深圳市拓普微科技开发有限公司
SHENZHEN TOPWAY TECHNOLOGY CO., LTD.

LMT070DICFWD-NAA

LCD Module User Manual

Prepared by:	Checked by:	Approved by:
HT LIU		
Date: 2016-04-05	Date:	Date:

Rev.	Descriptions	Release Date
0.1	Preliminary release	2010-11-16
0.2	Update Jumper Setting	2010-11-18
0.3	Typing Correction in General Spec	2010-12-27
0.4	Typing Correction in General Spec	2011-05-13
0.5	Refine 7.1 Timing Characteristics	2012-02-09
0.6	Add 6.2 Touch panel Characteristics Details	2013-01-10
0.7	Typing Correction	2016-4-6

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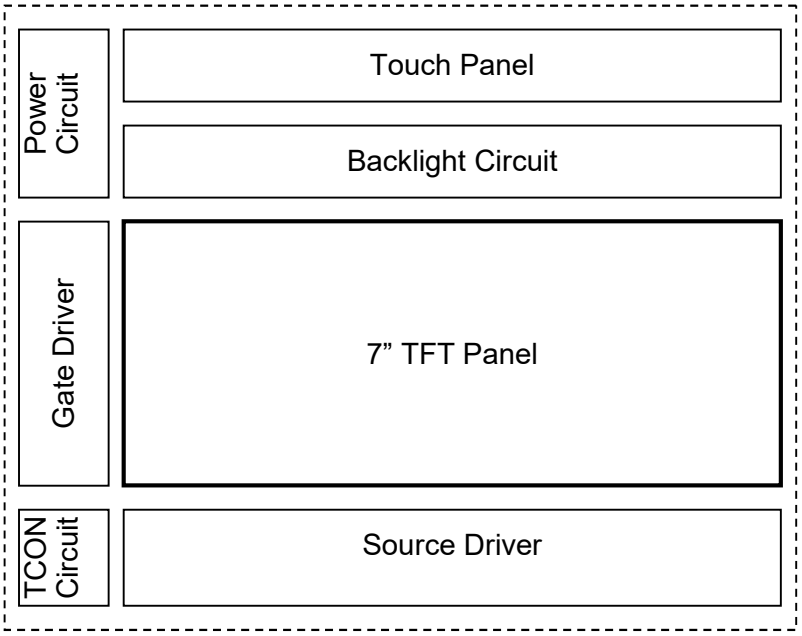
1. Applications

This Module is designed for application which require high quality flat panel displays. It is also a good substitute for many outmoded CSTN module in the industrial application.

2. General Specification

Signal Interface :	Digital 24-bits RGB
Display Technology :	a-Si TFT active matrix
Display Mode :	Transmissive / Normal White
Screen Size(Diagonal) :	7.0”
Outline Dimension :	190.0 x 112.0 x 13.4 (mm) (see attached drawing for details)
Active Area :	154.08 x 85.92 (mm)
Number of dots :	800 x 3 (RGB) x 480
Pixel Pitch :	0.0642 x 0.179 (mm)
Pixel Configuration :	RGB Stripe
Backlight :	LED
Surface Treatment :	Anti-Glare Treatment
Viewing Direction :	6 o’clock
Touch Panel:	4wire resistive
Operating Temperature :	-20 ~ +70°C
Storage Temperature :	-30 ~ +80°C

3. Block Diagram



4. Terminal Function

K2 Pin No.	Pin Name	I/O	Descriptions	
			DE Mode <default>	Sync Mode
1	VCC	Power	Positive Power Supply	
2	VCC			
3	B0	Input	Blue Data	
:	:			
10	B7			
11	GND	Power	Power Supply GND (0V)	
12	G0	Input	Green Data	
:	:			
19	G7			
20	GND	Power	Power Supply GND (0V)	
21	R0	Input	Red Data	
:	:			
28	R7			
29	GND	Power	Power Supply GND (0V)	
30	LED_ADJ	Input	LED driver enable control	
31	NC	--	No connection, leave open	
32	NC	--	No connection, leave open	
33	DE	Input	DE Signal Input	Pull Lo
34	VS	Input	Pull Hi	Vertical Sync Input
35	HS	Input	Pull Hi	Horizontal Sync Input
36	DCLK	Input	Data Clock Input Data shall be latched at the falling edge of DCLK.	
37	TSXM	Passive	Touch Screen X- terminal	
38	TSXP	Passive	Touch Screen X+ terminal	
39	TXYM	Passive	Touch Screen Y- terminal	
40	TSYP	Passive	Touch Screen Y+ terminal	

