DATA MODUL

SPECIFICATION

HannStar

HSD021GPW1-C00-0299-P

2.13" - 122 x 250 - SPI

Version: 1.0
Date: 26.10.2023

Note: This specification is subject to change without prior notice

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TO　　:　　DATA MODUL

Date　:　　Oct.26.2023

HannStar Product Information
(Preliminary)

2.13" Reflective Mono TFT-LCD Module
Model：HSD021GPW1-C00-0299-P

Note:

(1) The information contained herein is preliminary 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.

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Record of Revisions

Rev.	Date	Sub-Model	Description of change
1.0	Oct., 25, 2023	C00-0299-P	Preliminary Product Information first released.

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1.0 GEGENERAL DESCRIPTION

1.1 Introduction

HannStar Display model HSD021GPW1-C00-0299-P is a mono active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. It is a reflective type display operating in the total reflection. This model is composed of a TFT LCD panel, driving circuit. This TFT LCD has a 2.13 inch diagonally measured active display area with 122 horizontal by 250 vertical pixel resolution.

1.2 Features

■ 2.13 (diagonal) inch configuration
■ Mono by 1 bit signal input
■ RoHS Compliance & Halogen Free

1.3 Applications

■ Industrial Control Application

1.4 General Information

Item		Specification	Unit
Outline Dimension		27.068(H)x 56.20(V)x0.738(T) (Typ.)	mm
Display Area		23.668(H)x48.5(V)	mm
Number of Pixel		122(H)x250(V)	pixels
Pixel Pitch		0.194(H)x0.194(V)	mm
Pixel arrangement		Mono	
Display Mode		Normally White	
Interface		SPI	
Frame rate		1	Hz
Surface treatment		HC	Note
Weight		2.62 (Typ.)	g
Power Consumption	Logic System (Black Pattern)	TBD	mW

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2.0 ABSOLUTE MAXIMUM RATINGS

2.1 Electrical Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Supply Voltage	VDD	-0.3	4.0	V	GND=0
Logic Input Voltage	VIN	-0.3	VDD+0.5	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.

(2) $Ta = 25 \pm 2°C$

2.2 Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Operating Temperature	T_{opa}	-20	70	°C	
Storage Temperature	T_{stg}	-30	80	°C	

3.0 OPTICAL CHARACTERISTICS

3.1 Optical Specification   (Reflective, w/HSD FOG+D65 light)

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
White Reflectance (with Polarizer)		Rw (%)	$\Theta=0$ Normal viewing angle —	—	40.00	—	%	
Contrast Ratio		CR		—	(15)	—	—	
White chromaticity (CIE1931)		Wx			(0.300)			
		Wy			(0.330)			
Response Time		ms			5	7		
Viewing Angle	Hor.	Θ_L	CR>2	—	60	—	—	
		Θ_R		—	60	—		
	Ver.	Θ_U		—	60	—		
		Θ_D		—	60	—		

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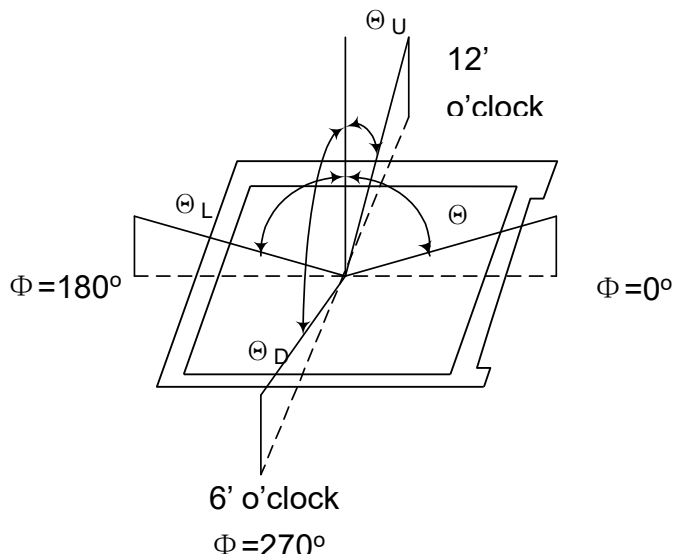| Document Title	HSD021GPW1-C00-0299-P Product Information for DATA MODUL	Page No.	6/18
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3.2 Measuring Condition
- Measuring surrounding：dark room
- Ambient temperature：25±2°C
- 15min. warm-up time.

