PRODUCT SPECIFICATION

CDTECH Model: **S050BWV105ES**

CUSTOMER Model: -

Description: **5.0” TFT-LCD Module**

Version: **1.0**

CDTECH	PREPARED BY	CHECKED BY	APPROVED BY
SIGNATURE			
DATE	2022.12.10	2022.12.10	2022.12.10

	SIGNATURE	DATE
CUSTOMER APPROVAL		

Record of Revisions

Version	Revise Date	Description	Page
1.0	2022-12-10	First Release	-

Contents

1. General Specifications

1.1 LCM General Information

Item	Specification	Unit
LCD Size	5.0	inch
Number of Pixels	800 (H) RGB x 480 (V)	pixels
Display Mode	Normally Black	-
Viewing Direction	Free	o' clock
Interface	RGB	-
Display Colors	16.7M	colors
Outline Dimension	121.00 (H) x 78.80 (V) x 7.00 (D)	mm
Active Area	108.00 (H) x 64.80 (V)	mm
Pixel Pitch	0.1350 (H) x 0.1350 (V)	mm
Driver IC	ST72568-G6-E8	-
Operation Temperature	-30~85	℃
Storage Temperature	-30~85	℃

Note1:Requirements on environmental protection RoHS compliant.

2. Absolute Maximum Ratings

Item	Symbol	MIN.	MAX.	Unit	Note
Analog Supply voltage	VDD	-0.3	5.0	V	Note 1

Note 1:Permanent damage may occur to the LCD module if beyond this specification.
Functional operation should be restricted to the conditions described under normal operating conditions.

3. Elecrical Characteristics

3.1 Recommended Operating Condition for TFT LCD

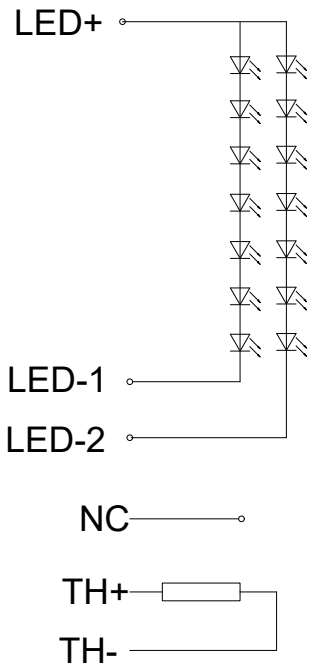
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Analog Supply voltage	VCC	3.0	3.3	3.6	V	
Analog supply current	I_{VCC}	-	TBD	-	mA	VCC=3.3V
Logic input voltage	VIH	0.7*VCC	-	VCC	V	
	VIL	GND	-	0.3*VCC	V	

3.2 Recommended Driving Condition for Backlight

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Driving Current	I_F	-	140	-	mA	
Driving Voltage	V_F	18.9	-	23.8	V	
Power consumption	W_{BL}	2.646	-	3.332	W	
LED Life-Time	N/A	30,000	50,000	-	Hours	Ta=25℃ Note 1

Note 1:LED lifetime is defined as the module brightness decay 50% of original brightness at Ta=25 degree, typical current.

Note 2:LED circuit :



4. Interface Pin Assignment

4.1 LCM Pin Assignment

Recommended connector：FH28D-50S-0.5SH manufactured by HIROSE

No.	Symbol	Description
1	NTC-	Thermistor pin1
2	NTC+	Thermistor pin2
3	LEDK2	Power for LED backlight (Cathode)
4	LEDK1	Power for LED backlight (Cathode)
5	LEDA	Power for LED backlight (Anode)
6	LEDA	Power for LED backlight (Anode)
7	GND	Ground
8	NC(VDD_MTP)	No connection
9	NC(CSB)	3-SPI Chip select pin. When not use, connect to VCC.
10	NC(SDA)	3-SPI Data input/output. When not use, connect to GND.
11	NC(SCL)	3-SPI CLK input. When not use, connect to GND.
12	NC	No connection
13	NC	No connection
14	VCC	Power supply(3.3V.typ)
15	VCC	Power supply(3.3V.typ)
16	DE	Enabled signal for RGB
17	HSYNC	Horizontal synchronizing signal for RGB. When use De mode,no use, open.
18	VSYNC	Vertical synchronizing signal for RGB. When use De mode, no use, open.
19	GND	Ground
20	DCLK	Clock signal for RGB
21	GND	Ground
22-29	B07-B00	Blue Date
30	GND	Ground
31-38	G07-G00	Green Date
39	GND	Ground
40	R07-R00	Red Date
48	GND	Ground
49	RESET	Global reset pin
50	STBYB	Standby mode setting pin. Active low. H: Normal mode. L: Standby mode. Timing controller, output buffer ,DAC and power circuit are off.

