

Product Specification

PART NUMBER # REV: FLC-101QMMG000SA1#00

DESCRIPTION: TFT 10.1" w 800x1280 MIPI 450CD Full View

() 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	2020/12/10		First Edition	
V1.1	2020/12/18		Updated edition	
V1.2	2020/12/21		Update the drawing	
V1.3	2020/12/24		Modified Timing Table	P8
V1.4	2021/01/20		Update Power Consumption	P4,P6
V1.5	2021/03/30		Update Power Sequence	
V1.6	2021/05/14		Update LED Life time	

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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 LCD Electrical Specification.....	6
3.3 Backlight Unit.....	6
4. DC and AC Characteristics.....	7
4.1 MIPI Input Signal.....	7
4.2 Timing.....	8
4.3 Power On/Off Sequence.....	9
5. INTERFACE PIN DESCRIPTION.....	10
5.1 LCM Connector PIN Assignment.....	10
7. BLOCK DIAGRAM.....	12
8. OPTICAL CHARACTERISTIC.....	13
9. DIMENSION AND DRAWING.....	16
10. PRECAUTION AND PRODUCT HANDLING.....	17

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1. GENERAL DESCRIPTION

1.1 Description

10.1”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 800x1280 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	800 (H) x 3(RGB)x 1280 (V)	Pixels
3	Outline Dimension	143.0(W)x228.6(H)x2.6(D)	mm
4	Active Area	135.36 (H) x 216.58 (V)	mm
5	Pixel Pitch	0.1692(H) x0.1692(V)	mm
6	Display Colors	16.7M colors	
7	Pixel Arrangement	RGB vertical stripe	--
8	Display Mode	Full View / Normally Black	--
9	Electrical Interface	MIPI	--
10	Surface Treatment	Antiglare, HC	--
11	Brightness	450 (Typ.)	cd/m2
12	Contrast Ratio	1000 (Typ.)	--
13	Total Power Consumption	2.246(Typ.) 2.888(Max.)	W

2. ABSOLUTE MAXIMUM RATING

2.1 Electrical Absolute Rating

Item	Symbol	Values			Unit	Note
		Min	Typ	Max		
Power supply voltage	VDD	-0.3	3.3	5.5	V	

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 $T_a = 25 \pm 2^\circ\text{C}$

2.2 Environment Absolute Rating

Item	Symbol	Values			Unit	Note
		Min	Typ	Max.		
Operating Temperature	Top	-10		+50	$^\circ\text{C}$	Note(1)(2)
Storage Temperature	Tstg	-20		+60	$^\circ\text{C}$	

Note (1): 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

3. ELECTRICAL CHARACTERISTICS

3.1 LCD Electrical Specification

Item	Symbol	Min.	Type	Max.	Unit.	Note
Power supply voltage	VDD	3.0	3.3	3.6	V	
Input logic high voltage	VIH	0.7VDD	-	VDD	V	
Input logic low voltage	VIL	0	-	0.3VDD		
LCD current	IVDD	-	-	180	mA	
TFT Power Consumption			0.198	0.648	W	

Note 1: The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

Note 2: VR Conditions: Zener Diode 20mA

3.3 Backlight Unit

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

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Power voltage	VccBL	-	25.6	28	V	
Forward current	IvccBL		80		mA	
Power Consumption	PBL		2.048		W	
LED Life Time			40,000		hrs	

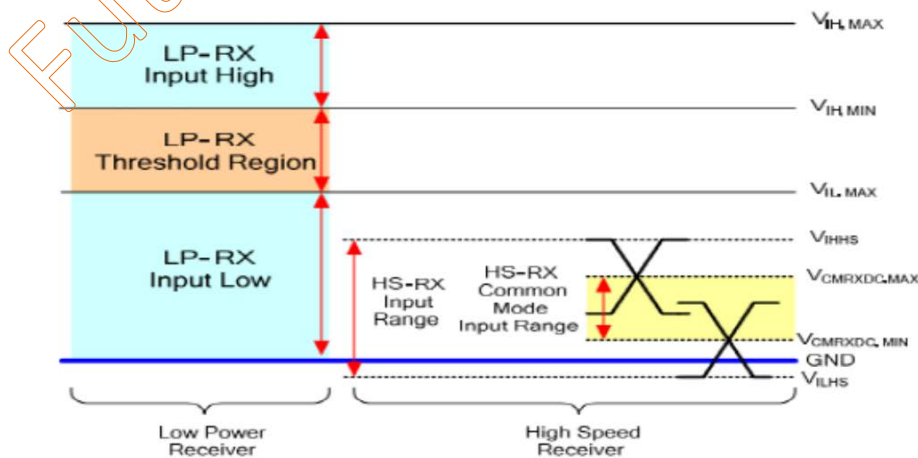
Note: (1) Permanent damage may occur to the LCD module if beyond this specification. Functional operation should be restricted to the conditions described under normal operating conditions.

