Trust Industry Co.,LTD
Display Module SPECIFICATION
Model: T043S48027240011AH

Customer	
Customer NO.	
Approve By	

For Solution ---4.3 inch ;480(W)XRGBX272(H)

Owner:

Version: V1

Document ID: T043S480272011AH_V1

Approved By	Checked By	Prepared By

Record of Revisions

Rev	Date	Sub-Model	Description of change
V1	**July 06, 2011**		**Preliminary Product Specification was first issued.**

Table of contents

1. General description

1.1 Introduction

Trust Industry model T043S480272011AH 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 4.3 (16:9) inch diagonally measured active display area with WQVGA (480 horizontal by 272 vertical pixel) resolution.

1.2 Features

4.3 (16:9 diagonal) inch configuration
6 bits + FRC driver with 1channel TTL interface
LED Backlight
RoHS Compliance

1.3 Applications

Mobile NB
Digital Photo frame
Multimedia applications and Others AV system

1.4 General information

Item		Specification	Unit
Outline Dimension		105.5*67.2*2.95 (Typ.)	mm
Display area		95.04*53.85	mm
Number of Pixel		480 RGB(H) x 272(V)	pixels
Pixel pitch		0.198 x 0.198	mm
Pixel arrangement		RGB Vertical stripe	
Display mode		Normally white	
Surface treatment		Antiglare, Hard-Coating	
Weight		TBD.	g
Back-light		Single LED (Side-Light type)	
Power Consumption	B/L System	0.52	w

1.5 Mechanical Information

item		Min.	Typ.	Max.	Unit
Module Size	Horizontal(H)	105.2	105.5	105.8	mm
	Vertical(V)	66.9	67.2	67.5	mm
	Depth(D)	2.75	2.95	3.15	mm

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	VDD	0	5	V	GND=0

2.1.2 Back-Light Unit

Item	Symbol	Typ	MIN.	MAX.	Unit	Note
Forward voltage	Vf	(13V)	--	16	V	(1)(2)
Forward current	If	40	--		mA	(1)(2) (3)
Power Consumption	PBL	0.52	--	--	mW	

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℃

(3) Test Condition: LED current 40 mA

2.2 Environment Absolute Rating

Item	**Symbol**	**Min.**	**Max.**	**Unit**	**Remarks**
Operating Temperature	**Topa**	**-20**	**+70**	℃	
Storage Temperature	**Tstg**	**-30**	**+80**	℃	

3.0 OPTICAL CHARACTERISTICS

3.1 Optical specification:

Item	Symbol	Temp.	Min.	Typ.	Max.	Unit	Condition
Response Time	Tr	25℃	5	7	--	msec	θ=0 °,φ=0 ° (Note 1,3)
	Tf	25℃	20	28	--		
Contrast Rate	Cr	25℃	400	500	--	--	θ=0 °, φ=0 ° LED:ON, LIGHT:OFF(Note1,2)
Brightness	YL	25℃	200	250		Cd/m2	(IL=40mA)(Note1,4)
Visual angle range front and rear	θ	25℃	(θf) 60 (θb)55			De-gree	φ= 0°, CR≧10 LED:ON LIGHT:OFF(Note 1,4)
Visual angle range left and right	θ	25℃	(θl) 50 (θr) 50			De-gree	φ=90°, CR≧10 LED:ON LIGHT:OFF(Note 1,4)
Brightness uniformity	BUNI		75			%	Θ=0(Note5,7)
Visual angle			6:00				(Note 6)

