规　　格　　书

Customer
客　　戶：_____
Product
品　　名：　6.2 寸 LCM
Part No.
型　　号：　SHX-H062-01
Panel
LCD　屏：　HSD6.2 寸数字屏
Date`
日　　期：　2013-12-08

Approved 批 准	check 审 核	prepare 作　成

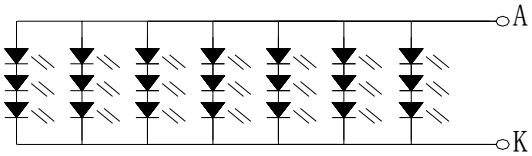
三和鑫(香港)有限公司
地址：深圳市宝安区新安六路勤业商务中心 A 座 522 室
电话：0755-23057826/13927411766

一、 目 录

二、 变更记录

日期	内容	版次	负责人
13-12-08	首次发行	V0	

三、电路图：

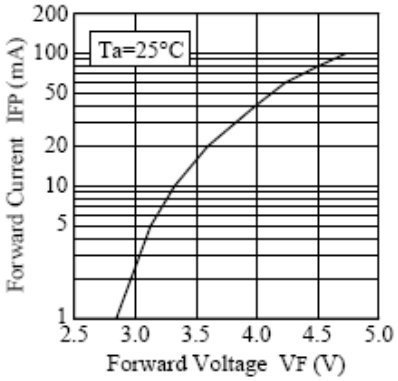


Backlight LED Circuit（3 串 7 并 = 21 LED）

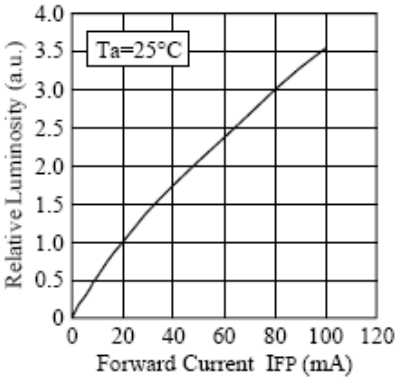
四、光电特性

4.1 LED 光源特性图。

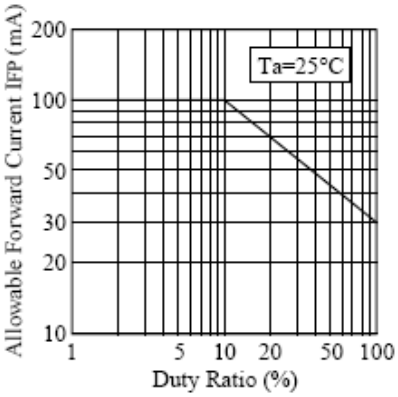
■ Forward Voltage vs. Forward Current



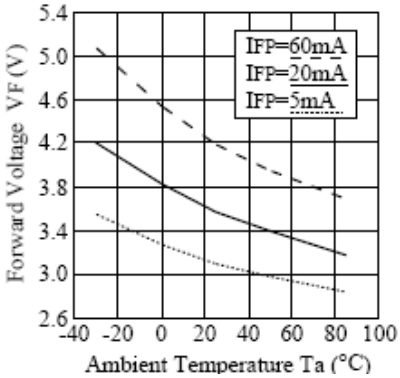
■ Forward Current vs. Relative Luminosity



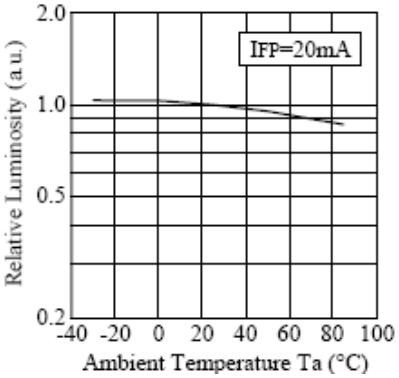
■ Duty Ratio vs. Allowable Forward Current



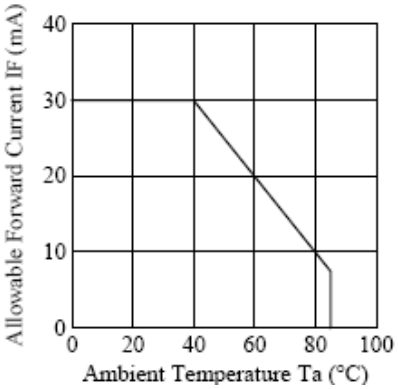
■ Ambient Temperature vs. Forward Voltage



■ Ambient Temperature vs. Relative Luminosity



■ Ambient Temperature vs. Allowable Forward Current



4.2 背光源光电特性

项目 (Item)	符号 (Symbol)	测定条件 (Condition)	最小值 (min.)	典型值 (typ.)	最大值 (max.)	单位 (Unit)
正向电压(Forward Voltage)	Vf	If= 140 mA	8.7	9.6	10.5	V
坐标（Colour Coordinate）	X		TBD		TBD	
	Y		TBD		TBD	
均匀性（Uniformity）	△Iv		70	75		%
亮度(9 点均值）背光 BL (Luminance)	Lv					cd/m2
亮度(9 点均值）模组 LCM (Luminance)	Lv			280		cd/m2

均匀性计算方法：9 点辉度值之（最小辉度/最大辉度）X100%值

4.3 背光源极限参数

项目 Item	符号 Symbol	条件 Conditions	值 Rating	单位 Unit
极限直流正向电流 Absolute maximum forward current	Ifm	——	210	mA
脉动驱动时极限正向电流 Peak forward current	Ifp	1msec 脉动，1/10 占空比 1msec Pius 10%Duty Cycle	420	mA
极限功耗 Power dissipation	Pd	——	2205	mW
工作温度 Operating Temperature Range	Topr	——	-20∽+70℃C	℃
贮存温度 Storage Temperature Range	Tstg	——	-30∽+80℃C	℃

当工作温度高于 25℃时，Ifm(极限直流正向电流)、Ifp(脉冲驱动时极限正向电流)、Pd(极限功耗)都必须降低)。Ifm(极限直流正向电流)降低率是-0.36/LED mA/℃；Ifp(脉冲驱动时极限正向电流)降低率是-0.86/LED mA/℃；Pd(极限功耗)降低率是-0.75/LED mW/℃；产品的工作电流不能大于对应工作温度条件下的 Ifm(极限直流正向电流)或 Ifp(脉冲驱动时极限正向电流)的 60%。

5、光学测量规定：

5.1 测试仪器及方法（见下图）

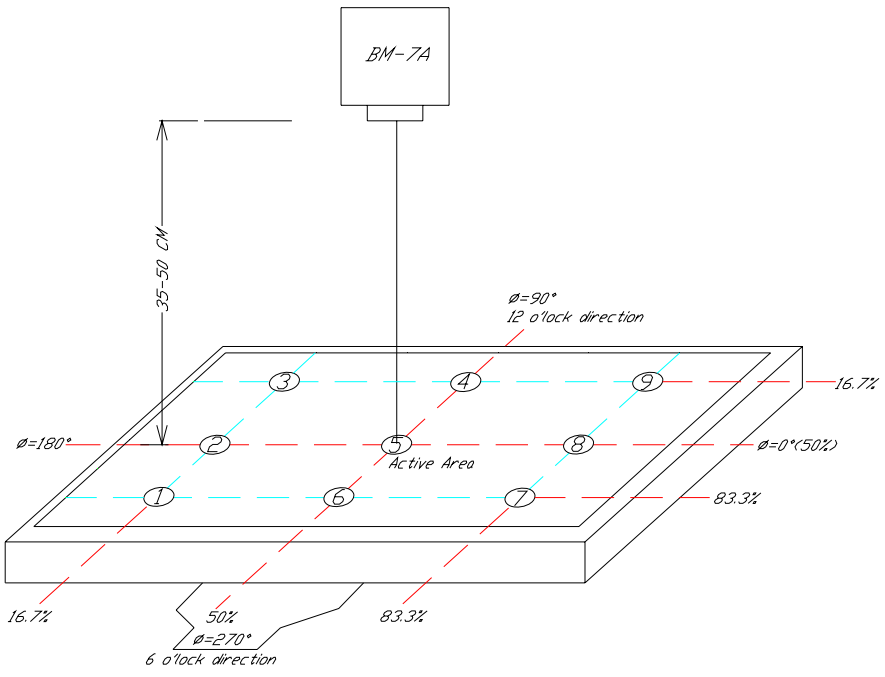
5.2 测试条件：

1) 测试设备：TOPCON BM-7A
机器误差：亮度±5%，色坐标±0.005.