3.3 Measuring Equipment
- DMS (DMS = Display Measurement System) of AUTRONIC-MELCHERS GmbH, motorized goniometer system for comprehensive display characterization

Note (1) Definition of Viewing Angle:

Note (2) Definition of Contrast Ratio (CR) :
measured at the center point of panel

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

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Note (3) Definition of Response Time : Sum of T_R and T_F
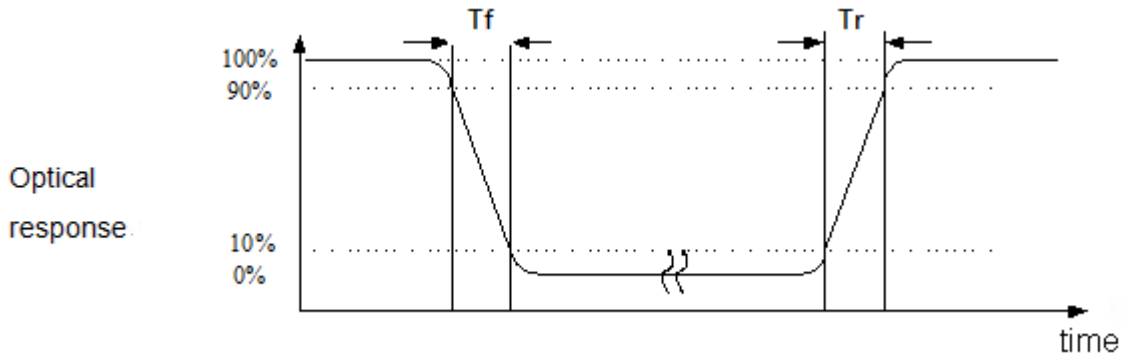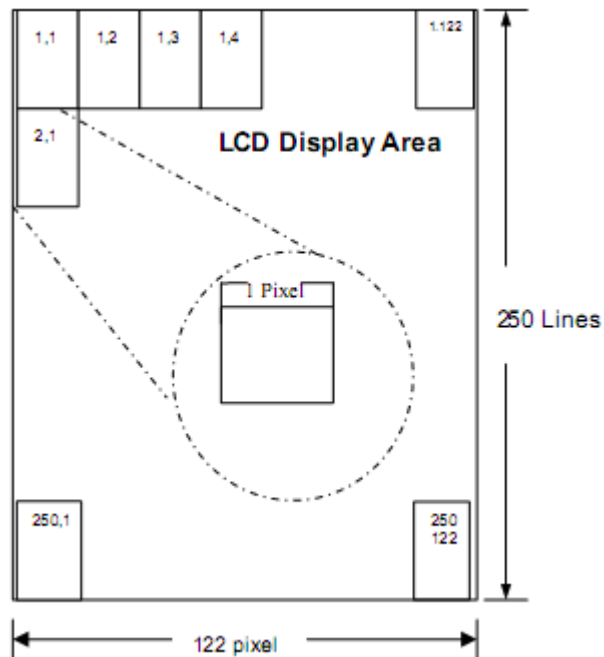

