深圳市鑫航盛科技有限公司

SHENZHEN XINHANGSHENG TECHNOLOGY CO, LTD.,

产品规格书

Product Type: 9″TFT LCD Module

LCD Nunmber: WD090SHL40AC-F6

MODULE NO.:

CUSTOMER APPROVED	PREPARE BY	CHECK BY	APPROVED BY
SUPPLIER APPROVED	PREPARE BY	CHECK BY	APPROVED BY

■ Preliminary Specification

☐ Final Specific

1.0 GENERAL DESCRIPTION

1.1 Introduction

HannStar Display model HSD090IFW1-A 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 9” (16:9) inch diagonally measured active display area with WSVGA (1024 horizontal by 600 vertical pixel) resolution.

1.2 Features

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

1.3 Applications

- Automobile

1.4 General information

Item		Specification	Unit
Outline Dimension		210.7(H) x 126.5(V) x5.1(Typ.)	mm
Display area		196.608(H) x 114.15V)	mm
Number of Pixel		1024 RGB (H) x 600(V)	pixels
Pixel pitch		0.192(H) x 0.19025(V)	mm
Pixel arrangement		RGB Vertical stripe	
Display mode		Normally Black	
Surface treatment		Antiglare, Hard-Coating (3H)	
Weight		240 (Typ.)	g
Back-light		Single LED (Side-Light type)	
Power Consumption	Logic System	0.3(Max)	W
	B/L System	2.769 (Max.)	W

1.5 Mechanical Information

Item		Min.	Typ.	Max.	Unit
Module Size	Horizontal (H)	210.5	210.7	210.9	mm
	Vertical (V)	126.2	126.5	126.8	mm
	Depth (D)	4.85	5.2	5.3	mm
Weight		—	240	—	g

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	-0.3	5	V	
	AVDD	-0.5	15	V	
	VGH	-0.3	42	V	
	VGL	-20	0.3	V	
	VGH-VGL	-0.3	40	V	

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
Contrast		CR	Θ=0 Normal viewing angle	640	800	—		(1)(2)
Response time	Rising	T_R		—	18		msec	(1)(3)
	Falling	T_F		—	17			
White luminance (Center)		Y_L		430	470	—	cd/m^2	(1)(4) (I_L=150mA)
Color chromaticity (CIE1931)	White	W_x		0.270	0.310	0.350		(1)(4)
		W_y		0.290	0.330	0.370		
	Red	R_x			TBD			
		R_y			TBD			
	Green	G_x			TBD			
		G_y			TBD			
	Blue	B_x			TBD			
		B_y			TBD			
Viewing angle	Hor.	Θ_L	CR>10	—	85	—		
		Θ_R		—	85	—		
	Ver.	Θ_U		—	85	—		
		Θ_D		—	85	—		
Brightness uniformity		B_{UNI}	Θ=0	—	70	—	%	(5)
Optima View Direction		Free						(6)

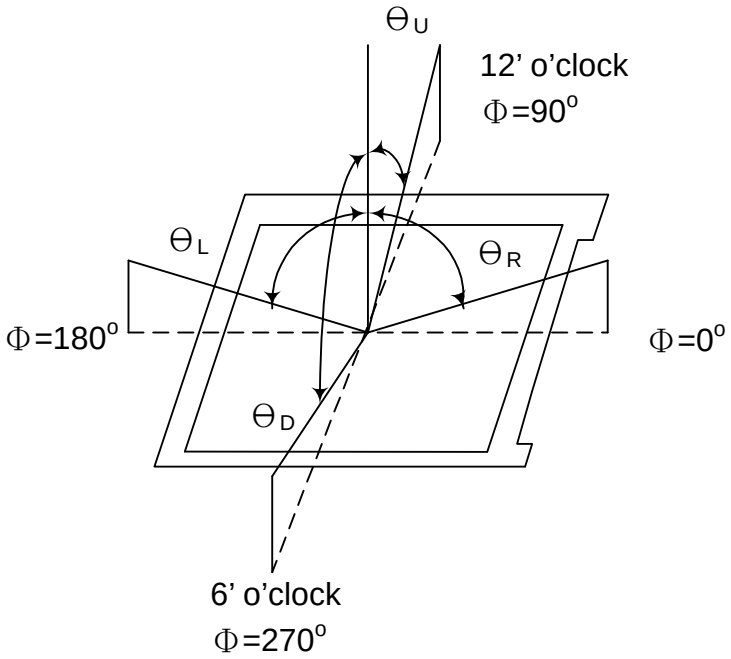
3.2 Measuring Condition

- ■ Measuring surrounding：dark room
- ■ LED current I_L：150mA
- ■ 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

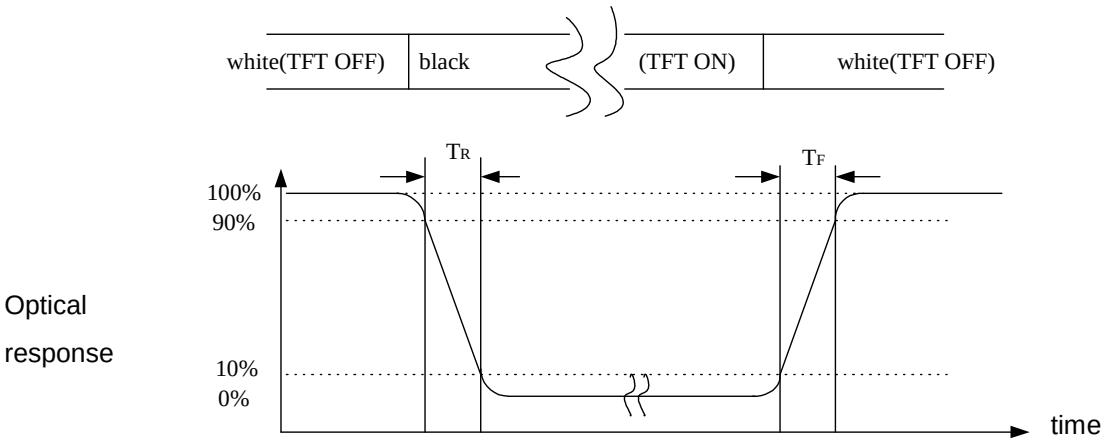
Note (1) Definition of Viewing Angle:



