Chunghwa Picture Tubes, Ltd.
Technical Specification

To : 駿年
Date : 2013/03/27

TFT LCD
CLAB133UA01 CG

ACCEPTED BY :

APPROVED BY	CHECKED BY	PREPARED BY
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1. OVERVIEW

CLAB133UA01_CG is 13.3" color (16：9) TFT-LCD (Thin Film Transistor Liquid Crystal Display) module composed of LCD panel, LVDS interface ICs and control circuit .By applying 6 bit digital data, 1600×RGB (3) ×900, 262K-color images are displayed on the 13.3" diagonal screen. General specifications are summarized in the following table：

ITEM	SPECIFICATION
Display Area	293.28(H) x 164.97(V) (mm) (13.3-inch diagonal)
Number of Pixels	1600 x 3 (RGB) x 900
Pixel Pitch	0.1833 (H) x 0.1833 (V) (mm)
Color Pixel Arrangement	RGB vertical stripe
Display Mode	Normally white
Number of Colors	262,144(6bits) (LVDS interface)
Surface Treatment	HC
Viewing Angle	40°、-40° /15°、-30° (MIN.)

2. ABSOLUTE MAXIMUM RATINGS

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

ITEM	SYMBOL	MIN	MAX	UNIT	NOTE
LCD Power Voltage	VCC	0	4.0	V	
LED Driver Input Voltage	VBL+	7	21	V	
Operation Temperature	Top	0	50	℃	*1).*2).*3).*4).
Storage Temperature	Tstg	-25	65	℃	*1).*2).*3).

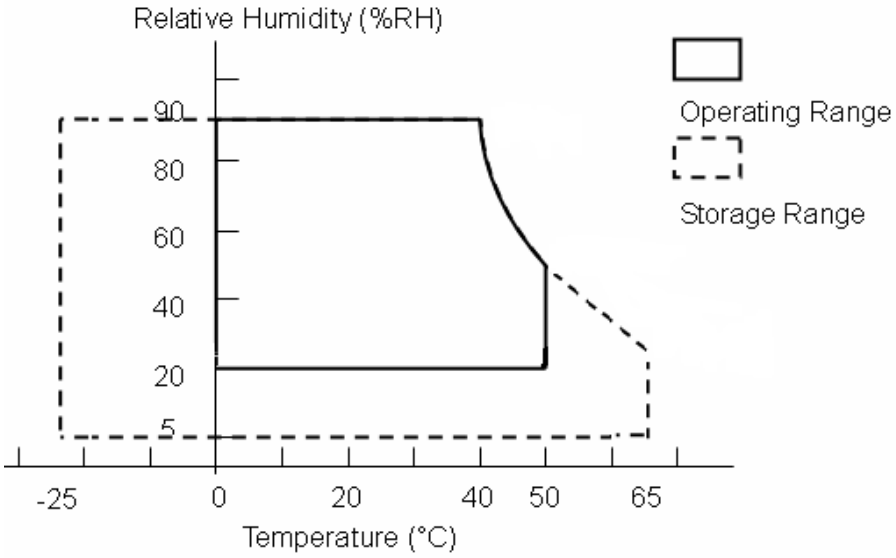
【Note】

*1) The relative temperature and humidity range are as below sketch, 90%RH Max. (Ta≦40℃)

*2) The maximum wet bulb temperature ≦39℃(Ta＞40℃) 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℃.