5. Interface Characteristics

5.1 Parallel 24-bit RGB Input Timing Table

Parallel 24-bit RGB Input Timing (PVDD=VDD=VDDI= 3.3V, AGND= 0V, TA=25°C)

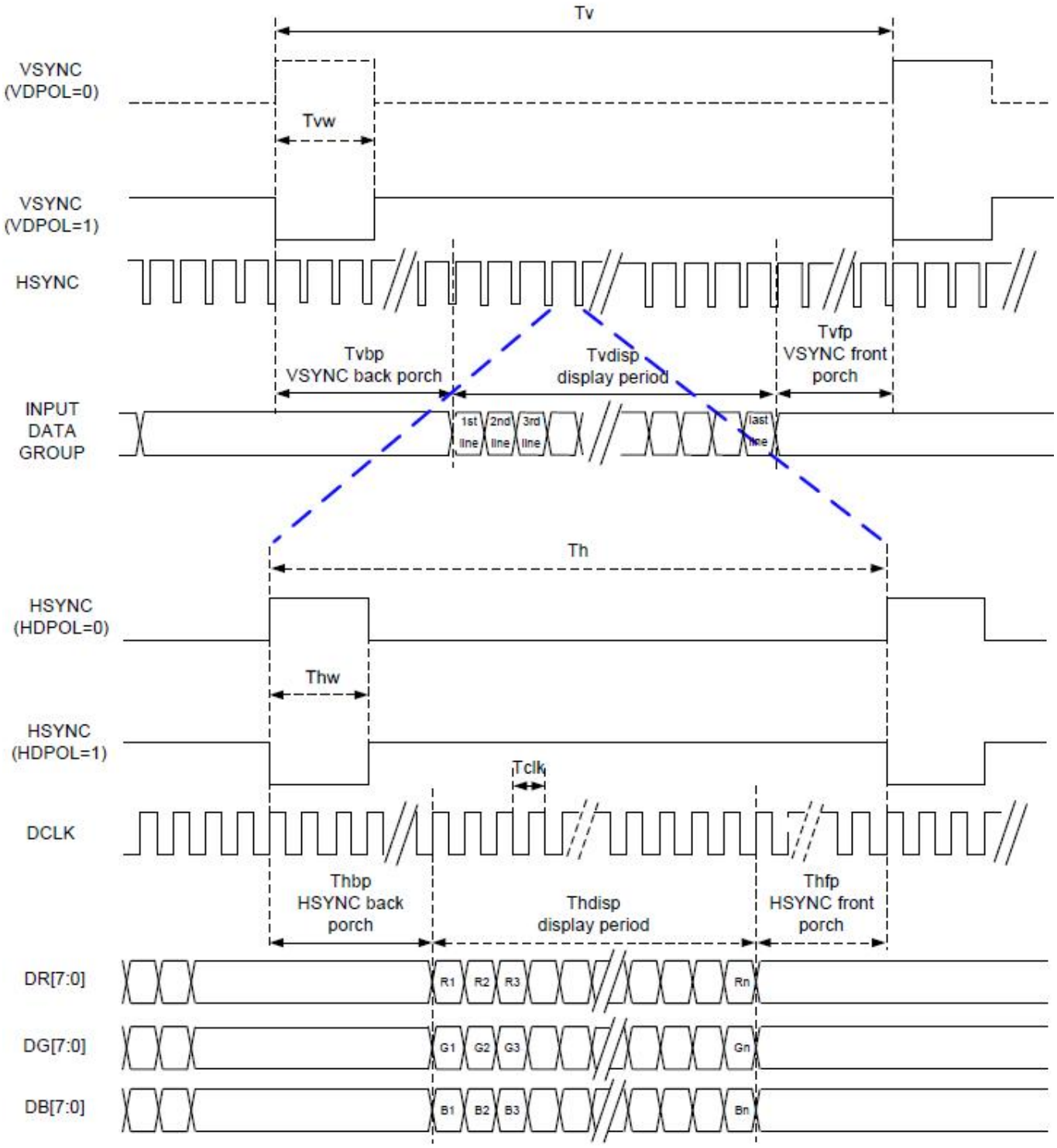
Parallel 24-bit RGB Interface Timing Table							
Item		Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK Frequency		Fclk	23	25	27	MHz	.
HSYNC	Period Time	Th	808	816	848	DCLK	
	Display Period	Thdisp		800		DCLK	
	Back Porch	Thbp	4	8	24	DCLK	
	Front Porch	Thfp	4	8	24	DCLK	
	Pulse Width	Thw	2	4	8	DCLK	
VSYNC	Period Time	Tv	496	512	528	HSYNC	
	Display Period	Tvdisp		480		HSYNC	
	Back Porch	Tvbp	8	16	24	HSYNC	
	Front Porch	Tvfp	8	16	24	HSYNC	
	Pulse Width	Tvw	2	4	8	HSYNC	

