DATA MODUL

SPECIFICATION

HannStar

HSD101GWW7-90000C-PX

10.1" - WXGA - MIPI

Version: 1.0
Date: 13.03.2023

Note: This specification is subject to change without prior notice

TO : DATA MODUL

Date : Mar.13.2023

HannStar Product Information

(Preliminary)

10.1” Color TFT-LCD Module

Model: **HSD101GWW7-90000C-PX**

Note: (1) The information contained herein is tentative and may be changed without prior notices.

(2) Please contact HannStar Display Corp. before designing your product based on this module specification.

(3) The information contained herein is presented merely to indicate the characteristics and performance of our products. No responsibility is assumed by HannStar for any intellectual property claims or other problems that may result from application based on the module described herein.

Record of Revisions

Rev.	Date	Sub-Model	Description of change
1.0	Mar.13.2023	-90000C-PX	Preliminary Product Information was first released

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1.0 GENERAL DESCRIPTION

1.1 Introduction

HannStar Display model HSD101GWW7-90000C-PX is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT LCD panel, a driving circuit and a back- light system. This TFT LCD has a 10.1(10:16) inch diagonally measured active display area with 800x1280 (800 horizontal by 1280 vertical pixel) resolution.

1.2 Features

- 10.1 inch configuration
- 16.7M color by 8 bits R.G.B.
- ROHS / Halogen Free Compliance

1.3 General information

Item		Specification	Unit
Outline Dimension(LCM)		143.0(H) x 228.6(V) x 2.6(D)	mm
Display area		135.36 (H) x216.58 (V)	mm
Number of Pixel		800 RGB (H) x1280 (V)	pixels
Pixel pitch		0.1692(H) x 0.1692(V)	mm
Pixel arrangement		RGB Vertical Stripe	--
Display mode		Normally Black	--
Display Interface		MIPI	--
NTSC		57 (Typ.)	%
Surface treatment		HC	--
Weight		173(Typ.)	g
Power Consumption	Logic System (White Pattern)	1.056 (typ.)	W
	B/L System	2.16 (typ.)	W

2.0 ABSOLUTE MAXIMUM RATINGS

2.1 Electrical Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Analog Supply voltage	VCC	-0.3	3.6	V	GND=0
Logic Input voltage	Vin	-0.3	VCC+0.3	V	GND=0

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.

Note (2):

Ta =25±2℃

2.2 Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Operating Temperature	T_{opa}	-20	70	℃	(3),(4)
Storage Temperature	T_{stg}	-30	80	℃	(3),(4)

Note (3):

If Ta below 50ºC, the maximal humidity is 90%RH, if Ta over 50ºC, absolute humidity should be less than 60%RH.

Note (4):

The response time will be extremely slow when the operating temperature is around -10℃, and the back ground will become darker at high temperature operating.

3.0 OPTICAL CHARACTERISTICS

3.1 Optical specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast		CR	Θ=0 Normal viewing angle	800	1000	--	--	(1)(2)
Response time		Tr+Tf		--	30	40	msec	(1)(3)
White luminance (Center)		Y_L		--	350	--	cd/m^2	(1)(4)
Color Gamut		S(%)		--	57	--	%	
Color chromaticity (CIE1931)	White	W_x		0.300	0.330	0.360		(1)(4)
		W_y		0.330	0.360	0.390		
	Red	R_x		--	--	--		
		R_y		--	--	--		
	Green	G_x		--	--	--		
		G_y		--	--	--		
	Blue	B_x		--	--	--		
		B_y		--	--	--		
Viewing angle	Hor.	$Θ_L$	CR>10	--	80	--		
		$Θ_R$		--	80	--		
	Ver.	$Θ_U$		--	80	--		
		$Θ_D$		--	80	--		
Brightness Uniformity		B_{UNI}	Θ=0	75	80	--		(5)
Optima View Direction		ALL						

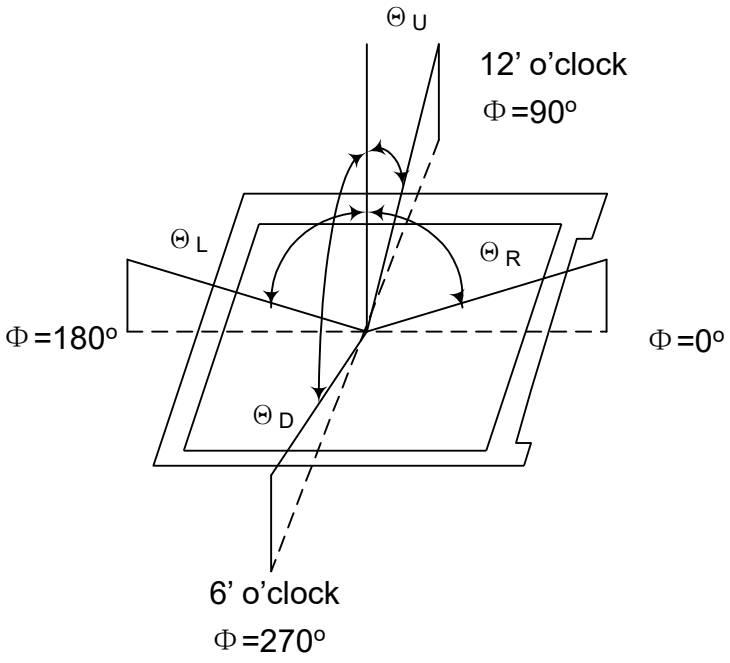
3.2 Measuring Condition

- Measuring surrounding：dark room
- Ambient temperature：25±2°C
- 15min. warm-up time.

