UP KIT Solution Product Specification

◇ PRELIMINARY SPECIFICATION

◆ APPROVED SPECIFICATION

Part Number: KIT-215MML20PUSA1B

Description: 21.5''W KIT SOLUTION with TFT LCD (1920*1080 Full HD LVDS 250CD) assemble Pcap 3mm Black USB Driven by CONVERTER BOARD with CABLE

Prepared by: Joy

Version : 0.3

	Approved by	
	Date	

Revision History

Version	Date	Page	Description	Note
V0.1	2018/4/24		First Edition	
V0.2	2018/6/28	P22	Modify Drawing	
V0.3	2018/7/20	P4/P5 P9/P22	Correct O.T eliminate double information, update Fclkin_mod, update with better image	

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Table of Content

A. LCD specification

1. GENERAL DESCRIPTION

1.1 Description

21.5" 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 FHD 1920x1080 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	21.5	Inch
2	Pixel Number	1920 (H) x RGB x 1080 (V)	Pixels
3	Outline Dimension	495.60 (H) ×292.20 (V) ×11.0 (D)	mm
4	Active Area	476.06 (H) × 267.79 (V)	mm
5	Display Colors	16.7M	- -
6	Pixel Arrangement	RGB vertical stripe	- -
7	Display Mode	Normally Black / Transmissive	- -
8	Electrical Interface	LVDS	- -
9	Surface Treatment	Anti-Glare, 3H hard coating	- -
10	Brightness	250 (Typ.)	cd/m2
11	Contrast Ratio	3000 (Typ.)	- -
12	Power Consumption (Typ)	Total 16.42	W

2. ABSOLUTE MAXIMUM RATING

2.1 Electrical Absolute Rating

Item	Symbol	Values			Unit	Note
		Min	Typ	Max.		
Power supply voltage	VCC	-0.3	-	6	V	(1)
Logic Input Voltage	VIN	-0.3	-	3.6	V	
LED Forward Current Per Input Pin	IF	-	65	69	mA	Duty=100% (1)(2)
LED Pulse Forward Current per Input Pin	IP	-	-	500	mA	(1), (2) Pulse Width≦10msec. and Duty≦25%

Note (1) 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) Specified values are for input pin of LED light bar at Ta-25+/- 2°C

2.2 Environment Absolute Rating

Item	Symbol	Values			Unit	Note
		Min	Typ	Max.		
Operating Temperature	Top	0		50	°C	Ta=25°C
Storage Temperature	Tstg	-20		60	°C	

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

　　　(a)　90% RH Max.. (b) Wet-bulb temperature should be 39°C Max. (Ta<40°C) (c) No condensation

　　(2) The temperature of panel surface should be 0°C min. and 60°C max. under Vcc=5V Fr=60Hz, typical LED string current. Any condition of ambient operating temperature, the surface of active area should be keeping not higher than 60°C
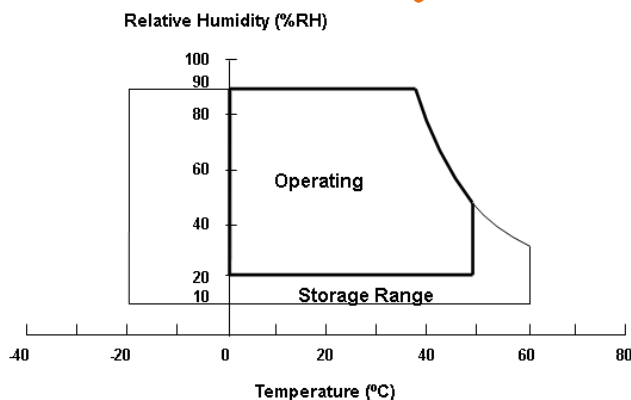
3. ELECTRICAL CHARACTERISTICS

3.1 LCM

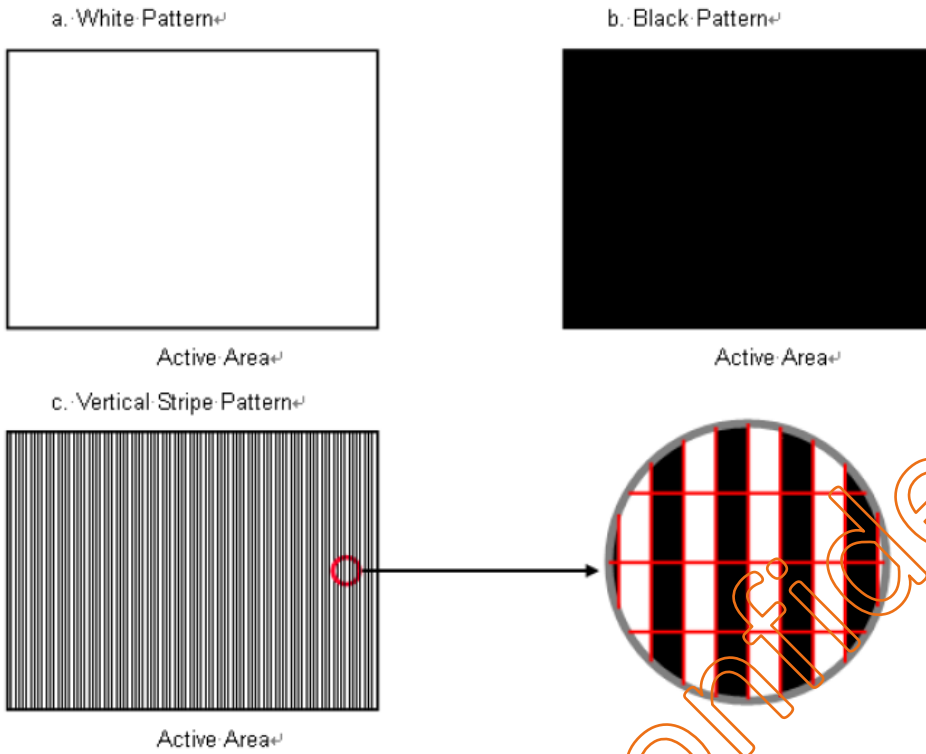| Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power Supply Voltage		VCC	4.5	5	5.5	V	
Ripple Voltage		V_{RP}	--	--	300	mV	
Rush Current		I_{RUSH}	--	--	3.0	A	(2)
Power Supply Current	White		--	0.768	0.910	A	(3)
	Black		--	0.720	0.845	A	
	Vertical Stripe		--	0.948	0.1105	A	
Power Consumption		P_{LCD}	--	4.8	5.6	W	(4)
LVDS differential input voltage		V_{ID}	100	--	600	mV	-
LVDS common input voltage		V_{CM}	1.0	1.2	1.4	V	-
Differential Input High Threshold Voltage		V_{TH}			+100	mV	
Differential Input Low Threshold Voltage		V_{TL}	-100			mV	

