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Chunghwa Picture Tubes, Ltd.^{EQ}

Product Specification

To : 集城

Date : 090806

TFT LCD

CLAB070JA05CW

ACCEPTED BY : (V0.3)

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CONTENTS

1. OVERVIEW 4

2. ABSOLUTE MAXIMUM RATINGS 5

3. ELECTRICAL CHARACTERISTICS 6

 3.1 Typical operation conditions 6

 3.2 Current consumption..... 7

 3.3 Timing characteristics of input signals 8

4. INTERFACE CONNECTION: 11

 4.1 CN1(Signal of interface) 11

5. MECHANICAL DIMENSION 12

6. OPTICAL CHARACTERISTICS 13

7. RELIABILITY TEST CONDITIONS (WITH BACK LIGHT)..... 15

1. OVERVIEW

CLAB070JA05CW is 7.0" color TFT-LCD (Thin Film Transistor Liquid Crystal Display) OLB module (finish outer lead bonding) composed of LCD panel and driver ICs (the backlight is not included in this OLB module).

The 7.0" (17.67cm) screen produces 480(*3)X234 WQVGA resolution image. By applying R.G.B. input signal, full color images are displayed.

General specifications are summarized in the following table:

ITEM	SPECIFICATION
Display Area (mm)	154.08 (H) × 86.58 (V)
Number of Pixels	480(H) × 3(RGB)× 234(V)
Pixel Pitch (mm)	0.321(H)×0.37(V)
Color Pixel Arrangement	RGB vertical stripe
Display Mode	Normally white,TN
Number of color	Full color
Viewing Direction	6 o'clock
Panel Transmittance (%)	8.3 (TYP.)
Power Consumption(W)	<0.25
Outline Dimension(mm)	162.5(W) × 95.5(H) × 1.7(D) (exclude FPC)
Surface Treatment	Anti-Glare

2. ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	conditions	MIN.	MAX.	UNIT	Note
Power Supply Voltage for LCD	VCC	GND=0	-0.3	6	V	
	AVDD	AVSS=0	-0.3	7	V	
	VGH	GND=0	-0.3	40	V	
	VGL		-20	0.3	V	
Signal input voltage	Vi		-0.2	AVDD+0.2	V	Note1
	VI		-0.3	VCC+0.3	V	Note2

Note1 : Analog input voltage VR, VG, VB

Note2 : Logical signal STHL, STHR, OEH, L/R, CPH1~CPH3, STVR, STVL, OEV,CKV, U/D.

3. ELECTRICAL CHARACTERISTICS

3.1 Typical operation conditions

GND = Avss = 0V (Ta=25°C)

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	Note
Power Supply Voltage	V_{CC}	3.0	3.3	3.6	V	Note6
		4.5	5	5.5	V	
	AV_{DD}	4.5	5	5.5	V	
	V_{GH}	17	18	19	V	
	V_{GL}	-7	-6	-5	V	
Signal Amplitude (VR, VG, VB)	V_{iA}	0.4	-	$AV_{DD}-0.4$	V	Note1
	V_{iAC}	-	4	-	V	Note1
	V_{iDC}	-	$AV_{DD}/2$	-	V	Note1
VCOM	V_{CAC}	4	4.88	6	V _{P-P}	Note1,2
	V_{CDC}	1.85	1.95	2.05	V	Note1,3
Input Signal Voltage	V_{IH}	$0.7V_{CC}$	-	V_{CC}	V	Note4
	V_{IL}	0	-	$0.3V_{CC}$	V	

Note1 : Please refer to Fig.1

Note2 : Brightness level is adjusted by varying this amplitude V_{CAC}

Note3 : Please adjust V_{CDC} to make the flicker level be minimum.

Note4 : Logical signal STHL,STHR,OEHL,L/R,CPH1~CPH3,STVR,STVL,OEVL,CKV,U/D.

