Chunghwa Picture Tubes, Ltd.
Product Specification

To :
Date : 2007.02.05

TFT LCD
CLAA057VA01CT (Tentative)

ACCEPTED BY :
(Tentative)

APPROVED BY	CHECKED BY	PREPARED BY
張聖暉	李家銘	張奕祥

Prepared by :
Small &Medium Product Planning Management Department
Small &Medium Product General Division
CHUNGHWA PICTURE TUBES, LTD.
1127 Hopin Rd., Padeh, Taoyuan, Taiwan 334, R.O.C.

Doc.No:	CLAA057VA01CT-Ver0.3-RB - 20070119	Issue Date:	2007/01/17

REVISION STATUS

Revision Notice	Description	Page	Rev. Date
0.0	First revision (Tentative)		2006/9/15
0.1	1.Add CHARACTERISTIC OF TOUCH PANEL	p.13 & p.14	2006/11/7
	2. Revise INTERFACE CONNECTION	p.8	
0.2	1. Add ADJ Input Voltage in 3-1 TFT-LCD	p.6	2006/11/7
	2. Delete Remark(4) in ABSOLUTE MAXIMUM RATINGS	p.4	
	3. Revise TFT-LCD current comsumption	p.6	
	4. Revise INTERFACE CONNECTION	p.8	
	5. Revise Timing Specification	p.10	
	6. Revise Timing sequence(Timing chart)	p.11	
	7. Revise BLOCK diagram	p.15	
0.3	1. operation frequency:20±5KHZ	p.9	2006/12/22
	2. 6.1 Basis characteristic: Hardness:3H	p.14	

CONTENTS

1. OVERVIEW

CLAA057VAO1CT is 5.7" color TFT-LCD(Thin Film Transistor Liquid Crystal Display)module composed of LCD panel,driver ICs,control circuit,and LED backlight.

The 14.52cm(5.7") screen produces a high resolution image that is composed of 640×480 pixel elements in a stripe arrangement.Display 262K colors by 6 Bit R.G.B signal input.Use 3.3 Voltage to drive the power of LCD system,and 5 Voltage to drive the black light LED.

General specifications are summarized in the following table:

ITEM	SPECIFICATION
Panel Size	5.7 inch(panel diagonal)
Display Area (mm)	116.16(W)×87.12(H)
Number of Pixels	640×3(H)×480(V)
Pixel Pitch (mm)	0.1815(H)×0.1815(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)	30ms
Brightness(cd/m^2)	180nit(typ)
NTSC ratio	50%
Viewing Angle(BL on,CR≧10)	140 degree(H)，100degree(V)
Electrical Interface(data)	TTL
Power consumption(W)	TBD
Outline Dimension(in mm)	127(W)×100(H)×7.65(D)
Weight(g)	~132g
BL unit	LED
Surface Treament	Anti-Glare，Hardness:3H
Type of touch screen	4 Wire resistance type

2. ABSOLUTE MAXIMUM RATINGS

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

Remarks：

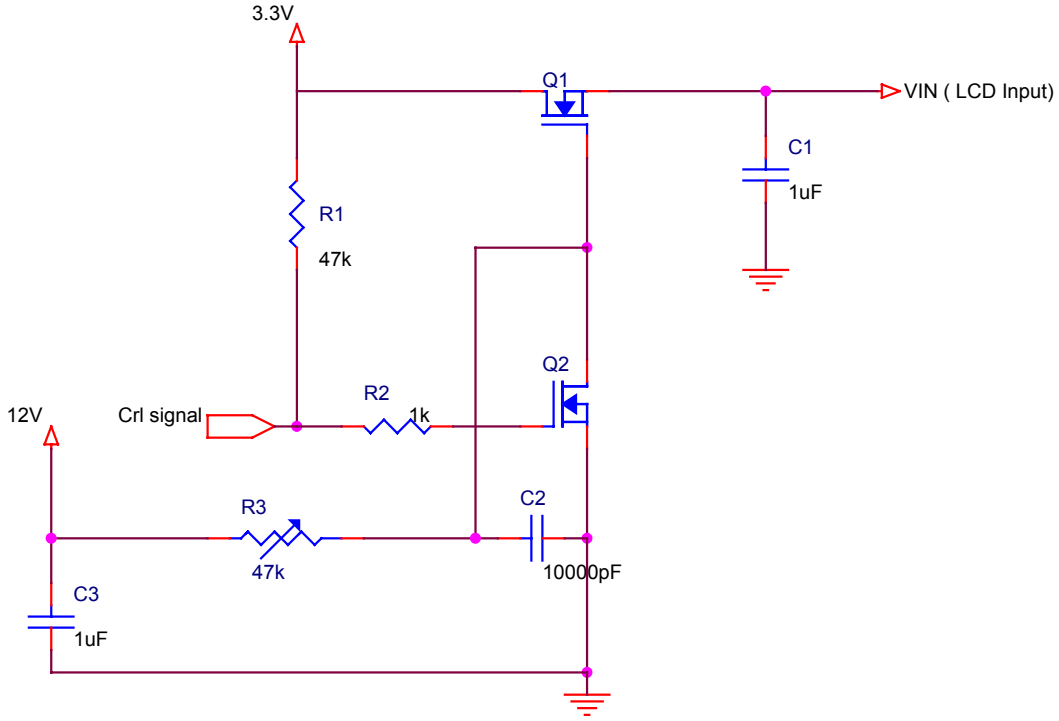
*1) If users use the product out off the environmemt operation range（temperature and humidity）,it will concern for visual quality.