3.3 Measuring Equipment

- FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-7 for other optical characteristics.
- Measuring spot size: 20 ~ 21 mm

Note (1) Definition of Viewing Angle:

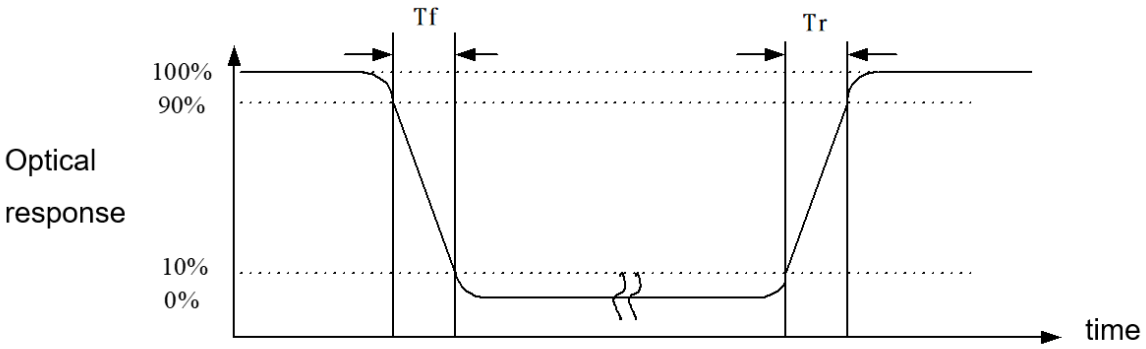


Note (2) Definition of Contrast Ratio (CR) :

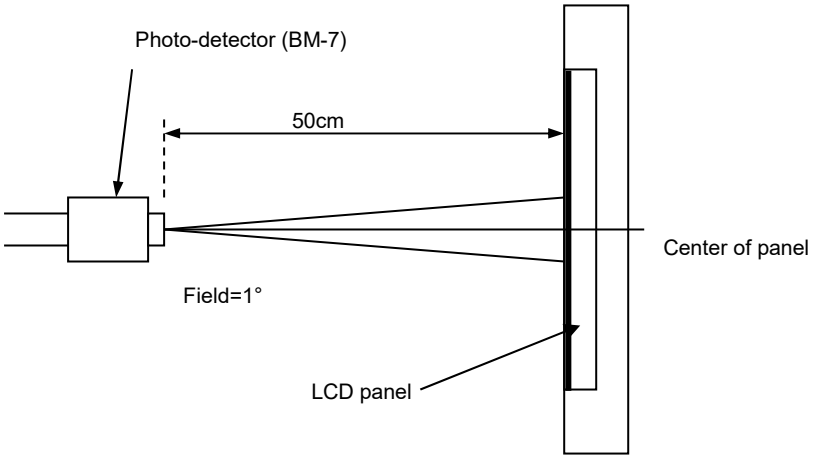
measured at the center point of panel

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

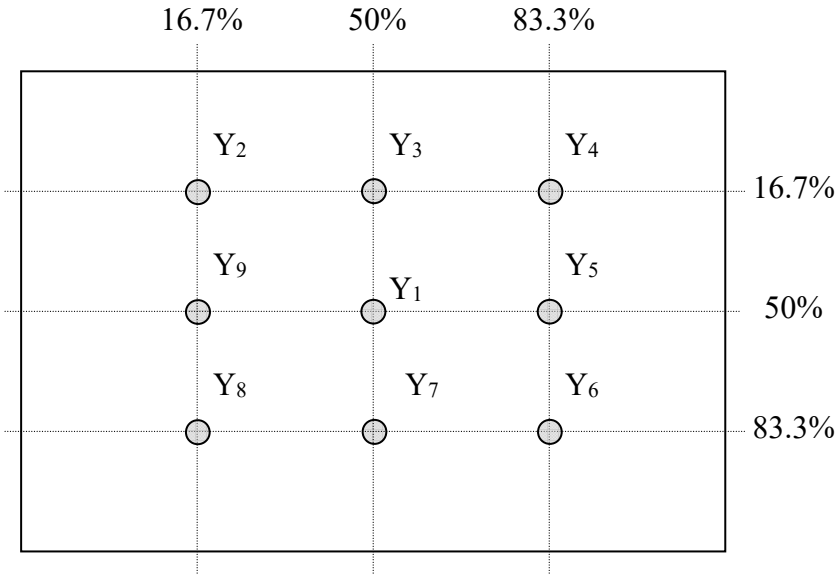
Note (3) Definition of Response Time : Sum of Tr and Tf



