



PRODUCT SPECIFICATION

PART NUMBER # REV: FLD-104GML20PCFA1#00

DESCRIPTION: 10.4" TFT 1024x768 500CD Full View LVDS interface
Assembled Rocktouch Pcap 1.1mm Transparent USB-I2C

() Preliminary Specification

(V) Approved Specification

Customer Name:	
Signature:	Date:

PREPARED BY	REVIEWED BY
<i>Mia</i>	<i>David</i>

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Revision History

Version	Date	Page	Description	Note
V1.0	2020/11/11		First Edition	
V1.1	2021/08/27		Update ME spec	

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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 XGA, 1024x768 screen and 16.2M colors (6-bits colors with FRC).

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	1024 (H) x RGB x 768 (V)	Pixels
3	Outline Dimension	230.7 (H) x 174.6 (V) x 10.75 (D)	mm
4	Active Area	210.4 (H) x 157.8 (V)	mm
5	Display Colors	16.2M / 262K	--
6	Pixel Arrangement	RGB vertical stripe	--
7	Display Mode	Transmissive mode / Normally black	--
8	Electrical Interface	LXDS	--
9	Surface Treatment	Anti-Glare	--
10	Brightness	500 (Typ.)	cd/m2
11	Contrast Ratio	1000 (Typ.)	--
12	Total Power Consumption (Typ)	TBD	W

2. ABSOLUTE MAXIMUM RATING

2.1 Electrical Absolute Rating

Item	Symbol	Values		Unit	Note
		Min	Max.		
Power supply voltage	VCC	-0.3	4	V	
Logic Input Voltage	Vin	-0.3	VCC+0.3	V	
Converter Voltage	Vi	-0.3	18	V	
Enable Voltage	EN	-0.3	5.5	V	
Backlight Adjust	ADJ	-0.3	5.5	V	

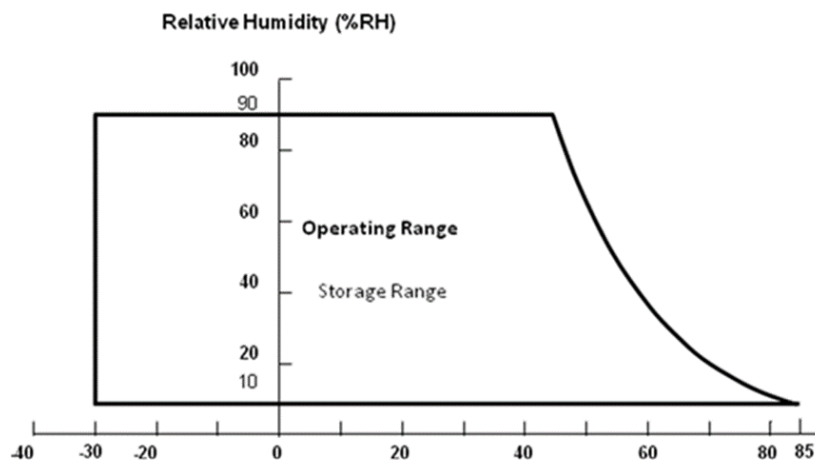
Note Permanent damage to the device may occur if max. values are exceeded. Function operation should be restricted to the conditions described under normal operating conditions.

2.2 Environment Absolute Rating

Item	Symbol	Values			Unit	Note
		Min	Typ	Max.		
Operating Temperature	Top	-30		85	°C	Ta=25°C
Storage Temperature	Tstg	-30		85	°C	

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

- (a) 90 %RH Max. (Ta < 39 °C).
- (b) Wet-bulb temperature should be 39 °C Max. (Ta > 39 °C).
- (c) No condensation
- (d) for Module only



3. ELECTRICAL CHARACTERISTICS

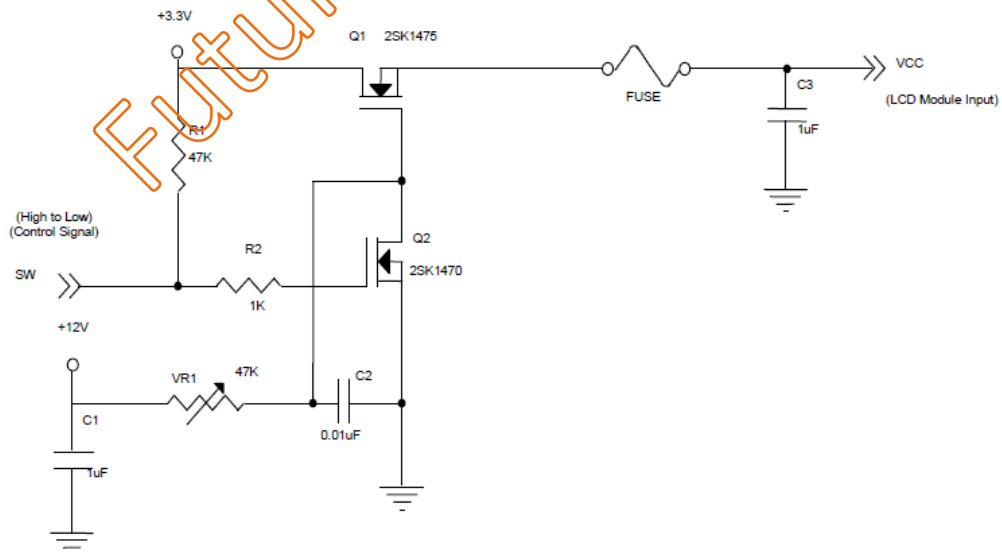
3.1 LCM

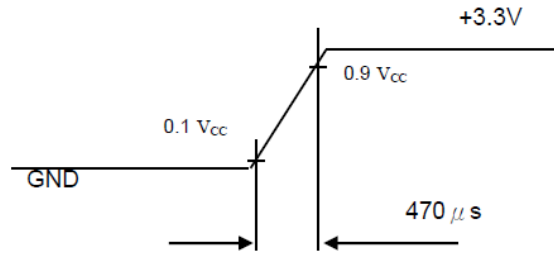
Parameter	Symbol	Value			Unit	Note	
		Min.	Typ.	Max.			
Power Supply Voltage	VCC	3.0	3.3	3.6	V	(1)	
Power Supply Ripple Voltage	VRP	--	--	100	mV		
Rush Current	IRUSH	-	-	4.0	A	(2)	
Power Supply Current	White	ICC	--	TBD	TBD	mA	(3)
	Black		--	TBD	TBD	mA	
Power Consumption	PL		TBD	TBD	W	-	
LVDS differential input voltage	VID	100	-	600	mV		
LVDS common input voltage	VIC	1.0	1.2	1.4	V	-	
Logic High Input Voltage	VIH	2.3	-	VCC	V		
Logic Low Input Voltage	VIL	0	-	0.7	V		
LVDS terminating resistor	RT	-	100	-	ohm		

