

TFT Product Specification

- ◇ PRELIMINARY SPECIFICATION
- ◆ APPROVED SPECIFICATION


Part Number: FLD-1234ML81PCSA1

Description: 12.3" cut TFT LCD 850CD LVDS Interface 1920x720 format can display 16.7M colors assemble Pcap 1.8mm Black USB-I2C

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Approved by: David

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Approved by 	
Date	

Revision History

Version	Date	Page	Description	Note
V1.0	2019/11/22		First Edition	
V2.0	2019/02/12		Update Edition	
V3.0	2020/02/25	5	Update 2.2 Environment Absolute Rating	

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1. GENERAL DESCRIPTION

1.1 Description

12.3" is a Color Active Matrix Liquid Crystal Display Module composed of a TFT LCD panel and LED backlight system. The screen format is intended to support the 1920x720 screen and 16.7M colors.

1.2 Product Summary

The following items are summary on the table under Ta=25 °C condition:

No.	Item	Specification	Unit
1	Display Size	12.3	Inch
2	Pixel Number	1920 (H) x 3 (RGB) x 720 (V)	Pixels
3	Outline Dimension	322.4(H) x 142.1(V) x 10.4(D)	mm
4	Active Area	292.032(H) x 109.512(V)	mm
5	Display Colors	16.7M	--
6	Pixel Arrangement	RGB vertical stripe	--
7	Display Mode	Normally Black / Transmissive	--
8	Electrical Interface	LVDS	
9	Pixel pitch	0.1521(H) x RGB x 0.1521 (V)	mm
10	Brightness	850 (Typ.)	cd/m2
11	Viewing Direction	All Direction	--
12	Contrast Ratio	1000 (Typ.)	--
13	Color gamut	75%	Typ



2. ABSOLUTE MAXIMUM RATING

2.1 Electrical Absolute Rating

Item	Symbol	Values		Unit	Note
		Min	Max.		
Power supply voltage for LCD	VCC	-	5.7	V	

2.2 Environment Absolute Rating

Item	Symbol	Unit	Note		
		Min	Max.	Unit	
Operating Temperature	Top	-30	85	°C	
Storage Temperature	Tstg	-40	85	°C	

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3. ELECTRICAL CHARACTERISTICS

3.1 Electrical Specifications

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
TFT Gate ON Voltage	VGH	16	-	18	V	
TFT Gate OFF Voltage	VGL	-15	-	-11	V	
TFT Common Electrode Voltage	VCOM	-3	-	0	V	TBD
Voltage of VCC		3	-	3.5	V	
Current of VCC		150	-	550	V	
Supply current of LED backlight	Per string		-	90	mA	9 LED
Total Supply current of LED Backlight	I _{LED Total}		-	360	mA	4 strings
Supply voltage of LED backlight	Per string	23.7	27.27	30.1	V	4 strings
LED Life-Time		30000			Hrs	Note 4

Note (1) AVDD should be set to satisfy the characteristic of LC.

