typ	Max.	Unit	Note
Power Supply Voltage For LCD	VCC	3.0	3.3	3.6	V	*1)
Power Supply Voltage For LED	VDD	4.5	5	5.5	V	
Logic Input Voltage	VIH	VCC*0.7	-	VCC	V	
	VIL	0	-	VCC*0.3	V	
ADJ Input Voltage	VIH	3.0		3.3	V	
	VIL	GND		0.3	V	

Remarks :

\*1) VCC -dip condition:

When  $2.7\text{ V} \leq VCC < 3.0\text{ V}$  ,  $td \leq 10\text{ ms}$ . $VCC > 3.0\text{ V}$  , VCC-dip condition should be same as VCC-turn-on condition.

### 3.2 TFT-LCD Current Consumption

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	REMARK
LCD Power Current	ICC	--	150	200	mA	*1)
LED Power Current	IDD		400	450	mA	*2)

\*1) Typical: Under 64 gray pattern  
 Maximum: Under black pattern



(a)64 Gray Pattern

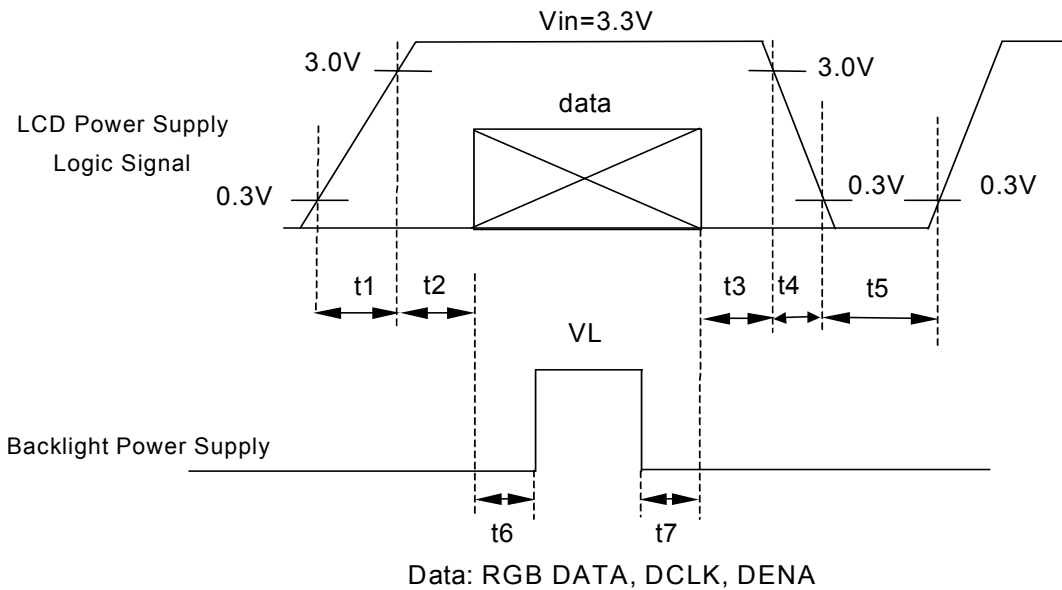


(b)Black Pattern

\*2) Typical: When VDD is 5V  
 Maximum: When VDD is 4.5V

### 3.3 Power · signal sequence

- $t1 \leq 10ms$        $1 \text{ sec} \leq t5$
- $50ms \leq t2$        $200ms \leq t6$
- $0 < t3 \leq 50ms$        $200ms \leq t7$
- $0 < t4 \leq 10ms$



