MODEL NO. : TM035PDW01

ISSUED DATE: 2010-12-2

VERSION : Ver 1.0

■Preliminary Specification
□Final Product Specification

Customer :

Approved by	Notes

SHANGHAI TIANMA Confirmed :

Prepared by	Checked by	Approved by

This technical specification is subjected to change without notice

Table of Contents

Record of Revision

Rev	Issued Date	Description	Editor
1.0	2010-12-2	Preliminary Specification Release	Lu Bai

1 General Specifications

Feature		Spec
Display Spec.	Size	3.5 inch
	Resolution	320(RGB) x 480
	Interface	CPU/RGB
	Color Depth	65/262K
	Technology Type	a-Si
	Pixel Pitch (mm)	0.153x0.153
	Pixel Configuration	R.G.B. Vertical Stripe
	Display Mode	TM with Normally White
	Surface Treatment(Up Polarizer)	Clear
	Viewing Direction	6’ clock
	Gray Scale Inversion Direction	12’ clock
Mechanical Characteristics	LCM (W x H x D) (mm)	55.26X84.69X2.20
	Active Area(mm)	48.96X73.44
	With/Without TSP	Without TSP
	Weight (g)	22.35
	LED Numbers	6 LEDs (parallel)
Electronic	Driver IC	ILI9481

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

2.1 TFT LCD Panel

Connector type: FH26-45S-0.3SHW(05)

No	Symbol	I/O	Description	Comment
1	FLM	O	Output a frame head pulse signal If no used, please open this pin	
2	GND	P	Ground	
3	ENABLE	I	Data enable signal in RGB mode If no used, please fix this pin at GND level	
4	DOTCLK	I	Pixel clock signal in RGB mode If no used, please connect this pin to GND	
5	VSYNC	I	Vertical sync. signal in RGB mode If no used, please connect this pin to GND	
6	GND	P	Ground	
7	HSYNC	I	Horizontal sync, signal in RGB mode If no used, please connect this pin to GND	
8	IM0	I	MPU system interface mode select	
9	IM1	I		
10	IM2	I		
11	IOVCC	p	IO POWER	
12	VCC	P	Analog POWER	
13	SDI	I/O	Serial data in/out pin in DBI Type C 9bit mode Serial data input pin in DBI Type B 8bit mode If no used, please connect this pin to GND	
14	SDO	O	Serial data output pin If no used, please connect this pin to GND	
15	DB17	I/O	Data Bus	
16	DB16	I/O	Data Bus	
17	DB15	I/O	Data Bus	
18	DB14	I/O	Data Bus	
19	DB13	I/O	Data Bus	
20	DB12	I/O	Data Bus	
21	DB11	I/O	Data Bus	
22	DB10	I/O	Data Bus	
23	DB9	I/O	Data Bus	
24	DB8	I/O	Data Bus	
25	DB7	I/O	Data Bus	
26	DB6	I/O	Data Bus	
27	DB5	I/O	Data Bus	
28	DB4	I/O	Data Bus	
29	DB3	I/O	Data Bus	
30	DB2	I/O	Data Bus	
31	DB1	I/O	Data Bus	
32	DB0	I/O	Data Bus	
33	/RESET	I	Reset pin	

34	RD	I	Read strobe signal If no used, please connect this pin to IOVCC	
35	/WR/SCL	I	(WR) Write data enable pin in DBI Type B (SCL) Write data enable pin in DBI Type C If no used, please connect this pin to IOVCC	
36	RS	I	Data/command selection pin	
37	/CS	I	Chip select signal	
38	LEDK6	p	LED CATHODE	
39	LEDK5	p	LED CATHODE	
40	LEDK4	p	LED CATHODE	
41	LEDK3	p	LED CATHODE	
42	LEDK2	p	LED CATHODE	
43	LEDK1	p	LED CATHODE	
44	LEDA	p	LED ANODE	
45	LCM_ID	O	Ground	

Table 2.1 input terminal pin assignment

I/O definition：I-----Input; O---Output; P----Power

Note: no used I/O pin please fix to GND level

Note 2-1: Select the MPU system interface mode

IM2	IM1	IM0	MPU-Interface Mode	DB Pin in use	Colors
0	0	0	DBI Type B 18-bit	DB[17:0]	262K
0	0	1	DBI Type B 9-bit	DB[8:0]	262K
0	1	0	DBI Type B 16-bit	DB[15:0]	65K/262K
0	1	1	DBI Type B 8-bit	DB[7:0]	65K/262K
1	0	0	Setting prohibited	-	-
1	0	1	DBI Type C 9-bit	DIN, DOUT	8/262K
1	1	0	Setting prohibited	-	-
1	1	1	DBI Type C 8-bit	DIN, DOUT	8/262K

3 Absolute Maximum Ratings

3.1 Driving TFT LCD Panel

Ta = 25℃

Item	Symbol	Min	Max	Unit	Remark
Logic Supply Voltage	IOVCC	-0.3	4.6	V	
Analog Supply Voltage	VCC	-0.3	4.6	V	
Back Light Forward Current	I_{LED}		25	mA	For each LED
Operating Temperature	T_{OPR}	-20	70	℃	
Storage Temperature	T_{STG}	-30	80	℃	

Table 3.1 absolute maximum rating

4 Electrical Characteristics

4.1 LCD module

GND=0V, Ta=25℃

Item		Symbol	MIN	TYP	MAX	Unit	Remark
Logic Supply Voltage		IOVCC	1.65	2.8	3.3	V	
Analog Supply Voltage		VCC	2.5	2.8	3.3	V	
Input Signal Voltage	Low Level	V_{IL}	-0.0	-	0.3* IOVCC	V	/CS,/RD,/WR/SCL,RS, ENABLE,VSYNC,HSYNC, DOTCLK, SDO.SDI,/RESET,IM0, IM1,IM2,DB[0~17]
	High Level	V_{IH}	0.7* IOVCC	-	IOVCC	V	
Output Signal Voltage	Low Level	V_{OL}	0.0	-	0.2* IOVCC	V	
	High Level	V_{OH}	0.8* IOVCC	-	IOVCC	V	
(Panel+LSI) Power Consumption		Black Mode (60Hz)	-	TBD	-	mW	
		Sleeping Mode	-	TBD	-	mW	
		Standby Mode	-	TBD	-	uW	

Table 4.1 LCD module electrical characteristics

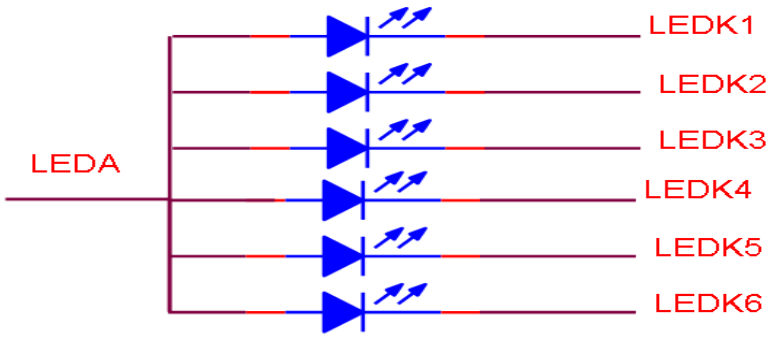
4.2 Backlight Unit

Ta=25℃

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	I_F	--	20	--	mA	
Forward Voltage	V_F	--	3.2	--	V	
Backlight Power Consumption	W_{BL}	--	384	--	mW	

Table 4.2 backlight unit electrical characteristics

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



Note 2: One LED :1/6x I_F =20mA, V_F =3.2V

Note 3: : I_F is defined for one channel LED.

Optical performance should be evaluated at Ta=25℃ 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.

