HannStar Product Information

4.46” Color TFT-LCD Module

Model：HSD045B8W4-A**

(1/4 cut)

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, 22,2013**	**A****	**Product information was first released.**
1.1	**Dec, 11, 2013**		**P10 Update transmittance.** **P13 Update note 5 drawing.** **P14-20 Update outline dimension.** **P22-23 Update 6.5 IC & FPC position.** **P24 Update 6.6 Cell test.** **P24 Add ground PAD information.** **P37 Add optical and POL angle information for specific customers.**
1.2	**Dec, 30, 2013**		**P23 Update IC & FPC position drawing.** **P33 Update optical specification for specific customers.**
1.3	**Mar. 4, 2014**		**P8 Update IC information.**
1.4	**Apr. 8, 2014**		**P4 Update driving method.**

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1.0 GENERAL DESCRIPTION

1.1 Introduction

HannStar Display model **HSD045B8W4-A*** is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This TFT LCD has a 4.46 (16:9) inch diagonally measured active display area with FWVGA (480 horizontal by 854 vertical pixel) resolution.

1.2 Features

- 4.46 (16:9 diagonal) inch configuration
- 16.7M color by 8 bit R.G.B signal input
- RoHS Compliance & Halogen Free

1.3 Applications

- Mobile Smart Phone
- Personal Navigation Device
- Multimedia applications and AV system

1.4 General information

Item	Specification	Unit
Outline Dimension	58.24 (H) X 105.857 (V) X 0.8 (T) (Typ.)	mm
Display area	55.44 (H) X 98.637 (V)	mm
Number of Pixel	480 RGB (H) x 854 (V)	pixels
Pixel pitch	0.1155 (H) X 0.1155 (V)	mm
Pixel arrangement	RGB Vertical Stripe	
Display mode	Normally Black	
Driving Method	Column Inversion	
NTSC	70%	C-Light

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2.0 ABSOLUTE MAXIMUM RATINGS

(The following are maximum values which, if exceeded, may cause operation or damage to the unit.)

Item	Symbol	Min.	Max.	Unit	Note
LC Operating Voltage	VOP	--	5.1	V	*1,*2
Operating Temperature	T_{OP}	-20	70	℃	
Storage Temperature	T_{ST}	-30	80	℃	
Operating Ambient Humidity	H_{OP}	10	*4	RH	*3
Storage Humidity	H_{ST}	10	*4	RH	*3

Note:

*1. At 25±5℃

*2. Due to the characteristics of LC Material, the Liquid Crystal driving voltage varies with environmental temperature.

*3. Non-condensation.

*4. Temp.≤ 60℃,90%RH Max.

Temp. > 60℃,Absolute humidity shall be less than 90%RH.

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3.0 Electrical Specifications

Item	Symbol	Min.	Typ.	Max.	Unit	Note
TFT Gate ON Voltage	VGH	--	15	--	V	*1
TFT Gate OFF Voltage	VGL	--	-10	--	V	*2
TFT Common Voltage	Vcom	-2	--	-1	V	*3
Data (RGB signal) Voltage	Vsig	-5.5	--	5.5	V	

Note:

1. VGH is TFT Gate operating Voltage.

*2. VGL is TFT Gate operating Voltage.

The storage structure of this model is C_{ST}(Storage on Common)

*3. Vcom must be adjusted to optimize display quality _Cross talk, Contrast Ratio and etc.

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3.1 FPC PIN ASSIGNMENT (ILI9806E/NT35510S)

Pin No.	Pin Define	Pin No.	Pin Define	Pin No.	Pin Define	Pin No.	Pin Define	Pin No.	Pin Define
1	DUMMY11	37	TE	73	PCLK	109	VREFCP	145	C23N
2	VSSA	38	VSEL	74	HS	110	EXTP	146	C23N
3	VCOM	39	SDO	75	VS	111	CSP	147	C24P
4	MTP_PWR	40	SDI	76	LEDPWM	112	EXTN	148	C24P
5	VGLX	41	DCX	77	LEDON	113	CSN	149	C24N
6	VGLO	42	WRX	78	VDDI	114	VDDB	150	C24N
7	VGL_REG	43	RDX	79	VSSI	115	VSSB	151	VDDB
8	VCL	44	CSX	80	AVDD	116	C11P	152	VCL_VDDB/VCL/VCL_AVSS
9	VREF_PWR	45	RESX	81	AVSS_AVDD/AVSS	117	C11P	153	AVSS
10	VSSA	46	VSSI	82	AVEE_AVSS/AVEE	118	C11N	154	VSSB
11	VDDA	47	VDDI	83	VDDA	119	C11N	155	C31P
12	VDDR	48	D23	84	DVSS	120	C12P	156	C31P
13	VSSR	49	D22	85	DVDD	121	C12P	157	C31N
14	VDD_DET	50	D21	86	VSSAM	122	C12N	158	C31N
15	DIOPWR	51	D20	87	HSSI_D1_P	123	C12N	159	C32P
16	VGSN/VGSN_VGSP	52	D19	88	HSSI_D1_P	124	C13P	160	C32P
17	VGSP	53	D18	89	HSSI_D1_N	125	C13P	161	C32N
18	VGMN/VGMN_VGMP	54	D17	90	HSSI_D1_N	126	C13N	162	C32N
19	VGMP	55	D16	91	VSSAM	127	C13N	163	DVDD
20	DVSS	56	D15	92	HSSI_CLK_P	128	C14P	164	DVSS
21	DVDD	57	D14	93	HSSI_CLK_P	129	C14P	165	C41P
22	VDDB	58	D13	94	HSSI_CLK_N	130	C14N	166	C41P
23	VCL/VCL_VDDB/VCL_AVSS	59	D12	95	HSSI_CLK_N	131	C14N	167	C41N
24	AVSS	60	D11	96	VSSAM	132	AVDD	168	C41N
25	LANSEL	61	D10	97	HSSI_D0_P	133	AVSS_AVDD/AVSS	169	VGH/VGHO
26	DSWAP	62	D9	98	HSSI_D0_P	134	AVEE_AVSS/AVEE	170	C51P
27	PSWAP	63	D8	99	HSSI_D0_N	135	C21P	171	C51P
28	DSTB_SEL	64	D7	100	HSSI_D0_N	136	C21P	172	C51N
29	DUMMY	65	D6	101	VSSAM	137	C21N	173	C51N
30	RGBBP	66	D5	102	MVDDL	138	C21N	174	VGL_REG
31	I2C_SA0	67	D4	103	MVDDL	139	C22P	175	VGLO
32	IM3	68	D3	104	MVDDA	140	C22P	176	VGLX
33	IM2	69	D2	105	MVDDA	141	C22N	177	VCOM
34	IM1	70	D1	106	VDDAM	142	C22N	178	VSSA
35	IM0	71	D0	107	VDDR	143	C23P	179	Dummy
36	EXB1T	72	DE	108	VSSR	144	C23P		

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3.2 TFT Design Rules

Item		Specification	unit
COG ILITEK ILI9806E	Chip size	24000 x 800	μm
	Pad number	2069	~
	Pin assignment	Based on the ILI9806E Spec.	
COG Novatek NT35510S	Chip size	24000 x 963	μm
	Pad number	2075	~
	Pin assignment	Based on the NT35510S Spec.	
COG HX8379A	Chip size	24000 x 800	μm
	Pad number	2077	~
	Pin assignment	Based on the HX8379A Spec.	
COG Raydium RM68171	Chip size	24000 x 850	μm
	Pad number	2075	~
	Pin assignment	Based on the RM68171 Spec.	
COG ILITEK ILI9806	Chip size	24360 x 1460	μm
	Pad number	2075	~
	Pin assignment	Based on the ILI9806 Spec.	
COG ILITEK ILI9806C	Chip size	24000 x 930	μm
	Pad number	2065	~
	Pin assignment	Based on the ILI9806C Spec.	
COG ILITEK ILI9806H	Chip size	24060 x 1200	μm
	Pad number	2071	~
	Pin assignment	Based on the ILI9806H Spec.	
COG Orise OTM8009A	Chip size	24000 x 1380	μm
	Pad number	2075	~
	Pin assignment	Based on the OTM8009A Spec.	

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Item		Specification	unit
COG Orise OTM8018B	Chip size	24000 x 950	μm
	Pad number	2075	~
	Pin assignment	Based on the OTM8018B Spec.	
COG Orise OTM8012A	Chip size	24000 x 1110	μm
	Pad number	2075	~
	Pin assignment	Based on the OTM8012A Spec.	

