

PRODUCT SPECIFICATIONS

Customer Model No.

FB101EFP312-A

Module No.:

Version :0

FOR CUSTOMER APPROVAL

PEREPARED BY:	REVIEEDE BY:	APPROVED BY :

SUPPLIER SIGNATURE

PEREPARED BY:	REVIEEDE BY:	APPROVED BY :



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1.0 GENERAL DESCRIPTION

FB101EFP312-A is a color active matrix thin film transistor (TFT) IPS liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. It is composed of a TFT LCD panel, Driver IC ,FPC and Backlight.

No.	Item	Specification	Unit
1	Panel Size	10.1"	inch
2	Number of Pixels	800 x3(RGB) x 1280	pixels
3	Active Area	135.360(W)x216.576(H)	mm
4	Pixel Pitch	0. 1692 x 0.1692	mm
5	OutlineDimension	143(W) x 228.6(H) x2.6(D) mm	
6	Number of Colors	16.7M	-
7	Display Mode	Normally Black	-
8	ViewingDirection	IPS	
9	Pixel Arrangement	RGB vertical stripe	-
10	Luminance (cd/m^2)	300(TYP.)	nit
11	Contrast Ratio	1000(TYP.)	
12	Surface Treatment	Anti-glare	-
13	Interface	MIPI	-
14	Backlight	White LED	-
15	Operation Temperature	-10~50	°C
16	Storage Temperature	-20~60	°C
17	Driver IC	JD9365DA-H3	-



2. Outline Dimension





3.0 ELECTRICAL SPECIFICATIONS

3.1 Electrical Specifications

< Table 3. LCD Module Electrical Specifications > $[Ta = 25 \pm 2 \degree C]$

Parameter	Symbol	Value	Unit	Remarks
TFT Gate ON Voltage	VGH	15	V	
TFT Gate OFF Voltage	VGL	-11	V	
Analog Power Supply Voltage	AVDD/AV EE	5/-5	V	



4.0 OPTICAL SPECIFICATION

4.1 Overview

The test of Optical specifications shall be measured in a dark room (ambient luminance ≤ 1 lux and temperature = $25\pm2^{\circ}$ C) with the equipment of Luminance meter system (Goniometer system and TOPCON BM-5) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of θ and Φ equal to 0°. We refer to $\theta \emptyset = 0$ (= $\theta 3$) as the 3 o'clock direction (the "right"), $\theta \emptyset = 90$ (= $\theta 12$) as the 12 o'clock direction ("upward"), $\theta \emptyset = 180$ (= $\theta 9$) as the 9 o'clock direction ("left") and $\theta \emptyset = 270$ (= $\theta 6$) as the 6 o'clock direction ("bottom"). While scanning θ and /or \emptyset , the center of the measuring spot on the Display surface shall stay fixed. The backlight should be operating for 30 minutes prior to measurement. VDD shall be 3.3 ± 0.3 V for LVDS interface or 1.8 ± 0.09 V for MIPI interface at 25°C.

4.2 Optical Specifications

Parameter		Symbol	Condition	Min.	Тур.	Max.	Unit	Remark
	l la rimo reta l	Θ3		80	85	-	Deg.	
Viewing Angle	Horizontai	Θ		80	85	-	Deg.	
range	Vertical	Θ ₁₂	CR > 10	80	85	-	Deg.	Note 1
	venical	Θ_6		80	85	-	Deg.	
Color G	amut (Clig	ht)		-	53	-	%	
Luminance Co	ontrast ratio	CR	Θ = 0°	700	1000			Note 2
								Base on C
Transmit	tance	T(%)	Θ = 0°	5.85	6.5	7.15	%	Light
								Note 3
White Chro	maticity	x _w	$\Theta = 0^{\circ}$	0.270	0.300	0.330		
		Уw		0.329	0.359	0.389		
	Pod	x _R		0.610	0.640	0.670		
Denneduction	Reu	y _R		0.315	0.345	0.375		Note 4
Reproduction	Croon	X _G	$\circ - \circ \circ$	0.241	0.271	0.301		C light
(C light)	Green	У _G	0-0	0.531	0.561	0.591		
	Plue	Х _В		0.107	0.137	0.167		
	Blue	У _В		0.147	0.177	0.207		
Response (Rising + I	e Time Falling)	T _{RT}	Ta= 25° C Θ = 0°	-	30	35	ms	Note 5