4.3 Block Diagram

LCD module diagram

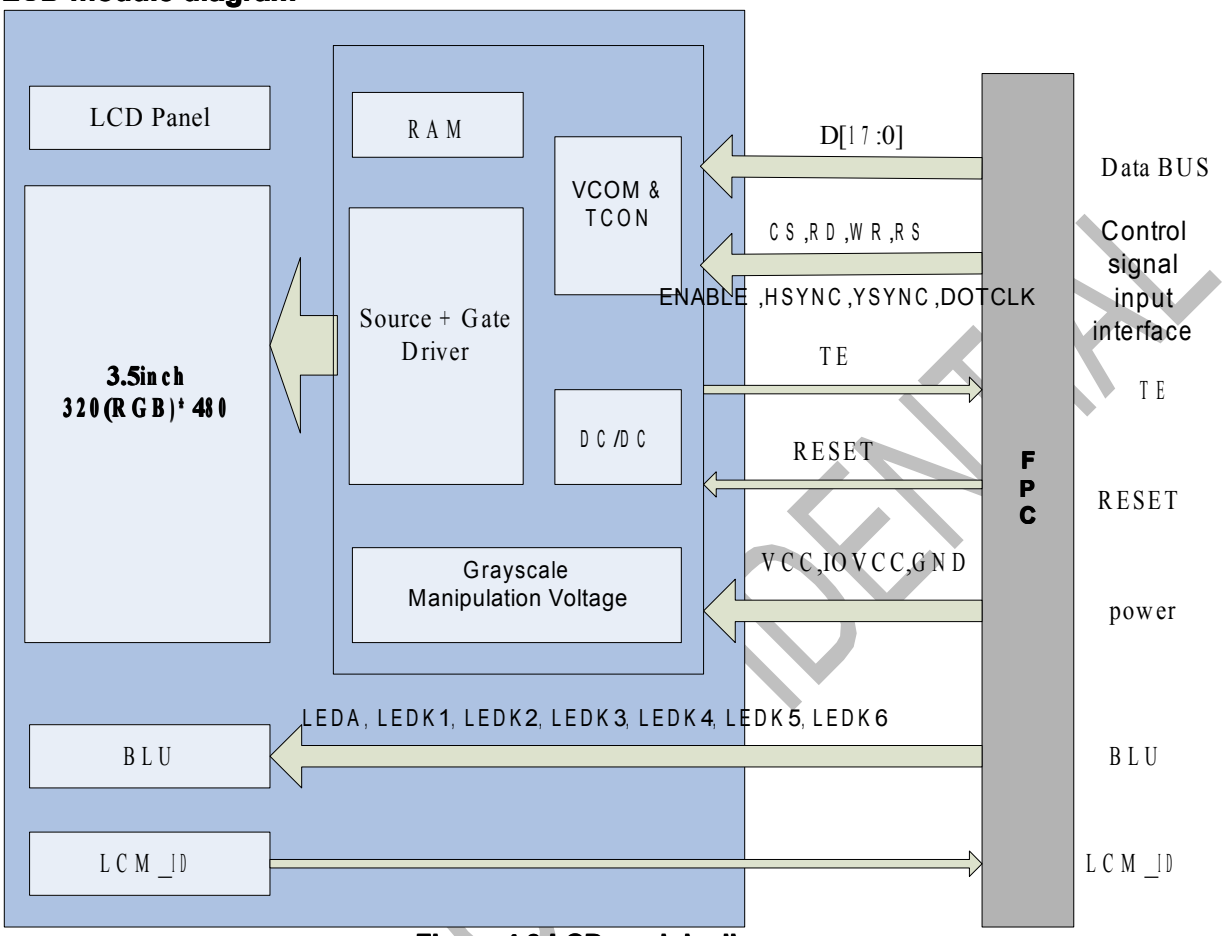
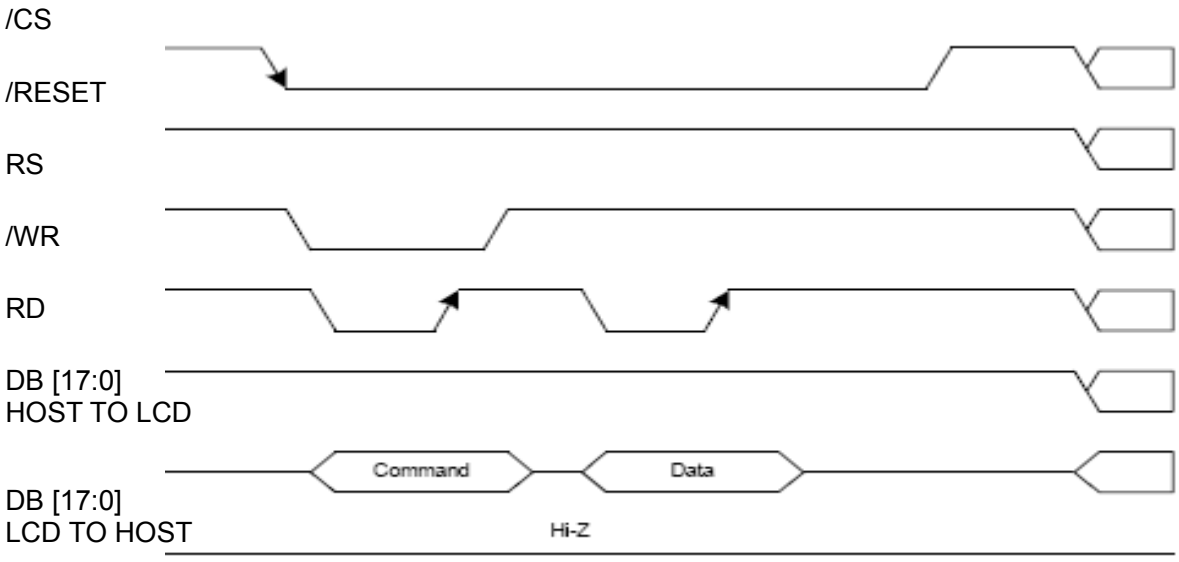


