



## Table of Contents

Table of Contents .....	2
Record of Revision.....	3
1 General Specifications .....	4
2 Input/Output Terminals .....	5
3 Absolute Maximum Ratings.....	7
4 Electrical Characteristics .....	8
5 Timing Chart.....	11
6 Optical Characteristics .....	15
7 Environmental / Reliability Test .....	18
8 Mechanical Drawing .....	19
9 Packing Drawing .....	20
10 Precautions for Use of LCD Modules.....	21

[illegible]



## 1 General Specifications

Feature		Spec
Display Spec.	Size	7.0 inch
	Resolution	800(RGB) x 600
	Interface	RGB 18 bits with TCON
	Color Depth	262K
	Technology Type	a-Si TFT
	Pixel Pitch (mm)	0.176 x 0.176
	Pixel Configuration	R.G.B. Vertical Stripe
	Display Mode	TM with Normally White
	Surface Treatment(Up Polarizer)	Anti-Glare
	Viewing Direction	12 o'clock
	Gray Scale Inversion Direction	6 o'clock
Mechanical Characteristics	LCM (W x H x D) (mm)	155.5×118.7×3.5
	Active Area(mm)	141.00× 105.75
	With /Without TSP	Without TSP
	Weight (g)	TBD
	LED Numbers	18 LEDs

Note 1: Viewing direction for best image quality is different from TFT definition. There is a 180 degree shift.

Note 2: Requirements on Environmental Protection:Q/S0002

Note 3: LCM weight tolerance: +/- 5%



## 2 Input/Output Terminals

TFT-LCD Panel Driving

Matching Connector of FH19C-30S-0.5SH

Pin	Symbol	I/O	Description	Remark
1	GND	P	Ground	
2	GND	P	Ground	
3	B0	I	Data bus	
4	B1	I	Data bus	
5	B2	I	Data bus	
6	B3	I	Data bus	
7	B4	I	Data bus	
8	B5	I	Data bus	
9	G0	I	Data bus	
10	G1	I	Data bus	
11	G2	I	Data bus	
12	G3	I	Data bus	
13	G4	I	Data bus	
14	G5	I	Data bus	
15	R0	I	Data bus	
16	R1	I	Data bus	
17	R2	I	Data bus	
18	R3	I	Data bus	
19	R4	I	Data bus	
20	R5	I	Data bus	
21	GND	P	Ground	
22	DCLK	I	Clock signal	
23	DE	I	Normally pull low	
24	HSYNC	I	Horizontal sync input	
25	VSYNC	I	Vertical sync input	
26	GND	P	Ground	
27	VCC	P	Power supply for 3.3V	
28	VCC	P	Power supply for 3.3V	
29	GND	P	Ground	
30	GND	P	Ground	



Note1: I/O definition.

I---Input, O---Output, P--- Power/Ground

Note2:

Scan Control Input		IN/OUT State For Start Pulse				Scanning Direction
U/D	R/L	STVD	STVU	DIO2	DIO1	
GND	GND	O	I	I	O	Up to Down , Right to Left
GND	VCC	O	I	O	I	Up to Down , Left to Right
VCC	GND	I	O	I	O	Down to Up , Right to Left
VCC	VCC	I	O	O	I	Down to Up , Left to Right

Note: From gray scale inversion direction

Default: U/D=VCC, R/L=GND



### 3 Absolute Maximum Ratings

VSS1=VSS=GND=0V, Ta = 25°C

Item	Symbol	MIN	MAX	Unit	Remark
Supply Voltage	VCC	-0.5	5	V	
Digital Input voltage	R0~R5,G0~G5,B0~B5,VSYNC, HSYNC,DCLK,DE	-0.5	5	V	
Back Light Forward Current	I <sub>LED</sub>		25	mA	For each LED
Operating Temperature	T <sub>OPR</sub>	-20	60	°C	
Storage Temperature	T <sub>STG</sub>	-30	70	°C	



## 4 Electrical Characteristics

### 4.1 LCD module

VSS1=VSS=GND=0V, Ta = 25℃

Item		Symbol	MIN	TYP	MAX	Unit	Remark
Power Supply Voltage		VCC	3.0	3.3	3.6	V	
Input Signal Voltage	Low Level	V <sub>IL</sub>	0	-	0.2×VCC	V	R0~R5,G0~G5,B0~B5 ,HSYNC,VSYNC,DCLK ,DE
	High Level	V <sub>IH</sub>	0.8×VCC	-	VCC	V	
Output Signal Voltage	Low Level	V <sub>OL</sub>	0	-	0.3×VCC	V	
	High Level	V <sub>OH</sub>	0.7×VCC	-	VCC-	V	
Power Consumption		Black Mode (60Hz)	-	TBD	-	mW	
		Back light	-	TBD	-	mW	

Note: The value is for design stage only.



## 4.2 Recommended Driving Condition for Backlight

Ta=25°C

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	$I_F$	--	20	25	mA	
Forward Voltage	$V_F$	--	9.6	--	V	
Backlight Power Consumption	$W_{BL}$	--	1.152	--	W	
Operating Life Time	--	10000	(20000)	--	hrs	Note 2

Note 1: The figure below shows the connection of backlight LED.



Note 2:  $I_F$  is defined for one channel LED.

Optical performance should be evaluated at Ta=25°C only.

If LED is driven by high current, high ambient temperature & humidity condition.

The life time of LED will be reduced.