Jumper Setting

JP1	JP2	JP3	JP4	JP5	JP6	JP7	JP8	Function Descriptions
CLOSE	**OPEN**	-	-	-	-	-	-	DE MODE <default>
OPEN	CLOSE	-	-	-	-	-	-	SYNC MODE
-	-	**CLOSE**	**OPEN**	**OPEN**	**CLOSE**	-	-	Up to down, left to right <default>
-	-	OPEN	CLOSE	CLOSE	OPEN	-	-	Down to up, right to left
-	-	OPEN	CLOSE	OPEN	CLOSE	-	-	Up to down, right to left
-	-	CLOSE	OPEN	CLOSE	OPEN	-	-	Down to up, left to right
-	-	-	-	-	-	**CLOSE**	**OPEN**	Disable internal dithering function <default>
-	-	-	-	-	-	OPEN	CLOSE	Enable internal dithering function

Note:
* 1. When select DE mode, MODE="1", VS and HS must pull high.
When select SYNC mode, MODE= "0", DE must be grounded.

5. Absolute Maximum Ratings

Items	Symbol	Min.	Max.	Unit	Condition
Power Supply voltage	V_{CC}	-0.3	6.0	V	
Operating Temperature	T_{OP}	-20	70	°C	No Condensation
Storage Temperature	T_{ST}	-30	80	°C	No Condensation

Note:
*1. This rating applies to all parts of the module. And should not be exceeded.
*2. The operating temperature only guarantees operation of the circuit. The contrast, response speed, and the other specification related to electro-optical display quality is determined at the room temperature, T_{OP}=25.
*3. Ambient temperature when the backlight is lit (reference value)
*4. Any Stresses exceeding the Absolute Maximum Ratings may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

6. Electrical Characteristics

6.1 DC Characteristics

Top=25℃, GND=0V

Items	Symbol	Min.	Typ.	Max.	Unit	Remark
Power Supply Voltage	V_{CC}	4.5	5.0	5.5	V	(*1)
Input logic high voltage	V_{IH}	3.0	-	3.6	V	
Input logic low voltage	V_{IL}	0	-	0.7	V	
Logic Supply (VDD)	I_{VDD}	-	255	640	mA	LED_ADJ=Hi (*3)

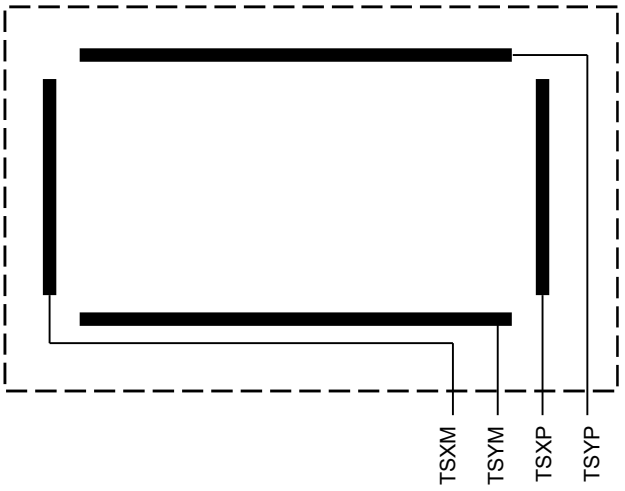
Note:
*1. Never apply logic signal before the VCC.
*2. PWM signal (Freq<800Hz) could be applied to LED_ADJ pin for backlight brightness control, where its life time could be extend by lower its brightness.