Note (4) Definition of optical measurement setup

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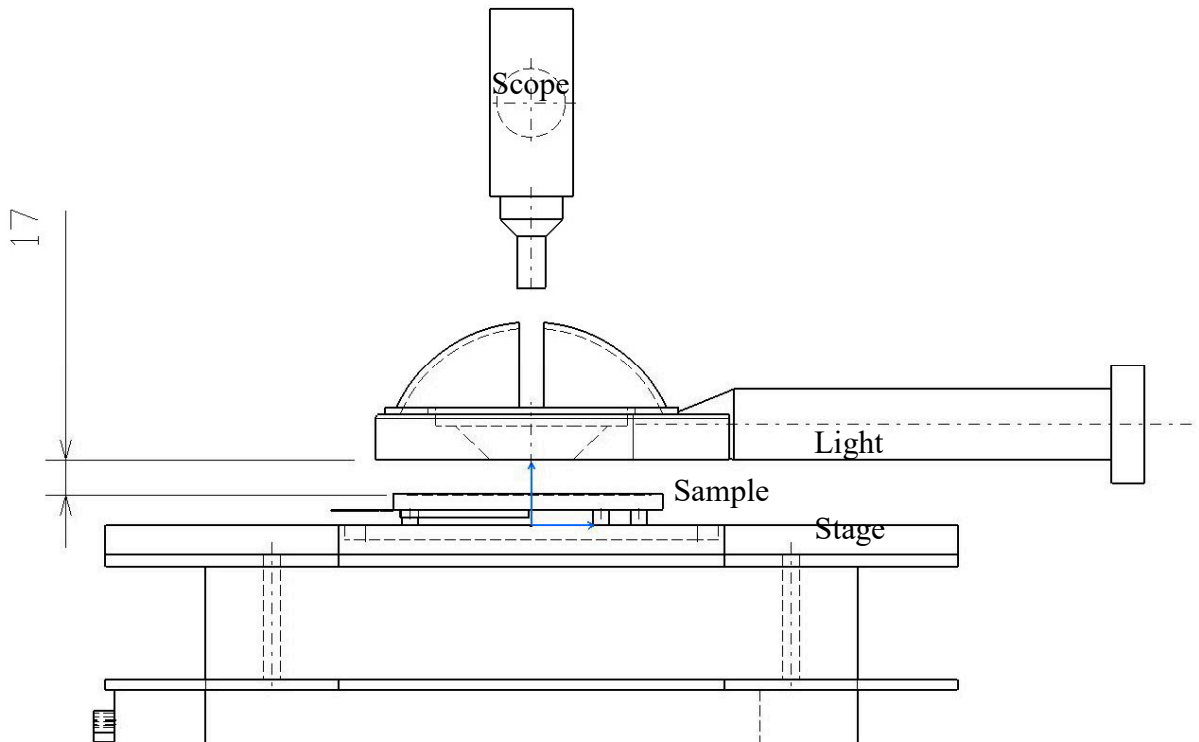
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4.0 BLOCK DIAGRAM
4.1 TFT LCD Module:
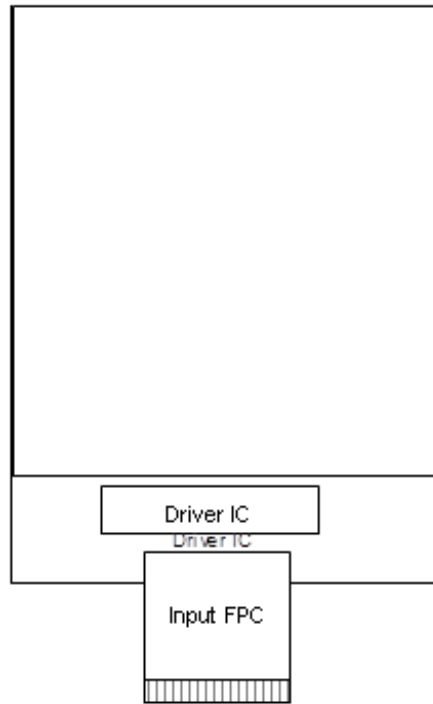
4.2 Pixel Format

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4.3 Relationship Between Displayed Color and Input

