



TopView Product Specification

6.2" Color TFT-LCD Module

Model: TPV062HAD60PTT21

Note:1.Please contact TopView Optoelectronics 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 TopView for any intellectual property claims or other problems

1.0 GENERAL DESCRIPTION

1.1 Introduction

Topview model TPV062HAD60PTT21 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 6.2 (16:9) inch diagonally measured active display area with 800 horizontal by 480 vertical pixel resolutions.

1.2 Features

- 0 6.2 (16:9 diagonal) inch configuration
- 0 6 bits + FRC driver with 1channel TTL interface
- 0 LED Backlight
- 0 Up/Down, Left/Right reversion selection
- 0 RoHS/ Halogen Free Compliance

1.3 Applications

Automotive

1.4 General information

Item		Specification	Unit
Outline Dimension		155.2 x 88.2 x 5.0 (T)	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	
Surface treatment		Antiglare, Hard-Coating(3H) with EWV film	
Weight		120 (Typ.)	g
Back-light		Side-Light type	
Power Consumption	B/L System	1.54 (Max.)	W

1.5 Mechanical Information

Item		Min.	Typ.	Max.	Unit
Module Size	Horizontal(H)	154.9	155.2	155.5	mm
	Vertical(V)	87.9	88.2	88.5	mm
	Depth(D)	4.7	5.0	5.3	mm
Weight (Without inverter)			120		g

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	V _{CC}	-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	V _{CC} +0.3	V	

2.1.2 Back-Light Unit

Item	Symbol	Typ.	Max.	Unit	Note
LED current	I _L	140		mA	(1) (2)(3)
LED voltage	V _L	9.9		V	(1) (2)(3)

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) T_a =25±2

(3) Test Condition: LED current 140 mA. The LED lifetime could be decreased if

operating I_L is larger than 140mA.

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	Normal viewing angle	480	600	—		(1)(2)
Response time	Rising	T _R		—	2	4	msec	(1)(3)
	Falling	T _F		—	6	12		
White luminance (Center)		Y _L		300	350	—	cd/m ²	(1)(4) (I _L =140mA)
Color chromaticity (CIE1931)	White	W _x		0.260	0.310	0.360		(1)(4)
		W _y		0.280	0.330	0.380		
Viewing angle	Hor.	θ _L	CR>10	65	75	—		
		θ _R		65	75	—		
	Ver.	θ _U		60	70	—		
		θ _D		60	70	—		
Brightness uniformity		B _{UNI}	θ=0	70	-	—	%	(5)(7)
Optima View Direction				6 ' O	clock			(6)

0 Measuring surrounding: dark room

0 LED current I_L : 140mA

0 Ambient temperature: $25\pm 2^\circ\text{C}$

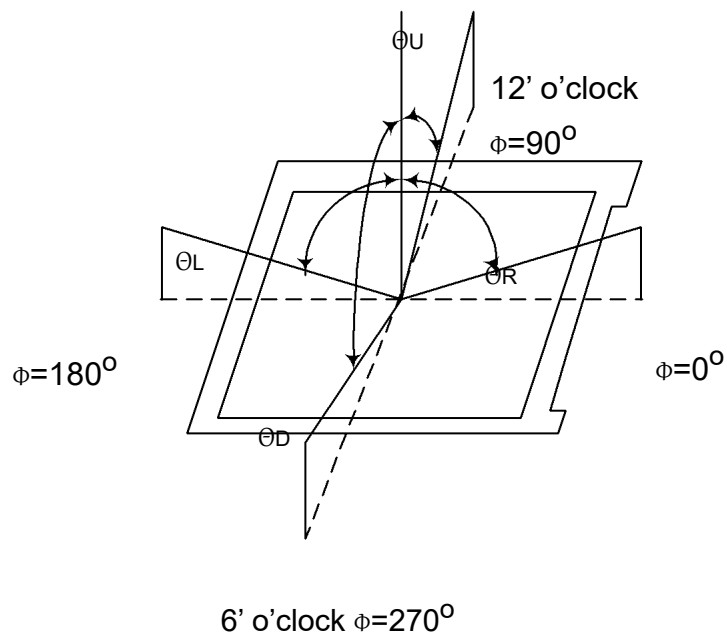
0 15min. warm-up time.

