Product Specification

Part Number # REV: FLC-133MML5000SA1#00

Description: TFT 13.3’’w 1920*1080 Full View 1000CD with LVDS interface + Led Cable

( ) Preliminary Specification
(V) Approved Specification

Customer Name:	
Signature:	**Date:**

PREPARED BY	**REVIEWED BY**	**SIGNATURE DATE**
Mia	*David*	*2020/10/28*

Revision History

Version	Date	Page	Description	Note
V1.0	2020/10/22		First Edition	
V1.1	2020/10/28		Update Revision	

Table of Content

Product Specification 1

1. GENERAL DESCRIPTION 4

1.1 Description *4*
1.2 Product Summary *4*

2. ABSOLUTE MAXIMUM RATING 5

2.1 Electrical Absolute Rating 5

2.2 Environment Absolute Rating 5

3. ELECTRICAL CHARACTERISTICS 6

3.1 TFT LCD Module Power Specification *6*
3.2 Backlight Unit *7*
3.2.1 LED Light bar connector 7

4. SIGNAL CHARACTERISTICS 8

4.1 Signal Electrical Characteristic *8*
4.2 Signal Interface Characteristic *9*
4.3 Interface Timing *10*
4.3.1 Timing Characteristics: 10
4.4 Power ON/OFF Sequence *12*
4.5 The Input Data Format *13*

5. INTERFACE PIN DESCRIPTION 13

5.1 LCM Connector PIN Assignment *13*

6. BLOCK DIAGRAM 15

7. OPTICAL CHARACTERISTIC 16

8. DIMENSION AND DRAWING 19

9. PRECAUTION AND PRODUCT HANDLING 20

1. GENERAL DESCRIPTION

1.1 Description

13.3”w 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 FHD, 1920x1080 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	13.3”w	Inch
2	Pixel Number	1920 (H) x 3(RGB)x 1080 (V)	Pixels
3	Outline Dimension	309.7(W)×184.1(H)×10.1(D, max)	mm
4	Active Area	293.47 (H) x 165.08(V)	mm
5	Display Colors	16.7M	- -
6	Pixel Arrangement	RGB vertical stripe	- -
7	Display Mode	Full View / Normally Black	- -
8	Electrical Interface	2-Channel LVDS	- -
9	Surface Treatment	Anti-Glare	- -
10	Brightness	1000 (Typ.)	cd/m2
11	Contrast Ratio	800 (Typ.)	- -
12	Total Power Consumption (Typ)	Total 15.2 (Vdd line: 1.8W; LED line: 13.4W)	W

2. ABSOLUTE MAXIMUM RATING

2.1 Electrical Absolute Rating

Item	Symbol	Values			Unit	Note
		Min	Typ	Max		
Power supply voltage	VDD	-0.3	-	4.0	V	(1)
Logic input voltage	Vin	-0.3	--	VDD+0.3	V	
LED Current	I LED	--	--	120	mA	Duty=100% (1)(2)

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	-20		70	°C	Note(1)(2)
Storage Temperature	Tstg	-20		70	°C	

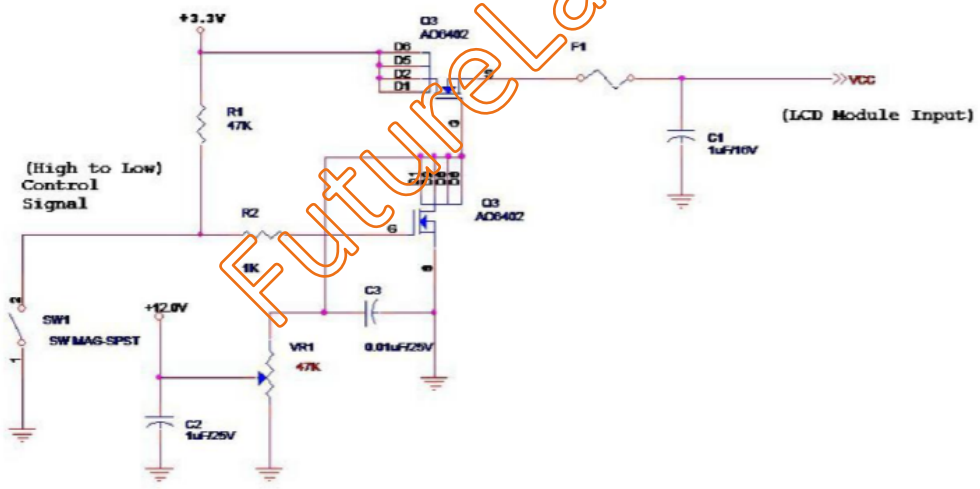
Note (1) : Max O.T. LCD surface Temperature
Note (2) : Permanent damage to the device may occur if exceed maximum values

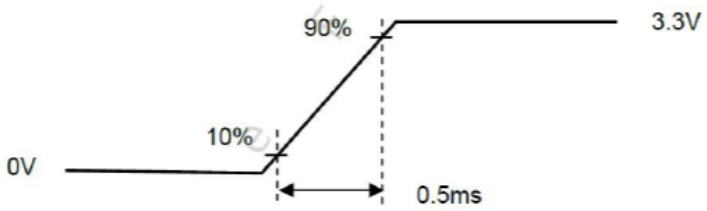
3. ELECTRICAL CHARACTERISTICS

3.1 TFT LCD Module Power Specification

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Logic/LCD Driver Voltage	VDD	3.0	3.3	3.6	V	
VDD Power	PDD	--	--	1.8	W	Note 1
IDD Current	IDD	--	--	500	mA	Note 1
Inrush Current	IRush	--	--	2	A	Note 2
Allowable Logic/LCD Driver Ripple Voltage	VDDrp	--	--	200	mV p-p	