3. ELECTRICAL CHARACTERISTICS

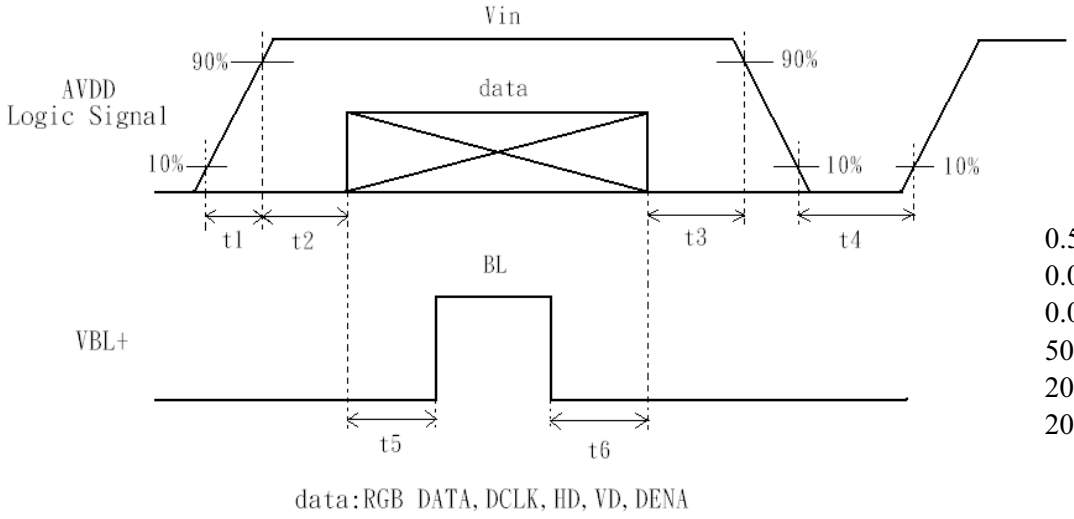
(A) TFT LCD

ITEM		SYMBOL	MIN	TYP	MAX	UNIT	NOTE
LCD Power Voltage		VCC	3.0	3.3	3.6	V	*1)
LCD Power Current		ICC	-	320	420	mA	*2)
Rush Current		Irush	-	-	2	A	*4)
Logic Input Voltage (LVDS: IN+,IN-)	Common Voltage	VCM	1.125	1.25	1.375	V	*3)
	Differential Input Voltage	| VID |	250	350	450	mV	*3)
	Threshold Voltage (HIGH)	VTH	-	-	100	mV	*3) When VCM = +1.2V
	Threshold Voltage (LOW)	VTL	-100	-	-	mV	

【Note】

*1)

(a)Power Sequence：



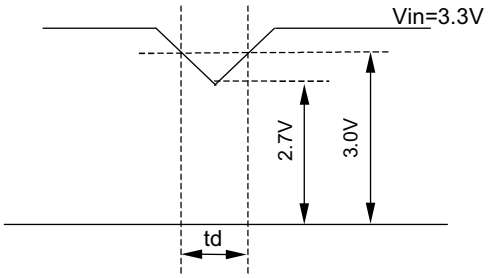
data:RGB DATA, DCLK, HD, VD, DENA

0.50 ms≦t1 ≦10 ms
0.01 ms＜t2 ≦50 ms
0.01 ms＜t3 ≦50 ms
500 ms≦t4
200 ms≦t5
200 ms≦t6

(b)VCC-dip state

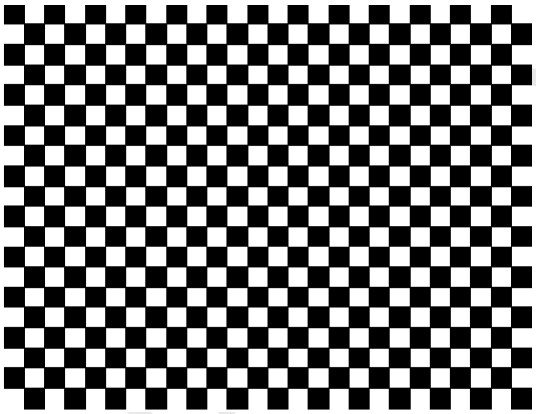
(1)when 3.0V＞VCC≧2.7V，td≦10 ms.

(2)when VCC＜2.7V，VCC-dip condition should as the VCC-turn-off condition.



*2) Typical value is Mosaic (32*36 Checker board) Pattern：900 line mode.

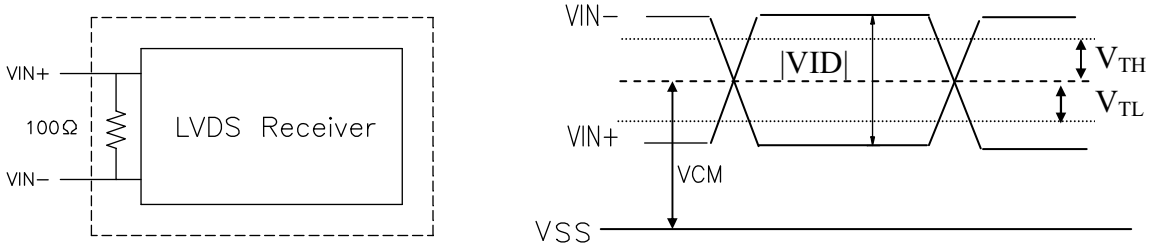
Circuit condition：VCC=3.3 V，f_V=60 Hz，f_H=55.92KHz，f_{CLK}=50.1MHz



Max value is Black Pattern：900 line mode.