*2) Test Condition: IEC 61000-4-2 ,

VESDc ：Contact discharge to input connector

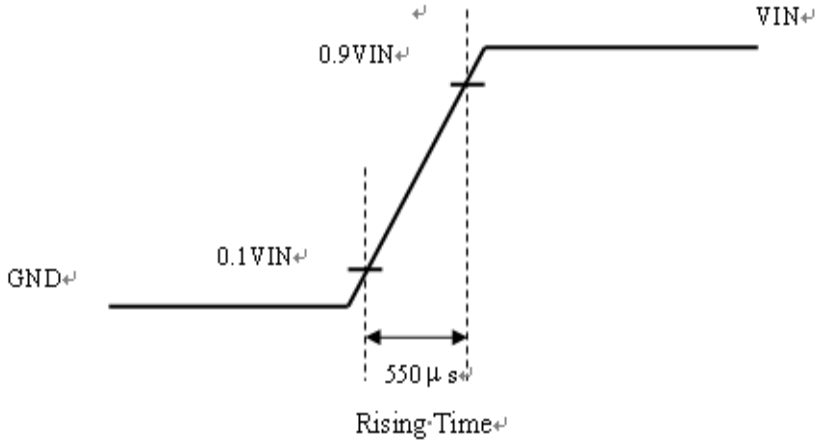
VESDm：Contact discharge to module

*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

3.1TFT LCD

Ta=25℃

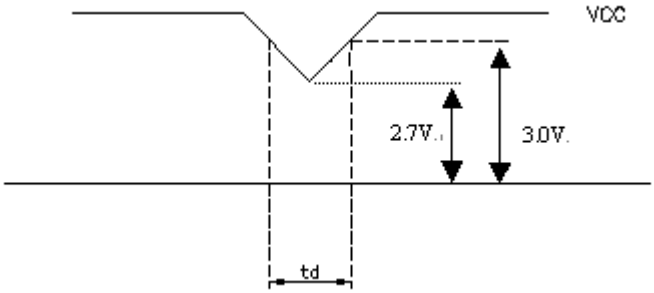
Item		Symbol	Min.	Typ	Max.	Unit	Note
Power Supply Voltage For LCD		V_{CC}	3.0	3.3	3.6	V	*1)
Power Supply Voltage For LED		V_{LED}	4.5	5	5.5	V	
Logic Input Voltage		V_{IH}	VCC*0.7	--	VCC	V	
		V_{IL}	0	--	VCC*0.3	V	
ADJ Input Voltage	Threshold Voltage(high)	VIH	VCC*0.7	--	VCC	V	
	Threshold Voltage(low)	VIL	0	--	VCC*0.3	V	

Remarks：

*1) VCC –dip codition:

When 2.7 V≦VCC＜3.0V，td≦10ms.

VCC＞3.0V，VCC-dip condition should be same as VCC-turn-on condition.

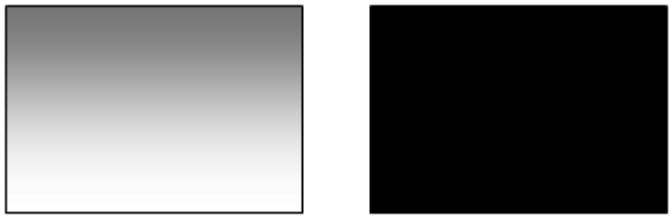


3.2TFT-LCD current comsumption

Item	Symbol	Min.	Typ	Max.	Unit	Note
LCD power current	I_{CC}	--	150	190	mA	*1)
LED power current	I_{LED}		345	385	mA	*2)

