Chefree Technology Corp.

7.0” TFT-LCD Module
MODEL: CF070TLDLTN-001
(Complied with RoHS)

WVGA
LVDS interface

Version: P00

Customer : _____

Approved By : _____

Date: _____

CHEFREE		
APPROVAL	**CHECKER**	**PREPARE**
Tim	Mark	Benson

CONTENTS

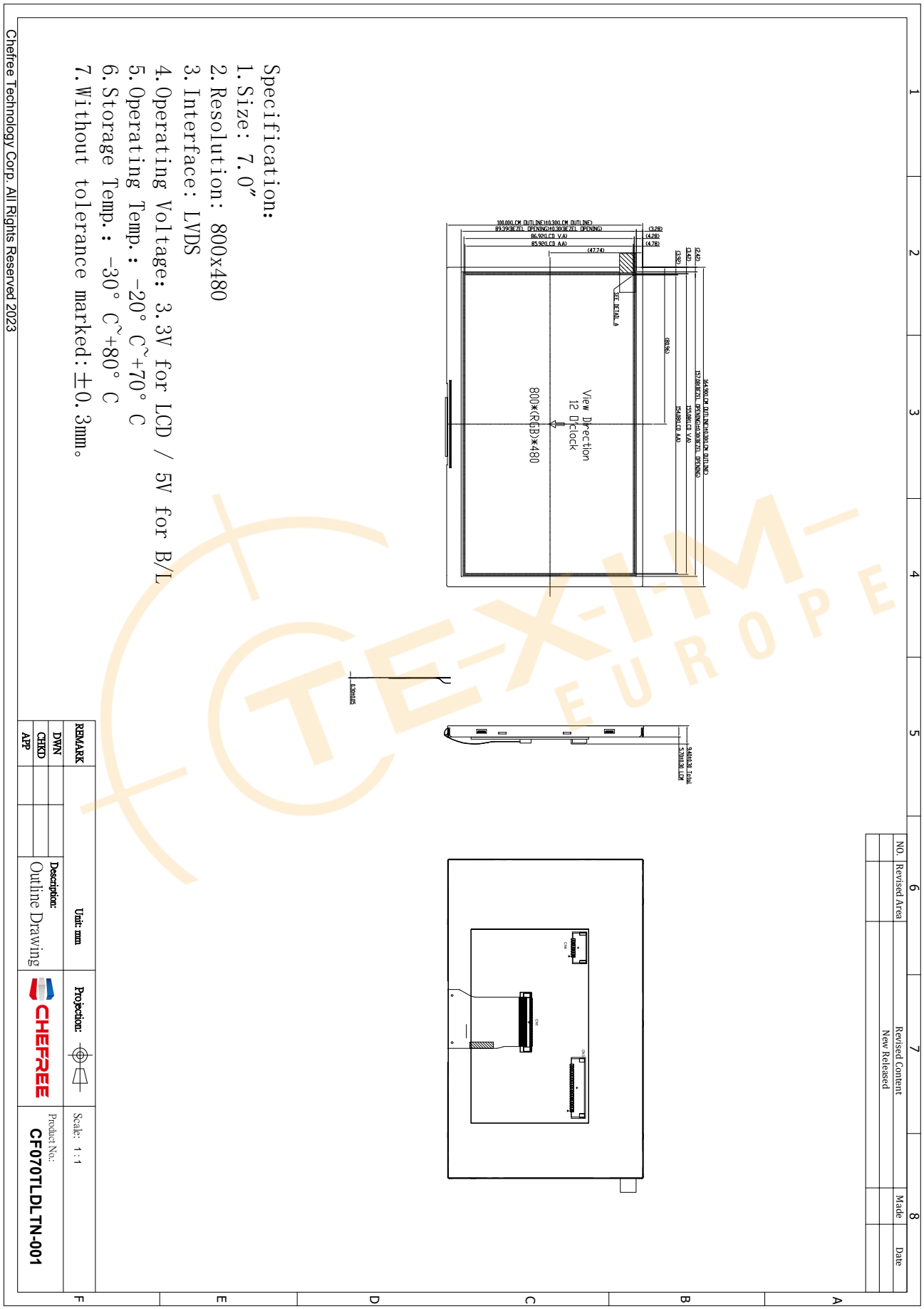
1. RECORD OF REVISION

Rev	DATE	PAGE	SUMMARY
P00	2023-02-09	ALL	First Release.