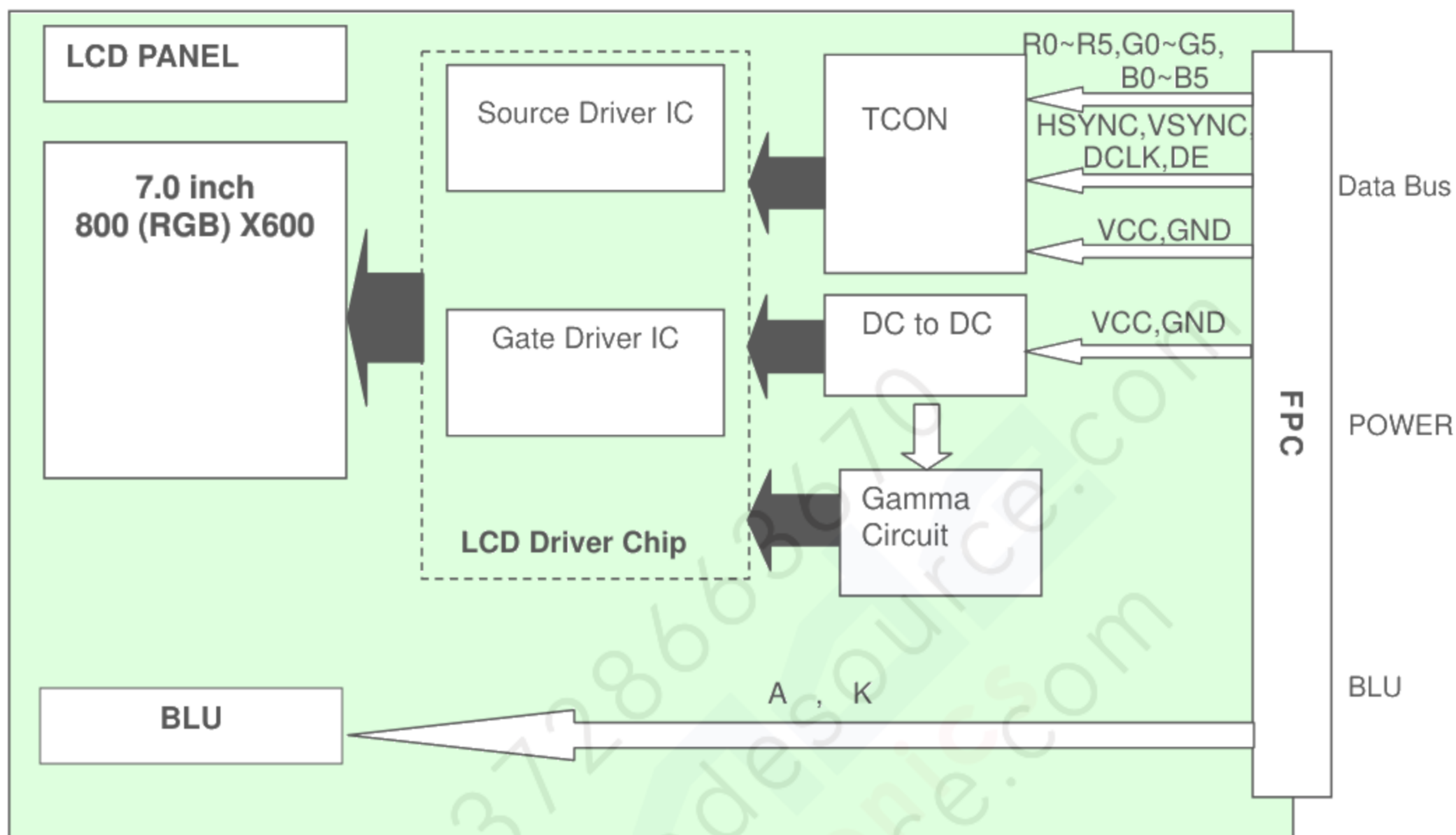
Operating life means brightness goes down to 50% initial brightness.

Typical operating life time is estimated data.

Note 3: One LED :  $I_F = 20 \text{ mA}$ ,  $V_F = 3.2 \text{ V}$ .



## 4.3 Block Diagram





## 5 Timing Chart

### 5.1 AC Electrical Characteristics

(VCC = 3.3V , GND = PGND = 0V, TA = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Power on RESET time	Tpor	-	-	10	ms	VCC = 3.3V
RESET time	tRSTW	1	-	-	ms	VCC = 3.3V
DCLK frequency	fclk	5	-	71	MHz	
DCLK cycle time	Tclk	14	-	200	ns	
DCLK pulse duty	Tcwh	40	50	60	%	
VSYNC setup time	Tvst	4	-	-	ns	
VSYNC hold time	Tvhd	4	-	-	ns	
HSYNC setup time	Thst	4	-	-	ns	
HSYNC hold time	Thhd	4	-	-	ns	
Data set-up time	Tdsu	4	-	-	ns	RI, GI, BI to DCLK
Data hold time	Tdhd	4	-	-	ns	RI, GI, BI to DCLK
DE setup time	Tesu	4	-	-	ns	
DE hold time	Tehd	4	-	-	ns	
HCLK cycle time	Tcph	1			Tclk	
Output data setup time	Tsu	5			ns	
Output data hold time	Thd	5			ns	