3.2 Measuring Condition

Measuring surrounding: dark room ,LED current IL : 40Ma/LED

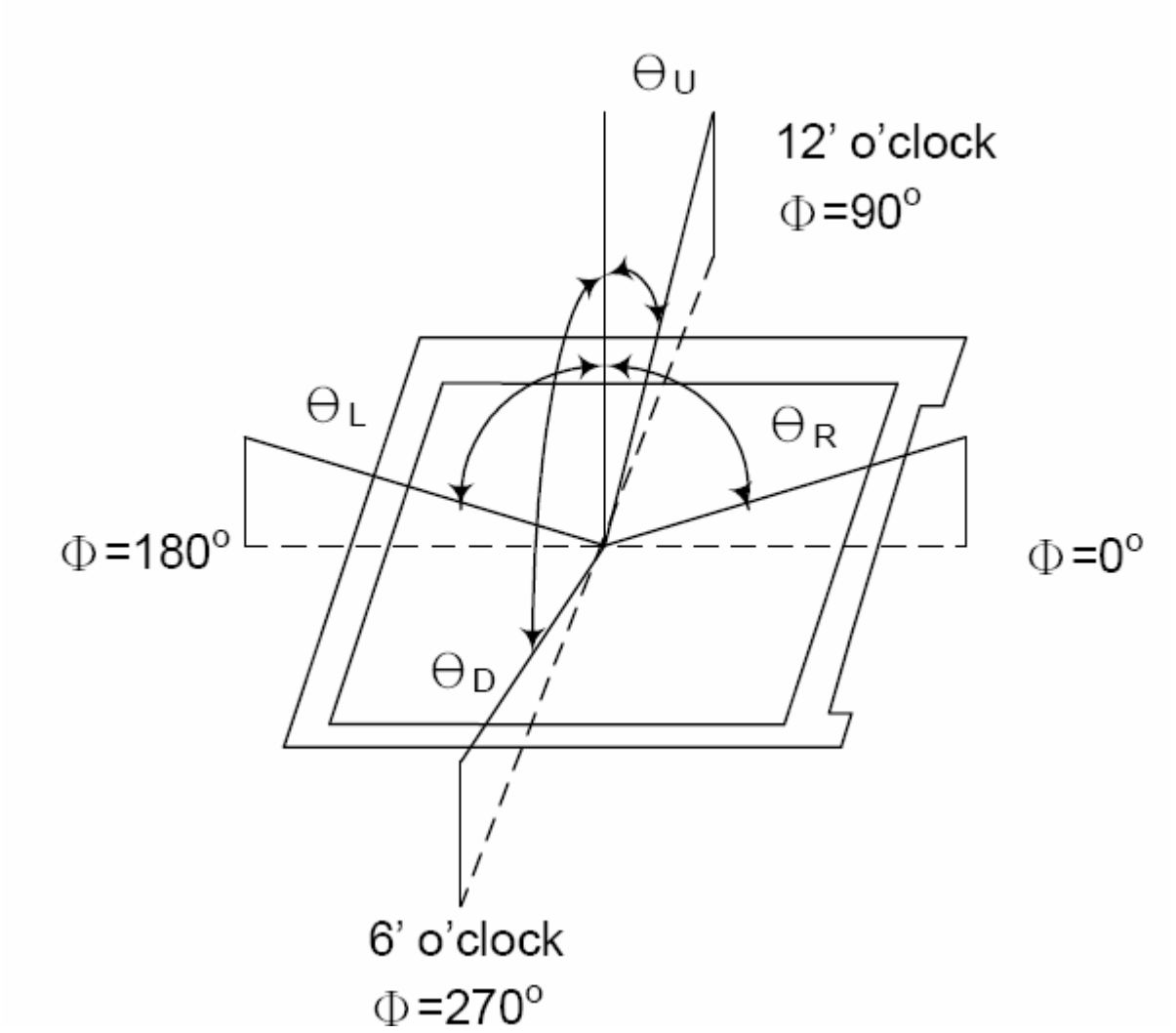
Ambient temperature: 25±2oC

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

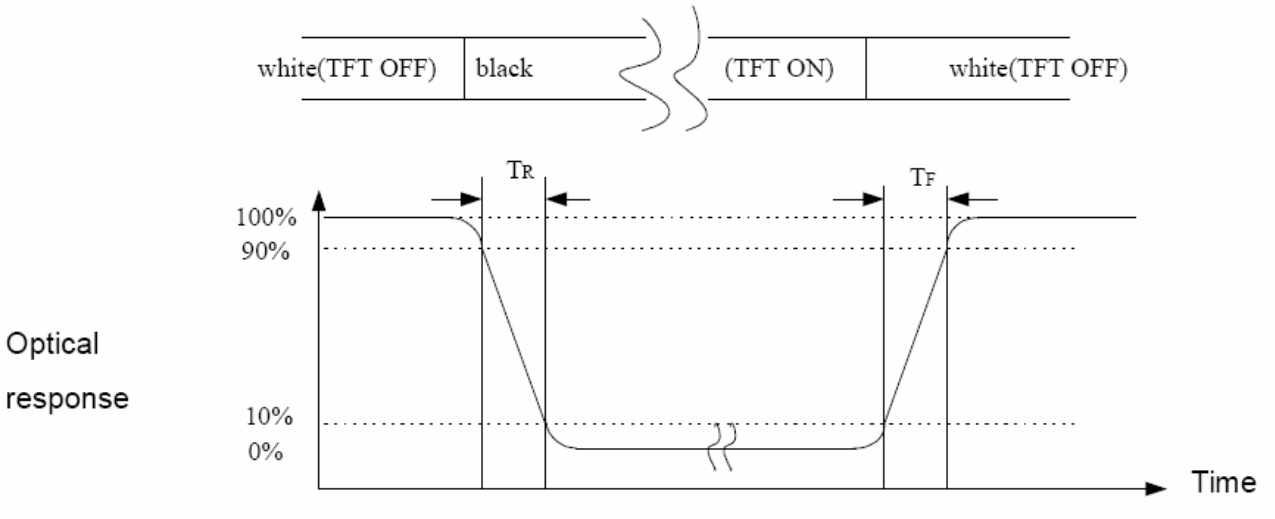
Note (1) Definition of Viewing Angle :



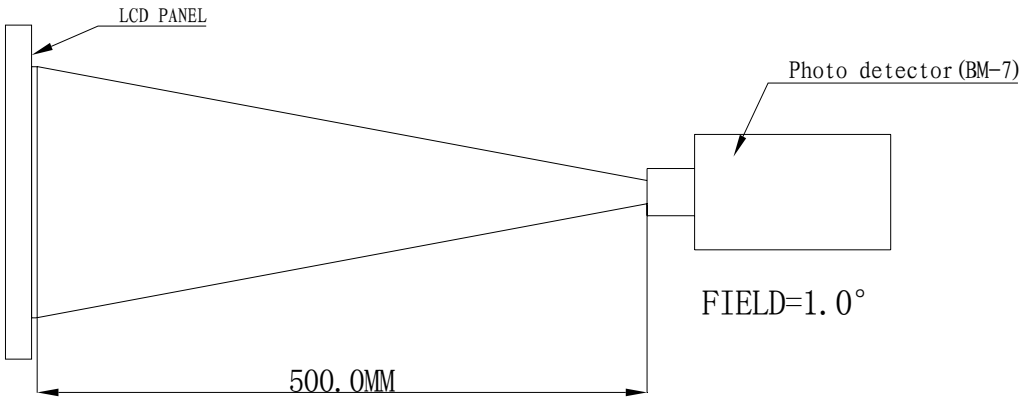
Note (2) Definition of Contrast Ratio (CR):
Measured at the center point of panel