2. MECHANICAL SPECIFICATIONS

(1)	Number of Dots	800(R.G.B) x 480
(2)	Module Size(mm)	164.9(H) x 100.0(V) x 9.4(D)
(3)	Active Area(mm)	154.08(W) x 85.92(H)
(4)	Pixel Pitch(mm)	0.1926(H) x 0.179(V)
(5)	LCD Model	Normally Black
(6)	Backlight Color	White, LED
(7)	Viewing Direction	12 o'clock
(8)	Electrical Interface	LVDS Interface
(9)	Color Configuration	R.G.B. Vertical Stripe
(10)	Touch Panel Mode	Without PCAP
(11)	Module Weight(g)	TBD

3. OUTLINE DIMENSIONS



4. INTERFACE PIN CONNECTION

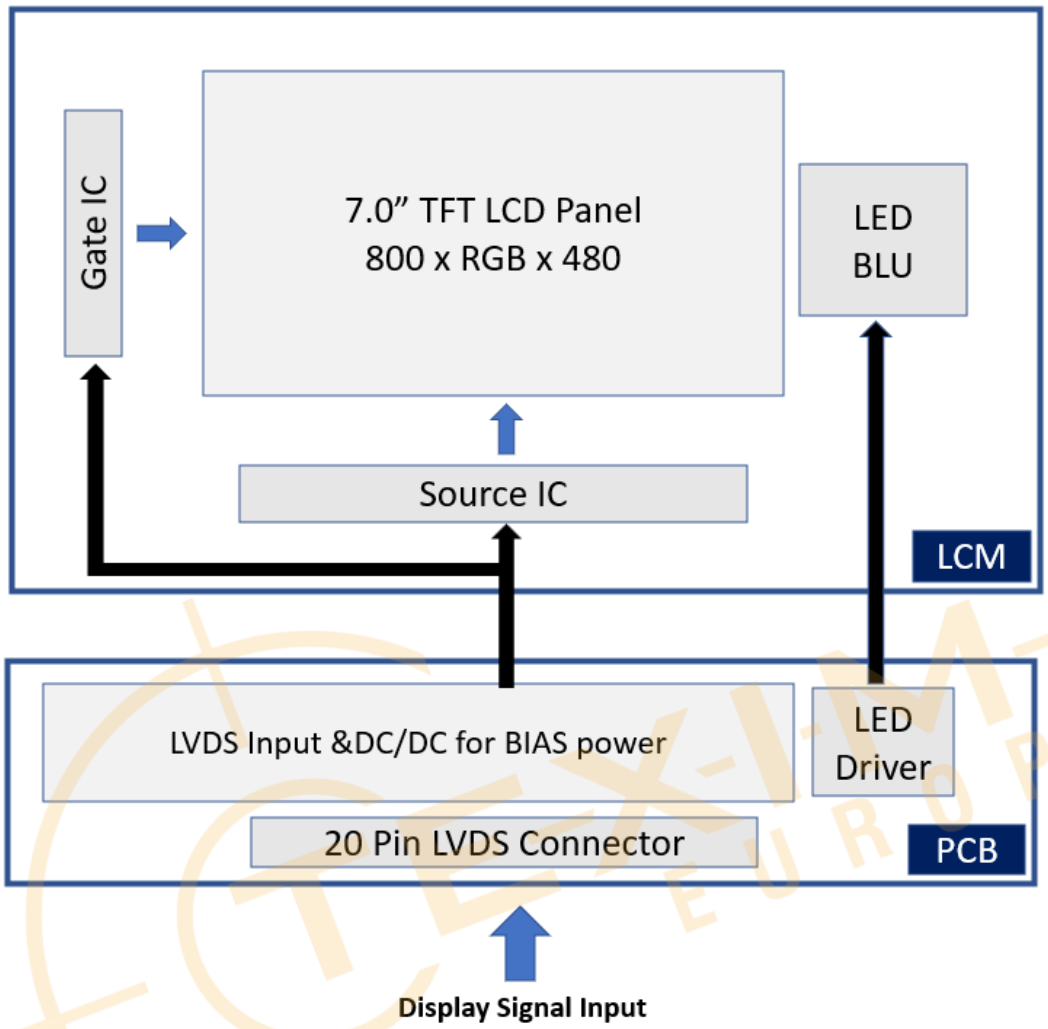
4.1 TFT LCM PANEL PIN DEFINE

Matching connector type: Hirose DF14-20S-1.25C or Equivalent

PIN NO.	Definition	I/O	Description	Remark
1	VDD	P	Power Supply for Digital Circuit	
2	VDD	P	Power Supply for Digital Circuit	
3	GND	P	Ground	
4	GND	P	Ground	
5	RxIN0-	I	Differential Data Input,CH0(Negative)	
6	RxIN0+	I	Differential Data Input,CH0(Positive)	
7	GND	P	Ground	
8	RxIN1-	I	Differential Data Input,CH1(Negative)	
9	RxIN1+	I	Differential Data Input,CH1(Positive)	
10	GND	P	Ground	
11	RxIN2-	I	Differential Data Input,CH2(Negative)	
12	RxIN2+	I	Differential Data Input,CH2(Positive)	
13	GND	P	Ground	
14	CKIN-	I	Differential Clock Input(Negative)	
15	CKIN+	I	Differential Clock Input(Positive)	
16	GND	P	Ground	
17	VLED	P	Power supply for LED circuit	
18	VLED	P	Power supply for LED circuit	
19	GND	P	Ground	
20	ADJ	I	Brightness Control for LED B/L	

Note：‘P’ stand for Power, ‘ I ‘ stand for Input

5. BLOCK DIAGRAM



6. ABSOLUTE MAXIMUM RATINGS

6.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
Power Supply Voltage	VDD	-0.3	4.0	V	
