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Mechanical design





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Document No.	DC110-003355	Revision	1.0

TO :

Date : Oct., 16, 2019

HannStar Product Specification **(Preliminary)**

10.1” Color TFT-LCD Module

Model: **HSD101JFW1-C11**

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.

(4) The mark “ ** ” of Model means sub-model code.

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Record of Revisions

Rev.	Date	Sub-Model	Description of change
1.0	Oct., 16, 2019	C11	Preliminary Product Specification was first released.



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1.0 GENERAL DESCRIPTION

1.1 Introduction

HannStar Display model HSD101KFW1-C 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" (16:9) inch diagonally measured active display area with WSVGA (1024 horizontal by 600 vertical pixel) resolution.

1.2 Features

- 10.1 (16:9 diagonal) inch configuration
- 16.2M color by 6 bit + FRC
- ROHS / Halogen Free Compliance

1.3 Applications

- Automotive

1.4 General information

Item		Specification	Unit
Outline Dimension		235(H) x 143(V) x 4.5(Typ.)	mm
Display area		222.72(H) x 125.28(V)	mm
Number of Pixel		1024 RGB (H) x 600(V)	pixels
Pixel pitch		0.2175(H) x 0.2088(V)	mm
Pixel arrangement		RGB Vertical stripe	
Display mode		Normally Black	
NTSC		45(Typ.)	%
Surface treatment		Hard-Coating (3H)	
Weight		265 (Typ.)	g
Back-light		Single LED (Side-Light type)	
Power Consumption	Logic System	0.68W(Max) White Pattern (60Hz, VDD=3.3V)	W
	B/L System	3.2844(Max.)	W

1.5 Mechanical Information

Item		Min.	Typ.	Max.	Unit
Module Size	Horizontal (H)	234.7	235	235.3	mm
	Vertical (V)	142.7	143	143.3	mm
	Depth (D)w/o FPC	4.2	4.5	4.8	mm
Weight		—	265	275	g

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2.0 ABSOLUTE MAXIMUM RATINGS

2.1 Electrical Absolute Rating

2.1.1 TFT LCD Module

Parameters	Symbol	Min.	Max.	Unit	Note
Power Supply voltage	VDD	-0.5	3.96	V	
	AVDD	-0.5	14.85	V	
	VGH	-0.3	VGL+42	V	
	VGL	-25	0.3	V	

2.2 Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Operating Temperature	T _{opa}	-30	85	°C	240hrs
Storage Temperature	T _{stg}	-30	85	°C	240hrs

Note: The Judgment basis base on room temperature.

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3.0 OPTICAL CHARACTERISTICS

3.1 Optical specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast		CR	$\Theta=0$ Normal viewing angle	600	800	—		(1)(2)
Response time		T _R +T _F		—	25	30	msec	(1)(3)
White luminance (Center)		Y _L		400	500	—	cd/m ²	(1)(4) (I _L =161mA)
Color chromaticity (CIE1931)	White	W _x		0.250	0.300	0.350		(1)(4)
		W _y		0.270	0.320	0.370		
	Red	R _x		0.522	0.562	0.602		
		R _y		0.301	0.341	0.381		
	Green	G _x		0.251	0.294	0.334		
		G _y		0.517	0.557	0.597		
	Blue	B _x		0.117	0.157	0.197		
		B _y	0.069	0.109	0.149			
Viewing angle	Hor.	Θ _L	CR>10	75	85	—		
		Θ _R		75	85	—		
	Ver.	Θ _U		75	85	—		
		Θ _D		75	85	—		
Brightness uniformity		B _{UNI}	Θ=0	—	70	—	%	(5)
Optima View Direction		Free						(6)
Reflection	%	R (%)	—	—	5.0	5.5	%	(7)

3.2 Measuring Condition

- Measuring surrounding : dark room
- LED current I_L : 161mA
- Ambient temperature : $25\pm 2^\circ\text{C}$
- 15min. warm-up time.

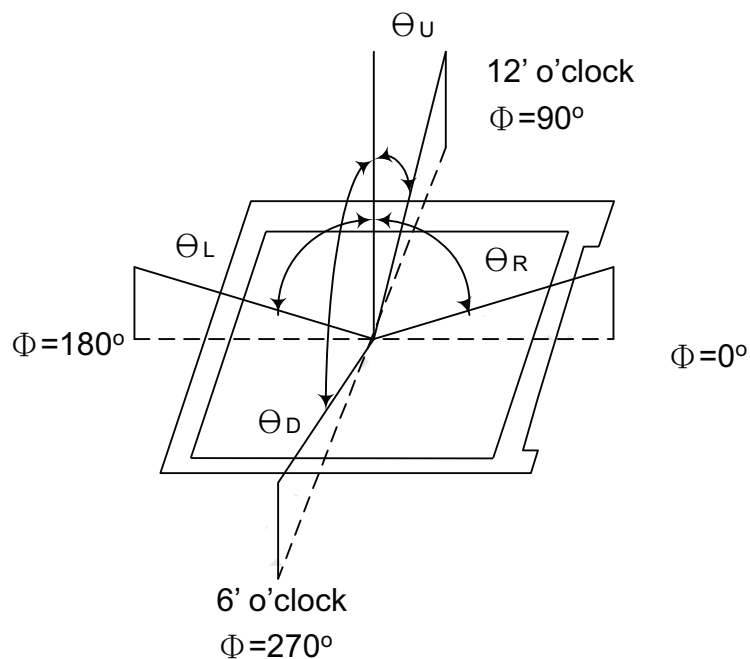
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3.3 Measuring Equipment

- FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.