Figure 4.3 LCD module diagram

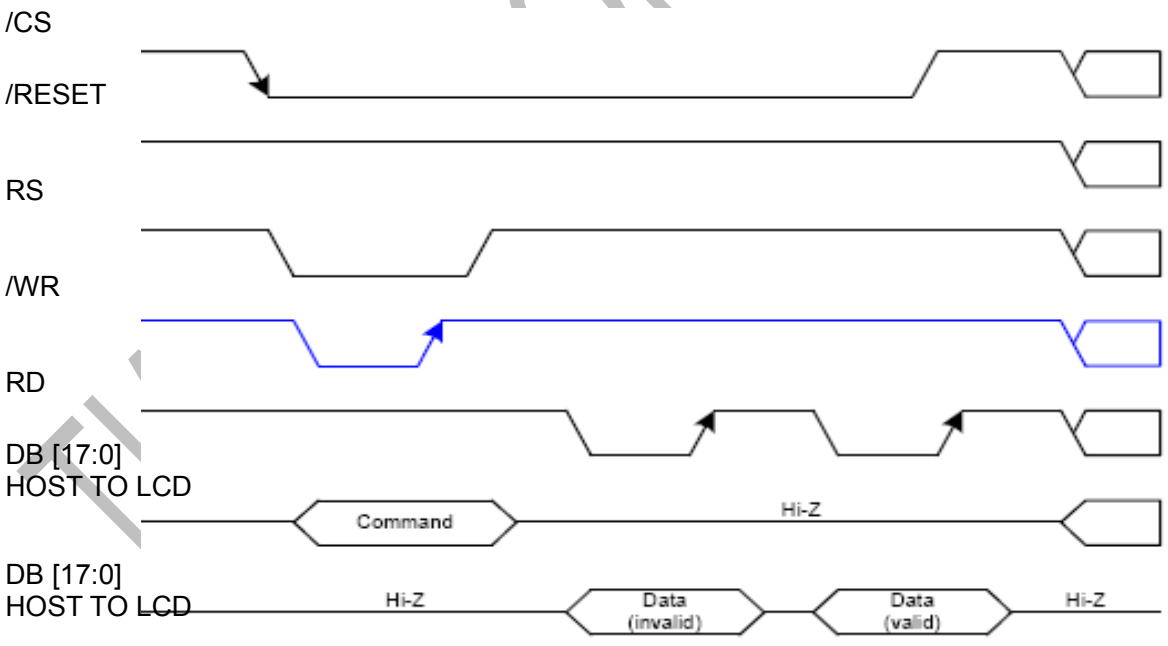
.5 MPU-Interface

5.1 DBI Type B

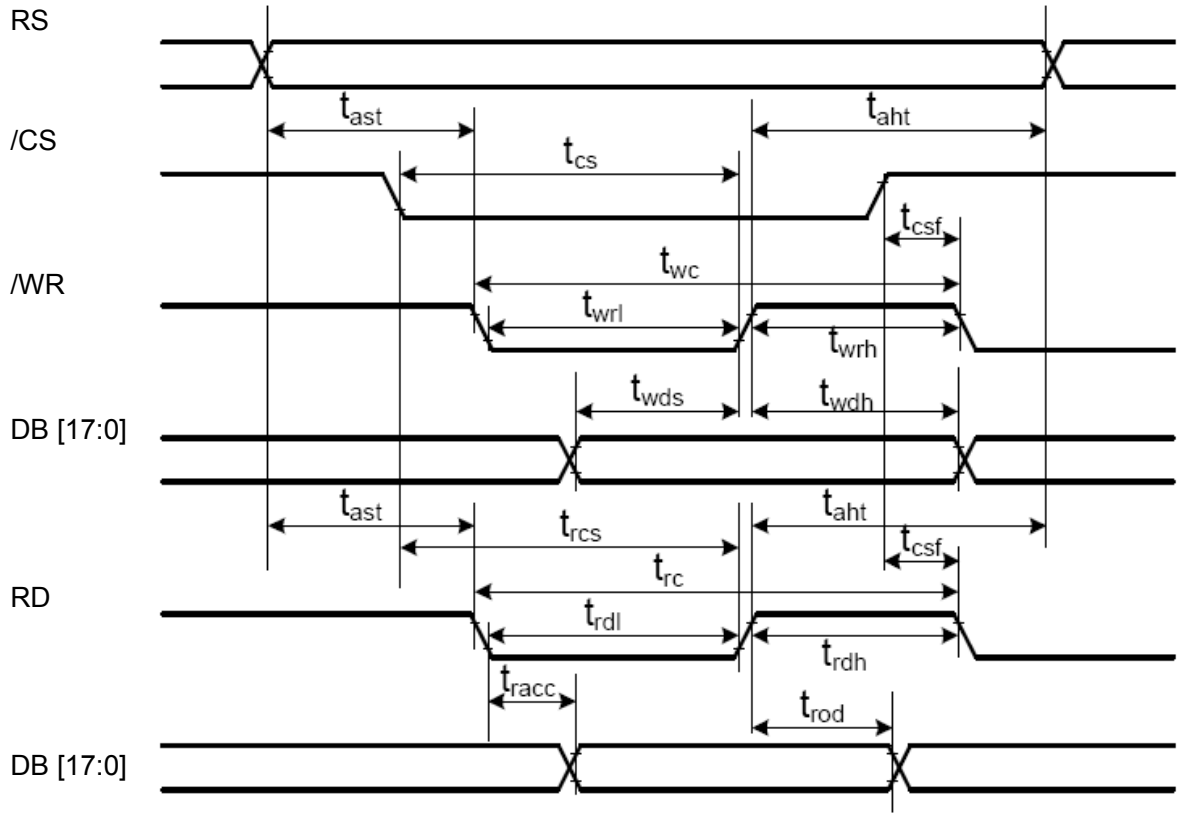
5.1.1 DBI Type B Write Cycle



5.1.2 DBI Type B Read Cycle



5.1.3 DBI Type B（18/16/9/8 bit）Interface Timing Characteristics



5.1.4 Interface Timing Parameters

Normal Write Mode

Signal	Symbol	Parameter	Spec.			Description
			Min.	Max.	Unit	
RS	t_{AST} t_{AHT}	Address setup time Address hold time(Write/Read)	10 10	-	ns	-
CS	t_{CS} t_{RCS} t_{CSF}	Chip select setup time (Write) Chip select setup time (Read) Chip select wait time(Write/Read)	20 20 20	-	ns	-
WR	t_{WC} t_{WRH} t_{WRL}	Write cycle Control pulse “H” duration Control pulse “L” duration	100 30 25	-	ns	-
RD	t_{RC} t_{RDH} t_{RDL}	Read cycle Control pulse “H” duration Control pulse “L” duration	450 250 170	-	ns	
DB[17:0] DB[15:0] DB[8:0] DB[7:0]	T_{WDS} T_{WDH} t_{RACC} t_{ROD}	Data setup time Data hold time Read access time Output disable time	15 20 10 10	- - 340	ns	For maximum C_L=30pF For minimum C_L=8pF

5.1.5 DBI Type B interface

18-bit data bus DB[17:0] interface, IM[2:0] = 000

	Set_pixel_format	DFM	DB17	DB16	DB15	DB14	DB13	DB12	DB11	DB10	DB9	DB8	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Command/Parameter Write	*	*											D[7]	D[6]	D[5]	D[4]	D[3]	D[2]	D[1]	D[0]
Command/Parameter Read	*	*											D[7]	D[6]	D[5]	D[4]	D[3]	D[2]	D[1]	D[0]

	Set_pixel_format	DFM	DB17	DB16	DB15	DB14	DB13	DB12	DB11	DB10	DB9	DB8	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
18bpp Frame Memory Write	3'h6	*	R[5]	R[4]	R[3]	R[2]	R[1]	R[0]	G[5]	G[4]	G[3]	G[2]	G[1]	G[0]	B[5]	B[4]	B[3]	B[2]	B[1]	B[0]
Frame Memory Read	*	*	r[5]	r[4]	r[3]	r[2]	r[1]	r[0]	g[5]	g[4]	g[3]	g[2]	g[1]	g[0]	b[5]	b[4]	b[3]	b[2]	b[1]	b[0]

16-bit data bus DB[15:0] interface, IM[2:0] = 010

	Set_pixel_format	DFM	DB15	DB14	DB13	DB12	DB11	DB10	DB9	DB8	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Command/Parameter Write	*	*									D[7]	D[6]	D[5]	D[4]	D[3]	D[2]	D[1]	D[0]
Command/Parameter Read	*	*									D[7]	D[6]	D[5]	D[4]	D[3]	D[2]	D[1]	D[0]

	Set_pixel_format	DFM	DB15	DB14	DB13	DB12	DB11	DB10	DB9	DB8	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
16bpp Frame Memory Write	3'h5	*	R4]	R[3]	R[2]	R[1]	R[0]	G[5]	G[4]	G[3]	G[2]	G[1]	G[0]	B[4]	B[3]	B[2]	B[1]	B[0]
Frame Memory Read	*	*	r4]	r[3]	r[2]	r[1]	r[0]	g[5]	g[4]	g[3]	g[2]	g[1]	g[0]	b[4]	b[3]	b[2]	b[1]	b[0]

			First Transfer			Second Transfer			Third Transfer			
	Set_pixel_format	DFM	DB[15:10]	DB[9:8]	DB[7:2]	DB[15:10]	DB[9:8]	DB[7:2]	DB[15:10]	DB[9:8]	DB[7:2]	DB[1:0]
18bpp Frame Memory Write	3'h6	0	R1[5:0]		G1[5:0]	B1[5:0]		R2[5:0]	G2[5:0]		B2[5:0]	
		1			R1[5:0]	G1[5:0]		B1[5:0]			R2[5:0]	
Frame Memory Read	*	0	r1[5:0]		g1[5:0]	b1[5:0]		r2[5:0]	g2[5:0]		b2[5:0]	
		1			r1[5:0]	g1[5:0]		b1[5:0]			r2[5:0]	

9-bit data bus DB[8:0] interface, IM[2:0] = 001

	Set_pixel_format	DFM	DB8	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Command/Parameter Write	*	*		D[7]	D[6]	D[5]	D[4]	D[3]	D[2]	D[1]	D[0]
Command/Parameter Read	*	*		D[7]	D[6]	D[5]	D[4]	D[3]	D[2]	D[1]	D[0]

			First Transfer								Second Transfer							
	Set_pixel_format	DFM	DB8	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	DB8	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
18bpp Frame Memory Write	3'h6	*	R[5]	R4]	R[3]	R[2]	R[1]	R[0]	G[5]	G[4]	G[3]	G[2]	G[1]	G[0]	B[5]	B[4]	B[3]	B[2]	B[1]	B[0]
Frame Memory Read	*	*	r[5]	r4]	r[3]	r[2]	r[1]	r[0]	g[5]	g[4]	g[3]	g[2]	g[1]	g[0]	b[5]	b[4]	b[3]	b[2]	b[1]	b[0]

8-bit data bus DB[7:0] interface, IM[2:0] = 011

	Set_pixel_format	DFM	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
Command/Parameter Write	*	*	D[7]	D[6]	D[5]	D[4]	D[3]	D[2]	D[1]	D[0]
Command/Parameter Read	*	*	D[7]	D[6]	D[5]	D[4]	D[3]	D[2]	D[1]	D[0]

			First Transfer								Second Transfer							
	Set_pixel_format	DFM	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
16bpp Frame Memory Write	3'h5	*	R4]	R[3]	R[2]	R[1]	R[0]	G[5]	G[4]	G[3]	G[2]	G[1]	G[0]	B[4]	B[3]	B[2]	B[1]	B[0]
Frame Memory Read	*	*	r4]	r[3]	r[2]	r[1]	r[0]	g[5]	g[4]	g[3]	g[2]	g[1]	g[0]	b[4]	b[3]	b[2]	b[1]	b[0]

			First Transfer								Second Transfer								Third Transfer							
	Set_pixel_format	DFM	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0		DB6	DB5	DB4	DB3	DB2	DB1	DB0
18bpp Frame Memory Write	3'h6	*	R[5]	R[4]	R[3]	R[2]	R[1]	R[0]			G[5]	G[4]	G[3]	G[2]	G[1]	G[0]			B[5]	B[4]	B[3]	B[2]	B[1]	B[0]		
Frame Memory Read	*	*	r[5]	r[4]	r[3]	r[2]	r[1]	r[0]			g[5]	g[4]	g[3]	g[2]	g[1]	g[0]			b[5]	b[4]	b[3]	b[2]	b[1]	b[0]		

