

Product Specification

PART NUMBER # REV: FLD-070DML20PCSA1#00

DESCRIPTION: TFT 7"W, 800*480, LVDS, Full View 500CD
with PCAP Rocktouch Black I2C-USB

- Preliminary Specification
- Approved Specification

Customer Name:	
Signature:	Date:

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Revision History

Version	Date	Page	Description	Note
V1.0	2021/07/14		1st initial	

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1. GENERAL DESCRIPTION

1.1 Description

7 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 800 x 480 screen.

1.2 Product Summary

The following items are summary on the table under Ta=25 °C condition:

No.	Item	Specification	Unit
1	Display Size	7"	Inch
2	Pixel Number	800 (H) x 3(RGB)x 480 (V)	Pixels
3	Outline Dimension	193(W) x 136(H) x 13.85(D)(Max.)	mm
4	Active Area	152.4 (W) x 91.44 (H)	mm
5	Pixel Pitch	0.1905 (H) x 0.1905 (V)	mm
6	Display Colors	16.7M / 262K	Colors
7	Pixel Arrangement	RGB stripe	-
8	Display Mode	Normally Black	-
9	Electrical Interface	1ch-LVDS	-
10	Surface Treatment	Anti-Glare	-
11	Brightness	500 (Typ.)	cd/m2
12	Contrast Ratio	800 (Typ.)	-
13	Power Consumption	Total: 2.48 Backlight: 2.0	W

2. ABSOLUTE MAXIMUM RATING

2.1 Electrical Absolute Rating

Item	Symbol	Values			Unit	Note
		Min	Typ	Max		
Power Supply Voltage	VCC	-0.3	-	3.6	V	(1)
Logic Supply Voltage	V _{IN}	-0.3	-	3.6	V	

2.2 Backlight Converter

Item	Symbol	Values			Unit	Note
		Min	Typ	Max		
Converter Voltage	LED_ V _{IN}	0	12.0	18.0	V	(1), (2) Duty=100%
Enable Voltage	LED_EN	0	3.3 / 5	7	V	
Backlight Adjust	LED_PWM	0	3.3 / 5	7	V	(1), (2) Pulse Width≤10msec. And Duty≤10%

Note (1) Permanent damage to the device may occur if maximum values are exceeded. Function operation should be restricted to the conditions described under Normal Operating Conditions.

Note (2) Specified values are for input pin of LED light bar at Ta=25±2°C °.

2.3 Environment Absolute Rating

Item	Symbol	Values			Unit	Note
		Min	Typ	Max.		
Operating Temperature	Top	-30	-	+85	°C	
Storage Temperature	Tstg	-40	-	+90	°C	

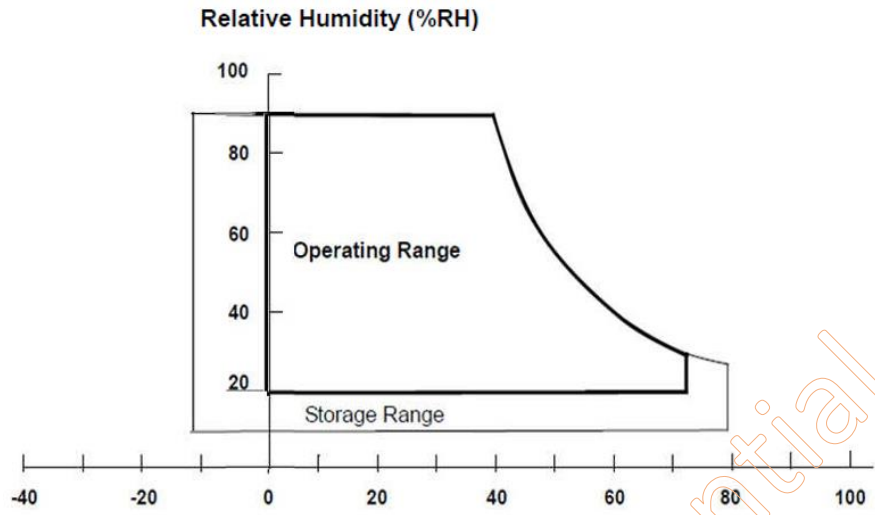
Note 1 Temperature and relative humidity range is shown in the figure below.

(a) 90 %RH Max. (Ta ≤ 40 °C).

(b) Wet-bulb temperature should be 39 °C Max. (Ta > 40 °C).

(c) No condensation.

Note 2 The absolute maximum rating values of this product are not allowed to be exceeded at any times. The module should not be used over the absolute maximum rating value. It will cause permanently unrecoverable function fail in such a condition.