6.2 Touch panel Characteristics

T_{OP} =25°C

Items	MIN.	TYP.	MAX.	Unit	Applicable Pin
Terminal resistance	100	-	900	Ω	X- terminal
	200	-	1200	Ω	Y- terminal
Operating Voltage	-	-	7	V	-
Response time	-	-	10	ms	-
Operating Force	100	-	160	g	-
Life Time	-	1,000,000	-	times	-

Cautions:
Exceeding the recommended Condition could cause substantial damage to the touch panel and shorten its lifetime.

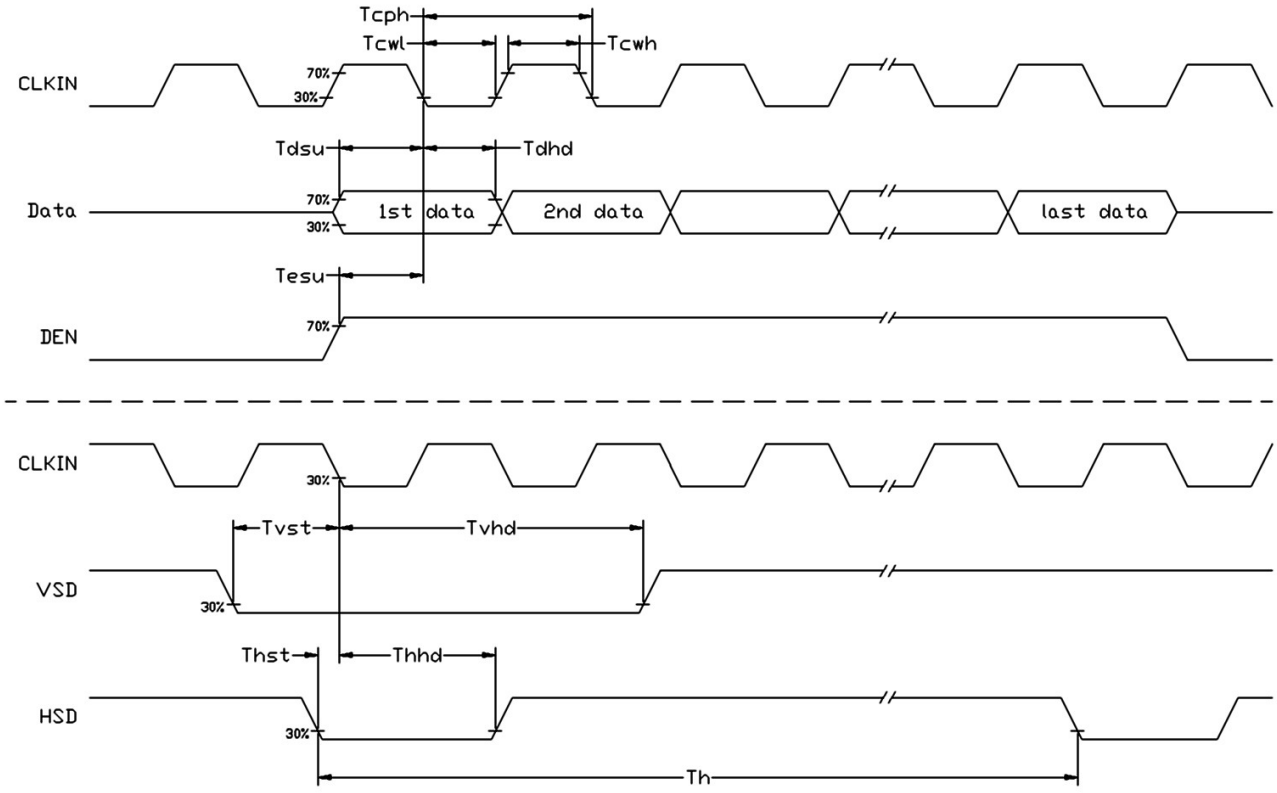


7. AC Characteristics

7.1 Timing Characteristics

Item	Symbol	MIN.	TYP.	MAX.	Unit	Remark
HS setup time	Thst	8	-	-	ns	
HS hold time	Thhd	8	-	-	ns	
VS setup time	Tvst	8	-	-	ns	
VS hold time	Tvhd	8	-	-	ns	
Data setup time	Tdsu	8	-	-	ns	
Data hole time	Tdhd	8	-	-	ns	
DE setup time	Tesu	8	-	-	ns	
V_{CC} Power On Slew rate	TPOR	-	-	20	ms	From 0 to 90% V_{CC}
DCLK cycle time	Tcph	20	-	-	ns	
DCLK pulse duty	Tcwh	40	50	60	%	