Circuit condition：VCC=3.3 V，f_V=60 Hz ，f_H=55.92KHz，f_{CLK}=50.1MHz

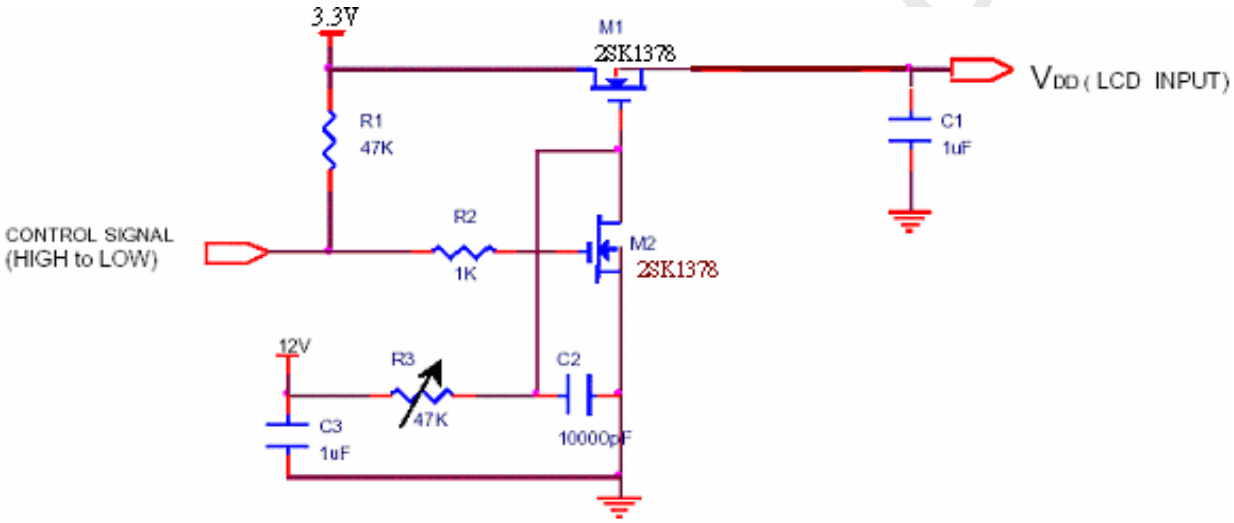
*3) LVDS Signal Definite：

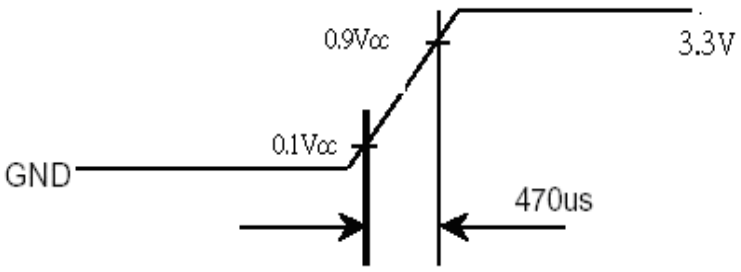


VIN+：Positive differential DATA & CLK Input

VIN-：Negative differential DATA & CLK Input

*4) Irush measure condition





(B) BACK LIGHT

a. ELECTRICAL CHARACTERISTICS

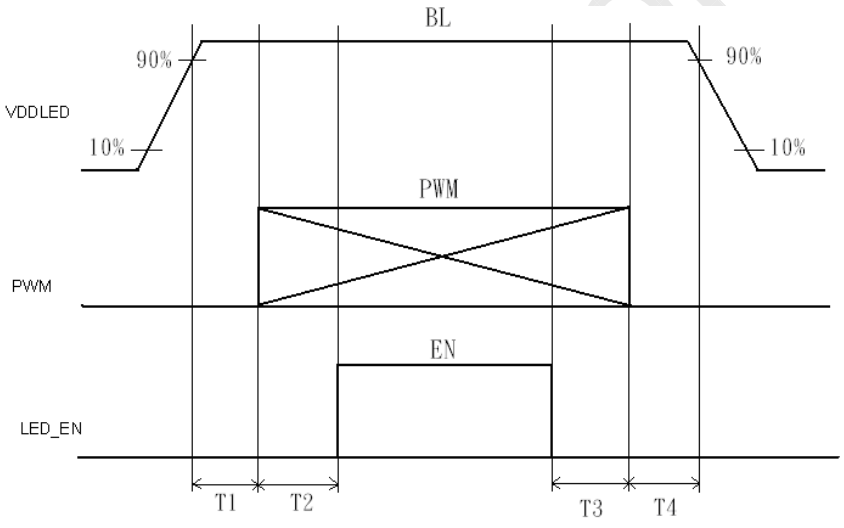
Ta=25℃

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
LED Driver Input Voltage	VBL+	7	12	21	V	
LED Driver Input Current	IBL+			650	mA	*1)
Forward Voltage	V_F		2.9	3.0	V	*2) I_F=20mA
Forward Current	I_F	19.5	20	20.5	mA	*2)
Power Consumption	PLED	2.66	2.73	2.9	W	*2)*3)
PWM Frequency	PWM_BL	180	200	1K	Hz	*2)I_F=20mA
Duty ratio	Dim	10		100	%	

b. LED LIFE – TIME

ITEM	CONDITION	MIN	TYP	MAX	UNIT	NOTE
Life Time	I_F=20mA、Ta=25℃	15000			hrs	*4)

c. LED ON/OFF Sequence：



10ms ≦ T1　　0ms ≦ T3

10ms ≦ T2　　10ms ≦ T4

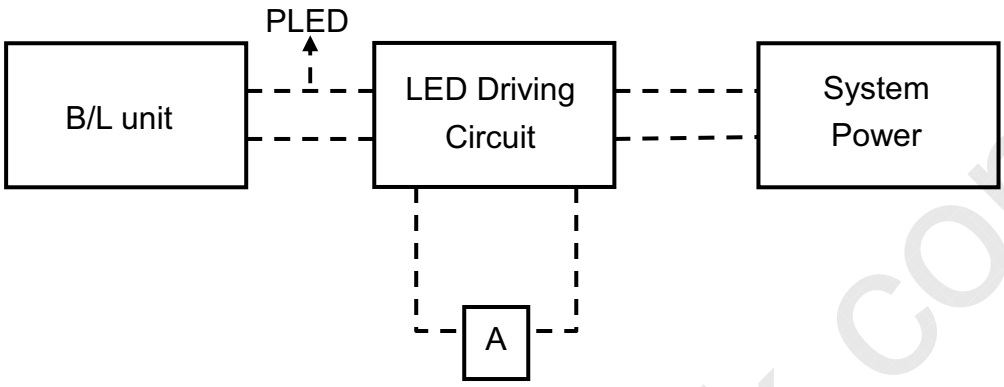
【Note】

*1) Maximum LED Driver Input Current at 7V Input Voltage/PWM Duty 100%.