## 5.2 18 bit RGB timing table

HV mode

### Horizontal input timing

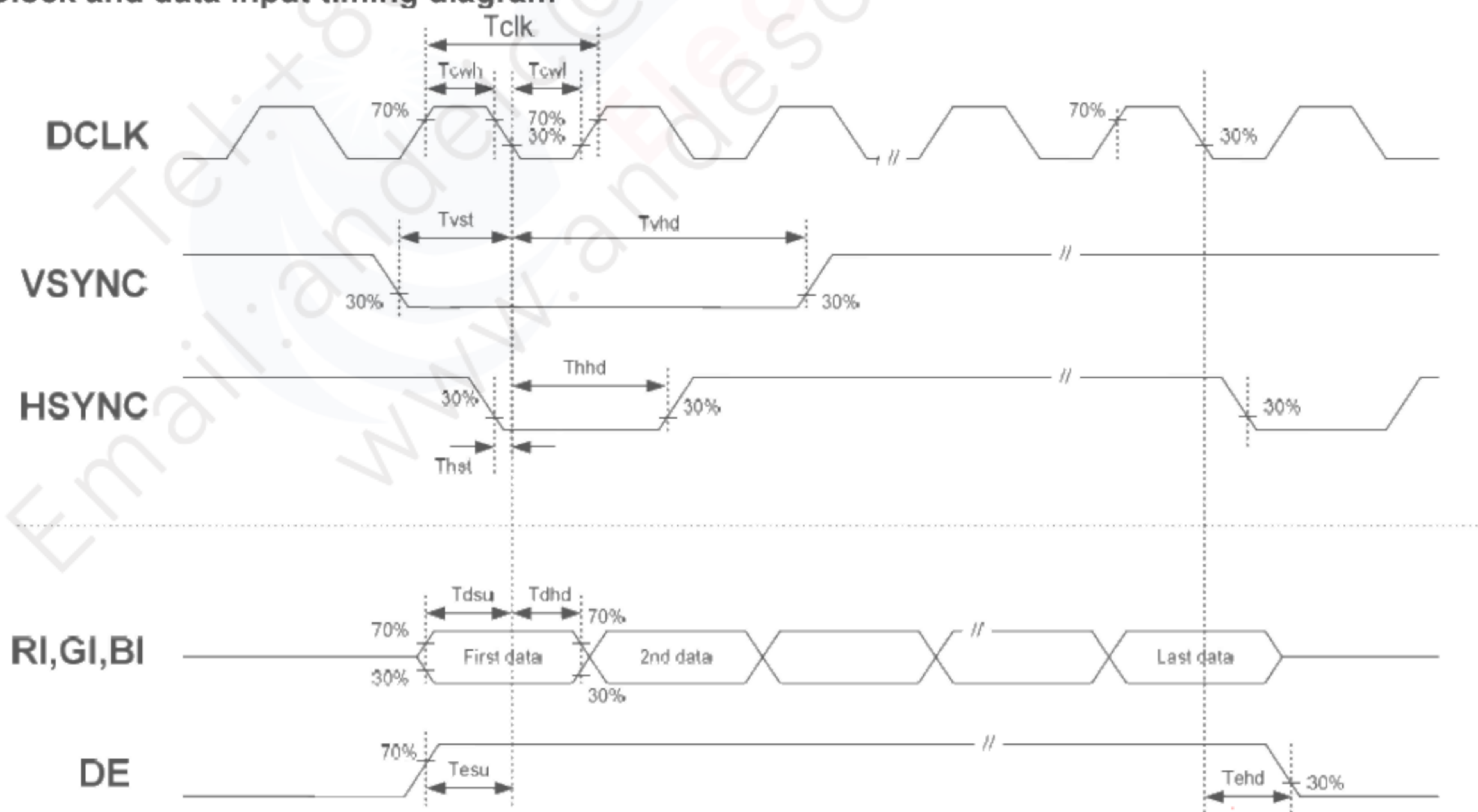
Parameter	Symbol	Value			Unit
Horizontal display area	thd	800			DCLK
DCLK frequency @ Frame rate =60HZ	fclk	Min.	Typ.	Max.	MHZ
		32.3	40.2	50.4	
1 Horizontal Line	th	862	1056	1200	DCLK
HSYNC pulse width	thpw	1	-	40	
HSYNC blanking	thb	46	46	46	
HSYNC front porch	thfp	16	210	354	

### Vertical input timing

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Vertical display area	tvd	600			H
VSYNC period time	tv	624	635	700	H
VSYNC pulse width	tvpw	1	-	20	H
VSYNC Blanking(tvb)	tvb	23	23	23	H
VSYNC Front porch (tvfp)	tvfp	1	12	77	H