Note (4) Definition of optical measurement setup



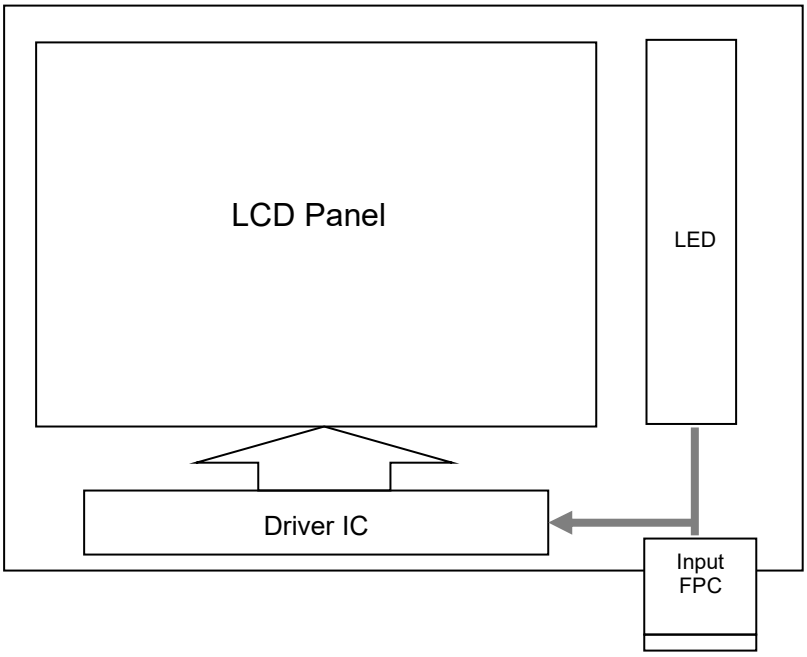
Note (5) Definition of brightness uniformity



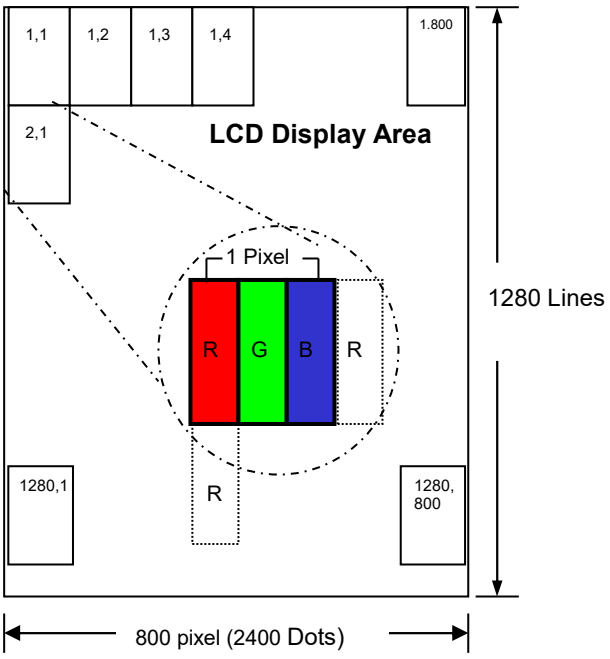
$$\text{Luminance uniformity} = \frac{\text{(Min Luminance of 9 points)}}{\text{(Max Luminance of 9 points)}} \times 100\%$$

4.0 BLOCK DIAGRAM

4.1 TFT LCD Module



4.2 Pixel Format



5.0 INTERFACE PIN CONNECTION

5.1 LCM Pin Assignment

The used connector：FH12-40S-0.5SH manufactured by HIROSE

NO.	Symbol	Description
1	NC	Not connect
2-3	VCC	Power supply(3.3V)
4	GND	Ground
5	RESET	Reset signal pin
6	NC	Not connect
7	GND	Ground
8	D0N	Negative polarity of low voltage differential data signal
9	D0P	Positive polarity of low voltage differential data signal
10	GND	Ground
11	D1N	Negative polarity of low voltage differential data signal
12	D1P	Positive polarity of low voltage differential data signal
13	GND	Ground
14	LCKN	Negative polarity of low voltage differential clock signal
15	LCKP	Positive polarity of low voltage differential clock signal
16	GND	Ground
17	D2N	Negative polarity of low voltage differential data signal
18	D2P	Positive polarity of low voltage differential data signal
19	GND	Ground
20	D3N	Negative polarity of low voltage differential data signal
21	D3P	Positive polarity of low voltage differential data signal
22	GND	Ground
23-24	NC	Not connect
25	GND	Ground
26-29	NC	Not connect
30	GND	Ground
31-32	LEDK	LED Cathode.
33-38	NC	Not connect
39-40	LEDA	LED Anode.