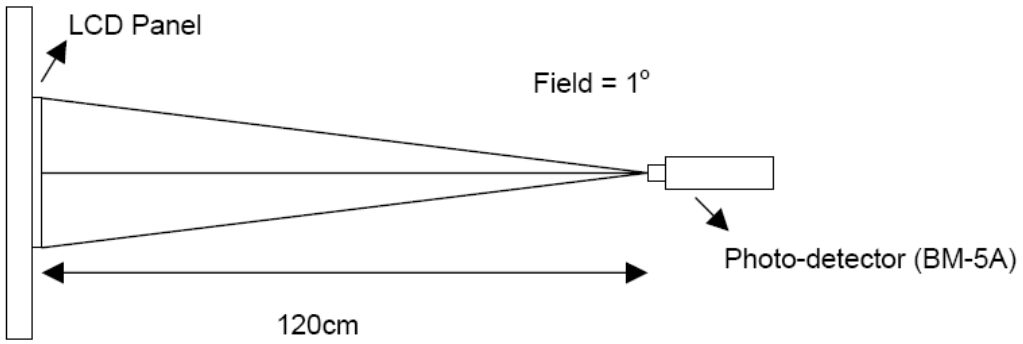
Note (2) Definition of Contrast Ratio (CR) :
measured at the center point of panel

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

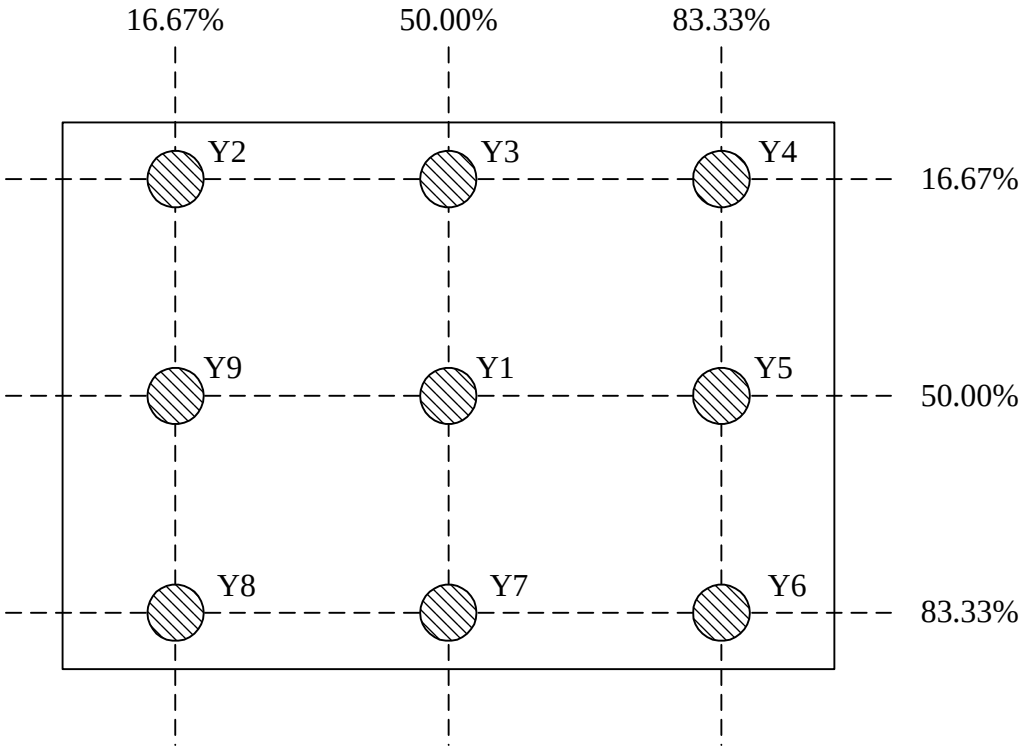
Note (3) Definition of Response Time : Sum of T_R and T_F