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

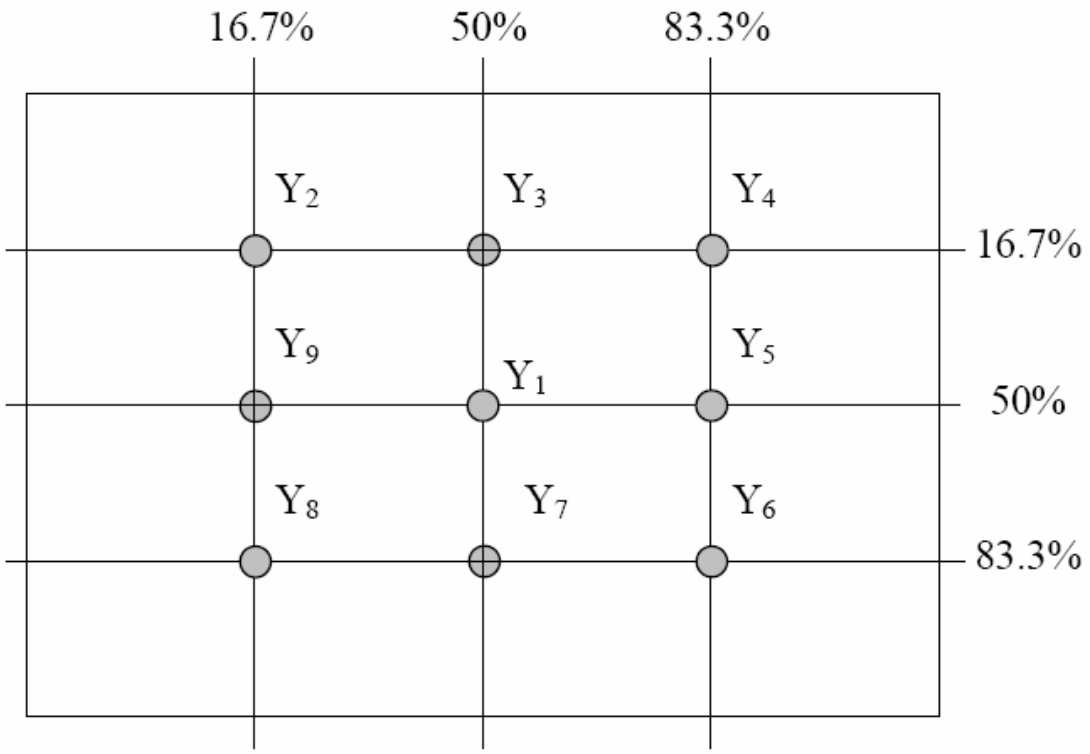
Note (3) Definition of Response Time: Sum of TR and TF



Note (4) Definition of optical measurement setup



Note (5) Definition of brightness uniformity



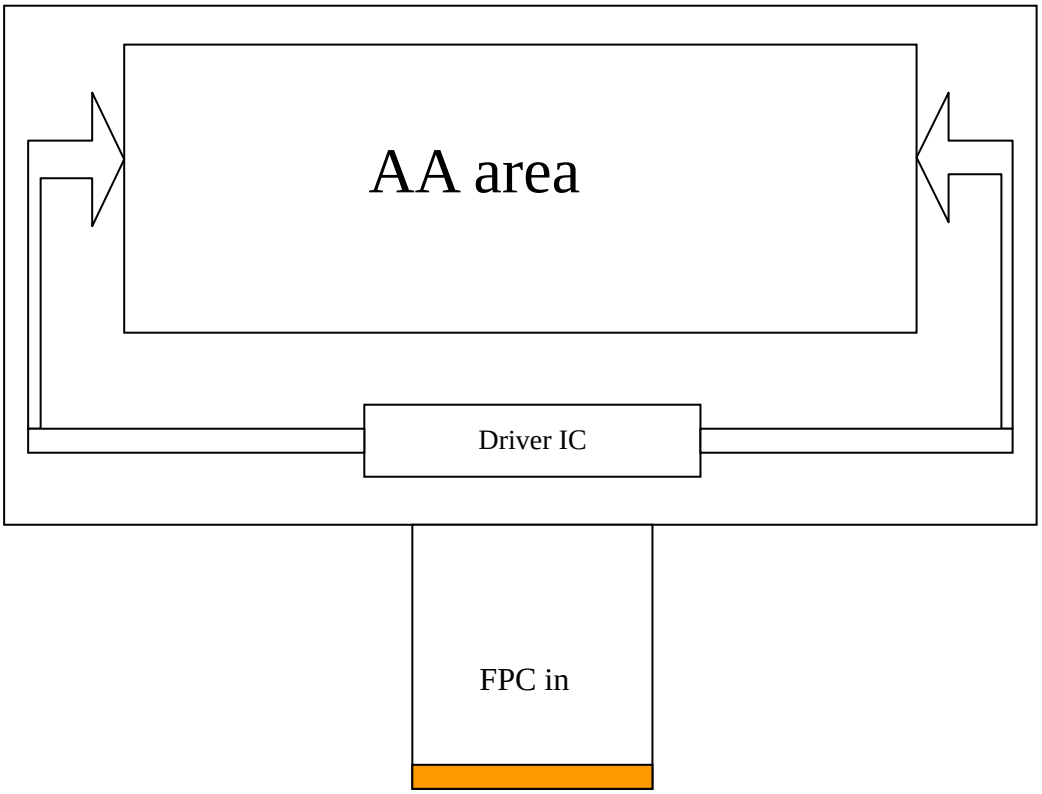
$$\text{Luminance uniformity} = \frac{\text{(Min Luminance of 9 points)}}{\text{(Max Luminance of 9 points)}} \times 100\%$$