- Measuring spot size : 20 ~ 21 mm

Note (1) Definition of Viewing Angle:

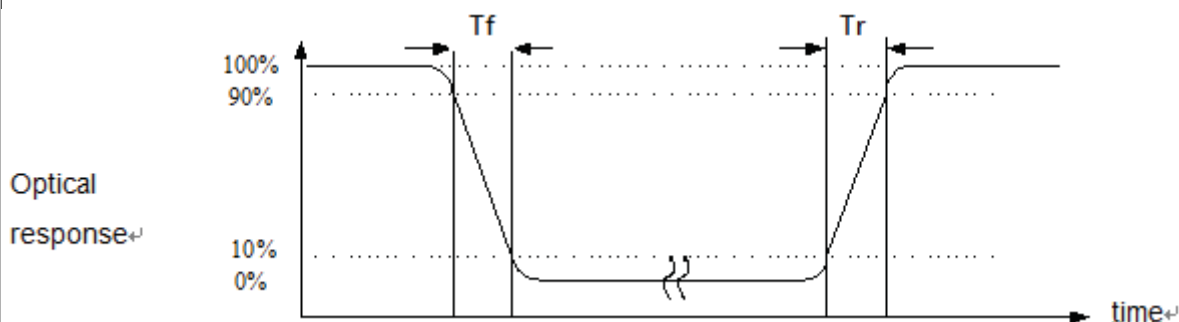


Note (2) Definition of Contrast Ratio (CR) :
measured at the center point of panel

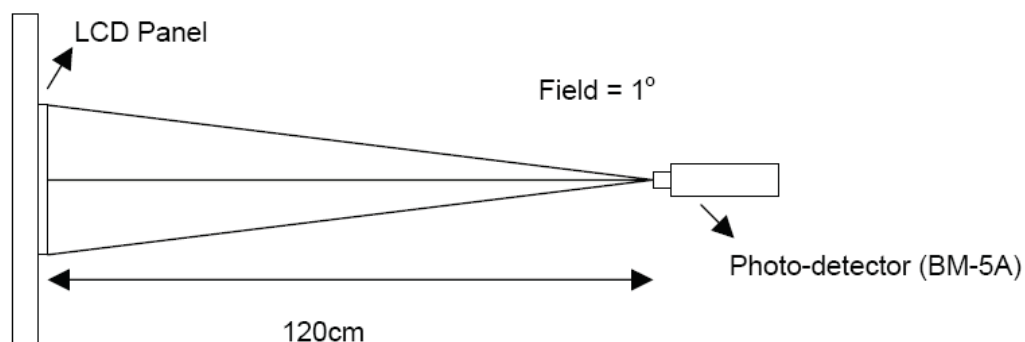
$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

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

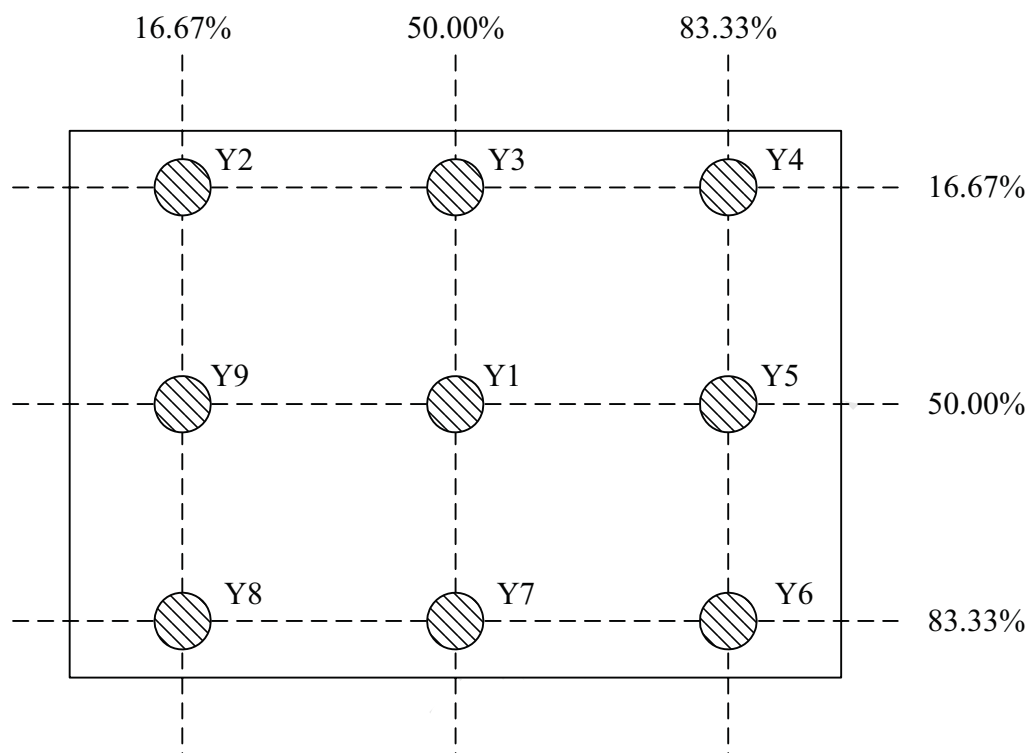


Note (4) Definition of optical measurement setup



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Note (5) Definition of brightness uniformity



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

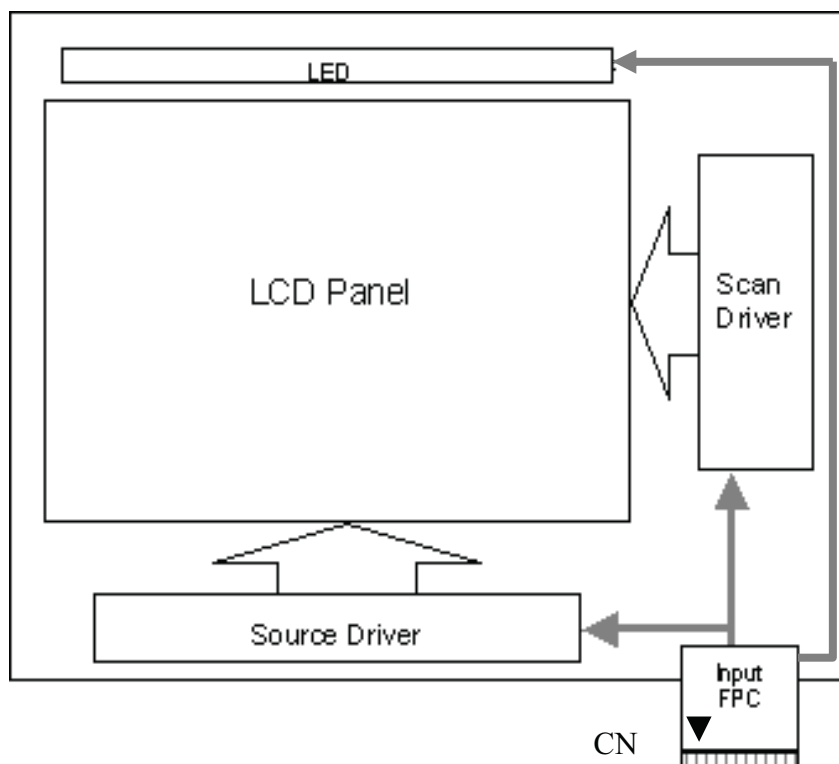
Note (6) : Rubbing Direction (The different Rubbing Direction will cause the different optima view direction.

