

HV07V8

1. OVERVIEW

HV07V8 is 7" color (**16 : 10**) TFT-LCD (Thin Film Transistor Liquid Crystal Display) full cell product (after LC injected). The 7" screen produces **800×RGB (3) ×1280** 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	94.2(H)x150.72(V) (mm) (7-inch diagonal)
CF Glass Dimension	99.9(H) x 155.42(V)(mm)
TFT Glass Dimension	102.1(H) x 158.92(V)(mm)
Number of Pixels	800 ×3(H)×1280 (V)
Pixel Pitch	0.11775(H)×0.11775(V) (mm)
Color Pixel Arrangement	RGB vertical stripe
Driving Method	TFT Active Matrix
Display Mode	Normally black
Number of Colors	262,144(6bits)/16.7M(8bits)(LVDS)
Transmittance	3.37(Min)/3.66 (Typ.)
Response Time	50ms (Max)

The LCD Products listed on this document are not suitable for use of aerospace equipment, submarine cable, and nuclear reactor control system and life support systems. If customers intend to use these LCD products for applications listed above or those not included in the "Standard" list as follows, please contact our sales in advance.

Standard : Computer, Office equipment, Communication equipment, Test and Measurement equipment, Machine tool, Industrial robot, Audio and Visual equipment, Other consumer products.

2. ABSOLUTE MAXIMUM RATINGS

The following are maximum value, which if exceeded, may cause faulty operation or damage to the unit.

Ta=25+/-2°C

ITEM	SYMBOL	MIN.	MAX.	UNIT	NOTE
LCD Power Voltage	VDD	0	4.5	V	
Operation Temperature	Top	0	50	°C	*1). 2). 3). 4)
Storage Temperature	Tstg	-25	65	°C	*1). 2). 3)

【Note】

- *1) The relative temperature and humidity range are as below sketch, 90%RH Max. ($T_a \leq 40^\circ\text{C}$)
- *2) The maximum wet bulb temperature $\leq 39^\circ\text{C}$ ($T_a > 40^\circ\text{C}$) and without dewing.
- *3) If product in environment which over the definition of the relative temperature and humidity out of range too long, it will affect visual of LCD.
- *4) If you operate LCD in normal temperature range, the center surface of panel should be under 50°C .

3. ELECTRICAL CHARACTERISTICS

(A) TFT LCD

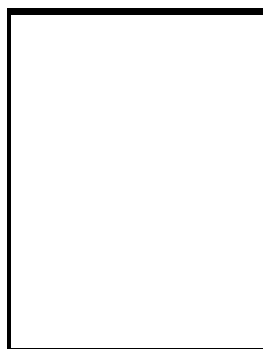
ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Power Voltage	VDD	3	3.3	3.6	V	*1)
LED Voltage	VLED	3	3.3	5	V	
Rush Current	Irush	-	-	2	A	*4)
VDD Current	IDD	-	-	155	mA	
LED Current	ILED		500		mA	

【Note】

*1) Be sure to apply VDD and VGL to the LCD first ,and then apply VGH.

*2) Max value is White Pattern : 1280 line mode.

Circuit condition (Max) : $f_V=60$ Hz , $f_H=49.38$ kHz , $f_{CLK}=71.11$ MHz.

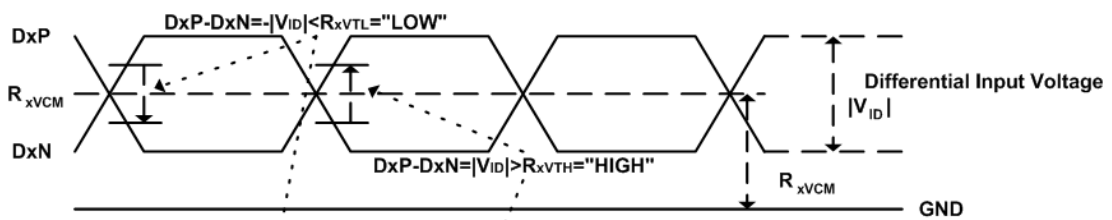


White Pattern

*3) LVDS Signal Definite :

LVDS Interface DC characteristic						
(VDD=3.0 to 3.6V, AVDD=8.0 to 13.5V, GND=AGND=0V, TA=-20 to +85°C)						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Differential input high threshold voltage	RxVTH	0.1	0.2	0.3	V	RxVCM=1.2V
Differential input low threshold voltage	RxVTL	-0.3	-0.2	-0.1	V	
Differential input common mode voltage	RxVCOM	1	1.2	1.4	V	VID =0.2V
Differential input impedance	ZID	80	100	125	ohm	
Differential input voltage	VID	0.2	-	0.6	V	

Single-end Signals



Differential Signal

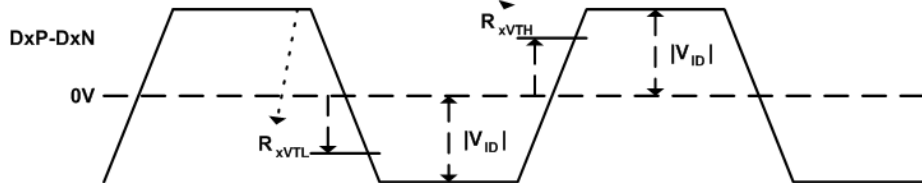


Figure1. LVDS DC Diagram

LVDS Interface AC characteristic						
(VDD=3.0 to 3.6V, AVDD=8.0 to 13.5V, GND=AGND=0V, TA=-20 to +85°C)						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Clock frequency	RxFCLK	.	66.77	-	MHz	Refer to input timing table for each display resolution.
Input data skew margin	TRSKM	500	-	-	ps	VID =200mV RxVCM=1.2V RxFCLK=81MHz
Clock high time	TLVCH	-	$4/(7 * RxFCLK)$	-	ns	
Clock low time	TLCVL	-	$3/(7 * RxFCLK)$	-	ns	
PLL wake-up time	TenPLL	-	-	150	us	