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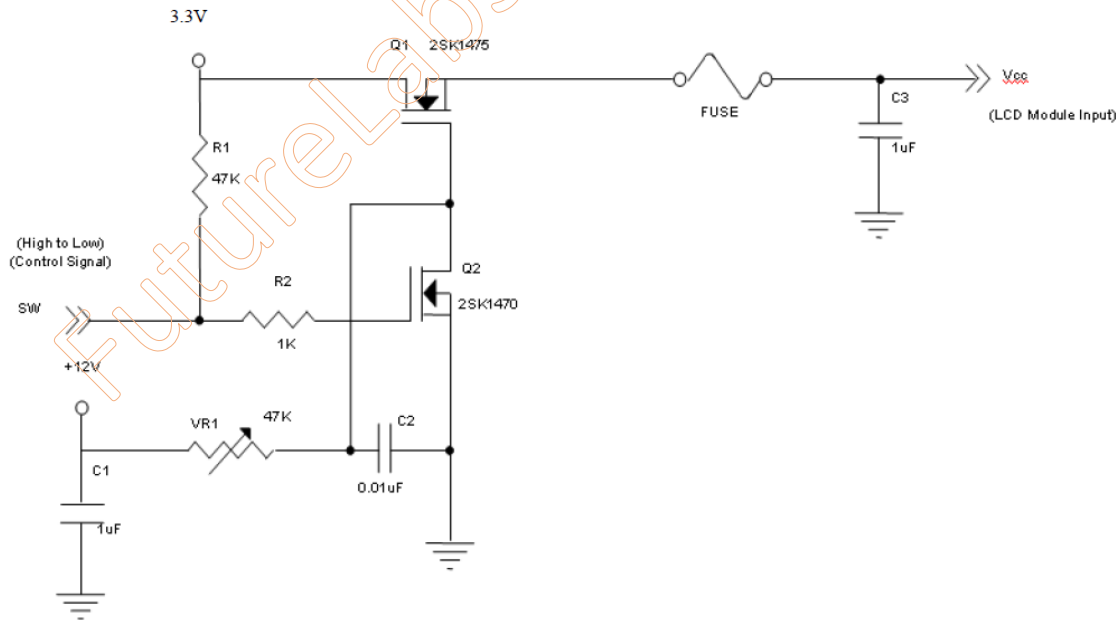
3. ELECTRICAL CHARACTERISTICS

3.1 LCD Electrical Specification

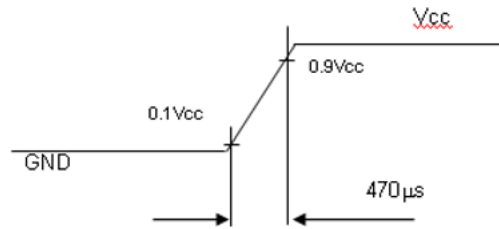
Parameter		Min.	Type	Max.	Unit.	Note
Power supply voltage	V _{CC}	3.0	3.3	3.6	V	
Ripple Voltage	V _{RP}	-	-	100	mVp-p	
Rush Current	I _{RUSH}	-	-	2	A	(2)
Power Supply Current	White	-	135	200	mA	(3)a
	Black	-	85	135	mA	(3)b
	Vertical Stripe	-	145	220	mA	(3)c
Power Consumption	PLCD	-	0.48	0.73	W	
LVDS differential input voltage	V _{id}	200	-	600	mV	
LVDS common input voltage	V _{ic}	1.0	1.2	1.4	V	
LVDS terminating resistor	R _T	-	100	-	ohm	

Note (1) The ambient temperature is $T_a = 25 \pm 2^\circ\text{C}$.

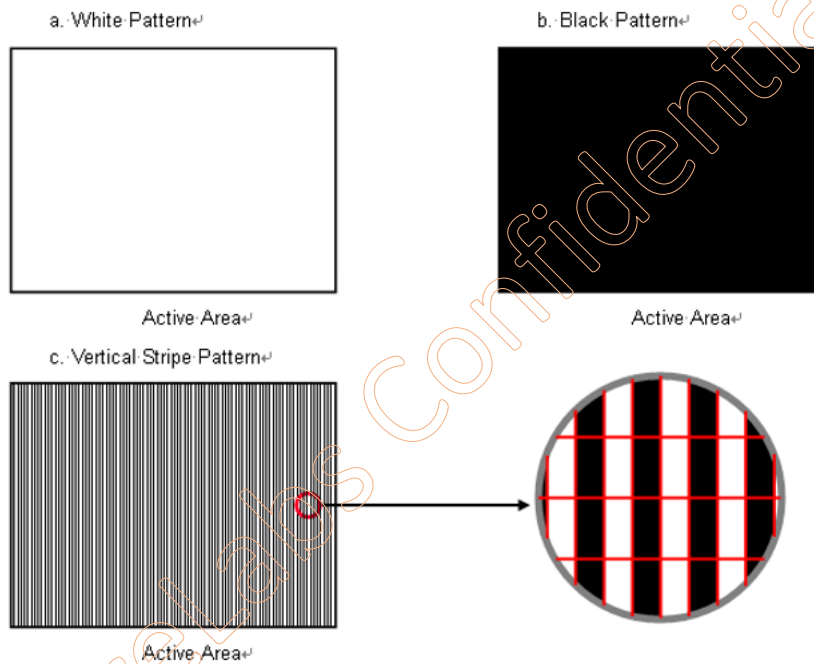
Note (2) Measurement Conditions:



Vcc rising time is 470µs

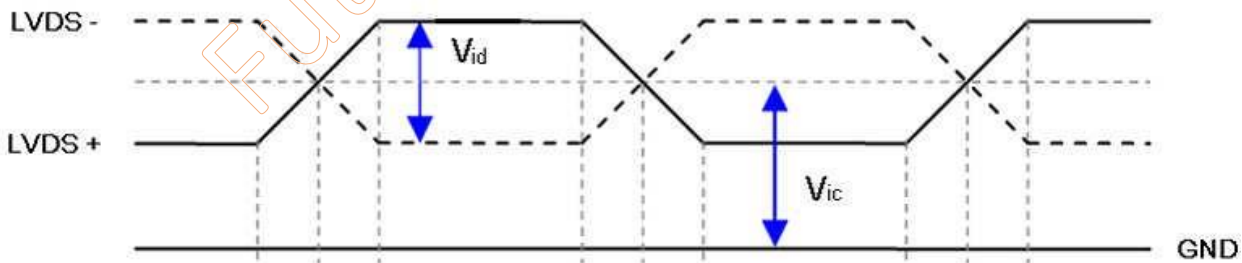


Note (3) The specified power supply current is under the conditions at $V_{CC}=3.3V$, $T_a=25\pm 2^\circ C$, $F_r=60Hz$, whereas a power dissipation check pattern below is displayed.



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

Note (5) VID waveform condition



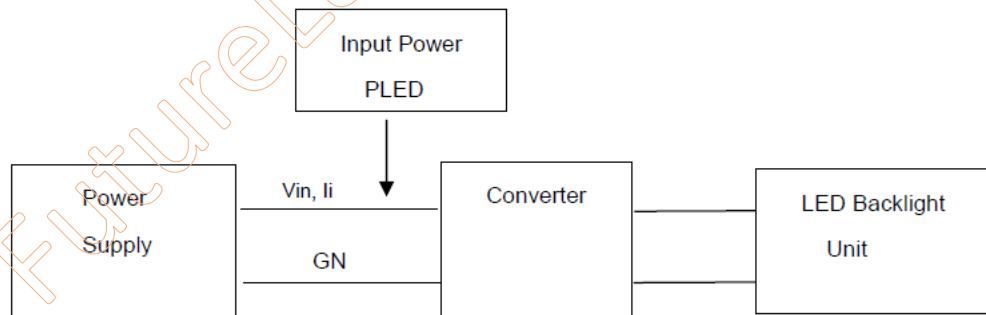
3.2 Backlight Unit

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

Parameter		Symbol	Min.	Type	Max.	Unit.	Note
Converter Power Supply Voltage		LED_Vin	10.8	12.0	13.2	V	
Converter Power Supply Current		li	0.1	0.17	2.0	A	@LED_Vin= 12V Duty=100%
Converter Input Rush Current		lirsh		4.3		A	@LED_Vin rising = 1mS
Power Consumption		PLED		2.0	2.3	W	@ LED_Vin = 12V Duty=100%
EN Control Level	Backlight on	LED_EN	2.0	3.3	5.0		
	Backlight off		0	-	0.15		
PWM Control Level	PWM High Level	LED_PWM	2.0	-	5.0		
	PWM Low Level		0	-	0.15		
PWM Control Duty Ratio			5	-	100	%	
PWM Control Frequency		f _{PWM}	190	200	300	Hz	
LED Life Time		L _L	50,000			Hrs	(2)

Note 1: LED light bar input voltage and current are measured by utilizing a true RMS multimeter.

Note 2: The lifetime of LED is estimated data and defined as the time when it continues to operate under the conditions at $T_a = 25 \pm 2^\circ\text{C}$ 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.



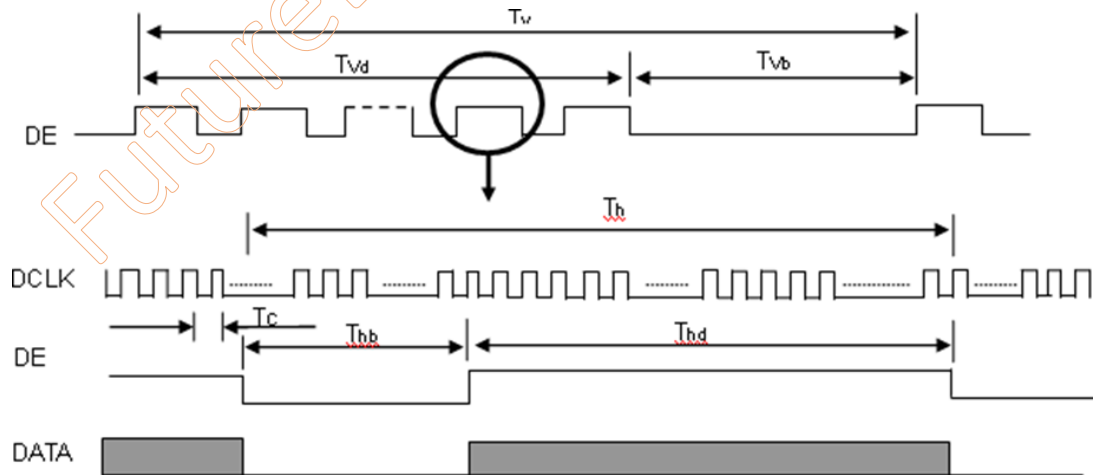
4. Timing Chart

4.1 Timing Table

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
LVDS Clock	Frequency	F _c	25.2	25.4	35.7	MHz	-
	Period	T _c		39.37		ns	
	Input cycle to cycle jitter	T _{rcl}	-0.02*T _c	-	0.02*T _c	ns	(3)
	Input clock to data skew	TLVCCS	-0.02*T _c	-	0.02*T _c	ns	(4)
	Spread spectrum modulation range	F _{clk_in_mod}	FC*98%	-	FC*102%	MHz	(5)
	Spread spectrum modulation frequency	F _{SSM}	23	-	93	KHz	
Vertical Display Term	Frame Rate	Fr	-	60	-	Hz	T _v =T _{vd} +T _{vb}
	Total	T _v	488	490	611	Th	-
	Active Display	T _{vd}	480			Th	-
	Blank	T _{vb}	8	10	131	Th	-
Horizontal Display Term	Total	T _h	860	864	974	T _c	T _h =T _{hd} +T _{hb}
	Active Display	T _{hd}	800			T _c	-
	Blank	T _{hb}	60	64	174	T _c	-

