Chunghwa Picture Tubes, Ltd.
Technical Specification

CPT TFT-LCD

CLAB133UA01_CW

APPROVED BY	CHECKED BY	PREPARED BY

Prepared by : Design General Division

CHUNGHWA PICTUER TUBES, LTD.

No. 1, Huaying Rd., Sanho Tsun, Lungtan Shiang, Taoyuan, Taiwan, 325, R.O.C.
TEL: +886-3-4805678 FAX: +886-3-4800589

Doc. No:	**CLAB133UA01_CW-tentative**	Issue Date:	2012/06/12

Title：CLAB133UA01_CW Technical Specification

Modification Record List

NO.	Issue Date	Modification Index
1	2012/06/12	First version
2		
3		
4		
5		
6		
7		
8		
9		
10		

Title：CLAB133UA01_CW Technical Specification

Table of Content

Title：CLAB133UA01_CW Technical Specification

1. OVERVIEW

CLAB133UA01_CW is 13.3" color (16：9) TFT-LCD (Thin Film Transistor Liquid Crystal Display) module composed of LCD panel, eDP 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) (eDP interface)
Surface Treatment	**AG25%**
Viewing Angle	**80°、-80° /60°、-80° (typ.)**

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).

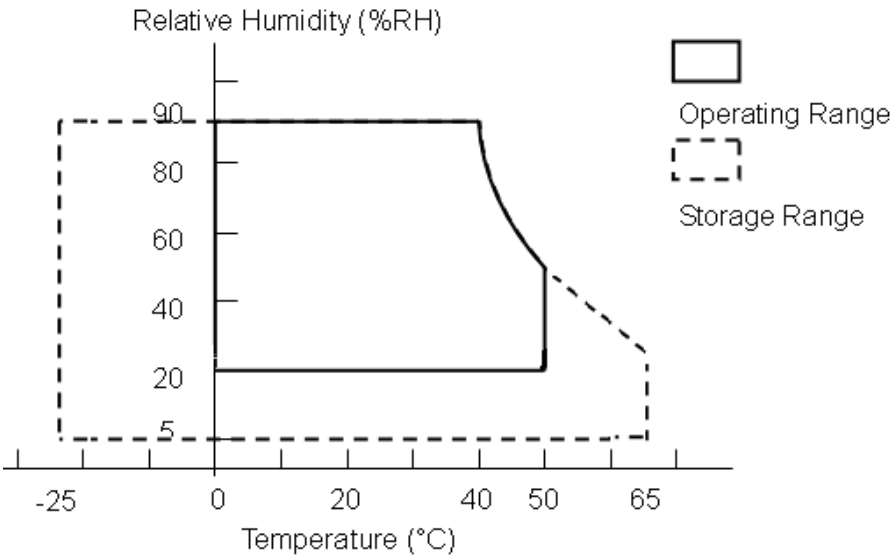
【Note】

*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

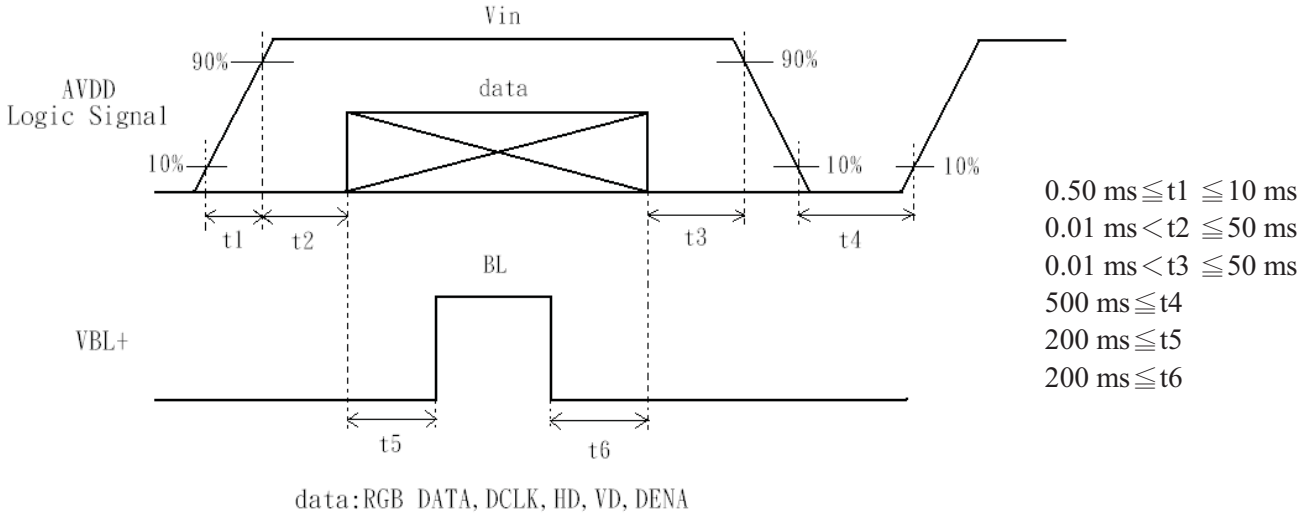
(A) TFT LCD

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：



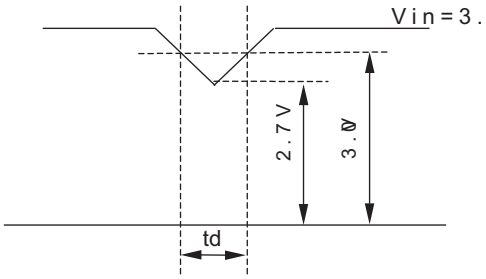
data:RGB DATA, DCLK, HD, VD, DENA

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

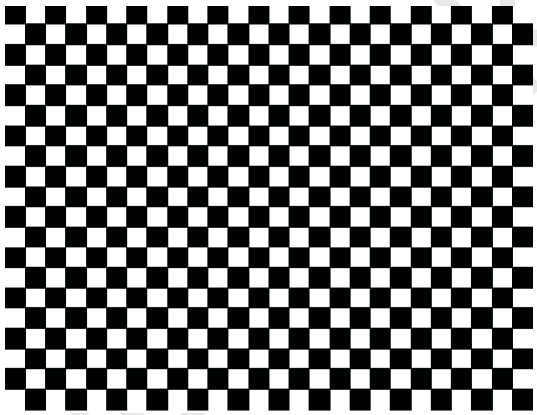
(1)when 3.0V＞VCC≧2.7V，td≦10 ms.

(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.

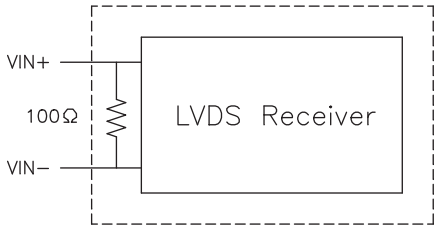
Circuit condition (Typ)：VCC=3.3 V，f_V=60 Hz，f_H=55.92KHz，f_{CLK}=50.1MHz

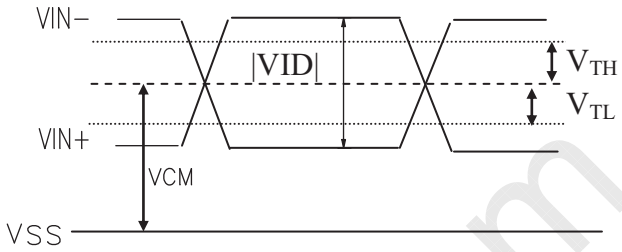


Max value is Black Pattern：900 line mode.

