



LCD MODULE SPECIFICATION

MODEL NO. : IE-A-1110BH05R24-CBCM-WL

CUSTOMER P/N: _____

ISSUED DATE : _____

VERSION : 1.0

Prepare by	Check by	Approve by

Customer :

Approve by	Notes

Record of Version

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1. General Specification

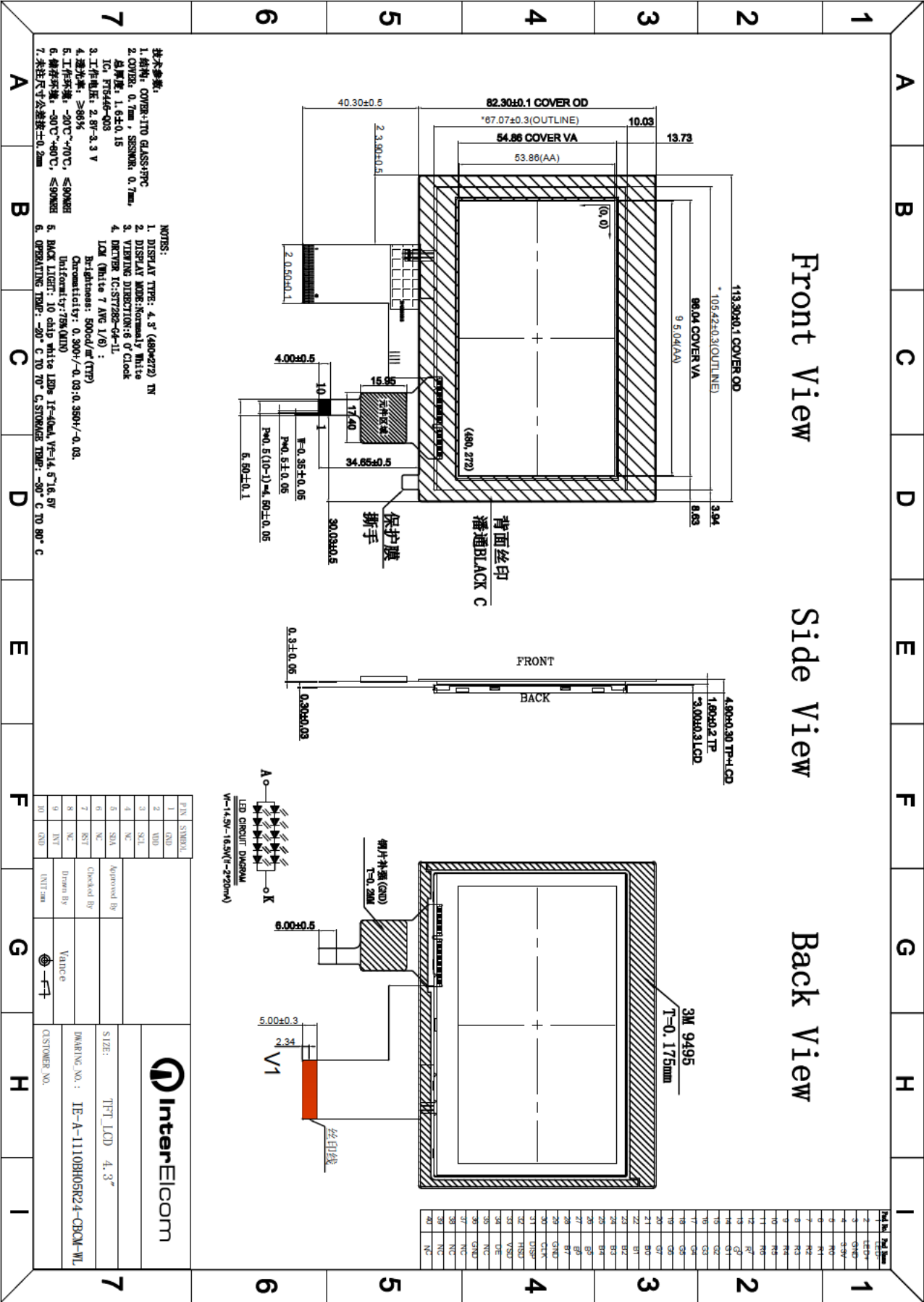
1.1. General Specification for LCM

Feature		Spec
Characteristics	Size	4.3 inch
	Resolution	480(RGB) x 272
	Interface	RGB
	Color Depth	16.7M
	Technology Type	a-Si
	Pixel Pitch (mm)	0.198(W) X 0.198(H)
	Pixel Configuration	R.G.B. Vertical Stripe
	Display Mode	Normally White
	Surface Treatment(Polarizer)	Glare
	Viewing Direction	12 O' Clock
Mechanical Characteristics	Overall dimensions (W x H x D) (mm)	113.3x82.3x4.9
	Active Area(mm)	95.04(W)X53.86(H)
	With /Without TP	With CTP
	Weight (g)	TBD
	LED Numbers	10 LEDs
Electronic	LCD Driver IC	ST7282