*1) Typical: Under 64 gray pattern

Maximum: Under black pattern

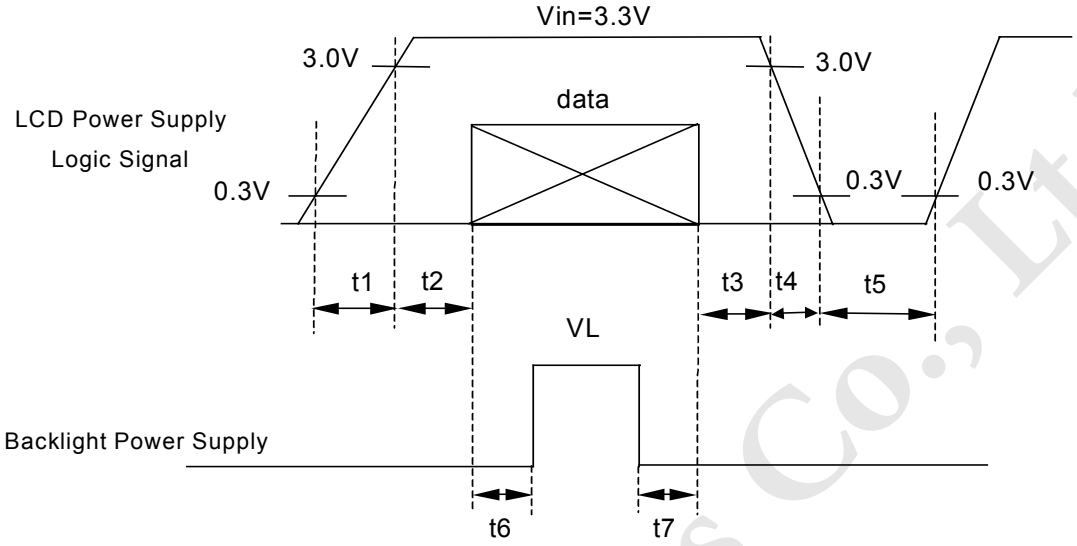


*2) Typical: When V_{LED} is 5.0V

Maximum: When V_{LED} is 4.5V

3.3 Power、Signal sequence

t1≦10ms 1 sec≦t5
50ms≦t2 200ms≦t6
0＜t3≦50ms 200ms≦t7
0＜t4≦10ms



Data: RGB DATA, DCLK, DENA

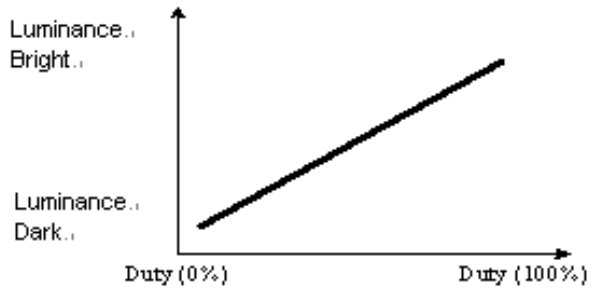
4. INTERFACE CONNECTION

CN1：Starconn 089N40-000R00-G2

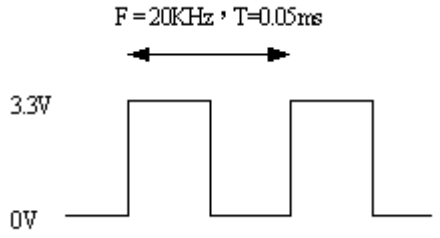
Pin NO.	SYMBOL	DESCRIPTION
1	U/D	Up or Down Display Control
2	NC	Customer non-connect ; initial pull high =DE mod
3	Hsync	Horizontal SYNC.
4	V_{LED}	Power Supply for LED
5	V_{LED}	Power Supply for LED
6	V_{LED}	Power Supply for LED
7	Vcc	Power Supply for LCD
8	Vsync	Vertical SYNC.
9	DE	Data Enable
10	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_{SS}	Power Ground
17	B2	Blue Data 2
18	B1	Blue Data 1
19	B0	Blue Data 0 (LSB)
20	V_{SS}	Power Ground
21	G5	Green Data 5 (MSB)
22	G4	Green Data 4
23	G3	Green Data 3
24	V_{SS}	Power Ground
25	G2	Green Data 2
26	G1	Green Data 1
27	G0	Green Data 0 (LSB)
28	V_{SS}	Power Ground
29	R5	Red Data 5 (MSB)
30	R4	Red Data 4
31	R3	Red Data 3
32	V_{SS}	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_{SS}	Power Ground
40	L/R	Left / Right Display Control

Remarks：

1).ADJ adjust brightness to control Pin，Pulse duty the bigger the brighter.



2) ADJ signal =0~3.3V，operation frequency:20±5KHZ



3) GND Pin must ground contact，can not be floating.

4) U/D and L/R are controled 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

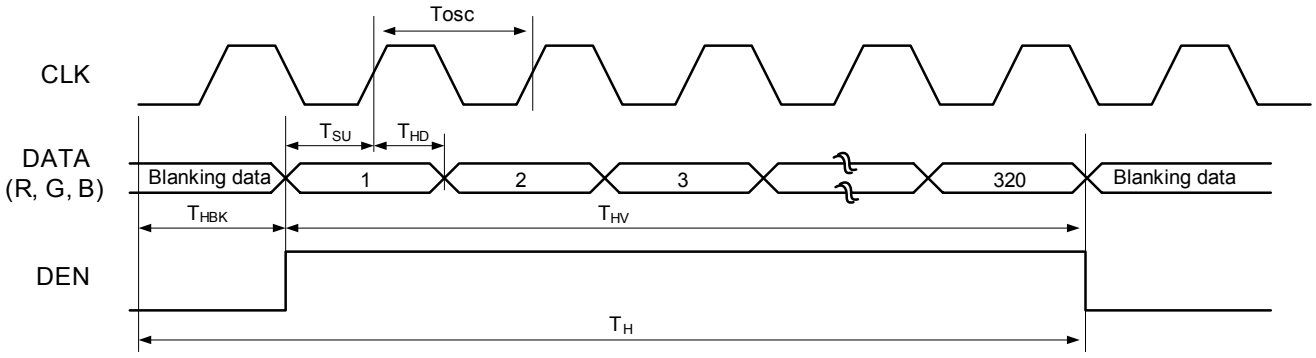
5. INPUT SIGNAL(DE ONLY MODE)

5.1 Timing Specification

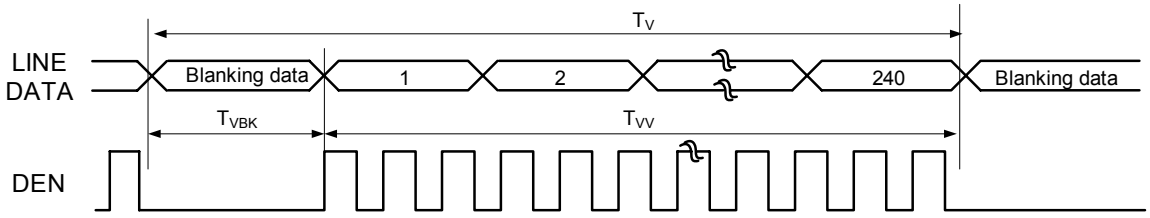
characteristics		SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
DCLK	Period	T_{OSC}	33	40	43	ns	
	Dot Clock	F_{OSC}	23	25	30	MHz	
	Horizontal Period	T_H	750	800	900	T_{OSC}	
	Horizontal Valid	T_{HV}		640			
	Horizontal Blank	T_{HBK}	110	160	260		
	Vertical Period	T_{VP}	515	525	560	T_H	
	Vertical Valid	T_{VV}		480			
	Vertical Blank	T_{VBK}	35	45	80		
	Vertical Frequency	F_V	55	60	65	Hz	
SYNC MODE	Horizontal Period	T_H	750	800	900	T_{OSC}	
	Horizontal Pulse Width	T_{HS}	1	1	1		
	Horizontal Pulse Width + Back Proch	T_{HPWB}	46	46	46		
	Horizontal Front Proch	T_{HF}	64	114	214		
	Horizontal Valid	T_{HV}		640			
	Vertical Period	T_{VP}	515	525	560	T_H	
	Vertical Pulse Width	T_{VS}	1	1	1		
	Vertical Pulse Width + Back Proch	T_{VPWB}	34	34	34		
	Vertical Front Proch	T_{VF}	1	11	46		
	Vertical Valid	T_{VV}		480			
	Vertical Frequency	F_V	55	60	65	Hz	