Note (7) Definition of CM-3700A(Konica Minolta) Measurement specification

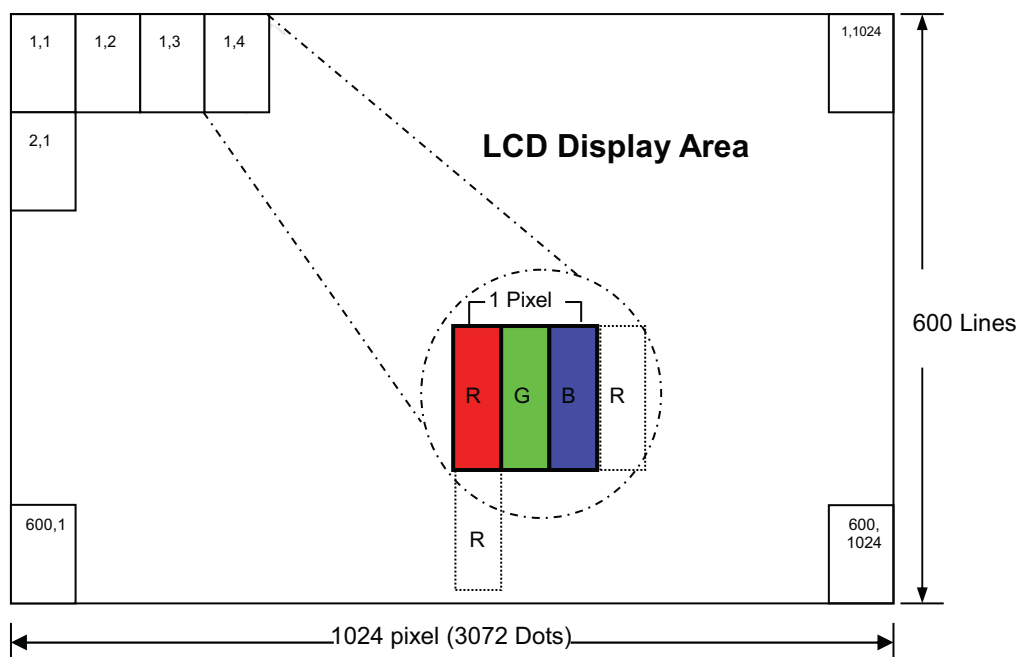
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4.0 BLOCK DIAGRAM

4.1 TFT LCD Module:



4.2 Pixel Format



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4.3 Relationship Between Displayed Color and Input

	Display	MSB LSB								MSB LSB								MSB LSB								Gray scale Level
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0	
Basic color	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	-
	Blue	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	-
	Green	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	-
	Light Blue	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-
	Red	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	-
	Purple	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	-
	Yellow	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	-
	White	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-
Gray scale of Red	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L0
	Dark ↑ ↓ Light	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L1
		L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L2
		:								:								:								L3...L251
		H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L252
	Light	H	H	H	H	H	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L253
		H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L254
	Red	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	Red L255
Gray scale of Green	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L0
	Dark ↑ ↓ Light	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L1
		L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L2
		:								:								:								L3...L251
		L	L	L	L	L	L	L	L	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L252
	Light	L	L	L	L	L	L	L	L	H	H	H	H	H	H	L	H	L	L	L	L	L	L	L	L	L253
		L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L254
	Green	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	Green L255
Gray scale of Blue	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L0
	Dark ↑ ↓ Light	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	L1
		L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	L	L2
		:								:								:								L3...L251
		L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	L	L	L252
	Light	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	L	H	L253
		L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	L	L254
	Blue	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	Blue L255
Gray scale of White & Black	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L0
	Dark ↑ ↓ Light	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	H	L	L	L	L	L	L	H	L	L1
		L	L	L	L	L	L	H	L	L	L	L	L	L	H	L	L	L	L	L	L	L	H	L	L	L2
		:								:								:								L3...L251
		H	H	H	H	H	H	L	L	H	H	H	H	H	H	L	L	H	H	H	H	H	H	L	L	L252
	Light	H	H	H	H	H	H	L	H	H	H	H	H	H	L	H	H	H	H	H	H	H	L	H	H	L253
		H	H	H	H	H	H	H	L	H	H	H	H	H	H	L	H	H	H	H	H	H	H	L	H	L254
	White	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	White L255

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5.0 INTERFACE PIN CONNECTION

FPC connector is used for electronics interface. The recommended model is FH28-60S-0.5SH manufactured by Hirose.

