



Chunghwa Picture Tubes, Ltd.

Product Specification

To

Date : 20070110

TFT LCD

CLAA057VA01CW

ACCEPTED BY : V0.3

APPROVED BY	CHECKED BY	PREPARED BY
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REVISION STATUS

Revision Notice	Description	Page	Rev. Date
0.0	First revision (Tentative)	18	2006/9/6
0.1	Product name change to CLAA057VA01CW	18	2006/9/13
	Revise the contact of <u>1.OVERVIEW</u> (P.3)		
	The thickness of MDL appearance is revised for 6.6mm (P.3)		
	MDL weight is revised for 110g (P.3)		
	Delete three items Forward Current, Reverse Voltage, Pulse forward current in <u>2.ABSOLUTE MAXIMUM RATINGS</u> (P4)		
	Voltage of LED power in the <u>3.ELECTRICAL CHARACTERISTICS</u> (V_{LED}) as Minimum= 4.5V Stand= 5V & Maximum= 5.5V.		
	Revision LED power electric current mark is I_{LED} in the <u>3.ELECTRICAL CHARACTERISTICS</u>		
	Revise standard specification value: V_{LED} is input for 5.0 V. Maximum specification value: V_{LED} is input for 4.5 V.		
	Revise <u>4.INTERFACE CONNECTION SYMBOL & DESCRIPTION</u> of 2nd, 3rd & 8th pin.		
	Alter <u>ADJ: Luminance control pin</u> , the bigger the brighter its pulse duty is.		
	Revise <u>5. Input signal (DE only mode)</u> : Dot Clock (f_{CLK}) TYP value is 25.		
	Modification of figures of front view and back view in the <u>7. MECHANICAL DIMENSION</u> .		
	Modification of the high temperature keeping testing is 95°C for 240 hours. Thermal shock testing is -30°C (0.5hours) to 85°C (0.5hours) for 200 cycles in <u>9.RELIABILITY TEST</u> . Supplementary: Low-temperature turn on testing condition : Backlight unit always turn on.		
	4. interface connection(p8.)		
0.2	Power consumption(p.4)		2006/10/31
	TFT-LCD current consumption (p.6)		
0.3	MECHANICAL DIMENSION (p.14 &p.15)		2006/11/6

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1. OVERVIEW

CLAA057VAO1CW 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)	220nit(typ)
NTSC ratio	50%
Viewing Angle(BL on,CR ≥ 10)	140 degree(H) · 100degree(V)
Electrical Interface(data)	TTL
Power consumption(W)	2.1W
Outline Dimension(in mm)	127(W)×100(H)×6.6(D)
Weight(g)	110g
BL unit	LED
Surface Treatment	Anti-Glare · Hardness:3H

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	°C	*1)
Storage Temperature	T _{stg}	-40	95	°C	*1)

Remarks :

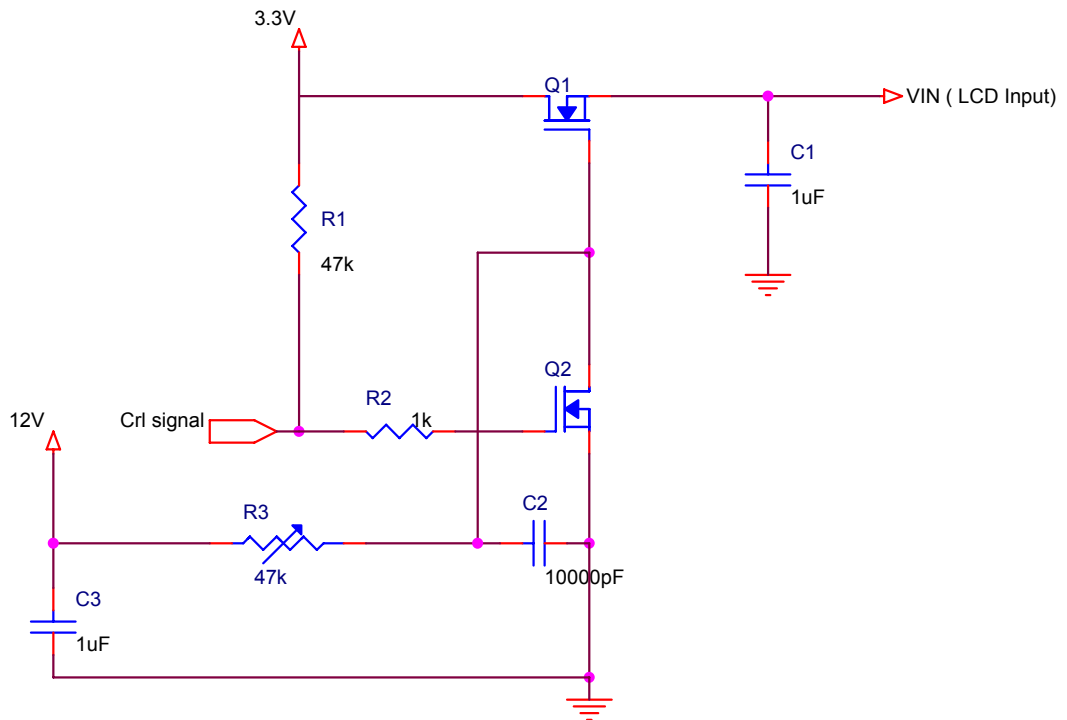
*1) If users use the product out off the environment operation range (temperature and humidity) ,it will concern for visual quality.