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

*3) LVDS Signal Definite：

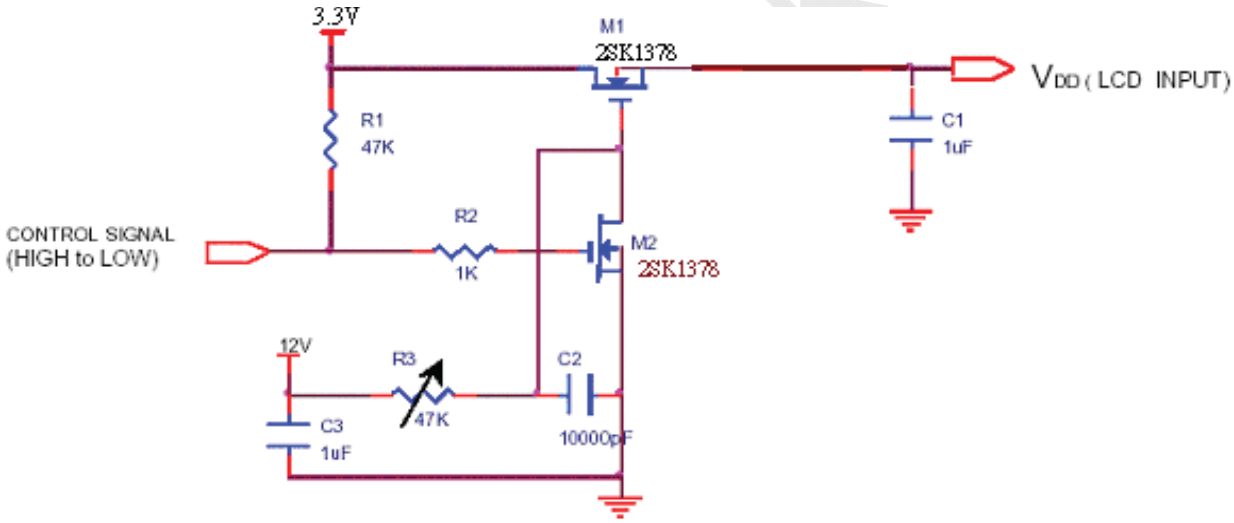


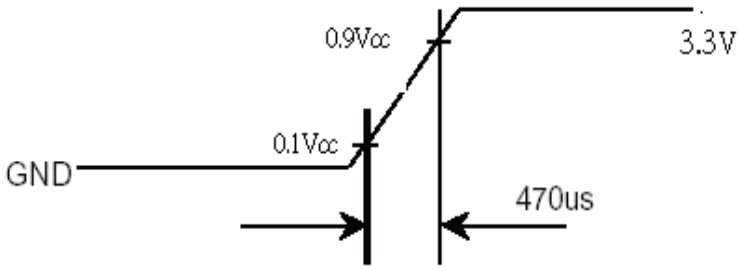


VIN+：Positive differential DATA & CLK Input

VIN-：Negative differential DATA & CLK Input

*4) Irush measure condition





4. Connector Interface PIN & Function

(1) CN (Input interface signal)

Pin No.	SYMBOL	FUNCTION
1	NC	(Diag pin for Dell testing)
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 (BIST function)
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	(Diag pin for Dell testing)
35	BLIM	System PWM Signal Input (+3.3V Swing)
36	BL_ON	LED enable pin (+3.3V Input)
37	NC	
38	VDDLED	7V – 21V LED power
39	VDDLED	7V – 21V LED power
40	VDDLED	7V – 21V LED power

(2) CN2 (LED BACKLIGHT)

Input Connector	型式	MS24022P12 (STM) or equivalent 12 pin connector	
Pin assignment	Pin	Signal	Description
	1	VLED	LED power current supply
	2	VLED	LED power current supply
	3	VLED	LED power current supply
	4	NC	No connection
	5	NC	No connection
	6	NC	No connection
	7	NC	No connection
	8	LED1	LED stream1 current back in.
	9	LED2	LED stream2 current back in.
	10	LED3	LED stream3 current back in.
	11	LED4	LED stream4 current back in.
	12	LED5	LED stream5 current back in.

【Note】

BIST (Build in self-test pattern)

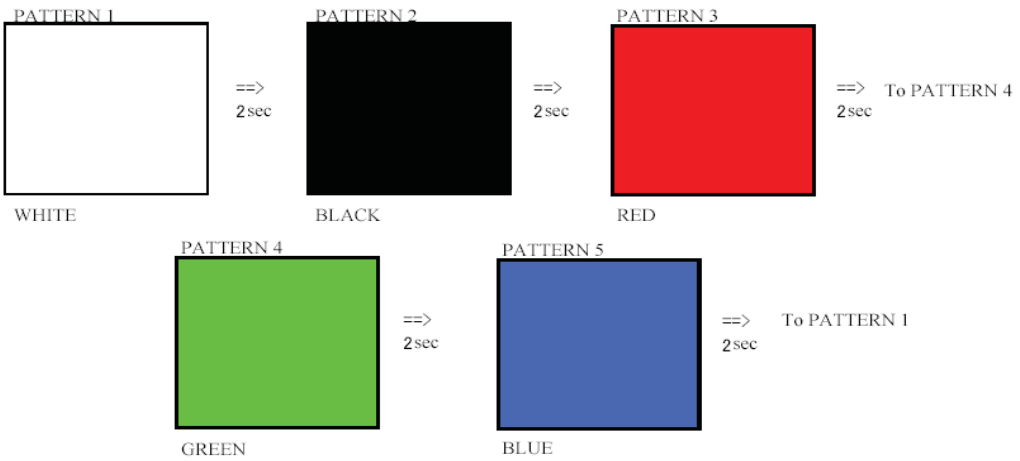
BIST pin = low(GND)：Normal

BIST pin = high(VCC)：Self-test mode

(1). Self-test Display Pattern change when pin 5 is high and no input signals detected, as followed patterns runs continuously. (White, Black, Red, Green and Blue).