Note 1: Maximum Measurement Condition：White Pattern at 3.6V driving voltage (Pmax=V3.6x Iwhite)
Note 2: Measure





3.2 Backlight Unit

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

Parameter	Min.	Typ.	Max.	Unit	Note
LED voltage (VL)		37.2		V	(2)
LED current (IL-channel)		360		mA	(2)
LED Power (PL)		13.4		W	
LED life Time (Typical)		50,000	--	Hrs	(1)

Note 1: The “LED lift time” is defined as the module brightness decrease to 50% original brightness that the ambient temperature is 25℃ and typical LED Current at 360 mA.

Note 2: PL=VL x IL x 1

3.2.1 LED Light bar connector

Recommended connector: JOIN TEK BHSR-02VS-1 manufactured by JST

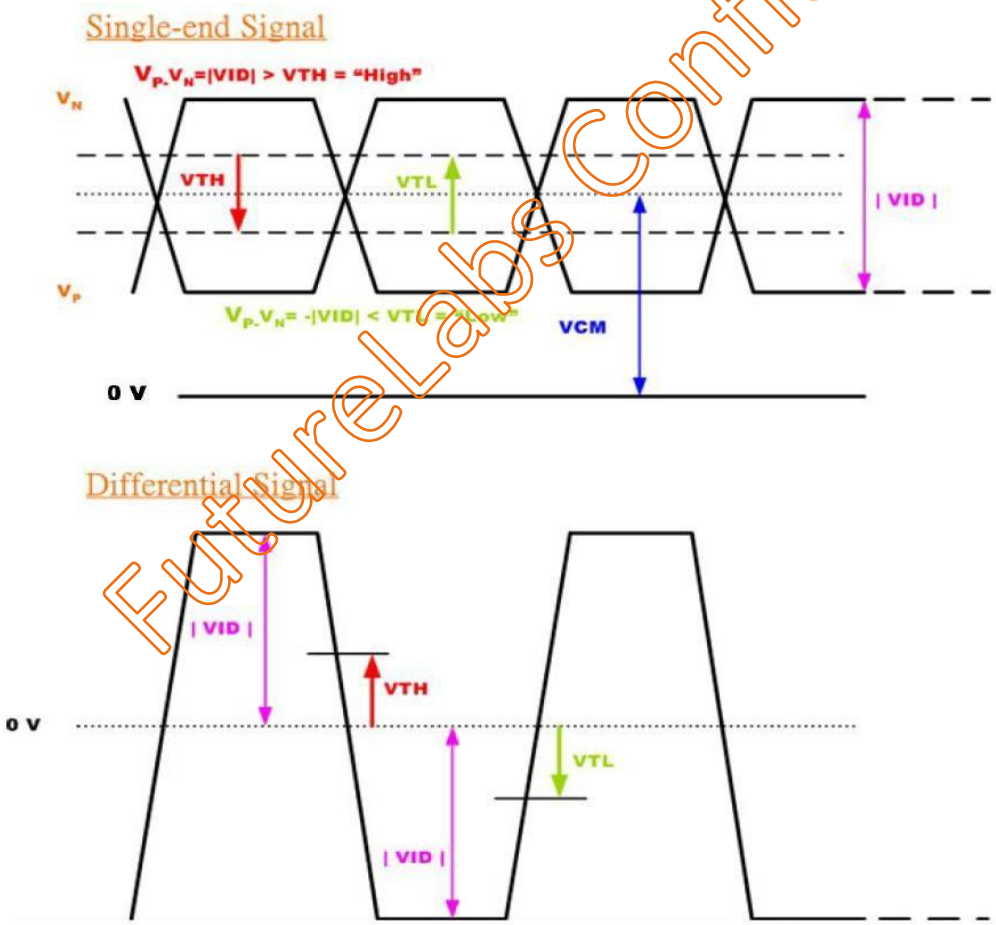
Pin No	Symbol	I/O	Description	Remark
1	VLED+	P	Backlight LED anode	
2	VLED-	P	Backlight LED cathode	

4. SIGNAL CHARACTERISTICS

4.1 Signal Electrical Characteristic

Symbol	Parameter	Min.	Typ.	Max.	Unit	Note
VTH	Differential Input High Threshold	--	--	+100	mV	
VIL	Differential Input Low Threshold	-100	-	-	mV	
I VID I	Input Differential Voltage	100	400	600	mV	
V_{CM}	Differential Input Common Mode Voltage	1.125	-	1.375	Volt	