Note (1) The assembly should be always operated within above ranges. Ta = 25 ± 2 ºC

Note (2) Measurement Conditions:
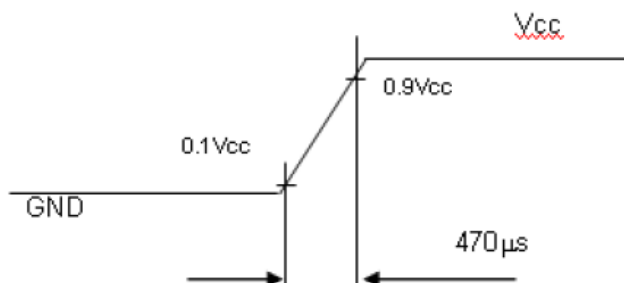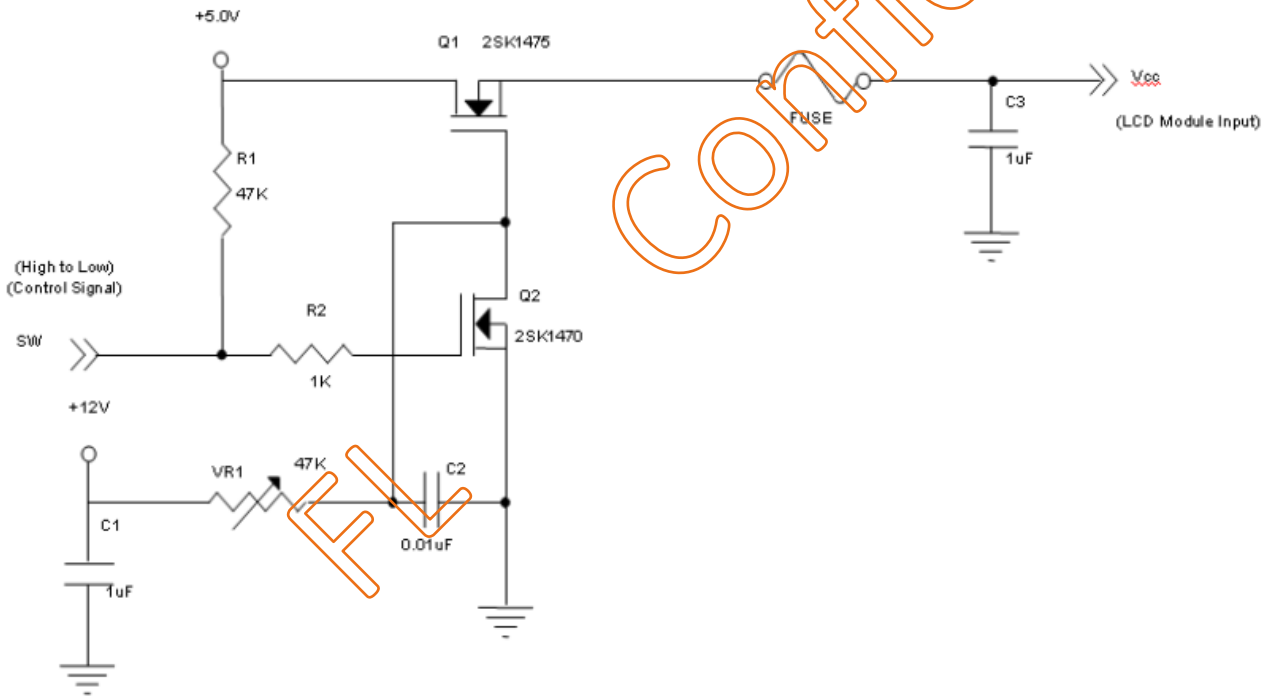
Note (3) The specified power supply current is under the conditions at Vcc=5V, Fr=60Hz, whereas a power dissipation check pattern below is displayed

a. White Pattern

Active Area

b. Black Pattern

Active Area

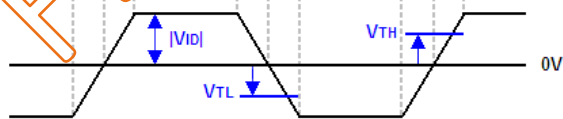c. Vertical Stripe Pattern

Active Area

Note (4) The power consumption is specified at the pattern with the max. current.

Note (5) The LVDS input characteristics are as follows:

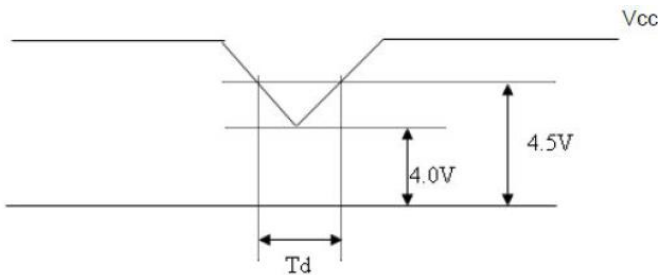**Single-end Signals**

LVDS−
LVDS+
|VID|
VCM
GND
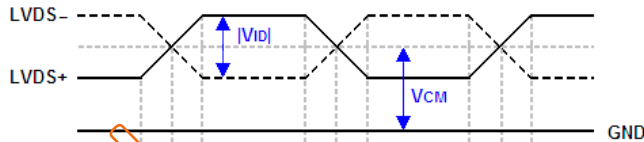
Differential Signal

|VID|
VTL
VTH
0V

Note (6) Power Dip condition

Vcc
4.5V
4.0V
Td

Dip condition: $4.0 \leq Vcc \leq 4.5$, $Td \leq 20ms$

3.2 Backlight Unit

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

Symbol	Parameter	Min.	Typ.	Max.	Unit	Note
LED_Vpin	LED Light Bar Input Voltage Per Input Pin	33.67	37.7	41.6	V	(1) Duty=100% IPIN=65mA
IIPIN	LED Light Bar Current Per Input Pin	-	65	69	mA	(1)(2) Duty=100%
P$_{BL}$	BLU Power consumption	--	9.802	10.82	W	(1) Duty=100% IPIN=65mA
LLED	LED life Time (Typical)	40,000	--	--	Hrs	(3)

Note (1) LED light bar input voltage and current are measured by utilizing a true RMS multimeter as shown below:

Note (2) PBL (Typ)= IPIN(Typ) x VPIN(Typ) x (4) PBL (Max) =IPIN(Typ) x VPIN(Max) x (4) input pins.

