

## UP KIT Solution Specification

- ◇ PRELIMINARY SPECIFICATION
- ◆ APPROVED SPECIFICATION

### Part Number: KIT-104ETL20PUSA1B

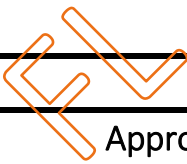
Description: 10.4" KIT SOLUTION WITH TFT LCD (TN Type 400CD, LVDS

interface, 800x600) assemble Pcap (3mm Black USB) DRIVEN BY CONVERTER

BOARD AND CABLES

Prepared by: Joy

Confidential

 Approved by	
Date	

## Revision History

Version	Date	Page	Description	Note
V0.1	2018/04/11		First Edition	

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## A. LCD specification

### 1. GENERAL DESCRIPTION

#### 1.1 Description

10.4" 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 SVGA, 800x600 screen and 16.2M 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	10.4	Inch
2	Pixel Number	800 (H) x RGB x 600 (V)	Pixels
3	Outline Dimension	243 (H) ×184 (V) ×7 (D)	mm
4	Active Area	211.2 (H) × 158.4 (V)	mm
5	Display Colors	16.2M	--
6	Pixel Arrangement	RGB vertical stripe	--
7	Display Mode	TN / Normally White / Transmissive	--
8	Electrical Interface	LVDS	--
9	Surface Treatment	Anti-Glare, 3H hard coating	--
10	Brightness	400 (Typ.)	cd/m2
11	Contrast Ratio	700 (Typ.)	--
12	Total Power Consumption (Typ)	4.8	W
13	Operating Temperature	-20 ~ 70	°C
14	Storage Temperature	-40 ~ 80	°C

## 2. ABSOLUTE MAXIMUM RATING

### 2.1 Electrical Absolute Rating

Item	Symbol	Values		Unit	Note
		Min	Max.		
Power supply voltage	VCC	-0.3	7	V	
Converter Voltage	Vi	-0.3	18	V	
Enable Voltage	EN	--	5.5	V	
Backlight Adjust	Dimming	--	5.5	V	

Note Permanent damage to the device may occur if max. values are exceeded. Function operation should be restricted to the conditions described under normal operating conditions.

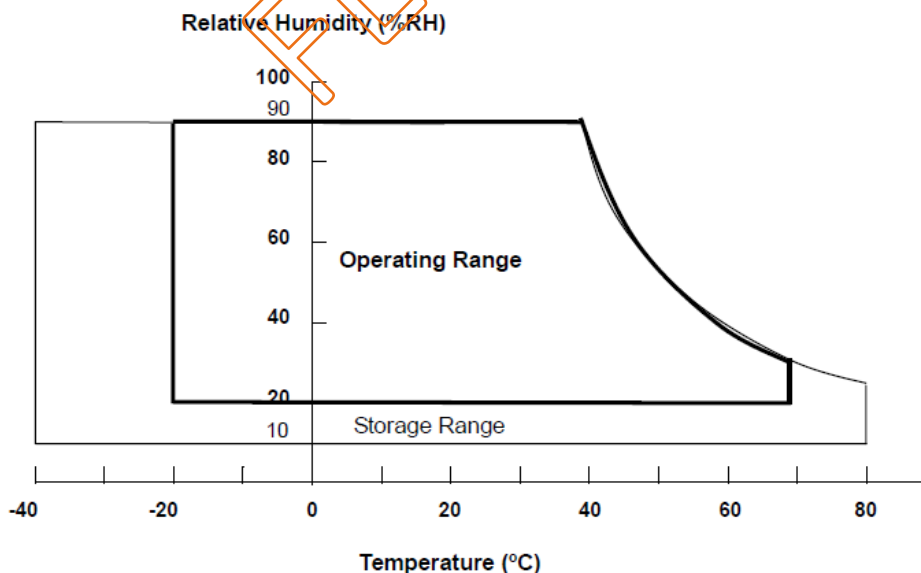
### 2.2 Environment Absolute Rating

Item	Symbol	Values			Unit	Note
		Min	Typ	Max.		
Operating Temperature	Top	-20		70	°C	Ta=25°C
Storage Temperature	Tstg	-40		80	°C	

Note (1) Temperature and relative humidity range is shown in the figure below.

Note (2) 90%RH Max. (Ta<40°C)

Note (3) Wet-bulb temperature should be 39°C Max.



