

## Product Specification

PART NUMBER # REV: FLD-101HML00PCSA2#00

DESCRIPTION: TFT 10.1" w, 1280(H)\*800(V), LVDS,  
16.7M Color, 1200CD with Rocktouch PCAP Black 6mm USB-I2C

- Preliminary Specification
- Approved Specification

<b>Customer Name:</b>	
<b>Signature:</b>	<b>Date:</b>

PREPARED BY	REVIEWED BY
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## Revision History

Version	Date	Page	Description	Note
V1.0	2022/06/16		First Edition	

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# 1. GENERAL DESCRIPTION

## 1.1 Description

10.1 inch 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 1280 x 800 screen and 16.7 M 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	Pixel Number	1280 (H) x 3(RGB)x 800 (V)	Pixels
3	Outline Dimension	283(W)×202(H)×12.3(D)	mm
4	Active Area	216.96 (W) x 135.60 (H)	mm
5	Pixel Pitch	0.1695(W) x 0.1695(H)	mm
6	Display Colors	16.7M colors (8bit RGB)	
7	Pixel Arrangement	RGB vertical stripe	-
8	Display Mode	Normally Black	-
9	Electrical Interface	LVDS	-
10	Surface Treatment	None	-
11	Brightness	1200 (Typ.)	cd/m <sup>2</sup>
12	Contrast Ratio	1000 (Typ.)	-
13	Power Supply Voltage	3.3V for LCD – 12V for Backlight	
14	Power Consumption	Backlight System: 6W (Typ.) Total: 7W (Typ.)	W

## 2. ABSOLUTE MAXIMUM RATING

### 2.1 Electrical Absolute Rating

Item	Symbol	Values			Unit	Note
		Min	Typ	Max		
Power Supply Voltage	VDD	-0.3	-	3.9	V	GND=0

### 2.2 Environment Absolute Rating

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

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### 3. ELECTRICAL CHARACTERISTICS

#### 3.1 TFT LCD Module

Item	Symbol	Values			Unit	Note
		Min	Typ	Max		
Power supply voltage	VDD	3.0	3.3	3.6	V	GND=0
Power Current	I <sub>VDD</sub>	-	300	-	mA	
Input logic high voltage	V <sub>IH</sub>	0.8VDD	-	3.6	V	
Input logic low voltage	V <sub>IL</sub>	0	-	0.2VDD	V	

#### 3.2 Backlight Characteristics

Parameter guideline for LED driving is under stable conditions at 25°C (Room Temperature):

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Power for Analog circuit	VDD_LED	11.0	12.0	13.0	V	GND=0
Backlight Current	I <sub>VDD_LED</sub>	-	500	-	mA	
PWM Singal Voltage_High	VPWM	3.0	-	3.6	V	
PWM Singal Voltage_Low		0	-	0.4	V	
LED PWM Duty Cycle	T <sub>D</sub>	1	-	100	%	
LED driver PWN Signal	LED_PWM	100	--	10K	HZ	GND=0
LED PWM High Threshold	V <sub>PWMH</sub>	-	3.3	-	V	
LED PWM Low Threshold	V <sub>PWML</sub>	-	0	-	V	
Operating LED life time	Hr	-	50000	-	Hours	(1)(2)

Note (1) LED life time (Hr) can be defined as the time in which it continues to operate under the condition:  
 $T_a = 25 \pm 3^\circ\text{C}$ , typical IL value indicated in the above table until the brightness becomes less than 50%.

Note (2) The "LED life time" is defined as the module brightness decrease to 50% original brightness at  $T_a = 25^\circ\text{C}$ .  
 The LED lifetime could be decreased if operating IL is larger. The constant current driving method is suggested.