Note: 1. The minimum blanking time depends on the GIP timing of the panel specification

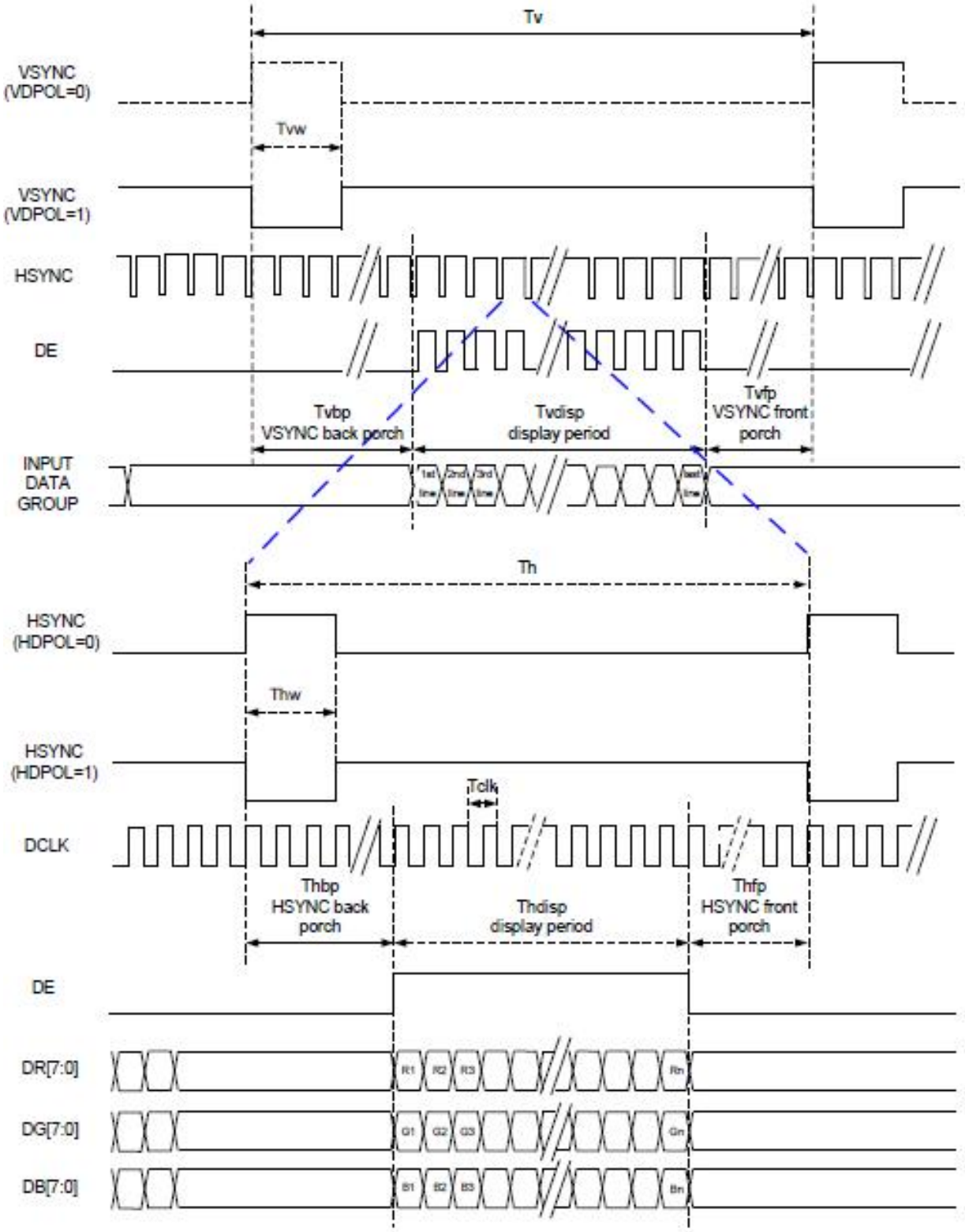
2. To ensure the compatibility of different panels, it is recommended to use the typical setting.