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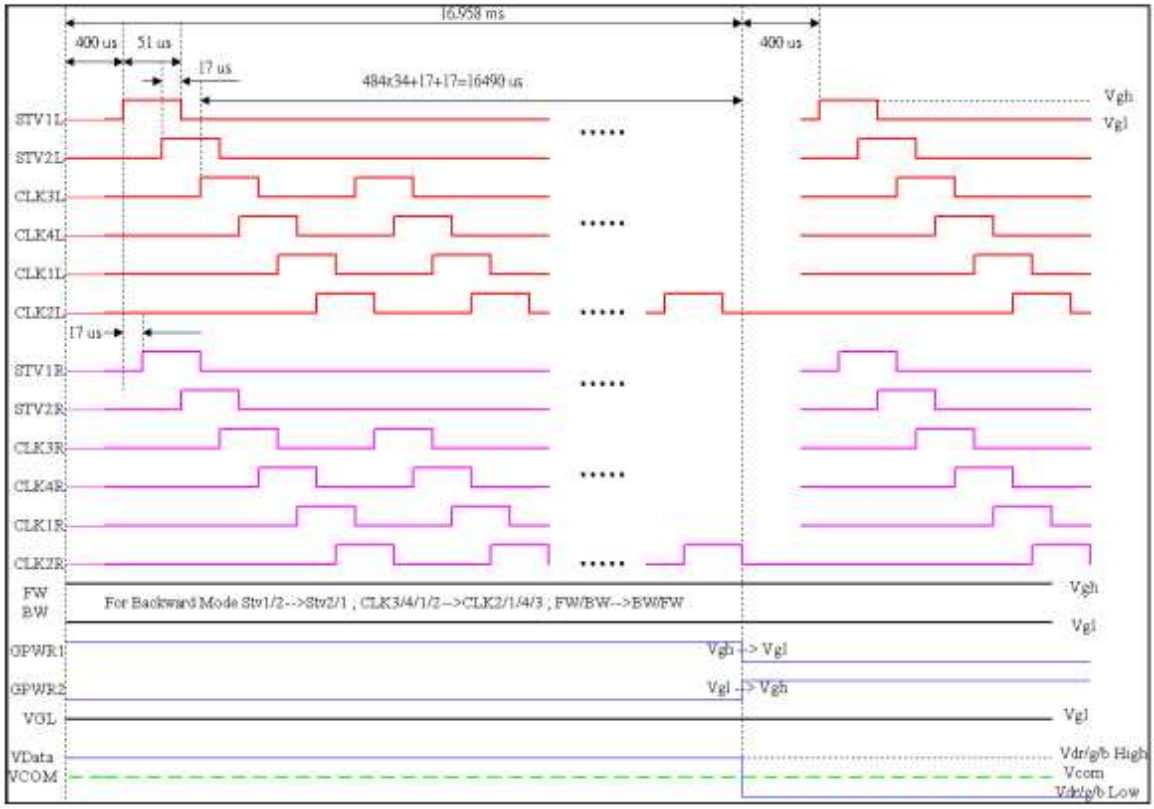
3.3 Cell test light on waveform

Voltage	Gray	White	Black	Red	Green	Blue
Vgg	+30V	+30V	+30V	+30V	+30V	+30V
Vcom	-1.55V	-1.55V	-1.55V	-1.55V	-1.55V	-1.55V
Vgh	+15V	+15V	+15V	+15V	+15V	+15V
Vgl	-10V	-10V	-10V	-10V	-10V	-10V
Vdr High	+2.5V	+5V	0.1V	+5V	0.1V	0.1V
Vdr Low	-2.5V	-5V	-0.1V	-5V	-0.1V	-0.1V
Vdg High	+2.5V	+5V	0.1V	0.1V	+5V	0.1V
Vdg Low	-2.5V	-5V	-0.1V	-0.1V	-5V	-0.1V
Vdb High	+2.5V	+5V	0.1V	0.1V	0.1V	+5V
Vdb Low	-2.5V	-5V	-0.1V	-0.1V	-0.1V	-5V



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4.0 OPTICAL CHARACTERISTICS

4.1 Optical specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Transmittance (with Polarizer)		T (%)	Θ=0 Normal viewing angle	—	4.5%	—	—	Transmittance base on using Normal Polarizer，Reference Only
Transmittance (without Polarizer)		T (%)		—	14.4%	—	—	—
Contrast		CR		800	1000	—		(1)(2)
Response time	Rising	T_R		—	16	21	msec	Response time
	Falling	T_F		—	19	24		
Color gamut	S(%)			—	70	—	%	Color gamut (Under C-Light)
Color chromaticity (CIE1931)	White	W_x		0.307	0.327	0.347		Color chromaticity (CIE1931) (Under C-Light)
		W_y		0.327	0.347	0.367		
	Red	R_x		0.639	0.659	0.679		
		R_Y		0.299	0.319	0.339		
	Green	G_x		0.295	0.315	0.335		
		G_Y		0.569	0.589	0.609		
	Blue	B_x		0.120	0.140	0.160		
		B_Y		0.06	0.080	0.100		
Viewing angle	Hor.	$Θ_L$	CR>10	—	80	—		Viewing angle
		$Θ_R$		—	80	—		
	Ver.	$Θ_U$		—	80	—		
		$Θ_D$		—	80	—		
Optima View Direction		Free						(5)

4.2 Measuring Condition

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

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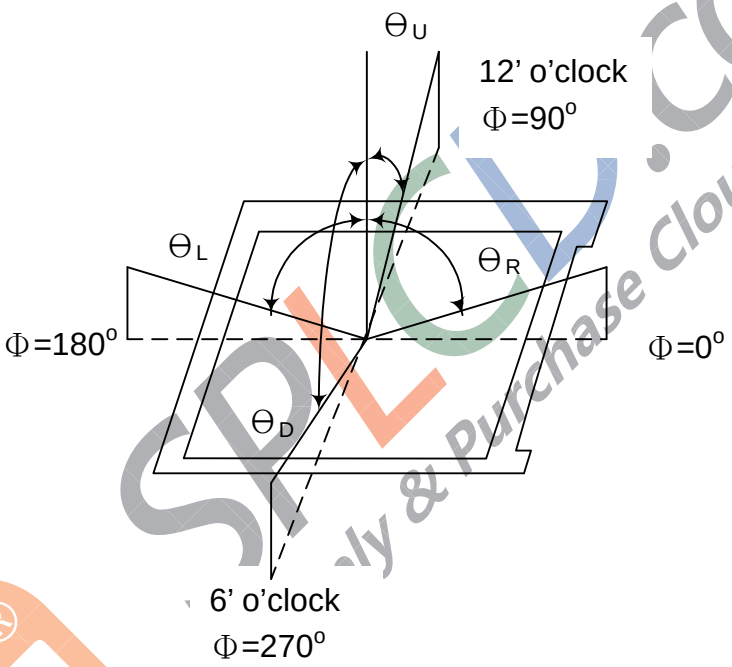
4.3 Measuring Equipment

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

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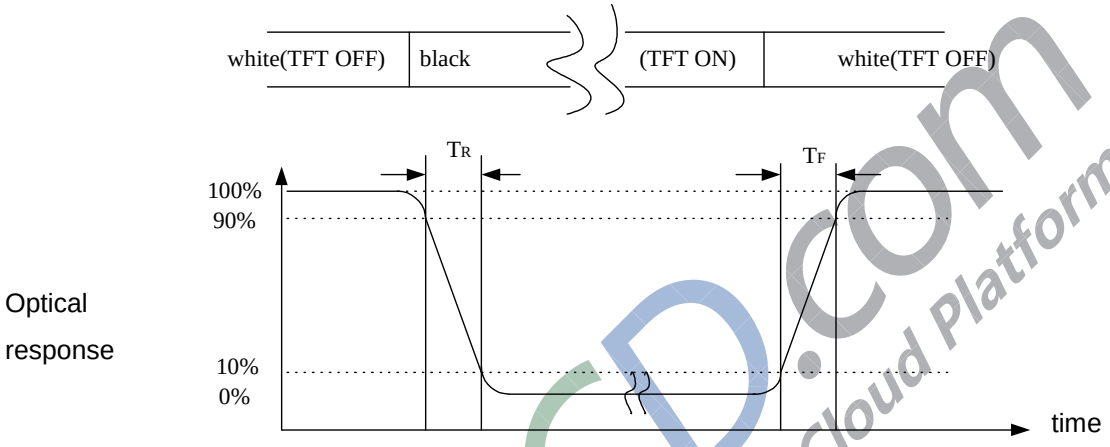
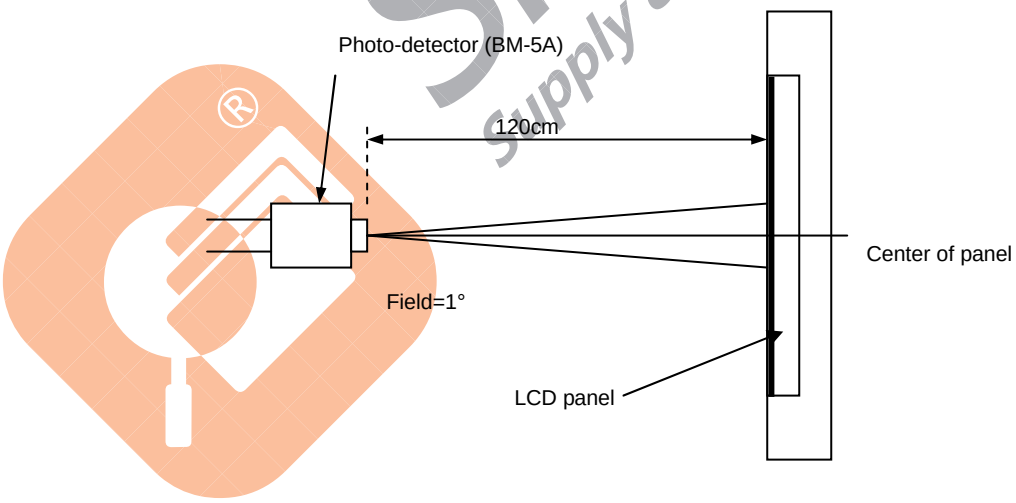
Note (3) Definition of Response Time : Sum of T_R and T_F