Pin No.	Signal	Description	Note
1	GND	Ground	
2	AVDD	Power for Analog Circuit	
3	VDD	Power Voltage for digital circuit	
4	GND	Ground	
5	VCOM	Common Voltage	
6	VDD	Power Voltage for digital circuit	
7	GND	Ground	
8	NC	No Connection	
9	NC	No Connection	
10	NC	No Connection	
11	NC	No Connection	
12	NC	No Connection	
13	NC	No Connection	
14	NC	No Connection	
15	GND	Ground	
16	VDD	Power Voltage for digital circuit	
17	GND	Ground	
18	RXIN3+	+ LVDS differential data input	
19	RXIN3-	- LVDS differential data input	
20	GND	Ground	
21	RXCLKIN+	+ LVDS differential clock input	
22	RXCLKIN-	- LVDS differential clock input	
23	GND	Ground	
24	RXIN2+	+ LVDS differential data input	
25	RXIN2-	- LVDS differential data input	
26	GND	Ground	
27	RXIN1+	+ LVDS differential data input	
28	RXIN1-	- LVDS differential data input	
29	GND	Ground	
30	RXIN0+	+ LVDS differential data input	
31	RXIN0-	- LVDS differential data input	
32	GND	Ground	
33	GND	Ground	

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Pin No.	Signal	Description	Note
34	Reset	Global reset pin. Active low to enter reset state. Suggest to connecting with RC reset circuit for stability. Normally pull high.(R=10KΩ、C=0.1uF)	Note1
35	STBYB	Standby mode, Normally pulled high STBYB = "1", normal operation STBYB = "0", timing controller, source driver will turn off, all output are High-Z	
36	SHLR	Left or right display control	Note2
37	VDD	Power Voltage for digital circuit	
38	UPDN	Up/down display control	Note2
39	GND	Ground	
40	AVDD	Power for Analog Circuit	
41	VCOM	Common Voltage	
42	DITH	Dithering function enable control. Normally pull low. DITHER = "1", LVDS input data is 8 bits DITHER = "0", LVDS input data is 6 bits	Note3
43	GND	Ground	
44	VDD	Power Voltage for digital circuit	
45	GND	Ground	
46	NC	No Connection	
47	NC	No Connection	
48	NC	No Connection	
49	NC	No Connection	
50	NC	No Connection	
51	NC	No Connection	
52	NC	No Connection	
53	GND	Ground	
54	VDD	Power Voltage for digital circuit	
55	SELB	6bit/8bit mode select SELB = "0", LVDS input data is 8 bits SELB = "1", LVDS input data is 6 bits	Note3
56	VGH	Gate ON Voltage	
57	VDD	Power Voltage for gate digital circuit	
58	VGL	Gate OFF Voltage	
59	GND	Ground	
60	BIST	Normal operation/BIST pattern select. BIST="0"(GND): Normal operation. BIST="1"(3.3V): BIST mode	for HSD

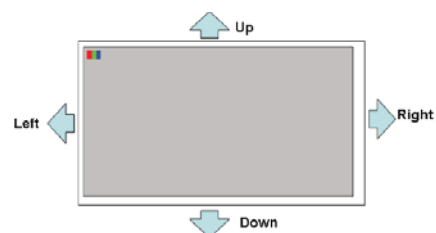
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Note1 : Global reset pin: Active low to enter reset mode. Suggest connecting with an RC reset circuit for stability. Normally pull high. (R=10K Ω , C=0.1 μ F)

Note: If RC is not added, users must follow the rule, T2 > 15ms on page 18 item 6.5 power on/off sequence.

Note2 :

SHLR	UPDN	Data shifting
DVDD	GND	Left→Right ; Up→Down(default)
GND	GND	Right→Left ; Up→Down
DVDD	DVDD	Left→Right ; Down→Up
GND	DVDD	Right→Left ; Down→Up



Note3 : If LVDS input data is 6 bits, SELB must be set to High; DITH must be set to Low.
(262K Colors)

If LVDS input data is 8 bits, SELB must be set to Low; DITH must be set to High.
(16.2M Colors)

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6.0 ELECTRICAL CHARACTERISTICS

6.1 TFT LCD Module

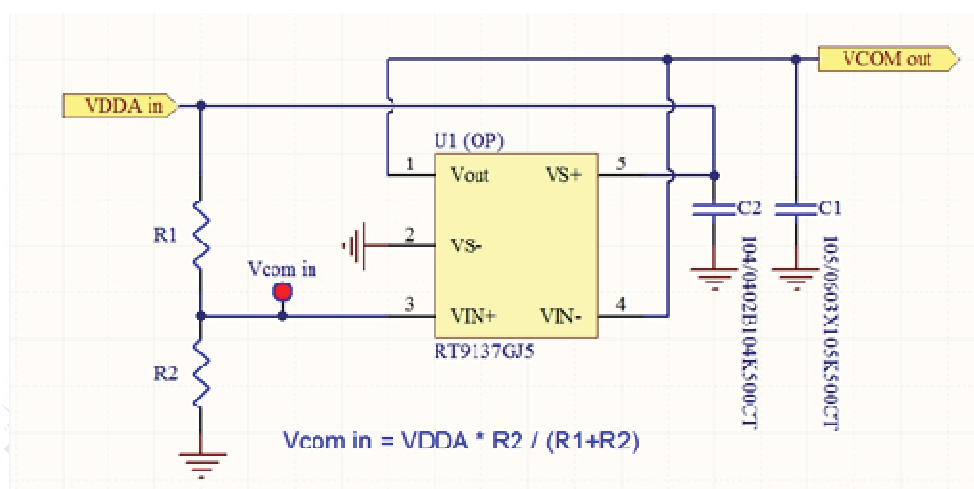
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage VCOM	VDD	3	3.3	3.6	V	
	VGH	19.4	20	20.6	V	
	VGL	-10.3	-10	-9.7	V	
	AVDD	12.4	12.5	12.6	V	
	VCOMin	-	5.7	-	V	Note (1)(4)
Input signal voltage	ViH	0.7 VDD	-	VDD	V	Note (2)
	ViL	0	-	0.3 VDD	V	
Current of power supply	IDD	-	20.9	-	mA	VDD =3.3V
	IADD	-	39	-	mA	AVDD=12.5V
	IGH	-	0.55	-	mA	VGH=20V
	IGL	-	1.9	-	mA	VGL=-10V
	Ivcom	-	0.001	--	mA	Vcom= 5.7 V

Note (1): Please adjust VCOM to make the flicker level minimum.