3. It is necessary to keep Tvbp =16 and Thbp =8 in sync mode. DE mode is unnecessary to keep it.

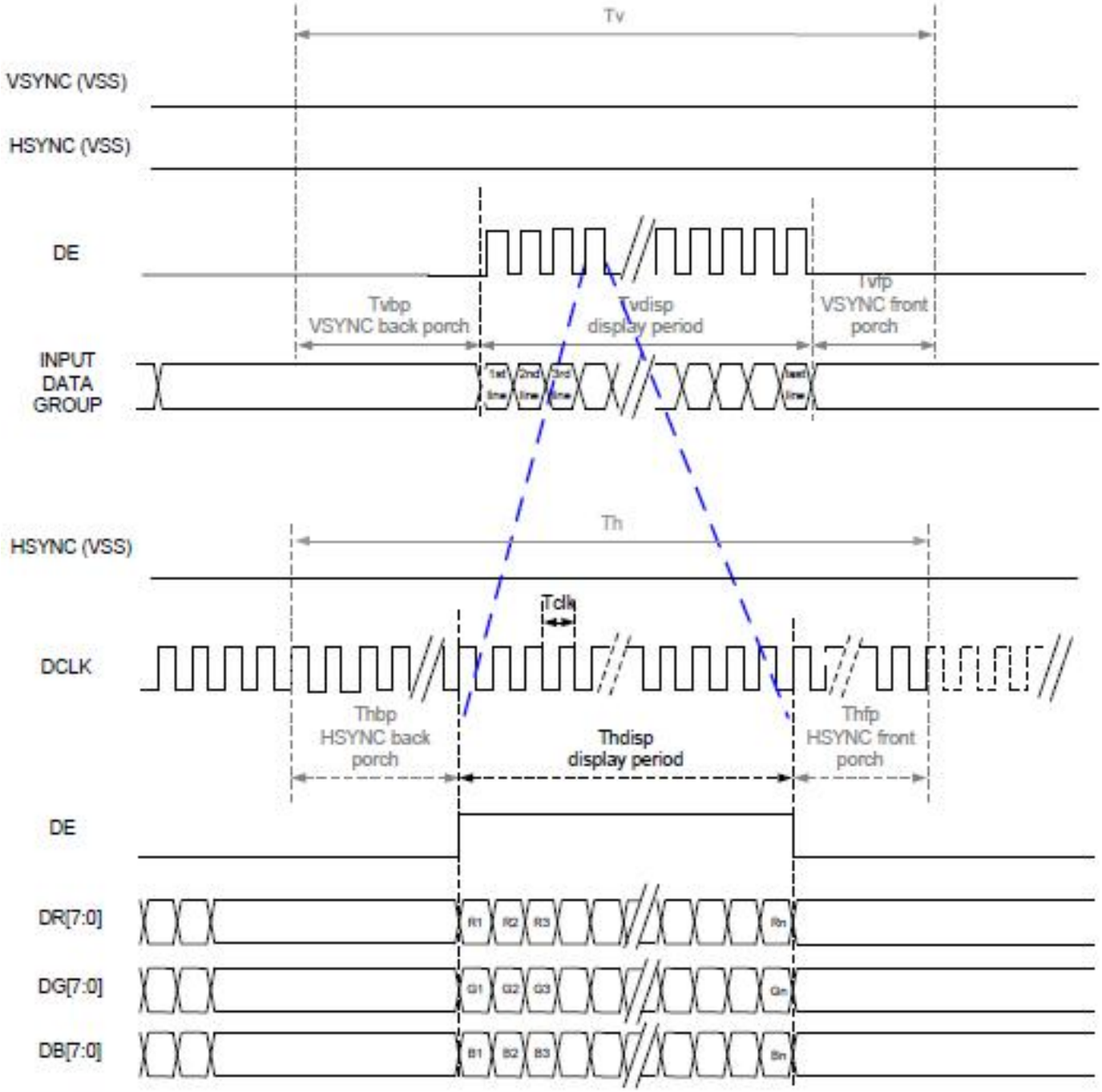
5.2 SYNC Mode


Tv
VSYNC
(VDPOL=0)
Tvw
VSYNC
(VDPOL=1)
HSYNC
Tvbp
VSYNC back porch
Tvdisp
display period
Tvfp
VSYNC front
porch
INPUT
DATA
GROUP
1st line
2nd line
3rd line
last line
Th
HSYNC
(HDPOL=0)
Thw
HSYNC
(HDPOL=1)
Tclk
DCLK
Thbp
HSYNC back
porch
Thdisp
display period
Thfp
HSYNC front
porch
DR[7:0]
R1
R2
R3
Rn
DG[7:0]
G1
G2
G3
Gn
DB[7:0]
B1
B2
B3
Bn