2) 观测角度 ： 1°

3) 稳定时间：
LED 背光源点亮 1 分钟后测定；CCFL 背光源点亮 3 分钟后测定

4) 测试环境
环境温度：+25℃±3℃ ；环境湿度：60%RH±20%RH ；环境亮度：暗室（10 LUX 以下）



六、品质检验标准

6.1 出货检查规定

1)、批量的定义：原则上同一日所制造之背光源视为一批次（LOT），出货时以每一批次为单位进行检查。

2)、检查方法：MIL-STD-105E (GB/T2828-87)

3)、抽样水准： II

6.2 检查项目

No.	检查项目	合格条件	检查条件
1	外观	轻不良 AQL：1.0% 重不良 AQL：0.4% 致命不良 c=0	见 5 页 7.3 外观检查规格表 按抽样方案执行，MIL-STD-105E
2	构造、寸法（重不良）	n=5 c=0（抽样 5pcs）	按图纸，测量长、宽、厚度、出线长
3	光学的特性（重不良）	n=5 c=0（抽样 5pcs）	见 3 页 5.2 背光源光电特性表

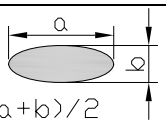
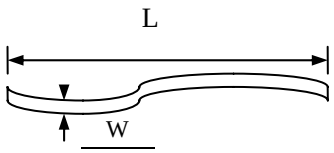
检查规格分类表：

CR（严重） AC→0；RE→1	MA（主要） AQL：0.4%	MI（次要） AQL：1.0%
1、背光源不亮 2、背光源散架	1、可视区光学膜片（Film）偏移、翅曲、浮点、变形。 2、光学特性，包括辉度、均匀性、色度。 3、管制尺寸，指组装液晶成品不可发生干涉的重点尺寸。 4、混料。 5、可视区塑胶框毛边；可视区漏光；可视区黑影；可视区点状缺陷；可视区线状缺陷；可视区线状缺陷。 6、B/L 不亮。	1、铁框变形、刮痕、打痕、油污、毛边、生绣；铁框扣位未扣紧；背板绝缘膜未贴合。 2、塑胶框外观不良。 3、螺丝未锁紧、滑牙、螺孔毁损、未攻牙、偏移。 4、外包装箱胶带类的偏移、浮起。 5、无序号标签、批号标示不清楚。 6、短装（包装数量）。

6.3 外观检查表

1)、点灯外观

点灯外观规格如下：以组装完成的背光源为准。检验距离：发光面法线方向 30±5cm

No.	项目	规格
1	黑点、黑不均 白点、白不均 异物（点状）	直径(D) Φ≤0.2mm ，不计； 0.2<Φ≤0.3mm ，3 个可过，任两点距离不可小于 10mm； Φ≥0.3mm, 不可有。 
2	异物（线状）	W≤0.02mm, 不计 0.02<W≤0.03mm ，L≤5.0mm, 3 处可过 0.03<W≤0.05mm ， L≤3.0mm, 1 处可过 W>0.05mm, 以点状式判定 
3	异常发光 牛顿环	亮眼、轻微发光不均匀（一半黄，一半蓝），以客户承认样板为接收标准； 牛顿环盖上 LCD Panel 不可有

备注：

a)两个 ∮0.10 以下的黑点及亮度需相距 10mm 以上。

b)以上规格包含扩散膜上之浓黑点。

c)判定有困难时以盖上 Panel 判定（转动背光源上下±45° ，左右±60° 。）

d)检查时加以振动及以空气吹，确认无不良。

2)、非点灯的外观

项目	规格
膜片	逆翘不可有;扩散膜,增光膜正翘,拱起不能超出1.0mm;反射膜拱起不能超过2.0mm; 不过有龟裂，缺角，破孔现象; 不可有受重压扭曲变形，受热扭曲变形现象; 表面脏污，胶粘物不可有（保护膜除外）。
线材、端子线	线材焊接端不可分叉，导线绝缘皮不可破损露线芯，热塑套管不可破损; 端子不得脱落，于管轴方向可抵抗11.76N（1.2kgf/sec）静负荷; 极性不可接反（A为正极，K为负极）。
塑胶框	不可有龟裂，不可有缺胶; 注胶口残料不得高于胶框有效平面; 不可有油垢，脏污，胶粘物; 毛边，溢边不能影响LCD模组组装作业。
铁框	表面刮花: W(Width)宽， L(Length)长；范围：50x50mm平方内， 0.1＜W≤0.2mm，L≤10.0mm 允许8条 0.1＜W≤0.2mm，10.0≤L≤20.0mm 允许4条 无感刮伤不计，W＜0.05mm 不计; 表面凹点: Φ圆之直径，范围：50x50mm平方内， Φ≤0.3mm 不计， 0.3≤Φ≤0.5mm 允许2点 Φ≥0.5mm 不允许 表面油垢，脏污，胶粘物不可有，锈斑不可有。
平整度	L≤100mm,C≤0.5mm; L>100mm,C≤1.0mm

备注：

1） 目视距离：30cm；检验角度：上下±35°，左右±45°。

2） 针对无感刮伤及原素材不良之部分，最终依双方所签订之限度样板为依据。

七、产品寿命

周围温度+25℃±2℃，湿度60±20%RH，以每灯20mA工作电流之推荐使用条件，背光源之寿命为：

辉度减半平均寿命： 30，000 小时以上

辉度减半保证寿命： 20，000 小时以上

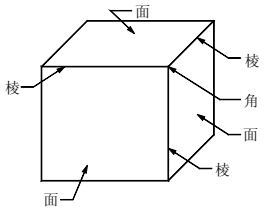
注：辉度减半平均寿命指背光源平均辉度衰减到初期平均辉度的50%所需时间。

八、信赖性试验

8.1 寿命试验

试验项目	检验方法	判定
1.高温高湿放置试验	温度+70℃，湿度90%RH 240Hrs	试验后，须常温放置 2 小时，在24小时后测定。 1.亮度衰减在20%以内，电压≤±5%。2.外形尺寸变化仍在规格以内。 注:马口铁,镀铝锌板铁框在高湿、吸潮的情况下易生绣,生锈不列入判定项目。
2.低湿放置试验	温度-30℃，常湿 240Hrs	
3.高温放置试验	温度+70℃，常湿 240Hrs	
4.高温高湿操作试验	温度+70℃，湿度90%RH 240Hrs	
5.低温操作试验	温度-20℃，常湿 240Hrs	
6.高温操作试验	温度+70℃，常湿 240Hrs	
7.冷热冲击试验	-20℃ → +25℃ → +70℃ （30min）→（5min）→(30min) 200Cycles	

8.2 机械环境测试

试验项目	检验方法	时间	判定
跌落试验	H=60cm 自由落下: 从七个方向：相邻的三个面、三条棱、一个角  	首次量产及包装方式、材料变更时。	1.试验后---------外观及机能判定： a.异物混入（产品表面可接受）、刮伤、位置偏移、零件脱落、凹凸伤痕、折痕，不可有。 b.不点灯或点灯异常（闪烁变色半亮）之非正常点灯现象不可有。 c.机械性及物理性之损害（部材破损、外观变形、嵌合不良）不可有。 d.落下试验后，包外箱不可有破裂之现象。 2.判定基准 a.点灯无问题。 b.外观无异常变化。 c.外观无损坏、破裂伤痕等情形。
振荡试验	幅度 1.5mm 频率 10～55Hz，相邻三个面每面各 15 分钟		外观：产品无缺损，脱落等外观不良。 发光：不可有不发光及点亮闪烁。
引线拉伸强度	于管轴方向可抵抗 11.76N（1.2kgf/sec）静负荷		
端子拉伸强度	于管轴方向可抵抗 11.76N（1.2kgf/sec）静负荷		
底盖螺栓孔承受扭力	1.5kgf·cm		

九、不合格品补偿

9.1 由贵公司检查若发现有不合格品时，请尽快通知本公司，以便双方进行检讨，决定处置方案。

9.2 若不合格品的起因是制造所致，则免费更换该成品。

十、防静电要求

10.1 本产品对静电十分敏感，接触产品时须注意；在有超过产品额定最大值(2KV)的瞬间高压下，会对产品造成伤害破坏。

10.2 防静电措施应做到身体接地，戴防静电手环，指套，穿防静电衣服，鞋等。

10.3 所有机器，设备必须接地，在静电容易产生的场所，最好使用离子风机。

10.4 在产品的一系列组装过程中，都应采取防静电措施。

十一、敬告客户

11.1 如果本产品所使用的铁框是马口铁，该材料表面是没有经过防锈处理，如暴露于高温、潮湿的空气中极易氧化生锈；如果产品使用的是镀铝锌板材质，其材料表面虽有镀铝锌层保护，有一定的防锈功能，但其切口（边）也容易生锈；马口铁和镀铝锌板材料本身无法通过盐雾试验；

11.2 防止马口铁、镀铝锌板氧化生锈比较可行的办法是置于密封、干燥的环境，温湿度要求是：温度≤35℃,湿度≤45%RH.我司产品出货时都有塑胶袋密封包装，拆封后 3-5 天内必须完成装机或重新密封保存，否则容易氧化生锈；

11.3 基于马口铁、镀铝锌板材质都有生锈的可能，如贵司对铁框外观有特别要求，或表面不允许氧化生锈等，请在确认前将相关信息告知我司，以便选用符合贵司要求的相关材质。

十二、机密文件

相互注意有关本产品规格的情报档案、图面内容等，不可透露给不相关的单位及个人

十三、安全性

13.1 本产品制造工程中所选材料均是取得环保认证的无害物质，符合欧盟规定的“RoHS”标准；

13.2 以不会发生火灾的材料制造而成。

十四、其它

14.1 对本承认书，如有任何问题点，经双方协议后处理。

14.2 任何变更都必须经过联络，并取得彼此同意后方可变更，并针对变更内容记录管理。

14.3 本产品保证期限自出厂日起一年。

十五、光 电 测 试 报 告

测试条件：

1. 测试设备：TOPCON BM-7A

机器误差：亮度±5%，色坐标±0.005.