### 3.3 DC and AC Characteristics

#### DC Electrical Characteristics

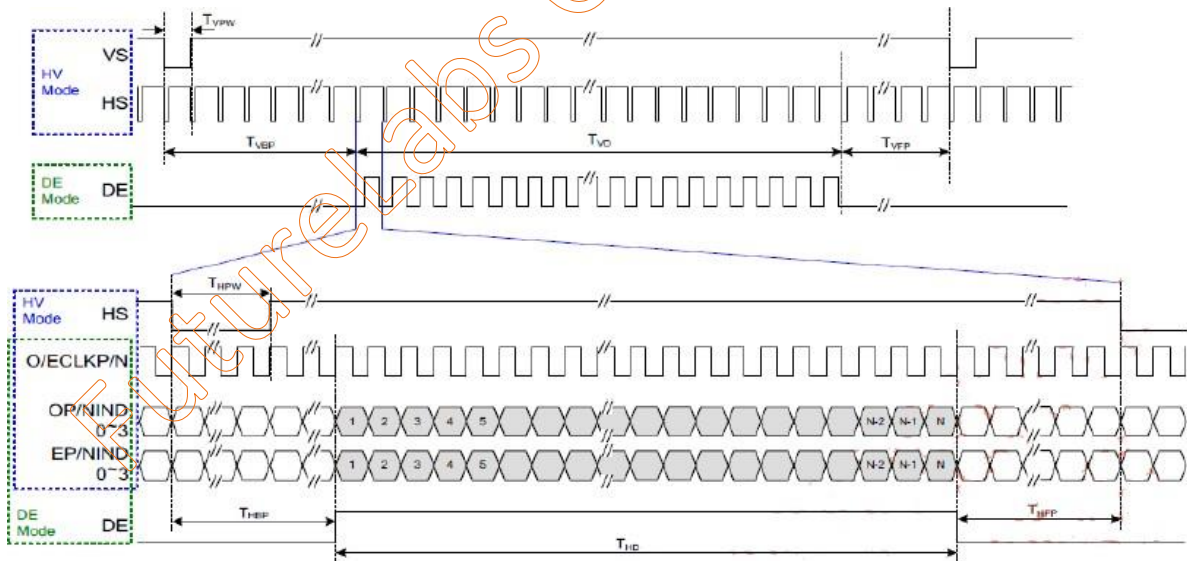
Item	Symbol	Min	Typ	Max	Unit	Note
Differential Input High Threshold Voltage	RXVTH	100	200	300	mV	
Differential Input Low Threshold Voltage	RXVTL	-300	-200	-100	mV	
Differential Input Common Mode Voltage	RXVCM	1.0	1.2	1.4	V	
Differential Input Voltage	IVIDI	200	-	600	mV	

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## 4. Signal Characteristic

### 4.1 Timing Chart

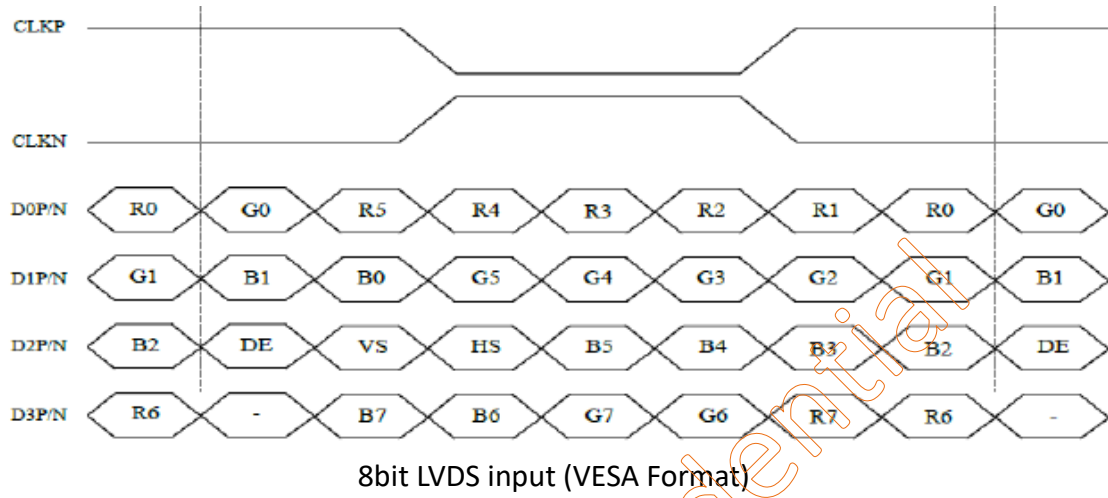
Item	Symbol	Min.	Typ.	Max.	Unit
Frame Rate	Fr	-	60	-	Hz
Vertical Total Time	TV	824	838	872	TH
Vertical Display Time	TVD	800			TH
VSYNC back porch(with pulse width)	TVBP	23	23	23	TH
VSYNC front porch	TVFP	1	15	49	TH
Vertical Blanking Time	TVBP+TVFP	24	38	72	TH
Horizontal Total Time	TH	1380	1440	1500	Tclock
Horizontal Display Time	THD	1280			Tclock
HSYNC back porch(with pulse width)	THBP	88	88	88	Tclock
HSYNC front porch	THFP	12	72	132	Tclock
Horizontal Blanking Time	THBP+THFP	90	160	220	Tclock
Clock Rate	1/Tclock	66.3	72.4	78.9	MHz