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

Ta = 25 ± 2 °C

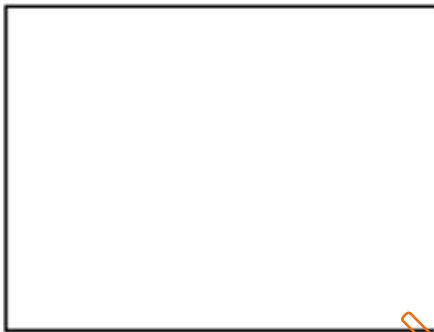
Note (2) Measurement Conditions:





Note (3) The specified power supply current is under the conditions at VDD=3.3V, T_a=25 ± 2 °C, DC current and f_v=60Hz, whereas a power dissipation check pattern below is displayed.

a. White Pattern



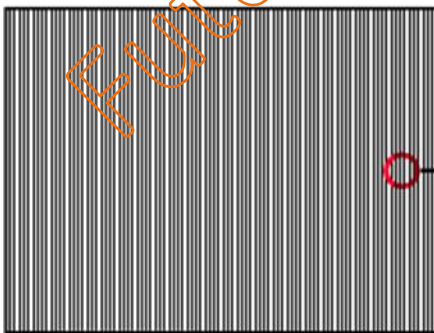
Active Area

b. Black Pattern

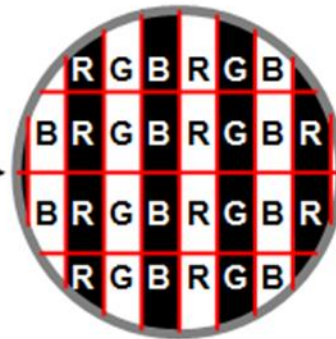


Active Area

c. Vertical Stripe Pattern



Active Area



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	
Vi	Converter Power Supply Voltage	10.8	12.0	13.2	V	Duty 100%	
ViRP	Converter Power Supply Ripple Voltage			350	mV		
li	Converter Power Supply Current	--	0.42	0.5	A	@Vi=12V (Duty 100%)	
liRUSH	Converter Inrush Current	-	-	3.0	A	@Vi rising time= 20ms(Vi=12V)	
PLED	LED Power consumption	--	5	6	W	(1) @Vi=12V (Duty 100%)	
BLON	EN Control Level	Backlight on	2.5	3.3	5.0	V	
		Backlight off	0	--	0.3	V	
E_PWM	PWM Dimming Control Level	PWM High Level	2.5	3.3	5.0	V	
		PWM Low Level	0	--	0.15	V	
VNoise	PWM Noise Range	--	--	0.1	V		
fPWM	PWM Control Frequency	190	200	20K	Hz	(2)	
-	PWM control Duty Ratio	5	-	100	%	(2) Suggestion@ 190Hz ≤ fPWM < 1kHz	
		20	-	100	%	(2) Suggestion@ 1kHz ≤ fPWM ≤ 20kHz	
LL	LED life Time (Typical)	50,000		--	Hrs	(3)	

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

Note (2) At 190 ~1kHz PWM control frequency, duty ratio range is restricted from 5% to 100%.

1K ~20kHz PWM control frequency, duty ratio range is restricted from 20% to 100%.

If PWM control frequency is applied in the range from 1KHz to 20KHz,

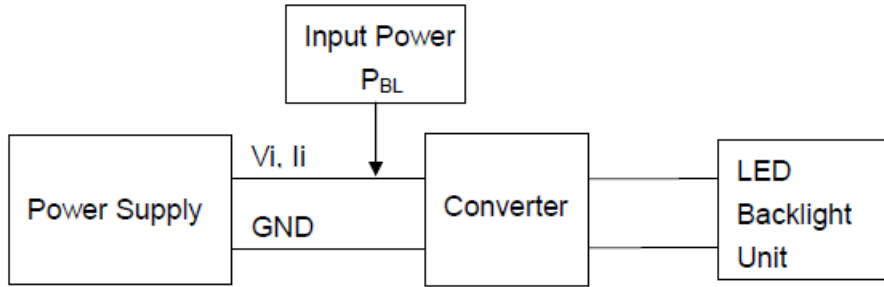
The “non-linear” phenomenon on the Backlight Unit may be found.

So It’s a suggestion that PWM control frequency should be less than 1KHz.

Note (3) The lifetime of LED is estimated data and defined as the time when it continues to operate under the conditions at

Ta = 25 ±2 °C and Duty=100% until the brightness becomes ≤ 50% of its original value.

Operating LED under high temperature environment will reduce lifetime and lead to color shift.



4. SIGNAL CHARACTERISTICS

4.1 Interface Timing

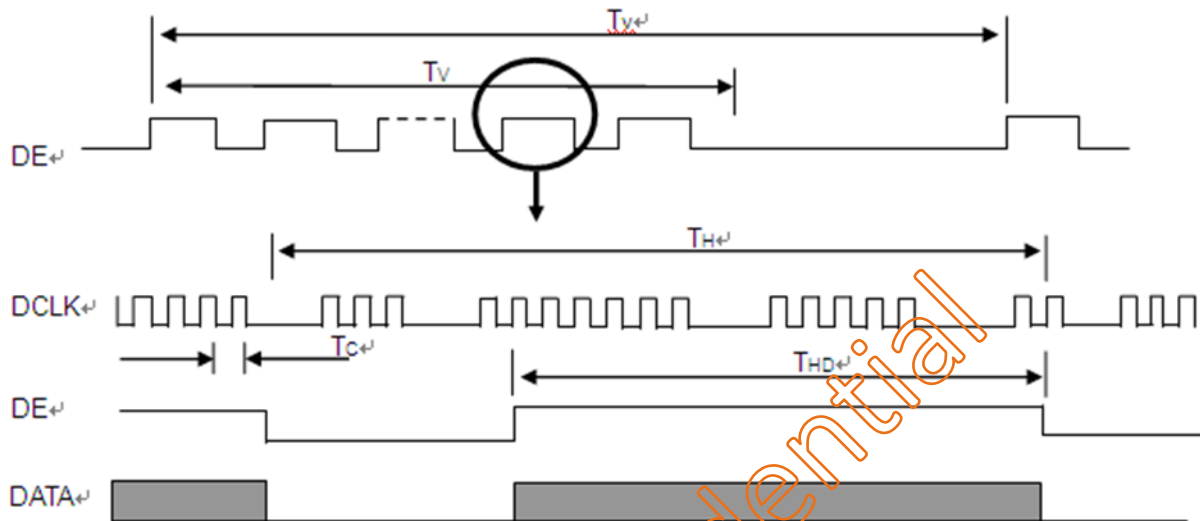
4.1.1 Timing Characteristics:

