

LCD Module + Touch Panel Specifications

Customer:

Model Name:

MCTP070C90C-005

Date:

2017.10.24

Version:

V.0

☒ Preliminary Specification

☐ Final Specification

Customer Signature

Approved By	Comment

Approved By	Checked By	Prepared By
Carrio	Carrio	LXL

Record of Revision

[illegible]

Contents

1. General Description.....	4
2. Electrical Characteristics.....	6
3. Touch Panel Specifications.....	16
4. Optical Characteristics.....	18
5. Reliability Test Items.....	21
6. General Precautions.....	23
7. Mechanical Drawing.....	24
8. Packing Standard.....	25

1. GENERAL DESCRIPTION

1.1 Introduction

This specification applies to the 7 inch diagonal display module with touch panel .

1.2 Features

7 inch configuration

Compatible with NTSC & PAL system

Image Reversion: UP/DOWN and LEFT/RIGHT

Capacitive touch screen

ROHS design

1.3 General Information

Feature		SPEC
Display Spec	Size	7 inch
	Resolution	1024(H) x 3RGB x 600(V)
	Technology Type	a-si TFT
	Pixel Configuration	R.G.B. Vertical Stripe
	Pixel pitch(mm)	0.1506(H) x 0.1432(V)
	Display Mode	Normally black
	Surface Treatment	Anti-Glare , Surface hardness: 3H
	Viewing Direction	6 O'clock
	Gray Scale Inversion Direction	12 O'clock
Mechanical	OD (W*H*D)(mm)	202.3(H) x 196.75(W) x 6.1(D)
	Active Area	154.21(H) x 85.92(W)
	With/Without TP	With TP
	Matching Connection Type	TBD
	Weight(g)	330±5(g)
Electrical Characteristics	Interface	LVDS
	Color Depth	16.7M
	Driver IC	HX8282-A01 / HX8696-A
CTP	Interface	IIC
	Surface hardness	6H
	Structure	G+G
	Touch Method	Finger
	Active Area(mm)	119.18(H) x 90.12(V)

	Number of Simultaneous Touches	5
	Minimum Touch Area(mm)	0.5
	Finger Touch Pitch(mm)	2.5

2. ELECTRICAL CHARACTERISTICS

2.1 Typical operation conditions

Item	Symbol	Min	Typ	Max	Unit
Digital Supply Voltage	DVDD	3	3.3	3.6	V
Analog Supply Voltage	AVDD	9.4	9.6	9.8	V
Gate On Voltage	VDDG	17	18	19	V
Gate Off Voltage	VEEG	-6.6	-6	-5.4	V
Common Voltage	VCOM	-	3.4	-	Note 1
Operating Temperature	Topa	-20	70	°C	
Storage Temperature	Tstg	-30	80	°C	

Note 1: VCOM must be optimized according to each LCM. Be sure to use VR or OP buffer on VCOM output. Please adjust VCOM to make the flicker level be minimum for getting excellent image.

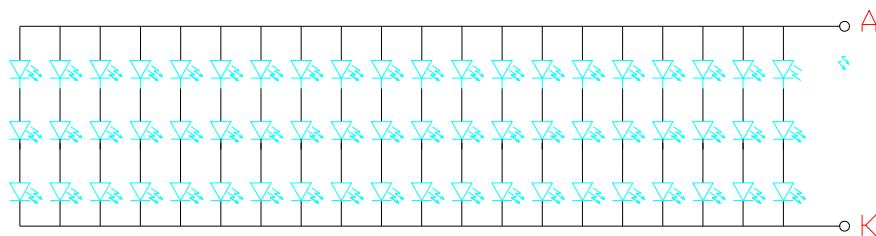
2.2 Back-light Unit:

Parameter	Symbol	MIN	TYP	MAX	Unit	CONDITION	Note
LED Current	IF	—	400	450	mA	Ta=25°C	1
LED Voltage	VF	8.4	9.6	10.5	V	Ta=25°C	1
Life Time		30K	50K	—	Hr	Ta=25°C	2

Note 1: LED supply voltage defined by an array of 20 branches of 3 diodes in series.

Note 2: Useful Life is defined as the time for the emitted luminance of the backlight to decline to 50% of its initial brightness.

Backlight LED Array



Circuit Diagram
3*20=60 EA

Stresses above those listed under "Absolute Maximum Rating" may cause permanent damage to the device.

2.1 Pin Assignment

Pin NO	SYMBOL	DESCRIPTION
1	V _{COM}	Common Voltage
2	V _{DD}	Power Voltage for Digital Circuit
3	V _{DD}	Power Voltage for Digital Circuit
4	NC	No Connection
5	Reset	Global Reset Pin
6	STBYB	Standby Mode, Normally Pulled High STBYB = "1", Normal Operation STBYB = "0", Timing Controller, Source driver will turn off, all output are High-Z
7	GND	Ground
8	RXIN0-	LVDS Differential Data Input -
9	RXIN0+	LVDS Differential Data Input +
10	GND	Ground
11	RXIN1-	LVDS Differential Data Input -
12	RXIN1+	LVDS Differential Data Input +
13	GND	Ground
14	RXIN2-	LVDS Differential Data Input -
15	RXIN2+	LVDS Differential Data Input +
16	GND	Ground
17	RXICKUN-	LVDS Differential Clock Input -
18	RXICKUN+	LVDS Differential Clock Input +
19	GND	Ground
20	RXIN3-	LVDS Differential Data Input -
21	RXIN3+	LVDS Differential Data Input +