LVDS input timing format



## 4.2 The Input Data Format



## 5. INTERFACE PIN DESCRIPTION

### 5.1 LCM Connector PIN Assignment

A 40 Pin connector is used for the module electronics interface the recommended model is STM MSAK24025P40B or equivalent.

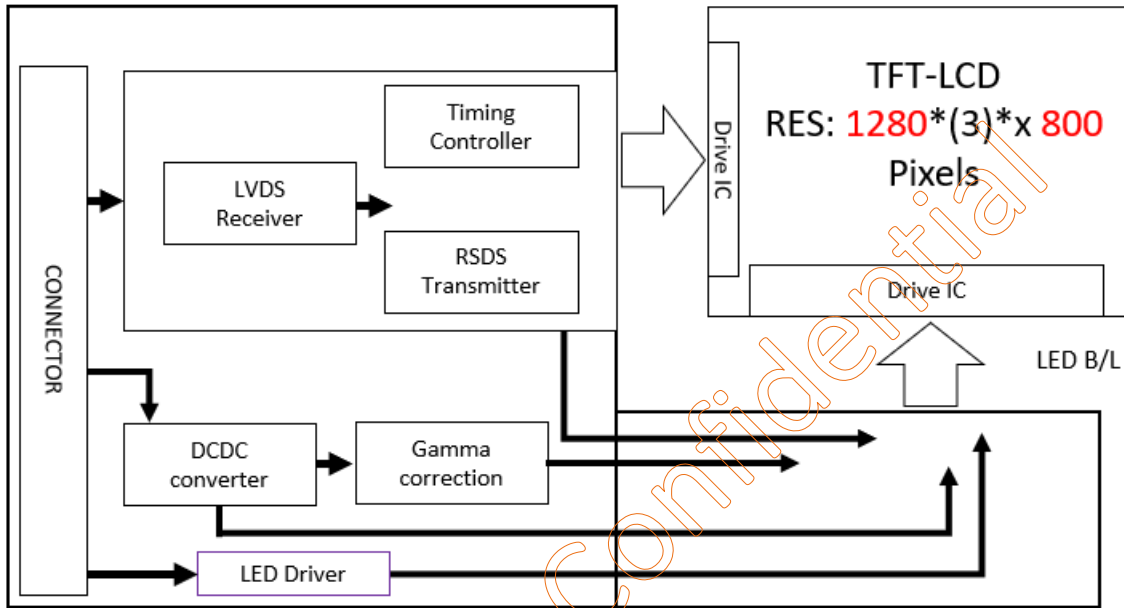
Pin No.	Symbol	I/O	Description
1	NC	-	No connection
2	VDD	P	power supply
3	VDD	P	power supply
4	NC	-	No Connection
5	NC	-	No Connection
6	NC	-	No Connection
7	NC	-	No connection
8	Rxin0N	I	-LVDS differential data
9	Rxin0P	I	+LVDS differential data
10	GND	P	Ground
11	Rxin1N	I	-LVDS differential data
12	Rxin1P	I	+LVDS differential data
13	GND	P	Ground
14	Rxin2N	I	-LVDS differential data
15	Rxin2P	I	+LVDS differential data
16	GND	P	Ground
17	RXCLKN	I	- LVDS differential clock input
18	RXCLKP	I	+ LVDS differential clock input
19	GND	P	Ground
20	Rxin3N	I	-LVDS differential data
21	Rxin3P	I	+LVDS differential data
22	GND	P	Ground

