Product Specification

PART NUMBER # REV: FLD-101HMLC0PUFA3#01

DESCRIPTION: TFT 10.1"w, 1280(H)*800(V), LVDS, Full View, 350CD slim model + Rocktouch PCAP Black USB – I2C with External DSA

(   )   Preliminary Specification
(V)   Approved Specification

Customer Name:	
Signature:	**Date:**

PREPARED BY	REVIEWED BY
Ellen Chen	*David*

Revision History

Version	Date	Page	Description	Note
V1.0	2022/05/05		1st Edition	

Table of Content

1. GENERAL DESCRIPTION

1.1 Description

10.1 inch is a Color Active Matrix Liquid Crystal Display Module composed of a Round TFT LCD panel and LED backlight system. The screen format is intended to support the 1280 x 800 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	10.1''W	Inch
2	Display Format	1280(H) x (R,G,B) x 800(V)	Dots
3	Outline Dimension (H x V x D)	229.46 × 149.1 × 6.19 (Min.) 229.46 × 149.1 × 9 (Max.) PCB Zone	mm
4	Active Area	216.96 x 135.60	mm
5	Pixel Pitch	0.1695 × 0.1695	mm
6	Support Color	16.7 M	
7	Display Mode	Normally Black	- -
8	Electrical Interface	LVDS	
10	Brightness	350 (Typ)	cd/m2
11	Viewing Direction	All	- -
12	Contrast Ratio	800 (Typ.)	- -
13	Input Voltage	3.3 (Typ.)	V
14	Response Time	25(Typ.)	W
15	Surface Treatment	Glare, Hard-Coating 3H	

2. ABSOLUTE MAXIMUM RATING

2.1 Electrical Absolute Rating

Item	Symbol	Values			Unit	Note
		Min	Typ	Max		
Power Supply Voltage	V$_{DD}$	-0.3	-	4.0	V	
Logic Input Signal Voltage	Vsignal	-0.3	-	4.0	V	

2.2 Environment Absolute Rating

Item	Symbol	Values			Unit	Note
		Min	Typ	Max.		
Operating Temperature	Top	-20	-	+70	°C	
Storage Temperature	Tstg	-30	-	+80	°C	

* Note 1: All the parameters specified in the table are absolute maximum rating values that may cause faulty operation or unrecoverable damage, if exceeded. It is recommended to follow the typical value.

* Note 2: Operating temperature 25℃, humidity 55%RH.

* Note 3: Unpredictable results may occur when it was used in extreme conditions. Ta= Ambient Temperature, Tgs= Glass Surface Temperature. All the display fineness should be inspected under normal conditions.

* Note 4: Temperature and relative humidity range are shown in the figure below. Wet bulb temperature should be lower than 57.8℃, and no condensation of water. Besides, protect the module from static electricity.

3. Signal Electrical Characteristics

3.1 Signal Electrical Characteristics for LVDS Receiver

The built-in LVDS receiver is compatible with (ANSI/TIA/TIA-644) standard.

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Differential Input High Threshold	V_{th}	-	-	+100	mV	V_{CM}=+1.2V
Differential Input Low Threshold	V_{tl}	-100	-	-	mV	V_{CM}=+1.2V
Input voltage range(singled-end)	RXVIN	0.7		1.7		-
Magnitude Differential Input Voltage	$|V_{ID}|$	200	-	600	mV	-
Common Mode Voltage	V_{CM}	1	1.2	1.4	V	$|VID|$=0.2