		Display	B/W	Gray scale Level
Basic color		Black	H	-
		White	L	-

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5.0 INTERFACE PIN CONNECTION

5.1 FPC Pin Assignment

The used connector： FH26W-13S-0.3SHW   manufactured by HIROSE

PIN	SYMBOL	Description
1	GND	Ground
2	VDD	Power Supply
3	VDD	
4	CS	Chip select input pin. Low active.
5	A0	Display data/command indication controlled by register selection pin(A0). A0=High, display data on data bus. A0=Low, instruction command on data bus.
6	GND	Ground
7	RESET	Reset input pin, Low active.
8	SCLK	Serial input clock.
9	SDA	Serial input/output data.
10	TE	Tearing effect signal is used to synchronize MCU to frame memory writing.
11	EXTB	When programming MTP, connect EXTB to DGND externally. This pin has an internal pull-high resistor. Please leave this pin OPEN after special operation.
12	VPP	The programming power supply of the built-in NVM. Apply external power 7.5V here when programming (> 8mA for successful programming). If not used, left this pin open.
13	GND	Ground

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6.0 ELECTRICAL CHARACTERISTICS

6.1 TFT LCD Module

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	VDD	3.0	3.3	3.6	V	
Operating current	IDD	-	TBD	-	uA	VDD=3.3V Black pattern
Input signal voltage	ViH	0.8*VDD	-	VDD	V	
	ViL	0	-	0.2*VDD	V	

6.2 Timing Characteristic

6.2.1 Single 4-Line Serial Interface

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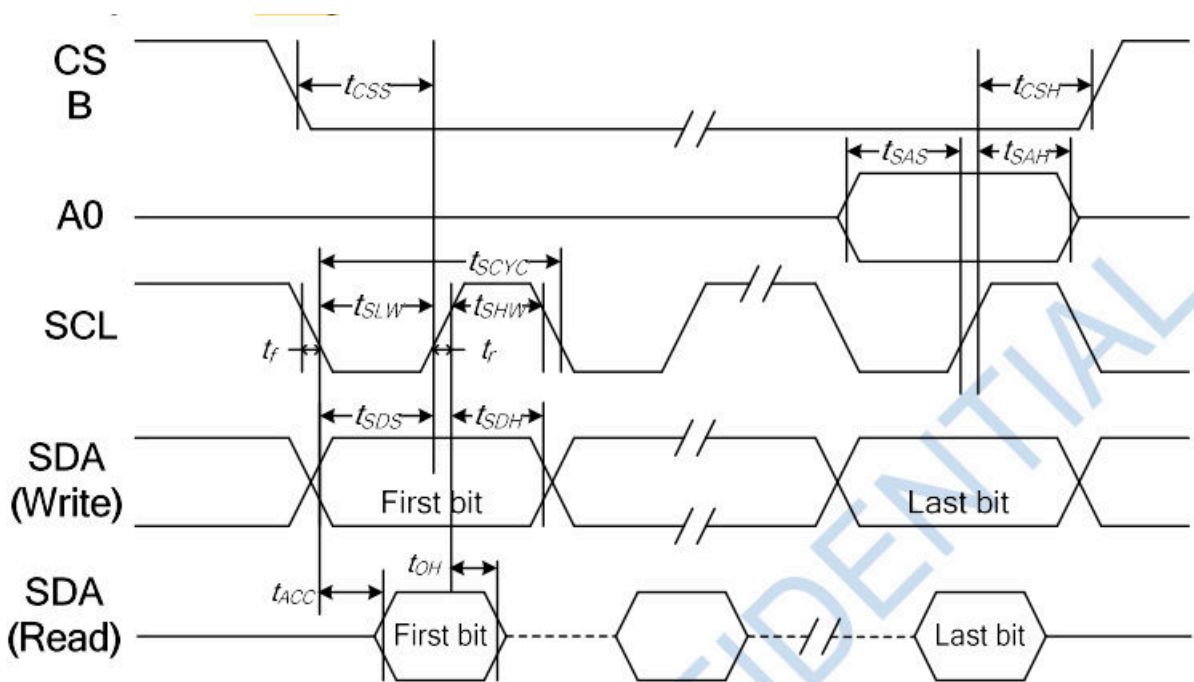
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VDDI = 1.8~3.3V, Ta = 25°C