3.3 Measuring Equipment

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

0 Measuring spot size: 20 ~ 21 mm

Note (1) Definition of Viewing Angle:

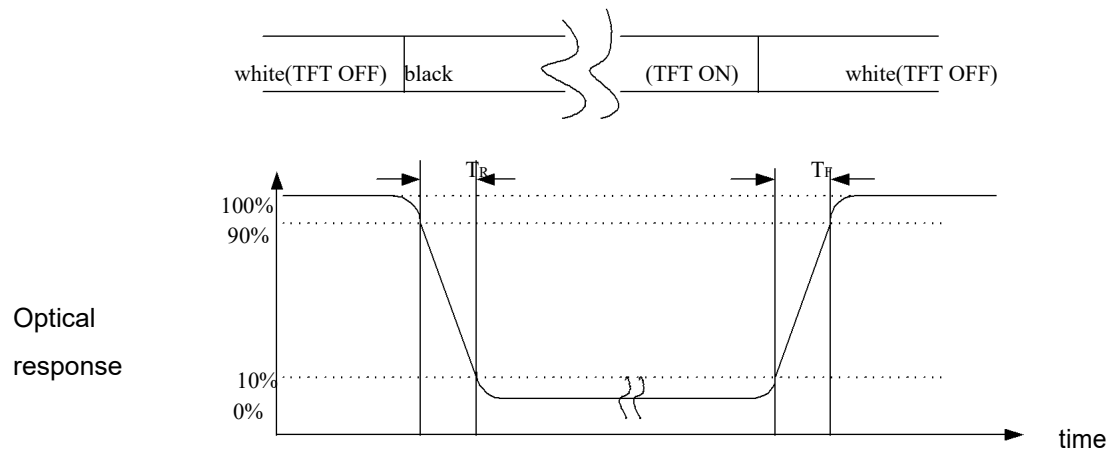


Note (2) Definition of Contrast Ratio (CR):

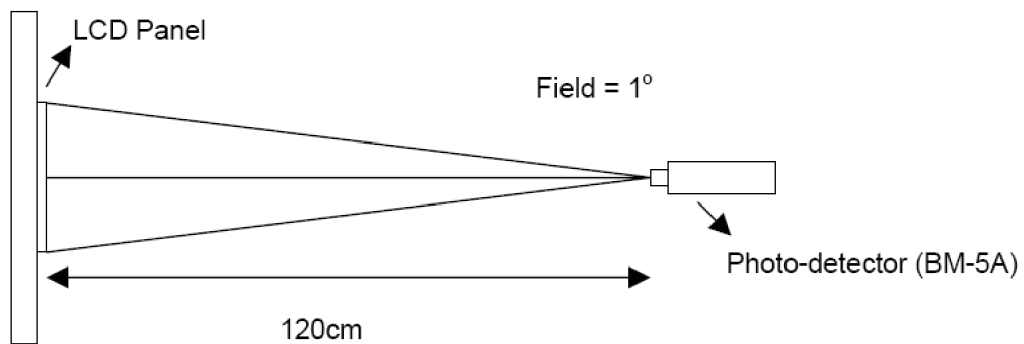
Luminance with all pixels white

Luminance with all pixels black

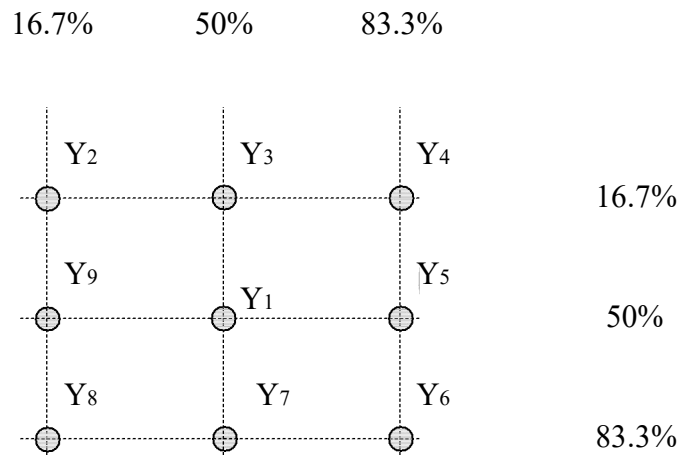
Note (3) Definition of Response Time : Sum of T_R and T_F



Note (4) Definition of optical measurement setup



Note (5) Definition of brightness uniformity



(Min Luminance of 9 points)