<Table 5. Optical Specifications>



- Notes : 1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface (see FIGURE 1).
 - Contrast measurements shall be made at viewing angle of Θ= 0 and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state. (see FIGURE 1) Luminance Contrast Ratio (CR) is defined mathematically.

CR =

Luminance when displaying a black raster

- 3. Transmittance is the Value with Polarizer
- 4. The color chromaticity coordinates specified in Table 5 shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.
- The electro-optical response time measurements shall be made as FIGURE 3 by switching the "data" input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is Tr, and 90% to 10% is Td.



5.0 APPENDIX

Figure 1. The Definition of Vth & Vsat



Figure 2. Measurement Set Up



Figure 3. Response Time Testing





Figure 6-2. TFT-LCD Panel Test 时序





6.0 PIN Assignment

Pin No.	Symbol	I/O	Function	Remark
1	VCOM	Ρ	Common Voltage(-0.7~~0 V), No connection	NC
2	VDDIN	Р	Power supply for interface system except	
3	VDDIN	Р	MIPI interface pin,VDDIN=3.3V	
4	GND	Р	GROUND	
5	RST	Р	Device reset signal	
6	NC	/	No connection	
7	GND	Р	GROUND	
8	MIPI_D0N	-	MIPI Negative data signal (-)	
9	MIPI_D0P	I	MIPI Positive data signal (+)	
10	GND	Р	Ground	
11	MIPI_D1N	I	MIPI Negative data signal (-)	
12	MIPI_D1P	I	MIPI Positive data signal (+)	
13	GND	Р	Ground	
14	MIPI_CKN	I	MIPI Negative clock signal (-)	
15	MIPI_CKP	I	MIPI Positive clock signal (+)	
16	GND	Р	Ground	
17	MIPI_D2N	I	MIPI Negative data signal (-)	
18	MIPI_D2P	I	MIPI Positive data signal (+)	
19	GND	Р	Ground	
20	MIPI_D3N	I	MIPI Negative data signal (-)	
21	MIPI_D3P	I	MIPI Positive data signal (+)	
22	GND	Р	Ground	
23	NC	/	No connection	
24	NC	/	No connection	
25	GND	Р	Ground	
26	NC	/	No connection	



27	PWMO	0	PWM control signal for LED driver (CABC)	
28	NC	/	No connection	
29	VCL	0	Output voltage pin,use it to generate Vcom voltage by a VR circuit (output voltage -2.5V)	NC
30	GND	Р	Ground	
31	LED-	Р	LED cathode	
32	LED-	Р	LED cathode	
33	NC	/	No connection	
34	NC	/	No connection	
35	AVEE	Р	NC	
36	NC	/	No connection	
37	NC	/	No connection	
38	AVDD	Р	NC	
39	LED+	Р	LED anode	
40	LED+	Р	LED anode	



7.0 ABSOLUTE MAXIMUM RATINGS

7.1Environment Absolute Rating

ltem	Stor	age	Operat	Note	
	MIN.	MAX.	MIN.	MAX.	
Ambient Temperature	-10°C	60 °C	-10 °C	50 °C	1,2
Humidity	-	-	-	-	3

1. The response time will become lower when operated at low temperature.

2. Background color changes slightly depending on ambient temperature.

The phenomenon is reversible.