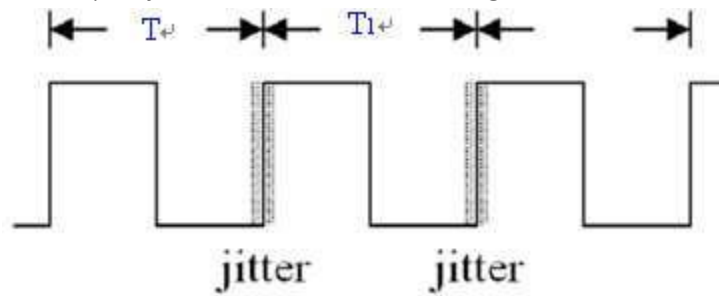
Note (1) Because this module is operated by DE only mode, Hsync and Vsync input signals are ignored.

Note (2) The T_v(T_{vd}+T_{vb}) must be integer, otherwise, this module would operate abnormally.

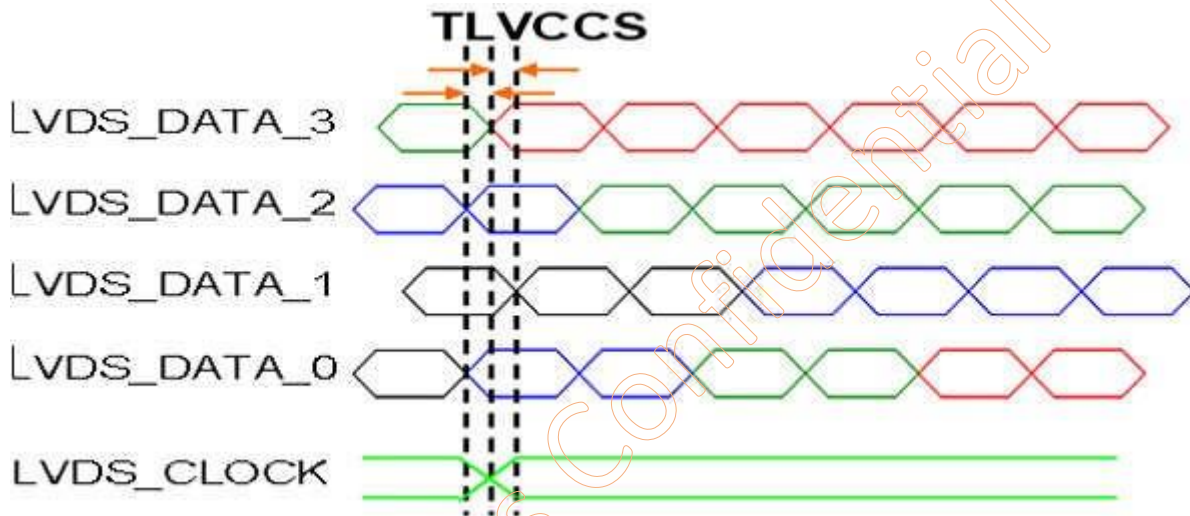


INPUT SIGNAL TIMING DIAGRAM

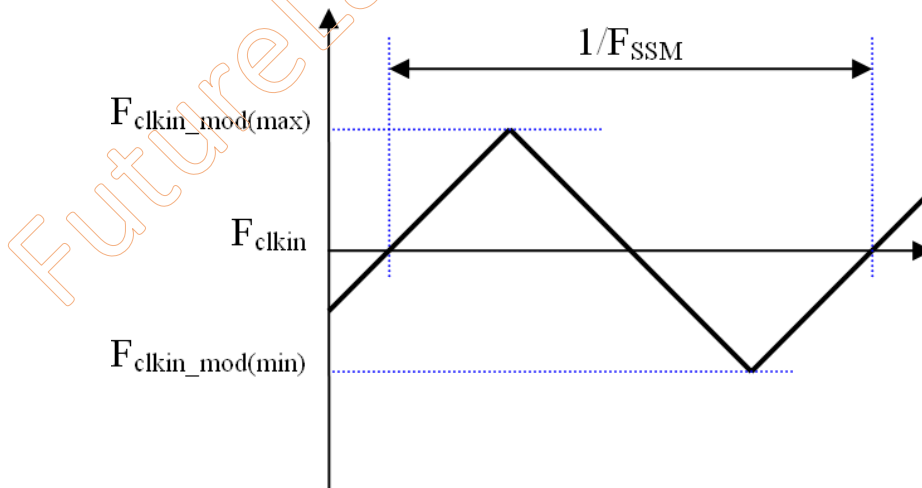
Note (3) The input clock cycle-to-cycle jitter is defined as below figures. $Trcl = |T1 - T1|$



Note (4) Input Clock to data skew is defined as below figures.