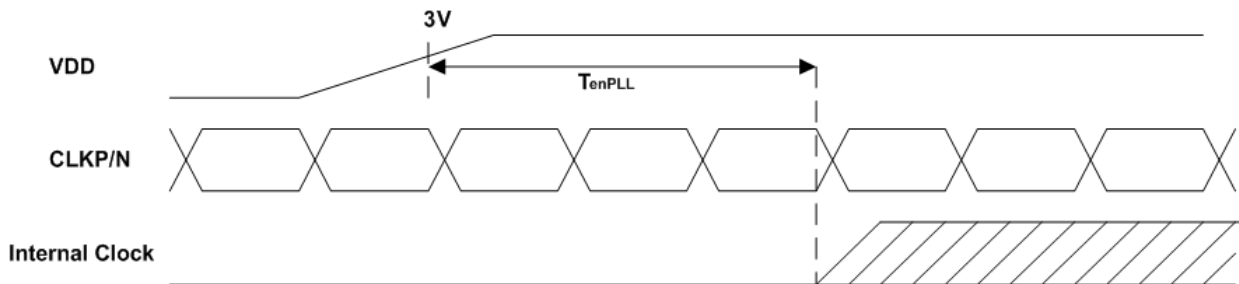


Figure2. Relationship between VDD, LVDS clock, and internal clock

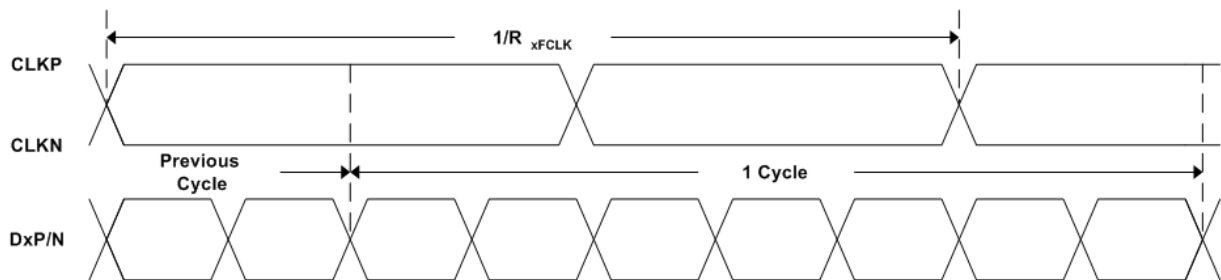
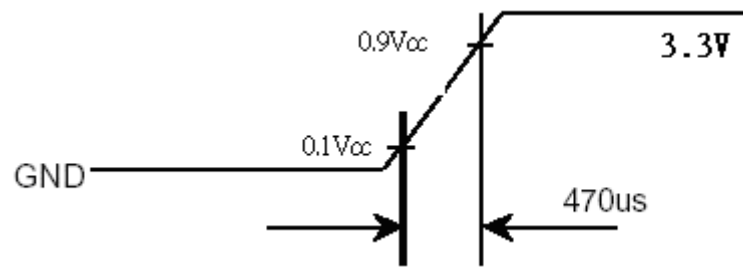
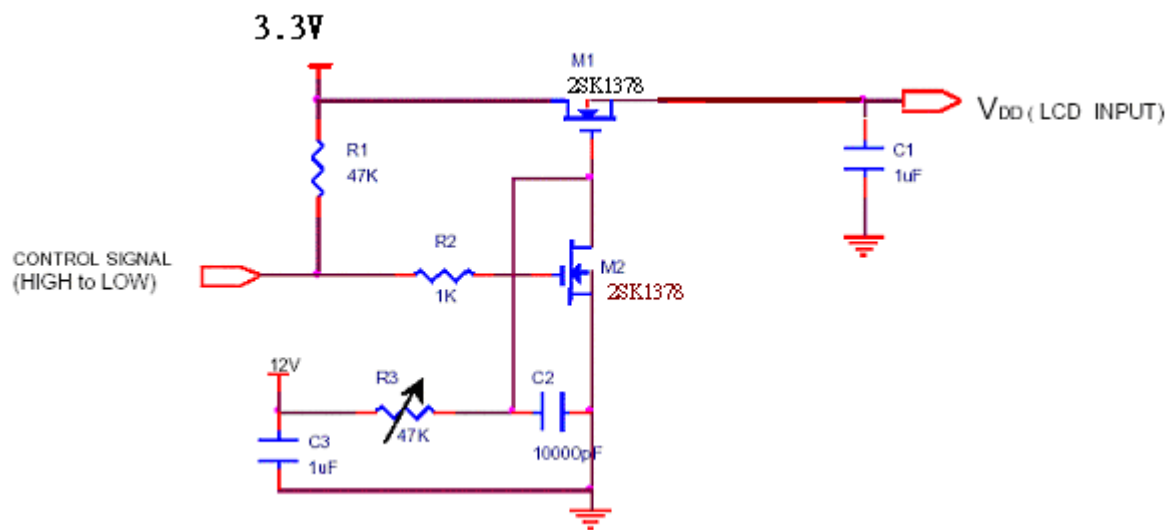