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

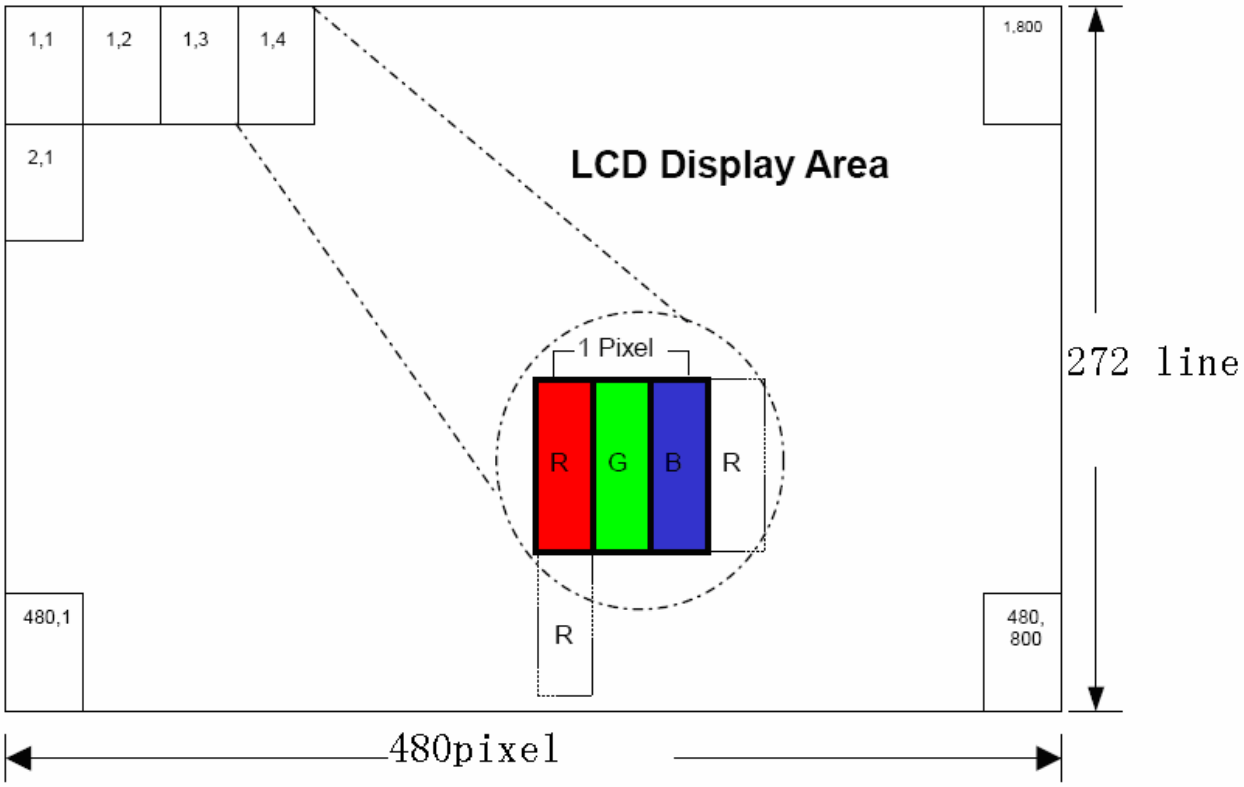
Note (7) Measured at the brightness of the panel when all terminals of LCD panel are electrically open.

4.0 BLOCK DIAGRAM

4.1 TFT LCD Module



4.2 Pixel Format



5.0 INTERFACE PIN CONNECTION

5.1 TFT LCD ModuleCN2 (Input signal): FPC Down Connector, (FH28-40S-0.5SH (HIROSE), 40pin,pitch = 0.5mm)

Terminal No.	Symbol	IO	Functions
1	LED-	P	LED cathode
2	LED+	P	LED anode
3	GND	P	Power Ground
4	VDD	P	3.3V power
5	R0	I	Data Input(LSB)
6	R1	I	Data Input
7	R2	I	Data Input
8	R3	I	Data Input
9	R4	I	Data Input
10	R5	I	Data Input
11	R6	I	Data Input
12	R7	I	Data Input (MSB)
13	G0	I	Data Input (LSB)
14	G1	I	Data Input
15	G2	I	Data Input
16	G3	I	Data Input
17	G4	I	Data Input
18	G5	I	Data Input
19	G6	I	Data Input
20	G7	I	Data Input(MSB)
21	B0	I	Data Input(LSB)
22	B1	I	Data Input
23	B2	I	Data Input
24	B3	I	Data Input
25	B4	I	Data Input
26	B5	I	Data Input
27	B6	I	Data Input
28	B7	I	Data Input(MSB)
29	GND	P	Power Ground
30	DCLK	I	Data Clock Input