Note (4) Definition of optical measurement setup



Note (5) Definition of brightness uniformity

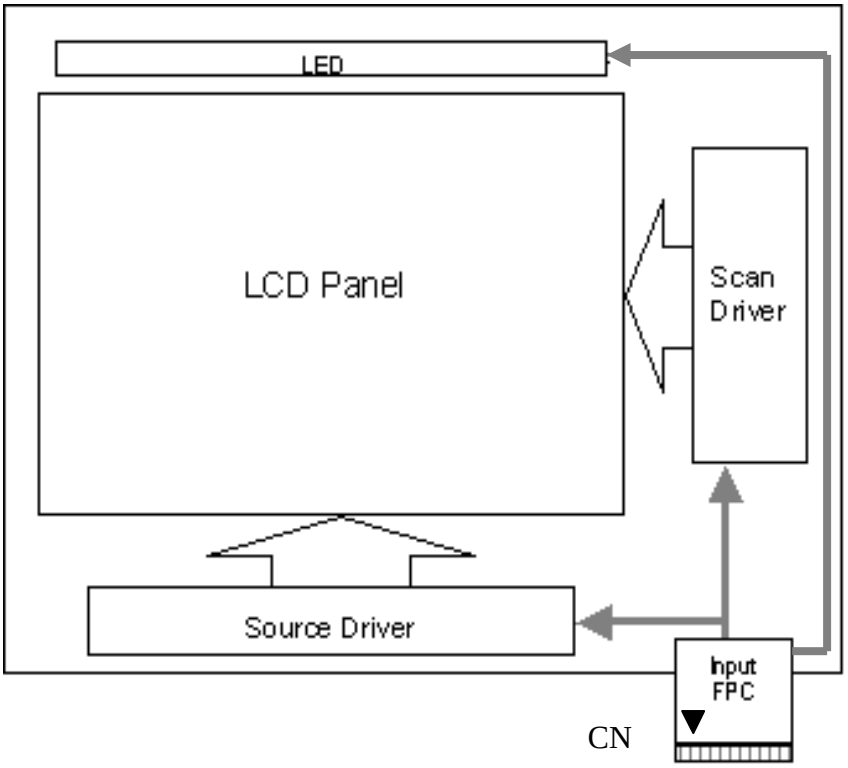


$$= \frac{\text{(Min Luminance of 9 points)}}{\text{(Max Luminance of 9 points)}} \times 100\%$$

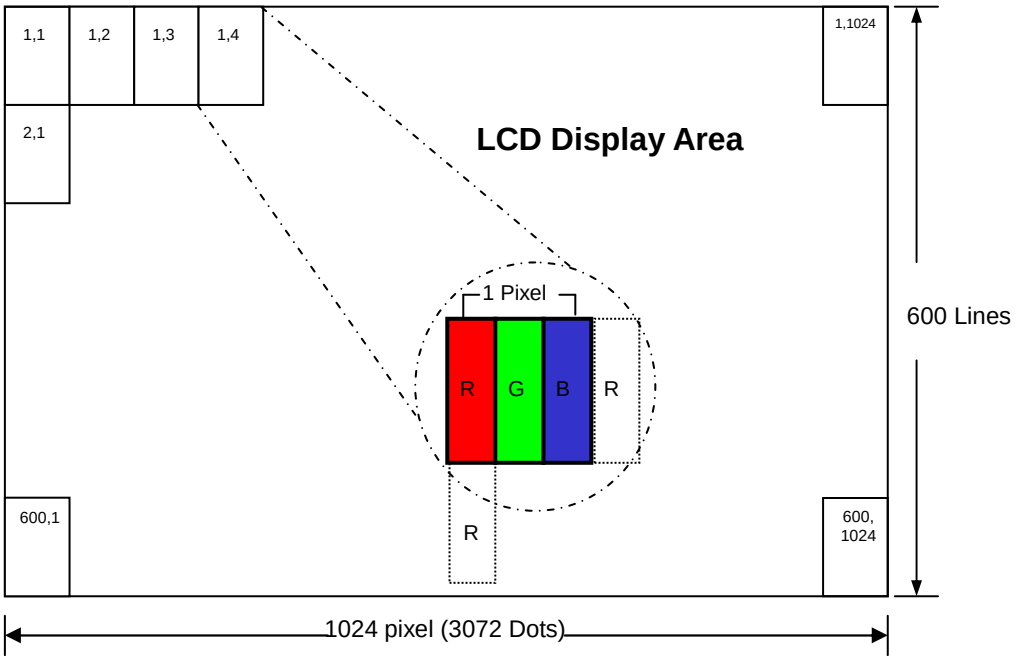
Note (6)：Rubbing Direction (The different Rubbing Direction will cause the different optima view direction.

4.0 BLOCK DIAGRAM

4.1 TFT LCD Module:



4.2 Pixel Format



4.3 Relationship Between Displayed Color and Input

	Display	MSB R7	R6	R5	R4	R3	R2	R1	LSB R0	MSB G7	G6	G5	G4	G3	G2	G1	LSB G0	MSB B7	B6	B5	B4	B3	B2	B1	LSB B0	Gray scale Level
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	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L1
	↑	L	L	L	L	L	L	H	L	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	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	L	H	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	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L1
	↑	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	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	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	H	L1
	↑	L	L	L	L	L	L	H	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	H	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	H	L	H	H	H	H	H	H	H	L	H	L253
		H	H	H	H	H	H	H	L	H	H	H	H	H	H	H	L	H	H	H	H	H	H	H	L	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

5.0 INTERFACE PIN CONNECTION

FPC connector is used for electronics interface. The recommended model is FH12A-40S-0.5SH manufactured by Hirose.

Pin No.	Symbol	I/O	Function	Note
1	VCOM	P	Common Voltage	
2	VDD	P	Power Voltage for digital circuit	
3	VDD	P	Power Voltage for digital circuit	
4	NC	---	No connection	
5	Reset	I	Global reset pin	Note1
6	U/D	I	Vertical inversion	Note2
7	L/R	I	Horizontal inversion	Note2
8	STBYB	I	Standby mode, Normally pulled high STBYB = “1”, normal operation STBYB = “0”, timing controller, source driver will turn off, all output are High-Z	
9	GND	P	Ground	
10	RXCLKIN-	I	- LVDS differential data input	
11	RXCLKIN+	I	+ LVDS differential data input	
12	GND	P	Ground	
13	RXIN0-	I	- LVDS differential data input	
14	RXIN0+	I	+ LVDS differential data input	
15	GND	P	Ground	
16	RXIN1-	I	- LVDS differential data input	
17	RXIN1+	I	+ LVDS differential data input	
18	GND	P	Ground	
19	RXIN2-	I	- LVDS differential clock input	
20	RXIN2+	I	+ LVDS differential clock input	
21	GND	P	Ground	
22	RXIN3-	I	- LVDS differential data input	
23	RXIN3+	I	+ LVDS differential data input	
24	GND	P	Ground	
25	SELB	I	6bit/8bit mode selection	Note3
26	GND	P	Ground	
27	AVDD	P	Power for Analog Circuit	
28	GND	P	Ground	
29	VGH	P	Gate ON Voltage	
30	NC	---	No connection	
31	NC	---	No connection	
32	VGL	P	Gate off Voltage	
33	GND	P	Ground	
34	NC	---	No connection	