Signal	Item	Symbol	Min	Typ	Max	Unit	Note	
LVDS Clock	Frequency	Fc	57.6	65	74.5	MHz		
	Period	Tc	13.4	15.4	17.4	ns		
	Input cycle to cycle jitter	Trd	--	--	200	ns	(a)	
	Input Clock to data skew	TLVCCS	-0.02*Tc	--	0.02*Tc	ps	(b)	
	Spread spectrum modulation range	Fclk _{in_mod}	--	--	1.02*Fc	MHz	(c)	
	Spread spectrum modulation frequency	FSSM	--	--	200	KHz		
		High Time	Tch	--	4/7	--	Tch	
		Low Time	Tcl	--	3/7	--	Tch	
Vertical Display Term	Frame Rate	Fr	--	60	--	Hz	Tv=Tvd+Tvb	
	Total	Tv	774	806	848	Th		
	Active Display	Tvd	768	768	768	Th		
	Blank	Tvb	6	38	80	Th		
Horizontal Display Term	Total	Th	1024	1344	1464	Tc	Th=Thd+Thb	
	Active Display	Thd	1024	1024	1024	Tc		
	Blank	Thb	216	320	440	Tc		

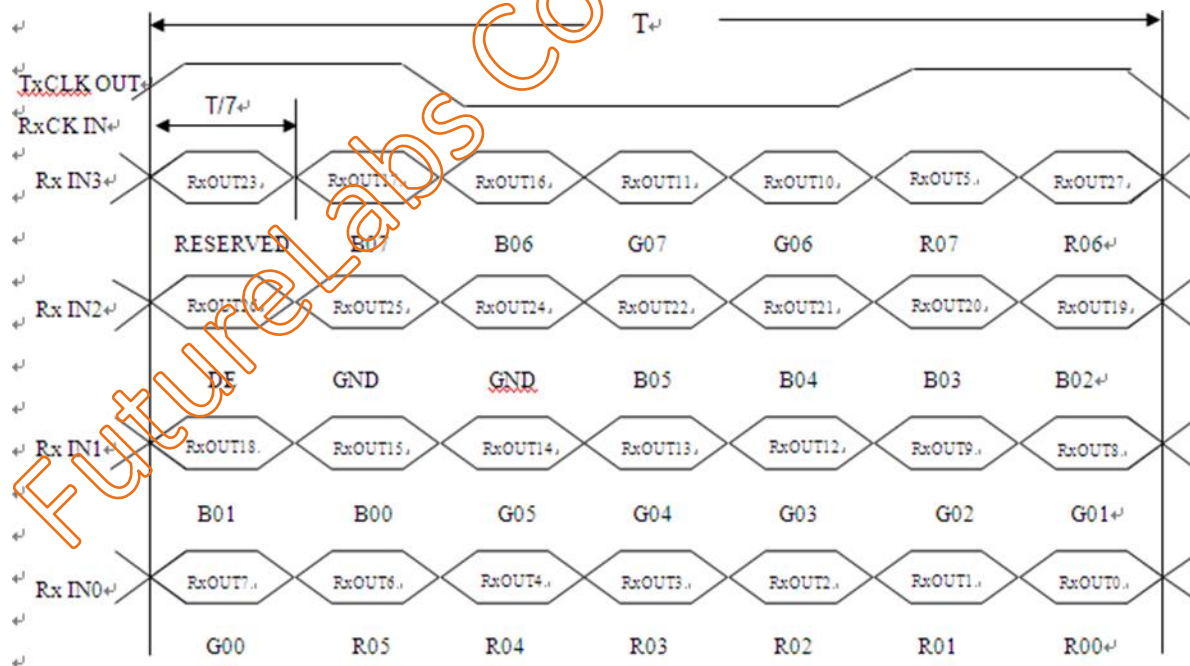
Note (1) Since this assembly is operated in DE only mode, Hsync and Vsync input signals should be set to low logic level or ground. Otherwise, this assembly would operate abnormally.

Note (2) The Tv(Tvd+Tvb) must be integer, otherwise, the module would operate abnormally.