31	DISP	I	Display on/off
32	HSD	I	Horizontal sync input Negative polarity
33	VSD	I	Vertical sync input Negative polarity
34	DEN	I	Data Enable
35	NC	I	No connection
36	GND	I	Power Ground
37	XR	I/O	RTP Right electrode
38	YD	I/O	RTP Bottom electrode
39	XL	I/O	RTP Left electrode
40	YU	I/O	RTP Top electrode

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
1	VL	LED power supply (high voltage)
2	GL	LED power supply (low voltage)

6.0 ELECTRICAL CHARACTERISTICS

6.1 TFT LCD Module

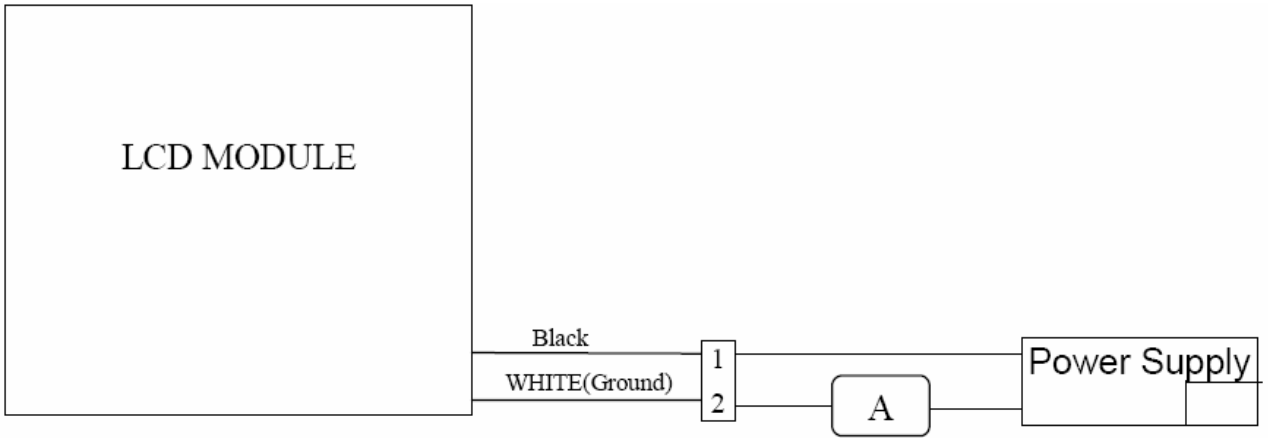
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Power in	VDD	2.7	3.3	3.6	V	2
Digital in	Din	0	-	VDD	V	1

Note (1): HSYNC, VSYNC, DE, Digital Data
Note (2): Be sure to apply the power voltage as the power sequence spec.

6.2 Back-Light Unit

The backlight system is an edge-lighting type with 8 LED.
The characteristics of the LED are shown in the following tables.

Item	Symbol	Min.	Typ.	Max.	Unit	Note
LED current	IL	-	40	-	mA	(2)
LED Voltage	VL	-	13	-	V	
Operating LED life time	Hr	20000	-	-	Hour	(1)(2)