7.2 LED backlight specification(VSS=0V,Ta=25°C)

lte	em	Symbol	Condition	Min	Тур	Max	Unit	Note
Supply	voltage	-	-	-	12	-	V	1
Supply	current	۱ _f	-	-	160	-	mA	2
Forward	Normal	I _{pn}	4-chip	-	-	-		
current	Dimming	I _{pd}	series x 8	-	-	-	mA	

Note:

- 1: VLED=VLED(+)-VLED(-).
- 2:The current of LED is 20mA.

A LED drive in constant current mode is recommended.

3: LED power consumption is around 0.297W.



8.0 RELIABILITY SPECIFICATION

8.0.1TEMPERATURE AND HUMIDITY

Test Item	Test Condition	Remark
High Temperature Storage	Ta=60°C; 72hrs	IEC60068-2-1: 2007 GB2423.2-2008
Low Temperature Storage	Ta=-20℃; 72hrs	IEC60068-2-1: 2007 GB2423.1-2008
High Temperature Operation	Ta=50°C; 72hrs	IEC60068-2-1: 2007 GB2423.2-2008
Low Temperature Operation	Ta=-10℃; 72hrs	IEC60068-2-1: 2007 GB2423.1-2008
High Temperature High Humidity Operation	Ta=50℃,90%RH, 72Hrs(no condensation)	IEC60068-2-78: 2001 GB/T2423.3-2006
Thermal Shock	-20℃(0.5h) ~ 60℃(0.5h) / 10cycles	Start with cold temperature , End with high temperature, IEC60068-2-14:1984,GB2423.22-2002
Image Sticking	25℃;2hrs	Note1

Note1:Condition of image sticking test :25 $^\circ\!\!\!C\pm\!\!2^\circ\!\!\!\!C$

Operation with test pattern sustained for 2hrs, then change to gray pattern immediately.after5 mins, themura must be disappeared completely



(a) Test Pattern (chess board Pattern)



8.0.2ESD

Test item	Conditions	Remark		
Electro Static Discharge Test	150pF, 330Ω, Contact:±3KV,Air:±8KV	1	IEC61000-4-2: 2001	
(non-operation)	200pF, 0Ω , ±200V contact test	2	GD/11/020.2-2000	

Note: Measure point :

1. LCD glass and metal bezel

2. IF connector pins



8.1 Use Restriction

This product is not authorized for use in life supporting systems, aircraft navigation control systems, military systems and any other application where performance failure could be life threatening or otherwise catastrophic.

8.2 Disassembling or Modification

Do not disassemble or modify the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display. HannStar does not warrant the module, if customers disassemble or modify the module.

8.3 Breakage of LCD Panel

8.3.1.If LCD panel is broken and liquid crystal spills out, do not ingest or inhale liquid crystal, and do not contact liquid crystal with skin.

8.3.2. If liquid crystal contacts mouth or eyes, rinse out with water immediately.

8.3.3. If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.

8.3.4. Handle carefully with chips of glass that may cause injury, when the glass is broken.

8.4 Electric Shock

8.4.1. Disconnect power supply before handling LCD module.

8.4.2. Do not pull or fold the LED cable.

8.4.3. Do not touch the parts inside LCD modules and the fluorescent LED's connector or cables in order to prevent electric shock.

8.5 Absolute Maximum Ratings and Power Protection Circuit

8.5.1. Do not exceed the absolute maximum rating values, such as the supply voltage variation, input voltage variation, variation in parts' parameters, environmental temperature, etc., otherwise LCD module may be damaged. 9.5.2. Please do not leave LCD module in the environment of high humidity and high temperature for a long time. 11.5.3. It's recommended to employ protection circuit for power supply.

8.6 Operation

8.6.1 Do not touch, push or rub the polarizer with anything harder than HB pencil lead.

8.6.2 Use fingerstalls of soft gloves in order to keep clean display quality, when persons handle the LCD module for incoming inspection or assembly.



8.6.3 When the surface is dusty, please wipe gently with absorbent cotton or other soft material.

8.6.4 Wipe off saliva or water drops as soon as possible. If saliva or water drops contact with polarizer for a long time, they may causes deformation or color fading.