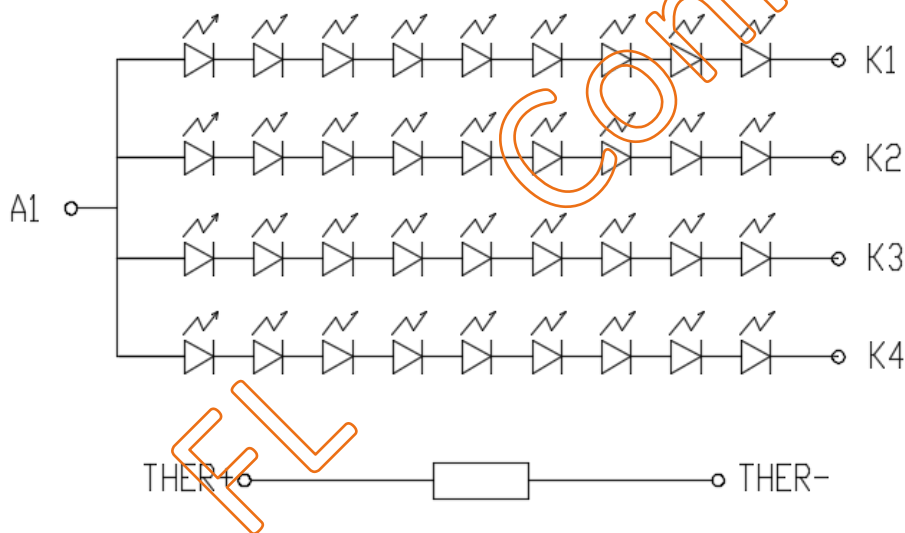
Note (2) Frame rate = 60Hz

Note (3) Each LED light bar consists of 36 pcs LED package (4 strings x9 pcs / string).

Max Current value:360 mA. Each strings max current value:90 mA.

Note (4): The “LED Life Time” is defined as the time period when the brightness decrease to 50% of the initial value under continuous lighting at 25°C

Backlighting circuit :



3.2 BLU PIN definition

Connector Terminal : 196415-12041-36

1	LED-A	LED Anode
2	LED-A	LED Anode
3	LED-A	LED Anode
4	LED-A	LED Anode
5	NC	No Connection
6	NTC1	NTC thermistor terminal 1
7	NTC2	NTC thermistor terminal 2
8	NC	No Connection
9	LED-K1	LED string 1 cathode
10	LED-K2	LED string 2 cathode
11	LED-K3	LED string 3 cathode
12	LED-K4	LED string 4 cathode