7.2 Input Clock and Data Timing Diagram



7.3 Timing

Item	Symbol	MIN.	TYP.	MAX.	Unit	Remark
Horizontal Display Area	thd	-	800	-	DCLK	
DCLK Frequency	fclk	26.4	33.3	46.8	MHz	
One Horizontal Line	th	862	1056	1200	DCLK	
HS pulse width	thpw	1	-	40	DCLK	
HS Blanking	thb	46	46	46	DCLK	
HS Front Porch	thfp	16	210	354	DCLK	
Vertical Display Area	tvd	-	480	-	TH	
VS period time	tv	510	525	650	TH	
VS pulse width	tvpw	1	-	20	TH	
VS Blanking	tvb	23	23	23	TH	
VS Front Porch	tvfp	7	22	147	TH	

7.4 Data Input Format

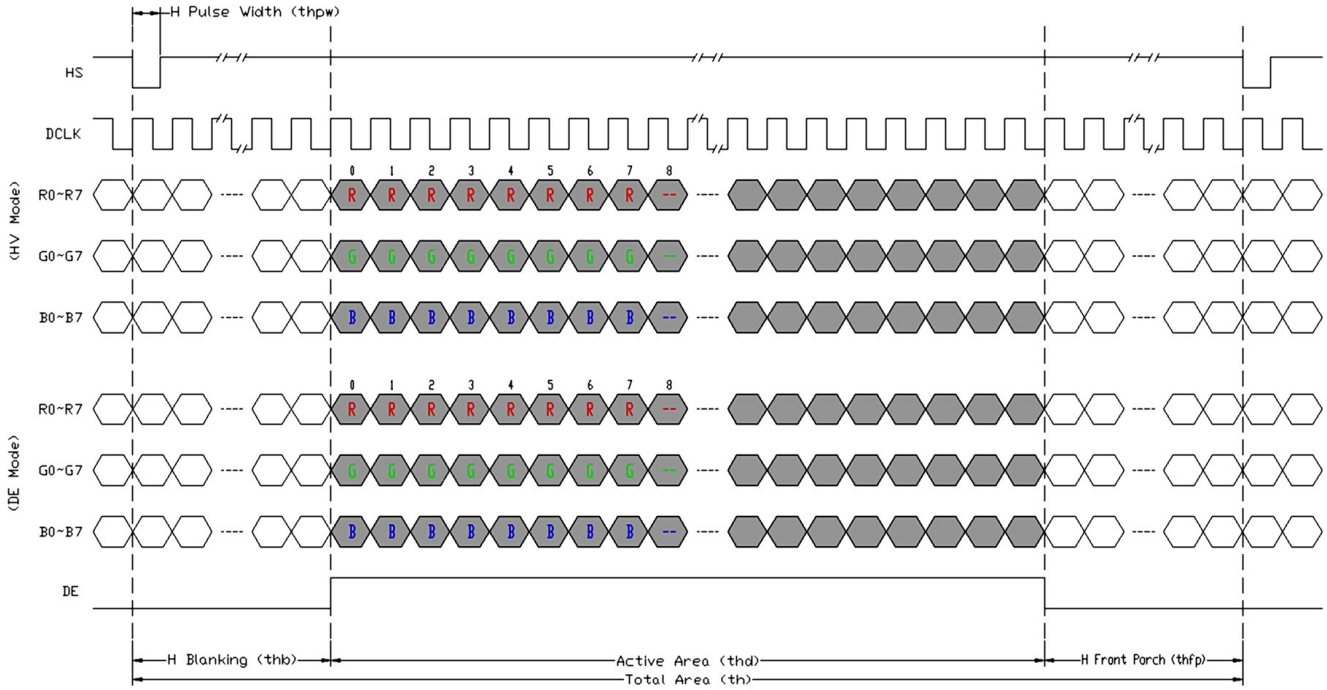


Figure 6-2-1 Horizontal input timing diagram.

