



Chunghwa Picture Tubes, Ltd.

Product Specification

To

Date : 070621

TFT LCD

CLAA070LC01CW

ACCEPTED BY : (V0.2)

APPROVED BY	CHECKED BY	PREPARED BY
張聖暉	李家銘	鄭紹亨

Prepared by :

Product Planning Management Division
Small & Medium TFT Product Business Unit
CHUNGHWA PICTURE TUBES, LTD.

1127 Hopin Rd., Padeh, Taoyuan, Taiwan 334, R.O.C.
TEL: +886-3-3675151 FAX: +886-3-377-3858

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1. OVERVIEW

CLAA070LC01CW is 7" color TFT-LCD(Thin Film Transistor Liquid Crystal Display)module composed of LCD panel,driver ICs,control circuit,and 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.Inverter for backlight is not included in this module.

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	800×3(H)×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
Brightness(cd/m ²)	220nit(typ)
Response Time (Tr+Tf)	20ms
Outline Dimension(in mm)	165.0(W)×104.0(H)×5.5(D)
Viewing Angle(BL on,CR≥10)	140 degree(H) , 110degree(V)
Power consumption	2.7W(Typ)
BL unit	CCFL , 1 lamp
Electrical Interface(data)	TTL
Viewing Direction	6 o'clock
Surface Treatment	Anti-Glare , Hardness:3H
Weight(g)	128(g)

2. ABSOLUTE MAXIMUM RATINGS

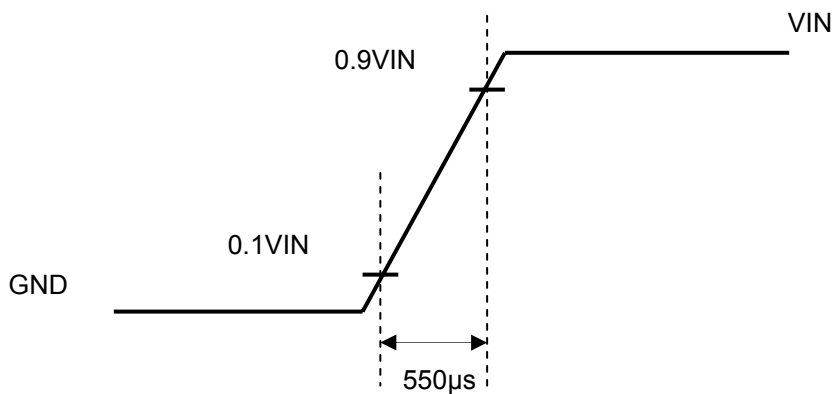
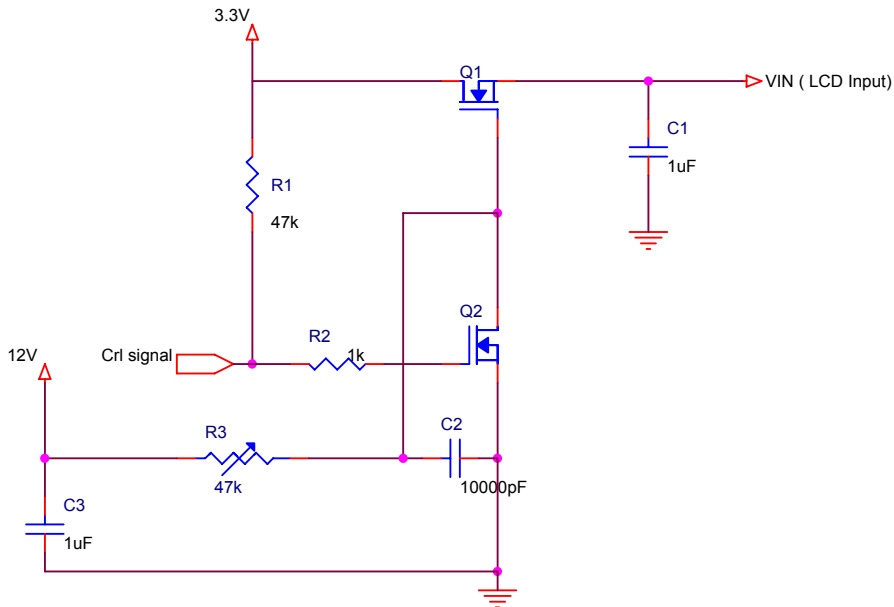
Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	Vcc	-0.3	4.6	V	
Lamp Voltage	VL	-	484	Vrms	
Lamp Current	IL	4.0	8.0	mArms	
Lamp Frequency	FL	30	80	KHz	
Static Electricity	VESDc	-200	200	V	【Note1】
	VESDm	-15K	15K		
ICC Rush Current	IRUSH	-	1	A	【Note2】
Operation Temperature	T _{op}	-30	85	°C	
Storage Temperature	T _{stg}	-40	95	°C	