1.2. General Specification for CTP

Feature		Spec
Mechanical Characteristics	CTP Size	4.3 inch
	Resolution	480 x272
	Interface	IIC
	CTP report rate	90
	Support Points	5
	Surface hardness	>6H
	Transparency	>86%
	CTP (W x H x D) (mm)	113.3x82.3x4.9
	COVER V.A (mm)	96.04(W)x54.86(H)
Electronic	CTP Driver IC	FT5446
	Power supply	3.3V

2.Mechanical Drawing



3. PIN Description

3.1. LCM PIN

Pin No.	Symbol	I/O	Function
1	LED-	P	POWER FOR BACKLIGHT (GROUN)
2	LED+	P	POWER FOR BACKLIGHT(ANODE)
3	GND	P	GROUN
4	3.3V	P	POWER SUPPLY 3.3V
5-12	R0-R7	I	RED DATA
13-20	G0-G7	I	GRREN DATA
21-28	B0-B7	I	BIUE DATA
29	GND	P	GROUN
30	CLK	I	DOT CLOCK SIGNAL FOR RGB INTERFACE OPERATION.
31	DISP	I	DISPLAY ON/OFF
32	HSD	I	LINE SYNCHRONOUS SIGNAL FOR RGB INTERFACE
33	VSD	I	FRAME SYNCHRONOUS SIGNAL FOR RGB INTERFACE
34	DE	I	DATA ENABLE SIGNAL FOR RGB INTERFACE OPERATION.
35	NC		NOT CONNECT
36	GND	P	GROUN
37-40	NC		No Connection.

3.2. CTP PIN

Pin No.	Symbol	I/O	Function
1	GND	P	Ground.
2	VDD	P	Power supply 3.3V.
3	SCL	I	Serial interface clock No Pull-up resistor in FPC (3.3V) .
4	NC		
5	SDA	I/O	Serial in/out signal No Pull-up resistor in FPC (3.3V) .
6	NC		
7	RST	I	Active Low to enter Reset State Normally pull high.
8	NC		
9	INT	I	Interrupt pin No Pull-up resistor in FPC.
10	GND	P	

4. Absolute Maximum Rating

Ta = 25°C

Item	Symbol	Min	Max	Unit	Remark
Power Voltage for LCM	V _{CC}	-0.50	4.00	V	-
Backlight Forward Current	I _F	-	25.0	mA	For each serial LED
Power Voltage for CTP	V _{DD}	0	3.3	V	
Operating Temperature	Top	-20	70	°C	-
Storage Temperature	Tst	-30	80	°C	-

5. Electrical Characteristics

5.1. Operating Condition for LCD

Ta = 25°C

Parameter		Symbol	MIN	TYP	MAX	Unit	Remark
Digital supply Voltage		V _{CC}	3.00	3.30	3.60	V	-
Input Signal Voltage	Low Level	V _{IL}	0	-	0.3*V _{CC}	V	R0-R7,G0-G7,B0-B7, CLK,HSD,VSD, DE
	High Level	V _{IH}	0.7*V _{CC}	-	V _{CC}	V	
Current of digital supply voltage		I _{VCC}	-	20	-	mA	V _{VCC} =3.3V color bar pattern

5.2. Driving Condition for Backlight

Ta=25℃

Item	Symbol	Min	Typ	Max	Unit	Remark
Forward Current	IF	-	40	-	mA	Constant current driving
Forward Voltage	VF	14.5	15.5	16.5	V	
Backlight Power Consumption	WBBLB	-	0.62	-	W	
Operating Life Time	-	-	30000	-	hrs	Note 3

Note 1: The LED driving condition is defined for total backlight consumption, and which depend on Forward Current setting.

Note 2: Forward Voltage is just for reference for one serial.

Note 3: The “Operating life time” is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and IF =40mA. The LED lifetime could be decreased if operating IF is larger than 40mA.