### 3. ELECTRICAL CHARACTERISTICS

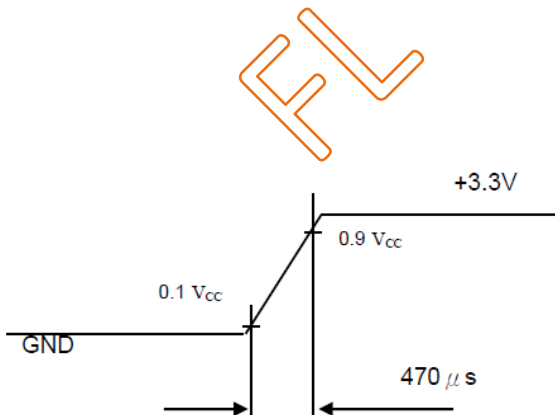
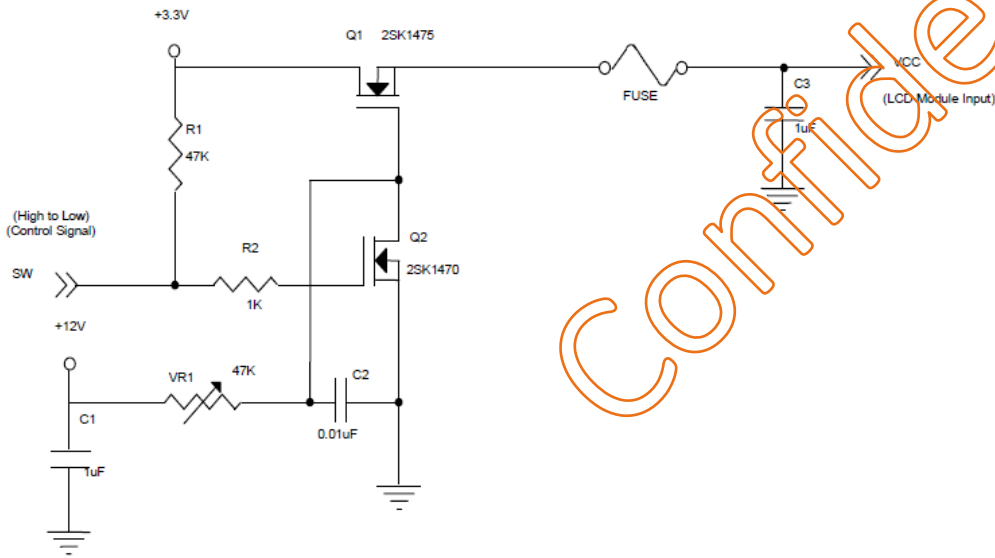
#### 3.1 LCM

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Power Supply Voltage	V <sub>CC</sub>	3.0	3.3	3.6	V	
Rush Current	I <sub>RUSH</sub>	-	-	4.0	A	(2)
Power Supply Current	White	--	410	490	mA	(3)
	Black	--	540	650	mA	
LVDS differential input voltage	VID	100	-	600	mV	-
LVDS common input voltage	V <sub>IC</sub>	0.7	-	1.6	V	-

Note (1) The assembly should be always operated within above ranges.

T<sub>a</sub> = 25 ± 2 °C

Note (2) Measurement Conditions:



Note (3) The specified power supply current is under the conditions at V<sub>DD</sub>=3.3V, T<sub>a</sub>=25 ± 2 °C, DC current and f<sub>v</sub>=60Hz, whereas a power dissipation check pattern below is displayed.

a. White Pattern



Active Area

b. Black Pattern



Active Area

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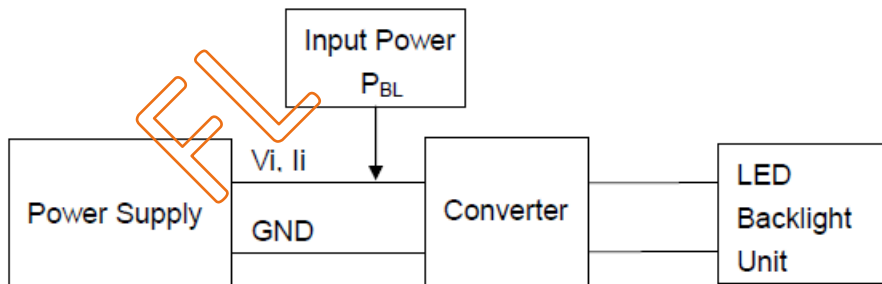
### 3.2 Backlight Unit

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

Symbol	Parameter	Min.	Typ.	Max.	Unit	Note	
$V_i$	Converter Power Supply Voltage	7	12.0	17	V		
$I_i$	Converter Power Supply Current	--	0.25	0.3	A	@ $V_i=12V$ (Duty 100%)	
$P_{LED}$	LED Power consumption	--	3	3.6	W	@ $V_i=12V$ (Duty 100%)	
--	EN Control Level	Backlight on	2.0	3.3	5.0	V	
		Backlight off	0	--	0.8	V	
--	PWM Dimming Control Level	PWM High Level	2.0	3.3	5.0	V	
		PWM Low Level	0	--	0.15	V	
--	PWM Dimming Control Duty Ratio	10	--	100	%		
$f_{PWM}$	PWM Dimming Control Frequency	190	200	20K	Hz	Recommend 200Hz	
LL	LED life Time (Typical)	30,000		--	Hrs	(2)	

Note (1) LED current is measured by utilizing a high frequency current meter as shown below:

Note (2) The life time of LED is estimated data and defined as the time when it continues to operate under the conditions at  $T_a=25 \pm 2$  °C and Duty 100% until the brightness becomes  $\leq 50\%$  of its original value. Operating LED under high temperature environment will reduce life time and lead to color shift.