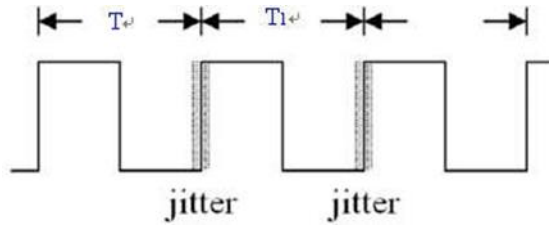
INPUT SIGNAL TIMING DIAGRAM



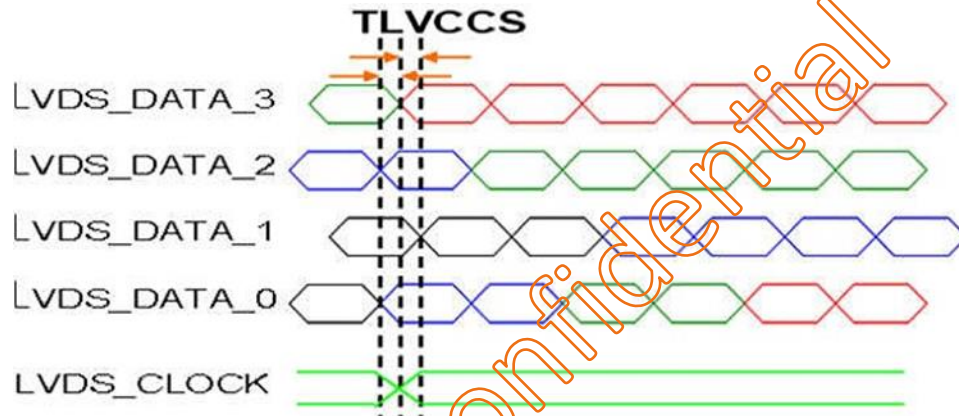
TIMING DIAGRAM of LVDS



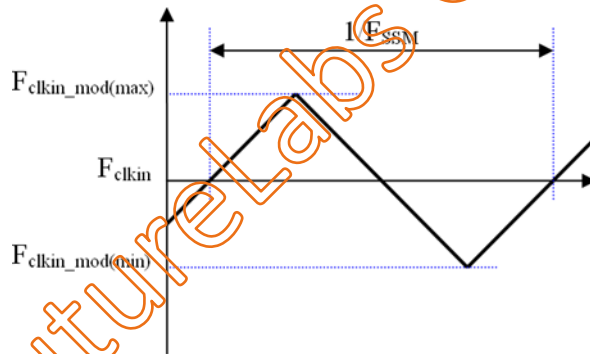
Note (a) The input clock cycle-to-cycle jitter is defined as below figures. $Trcl = |T1 - Tl|$



Note (b) Input Clock to data skew is defined as below figures.

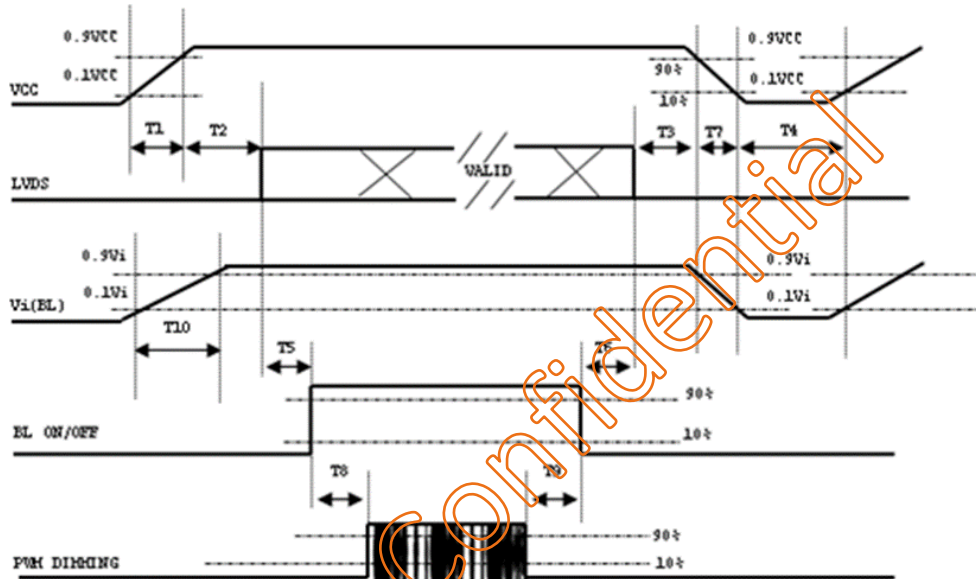


Note (c) The SSCG (Spread spectrum clock generator) is defined as below figures.



4.2 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.



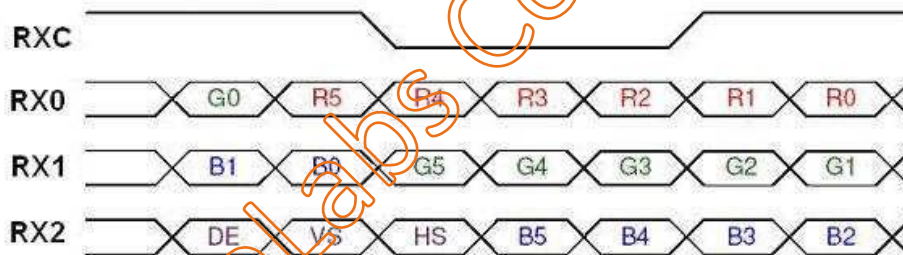
Note:

- (1) The supply voltage of the external system for the module input should be the same as the definition of Vcc.
- (2) When the backlight turns on before the LCD operation of the LCD turns off, the display may momentarily become abnormal screen.
- (3) In case of VCC = off level, please keep the level of input signals on the low or keep a high impedance.
- (4) T4 should be measured after the module has been fully discharged between power off and on period.
- (5) Interface signal shall not be kept at high impedance when the power is on.
- (6) Futurelabs won't take any responsibility for the products which are damaged by the customers not following the Power Sequence.
- (7) 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 "T7 spec".

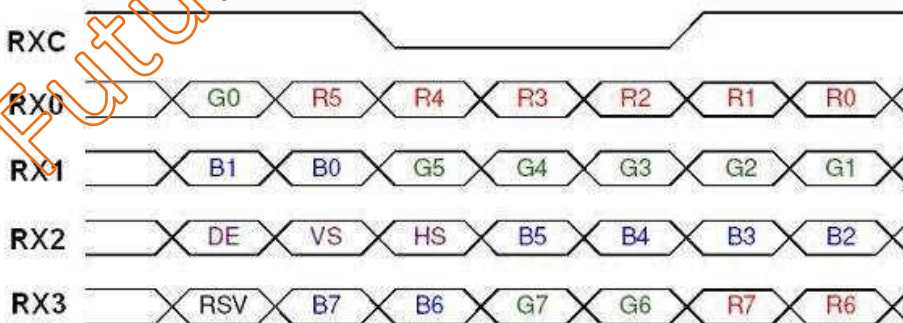
Parameter	Value			Units
	Min	Typ	Max	
T1	0.5	---	10	ms
T2	0	---	50	ms
T3	0	---	50	ms
T4	500	---	---	ms
T5	450	---	---	ms
T6	200	---	---	ms
T7	10	---	100	ms
T8	10	---	---	ms
T9	10	---	---	ms
T10	20	---	50	ms

4.3 THE INPUT DATA FORMAT

SEL 6/8 = "High" for 6 bits LVDS Input



SEL 6/8 = "Low" or "NC" for 8 bits LVDS Input

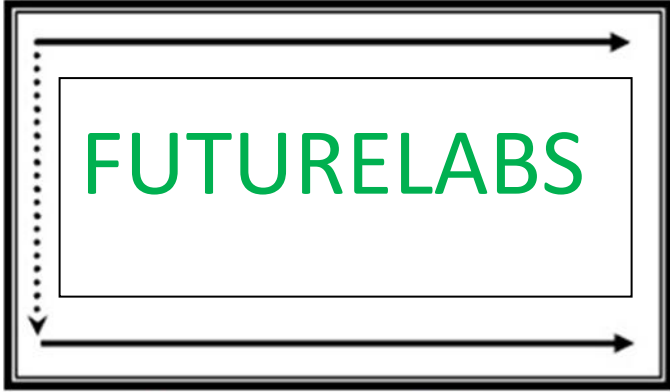


Note (1) R/G/B data 7: MSB, R/G/B data 0: LSB

Note (2) Please follow PSWG

Note (3) Output signals from any system shall be low or Hi-Z state when VCC is off