Pin No.	Symbol	I/O	Function	Note
35	LED-	P	LED Cathode	
36	LED-	P	LED Cathode	
37	NC	---	No connection	
38	NC	---	No connection	
39	LED+	P	LED Anode	
40	LED+	P	LED Anode	

I: input O: Output P: Power

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

Note: If RC is not added, users must follow the rule, T2 > 50ms on page 18 item 6.5 power on/off sequence.

Note2：When L/R=”0”, set right to left scan direction.

an direction.

When U/D=”0”, set top to bottom scan direction.

When U/D=”1”, set bottom to top scan direction.

Note3：If LVDS input data is 6 bits, SELB must be set to High;

must be set to Low.

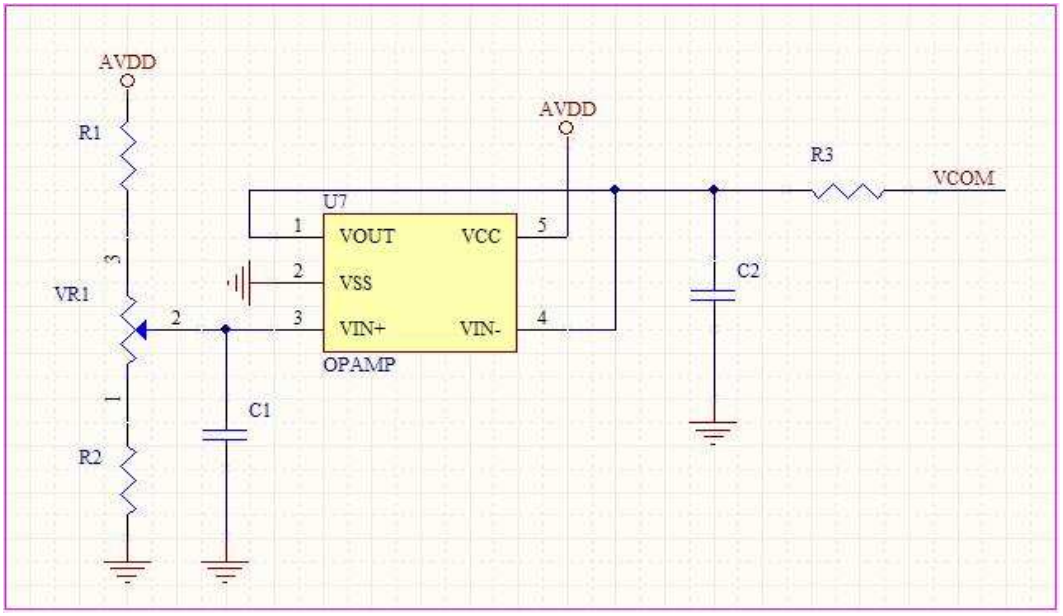
6.0 ELECTRICAL CHARACTERISTICS

The following parameters are for reference only,
With the actual debugging parameters as the standard

6.1 TFT LCD Module

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	VDD	3.0	3.3	3.6	V	
	VGH	22	23	24	V	Note (1)
	VGL	-9	-10	-11	V	Note (2)
	AVDD	12.1	12.6	12.9	V	
	VCOM	5	5.8	6	V	Note (3)
Input signal voltage	ViH	0.7 VDD	-	VDD	V	
	ViL	0	-	0.3 VDD	V	
Current of power supply	IDD	-	(TBD)	-	mA	VDD =3.3V
	IADD	-	(TBD)	-	mA	AVDD=12.6V
	IGH	-	(TBD)	-	mA	VGH=23V
	IGL	-	(TBD)	-	mA	VGL=-10V
	Ivcom	(TBD)	--	--	mA	VCOM=4.5V