## 4. SIGNAL CHARACTERISTICS

### 4.1 Interface Timing

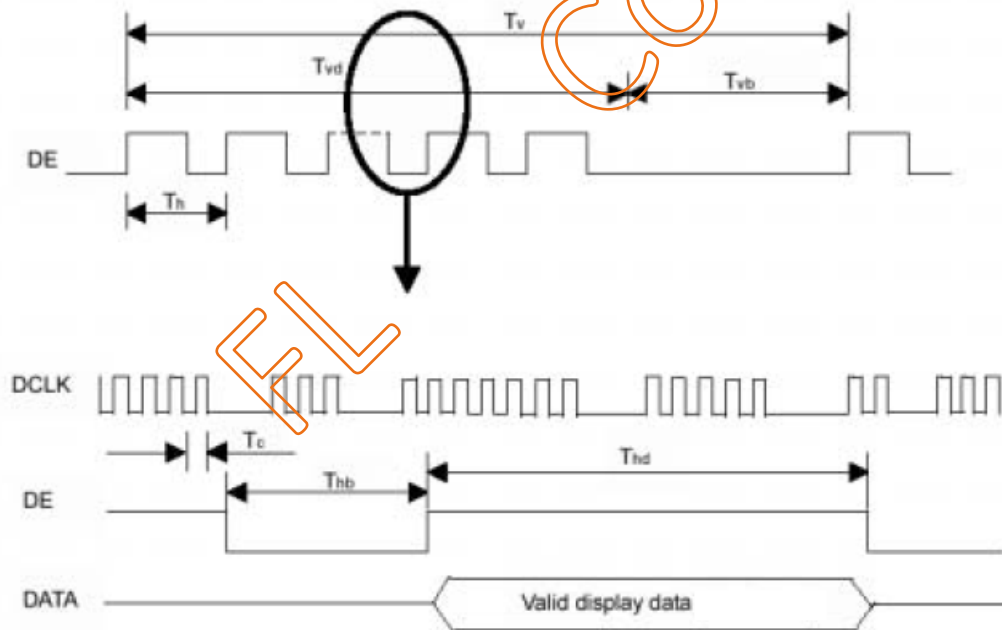
#### 4.1.1 Timing Characteristics:

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
DCLK	Frequency	Fc	35	40	45	MHZ	
Vertical Display Term	Total	Tv	608	628	750	Th	Tv=Tvd+Tvb
	Display	Tvd	-	600	-	Th	-
	Blank	Tvb	8	28	150	Th	-
Horizontal Display Term	Total	Th	960	1056	1060	Tc	Th=Thd+Thb
	Display	Thd	-	800	-	Tc	-
	Blank	Thb	160	256	260	Tc	-

Note (1) Since this assembly is operated in DE only mode, Hsync and Vsync input signals should be set to low logic level or ground. Otherwise, this assembly would operate abnormally.