Note5 : Power sequence refer to Fig.2

Note6 : Vcc please refer T-con setup on system

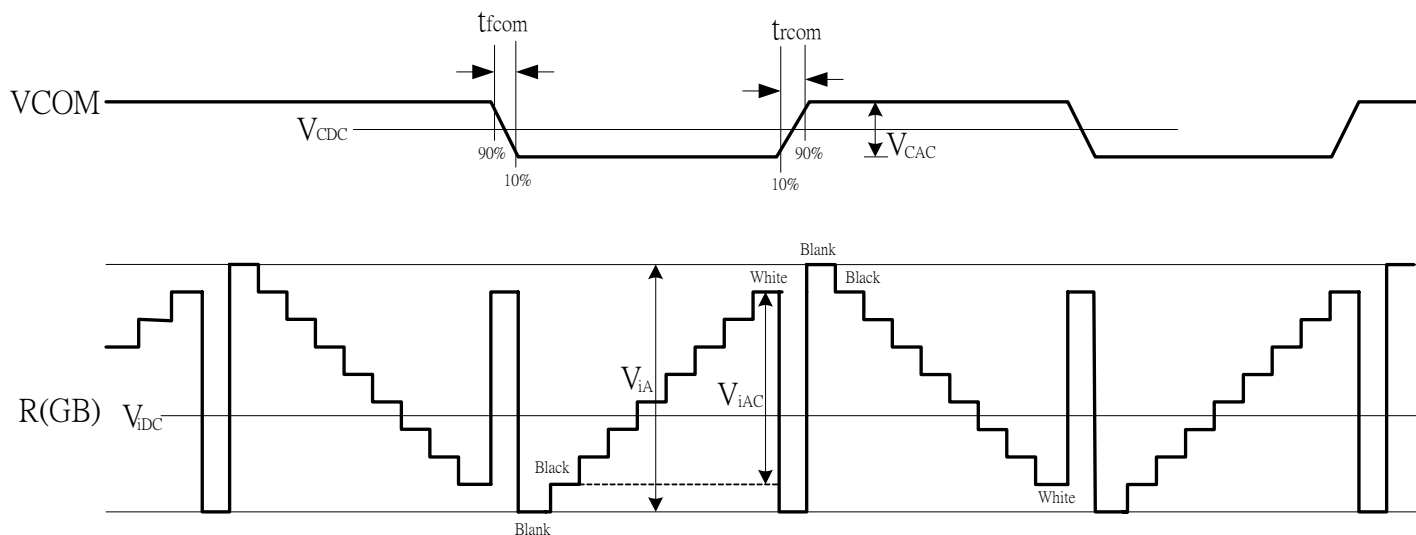
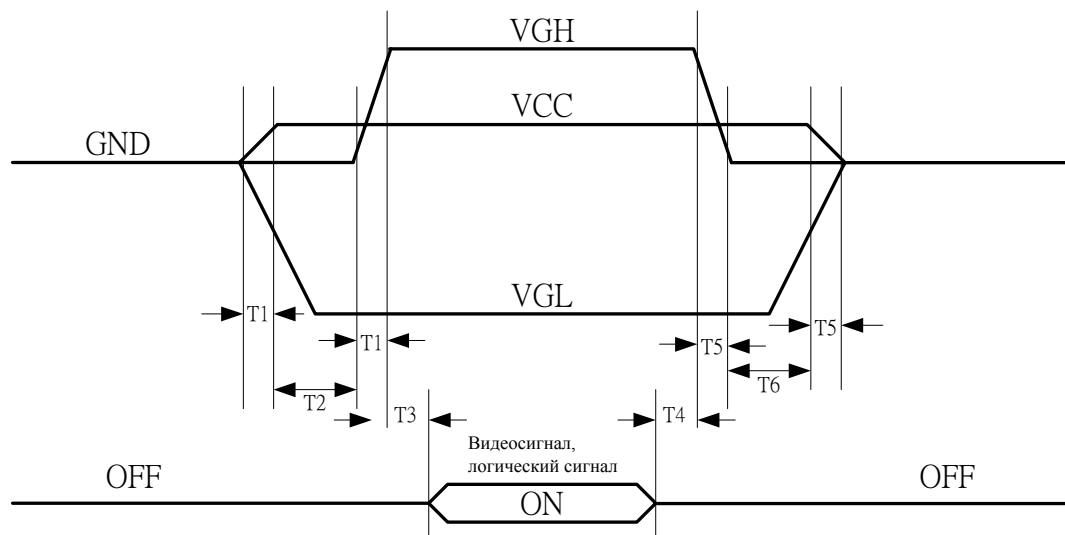