Note (4) Definition of optical measurement setup



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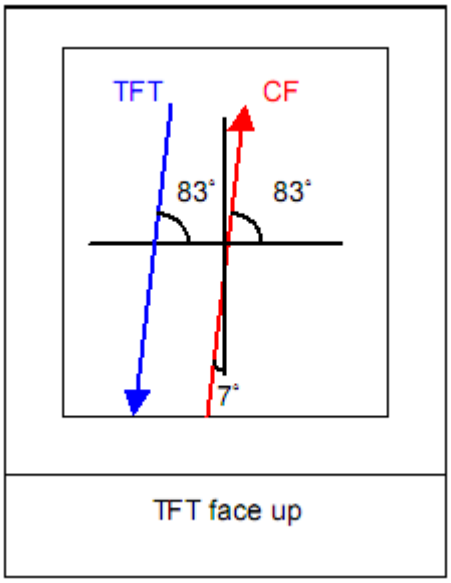
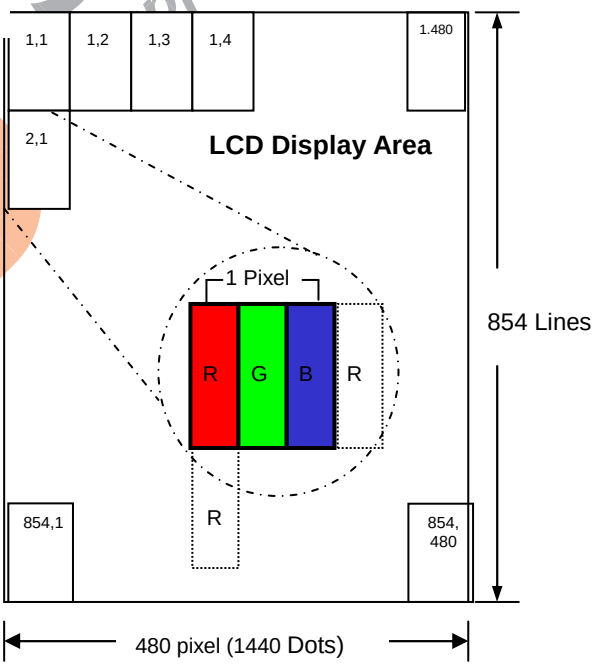
Note (5) Rubbing Direction (The different Rubbing Direction will cause the different optima view direction.



5. Pixel Format



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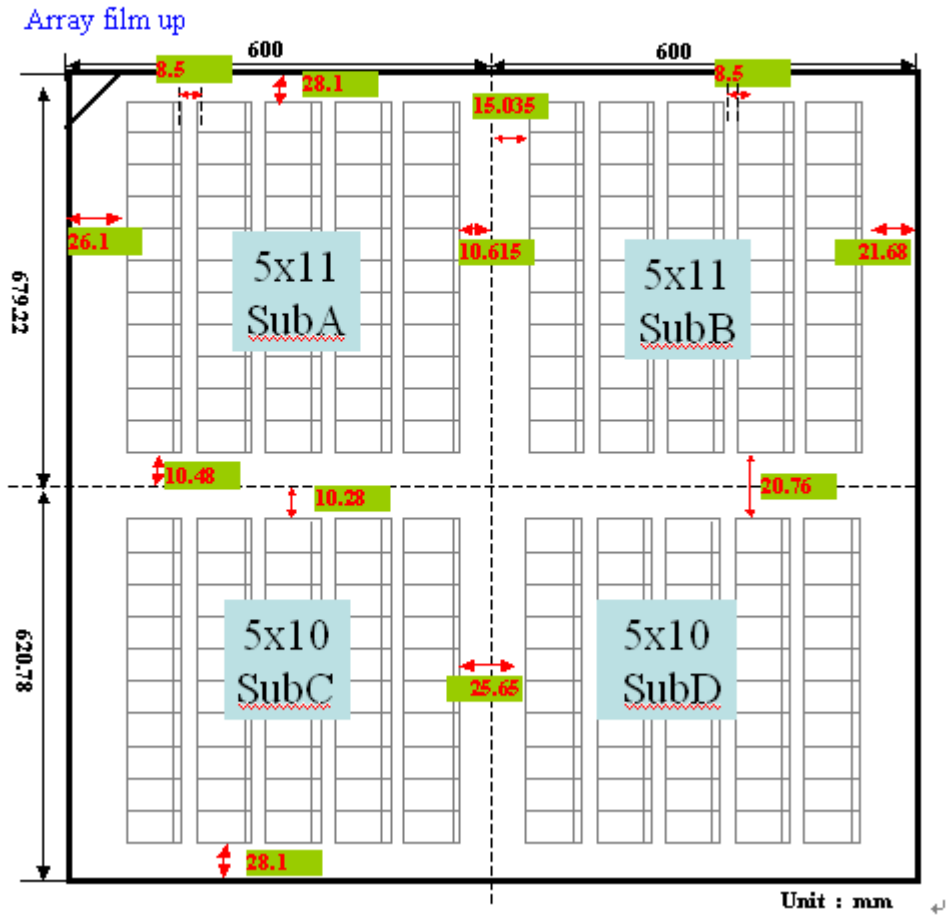
6.0 OUTLINE DIMENSION

6.1 Outline Dimension of Mother Glass (Unit : mm)

For TFT Array film up

(Array Film Up) (210 PCS)



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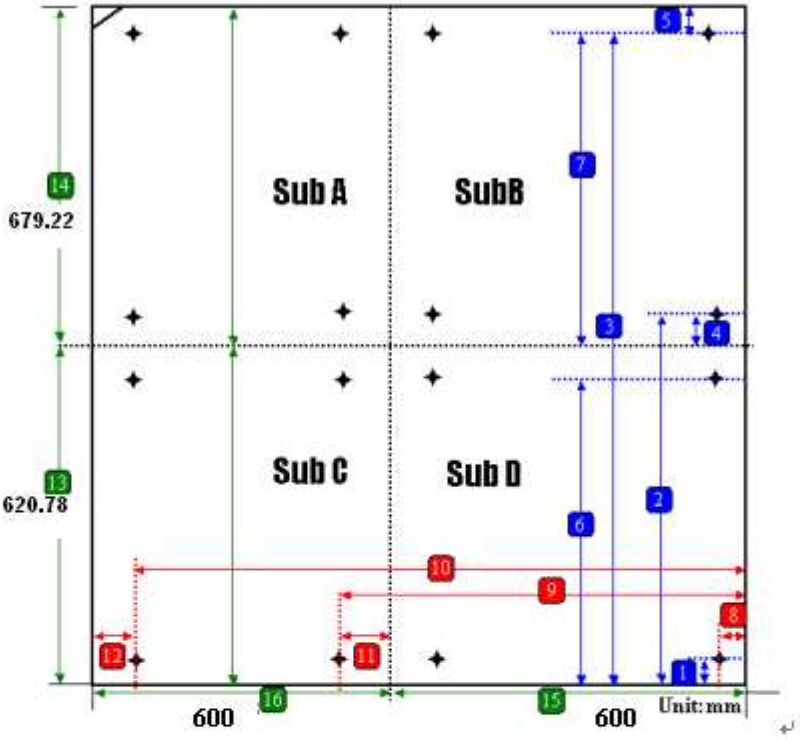
(Array film up) (210 PCS)



Unit : mm

No.	Distance	No.	Distance
1	20	9	606.0
2	623.16	10	1182.935
3	1286.0	11	6.0
4	2.38	12	17.065
5	14	13	620.78
6	610.78	14	679.22
7	665.22	15	600
8	17.065	16	600