Figure3. 1 cycle time of LVDS

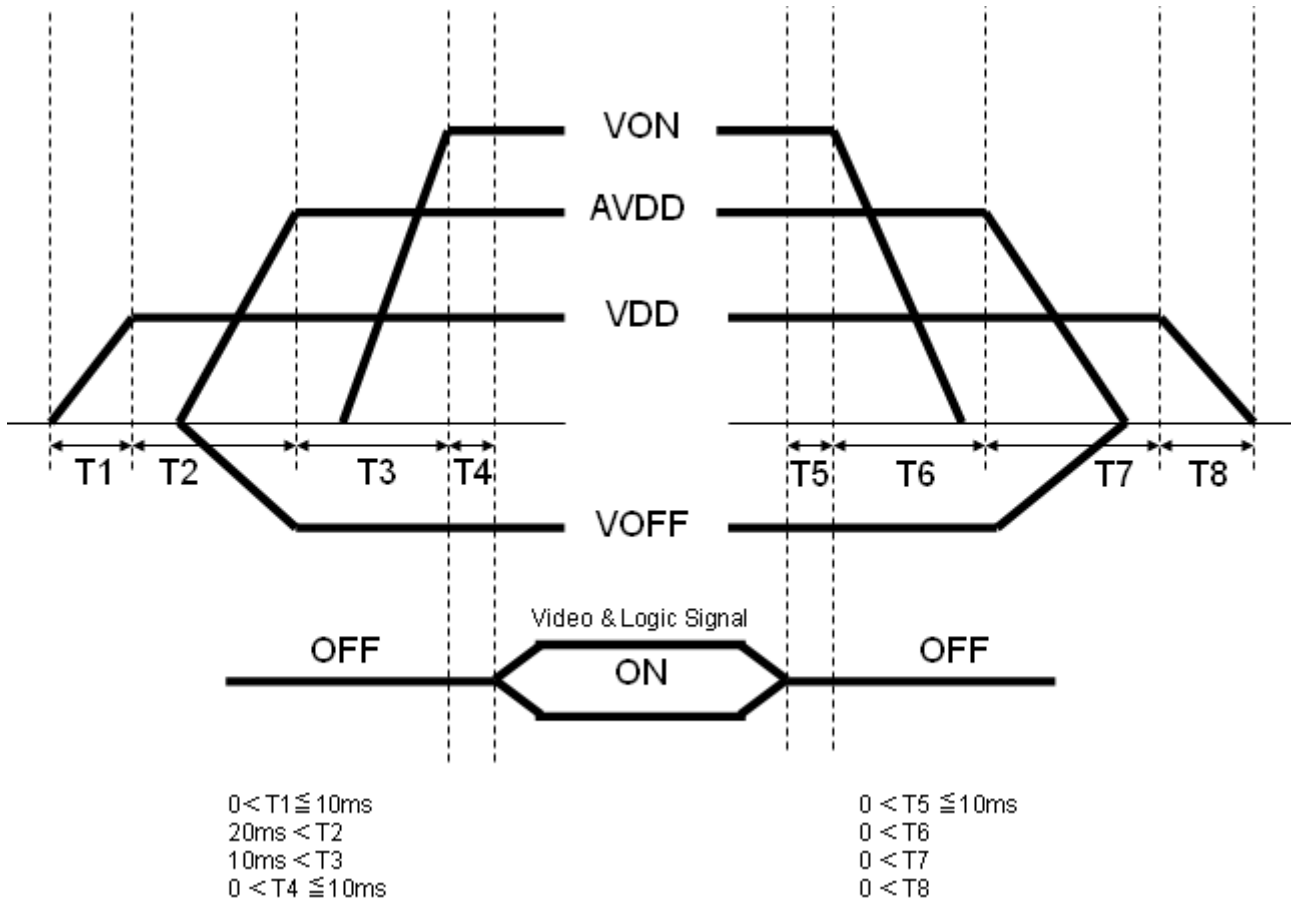
*4) Irush measure condition



(B) POWER SEQUENCE

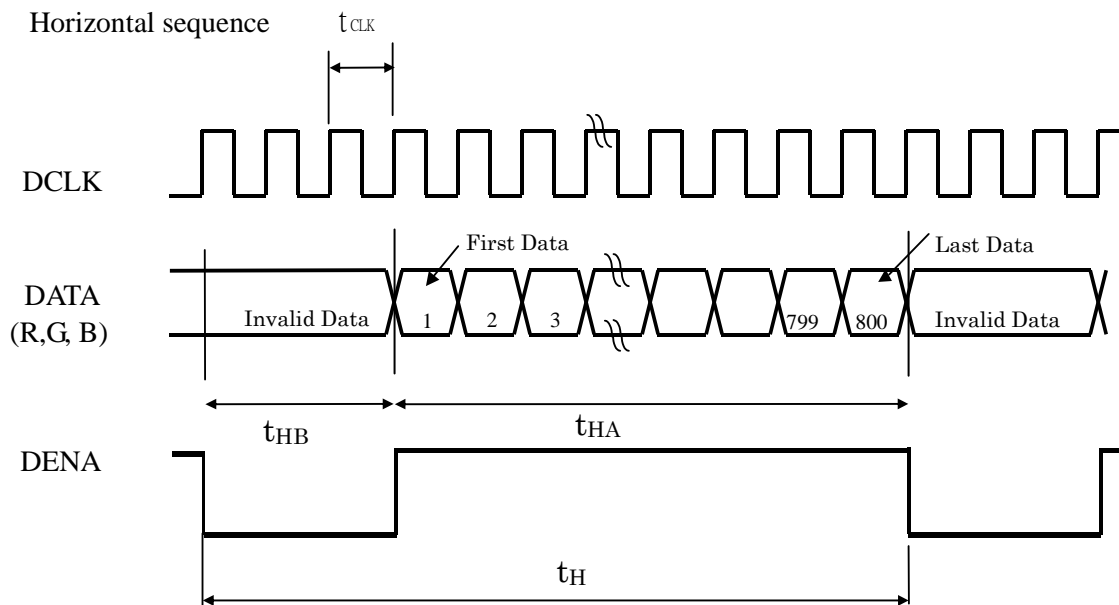
Power On : VDD → AVDD/VOFF → VON → Video & Logic Signal