22	GND	Ground
23	NC	No Connection
24	NC	No Connection
25	GND	Ground
26	NC	No Connection
27	DIMO	Backlight CABC Controller Signal Output
28	SELB	6bit/8bit Mode Select, SELB=L, 8bit mode, SELB=H, 6bit mode
29	AV _{DD}	Power for Analog Circuit
30	GND	Ground
31	LED-	LED Cathode
32	LED-	LED Cathode
33	L/R	Horizontal Inversion
34	U/D	Vertical Inversion
35	V _{GL}	Gate OFF Voltage
36	CABCEN1	CABC H/W Enable
37	CABCEN0	CABC H/W Enable
38	V _{GH}	Gate ON Voltage
39	LED+	LED Anode
40	LED+	LED Anode

Note 1: DE/SYNC mode select. Normally pull high.

When select DE mode, MODE="1", VS and HS must pull high.

When select SYNC mode, MODE= "0", DE must be grounded.

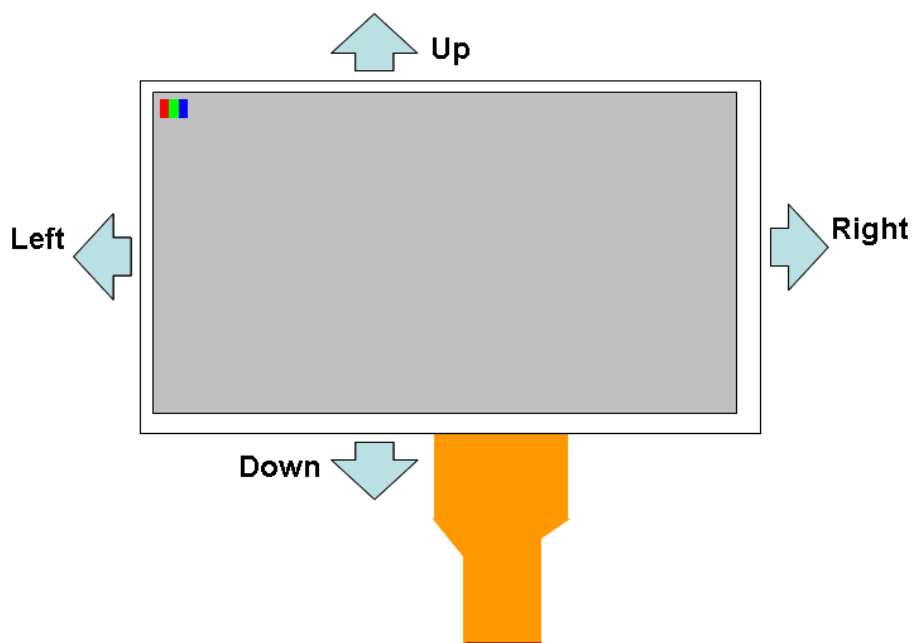
Note 2: When input 18 bits RGB data, the two low bits of R,G and B data must be grounded.

Note 3: Data shall be latched at the falling edge of DCLK.

Note 4: Selection of scanning mode

Setting of scan control input		Scanning direction
U/D	L/R	
GND	DVDD	Up to down, left to right
DVDD	GND	Down to up, right to left
GND	GND	Up to down, right to left
DVDD	DVDD	Down to up, left to right

Note 5: Definition of scanning direction.Refer to the figure as below:



2.4 Timing characteristics of input signals

- **DE mode**

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK Frequency	fclk	40.8	51.2	67.2	MHz
Horizontal Display Area	thd	1024			DCLK
HSD Period	th	1114	1344	1600	DCLK
HSD Blanking	thb+ thfp	90	320	376	DCLK
Vertical Display Area	tvd	600			T _H
VSD Period	tvbp	610	635	800	T _H
VSD Blanking	tvbp+ tvfp	10	35	200	T _H

DE mode (1024x600)

- **HV mode**

Horizontal timing

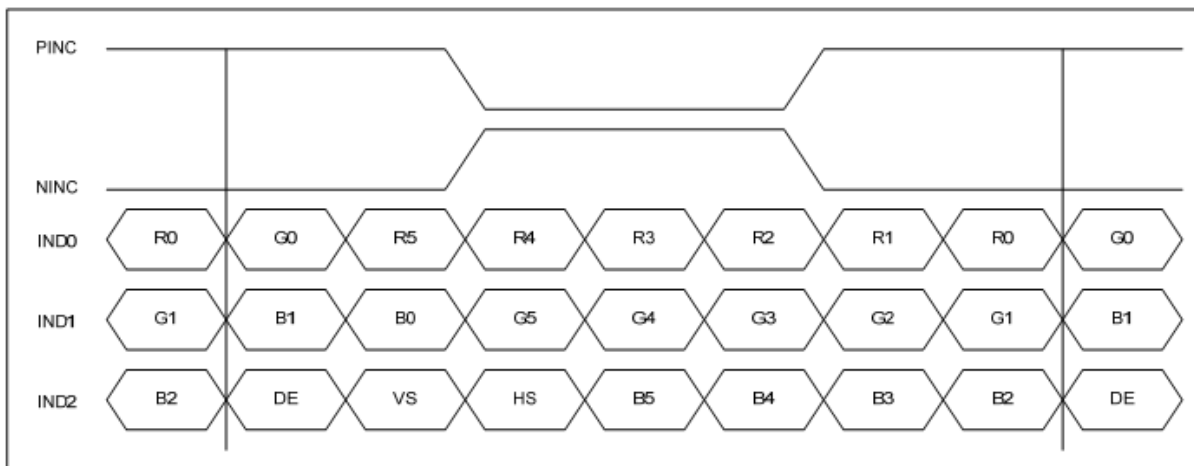
Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK Frequency	fclk	44.9	51.2	63	MHz
Horizontal Display Area	thd	1024			DCLK
HSD Period	th	1200	1344	1400	DCLK
HSD Pulse Width	thpw	1	-	140	DCLK
HSD Back Porch	thbp	160			DCLK
HSD Front Porch	thfp	16	160	216	DCLK