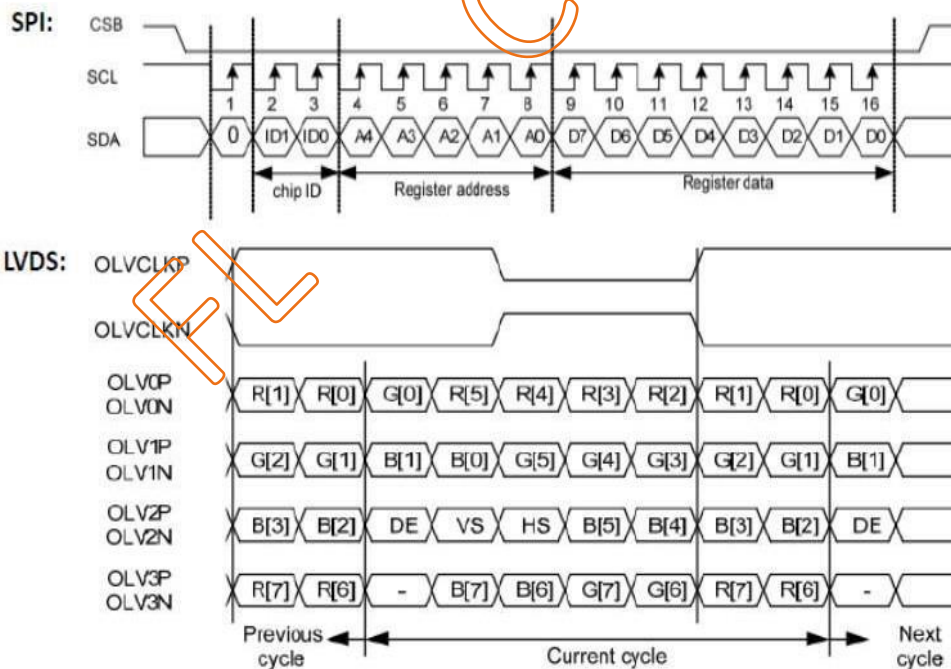
4. SIGNAL CHARACTERISTICS

4.1 Interface Timing

4.1.1 LVDS Signal Timing:

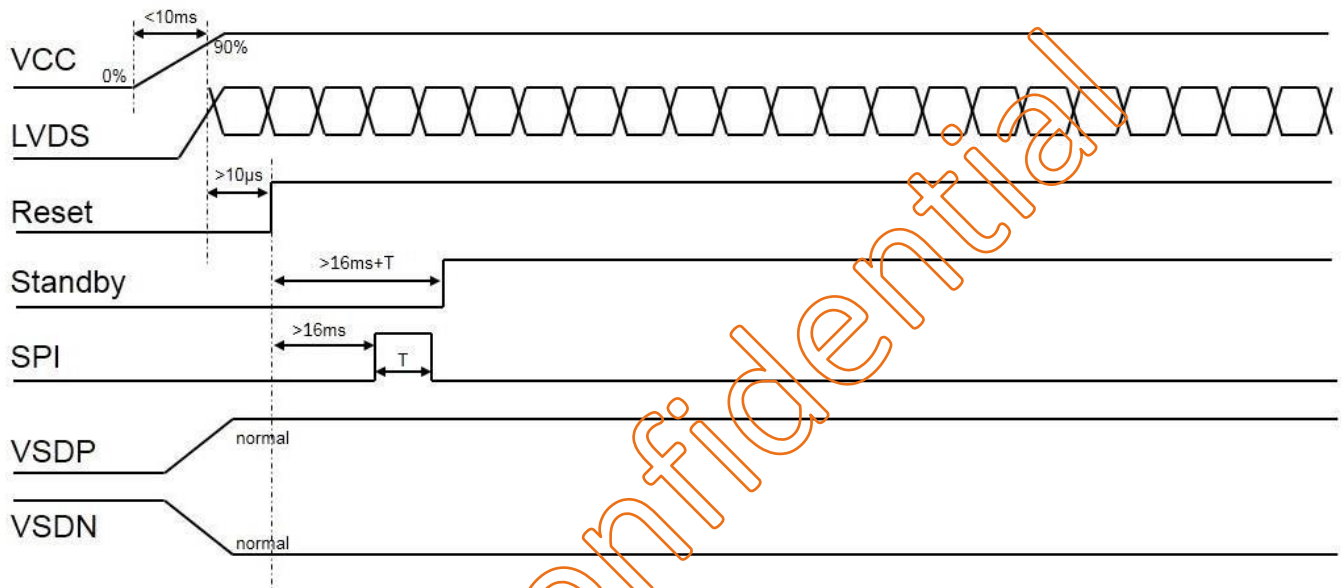
Parameter	Symbol	Min.	Typ.	Max.	Unit
Clock frequency	RxFCLK	-	44.1	-	MHz
Horizontal Display Area	thd	960			DCLK
HS Period	th	989	1002	1248	DCLK
HB Blanking	Thb+thfp		42		DCLK
Vertical Display Area	tvd	720			TH
VS Period	tv	727	733	936	TH
VS Blanking	Tvbp+tvfp		13		TH
Clock period	TLVCYC	11.76			ns
1 data bit time	UI		1/7		TLVCYC
Clock high time	TLVCH	2.8	4	4.2	UI
Clock low time	TLVCL	2.8	3	4.2	UI
LVDS WAKE-UP Time	TenLVDS			150	us