Power Off : Video & Logic Signal → VON → AVDD/VOFF → VDD

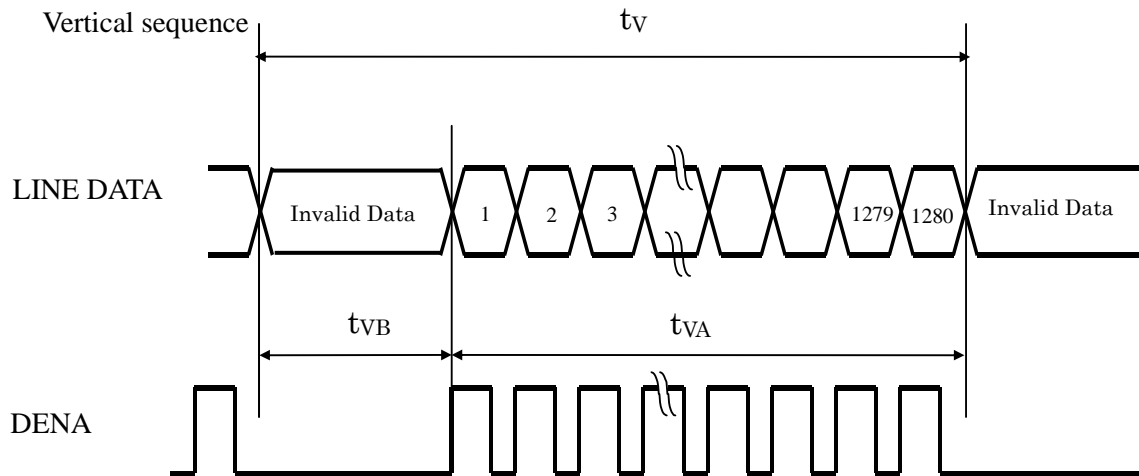


4. INTERFACE TIMING CHART

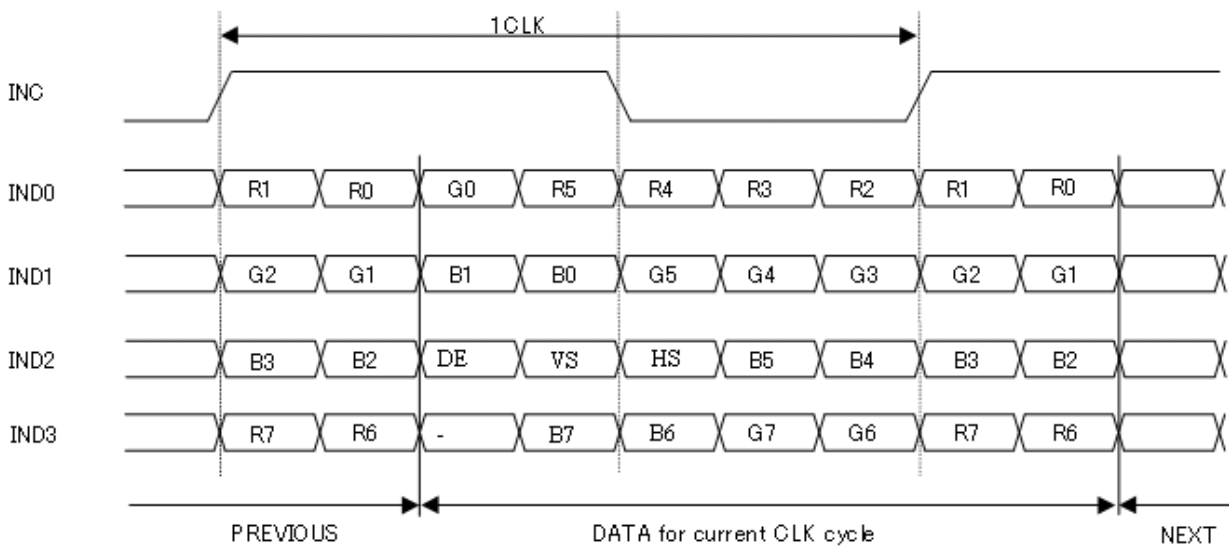
(1)(a) Input time sequence



(b)LCD input time sequence



(C)Input Data mapping



(2) Timing Chart

ITEM			SYMBOL	MIN	TYP	MAX	UNIT	
LCD Timing	Frame Rate		-	-	60	-	Hz	
	DCLK		Frequency	f_{CLK}	-	66.77	-	MHz
	DENA	Horizontal	Horizontal total time	t_H	-	864	-	t_{CLK}
			Horizontal Active time	t_{HA}	-	800	-	t_{CLK}
			Horizontal Blank time	t_{HB}	-	64	-	t_{CLK}
	DENA	Vertical	Vertical total time	t_V	-	1280	-	t_H
			Vertical Active time	t_{VA}	-	1200	-	t_H
Vertical Blank time			t_{VB}	-	8	-	t_H	

【Note】

- *1) DENA (DATA ENABLE) usually is positive.
- *2) During the whole blank period, DCLK should keep input.

(3) DATA mapping

COLOR	INPUT DATA	R DATA								G DATA								B DATA							
		R7 MSB	R6	R5	R4	R3	R2	R1	R0 LSB	G7 MSB	G6	G5	G4	G3	G2	G1	G0 LSB	B7 MSB	B6	B5	B4	B3	B2	B1	B0 LSB
BASIC COLOR	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	GREEN(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	
	BLUE(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	
	CYAN	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	MAGENTA	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	
	YELLOW	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	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	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	0	0	0	0		
	RED(1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	RED(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	RED(254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	RED(255)	1	1	1	1	1	1	1	1	0	0	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	0	0	0	0		
	GREEN(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0		
	GREEN(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0		
	GREEN(254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0		
	GREEN(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	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	0	0	0	0		
	BLUE(1)	0	0	0	0	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	0	0	0	0	1	0		
	BLUE(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0		
	BLUE(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1		

【Note】

1) Gray level:

Color(n) : n is level order; higher n means brighter level.