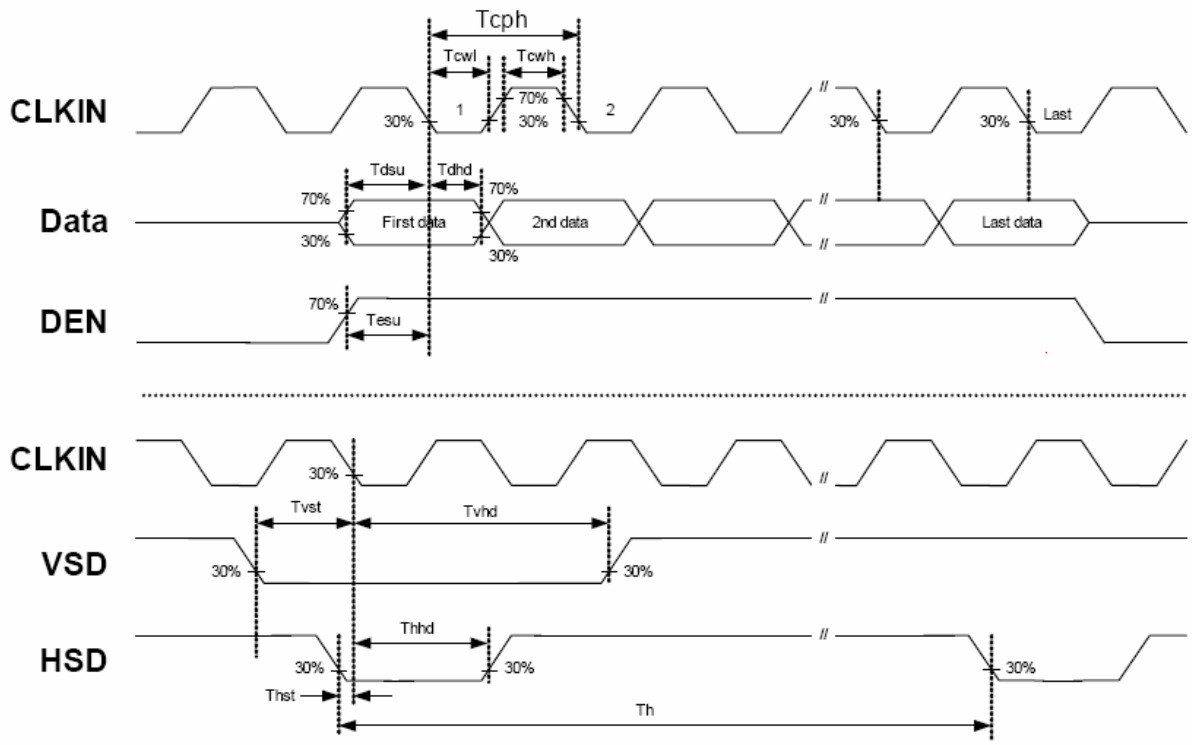


Note (1) LED life time (Hr) can be defined as the time in which it continues to operate under the condition: Ta=25±3 oC, typical IL value indicated in the above table until the brightness becomes less than 50%.

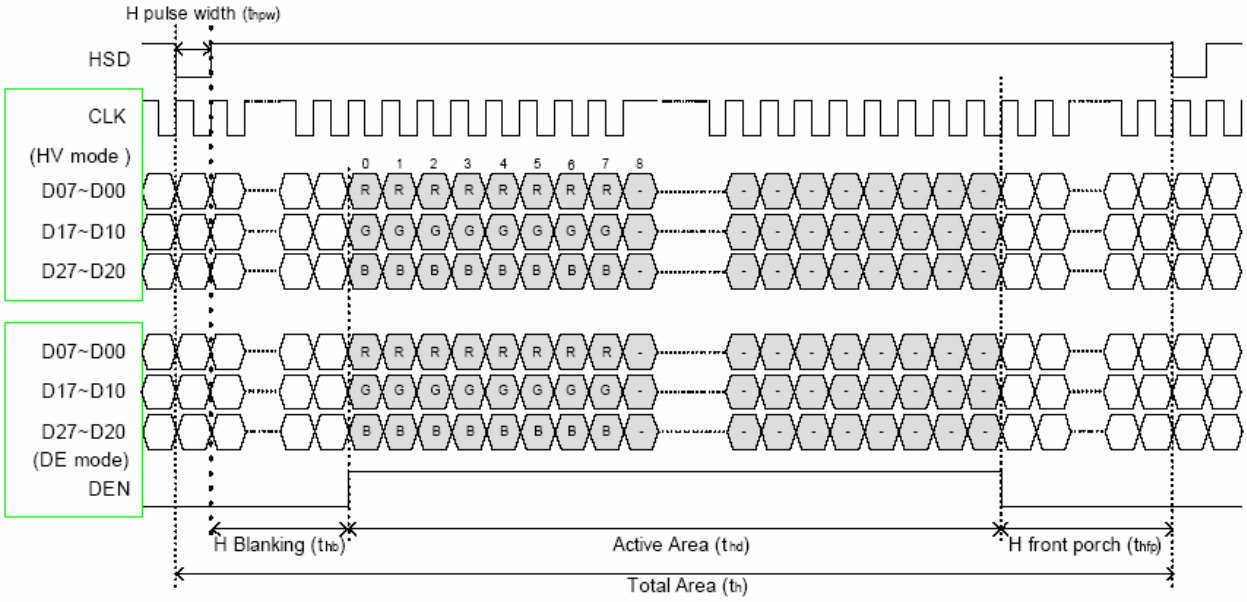
6.3 AC Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Note
DCLK clock time	Tclk	33.3	-	-	ns	DCLK=30MHz
DCLK clock low period	Tcwl	40	-	60	%	
DCLK clock high period	Tcwh	40	-	60	%	
Clock rising time	Trck	9	-	-	ns	
Clock falling time	Tfck	9	-	-	ns	
HSD width	Thwh	1	-	-	DCLK	
HSD period time	Th	55	60	65	us	
HSD setup time	Thsu	12	-	-	ns	
HSD hold time	Thhd	12	-	-	ns	
VSD width	Thwh	1	-	-	Th	
VSD setup time	Tvsu	12	-	-	ns	
VSD hold time	Tvhd	12	-	-	ns	
Data setup time	Tdasu	12	-	-	ns	
Data hold time	Tdahd	12	-	-	ns	
DEN setup time	Tdesu	12	-	-	ns	
DEN hold time	Tdehd	12	-	-	ns	