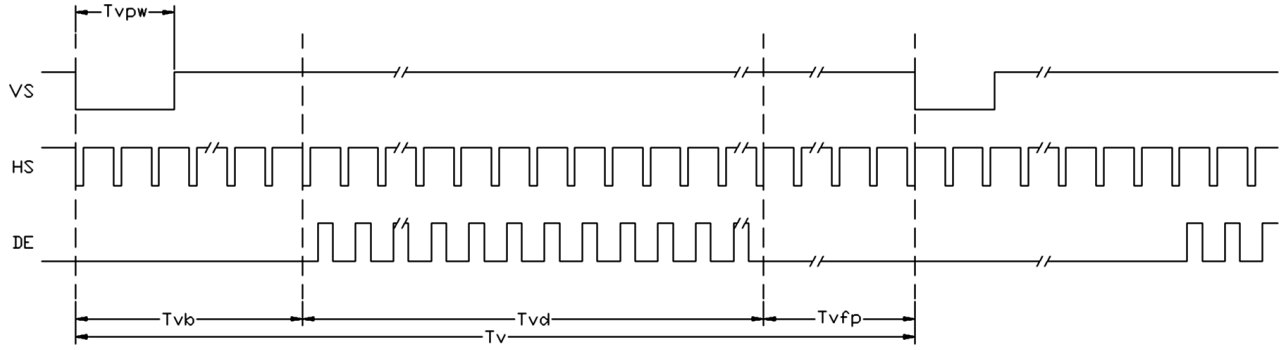


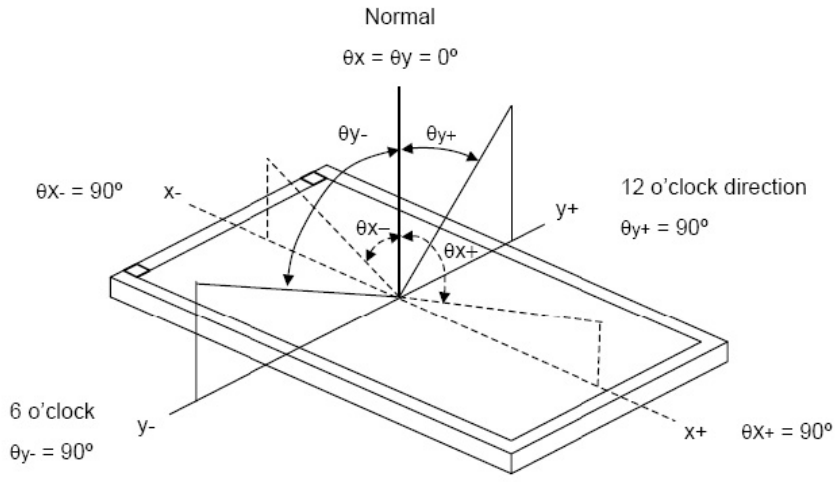
Figure 6-2-2 Vertical input timing diagram.

7.5 Optical Characteristics

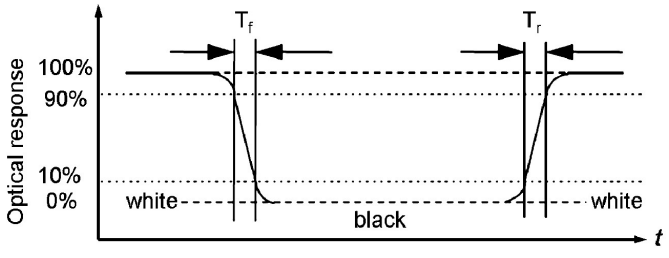
Item	Symbol	Condition	MIN.	TYP.	MAX.	UNIT	Note.
Viewing angle (CR≥10)	θ_L	9 o'clock	60	70	-	degree	*2
	θ_R	3 o'clock	60	70	-		
	θ_T	12 o'clock	40	50	-		
	θ_B	6 o'clock	60	70	-		
Response Time	T_f	Normal θ=0°	-	10	20	msec	*3
	T_r		-	15	30	msec	
Contrast ratio	CR		400	500	-	-	*1
Color chromaticity	W_X		0.26	0.31	0.26	-	
	W_Y		0.28	0.33	0.38	-	
Luminance	L		-	250	-	cd/m²	*4
Luminance uniformity	Y_U		70	75	-	%	*4