5.2 Timing sequence(Timing chart)

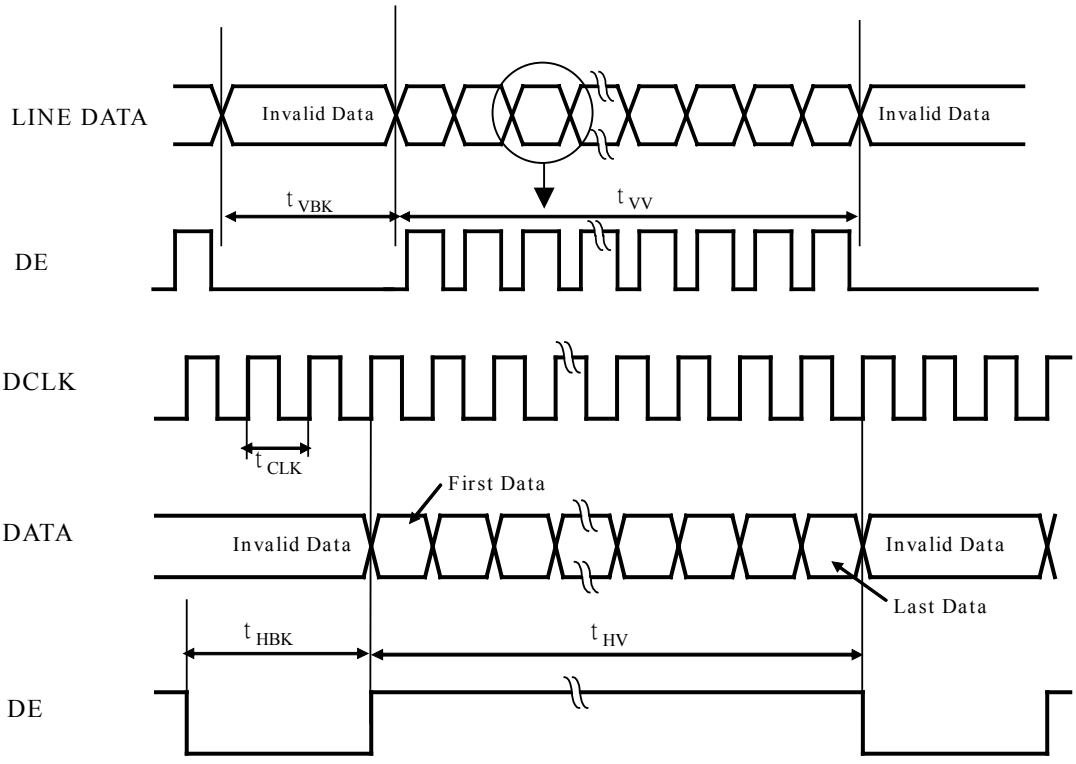
Horizontal Timing Sequence



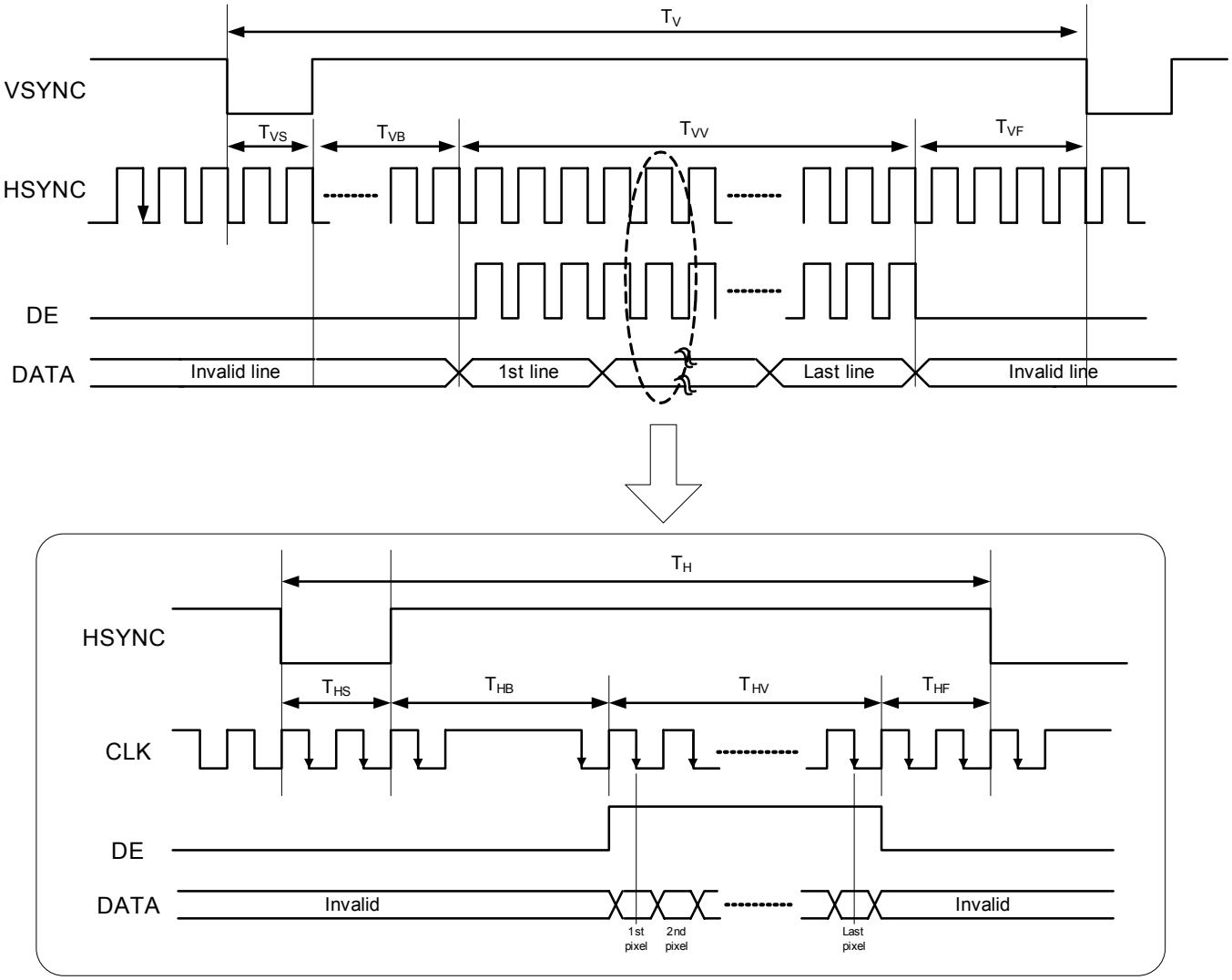
Vertical Timing Sequence



DE mode Timing



DE mode Timing



Sync mode Timing

5.3 Color Data Assignment

COLOR	INPUT	R DATA						G DATA						B DATA					
	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
	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
BASIC	GREEN(63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
COLOR	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(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																			
	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(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																			
	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(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																			
	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

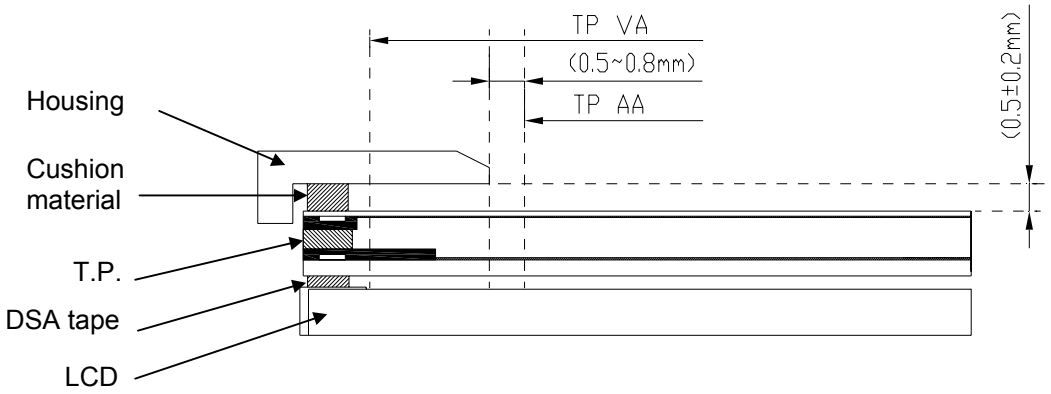