4.4 SCANNING DIRECTION



(PCBA on the top side)

RPF1 = Low/floating; normal display (default)



(PCBA on the top side)

RPF1 = Low/floating; normal display (default)

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5. INTERFACE PIN DESCRIPTION

5.1 LCM Connector PIN Assignment

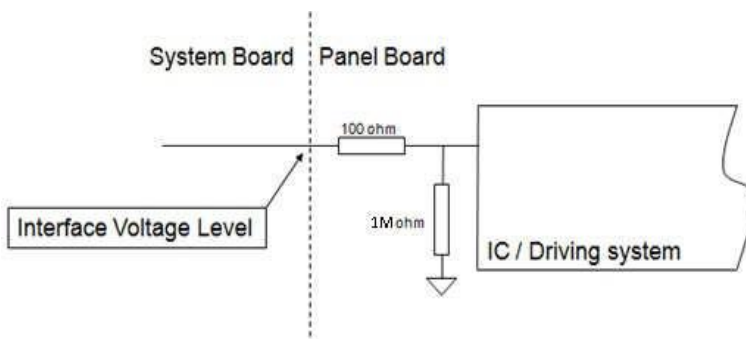
CN1

Pin No.	Symbol	Description	Note
1	VCC	Power supply: +3.3V	-
2	VCC	Power supply: +3.3V	-
3	VCC	Power supply: +3.3V	-
4	GND	Ground	-
5	GND	Ground	-
6	GND	Ground	-
7	RPMI	Reverse Panel Function (Display Rotation)	(2)
8	NC	No Connection	(2)
9	NC	No Connection	(2)
10	NC	No Connection	(2)
11	SEL6/8	LVDS6/8bit select function control. Low or NC 8bit Input Mode High 6bit Input Mode	(2)
12	GND	Ground	-
13	NC	No Connection	(2)
14	GND	Ground	-
15	RX0-	Negative transmission data of pixel 0	-
16	RX0+	Positive transmission data of pixel 0	-
17	GND	Ground	-
18	RX1-	Negative transmission data of pixel 1	-
19	RX1+	Positive transmission data of pixel 1	-
20	GND	Ground	-
21	RX2-	Negative transmission data of pixel 2	-
22	RX2+	Positive transmission data of pixel 2	-
23	GND	Ground	-
24	RXCLK-	Negative of clock	-
25	RXCLK+	Positive of clock	-
26	GND	Ground	-
27	RX3-	Negative transmission data of pixel 3	-
28	RX3+	Positive transmission data of pixel 3	-
29	GND	Ground	-
30	NC	No Connection	(2)

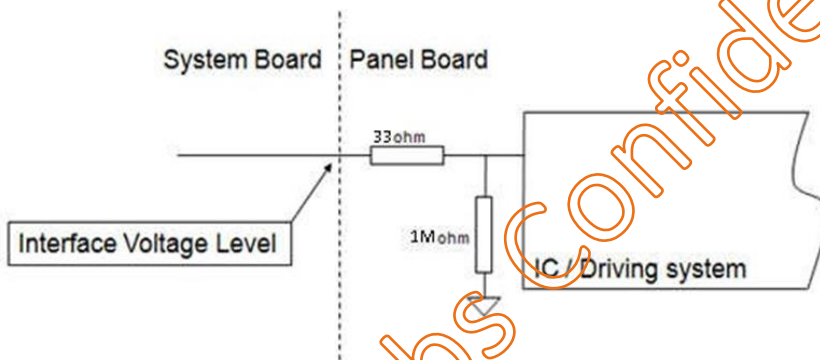
Note (1) Connector Part No.: STM, MSCK2407P30.D or compatible connector

Note (2) "Low" stands for 0V. "High" stands for 3.3V. "NC" stands for "No Connected".

RPF1 pin:



SEL6/8 pin:



5.2 BACKLIGHT UNIT (CONVERTER CONNECTOR PIN)

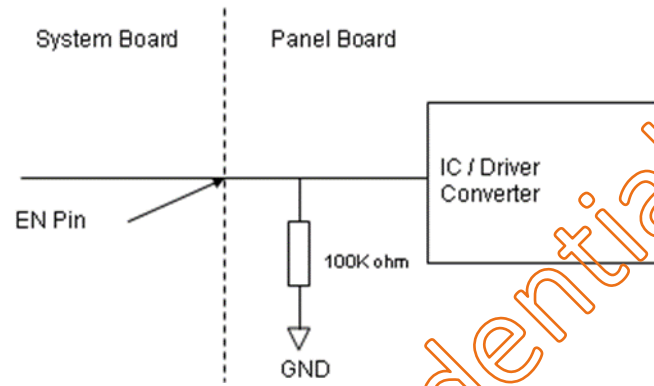
Pin	Symbol	Description	Remark
1	V_i	Converter input voltage	12V
2	V_i	Converter input voltage	12V
3	V_i	Converter input voltage	12V
4	V_i	Converter input voltage	12V
5	VGND	Converter ground	Ground
6	VGND	Converter ground	Ground
7	VGND	Converter ground	Ground
8	VGND	Converter ground	Ground
9	EN	Enable pin	3.3V, Note (3)
10	ADJ	Backlight Adjust	PWM Dimming (190-210Hz, Hi:3.3VDC, Lo: 0VDC) , Note (3)

Note (1) Connector Part No.: ACES,91208-01001-H01 or equivalent

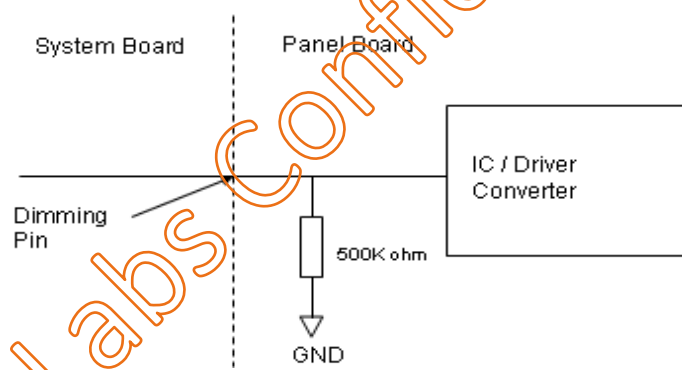
Note (2) User's connector Part No.: ACES,91209-01011 or equivalent

Note (3) EN(BLON), ADJ(E_PWM) as shown below:

BLON Pin



E_PWM Pin



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5.3 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 6-bit gray scale data input for the color. The higher the binary input, the brighter the color.