HV mode horizontal timing (1024x600)

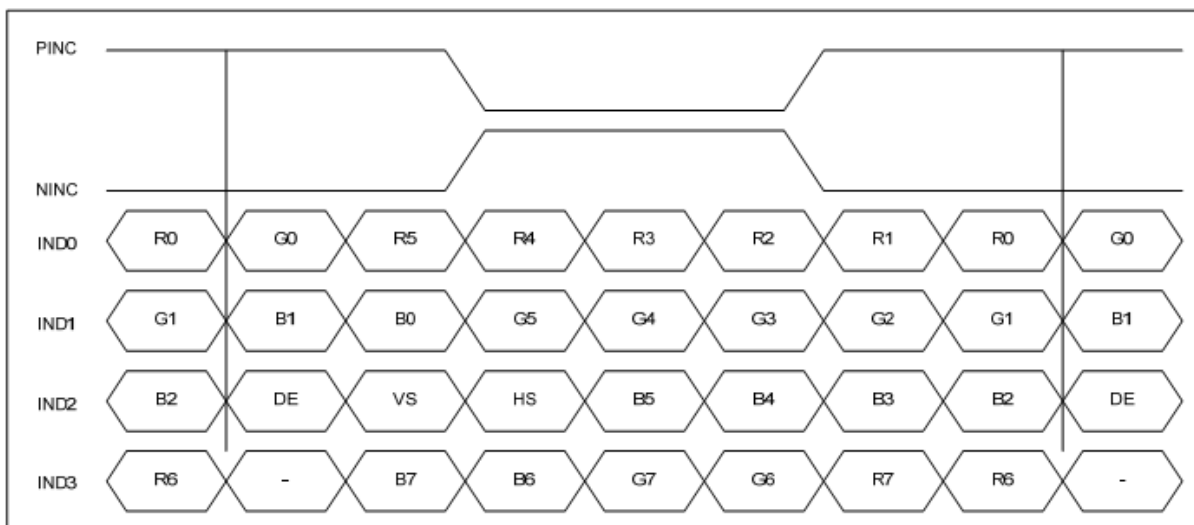
Vertical Timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Vertical Display Area	tvd	600			T _H
VSD Period	tv	624	635	750	T _H
VSD Pulse Width	tvpw	1	-	20	T _H
VSD Back Porch	tvbp	23			T _H
VSD Front Porch	tvfp	1	12	127	T _H

HV Mode Vertical Timing (1024x600)



6-bit LVDS input



8-bit LVDS Input

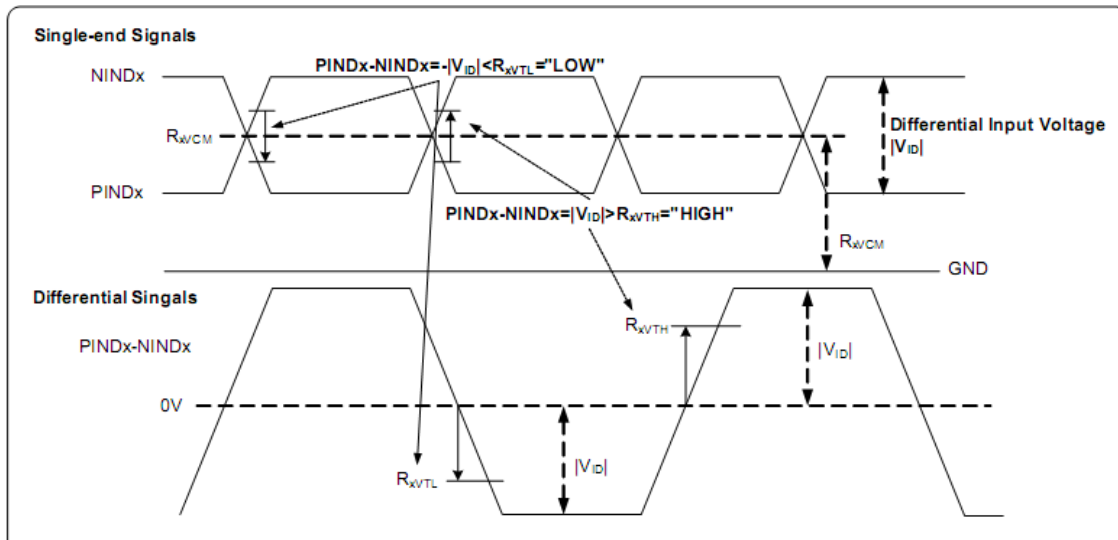
2.5. DC Electrical Characteristics

DC Characteristics

(TA = -20 to 85°C, VDD = 2.3 to 3.6V, AVDD = 8 to 13.5V, GND = AGND = GND_LVDS = 0V)