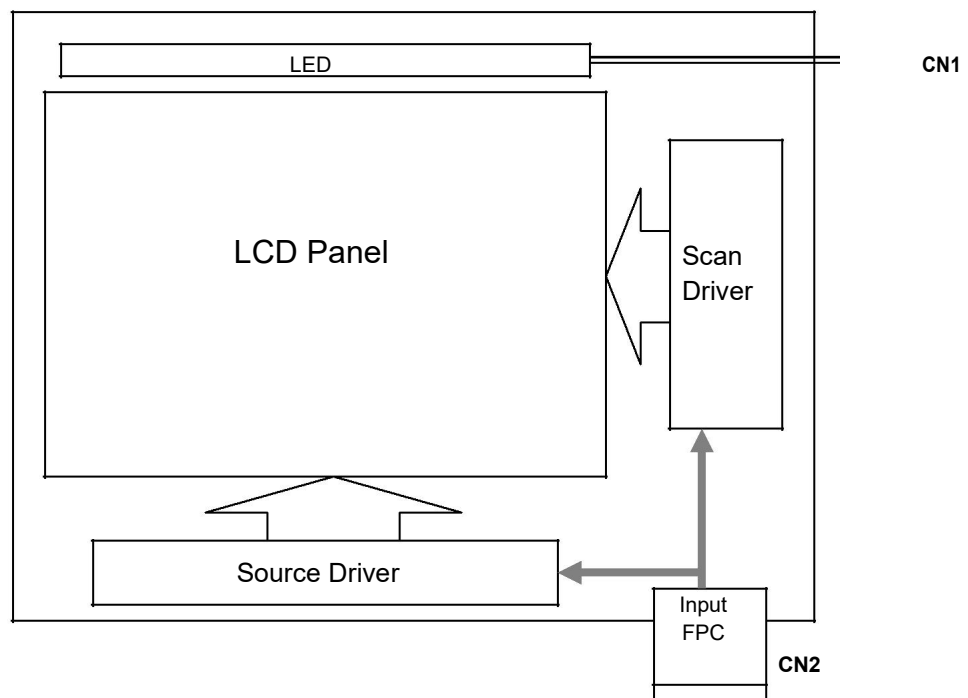
(Max Luminance of 9 points)

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

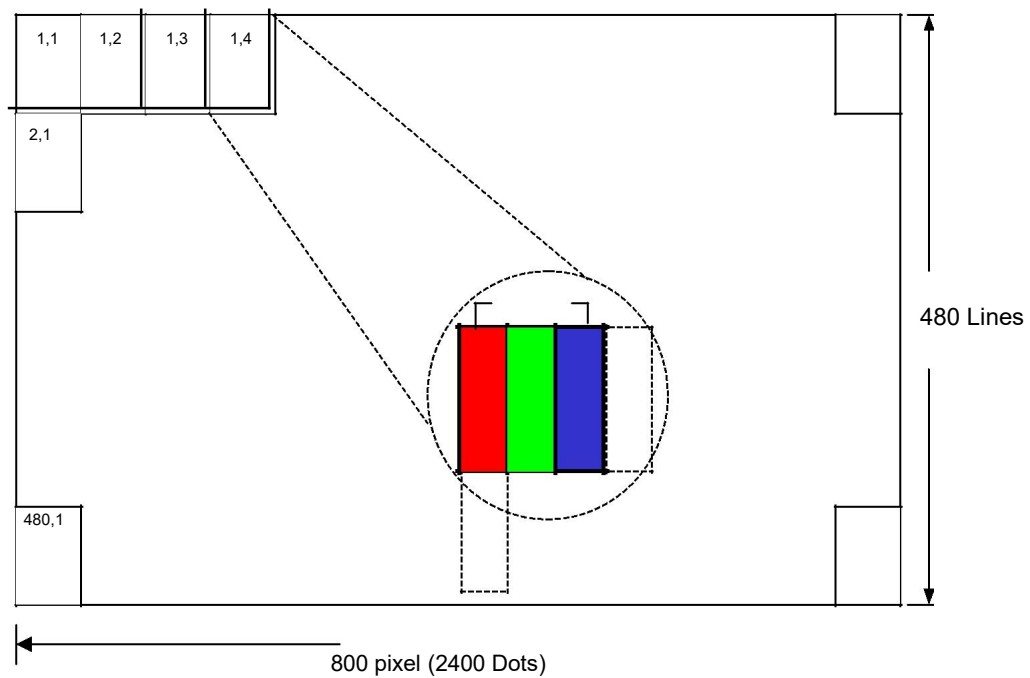
Note (7) Measured at the brightness of the panel when all terminals of LCD panel are electrically open.