(1) Signal Format

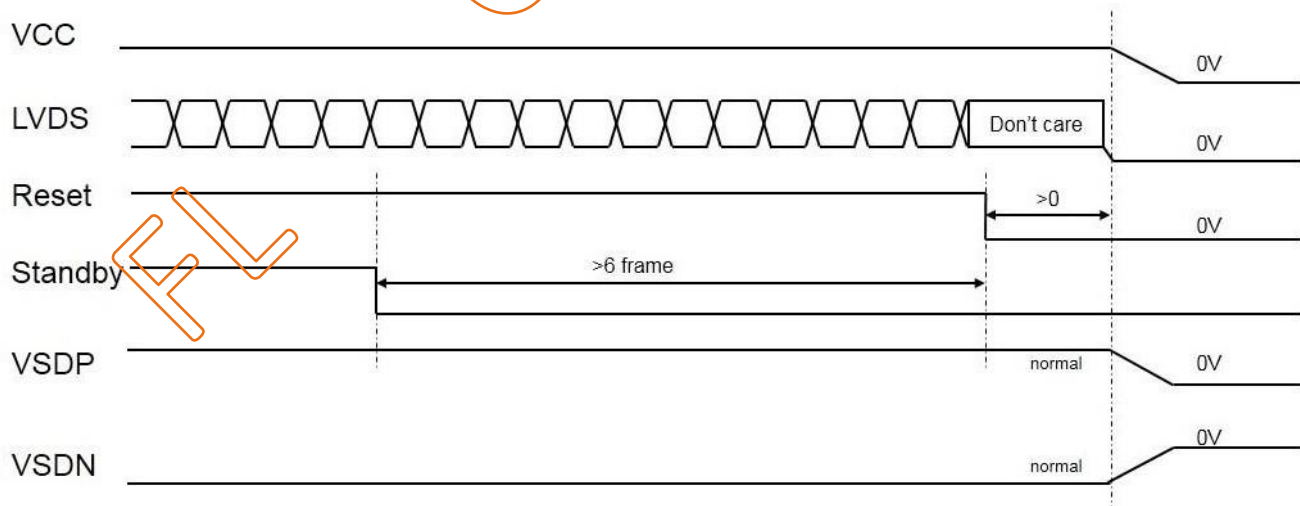


4.1.2 Power ON/OFF SEQUENCE

POWER ON sequence



POWER OFF sequence



5. INTERFACE PIN DESCRIPTION

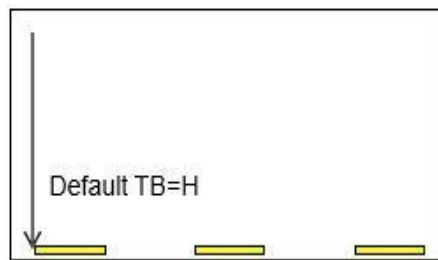
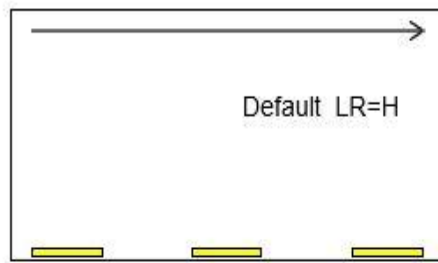
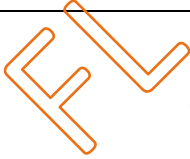
5.1 LCM Connector PIN Assignment

The Recommended connector is Hirose FH28-50S-0.5SH(0.5)

PIN NO	Symbol	Description	Note
1	GND	Ground	
2	VCC	Power supply	
3	VCC	Power supply	
4	VCC	Power supply	
5	VCC	Power supply	
6	GND	Ground	
7	ELV0N	EVEN LVDS Data input 0-	
8	ELV0P	EVEN LVDS Data input 0+	
9	GND	Ground	
10	ELV1N	EVEN LVDS Data input 1-	
11	ELV1P	EVEN LVDS Data input 1+	
12	GND	Ground	
13	ELV2N	EVEN LVDS Data input 2-	
14	ELV2P	EVEN LVDS Data input 2+	
15	GND	Ground	
16	ECLKN	EVEN Negative CLK input	
17	ECLKP	EVEN Positive CLK input	
18	GND	Ground	
19	ELV3N	EVEN LVDS Data input 3-	
20	ELV3P	EVEN LVDS Data input 3+	
21	GND	Ground	
22	OLV0N	ODD LVDS Data input 0-	
23	OLV0P	ODD LVDS Data input 0+	
24	GND	Ground	
25	OLV1N	ODD LVDS Data input 1-	
26	OLV1P	ODD LVDS Data input 1+	
27	GND	Ground	
28	OLV2N	ODD LVDS Data input 2-	
29	OLV2P	ODD LVDS Data input 2+	