Parameter	Symbol	Spec.			Unit	Condition
		Min.	Typ.	Max.		
Differential input high Threshold voltage	R_{XVTH}	-	-	+0.1	V	$R_{XVCM}=1.2V$
Differential input low threshold voltage	R_{XVTL}	-0.1	-	-	V	
Input voltage range (singled-end)	R_{XVIN}	0	-	$VDD-1.2+ V_{ID} /2$	V	-
Differential input common Mode voltage	R_{XVCM}	$ V_{ID} /2$	-	$VDD-1.2$	V	-
Differential input voltage	$ V_{ID} $	0.2	-	0.6	V	-
Differential input leakage Current	R_{VXIZ}	-10	-	+10	μA	-
LVDS Digital Operating Current	I_{ddlvds}	-	15	30	mA	Fclk=65MHz, VDD=3.3V
LVDS Digital Stand-by Current	I_{stlvds}	-	10	50	μA	Clock & all Functions are stopped

Table 9.3: LVDS mode DC electrical characteristics



2.6 Power Sequence

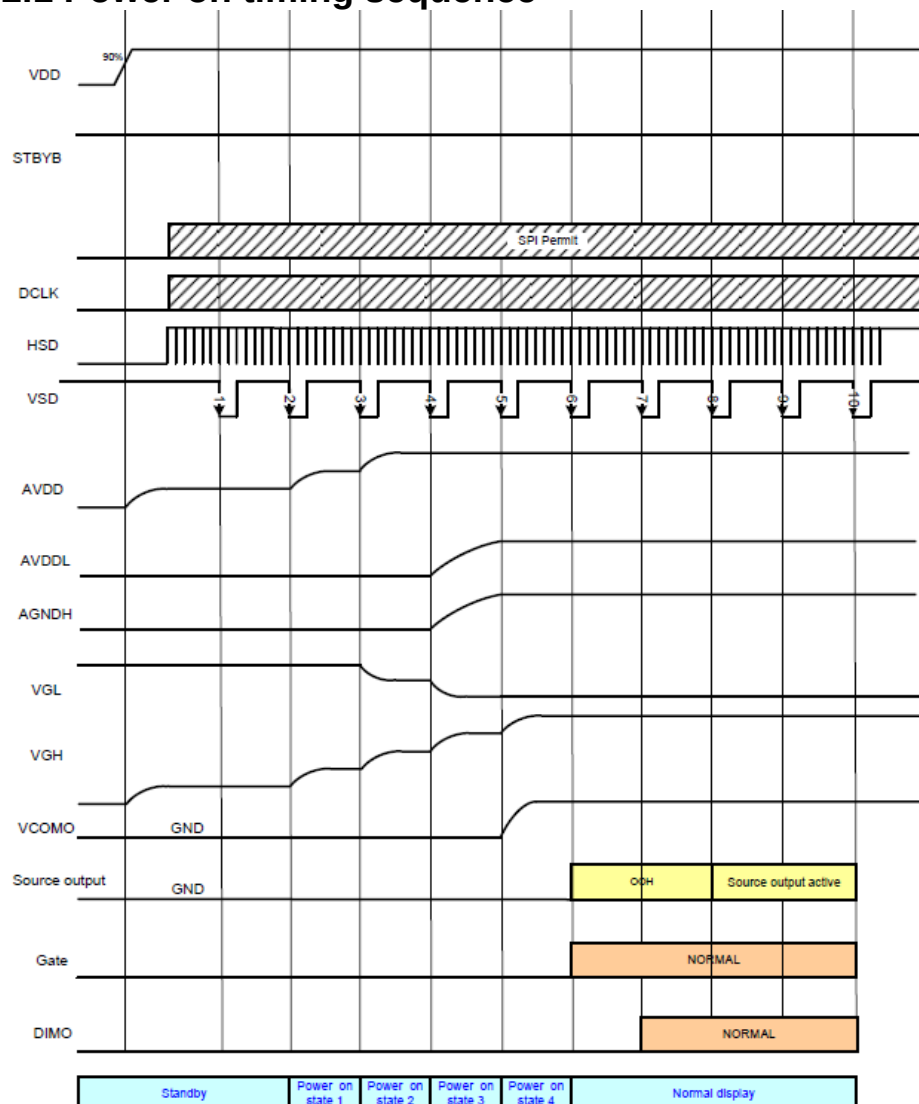
2.6.1 LVDS mode AC electrical Characteristics

In order to prevent IC from power on reset fail, the rising time(TPOR) of the digital power supply VDD should be maintained within the given specifications. Refer to “LVDS mode AC electrical Characteristics” for more detail on timing.