2. 观测角度 ： 1°

3. 稳定时间：

LED 背光源点亮 1 分钟后测定；

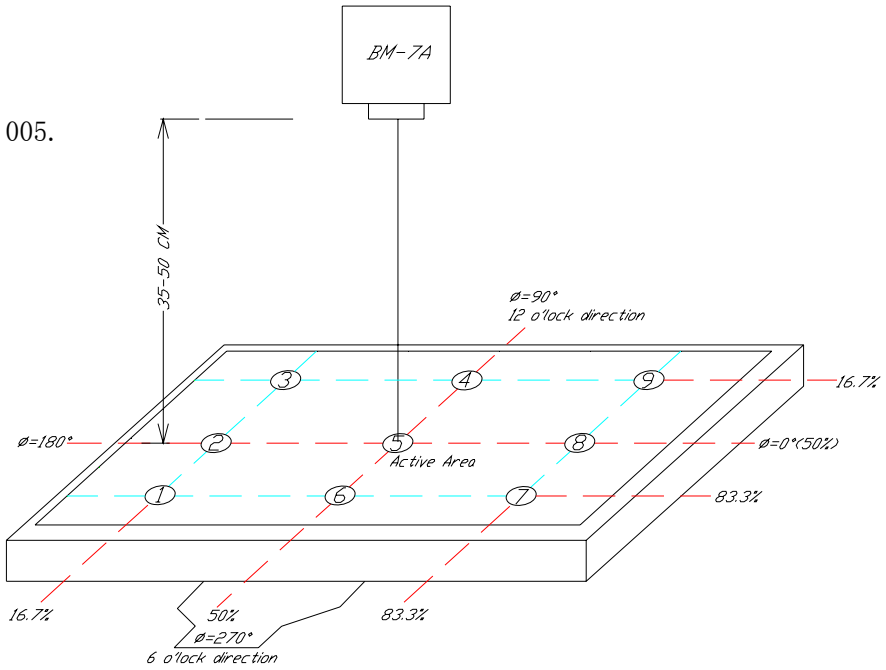
CCFL 背光源点亮 3 分钟后测定

4. 测试环境：

环境温度：+25℃±3℃ ；

环境湿度：60%RH±20%RH ；

环境亮度：暗室（10 LUX 以下）

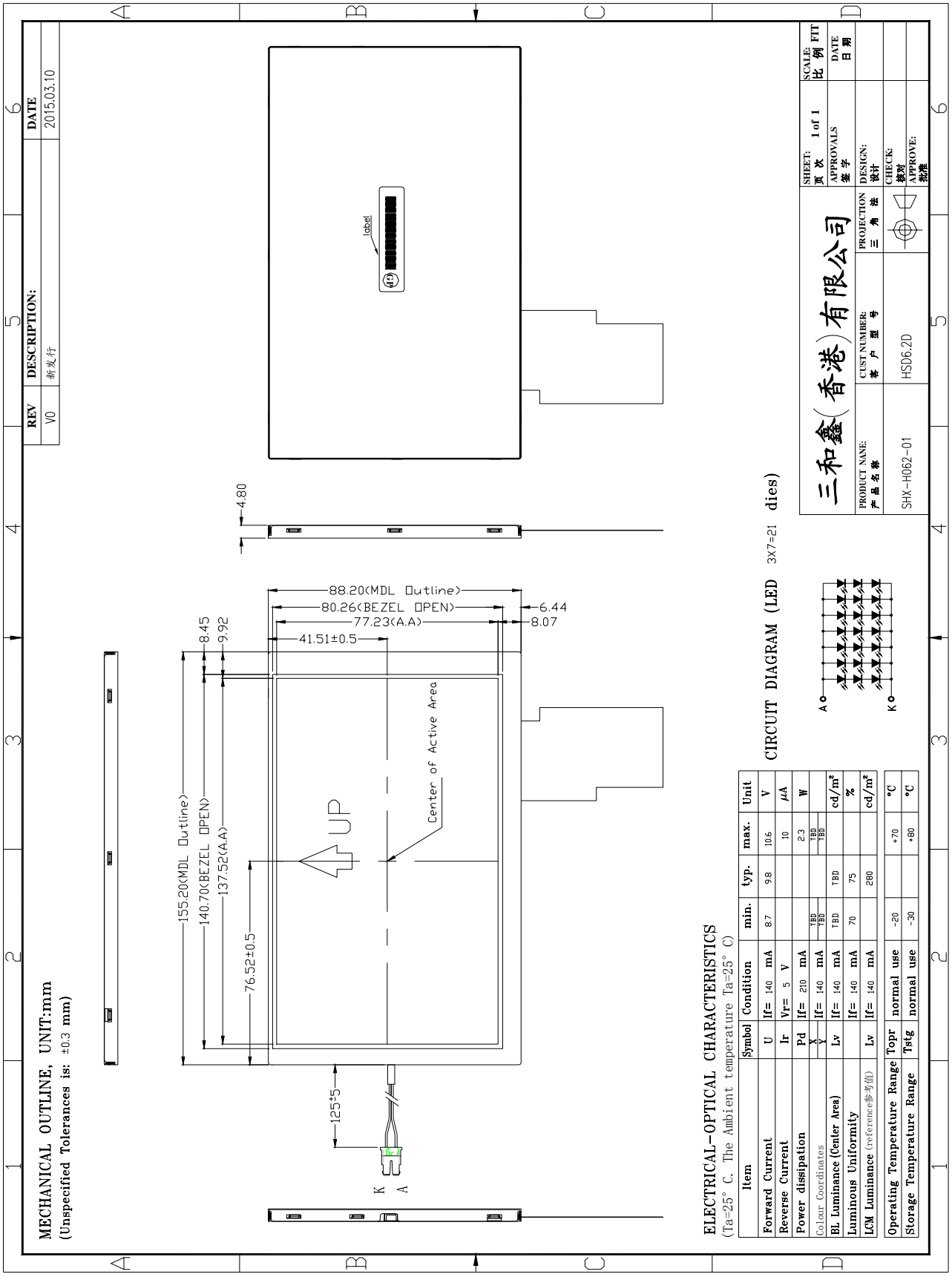


亮度 / 样品 / 测试点	额定电流	（ 140 ） mA						
	背光 1#	模组 1#	背光 2#	模组 2#	背光 3#	模组 3#	背光 4#	模组 4#
TP1	6783	289						
TP2	6834	289						
TP3	6613	284						
TP4	6647	289						
TP5	7072	306						
TP6	6596	284						
TP7	6800	298						
TP8	7038	304						
TP9	6681	289						
Xcoordinate								
Ycoordinate								
△Lv(cd/m2)	6785	292						
均匀性(%)	93	93						
Vf （V）	9.2	9.2						

均匀性计算公式：

$$\text{亮度均匀性} = \frac{\text{9 点最小值}}{\text{9 点最大值}} \times 100\%$$

十六、外形尺寸



ELECTRICAL-OPTICAL CHARACTERISTICS
(Ta=25° C. The Ambient temperature Ta=25° C)

Item	Symbol	Condition	min.	typ.	max.	Unit
Forward Current	U	If= 140 mA	8.7	9.8	10.6	V
Reverse Current	Ir	Vr= 5 V			10	μA
Power dissipation	Pd	If= 210 mA			2.3	W
Colour Coordinates	X	If= 140 mA	TBD		TBD	
	Y		TBD		TBD	
BL Luminance (Center Area)	Lv	If= 140 mA	TBD	TBD		cd/m²
Luminous Uniformity		If= 140 mA	70	75		%
LCM Luminance (reference参考值)	Lv	If= 140 mA		280		cd/m²
Operating Temperature Range	Topr	normal use	-20		+70	°C
Storage Temperature Range	Tstg	normal use	-30		+80	°C

TO : Roadwell

Date : Nov., 06, 2012

HannStar Product Specification

(Formal)

6.2” Color TFT-LCD Module

Model: HSD062IDW1-A02-0299

Note:

1. Please contact HannStar Display Corp. before designing your product based on this module specification.
2. 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, 01, 2012	-	Formal Product Specification was first issued.
1.1	Oct, 19, 2012	-	Modify Item 3.1 Optical Specification_ Transmittance & color chromaticity (P.6) Item 8.1 Outline Dimension (P.20)
2.0	Nov, 06, 2012	-	Modify Item 8.1 Outline Dimension_ FPC Tolerance (P19)

Contents

1.0 GENERAL DESCRIPTION

1.1 Introduction

HannStar Display model HSD062IDW1-A02-0299 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 and a driving circuit. This TFT LCD has a 6.2 (16:9) inch diagonally measured active display area with 800 horizontal by 480 vertical pixel resolutions.