(2) The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25°C

4. DC and AC Characteristics

4.1 MIPI Input Signal

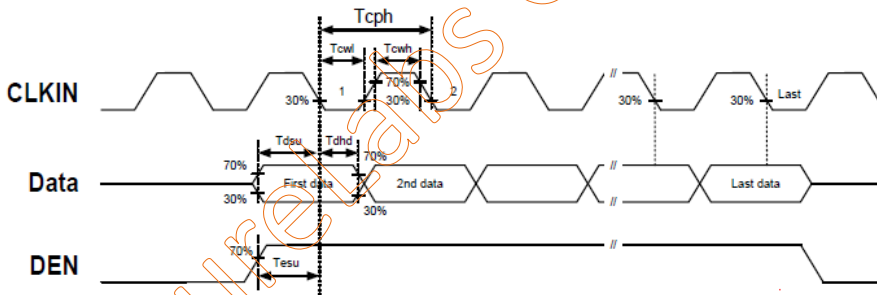
Item	Symbol	Min.	Type	Max.	Unit.	Note
MIPI digital operation current	IVCCIF	-	-	24	mA	
MIPI digital stand-by current	IVCCIFST	-	200	-	uA	
MIPI Characteristics for High Speed Receiver						
Single-ended input low voltage	VILHS	-40	-	-	mV	
Single-ended input high voltage	-	-	-	460		
Common mode voltage	VCMRXDC	155	-	330	mV	
Differential input impedance	ZID	80	100	125	Ω	
HS transmit differential voltage (VOD=VDP-VDN)	VOD	85	200	250	mV	
MIPI Characteristics for Low Power Receiver						
Pad signal voltage range	VI	-50	-	1350	mV	
Ground shift	VGNDSH	-50	-	50	mV	
Output low level	VOL	-150	-	150	mV	
Output high level	VOH	1.1	1.2	1.3	V	



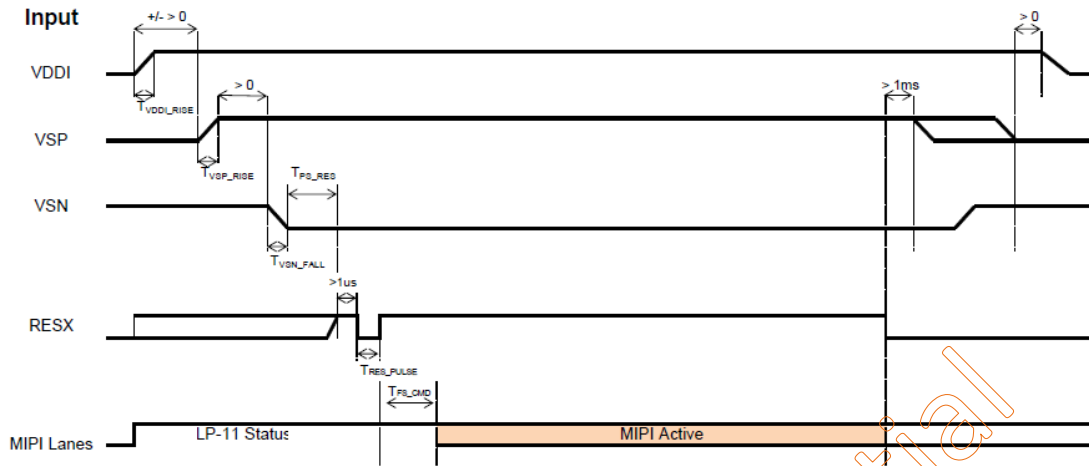
4.2 Timing

Item	Symbol	Min.	Type	Max.	Unit.	Remark
Clock Frequency	fclk	-	65.6	-	MHz	
Horizontal display area	HDISP	800			DCLK	
HS period time	TH	-	854	-	DCLK	
HS low pulse width	HS	-	18	-	DCLK	
Horizontal front porch	HFP	-	18	-	DCLK	
Horizontal back porch	HBP	-	18	-	DCLK	
Vertical display area	VDISP	1280			H	
VS period time	TV	-	1316	-	H	
Vertical low pulse width	VS	-	4	-	H	
Vertical front porch	VFP	-	24	-	H	
Vertical back porch	VBP	-	8	-	H	