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## 4. INTERFACE CONNECTION

### 4.1 CN1 : Interface For Input Signal

(Connector type:40pin/0.5mm pitch/Bottom contact)-089N40-000R00-G2

Pin NO.	SYMBOL	DESCRIPTION
1	U/D	Up or Down Display Control
2	DMS	Selection DE or SYNC
3	Hsync	Horizontal SYNC.
4	VDD	Power Supply for LED Driver circuit
5	VDD	Power Supply for LED Driver circuit
6	VDD	Power Supply for LED Driver circuit
7	V <sub>CC</sub>	Power Supply for Digital Circuit
8	Vsync	Vertical SYNC.
9	DE	Data Enable
10	V <sub>SS</sub>	Power Ground
11	V <sub>SS</sub>	Power Ground
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	V <sub>SS</sub>	Power Ground
37	V <sub>SS</sub>	Power Ground
38	DCLK	Clock Signals ; Latch Data at the Falling Edge
39	V <sub>SS</sub>	Power Ground
40	L/R	Left or Right Display Control

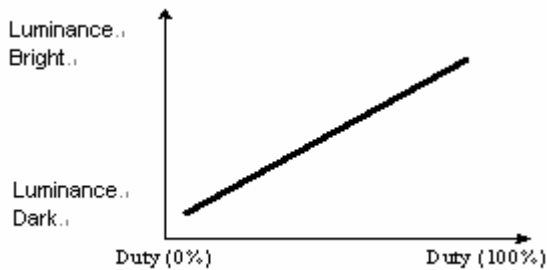


## 4.2 CN2 ( Touch Panel )

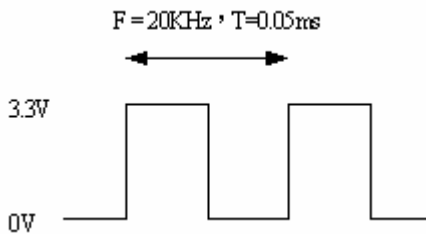
Pin No.	Symbol	function
1	XL	X axis resistance
2	YD	Y axis resistance
3	XR	X axis resistance
4	YU	Y axis resistance

Remarks :

1).ADJ adjust brightness to control Pin · Pulse duty the more big the more bright



2) ADJ signal=0~3.3V · operation frequency : 20±5KHz



3) AVSS Pin must ground contact · can not be floating.

4) TP\_FPC suggested connector(CN2) : molex 52207-0490 (or compatible connectors)

5) U/D and L/R controle Function

L/R	U/D	Function
1	0	Normally display
0	0	Left and Right opposite
1	1	Up and Down opposite
0	1	Left and Right opposite · Up and Down opposite

6) DMS ( Selection DE / SYNC mode )