6.0 ELECTRICAL CHARACTERISTICS

6.1 TFT LCD Module

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Analog Supply voltage	VCC	3.0	3.3	3.6	V	
Analog supply current	I_{VCC}	-	320	350	mA	VCC=3.3V
Logic input voltage	VIH	0.7*VCC	-	VCC	V	
	VIL	GND	-	0.3*VCC	V	

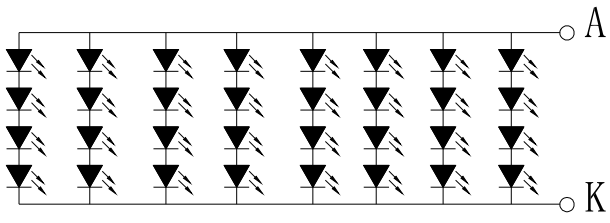
6.2 Backlight Unit

Parameter	Symbol	Min	Typ	Max	Units	Condition
LED Current	I_F	--	180	--	mA	Ta=25℃
LED Voltage	V_F	11.2	12.0	13.6	Volt	Ta=25℃
LED Life-Time	N/A	15,000	--	--	Hour	Ta=25℃ Note (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℃. and LED typical current. The LED lifetime could be decreased if operating I_F is larger than LED typical current. The constant current driving method is suggested.

Note (3) LED light bar circuit :



LED CIRCUIT DIAGRAM

Vf=11.2V–13.6V(If=8*22.5mA)

6.3 Interface Characteristics

6.3.1 DC characteristics for interface

Parameter	Symbol	Condition	Specification			Unit
Input Common Mode Voltage for Clock	V_{CMCLK}	CLKP/N Note 2, Note 3	70	-	330	mV
Input Common Mode Voltage for Data	V_{CMDATA}	DnP/N Note 2, Note 3, Note 5	70	-	330	mV
Common Mode Ripple for Clock Equal or Less than 450MHz	$V_{CMRCLKL450}$	CLKP/N Note 4	-50	-	50	mV
Common Mode Ripple for Data Equal or Less than 450MHz	$V_{CMRDATAL450}$	DnP/N Note 4, Note 5	-50	-	50	mV
Common Mode Ripple for Clock More than 450MHz (peak sine wave)	$V_{CMRCLKM450}$	CLKP/N	-	-	100	mV
Common Mode Ripple for Data More than 450MHz (peak sine wave)	$V_{CMRDATAM450}$	DnP/N Note 5	-	-	100	mV
Differential Input Low Level Threshold Voltage for Clock	$V_{THLCLK-}$	CLKP/N	-70	-	-	mV
Differential Input Low Level Threshold Voltage for Data	$V_{THLDATA-}$	DnP/N Note 5	-70	-	-	mV
Differential Input High Level Threshold Voltage for Clock	$V_{THHCLK+}$	CLKP/N	-	-	70	mV
Differential Input High Level Threshold Voltage for Data	$V_{THHDATA+}$	DnP/N Note 5	-	-	70	mV
Single-ended Input Low Voltage	V_{ILHS}	CLKP/N, DnP/N Note 3, Note 5	-40	-	-	mV
Single-ended Input High Voltage	V_{IHHS}	CLKP/N, DnP/N Note 3, Note 5	-	-	460	mV
Differential Termination Resistor	R_{TERM}	CLKP/N, DnP/N Note 5	80	100	125	Ω
Single-ended Threshold Voltage for Termination Enable	$V_{TERM-EN}$	CLKP/N, DnP/N Note 5	-	-	450	mV
Termination Capacitor	C_{TERM}	CLKP/N, DnP/N Note 5, Note 6	-	-	60	pF

Notes:

1. Ta = -30℃ to 70℃ (to +85℃ no damage) , VCI = 2.5V to 6.6V, VDDI = 1.65V to 3.6V

2. Includes 50mV (-50mV to 50mV) ground difference

3. Without VCMRCLKM450/VCMRDATAM450

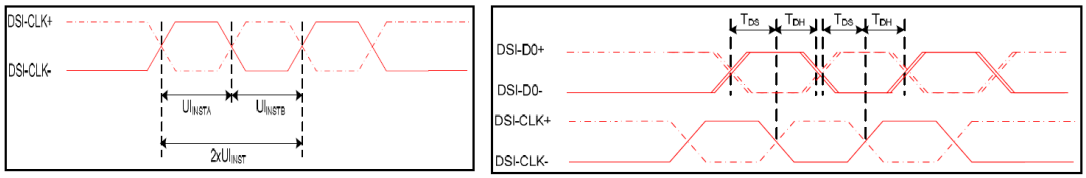
4. Without 50mV (-50mV to 50mV) ground difference