2) DATA:

1: high , 0: low

5. FPC Pin Assignment

1) 6 bit FPC Pin Assignment

NO.	Symbol	Description
1	VCOM	Common Voltage 2.4V~3.6V Please adjust VCOM to make the flicker level be minimum *1) *2)
2	VCOM	
3	NC	Floating
4	VDD	Power Supply 3.3V +/-0.3V
5	VDD	
6	GND	Ground
7	D0N	D0-
8	D0P	D0+
9	GND	Ground
10	D1N	D1-
11	D1P	D1+
12	GND	Ground
13	D2N	D2-
14	D2P	D2+
15	GND	Ground
16	CLKN	CLK-
17	CLKP	CLK+
18	GND	Ground
19	NC	Floating
20	NC	Floating
21	GND	Ground
22	GND	Ground
23	NC	Floating
24	GND	Ground
25	GND	Ground
26	NC	Floating
27	AVDD	Analog Power Supply 8.94V +/-0.2V
28	AVDD	
29	GND	Ground
30	CATHODE	LED-
31	CATHODE	LED-
32	NC	Floating
33	VGL	Gate Low Voltage -8.18V +/-0.6V
34	VGL	

35	NC	Floating
36	VGH	Gate High Voltage 17.3V+/-1V
37	VGH	
38	NC	Floating
39	ANODE	LED+
40	ANODE	LED+

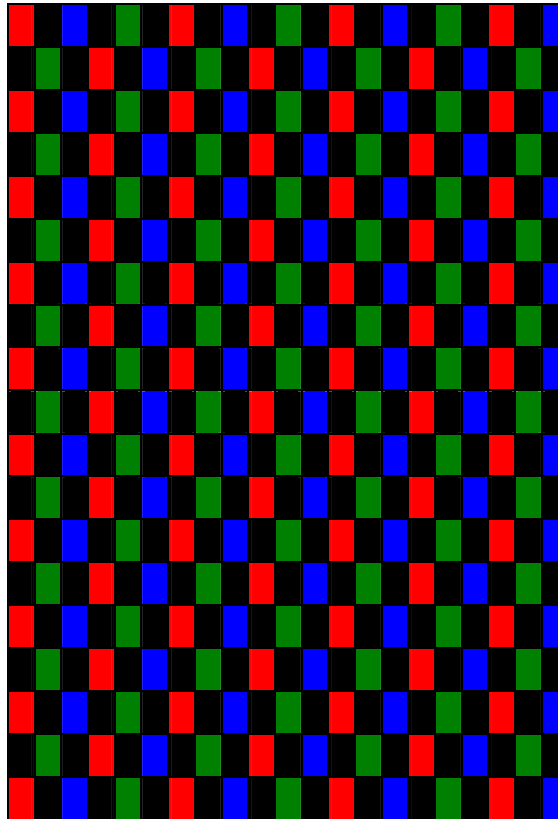
2) 8 bit FPC Pin Assignment

NO.	Symbol	Description
1	VCOM	Common Voltage 2.4V~3.6V
2	VCOM	Please adjust VCOM to make the flicker level be minimum *1) *2)
3	NC	Floating
4	VDD	Power Supply 3.3V +/-0.3V
5	VDD	
6	GND	Ground
7	D0N	D0-
8	D0P	D0+
9	GND	Ground
10	D1N	D1-
11	D1P	D1+
12	GND	Ground
13	D2N	D2-
14	D2P	D2+
15	GND	Ground
16	CLKN	CLK-
17	CLKP	CLK+
18	GND	Ground
19	D3N	D3-
20	D3P	D3+
21	GND	Ground
22	LVFMT (1.8V)	1.8V±0.1V Normally pull high
23	NC	Floating
24	LVBIT (1.8V)	1.8V±0.1V Normally pull high
25	DITHER (1.8V)	1.8V±0.1V Normally pull high
26	NC	Floating
27	AVDD	Analog Power Supply 8.94V +/-0.2V
28	AVDD	
29	GND	Ground
30	CATHODE	LED-
31	CATHODE	LED-
32	NC	Floating
33	VGL	Gate Low Voltage -8.18V +/-0.6V
34	VGL	
35	NC	Floating
36	VGH	Gate High Voltage 17.3V +/-1V

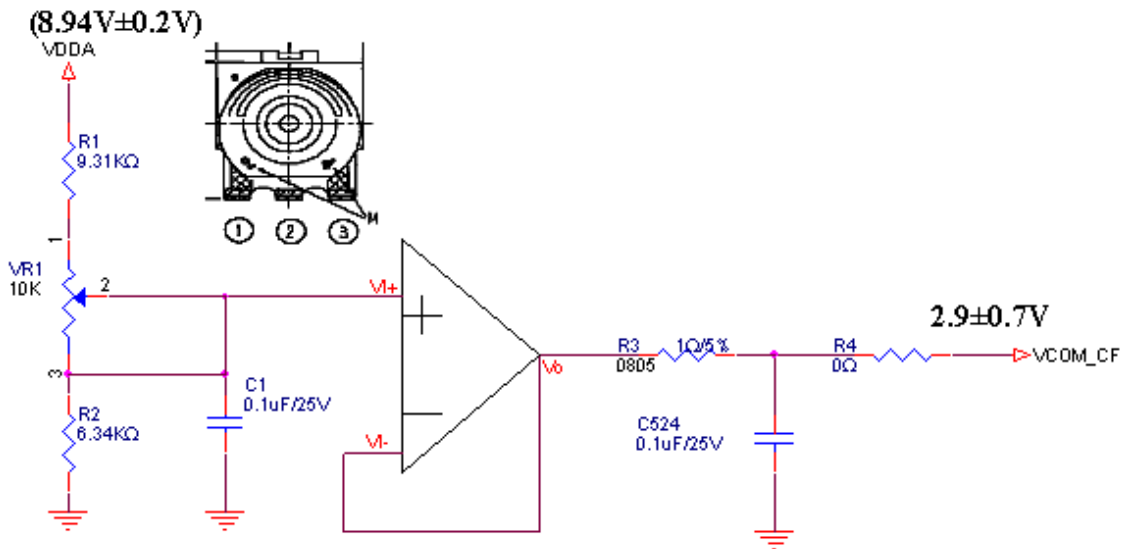
37	VGH	
38	NC	Floating
39	ANODE	LED+
40	ANODE	LED+