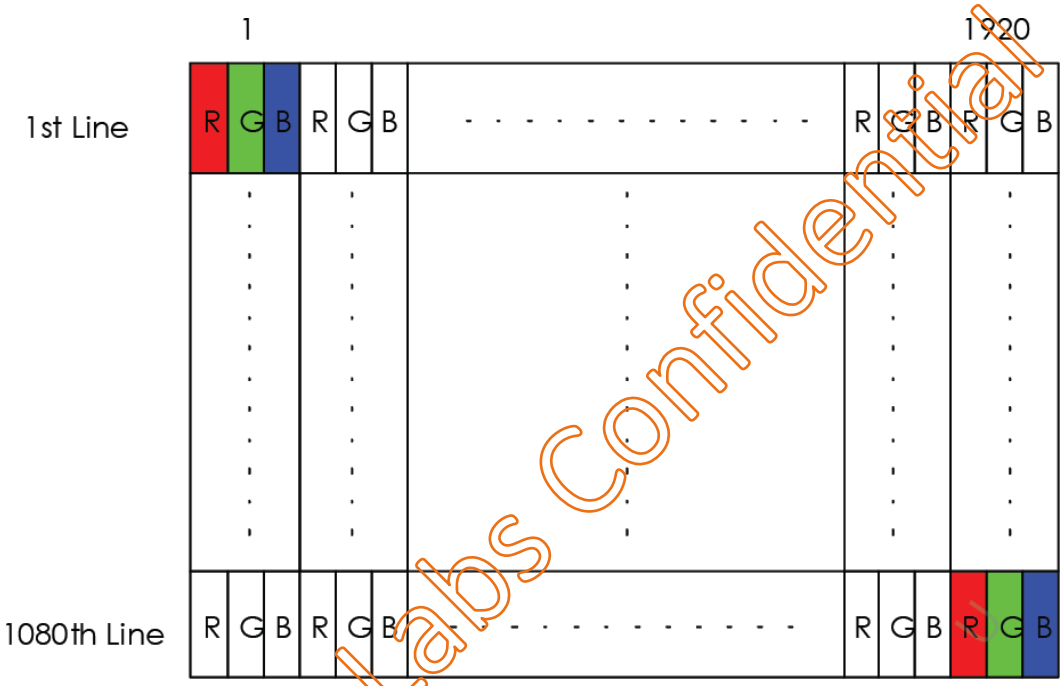
Note 1: LVDS Signal Waveform



4.2 Signal Interface Characteristic

Pixel Format Image

Following figure shows the relationship of the input signals and LCD pixel format.



4.3 Interface Timing

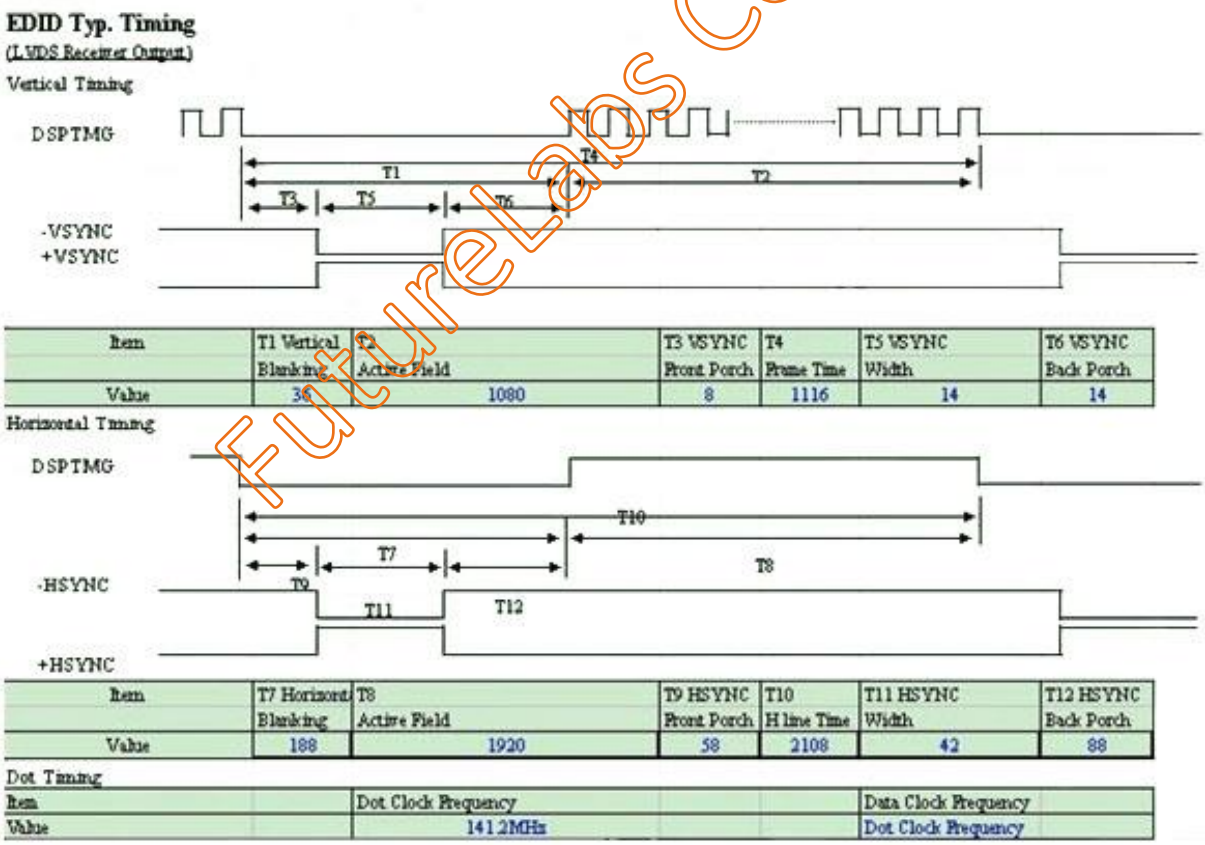
4.3.1 Timing Characteristics:

Parameter		Symbol	Min.	Typ.	Max.	Unit	Note
Frame Rate		-	60	60	60	Hz	
Clock frequency		1/Tclock	134	141.2	149	MHz	
Vertical Display Term	Period	TH	2046	2108	1920+B		
	Active	THD	1920				
	Blanking	THB	126	188	B		
Horizontal Display Term	Period	TV	1092	1116	1080+A		
	Active	TVD	1080				
	Blanking	TVB	12	36	A		

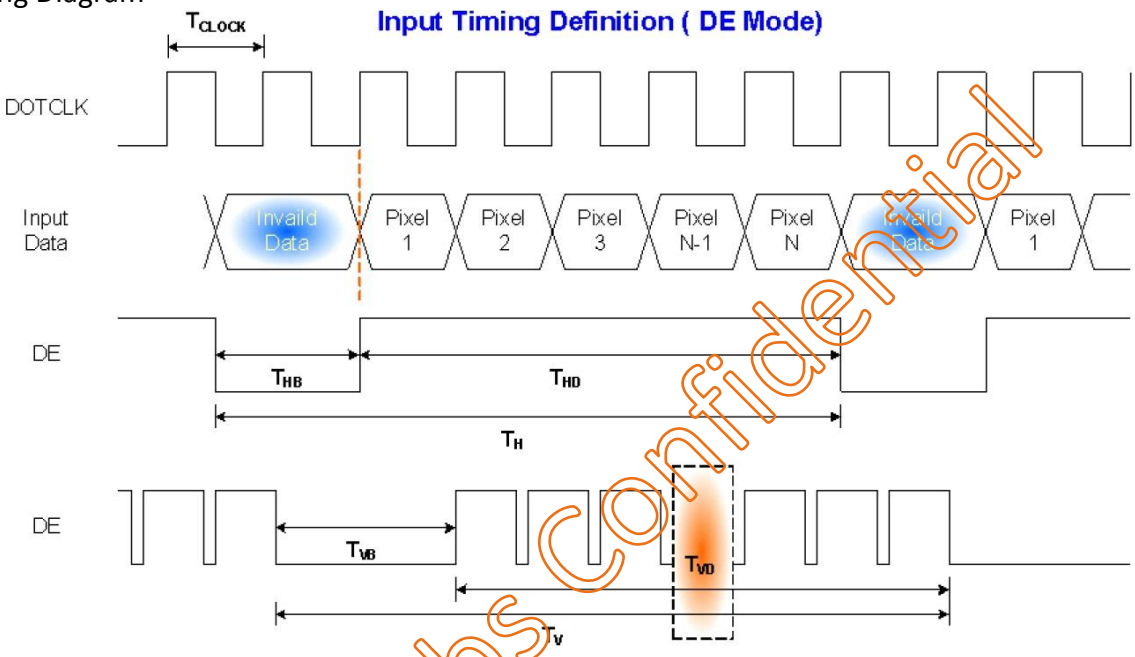
Note1 : The above is as optimized setting Note2 : DE mode only

Note3 : The maximum clock frequency = [(1920 + B)*(1080+A)*60] < 149MHz

Note4 : Clock frequency number is for reference, real setting value refer to EDID (Clock frequency 141.4 MHz)

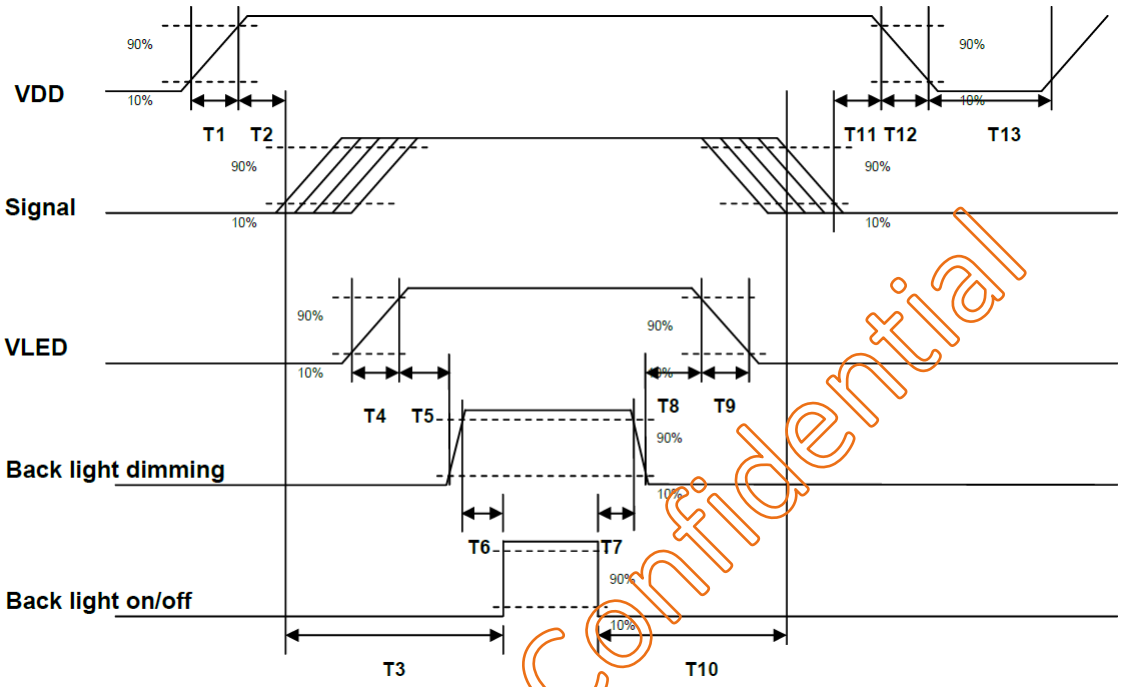


Timing Diagram



4.4 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.