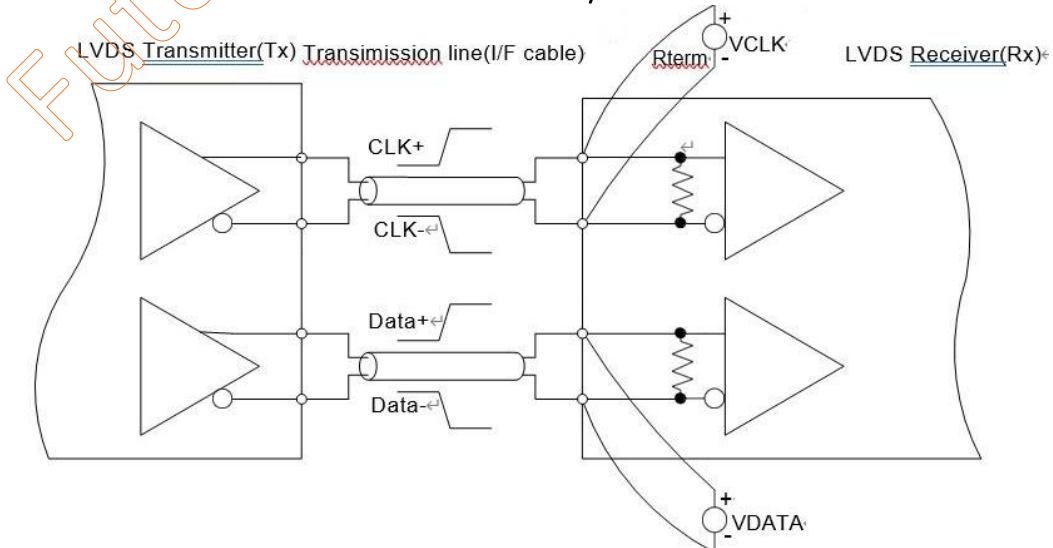* Note 1: Input signals shall be low or Hi- resistance state when VDD is off.
* Note 2: All electrical characteristics for LVDS signal are defined and shall be measured at the interface connector of LCD.
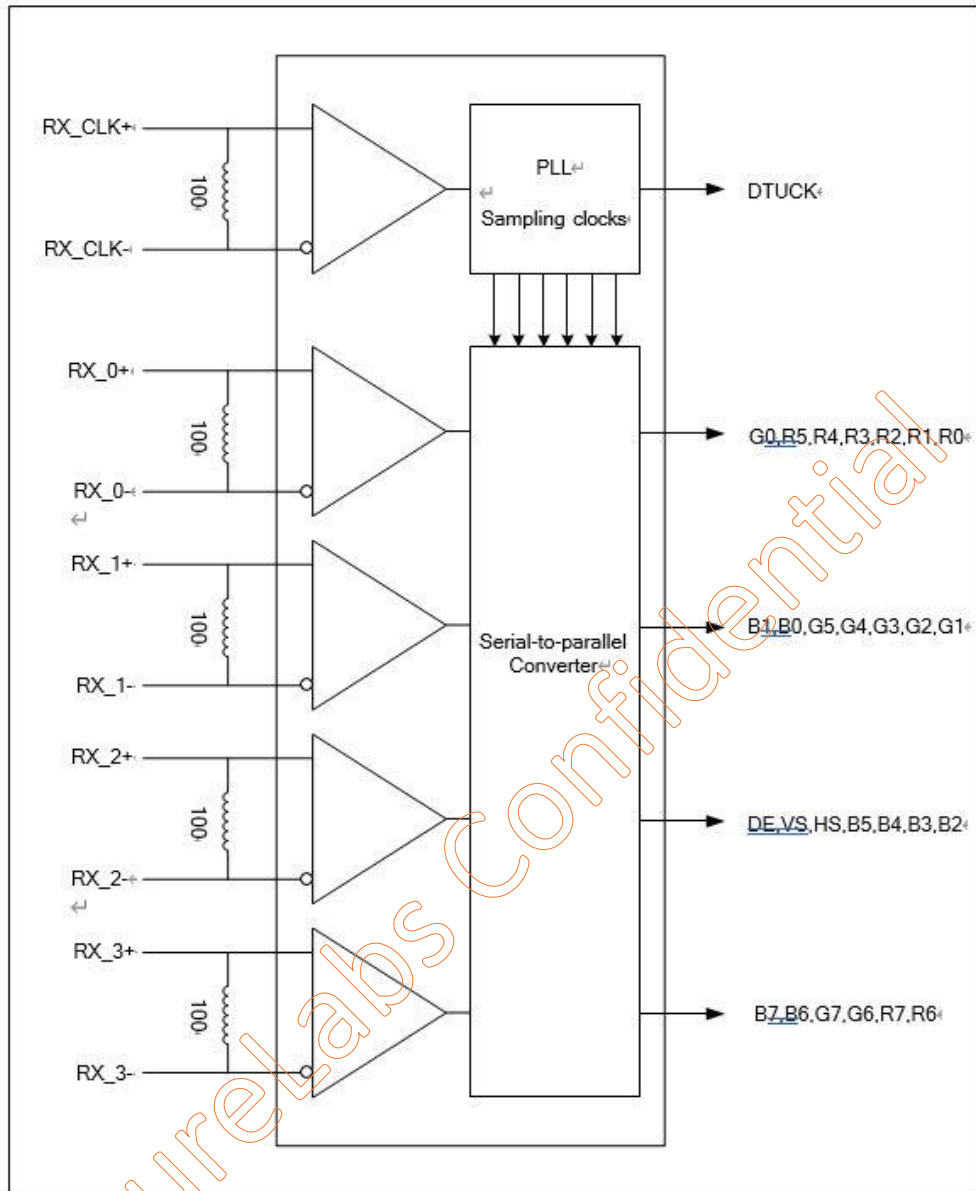
Voltage Definitions
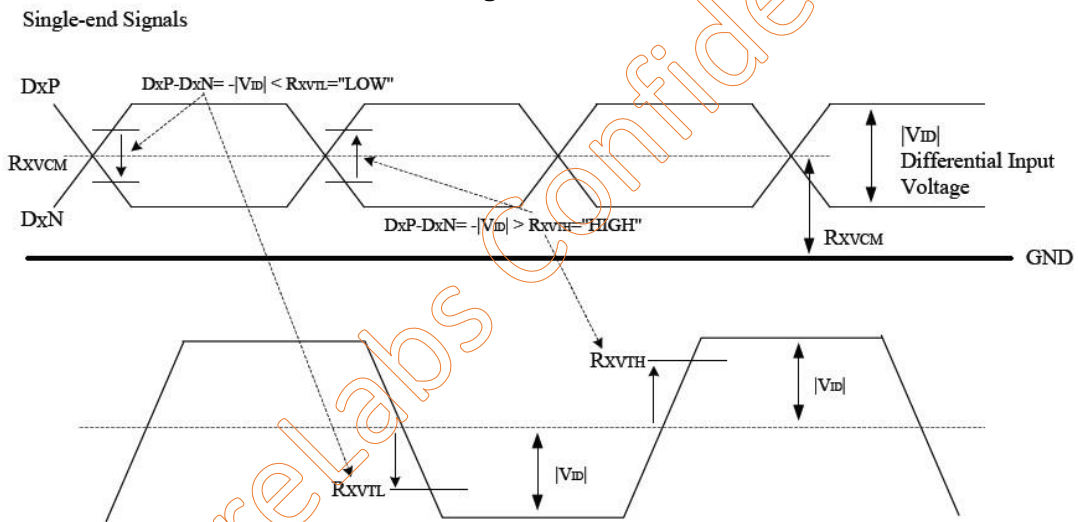
Measurement System