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

VESDc : Contact discharge to input connector

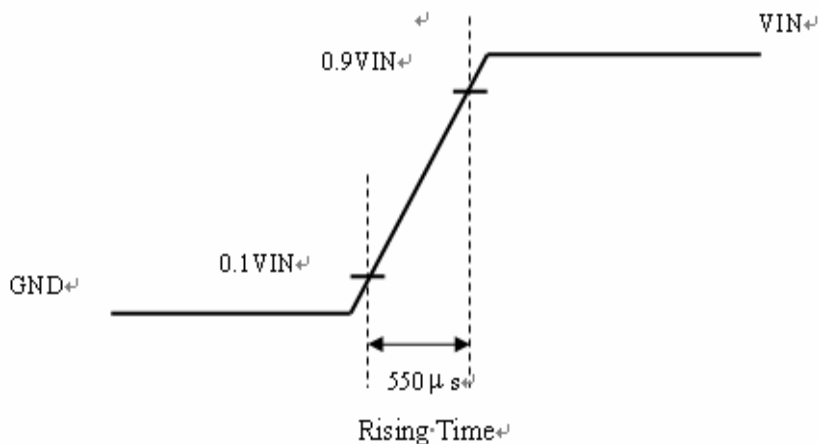
VESDm : Contact discharge to module

*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.



*4) Ifp Conditions : Pulse Width=10msec and Duty=1/10 °

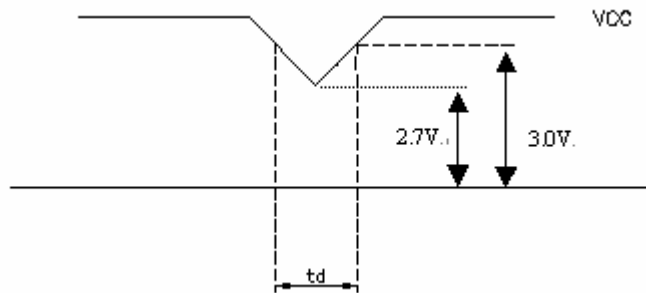
3. ELECTRICAL CHARACTERISTICS

3.1TFT LCD

Ta=25°C

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}	$V_{CC} \cdot 0.7$	--	V_{CC}	V	
	V_{IL}	0	--	$V_{CC} \cdot 0.3$	V	

Remarks :

*1) V_{CC} -dip condition:When $2.7\text{V} \leq V_{CC} < 3.0\text{V}$, $t_d \leq 10\text{ms}$. $V_{CC} > 3.0\text{V}$, V_{CC} -dip condition should be same as V_{CC} -turn-on condition.

3.2TFT-LCD current consumption

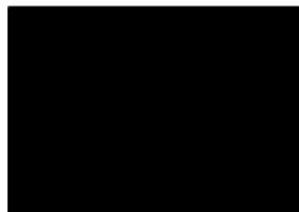
Item	Symbol	Min.	Typ	Max.	Unit	Note
LCD power current	I_{CC}	--	150	190	mA	*1)
LED power current	I_{LED}		320	360	mA	*2)