6.1.2 Vcom reference circuit

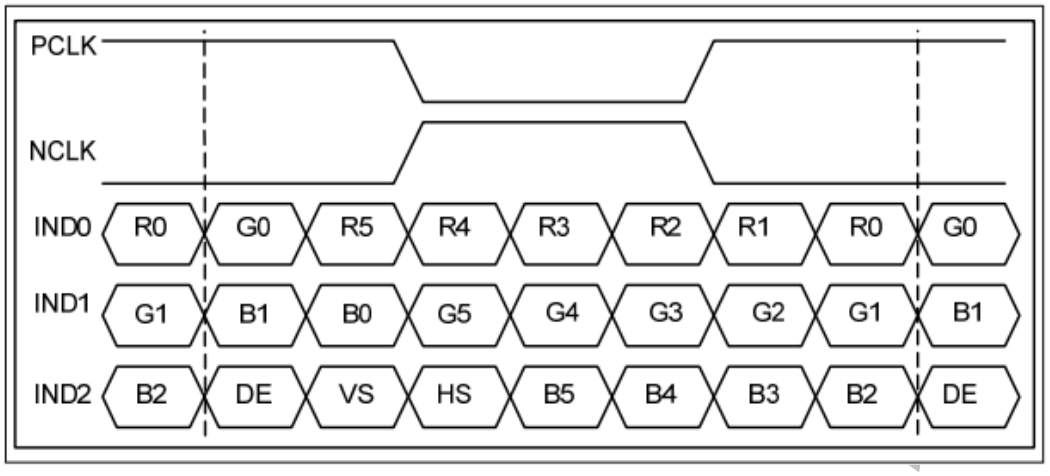


6.2 Switching Characteristics for LVDS Receiver

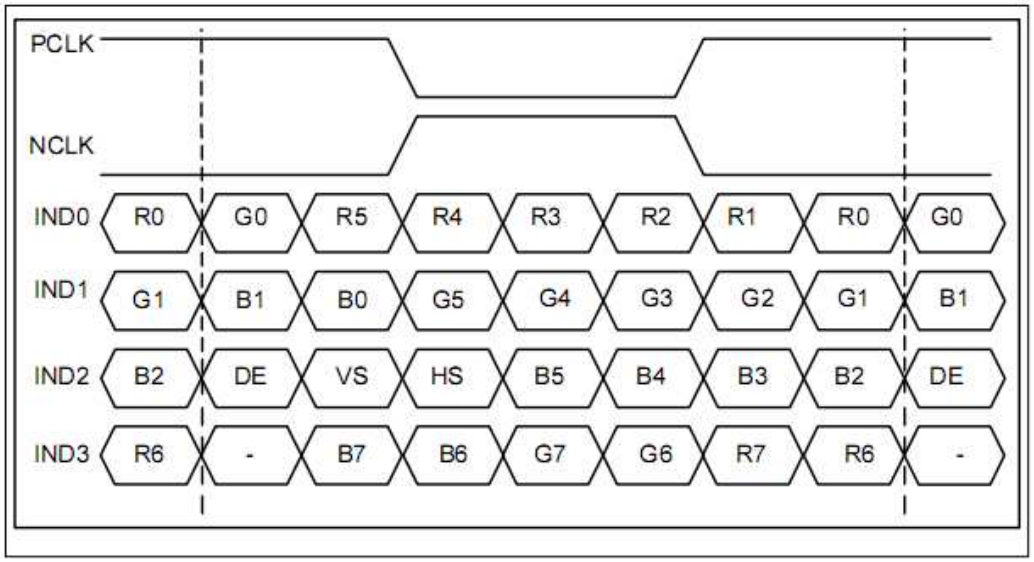
Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
Differential Input High Threshold	Vth	—	—	100	mV	V_{CM}=1.2V
Differential Input Low Threshold	Vtl	-100	—	—	mV	
Input Current	I_{IN}	-10	—	+10	uA	
Differential input Voltage	$\|V_{ID}\|$	0.1	—	0.6	V	
Common Mode Voltage Offset	V_{CM}	0.7	1.2	1.6	V	

