



韵唐光电

SPECIFICATION FOR QLED LCM

☐ Preliminary Specification

☒ Final Specification

韵唐 QLED

Customer Approve:

QC 品质 : _____

R&D 研发 : _____

Approved 批准: _____

产品型号(Description): YT097IBEXL001-A

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REVISION RECORD

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1.0 General description

1.1 Introduction

YT097IBEXL001-A is **QLED** model 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 **10.1 (16:10) inch** diagonally measured active display area with **XGA(768 horizontal by 1024 vertical pixel array)** resolution. The TFT-LCD panel used for this module is adapted for a low reflection and higher color type.

1.2 Features

- 4 lanes MIPI Interface
- Data enable signal mode
- 8-bit color depth, display 16.7M colors
- Low driving voltage and low power consumption
- ROHS Compliant

1.3 General information

Item		Specification	Unit	Remarks
Outline Dimension		210.2(W)x164.2(H)x4.8(T)	mm	Tolerance: ± 0.3 mm
Display area		147.456(W) x 196.608(H)	mm	
Number of Pixel		768(H) x RGB x 1024(V)	pixels	
Pixel pitch		0.192(H) x 0.192(V)	mm	
Pixel arrangement		Pixels RGB stripe arrangement		
Display mode		Normally Black		
Surface treatment		IPS Film		
Weight		TBD (Typ.)	gram	
Back-light		Single LED (Side-Light type)		
Power Consumption	B/L System	2.856(Max.)	watt	
Driver IC		-		*Using IC
Polarizer : zhuyou		Up: 0° sand surface Down 90° smooth surface	pcs	

1.4 Mechanical Information

Item		Min.	Typ.	Max.	Unit
Module Size	Horizontal(H)	209.9	210.2	210.5	mm
	Vertical(V)	163.9	164.2	164.5	mm
	Depth(D)	4.5	4.8	5.1	mm



2.0 ABSOLUTE MAXIMUM RATINGS

2.1 Electrical Absolute Rating (GND=AGND=0V)

Parameter	Symbol	Spec.			Unit	Note
		Min.	Typ.	Max.		
Interface Supply Voltage	IOVCC	-0.3	-	+3.6	V	
Logic Supply Voltage	VCI	-0.3	-	+6.6	V	
Analog Supply Voltage	VCIP	-0.3	-	+6.6	V	
High speed interface Supply Voltage	VCCH	-0.3	-	+6.6	V	
Positive Voltage input	AVDD	-0.3	-	AVDD+0.5	V	
Negative Voltage input	AVEE	0	-	-6.6	V	
Power Supply Voltage	VGH	-0.3	-	+25	V	
Power Supply Voltage	VGL	0	-	-16	V	
Operation Temperature	TOPR	-20	-	+70	°C	
Storage Temperature	TSTG	-10	-	+60	°C	

Note: (1) All of the Voltages listed above are with respect to GND=0V.

2.2 TFT LCD Power Supply Voltage

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	VCI	-	3.3	-	V
	AVDD	9	10	13	V
	AVEE	-	-	-	V
	IOVCC	-	-	-	V



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2.3 Back-light Unit

Parameter	Symbol	Min	Typ	Max.	Unit	Note
LED Current	I_L	-	-	-	mA	Ta=25°C
LED Voltage	V_L	-	-	-	V	Ta=25°C
LED Life-time	h	20000	-	-	V	Ta=25°C, If=20mA

2.4 Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Operating Temperature	Topa	-20	70	°C	
Storage Temperature	Tstg	-30	80	°C	