Backlight Supply Voltage	VLED	-0.3	6.0	V	
Power Voltage For CTP	-	-	-	V	

Note：The absolute maximum rating values of this product not allowed to be Exceeded at any times. Should be module be used with any of absolute maximum ratings exceeded. The characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

6.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
Operating Temperature	T_{op}	-20.0	70.0	℃	
Storage Temperature	T_{st}	-30.0	80.0	℃	
Relative Humidity (Note1)	RH	-	≤95	%	Ta≤40℃
		-	≤85	%	40℃＜Ta≤50℃
		-	≤55	%%	50℃＜Ta≤60℃
		-	≤36	%	60℃＜Ta≤70℃
		-	≤24	%	70℃＜Ta≤80℃
Absolute Humidity	AH	-	≤70	g/m³	Ta＞70℃

Note1: Ta means the ambient temperature. It is necessary to limit the relative humidity to the specified temperature range. Condensation on the module is not allowed.

7. ELECTRICAL CHARACTERISTICS

7.1 ELECTRICAL CHARACTERISTIC

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
Power Voltage For LCD	VDD	3.0	3.3	3.6	V	
	IDD	-	TBD	-	mA	
High Level Input Voltage	VIH	0.7VDD	-	VDD	V	
Low Level Input Voltage	VIL	GND	-	0.3VDD	V	

7.2 BACKLIGHT UNITS

Ta=25℃

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
LED Driving Voltage	VLED	4.7	5	5.3	V	
LED Driving Current	ILED	-	TBD	-	A	Note3
LED Life Tim	-	20000	-	-	Hrs	Note1
PWM Frequency	--	100	--	2000	Hz	

Note 1: The LED life time define as the estimated time to 50% degradation of initial luminous.
Note 2: Operating temperature 25℃,humidity 55%RH.
Note 3: The figures were in parentheses is calculated value. The sample measurement value will be updated without parenthesis.