Note:
*1. Definition of Contrast Ratio
The contrast ratio could be calculate by the following expression:
Contrast Ratio (CR) = Luminance with all pixels white / Luminance with all pixels black

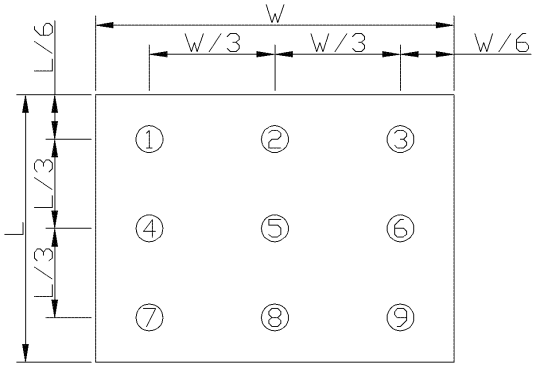
*2 Definition of Viewing Angle



*3 Definition of response time



*4 Definition of Luminance Uniformity
Luminance uniformity (Lu)=
Min. Luminance form pt1~pt9 / Max Luminance form Pt1~pt9



*5. Given parameter measured without touch panel.

8. Precautions of using LCD Modules

Please refer to "LCD-Module-Design-Handling-Precaution.pdf".

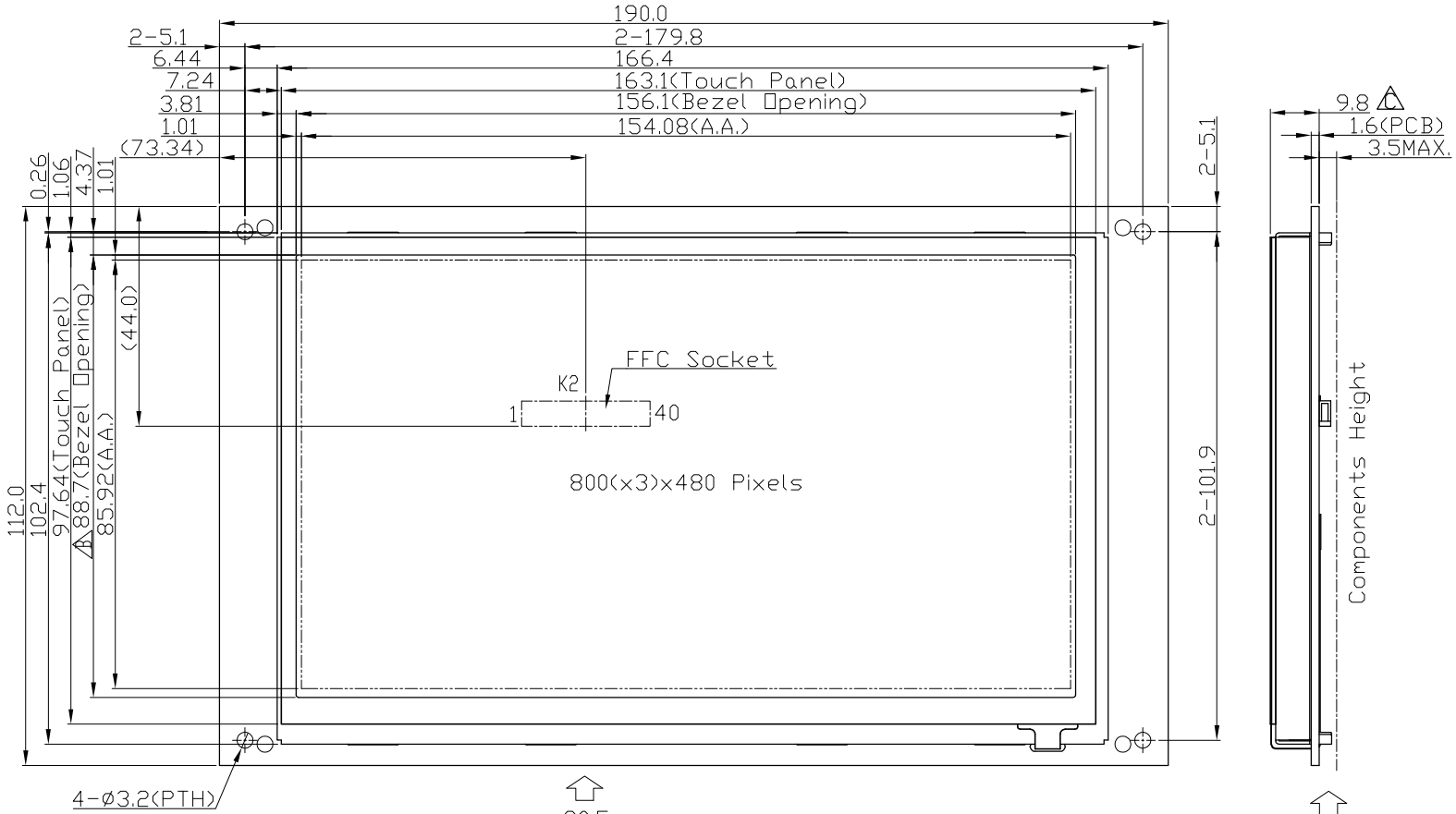
9. Appendix <Inspection items and criteria for appearance defect>