6.1 Bit LVDS input

6.1.2 6bit LVDS input



6.1.2 8Bit LVDS input

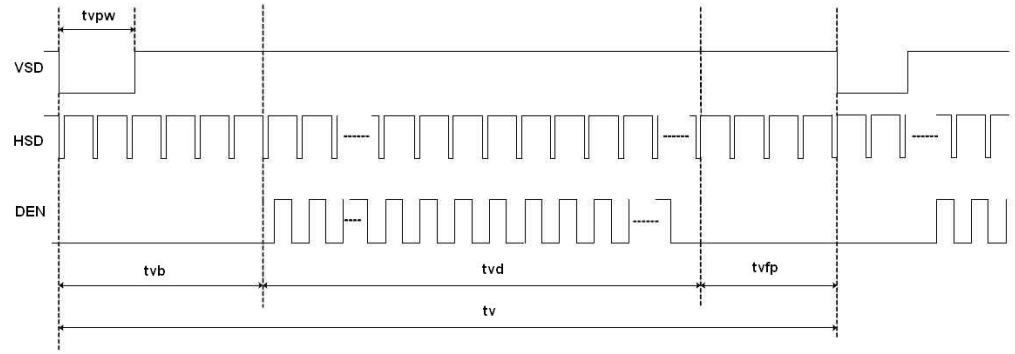


6.2 Interface Timing (DE mode)

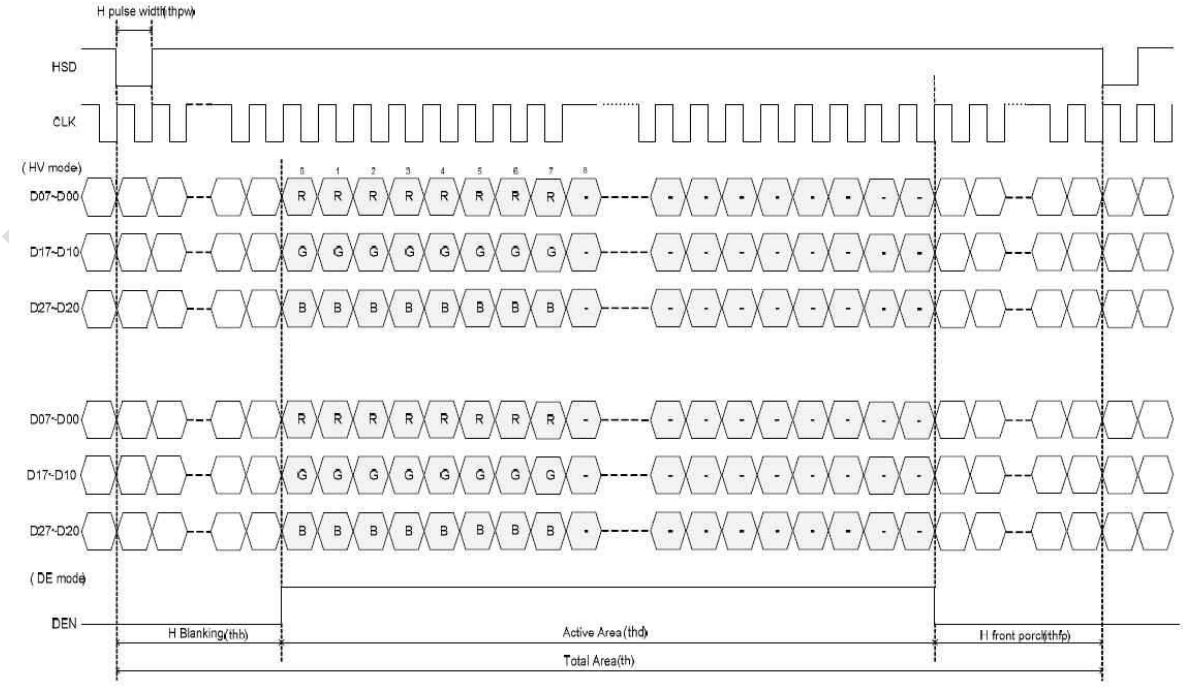
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency @Frame rate=60hz	fclk	40.8	51.2	67.2	Mhz
Horizontal display area	thd		1024		DCLK
HSYNC period time	th	1114	1344	1400	DCLK
HSYNC blanking	thb+thfp	90	320	376	DCLK
Vertical display area	tvd		600		H
VSYNC period time	tv	610	635	800	H
VSYNC blanking	tvb+tvfp	10	35	200	H

Timing Diagram of Interface Signal (DE mode)

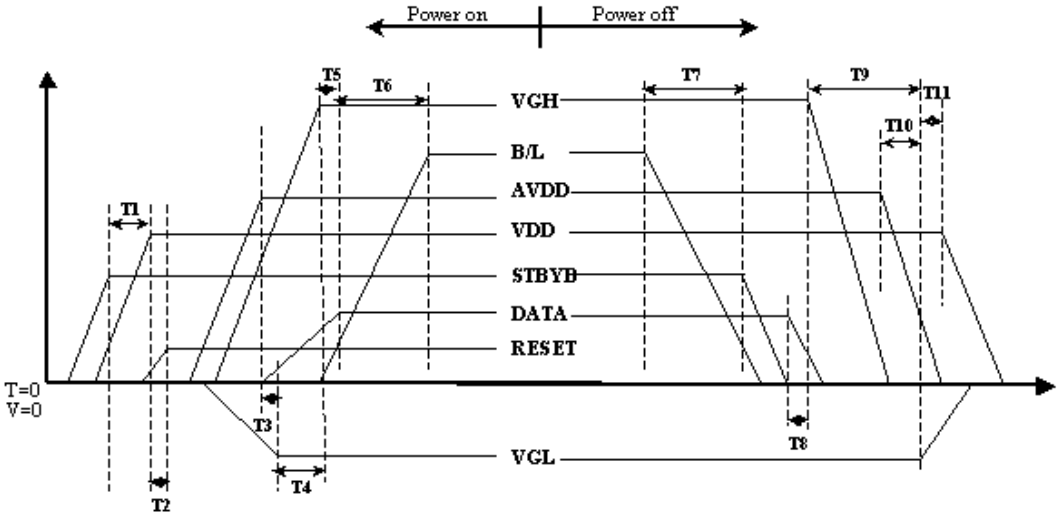
(1) Vertical input timing



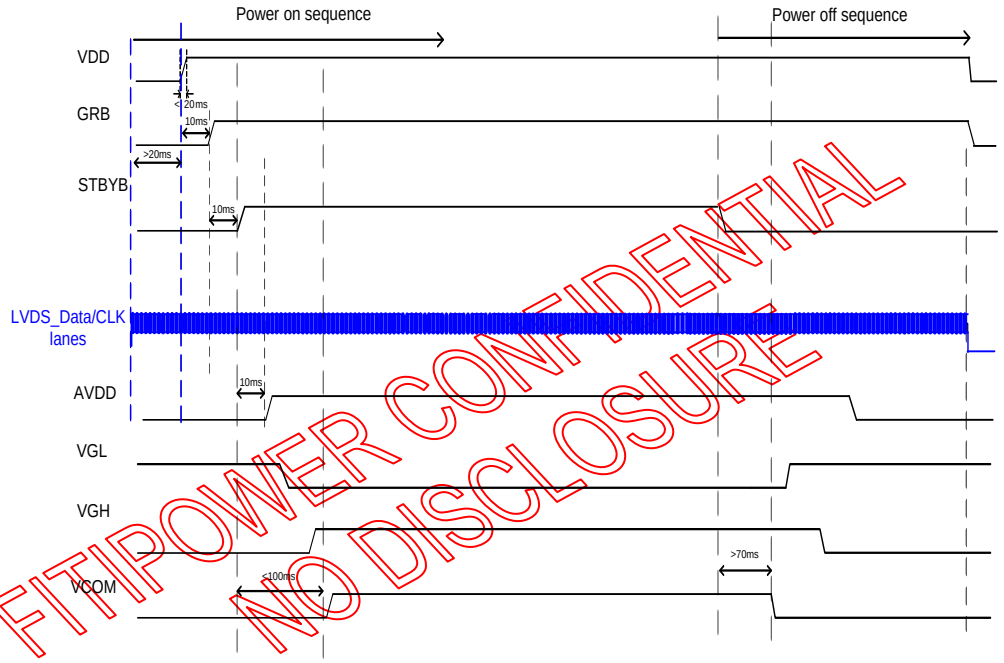
(2) Horizontal Vertical input timing



6.3 Power On / Off Sequence



Item	Min.	Typ.	Max.	Unit
T1	0	--	--	ms
T2	50	--	--	ms
T3	5	--	--	ms
T4	10	--	--	ms
T5	20	--	--	ms
T6	180	--	--	ms
T7	20	--	--	ms
T8	10	--	--	ms
T9	20	--	--	ms
T10	10	--	--	ms
T11	20	--	--	ms