BLOCK DIAGRAM

4.1 TFT LCD Module



4.2 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

5.2 Back-Light Unit

CN1 LED Power Source (**BHSR-02VS-1**) or equivalent

Mating Connector: (**SBHT-002T-P0.5**) or equivalent

Terminal no.	Symbol	Function	Color
1	VL	LED power supply (high voltage)	red
2	GL	LED power supply (low voltage)	white

6.0 ELECTRICAL CHARACTERISTICS

6.1 TFT LCD Module

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

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	V _{CC}	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 V _{CC}	-	V _{CC}	V	Note (1)
	V _{iL}	0	-	0.3 V _{CC}	V	
Current of power supply	I _{DD}	-	12.37	-	mA	V _{CC} = 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	V _x	AVDD/2-		AVDD-0.1-	V	
Input level of V6~V10	V _x	0.1-		AVDD/2-	V	

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

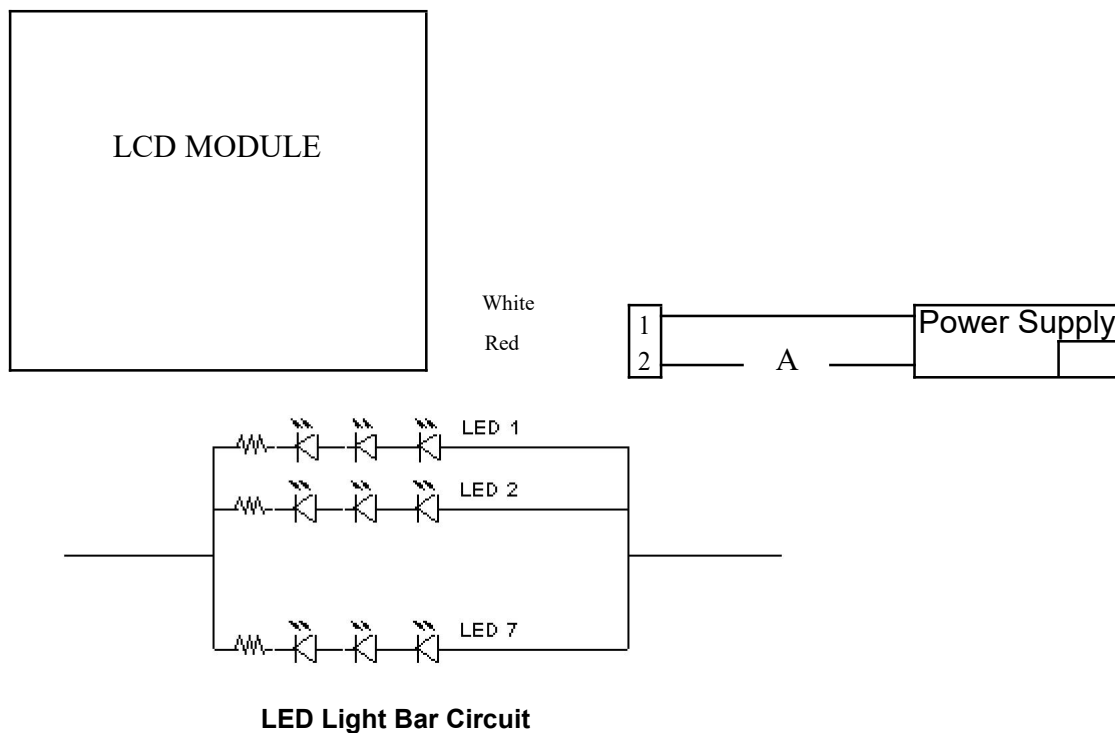
Note (2): Be sure to apply the power voltage as the power sequence spec.

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

6.2 Back-Light Unit

The backlight system is an edge-lighting type with 21 LED. The characteristic of the LED is shown in the following tables.