Timing specifications:

Parameter	Value			Units
	Min	Typ	Max	ms
T1	0.1	-	10	ms
T2	200	-	-	ms
T3	50	-	-	ms
T4	0.5	-	10	ms
T5	10	-		ms
T6	10	-		ms
T7	10	-	-	ms
T8	10	-		ms
T9	0.5	-	10	ms
T10	50	-	-	ms
T11	10	-	-	ms
T12	-	-	10	ms
T13	1000	-	-	ms

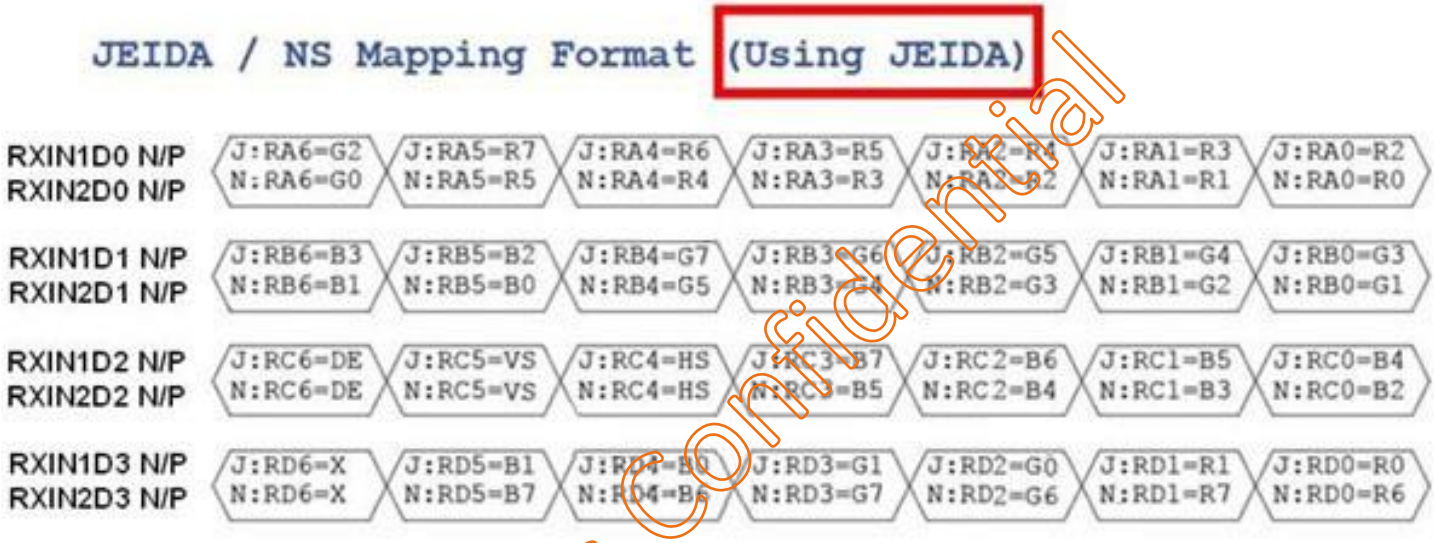
Note (1) Please avoid floating state of interface signal at invalid period.

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

Note (3) The above on/off sequence should be applied to avoid abnormal function in the display. Please make sure to turn off the power when you plug the cable into the input connector or pull the cable out of the connector.

4.5 The Input Data Format

LVDS interface JEIDA model (8 bit)



5. INTERFACE PIN DESCRIPTION

Connector Name / Designation	Interface Connector / Interface card
Manufacturer	Hirose
Type Part Number	DF19K-30P-1H(54)
Mating Housing Part Number	DF19G-30S-1C(05) DF19A-2830SCFA(41)