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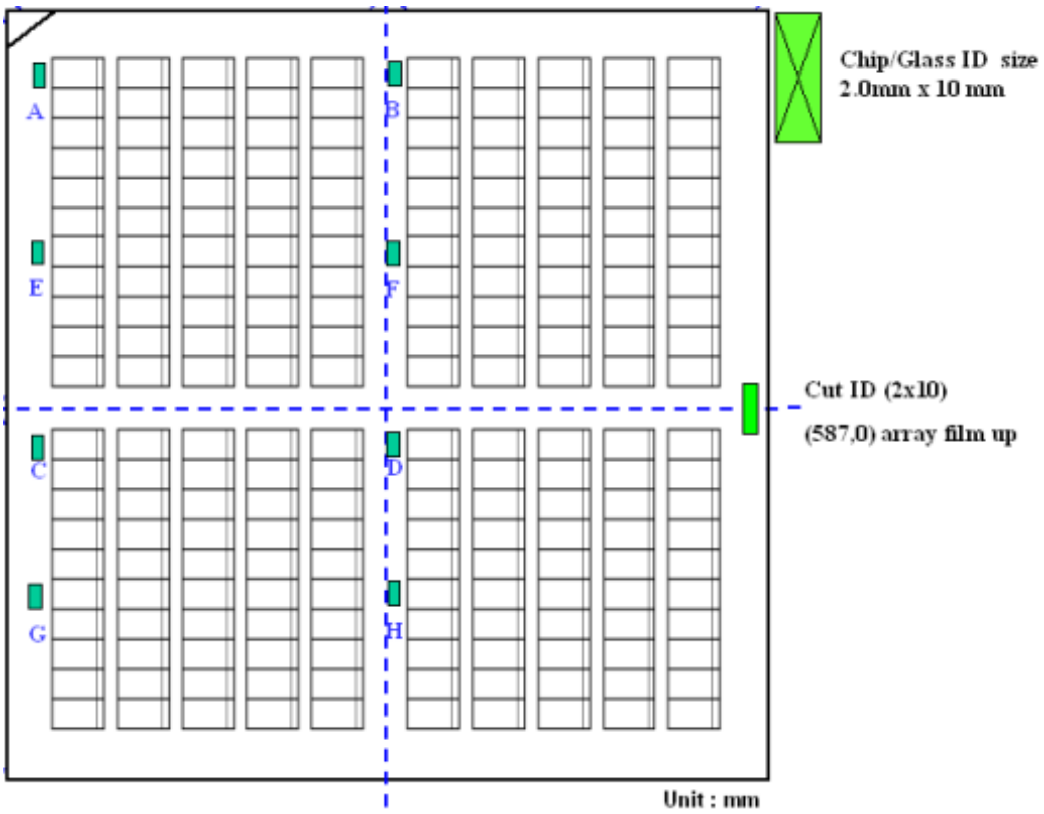
6.2 Chip ID position for fully sheet (1200mmx1300mm)



Chip ID	X	Y
A	-584.0	544.0
B	4.935	544.0
C	-584.0	-59.16
D	4.935	-59.16
E	-584.0	312.8
F	4.935	312.8
G	-584.0	-290.36
H	4.935	-290.36

Unit: mm

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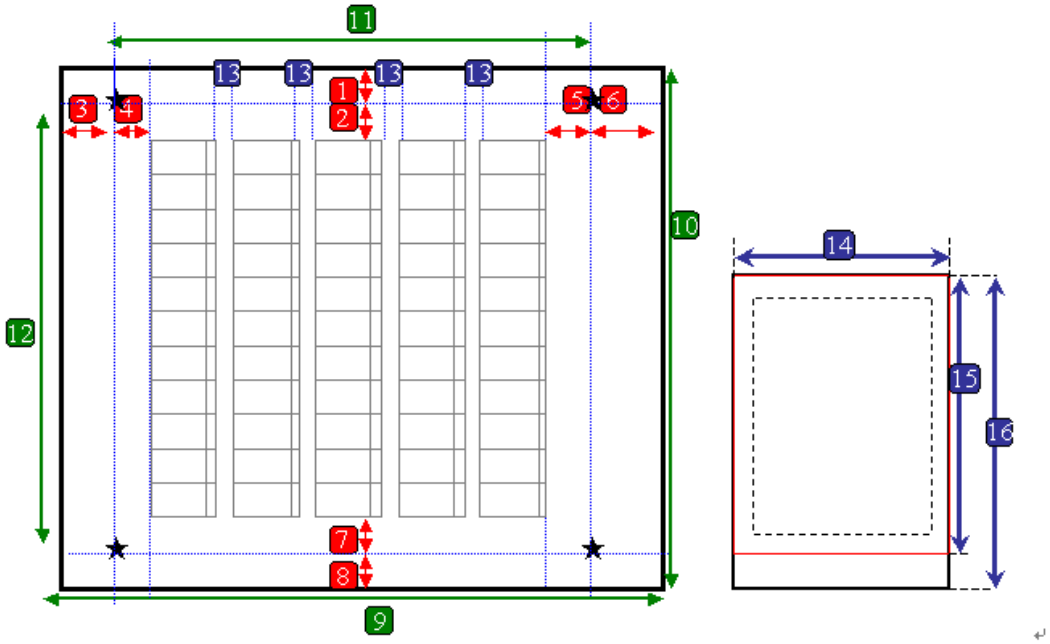
6.3 Chip Cut Mark Position

Sub A/B TFT Array Film Up (Unit : mm)



Sub A				Sub B			
No.	Distance	No.	Distance	No.	Distance	No.	Distance
1	14	9	600	1	14	9	600
2	14.1	10	679.22	2	14.1	10	679.22
3	17.065	11	576.935	3	6	11	576.935
4	9.035	12	662.84	4	9.035	12	662.84
5	4.615	13	8.5	5	4.615	13	8.5
6	6	14	58.24	6	17.065	14	58.24
7	8.1	15	102.337	7	8.1	15	102.337
8	2.38	16	105.857	8	2.38	16	105.857

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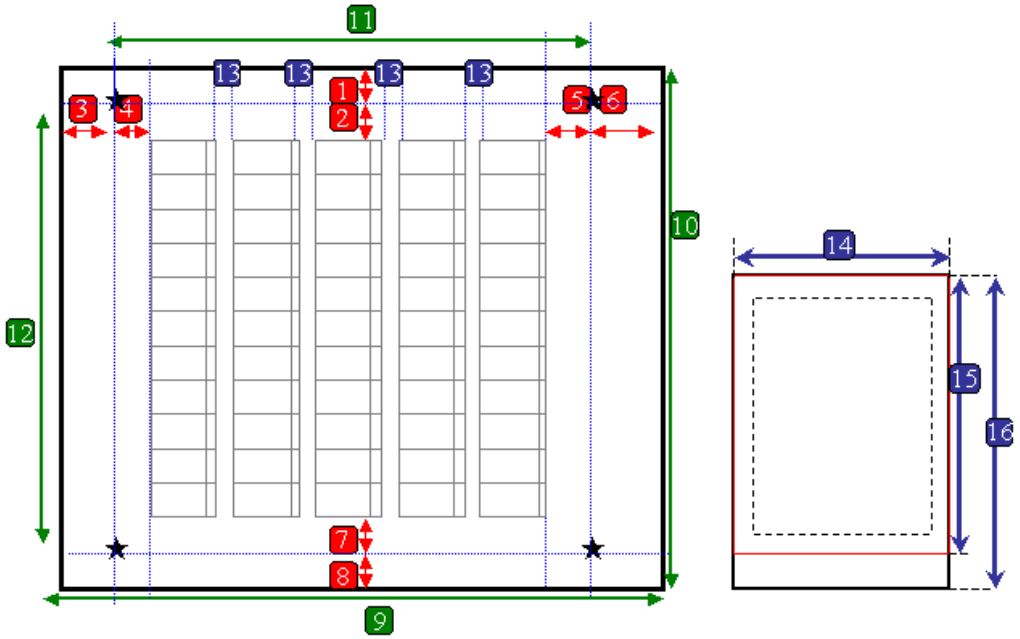
Sub A/B TFT Array Film Up (Unit : mm)



Sub A				Sub B			
No.	Distance	No.	Distance	No.	Distance	No.	Distance
1	14	9	600	1	14	9	600
2	14.1	10	679.22	2	14.1	10	679.22
3	17.065	11	576.935	3	6	11	576.935
4	9.035	12	662.84	4	9.035	12	662.84
5	4.615	13	8.5	5	4.615	13	8.5
6	6	14	58.24	6	17.065	14	58.24
7	8.1	15	102.337	7	8.1	15	102.337
8	2.38	16	105.857	8	2.38	16	105.857