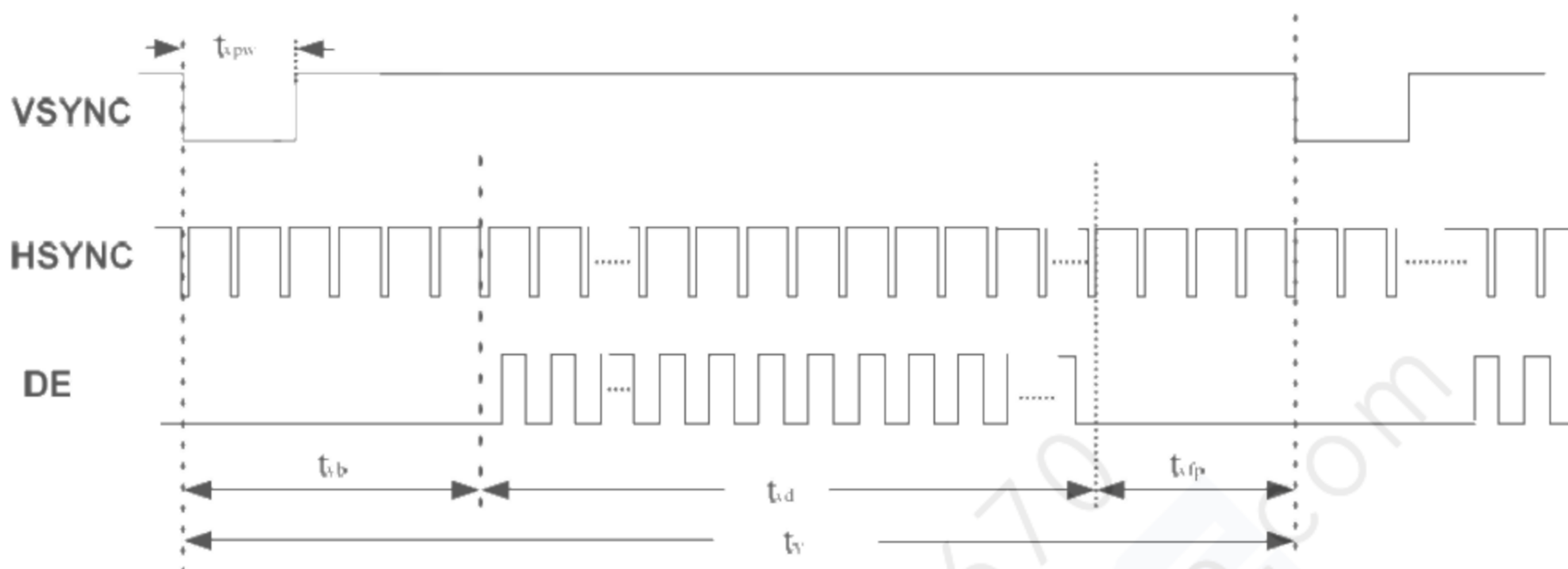
## 5.3 Timing Diagram

### Clock and data input timing diagram

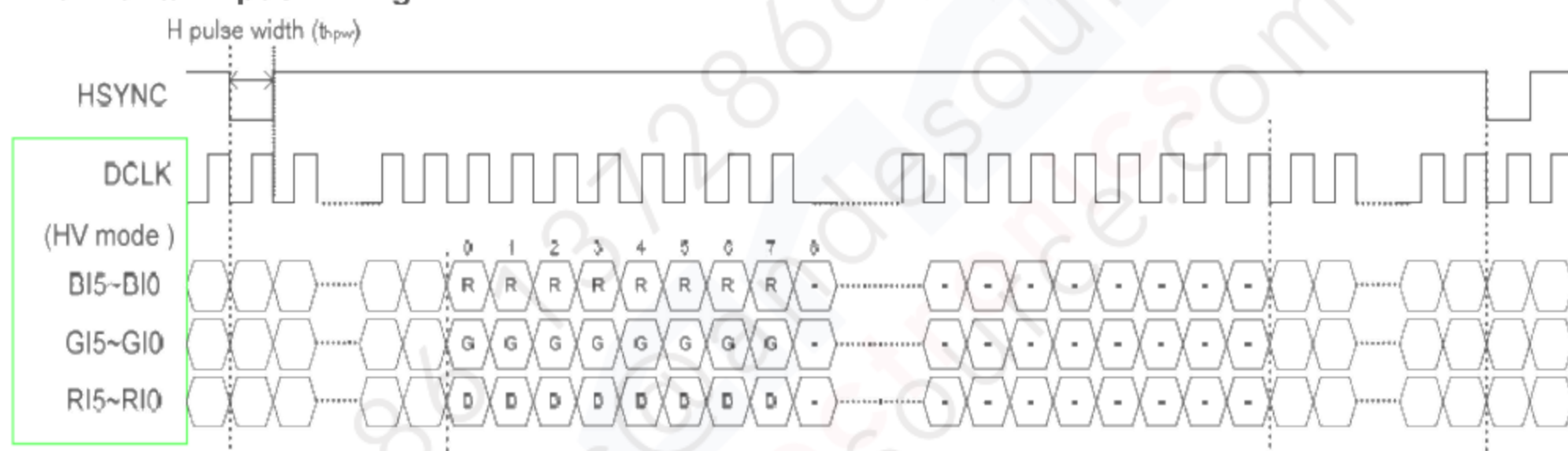




## Vertical Input Timing



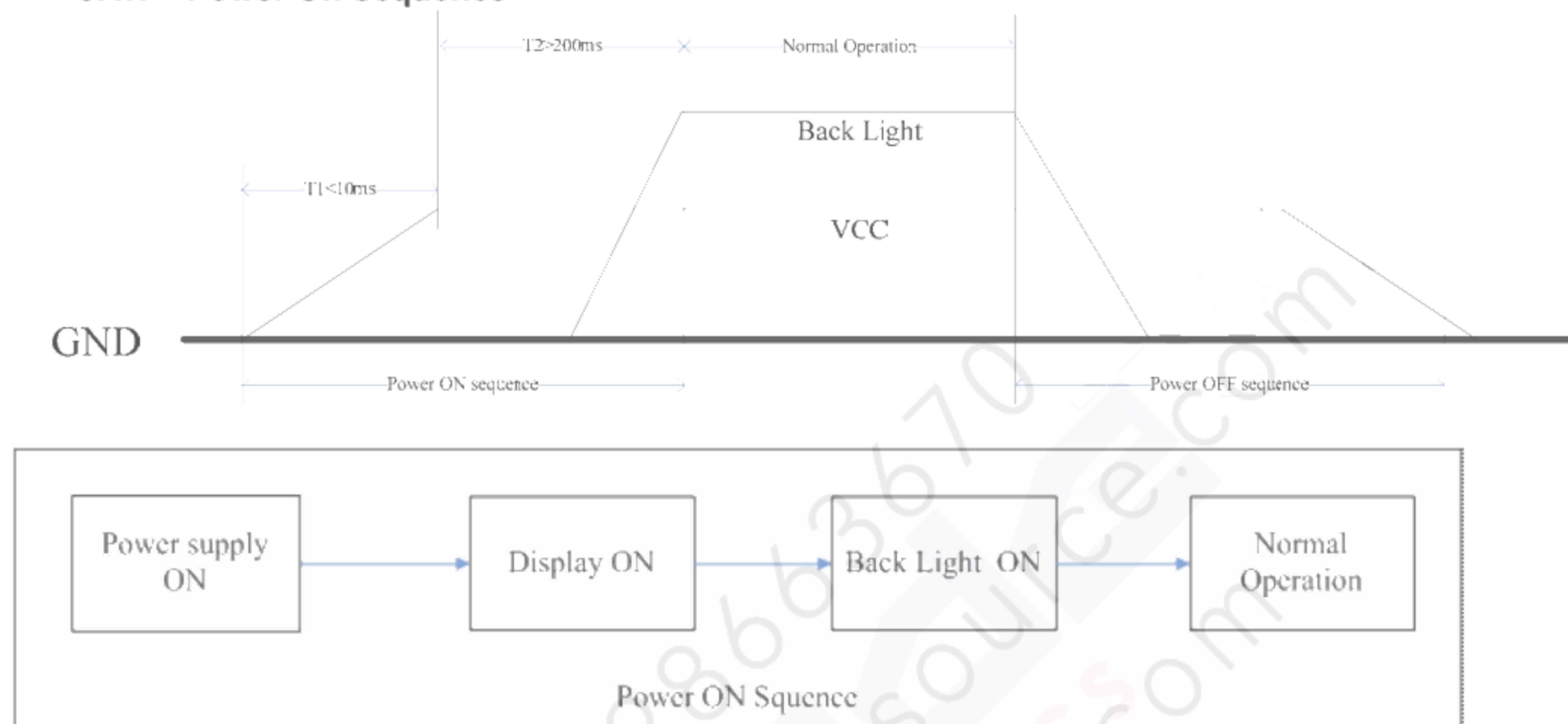
## Horizontal Input Timing



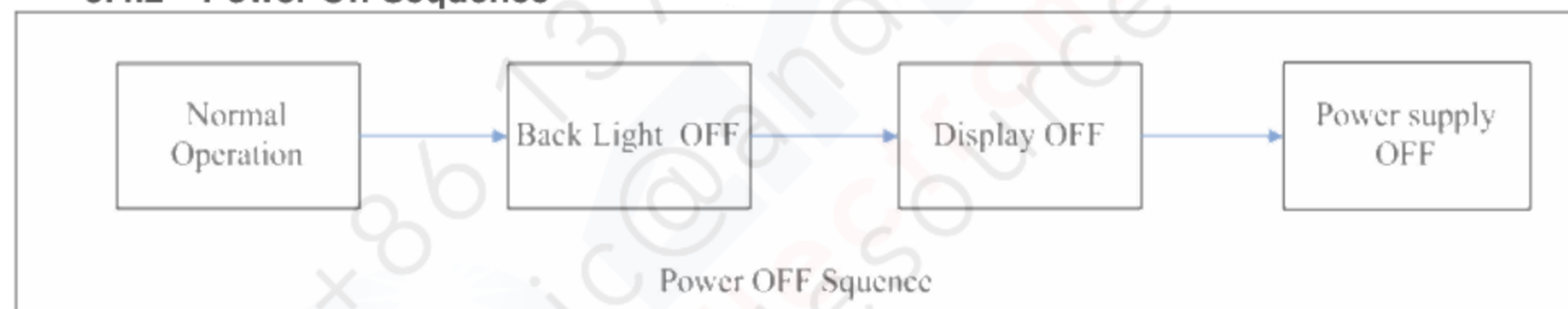


## 5.4 Power On\Off Sequence

### 5.4.1 Power On Sequence



### 5.4.2 Power Off Sequence





## 6 Optical Characteristics

Ta=25℃

Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≥10	50	60	-	Degree	Note2,3
		θB		60	70	-		
		θL		60	70	-		
		θR		60	70	-		
Contrast Ratio		CR	θ=0°	400	500	-		Note 3
Response Time		T <sub>ON</sub>	25℃	-	25	40	ms	Note 4