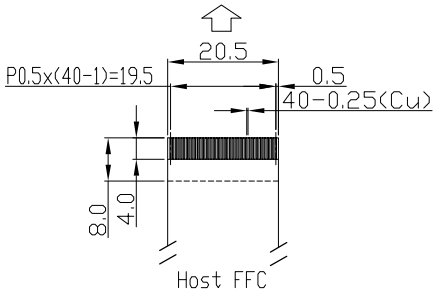
Bright/Dark Dots:

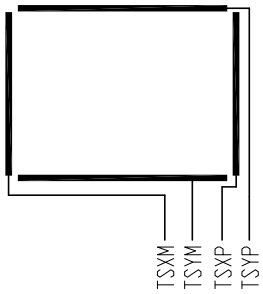
Defect Type	Specification	Major	Minor
Bright Dots	N≤ 2		●
Dark Dots	N≤ 3		●
Total Bright and Dark Dots	N≤ 4		●

Note: 1. **The definition of dot:** The size of a defective dot over 1/2 of whole dot is regarded as one defective dot.

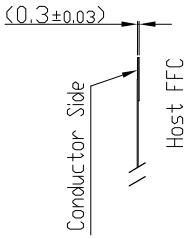
2. **Bright dot:** Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern.
3. **Dark dot:** Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green, blue pattern.







Touch Panel Logic Details
Scale=free



⚠

K2 Terminal	
No	Pin Name
1	VCC
2	VCC
3	B0
:	:
10	B7
11	GND
12	G0
:	:
19	G7
20	GND
21	R0
:	:
28	R7
29	GND
30	LED_ADJ
31	NC
32	NC
33	DE
34	VS
35	HS
36	DCLK
37	TSXM
38	TSXP
39	TSYM
40	TSYP

Note:
*1. LCD Display Type: TFT,Transmissive
*2. Pixel Arrangment: RGB-SPRIPE
*3. Supply Voltage : 5.0V ⚠
*4. Signal Voltage : 3.3V
*5. Backlight : White LED
*6. Operating Temperature : -20°C~70°C
*7. Storage Temperature : -30°C~80°C

Rev	Note	Date
C	Typing correction	Yu 2012-08-04
B	Refine Dwg	Zhou Huifang 2010-11-29
A	- Add Note - Update Pin Name	K.C. 2010-11-17

Dwg Title	LMT070DICFWD-NAA Outline Dwg			
Dwg No.	MK-003441c-1-1			Date 2010-10-12
Scale 1/1	Tol. ±0.5	Unit mm	Paper Size A3	
Approved		Checked	Drawn Zhou Huifang	

TOPWAY