16-bit data extend to 18-bit

		Frame Memory Data (18bpp)																	
Set_pixel_format	EPF[1:0]	DB17	DB16	DB15	DB14	DB13	DB12	DB11	DB10	DB9	DB8	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
18bpp	*	R[5]	R[4]	R[3]	R[2]	R[1]	R[0]	G[5]	G[4]	G[3]	G[2]	G[1]	G[0]	B[5]	B[4]	B[3]	B[2]	B[1]	B[0]
16bpp	2'h0	R4]	R[3]	R[2]	R[1]	R[0]	0	G[5]	G[4]	G[3]	G[2]	G[1]	G[0]	B[4]	B[3]	B[2]	B[1]	B[0]	0
	2'h1	R4]	R[3]	R[2]	R[1]	R[0]	1	G[5]	G[4]	G[3]	G[2]	G[1]	G[0]	B[4]	B[3]	B[2]	B[1]	B[0]	1
	2'h2	R4]	R[3]	R[2]	R[1]	R[0]	R4]	G[5]	G[4]	G[3]	G[2]	G[1]	G[0]	B[4]	B[3]	B[2]	B[1]	B[0]	B[4]

5.2 Display Pixel Interface(DPI)

5.2.1 Input Clock and Data Timing

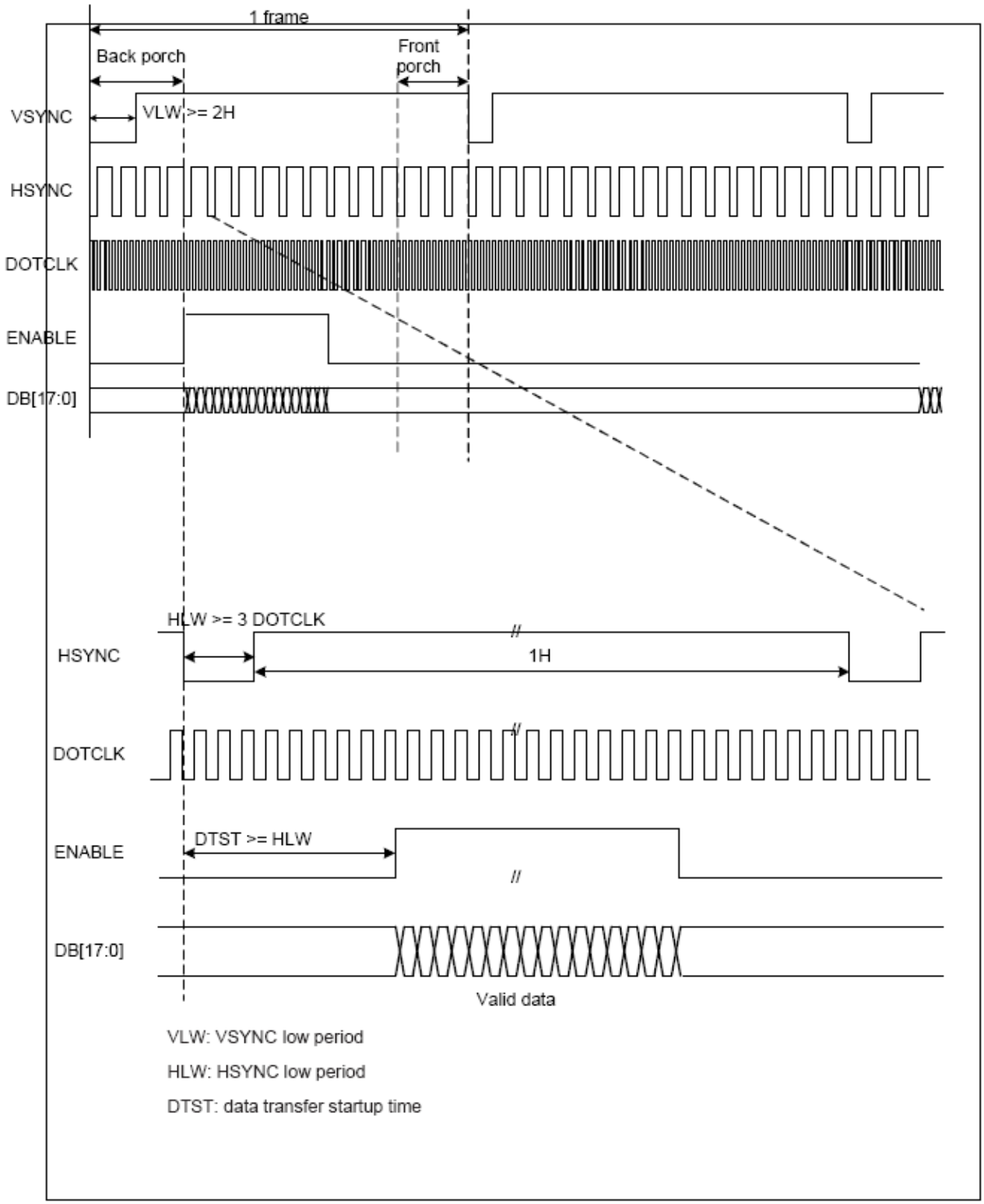


Figure 5.1 Horizontal and Vertical input timing

Parameters	Symbols	Condition	Min.	Typ.	Max.	Units
PCLK Cycle	$PCLK_{CYC}$		-	125	95.5	ns
Horizontal Synchronization	Hsync		2	2	-	PCLK
Horizontal Back Porch	HBP		3	3	-	PCLK
Horizontal Address	HAdr		-	320	-	PCLK
Horizontal Front Porch	HFP		3	3	-	PCLK
Vertical Synchronization	Vsync		2	2	-	Line
Vertical Back Porch	VBP		2	2	-	Line
Vertical Address	VAdr		-	480	-	Line
Vertical Front Porch	VFP		2	4	-	Line
Vsync setup time	VSST					Hz
Vsync hold time	VSHT					Hz
Hsync setup time	HSST					Hz
Hsync hold time	HSHT					Hz
Data setup time	DST					Hz
Data hold time	DHT					Hz
Vertical Frequency(*)				50	65	Hz
Horizontal Frequency(*)			-	-	-	KHz
PCLK Frequency(*)			-	8	10.5	MHz

Table 5.2Horizontal and Vertical input timing

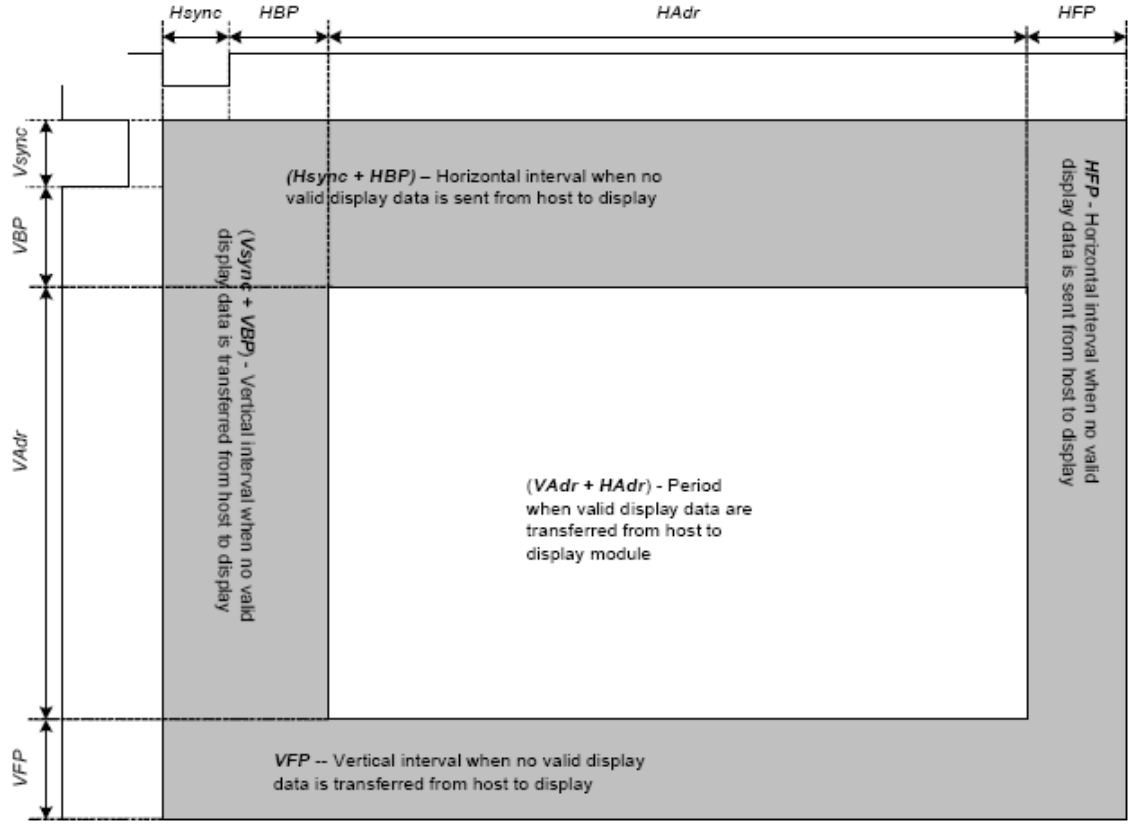
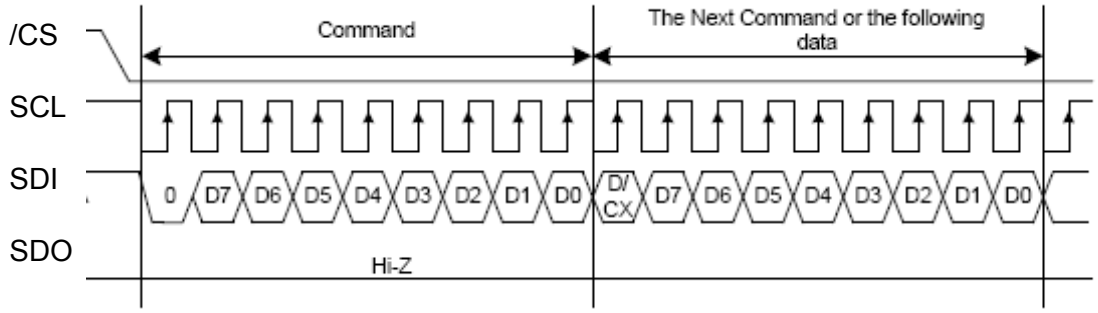