(2). Pattern sequence

Pattern1→ Pattern2→ Pattern3→ Pattern4→ Pattern5→Pattern1→……..

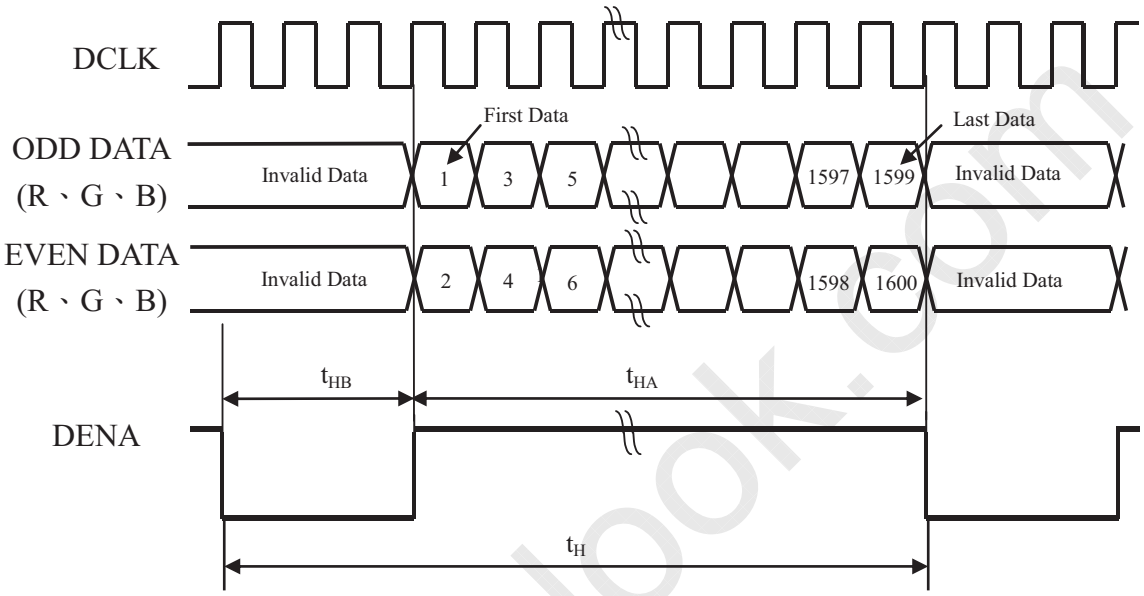


Alternative Display Pattern Sequence

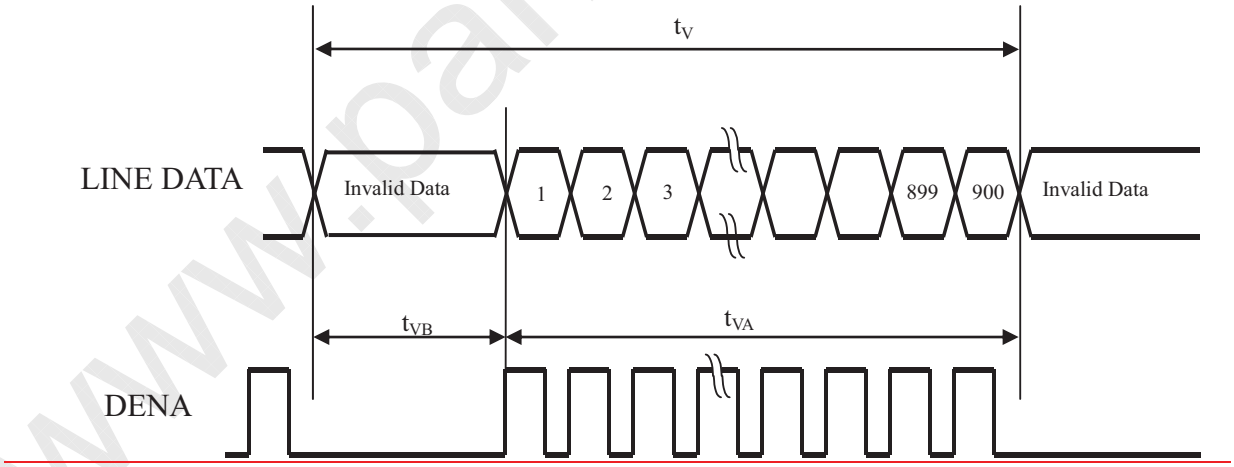
5. INTERFACE TIMING CHART