7.3 CTP ELECTRICAL CHARACTERISTICS

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
Power Voltage For PCAP	VCC	-	-	-	V	

8. OPTICAL CHARACTERISTICS

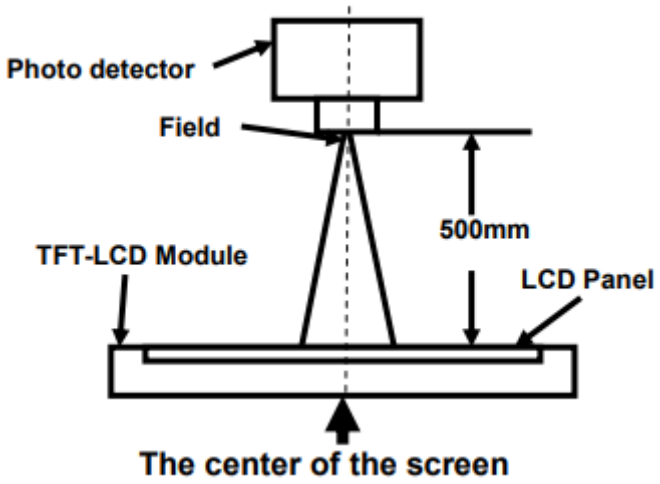
Ta=25℃

ITEM	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT	REMARK
Viewing Angle	θT	CR≧10	50	60	-	deg	Note2
	θB		60	70	-		
	θL		60	80	-		
	θR		60	80	-		
Response Time	TON	25℃°	-	25	-	msec	Note1 Note4
	TOFF						
Contrast Ratio	CR	θ=0°	600	800	-	-	Note1 Note3
Color Chromaticity	RX	Backlight is on	0.558	0.588	0.618		Note1 Note5
	RY		0.322	0.352	0.382		
	GX		0.318	0.348	0.378		
	GY		0.551	0.581	0.611		
	BX		0.120	0.150	0.180		
	BY		0.056	0.086	0.116		
	WX		0.231	0.281	0.331		
	WY		0.273	0.323	0.373		
Luminance	L		350	400	-	cd/m²	Note1 Note7
Luminance Uniformity	U		80	85	-	%	Note1 Note6
NTSC	-		65	72	-	%	Note5

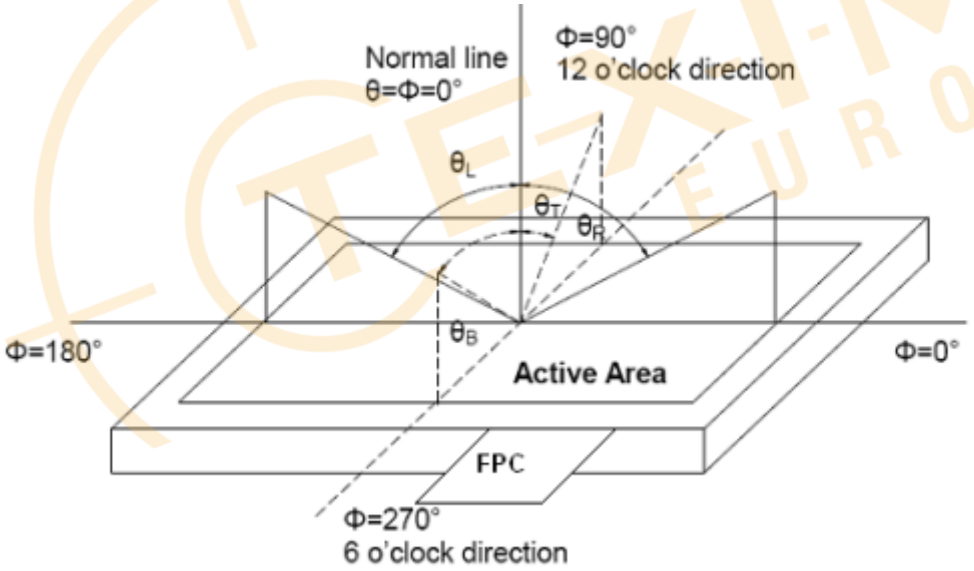
Test Conditions:

1. IF= 160 mA, VF=9.6 V and the ambient temperature is 25±2℃.humidity is 65±7%
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.