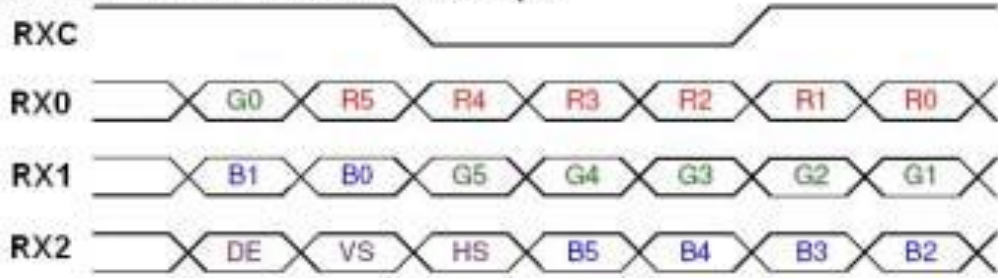
Note(2) Frame rate is 60Hz

#### INPUT SIGNAL TIMING DIAGRAM

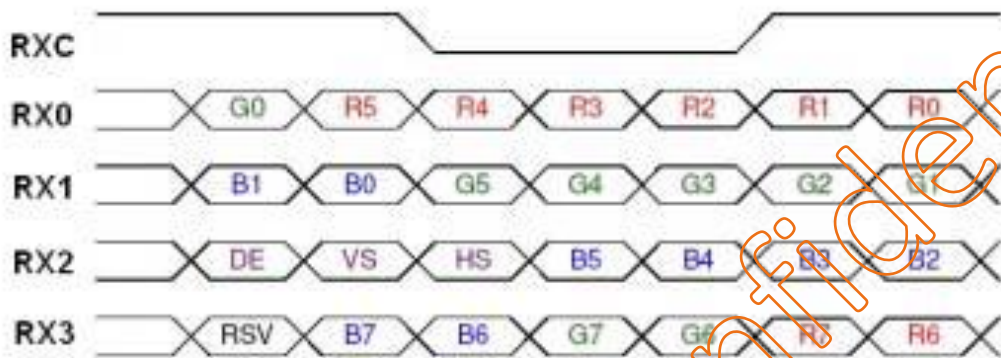


Note(3) Input Data format

**SEL68 = "Low" or "NC" for 6 bits LVDS Input**



**SEL68 = "High" for 8 bits LVDS Input**

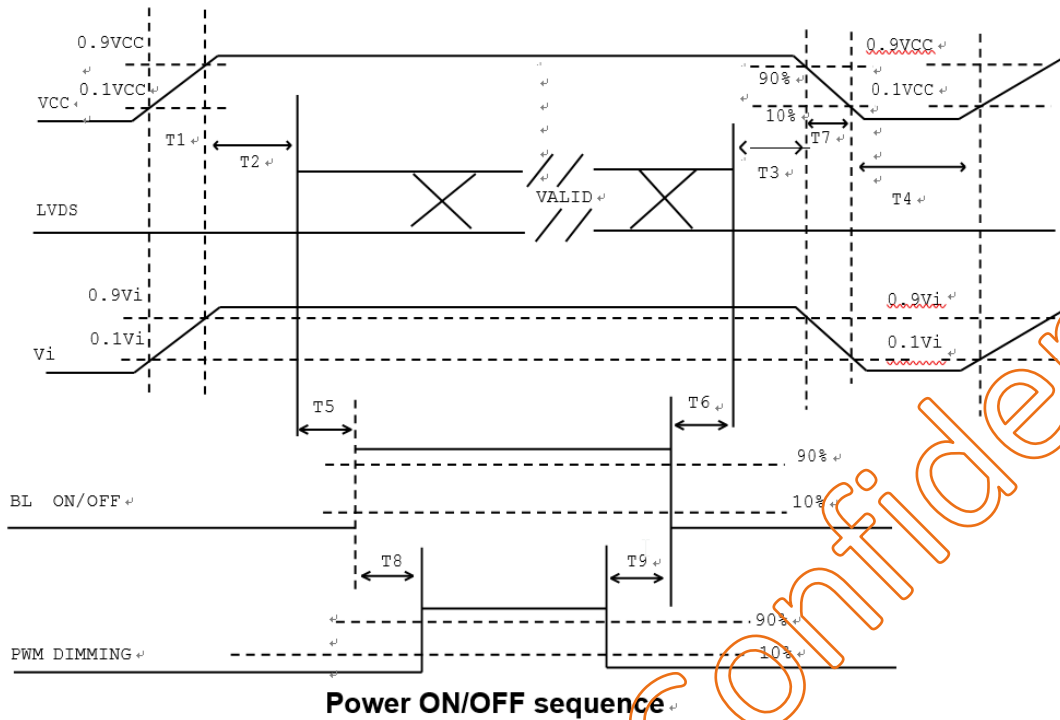


Note R/G/B data 7: MSB, R/G/B data 0: LSB; Please follow PSWG

Signal Name	Description	Remark
R7	Red Data 7 (MSB)	Red-pixel Data Each red pixel's brightness data consists of these 8 bits pixel data.
R6	Red Data 6	
R5	Red Data 5	
R4	Red Data 4	
R3	Red Data 3	
R2	Red Data 2	
R1	Red Data 1	
R0	Red Data 0 (LSB)	
G7	Green Data 7 (MSB)	Green-pixel Data Each green pixel's brightness data consists of these 8 bits pixel data.
G6	GreenData 6	
G5	GreenData 5	
G4	GreenData 4	
G3	GreenData 3	
G2	GreenData 2	
G1	GreenData 1	
G0	GreenData 0 (LSB)	
B7	Blue Data 7 (MSB)	Blue-pixel Data Each blue pixel's brightness data consists of these 8 bits pixel data.
B6	Blue Data 6	
B5	Blue Data 5	
B4	Blue Data 4	
B3	Blue Data 3	
B2	Blue Data 2	
B1	Blue Data 1	
B0	Blue Data 0 (LSB)	
RXCLKIN+ RXCLKIN-	LVDS Clock Input	
DE	Display Enable	
VS	Vertical Sync	
HS	Horizontal Sync	

### 4.1.2 Power ON/OFF Sequence

To prevent a latch-up or DC operation of LCD assembly, the power on/off sequence should be as the diagram below.



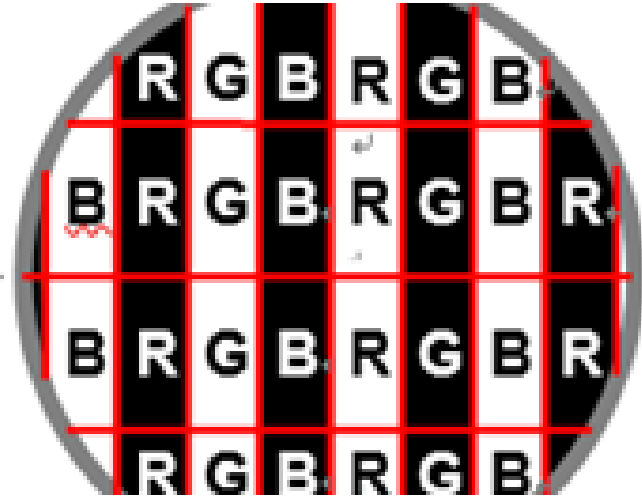
Note (1) Please avoid floating state of interface signal at invalid period.

Note (2) When the interface signal is invalid, be sure to pull down the power supply of LCD VCC to 0V.

Note (3) The Backlight converter power must be turned on after the power supply for the logic and the interface signal is valid. The Backlight converter power must be turned off before the power supply for the logic and the interface signal is invalid.

Parameter	Value			Units
	Min	Ty	Max	
T1	0.5	-	10	ms
T2	0	-	50	ms
T3	0	-	50	ms
T4	500	-	-	ms
T5	200	-	-	ms
T6	200	-	-	ms
T7	5	-	300	ms
T8	10	-	-	ms
T9	10	-	-	ms

## 4.2 Pixel Format Image



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## 5. INTERFACE PIN DESCRIPTION

### 5.1 LCM Connector PIN Assignment

CN1

	Symbol	Description	Note
1	VCC	Power supply	-
2	VCC	Power supply	-
3	GND	Ground	-
4	DPS	Reverser Scan Function High: Enable, Low: Disable	(3)
5	RX0-	LVDS Differential Data Input (Negative)	-
6	RX0+	LVDS Differential Data Input (Positive)	-
7	GND	Ground	-
8	RX1-	LVDS Differential Data Input (Negative)	-
9	RX1+	LVDS Differential Data Input (Positive)	-
10	GND	Ground	-
11	RX2-	LVDS Differential Data Input (Negative)	-
12	RX2+	LVDS Differential Data Input (Positive)	-
13	GND	Ground	-
14	RXC-	LVDS Differential Clock (Negative)	-
15	RXC+	LVDS Differential Clock (Positive)	-
16	GND	Ground	-
17	RX3-	LVDS Differential Data Input (Negative)	-
18	RX3+	LVDS Differential Data Input (Positive)	-
19	RSV	Reserved	-
20	SEL68	LVDS 6/8 bit select function control, Low or NC-> 6bit input mode High-> 8bit input mode	(3)

Note (1) Connector Part No.: STARCONN 107A20-0022RA-G3-R or equivalent.