Pin No.	Symbol	I/O	Description
23	NC	-	No connection
24	NC	-	No connection
25	GND	P	Ground
26	NC	-	No connection
27	NC	-	No connection
28	GND	P	Ground
29	NC	-	No connection
30	NC	-	No connection
31	LED_K	P	Ground for LED Driver
32	LED_K	P	Ground for LED Driver
33	LED_K	P	Ground for LED Driver
34	NC	-	No connection
35	PWM	I	PWM signal for LED Driver Control Backlight Brightness
36	NC	-	No connection
37	NC	-	No connection
38	LED_A	P	Power Supply for LED Driver 12V
39	LED_A	P	Power Supply for LED Driver 12V
40	LED_A	P	Power Supply for LED Driver 12V

I : input O : output P : power

## 6. BLOCK DIAGRAM

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



## 7. OPTICAL CHARACTERISTIC

The optical characteristics are measured under stable conditions at room temperature 25 °C.

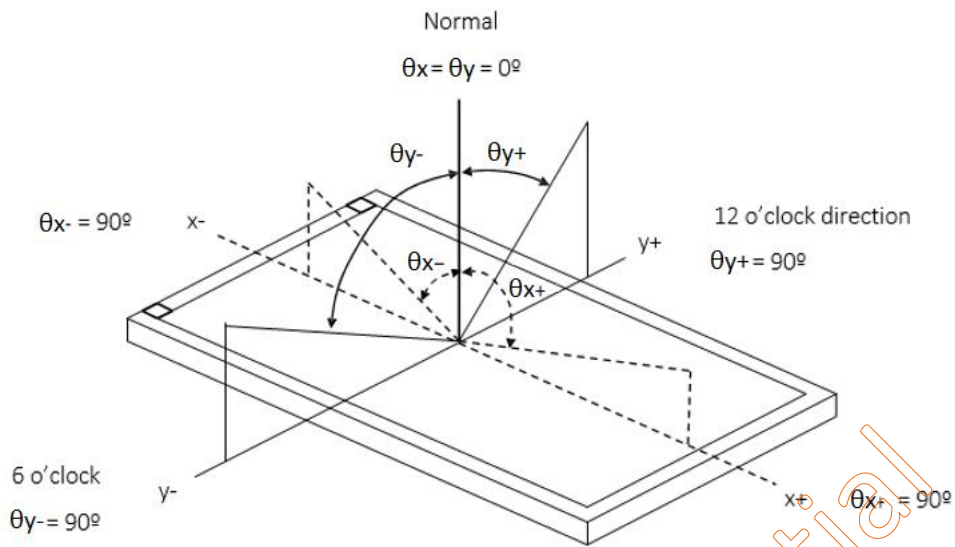
Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	$\theta_x=0^\circ$	800	1000	-	-	(2)(5)
Response Time		T <sub>R</sub>	25°C	-	25	35	ms	(3)
		T <sub>F</sub>						
Center Luminance of White		LC	$\theta_x=0^\circ, \theta_y=0^\circ$ Viewing angle at normal direction	1000	1200	-	cd/m <sup>2</sup>	(4)(5)
Brightness uniformity				75			%	(5)(6)
Chromaticity	Red	R <sub>x</sub>		$\theta_x=0^\circ, \theta_y=0^\circ$ Viewing angle at normal direction	Typ. -0.03	0.618	Typ. +0.03	-
		R <sub>y</sub>	0.328			-		
	Green	G <sub>x</sub>	0.335			-		
		G <sub>y</sub>	0.542			-		
	Blue	B <sub>x</sub>	0.136			-		
		B <sub>y</sub>	0.145			-		
	White	W <sub>x</sub>	0.322			-		
		W <sub>y</sub>	0.342			-		
Viewing Angle	Horizontal	$\theta_{x+}$	CR=10	80	85	-	Deg.	(1)(5)
		$\theta_{x-}$		80	85	-		
	Vertical	$\theta_{y+}$		80	85	-		
		$\theta_{y-}$		80	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