Fig.1 VCOM-RGB



- $T1 \leq 15\text{ms}$ (From 10%*VCC to 90%*VCC , when VCC is Low to High) ;
 $T2 \leq 10\text{ms}$ (From 90%*VCC to 10%*VGH , when VCC is Low to High) ;
 $T3 \leq 10\text{ms}$ (From 90%*VGH to Video Signal , when VGH is Low to High) ;
 $T4 \leq 10\text{ms}$ (From Video signal to 90%*VGH , when VGH is High to Low) ;
 $T5 \leq 20\text{ms}$ (From 90%*VCC to 10%*VCC , when VCC is High to Low) ;
 $T6 \leq 10\text{ms}$ (From 10%*VGH to 90%*VCC , when VCC is Low to High) ;

Fig.2 Power Sequence

3.2 Current consumption

(GND = Avss = 0V)

ITEM	SYMBOL	УСЛОВ.	MIN.	TYP.	MAX.	UNIT	ПРИМ.
Drive Current	I_{GH}	$V_{GH} = 18V$	-	60	65	мкА	Прим. 1
	I_{GL}	$V_{GL} = -6V$	-	62	67	мкА	Прим. 1
	I_{CC}	$V_{CC} = 5V$	-	11	22	мкА	Прим. 1
	I_{DD}	$AV_{DD} = 5V$	-	8.3	21.6	мА	Прим. 1

[Note1] : Typ. specification : Gray-level test Pattern

Max. specification : Black test Pattern



(a) Gray-level Pattern



(b) Black Pattern

3.3 Timing characteristics of input signals

characteristics	SYMBOL	MIN.	TYP.	MAX.	UNIT	Note
1 Field scanning period	T_{IV}	-	262.5	-	H	
1 Line scanning period	T_{IH}	-	63.5	-	μs	
Source driver operating frequency	F_{OP}	-	9.6	-	MHz	
CLK pulse width	T_{CW}	50	103.8	2000	ns	
CLK pulse period duty	T_{CWH}	40	-	60	%	
CLK pulse delay	TC12 TC23 TC31	12	69	$1/2 \cdot T_{CW}$	ns	CPH1~CPH3
STH start pulse width	T_{STH}	32	114.2	-	ns	STHR,STHL
STH start pulse setup time	T_{SUH}	16	76.8	-	ns	STHR,STHL
STH start pulse hold time	T_{HDH}	16	37.6	-	ns	STHR,STHL
OEH output enable pulse width	T_{OEH}	$1T_{CW}$	2.7	-	μs	OEH
Sample and hold disable time OEH& STH	$T_{OEH-STH}$	1	8.9	-	μs	OEH-STH
CLKV pulse width	T_{CKVW}	1	63.5	-	μs	CKV
CLKV pulse high period	T_{CKVH}	0.5	2.64	-	μs	CKV
CLKV pulse low period	T_{CKVL}	0.5	60.9	-	μs	CKV
STV start pulse width	T_{STV}	0.5	63.5	-	μs	STVR, STVL
STV start pulse setup time	T_{SUV}	0.2	60.8	-	μs	STVR, STVL
STV start pulse hold time	T_{HDV}	0.3	2.72	-	μs	STVR,STVL
OEV pulse width	t_{OEV}	1	5.3	-	μs	OEV
Clean enable time	t_{DIS2}	-	2.54	-	μs	OEV-CKV