5. n = 0 and 1

6. For higher bit rates, a 14pF capacitor will be needed to meet the common-mode return loss specification.

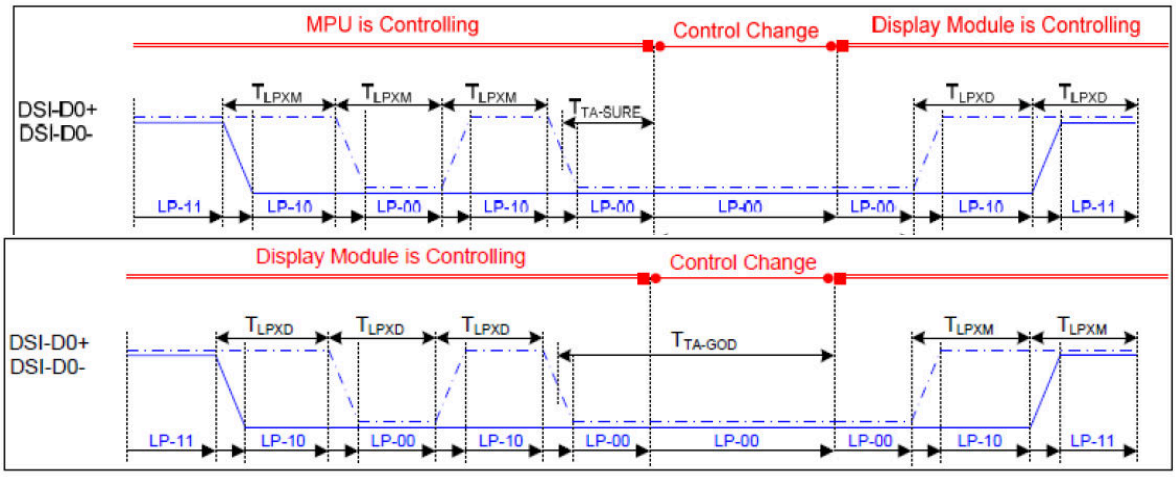
6.3.2 AC characteristics for interface

6.3.2.1 DSI HS mode

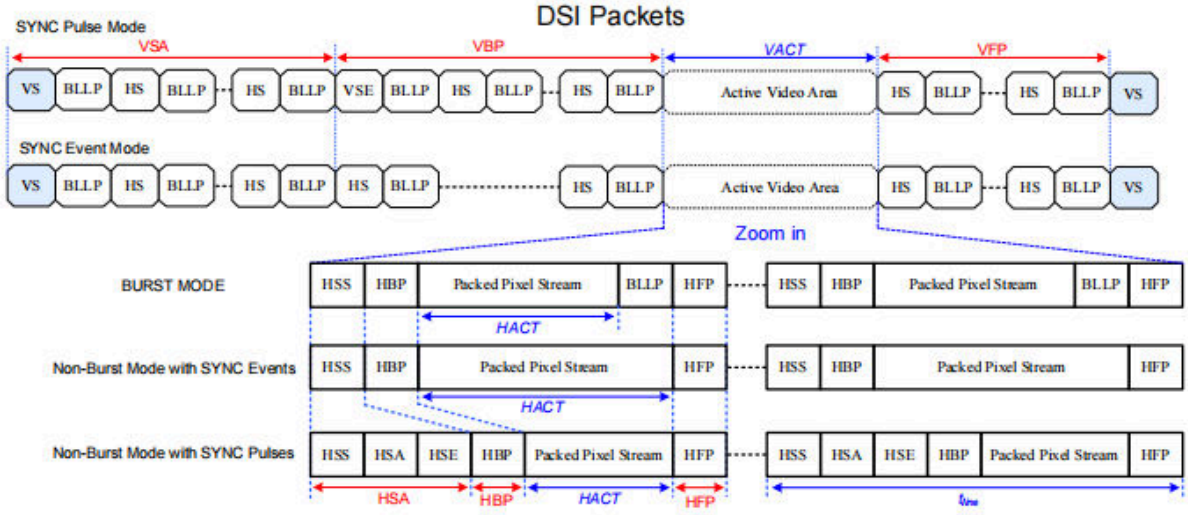


Signal	Symbol	Parameter	MIN	MAX	Unit	Description
DSI-CLK+/-	$2xUI_{INSTA}$	Double UI instantaneous	4	25	ns	
DSI-CLK+/-	UI_{INSTA} UI_{INSTB}	UI instantaneous halfs	2	12.5	ns	$UI = UI_{INSTA} = UI_{INSTB}$
DSI-Dn+/-	tDS	Data to clock setup time	0.15	-	UI	
DSI-Dn+/-	tDH	Data to clock hold time	0.15	-	UI	

6.3.2.2 DSI LP mode



DSI Packets



VS → Packet V-sync. Start
VSE → Packet V-sync. End
HS → Packet H-sync.
BLLP → Non-restricted DSI packet or Low power mode including optional BTA

Packet Pixel Stream → Pixel stream and Null packets
HSS → H-sync. Start
HSA → H-sync. Active (No data)
HSE → H-sync. End
HBP → Horizontal Back Porch
HFP → Horizontal Front Porch
BLLP → Non-restricted DSI packet or Low power mode including optional BTA

Parameters	Symbols	Min.	Typ.	Max.	Units
Vertical sync. active	VSA	2 (Note 6)	-	-	Line
Vertical Back Porch	VBP	14 (Note 6)	-	-	Line
Vertical Front Porch	VFP	8 (Note 6)	-	-	Line
Active lines per frame	VACT	-	1280	-	Line
Horizontal sync. active	HSA	2	-	-	Pixel
Horizontal Porch period	HSA + HBP + HFP	1.6	-	-	us
Active pixels per line	HACT	-	720	-	Pixel
Bit rate	BR_{bps}	385		Note 5	Mbps/lane