8.6.5 When cleaning the adhesives, please use absorbent cotton wetted with a little petroleum benzine or other adequate solvent.

8.7 Mechanism

Please mount LCD module by using mouting holes arranged in four corners tightly.

8.8 Static Electricity

8.8.1 Protection film must remove very slowly from the surface of LCD module to prevent from electrostatic occurrence.

8.8.2. Because LCD module use CMOS-IC on circuit board and TFT-LCD panel, it is very weak to electrostatic discharge. Please be careful with electrostatic discharge. Persons who handle the module should be grounded through adequate methods.

8.9 Strong Light Exposure

The module shall not be exposed under strong light such as direct sunlight. Otherwise, display characteristics may be changed.

8.10 Disposal

When disposing LCD module, obey the local environmental regulations.



9 Quality level

9.1 Classification of defects

Major defects (MA): A major defect refers to a defect that may substantially degrade usability for product applications, including all functional defects(such as no display, abnormal display, open or missing segment, short circuit, missing component), outline dimension beyond the drawing, progressive defects and those affecting reliability.

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Minor defects (MI): A minor defect refers to a defect which is not considered to be able to substantially degrade the product application or a defect that deviates from existing standards almost unrelated to the effective use of the product or its operation, such as black spot, white spot, bright spot, pinhole, black line, white line, contrast variation, glass defect, polarizer defect, etc.

9.2 Definition of inspection range



9.3 Inspection items and general notes

General notes	standard shall be determined by mutual agreement between customer and TIANMA. 2.Viewing area should be the area which TIANMA guarantees. 3.Limit sample should be prior to this Inspection standard. 4.Viewing judgment should be under static pattern. 5.Inspection conditions			
	Inspection distance: 250 mm (from the sample) Temperature : 25± °C			
	Inspection angle : 45 degrees in 6 o'clock direction (all defects in viewing are should be inspected from this direction)			



Pinhole, Bright spot, Black The color of a small area is different from the spot, White spot, Black line, remainder. The phenomenon doesn't change with White Line, Foreign particle, voltage Bubble The color of a small area is different from the Contrast variation remainder. The phenomenon changes with voltage Scratch, Dirt, Particle, Bubble on polarizer or Polarizer defect Inspecti between polarizer and glass on items The pixel appears bright or dark abnormally when Dot defect (TFT LCD) display No display, Abnormal display, Open or missing Functional defect segment, Short circuit, False viewing direction Glass crack, Shaved corner of glass, Surplus Glass defect glass PCB defect Components assembly defect

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9.4 Outgoing Inspection level

Outaoina		Inspection				
Inspection standard		Min.	Max	Unit	IL	AQL
Major Defects See 8.3 general notes		See 8.5		5	П	0.065
Minor Defects See 8.3 general notes		S	ee 8.	5	II	0.065
Note : Sampling standard conforms to GB2828						

9.5 Inspection Items and Criteria

Inspection items		Judgment standard					
		Category		Acceptable number			
				A zone	B zone		
	Black spot, White spot		А	Ф<=0.20	Neglected	Neglected	
	Pinhole, Eoreign	b 1	В	0.20<Ф<=0.25	3	Neglected	
1	Particle,	a	С	0.25<Ф<=0.3	2	Neglected	
	on glass,	$\Phi = (a+b)/2(m)$	D	0.3<Ф<=0.4	1	3	
	glass		Е	0.4<Ф<=0.5	0	2	