Note1 : 1. High level of source driver and gate driver logic signal are 70%

2. Low level of source driver and gate driver logic signal are 30%

Note2 : Please refer to Fig.3 and Fig.4

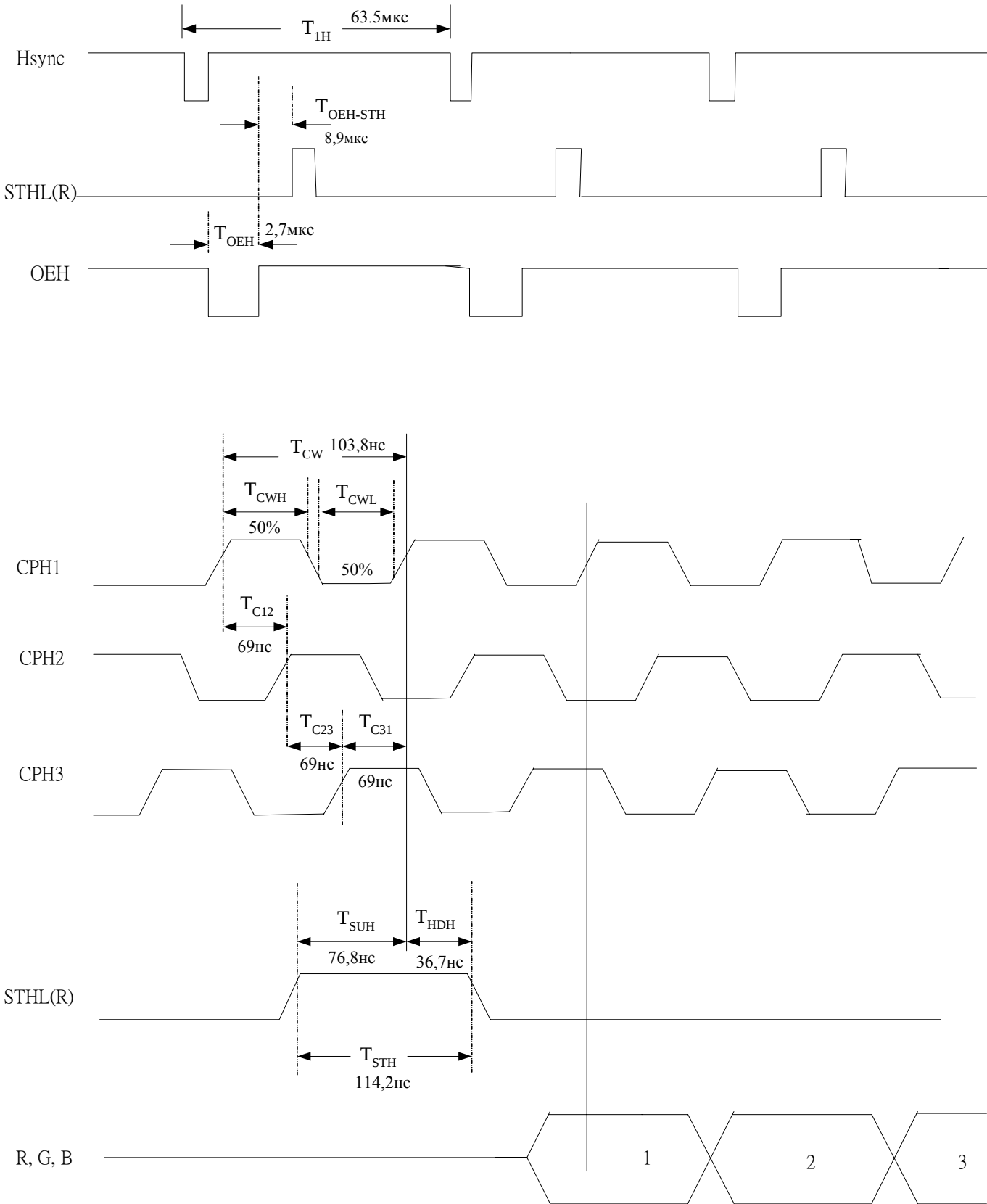


Fig.3 Horizontal Timing

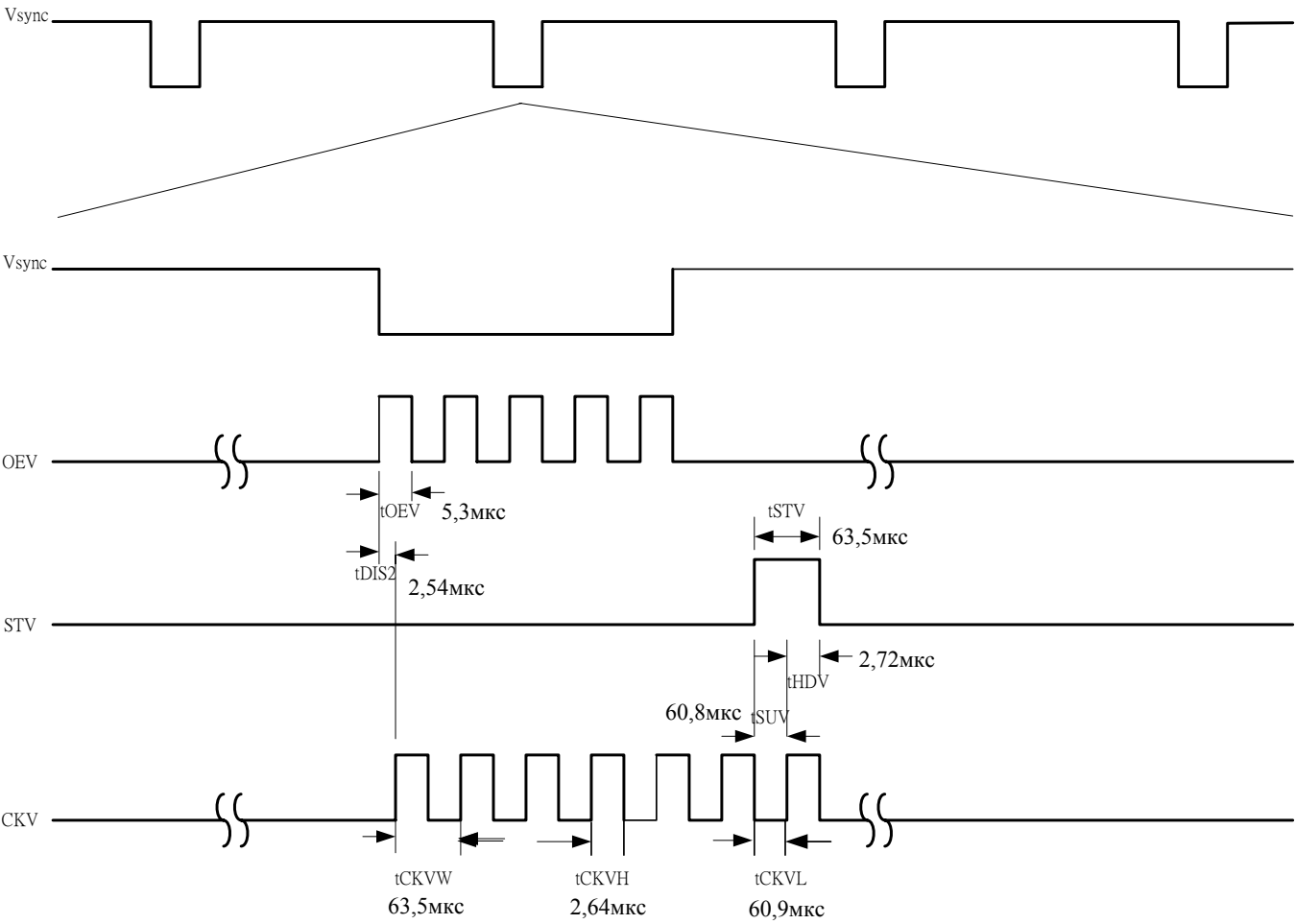


Fig.4 Vertical Timing sequence

4. INTERFACE CONNECTION:

4.1 CN1(Signal of interface)

Pin No.	SYMBOL	I/O	FUNCTION	NOTE
1	GND	-	Ground for logic circuit	
2	V _{CC}		Supply voltage of logic control circuit for scan driver	
3	V _{GL}		Negative power for scan driver	
4	V _{GH}		Positive power for scan driver	
5	STVR	I/O	Vertical start pulse	Note 1
6	STVL	I/O	Vertical start pulse	Note 1
7	CKV		Shift clock input for scan driver	
8	U/D		UP/DOWN scan control input	Note 1
9	OE _V		Output enable input for driver	
10	V _{COM}		Common electrode driving signal	
11	V _{COM}		Common electrode driving signal	
12	L/R		LEFT/RIGHT scan control input	Note 1
13	MOD		Sequential sampling and simultaneous sampling setting	Note 2
14	OE _H		Output enable input for data driver	
15	STHL	I/O	Start pulse for horizontal scan line	Note 1
16	STHR	I/O	Start pulse for horizontal scan line	Note 1
17	CPH3		Sampling and shifting clock pulse3 for data drive	
18	CPH2		Sampling and shifting clock pulse2for data drive	
19	CPH1		Sampling and shifting clock pulse1 for data drive	
20	V _{CC}		Supply voltage of logic control circuit for data driver	
21	GND	-	Ground for logic circuit	
22	VR		Alternated video signal input(Red)	
23	VG		Alternated video signal input(Green)	
24	VB		Alternated video signal input(Blue)	
25	AV _{DD}		Supply voltage for analog circuit	
26	AV _{SS}	-	Ground for analog circuit	