Note (2) User's connector Part No.: STARCONN 093A20-010010-T4, HRS DF19G-20S-1C(05), STMP24013P20 or equivalent.

Note (3) "Low" stands for 0V. "High" stands for 3.3V. "NC" stands for "No Connection"

## 5.2 Backlight and LED Driver Connector PIN Assignment

### CN2

Pin No	Symbol	Description	Remark
1	Vi	Converter input voltage	12V
2	V <sub>GND</sub>	Converter ground	Ground
3	EN	Enable pin	3.3V
4	ADJ	Backlight Adjust	PWM Dimming (Hi: 3.3V <sub>DC</sub> , Lo: 0V <sub>DC</sub> )
5	NC	Not Connect	Ground

Note (1) Connector Part No.: 3823K-F05N-00L (Entry) or equivalent

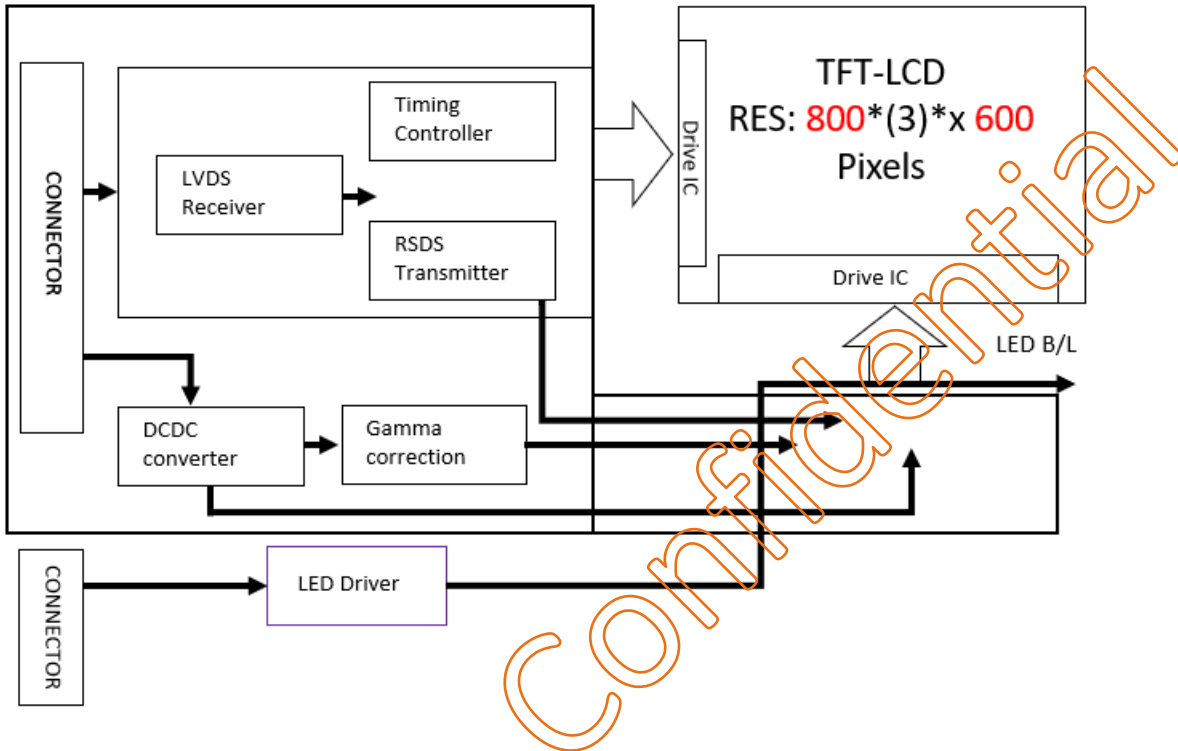
Note (2) User's connector Part No.: H208K-P05N-02B (Entry) or equivalent.

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## 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.

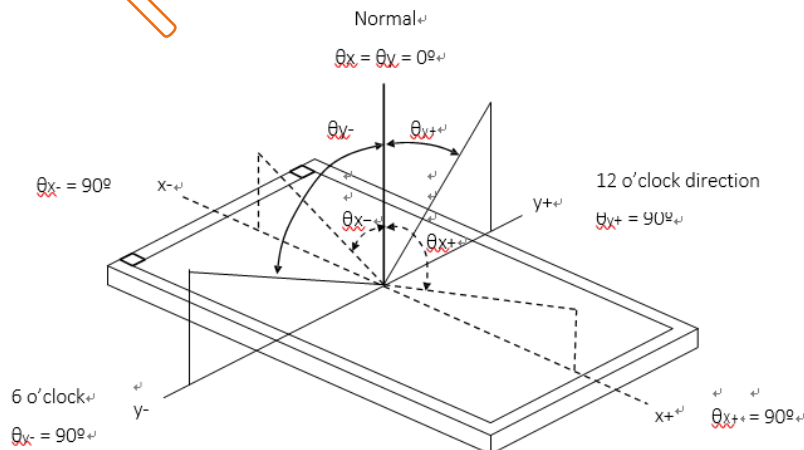
Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note		
Contrast Ratio		CR	$\theta_x=0^\circ, \theta_y=0^\circ$ Viewing angle at normal direction	500	700		-	(2)(5)		
Response Time		$T_R$		-	5	10	ms	(3)		
		$T_F$		-	11	16	ms			
Center Luminance of White		$L_C$			300	400	-	cd/m <sup>2</sup>	(4)(5)	
White Variation		$\delta W$			-	1.25	1.4	-	(5)(6)	
Chromaticity	Red	$R_x$		$\theta_x=0^\circ, \theta_y=0^\circ$ Viewing angle at normal direction	Typ.	0.609	Typ.	-	(1)	
		$R_y$	0.339			-				
	Green	$G_x$	0.333			-				
		$G_y$	0.590			-				
	Blue	$B_x$	0.154			-				
		$B_y$	-0.05			0.146		+0.05		-
	White	$W_x$	0.292			-				
$W_y$		0.334	-							
Viewing Angle	Horizontal	$\theta_{x+}$	CR $\geq$ 10	70	80	-	Deg.	(1)(5)		
		$\theta_{x-}$		70	80	-				
	Vertical	$\theta_{y+}$		60	70	-				
		$\theta_{y-}$		60	70	-				