Figure5.3Horizontal and Vertical display area

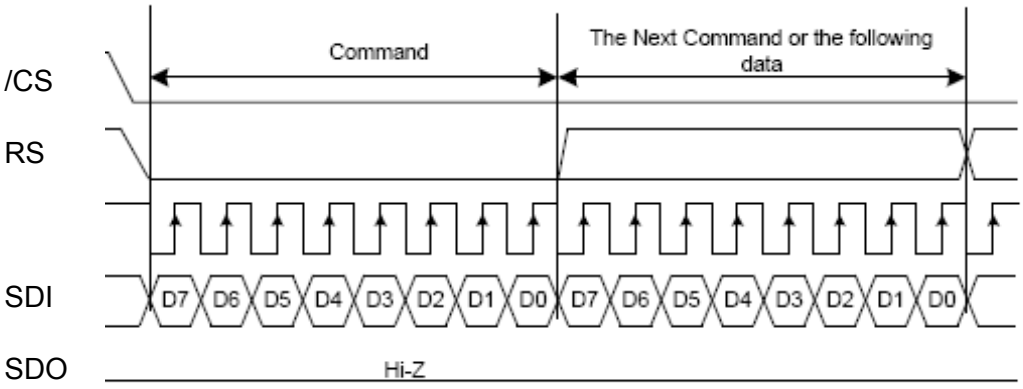
5.3 Serial Interface(Type C)

5.3.1 Write Cycle and Sequence



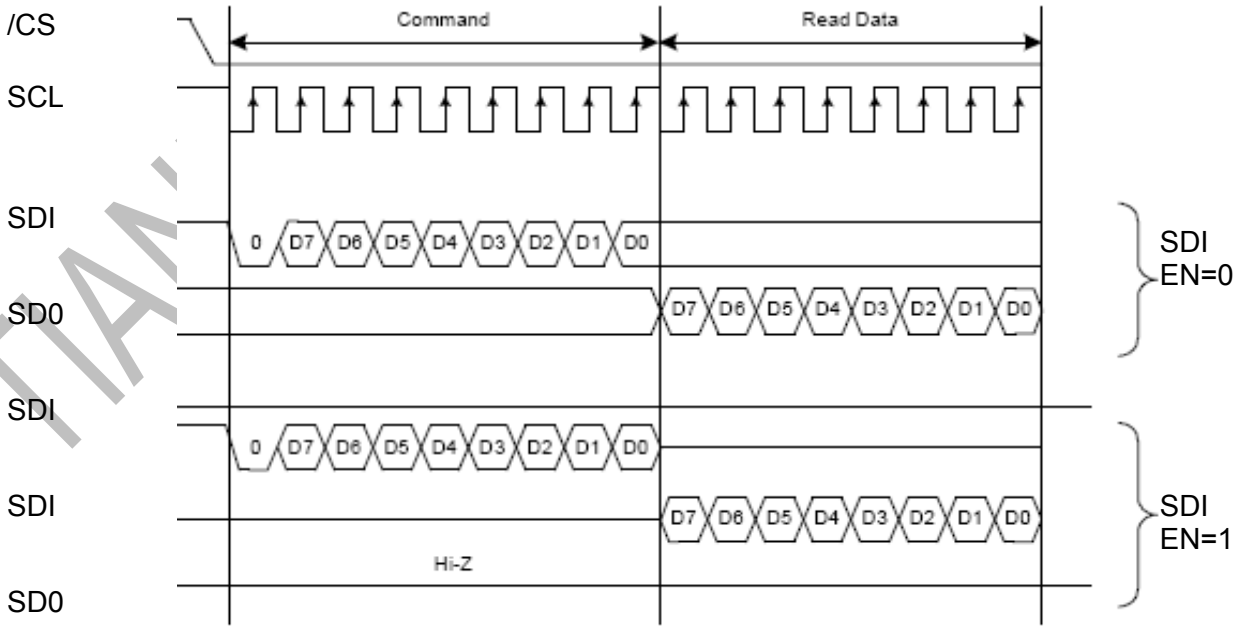
DBI Type C 9bit Interface write sequence

Note: D/CX equal to RS signal ,if no use please fix this pin at GND level.

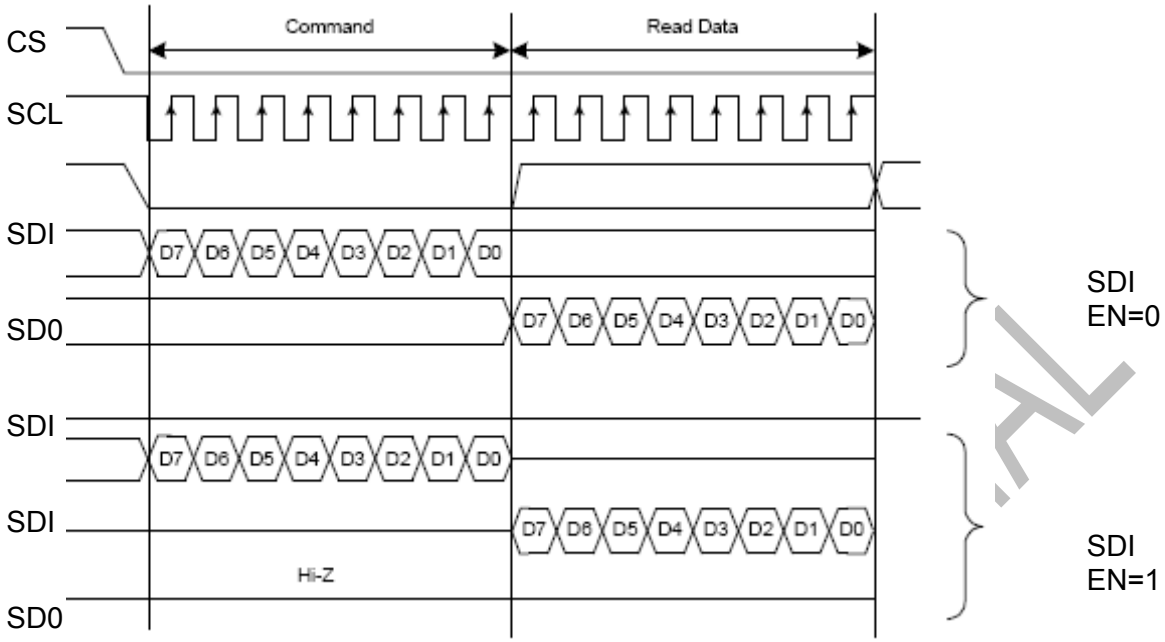


DBI Type C 8bit Interface write sequence

5.3.2 Read Cycle and Sequence



DBI Type C 9bit Interface read sequence



DBI Type C 8bit Interface read sequence

5.4 Reset Timing Characteristics

Ta=25℃

Item	Symbol	Unit	Min.	Typ.	Max.
RESET low-level width	t_{RES}	ms	1	-	-
RESET rise time	t_{rRES}	μs	-	-	10
Reset high-level width	tRES_H	ms	50		