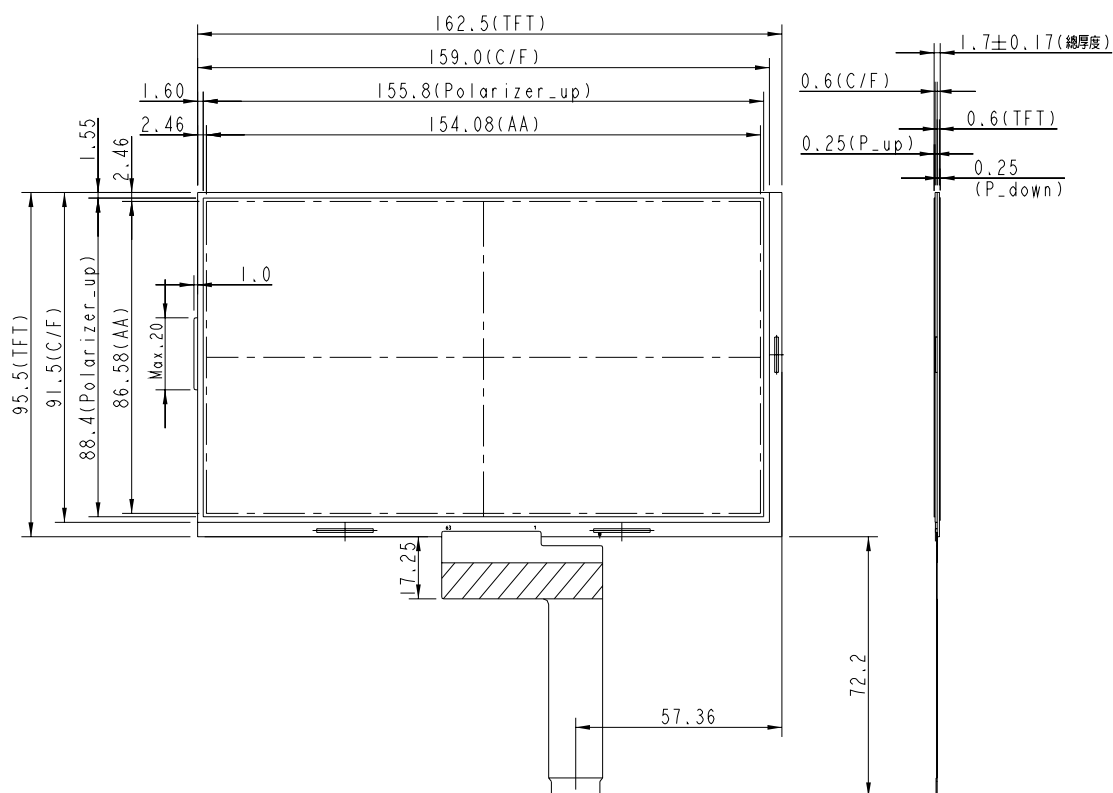
Note1 :

Setting of scan control input		IN/OUT state for start pulse				Scanning direction
U/D	L/R	STVR	STVL	STHR	STHL	
GND	V _{CC}	OUT	IN	OUT	IN	From up to down ,and from left to right
V _{CC}	GND	IN	OUT	IN	OUT	From down to up ,and from right to left
GND	GND	OUT	IN	IN	OUT	From up to down ,and from right to left
V _{CC}	V _{CC}	IN	OUT	OUT	IN	From down to up ,and from left to right