5.3. Driving Condition for CTP

Parameter		Symbol	MIN	TYP	MAX	Unit	Remark
Digital supply Voltage		V _{DD}	2.7	3.3	3.3	V	-
Input Signal Voltage	Low Level	V _{IL}	-0.30	0	0.3*V _{DD}	V	-
	High Level	V _{IH}	0.7*V _{DD}	-	V _{DD}	V	
Operating current(Normal mode)		I _{VDD-CTP}	-	11	-	mA	VCC=3.3V
Operating current(Green mode)		I _{VDD-CTP}		TBD			
Operating current(Sleep mode)		I _{VDD-CTP}	-	42	-	uA	

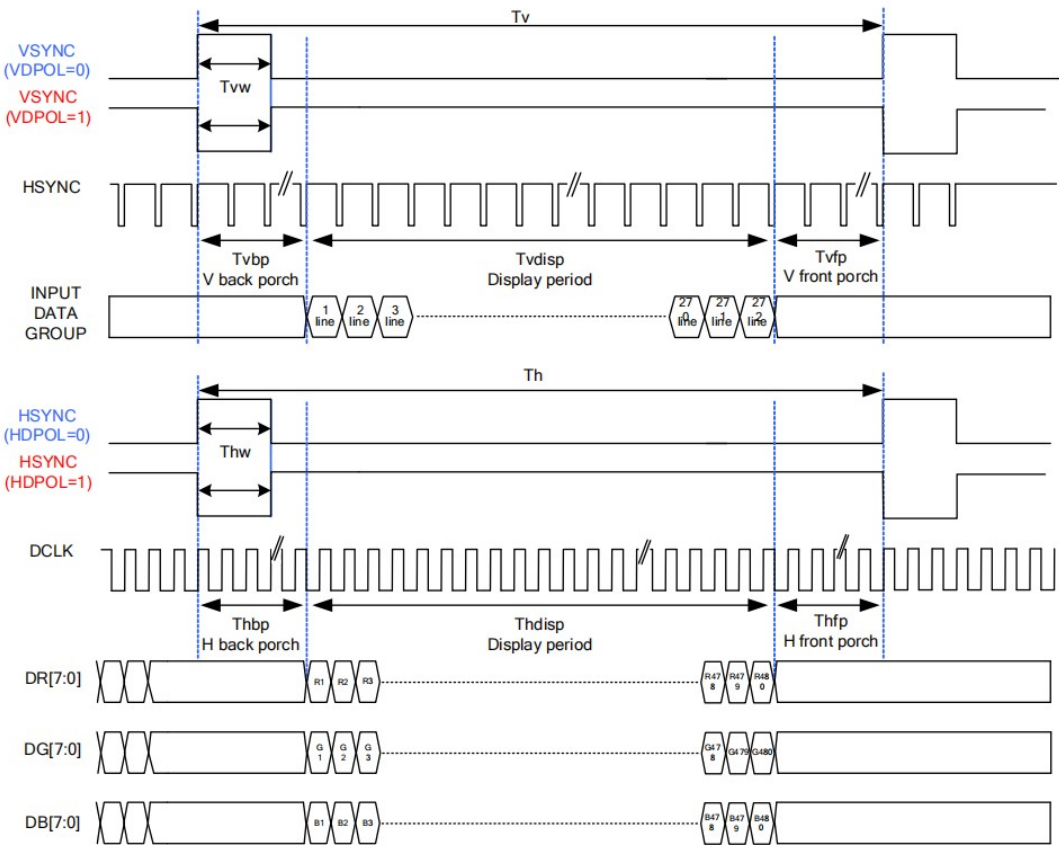
6.Timing Chart for LCM

6.1. Parallel 24-bit RGB Timing Tabel

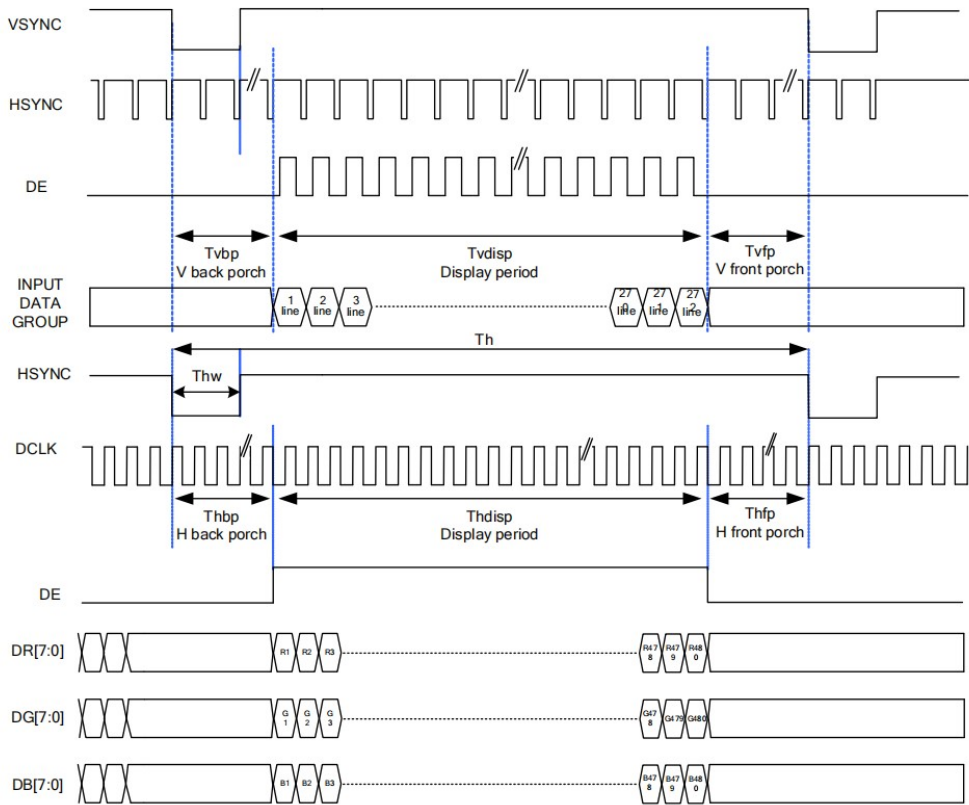
480RGB X 272 Resolution Timing Table						
Item	Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK Frequency	Fclk	8	9	12	MHz	
DCLK Period	Tclk	125	111	83	ns	
HSYNC	Period Time	Th	531	598	DCLK	
	Display Period	Thdisp	480	-	DCLK	
	Back Porch	Thbp	3	43	DCLK	By H_Blanking setting
	Front Porch	Thfp	4	75	DCLK	
	Pulse Width	Thw	4	75	DCLK	
VSYNC	Period Time	Tv	292	321	H	
	Display Period	Tvdisp	272	-	H	
	Back Porch	Tvbp	2	12	H	By V_Blanking setting
	Front Porch	Tvfp	2	37	H	
	Pulse Width	Tvw	4	37	H	

Note: 1.It is necessary to keep Tvbp =12 and Thbp =43 in sync mode. DE mode is unnecessary to keep it.
2.Thbp+Thfp >=7