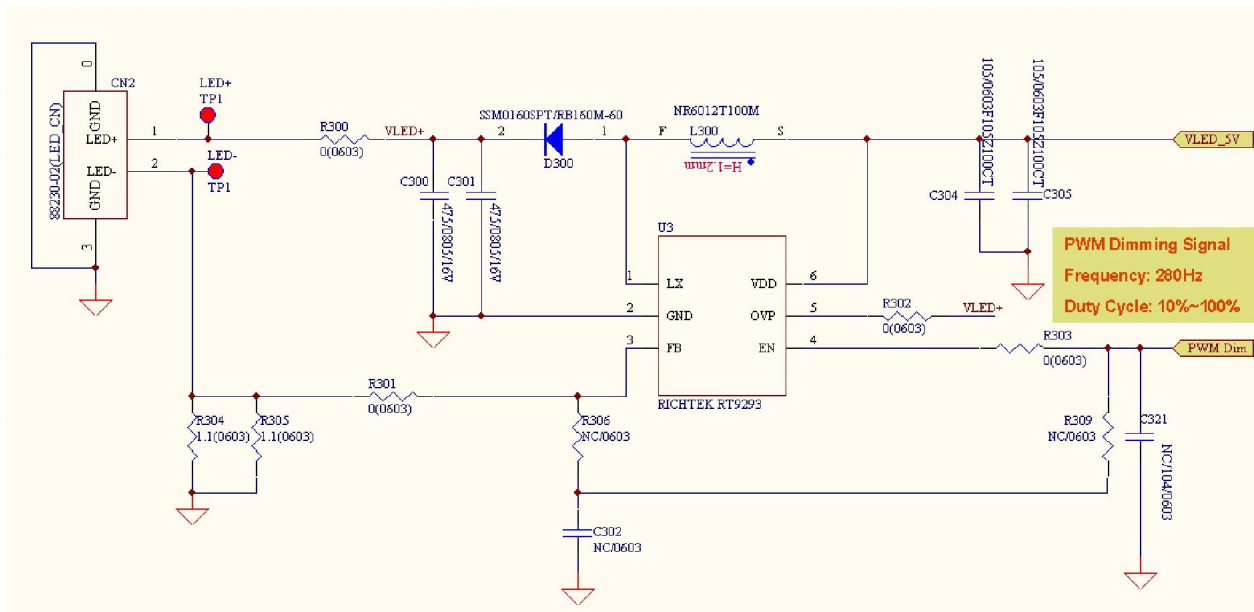
Item	Symbol	Min.	Typ.	Max.	Unit	Note
LED current	IL		140		mA	(2)
LED voltage	VL	—	9.9		V	
Operating LED life time	Hr	20,000		—	Hour	(1)(2)



Note (1) LED life time (Hr) can be defined as the time in which it continues to operate under the condition: $T_a=25\pm3\text{ }^{\circ}\text{C}$, 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 $T_a=25\text{ }^{\circ}\text{C}$ and $IL=140\text{mA}$. The LED lifetime could be decreased if operating IL is larger than 140mA. The constant current driving method is suggested.