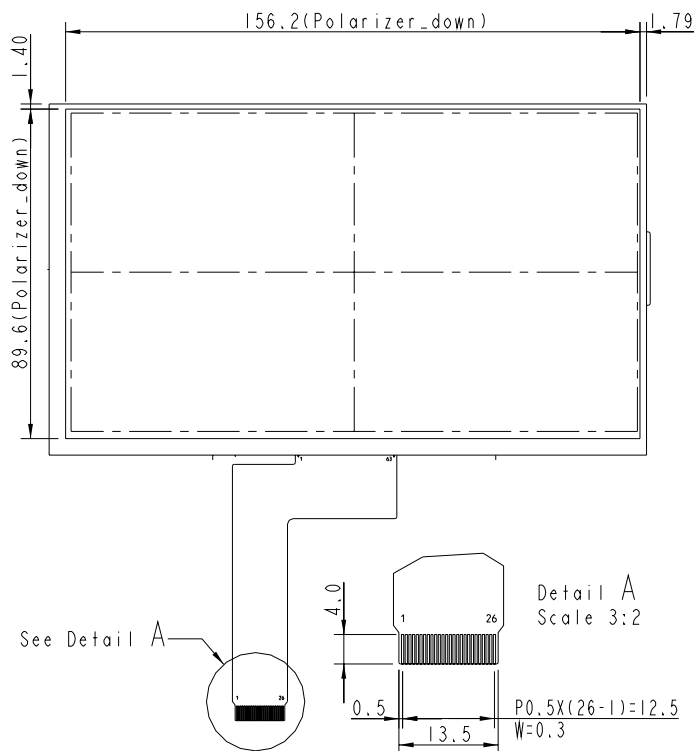
Note2 : MOD=H: Simultaneous sampling (Set CPH2 and CPH3 to LOW)
 MOD=L: Sequential sampling

5. MECHANICAL DIMENSION

(1) Front Side



(2) Rear Side



[Note] : Tolerance is $\pm 0.2\text{mm}$ unless noted (Unit : mm)

6. OPTICAL CHARACTERISTICS

$T_a=25^{\circ}\text{C}$, $V_{CC}=3.3\text{V}$

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Panel Transmittance		--	---	6.7	8.3	--	%
Contrast Ratio		CR	*1)	(320)	400	--	--
Response Time		Tr	*3)	--	20	30	ms
		Tf					
Viewing Angle	Horizontal	$\phi^{*2)}$	*2) CR ≥ 10	120	140	--	°
	Vertical	$\theta^{*2)}$		100	120	--	°

[Note]

- Measured mouldle : With Back Light Luminance = 4300 nit ; Lamp Current(I_L) = 6.0 mA
- These items are measured by BM-5A (TOPCON) or CA-1000(MINOLTA) in the dark room. (no ambient light)

Measuring point : Fig.5 Measurin-point : 1~9 points

Measuring Viewing Angle : Fig.6 : $\theta=\psi=0^{\circ}$

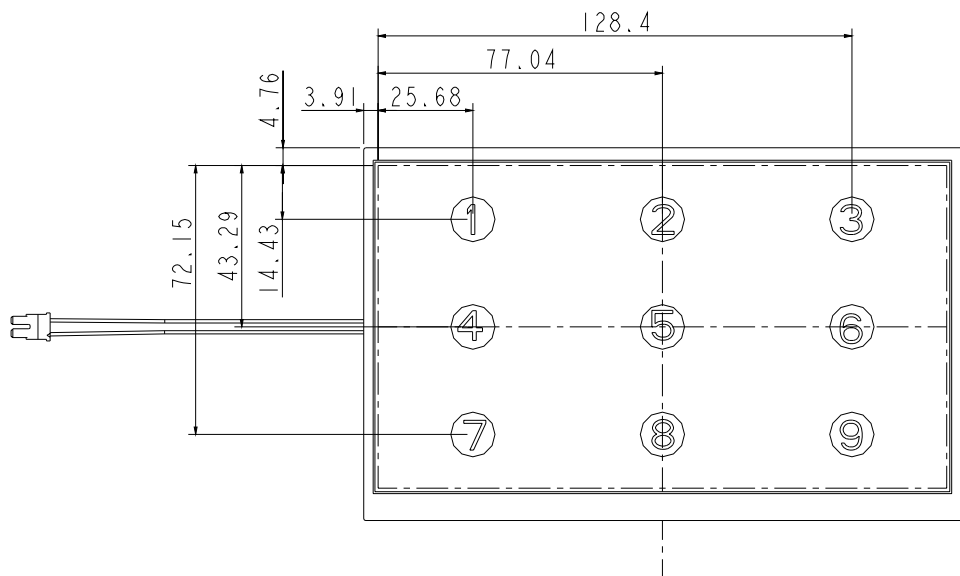


Fig.5 Measuring point

*1) Definition of contrast ratio :