1 UI=1/Bit rate

HSA(pixel)= (tHSA*lane number) / (UI* pixel format)

HBP(pixel)= (tHBP*lane number) / (UI* pixel format)

HFP(pixel)= (tHFP*lane number) / (UI* pixel format)

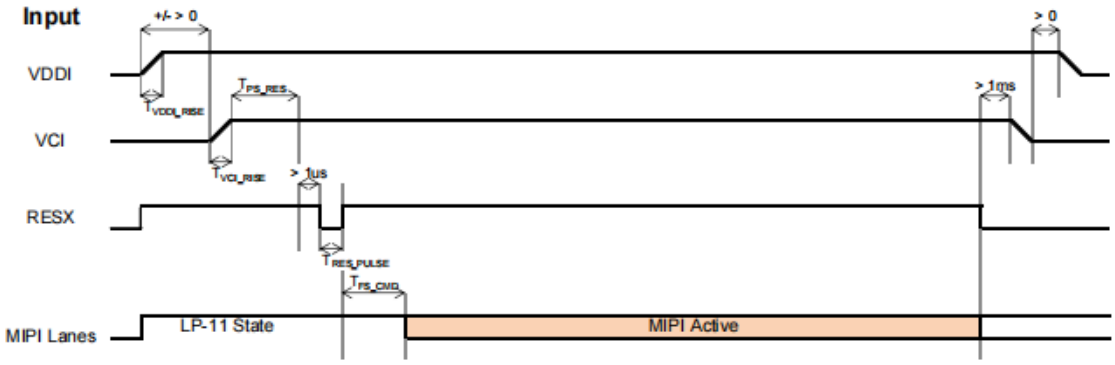
$$\text{Frame Rate} = \frac{BR_{bps} \times Lane_{num}}{(VACT+VSA+VBP+VFP) \times (HACT+HSA+HBP+HFP) \times \text{Pixel Format}}$$

6.3.3 Input timings for interface

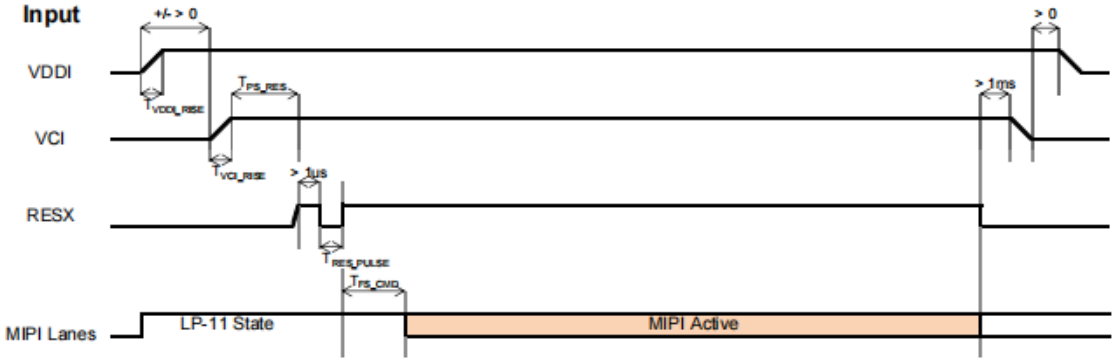
Item	Symbol	Value			Unit
		Min.	Typ.	Max.	
HS low pulse width	HS		6		DCK
Horizontal back porch	HBP		60		DCK
Horizontal front porch	HFP		60		DCK
Horizontal blanking period	HBLK		NA		DCK
Horizontal active area	HDISP	-	800	-	DCK
Pixel Clock	PCLK		72		MHz
Vertical low pulse width	VS		4		Line
Vertical back porch	VBP		8		Line
Vertical front porch	VFP		8		Line
Vertical blanking period	VBK		NA		Line
Vertical active area	-	-	1280	-	Line
Vertical Refresh rate	VRR	-	60	-	Hz

6.4 Power Sequence

Case A:



Case B:



Symbol	Characteristics	Min.	Typ.	Max.	Units
T_{VDDI_RISE}	VDDI Rise time	20	-	-	us
T_{VCI_RISE}	Case A: VCI Rise time	200	-	-	us
	Case B: VCI Rise time	40			
T_{PS_RES}	VDDI/VCI on to Reset high	5	-	-	ms
T_{RES_PULSE}	Reset low pulse time	10	-	-	us
T_{FS_CMD}	Reset to first command	10	-	-	ms

Figure 105: Power on/off sequence with Power Mode 3

7.0 RELIABILTY TEST ITEMS

No.	Item	Conditions	Remark
1	High Temperature Storage	Ta=+80±2℃, 240hrs	
2	Low Temperature Storage	Ta=-30±2℃, 240hrs	
3	High Temperature Operation	Ta=70±2℃, 240hrs	
4	Low Temperature Operation	Ta=-20±2℃, 240hrs	
5	High Temperature and High Humidity (operation)	Ta=60±2℃, 90%RH, 240Hrs	
6	Thermal Cycling Test (non operation)	-20℃(30min)→+70℃(30min),100 cycles	