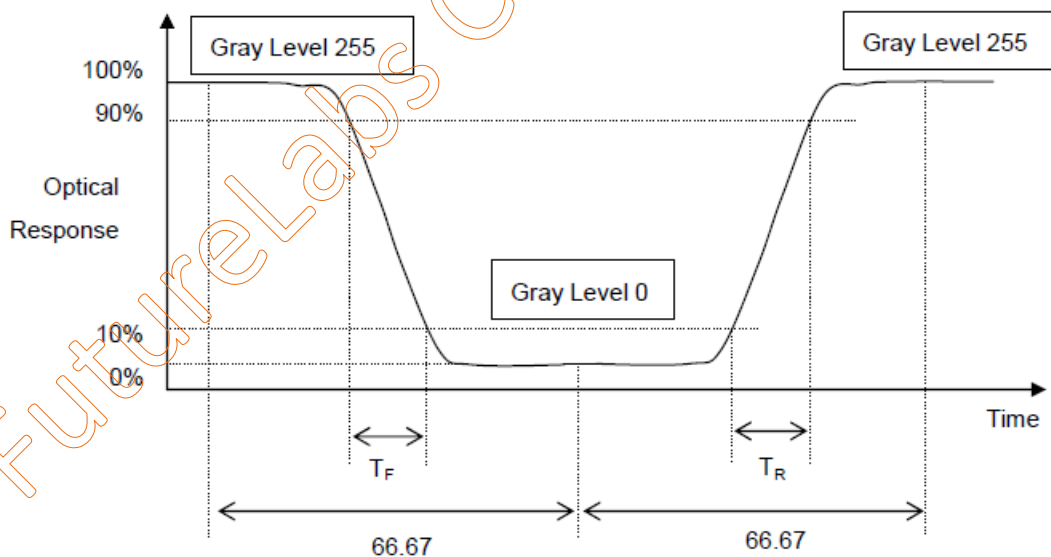


Note 2: Definition of Contrast Ratio (CR)

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:

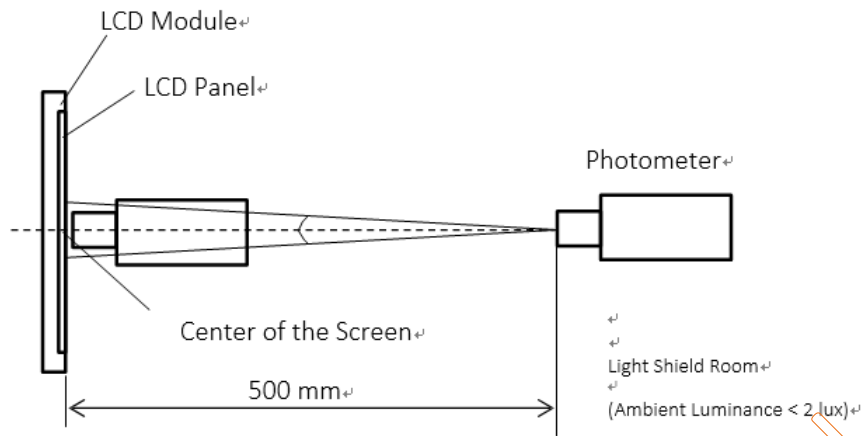
The response time is set initially by defining the “Rising Time (TR)” and the “Falling Time (TF)” respectively. Please refer the figure to the followings:



Note 4: Definition of Brightness (L)

Measure the center area of the panel and the viewing angle of the  $\theta_x = \theta_y = 0^\circ$

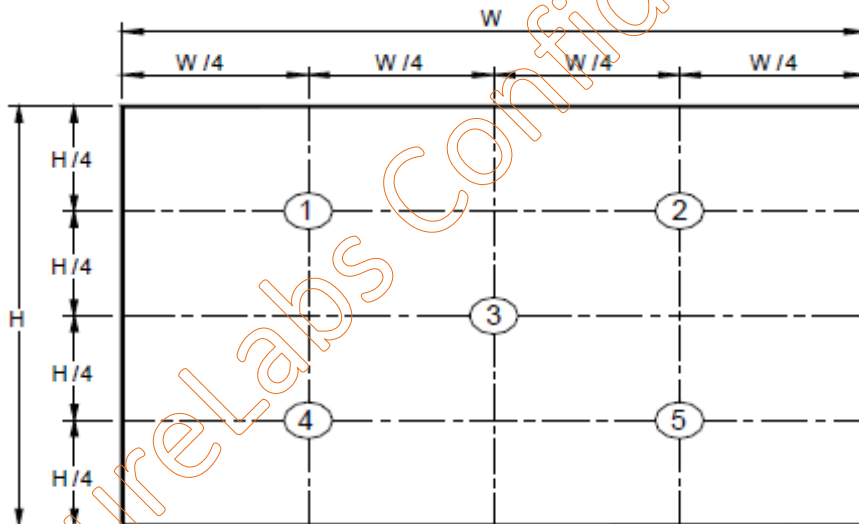
Note 5: The method of optical measurement:



Note 6: Definition of White Variation ( $\delta W$ ):

Measure the luminance of gray level 255 at 5 points

$$\delta W = (\text{Maximum } [L(1), L(2), L(3), L(4) \sim L(5)] / \text{Minimum } [L(1), L(2), L(3), L(4) \sim L(5)]) \times 100\%$$



## 8. Touch Screen Specification

### 8.1 Environmental Specification

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

### 8.2 Mechanical Specification

Specification	Value
Operating Life (Finger input)	10 <sup>7</sup> times
Light Transmittance	>86% Min. (JIS K-7105) with glass
Surface hardness	6H
FPC Peeling Force	5N Max