Measure contrast ratio on the 5 points (refer to figure 5, # 1~# 9 point) Contrast ratio is calculated with the following formula :

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

*2) Definition of Viewing Angle(θ, ψ) :

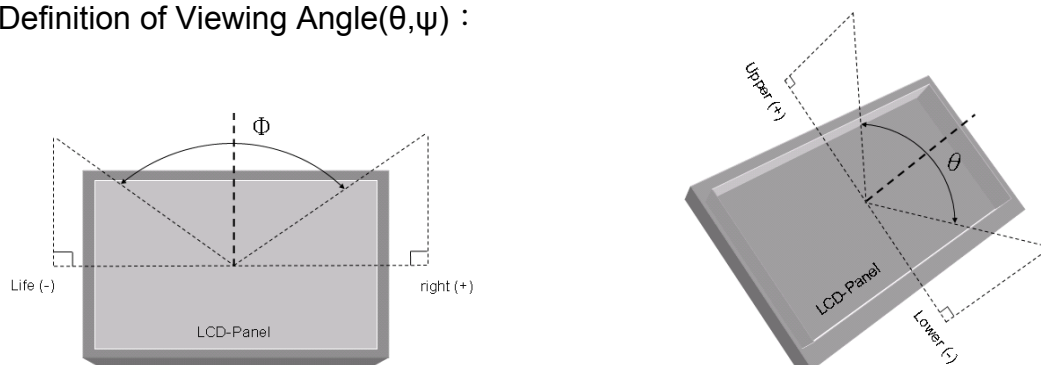


Fig.6 Definition of Viewing Angle

*3) Definition of Response Time

The response time is defined as the time interval between the 10% and 90% amplitudes. Refer to figure 7 as below.

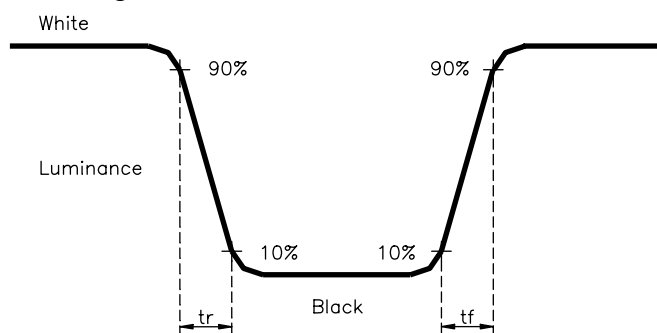


Fig.7 Definition of Response Time

7. RELIABILITY TEST CONDITIONS (WITH BACK LIGHT)

7.1 Temperature and Humidity

TEST ITEMS	CONDITIONS
HIGH TEMPERATURE OPERATION	85° C ; 240 Hrs
HIGH TEMPERATURE AND HIGH HUMIDITY OPERATION	60° C ; 90% RH ; 240 Hrs
HIGH TEMPERATURE STORAGE	95° C ; 240 Hrs
LOW TEMPERATURE OPERATION	-30° C ; 240Hrs (Backlight unit always turn on)
LOW TEMPERATURE STORAGE	-40° C ; 240 Hrs
THERMAL SHOCK (No operation)	-30° C (0.5Hr)~85° C (0.5Hr) 200 CYCLE

7.2 Shock & Vibration

TEST ITEMS	CONDITIONS
SHOCK (NON-OPERATION)	● 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)	● Frequency range:8~33.3Hz ● Stoke : 1.3 mm ● Vibration: sinusoidal wave, perpendicular axis (both x,z axis: 2Hrs , and y axis: 4Hrs). ● Sweep: 2.9G,33.3 Hz -400 Hz ● Cycle: 15 min

7.3 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 transformation of the module parts should be ignored.

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