Table 5.4 RESET Timing Parameter

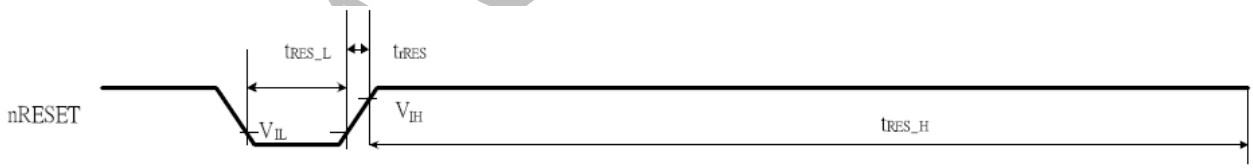
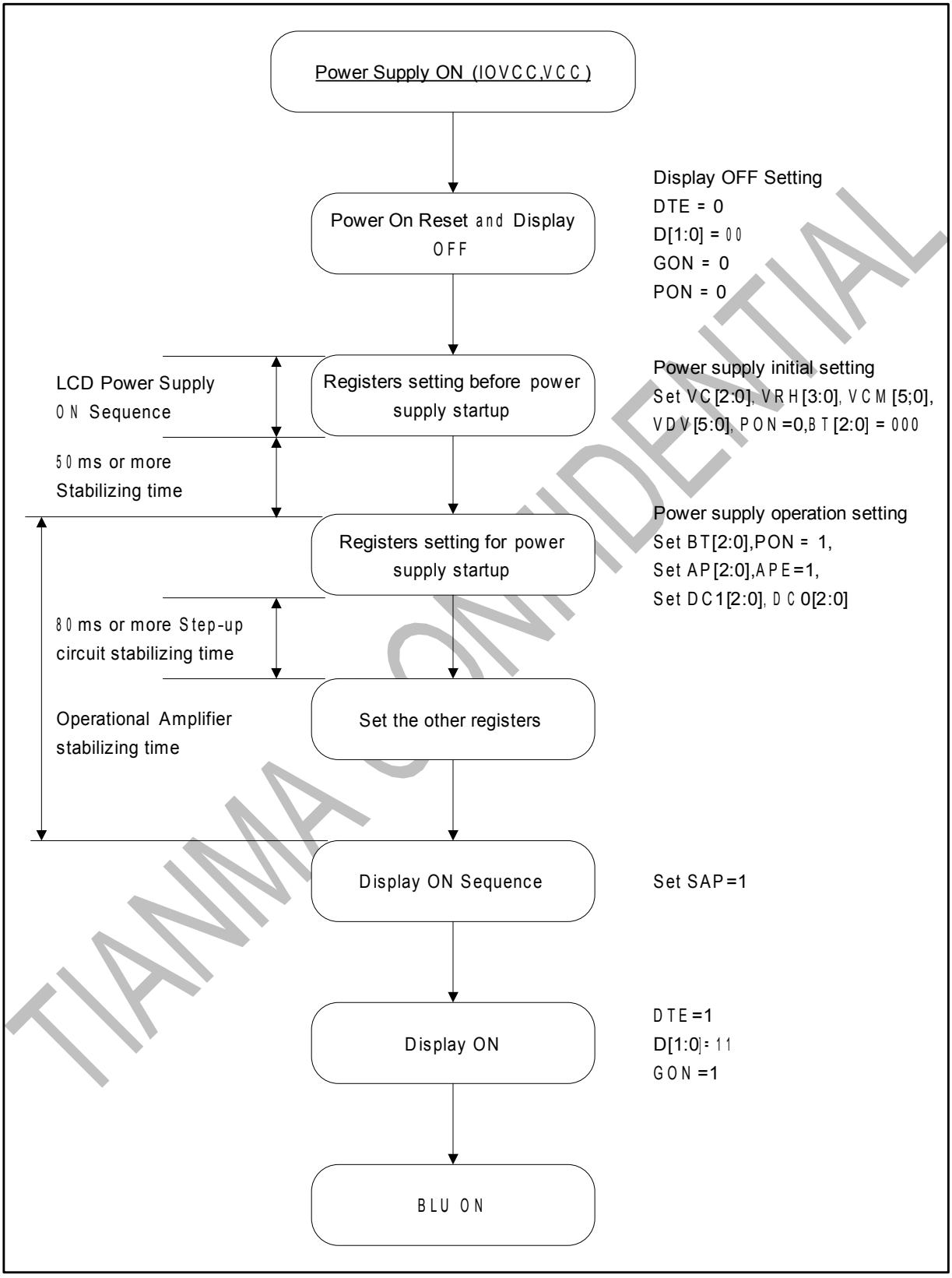


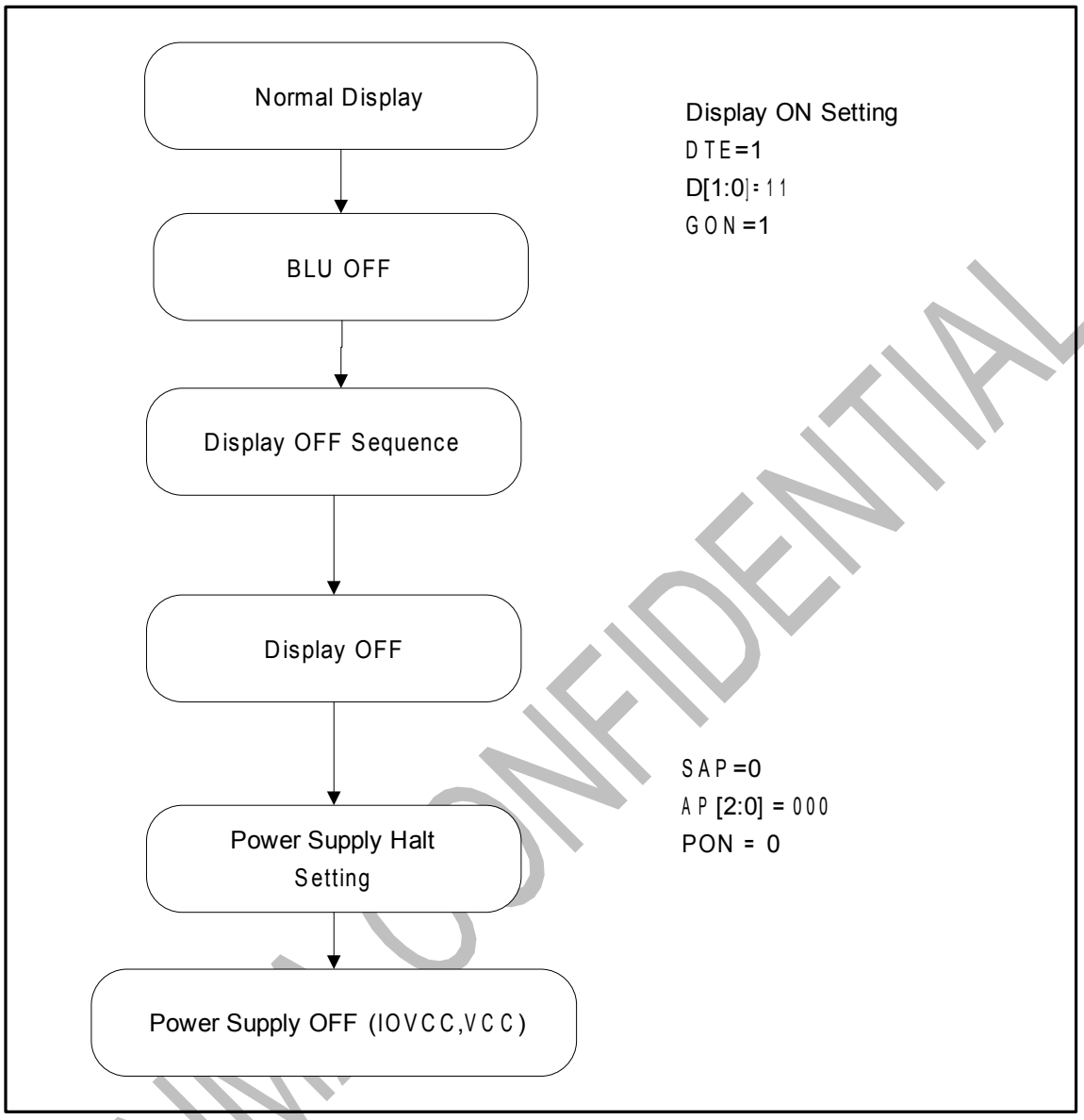
Figure 5.4 RESET Timing

5.5 Power On/Off sequence

5.5.1 Power on Sequence



5.5.2 Power off Sequence



6 Optical Characteristics

Ta=25℃

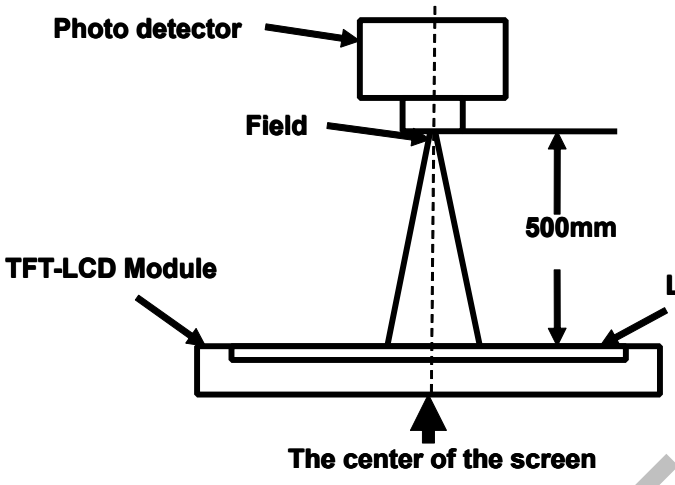
Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≧10	60	70	-	Degree	Note 2
		θB		50	60	-		
		θL		60	70	-		
		θR		60	70	-		
Contrast Ratio		CR	θ=0°	400	500	-	-	Note1 Note3
Response Time		T_{ON}	25℃	-	20	30	ms	Note1 Note4
		T_{OFF}						
Chromaticity	White	x	Backlight is on	0.235	0.285	0.335	-	Note5 Note1
		y		0.260	0.310	0.360		
	Red	x		0.562	0.612	0.662		
		y		0.283	0.333	0.383		
	Green	x		0.288	0.338	0.388		
		y		0.545	0.595	0.645		
	Blue	x		0.099	0.149	0.199		
		y		0.032	0.082	0.132		
Uniformity		U	-	-	80	-	%	Note1 Note6
NTSC		-	-	-	60	-	%	Note 5
Luminance		L		250	300		cd/m^2	Note1 Note7