Signal Timing wave forms



4.3 Power On/Off Sequence



Symbol	Characteristics	Min.	Typ	Max.	Unit.
T_{VDDI_RISE}	VDDI Rise time	10	-	-	us
T_{VSP_RISE}	VSP Rise time	130	-	-	Us
T_{VSN_FALL}	VSN Fall time	200	-	-	Us
T_{PS_RES}	VDDI/VSP on to Reset high	5	-	-	Ms
T_{RES_PULSE}	Reset low pulse time	10	-	-	Us
T_{FS_CMD}	Reset to first command	10	-	-	ms

- NOTE: 1. When the power supply VDD is 0V, keep the level of input signals on the low or keep high impedance.
2. Do not keep the interface signal high impedance when power is on. Backlight must be turn on after power for logic and interface signal are valid.

5. INTERFACE PIN DESCRIPTION

5.1 LCM Connector PIN Assignment

The electronics interface connector is 779FH19SC40S051 or Equivalent

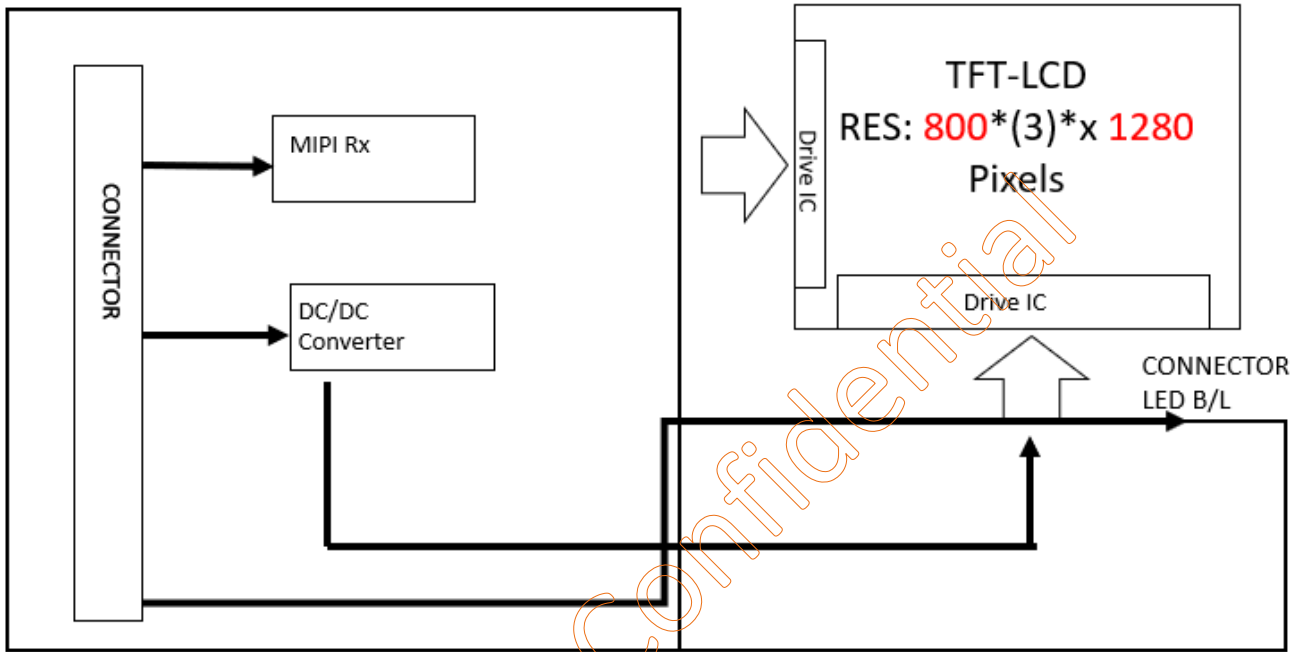
Pin No.	Symbol	I/O	Function	Remark
1	NC	--	Not connected	
2	VDD	P	+3.3V power supply	
3	VDD	P	+3.3V power supply	
4	GND	P	Ground	
5	RESET	I	Global reset pin. Normal pull high	
6	NC	--	Not connected	
7	GND	P	Ground	
8	MIPI_ON	I	MIPI data negative signal	
9	MIPI_OP	I	MIPI data positive signal	
10	GND	P	Ground	
11	MIPI_1N	I	MIPI data negative signal	
12	MIPI_1P	I	MIPI data positive signal	
13	GND	P	Ground	
14	MIPI_CLKN	I	MIPI clock negative signal	
15	MIPI_CLKP	I	MIPI clock positive signal	
16	GND	P	Ground	Note1
17	MIPI_2N	I	MIPI data negative signal	Note1
18	MIPI_2P	I	MIPI data positive signal	
19	GND	P	Ground	
20	MIPI_3N	I	MIPI data negative signal	
21	MIPI_3P	I	MIPI data positive signal	