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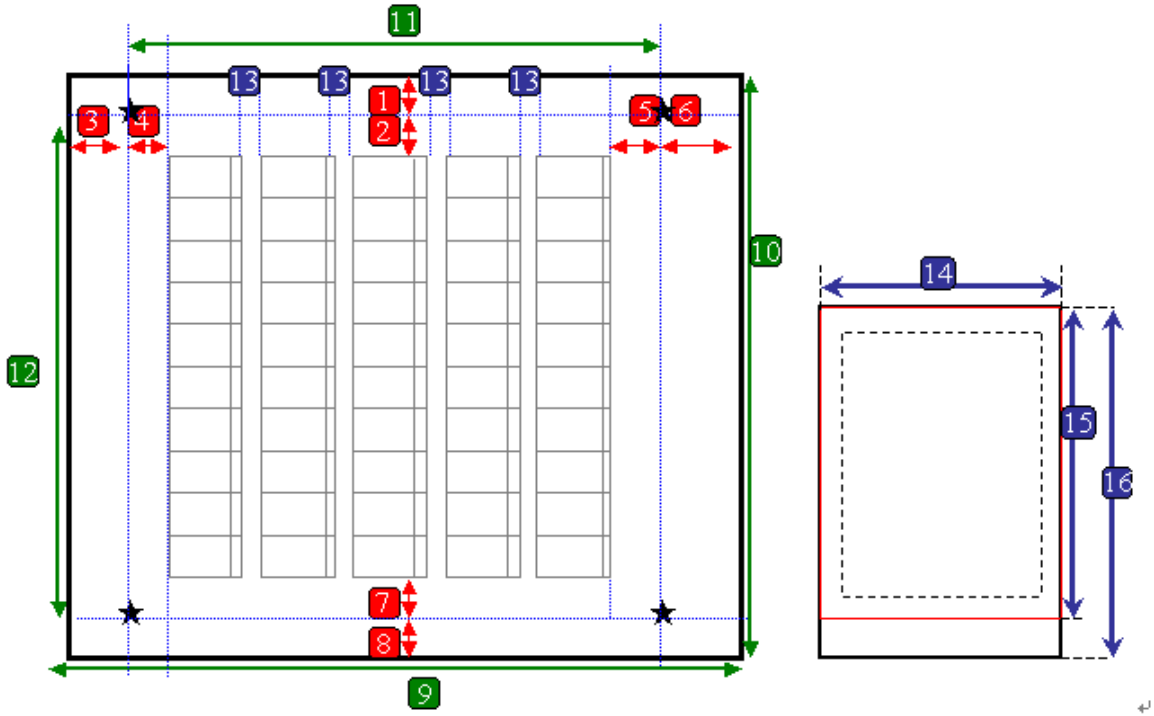
Sub C/D TFT Array Film Up (Unit : mm)



Sub C				Sub D			
No.	Distance	No.	Distance	No.	Distance	No.	Distance
1	10	9	600	1	10	9	600
2	0.28	10	620.78	2	0.28	10	620.78
3	17.065	11	576.935	3	6	11	576.935
4	9.035	12	590.78	4	9.035	12	590.78
5	4.615	13	8.5	5	4.615	13	8.5
6	6	14	58.24	6	17.065	14	58.24
7	8.1	15	102.337	7	8.1	15	102.337
8	20	16	105.857	8	20	16	105.857

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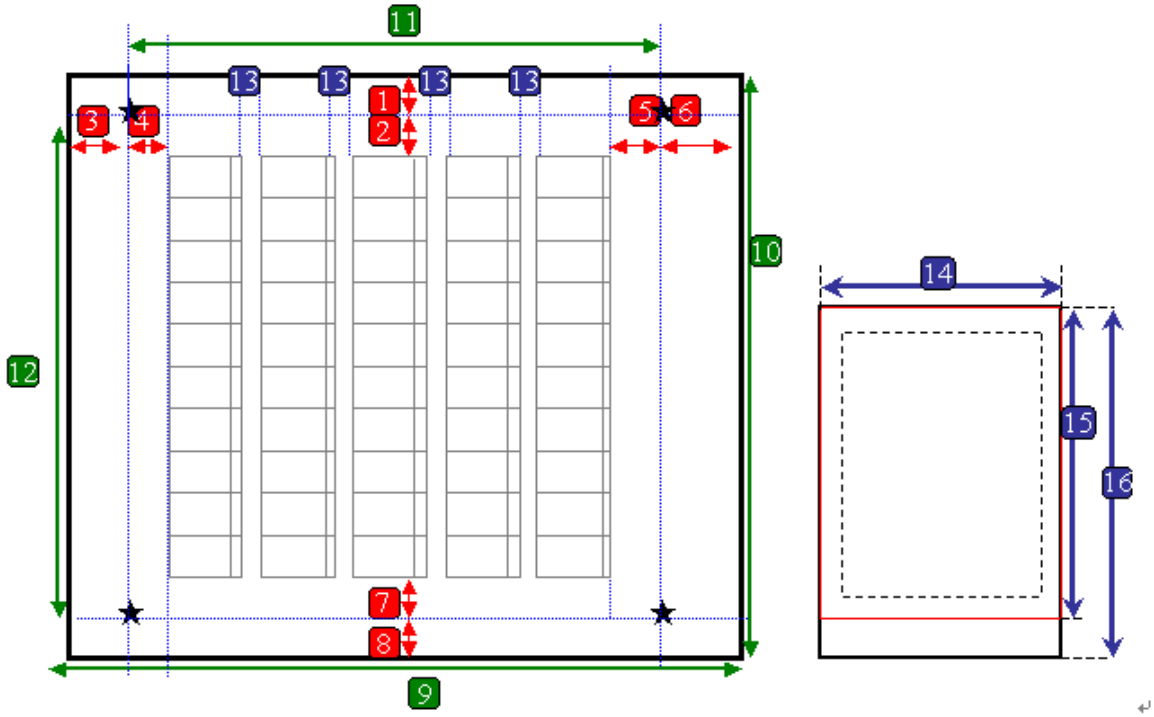
Sub C/D TFT Array Film Up (Unit : mm)



Sub C				Sub D			
No.	Distance	No.	Distance	No.	Distance	No.	Distance
1	10	9	600	1	10	9	600
2	0.28	10	620.78	2	0.28	10	620.78
3	17.065	11	576.935	3	6	11	576.935
4	9.035	12	590.78	4	9.035	12	590.78
5	4.615	13	8.5	5	4.615	13	8.5
6	6	14	58.24	6	17.065	14	58.24
7	8.1	15	102.337	7	8.1	15	102.337
8	20	16	105.857	8	20	16	105.857

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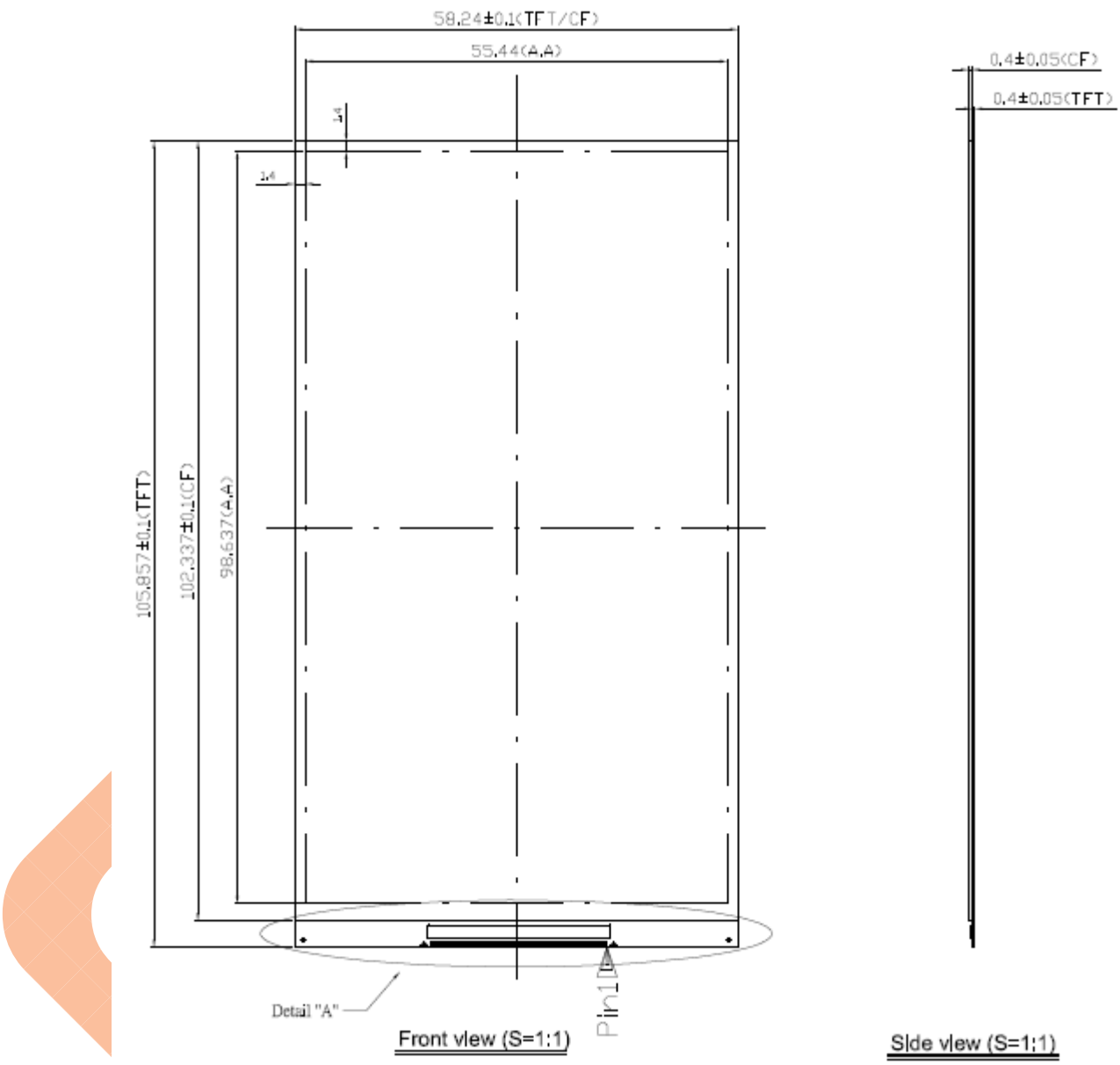
6.4 Chip Size