		T <sub>OFF</sub>						
Chromaticity	White	x	Backlight is on	0.265	0.315	0.365		Note 1,5
		y		0.285	0.335	0.385		
	Red	x		0.530	0.580	0.630		Note 1,5
		y		0.300	0.350	0.400		
	Green	x		0.300	0.350	0.400		Note 1,5
		y		0.530	0.580	0.630		
	Blue	x		0.100	0.150	0.200		Note 1,5
		y		0.060	0.110	0.160		
Uniformity		U		75	80	-	%	Note 6
NTSC				-	50	-	%	Note 5
Luminance		L		160	200	-	cd/m <sup>2</sup>	Note 7

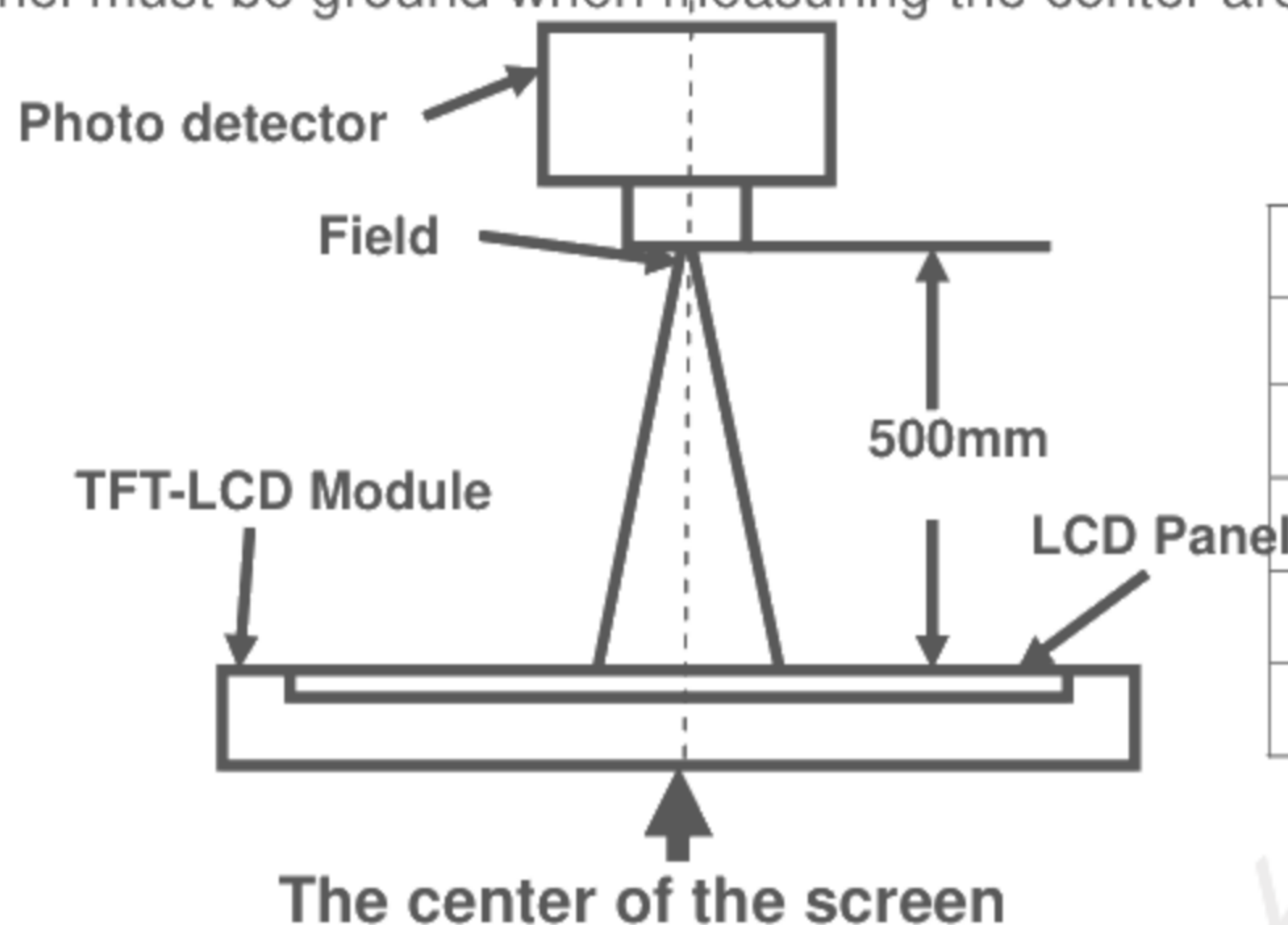
Test Conditions:

1. The ambient temperature is 25℃.
2. The test systems refer to Note 1 and Note 2.



Note 1: Definition of optical measurement system.