Note (3) The lifetime of LED is defined as the time when LED packages continue to operate under the conditions at Ta=25+/- 2℃ and

I=(65)mA (per chip) until the brightness becomes ≦50% of its original value.

Note (4) The module must be operated with constant driving current
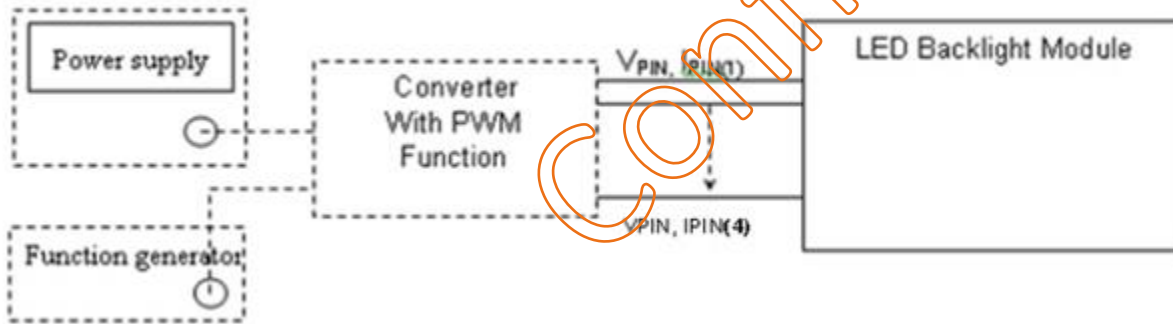
4. SIGNAL CHARACTERISTICS

4.1 Interface Timing

4.1.1 Timing Characteristics:

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
LVDS Clock	Frequency	Fc	58.54	74.25	97.98	MHZ	
	Period	Tc	--	13.47	--	ns	
	Input cycle to cycle jitter	Trcl	-0.02*Tc	--	0.02*Tc	ns	(4)
	Input Clock to data skew	TLVCCS	-0.02*Tc	--	0.02*Tc	ps	(5)
	Spread spectrum modulation range	F_{clkin_mod}	Fc*0.97	--	Fc*1.03	MHz	(6)
	Spread spectrum modulation frequency	F_{SSM}	--	--	100	KHz	
Vertical Display Term	Frame Rate	Fr	50	60	75	Hz	Tv=Tvd+Tvb
	Total	Tv	1115	1125	1136	Th	--
	Display	Tvd	1080	1080	1080	Th	--
	Blank	Tvb	35	45	56	Th	--
Horizontal Display Term	Total	Th	1050	1100	1150	Tc	Th=Thd+Thb
	Display	Thd	960	960	960	Tc	--
	Blank	Thb	90	140	190	Tc	--

Note (1) Because this module is operated by DE only mode. Hsync and Vsync input signals are ignored.