3.0 OPTICAL CHARACTERISTICS

3.1 Optical Specifications

Item	Symbol	Temp	Condition	Min	Typ	Max	Unit	Remark
Viewing Angle range	Horizontal	θ_{L}	CR > 10	75	80	--	Deg	Note (1,2)
		θ_{R}		75	80			
	Vertical	θ_{U}		75	80	--	Deg	
		θ_{D}		75	80			
Luminance Contrast ratio		CR	$\theta = 0^{\circ}$	700	900	--	--	Note (1,2)
Brightness		YL		-	TBD	--	Cd/cm2	Note (4,5)
Transmittance		T(%)	$\theta = 0^{\circ}$	--	4.9	--	%	
Color Gamut (C light)				--	70.8	--	%	
Reproduction of color (C-light)	White	Xw	$\theta = 0^{\circ}$	-0.02	0.292	+0.02		Note (1,4)
		Yw			0.323			
	Red	Rx			0.660			
		Ry			0.318			
	Green	Gx			0.255			
		Gy			0.574			
	Blue	Bx			0.137			
		By			0.095			
Response Time (Rising + Falling)	Trt		Ta= 25° C $\theta = 0^{\circ}$	--	30	40	ms	Note (1,3)
Opetical View Direction			ALL					Note (1)

3.2 Measuring Condition

Measuring surrounding: dark room

Ambient temperature: 25±2°C

15min. warm-up time.

3.3 Measuring Equipment

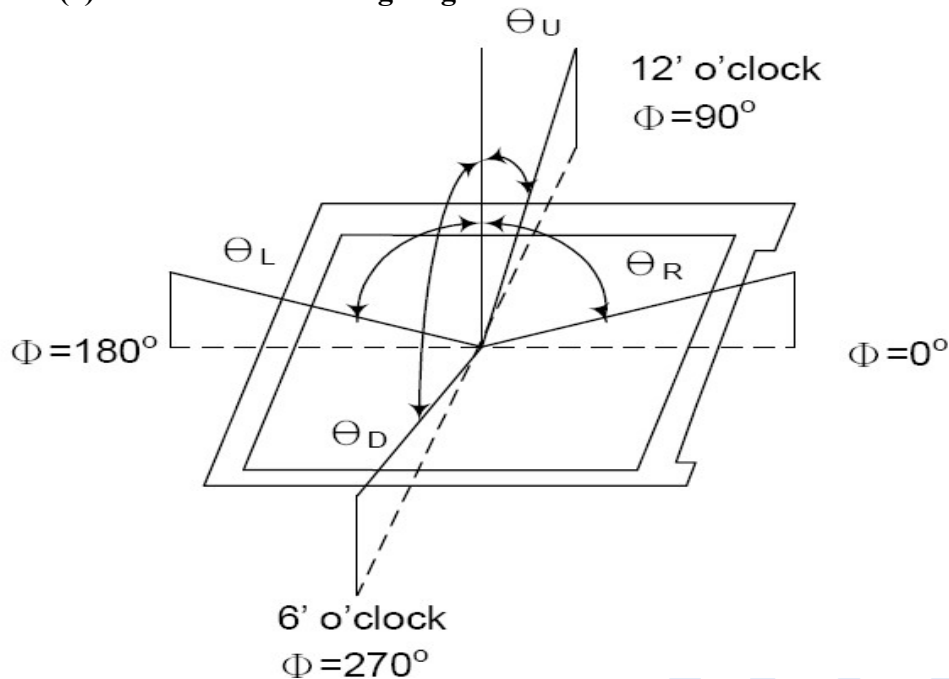
FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-7 for other optical characteristics. Measuring spot size: 20 ~ 21 mm



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Note (1) Definition of Viewing Angle :

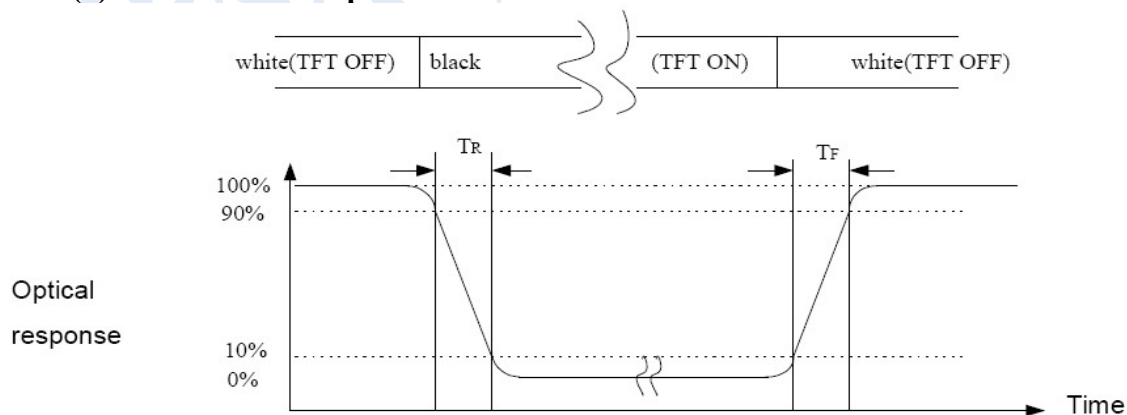


Note (2) Definition of Contrast Ratio (CR):