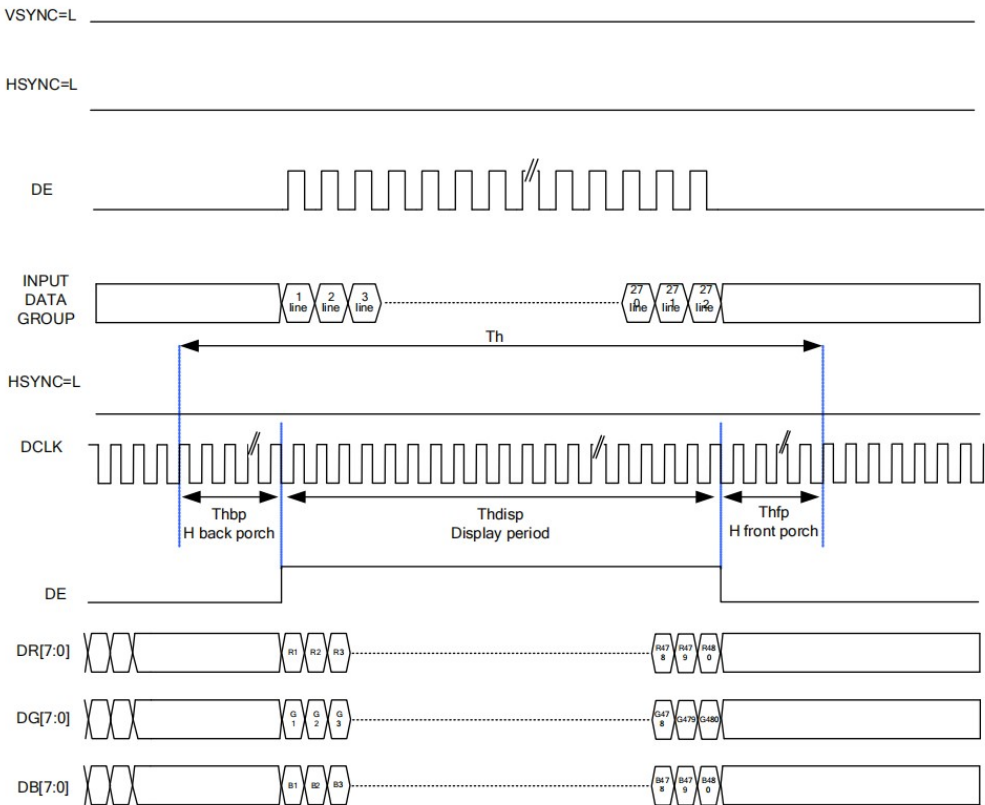
6.2. SYNC Mode Timing Diagram



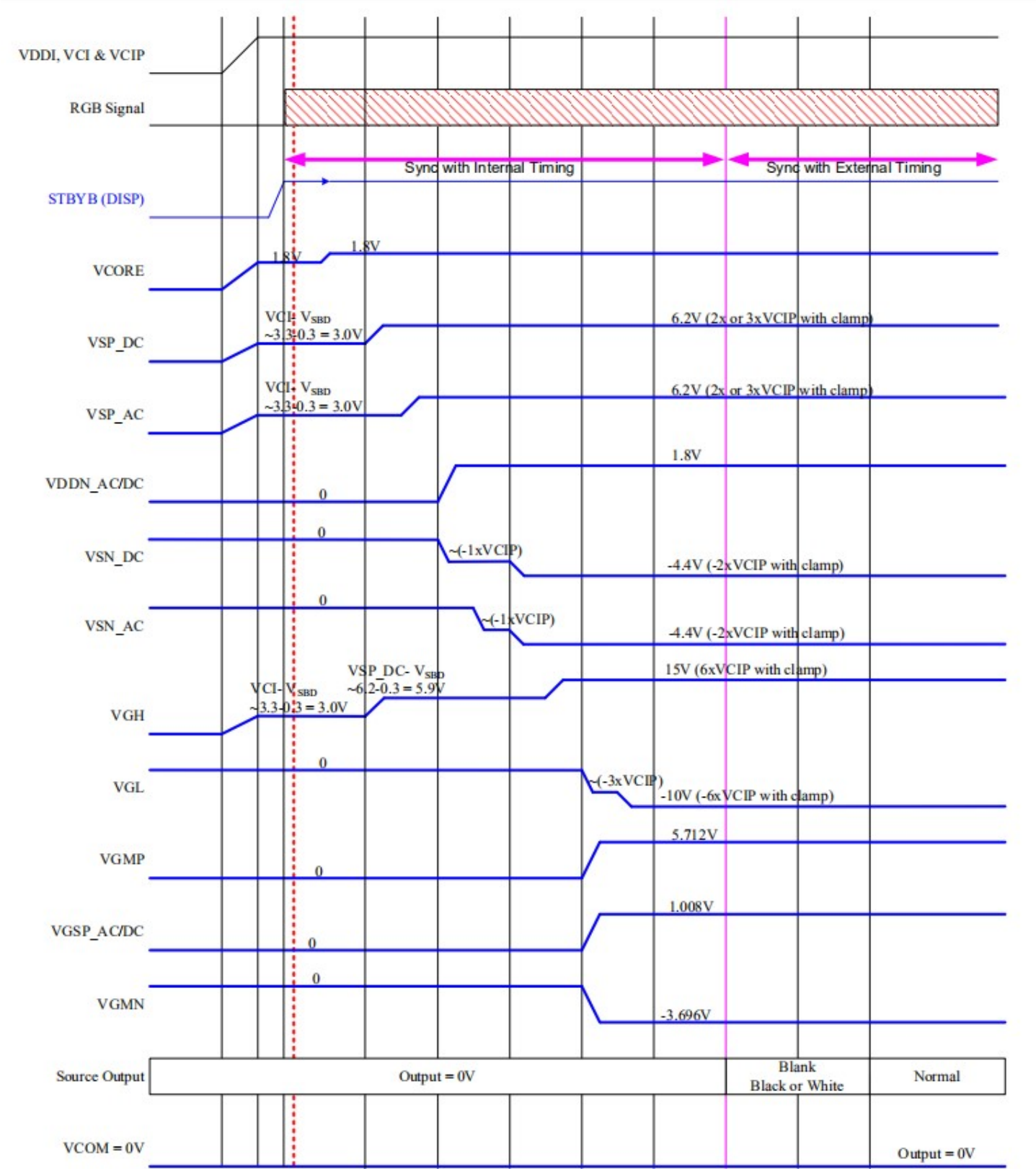
6.3. SYNC-DE Mode Timing Diagram



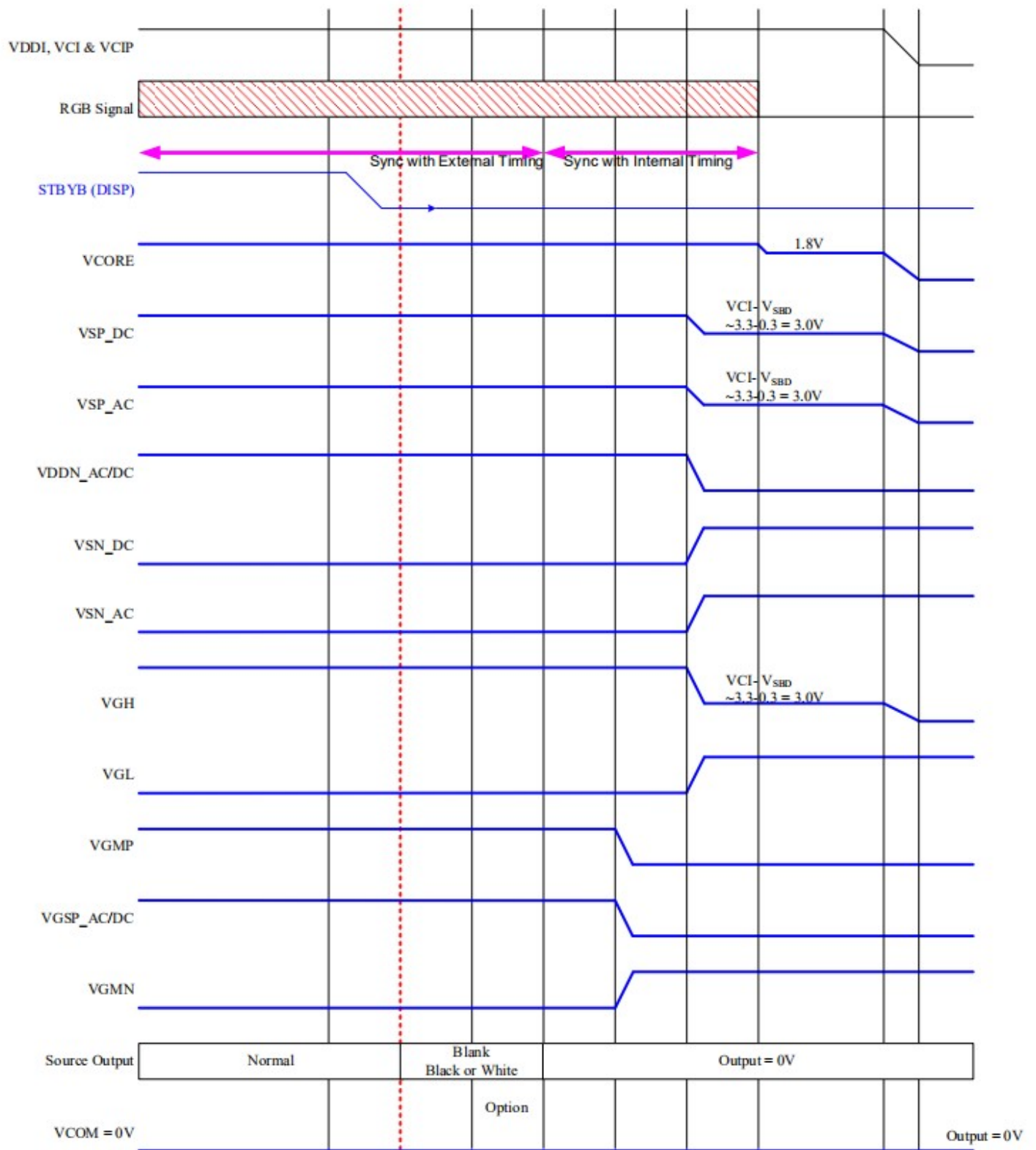
6.4.DE Mode Timing Diagram



6.5.POWER ON/OFF SEQUENCE



Power On Sequence



Power Off Sequence

7. Optical Characteristics

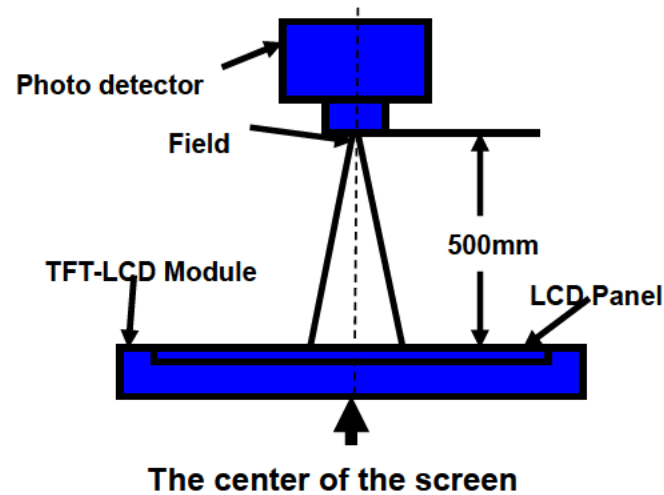
Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angle		θ_T	$CR \cong 10$	60	70	--	Degree	Note 2
		θ_B		50	60	--		
		θ_L		60	70	--		
		θ_R		60	70	--		