Note (2) The Tv must be integer, otherwise, this module would operate abnormally.
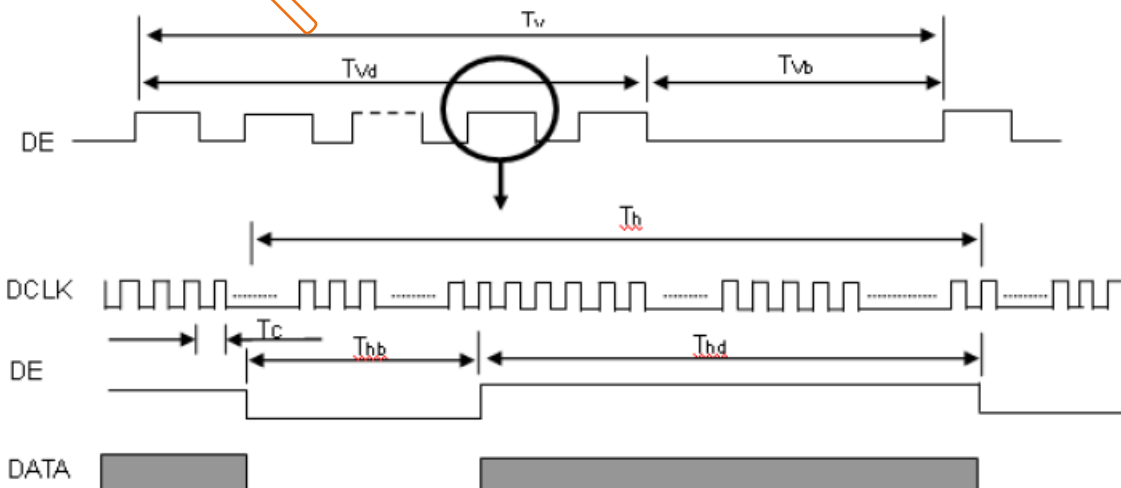
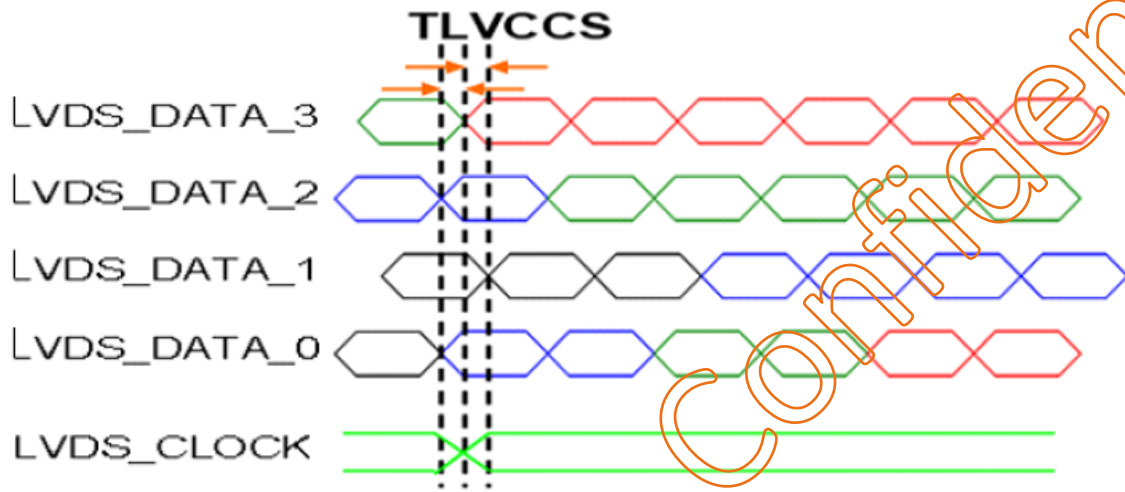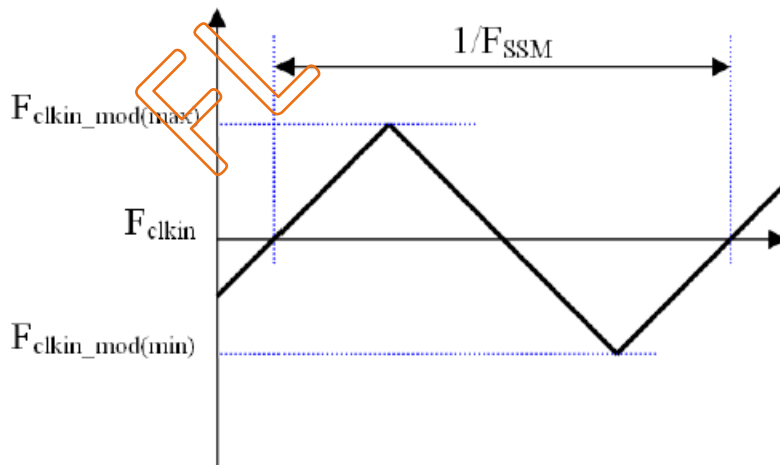Note (3) The input clock cycle-to-cycle jitter is defined as below figures. Trcl=|T1-T|
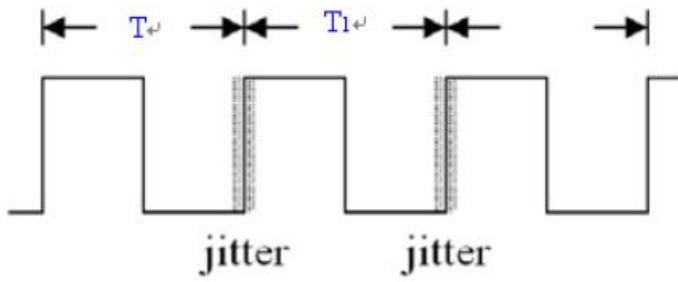
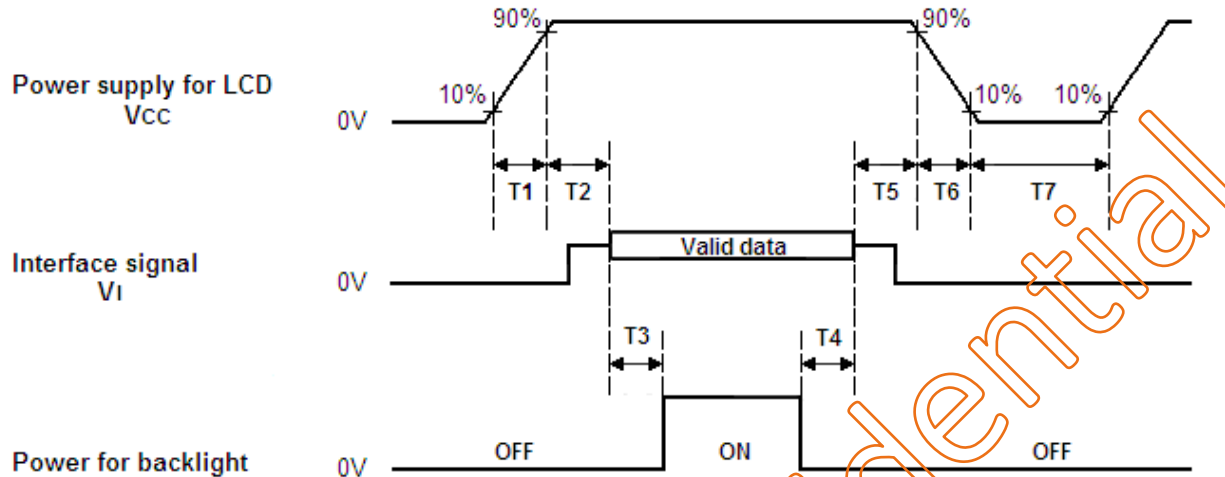Note (4) Input Clock to data skew is defined as below figures.

Note (5) The SSCG (Spread spectrum clock generator) is defined as below figures.

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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.

Parameters	Values			Units
	Min	Typ.	Max	
T1	0.5	--	10	ms
T2	0	30	50	ms
T3	450	--	--	ms
T4	100	250	--	ms
T5	0	20	50	ms
T6	0.1	--	100	ms
T7	1000	--	--	ms

Note (1) The supply voltage of the external system for the module input should be the same as the definition of Vcc

Note (2) When the backlight turns on before the LCD operation of the LCD turns off, the display may momentarily become abnormal screen.

Note (3) In case of VCC=off level, please keep the level of input signals on the low or keep a high impedance.

Note (4) T7 should be measured after the module has been fully discharged between power off and on period.

Note (5) Interface signal shall not be kept at high impedance when the power is on.

Note (6) There might be slight electronic noise when LCD is turned off (even backlight unit is also off). To avoid this symptom we suggest "Vcc falling timing" to follow "t6 spec.".