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)。



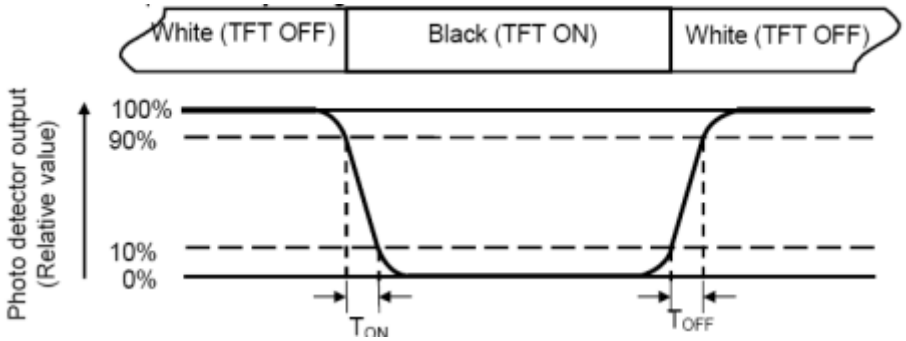
Note 3: Definition of contrast ratio

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

“White state “: The state is that the LCD should drive by Vwhite.
“Black state”: The state is that the LCD should drive 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)

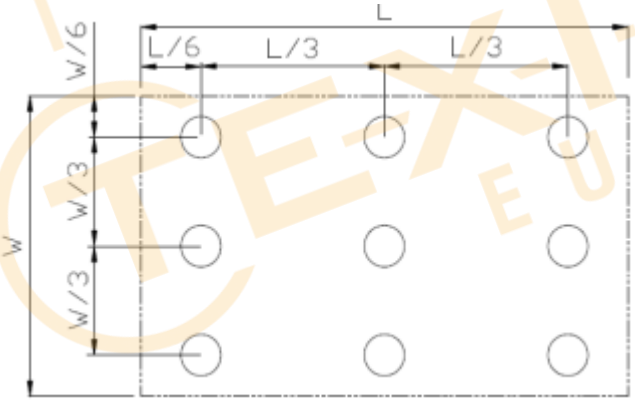
Color coordinates measured at center point of LCD.

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



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.

