Product Specification

PART NUMBER # REV: FLC-101HMLG200001#00

DESCRIPTION: TFT 10.1"w, 1280(H)*800(V), LVDS, 16.7M Color, 1200CD

(   )   Preliminary Specification
(V)   Approved Specification

Customer Name:	
Signature:	**Date:**

PREPARED BY	REVIEWED BY
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Revision History

Version	Date	Page	Description	Note
V1.0	2022/03/03		First Edition	
V1.1	2022/05/19		Update Spec	P6

Table of Content

1. GENERAL DESCRIPTION

1.1 Description

10.1 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 1280 x 800 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	10.1"w	Inch
2	Pixel Number	1280 (H) x 3(RGB)x 800 (V)	Pixels
3	Outline Dimension	229.46(W)×149.1(H)×4.8(D) typ	mm
4	Active Area	216.96 (W) x 135.60 (H)	mm
5	Pixel Pitch	0.1695(W) x 0.1695(H)	mm
6	Display Colors	16.7M colors (8bit RGB)	
7	Pixel Arrangement	RGB vertical stripe	-
8	Display Mode	Normally Black	-
9	Electrical Interface	LVDS	-
10	Surface Treatment	Anti-glare	-
11	Brightness	1200 (Typ.)	cd/m2
12	Contrast Ratio	1000 (Typ.)	-
13	Power Supply Voltage	3.3V for LCD – 12V for Backlight	
14	Power Consumption	Backlight System: 6W (Typ.) Total: 7W (Typ.)	W
15	Weight	300	g

2. ABSOLUTE MAXIMUM RATING

2.1 Electrical Absolute Rating

Item	Symbol	Values			Unit	Note
		Min	Typ	Max		
Power Supply Voltage	VDD	-0.3	-	3.9	V	GND=0

2.3 Environment Absolute Rating

Item	Symbol	Values			Unit	Note
		Min	Typ	Max.		
Operating Temperature	Top	-30	-	+80	°C	
Storage Temperature	Tstg	-30	-	+80	°C	

3. ELECTRICAL CHARACTERISTICS

3.1 TFT LCD Module

Item	Symbol	Values			Unit	Note
		Min	Typ	Max		
Power supply voltage	VDD	3.0	3.3	3.6	V	GND=0
Power Current	I_{VDD}	-	300	-	mA	
Input logic high voltage	VIH	0.8VDD	-	3.6	V	
Input logic low voltage	VIL	0	-	0.2VDD	V	

3.2 Backlight Characteristics

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

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Power for Analog circuit	VDD_LED	11.0	12.0	13.0	V	GND=0
Backlight Current	I_{VDD_LED}	-	500	-	mA	
PWM Singal Voltage_High	VPWM	3.0	-	3.6	V	
PWM Singal Voltage_Low		0	-	0.4	V	
LED PWM Duty Cycle	T_D	1	-	100	%	
LED driver PWN Signal	LED_PWM	100	--	10K	HZ	GND=0
LED PWM High Threshold	V_{PWMH}	-	3.3	-	V	
LED PWM Low Threshold	V_{PWML}	-	0	-	V	
Operating LED life time	Hr	50000	-	-	Hours	(1)(2)

Note (1) LED life time (Hr) can be defined as the time in which it continues to operate under the condition: Ta=25±3°C, typical IL value indicated in the above table until the brightness becomes less than 50%.

Note (2) The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25°C. The LED lifetime could be decreased if operating IL is larger. The constant current driving method is suggested.

## 3.3 DC and AC Characteristics

DC Electrical Characteristics

Item	Symbol	Min	Typ	Max	Unit	Note
Differential Input High Threshold Voltage	RXVTH	100	200	300	mV	
Differential Input Low Threshold Voltage	RXVTL	-300	-200	-100	mV	
Differential Input Common Mode Voltage	RXVCM	1.0	1.2	1.4	V	
Differential Input Voltage	IVIDI	200	-	600	mV	