LVDS Receiver Internal Circuit

Data Mapping
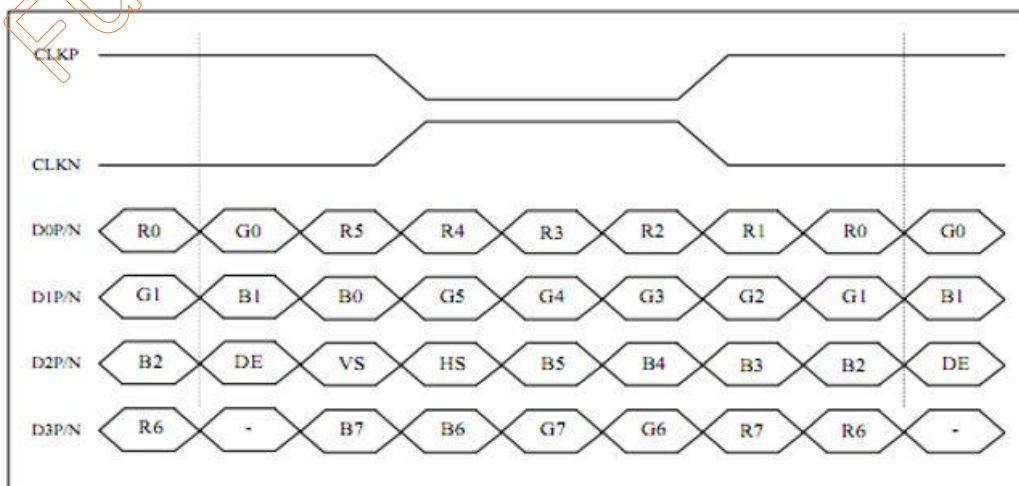
3.2 Interface Timings

Parameter	Symbol	Unit	Min.	Typ.	Max.
LVDS Clock Frequency	Fclk	MHz	70.0	72.4	76.6
Horizontal Total Time	HT	Clocks	1,410	1,440	1,470
Horizontal Active Time	HA	Clocks	1280		
Vertical Total Time	VT	Lines	828	838	868
Vertical Active Time	VA	Lines	800		
Frame Rate	FV	Hz	-	60	-

Note 1: HT * VT *Frame Frequency≤(76.6) MHz

Note 2: All reliabilities are specified for timing specification based on refresh rate of 60Hz

3.3 Input Power Specifications

Input power specifications are as follows.