Note (2) : DITH 、SELB 、SHLR 、UPDN

Note (3): Gamma Internal resistance do not need to Gamma voltage

Note (4): VCOM reference circuit :



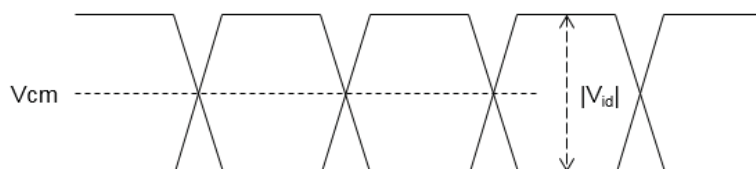
VCOM reference circuit

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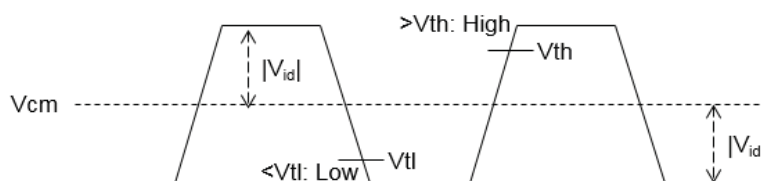
6.2 Switching Characteristics for LVDS Receiver

Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
Differential Input High Threshold	V_{th}	—	—	100	mV	$V_{CM}=1.2V$
Differential Input Low Threshold	V_{tl}	-100	—	—	mV	
Input Current	I_{IN}	-10	—	+10	μA	
Differential input Voltage	$ V_{ID} $	0.2	—	0.6	V	
Common Mode Voltage Offset	V_{CM}	$ V_{ID} /2$		$V_{DD}-1.2$	V	

Single-ended:
RXCLKINP,
RXCLKINN,
RXIN[3:0]P,
RXIN[3:0]N

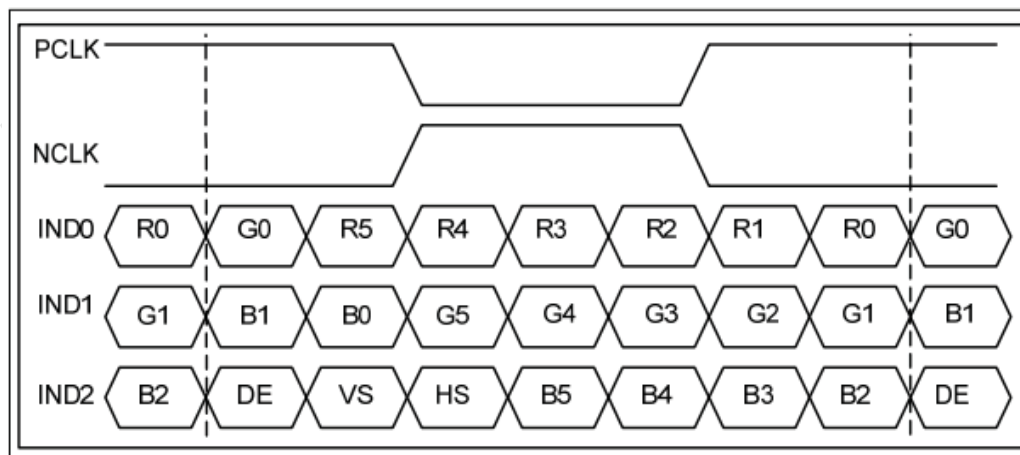


Differential:
RXCLKINP-RXCLKINN,
RXIN[3:0]P-RXIN[3:0]N



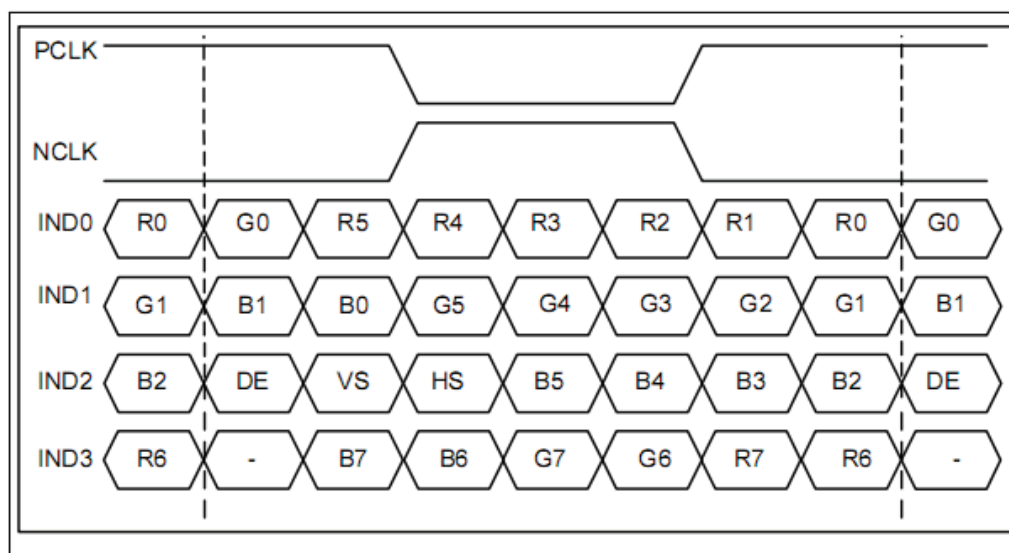
6.3 Bit LVDS input

6.3.1 6bit LVDS input



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6.3.2 8Bit LVDS input



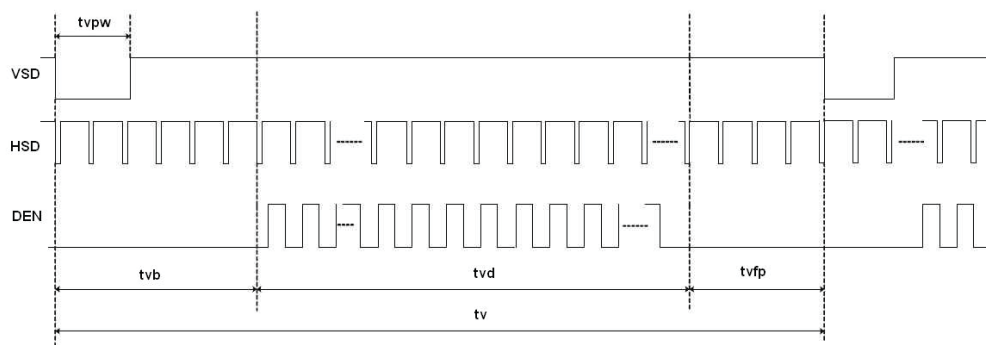
6.4 Interface Timing (DE mode)