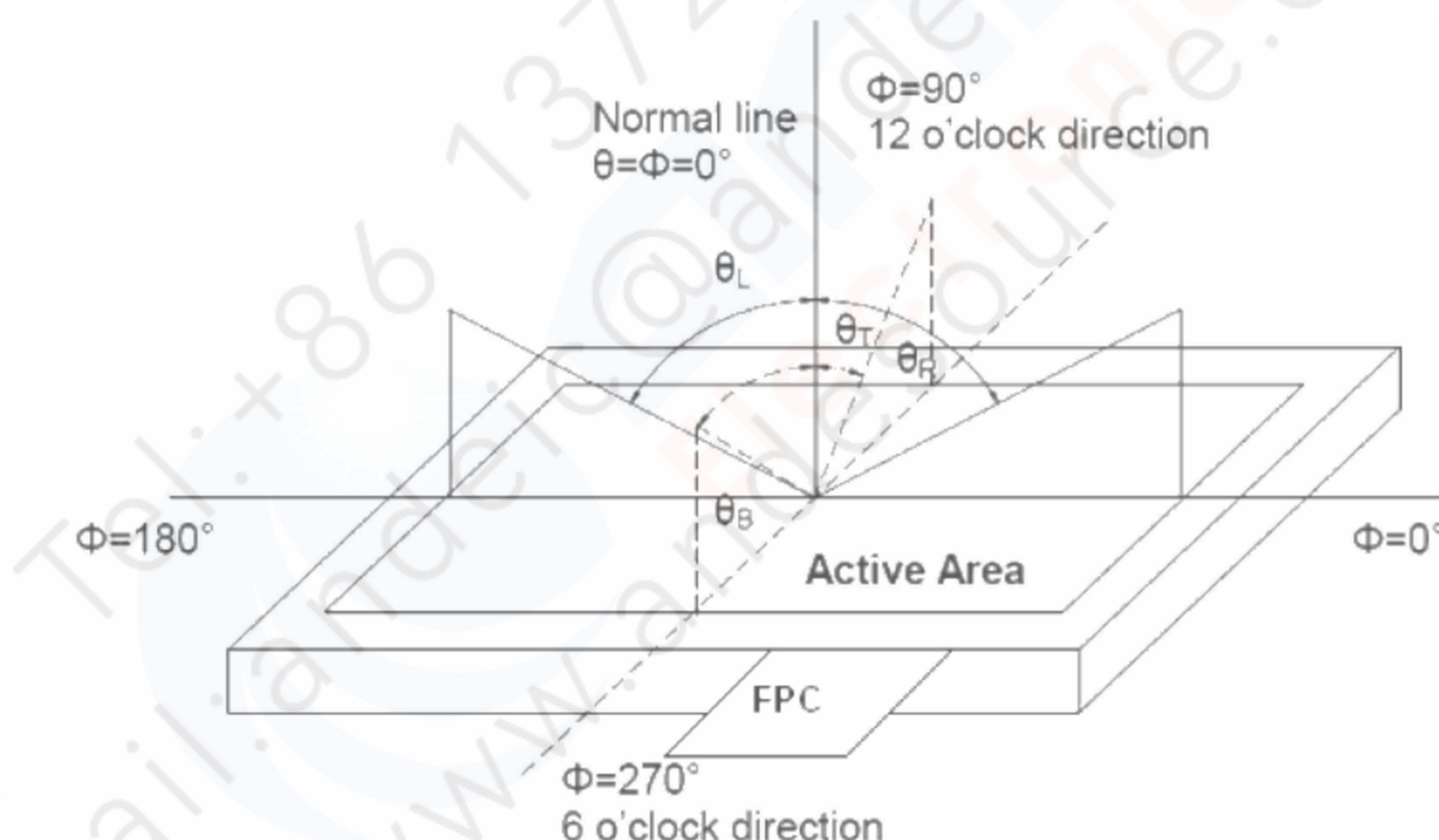
The optical characteristics should be measured in dark room. After 5 Minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



Item	Photo detector	Field
Contrast Ratio	SR-3A	1°
Luminance		
Chromaticity		
Lum Uniformity		
Response Time	BM-7A	2°

Note 2: Definition of viewing angle range and measurement system.

viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80).



Note 3: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD is on the "White" state}}{\text{Luminance measured when LCD is on the "Black" state}}$$

"White state ": The state is that the LCD should drive by  $V_{\text{white}}$ .

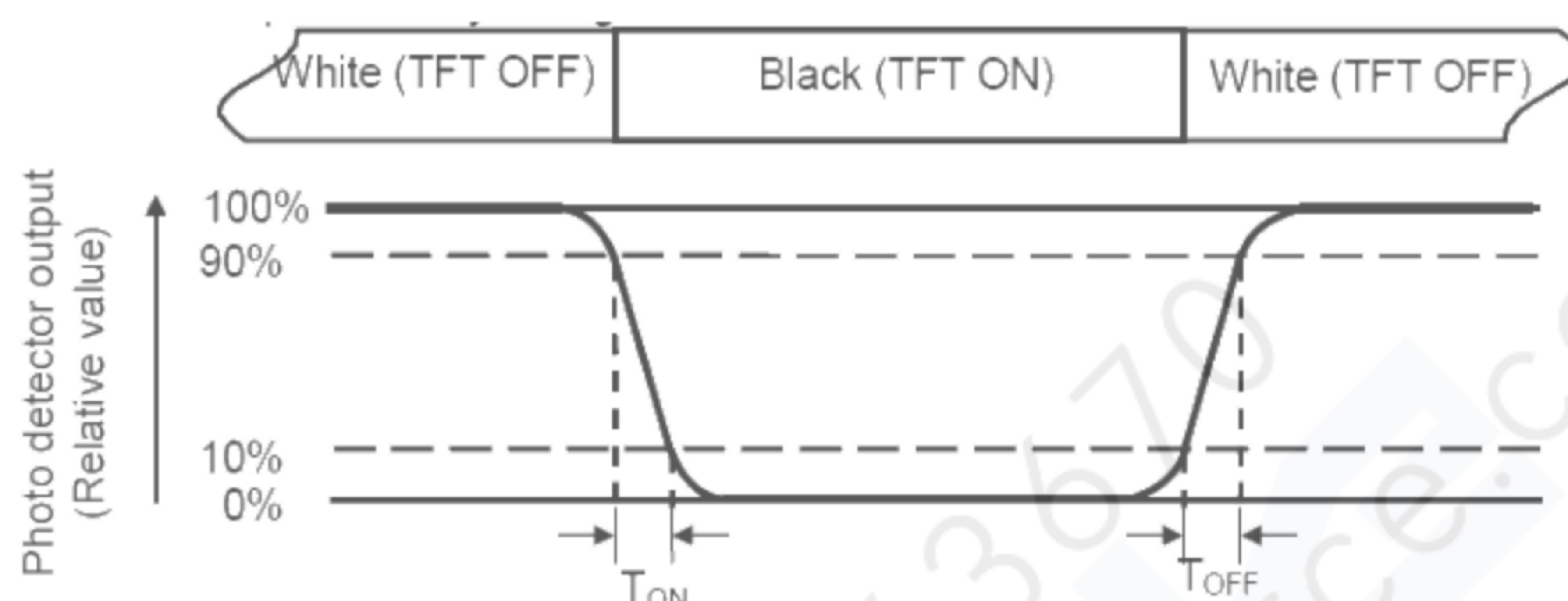
"Black state": The state is that the LCD should drive by  $V_{\text{black}}$ .