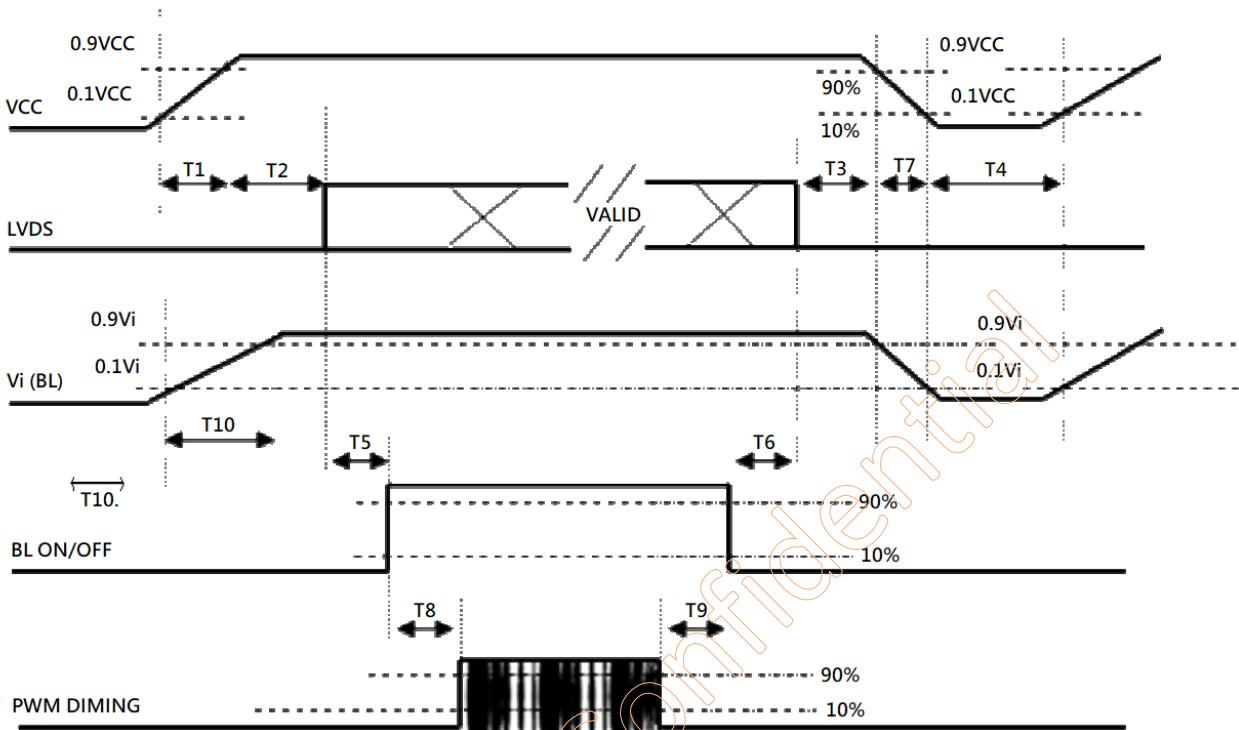


Note (5) The SSCG (Spread spectrum clock generator) is defined as below figures.



4.2 Power On/Off Sequence

The power sequence specifications are shown as the following table and diagram.



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

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 0 V.

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.

5. INTERFACE PIN DESCRIPTION

5.1 LCM Connector PIN Assignment

The electronics interface connector is Starconn 093G30-B0001A-G4 or equivalent.

Pin No.	Symbol	Functions	Note
1	12V	LED Power	
2	12V	LED Power	
3	12V	LED Power	
4	12V	LED Power	
5	ENLED	ENLED Enable pin	
6	Dimming	Backlight Adjust	
7	NC	No Connection	(2)
8	NC	No Connection	(2)
9	VCC	Power supply: +3.3V	
10	VCC	Power supply: +3.3V	
11	GND	Ground	
12	GND	Ground	
13	RX0-	Negative transmission data of pixel 0	
14	RX0+	Positive transmission data of pixel 0	
15	GND	Ground	
16	RX1-	Negative transmission data of pixel 1	
17	RX1+	Positive transmission data of pixel 1	
18	GND	Ground	
19	RX2-	Negative transmission data of pixel 2	
20	RX2+	Positive transmission data of pixel 2	
21	GND	Ground	
22	RXCLK-	Negative of clock	
23	RXCLK+	Positive of clock	
24	GND	Ground	
25	RX3-	Negative transmission data of pixel 3	
26	RX3+	Positive transmission data of pixel 3	
27	GND	Ground	

Pin No.	Symbol	Functions	Note
28	SEL6/8	LVDS 6/8 bit select function control.	(1)
		Low → 6 bit Input Mode	
		High or NC → 8bit Input Mode	
29	GND	Ground	
30	GND	Ground	