DMS	Function
1	DE Mode
0	SYNC Mode

## 5. INPUT SIGNAL(DE ONLY MODE)

### 5.1 Timing Specification

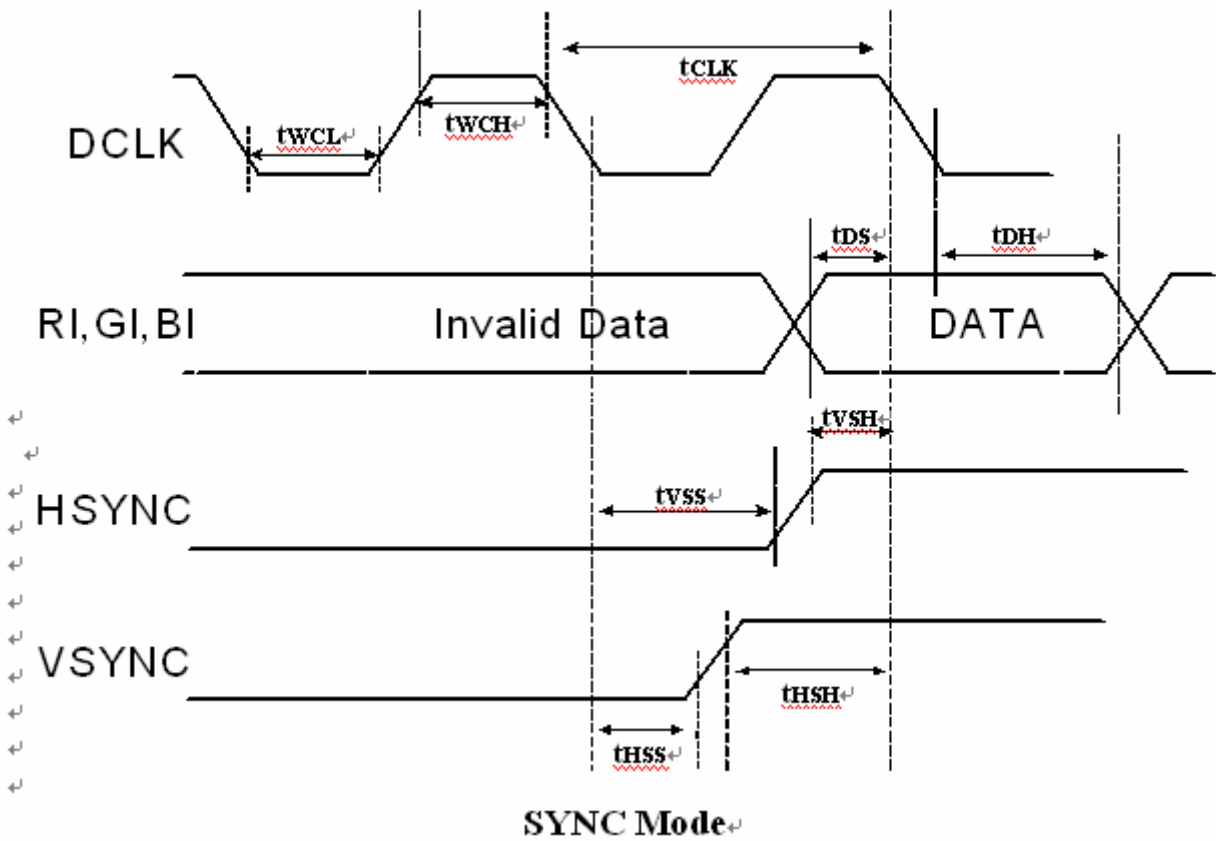
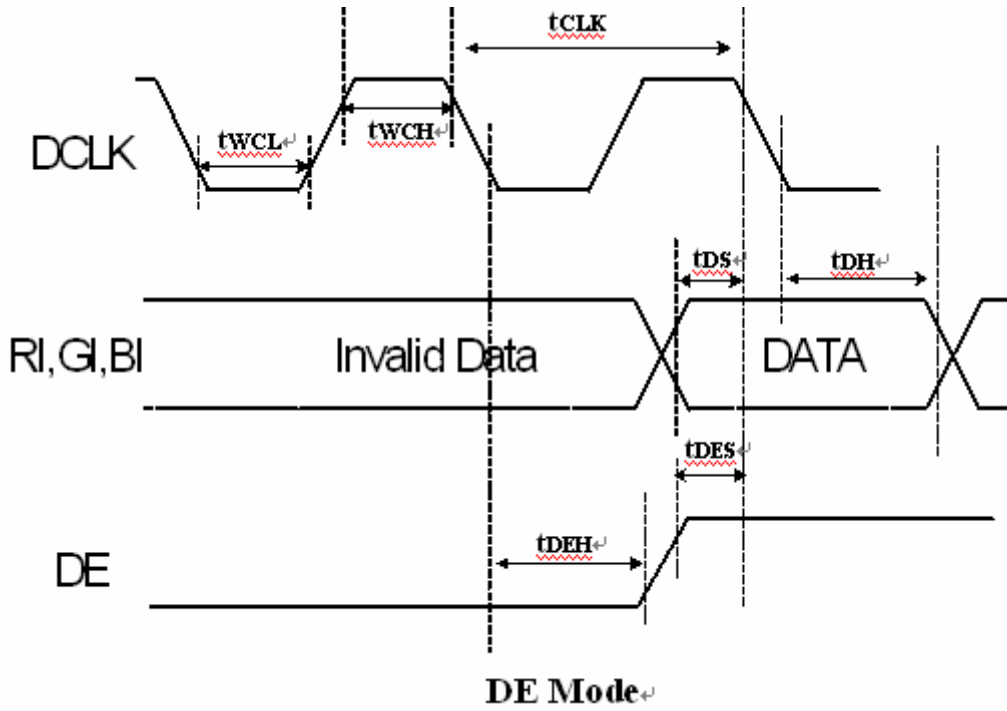
ITEM		SYMBOL	MIN.	TYP.	MAX.	UNIT
DCLK	Period	$t_{CLK}$	31	37.0	40.0	ns
	Dot Clock	$f_{CLK}$	25	27	32.11	MHz
	Low Level Width	$t_{WCL}$	6	-	-	ns
	High Level Width	$t_{WCH}$	6	-	-	
DE MODE	DE Setup Time	$t_{DES}$	5	-	-	ns
	DE Hold Time	$t_{DEH}$	10	-	-	
	Horizontal Period	$t_{HP}$	850	900	950	$t_{CLK}$
	Horizontal Valid	$t_{HV}$	800			
	Horizontal Blank	$t_{HBK}$	50	100	150	
	Vertical Period	$t_{VP}$	490	500	520	$t_{HP}$
	Vertical Valid	$t_{VV}$	480			
	Vertical Blank	$t_{VBK}$	10	20	40	
	Vertical Frequency	$f_V$	55	60	65	
	SYNC MODE	HSYNC Setup Time	$t_{HSS}$	5	-	-
HSYNC Hold Time		$t_{HSH}$	10	-	-	
VSYNC Setup Time		$t_{VSS}$	5	-	-	
VSYNC Hold Time		$t_{VSH}$	10	-	-	
Horizontal Period		$t_{HP}$	850	900	950	$t_{CLK}$
Horizontal Pulse Width		$t_{HPW}$	4	-	-	
Horizontal Pulse Width + Back Proch		$t_{HPWB}$	50	50	50	
Horizontal Front Proch		$t_{HFP}$	0	50	100	
Horizontal Valid		$t_{HV}$	800			$t_{HP}$
Vertical Period		$t_{VP}$	490	500	520	
Vertical Pulse Width		$t_{VPW}$	1	-	-	
Vertical Pulse Width + Back Proch		$t_{VPWB}$	6	6	6	
Vertical Front Proch		$t_{VFP}$	4	14	34	
Vertical Valid		$t_{VV}$	480			
Vertical Frequency	$f_V$	55	60	65		
Vertical Frequency	$f_V$	55	60	65		
DATA	Setup Time	$t_{DS}$	5	-	-	ns
	Hold Time	$t_{DH}$	10	-	-	