Parameter		Symbol	Min.	Typ.	Max.	Unit	Note
System Power Supply							
LCD Drive Voltage (Logic)		V_{DD}	3.0	3.3	3.6	V	Note 1, 2, 3
VDD Current	TBD	I_{DD}	-	-	TBD	A	Note 1,4
VDD Power Consumption	TBD	P_{DD}	-	-	TBD	W	
Rush Current		I_{RUSH}	-	-	1.5	A	Note 1,5
Allowable Logic/LCD Drive Ripple Voltage		V_{VDD-RP}	-	-	300	mV	Note 1
LED Power Supply							
LED Input Voltage		V_{LED}	6	12	21	V	Note 1, 2
LED Power Consumption		P_{LED}	-	-	2.5	W	Note 1, 6
LED Forward Voltage		V_F	2.8	-	3.3	V	
LED Forward Current		I_F	-	20	-	mA	
PWM Signal Voltage	High	V_{PWM}	3.0	-	3.6	V	Note 1
	Low		0	-	0.4		
LED Enable Voltage	High	V_{LED_EN}	3.0	-	3.6	V	
	Low		0	-	0.4		
Input PWM Frequency	F_{PWM}	F_{PWM}	100	-	200	Hz	DDIM≥ 0.1%
			200	-	500		DDIM≥ 0.25%
			500	-	1000		DDIM≥ 0.5%
			1000	-	2000		DDIM≥ 1%
			2000	-	5000		DDIM≥ 2.5%
			5000	-	10000		DDIM≥ 5%
			10000	-	20000		DDIM≥ 10%
			20000	-	30000		DDIM≥ 15%
Duty Ratio		PWM	5		100	%	Note 1, 8
LED Life Time		LT	20000	30000	-	Hours	Note 1, 8

Note (1) All of the specifications are guaranteed under normal conditions. Normal conditions are defined as follow: Temperature: 25℃, Humidity: 55± 10%RH.

Note (2) All of the absolute maximum ratings specified in the table, if exceeded, may cause faulty operation or unrecoverable damage. It is recommended to follow the typical value.

Note (3) The specified VDD current and power consumption are measured under the VDD = 3.3 V, FV = 60 Hz condition and TBD pattern.

Note (4) The figure below is the measuring condition of VDD. Rush current can be measured when TRUSH is 0.5 ms.

VDD Rising Time
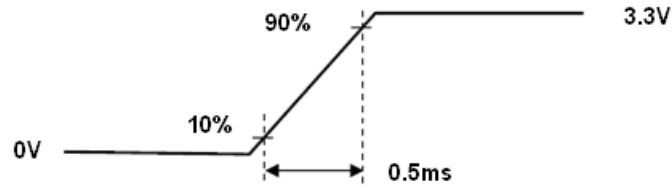
Note (5) The power consumption of LED Driver are under the VLED = 12 V, Dimming of Max luminance.

Note (6) Although acceptable range as defined, the dimming ratio is not effective at all conditions. The PWM frequency should be fixed and stable for more consistent luminance control at any specific level desired.

Note (7) The operation of LED Driver below minimum dimming ratio may cause flickering or reliability issue.

Note (8) The life time is determined as the sum of the lighting time till the luminance of LCD at the typical LED current reducing to 50% of the minimum value under normal operating condition.

3.4 Power ON/OFF Sequence

Interface signals are also shown in the chart. Signals from any system shall be Hi- resistance state or low level when VDD voltage is off.
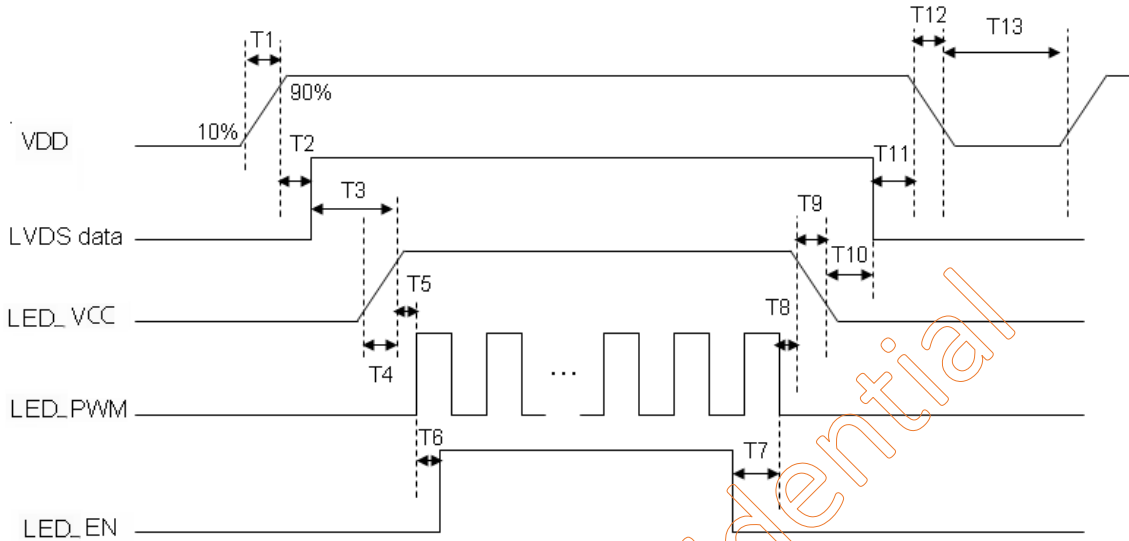
Power Sequencing Requirements