1.2 Features

- 6.2 (16:9 diagonal) inch configuration
- 6 bits + FRC driver with 1channel TTL interface
- Up/Down, Left/Right reversion selection
- RoHS/ Halogen Free Compliance

1.3 Applications

- Automotive

1.4 General information

Item	Specification	Unit
Outline Dimension	147 x 86.232 x 1.43 (Typ.)	mm
Display area	137.52(H) x 77.232(V)	mm
Number of Pixel	800 RGB (H) x 480(V)	pixels
Pixel pitch	0.1719(H) x 0.1609(V)	mm
Pixel arrangement	RGB Vertical stripe	
Display mode	Normally white	

2.0 ABSOLUTE MAXIMUM RATINGS

2.1 Electrical Absolute Rating

2.1.1 TFT LCD Module

Item	Symbol	Min.	Max.	Unit	Note
Power supply voltage	Vcc	-0.3	6.0	V	GND=0
	V_{GH}	-0.3	40	V	GND=0
	V_{GL}	-20	0.3	V	GND=0
	AV_{DD}	-0.5	15	V	AGND=0
	V_{COM}	0	6	V	
Logic Signal Input Level	V_I	-0.3	Vcc +0.3	V	

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±2℃

2.2 Environment Absolute Rating

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

3.0 OPTICAL CHARACTERISTICS

3.1 Optical specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Transmittance (With PZ)		T	Θ=0 Normal viewing angle	3.77	4.1	—	%	
Contrast		CR		480	600	—		(1)(2)
Response time	Rising	T_R		—	2	4	msec	(1)(3)
	Falling	T_F		—	6	12		
White luminance (Center)		Y_L		320	400	—	cd/m^2	(1)(4) (I_L=140mA)
Color chromaticity (CIE1931)	White	W_x		0.253	0.303	0.353		(1)(4) CF glass (C-light)
		W_y		0.274	0.324	0.374		
	Red	Rx		0.579	0.609	0.639		
		Ry		0.300	0.330	0.360		
	Green	Gx		0.257	0.287	0.317		
		Gy		0.497	0.527	0.557		
	Blue	Bx		0.117	0.147	0.177		
		By		0.108	0.138	0.168		
Viewing angle	Hor.	Θ_L	CR>10	65	75	—		
		Θ_R		65	75	—		
	Ver.	Θ_U		60	70	—		
		Θ_D		60	70	—		
Optima View Direction		6 O' clock						(5)

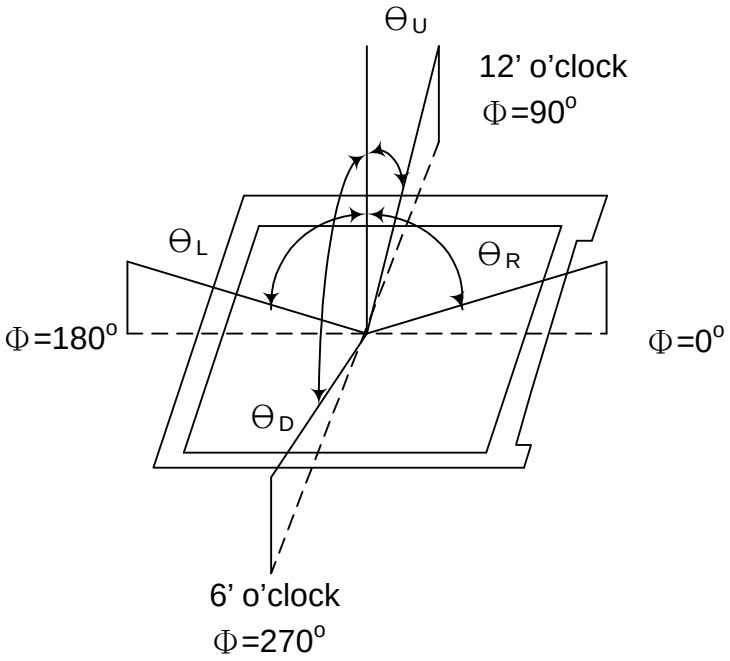
3.2 Measuring Condition

- Measuring surrounding: dark room
- LED current I_L : 140mA
- 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-5A for other optical characteristics.
- Measuring spot size: 20 ~ 21 mm

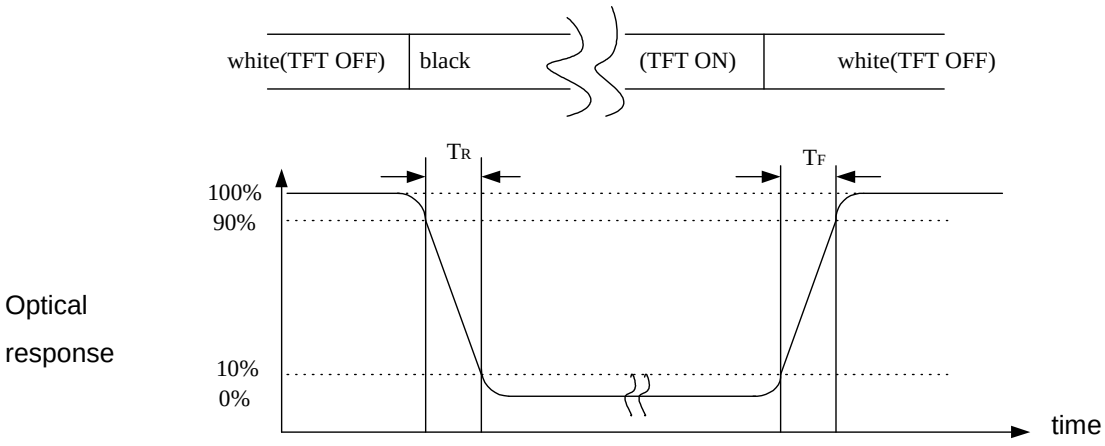
Note (1) Definition of Viewing Angle:



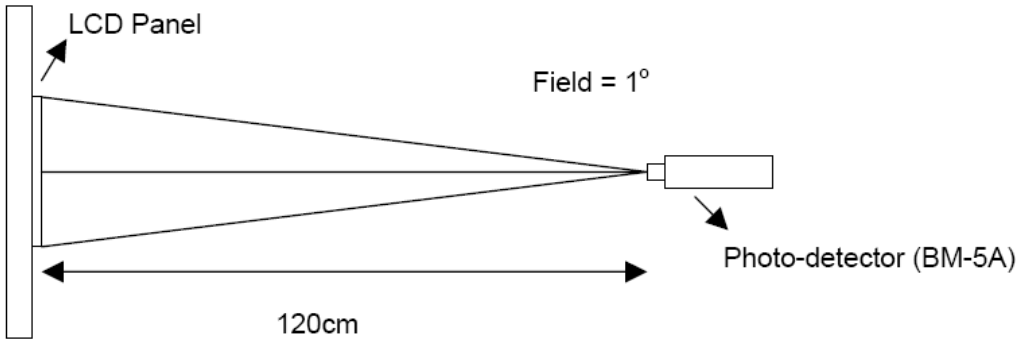
Note (2) Definition of Contrast Ratio (CR):
measured at the center point of panel

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

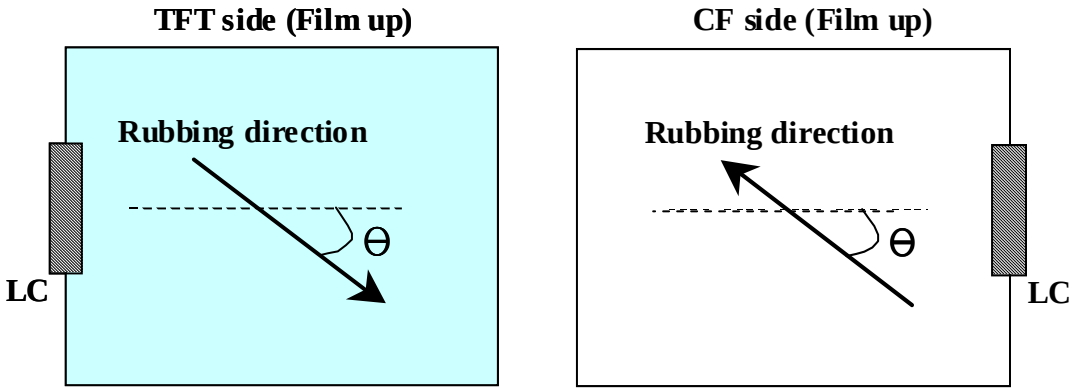
Note (3) Definition of Response Time : Sum of T_R and T_F



Note (4) Definition of optical measurement setup

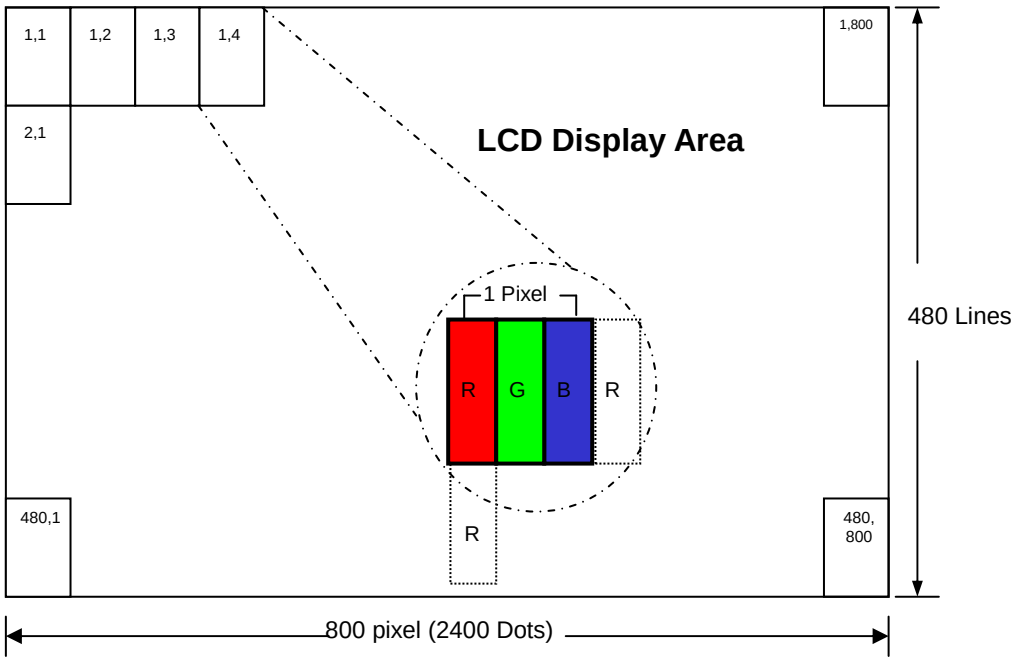


Note (5) Rubbing Direction (The different Rubbing Direction will cause the different Optima view direction.