Remarks :

\*1) High level of logic signal is 80%.Low level of logic signal is 20%

\*2) This module is operated by DE only mode.

5.2 Timing sequence(Timing chart)



5.3 Color Data Assignment

COLOR	INPUT DATA	R DATA						G DATA						B DATA					
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
		MSB					LSB	MSB					LSB	MSB					LSB
BASIC COLOR	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(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(1)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	RED(2)	0	0	0	0	1	0	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(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN(1)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	GREEN(2)	0	0	0	0	0	0	0	0	0	0	1	0	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(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BLUE(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	BLUE(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	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

Remarks :

- (1) Definition of Gray Scale  
 color(n) : n is series of Gray Scale  
 The more n value is, the bright Gray Scale.
- (2)Data:1-High,0-Low

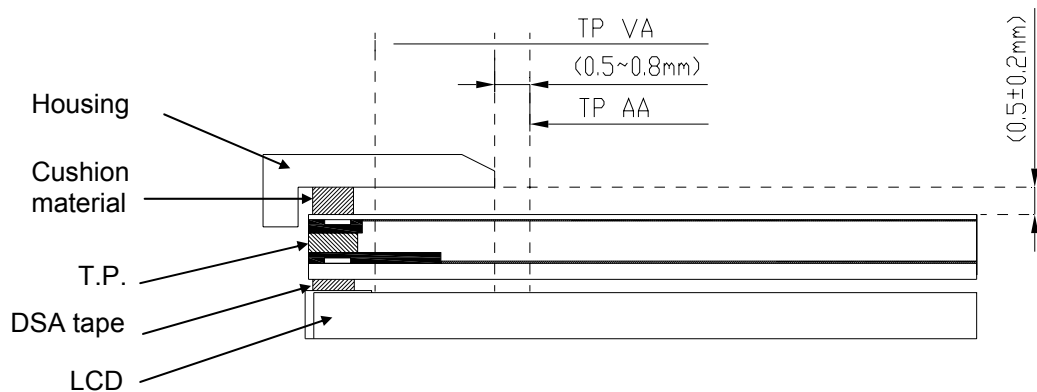
## 6. CHARACTERISTIC OF TOUCH PANEL

### 6.1 Basis characteristic

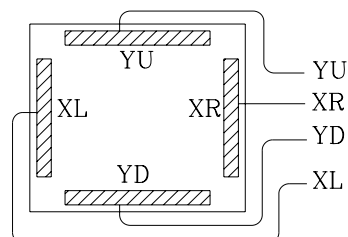
Item	Standard	Note
Operating Voltage	3V(Min)/5V(Typ)/7V(Max)	DC
Surface Treatment	Anti-Glare · Hardness : 3H	
Activation Force	20gf ± 10gf	Less than 80gf(Typical 20gf) individual with stylus pen (R 0.8mm) or finger (R 8.0mm)
Linearity Force	130 gf	Input with stylus pen (R0.8mm)
Interface Type	4 Wire Resistive	
Resistance Between Terminals	X(Glass side) : 360~1140Ω Y(Film side) : 120~640Ω	At the connector
Linearity	X(Glass side) : ≤ 1.5% Y(Film side) : ≤ 1.5%	Testing interval is 2mm with load 100g
Insulation Resistance	Min. 20MΩ	At DC 25V

### 6.2 Design guideline for Touch-Panel

- The Housing Cushion on touch-panel must be set at outside of T.P's view-area .
- The Cushion material must be elastic material.
- The housing must avoid to touch the T.P
- To combine, the housing should not be stuck on T.P.
- Example of housing design :