4. Signal Characteristic

4.1Timing Chart

Item	Symbol	Min.	Typ.	Max.	Unit
Frame Rate	Fr	-	60	-	Hz
Vertical Total Time	TV	824	838	872	TH
Vertical Display Time	TVD		800		TH
VSYNC back porch(with pulse width)	TVBP	23	23	23	TH
VSYNC front porch	TVFP	1	15	49	TH
Vertical Blanking Time	TVBP+TVFP	24	38	72	TH
Horizontal Total Time	TH	1380	1440	1500	Tclock
Horizontal Display Time	THD		1280		Tclock
HSYNC back porch(with pulse width)	THBP	88	88	88	Tclock
HSYNC front porch	THFP	12	72	132	Tclock
Horizontal Blanking Time	THBP+THFP	90	160	220	Tclock
Clock Rate	1/Tclock	66.3	72.4	78.9	MHz
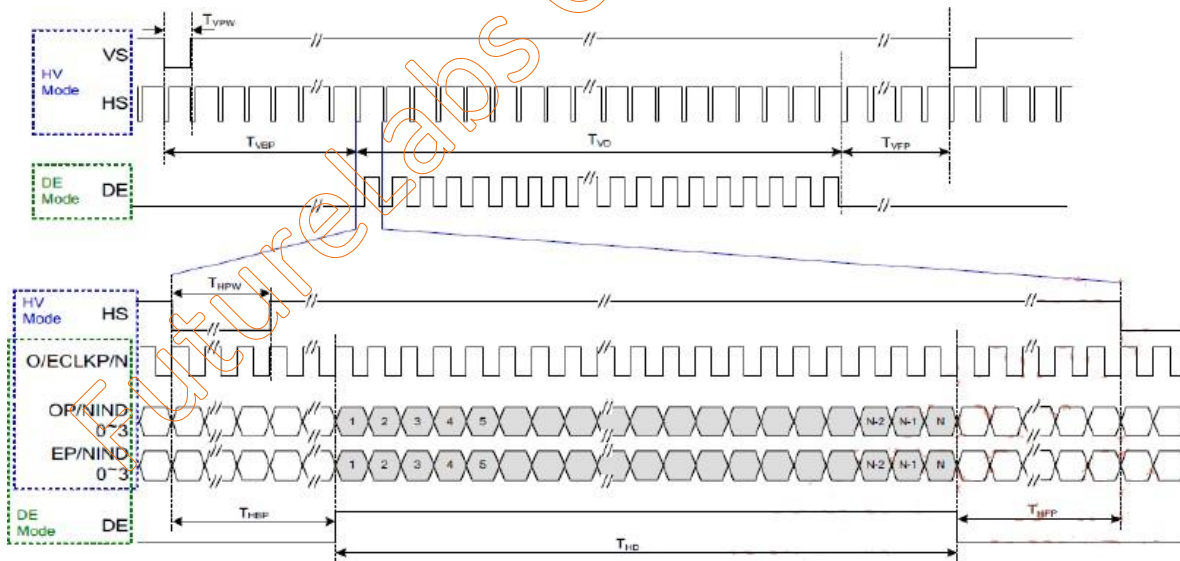
LVDS input timing format

4.2 The Input Data Format

8bit LVDS input (VESA Format)
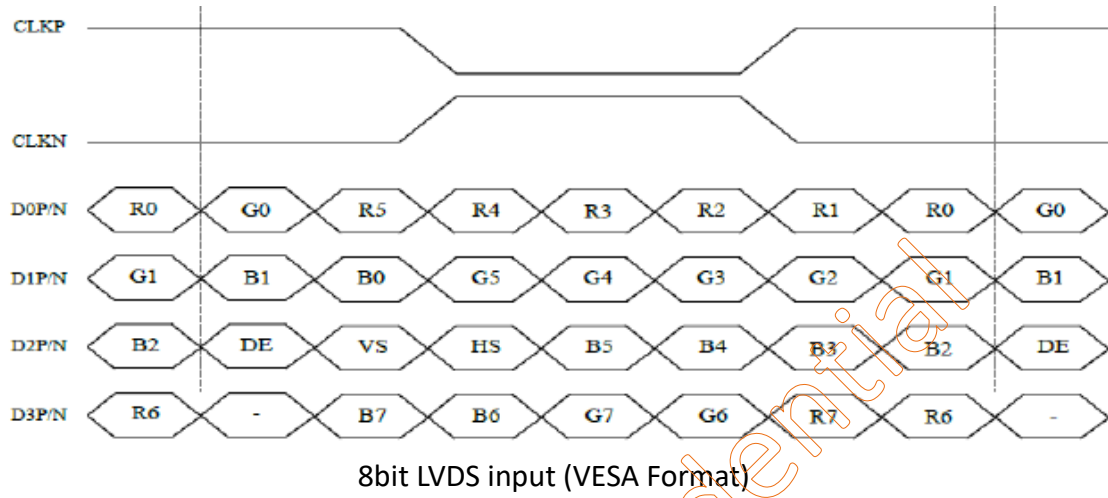
5. INTERFACE PIN DESCRIPTION

5.1 LCM Connector PIN Assignment

A 40 Pin connector is used for the module electronics interface the recommended model is STM MSAK24025P40B or equivalent.