5.3 SYNC-DE Mode



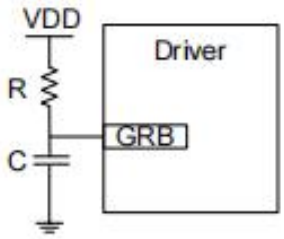
5.4 DE Mode

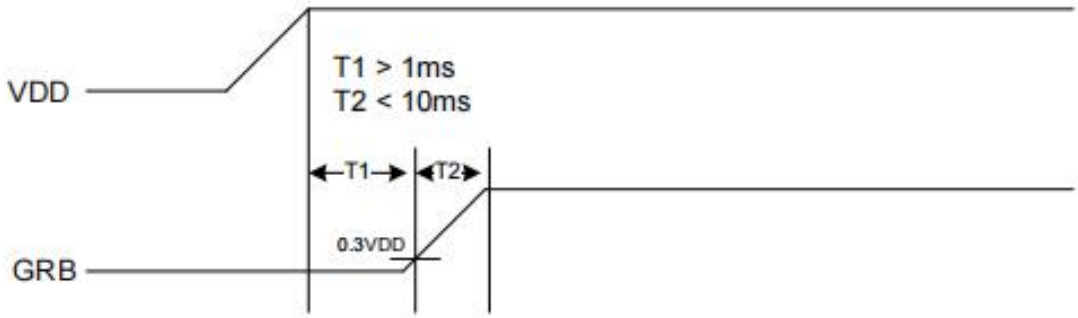

Tv
VSYNC (VSS)
HSYNC (VSS)
DE
Tvbp
VSYNC back porch
Tvdisp
display period
Tvfp
VSYNC front
porch
INPUT
DATA
GROUP
1st line
2nd line
3rd line
last line
Th
HSYNC (VSS)
Tclk
DCLK
Thbp
HSYNC back
porch
Thdisp
display period
Thfp
HSYNC front
porch
DE
DR[7:0]
R1
R2
R3
Rn
DG[7:0]
G1
G2
G3
Gn
DB[7:0]
B1
B2
B3
Bn

5.5 Reset timing

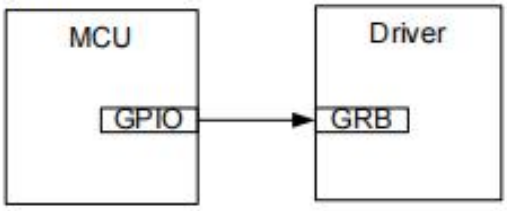
Setting GRB pin to "L" (hardware reset) can initialize internal function. Initialized by GRB pin is essential before operating. There are two suggestions for hardware reset connection.

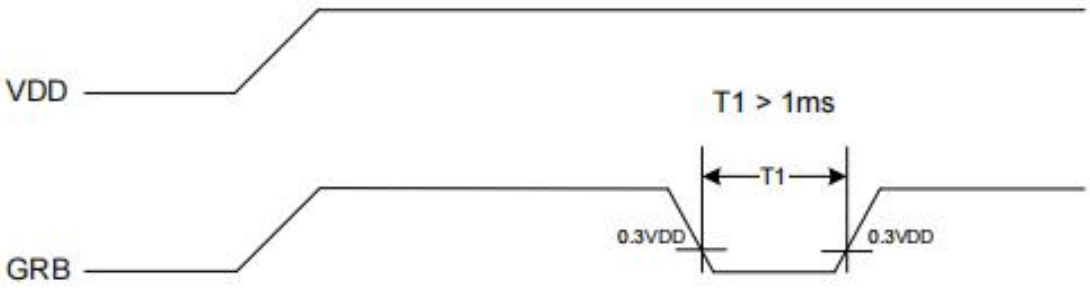
(1) The GRB pin with external RC circuit.





(2) The GRB pin controlled by MCU.