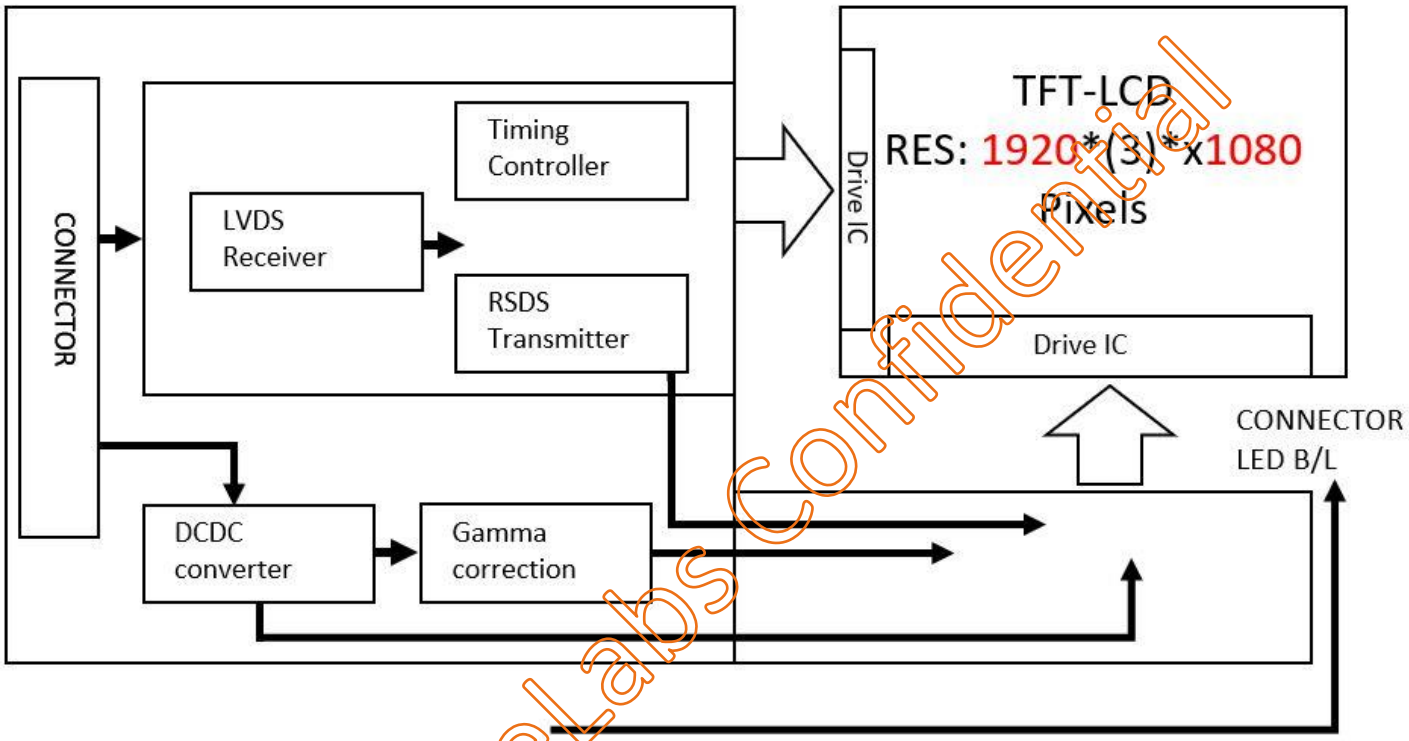
5.1 LCM Connector PIN Assignment

N O	Symbol	Description	Note
1	RXOIN0-	Negative LVDS differential data input (Odd data)	-
2	RXOIN0+	Positive LVDS differential data input (Odd data)	-
3	RXOIN1-	Negative LVDS differential data input (Odd data)	-
4	RXOIN1+	Positive LVDS differential data input (Odd data)	

5	RXOIN2-	Negative LVDS differential data input (Odd data)	-
6	RXOIN2+	Positive LVDS differential data input (Odd data)	
7	GND	Power Ground	
8	RXOCLKIN-	Negative LVDS differential clock input (Odd clock)	
9	RXOCLKIN+	Positive LVDS differential clock input (Odd clock)	-
10	RXOIN3-	Negative LVDS differential data input (Odd data)	-
11	RXOIN3+	Positive LVDS differential data input (Odd data)	
12	RXEIN0-	Negative LVDS differential data input (Even data)	
13	RXEIN0+	Positive LVDS differential data input (Even data)	
14	GND	Power Ground	-
15	RXEIN1-	Negative LVDS differential data input (Even data)	-
16	RXEIN1+	Positive LVDS differential data input (Even data)	-
17	GND	Power Ground	
18	RXEIN2-	Negative LVDS differential data input (Even data)	
19	RXEIN2+	Positive LVDS differential data input (Even data)	-
20	RXECLKIN-	Negative LVDS differential clock input (Even clock)	
21	RXECLKIN+	Positive LVDS differential clock input (Even clock)	
22	RXEIN3-	Negative LVDS differential data input (Even data)	
23	RXEIN3+	Positive LVDS differential data input (Even data)	
24	GND	Ground	
25	NC	NC	
26	VDD	Power +3.3V	
27	VDD	Power +3.3V	
28	NC	NC	
29	NC	NC	
30	GND	Ground	

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.

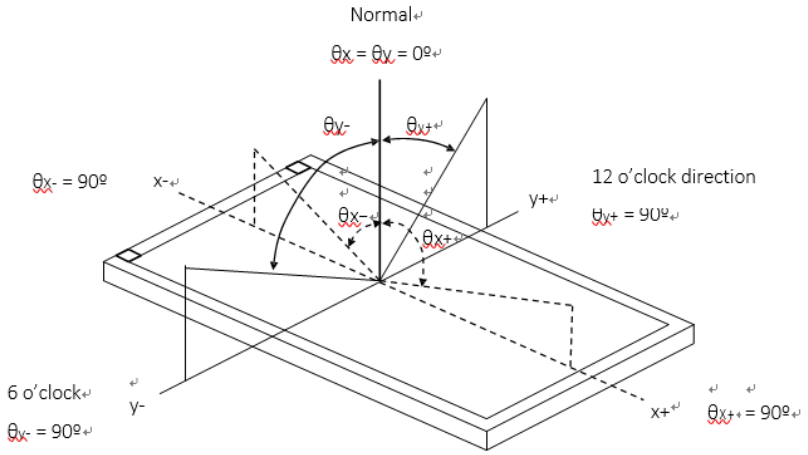
Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	θ_X=0°, θ_Y =0° Viewing angle at normal direction	500	800		-	(2)(5)
Response Time		T_R		-	13	-	ms	(3)
		T_F		-	12	-	ms	
Center Luminance of White		L_C		800	1000	-	cd/m2	(4)(5)
White Variation		δW		70	75	--	%	(5)(6)
Chromaticity	Red	Rx		Typ. -0.05	0.68	Typ. +0.05	-	(1) (5)
		Ry			0.32		-	
	Green	Gx			0.29		-	
		Gy			0.66		-	
	Blue	Bx			0.15		-	
		By			0.05		-	
	White	Wx			0.31		-	
		Wy			0.33		-	
Viewing Angle	Horizontal	θ_X+	CR=10	75	89	-	Deg.	(1)(5)
		θ_X-		75	89	-		
	Vertical	θY+		75	89	-		
		θY-		75	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