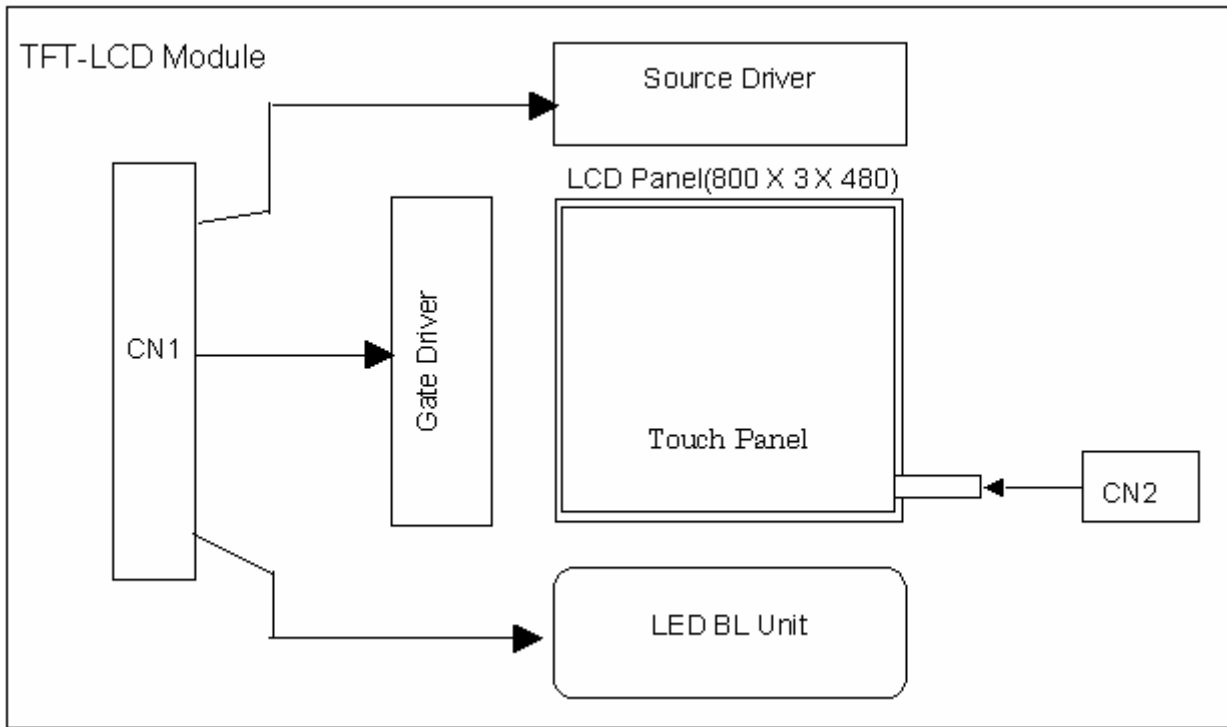


### 6.3 Circuit Diagram



Circuit Diagram

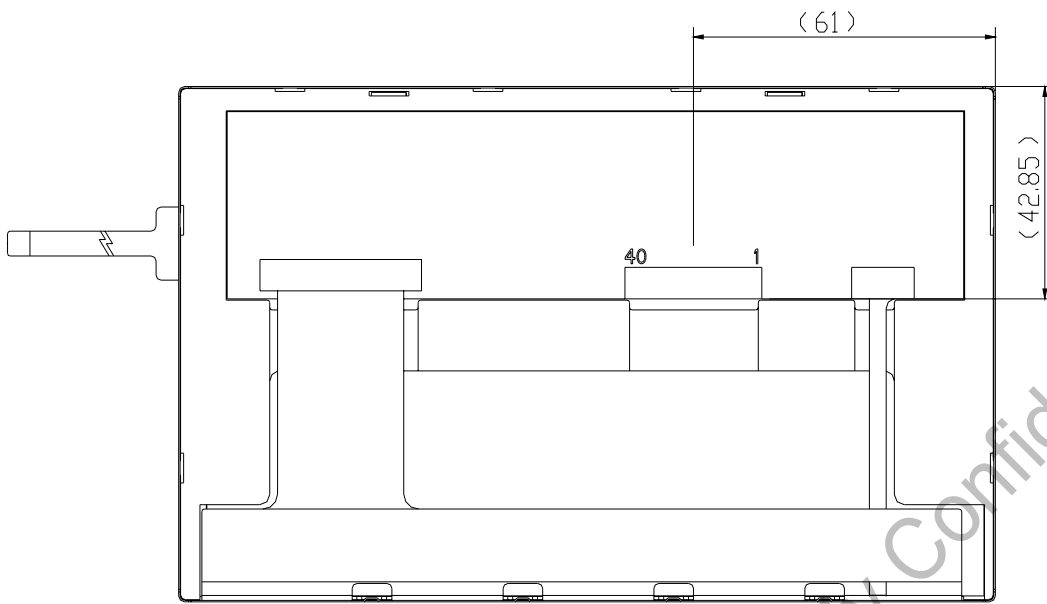
### 7. BLOCK DIAGRAM





8.2 Rear Side

[Unit : mm]