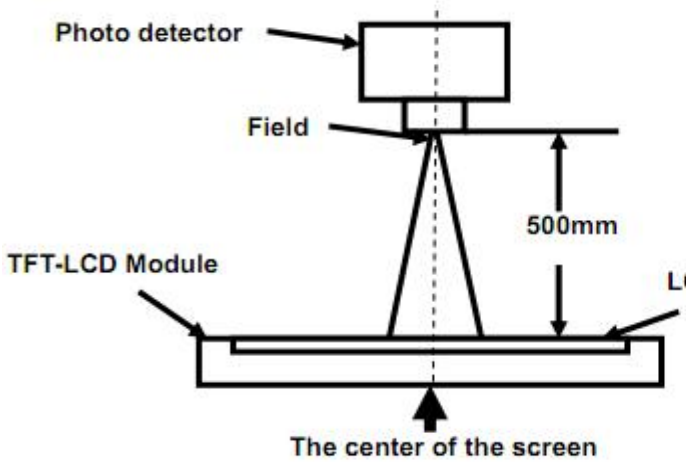


6. Optical Specifications

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Viewing Angle (CR≥10) B/L ON	θ_T	Φ=90°(12 o'clock)	70	80	-	deg	Note2
	θ_B	Φ=270°(6 o'clock)	70	80	-	deg	Note2
	θ_L	Φ=180°(9 o'clock)	70	80	-	deg	Note2
	θ_R	Φ=0°(3 o'clock)	70	80	-	deg	Note2
Response Time	T_{ON}	Normal θ=Φ=0°	-	10	15	msec	Note4
	T_{OFF}		-	10	15	msec	Note4
Contrast Ratio	CR		800	1000	-	-	Note1 Note3
Color Chromaticity	W_X		0.231	0.281	0.331	-	Note1 Note5
	W_Y		0.273	0.323	0.373	-	Note1 Note5
Luminance	L		800	1000	-	cd/m²	Note1 Note7
Luminance Uniformity	Y_U		75	80	-	%	Note1 Note6
NTSC	-		65	72	-	%	-

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).

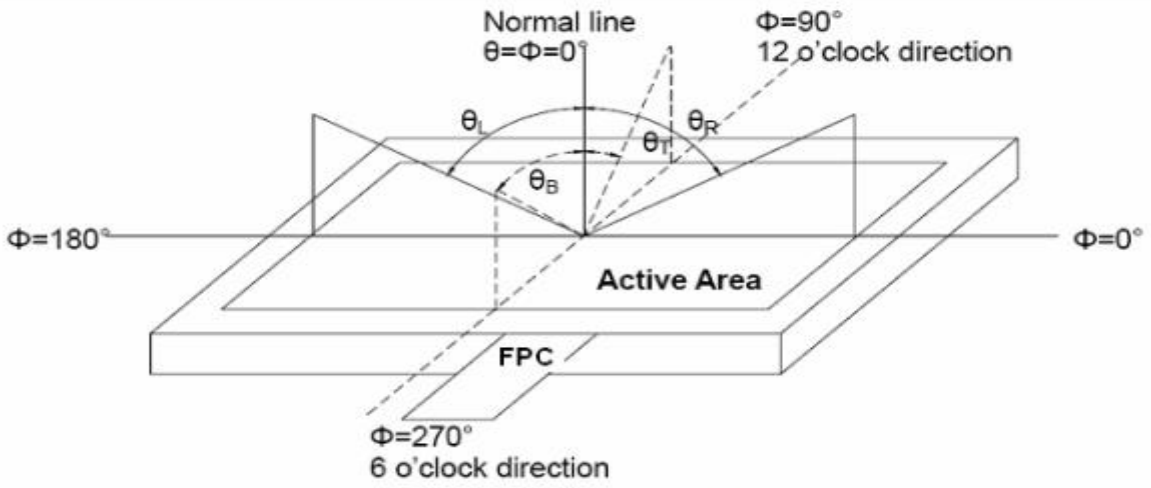


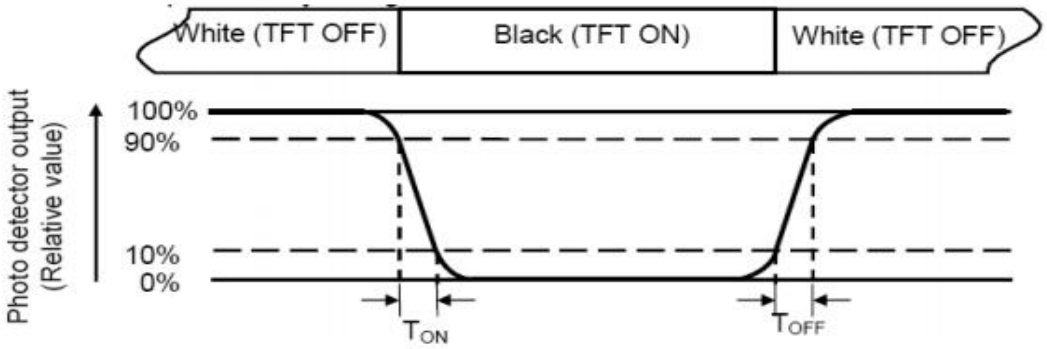
Fig. 1 Definition of viewing angle

Note 3: Definition of contrast ratio

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

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

The luminance uniformity in surface luminance is determined by measuring luminance at each test position 1 through n, and then dividing the maximum luminance of n points luminance by minimum luminance of n points luminance. For more information see FIG.2.