Test Conditions:

1. V_F=3.2V, I_F=120 mA(One LED current), 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)。

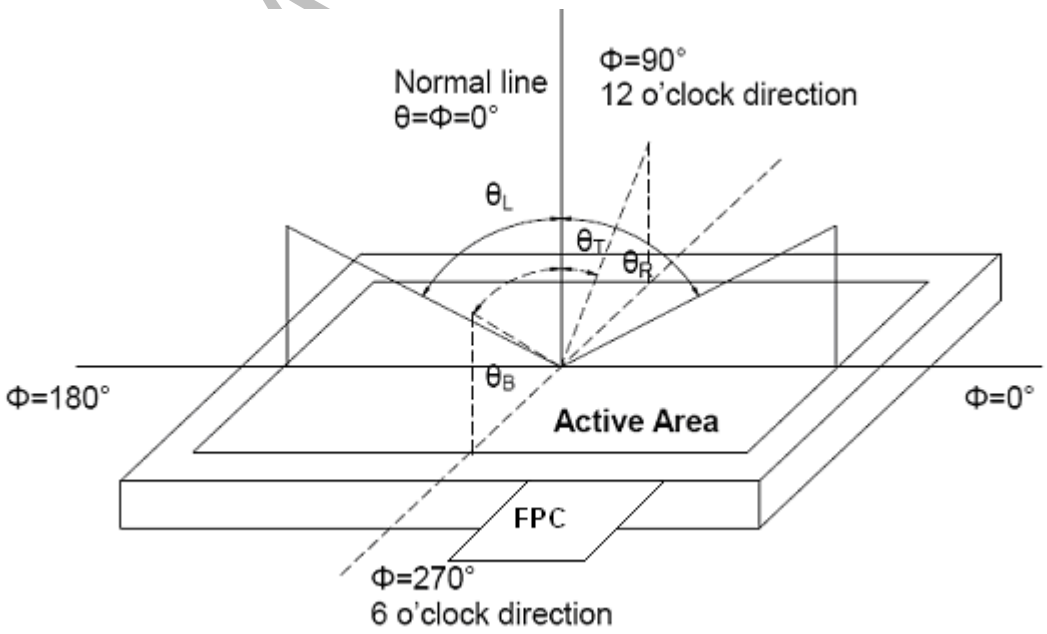


Fig. 1 Definition of viewing angle

Note 3: Definition of contrast ratio

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

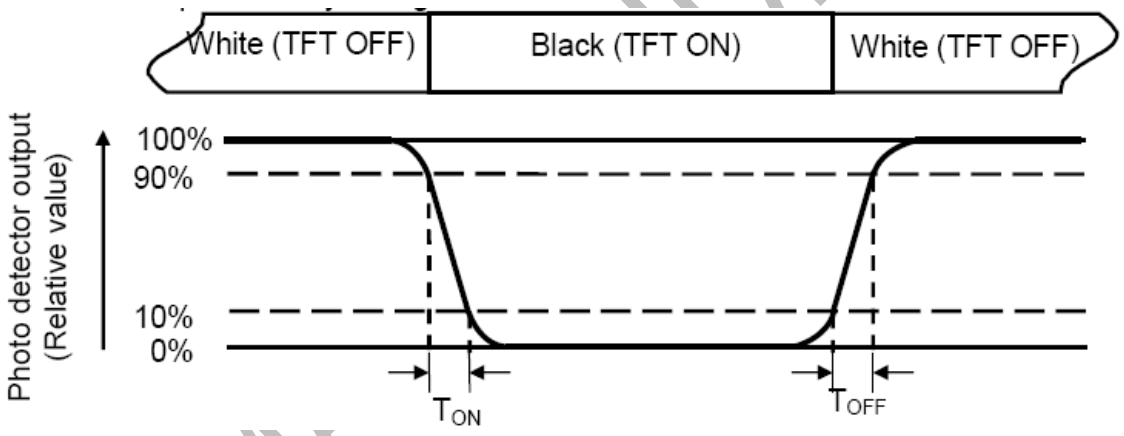
“White state “:The state is that the LCD should driven by Vwhite.

“Black state”: The state is that the LCD should driven by Vblack.

Vwhite: To be determined Vblack: 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 (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) 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) = Lmin/ Lmax

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

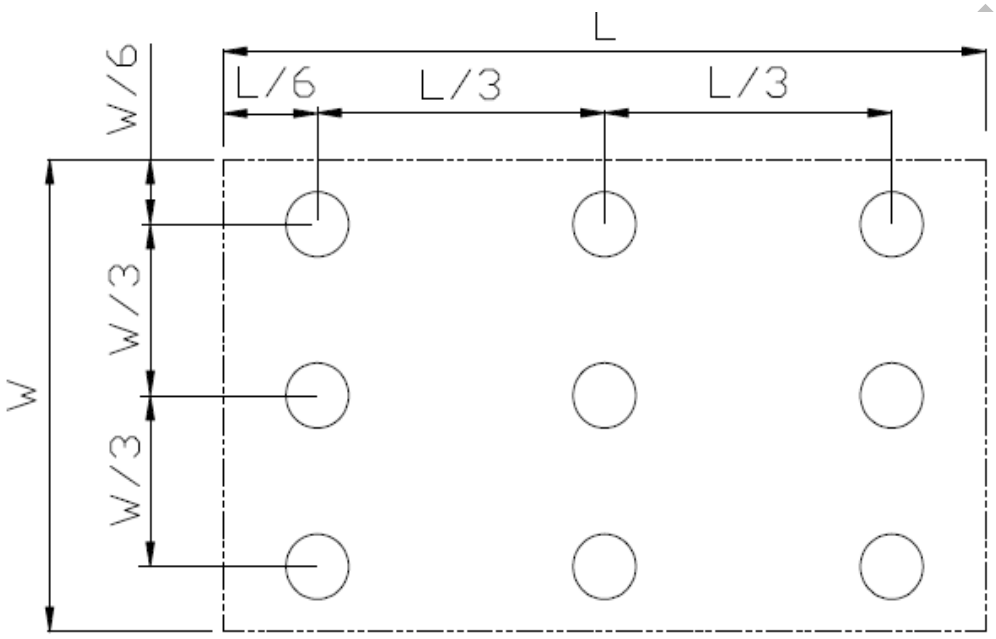


Fig. 2 Definition of uniformity

Lmax: The measured maximum luminance of all measurement position.

Lmin: The measured minimum luminance of all measurement position.

Note 7: Definition of Luminance :

Measure the luminance of white state at center point.