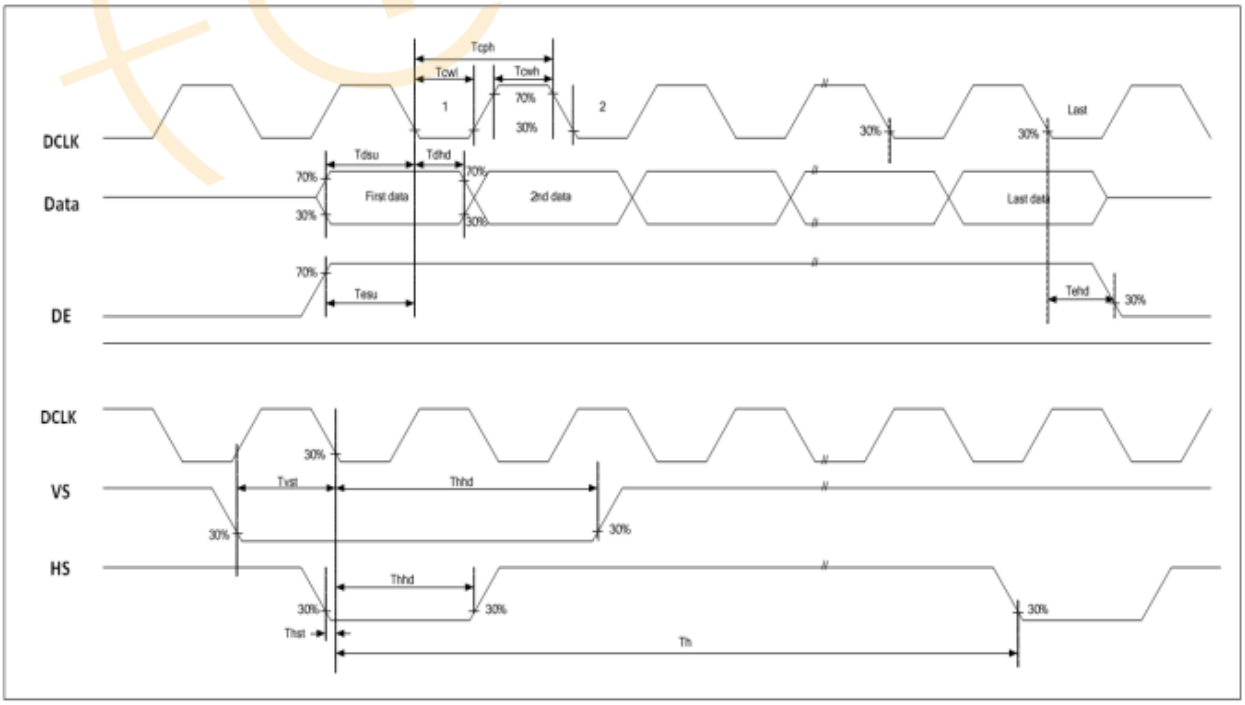
9. TIMING SPECIFICATIONS

9.1 TFT-LCD Input Timing

VCC=3.3V, GND=0V, Ta=25℃

Parameter	Symbol	Min.	Typ.	Max.	Unit
DCLK frequency	F_{clk}	28	30.0	40.0	MHz
DCLK cycle time	T_{cph}	25	33.3	36	ns
DCLK pulse width	T_{cw}	40%	50%	60%	T_{cph}
VS setup time	T_{vst}	8			ns
VS hold time	T_{vhd}	8	-	-	ns
HS setup time	T_{hst}	8			ns
HS hold time	T_{hhd}	8	-	-	ns
Data setup time	T_{dsu}	8			ns
Data hold time	T_{dhd}	8	-	-	ns
DE setup time	T_{esu}	8	-	-	ns
DE hold time	T_{ehd}	8	-	-	ns

Input Clock and Data timing Diagram:

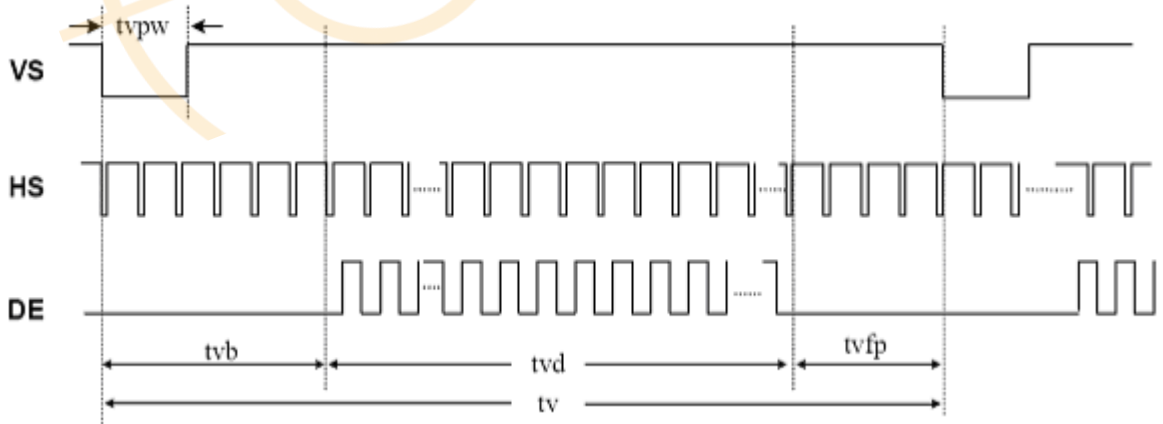


9.2 Recommended Timing Setting Of TCON

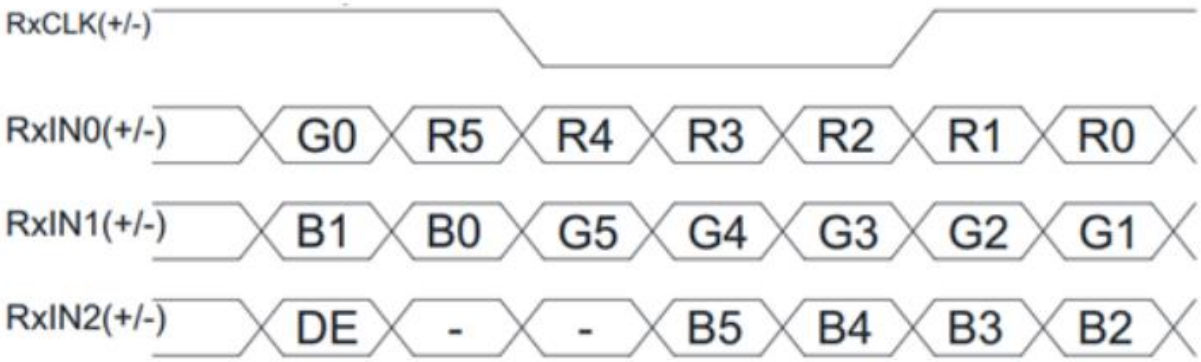
Parameter	Symbol	Min.	Typ.	Max.	Unit
DCLK	F_{clk}	28	30	40	MHZ
	t_{clk}	20	33.3	36	ns
HSD	t_h	862	1056	1200	t_{clk}
	t_{hd}	800	800	800	t_{clk}
	t_{hpw}	1	-	40	t_{clk}
	t_{hb}	46	46	46	t_{clk}
	t_{hfp}	16	210	354	t_{clk}
VSD	t_v	510	525	650	t_h
	t_{vd}	480	480	480	t_h
	t_{vpw}	1	3	20	t_h
	t_{vb}	23	23	23	t_h
	t_{vfp}	7	22	147	t_h