【Note1】

Test Condition: IEC 61000-4-2 ,
 VESDc : Contact discharge to input connector
 VESDm : Discontact discharge to module

【Note2】

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 Power Supply Voltage

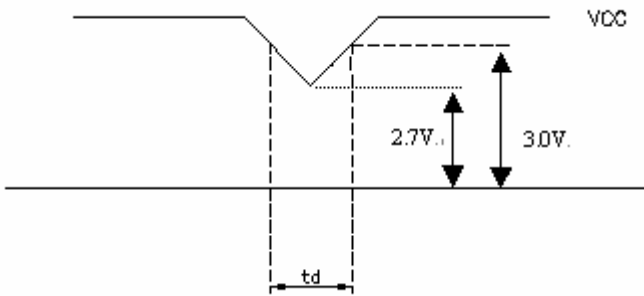
Ta=25°C

Item	Symbol	Min.	Typ	Max.	Unit	Note
Power Supply Voltage For LCD	Vcc	3.0	3.3	3.6	V	[Note1]
Logic Input Voltage	VIH	0.7VCC	-	VCC	V	
	VIL	0	-	0.3VCC	V	

[Note1]

VCC –dip codition:

- 1)When $2.7V \leq VCC < 3.0V$, $td \leq 10ms$.
 - 2)When $VCC < 3.0V$, it works abnormal that must reset power.
- VCC dip conditions should follow VCC turn on conditions



3.2 TFT-LCD Power Consumption

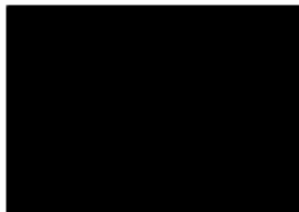
Ta=25°C

Item	Symbol	Min.	Typ	Max.	Unit	Note
Power Supply Current For LCD	ICC	-	150	200	mA	[Note1]

[Note1]