Item	Symbol	Min.	Typ.	Max.	Unit
Frame Rate	-	58	60	62	Hz
Frame Period	tv	610	635	800	line
Vertical Display Time	tvd	600	600	600	line
Vertical Blanking Time	tvb+tvfp	10	35	200	line
1 Line Scanning Time	th	1164	1344	1400	clock
Horizontal Display Time	thd	1024	1024	1024	clock
Horizontal Blanking Time	thb+thfp	140	320	376	Clock
Clock Rate	fclk	42.6	51.2	67.2	MHz

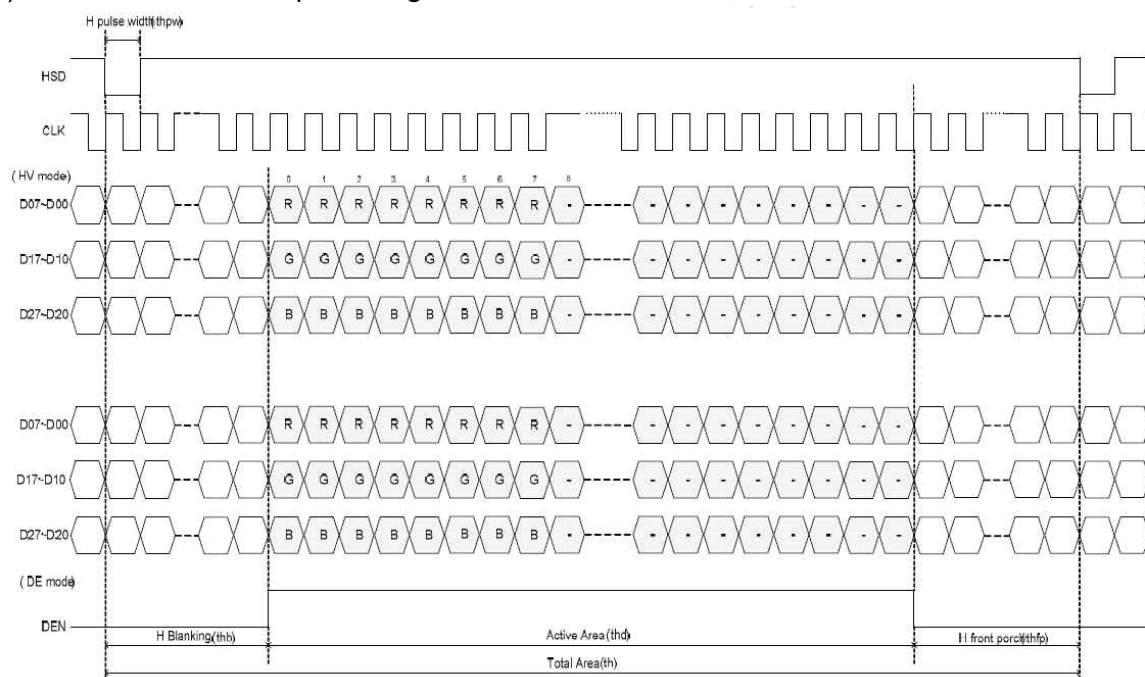
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Timing Diagram of Interface Signal (DE mode)

(1) Vertical input timing

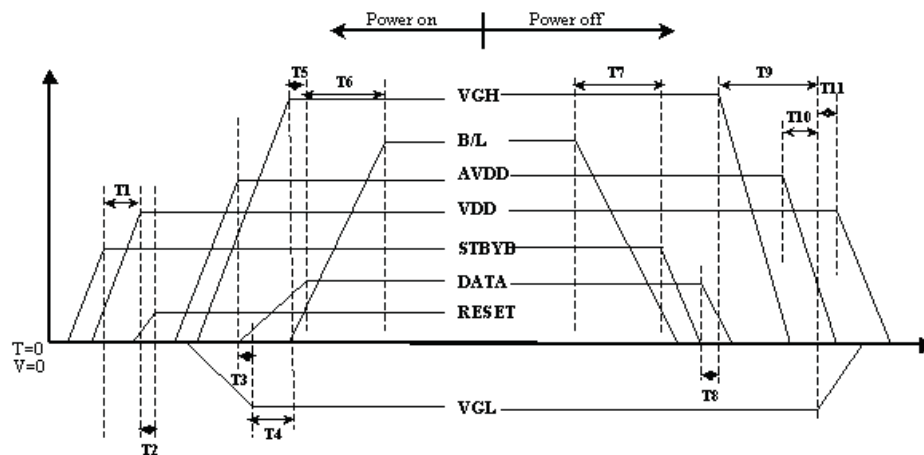


(2) Horizontal Vertical input timing



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6.5 Power On / Off Sequence



Item	Min.	Typ.	Max.	Unit
T1	0	--	--	ms
T2	15	--	--	ms
T3	5	--	--	ms
T4	10	--	--	ms
T5	20	--	--	ms
T6	50	--	--	ms
T7	20	--	--	ms
T8	10	--	--	ms
T9	20	--	--	ms
T10	10	--	--	ms
T11	20	--	--	ms

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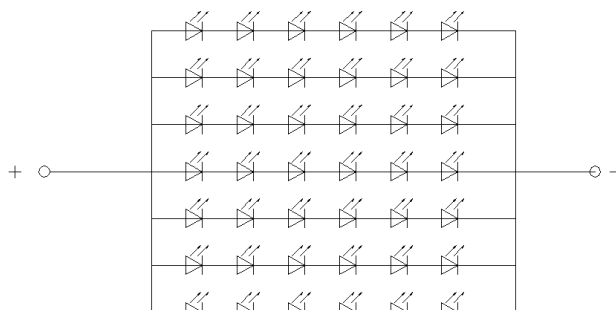
6.6 Backlight Unit