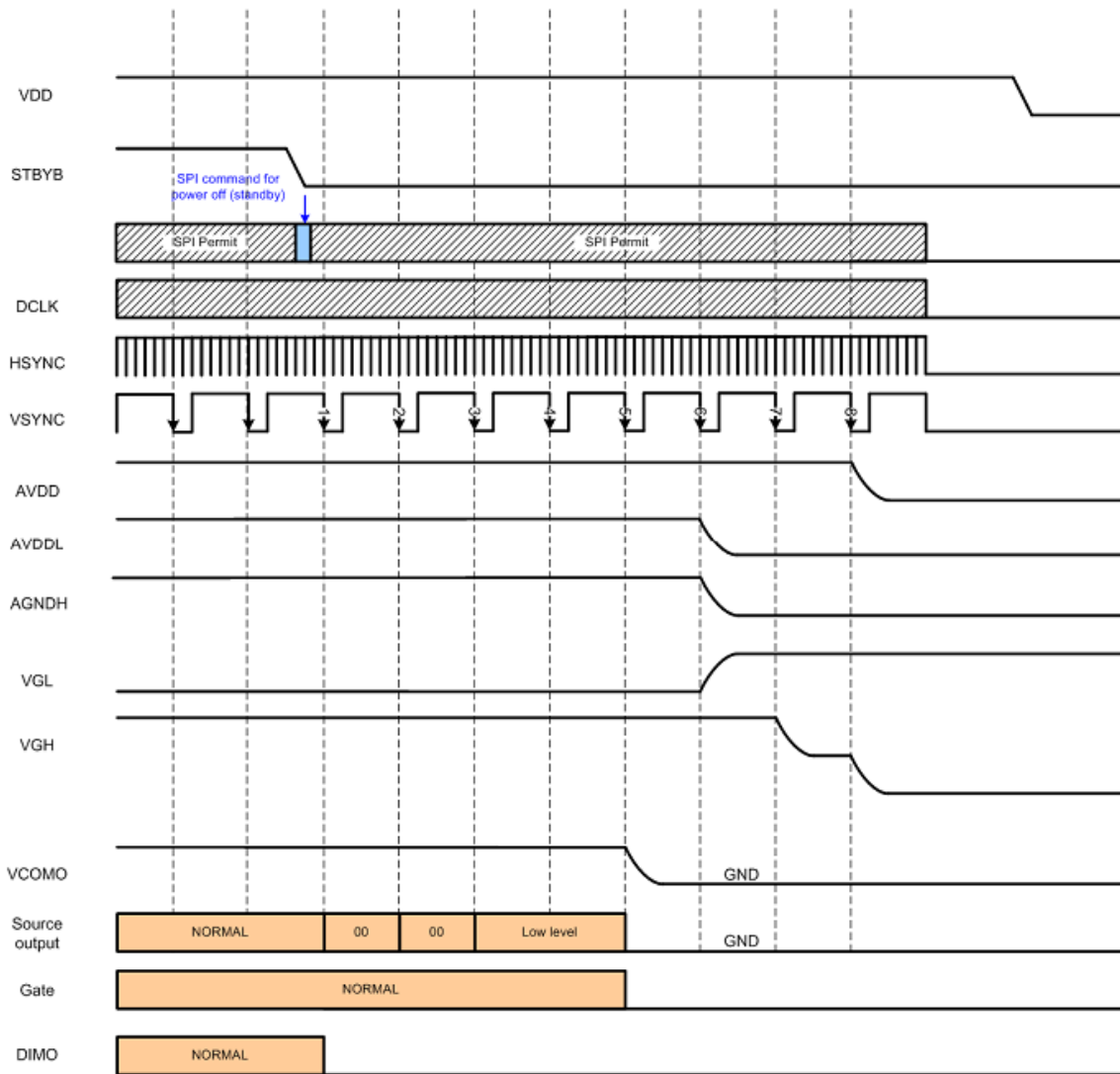
Parameter	Symbol	Spec.			Unit	Condition
		Min.	Typ.	Max.		
Clock frequency	R _{XFCLK}	20	-	71	MHz	-
Input data skew margin	T _{RSKM}	500	-	-	pS	V _{ID} =400mV R _{XVCM} =1.2V R _{XFCLK} =71MHz
Clock high time	T _{LVCH}	-	4/(7* R _{XFCLK})	-	ns	-
Clock low time	T _{LVCL}	-	3/(7* R _{XFCLK})	-	ns	-
PLL wake-up time	T _{emPLL}	-	-	150	μs	-

2.6.2. Power ON/OFF timing sequence

2.6.2.1 Power on timing sequence



2.6.2.2 Power off timing sequence



3. Touch panel specifications

3.1 General Specification

Item	Contents	Unit
Outline Dimension	202.3*196.75*2.7	mm
Active Area(W*L)	91.05 *156.00	mm
View Area	87.00 *155.00	mm
TP size (inch)	7	inch
Interface Type	IIC	-
Drive IC	SSD2543QN4	-
Number of touch point	5	-
Sensor thickness	0.55	mm
Cover lens thickness	2.0	mm
Resolution	>100 dpi	-
Input force	<10g	-
Surface hardness	> 6H	-

3.2 Electrical Characteristic

Item	Specification			
Insulation	20M or over(Dc 25V)			
Supply voltage for logic	min	type	max	unit
	2.7		3.3	V
Normal mode		8	14.5	mA
Current consumption(Green mode)		3.3		mA
Current consumption(Sleep mode)	70		120	uA
Doze mode		0.78		mV

Remark: The actual power consumption according to using environmental decision.