Pin No.	Symbol	I/O	Description
1	NC	-	No connection
2	VDD	P	power supply
3	VDD	P	power supply
4	NC	-	No Connection
5	NC	-	No Connection
6	NC	-	No Connection
7	NC	-	No connection
8	Rxin0N	I	-LVDS differential data
9	Rxin0P	I	+LVDS differential data
10	GND	P	Ground
11	Rxin1N	I	-LVDS differential data
12	Rxin1P	I	+LVDS differential data
13	GND	P	Ground
14	Rxin2N	I	-LVDS differential data
15	Rxin2P	I	+LVDS differential data
16	GND	P	Ground
17	RXCLKN	I	- LVDS differential clock input
18	RXCLKP	I	+ LVDS differential clock input
19	GND	P	Ground
20	Rxin3N	I	-LVDS differential data
21	Rxin3P	I	+LVDS differential data
22	GND	P	Ground

Pin No.	Symbol	I/O	Description
23	NC	-	No connection
24	NC	-	No connection
25	GND	P	Ground
26	NC	-	No connection
27	NC	-	No connection
28	GND	P	Ground
29	NC	-	No connection
30	NC	-	No connection
31	LED_K	P	Ground for LED Driver
32	LED_K	P	Ground for LED Driver
33	LED_K	P	Ground for LED Driver
34	NC	-	No connection
35	PWM	I	PWM signal for LED Driver Control Backlight Brightness
36	NC	-	No connection
37	NC	-	No connection
38	LED_A	P	Power Supply for LED Driver 12V
39	LED_A	P	Power Supply for LED Driver 12V
40	LED_A	P	Power Supply for LED Driver 12V

I : input   O : output   P : power

6. BLOCK DIAGRAM

The following diagram shows the functional block of the TFT module:
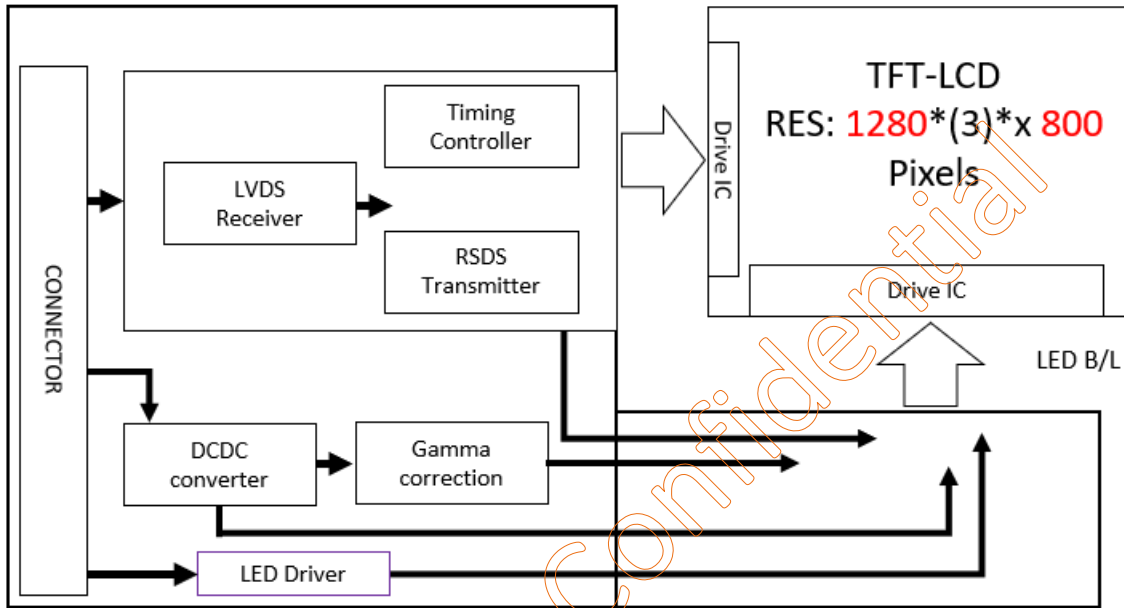
7. OPTICAL CHARACTERISTIC

The optical characteristics are measured under stable conditions at room temperature 25 °C.