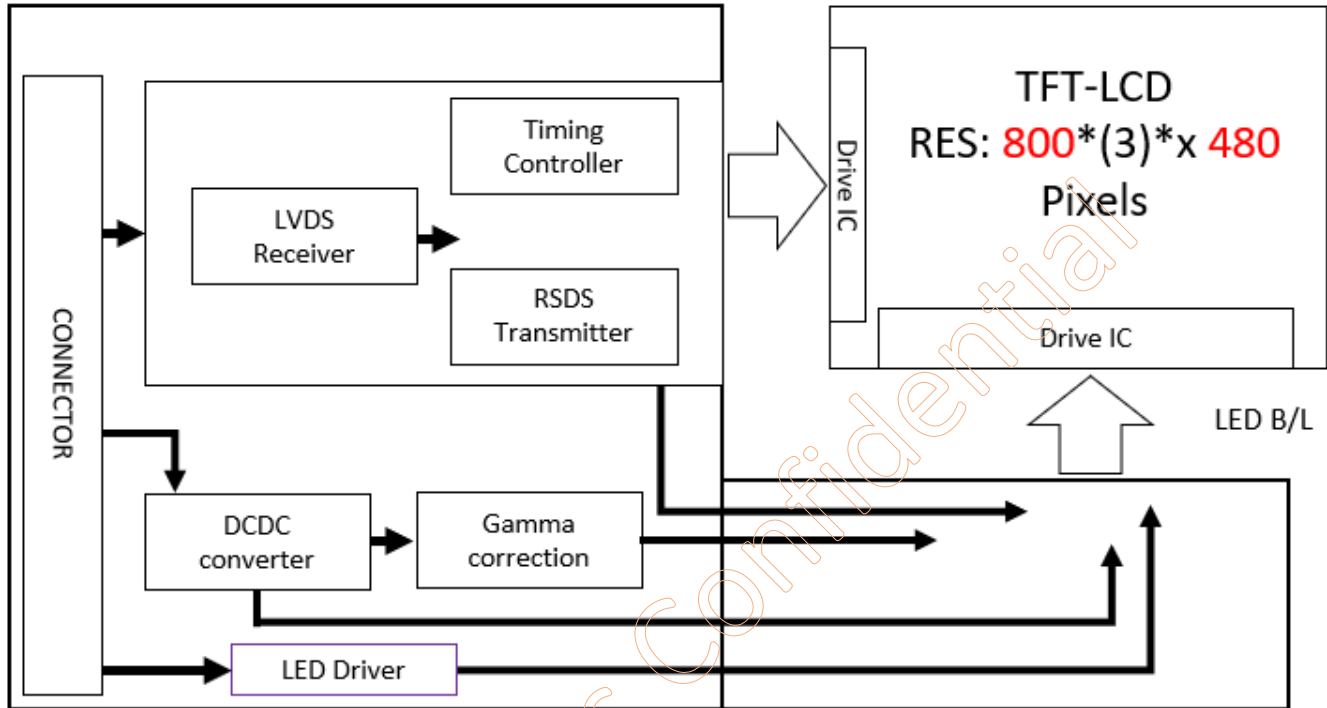
Note (1) “Low” stands for 0V. “High” stands for 3.3V

Note (2) Pin7, Pin8 input signals should be set to no connection or ground, this module would operate normally.

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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.

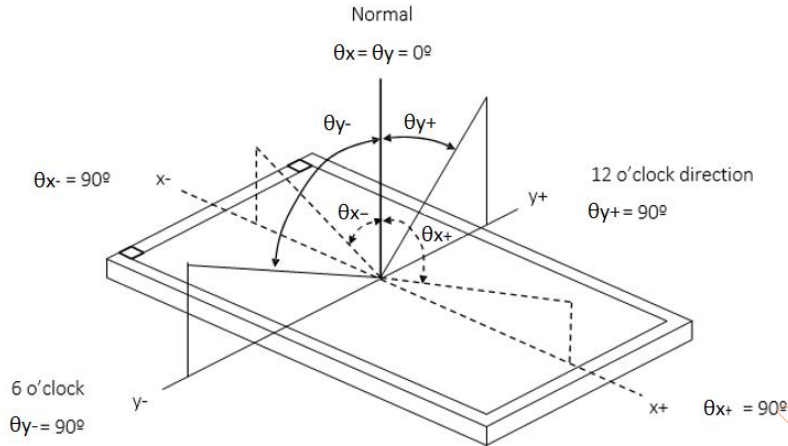
Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	$\theta_x=0^\circ$	600	800	-	-	(2)(5)
Response Time		T_R	25°C	-	13	-	ms	(3)
		T_F			12			
Center Luminance of White		LC	$\theta_x=0^\circ, \theta_y=0^\circ$ Viewing angle at normal direction	360	500	--	cd/m ²	(4)(5)
White Variation		W		70	-	-	%	
Chromaticity	Red	R_x		$\theta_x=0^\circ, \theta_y=0^\circ$ Viewing angle at normal direction	Typ. -0.05	0.625	Typ. +0.05	-
		R_y	0.303			-		
	Green	G_x	0.307			-		
		G_y	0.630			-		
	Blue	B_x	0.150			-		
		B_y	0.050			-		
	White	W_x	0.313			-		
		W_y	0.315			-		
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 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