Notes ;
1. General Tolerance: ± 0.2
2. FPC Pad Tolerance: ± 0.02

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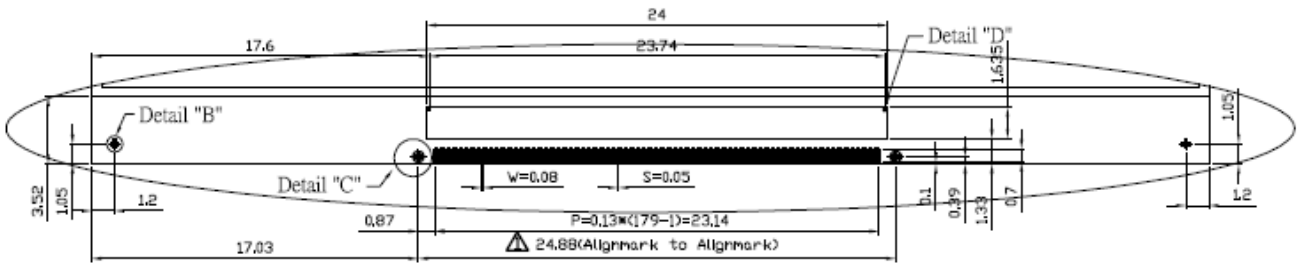
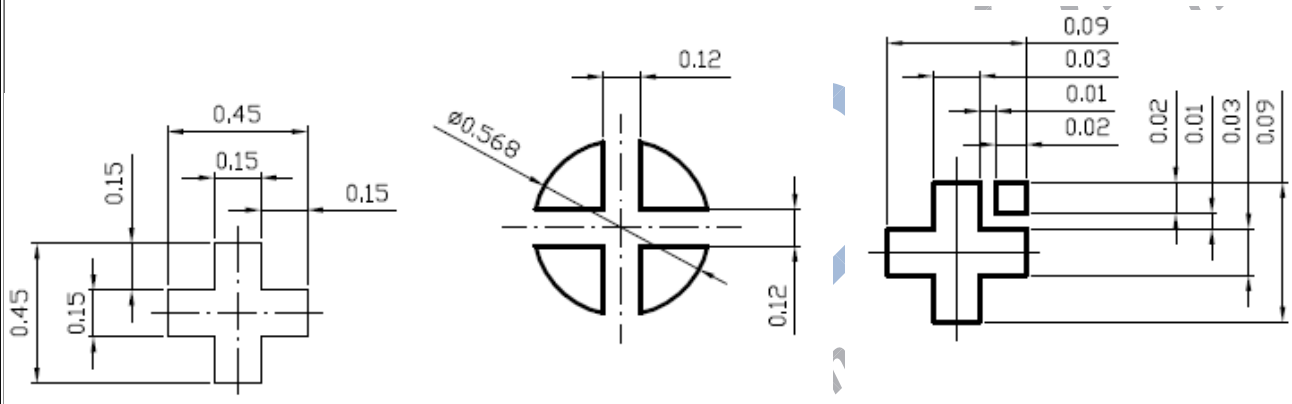
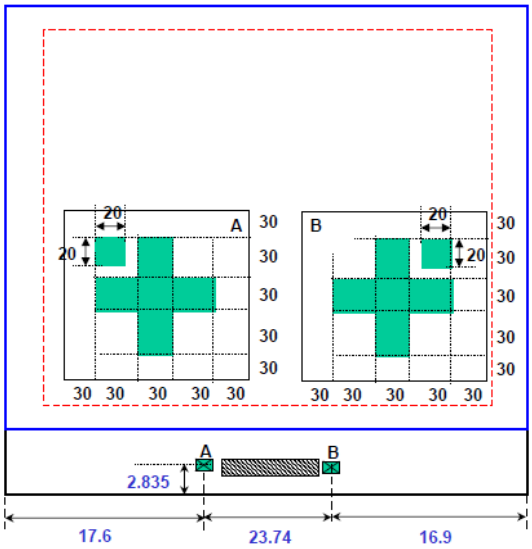


Detail "A" (S=2:1)



Detail "B" (S=20:1) Detail "C" (S=20:1) Detail "D" (S=100:1)

6.5 IC & FPC position



IC : NT35510S/NT35512 (data 1440 channel)

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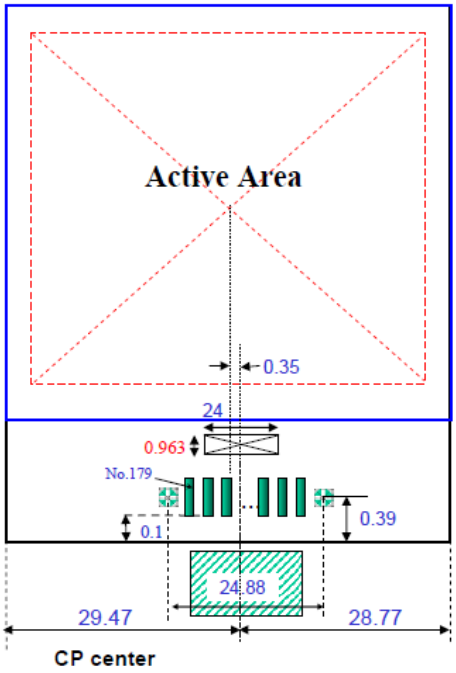
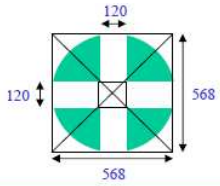
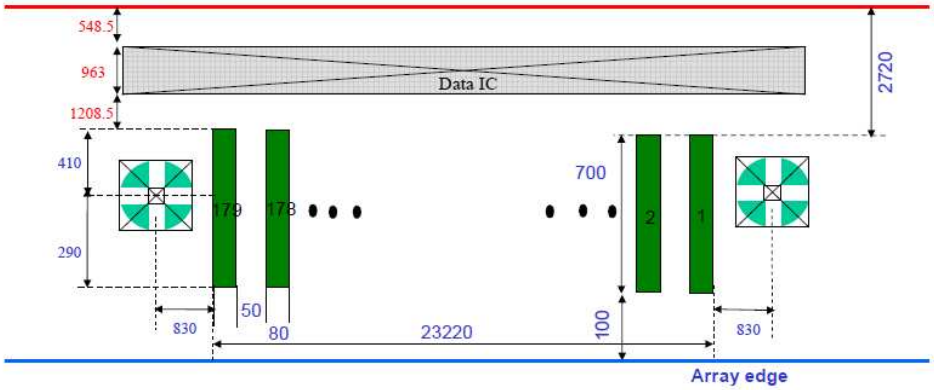