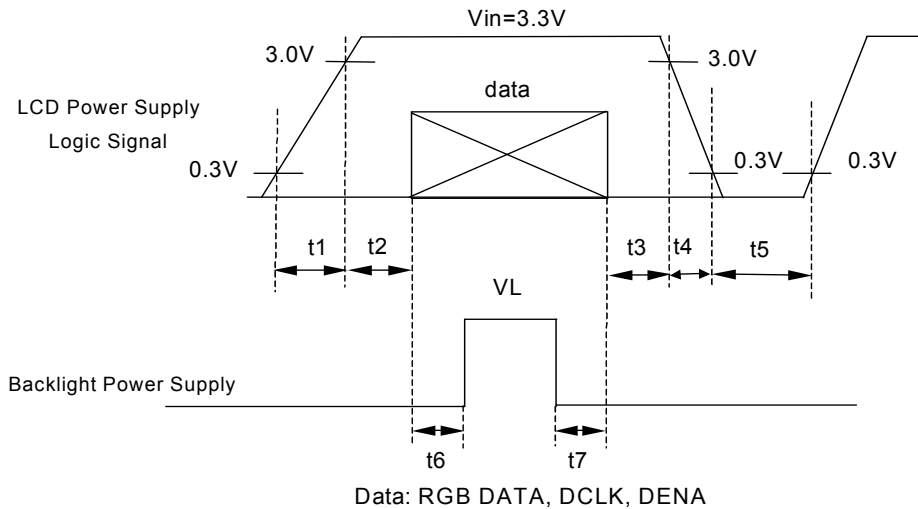
Typical: Under 64 gray pattern

Maximum: Under black pattern



.. (a)64 Gray Pattern .. (b)Black Pattern .. ↵

3.3 Power 、 Signal sequence



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

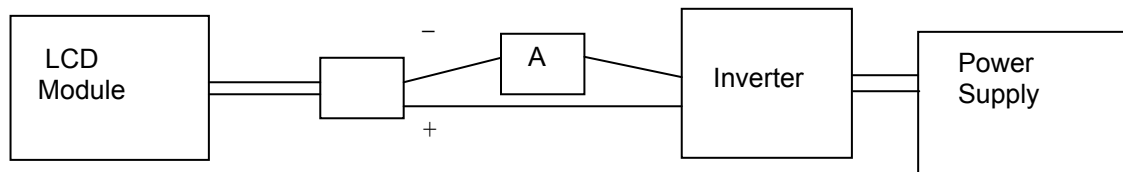
3.4 Backlight

Ta=25°C

Item	Symbol	Min.	Typ	Max.	Unit	Note
Lamp Voltage	VL	-	400	440	Vrms	*1)IL=5.5mA
Lamp Current	IL	5.0	5.5	6.0	mArms	*1) *2)
Lamp Frequency	FI	30	-	80	kHz	*4)
Lamp life time	LT	20,000	-	-	Hr	*1) *2) *3)IL=5.5mA , operation
Turn on and off life	-	100,000	-	-	Times	*1) *2) *3)IL=5.5mA , operation , time cycle 30s
Start Lamp Voltage	Ta=0°C	-	-	1050	Vrms	*5)
	Ta=25°C	-	-	800		
Power Consumption	PBL	-	2.2	-	Watt	VL*IL , IL=5.5mA/1 Lamp

[Note]

- *1) Table of specifications are definition of single lamp.
- *2) Lamp Current measurement method (The current meter is inserted in cold line)



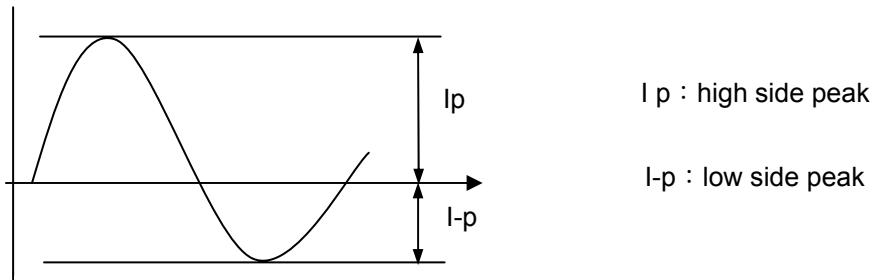
- *3) Definition of the lamp life time : Luminance(L) under 50% of specification starting lamp voltage.
- *4) 1.Frequency in this range can mala the characterisitics of electric and optics maintain in ±10% except hue.
2.Lamp frequency of inverter may produce interference with horizontal synchronous frequency (or vertical synchronous frequency),and this may cause ripple noise on the display. Therefore, please adjust inverter

frequency, and keep inverter as far from module as possible or use electronic shielding between inverter and module to avoid the interference.

- *5) 1.Starting Lamp Voltage: Vs = initial value Vs
2.Definition of starting lamp voltage means max. voltage of starting lamp. We suggest the inverter starting voltage greater then max. voltage of starting lamp to certify starting lamp stability.

*6) If the driving waveform of lamp is asymmetric, the distribution of mercury inside the lamp tube will become unequally or will deplete the Ar gas in it. Then it may cause the abnormal phenomenon of lighting-up. Therefore, designers have to try their best to for fill the conditions under the inverter designing-stage as below:

- The degrees of unbalance : $< 10 \%$
- The ratio of wave height : $< \sqrt{2} \pm 10 \%$