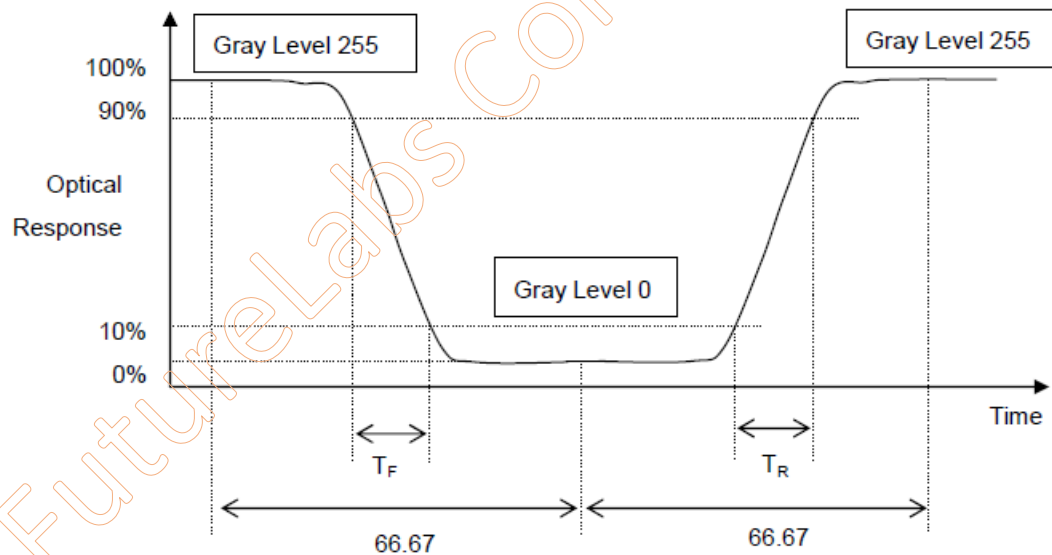


Note 2: Definition of Contrast Ratio (CR)

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:

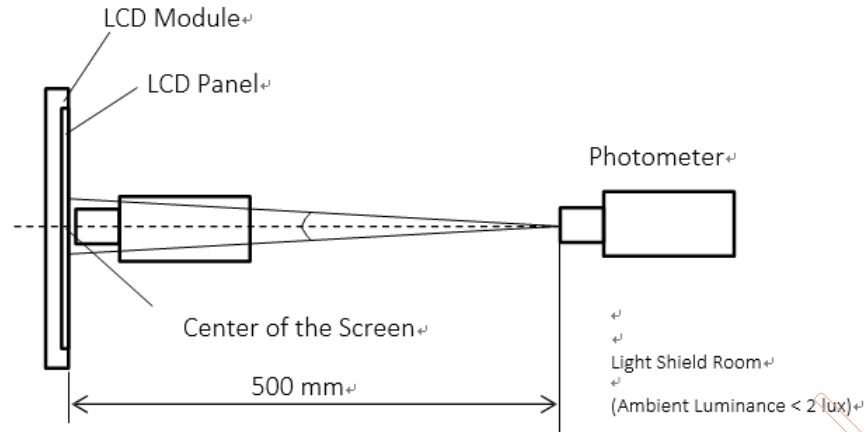
The response time is set initially by defining the "Rising Time (TR)" and the "Falling Time (TF)" respectively. Please refer the figure to the followings:



Note 4: Definition of Brightness (L)

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

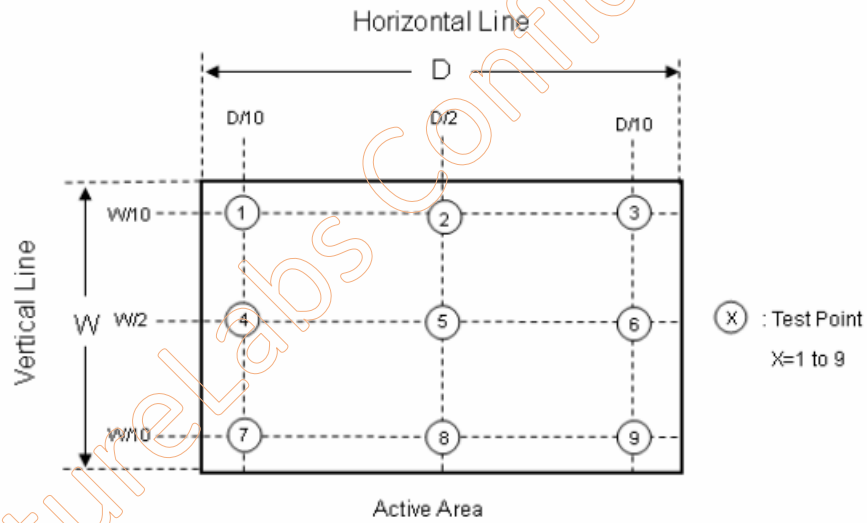
Note 5: The method of optical measurement:



Note 6: Definition of White Variation (δW):

Measure the luminance of gray level 255 at 5 points

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



8. Touch Screen specification

8.1 Environmental Specification

Specification	Value
Operating Temperature	-30°C ~ 80°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 ⁷ times
Light Transmittance	>85% Min. (JIS K-7105) with glass
Surface hardness	6H
FPC Peeling Force	5N Max