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 $\pm$ 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



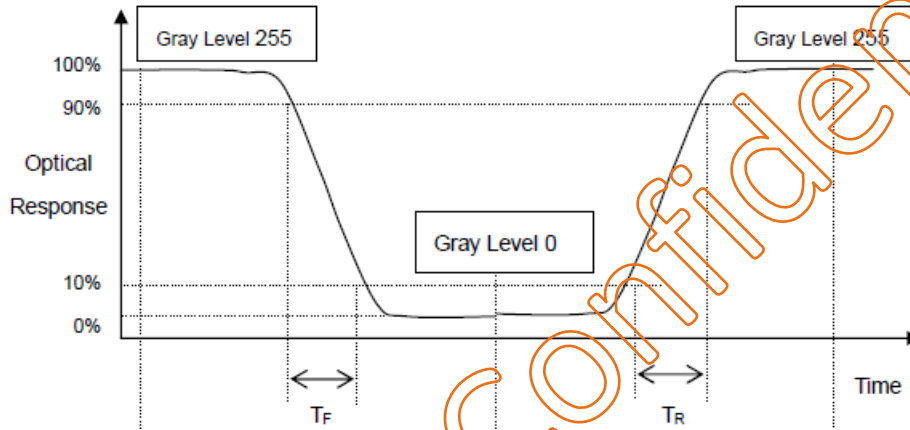


Note 2: Definition of Contrast Ratio (CR)

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:

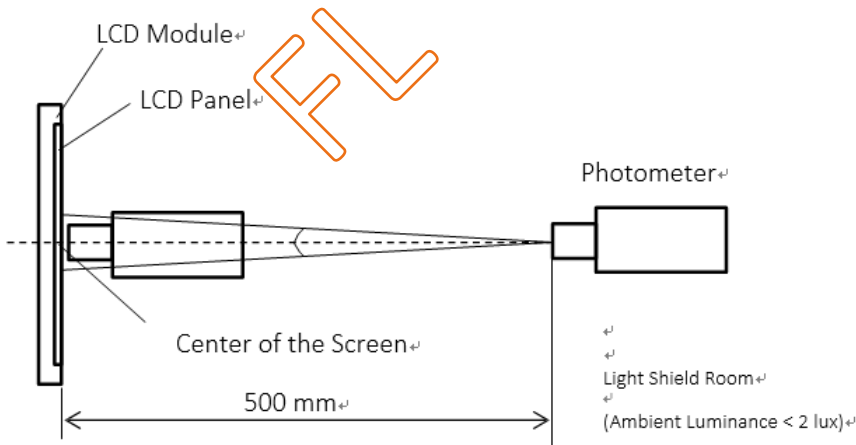
The response time is set initially by defining the “Rising Time ( $T_r$ )” and the “Falling Time ( $T_f$ )” respectively. The response time interval is between 10% and 90% of amplitudes, please refer the figure to the followings:



Note 4: Definition of Brightness (Lc)

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

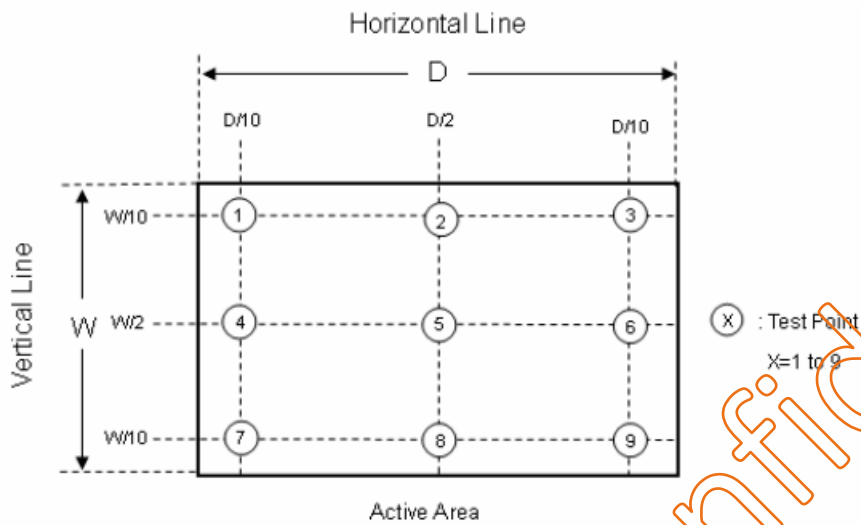
Note 5: The method of optical measurement:



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

Measure the luminance of gray level 255 at 9 points

$$\delta W = \text{Maximum [L (1), L (2), L (3)...L (8), L (9)]} / \text{Minimum [L (1), L (2), L (3)... L (4), L (5)]}$$



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## B. Touch Screen specification

### 1. Environmental Specification

Specification	Value	Remarks
Operating Temperature	-20°C ~ 70°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 <sup>7</sup> times
Light Transmittance	>85% Min. (JIS K-7105) with glass
Surface hardness	6H
FPC Peeling Force	5N Max