*1) Typical: Under 64 gray pattern

Maximum: Under black pattern



· · (a)64 Gray Pattern · · · · ·

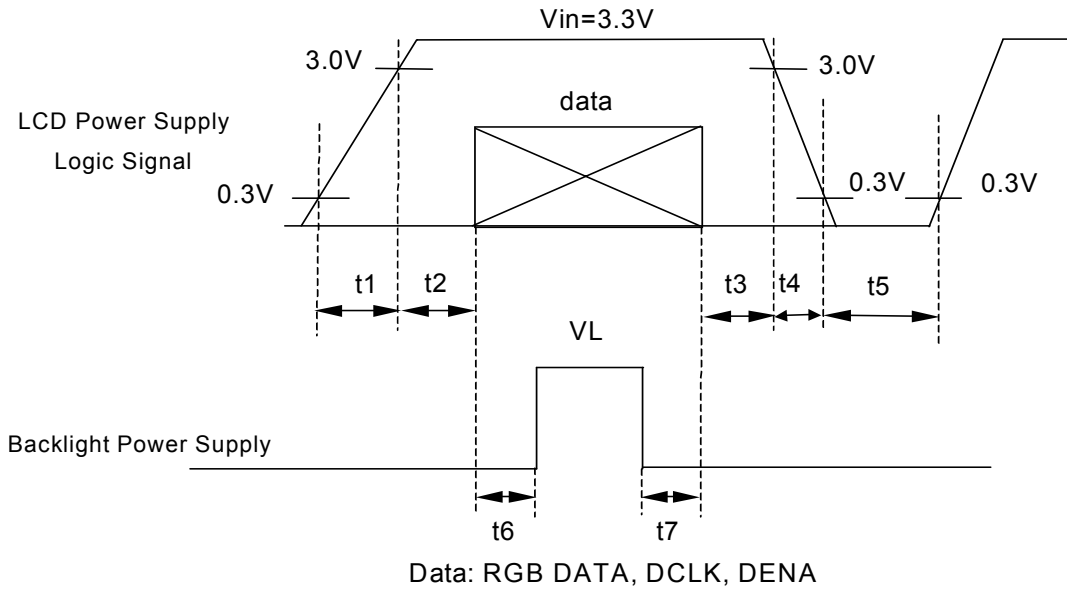


· · (b)Black Pattern · · · · ·

*2) Typical: When V_{LED} is 5.0VMaximum: When V_{LED} is 4.5V

3.3 Power 、 Signal sequence

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



4. INTERFACE CONNECTION

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

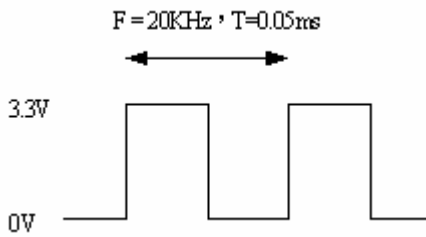
Pin NO.	SYMBOL	DESCRIPTION
1	U/D	Up or Down Display Control
2	NC	Customer non-connect ; initial pull high =DE mod
3	NC	NC
4	Vled	Power Supply for Digital Circuit LED
5	Vled	Power Supply for Digital Circuit LED
6	Vled	Power Supply for Digital Circuit LED
7	Vcc	Power Supply for Digital Circuit LCD
8	NC	NC
9	DE	Data Enable
10	V _{SS}	Power Ground
11	V _{SS}	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 _{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	V _{SS}	Power Ground
37	V _{SS}	Power Ground
38	DCLK	Clock Signals
39	V _{SS}	Power Ground
40	L/R	Left or 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 controlled 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