Parameter	Symbol	Unit	Min	Typ.	Max
VDD Rise Time (10% to 90%)	T1	ms	0.5	--	10
VDD Good to Signal Valid	T2	ms	30	--	90
Signal Valid to Backlight On	T3	ms	200	--	--
Backlight Power On Time	T4	ms	0.5	--	--
Backlight LED_VCC Good to System LED_PWM On	T5	ms	10	--	--
System LED_ PWM On to Backlight LED_EN On	T6	ms	10	--	--
Backlight LED_ EN Off to System LED_PWM Off	T7	ms	0	--	--
System LED_ PWM Off to B/L Power Disable	T8	ms	10	--	--
Backlight Power Off Time	T9	ms	0.5	10	30
Backlight Off to Signal Disable	T10	ms	200	--	--
Signal Disable to Power Down	T11	ms	0	--	50
VDD Fall Time	T12	ms	0.5	10	30
Power Off	T13	ms	500	--	--

4. INTERFACE PIN DESCRIPTION

4.1 LCM Connector PIN Assignment

The electronics interface connector is IPEX 20455-040E-66 or equivalent.

Pin	Symbol	Function	Note
1	NC	No Connection	
2	VDD	Power Supply	
3	VDD	Power Supply	
4	NC	No Connection	
5	NC	No Connection	
6	NC	No Connection	
7	NC	No Connection	
8	LV0N	-LVDS Differential Data Input	
9	LV0P	+LVDS Differential Data Input	
10	GND	Ground	
11	LV1N	-LVDS Differential Data Input	
12	LV1P	+LVDS Differential Data Input	
13	GND	Ground	
14	LV2N	-LVDS Differential Data Input	
15	LV2P	+LVDS Differential Data Input	
16	GND	Ground	
17	LVCLKN	-LVDS Differential Clock Input	
18	LVCLKP	+LVDS Differential Clock Input	
19	GND	Ground	
20	LV3N	-LVDS Differential Data Input	
21	LV3P	+LVDS Differential Data Input	
22	GND	Ground	
23	LED_GND	Ground for LED Driving	
24	LED_GND	Ground for LED Driving	
25	LED_GND	Ground for LED Driving	
26	NC	No Connection	
27	LED_PWM	PWM Input Signal for LED Driver	
28	LED_EN	LED Enable Pin	
29	NC	No Connection	
30	NC	No Connection	
31	LED_VCC	Power Supply for LED Driver	
32	LED_VCC	Power Supply for LED Driver	
33	LED_VCC	Power Supply for LED Driver	
34	NC	No Connection	

Pin	Symbol	Function	Note
35	NC	No Connection	
36	NC	No Connection	
37	NC	No Connection	
38	NC	No Connection	
39	NC	No Connection	
40	NC	No Connection	