Parameter	Symbol	Min	Typ	Max	Units	Condition
LED Current	I_L	--	161	--	mA	$T_a=25^{\circ}\text{C}$
LED Voltage	V_F	--	19.2	20.4	Volt	$T_a=25^{\circ}\text{C}$
LED Life-Time	N/A	20,000	--	--	Hour	$T_a=25^{\circ}\text{C}$ $I_F=20\text{mA}$ Note (2)
Power consumption	P_{LED}	--	--	3.2844	Watt	--

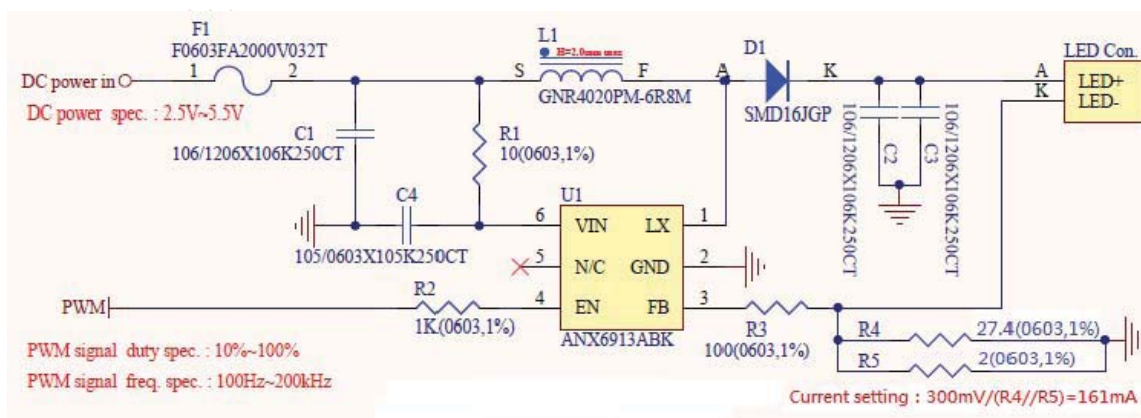
Note (1) LED life time (Hr) can be defined as the time in which it continues to operate under the condition: $T_a=25\pm3^{\circ}\text{C}$, typical I_L value indicated in the above table until the brightness becomes less than 50%.

Note (2) The "LED life time" is defined as the module brightness decrease to 50% original brightness at $T_a=25^{\circ}\text{C}$ and $I_L=161\text{mA}$. The LED lifetime could be decreased if operating I_L is larger than 161mA. The constant current driving method is suggested.

Note (3) LED Light Bar Circuit



Note (4) Suggested Schematic of LED Back-Light Driver



Suggested Schematic of LED Back-Light Driver

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7.0 RELIABILITY TEST ITEMS

No.	Item	Conditions	Remark
1	High Temperature Storage	Ta=+85°C, 240hrs	Note 1,2,3
2	Low Temperature Storage	Ta=-30°C, 240hrs (For reference Ta=-40°C,240hrs)	Note 1,2,3
3	High Temperature Operation	Ta=+85°C, 240hrs	Note 1,2,3
4	Low Temperature Operation	Ta=-30°C, 240hrs	Note 1,2,3
5	High Temperature and High Humidity (operation)	Ta=+60°C, 90%RH, 240hrs	Note 1,2,3
6	Thermal Cycling Test (non operation)	-30°C(30min) → +85°C(30min), 100 cycles	Note 1,2,3
7	Electrostatic Discharge	Contact = ± 8 kV, class B; (R=330Ω,C=150pF) Air = ± 15 kV, class B; (R=330Ω,C=150pF) 1 time for each point.	
8	Vibration	1.Random: 1.04G, 10~500Hz, XYZ, 30min/each direction 2.Sine: Freq.1.5G, 8~33.3Hz, Stoke: 1.3mmhz Sweep: 2.9G, 33.3~400 X/Z: 2hrs, Y:4hrs	
9	Shock	Half-Sine, 100G, 6ms, ±XYZ, 1time	
10	Vibration (with carton)	Random: 0.015G ² /Hz, 5~200Hz -6dB/Octave, 200~400Hz XYZ each direction 2hrs	
11	Drop (with carton)	Drop height condition, basis on the product weight and follow QB100-0027 1 corner, 3 edges, 6 surfaces	

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

Note2: The test result shall be evaluated after the sample has been left at room temperature and humidity for 2 hours without load. No condensation shall be accepted.