A : The degrees of unbalance = $| I_p - I-p | / I_{rms} \times 100 (\%)$

B : The ratio of wave height = I_p (or $I-p$) / I_{rms}

4. INTERFACE CONNECTION

4.1 CN1

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

Pin NO.	SYMBOL	DESCRIPTION
1	V _{SS}	Ground
2	V _{SS}	Ground
3	NC	No Connection
4	V _{CC}	Power Supply
5	V _{CC}	Power Supply
6	V _{CC}	Power Supply
7	V _{CC}	Power Supply
8	NC	No Connection
9	DE	Data Enable Timing Signal
10	V _{SS}	Ground
11	V _{SS}	Ground
12	V _{SS}	Ground
13	B5	Blue Data 5 (MSB)
14	B4	Blue Data 4
15	B3	Blue Data 3
16	V _{SS}	Ground
17	B2	Blue Data 2
18	B1	Blue Data 1
19	B0	Blue Data 0 (LSB)
20	V _{SS}	Ground
21	G5	Green Data 5 (MSB)
22	G4	Green Data 4
23	G3	Green Data 3
24	V _{SS}	Ground
25	G2	Green Data 2
26	G1	Green Data 1
27	G0	Green Data 0 (LSB)
28	V _{SS}	Ground
29	R5	Red Data 5 (MSB)
30	R4	Red Data 4
31	R3	Red Data 3
32	V _{SS}	Ground
33	R2	Red Data 2
34	R1	Red Data 1
35	R0	Red Data 0
36	V _{SS}	Ground
37	V _{SS}	Ground
38	DCLK	Data Clock
39	V _{SS}	Ground
40	V _{SS}	Ground

Remarks:

- 1) NC Pin must be retain, this pin can't contact GND or other signal.
- 2) V_{SS} Pin must ground contact , can not be floating.

4.2 CN2

Back Light

Input connector type for back light : BHSR-02VS-1(JST)

Output connector type for Inverter: SM02B-BHSS-1-(JST)

Pin No.	Symbol	function
1	CTH	VBLH(High-Voltage)
2	CTL	VBLL(Low-Voltage)

[Note]:VBLH-VBLL=VL

5. INPUT SIGNAL(DE ONLY MODE)

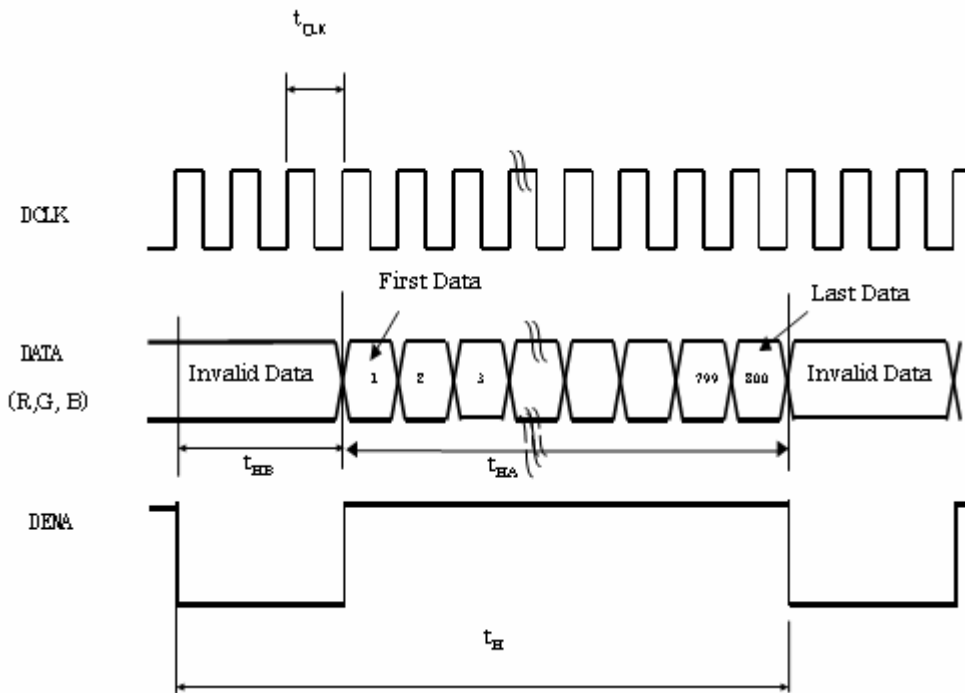
5.1 Timing Specification(De only mode)

ITEM		SYMBOL	MIN.	TYP.	MAX.	UNIT
DCLK	Dot Clock	1/tclk	25	27	32	MHz
	Low Level Width	t_{WCL}	6	-	-	ns
	High Level Width	t_{WCH}	6	-	-	ns
DE	Setup Time	t_{DES}	5	-	-	ns
	Hold time	t_{DEH}	10	-	-	ns
	Horizontal Period	t_H	850	900	950	t_{CLK}
	Horizontal Valid	t_{HA}	800			
	Horizontal Blank	t_{HB}	50	100	150	
	Vertical Period	t_V	490	500	520	t_{HP}
	Vertical Valid	t_{VA}	480			
	Vertical Blank	t_{VB}	10	20	40	
	Vertical Frequency	f_V	55	60	65	
	DATA	Setup Time	t_{DS}	5	-	-
Hold Time		t_{DH}	10	-	-	