*2) Measure method：

a. LED current is measured by utilizing a current meter as show below.

b. System power PLED is measured at input voltage 12V.



*3) Calculator value for reference $I_F \times V_F \times N = PLED$

*4) Life time means that estimated time to 50% degradation of initial luminous intensity.

4. Connector Interface PIN & Function

CN (Input interface signal)

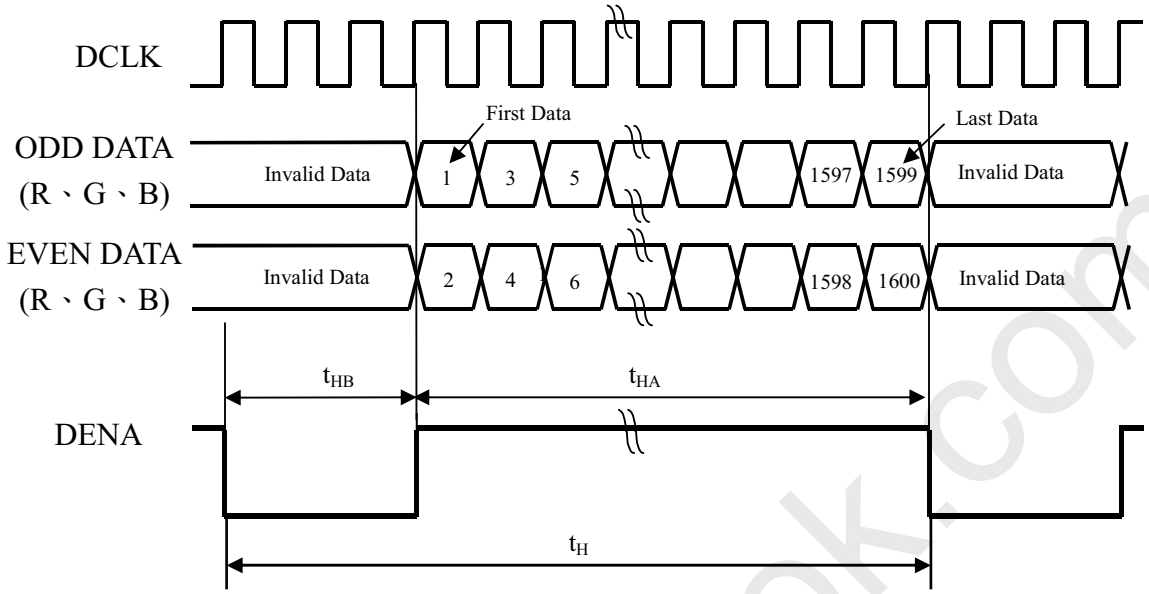
Outlet connector: TYCO_5-2069716-3

Pin No.	SYMBOL	FUNCTION
1	NC	No Connect
2	VDD	Power Supply, 3.3 V (typical)
3	VDD	Power Supply, 3.3 V (typical)
4	V_EEDID	DDC 3.3V power
5	NC	No Connect
6	SCL_EDID	DDC Clock
7	SDA_EDID	DDC Data
8	RXO0-	Minus signal of odd channel 0(LVDS)
9	RXO0+	Plus signal of odd channel 0(LVDS)
10	GND	Ground
11	RXO1-	Minus signal of odd channel 1(LVDS)
12	RXO1+	Plus signal of odd channel 1(LVDS)
13	GND	Ground
14	RXO2-	Minus signal of odd channel 2(LVDS)
15	RXO2+	Plus signal of odd channel 2(LVDS)
16	GND	Ground
17	RXOC-	Minus signal of odd clock channel (LVDS)
18	RXOC+	Plus signal of odd clock channel (LVDS)
19	GND	Ground
20	RXE0-	Minus signal of even channel 0(LVDS)
21	RXE0+	Plus signal of even channel 0(LVDS)
22	GND	Ground
23	RXE1-	Minus signal of even channel 1(LVDS)
24	RXE1+	Plus signal of even channel 1(LVDS)
25	GND	Ground
26	RXE2-	Minus signal of even channel 2(LVDS)
27	RXE2+	Plus signal of even channel 2(LVDS)
28	GND	Ground
29	RXEC-	Minus signal of even clock channel (LVDS)
30	RXEC+	Plus signal of even clock channel (LVDS)
31	VLED_GND	Ground - LED
32	VLED_GND	Ground - LED
33	VLED_GND	Ground - LED
34	NC	No Connect
35	BLIM	System PWM Signal Input (+3.3V Swing)
36	BL_ON	LED enable pin (+3.3V Input)
37	NC	No Connect
38	VDDLED	7V – 21V LED power
39	VDDLED	7V – 21V LED power
40	VDDLED	7V – 21V LED power