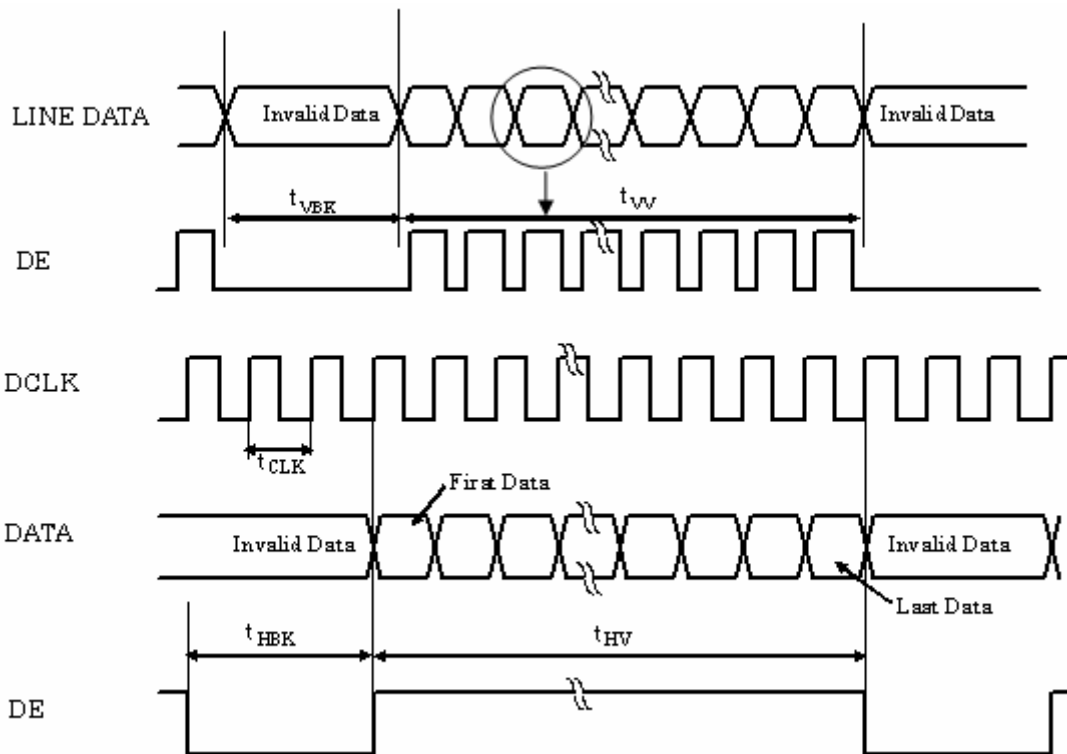
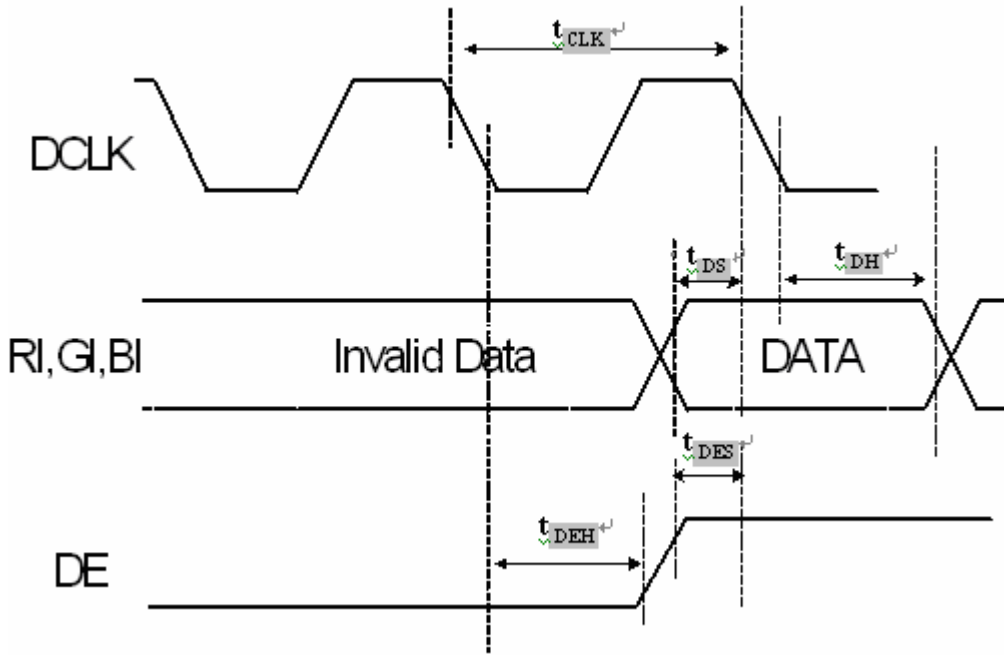
ITEM		SYMBOL	MIN.	TYP.	MAX.	UNIT
DCLK	Period	t_{CLK}	16.67			ns
	Dot Clock	f_{CLK}	5	25	40	MHz
	Low Level Width	t_{WCL}	0.3	-	-	ns
	High Level Width	t_{WCH}	0.3	-	-	
DE	Setup Time	t_{DES}	5	-	-	ns
	Hold time	t_{DEH}	10	-	-	
	Horizontal Period	t_{HP}	750	800	900	t_{CLK}
	Horizontal Valid	t_{HV}	640			
	Horizontal Blank	t_{HBK}	110	160	260	
	Vertical Period	t_{VP}	515	525	560	t_{HP}
	Vertical Valid	t_{VV}	480			
	Vertical Blank	t_{VBK}	35	45	80	
Vertical Frequency	f_V	55	60	65	Hz	
DATA	Setup Time	t_{DS}	4	-	-	ns
	Hold Time	t_{DH}	8	-	-	

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	R DATA						G DATA						B DATA					
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
	DATA	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 :