6. CHARACTERISTIC OF TOUCH PANEL

6.1 Basis characteristic

Item	Standard	Note
Operating Voltage	3V(Min)/5V(Typ)/7V(Max)	DC
Surface Treatment	Anti-Glare，Hardness：3H	
Activation Force	< 80gf	Less than 80gf(Typical 25gf) individual with stylus pen (R 0.8mm) or finger (R 8.0mm)
Linearity Force	130 gf	2 Layer(Thickness :0.7mm)
Interface Type	4 Wire Resistive	
Resistance Between Terminals	X(Glass side)：120~640Ω	At the connector
	Y(Film side)：200~900Ω	
Linearity	X(Glass side)：≦1.5%	Testing interval is 2mm with load 80g
	Y(Film side)：≦1.5%	
Insulation Resistance	Min. 20MΩ	At DC 25V

6.2 Design guideline for Touch-Panel

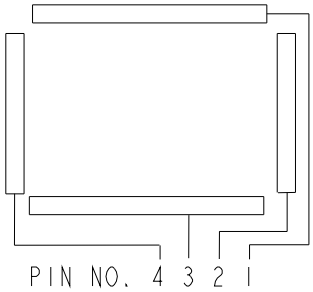
(a) The Housing Cushion on touch-panel must be set at outside of T.P's view-area .
(b) The Cushion material must be elastic material.
(c) The housing must avoid to touch the T.P
(d) To combine, the housing should not be stuck on T.P.
(e) Example of housing design：