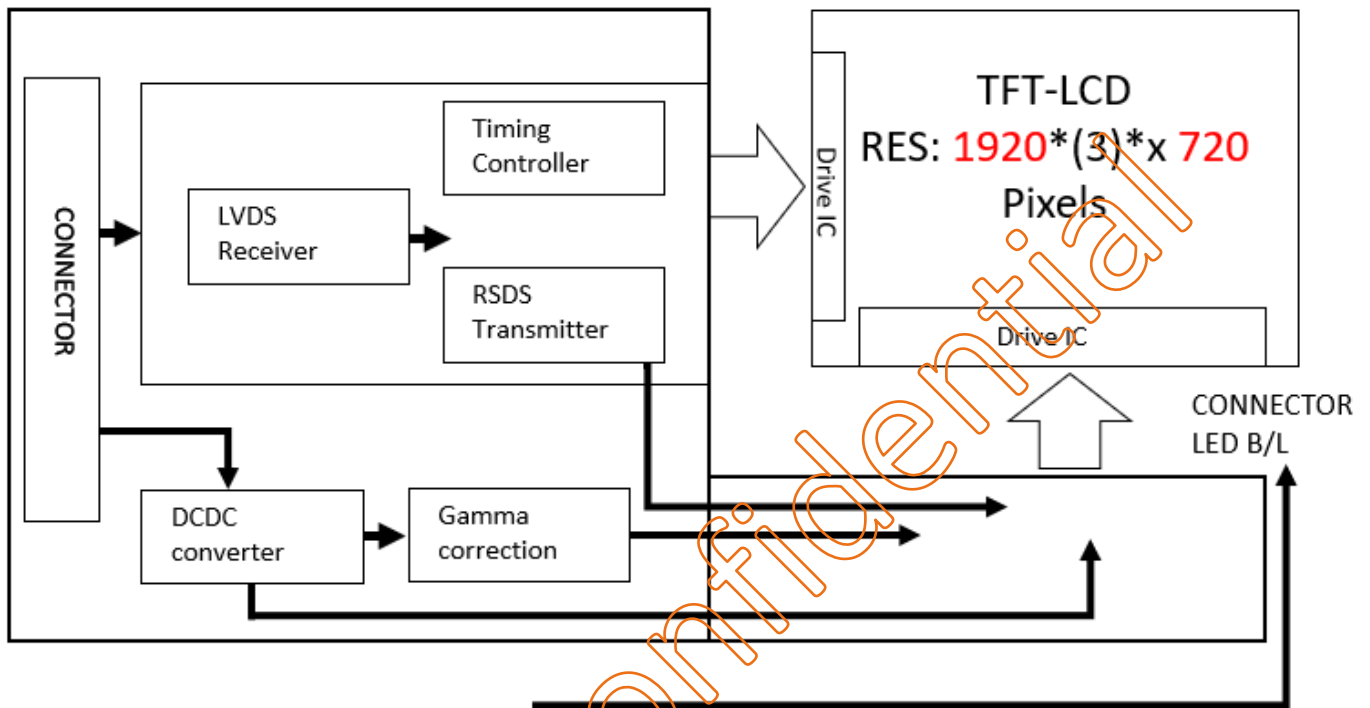
30	GND	Ground	
31	OCLKN	ODD Negative CLK input	
32	OCLKP	ODD Positive CLK input	
33	GND	Ground	
34	OLV3N	ODD LVDS Data input 3-	
35	OLV3P	ODD LVDS Data input 3+	
36	GND	Ground	
37	RESET	Reset	
38	STBYB	Standby mode setting pin, active low	
39	GND	Ground	
40	SCL	SCL	
41	CSB	CSB	
42	SDA	SDA	
43	ATREN	Enable auto reload signal	
44	VOTP	OTP Voltage	
45	GND	Ground	
46	LR	Horizontal shift direction selection	Note 1
47	TB	Vertical shift direction selection	Note 1
48	NC	No Connection	
49	FAULT	Output for fail detection	
50	NC	No Connection	

Note 1 :



6. BLOCK DIAMGRAM

The following diagram shows the functional block of the TFT module:



7. OPTICAL CHARACTERISTIC

The optical characteristics are measured under table conditions at room temperature.
 $T_a=25^{\circ}\text{C}$, $VCC=3.3\text{V}$

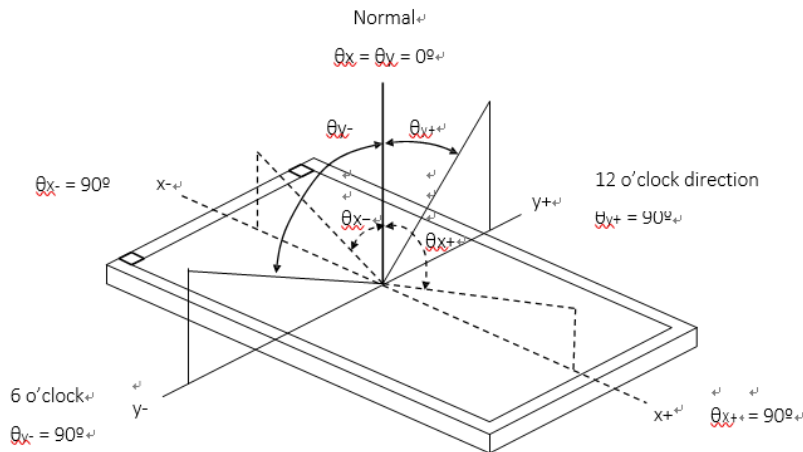
Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note	
Contrast Ratio	CR	$\theta_x=\theta_y=0^{\circ}$	-	1000	-	-	2,5,6	
Response Time (White-Black)	T_f+T_b	$\theta_x=\theta_y=0^{\circ}$	-	25	35	ms	3,5,6	
Center Luminance of White	L_w	$\theta_x=\theta_y=0^{\circ}$	700	850	-	cd/m^2	5,6	
Luminance Uniformity	ΔL		75	-		%	5,6	
Chromaticity	Red	R_x	$\theta_x=\theta_y=0^{\circ}$	0.650	Typ. +0.03	-	5,6	
		R_y		0.328		-		
	Green	G_x		0.316		-		
		G_y		0.628		-		
	Blue	B_x		-0.03		0.152		-
		B_y		0.059		-		
	White	W_x		0.292		-		
		W_y		0.325		-		
Viewing Angle	Horizontal	θ_{x+}	80	88	-	Deg.	1,5	
		θ_{x-}	80	88	-			
	Vertical	θ_{y+}	80	88	-			
		θ_{y-}	80	88	-			

The following optical specifications shall be measured in a darkroom or equivalent state (ambient luminance <1 lux, and at room temperature).

The room temperature is $25^{\circ}\text{C}\pm 2^{\circ}\text{C}$ and LED Backlight Current $I_L=360\text{mA}$.

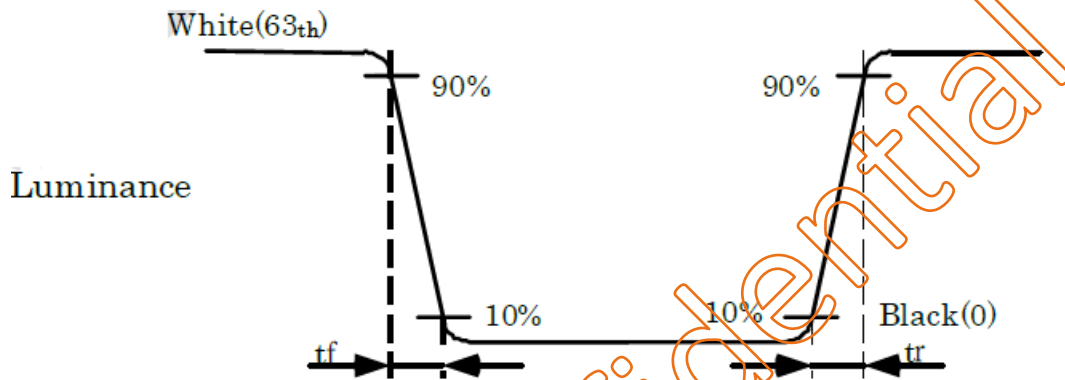
Note 1: Definition of Viewing Angle

Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles are determined for the horizontal or the vertical clock direction with respect to the optical axis which is normal to the LCD surface