Note (3) Suggested Schematic of LED Back-Light Driver



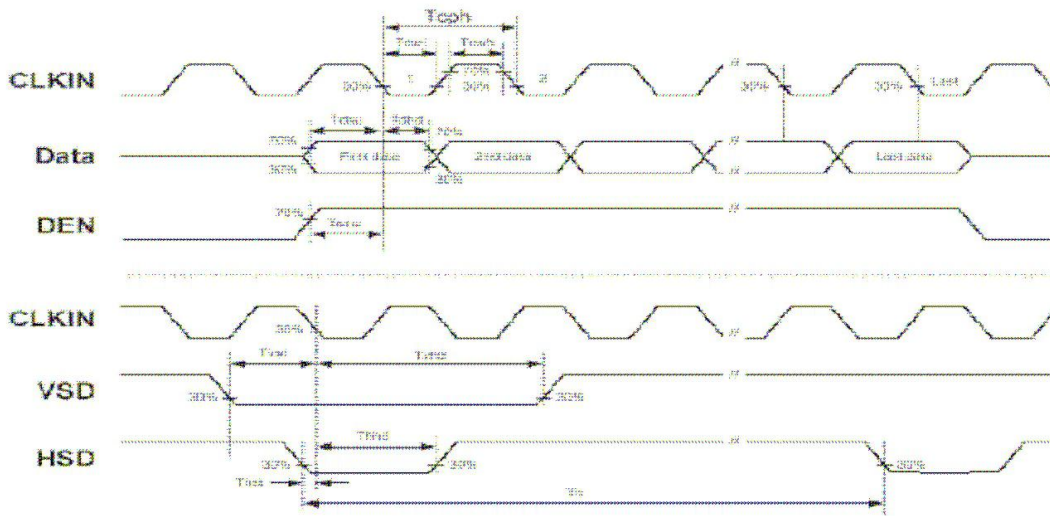
$$I = 0.3 / (R304 / R305)$$

Suggested Schematic of LED Back-Light Driver

6.3 AC Characteristics

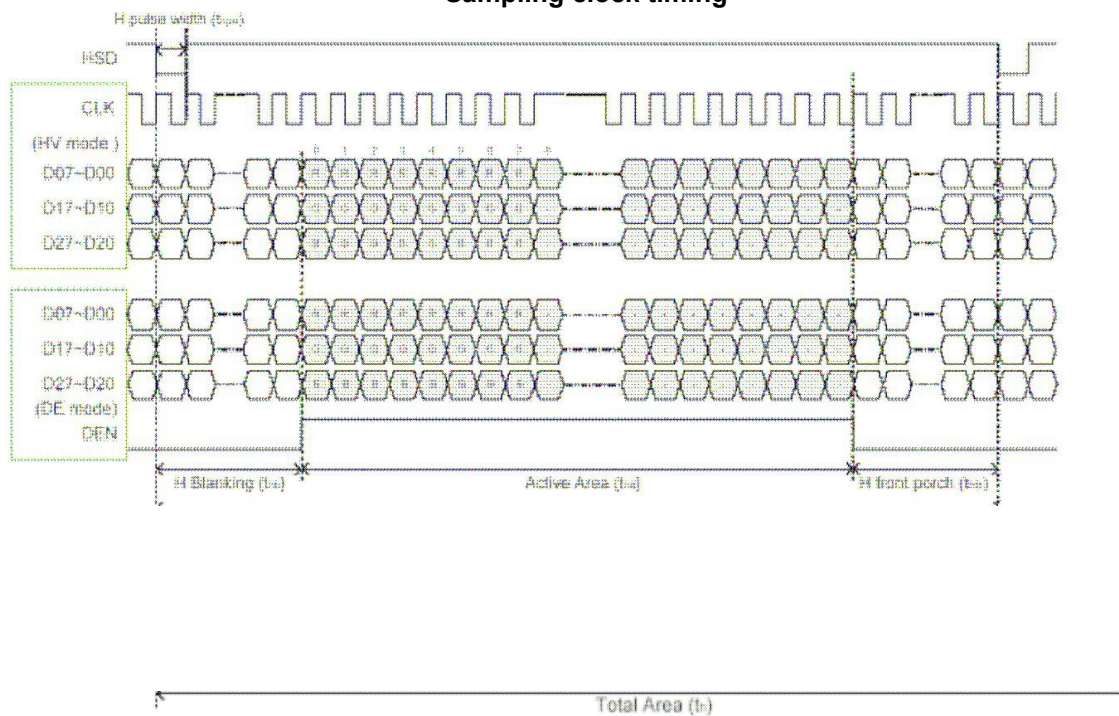
Item	Symbol	Min.	Typ.	Max.	Unit	Note
DCLK cycle time	Tcph	25			ns	
DCLK frequency	fclk		30	40	MHz	
DCLK pulse duty	Tcwh	40	50	60	%	
VSD setup time	Tvst	8			ns	
VSD hold time	Tvhd	8			ns	
HSD setup time	Thst	8			ns	
HSD hold time	Thhd	8			ns	
Data setup time	Tdsu	8			ns	
Data hold time	Tdhd	8			ns	
DE 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	