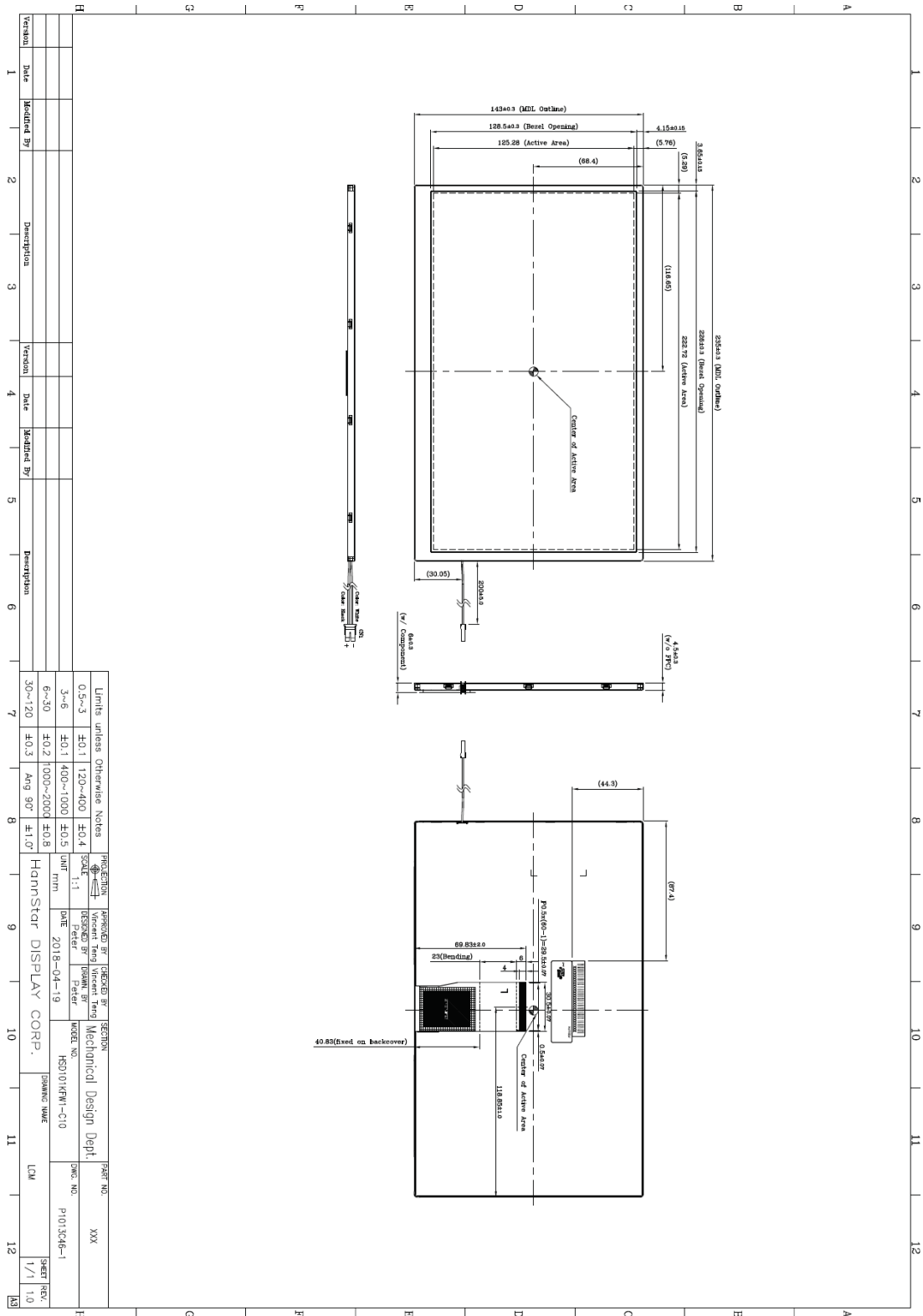
The sample shall be free from defects:

Air bubble in the LCD 、 Seal leak 、 Non-display 、 Missing segments 、 Glass crack.

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

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8.0 OUTLINE DIMENSION



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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

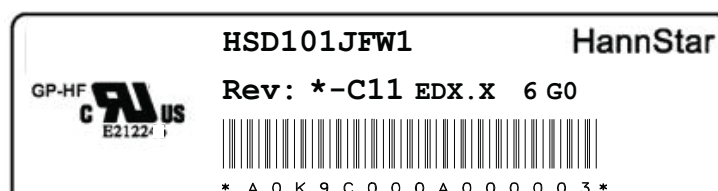
Year	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Mark	9	0	1	2	3	4	5	6	7	8

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.



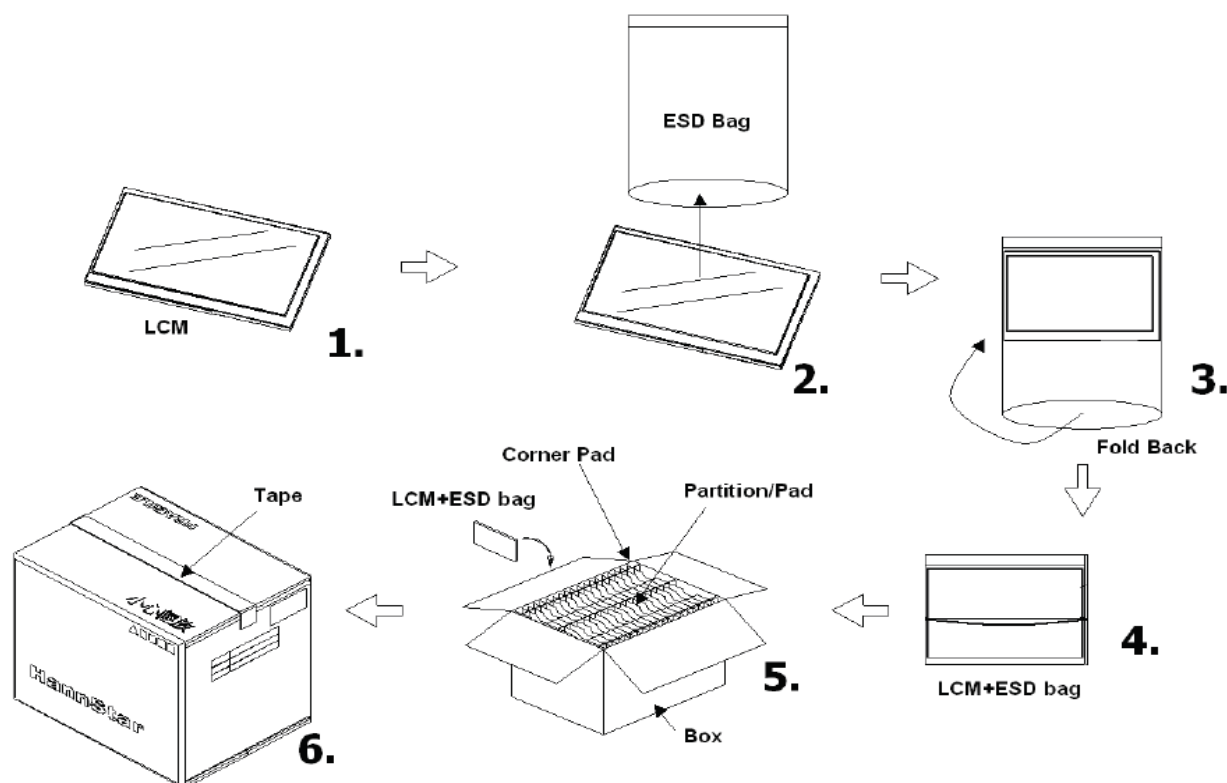
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10.0 PACKAGE SPECIFICATION

10.1 Packing form

LCM Model	LCM Qty. in the Box	Inner Box Size(mm)	Notice
HSD101JFW1-C11	50pcs/Box	456mmx373mmx313	--

10.2 Packing assembly drawings



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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

11.3.1. 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.

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

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

11.3.4. 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.



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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.