【Note】

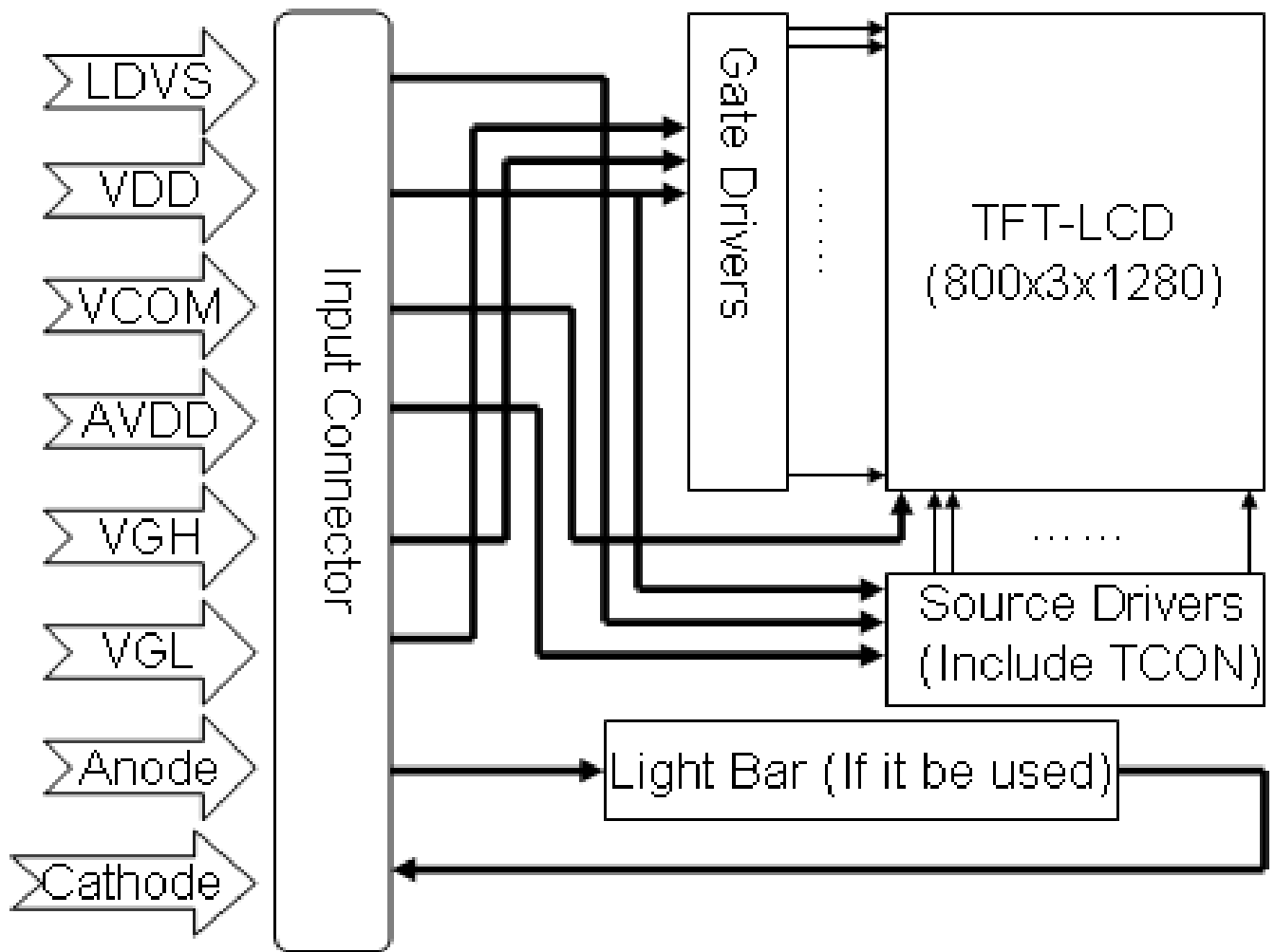
***1) Flicker Pattern schematic drawing(gray Leve=128)**