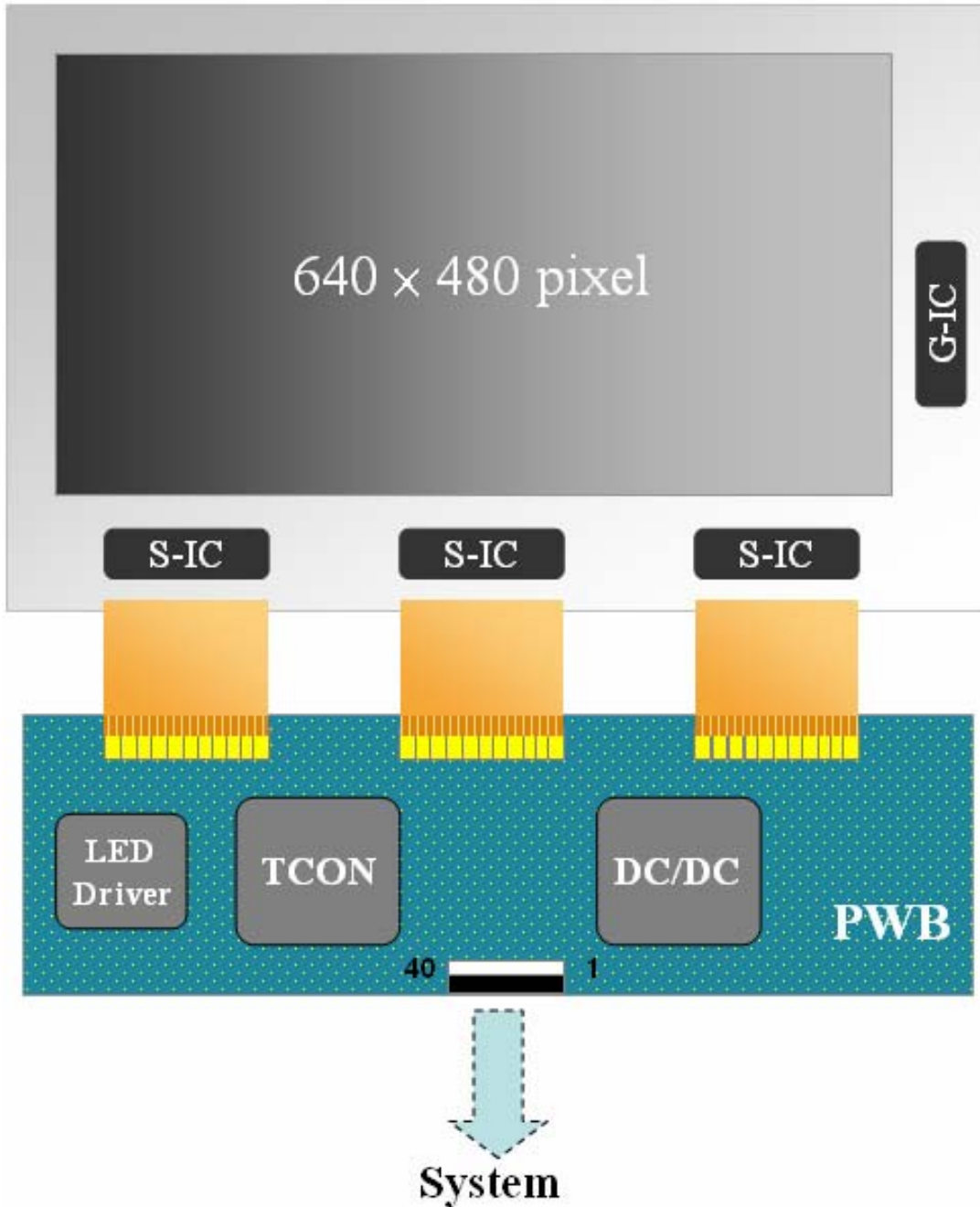
(1) Definition of Gray Scale

color(n) : n is series of Gray Scale

The more n value is, the bright Gray Scale.