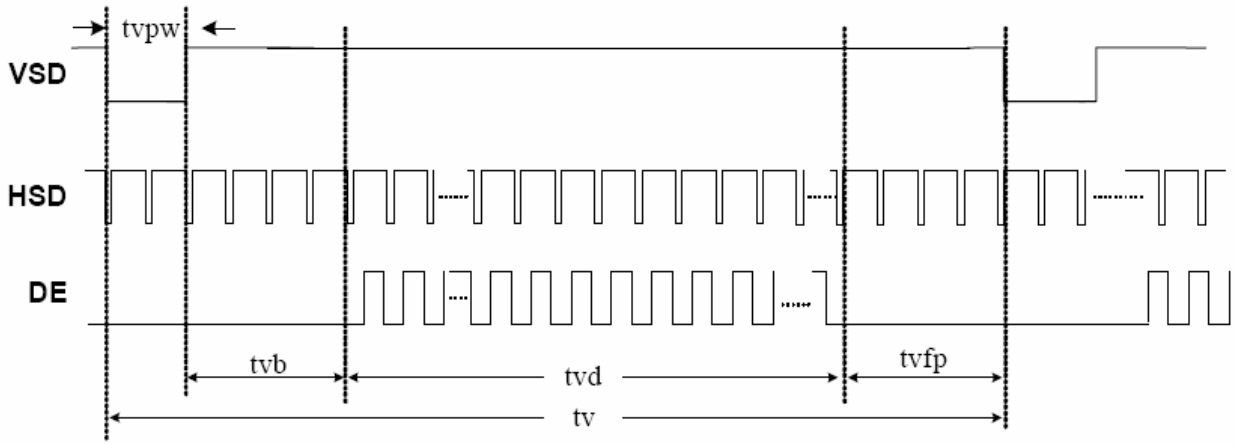
6.4 Timing Diagram of Interface Signal



Sampling clock timing



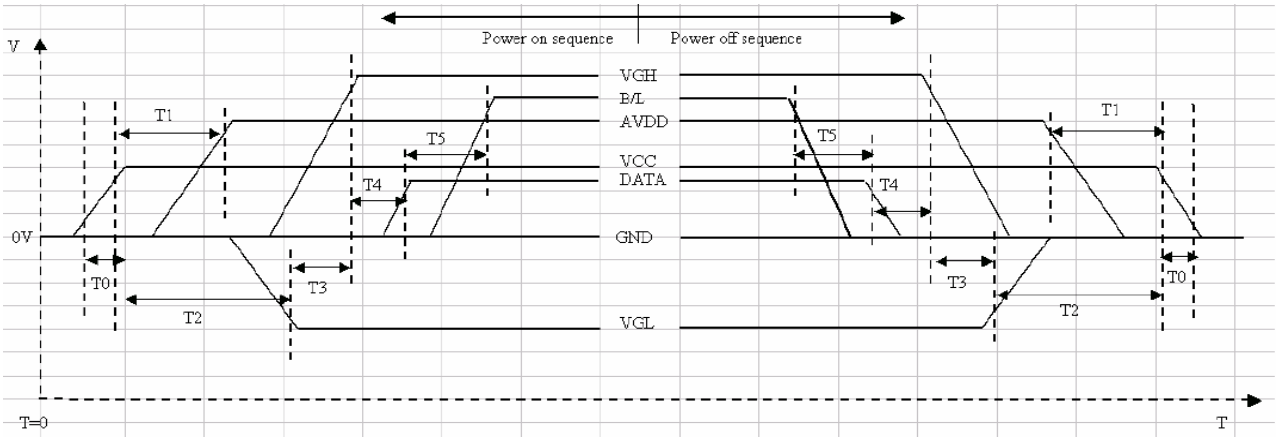
Horizontal display timing range



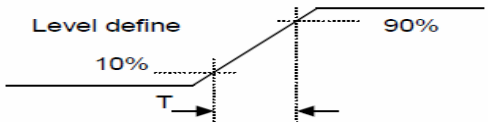
Vertical timing

Item	Symbol	Min.	Typ.	Max.	Unit	Note
DCLK frequency	Fclk	5	9	12	MHz	
VSD period time	Tv	277	288	400	Th	
VSD display area	Tvd		272		Th	
VSD back porch	Tvb	3	8	31	Th	
VSD front porch	Tvfp	2	8	93	Th	
HSD period time	Th	520	525	800	DCLK	
HSD display area	Thd		480		DCLK	
HSD back porch	Thb	36	40	255	DCLK	
HSD front porch	Thfp	4	5	65	DCLK	

6.5 Power Sequence



Item	Min.	Typ.	Max.	Unit
T0	0.5	--	20	msec
T1	16			msec
T2	20			msec
T3	10			msec
T4	10		50	msec
T5	50			msec