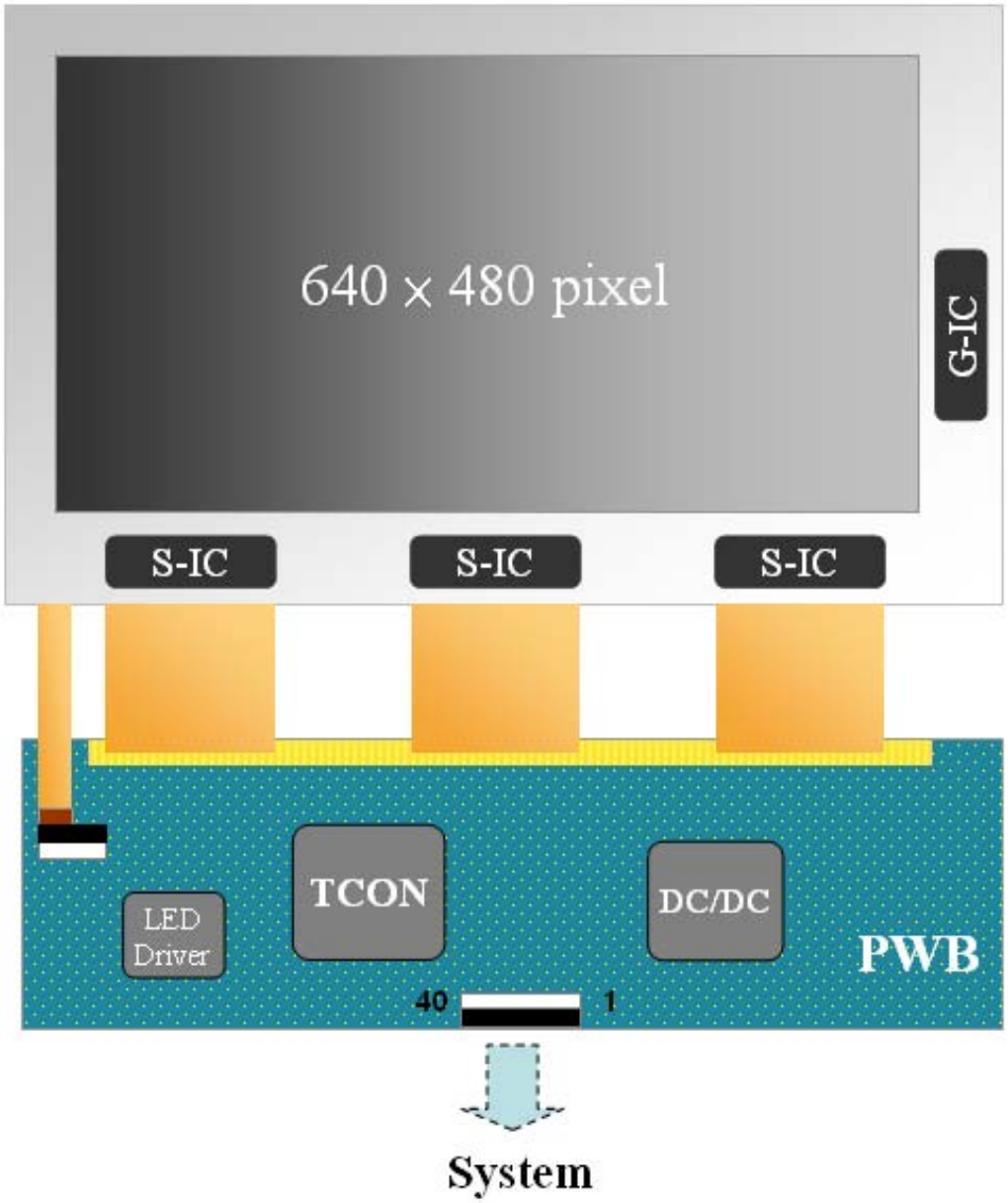
6.3 Circuit Diagram

PIN No.	Assignment
1	Y1
2	X1
3	Y2
4	X2

X:Film electrode
Y:Glass electrode

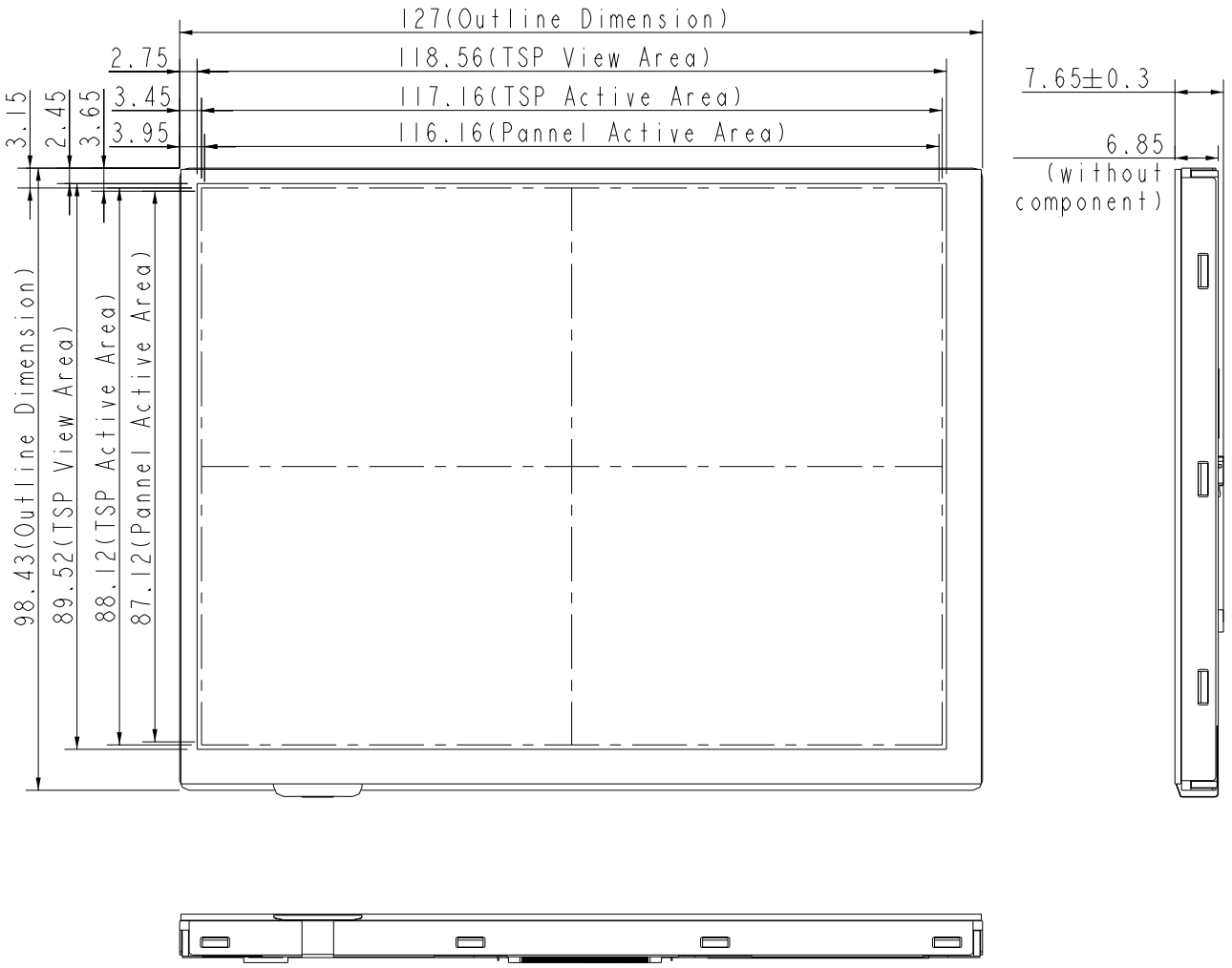


7. BLOCK DIAGRAM


640 x 480 pixel
G-IC
S-IC
S-IC
S-IC
LED Driver
TCON
DC/DC
PWB
40
1
System

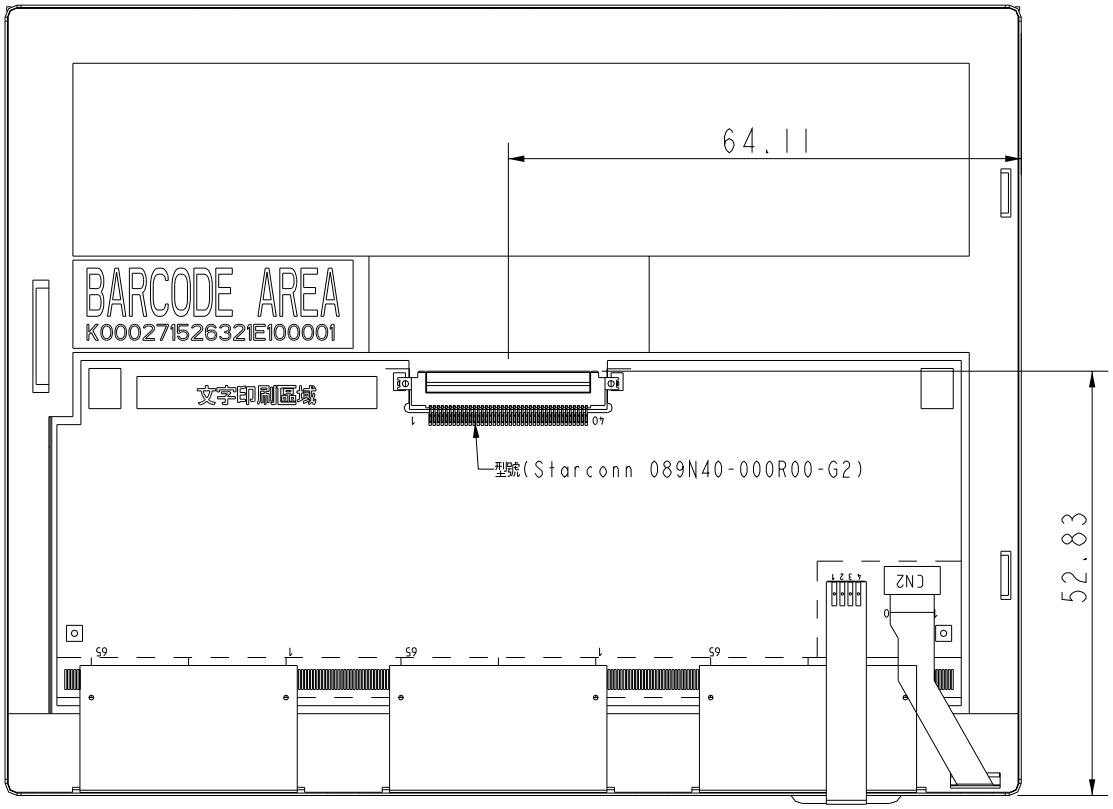
8. MECHANICAL DIMENSION

8.1 Front Side [Unit：mm]



8.2 Rear Side

[Unit：mm]



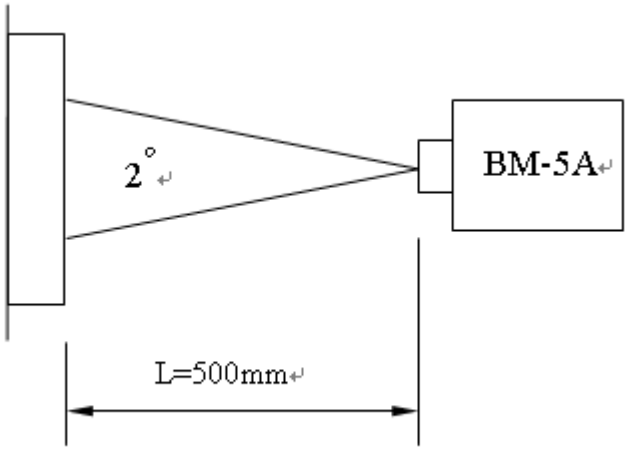
Remark：Un-indication tolerance is ±0.3mm

9. OPTICAL CHARACTERISTICS

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	Remarks
Constrast Ratio		CR	Point-5	200	300	--	--	*1)*2)*3)
Luminance		Lw	Point-5	160	180	--	cd/m^2	*1)*3)
Luminance Uniformity		ΔL		70	80	--	%	*1)*3)
Response Time (White - Black)		Tr+ Tf	Point-5	--	30	50	ms	*1)*3)*5)
Viewing Angle	Horizontal	ϕ	CR≧10 Point-5	120	140	--	°	*1)*2)*4)
	Vertical	θ		80	100	--	°	*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		

Remarks：

*1)Measure condition：25℃±2℃，60±10%RH，under10 Lux in the dark room.BM-5A (TOPCON)，viewing angle2°，VCC=3.3V，V_{LED}=5V.