(2)Data:1-High,0-Low

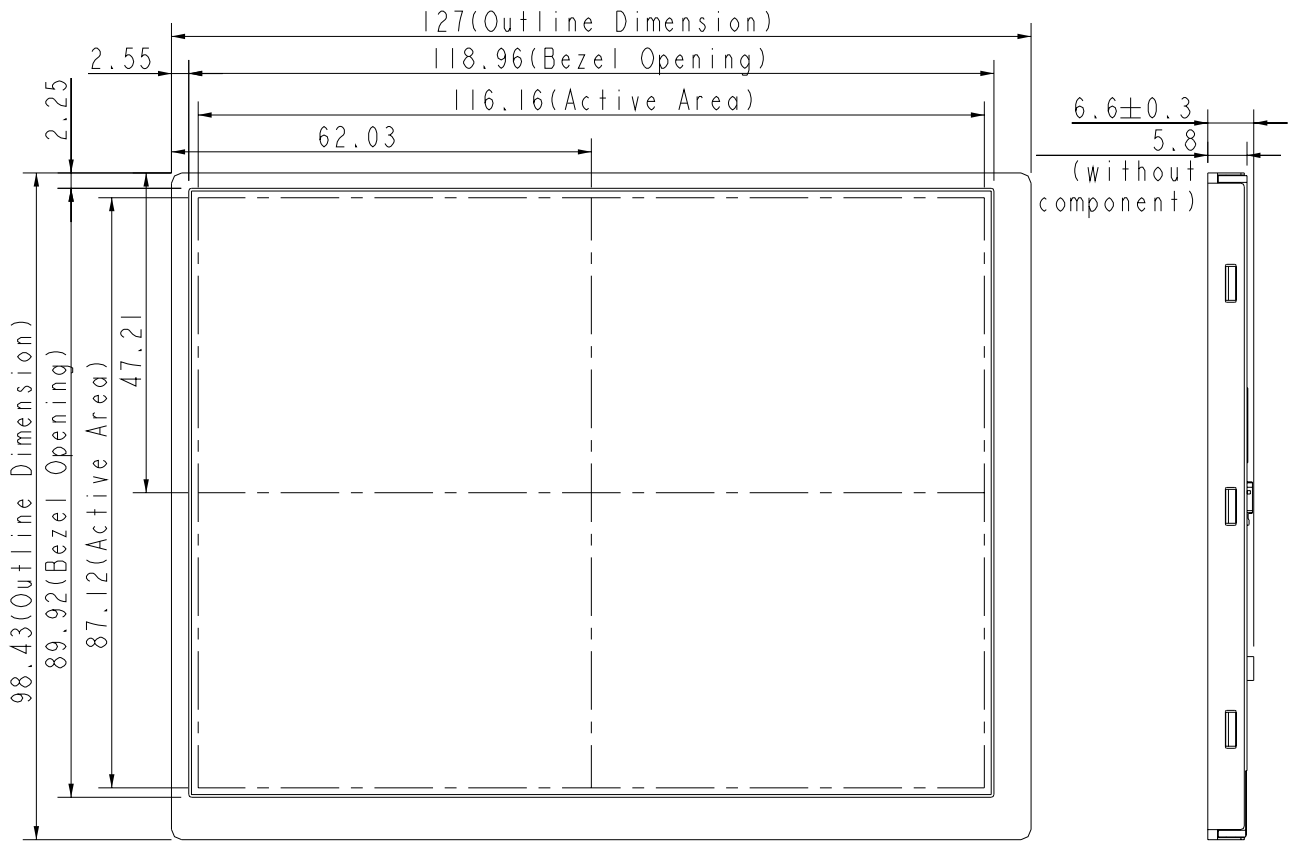
6. BLOCK DIAGRAM



7. MECHANICAL DIMENSION

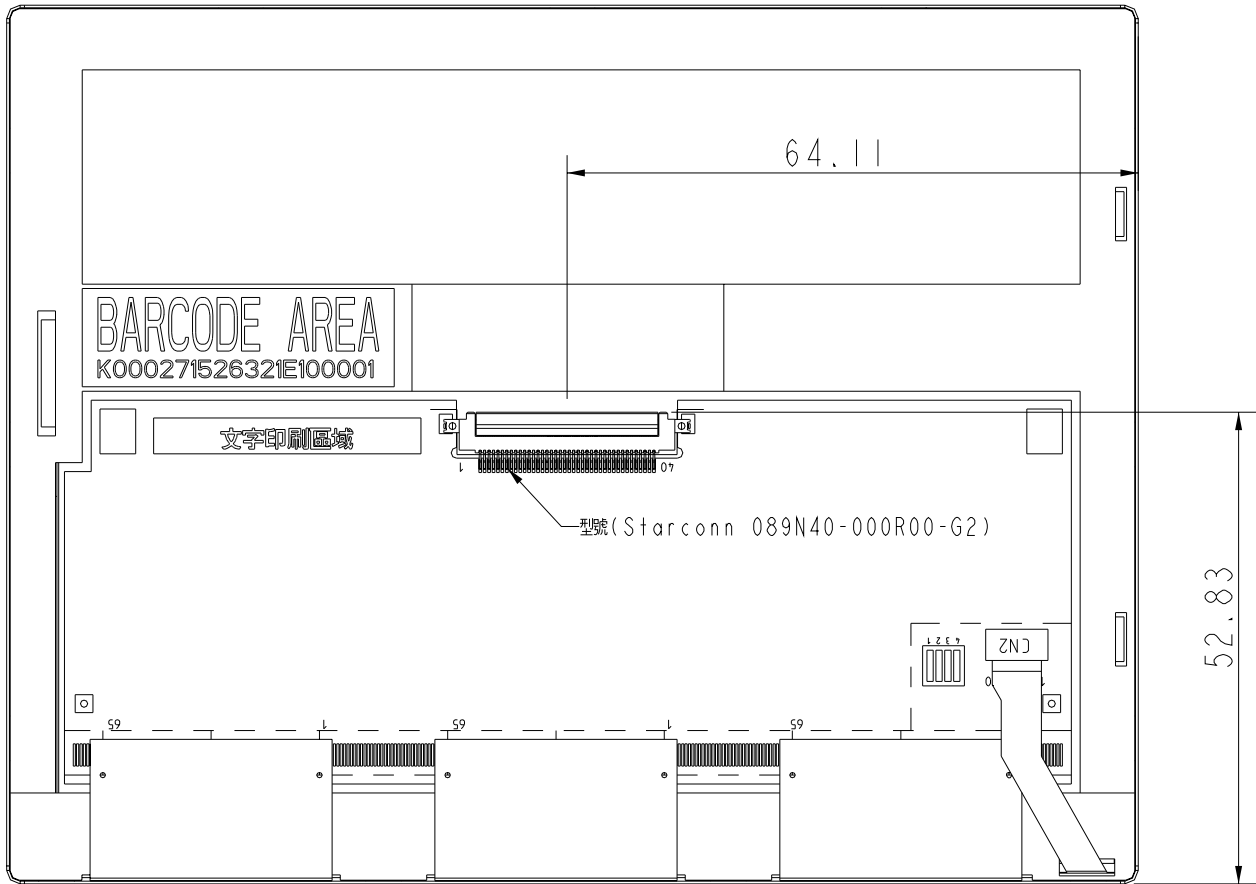
7.1 Front Side

[Unit : mm]



7.2 Rear Side

[Unit : mm]



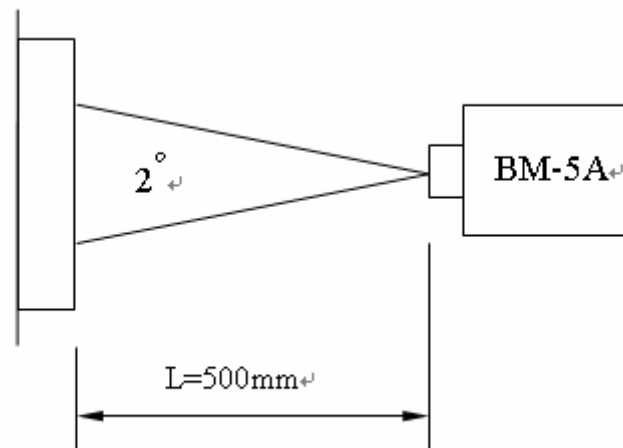
Remark : Un-indication tolerance is $\pm 0.3\text{mm}$

8. OPTICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	Remarks	
Constrast Ratio	CR	Point-5	200	300	--	--	*1)*2)*3)	
Luminance	Lw	Point-5	180	220	--	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 \geq 10 Point-5	120	140	--	$^{\circ}$	*1)*2)*4)
	Vertical	θ		80	100	--	$^{\circ}$	*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		0.570 0.296	0.610 0.336	0.650 0.376		
	Green	Gx Gy		0.290 0.534	0.330 0.574	0.370 0.614		
	Blue	Bx By		0.106 0.070	0.146 0.110	0.186 0.150		

Remarks :

*1)Measure condition : 25°C \pm 2°C , 60 \pm 10%RH , under10 Lux in the dark room.BM-5A (TOPCON) , viewing angle2° , VCC=3.3V , VDD=3.3V.