(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

Title：CLAB133UA01_CW Technical Specification

	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】

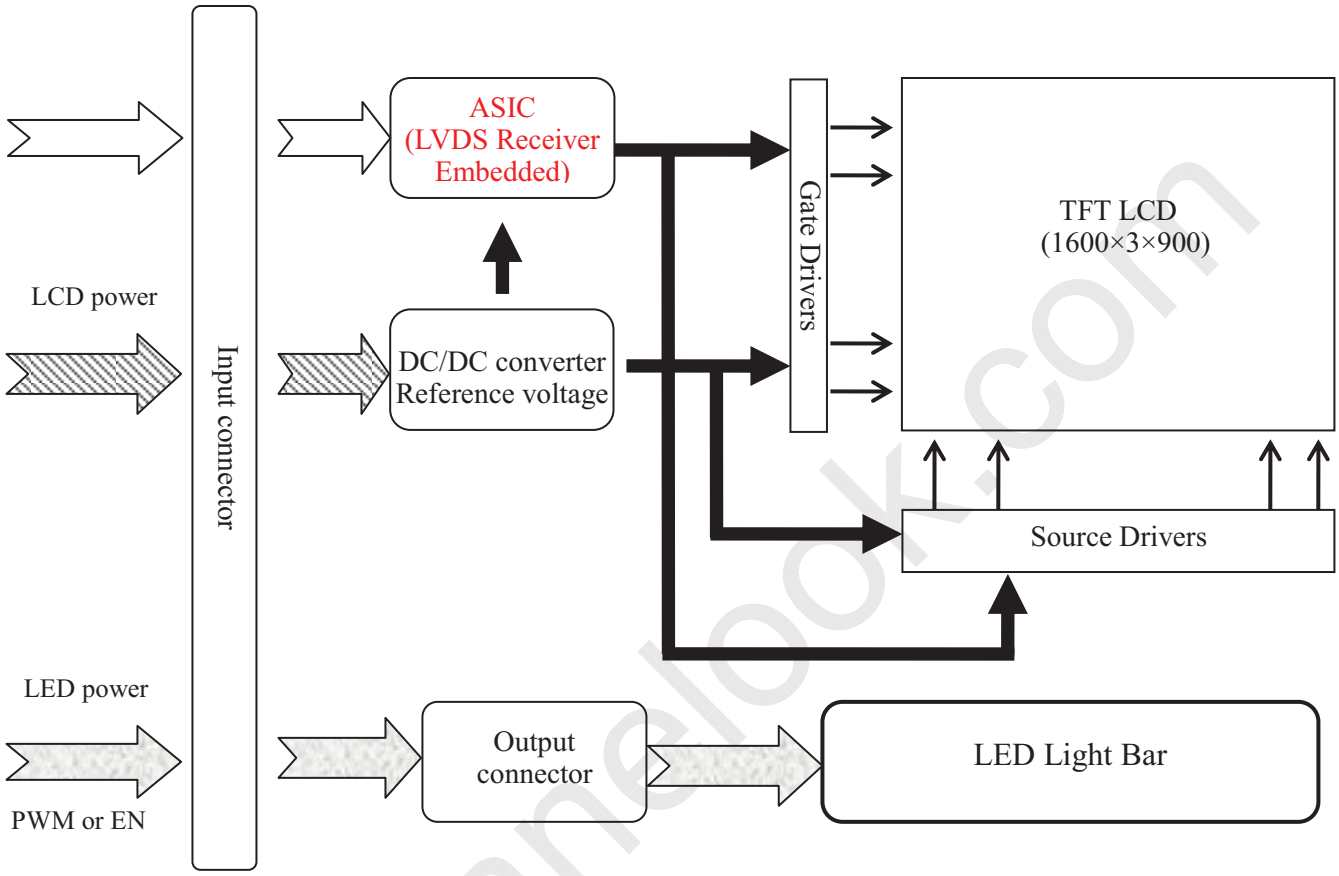
1) Gray level:

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

2) DATA:

1: high，0: low

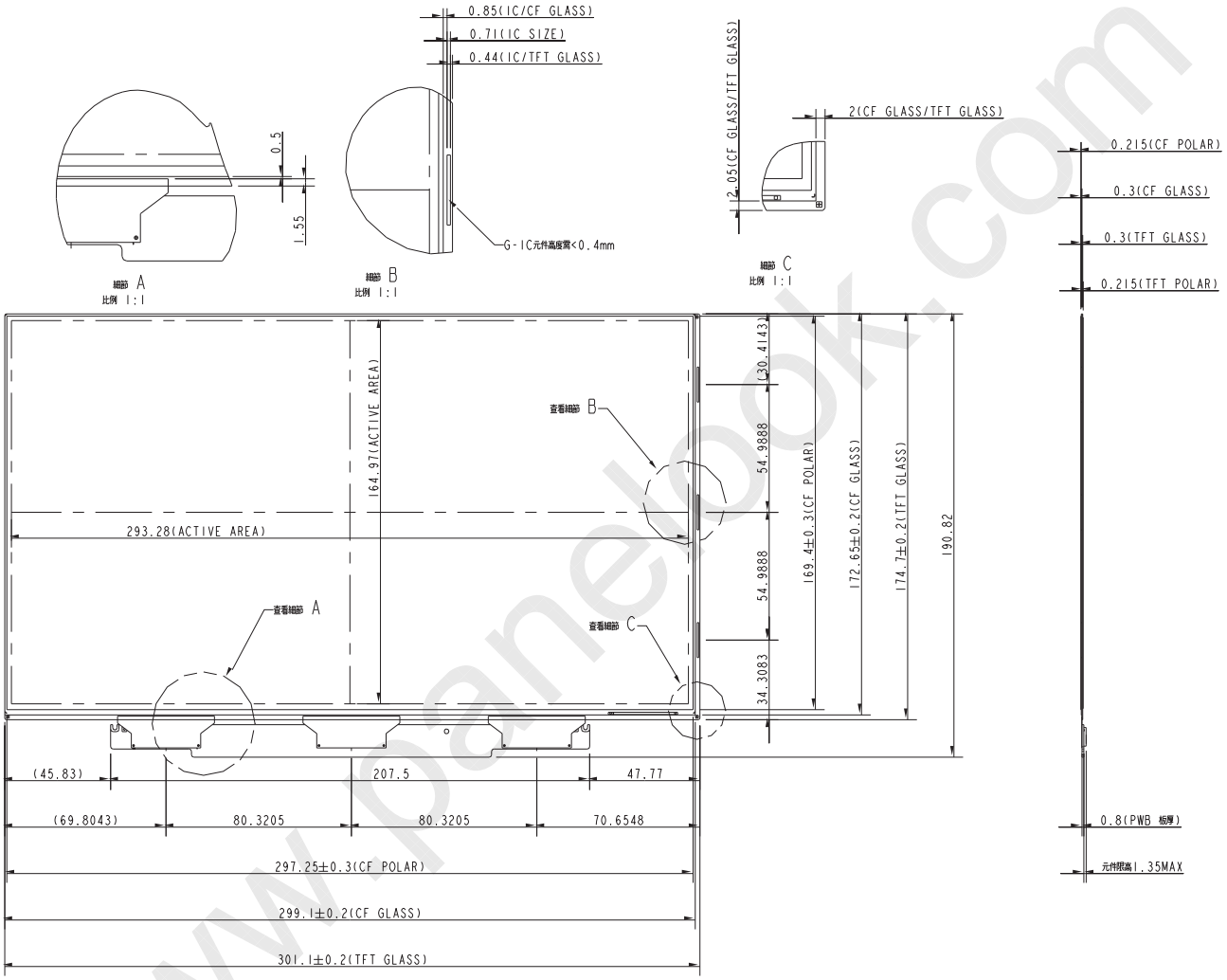
6. BLOCK DIAGRAM



7. MECHANICAL SPECIFICATION

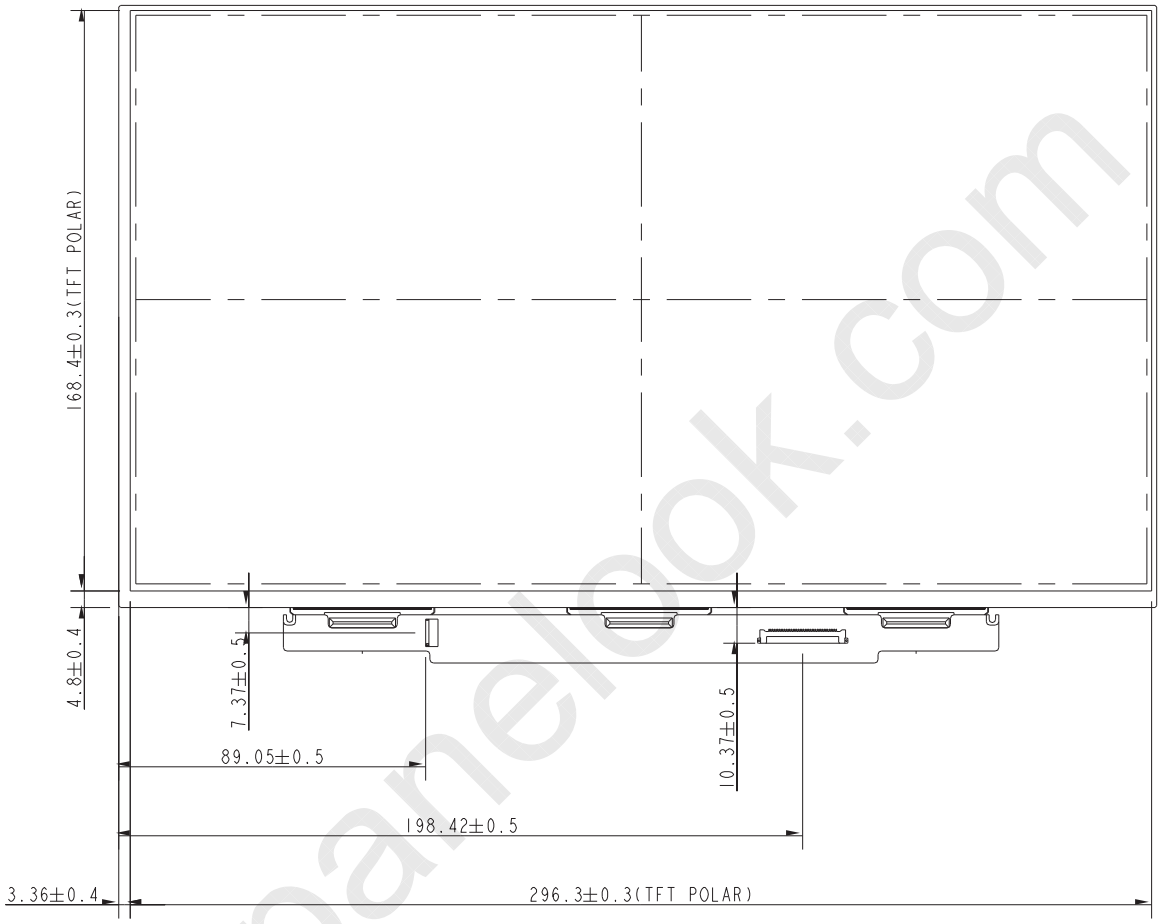
(1) Front side

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	300	400		--	*1) 2)
Transmittance (CEN)		T%		**(5.15%)**	**(5.75%)**		%	*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	%	*6)
View Angle	Horizontal	ψ	CR≧10	**70/-70**	**80/-80**		°	*3)
	Vertical	θ		**50/-70**	**60/-80**		°	*3)
Color Temperature Coordinate	W	X	θ=ψ= 0° CPT BLU	0.283	0.313	0.343		SRUL1R
		Y		0.299	0.329	0.359		
	R	X		**(0.546)**	**(0.576)**	**(0.606)**		
		Y		**(0.308)**	**(0.338)**	**(0.368)**		
	G	X		**(0.323)**	**(0.353)**	**(0.383)**		
		Y		**(0.534)**	**(0.564)**	**(0.594)**		
	B	X		**(0.132)**	**(0.162)**	**(0.192)**		
		Y		**(0.082)**	**(0.112)**	**(0.142)**		

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:

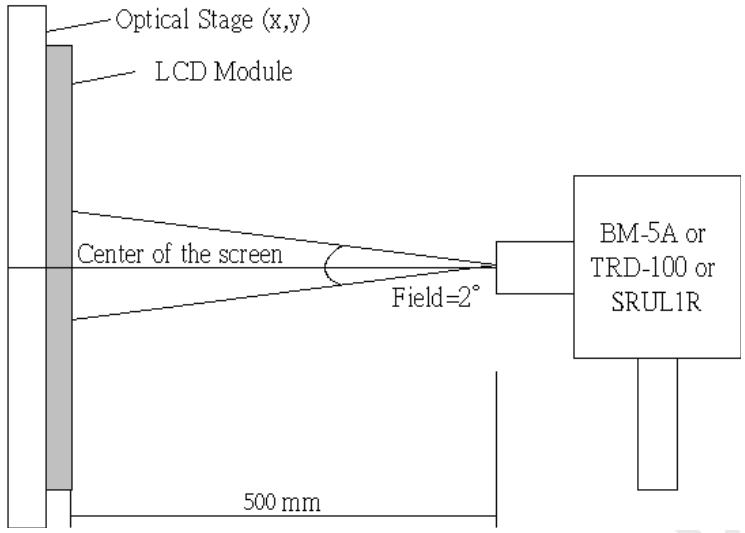
***1) Setup of Measurement Equipment**

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.

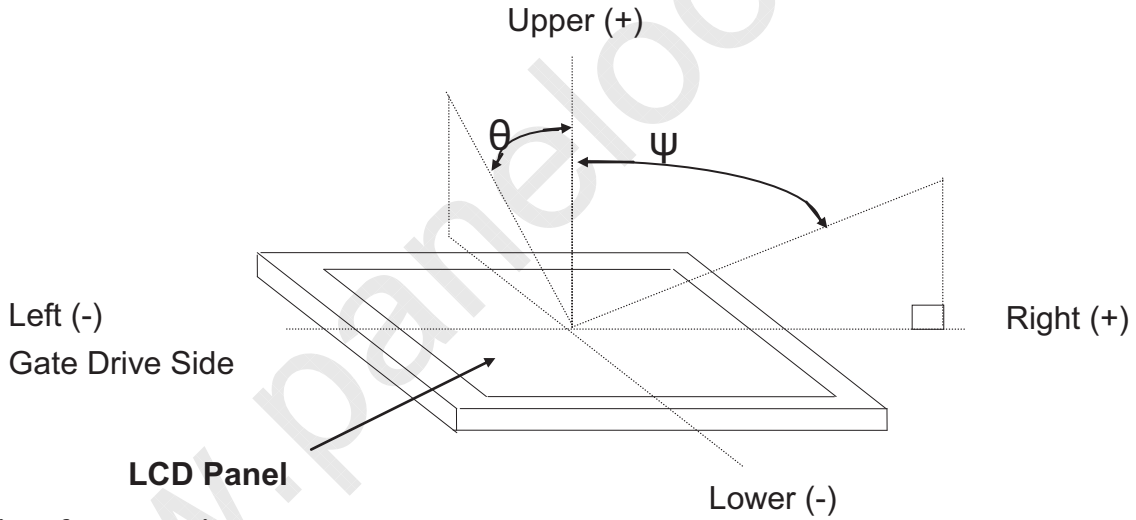
***2) Definition of Contrast Ratio**

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

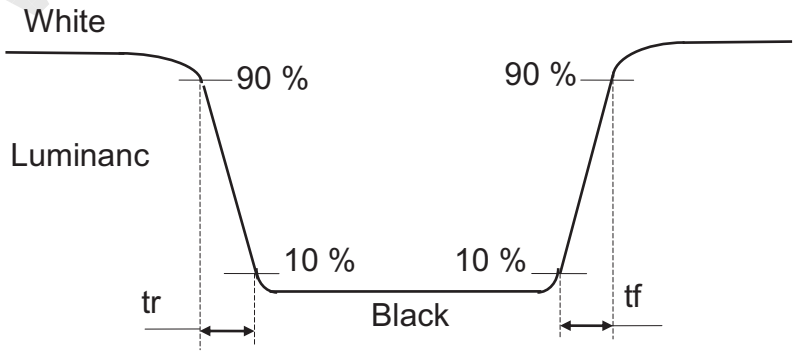
Title：CLAB133UA01_CW Technical Specification



***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)