		(a/b<2.5)	Total defective point(B,C)		1	-
		X	А	W<=0.03	Neglected	Neglected
	Black line	With	В	0.03 <w<=0.05 L<=3.0</w<=0.05 	3	Neglected
2	White line, and Particle	L:Length(m	с	0.05 <w<=0.1 L<=3.0</w<=0.1 	2	Neglected
	Polarizer and glass, Scratch		D	0.05 <w<=0.1 L<=4.0</w<=0.1 	1	3
	on glass	L/W>=2.5	Е	W>0.1 L>4.0	0	2
				Total defective point(B,C)	1	-
3	Brig	ht spot		any size	none	none
	Contrast variation		А	Ф<0.2	Neglected	
		\frown	В	0.2<Ф<=0.3	2	Neglecte
4		h	С	0.3<Ф<=0.4	1	d
		$a = \frac{a}{\Phi = (a+b)/2}$ (mm		0.4<Φ	0	
				Total defective point(B,C)	3	
5	Bubble	inside cell	any size		none	none
6	Polarizer defect (if	Scratch ,damage on polarizer, Particle on polarizer or between polarizer and glass.	Refer to item 1 and item 2.			
0	Polarizer is used)	Bubble, dent and convex	A	Ф<=0.1	Neglected	Neglecte d
			В	0.1 <Ф<=0.2	2	Neglecte d
			С	0.2 <Ф<=0.3	1	2
7	Surplus glass	Stage surplus glass	B<=0.3mm			



	Surrounding surplus glass	Should not influence outline dimension and assembling.		
8	Open segment or open common	Not permitted		
9	Short circuit	Not permitted		
10	False viewing direction	Not permitted		
11	Contrast ratio uneven	According to the limit specimen		
12	Crosstalk	According to the limit specimen		
13	Black /White spot(display)	Refer to item 1		
14	Black /White line(display)	Refer to item 2		

Inspection items		Judgment standard			
		Са	ategory(application: B zone)	Acceptab	
				le	
				number	
	$i\)$ The front of lead terminals	А	a≤ t, b≤1/5W, c≤3mm		
Glass defect crack	b	В	Crack at two sides of lead terminals should not cover	Max.3 defects allowed	
	w t		patterns and alignment mark		
	Glass defect crack	Inspection items i) The front of lead terminals Glass defect crack w t c	Inspection items Ca i) The front of lead terminals A Glass defect crack w b B	Inspection itemsCategory(application: B zone)i) The front of lead terminalsA $a \le t$, $b \le 1/5W$, $c \le 3mm$ Glass defect crack w b BGlass defect wBCrack at two sides of lead terminals should not cover patterns and alignment mark	



ii) Surrounding crack-non-contact	b < Inner borderline of the seal
iii) Surrounding crack- contact seal c b a Inner border line of the Outer border line of the	b < Outer borderline of the seal
iv) Corner	A a <= t, b <= 3.0, c <=
w b c	B Glass crack should not cover patterns u and alignment mark and patterns.

Inspection items	Judgment standard		
	Category(application: B zone)		







10. Precautions for Use of LCD Modules

10.1 Handling Precautions

- 10.1.1 The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.
- 10.1.2 If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.
- 10.1.3 Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.
- 10.1.4 The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.
- 10.1.5 If the display surface is contaminated, breathe on the surface and gently wipe it with a soft

dry cloth. If still not completely clear, moisten cloth with one of the following solvents:

- Isopropyl alcohol
- Ethyl alcohol
- Solvents other than those mentioned above may damage the polarizer. Especially, do not use
 - the following:
- Water
- Ketone
- Aromatic solvents
- 10.1.6 Do not attempt to disassemble the LCD Module.
- 10.1.7 If the logic circuit power is off, do not apply the input signals.
- 10.1.8 To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.
- a. Be sure to ground the body when handling the LCD Modules.



- b. Tools required for assembly, such as soldering irons, must be properly ground.
- c. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

d. The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

10.2 Storage precautions

- 10.2.1 When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.
- 10.2.2 The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:
- Temperature : $0^{\circ}C \sim 40^{\circ}C$
- Relatively humidity: ≤80%
- 10.2.3 The LCD modules should be stored in the room without acid, alkali and harmful gas.

10.3 The LCD modules should be no falling and violent shocking during

transportation, and also should avoid excessive press, water, damp and sunshine.



11.PACKAGE DRAWING