Note 1: DE timing refer to HS, VS input timing.

TCON Vertical Input Timing Diagram HV



9.3 The Input Data Format



Signal Name	Description	Remark
R5 R4 R3 R2 R1 R0	Red Data 5 Red Data 4 Red Data 3 Red Data 2 Red Data 1 Red Data 0	Red-pixel Data 6Bits LVDS input MSB：R5 ；LSB：R0
G5 G4 G3 G2 G1 G0	Green Data 5 Green Data 4 Green Data 3 Green Data 2 Green Data 1 Green Data 0	Green-pixel Data 6Bits LVDS input MSB：G5 ；LSB：G0
B5 B4 B3 B2 B1 B0	Blue Data 5 Blue Data 4 Blue Data 3 Blue Data 2 Blue Data 1 Blue Data 0	Blue -pixel Data 6Bits LVDS input MSB：B5 ；LSB：B0
RxCLK	LVDS Data Clock	
DE	Data Enable Signal	When the signal is high, the pixel shall be valid to be displayed.

10. RELIABILITY TEST

ENVIRONMENTAL TEST				
NO.	ITEM	CONDITIONS	TIME PERIOD	REMARK
1	High Temperature Storage	Ta= 80℃	240Hours	Note 1,3
2	Low Temperature Storage	Ta= -30℃	240Hours	Note 1,3
3	High Temperature Humidity Storage	60℃,90%RH	240Hours	Note 1,3
4	High Temperature Operation	Ts= 70℃	240Hours	Note 2,3
5	Low Temperature Operation	Ta= -20℃	240Hours	Note 1,3
6	Temperature Cycle	-30℃~+80℃	30min ， Change Time: 5min ， total 100cycle	Note 2,4

In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.

Note 1：Ta is the ambient temperature of samples.

Note 2：Ts is the temperature of panel's surface.

Note 3：Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

Note 4：Start with cold temperature and end with high temperature.

11. PRECAUTIONS FOR USE

11.1 SAFETY

(1) Do not swallow any liquid crystal, even if there is no proof that liquid crystal is poisonous.
(2) If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.
(3) If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.

11.2 STORAGE CONDITIONS

(1) Store the panel or module in a dark place where the temperature is 23±5°C and the humidity is below 50±20%RH.
(2) Store in anti-static electricity container.
(3) Store in clean environment, free from dust, active gas, and solvent.
(4) Do not place the module near organics solvents or corrosive gases.
(5) Do not crush, shake, or jolt the module.

11.3 HANDLING PRECAUTIONS

(1) Avoid static electricity which can damage the CMOS LSI.
(2) The polarizing plate of the display is very fragile. So, please handle it very carefully.
(3) Do not give external shock.
(4) Do not apply excessive force on the surface.
(5) Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the Surface of plate.
(6) Do not use ketonic solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.
(7) Do not operate it above the absolute maximum rating.
(8) Do not remove the panel or frame from the module.
(9) When the module is assembled, it should be attached to the system firmly, Be careful not to twist and bend the module.
(10) Wipe off water droplets or oil immediately . If you leave the droplets for a long time, staining and discoloration may occur.
(11) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, legs or clothes, it must be washed away thoroughly with soap.

11.4 WARRANTY

(1) Acceptance inspection period. The period is within one month after the arrival of contracted commodity at the buyer's factory site.
(2) Applicable warrant period. The period is within 12 months since the date of shipping out under normal using and storage conditions.

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