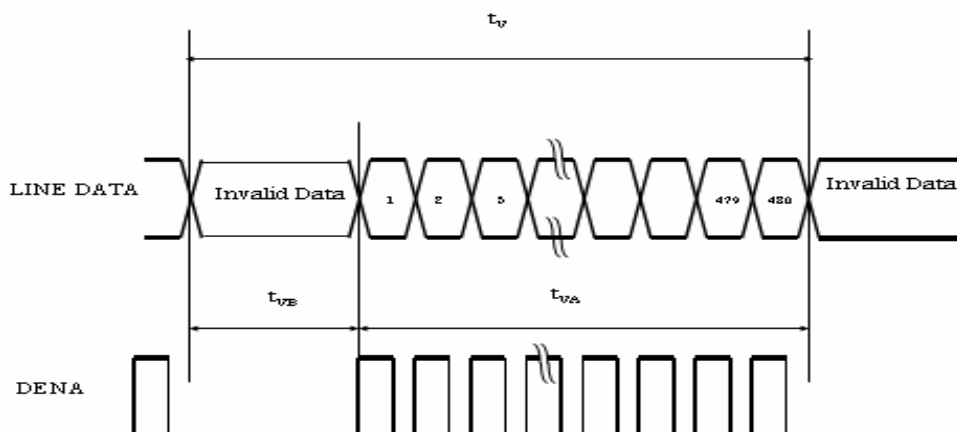
【Note1】 This module is operated by DE only mode.

5.2 Timing Chart

Horizontal Timing sequence



Vertical Timing sequence



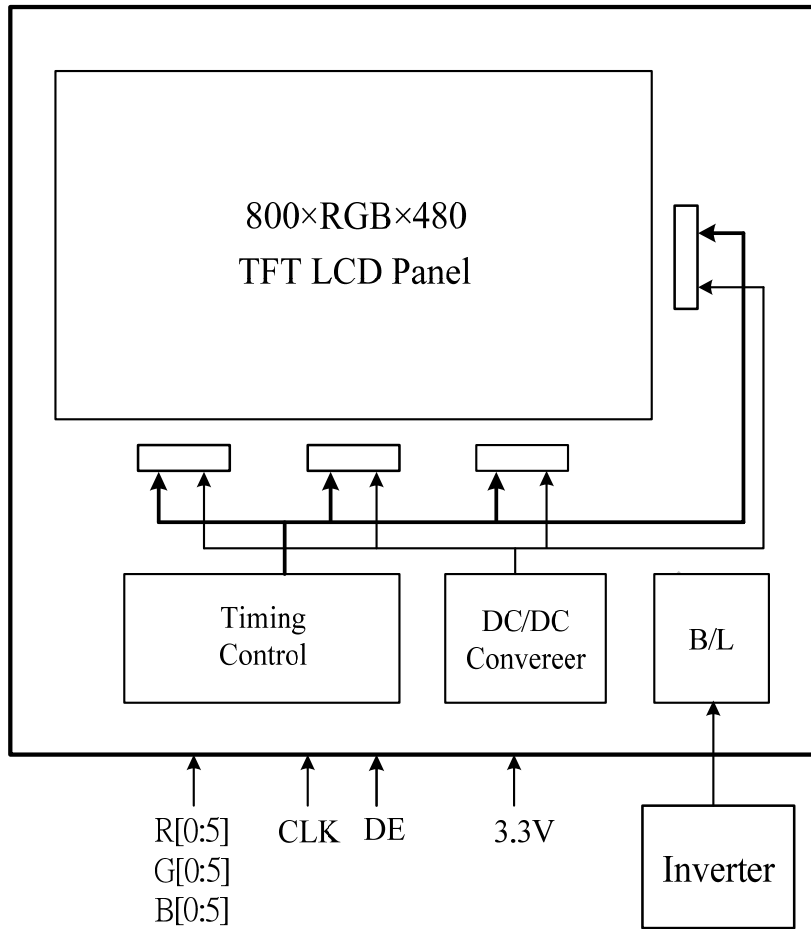
5.3 Color Data Assignment

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

[Note]