4.2 Pixel Format Image
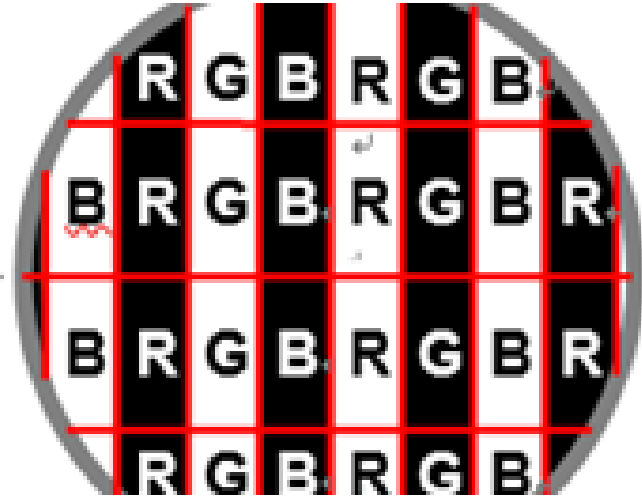
5. INTERFACE PIN DESCRIPTION

5.1 LCM Connector PIN Assignment

	Symbol	Description	Note
1	RXO0-	Negative LVDS differential data input. ChannelO0(odd)	-
2	RXO0+	Positive LVDS differential data input. ChannelO0(odd)	-
3	RXO1-	Negative LVDS differential data input. ChannelO1(odd)	-
4	RXO1+	Positive LVDS differential data input. ChannelO1(odd)	-
5	RXO2-	Negative LVDS differential data input. ChannelO2(odd)	-
6	RXO2+	Positive LVDS differential data input. ChannelO2(odd)	-
7	GND	Ground	
8	RXOC-	Negative LVDS differential clock input. (odd)	
9	RXOC+	Positive LVDS differential clock input. (odd)	-
10	RXO3-	Negative LVDS differential data input. ChannelO3(odd)	-
11	RXO3+	Positive LVDS differential data input. ChannelO3(odd)	
12	RXE0-	Negative LVDS differential data input. ChannelE0(even)	-
13	RXE0+	Positive LVDS differential data input. ChannelE0(even)	-
14	GND	Ground	-
15	RXE1-	Negative LVDS differential data input. ChannelE1(even)	-
16	RXE1+	Positive LVDS differential data input. ChannelE1(even)	-
17	GND	Ground	-
18	RXE2-	Negative LVDS differential data input. ChannelE2(even)	-
19	RXE2+	Positive LVDS differential data input. ChannelE2(even)	-
20	RXEC-	Negative LVDS differential clock input. (even)	
21	RXEC+	Positive LVDS differential clock input. (even)	
22	RXE3-	Negative LVDS differential data input. ChannelE3(even)	
23	RXE3+	Positive LVDS differential data input. ChannelE3(even)	
24	GND	Ground	
25	NC	No connection	
26	NC	No connection	
27	NC	No connection	
28	Vcc	+5V power supply	
29	Vcc	+5V power supply	
30	Vcc	+5V power supply	

Connector Part no.: WF13-422-3033(Fullconn) or 187098-30091(P-two) equivalent

User's connector Part no.: Mating wire cable connector part no.: FI-X30H(JAE) or FI-X30HL(JAE)

Mating FFC cable connector part no.: 217007-013001(P-TWO) or JF05X030-1(JAE)

Note (1) The first pixel is odd.

Note (2) Input signal of even and odd clock should be the same timing.

5.2 Backlight and LED Driver Connector PIN Assignment

Pin No	Description	Remark
1	Cathode of LED string	
2	Cathode of LED string	
3	VLED	
4	VLED	
5	Cathode of LED string	
6	Cathode of LED string	

Connector Part No.: WM13-406-063N & CI1406M1HRK-NH.

User's Mating connector part no.: CI1406SL000-NH (CviLux) or Compatible.

LB connector drawing:

Back Side of BLU Module

X-Board PIN 1

CNT

PIN 1

Don't Touch! Don't Touch! Don't Touch! Don't Touch! Don't Touch!
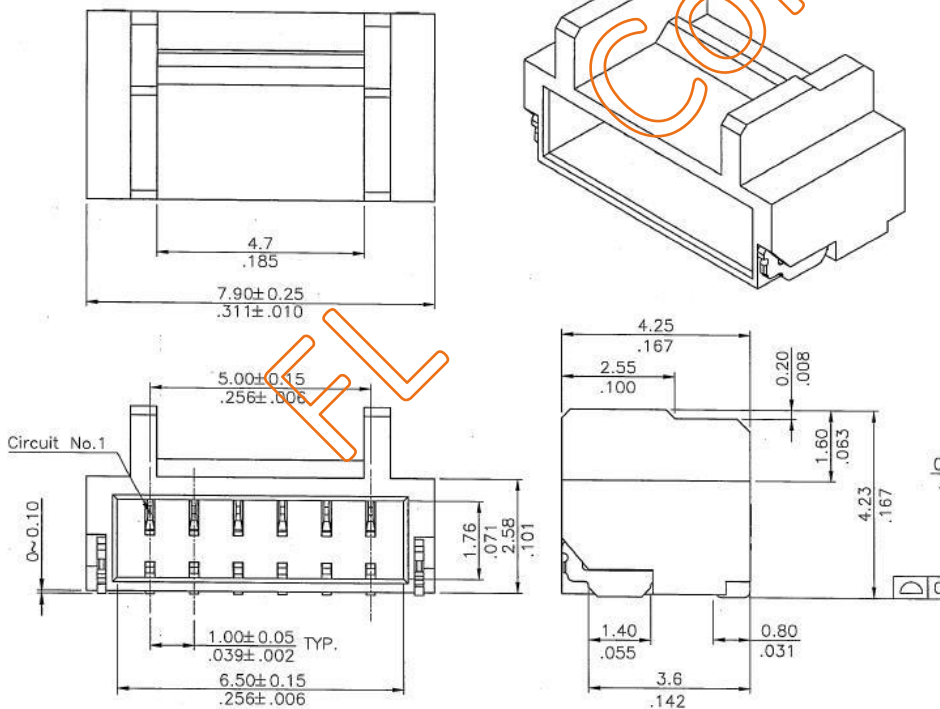
6. BLOCK DIAGRAM