4.0 BLOCK DIAGRAM

4.1 Pixel Format



5.0 INTERFACE PIN CONNECTION

5.1 TFT LCD Module

CN2 (Input signal): FPC Down Connector, (FH28-60S-0.5SH (HIROSE), 60pin,pitch = 0.5mm)

Terminal no.	Symbol	I/O	Function
1	AGND	P	Analog Ground
2	AVDD	P	Analog Power
3	VCC	P	Digital Power
4	R0	I	Data Input(LSB)
5	R1	I	Data Input
6	R2	I	Data Input
7	R3	I	Data Input
8	R4	I	Data Input
9	R5	I	Data Input
10	R6	I	Data Input
11	R7	I	Data Input(MSB)
12	G0	I	Data Input(LSB)
13	G1	I	Data Input
14	G2	I	Data Input
15	G3	I	Data Input
16	G4	I	Data Input
17	G5	I	Data Input
18	G6	I	Data Input
19	G7	I	Data Input(MSB)
20	B0	I	Data Input(LSB)
21	B1	I	Data Input
22	B2	I	Data Input
23	B3	I	Data Input
24	B4	I	Data Input
25	B5	I	Data Input
26	B6	I	Data Input
27	B7	I	Data Input(MSB)
28	DCLK	I	Clock input
29	DE	I	Data Enable signal
30	HSD	I	Horizontal sync input.Negative polarity
31	VSD	I	Vertical sync input.Negative polarity
32	MODE3	I	DE/SYNC mode select .normally pull high H:DE mode.L:HSD/VSD mode
33	RSTB	I	global reset pin.Active low to enter reset state.suggest to connecting with an RC reset circuit for stability .normally pull high.
34	STBYB	I	standby mode,normally pull high STBYB="1",normal operation STBYB="0",timming control ,soruce driver will turn off,all output are high-Z
35	SHLR	I	Source right or left sequence control.SHLR="L",shift left:last data=S1<-S2…S1200=first data SHLR="H",shift right:first data=S1->SS2…S1200=last data

Terminal no.	Symbol	I/O	Function
36	VCC	P	Digital Power
37	UPDN	I	gate up or down scan control. UPDN="L" , DOWN shift : G1->G2…->G480 ; UPDN="H", up shift: G1<-G2…<-G480
38	GND	P	Digital Ground
39	AGND	P	Analog Ground
40	AVDD	P	Analog Power
41	VCOMin	I	For external VCOM DC input (Adjustable)
42	DITH	I	Dithering setting: DITH="H" 6bit resolution (last 2 bits of input data truncated) (default setting) DITH="L" 8bit resolution
43	NC	-	Not connect For Test
44	NC	-	Not connect
45	V10	P	Gamma correction voltage reference
46	V9	P	Gamma correction voltage reference
47	V8	P	Gamma correction voltage reference
48	V7	P	Gamma correction voltage reference
49	V6	P	Gamma correction voltage reference
50	V5	P	Gamma correction voltage reference
51	V4	P	Gamma correction voltage reference
52	V3	P	Gamma correction voltage reference
53	V2	P	Gamma correction voltage reference
54	V1	P	Gamma correction voltage reference
55	NC	-	Not connect
56	VGH	P	Positive Power for TFT
57	VCC	P	Digital Power
58	VGL	P	Negative Power for TFT
59	GND	P	Digital Ground
60	NC	-	Not connect

6.0 ELECTRICAL CHARACTERISTICS

6.1 TFT LCD Module

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	Vcc	3.0	3.3	3.6	V	
	V_{GH}	12	15	23	V	
	V_{GL}	-12	-7	-5	V	
	AV_{DD}	9.9	10	10.1	V	
VCOM	VCOMin	-	3.4	-	V	
Input signal voltage	V_{iH}	0.7 Vcc	-	Vcc	V	Note (1)
	V_{iL}	0	-	0.3 Vcc	V	
Current of power supply	I_{DD}	-	12.37	-	mA	Vcc =3.3V
	I_{ADD}	-	13.599	-	mA	AV_{DD}=10 V (Black)
	I_{GH}	-	0.099	-	mA	V_{GH}=15V
	I_{GL}	-	0.371	-	mA	V_{GL}= -7V
Input level of V1~V5	Vx	AVDD/2-		AVDD-0.1-	V	
Input level of V6~V10	Vx	0.1-		AVDD/2-	V	

Note (1): HSYNC, VSYNC, DE, Digital Data

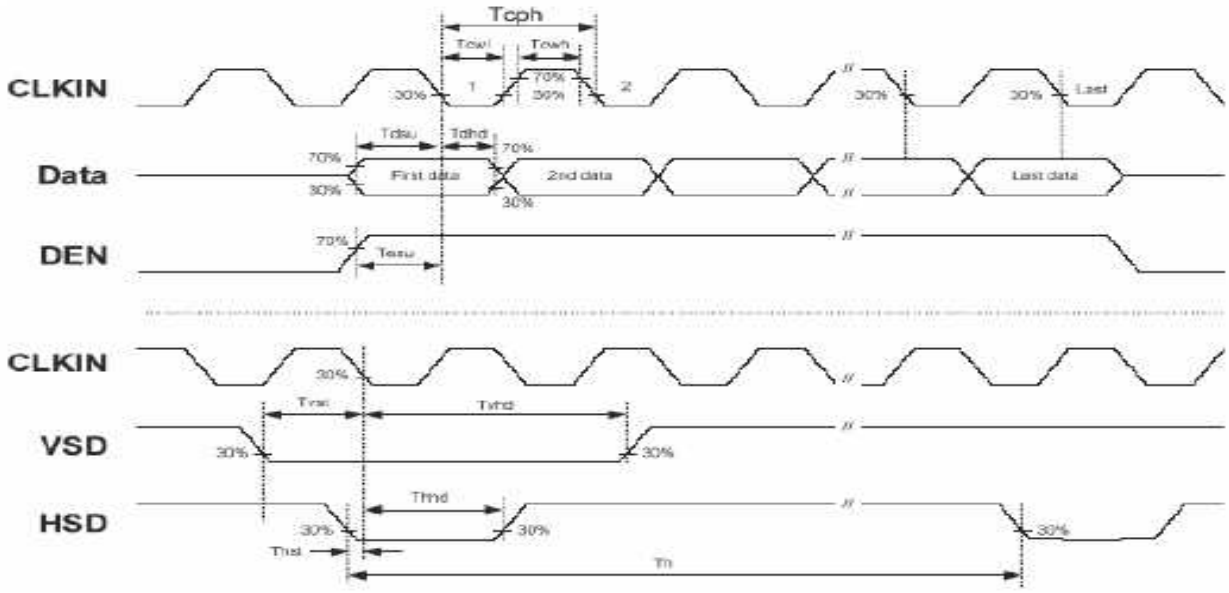
Note (2): Be sure to apply the power voltage as the power sequence spec.

Note (3): DGND=AGND=0V,)

6.2 AC Characteristics

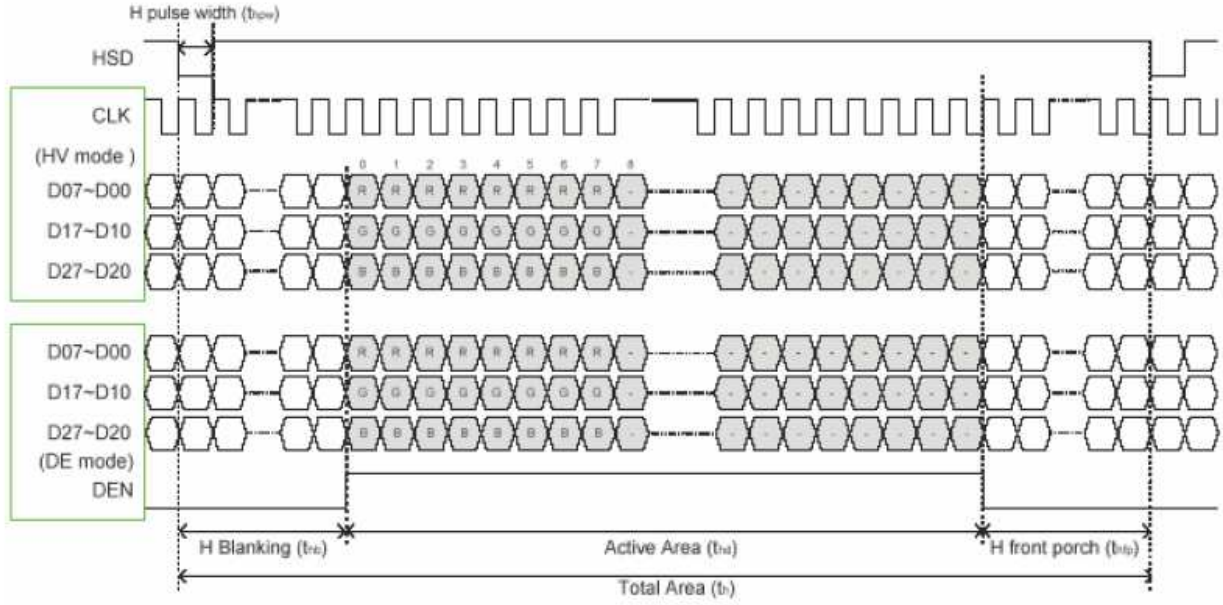
Item	Symbol	Min.	Typ.	Max.	Unit	Note
DCLK cycle time	Tcph	25			ns	
DCLK frequency	fclk		30	40	MHz	
DCLK pulse duty	Tcwh	40	50	60	%	
VSD setup time	Tvst	8			ns	
VSD hold time	Tvhd	8			ns	
HSD setup time	Thst	8			ns	
HSD hold time	Thhd	8			ns	
Data setup time	Tdsu	8			ns	
Data hold time	Tdhd	8			ns	
DE setup time	Tesu	8			ns	
DE hold time	Tehd	8			ns	
Horizontal display area	thd		800		Tcph	
HSD period time	th		928		Tcph	
HSD pulse width	thpw	1	48		Tcph	
HSD back porch	thb		88		Tcph	
HSD front porch	thfp		40		Tcph	
Vertical display area	tvd		480		th	
VSD period time	tv		525		th	
VSD pulse width	tvpw		3		th	
VSD back porch	tvb		32		th	
VSD front porch	tvfp		13		th	