- (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

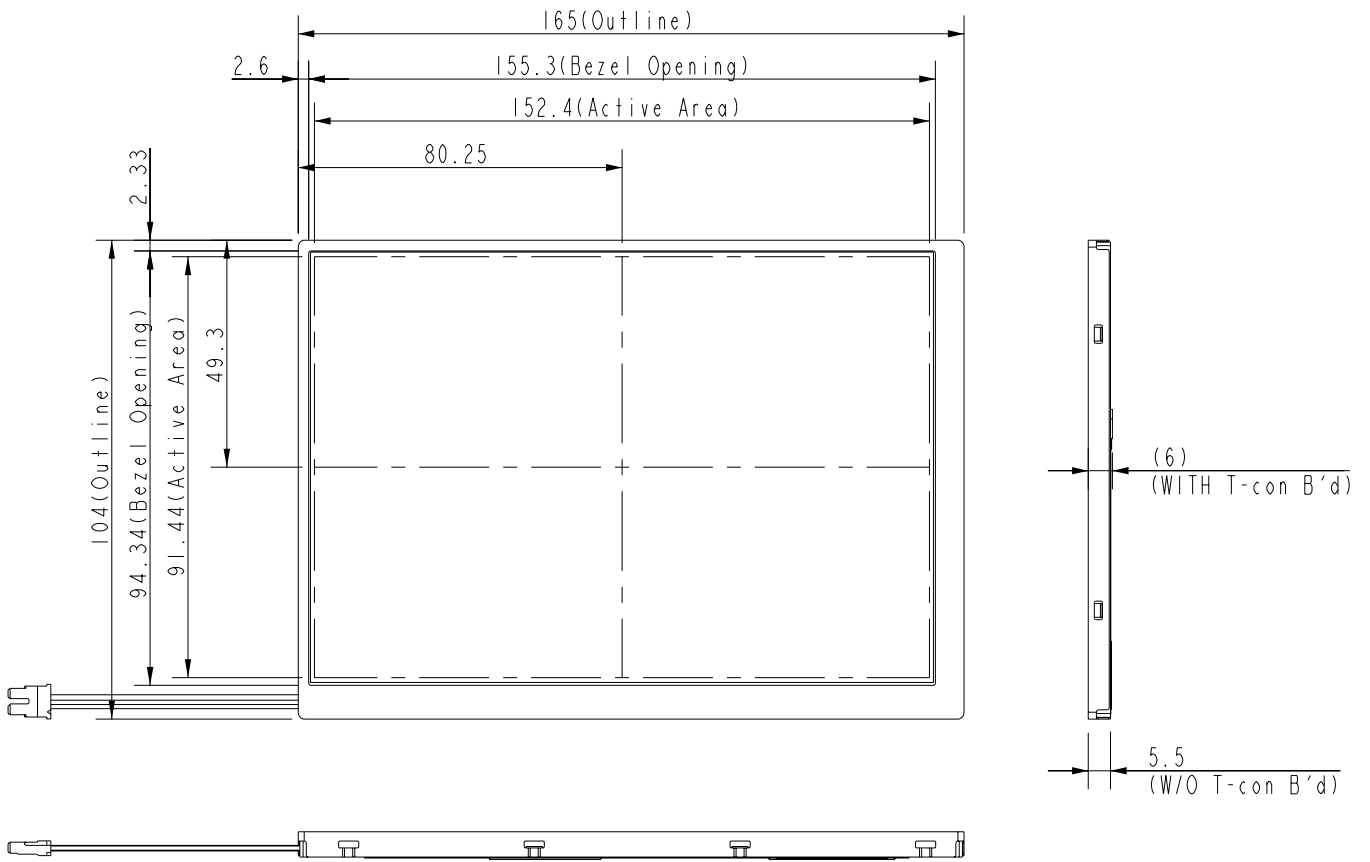
6. BLOCK DIAGRAM



7. MECHANICAL DIMENSION

7.1 Front Side

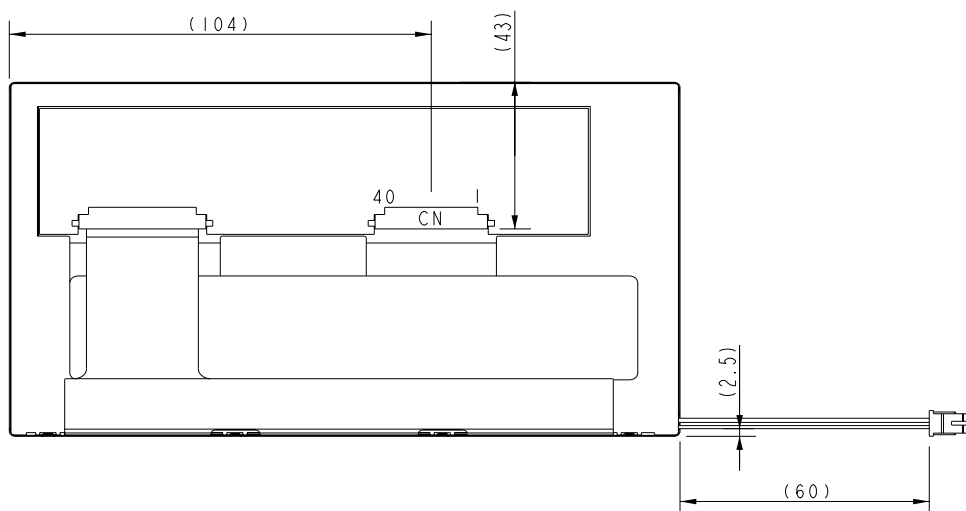
[Unit : mm]



7.2 Rear Side

Length of Lamp wire=60±5mm

[Unit : mm]



NOTE:

- 1.GENERAL TOLERANCE: ±0.3mm
- 2.CCFL connector: BHSR-02VS-1 (JST)
- 3.CN: STARCONN 089N40-000R00-G2 (or other compatible connectors)

8. OPTICAL CHARACTERISTICS

VCC=3.3V

Ta=25°C

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	Remarks	
Constrast Ratio	CR	Point-5	300	400	--	--	*1)*2)*3)	
Luminance*)	Lw		--	220	--	cd/m ²	*2)*3)	
Luminance Uniformity	ΔL		70	80		%	*2)*3)	
Response Time (White - Black)	Tr+ Tf		--	--	20	ms	*3)*4)	
Viewing Angle	Horizontal	ϕ	CR ≥ 10 Point-5	120	140	--	°	*2)*3)
	Vertical	θ		90	110	--	°	
Color Coordinate	White	Wx Wy	Point-5 $\theta = \phi = 0^\circ$	0.283 0.299	0.313 0.329	0.343 0.359	--	*2)*3)
	Red	Rx Ry		0.555 0.285	0.585 0.315	0.615 0.345		
	Green	Gx Gy		0.272 0.537	0.302 0.567	0.332 0.597		
	Blue	Bx By		0.122 0.118	0.152 0.128	0.182 0.158		

[Note]

- Brightness conditions : $I_L = 5.5 \text{ mA}$,

*1) Definition of contrast ratio :

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

Measure contrast ratio on the below 5 points (refer to figure1, #1~#5 point) and take the average value.

Contrast ratio is calculated with the following formula :

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

*2) Definition of luminance :

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

Measure white luminance on the same 5 points and take the average value.

Definition of Luminance Uniformity:

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

Measure maximum luminance(L(MAX))and minimum luminance (L(MIN))on the 5 points as figure8-1

Luminance Uniformity is calculated with the following formula :