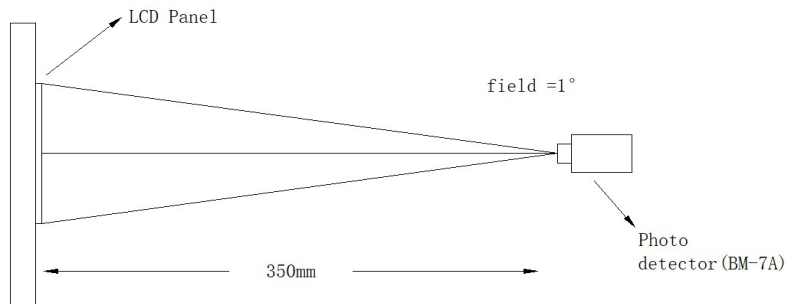
Measured at the center point of panel

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

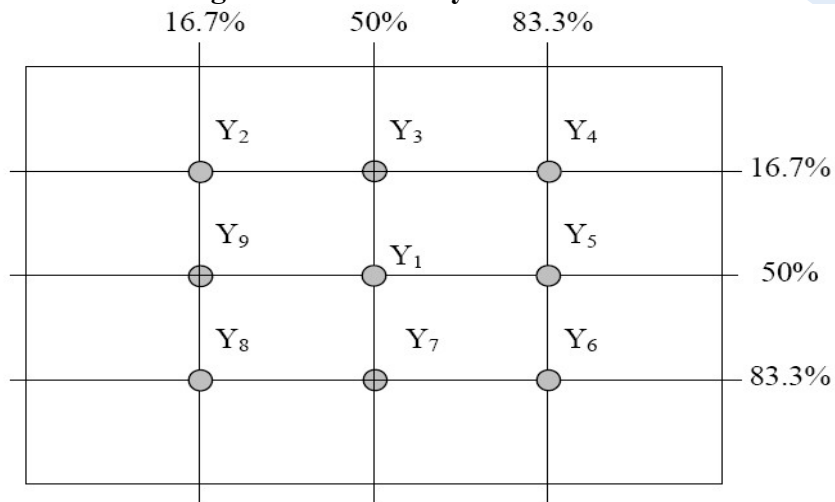
Note (3) Definition of Response Time: Sum of TR and TF