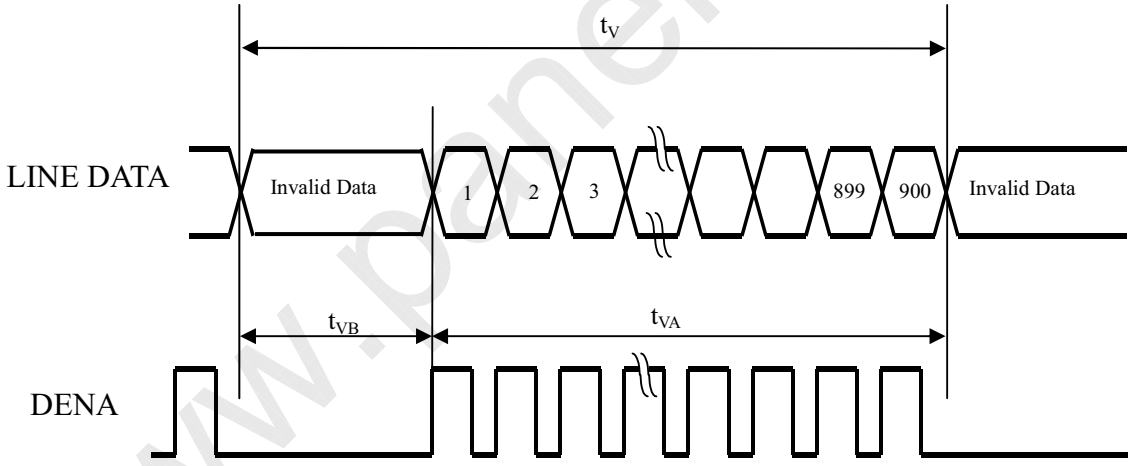
5. INTERFACE TIMING CHART

(1)LVDS input time sequence

(a). Horizontal sequence



(b). Vertical sequence



(2) Timing Chart

ITEM				SYNBOL	MIN	TYP	MAX	UNIT
LCD Timing	Frame Rate			-	55	60	60	Hz
	DCLK		Frequency	f_{CLK}	44.82	50.1	55.49	MHz
			Period	t_{CLK}	18.02	19.96	23.31	ns
	DENA	Horizontal	Horizontal total time	t_H	880	896	986	t_{CLK}
			Horizontal Active time	t_{HA}	800	800	800	t_{CLK}
			Horizontal Blank time	t_{HB}	80	96	186	t_{CLK}
		Vertical	Vertical total time	t_V	926	932	938	t_H
			Vertical Active time	t_{VA}	900	900	900	t_H
			Vertical Blank time	t_{VB}	26	32	38	t_H
LVDS spread spectrum range *3)					-2		2	%

【Note】

*1) DENA (DATA ENABLE) usually is positive.

*2) During the whole blank period, DCLK should keep input.

*3) LVDS input clock is 85MHz and modulation rate is fixed 100KHz

(3) DATA mapping

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】

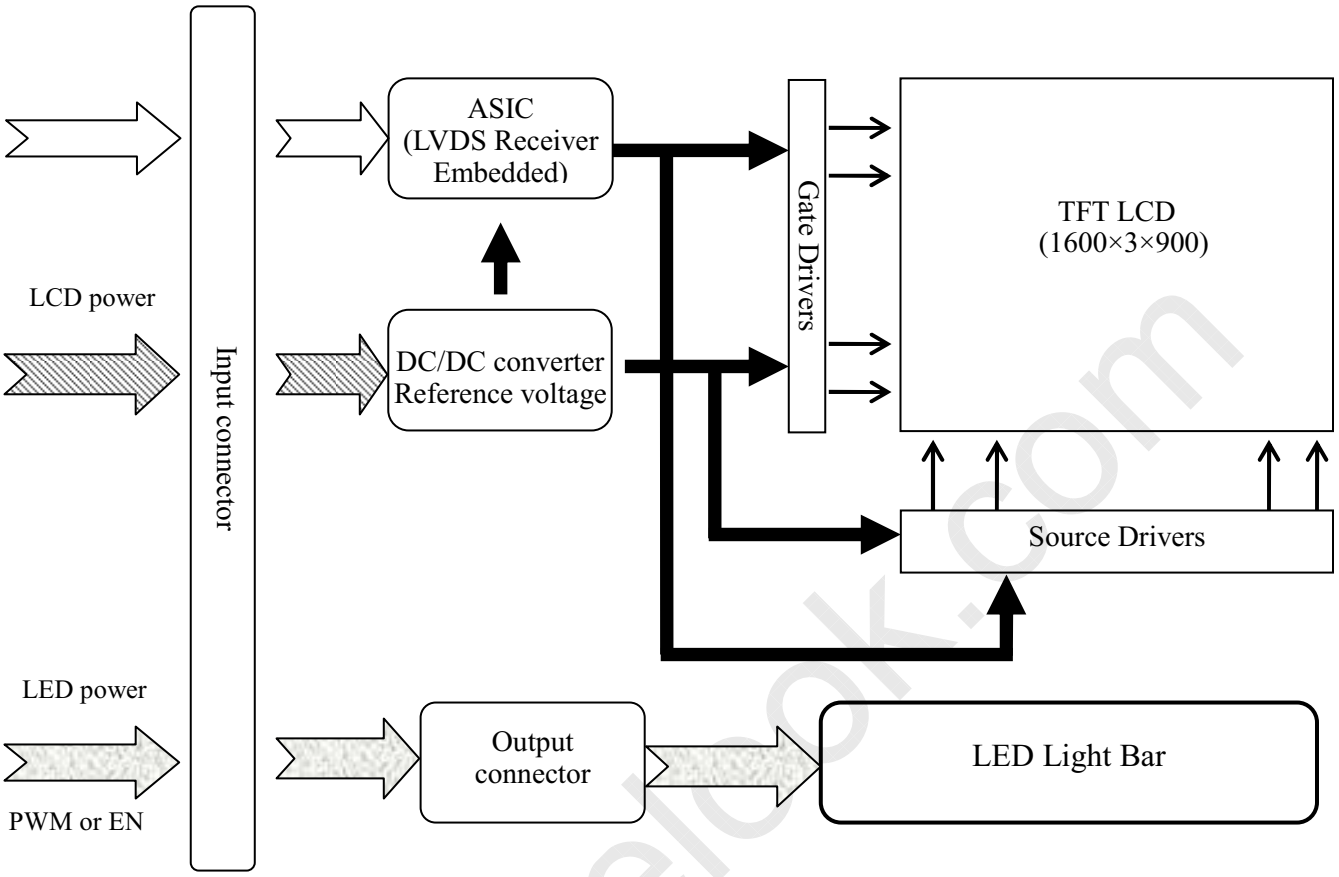
1) Gray level:

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

2) DATA:

1: high，0: low

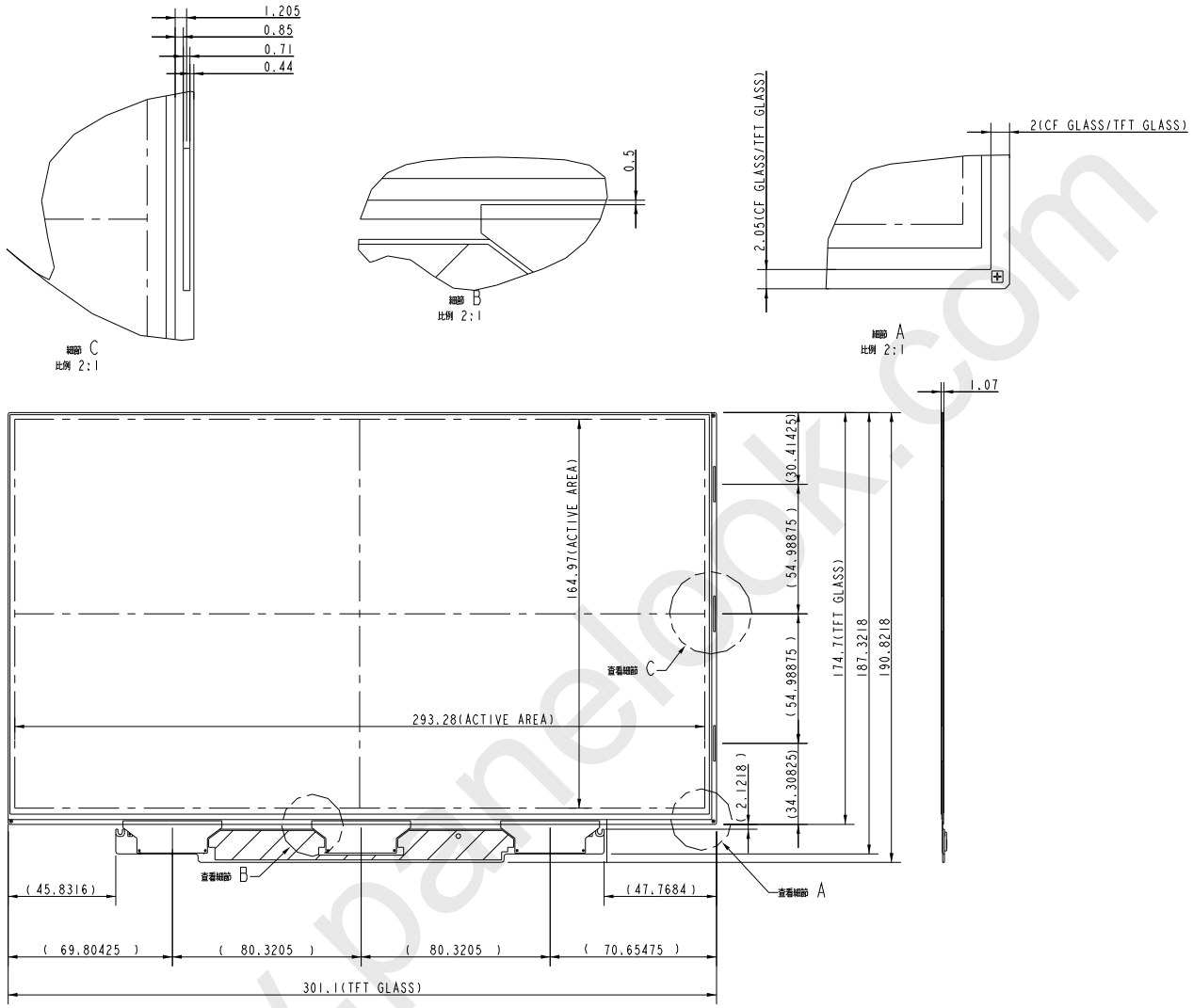
6. BLOCK DIAGRAM



7. MECHANICAL SPECIFICATION

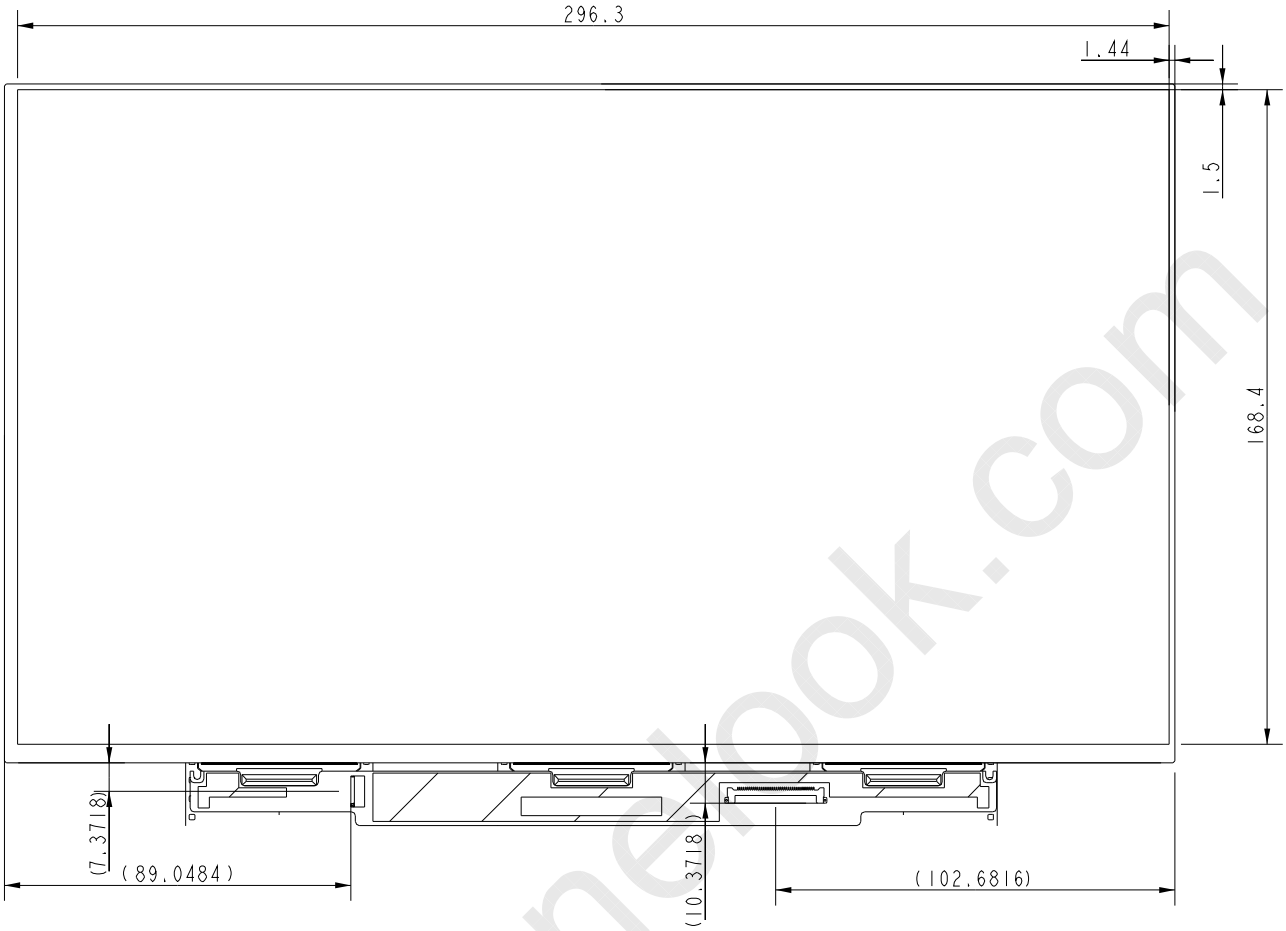
(1) Front side

The tolerance, not show in the figure, is ±0.5 mm. **[Unit：mm]**



(2) Rear side

The tolerance, not show in the figure, is ±0.5 mm. **[Unit：mm]**



8. OPTICAL CHARACTERISTICS

Ta=25℃，VDD=3.3V

ITEM		SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	NOTE
Contrast Ratio		CR	θ=ψ= 0° CPT BLU	350	500		--	*1) 2)
Transmittance (CEN)		T%		5.4%	5.95%		%	*5)
Response Time		Tr	θ=ψ= 0°		6	9	ms	*4)
		Tf	θ=ψ= 0°		10	16	ms	*4)
Cross Talk		CT	θ=ψ= 0°			1.5	%	*6)
View Angle	Horizontal	ψ	CR≧10	40/-40			°	*3)
	Vertical	θ		15/-30			°	*3)
Color Temperature Coordinate	W	X	θ=ψ= 0° CPT BLU	0.293	0.313	0.333		*3)
		Y		0.309	0.329	0.349		
	R	X		0.556	0.586	0.616		
		Y		0.306	0.336	0.366		
	G	X		0.318	0.348	0.378		
		Y		0.540	0.570	0.600		
	B	X		0.132	0.162	0.192		
		Y		0.091	0.121	0.153		

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).