The table below provides the assignment of color.

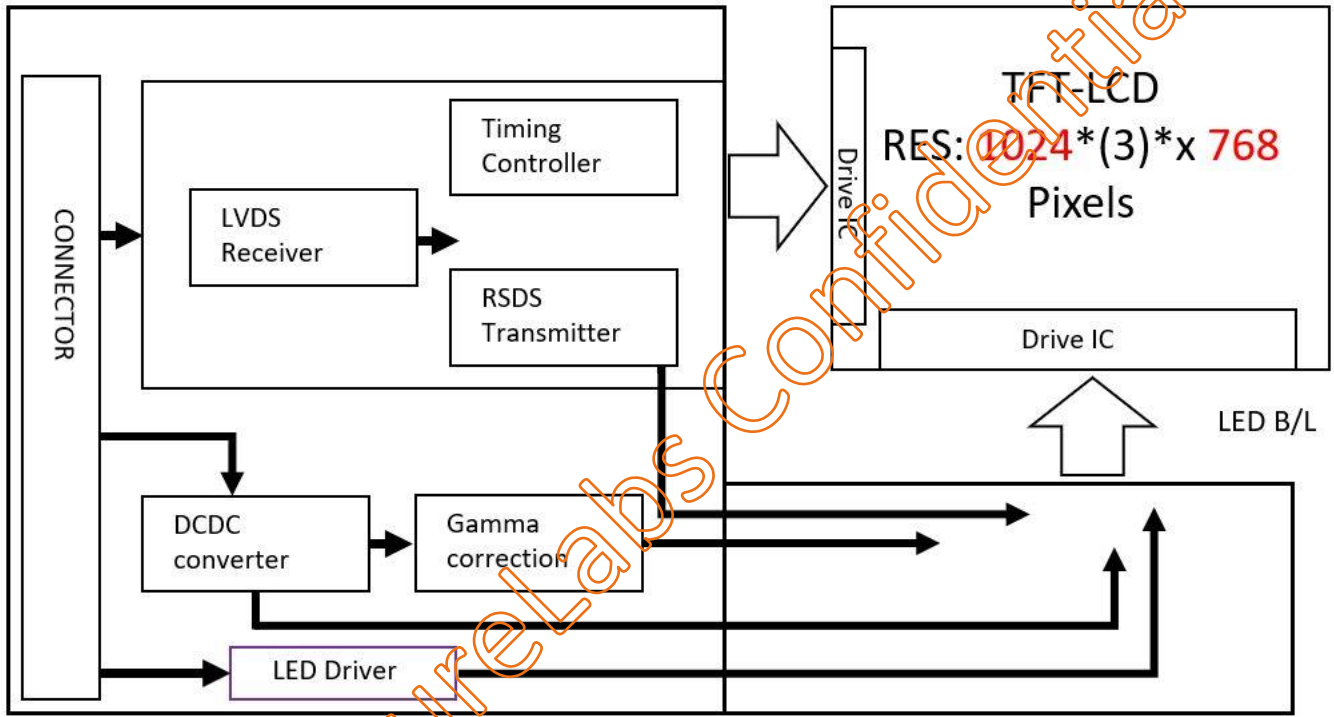
Color		Data Signal																	
		Red						Green						Blue					
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Cyan	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale Of Red	Red(0)/Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(61)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(62)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(63)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale Of Green	Green(0)/Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	Green(2)	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0
	Green(61)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	Green(62)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Green(63)	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale Of Blue	Blue(0)/Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(61)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1
	Blue(62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	Blue(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

The brightness of each primary color (red, green and blue) is based on the 8-bit gray scale data input for the color. The higher the binary input, the brighter the color. The table below provides the assignment of color versus data input.

Color		Data Signal																							
		Red								Green								Blue							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	
	Blue	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	Cyan	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	
	Magenta	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Gray Scale Of Red	Red(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Red(1)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Red(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:		
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:		
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:		
	Red(253)	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Red(254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Red(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Gray Scale Of Green	Green(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0		
	Green(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0		
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:		
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:		
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:		
	Green(253)	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0		
	Green(254)	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0		
Green(255)	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0			
Gray Scale Of Blue	Blue(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		
	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:		
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:		
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:		
	Blue(253)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0		
	Blue(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0		
Blue(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1			

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.

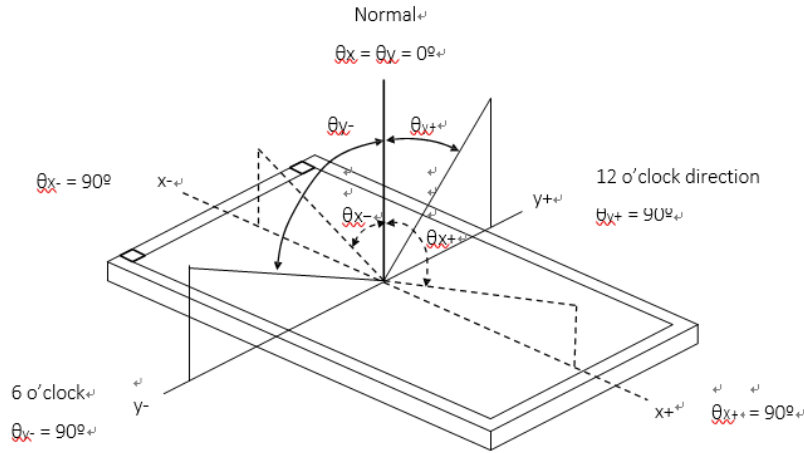
Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note		
Contrast Ratio		CR	$\theta_x=0^\circ, \theta_y=0^\circ$ Viewing angle at normal direction	700	1000	-	-	(2)(5)		
Response Time		T_R		-	14	19	ms	(3)		
		T_F		-	11	16	ms			
Center Luminance of White		L_c		400	500	-	cd/m ²	(4)(5)		
White Variation		δW		-	1.25	1.4	-	(5)(6)		
Chromaticity	Red	R_x		Typ. -0.05	0.652	Typ. +0.05	-	-	(1) (5)	
		R_y						-		
	Green	G_x						0.326		-
		G_y						0.608		-
	Blue	B_x						0.150		-
		B_y	0.053					-		
	White	W_x	0.313					-		
		W_y	0.329					-		
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 <2 lux, and at room temperature).