Note (4) Definition of optical measurement setup



Note (5) Definition of brightness uniformity



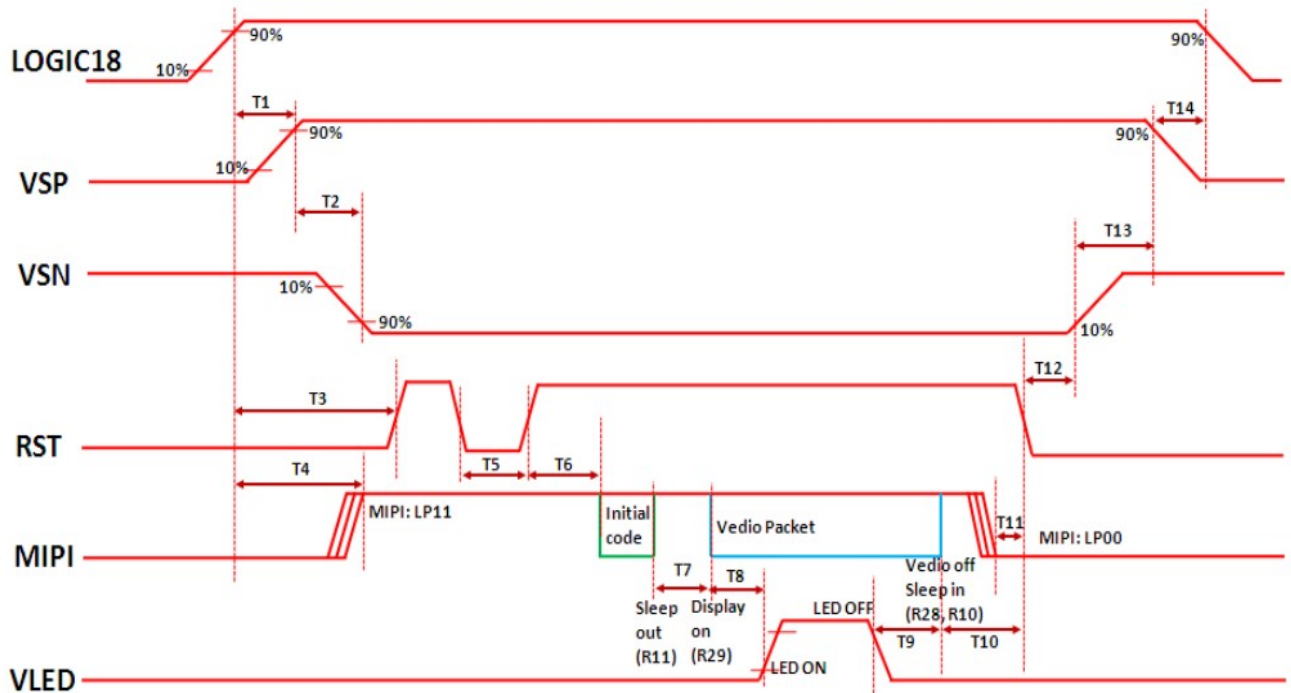
$$\text{Luminance uniformity} = \frac{(\text{Min Luminance of 9 points})}{(\text{Max Luminance of 9 points})} \times 100\%$$



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4.0 Power On/Off Sequence

To prevent the device damage from latch up, the power on/off sequence shown Below must be followed.



ITEM	Min.	Typ.	Max.	Unit	Remark
T1	0		5	ms	
T2	1		10	ms	
T3	60		100	ms	
T4	0		T3	ms	
T5	10		1000	us	
T6	200		300	ms	
T7	120		200	ms	
T8	2			Frame	
T9	2			Frame	
T10	100		300	ms	
T11	0				
T12	0				
T13	0				
T14	0				



5.0 ELECTRICAL CHARACTERISTICS

5.1 DC characteristics

(T_A=-40 ~ 85 °C, VCIP=2.5 ~ 4.8V, VCI=2.5 ~ 4.8V, IOVCC=1.65~3.3V)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
IOVCC	V _{IN}	Interface Supply Voltage	1.65	-	3.6	
VCIP	V _{IN}	Logic Supply Voltage	2.5	-	6.0	
VCI	V _{IN}	Analog Supply Voltage	2.5	-	6.0	
VCCH	V _{IN}	High speed interface Supply Voltage	1.65	-	3.6	
Input high voltage	V _{IH}	IOVCC= 1.65 ~ 3.3V VCIP= 2.5 ~ 3.3V VCI= 2.5 ~ 3.3V	0.7 IOVCC	-	IOVCC	V
Input low voltage	V _{IL}		0	-	0.3 IOVCC	V
VPP	V _{IH}	VPP	7.25V	7.5V	7.75V	V
	V _{IL}					
Output high voltage (SDO, LEDPWM)	V _{OH1}	I _{OH} = -1.0 mA	0.8 IOVCC	-	IOVCC	V
Output low voltage (SDO, LEDPWM)	V _{OL1}	IOVCC= 1.65 ~ 2.4V I _{OL} = 1.0 mA	0	-	0.2 IOVCC	V
Logic High level input current	I _{IH}	VSYNC, HSYNC	-	-	1	μA
		RESX, DCX, SCL, CSX, RDX, WRX, SCL	-	-	1	μA
	I _{IHD}	DB[23...0], SDI, DCX	-	-	1	μA
		DB[23...0]	-	-	1	μA
Logic Low level input current	I _{IL}	VSYNC, HSYNC	-1	-		μA
		RESX, DCX, CSX, RDX, WRX, SCL	-1	-		μA
	I _{ILD}	DB[23...0], SDI, DCX	-1	-		μA
		DB[23...0]	-1	-		μA
Current consumption standby mode (VCIP/VCI-VSSD)	I _{ST(VDD)}	VCIP/VCI=2.8V, IOVCC=1.8V T _A =25°C	-	TBD	-	μA
Current consumption standby mode (IOVCC- VSSD)	I _{ST(IOVCC)}		-	TBD	-	μA
Current consumption during Deep-standby mode (VCIP/VCI-VSSD)	I _{DP-ST(VDD)}	VCIP/VCI=2.8V, IOVCC=1.8V T _A =25°C	-	TBD	-	μA
Current consumption during Deep-standby mode (IOVCC- VSSD)	I _{DP-ST(IOVCC)}		-	TBD	-	μA