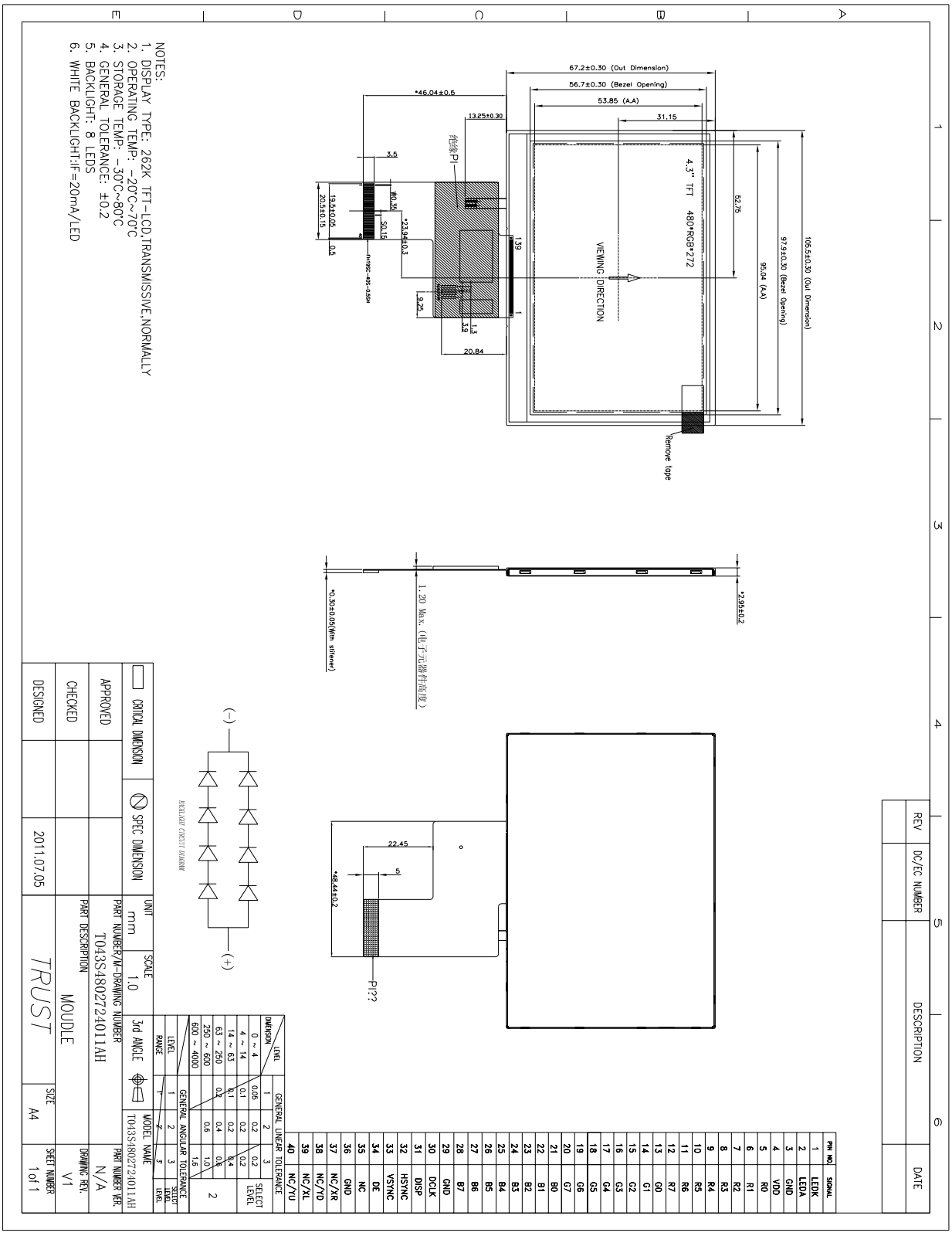
Power On Sequence : VCC=>AVDD=>VGL=>VGH=>DATA=>B/L
Power Off Sequence: B/L=>DATA=>VGH=>VGL=>AVDD=>VCC
NOTES:
Data Include
R0~R7,G0~G7,B0~B7,HSD,HSD,VSD,DCLK,SHLR,UPDN,DE,MODE,RSTB,
STBYB,DITH

7.0 Reliability test items

Test Item	Test Conditions	Notes
High temperature Operation	70±3℃ ,T=240hrs	
Low temperature Operation	-20±3℃ ,T=240hrs	
High Temperature Storage	80±3℃ ,T=240hrs	1,2
Low Temperature Storage	-30±3℃ ,T=240hrs	1,2
Humidity Test	60℃ ,Humidity 90% ,240hrs	1,2
Thermal Shock Test	-30℃,30min～80℃,30min (200 cycle)	1,2
Vibration Test(Packing)	Sweep frequency 10～55～10HZ/min Amplitude:0.75mm Test direction:X,Y,Z/3 axis Duration 30min/each axis	2
Static Electricity	150Pf 330ohm ±8KV, 10time air discharge ±4KV, 10time connect discharge	

8.0 OUTLINE DIMENSION

Outline Dimension:



9.0 GENERAL PRECAUTION

9.1 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.

9.2 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.

9.3 Breakage of LCD Panel

9.3.1.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.

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

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

9.3.4. Handle carefully with chips of glass that may cause injury, when the glass is broken.

9.4 Electric Shock

9.4.1. Disconnect power supply before handling LCD module.

9.4.2. Do not pull or fold the LED cable.

9.4.3. Do not touch the parts inside LCD modules and the fluorescent LED's connector or cables in order to prevent electric shock.

9.5 Absolute Maximum Ratings and Power Protection Circuit

9.5.1. 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. 9.5.2. 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.

9.6 Operation

9.6.1 Do not touch, push or rub the polarizer with anything harder than HB pencil lead.

9.6.2 Use fingerstalls of soft gloves in order to keep clean display quality, when persons handle the LCD module for incoming inspection or assembly.
9.6.3 When the surface is dusty, please wipe gently with absorbent cotton or other soft material.
9.6.4 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.
9.6.5 When cleaning the adhesives, please use absorbent cotton wetted with a little petroleum benzine or other adequate solvent.

9.7 Mechanism

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

9.8 Static Electricity

9.8.1 Protection film must remove very slowly from the surface of LCD module to prevent from electrostatic occurrence.
9.8.2. 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.

9.9 Strong Light Exposure

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

9.10 Disposal

When disposing LCD module, obey the local environmental regulations.