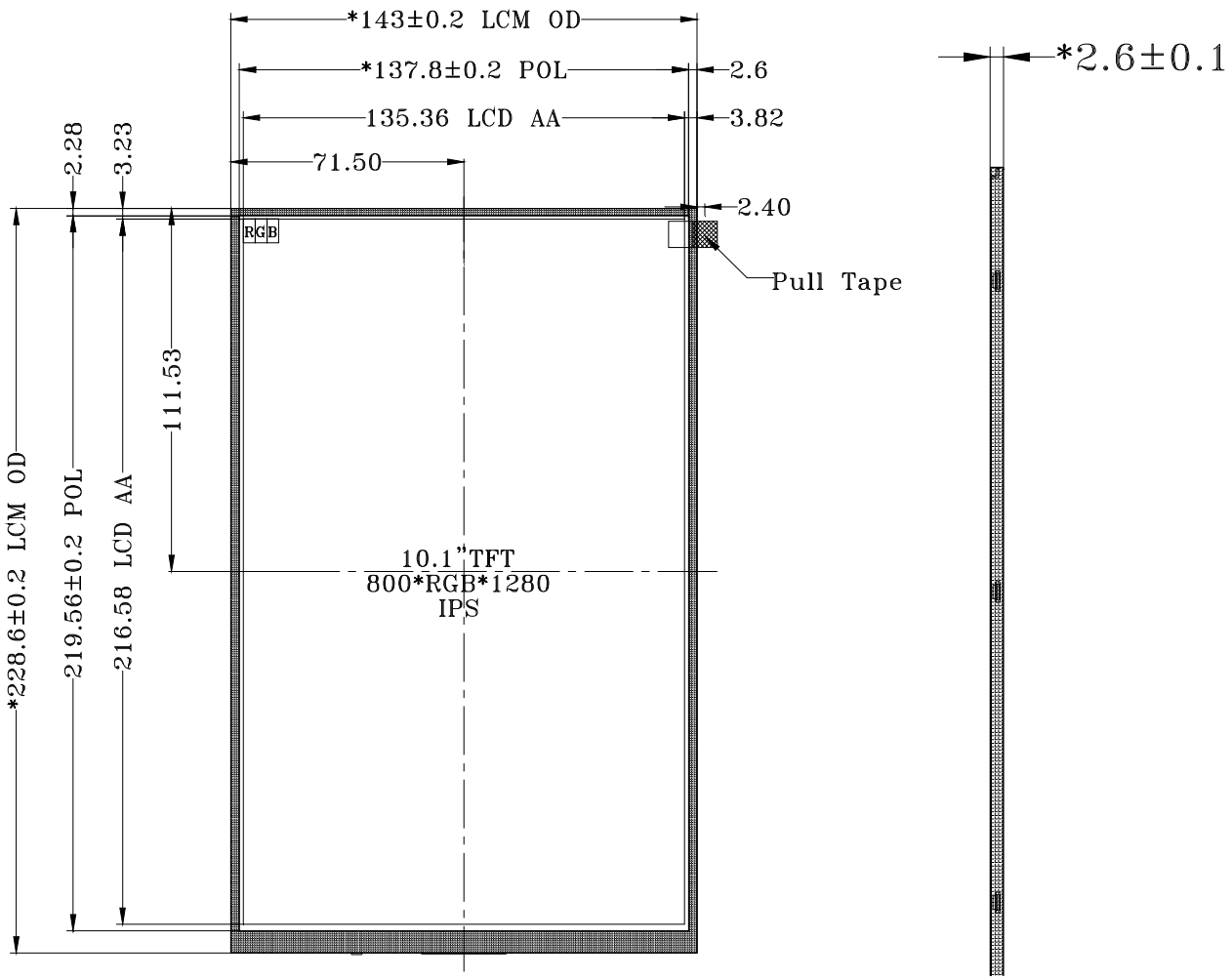
Note1: There is no display function NG issue occurred, all the cosmetic specification is judged before the reliability stress.