pad width = 0.08 mm, space 0.05 mm, pitch 0.13 mm

Unit : mm



FPC Pad dimension



pad width = 0.08mm, space 0.05mm, pitch=0.13mm

Unit : um

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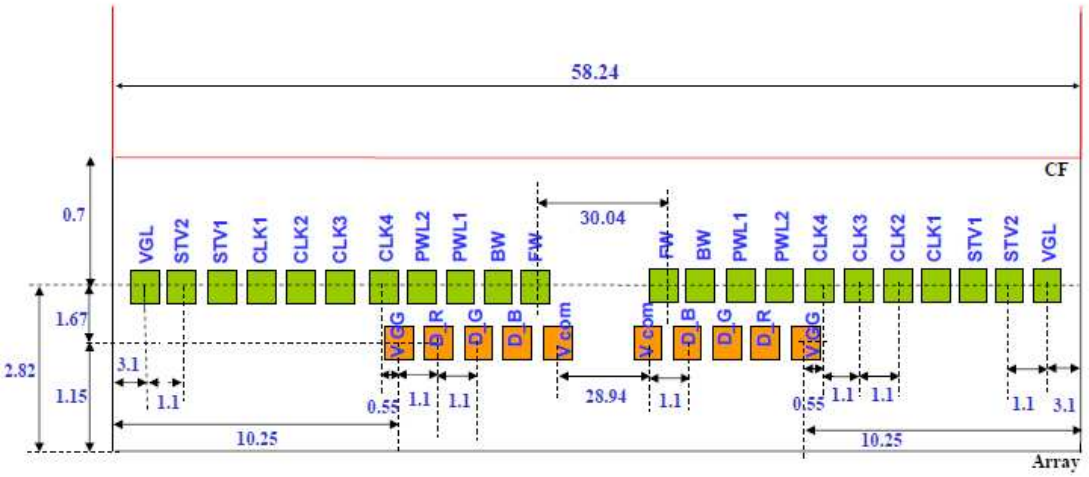
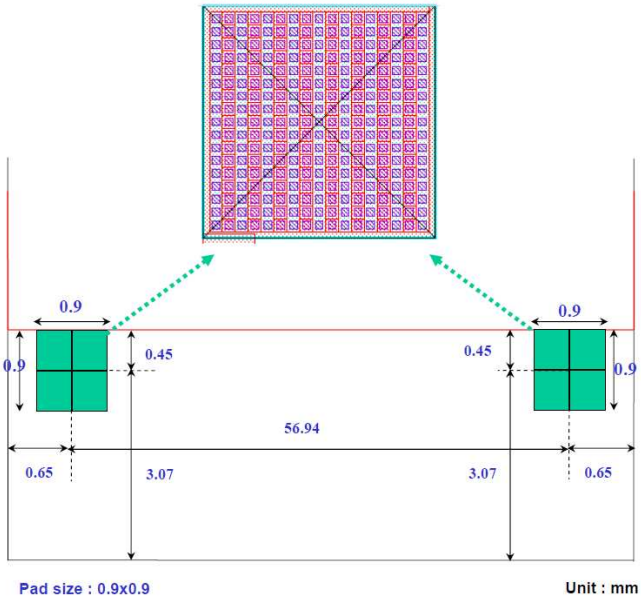
6.6 Cell Test



Pad size : 0.9 x 0.9

6.7 Ground PAD 銀膠點



Pad size : 0.9x0.9 Unit : mm

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7.0 Reliability test items

No.	Item	Conditions	Remark
1	High Temperature Storage	Ta=+80°C, 240hrs	
2	Low Temperature Storage	Ta=-30°C, 240hrs	
3	High Temperature Operation	Ta=+70°C, 240hrs	
4	Low Temperature Operation	Ta=-20°C, 240hrs	
5	High Temperature and High Humidity (Operating)	Ta=+60°C, 90%RH, 240hrs	

Note: (1) All tests above are practiced at module type.

(2) There is no display function NG issue occurred, all the cosmetic specification is judged before the reliability stress.

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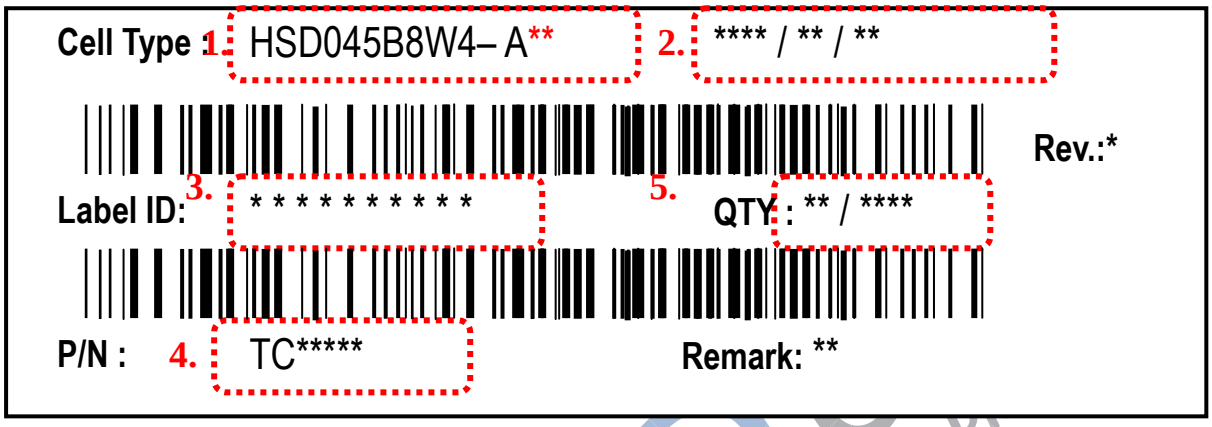
8.0. LOT MARK



8.1 Lot Mark

(1) Cell Type: Production name

1	2	3	4	5	6	7	8	9	10	11	12	13	14
H	S	D	0	4	0	C	8	W	1	-	A	*	*

code 1~3: Hannstar Display Co.

code 4~6: Display Area Diagonal size(inch)

011=1.1”

015=1.5”

018=1.8”,……

code 7 : Shipment type

A= Full Size before 2nd cut

B= 1/4 Cut

D= 1/16 Cut

F= Full cell without Polarizer

code 8 : Resolution

1=QQVGA ; 2=QCIF+ ; 3=QVGA ; 4=QQVGA- ;5=960x234 ;
6=480x234/480x240 ; 9=480x272 ; A=240x400/240x432 ;
C=640x234; D=800x480 ; E=SXGA ; F=1024x576/1024x600 ;
G=WXGA+; H=HDTV ;J=720x480; K=WSXGA+ ;S=SVGA ;
X=XGA ; U=WUXGA/FHD ; V=VGA ; W=WXGA ;

code 9 : Aspect ratio

N=Standard , W=Wide

code10 :Serial No.

code12 :Version No.

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code 13,14:Reversion No.

(2) Production date

(3) Label ID: serial number for barcode.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

Code (1),(2) : Out source code
Code (3) : Grade (D)
Code (4) : Year

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Mark	6	7	8	9	0	1	2	3	4	5

Code (5) : 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

Code (6) : Date (1~9, A~X exp.I/O:10~31)
Code (7),(8),(9),(10) : Serial No.

(4) P/N:Hannstar internal part number

(5) QTY: Quantity of chip

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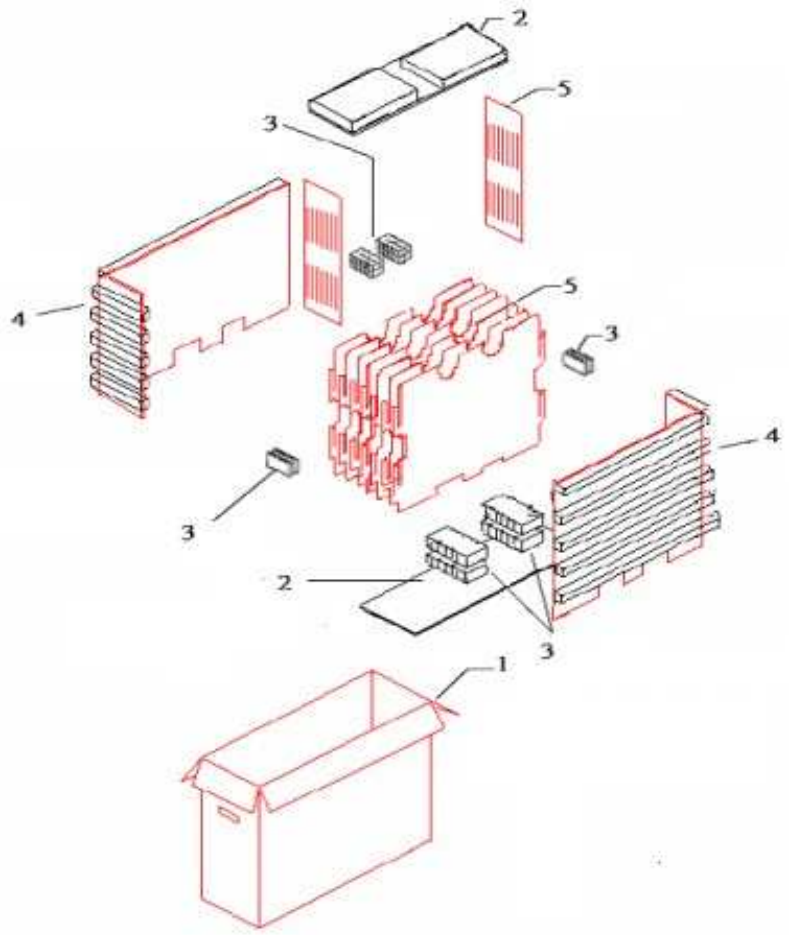
9.0 PACKAGE SPECIFICATION