*2）Definition of contrast ratio：
Contrast Ratio (CR)= (White) Luminance of ON ÷ (Black) Luminance of OFF

*3) Definition of luminance：

Measure white luminance on the point 5 as figure8-1

Definition of Luminance Uniformity:

Measure white luminance on the point1~9 as figure8-1

△L = [L(MIN)/L(MAX)]×100

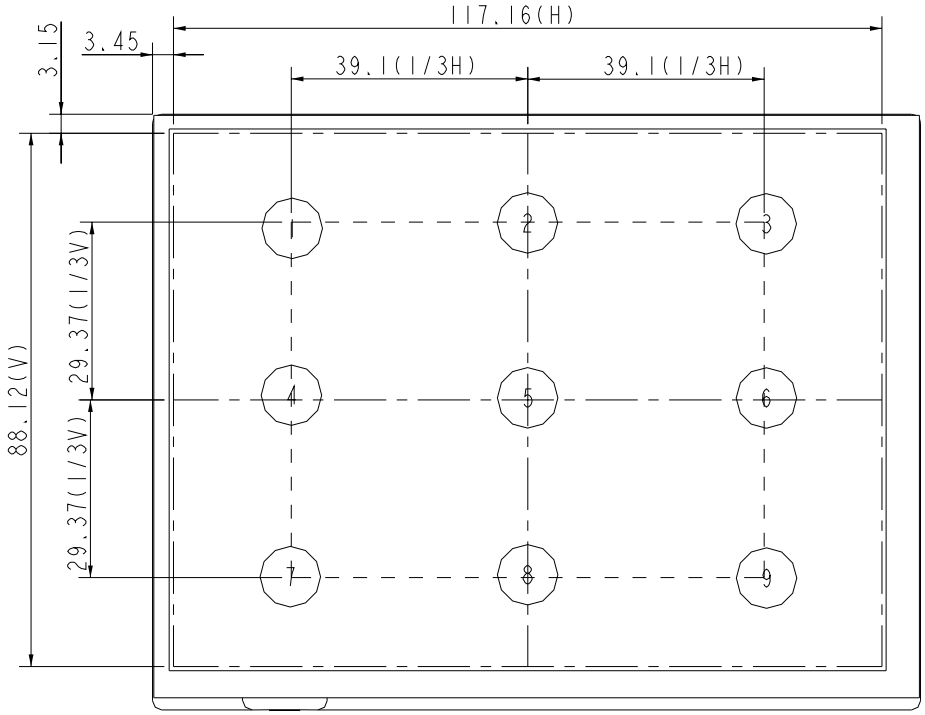


Fig8-1 Measuring point

*4) Definition of Viewing Angle(θ,ψ),refer to Fig8-2 as below：

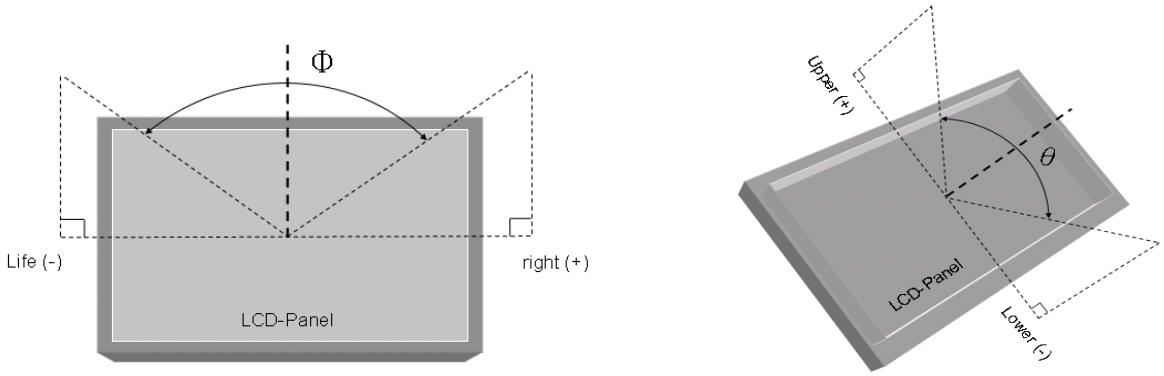


Fig8-2 Definition of Viewing Angle

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

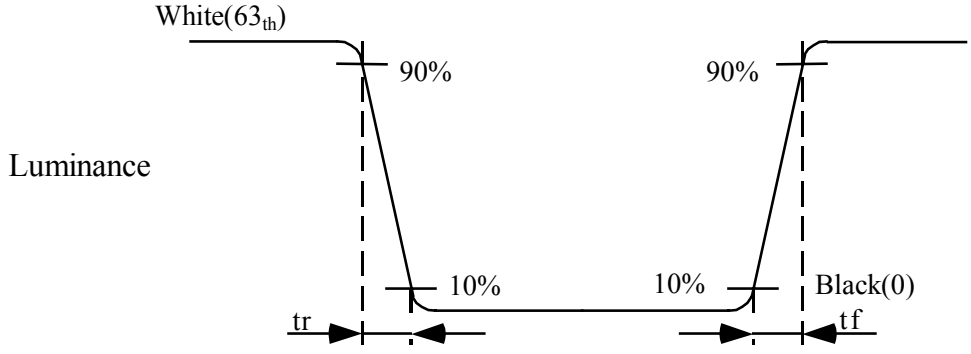


Fig8-3 Definition of Response Time(White-Black)

10. RELIABILITY TEST

10-1. Temperature and humidity

TEST ITEMS	CONDITIONS
High Temperature Operation	85℃，240H
High Temperature Storage	95℃，240H
High Temperature High Humidity Operation	60℃，90%RH，240H
Low Temperature Operation	-30℃，240H, Backlight unit always turn on
Low Temperature Storage	-40℃，240H
Thermal Shock	-30℃（0.5Hr）~ 85℃(0.5Hr) 200 cycles

10-2. Shock and Vibration

TEST ITEMS	CONDITIONS
Shock (Non-operation)	● Shock level:980m/s^2(equel to 100G) ● Waveform:half sinusoidal wave,6ms. ● Number of shocks:one shock input in each direction of three mutually perpendicular axes for a total of three shock inputs.
Vibration (Non-operation)	● Frequency range:8~33.3Hz ● Stoke:1.3mm ● Vibration:sinusodial wave,perpendicularaxis(both x,y,z axis:2Hrs). ● Sweep:2.9G,33.3Hz-400Hz ● Cycle:15min

10-3. 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 trasformation of the module parts should be ignored.

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