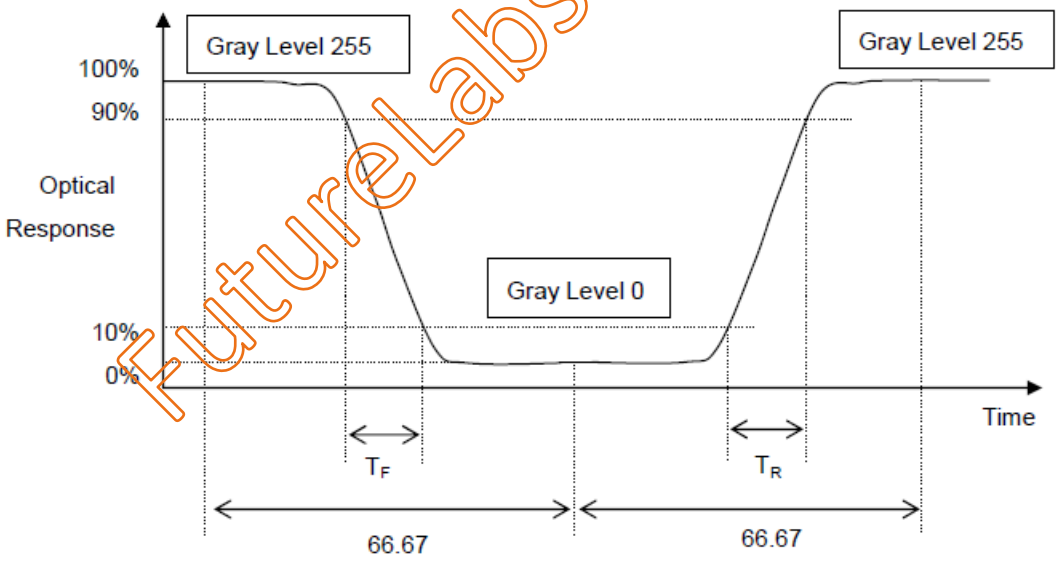


Note 2: Definition of Contrast Ratio (CR)

Measure the viewing angle of 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:

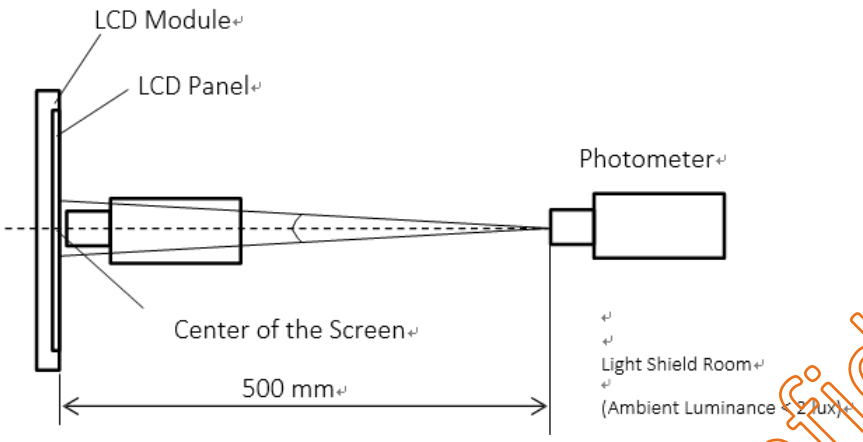
The response time is set initially by defining the "Rising Time (T_R)" and the "Falling Time (T_F)" respectively. Please refer the figure to the followings:



Note 4: Definition of Brightness (L)

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

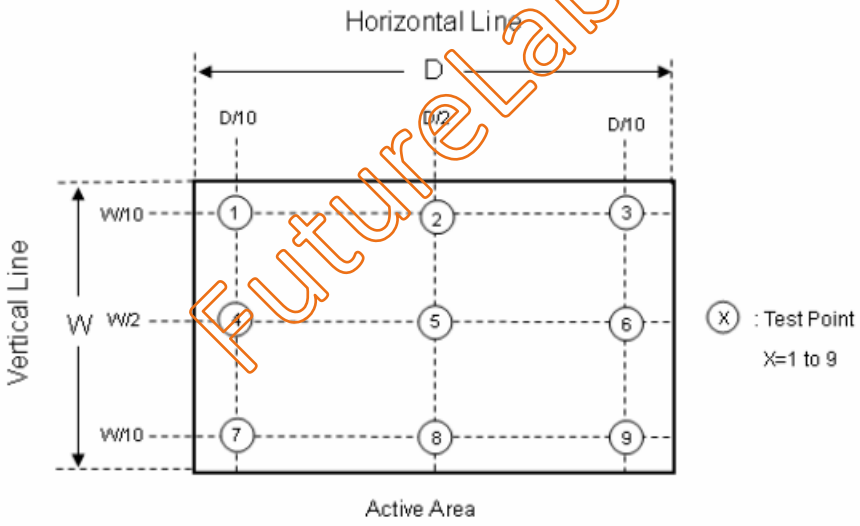
Note 5: The method of optical measurement:



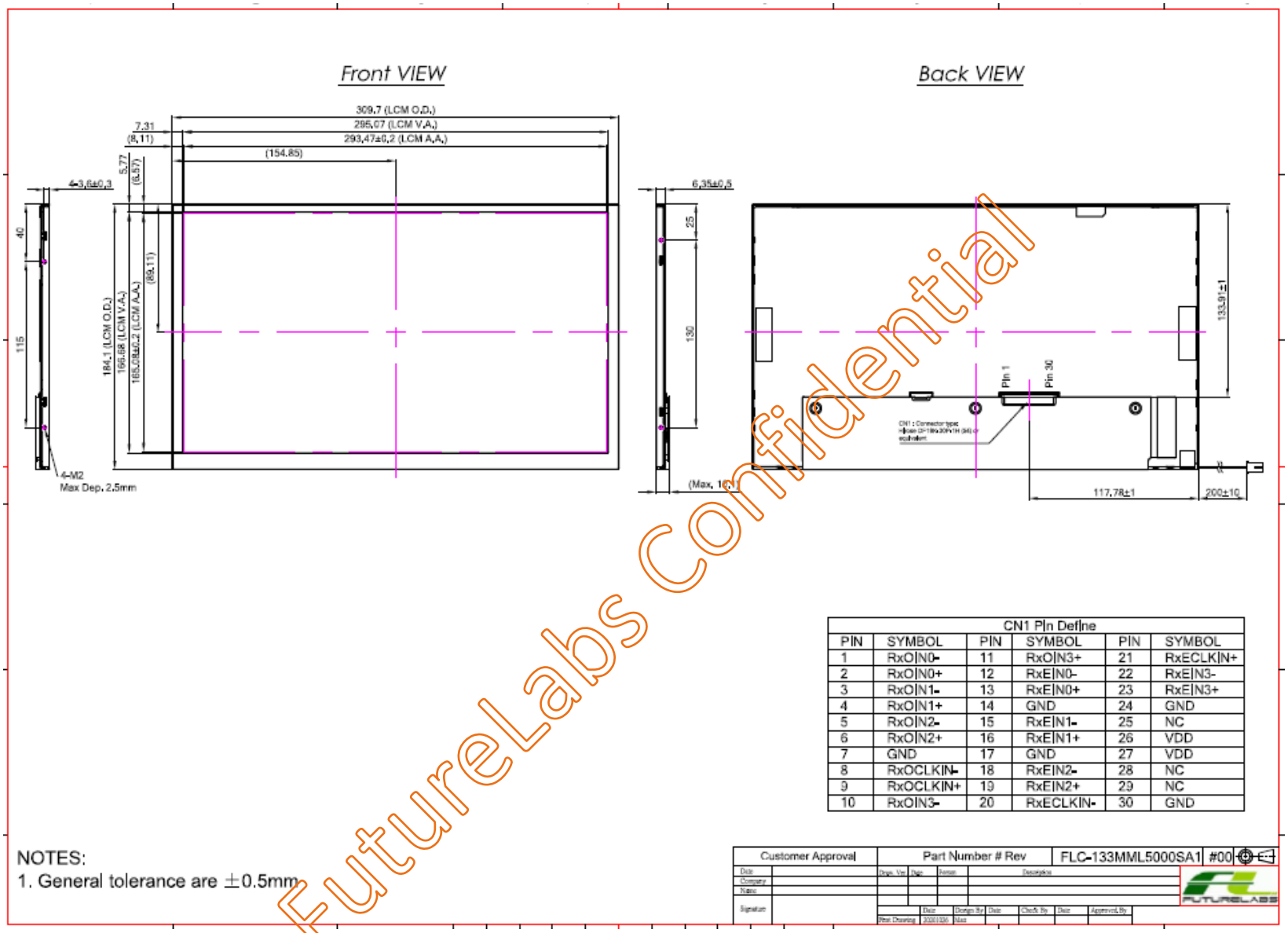
Note 6: Definition of White Variation (δW):

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)]



8. DIMENSION AND DRAWING



CN1 Pin Define

PIN	SYMBOL	PIN	SYMBOL	PIN	SYMBOL
1	RxOIN0-	11	RxOIN3+	21	RxECLKIN+
2	RxOIN0+	12	RxEIN0-	22	RxEIN3-
3	RxOIN1-	13	RxEIN0+	23	RxEIN3+
4	RxOIN1+	14	GND	24	GND
5	RxOIN2-	15	RxEIN1-	25	NC
6	RxOIN2+	16	RxEIN1+	26	VDD
7	GND	17	GND	27	VDD
8	RxOCLKIN-	18	RxEIN2-	28	NC
9	RxOCLKIN+	19	RxEIN2+	29	NC
10	RxOIN3-	20	RxECLKIN-	30	GND

NOTES:
1. General tolerance are ±0.5mm

Customer Approval	Part Number # Rev	FLC-133MML5000SA1	#00

9. 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°C ± 5°C and the humidity is below 60% RH.