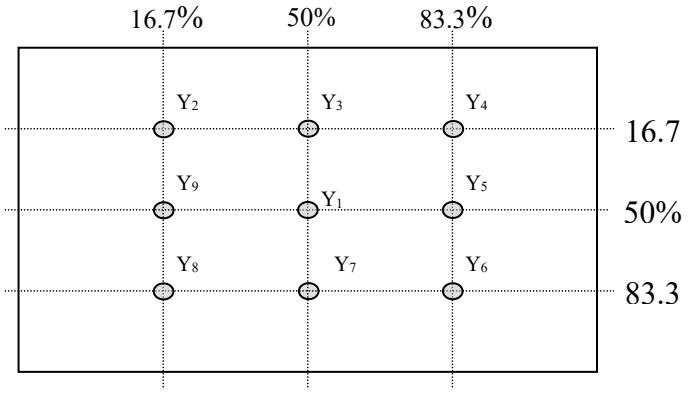


Fig. 2 Definition of points

Note 7:Definition of Luminance (Refer Fig. 2)

Surface luminance is the luminance with all pixels displaying white.

Lv = Average Surface Luminance with all white pixels(P1,P2,P3, ...,Pn).

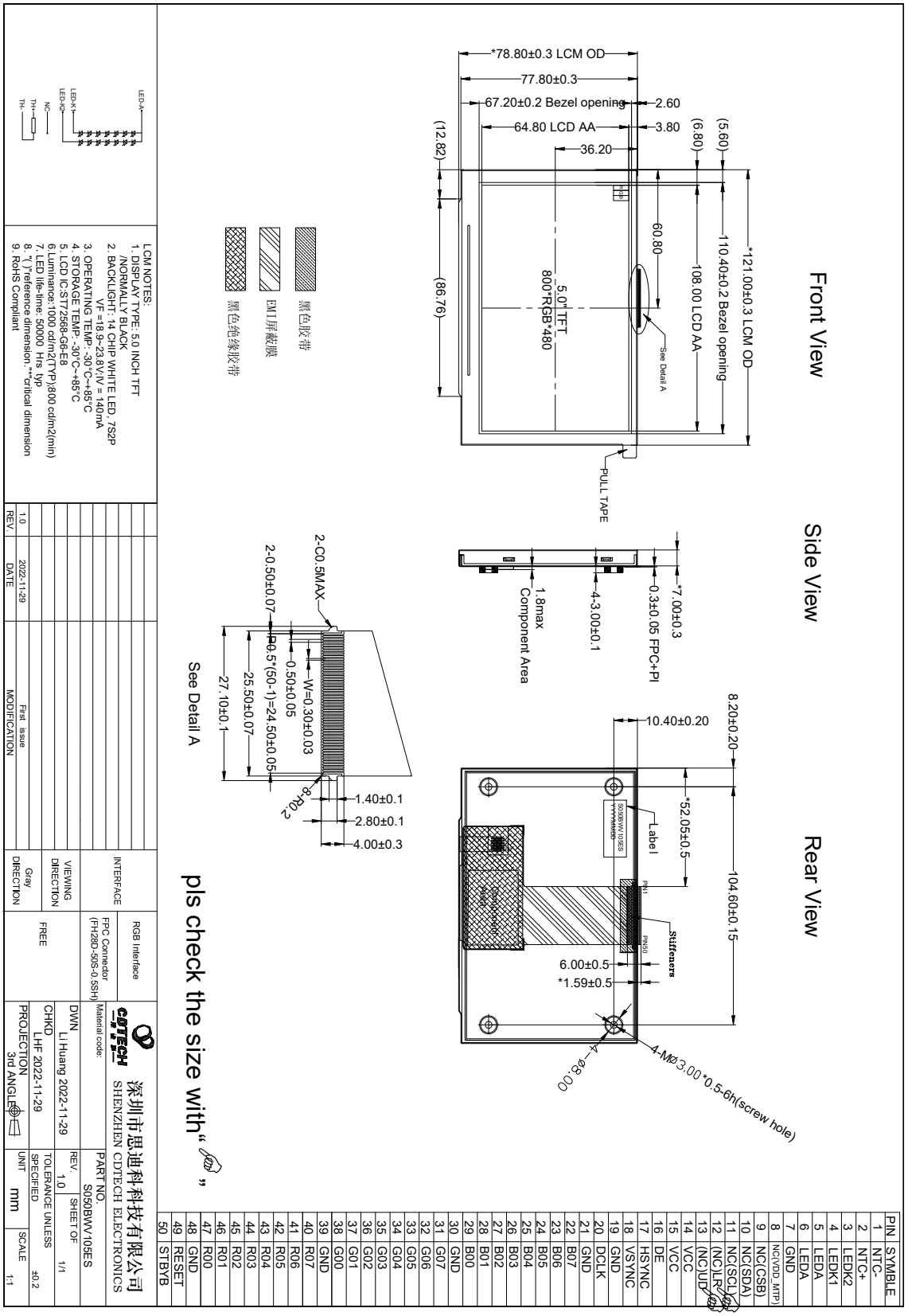
7. Reliability Test Items

Test Item	Test Conditions	
High Temperature Storage	Ta= +85℃	96hrs
Low Temperature Storage	Ta= -30℃	96hrs
High Temperature Operation	Ta= +85℃	96hrs
Low Temperature Operation	Ta= -30℃	96hrs
High Temperature and Humidity Storage	Ta= +60℃, 90% RH	96hrs
Thermal Shock (Non-operation)	-30℃/30 min ~ +85℃/30 min for 20 cycles Start with cold temperature end with high temperature	
Electro Static Discharge	Contact = ± 4 kV, class B Air = ± 8 kV, class B R=330Ω,C=150pF	
Vibration	Sweep: 10Hz~55Hz~10Hz Stroke: 1.5mm 2 hrs for each direction of X .Y. Z.	
Mechanical Shock	60G 6ms,±X,±Y,±Z 3 times for each direction	
Package Drop Test	Height: 60 cm 1 corner, 3 edges, 6 surfaces	

Notes: The test result shall be evaluated after the sample has been left at room temperature and humidity for 2 hours without load. No condensation shall be accepted. The sample will not be accepted if appear these defects:

1). Air bubble in the LCD
2). Seal leak or Glass crack
3). Non display or abnormal display