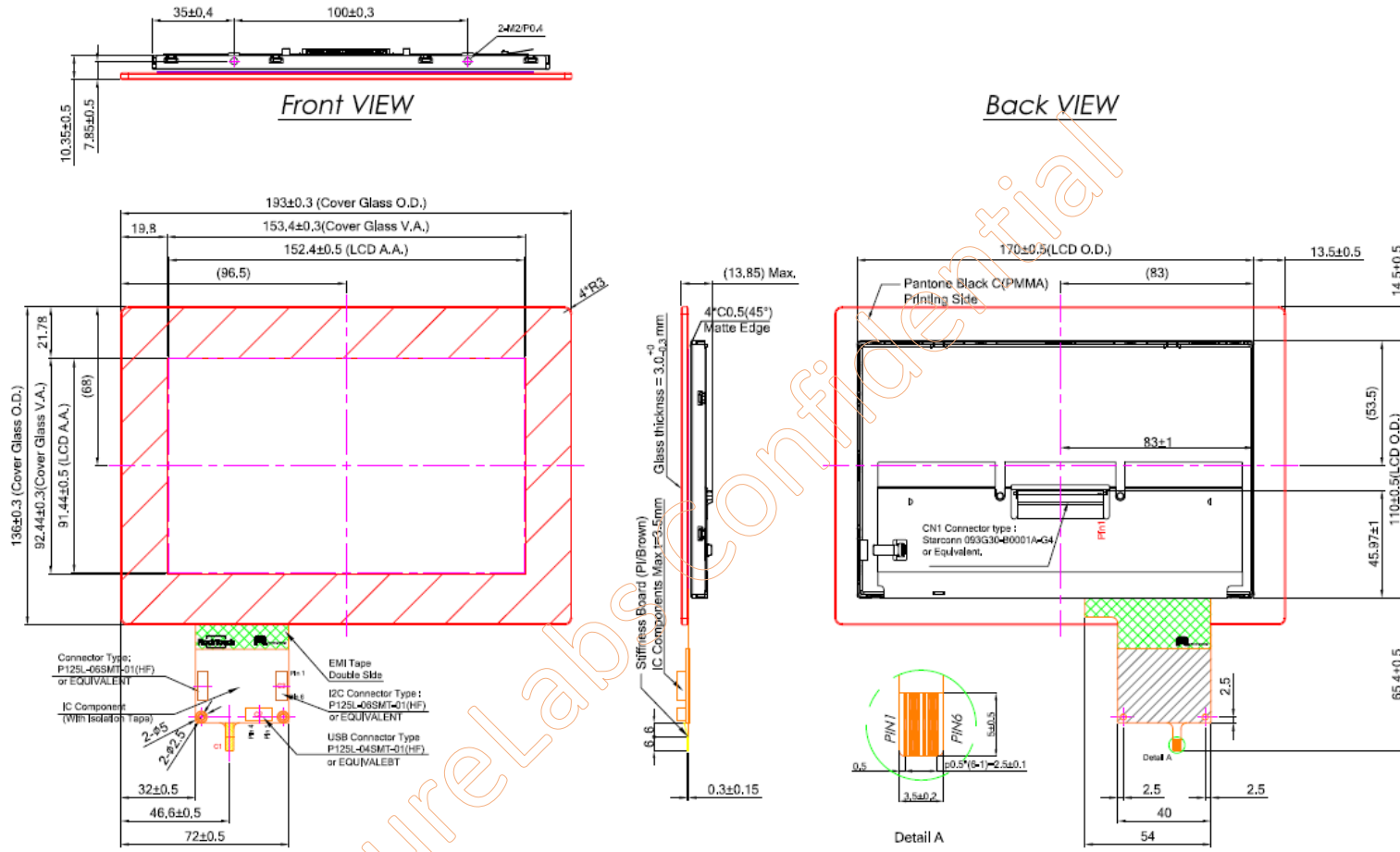
8.3 Combo Type Controller

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 Full Speed I2C: 100K/400K Hz
Resolution	16384×16384 resolution
Power consumption(mA)	Active Mode: <100mA
	Idle Mode : <20mA
	Sleep Mode :<1mA
	(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.

9. DIMENSION AND DRAWING



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-070DML2000SA1#00
11. Touch model : RTPC070W-R30BP1-C
12. Assembly Solution : DSA

C1:USB Interface		C2: Ph Define for USB 4 pin		C3: Pin Define for DC 6 pin		CN1 Pin Define					
PIN	SYMBOL	PIN	SYMBOL	PIN	SYMBOL	PIN	SYMBOL	PIN	SYMBOL	PIN	SYMBOL
Pin 01	VDD(SV)	Pin 01	GND	Pin 01	GND	1	12V	11	GND	21	GND
Pin 02	D-	Pin 02	D-	Pin 02	SDA	2	12V	12	GND	22	RXCLK-
Pin 03	D+	Pin 03	D+	Pin 03	SCL	3	12V	13	RX0-	23	RXCLK+
Pin 04	GND	Pin 04	VDD	Pin 04	NC	4	12V	14	RX0+	24	GND
Pin 05	RST			Pin 05	RST	5	ENLED	15	GND	25	RX3-
Pin 06	NC			Pin 06	NC	6	Dimming	16	RX1-	26	RX3+
						7	NC	17	RX1+	27	GND
						8	NC	18	GND	28	SE1A/B
						9	VCC	19	RX2-	29	GND
						10	VCC	20	RX2+	30	GND

Customer Approval		Part Number # Rev		FLD-070DML20PSCSA1 #00	
Date	Drawn	Date	Part No.	Description	
Company					
Name					
Signature		Date	Design By	Check By	Approved By
		20210530	Maz		

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.