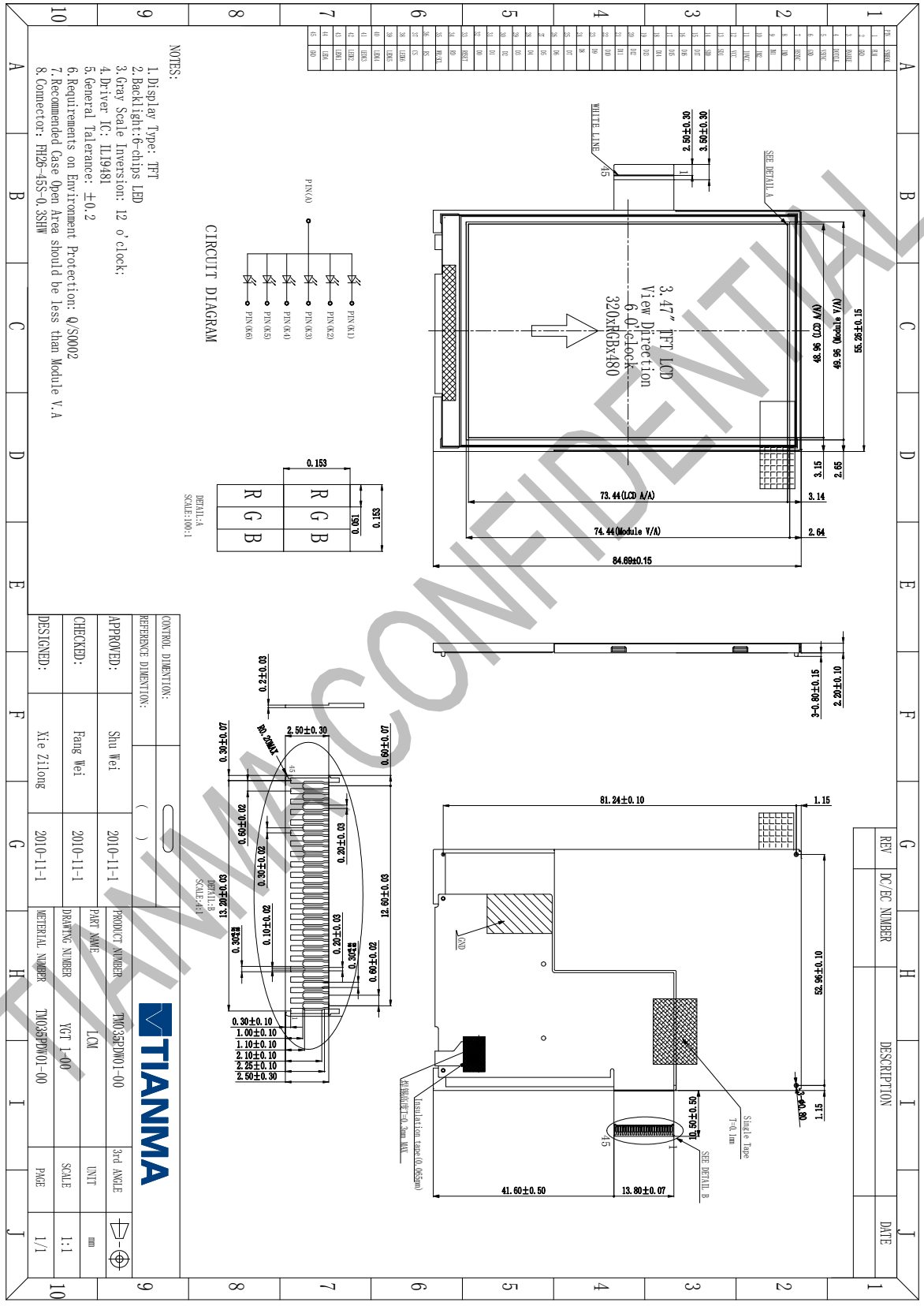
7 Environmental / Reliability Test

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts=+70℃, 240hrs	Note1 IEC60068-2-1,GB2423.2
2	Low Temperature Operation	Ta=-20℃, 240hrs	IEC60068-2-1 GB2423.1
3	High Temperature Storage	Ta=+80℃, 240hrs	IEC60068-2-1 GB2423.2
4	Low Temperature Storage	Ta=-30℃, 240hrs	IEC60068-2-1 GB2423.1
5	High Temperature & High Humidity Storage	Ta=+60℃, 90% RH 240 hours	Note2 IEC60068-2-78 GB/T2423.3
6	Thermal Shock (Non-operation)	-30℃ 30 min~+70℃ 30 min, Change time:5min, 20 Cycles	Start with cold temperature, End with high temperature, IEC60068-2-14,GB2423.22
7	Electro Static Discharge (Operation)	C=150pF, R=330Ω，5points/panel Air:±8KV, 5times; Contact:±4KV, 5 times; （Environment: 15℃～35℃, 30%～60%, 86Kpa～106Kpa）	IEC61000-4-2 GB/T17626.2
8	Vibration (Non-operation)	Frequency range:10~55Hz, Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z. (6 hours for total) (Package condition)	IEC60068-2-6 GB/T2423.10
9	Shock (Non-operation)	60G 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/T2423.8

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

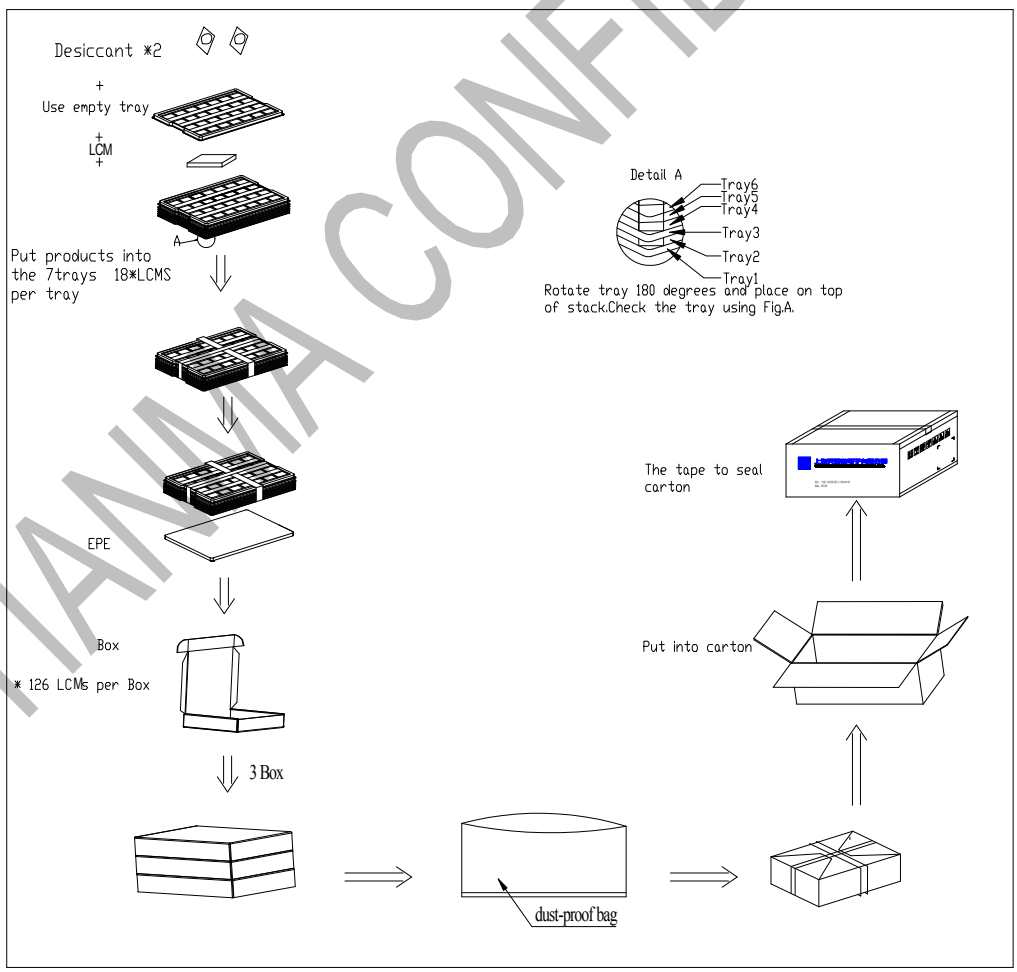
Note2: Ta is the ambient temperature of sample.

8 Mechanical Drawing



9 Packing Drawing

No	Item	Model (Material)	Dimensions(mm)	Unit Weight(Kg)	Quantity	Remark
1	LCM module	TM035PDW01-00	55.26×84.69×2.20	0.02235	378	
2	Tray	PET（Transmit）	485x330x13.8	0.161	24	Anti-static
3	EPE	EPE	485X330X5mm	0.0183	3	
4	Dust-Proof Bag		700x54.5	0.021	1	
5	BOX	CORRUGATED PAPER	520x345x74	0.227	3	
6	Desiccant	Desiccant	45×35	0.002	6	
7	Carton	CORRUGATED PAPER	544×365×250	1.01	1	
8	Total weight	14.0912 Kg				



10 Precautions For Use of LCD Modules

10.1 Handling Precautions

10.1.1 The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

10.1.2 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.

10.1.3 Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

10.1.4 The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

10.1.5 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

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:

- Water
- Ketone
- Aromatic solvents

10.1.6 Do not attempt to disassemble the LCD Module.

10.1.7 If the logic circuit power is off, do not apply the input signals.

10.1.8 To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

10.1.8.1 Be sure to ground the body when handling the LCD Modules.

10.1.8.2 Tools required for assembly, such as soldering irons, must be properly ground.

10.1.8.3 To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

10.1.8.4 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.

10.2 Storage precautions

10.2.1 When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

10.2.2 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:

Temperature : 0℃ ～ 40℃ Relatively humidity: ≤80%

10.2.3 The LCD modules should be stored in the room without acid, alkali and harmful gas.

10.3 Transportation Precautions

The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.