### 8.3 Combo Type Controller USB – I2C

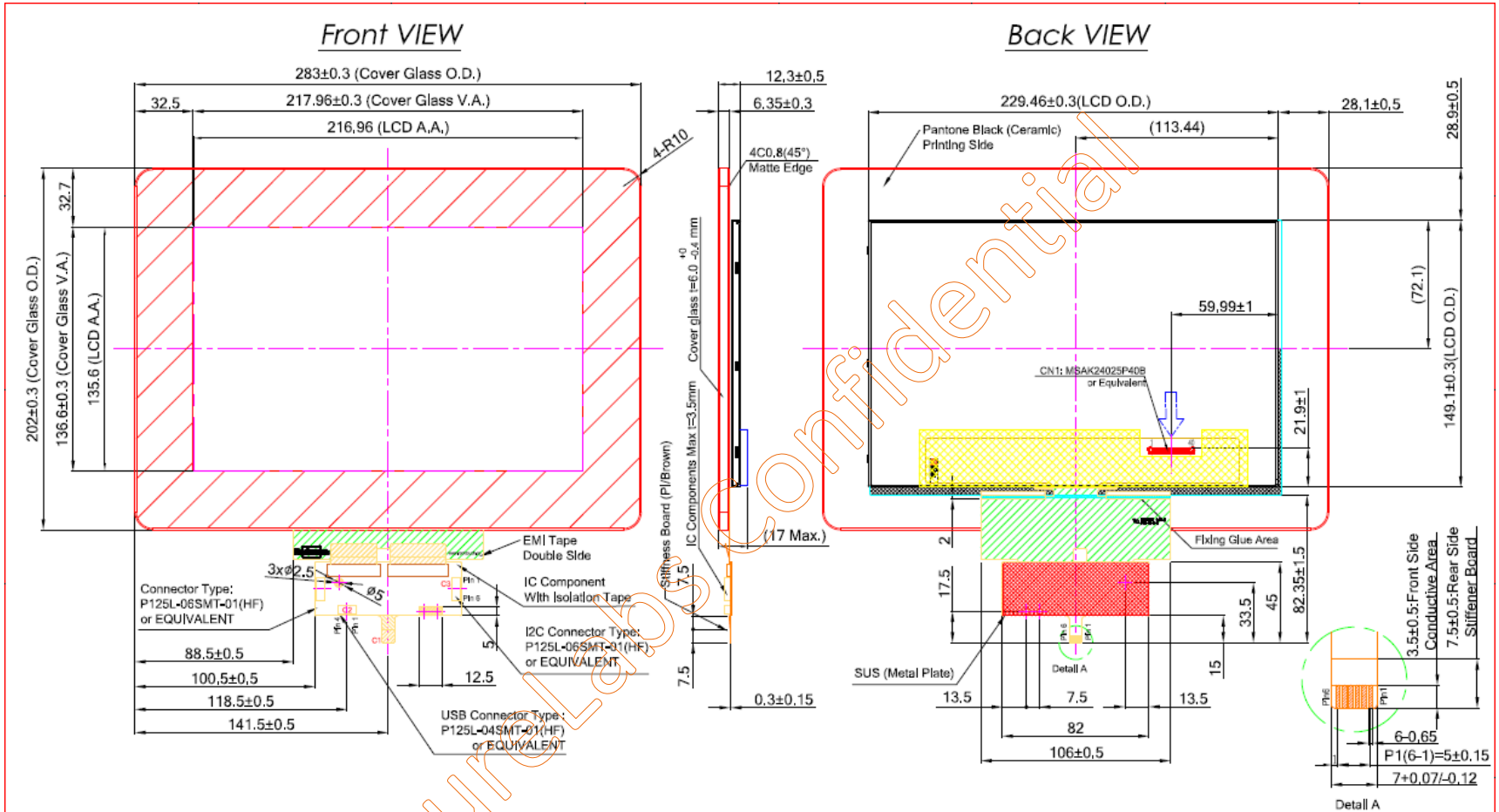
Parameters	Features
Circuit Board Dimension	Refer to drawings
Channels of Panel	Based on Sensor Design
Input Voltage	5V for USB – 5V/3,3V (Min 3,2V for I2C)
Linearity(Note 1)	Single Line drawing accuracy : Up to 1pt +/- 1mm offset /10mm
	Single Touch (point) accuracy : Up to 1pt +/- 1mm
Interface	USB: 2.0 Full Speed I2C: 100K/400K Hz
Resolution	16384x16384 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 others parameter.




# 9. DIMENSION AND DRAWING



- Note:**
1. Tolerance; ±0,5mm
  2. Touch finger Input or special conductive pen
  3. Touch Surface Hardness: 6H (Fully-Tempered 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-101HMLG200001#00
  10. Touch model : RTPC101WF1-R1-60BC1-C
  11. Assembly Solution : DSA

C1:USB Interface		C2: Pin Define for USB 4 pin		C3: Pin Define for I2C 6 pin	
Pin 01	GND	Pin 01	GND	Pin 01	GND
Pin 02	D-	Pin 02	D-	Pin 02	SDA
Pin 03	D+	Pin 03	D+	Pin 03	SCL
Pin 04	VDD(5V)	Pin 04	VDD(5V)	Pin 04	VDD(5V) 0.2V Min
Pin 05	NC			Pin 05	INT
Pin 06	RST			Pin 06	RST

Customer Approval		Part Number # Rev.		FLD-101HML00PCSA2 #00	
Date	Date/Ver.	Date	Person	Description	
Company Name					
Signature	Date	Design By	Date	Check By	Date
	Print Drawing	20220616	Name		



## 10. 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.