Contrast Ratio		CR	$\theta=0^\circ$	300	500	--		Note1 Note3
Response Time		Tr	25℃	--	25	50	ms	Note1 Note4
		Tf						
Chromaticity (CIE1931)	White	x		0.270	0.300	0.330	-	Note1 Note5
		y		0.300	0.330	0.360		
	Red	x		0.588	0.618	0.648		
		y		0.314	0.343	0.373		
	Green	x		0.276	0.306	0.336		
		y		0.497	0.527	0.557		
	Blue	x		0.109	0.139	0.169		
		y		0.068	0.098	0.128		
Uniformity		U	-	75	--	--	%	Note1 Note6
NTSC ratio		-	-	--	57	--	%	Note 5
Luminance		L	-	--	500	--	cd/m2	Note1 Note7

Test Conditions:

1. IF= 40 mA, and the ambient temperature is 25℃.
2. The test systems refer to Note 1 and Note 2.

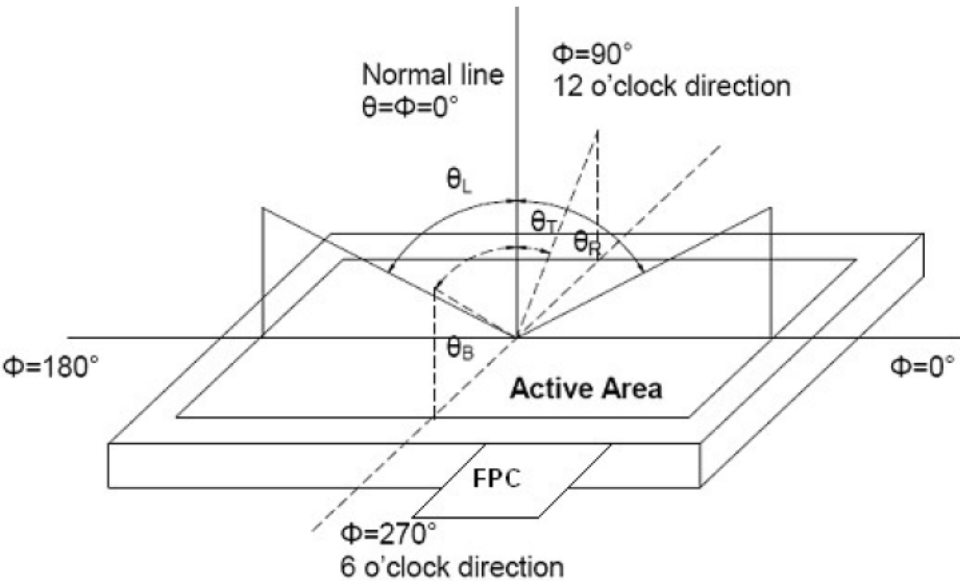
Note 1: Definition of optical measurement system.

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.



Item	Photo detector	Field
Contrast Ratio	BM-7A	1°
Luminance		
Chromaticity		
Lum Uniformity		

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

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

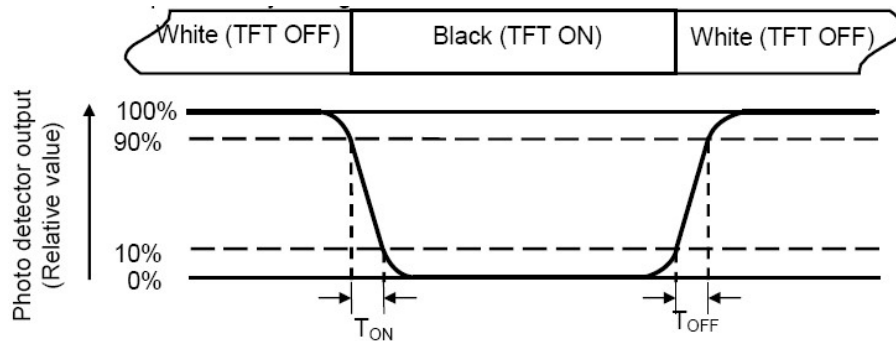
“White” state: The state is that the LCD should drive by V_{white} .