3.3 Optical Characteristics

Item	Specification	Remarks
Light Transmittance	≥85%	550nm

3.4 Touch panel pin assignment

Pin	Signal	Description
1	VDD-3.3V	Supply voltage
2	GND	Ground
3	SCL	I2C Serial Clock
4	SDA	I2C Serial Data
5	INT	External interrupt INT to the host, It is active low when finger touching on the screen.
6	RST	External reset

4. OPTICAL CHARACTERISTICS

Item		Symbol	condition	Min	Typ	Max	Unit	Note
Luminous instensity		LV		800	900	-	cd/m ²	
Contrast		CR		600	800	-		
Response time		Tr+Tf			25	40	ms	
NTSC				-	50	-	%	
Color chromaticity (CIE1931)	White	Wx	θ=0 Normal viewing angle	0.273	0.313	0.353		
		Wy		0.289	0.329	0.369		
	Red	Rx		0.566	0.606	0.646		
		Ry		0.285	0.325	0.365		
	Green	Gx		0.263	0.303	0.343		
		Gy		0.527	0.567	0.607		
	Blue	Bx		0.107	0.147	0.187		
		By		0.121	0.161	0.201		
Viewing angle	Hor	θL	CR>10	80	85	-		
		θR		80	85	-		
	Ver	θU		80	85	-		
		θD		80	85	-		
Luminance Uniformity		YU	θ=0	70	-	-	%	
View Direction		ALL (Max.Contrast,Gray level inversion)						

4.1 Measuring Condition]

- Measuring surrounding : dark room
- Ambient temperature : $25 \pm 2^\circ\text{C}$
- 30min. warm-up time.

4.2 Measuring Equipment

- TOPCON BM-5A
 - Measuring spot size : field 1°
- Note 1: Definition of viewing angle range

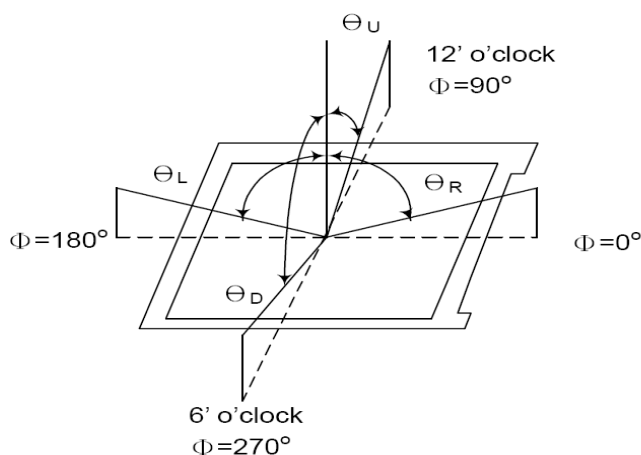


Fig. 4-1 Definition of viewing angle

Note 2: Definition of optical measurement system. The optical characteristics should be measured in dark room. After 30 minutes operation, the optical properties are measured at the center point of the LCD screen. (Response time is measured by Photo detector TOPCON BM-5, other items are measured by BM-5A/Field of view: 1° /Height: 50cm.)

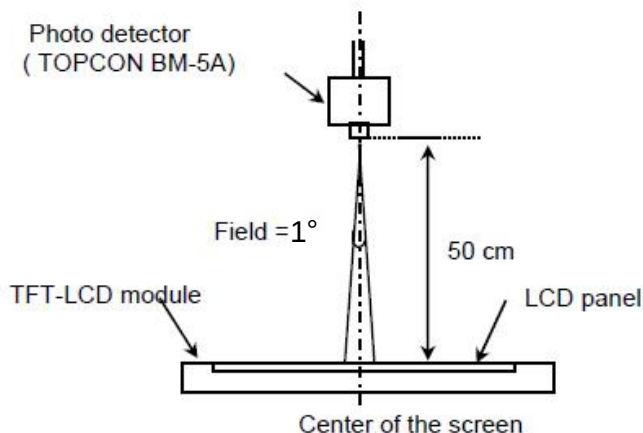


Fig. 4-2 Optical measurement system setup

Note 3: Definition of Response time The output signals of photo detector are measured when the input signals are changed from “black” to “white” (rising time) and from “white” to “black” (falling time), respectively. The response time is defined as the time interval between the 10% and 90% of amplitudes. Refer to figure as below

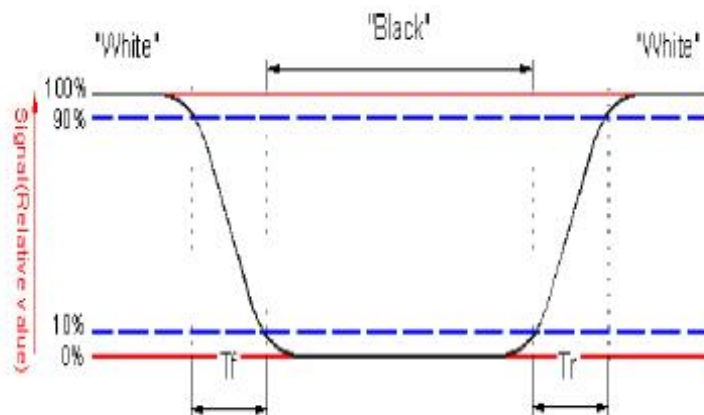


Fig. 4-3 Definition of response time

Note 4: Definition of contrast ratio:

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

Note 5: Definition of color chromaticity (CIE1931) Color coordinates measured at center point of LCD.

Note 6: All input terminals LCD panel must be ground while measuring the center area of the panel. The LED driving condition is $I_L = 400 \text{ mA}$.

Note 7: Definition of Luminance Uniformity Active area is divided into 9 measuring areas 【Refer to Fig.4-4】. Every measuring point is placed at the center of each measuring area.

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

$B_{\min}$: The measured minimum luminance of all measurement position.