*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

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

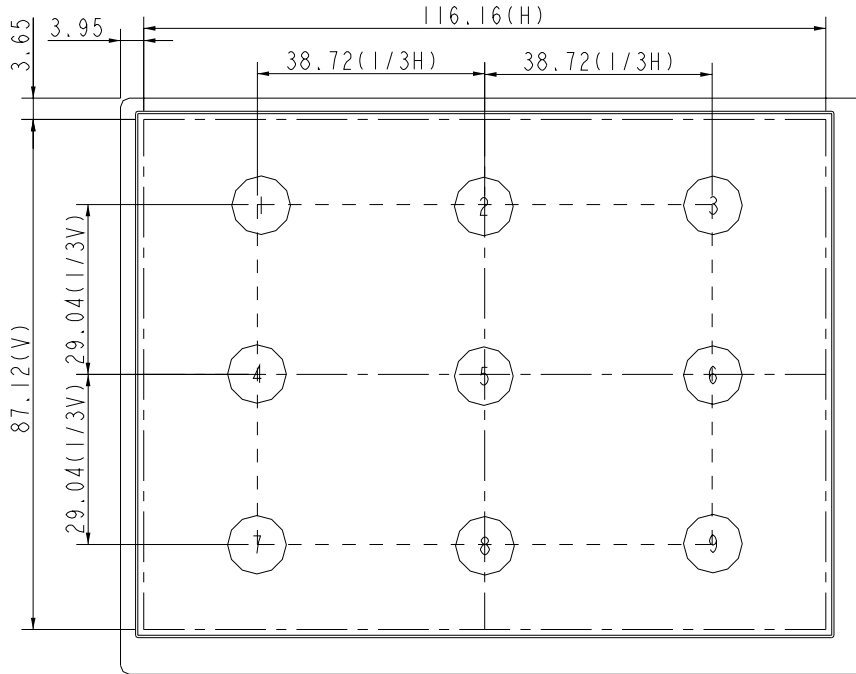


Fig8-1 Measuring point

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

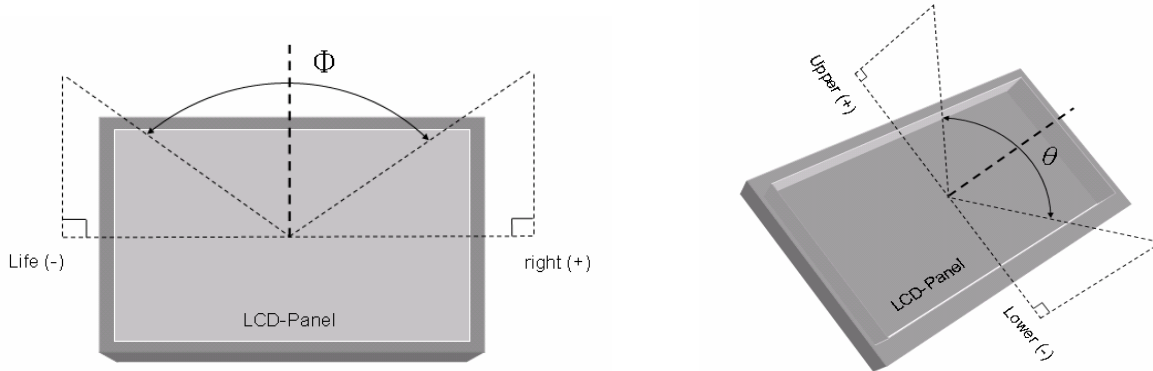


Fig8-2 Definition of Viewing Angle

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

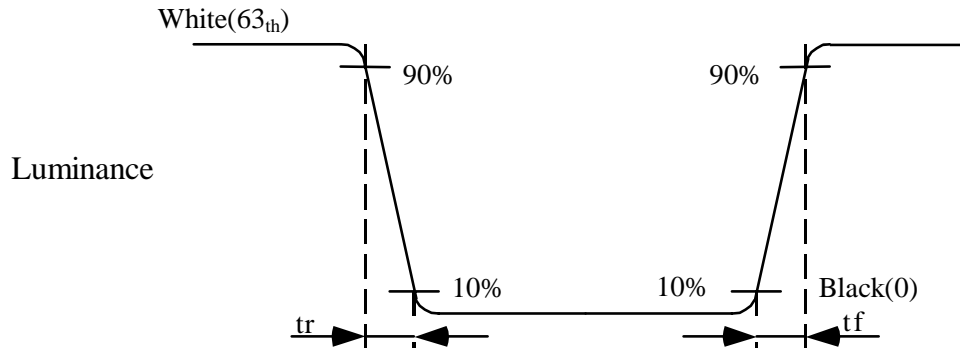


Fig8-3 Definition of Response Time(White-Black)

9. RELIABILITY TEST

9-1. Temperature and humidity

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

9-2. Shock and Vibration

TEST ITEMS	CONDITIONS
Shock (Non-operation)	<ul style="list-style-type: none"> ● Shock level:980m/s²(equal 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)	<ul style="list-style-type: none"> ● 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

9-3. 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.