“Black” state: The state is that the LCD should drive by V_{black} .

V_{white} : To be determined V_{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_r) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_f) 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.

Luminance Uniformity (U) = $L_{min} / L_{max} \times 100\%$

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

Note 7: Definition of Luminance:

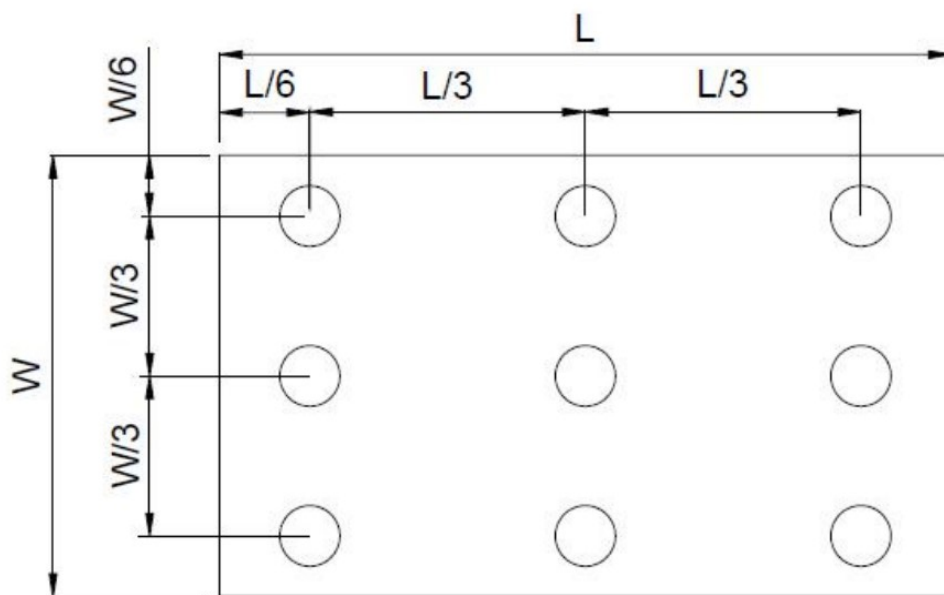
Measure the luminance of white state at center point.

Lmax: The measured Maximum luminance of all measurement position.

Lmin: The measured Minimum luminance of all measurement position.

$$\text{Luminance Uniformity (Yu)} = \frac{B_{min}}{B_{max}}$$

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



8. Reliability Test

Item	Test Conditions	Criterion
High Temperature Storage	Ta = 80°C 96hrs	A,B,C,D,E
Low Temperature Storage	Ta = -30°C 96hrs	A,B,C,D,E
High Temperature Operation	Ts = 70°C 96hrs	A,B,C,D,E
Low Temperature Operation	Ta = -20°C 96hrs	A,B,C,D,E
Operate at High Temperature and Humidity	+60°C, 90%RH 96hrs	A,B,C,D,E
Thermal Shock(non operation)	-20°C/30 min ~ +70°C/30 min for a total 5 cycles, Start with cold temperature and end with high temperature.	A,B,C,D,E
Vibration Test	Sweep:10Hz~55Hz~10Hz 2G 2 hours for each direction of X. Y. Z. (6 hours for total)	A,B,C,D,E
Package Vibration Test	Random Vibration : 0.015G*G/Hz from 5-200HZ, -6dB/Octave from 200-500HZ 2 hours for each direction of X. Y. Z. (6 hours for total)	A,B,C,D,E
Package Drop Test	Height:60 cm 1 corner, 3 edges, 6 surfaces	A,B,C,D,E
Electro Static Discharge	Contact=+/-2KV, Air=+/-4KV,(R=330R,C=150pF), 1 sec,9point,10times/point;	A,B,C,D,E

※Criterion:

A.LCM each function is OK.

B.LCM appearance inspection without abnormalities (Including scratch, damage, corrosion and serious deformation)

C.LCM brightness above the Min. value of Spec.

D. Luminance uniformity above the Min. value of Spec.

E. Color chromaticity within tolerance range