$B_{\max}$: The measured maximum luminance of all measurement position.

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

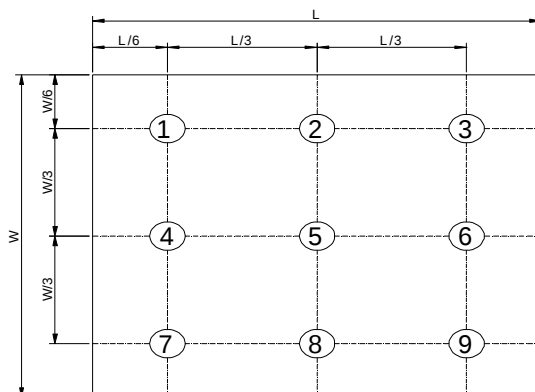


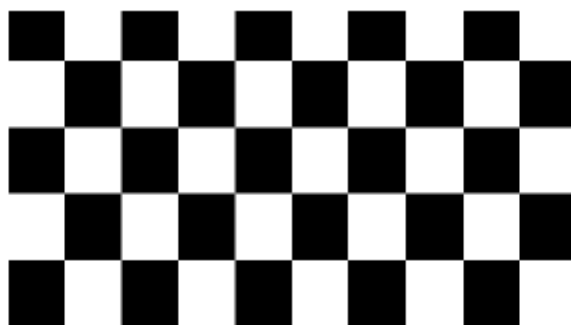
Fig. 4-4 Definition of measuring points

5. RELIABILITY TEST ITEMS

NO.	Test Item	Test Conditions	Remark
1	High Temperature Storage	Ta = 80°C 240hrs	Note 1, Note 4
2	Low Temperature Storage	Ta = -30°C 240hrs	Note 1, Note 4
3	High Temperature Operation	Ts = 70°C 240hrs	Note 2, Note 4
4	Low Temperature Operation	Ta = -20°C 240hrs	Note 1, Note 4
5	Operate at High Temperature and Humidity	+60°C, 90%RH 240hrs	Note 4
6	Thermal Shock	-20°C/30 min ~ +60°C/30 min for a total 200 cycles, Start with cold temperature and end with high temperature.	NON- Operation
7	Mechanical Shock	100G 6ms,±X, ±Y, ±Z 3 times for each direction	NON- Operation
8	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. (8 hours for total)	NON- Operation

Note1:Condition of image Sticking test:25°C ± 2°C

Operation with test pattern sustained for 4 hrs, then change to gray pattern immediately. After 5 mins, the mura will be disappeared completely.



(a)Test Pattern(chess board Pattern)



(b)Gray Pattern

Note 2: Ta is the ambient temperature of samples.

Note 3: Ts is the temperature of panel's surface.

Note 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 5: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

Electrostatic Discharge

TEST ITEM	CONFITIONS	NOTE
ESD	150Pf,330 Ω 8kV& $\pm$ 15kV air& contact test	1
	200Pf,0 Ω , $\pm$ 200V contact test	2

Note: Measure point:

- 1.LCD glass and metal bezel
- 2.IF connector pins

6. General Precautions

6.1 Safety

Liquid crystal is poisonous. Do not put it in your mouth. If liquid crystal touches your skin or clothes, wash it off immediately by using soap and water.

6.2 Handling

- (1). The LCD panel is plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.
- (2). The polarizer attached to the display is easily damaged. Please handle it carefully to avoid scratch or other damages.
- (3). To avoid contamination on the display surface, do not touch the module surface with bare hands.
- (4). Keep a space so that the LCD panels do not touch other components.
- (5). Put cover board such as acrylic board on the surface of LCD panel to protect panel from damages.
- (6). Transparent electrodes may be disconnected if you use the LCD panel under environmental conditions where the condensation of dew occurs.
- (7). Do not leave module in direct sunlight to avoid malfunction of the ICs.

6.3 Static Electricity

- (1). Be sure to ground module before turning on power or operating module.
- (2). Do not apply voltage which exceeds the absolute maximum rating value.