22	GND	P	Ground	
23	NC	-	Not connected	
24	NC	-	Not connected	
25	GND	P	Ground	
26	NC	-	Not connected	
27	NC	-	Not connected	
28	NC	-	Not connected	
29	NC	-	Not connected	
30	GND	P	Ground	
31	VLED-	P	Power supply for BL(cathode)	
32	VLED-	P	Power supply for BL(cathode)	
33	NC	-	Not connected	
34	NC	-	Not connected	
35	NC	-	Not connected	
36	NC	-	Not connected	
37	NC	-	Not connected	
38	NC	-	Not connected	
39	VLED+	P	Power supply for BL(Anode)	
40	VLED+	P	Power supply for BL(Anode)	

I: Input, O: output, P: Power

7. BLOCK DIAGRAM

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



8. OPTICAL CHARACTERISTIC

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

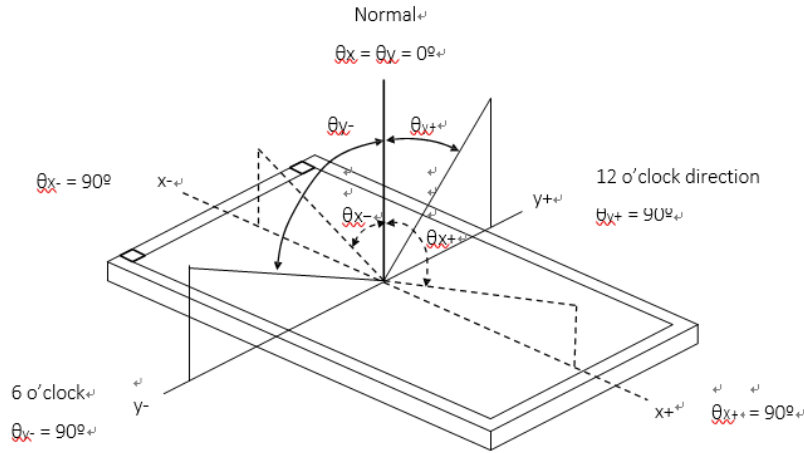
Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note	
Contrast Ratio		CR	Viewing angle at normal direction $\theta_x=0^\circ, \theta_y=0^\circ$	800	1000	-	-	(2)(5)	
Response Time		T _R		-	10	15	ms	(3)	
		T _F		-	15	20	ms		
Center Luminance of White		LC		360	450	-	cd/m ²	(4)(5)	
Brightness uniformity				--	70	-	%	(5)(6)	
Chromaticity	Red	R _x		Viewing angle at normal direction $\theta_x=0^\circ, \theta_y=0^\circ$	Typ.	0.618	Typ.	-	(1) (5)
		R _y	0.368			-			
	Green	G _x	0.325			-			
		G _y	0.603			-			
	Blue	B _x	0.158			-			
		B _y	-0.03			0.096		+0.03	
	White	W _x	0.304			-			
		W _y	0.320			-			
Viewing Angle	Horizontal	θ_{x+}	CR=10	75	85	-	Deg.	(1)(5)	
		θ_{x-}		75	85	-			
	Vertical	θ_{y+}		75	85	-			
		θ_{y-}		75	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