Note: 1. The VOTP pin is open on normal mode and in used while OTP programming condition.
2. The GRAM data is eliminated under the Deep standby mode.



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5.2 AC characteristics

Reset input timings

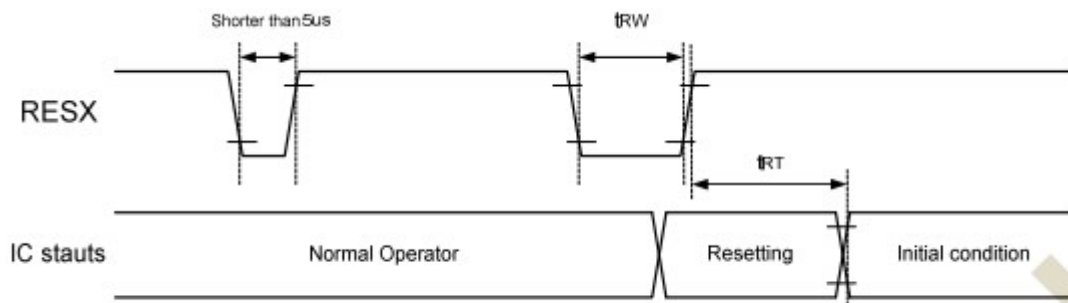


Figure 11.1: Reset input timings

Symbol	Parameter	Related pins	Min.	Max.	Unit
t_{RW}	Reset pulse width ⁽²⁾	RESX	10	-	μs
t_{RT}	Reset complete time ⁽³⁾	-	-	5 (Note 5)	ms
		-	-	120 (Note 6, 7)	ms

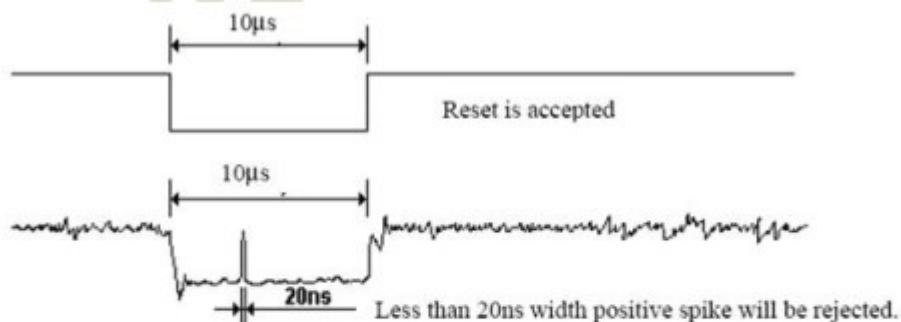
Note: (1) The reset complete time also required time for loading ID bytes from OTP to registers. This loading is done every time when there is HW reset cancel time (t_{RT}) within 5 ms after a rising edge of RESX.

(2) Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below.

RESX Pulse	Action
Shorter than 5 μs	Reset Rejected
Longer than 10 μs	Reset
Between 5 μs and 10 μs	Reset Start

(3) During the resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep Out –mode. The display remains the blank state in Sleep In –mode) and then returns to Default condition for H/W reset.

(4) Spike Rejection also applies during a valid reset pulse as shown below:



(5) When Reset is applied during Sleep In Mode.

(6) When Reset is applied during Sleep Out Mode.