The room temperature is $25^\circ\text{C} \pm 2^\circ\text{C}$

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

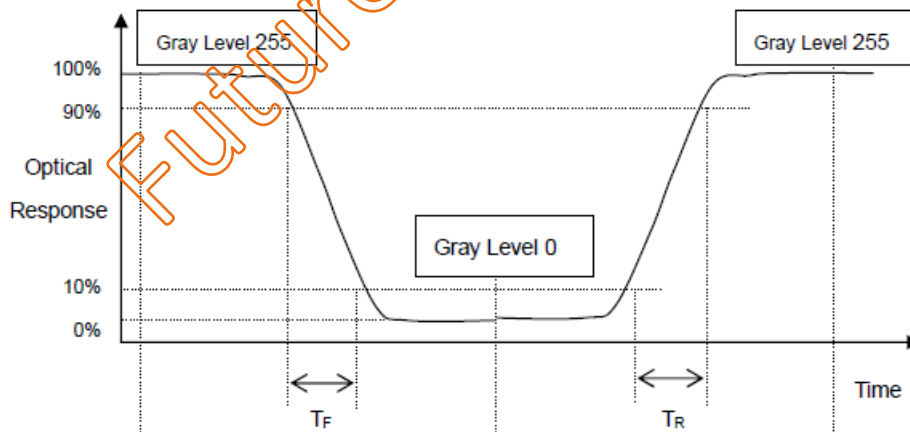


Note 2: Definition of Contrast Ratio (CR)

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:

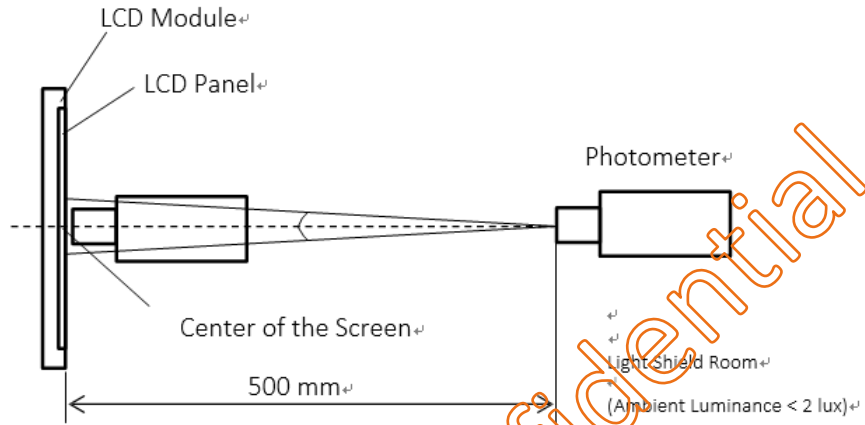
The response time is set initially by defining the “Rising Time (T_r)” and the “Falling Time (T_f)” respectively. The response time interval is between 10% and 90% of amplitudes, please refer the figure to the followings:



Note 4: Definition of Brightness (Lc)

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

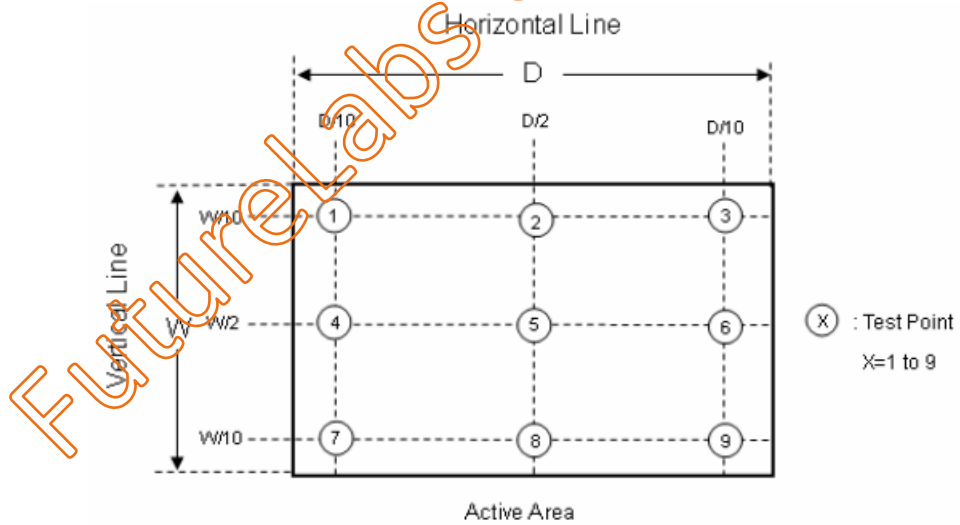
Note 5: The method of optical measurement:



Note 6: Definition of White Variation (δW):

Measure the luminance of gray level 255 at 9 points

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



B. Touch Screen Specification

B-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

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. 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/3,3V (Min 3.2V) 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: <50mA
	Idle Mode : <45mA
	Sleep Mode :<15mA
	(Operation Mode :Active Mode only)
Report rate(points/sec) Note(2)	> 100 Hz