$V_{\text{white}}$ : To be determined       $V_{\text{black}}$ : To be determined.



## Note 4: Definition of Response time

The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time ( $T_{ON}$ ) is the time between photo detector output intensity changed from 90% to 10%. And fall time ( $T_{OFF}$ ) is the time between photo detector output intensity changed from 10% to 90%.



## Note 5: Definition of color chromaticity (CIE1931)

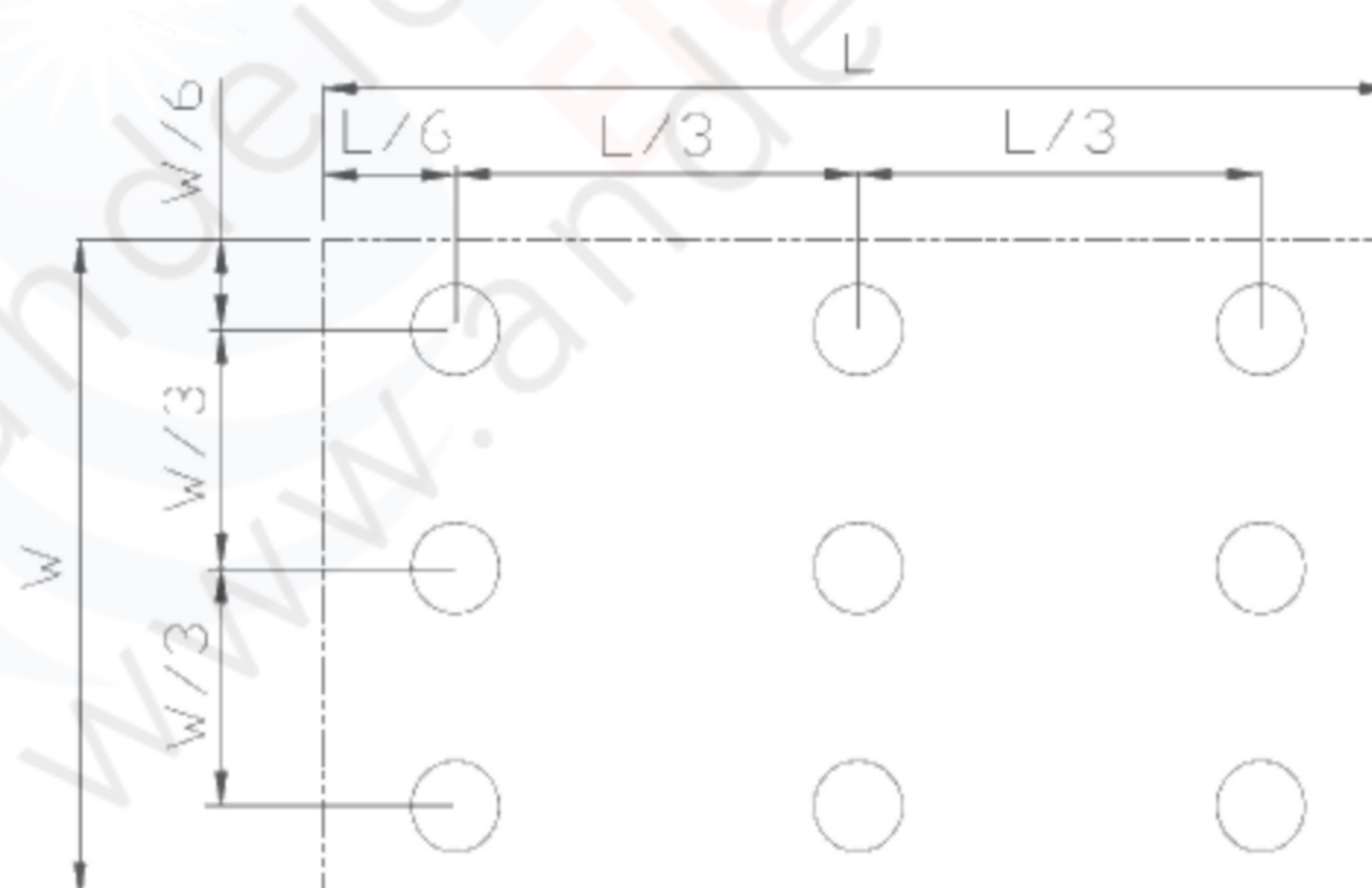
Color coordinates measured at center point of LCD.

## Note 6: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity (U)} = L_{\min} / L_{\max}$$

L-----Active area length W----- Active area width



$L_{\max}$ : The measured Maximum luminance of all measurement position.

$L_{\min}$ : The measured Minimum luminance of all measurement position.

## Note 7: Definition of Luminance:

Measure the luminance of white state at center point.



## 7 Environmental / Reliability Test

No	Test Item	Condition	Remark
1	High Temperature Operation	Ts=+60℃, 240hrs	Note1 IEC60068-2-1,GB2423.2
2	Low Temperature Operation	Ta=-20℃, 240hrs	IEC60068-2-1 GB2423.1
3	High Temperature Storage (non-operation)	Ta=+70℃, 240hrs	IEC60068-2-1, GB2423.2
4	Low Temperature Storage (non-operation)	Ta=-30℃, 240hrs	IEC60068-2-1 GB2423.1
5	High Temperature & High Humidity Operation	Ta = +60℃,90% RH max,240 hours	Note2 IEC60068-2-78 GB/T2423.3
6	Thermal Shock (non-operation)	-30℃ 30 min~+70℃ 30 min, Change time:5min, 100 Cycle	Start with cold temperature, end with high temperature IEC60068-2-14,GB2423.22
7	Electro Static Discharge (operation)	±2KV,Human Body Mode, 100pF/1500 Ω	IEC61000-4-2 GB/T17626.2
8	Vibration (non-operation)	Sine Wave Frequency range:10~55Hz, Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z.(6 hours for total)	IEC60068-2-6 GB/T2423.10
9	Shock (non-operation)	100G 6ms, ±X,±Y,±Z 3times for each direction	IEC60068-2-27 GB/T2423.5
10	Package Drop Test	Height:80 cm,1 corner, 3 edges, 6 surfaces	IEC60068-2-32 GB/2423.8
11	Package Vibration Test	Random Vibration: 0.015G*G/Hz for 5-200Hz, -6dB/Octave from 200-500Hz 2 hours for each direction of X,Y,Z (6 hours for total)	IEC60068-2-34 GB/T2423.11

Note1: Ts is the temperature of panel's surface.