Remark : Un-indication tolerance is  $\pm 0.3\text{mm}$

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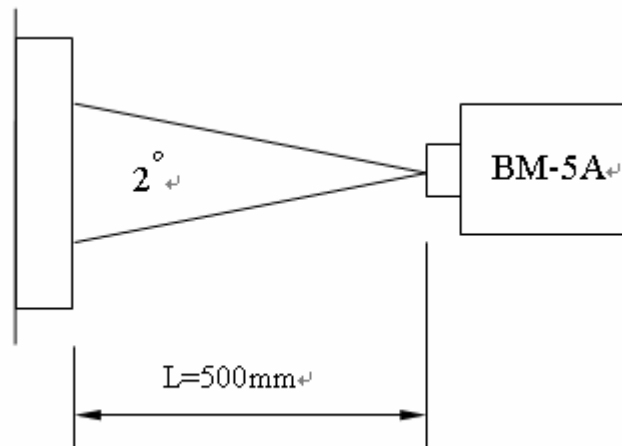


## 9. OPTICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	Remarks	
Constrast Ratio	CR	Point-5	300	400	--	--	*1)*2)*3)	
Luminance*)	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)	
Viewing Angle	Horizontal	$\phi$	CR $\geq$ 10 Point-5	120	140	--	°	*1)*2)*4)
	Vertical			$\theta$	90	110	--	
Color Coordinate	White	Wx Wy	Point-5	TBD	TBD	TBD	--	*1)*3)
	Red	Rx Ry		TBD	TBD	TBD		
	Green	Gx Gy		TBD	TBD	TBD		
	Blue	Bx By		TBD	TBD	TBD		

Remarks :

\*1)Measure condition : 25°C $\pm$ 2°C , 60 $\pm$ 10%RH under 10 Lux in the dark room.BM-5A (TOPCON) , viewing angle 2° , VCC=3.3V , VDD=5V.



\*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 :

Measure white luminance on the point 5 as figure9-1

Definition of Luminance Uniformity:

Measure white luminance on the point1 ~9as figure9-1

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

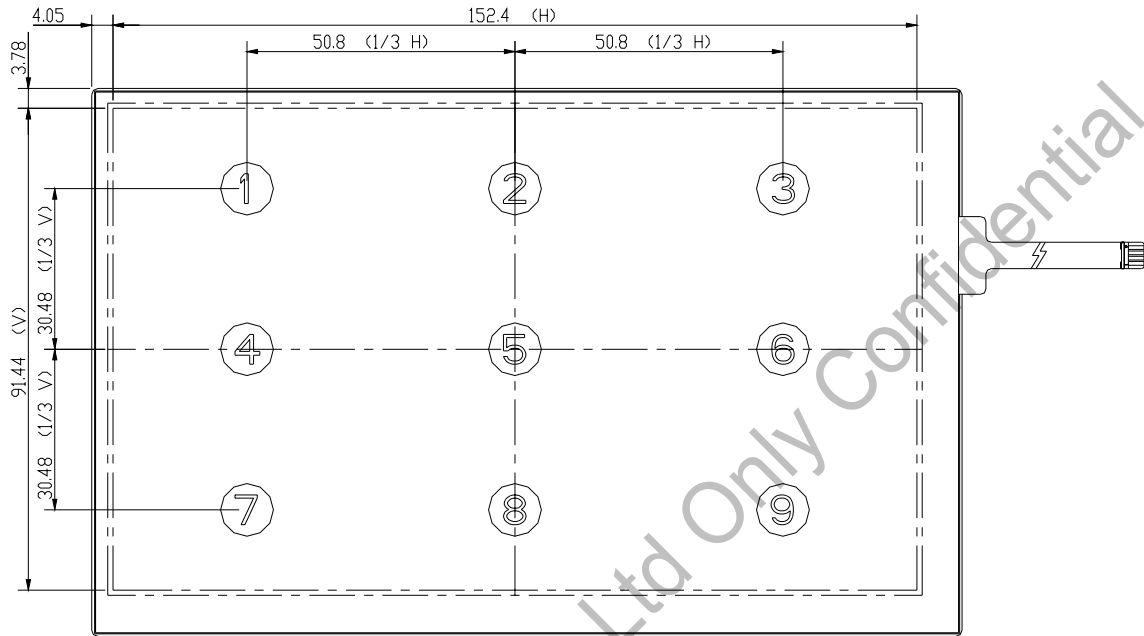


Fig9-1 Measuring point

\*4) Definition of Viewing Angle( $\theta, \psi$ ), refer to Fig9-2 as below :