6.3 Timing Diagram of Interface Signal



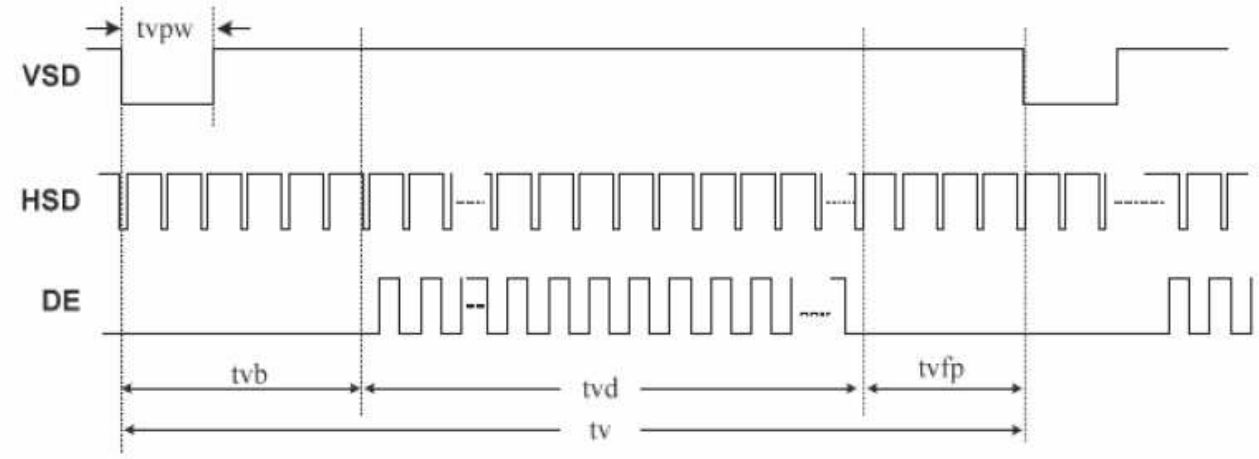
Sampling clock timing

Horizontal Input timing



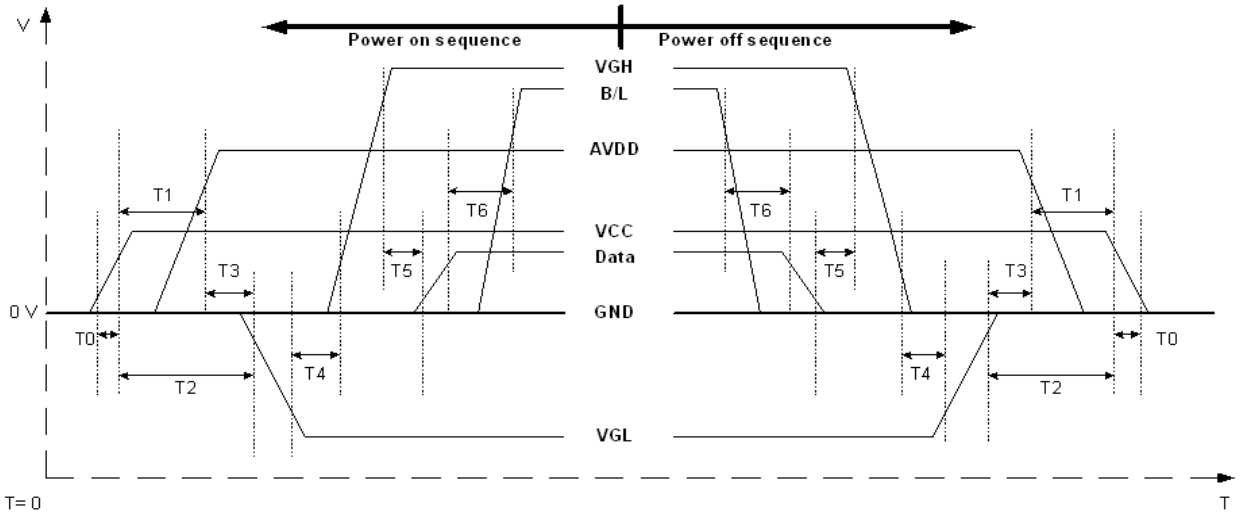
Horizontal display timing range

Vertical input timing

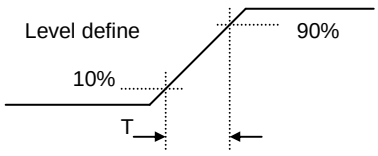


Vertical timing

6.4 Power Sequence



Item	Min.	Typ.	Max.	Unit
T0	0.5	--	20	msec
T1	16			msec
T2	20			msec
T3	0			msec
T4	20		--	msec
T5	20			msec
T6	50			msec

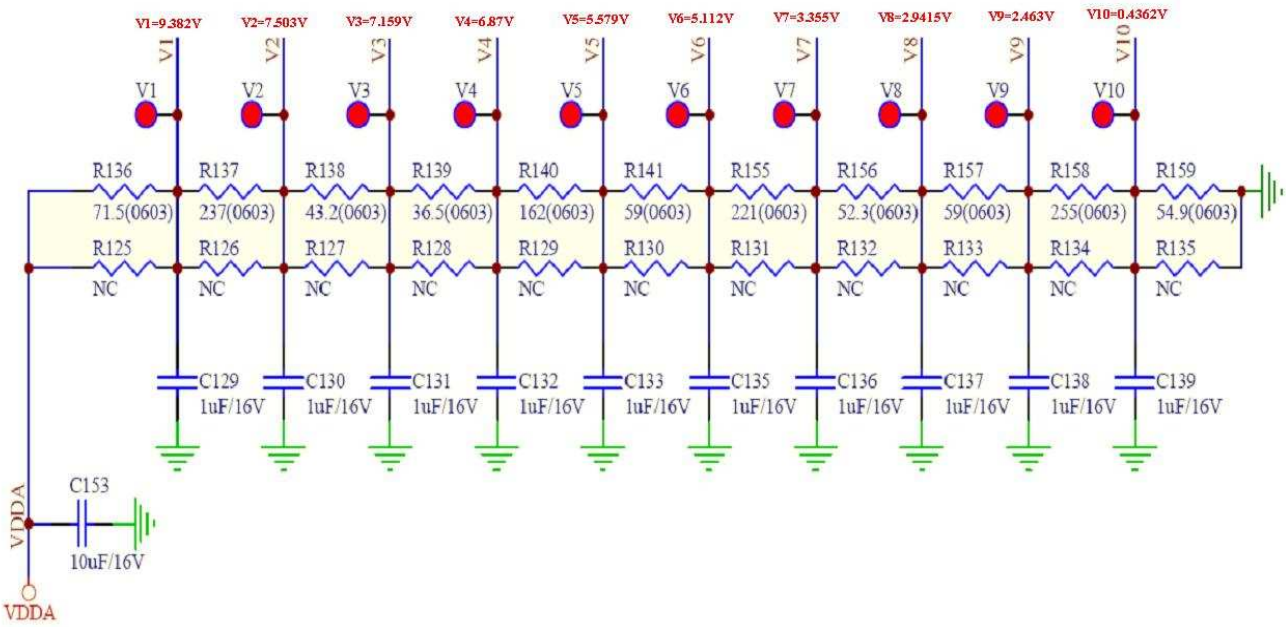


Power On Sequence: VCC-> AVDD -> VGL -> VGH -> Data -> B/L

Power Off Sequence: B/L-> Data -> VGH -> VGL -> AVDD -> VCC

Notes: Data include R0~R7, G0~G7, B0~B7, HSD, VSD, DCLK, SHLR, UPDN, DE MODE, RSTB, STBYB, SHLR, UPDN, DITH