5. BLOCK DIAGRAM
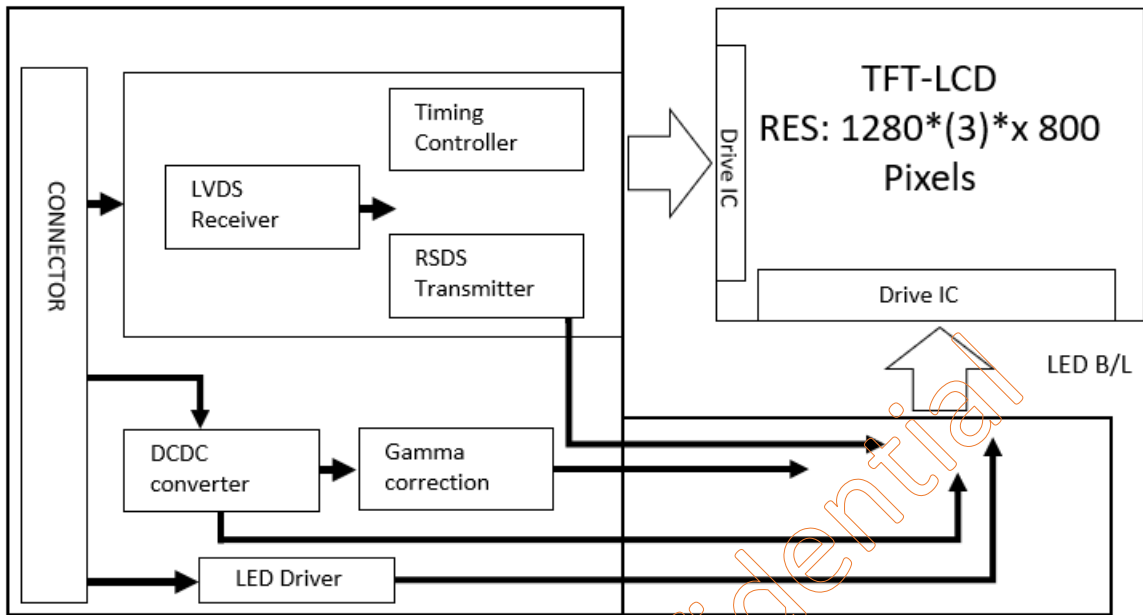
6. OPTICAL CHARACTERISTIC

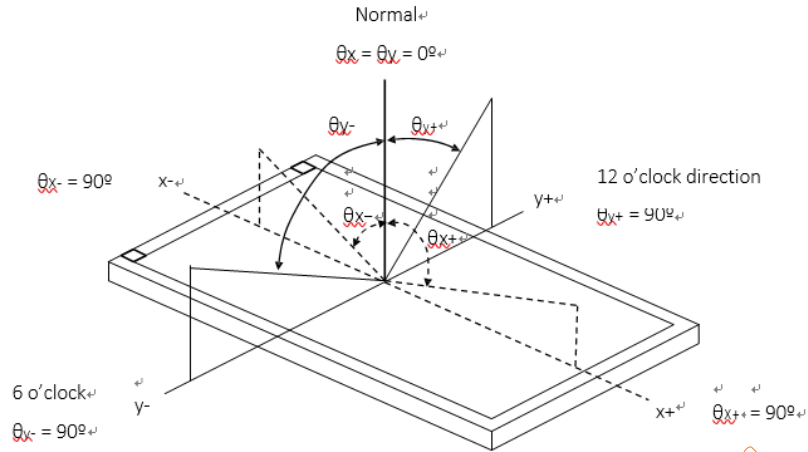The optical characteristics are measured under stable conditions at room temperature.

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	$\theta_X=0°$	600	800	-	-	(2)(5)
Response Time		T_R+T_F	25ºC	-	25	50	ms	(3)
Center Luminance of White		LC		300	350	-	cd/m2	(4)(5)
Brightness Uniformity				70	75	-	%	
Chromaticity	Red	Rx	$\theta_X=0°$, $\theta_Y=0°$ Viewing angle at normal direction	Typ. -0.03	TBD	Typ. +0.03	-	(1) (5)
		Ry			TBD		-	
	Green	Gx			TBD		-	
		Gy			TBD		-	
	Blue	Bx			TBD		-	
		By			TBD		-	
	White	Wx			0.313		-	
		Wy			0.329		-	
Viewing Angle	Horizontal	θ_X+	CR=10	75	85	-	Deg.	(1)(5)
		θ_X-		75	85	-		
	Vertical	θ_Y+		75	85	-		
		θ_Y-		75	85	-		

The following optical specifications shall be measured in a darkroom or equivalent state (ambient luminance <2 lux, and at room temperature).

The room temperature is 25°C±2°C.

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.
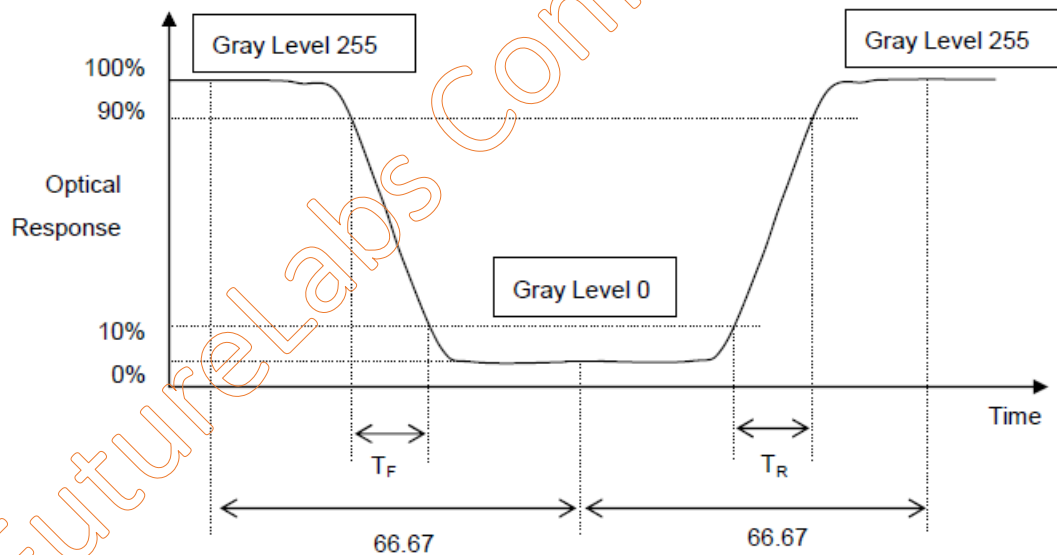
Normal
$\theta x = \theta y = 0º$

$\theta y-$ $\theta x+$

$\theta x- = 90º$ x-

12 o'clock direction
y+
$\theta y+ = 90º$

$\theta x-$
$\theta x+$

6 o'clock
y-
$\theta x- = 90º$

x+ $\theta x+ = 90º$

Note 2: Definition of Contrast Ratio (CR)