***2) Vcom suggests the circuit diagram**



6. BLOCK DIAGRAM



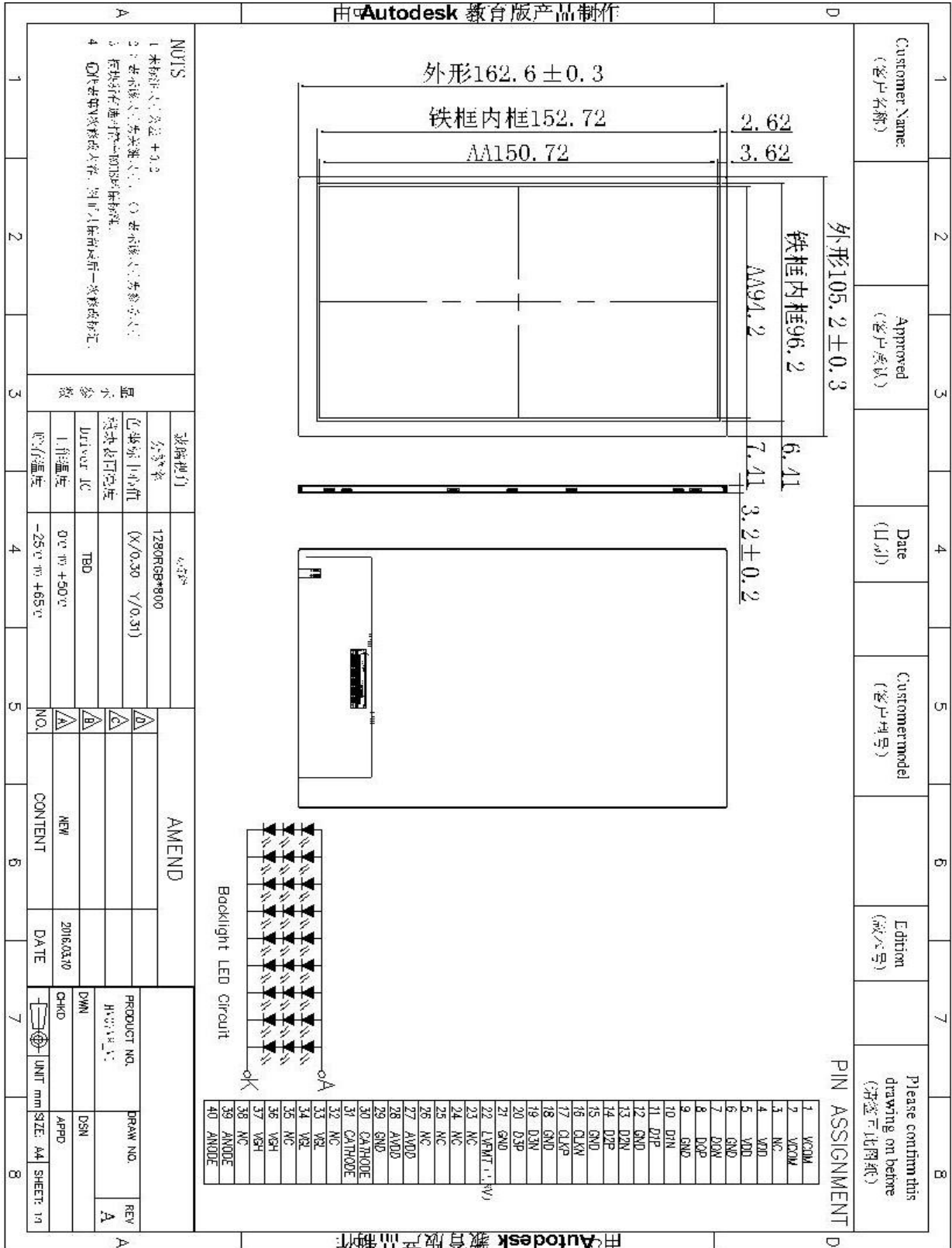
6. MECHANICAL SPECIFICATION

6.1 Outline Dimension

(1) Front side

The tolerance, not show in the figure, is $\pm 0.3\text{mm}$.

[Unit:mm]



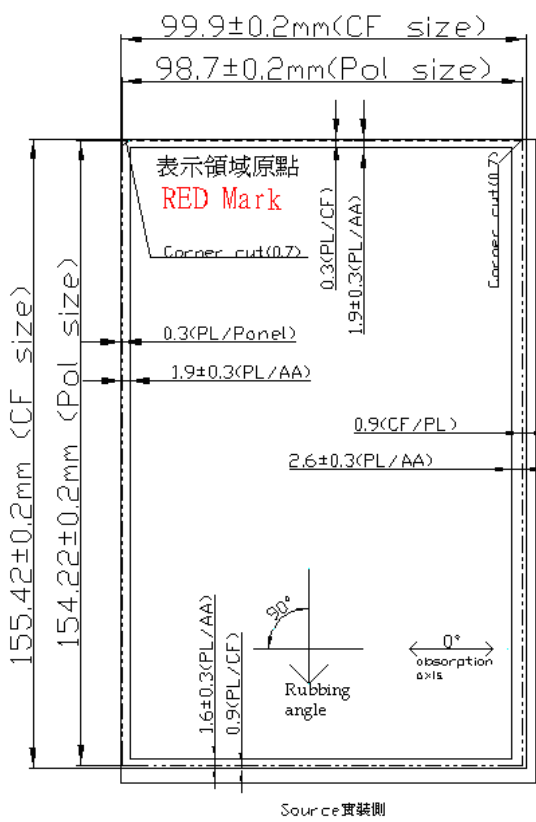
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(3) POLARIZER INFORMATION

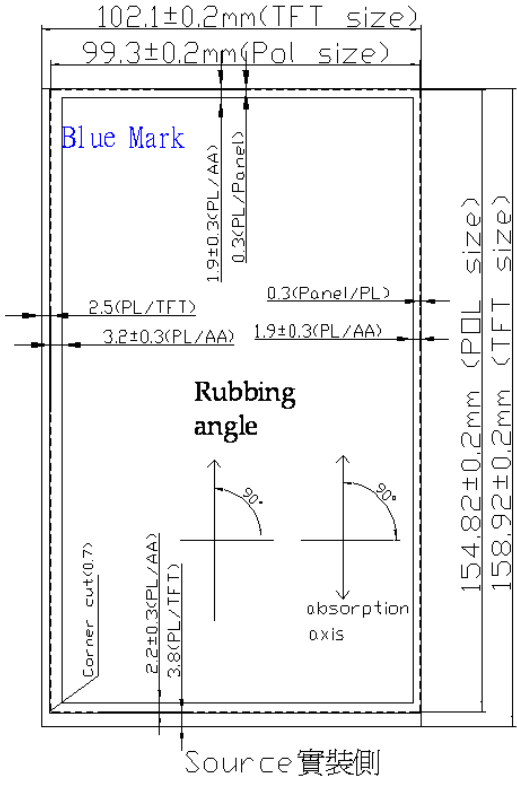
CF 側

TFT 側



Viewing from TFT glass side

側 實裝側



Source 實裝側

Surface Treatment : UP PL: HC 、 Down PL: AG25%

7. OPTICAL CHARACTERISTICS

Ta=25°C , VDD=3.3V

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE	
Contrast Ratio	CR	$\theta=\psi= 0^\circ$	500	700	--	--	*1) 2)	
Transmittance (CEN)	T%	$\theta=\psi= 0^\circ$		3.66	--	%	*1) 5) Base on: CPT 偏光板 條件& CPT BL	
Response Time	Tr+Tf	$\theta=\psi= 0^\circ$	--	--	50	ms	*5)	
View angle	Horizontal	Ψ	$CR \geq 10$	80/-80	85/-85	--	°	*4)
	Vertical	θ		80/-80	85/-85	--	°	*4)
Color Temperature Coordinate	W	X	$\theta=\psi= 0^\circ$	0.28	0.31	0.34	--	*3) Base on CPT BL
		Y		0.30	0.33	0.36	--	
	R	X		TBD	TBD	TBD	--	
		Y		TBD	TBD	TBD	--	
	G	X		TBD	TBD	TBD	--	
		Y		TBD	TBD	TBD	--	
	B	X		TBD	TBD	TBD	--	
		Y		TBD	TBD	TBD	--	

Color coordinate and color gamut are measured by SRUL1R, response time is measured by TRD-100, and all the other items are measured by BM-5A (TOPCON). All these items are measured under the dark room condition (no ambient light).