6.5 Gamma circuit



7.0 Reliability test items

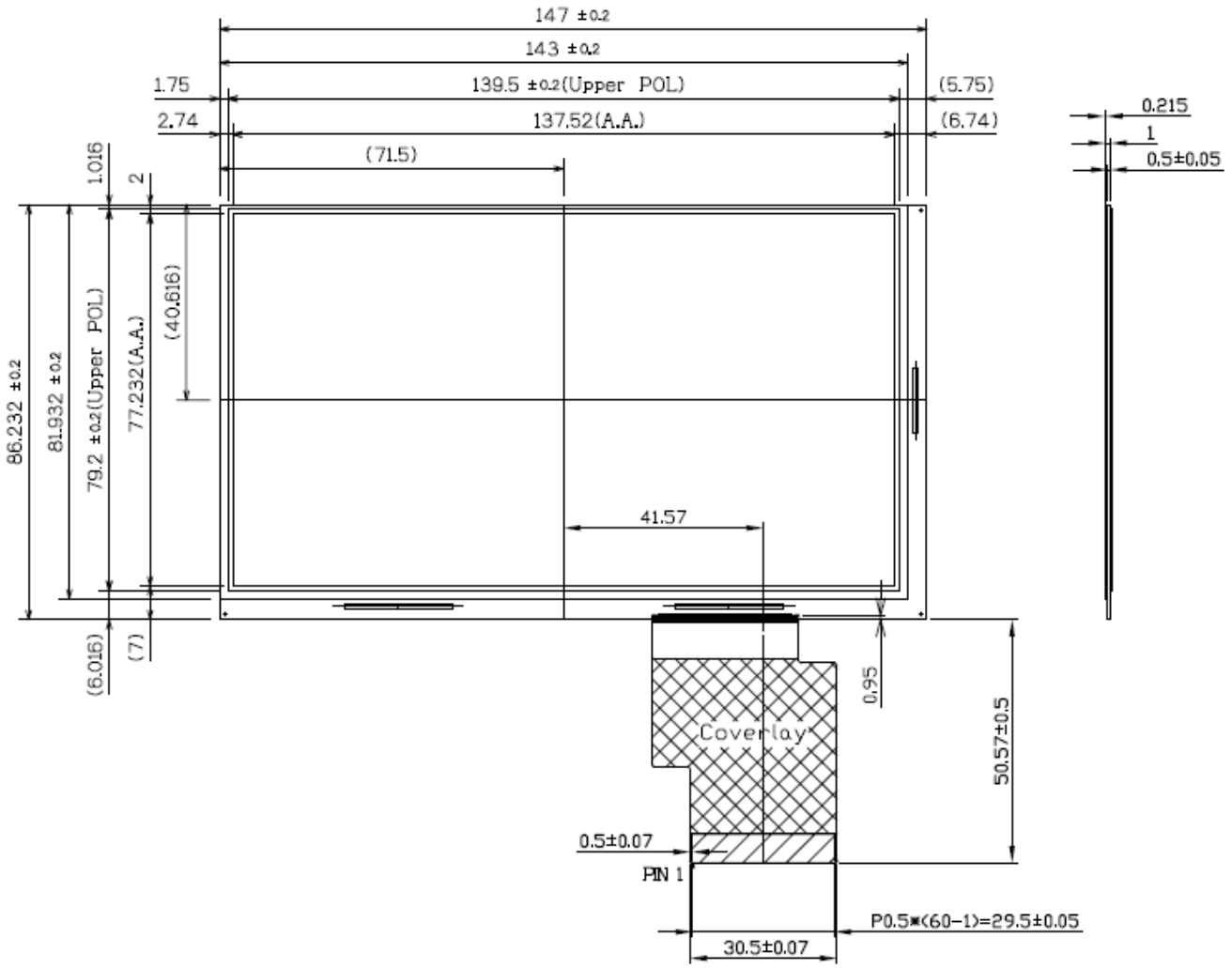
No.	Item	Conditions	Remark
1	High Temperature Storage	Ta=+80°C, 240hrs	
2	Low Temperature Storage	Ta=-30°C, 240hrs	
3	High Temperature Operation	Ta=+70°C, 240hrs	
4	Low Temperature Operation	Ta=-20°C, 240hrs	
5	High Temperature and High Humidity (operation)	Ta=+60°C, 90%RH, 240hrs	
6	Thermal Cycling Test (non operation)	-30°C(30min) → +80°C(30min), 200cycles	
7	Electrostatic Discharge	±200V,200pF(0Ω) 1 time/each terminal	
8	Packing	1. Sine, 1.5G, 5~200Hz, 1hr X, Y, Z direction 2. Random, 1.5Grms, 5~200Hz, 15min/ X, Y, Z direction 3. Half-Sine, 70G, 11ms+ X axis, 2 Times 4. Half-Sine, 200G, 2ms+ X axis, 2 Times 5. 90 degree topple to dash against the hard- face of table.	
9	Altitude Test (non operation)	50000ft, 24hr (25℃)	
10	Altitude Test (operation)	10000ft, 02hr (25℃)	
11	Pressure cooker Test	121℃, 100%R.H., 2atm, 16hr/20hr	

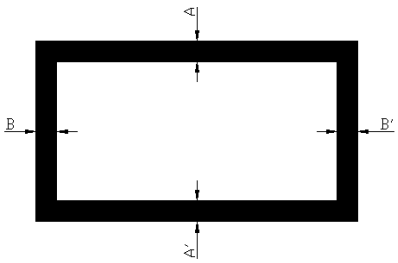
Note: There is no display function NG issue occurred, all the cosmetic specification is judged before the reliability stress.

8.0 OUTLINE DIMENSION

8.1 Outline Dimension

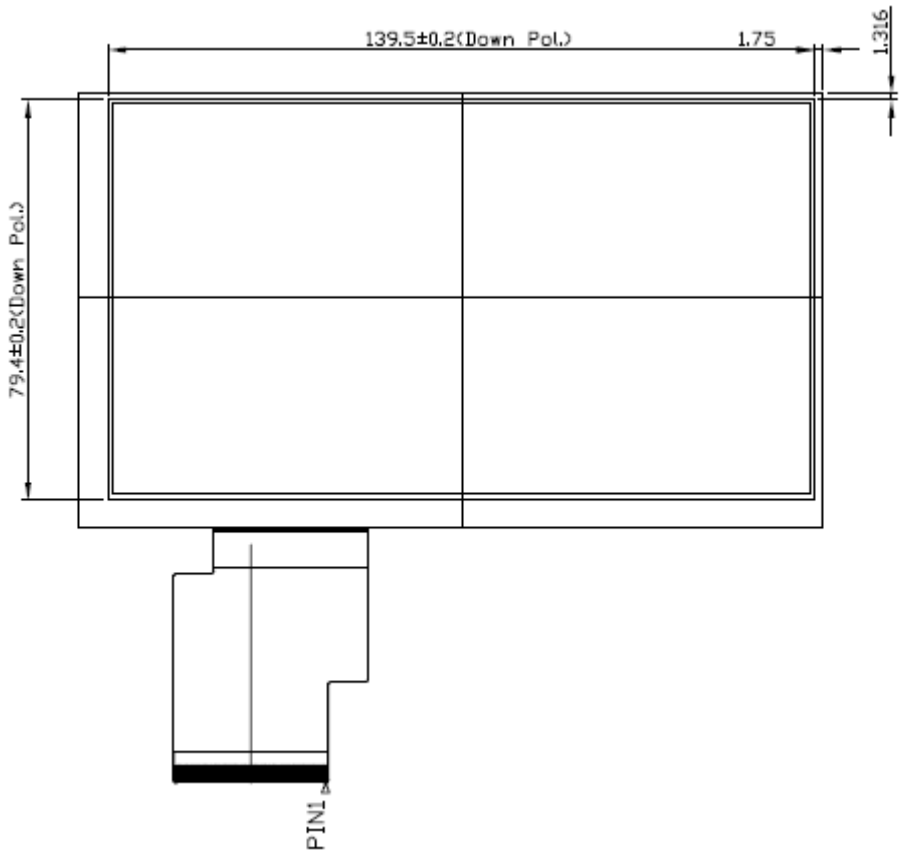
Unit : mm





BM Assembly Tolerance
| A - A' | ≦ 1 (mm)
| B - B' | ≦ 1 (mm)

Note: General Tolerance: +/- 0.3mm



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.