Measure the viewing angle of Θ= 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 (TR)" and the "Falling Time (TF)" respectively. Please refer the figure to the followings:

Gray Level 255   Gray Level 255

100%
90%

Optical
Response

Gray Level 0

10%
0%
Time

T_F T_R

66.67   66.67
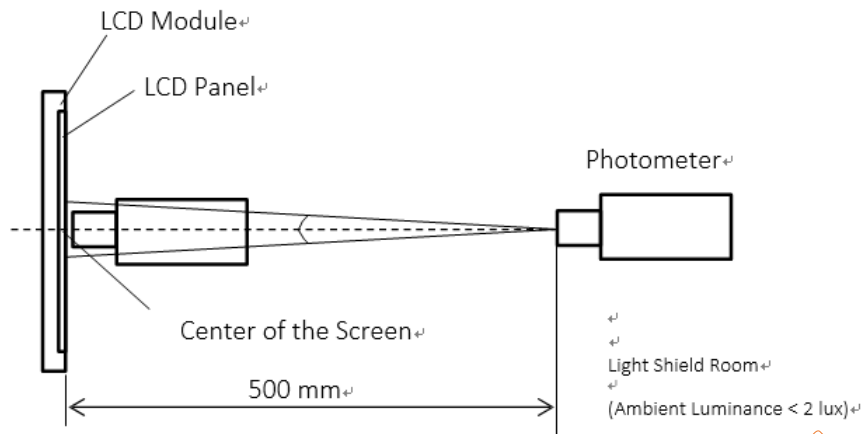
Note 4: Definition of Brightness (L)

Measure the center area of the panel and the viewing angle of the $\theta x = \theta y = 0°$

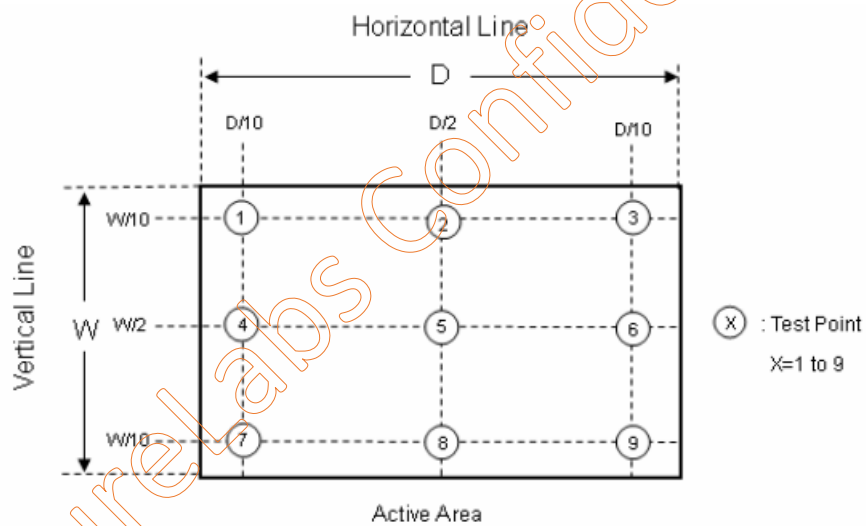Note 5: The method of optical measurement:

Note 6:   Definition of White Variation (δW):

Measure the luminance of gray level 255 at 5 points

δW = Maximum [L (1), L (2), L (3), L (4)~ L (9)] / Minimum [L (1), L (2), L (3), L (4)~ L (9)]

Touch Screen specification

B-1. Environmental Specification

Specification	Value
Operating Temperature	-20ºC ~ 70ºC
Storage Temperature	-30ºC ~ 80ºC
Operating Humidity	20% ~ 90%RH
Storage Humidity	10% ~ 90%RH

B-2. Mechanical Specification

Specification	Value
Operating Life (Finger input)	10^7 times
Light Transmittance	>85% Min. (JIS K-7105) with glass
Surface hardness	6H
FPC Peeling Force	5N Max

B-3. USB-I2C Combo Type Controller

Parameters	Features
Circuit Board Dimension	Refer to drawings
Channels of Panel	Based on Sensor Design
Input Voltage	5V for USB- 5V/3.3V (Min 3,2V) for I2C
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	16384×16384 resolution
Power consumption(mA)	Active Mode: <50mA
	Idle Mode : <45mA
	Sleep Mode :<15mA
	(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 parameter

7. TFT RELIABILITY TEST

Test Item	Operating Mode	Temperature / Humidity	Condition
High Temperature / High Humidity Test	Operating	60°C / 90%RH	240 hrs
High Temperature Test	Operating	70°C	240 hrs
Low Temperature Test	Operating	-20°C	240 hrs
High Temperature Test	Storage	80°C	240 hrs
Low Temperature Test	Storage	-30°C	240 hrs
Shock Test	Non- Operating	Room Temperature	(1) 240G (2) 2ms (3) 1 time for ±X, ±Y, ±Z 6 Directions
Vibration Test	Non- Operating	Room Temperature	(1) 1.5G (2) 10~500Hz (3) X, Y, Z each axis/1hour.