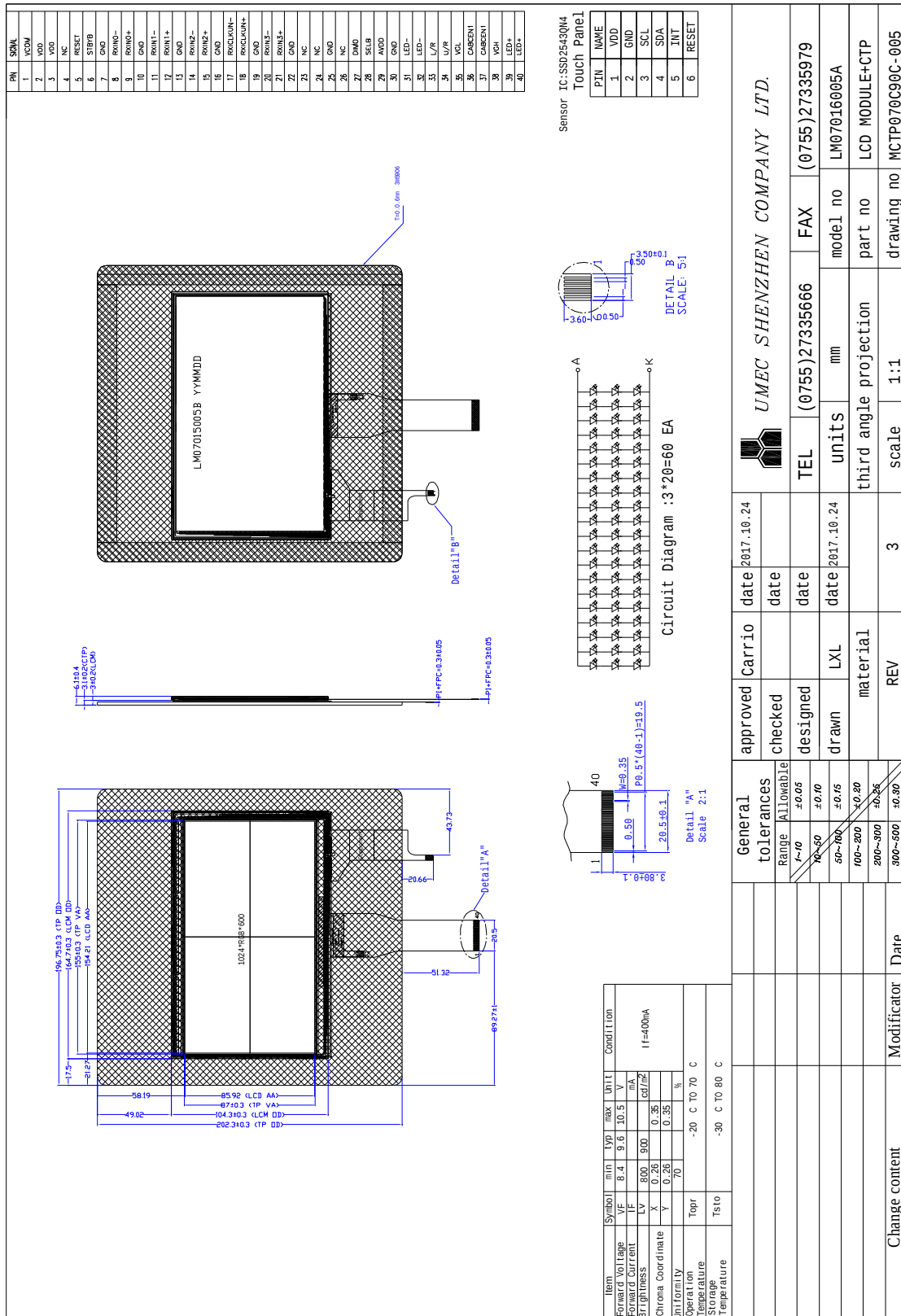
6.4 Storage

- (1). Store the module in a dark room where must keep at $25\pm 10^{\circ}\text{C}$ and 65%RH or less.
- (2). Do not store the module in surroundings containing organic solvent or corrosive gas.
- (3). Store the module in an anti-electrostatic container or bag.

6.5 Cleaning

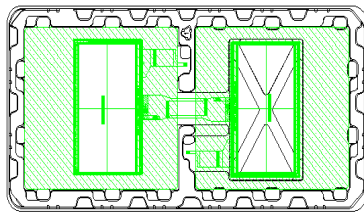
- (1). Do not wipe the polarizer with dry cloth. It might cause scratch.
- (2). only use a soft cloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.

7. MECHANICAL DRAWING



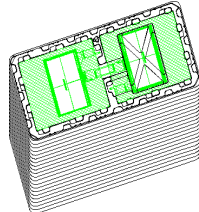
8. Packing Standard

Step1

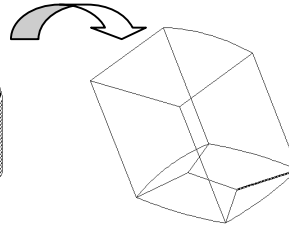


2PCS Product 1Tray

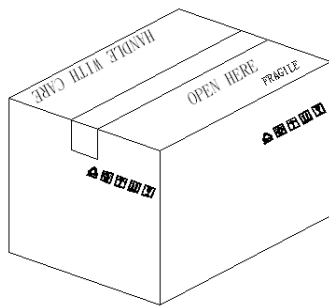
Step2



40PCS Product 1PE bag

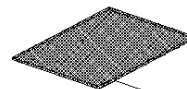


Step4



40PCS Product 1 Outer Box

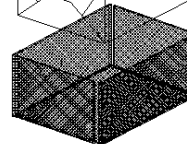
Step3



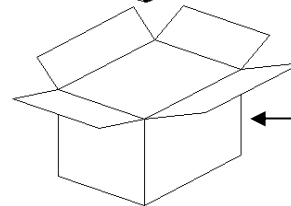
EPE Protect Sheet



EPE Protect Sheet

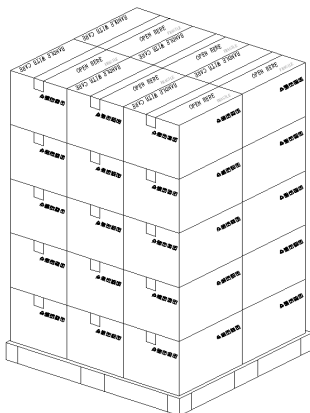


EPE Protect Sheet



Outer Box

Step5



The carton size is L525*W285*H277mm, and the pallet is L1200*W1000*H150mm. Each pallet packs 30 cartons (6layers) and each layer is including 5 cartons. The size of packed pallet is L1200*W1000*H1535mm, There are 40pcs in a carton