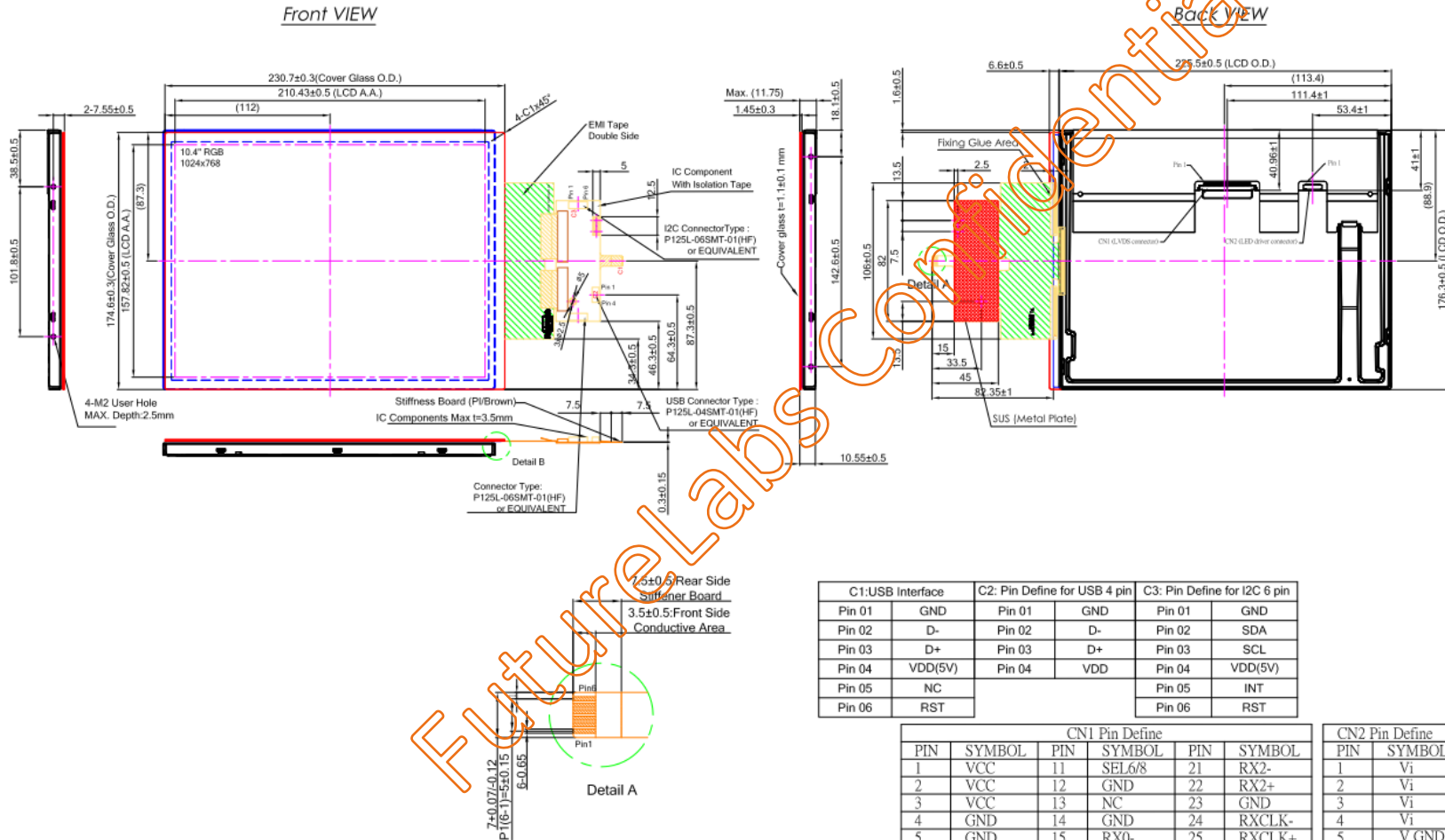
Response time	Average < 25 ms
---------------	-----------------

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

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8. DIMENSION AND DRAWING




- Note:
- Tolerance: ±0.3mm
 - Touch Finger input only or special conductive pen
 - Touch Surface Hardness: 6H (C.S.)
 - Touch Transmittance: >85% (JIS-K7105)
 - Distance between LCD and touch panel need to be minimum 1.0mm otherwise touch maybe will not work correctly
 - If customer put a front cover all around need use at least 2mm thick gasket between touch and metal frame
 - Touch USB max ripple acceptable is 50mV, in other case touch will not work correctly
 - Referring to the integration guide to avoid any integration noise issue
 - LCD P/N : FLC-104GML2000SA2#00
 - Touch P/N : RTPC104-0005-C#00
 - 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	Pin 04	VDD(5V)
Pin 05	NC			Pin 05	INT
Pin 06	RST			Pin 06	RST

CN1 Pin Define						CN2 Pin Define	
PIN	SYMBOL	PIN	SYMBOL	PIN	SYMBOL	PIN	SYMBOL
1	VCC	11	SEL6/8	21	RX2-	1	V _i
2	VCC	12	GND	22	RX2+	2	V _i
3	VCC	13	NC	23	GND	3	V _i
4	GND	14	GND	24	RXCLK-	4	V _i
5	GND	15	RX0-	25	RXCLK+	5	V GND
6	GND	16	RX0+	26	GND	6	V GND
7	RPF1	17	GND	27	RX3-	7	V GND
8	NC	18	RX1-	28	RX3+	8	V GND
9	NC	19	RX1+	29	GND	9	EN
10	NC	20	GND	30	NC	10	ADJ

Customer Approval	Part Number # REV	FLD-104GML20PCFA1	#00
Date	Rev	Date	Drawn
Company	01	20201108	Matt
Name	Modify cover glass thickness from 3mm to 1.1mm and back view position		
Signature	Date	Design By	Date
		Check By	Date
		Approved By	



9. TFT RELIABILITY TEST CRITERIA

Test Item	Test Condition	Note
High Temperature Storage Test	85°C, 240 hours	(1)
Low Temperature Storage Test	-30°C, 240 hours	(2)
Thermal Shock Storage Test	-20°C, 0.5hour←→70°C, 0.5hour; 100cycles, 1hour/cycle	(4)
High Temperature Operation Test	85°C, 240 hours	(5)
Low Temperature Operation Test	-30°C, 240 hours	
High Temperature & High Humidity Operation Test	50°C, 80%RH, 240hours	(1)
		(2)
		(4)
		(6)
Shock (Non-Operating)	50G, 11ms, half sine wave, 1 time for ± X, ± Y, ± Z.	(3)(4)
Vibration (Non-Operating)	1.5G, 10 ~ 300 Hz, 10min/cycle, 3 cycles each X, Y, Z	(3)(4)

Note (1) There should be no condensation on the surface of panel during test.

Note (2) Temperature of panel display surface area should be 85 °C Max.

Note (3) At testing Vibration and Shock, the fixture in holding the module has to be hard and rigid enough so that the module would not be twisted or bent by the fixture.

Note (4) In the standard conditions, there is no function failure issue occurred. All the cosmetic specification is judged before reliability test.

Note (5) Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

Note (6) Before cosmetic and function test, the product must have enough recovery time, at least 24 hours at room temperature.

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.

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