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

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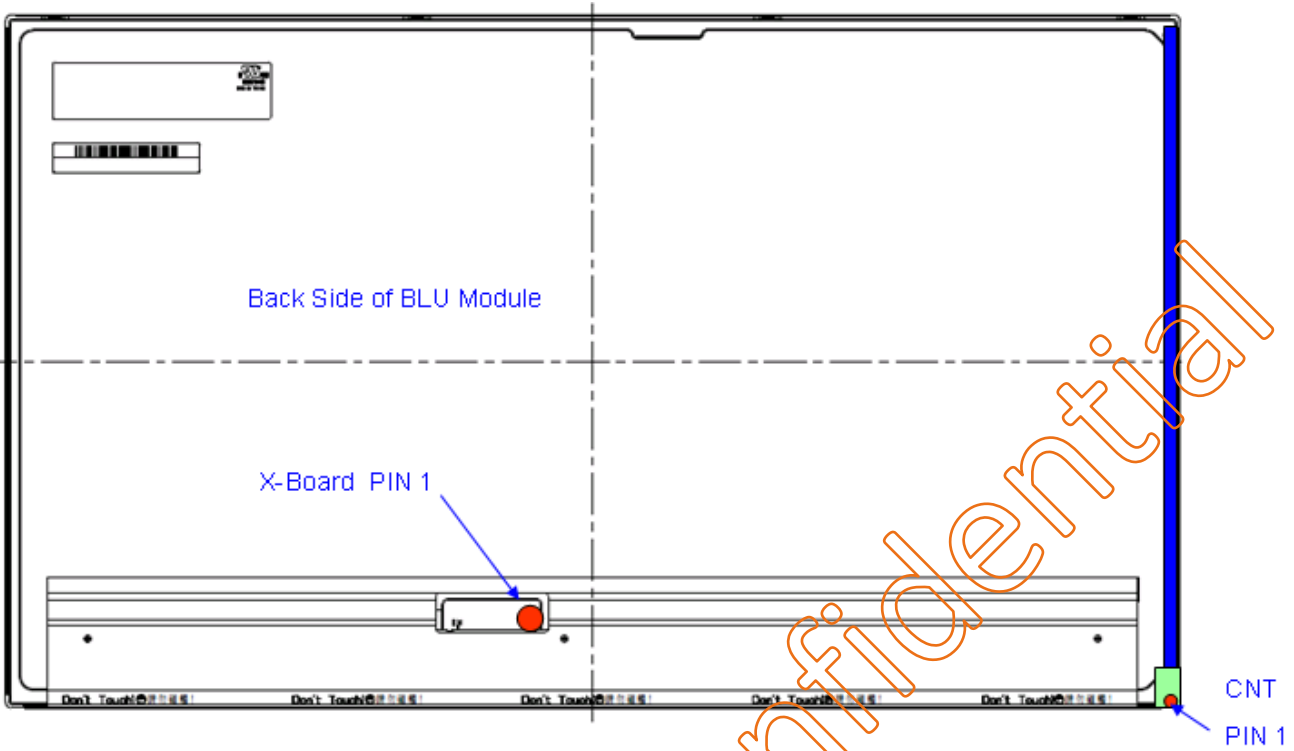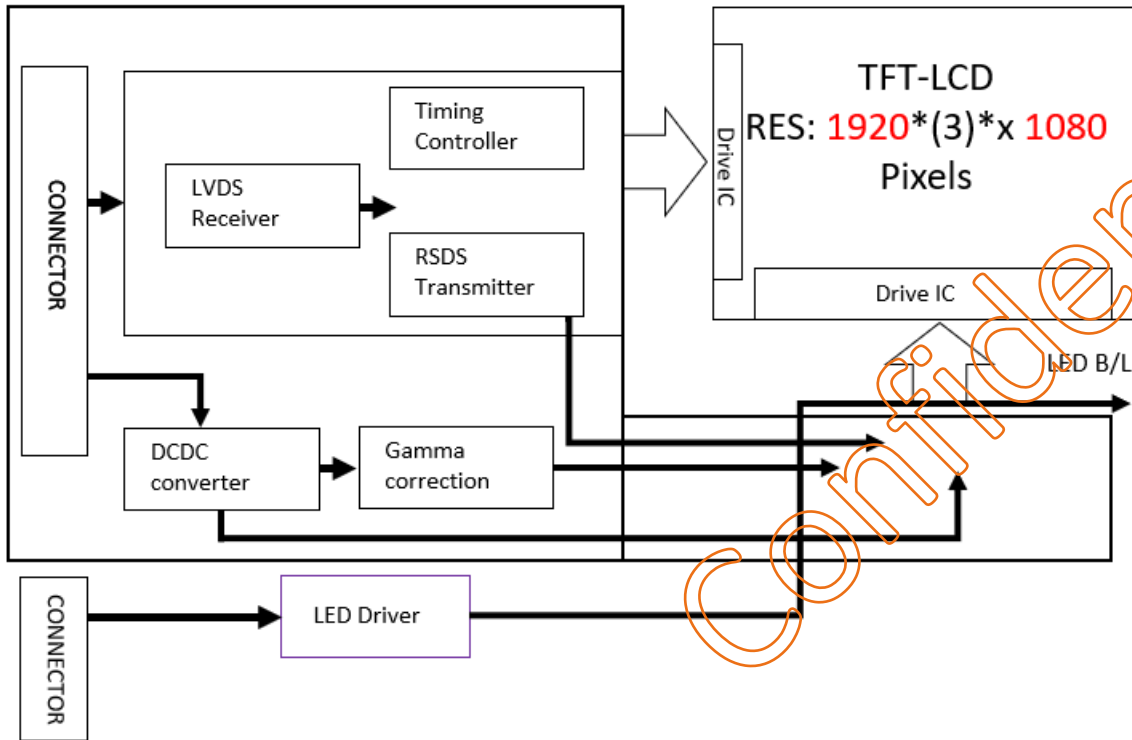
The optical characteristics are measured under stable conditions at room temperature.

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR		2000	3000		-	(2)(5)
Response Time		T_R		-	20	25	ms	(3)
		T_F		-	5	10	ms	
Center Luminance of White		L_C		200	250	-	cd/m2	(4)(5)
White Variation		δW		70	--	--	%	(5)(6)
Chromaticity	Red	Rx	$θ_X=0°, θ_Y =0°$ Viewing angle at normal direction	Typ. -0.03	0.644	Typ. +0.03	-	(1) (5)
		Ry			0.337		-	
	Green	Gx			0.317		-	
		Gy			0.617		-	
	Blue	Bx			0.152		-	
		By			0.054		-	
	White	Wx			0.313		-	
		Wy			0.329		-	
Viewing Angle	Horizontal	$θ_X+$	CR≥10	80	89	-	Deg.	(1)(5)
		$θ_X-$		80	89	-		
	Vertical	$θ_Y+$		80	89	-		
		$θ_Y-$		80	89	-		

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

The ambient temperature is 25°C±2°C and ambient humidity is 50±10 %RH.

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
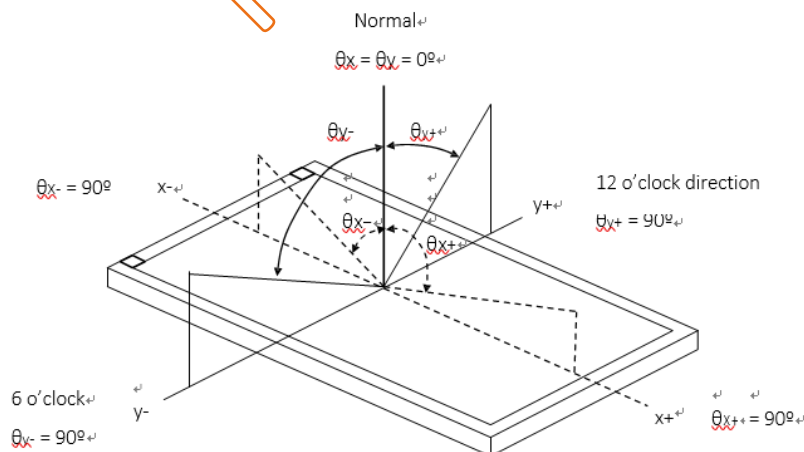
Note 2:   Definition of Contrast Ratio (CR)