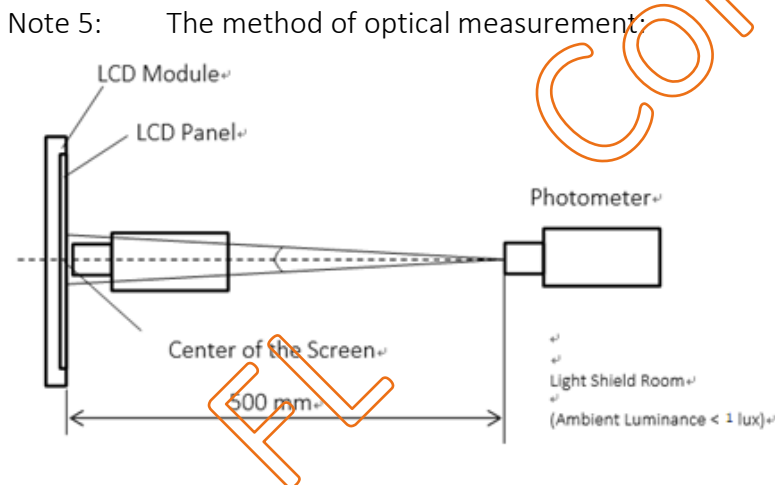


Note 2: Definition of Contrast Ratio (CR)
 Measure the viewing angle of $\Theta = 0$ and at the center of the LCD surface. Luminance with all pixels in white state divide by Luminance with all pixels in Black state

Note 3 Definition of Response Time:
 The response time is set initially by defining the “Rising Time (t_r)” and the “Falling Time (t_f)” respectively. The response time interval is between 10% and 90% of amplitudes, please refer the figure to the followings:

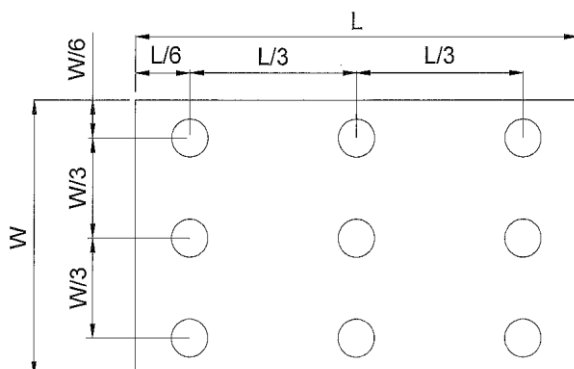


Note 4: Definition of Brightness (L_w)
 Measure the center area of the panel and the viewing angle of the $\theta_x = \theta_y = 0^\circ$



Note 6: Definition of Luminance: Measure white luminance on the point 5 as the following (δW):

$$\Delta L = \frac{\text{Maximum } [L(1), L(2), L(3), L(4), \dots, L(9)]}{\text{Minimum } [L(1), L(2), L(3), L(4), \dots, L(9)]} \times 100$$



B. Touch Screen specification

1. Environmental Specification

Specification	Value	Remarks
Operating Temperature	-30°C ~ 80°C	
Storage Temperature	-40°C ~ 80°C	
Operating Humidity	20% ~ 90%RH	
Storage Humidity	10% ~ 90%RH	

2. Mechanical Specification

Specification	Value
Operating Life (Finger input)	10 ⁷ times
Light Transmittance	>86% Min. (JIS K-7105) with glass
Surface hardness	Depending by the cover Lens Material Customer choose
FPC Peeling Force	5N Max