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	$\theta_X=0°$	800	1000	-	-	(2)(5)
Response Time		T_R	25°C	-	25	35	ms	(3)
		T_F						
Center Luminance of White		LC		1000	1200	-	cd/m2	(4)(5)
Brightness uniformity					75		%	(5)(6)
Chromaticity	Red	Rx	$\theta_X=0°$, $\theta_Y=0°$ Viewing angle at normal direction	Typ. -0.03	0.618	Typ. +0.03	-	(1) (5)
		Ry			0.328		-	
	Green	Gx			0.335		-	
		Gy			0.542		-	
	Blue	Bx			0.136		-	
		By			0.145		-	
	White	Wx			0.322		-	
		Wy			0.342		-	
Viewing Angle	Horizontal	θ_X+	CR=10	80	85	-	Deg.	(1)(5)
		θ_X-		80	85	-		
	Vertical	θ_Y+		80	85	-		
		θ_Y-		80	85	-		

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
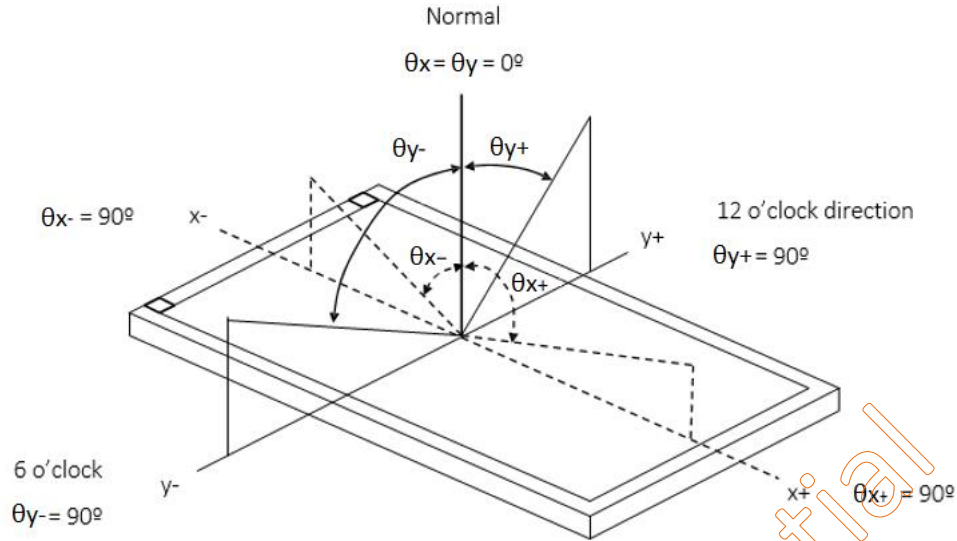
Note 2:   Definition of Contrast Ratio (CR)

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
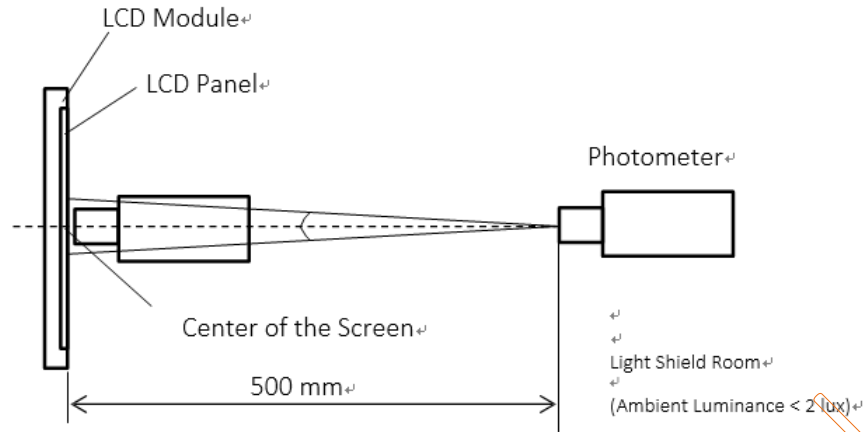
Note 3:   Definition of Response Time:

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:
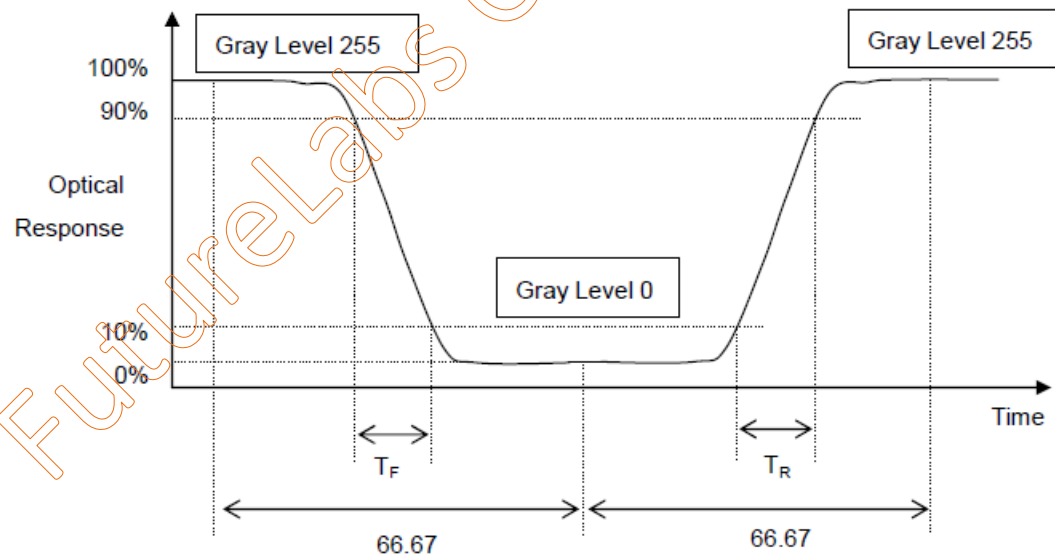
Note 4:   Definition of Brightness (L)

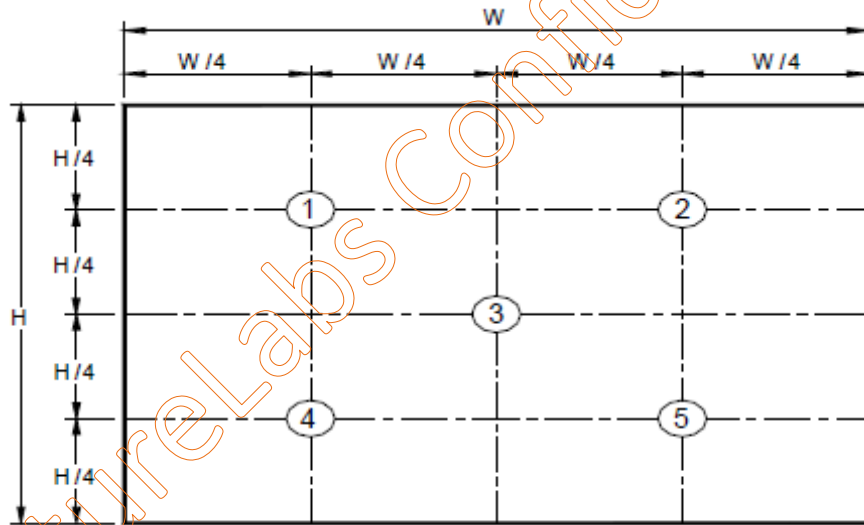Measure the center area of the panel and the viewing angle of the $\theta x = \theta y = 0°$

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 (5)] / Minimum [L (1), L (2), L (3), L (4)~ L (5)]) x 100%