Item	Signal	Symbol	Condition	Min.	Max.	Unit
Serial clock period (Write)	SCL	tSCYC		30	—	ns
Serial clock period (Read)				150		
SCLK "H" pulse width (Write)		tSHW		15	—	
SCLK "H" pulse width (Read)				60		
SCLK "L" pulse width (Write)		tSLW		15	—	
SCLK "L" pulse width (Read)				60		
Address setup time	A0	tSAS		10	—	
Address hold time		tSAH		10	—	
Data setup time	SDA (Write)	tSDS		10	—	
Data hold time		tSDH		10	—	
Read data access time	SDA (Read)	tACC	For maximum CL=30p	10	50	
Read data output disable time		tOH	For minimum CL=8p	15	50	
CSB-SCLK time	CSB	tCSS		10	—	
CSB-SCLK time		tCSH		10	—	

Note:

1. The input signal rise and fall time (tr, tf) are specified at 15 ns or less.

2. All timing is specified using 20% and 80% of VDDI as the standard.

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6.2.2 Power On/Off Sequence
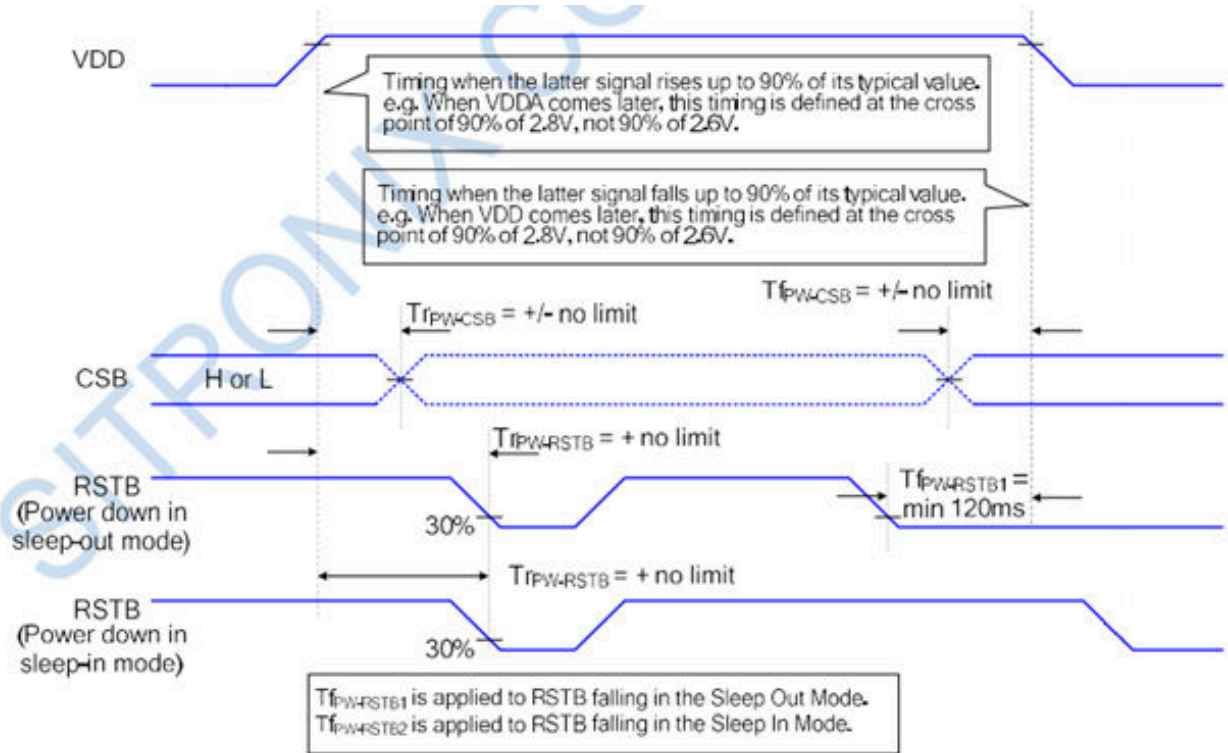
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7.0 RELIABILITY TEST ITEMS