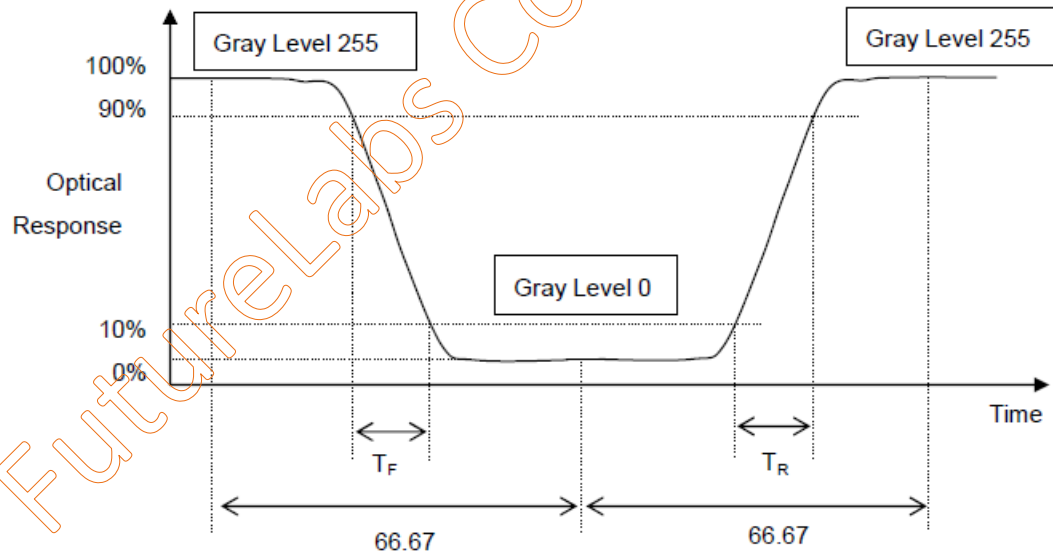


Note 2: Definition of Contrast Ratio (CR)

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:

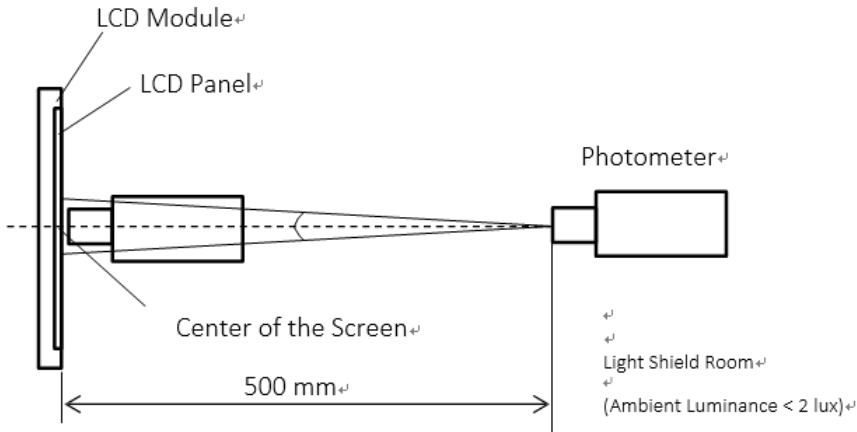
The response time is set initially by defining the "Rising Time (T_R)" and the "Falling Time (T_F)" respectively. Please refer the figure to the followings:



Note 4: Definition of Brightness (L)

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

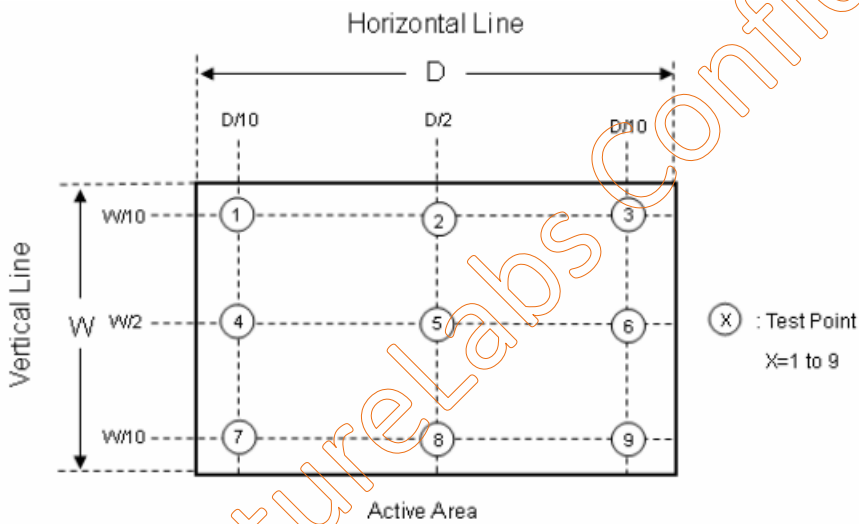
Note 5: The method of optical measurement:



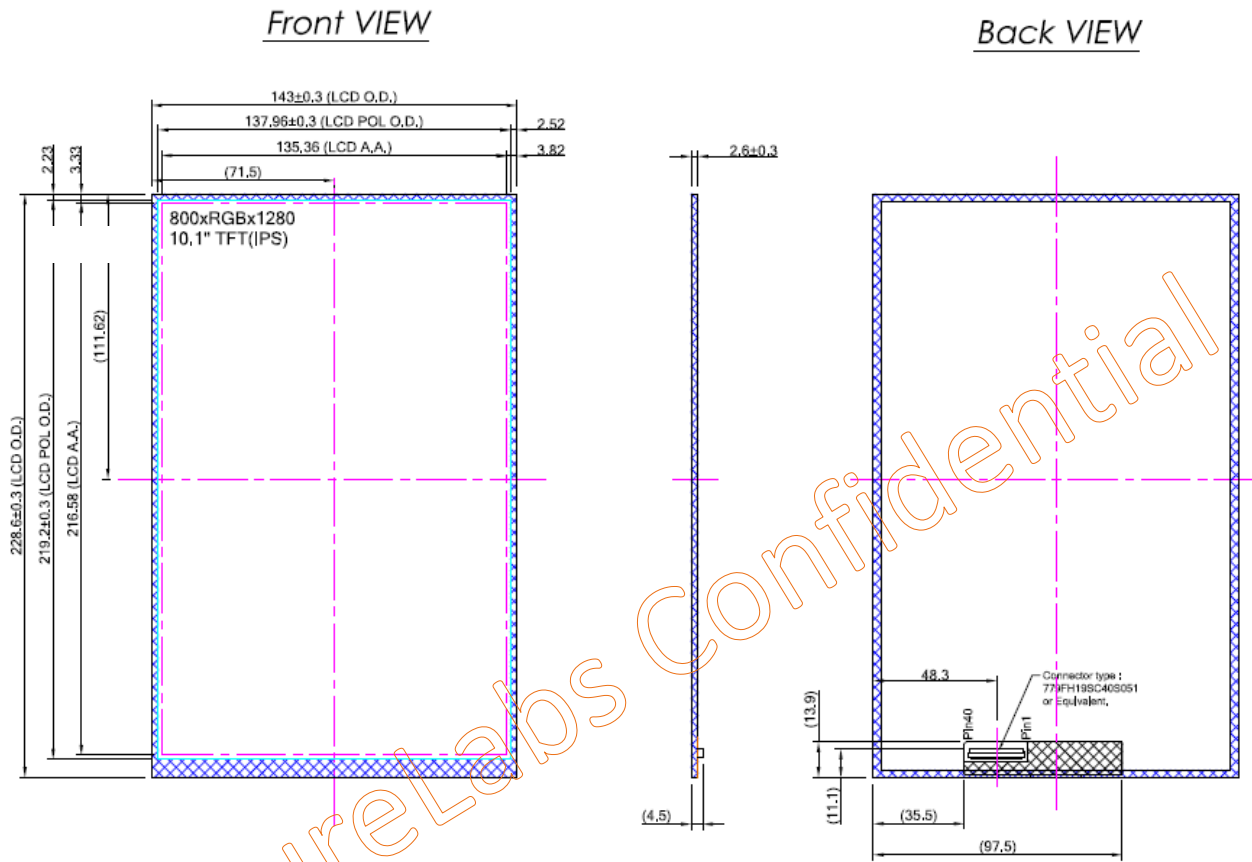
Note 6: Definition of White Variation (δW):

Measure the luminance of gray level 255 at 5 points

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



9. DIMENSION AND DRAWING



Circuit Diagram (LED 4X8=32)



Pin Define							
PIN	SYMBOL	PIN	SYMBOL	PIN	SYMBOL	PIN	SYMBOL
1	NC	11	MIFI-1N	21	MIFI-3P	31	VLED-
2	VDD	12	MIFI-1P	22	GND	32	VLED-
3	VDD	13	GND	23	NC	33	NC
4	GND	14	MIFI-CKN	24	NC	34	NC
5	Reset	15	MIFI-CKP	25	GND	35	NC
6	NC	16	GND	26	NC	36	NC
7	GND	17	MIFI-2N	27	NC	37	NC
8	MIFI-0N	18	MIFI-2P	28	NC	38	NC
9	MIFI-0P	19	GND	29	NC	39	VLED+
10	GND	20	MIFI-3N	30	GND	40	VLED+

NOTE:
1. General Tolerance is ±0.3

Customer Approval		Part Number #Rev		FLC-101QMMG000SA1 #00	
Date	Drawn By	Date	Design	Description	
Company	Rev	Date	Map	Modifi pin 27 to NC	
Name					
Signature	Date	Design By	Date	Check By	Approved By
First Drawing	20001207	Revise			

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.