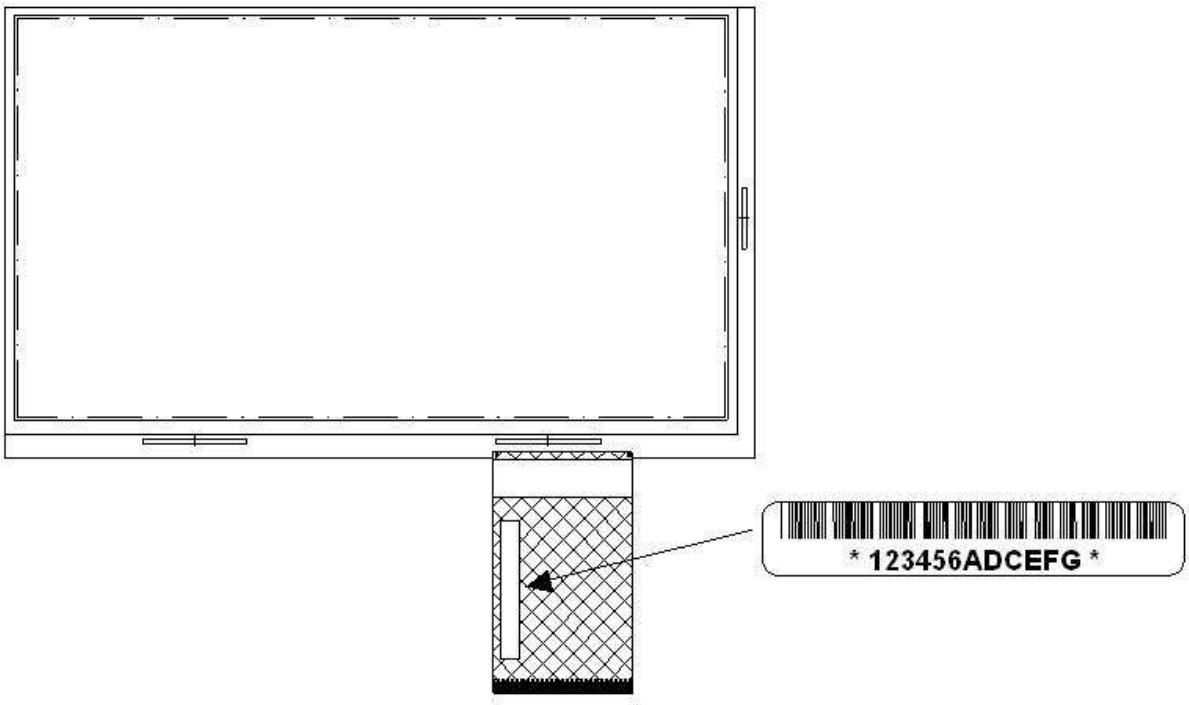
Note (1) Production Year: Code 8 is defined by the last number of the year, for example

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

Note (2) Production Month

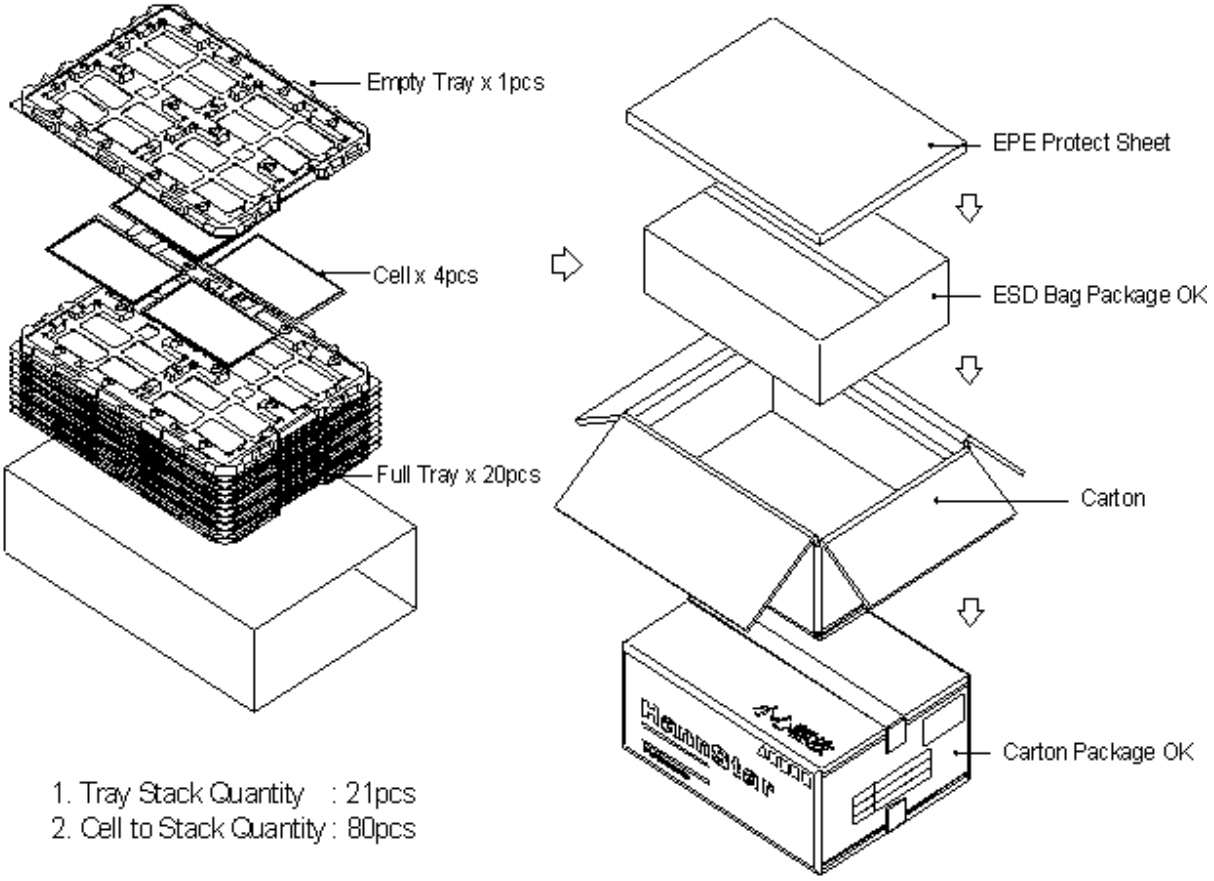
Month	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct	Nov.	Dec.
Mark	1	2	3	4	5	6	7	8	9	A	B	C

9.2 Location of Lot Mark



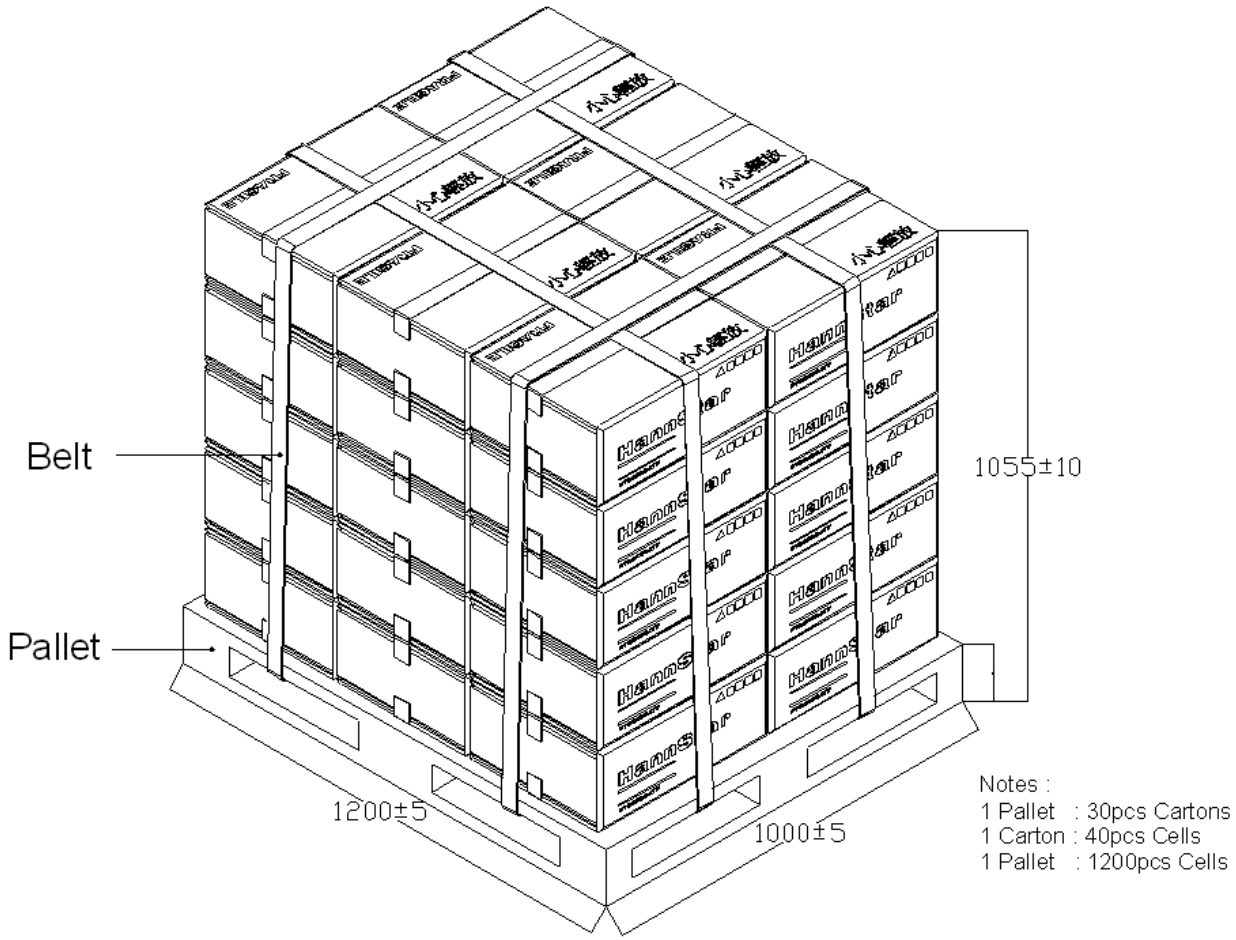
10.0 PACKAGE SPECIFICATION

10.1 6.2 inch Open Cell Package (40 in 1)



1. Tray Stack Quantity : 21pcs
2. Cell to Stack Quantity : 80pcs

10.2 Pallet drawing



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.

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 mouting 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.