### 3. USB Type Controller

Parameters	Features
Circuit Board Dimension	Refer to drawings
Channels of Panel	Based on Sensor Design
Input Voltage	5V for USB
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
Resolution	4096×4096 resolution
Power consumption(mA)	Active Mode: <70mA
	Idle Mode : <55mA
	Sleep Mode :< 15mA
	(Operation Mode :Active Mode only)
Report rate(points/sec) Note(2)	> 100 Hz
Response time	Average < 25 ms

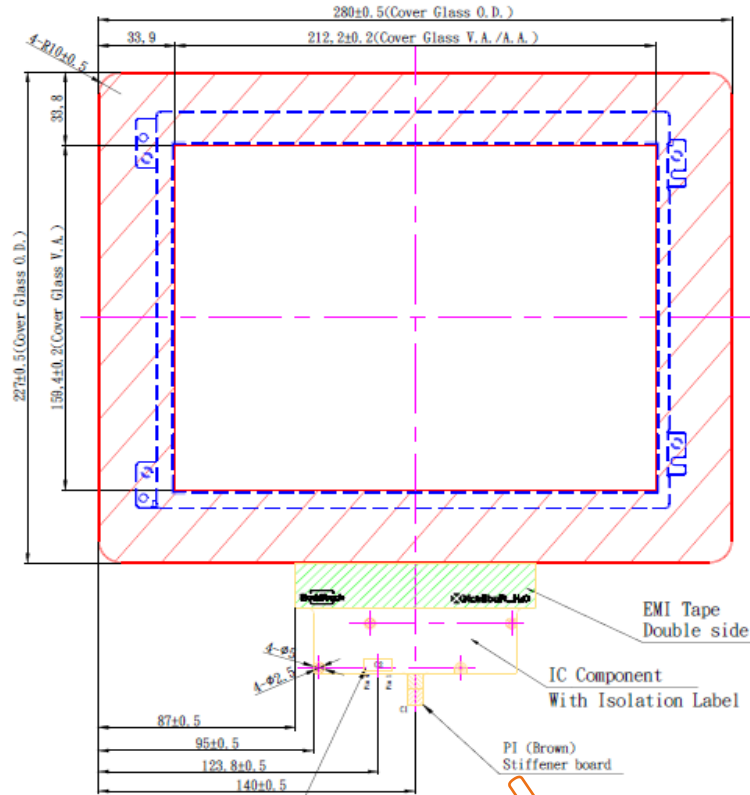
Note (1): Depending by Sensor design and other parameters, Refer to Windows 8 Logo regulation if need to follow min spec