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

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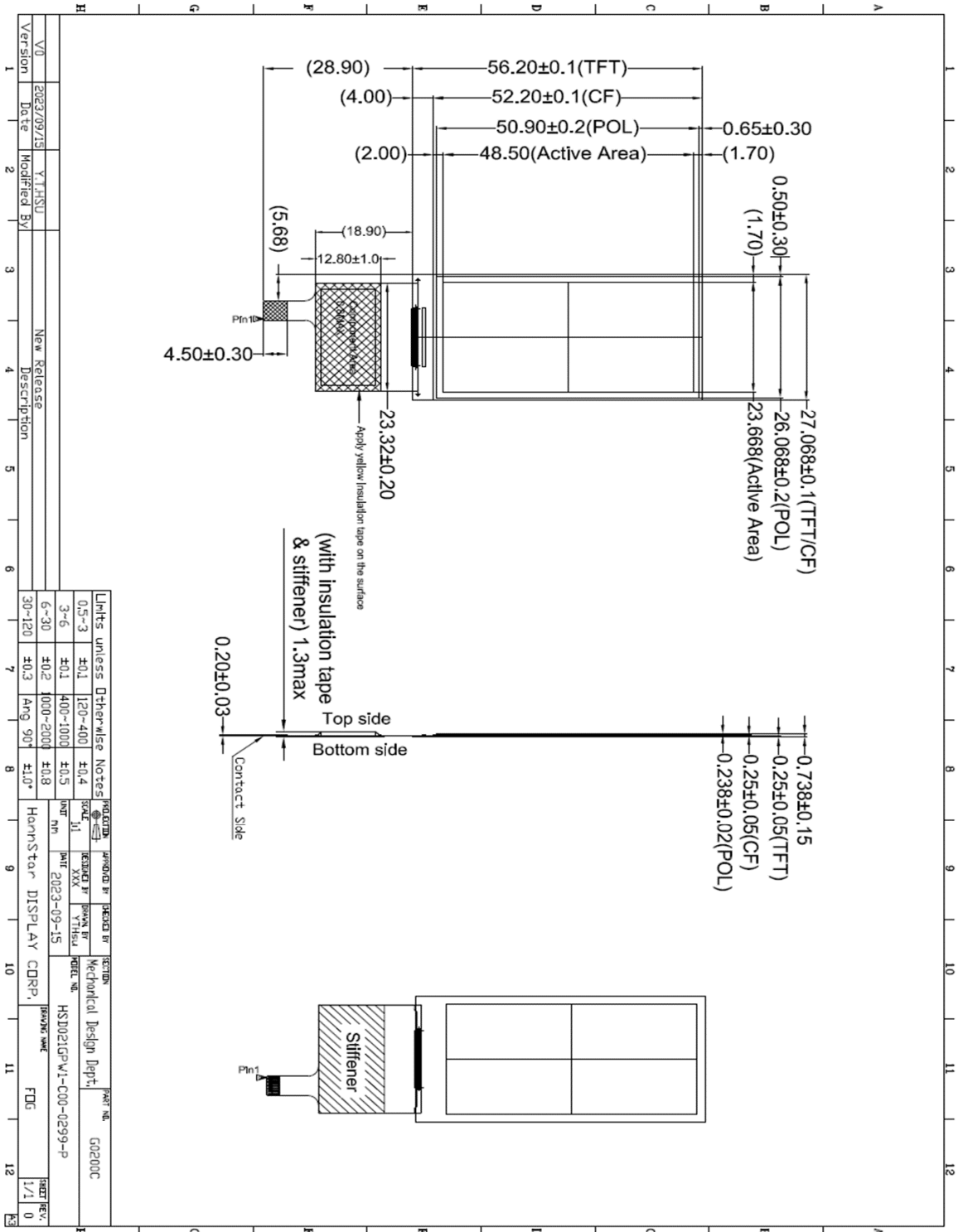   before the reliability stress.