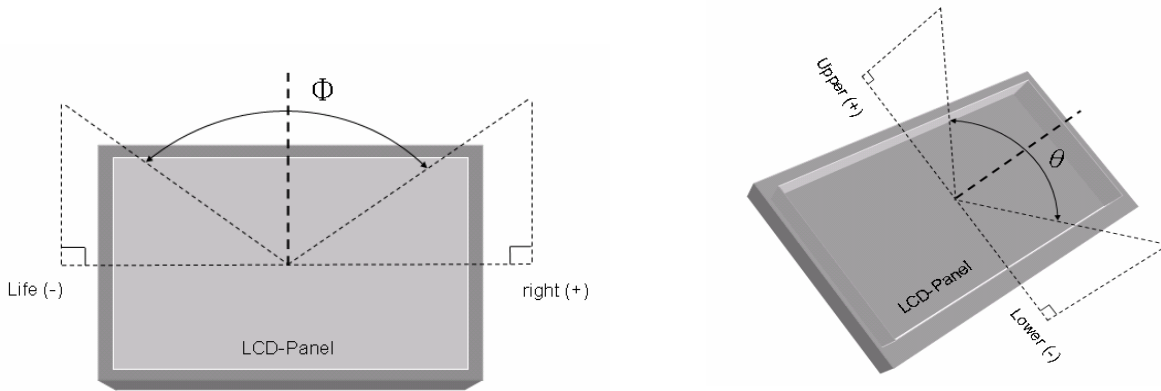


Fig9-2 Definition of Viewing Angle

\*5) Definition of Response Time.(White-Black)

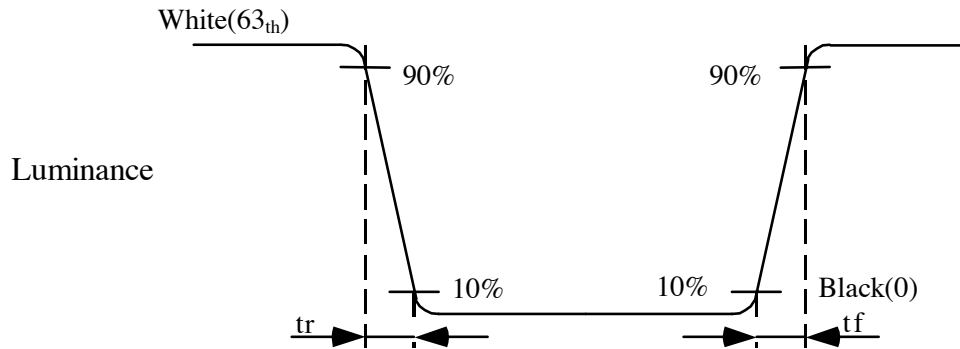


Fig9-3 Definition of Response Time(White-Black)

## 10. RELIABILITY TEST

### 10.1. Temperature and humidity

TEST ITEMS	CONDITIONS	REMARK
High Temperature Operation	85°C , 240Hrs	
High Temperature Storage	95°C , 240Hrs	
High Temperature 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 (0.5Hr) ~ 85°C(0.5Hr) 200 cycles	

### 10.2. 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: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:1.3mm</li> <li>● Vibration: sinusoidal wave, perpendicular axis(both x, z axis:2Hrs, y axis 4Hrs).</li> <li>● Sweep:2.9G,33.3Hz-400Hz</li> <li>● Cycle:15min</li> </ul>

### 10.3. ESD Test

ITEM	Condition	REMARKS
ESD	150pF , 330 ±8KV&±15KV air & contact test	*1)
	200pF , 0Ω ±250V contact test	*2)

Remarks :

\*1) LCD glass and metal bezel

\*2) IF connector pins

### 10.4Judgment 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 trasformation of the module parts should be ignored.

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