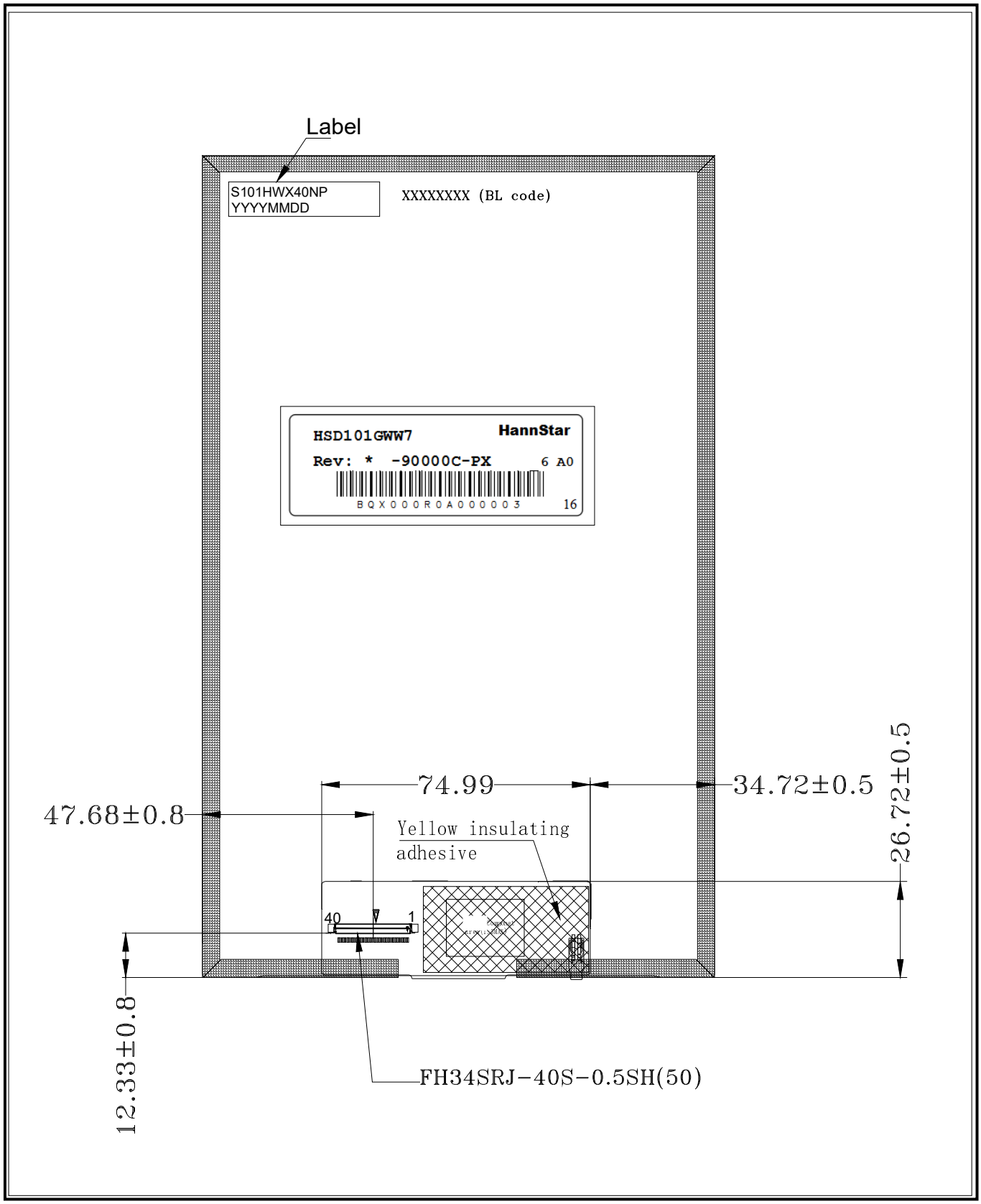
Note2: All of the function & cosmetic Judgment basis base on room temperature. (The tested module must have enough recovery time at least 2 hours at room temperature.)

Note3: The test condition definition panel's surface temperature.

8.0 OUTLINE DIMENSION

Unit : mm





9.0 LOT MARK

9.1 Lot Mark

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Code 1,2,3,4,5,6: HannStar internal flow control code.
Code 7: production location.
Code 8: production year.
Code 9: production month.
Code 10,11,12,13,14,15: serial number.

Note (1) Production Year: Code 8 is defined by the last number of the year, for example

Year	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Mark	6	7	8	9	0	1	2	3	4	5	6

Note (2) Production Month

Month	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct	Nov.	Dec.
Mark	1	2	3	4	5	6	7	8	9	A	B	C

9.2 Detail of Lot Mark

(1) Below label is attached on the backside of the LCD module. See Section 8.0: Outline Dimension.
(2) The detail of Lot Mark is attached as below.
(3) This is subject to change without prior notice.

10.0 PACKAGE SPECIFICATION

10.1 Packing form

TBD

10.2 Packing Drawing

TBD

11.0 GENERAL PRECAUTION

11.1 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.

11.2 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.

11.3 Breakage of LCD Panel

11.3.2. 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.

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

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

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

11.4 Electric Shock

11.4.1. Disconnect power supply before handling LCD module.

11.4.2. Do not pull or fold the LED cable.

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

11.5 Absolute Maximum Ratings and Power Protection Circuit

11.5.1. 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.

11.5.2. 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.

11.6 Operation

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

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

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

11.6.4 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.

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

11.7 Mechanism

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

11.8 Static Electricity

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

11.8.2 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.

11.9 Strong Light Exposure

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

11.10 Disposal

When disposing LCD module, obey the local environmental regulations.

DATA MODUL

ALL TECHNOLOGIES. ALL COMPETENCIES. ONE SPECIALIST.

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