9.1 Packing form



編號	品名	Unit	QTY	附注
1	Carton	PCS	1	
2	EPE Cushion (T/B)	PCS	2	1.EPE Cushion (T)：B 楞半板+EPE 片狀 2.EPE Cushion (B)：B 楞半板
3	EPE Buffer Cushion (T/B & both sides)	PCS	8~10	1 Carton*8~10pcs
4	Around Board=Cardboard + EPE Cushion	PCS	2	B 楞半板 +EPE 條狀
5	Cardboard of Partition	Set	1	
6	EPE Foam	PCS	48	1 Bag*6pcs
7	Vacuum Bag	PCS	8	
8	Sheath	PCS	32	1 Bag*4pcs

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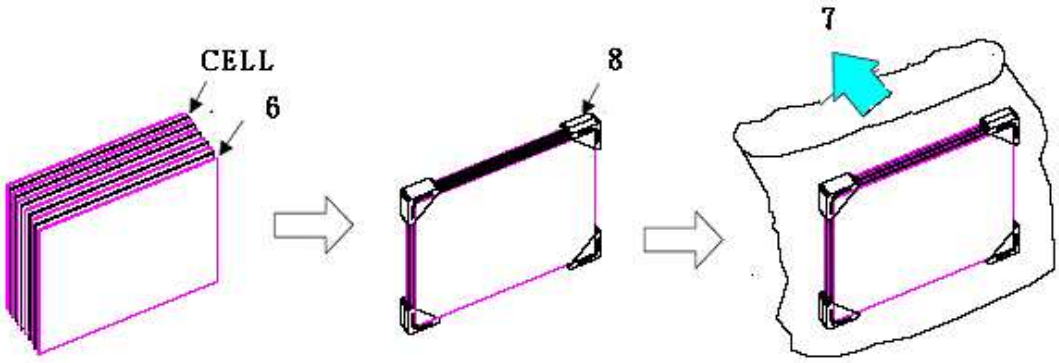
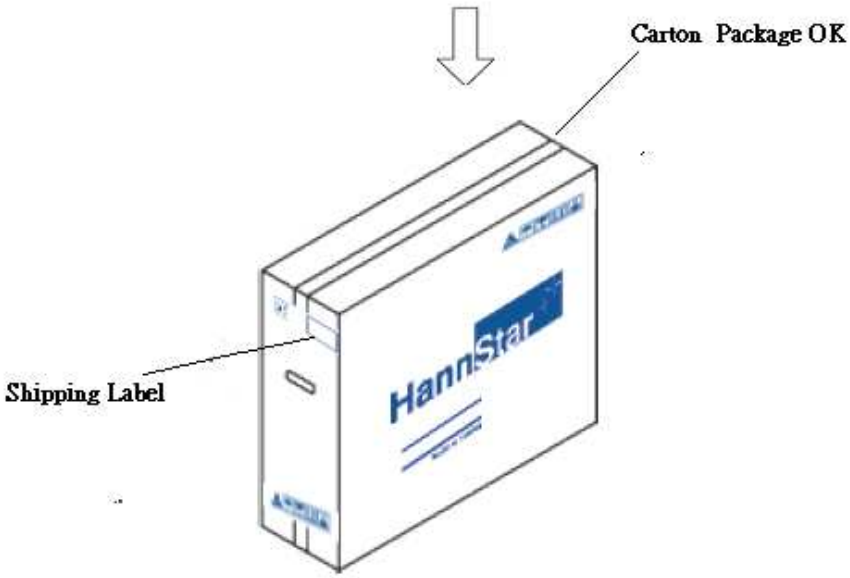


5 sheets x 8 packs=40 sheets



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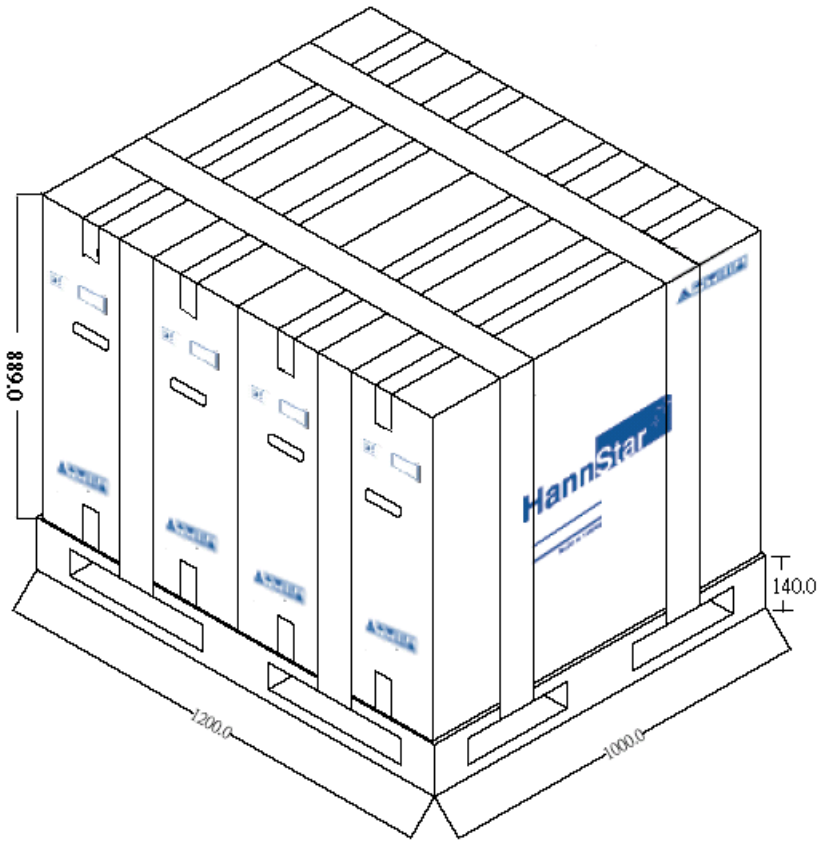
9.2 Packing assembly drawings



Notes:
1 Pallet: 4 set Cartons
1 Pallet: 160 sheet Cells

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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.

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.

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

10.7 Mechanism

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

10.8 Static Electricity

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

10.8.2 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.

10.9 Strong Light Exposure

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

10.10 Disposal

When disposing LCD module, obey the local environmental regulations.

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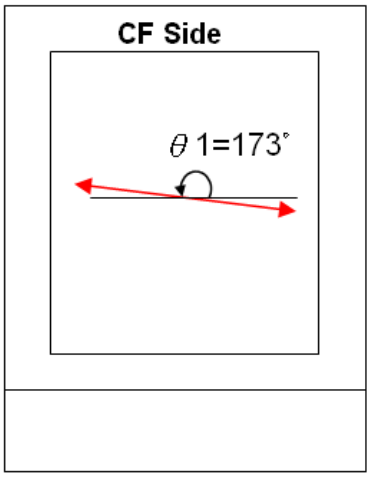
For Specific Customers

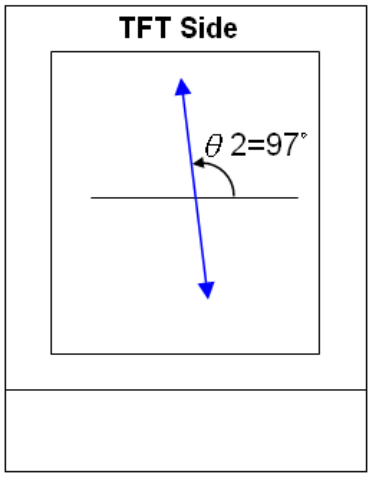
4.1 Optical specification

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Transmittance (with Polarizer)	T (%)	Θ=0 Normal viewing angle	3.825%	4.5%	—	—	Transmittance base on using Normal Polarizer，Reference Only
Transmittance (without Polarizer)	T (%)		12.24%	14.4%	—	—	—

CF side polarizing absorption angle θ 1=173° (Protective film on top, glue layer face down)

TFT side polarizing absorption angle θ 2=97° (Protective film on top, glue layer face down)





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