Note (1) A sample can only have one test. Outward appearance, image quality and optical data can only be checked at normal conditions according to the document before reliable test. Only check the function of the module after reliability test.

Note (2) The setting of electrical parameters should follow the typical value before reliability test.

Note (3) During the test, it is unaccepted to have condensate water remains. Besides, protect the module from static electricity.

Note (4) The sample must be released for 24 hours under normal conditions before judging. Furthermore, all the judgment must be made under normal conditions. Normal conditions are defined as follow: Temperature: 25℃, Humidity: 55± 10%RH. Ta= Ambient Temperature, Tgs= Glass Surface Temperature.

Note (5) The module should be fixed firmly in order to avoid twisting and bending.

8. OUTLINE DIMENSION

Front VIEW

250.6±0.2(Cover Glass O.D.)
217.56±0.2(Cover Glass V.A.)
216.96 (LCD A.A.)
16.52
(125.3)
4*R2.5
17.7
(85.8)
171.6±0.2(Cover Glass O.D.)
136.2±0.2(Cover Glass V.A.)
135.6 (LCD A.A.)

EMI tape Double side
2-Ø3.5
2-Ø2.5
Stiffener board PI (Brown)
Fixing Ground Pad
I2C Connector apply following Touch inteface Type:P125L-065MT-01(HF) or EQUIVALENT
USB Connector apply following Touch inteface Type:P125L-04SMT-01(HF) or EQUIVALENT
72.45±0.5
84.7±0.5

6.19±0.5 (C)
2.55±0.3
4*C0.15(45°) Matte Edge
Glass thicknss = 1.8±0.1mm (CS glass)
IC components : Max. t=3.5mm
9 (Max.)
1.2±0.1
4.7±0.5

Back VIEW

249.6±0.3 (DSA2 outer dimension)
235.6±0.3 (DSA2 inner dimension)
229.46±0.5 (LCD O.D.)
0.5±0.5
11.82±0.5
13.11±0.5
0.5±0.5
Pantone Black C(PMMA) Printing Side
(113.48)
(72.69)
(59.96)
149.1±0.5 (LCD O.D.)
156.6±0.3 (DSA2 inner dimension)
170.6±0.3 (DSA2 outer dimension)
(77.35)
CN1 : Starconn / 300E40-0010RA-G3
Rear DSA, t=0.25mm
54
27
60.56±1
2.25
28.5
33
16.16
(18.78)
(94.83)

Note:
1. Tolerance: ±0.5mm
2. Touch finger input or special conductive pen
3. Touch Surface Hardness: 6H (Chemical strength Glass)
4. Touch Transmittance: >85% (JIS-K7105)
5. Touch Surface Treatment: NA
6. If customer put a front cover all around need use at least 2mm thick gasket between touch and metal frame
7. 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 model : FLC-101HMLC000SA1#00
10. Touch model : RTPC101W-0010-C#00
11. Assembly Solution : DSA

J3:Pin Define for I2C 6 pin

Pin	
Pin 01	GND
Pin 02	SDA
Pin 03	SCL
Pin 04	VDD(5V/3.3V) (3.2V Min)
Pin 05	INT
Pin 06	RST

J2:Pin Define for USB 4 pin

Pin	
Pin 01	GND
Pin 02	D-
Pin 03	D+
Pin 04	VDD(5V)

Pin Define

PIN	SYMBOL	PIN	SYMBOL	PIN	SYMBOL	PIN	SYMBOL
1	NC	11	LV1N	21	LV3P	31	LED VCC
2	VDD	12	LV1P	22	GND	32	LED VCC
3	VDD	13	GND	23	LED GND	33	LED VCC
4	NC	14	LV2N	24	LED GND	34	NC
5	NC	15	LV2P	25	LED GND	35	NC
6	NC	16	GND	26	NC	36	NC
7	NC	17	LVCLKN	27	LED PWM	37	NC
8	LV0N	18	LVCLKP	28	LED EN	38	NC
9	LV0P	19	GND	29	NC	39	NC
10	GND	20	LV3N	30	NC	40	NC

Customer Approval	Part Number # Rev.	FLD-101HMLC0PUFA3	#01	
Date	Draw. Ver.	Date	Person	Description
Company	01	20220500	Matt	Correct FPC Length
Name				
Signature	Date	Design By	Date	Check By	Date	Approved By

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°C ± 5°C and the humidity is below 60% RH.