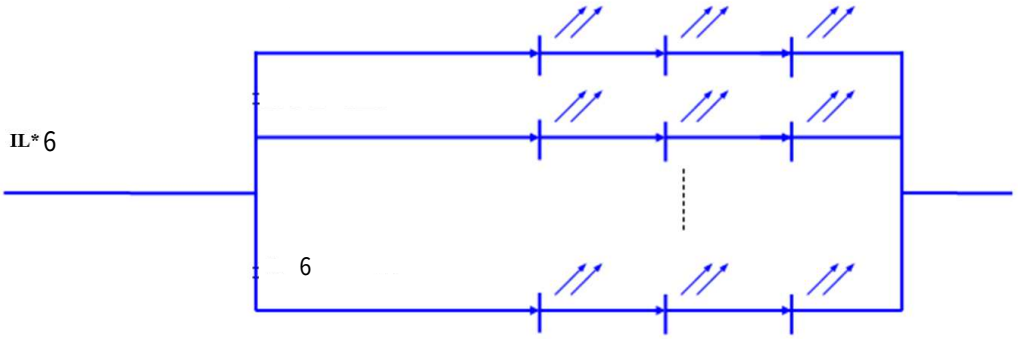
6.4 Backlight Unit

Parameter	Symbol	Min	Typ	Max	Units	Condition
LED Current	I_F	--	150	160	mA	Ta=25℃
LED Voltage	V_F	--	17	20.5	Volt	Ta=25℃
LED Life-Time	N/A	30,000	--	--	Hour	Ta=25℃ I_F=30mA 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 IL=150mA. The LED lifetime could be decreased if operating IL is larger than 165mA. The constant current driving method is suggested.

Note (3) LED Light Bar Circuit



7.0 Reliability test items

No.	Item	Conditions	Remark
1	High Temperature Storage	Ta=+80°C, 12hrs	
2	Low Temperature Storage	Ta=-30 °C, 24hrs	
3	High Temperature Operation	Ta=+70°C, 24hrs	
4	Low Temperature Operation	Ta=-20°C, 24hrs	
5	High Temperature and High Humidity (operation)	Ta=+60°C, 90%RH, 24hrs	
6	Thermal Cycling Test (non operation)	-20°C(30min) → +70° (30min) 120 cycles	
7	Electrostatic Discharge	±200V,200pF(0Ω) 1 time/connector	
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, 333.3~400 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 各方向 2hrs	
11	Drop (with carton)	Drop height condition, basis on the product weight and Follw QB100-0027 1 corner, 3 edges, 6 surfaces	

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

深圳市鑫航盛科技有限公司
SHENZHEN XINHANGSHENG TECHNOLOGY CO, LTD.,

深圳市光明新区公明塘尾宝塘高薪科技园2栋10楼 18

由Autodesk 教育版产品制作

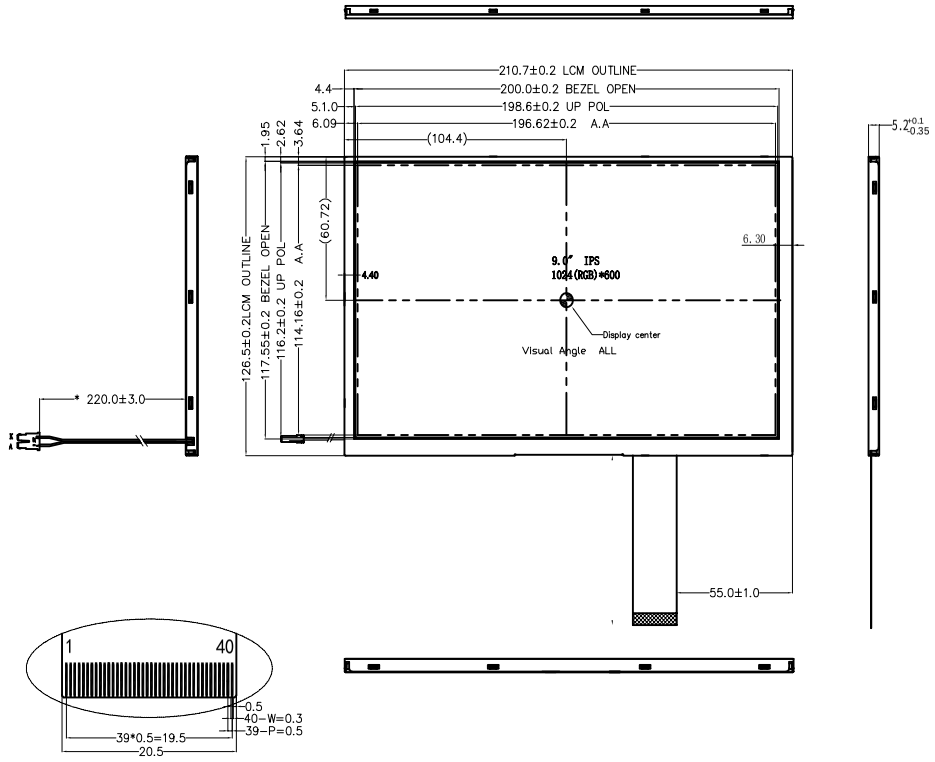
TOLERANCE GRADE (±)	DIMENSION RANGE 尺寸范围					
	0 ~ 5	5 ~ 15	15 ~ 60	60 ~ 150	150 ~ 300	300 ~ 630
A	0.05	0.10	0.15	0.20	0.25	0.30
B	0.10	0.15	0.20	0.25	0.30	0.35