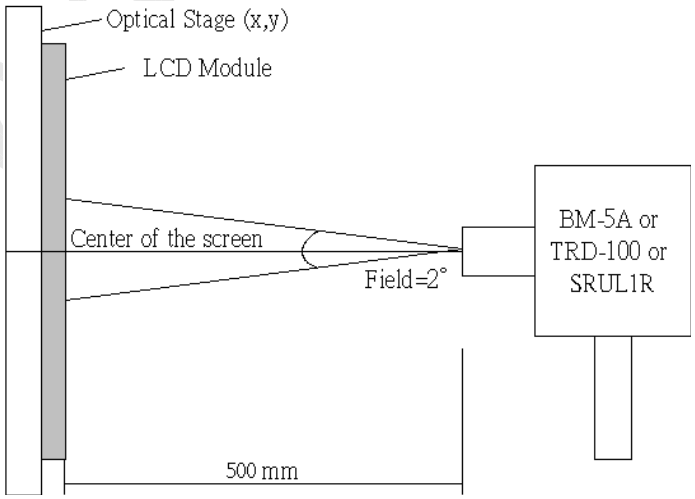
Definition of these measurement items is as follows:

***1) Setup of Measurement Equipment**

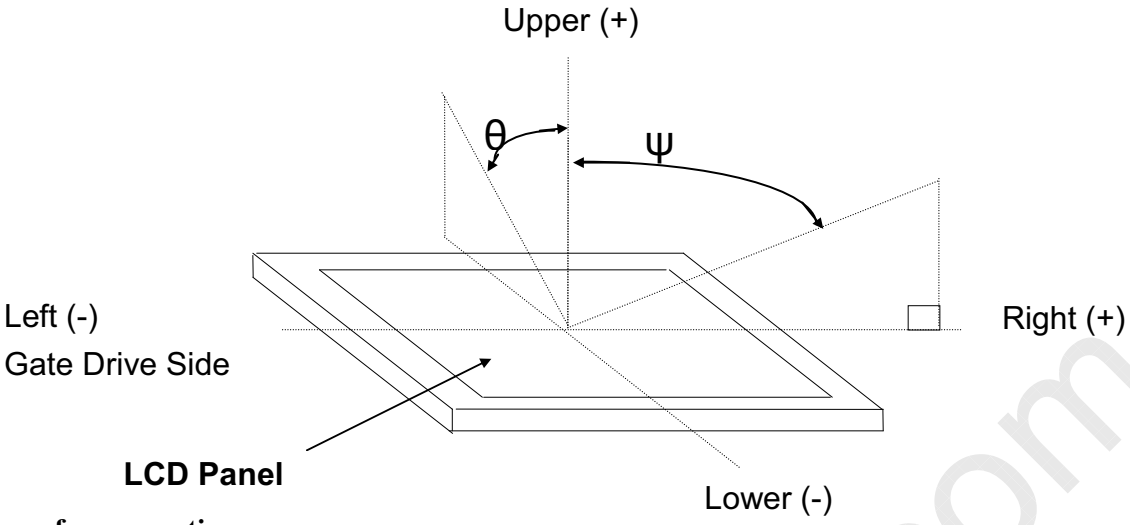
The LCD module should be turn-on to a stable luminance level to be reached. The measurement should be executed after lighting Backlight for 20 minutes and in a dark room.

***2) Definition of Contrast Ratio**

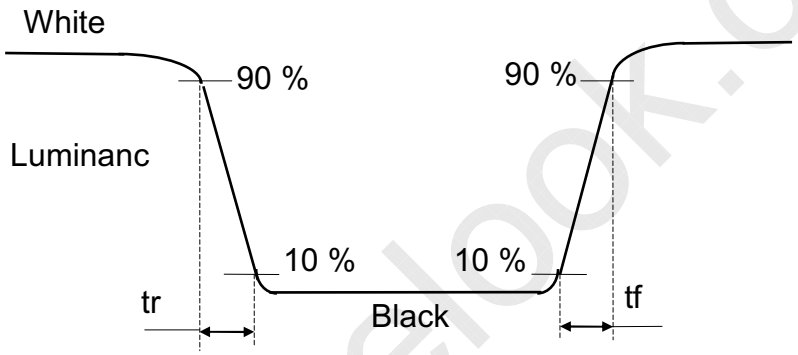
CR=ON (White) Luminance/OFF (Black) Luminance



***3) Definition of view angle(θ，ψ)**



***4) Definition of response time**



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

Transmittance = (Luminance of LCD module / Luminance of backlight) * 100%

***6) Crosstalk Modulation Ratio:**

CT= | Y_B-Y_A | / Y_A× 100%

Y_A、Y_B measure position and definition

Y_A means luminance at gray level 31(exclude gray level 0 pattern)

Y_B means luminance at gray level 31(include gray level 0 pattern)