6.4 Timing Diagram of Interface Signal



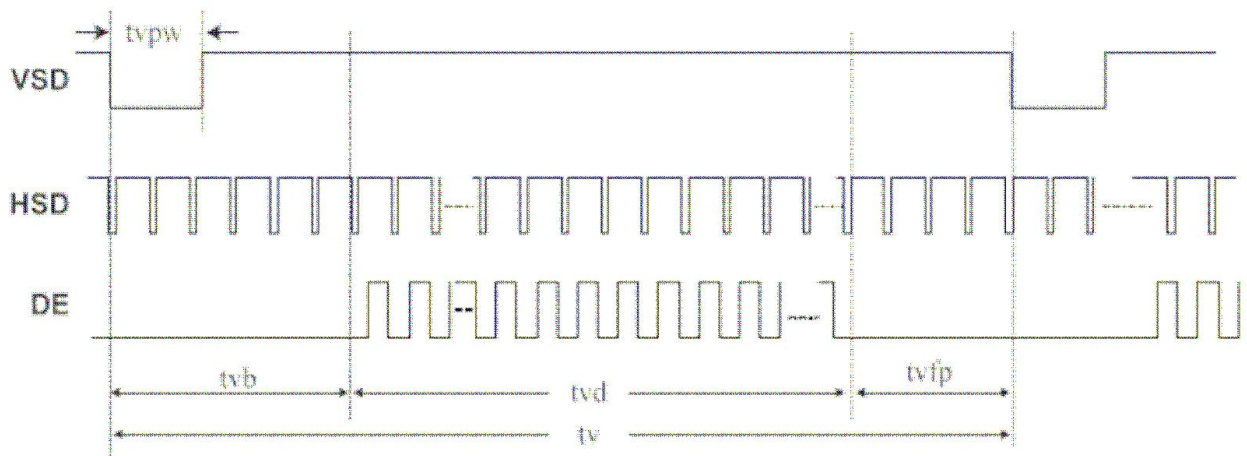
Horizontal input timing

Sampling clock timing



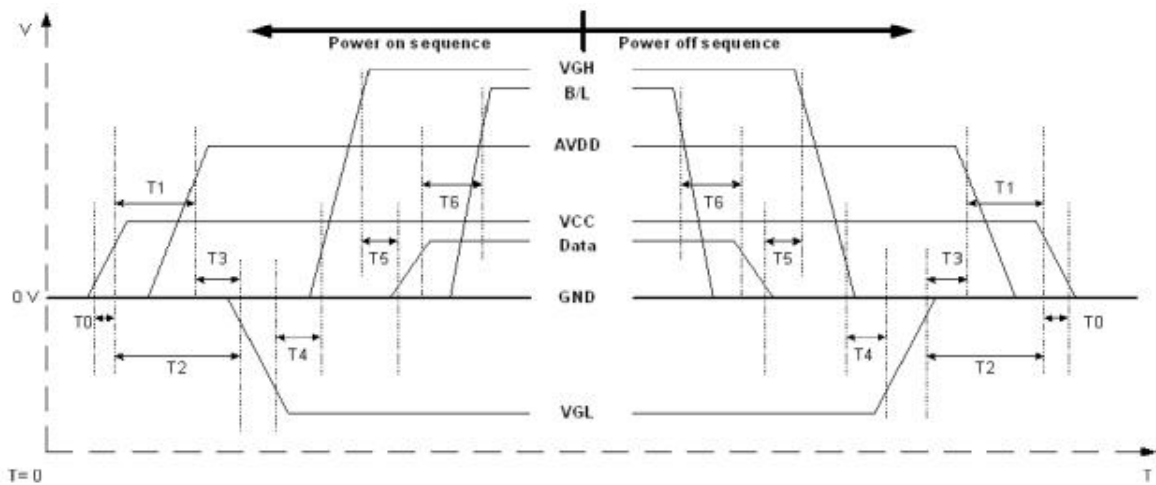
Horizontal display timing range

Vertical input timing

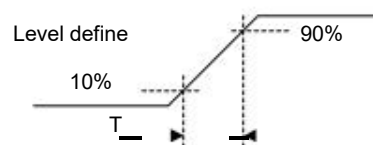


Vertical timing

6.5 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

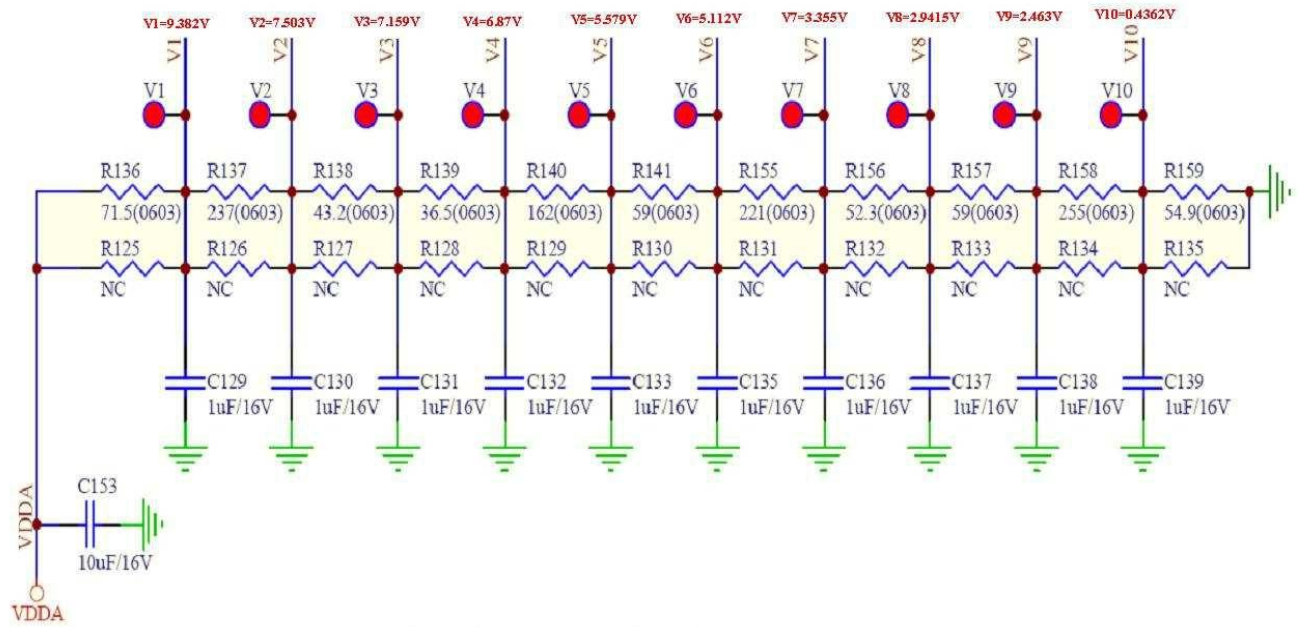


Power On Sequence: VCC-> AVDD -> VGL -> VGH -> Data -> B/L

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

6.6 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(0) 1 time/each terminal	
8	Vibration	1.Random: 1.04Grms, 5~500Hz, X/Y/Z, 30min/each direction 2. Sine: Freq. Range: 8~33.3Hz Stoke: 1.3mm Sweep: 2.9G, 33.3~400Hz ±X/Z: 2hr, Y: 4hr, cyc: 15min	