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

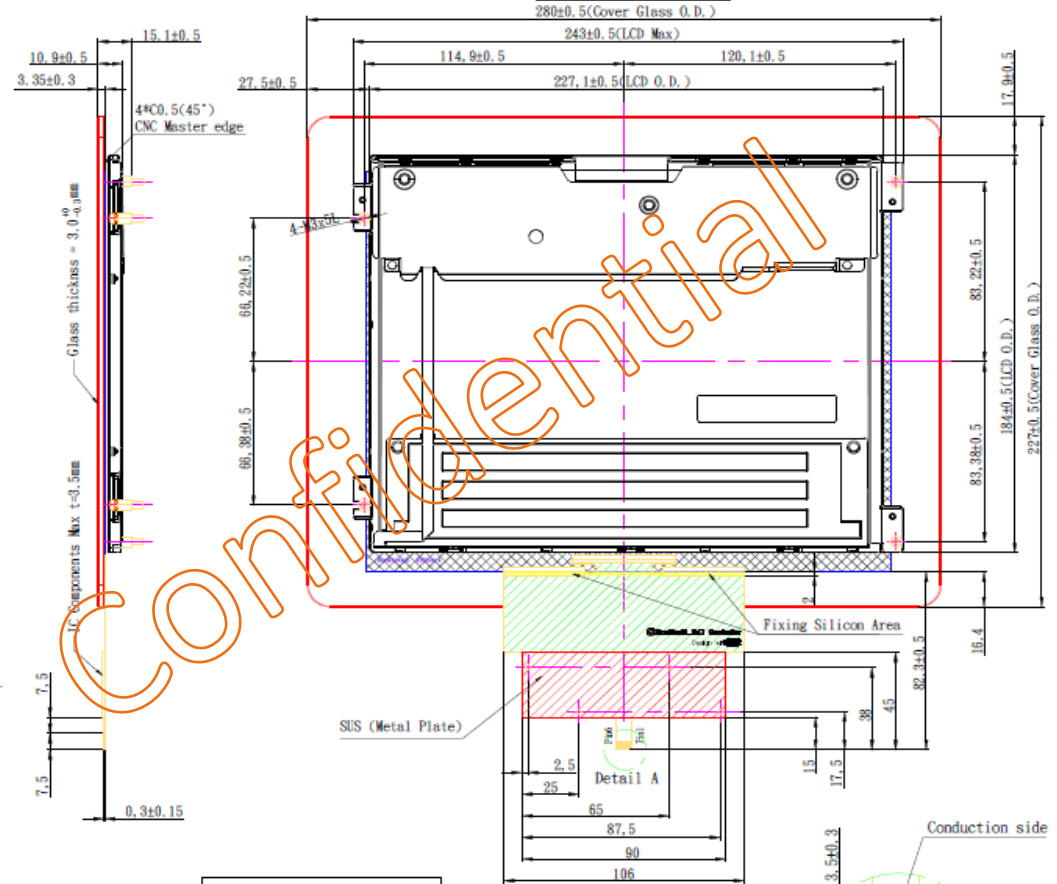
# C. DIMENSION AND DRAWING

LCM+TP

**Front VIEW**



**Back VIEW**

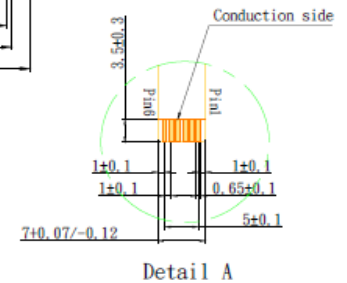


**Note:**

1. Tolerance: +/-0.3mm
2. Touch finger input or special conductive pen
3. Touch Surface Hardness: 6H (Semi Tempered Glass)
4. Touch Transmittance: >85% (JIS-K7105)
5. Touch Surface Treatment: None
6. Distance between LCD and touch panel need to be minimum 1.0mm otherwise touch maybe will not work correctly
7. If customer put a front cover all around need use at least 2mm thick gasket between touch and metal frame
8. USB max ripple acceptable is 50mV, in other case touch will not work correctly
9. Referring to the integration guide to avoid any integration noise issue
10. LCD model : FLC-104ETL2000SA1
11. Touch model : RTPC104-H30BP1-U
12. Assembly Solution : DSA

C1:USB Interface	
Pin 01	GND
Pin 02	D-
Pin 03	D+
Pin 04	VDD
Pin 05	NC
Pin 06	RST

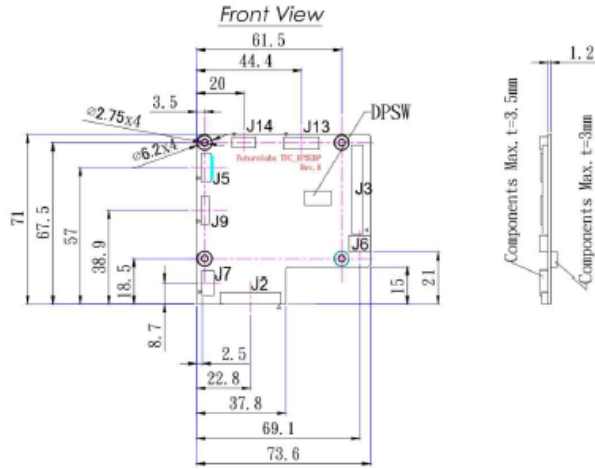
C2:Pin Define for USB 4 pin	
Pin 01	GND
Pin 02	D-
Pin 03	D+
Pin 04	VDD



Customer Approval		Part Number		FLD-104ETL20PUSA1	
Date	Rev	Date	Person	Description	
Company					
Name					
Date	Design By	Date	Check By	Date	Approved By
First Drawing	2017/03/11	Kevin			

## Converter board & Accessory

### 1. eDP Converter Board P/N : TFC\_UP2EDP

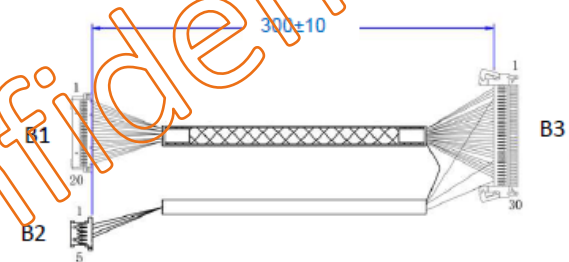


### 2. eDP to eDP Cable P/N : CBL-41-03-100-A



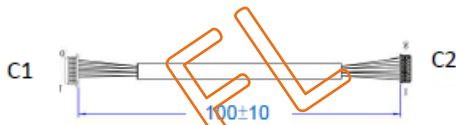
A1 to To UP eDP  
A2 to J9

### 3. LVDS Cable P/N : CB-EDP2G1045N03



B1 to LCD LVDS  
B2 to LCD LED Driver  
B3 to J3

### 4. Internal USB Cable P/N : CB\_UP2USB8



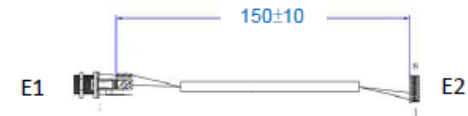
C1 To to UP USB  
C2 To to J5

### 5. Touch USB Cable 4 to 4 pin P/N : CB-EDP2USB4-200



D1 To J14  
D2 To Touch Screen

### 6. External Backlight power P/N : CB-EDP2DCJACK



DC Power JACK 5.5 \* 2.0  
E1 To 12V power  
E2 To J13

DPSW selection for 10.4"



Connector table of eDP Converter Board

Connector Number	Function	Cable
J2	No use	No use
J3	LVDS from 10.1"W up to 21.5"W	CB-EDP2G1045N03
J5	8 pin UB to 10 Pin USB UP	CB_UP2USB8
J6	No use	No use
J7 & J14	USB interface for Touch 10.4 up to 21.5"W	CB-EDP2USB4-200
J9	eDP to UP Board eDP-DSI	CBL-41-03-100-A
J13	Power Input for LCD backlight from 10.4"W up to 21.5"W	CB-EDP2DCJACK

Customer Approval		Part Number		KIT-104EML20PUSA1B	
Date	Rev. Date	Checked	Drawn	Description	
Company Name					
Signature	Date	Design By	Date	Check By	Date
First Drawing				Approved By	

## D. PRECAUTION AND PRODUCT HANDLING

- Do not apply the external force such as bending or twisting to the module 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 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.
- 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.



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