3. COMBO Type Controller

Parameters	Features
Circuit Board Dimension	Refer to drawings
Channels of Panel	Based on Sensor Design
Input Voltage	3.5V~5.5V Typical 5V for USB suggest to use 5V for I2C too
Linearity(Note 1)	Single Line drawing accuracy : Up to 1pt +/- 1mm offset /10mm Single Touch (point) accuracy : Up to 1pt +/- 1mm
Interface	USB: 2.0(Below) Full Speed I2C:100K/400K Hz
Resolution	4096×4096 resolution
Power consumption(mA)	Active Mode: <108mA
	Idle Mode : <54mA
	Sleep Mode :< 10mA
	(Operation Mode :Active Mode only)
Report rate(points/sec) Note(2)	> 100 Hz
Response time	Average < 25 ms

Note (1): Depending by Sensor design and other parameters, Refer to Windows 8 Logo regulation if need to follow min spec

Note (2): Report rate will vary by channel number, cover thickness, number of fingers and other parameters.

8. DIMENSION AND DRAWING

Front VIEW

Back VIEW

Backlighting Circuit :

Pin	Define
Pin 01	GND
Pin 02	D-
Pin 03	SDA
Pin 04	VDD
Pin 05	VDD(S/V)
Pin 06	INT
Pin 07	RST

Customer Approval

NO.	Pin Define	Description	NO.	Pin Define	Description
1	LED-A	LED Anode	21	ELV1 +	GND
2	LED-A	LED Anode	22	GND	OLV0 -
3	LED-A	LED Anode	23	OLV0 -	GND
4	LED-A	LED Anode	24	ELV2 -	GND
5	NC	No Connection	25	GND	OLV3 -
6	NC-1	NTC thermistor terminal 1	26	ELV1 +	GND
7	NC-2	NTC thermistor terminal 2	27	GND	OLV3 +
8	NC	No Connection	28	ELV1 +	GND
9	LED-K1	LED string 1 Cathode	29	GND	RESET
10	LED-K2	LED string 2 Cathode	30	ELV2 -	GND
11	LED-K3	LED string 3 Cathode	31	OLV2 +	STBYB
12	LED-K4	LED string 4 Cathode	32	GND	SCN
			33	ELV3 -	GND
			34	ELV3 +	NC

Part Number: **FLD-1234ML81PCSA1**

Note:

1. Tolerance: ±0.3mm
2. Touch Finger input only or special conductive pen
3. Touch Surface Hardness: 6H (Chemical strength Glass)
4. Touch Transmittance: >85% (JIS-K7105)
5. Distance between LCD and touch panel need to be minimum 1.0mm otherwise touch maybe will not work correctly
6. If customer put a front cover all around need use at least 2mm thick gasket between touch and metal frame
7. Touch USB max ripple acceptable is 50mV, in other case touch will not work correctly
8. Referring to the integration guide to avoid any integration noise issue
9. LCD PIN : FLC-1234ML8000SA1
10. Touch PIN : RTPC123W-R18BP1-C
11. Assembly Solution : DSA

9. PRECAUTION AND PRODUCT HANDLING

- Do not apply the external force such as bending or twisting to the LCD panel and backlight during assembly.
- Do not insert and plug out the input connector while the LCD panel is operating.
- Do not take apart the panel or frame from LCD module assembly or insert anything into the backlight unit.
- Do not keep the same pattern in a long period of time, it may cause image sticking on LCD panel. Can use shuffle content periodically if fixed pattern is displayed on the screen.
- Do not touch the display area with bare hands, this will stain the display area.
- Pay attention to handle lead wire of backlight, that is not tugged in connect with LED driver.
- Do not change variable resistance settings in LCD panel, it may cause not satisfy of LCD characteristics specification.
- The surface of LCD panel's polarizer is very soft and easily scratched, please use a very soft dry cloth without chemicals for cleaning.
- To avoid the static electricity to damage the CMOS LSI, the operator should be grounded when in contact with the LCD panel, and also to all electrical equipment.
- Need to follow the correct power frequency when LCD panel is connecting and operating, this can avoid damage to CMOS LSI during latch-up.
- Need to store the LCD panel indoor without the exposure of sunlight where the temperature is $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ and the humidity is below 60% RH.