8.RELIABILITY TESTS
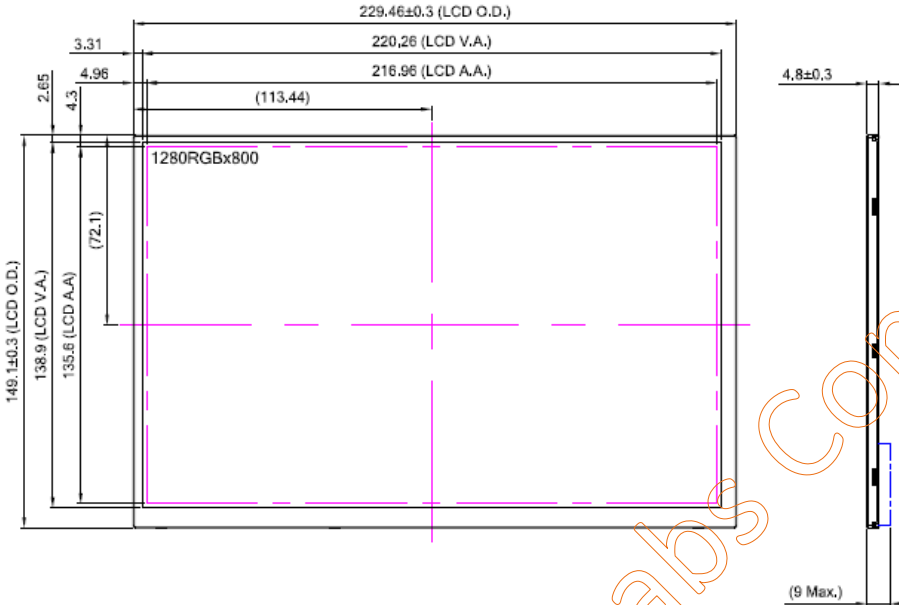
Test item	Condition	
High Temperature	1) Operating 2) 80°C	240 hrs
Low Temperature	1) Operating 2) -30°C	240 hrs
High Temperature	1) Storage 2)80°C	240 hrs
Low Temperature	1)Storage 2)-30°C	240 hrs
High Temperature and High Humidity (Operation)	1)+60°C 2)90%RH	240 hrs
Shock Test (Non Operating)	1) Acceleration 100G 2) Wave Time: 6 ms 3) X, Y, and Z directions 3 times for each direction	
Vibration (Non Operating)	1) 5~200Hz 2) Acceleration 0.015G Λ2/HZ 3) X, Y, and Z directions	2hr for each direction

Note: Inspection after 2～4 hours storage at room temperature, the sample shall be free from defects.
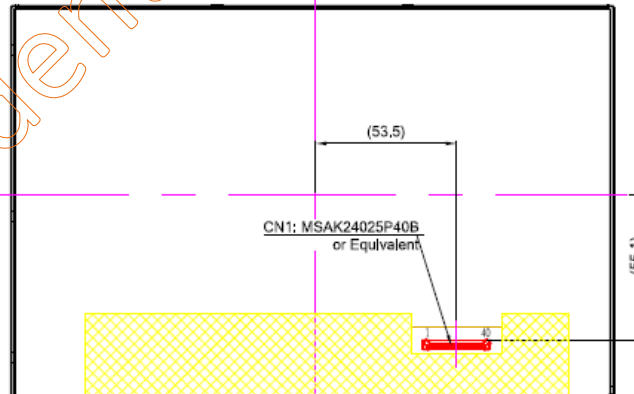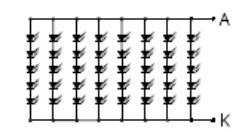
9. DIMENSION AND DRAWING

Front VIEW

229.46±0.3 (LCD O.D.)
220,26 (LCD V.A.)
216.96 (LCD A.A.)
(113.44)

3.31
4.96
2.65
4.3

1280RGBx800

149.1±0.3 (LCD O.D.)
138.9 (LCD V.A.)
135.6 (LCD A.A.)
(72.1)

4.8±0.3
(9 Max.)

Back VIEW

(53.5)
(55.1)

CN1: MSAK24025P40B
or Equivalent

LED CIRCUIT DIAGRAM:

A
K

CN1 Pin Define

PIN	SYMBOL	PIN	SYMBOL	PIN	SYMBOL	PIN	SYMBOL
1	NC	11	Rxin1-	21	Rxin3+	31	LED_K
2	VDD	12	Rxin1+	22	GND	32	LED_K
3	VDD	13	GND	23	NC	33	LED_K
4	NC	14	Rxin2-	24	NC	34	NC
5	NC	15	Rxin2+	25	GND	35	PWM
6	NC	16	GND	26	NC	36	NC
7	NC	17	RxCLK-	27	NC	37	NC
8	Rxin0-	18	RxCLK+	28	GND	38	LED_A
9	Rxin0+	19	GND	29	NC	39	LED_A
10	GND	20	Rxin3-	30	NC	40	LED_A

NOTES:
1. General tolerance are ±0.3mm
2. View Direction : Full View
3. ROHS complied

Part Number # REV: FLC-101HMLG200001 #00

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