Measurement Condition: IL= 12mA (each LED); 7,500 cd/m²

【Note】

*1) TFT side Polarizer: LG **ST020070WP020101B(L0)**; CF side Polarizer: LG **ST060070WP02010T(L0)**

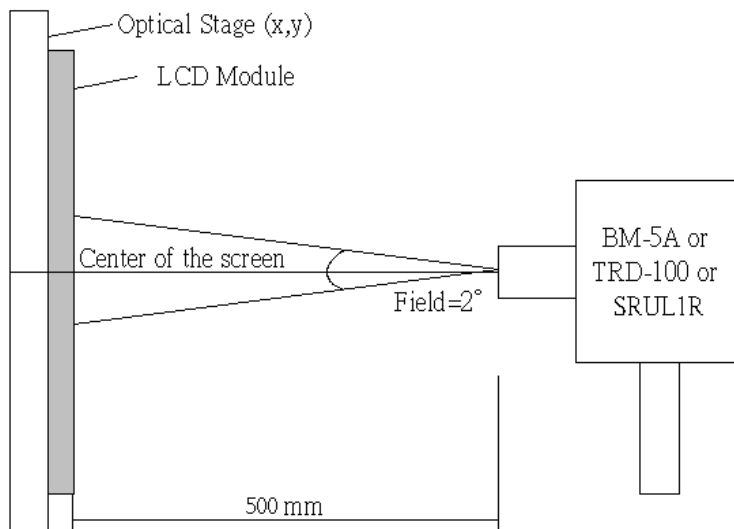
Definition of these measurement items is as follows:

***1) Setup of Measurement Equipment**

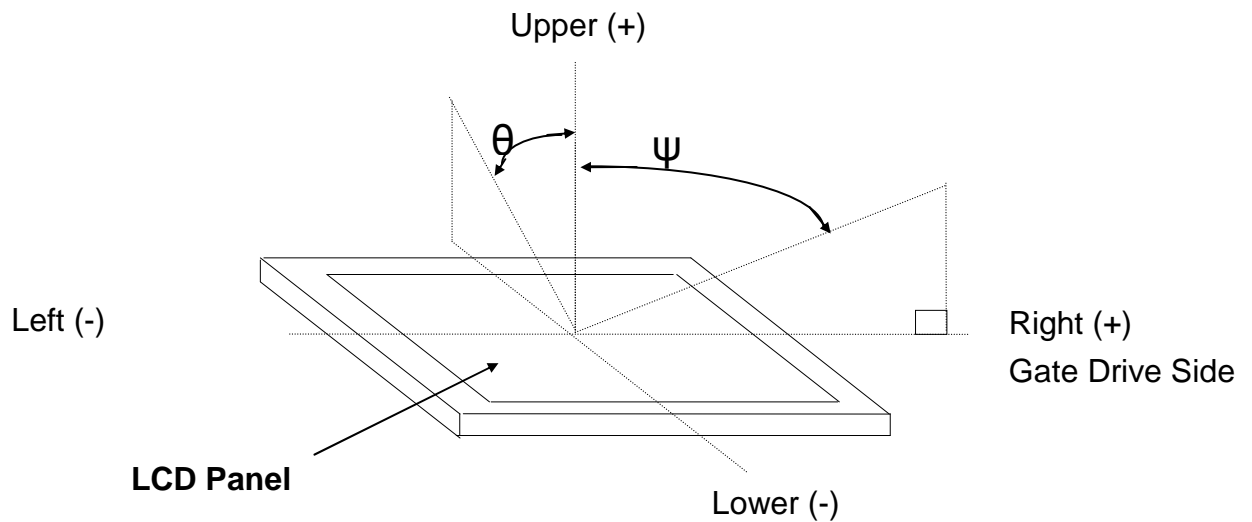
The LCD module should be turn-on to a stable luminance level to be reached. The measurement should be executed after lighting Backlight for 20 minutes and in a dark room.

***2) Definition of Contrast Ratio**

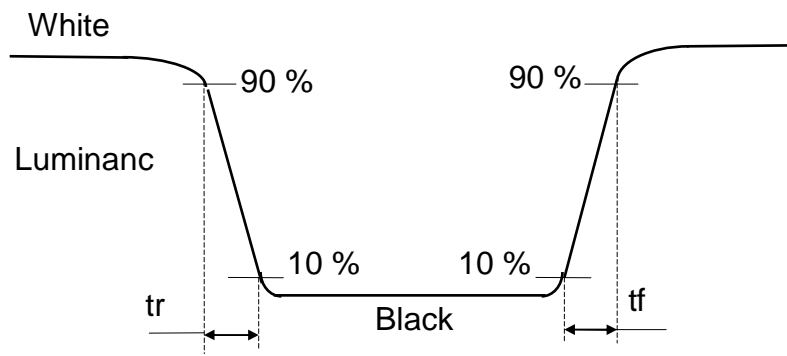
CR=ON (White) Luminance/OFF (Black) Luminance



***3) Definition of view angle(θ , ψ)**



***4) Definition of response time**



***5) Definition of Transmittance (T%)**

$$\text{Transmittance} = (\text{Luminance of LCD module} / \text{Luminance of backlight}) * 100\%$$