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

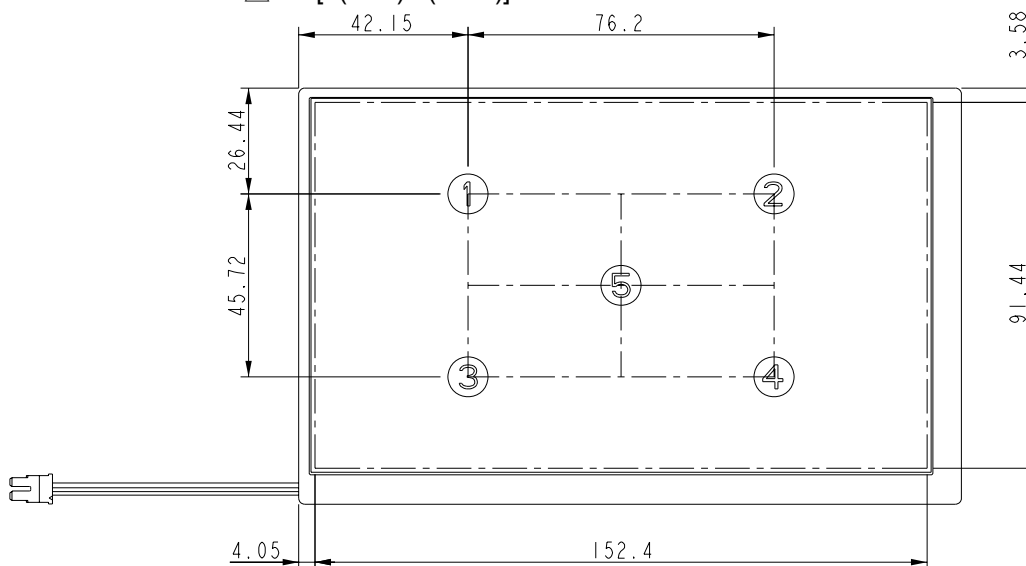


Fig8-1 Measuring point

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

These items are measured by EZ-CONTRAST(ELDIM) in the dark room. (no ambient light).

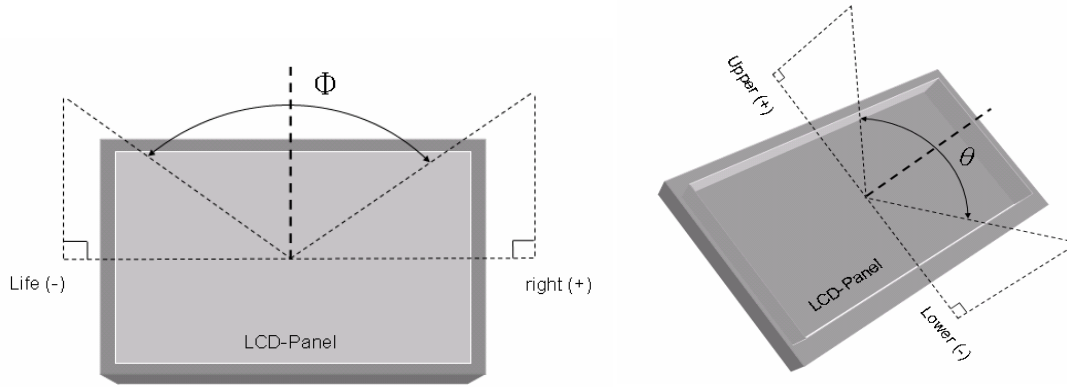


Fig8-2 Definition of Viewing Angle

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

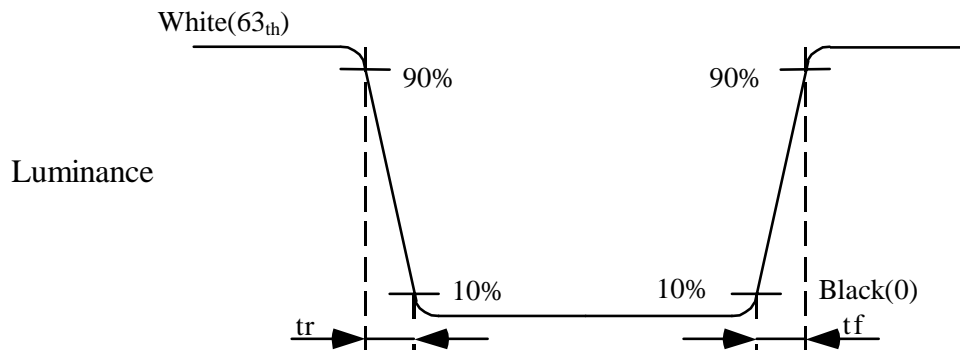


Fig8-3 Definition of Response Time(White-Black)

9. RELIABILITY TEST

9-1. Temperature and humidity

TEST ITEMS	CONDITIONS
High Temperature Operation	85°C , 240Hrs
High Temperature Storage	95°C , 240Hrs
High Temperature High Humidity Operation	60°C , 90%RH , 240Hrs
Low Temperature Operation	-30°C , 240Hrs
Low Temperature Storage	-40°C , 240Hrs
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,z,axis:2Hrs,y axis:4Hrs). ● 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.