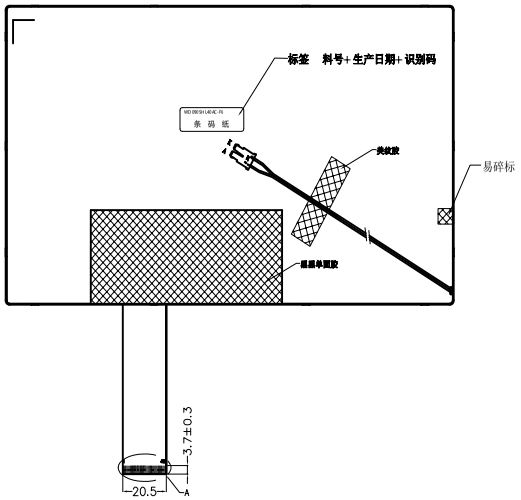
UNLESS OTHERWISE SPECIFIED
公差以上表所示，除非另有指定

Customer Name: 客户名称	***	Approval Date: 承认日期	******	Approved by: 承认	******	Please Confirm This Drawing On/Before 请签回此图	

ROHS

HSD 9.0 1024*600 模组图





PIN DEFIND			
pin	Assignment	pin	Assignment
1	VCOM	31	NC
2	DVDD	32	VGL
3	DVDD	33	GND
4	NC	34	NC
5	RESET	35	NC
6	UPDN	36	NC
7	SHLR	37	NC
8	STBYB	38	NC
9	GND	39	NC
10	NINC	40	NC
11	PINC	41	
12	GND	42	
13	NINDO	43	
14	PINDO	44	
15	GND	45	
16	NIND1	46	
17	PIND1	47	
18	GND	48	
19	NIND2	49	
20	PIND2	50	
21	GND	51	
22	NIND3	52	
23	PIND3	53	
24	GND	54	
25	SELB	55	
26	GND	56	
27	AVDD	57	
28	GND	58	
29	VGH	59	
30	NC	60	

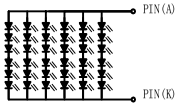
DETAIL A(4:1)

Notes:
1. RoHS must be complied.
2. ⚠Modification rev. number
3. Draft angle 1.5° :
4. ( ) reference dimen
5. All radii without dimension R0.3, Unspecified Tolerances is: ±0.2
6. Smoothness 0.4 max

Electrical-Optical Characteristics (Ta=25° C):

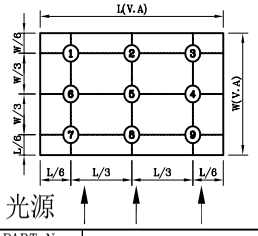
项目 Item		符号 Symbol	最小值 Mi	典型值 Typ	最大值 Max	单位 Uit	测试条件 Coditio
模组亮度	Average Lumious Itesity	Lv	--	470	--	cd/m²	If=150 mA (恒定电流测试)
背光亮度	Average Lumious Itesity	Lv	--	--	--	cd/m²	
均匀性	Uiformity	Avg	78	--	--	%	
色坐标	Colour coordiate	X	0.26	--	0.33		
		Y	0.27	--	0.34		
功率	Power Dissipatio	Pd	--	--	--	mW	测光方式 亮度值是9个测量点的平均值，亮度最小值比最大值一般大于80%，使用探头-7色度仪测量，测试光圈：07.7mm 测试距离：500mm ±50mm 角度：1°
正向电压	Forward Voltage	Vf	17	--	20.5	V	
反向电流	Reverse Curret	Ir	--	--	--	uA	
反向电压	ReverseVoltage	Vr	--	--	--	V	
工作温度	Operatig Temperatig Rage	Topr	-15	--	65	℃	
贮存温度	Storage Temperature Rage	Tstg	-25	--	80	℃	

线路原理图



LED: 6*6=36 PCS

测试点位置图



主要材料表			
10	FOG	1	
9	Bezel	1	
8	Reflector film	1	
7	Prism film (upper)	1	
6	Prism film (lower)	1	
5	Diffuser film	1	
4	SMT LED (white)	36	
3	FPC	1	
2	Light guide	1	
1	Plastic housing	1	
NO.	TITLE(名称)	Q'TY	MATERIAL(材质)

NO. 序号	REV 修订	DATE 修订日期	DESCRIPTION 修订内容	REVISER 修订者

试做图

REV 版本	A0
SCALE 比例	1:1
PART No. 料號	WD090SHL40AC-F6
Material 客户料号	********
MATERIAL 规格	210.7*126.5*5.1
COLOR 颜色	
UNIT 單位	mm
DATE 日期	2017-09-12

APPROVED BY 核准	CHECKED BY 審核	DRAWN BY 繪圖

深圳市鑫航盛科技有限公司
SHEN ZHEN XINHANGSHENG TECHNOLOGY CO.,LTD

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