Measure the viewing angle of 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 (T$_R$)" and the "Falling Time (T$_F$)" respectively. Please refer the figure to the followings:
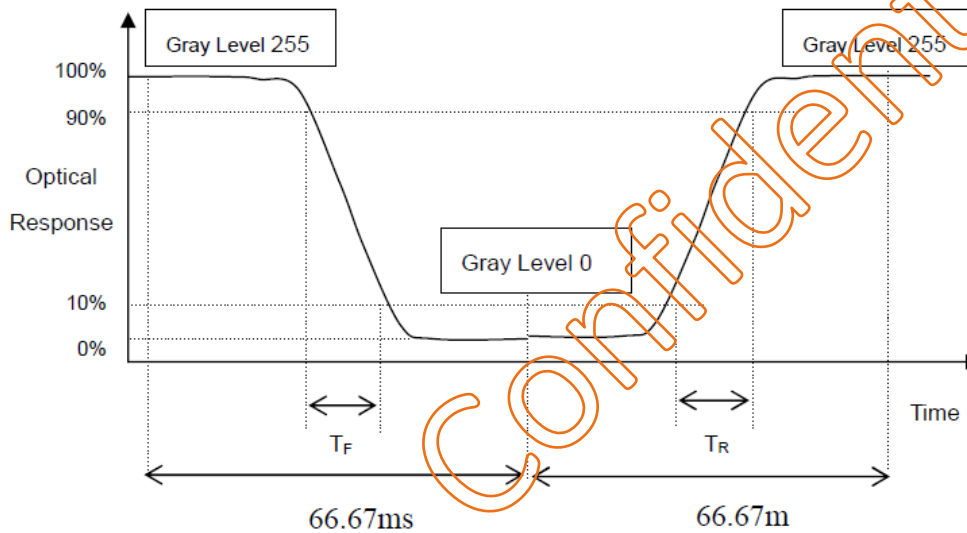
Note 4:   Definition of Brightness (Lc)

Measure the center area of the panel and the viewing angle of the θx=θy =0°

Note 5:   The method of optical measurement:
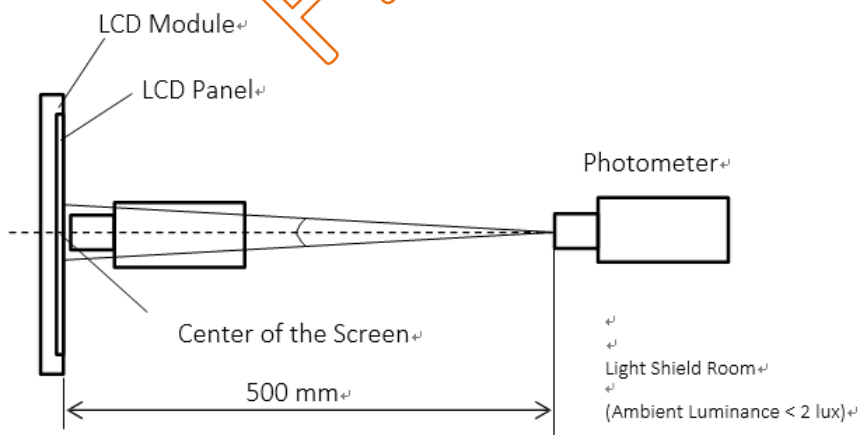
Note 6:   Definition of White Variation (δW):

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)]

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B. Touch Screen specification

1. Enviromental Specification

Specification	Value	Remarks
Operating Temperature	-20ºC ~ 70ºC	
Storage Temperature	-40ºC ~ 80ºC	
Operating Humidity	20% ~ 90%RH	
Storage Humidity	10% ~ 90%RH	

2. Mechanical Specification

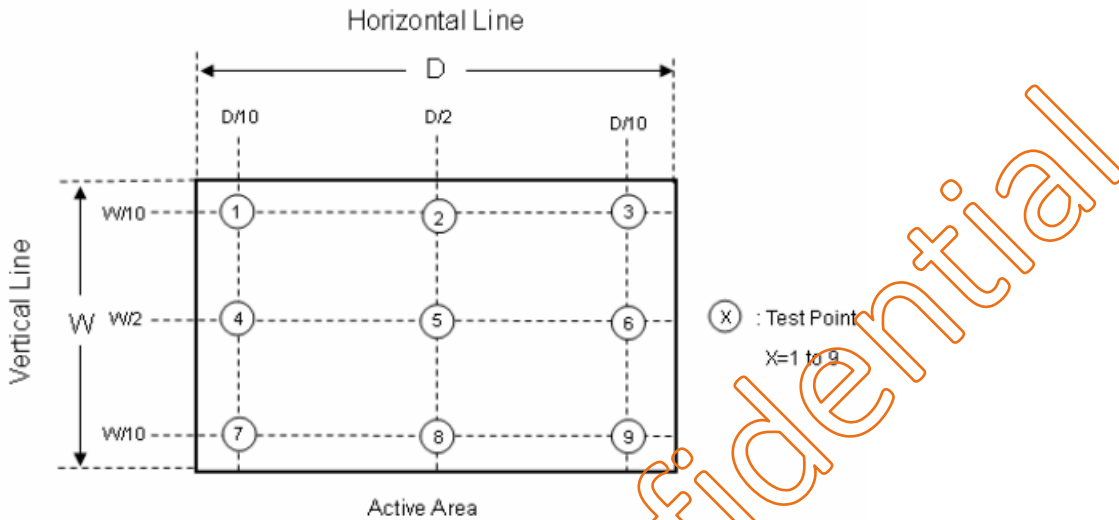| Specification	Value
Operating Life (Finger input)	10^7 times
Light Transmittance	>85% Min. (JIS K-7105) with glass
Surface hardness	6H
FPC Peeling Force	5N Max

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

Dimensions (left drawing):
- 559±0.5 (Cover Glass O.D.)
- 477.6±0.3 (Cover Glass V.A.)
- 476.06 (LCD A.A.)
- 40.7±0.5
- 4-R10±0.5
- 350±0.5 (Cover Glass O.D.)
- 269.1±0.3 (Cover Glass V.A.)
- 267.79 (LCD A.A.)
- 40.5±0.5
- 4-Ø2.5
- 4-Ø5
- 205.1±0.5
- 219.5±0.5
- 263.3±0.5
- 279.5±0.5

Labels:
- EMI Tape Double side
- IC Component With Isolation Label
- PI (Brown) Stiffener board
- USB Connector apply following Touch interface Type:P125L-04SMT-01(LF) or EQUIVALENT