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.

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8.0 OUTLINE DIMENSION

Unit : mm

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9.0 PACKAGE SPECIFICATION

9.1 Packing form

TBD

9.2 Packing assembly drawings

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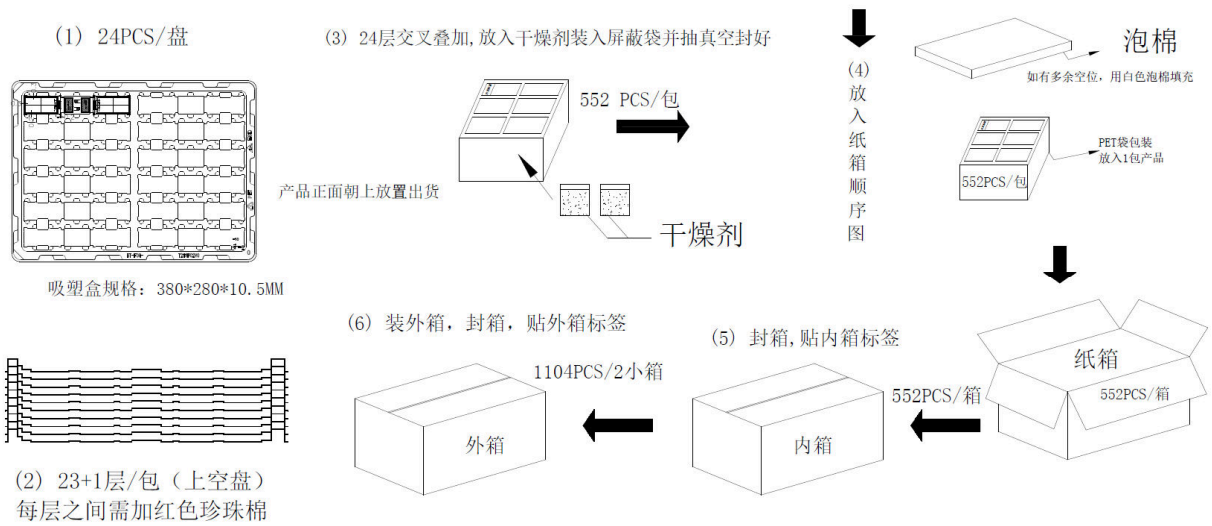
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10.0 GENERAL PRECAUTION

10.1 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.

10.2 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.

10.3 Breakage of LCD Panel

10.3.1.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.

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

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

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

10.4 Electric Shock

10.4.1. Disconnect power supply before handling LCD module.

10.4.2. Do not pull or fold the LED cable.

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

10.5 Absolute Maximum Ratings and Power Protection Circuit

10.5.1. 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.

10.5.2. Please do not leave LCD module in the environment of high humidity and high temperature for a long time.

10.5.3. It's recommended to employ protection circuit for power supply.

10.6 Operation

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

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

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

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      10.6.4 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.

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

10.7 Static Electricity

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

      10.7.2 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.

10.8 Strong Light Exposure

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

10.9 Disposal

When disposing LCD module, obey the local environmental regulations.

DATA MODUL

ALL TECHNOLOGIES. ALL COMPETENCIES. ONE SPECIALIST.

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