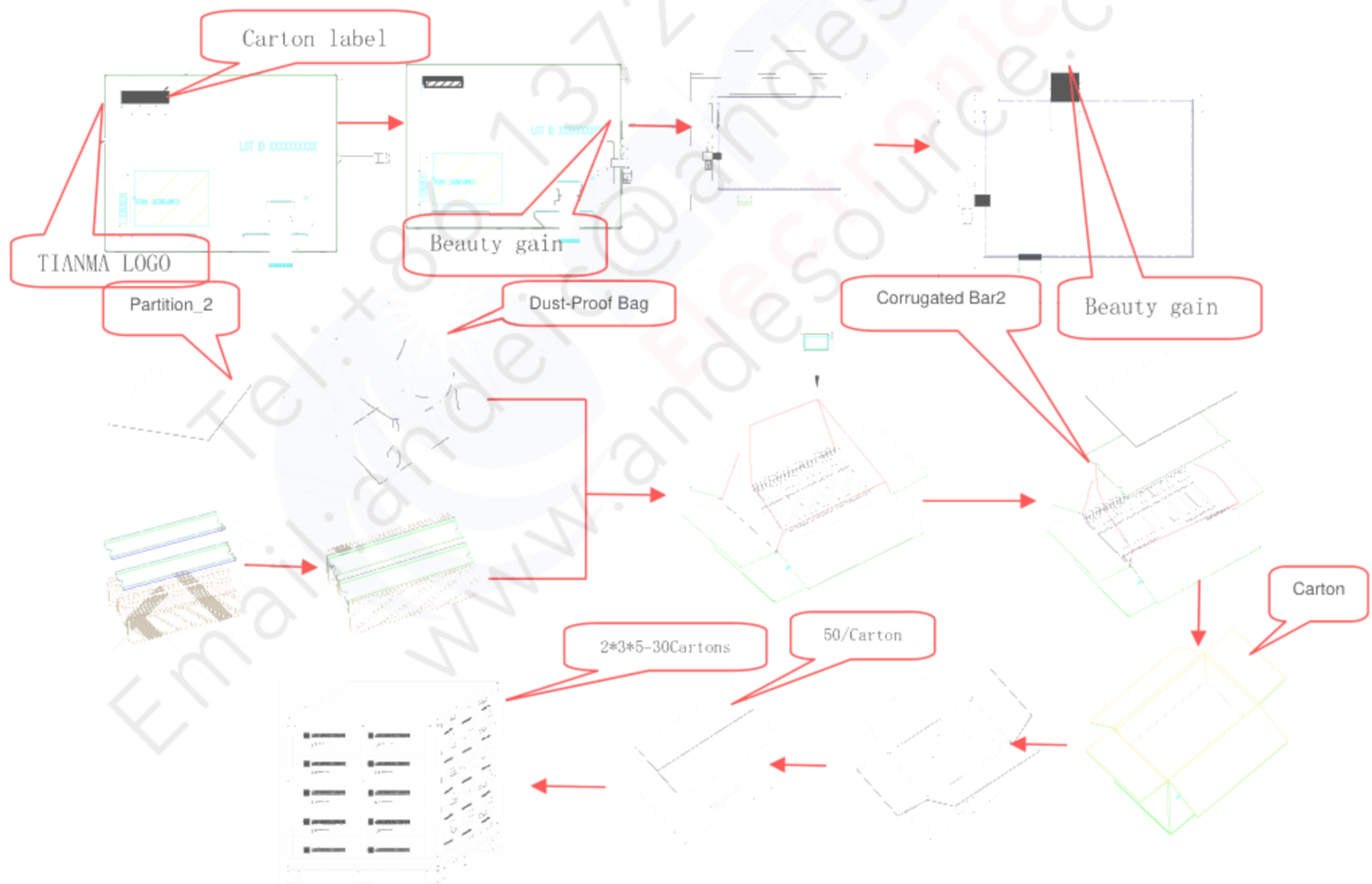
Note2: Ta is the ambient temperature of samples.





## 9 Packing Drawing

No	Item	Model (Material)	Dimensions(mm)	Unit Weight(Kg)	Quantity	Remark
1	LCM module	TM070SDH03-00	114.24*72.88*4.4	0.18350	50	
2	Partition_1	Corrugated Paper	513*333*106	2.0	2	
3.	Anti-Static Bag	PE	150*121*0.05	0.01	50	Anti-static
4	Dust-Proof Bag	PE	-----	0.0600	1	
5	Partition_2	Corrugated Paper	505*332*4.00	0.1	2	
6	Corrugated Bar	Carton	513*128*2.5	0.06	4	
7	Carton	Corrugated Paper	530*350*250	0.94	1	
8	Total weight	13.00±5%				





## 10 Precautions for Use of LCD Modules

### a) Handling Precautions

- i. The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.
  - ii. If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.
  - iii. Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.
  - iv. The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.
  - v. If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:
    - Isopropyl alcohol
    - Ethyl alcohol
  - vi. Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:
    - Water
    - Ketone
    - Aromatic solvents
  - vii. Do not attempt to disassemble the LCD Module.
  - viii. If the logic circuit power is off, do not apply the input signals.
  - ix. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.
- b) Be sure to ground the body when handling the LCD Modules.
- c) Tools required for assembly, such as soldering irons, must be properly ground.
- d) To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.
- e) The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.
- f) Storage precautions
- i. When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.
  - ii. The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:
    - g) Temperature : 0°C ~ 40°C      Relatively humidity: ≤80%
  - i. The LCD modules should be stored in the room without acid, alkali and harmful gas.
  - ii. Transportation Precautions
  - h) The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.