4). Brightness reduction >50%

8. Mechanical Drawing



PIN	SYMBLE
1	NTC-
2	NTC+
3	LEDK2
4	LEDK1
5	LEDA
6	LEDA
7	GND
8	NC(VDD_MTP)
9	NC(CSB)
10	NC(SDA)
11	NC(SCL)
12	(NC)LR
13	(NC)UD
14	VCC
15	VCC
16	DE
17	HSYNC
18	VSYNC
19	GND
20	DCLK
21	GND
22	B07
23	B06
24	B05
25	B04
26	B03
27	B02
28	B01
29	B00
30	GND
31	G07
32	G06
33	G05
34	G04
35	G03
36	G02
37	G01
38	G00
39	GND
40	R07
41	R06
42	R05
43	R04
44	R03
45	R02
46	R01
47	R00
48	GND
49	RESET
50	STBYB

LCM NOTES:
1. DISPLAY TYPE: 5.0 INCH TFT /NORMALLY BLACK
2. BACKLIGHT: 14 CHIP WHITE LED, 7S2P VF =18.9~23.8V,IV = 140mA
3. OPERATING TEMP: -30°C~+85°C
4. STORAGE TEMP: -30°C~+85°C
5. LCD IC:ST72568-G6-E8
6.Luminance:1000 cd/m2(TYP.)800 cd/m2(min)
7. LED life-time: 50000 Hrs typ
8. "( )"reference dimension."*"critical dimension
9. RoHS Compliant

REV.	DATE	MODIFICATION
1.0	2022-11-29	First issue

INTERFACE	RGB Interface
	FPC Connector (FH28D-50S-0.5SH)
VIEWING DIRECTION	FREE
Gray DIRECTION	

深圳市思迪科科技有限公司
SHENZHEN CDTECH ELECTRONICS

Material code:

DWN	Li Huang 2022-11-29	PART NO.	S050BWV105ES
CHKD	LHF 2022-11-29	REV. 1.0	SHEET OF 1/1
PROJECTION 3rd ANGLE		UNIT mm	TOLERANCE UNLESS SPECIFIED ±0.2
		SCALE 1:1	

9. Packing

TBD

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
- Ketene
- 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.