9	Shock	100G, 6ms, ±X, ±Y, ±Z 3 time for each direction	JIS C7021, A-10 (Condition A)
10	Vibration (with carton)	Random: 0.015G ² /Hz, 5~200Hz -6dB/Octave, 200~400Hz XYZ each direction: 2hr	
11	Drop (with carton)	Height: 60cm 1 corner, 3 edges, 6 surfaces	JIS Z0202

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

Unit : mm

8.1 Outline Dimension

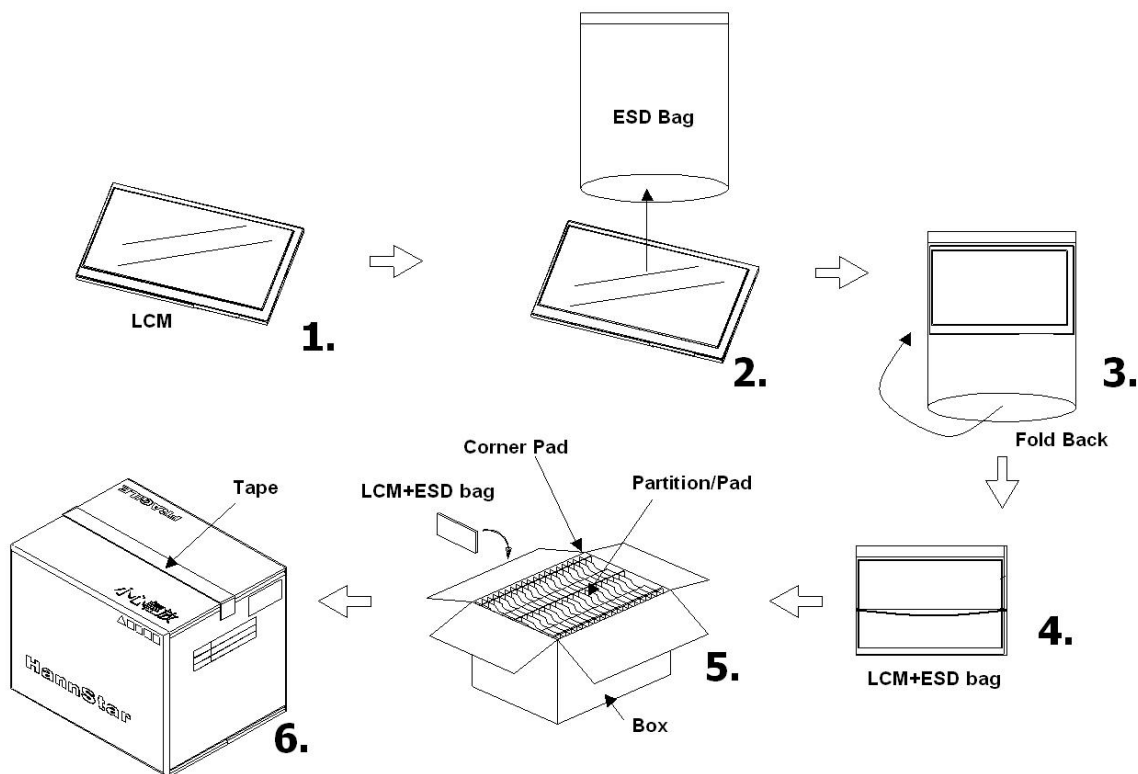
由 Autodesk 教育版产品制作

10.0 PACKAGE SPECIFICATION

10.1 Packing form

- (1) Package quantity in one carton: 60 pieces.
 (2) Carton size: 418mm 364mm 266mm.

Packing assembly drawing



	Material	Notice
Box	Corrugated Paper Board	(AB Flute)
Partition/Pad	Corrugated Paper Board	(B Flute)
Corner Pad	Corrugated Paper Board	(AB Flute)
ESD bag	PE	