Dimensions (right drawing):
- 12.75±0.5Δ
- 3.35±0.3
- 4*C0.5(45°) CNC Master edge
- Glass thickness = 3.0±0.1 mm
- IC Components Max = 3.5mm
- 559±0.5 (Cover Glass O.D.)
- 505.12±0.15(Film Sensor O.D)
- 495.6 (LCD A.A.)
- 25.2
- 31.75±0.5Δ
- 292.2 (LCD A.A.)
- 295.66±0.15(Film Sensor O.D)
- 350±0.5 (Cover Glass O.D.)
- 29.08±0.5Δ
- 22.5
- 7.5
- 7.5
- 7.5
- 0.3±0.15
- PANTONE Black C (PMMA) Printing side
- SUS (Metal Plate)
- Fixing Silicon Area
- 38
- 2.5
- 32.5
- 60
- 87.5
- 117.5
- 120
- 148.8
- 33.5
- 45
- 15
- 17.5
- 85.7±0.5

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. 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 : FL : FLC-215MML2000SA1
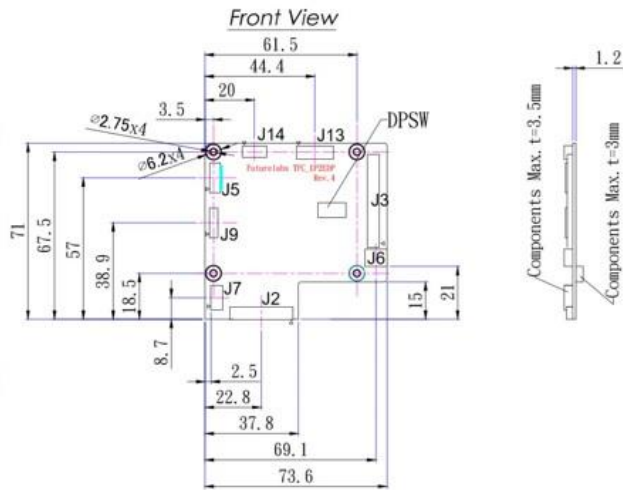10. Touch model : RTPC215W-H30BP1-U
11. Assembly Solution : DSA

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

Detail A
- 21.88±0.5:Front Side Conductive Area
- 46.88±0.5:Rear Side Stiffener Board
- 1±0.1
- 1±0.1
- 0.65±0.1
- P1(6-1)=5±0.1
- 7+0.07/-0.12

Customer Approval		Part Number		FLD-215MML20PUSA1
Date		Rev. Date	Person	Description
Company		01 20170826 Kevin	Update Touch design	
Name				
Signature		First Drawing 20170801 Kevin		
		Date	Design By Date	Check By Date	Approved By

1. eDP Converter Board
P/N : TFC_UP2EDP

Front View

Futurelabs TFC_UP2EDP Rev. 4

61.5
44.4
20
3.5
Ø2.75x4
Ø6.2x4
J14 J13 DPSW
J5
J9
J3
J6
J7
J2
71 67.5 57 38.9 18.5 8.7
15 21
2.5
22.8
37.8
69.1
73.6

Components Max. t=3.5mm
Components Max. t=3mm
1.2

Back View

Futurelabs TFC_UP2EDP Rev. 4
J4
27

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

12.6
A1
100
A2
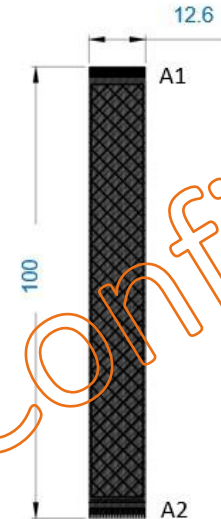
A1 to To UP eDP
A2 to J9

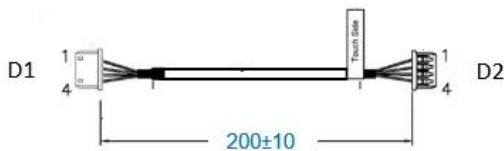# 3. LVDS Cable
P/N: CB-EDP2M215HJI

B3
300±10
B1 B2
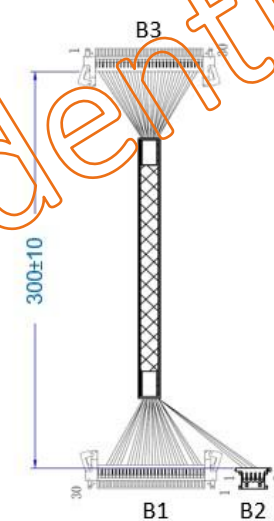
B1 to LCD LVDS
B2 to LCD LED Driver
B3 to J3

4. Internal USB Cable
P/N: CB_UP2USB8

C2
100±10
C1
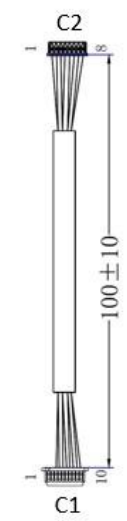
C1 To to UP USB
C2 To to J5

5. Touch USB Cable 4 to 4 pin
P/N: CB-EDPB2USB4-200

DPSW selection for 21.5"W

ON SAB
1 2 3 4 5 6 7 8

D1
1
4
Touch Side
1
4
D2
200±10

D1 To J14
D2 To Touch Screen

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-EDP2M215HJI
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-EDPB2USB4-200
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

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

150±10
E1
E2
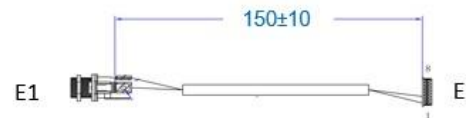
DC Power JACK 5.5 * 2.0
E1 To 12V power
E2 To J13

7. LED Driver with CBL
P/N: FL-BBRD-03-V

12.74
Ø3x2
F1
27.8 32.4
5.1
3.5
93.2
7.4
250
F2
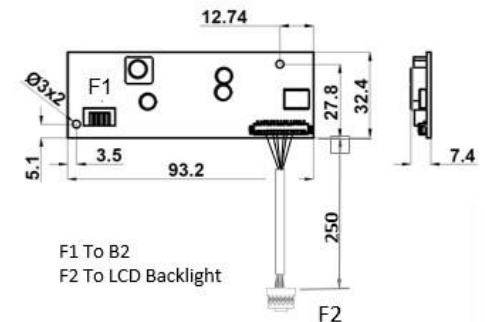
F1 To B2
F2 To LCD Backlight

Customer Approval	Part Number		KIT-215MML20PUSA1B

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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 da   SI, the operator sho
  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.

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