(7) It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.



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5.3 Input Signal Timing

Resolution=800x1280 (T_A=25°C, IOVCC=1.8V, VCIP=VCI=VCCH=2.8V)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
HS low pulse width	HS	-	6	18	78	DCK
Horizontal back porch	HBP	-	5	18	78	DCK
Horizontal front porch	HFP	-	5	18	78	DCK
Horizontal blanking period	HBLK	HS+HBP+HFP	16	54 (Note1)	88	DCK
Horizontal active area	HDISP	-	-	800	-	DCK
Pixel Clock	PCLK	-	63.06 (Note2)	67.33 (Note2)	81.51 (Note2)	MHz

Note 1: HS+HBP > 0.5us.

Note 2: Pixel Clock = (HBLK+HDISP) * (VBK+VDISP) * Frame rate, Frame rate=60Hz.

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Vertical low pulse width	VS	-	2	4	200 Note(1)	Line
Vertical front porch	VFP	-	4	20	200	Line
Vertical back porch	VBP	-	2	10	200 Note(1)	Line
Vertical blanking period	VBK	VS+VBP+VFP	8	34	250	Line
Vertical active area	-	VDISP	-	1280	-	Line
Vertical Refresh rate	VRR	-	-	60	-	Hz

Note: (1) The VS and VBP pulse width are related to GIP start pulse and GIP clock pulse timing. The GIP start pulse and GIP clock pulse must be set at corresponding position for LCD normal display.



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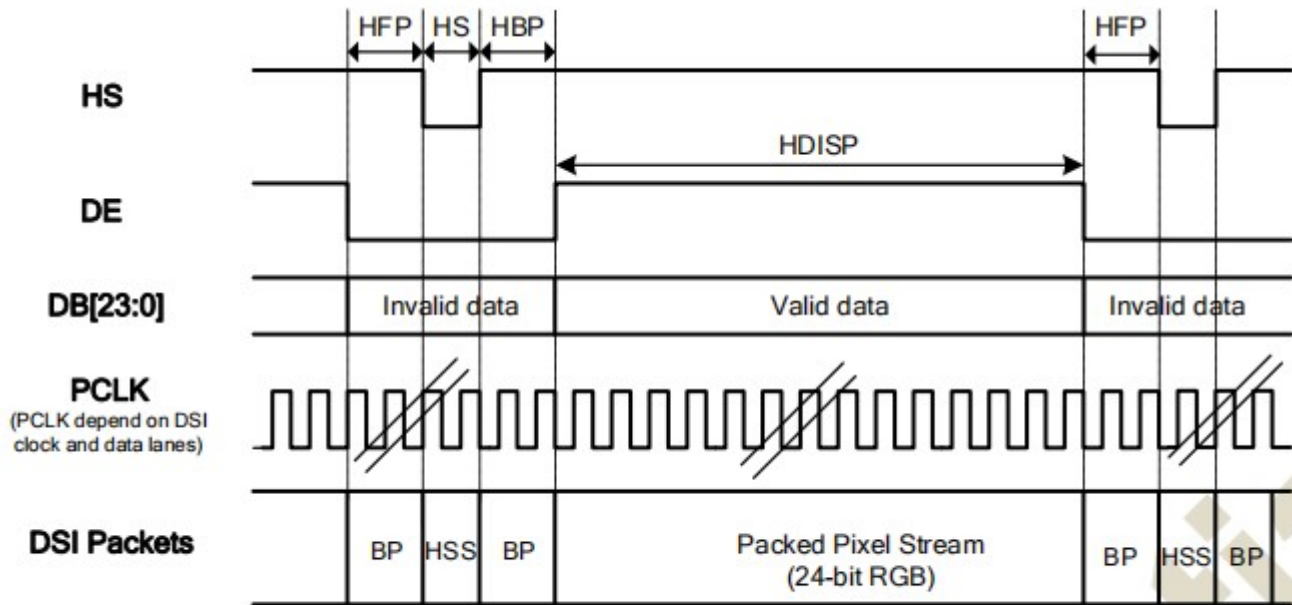


Figure 11.10: Horizontal Timing for DSI Video mode I/F

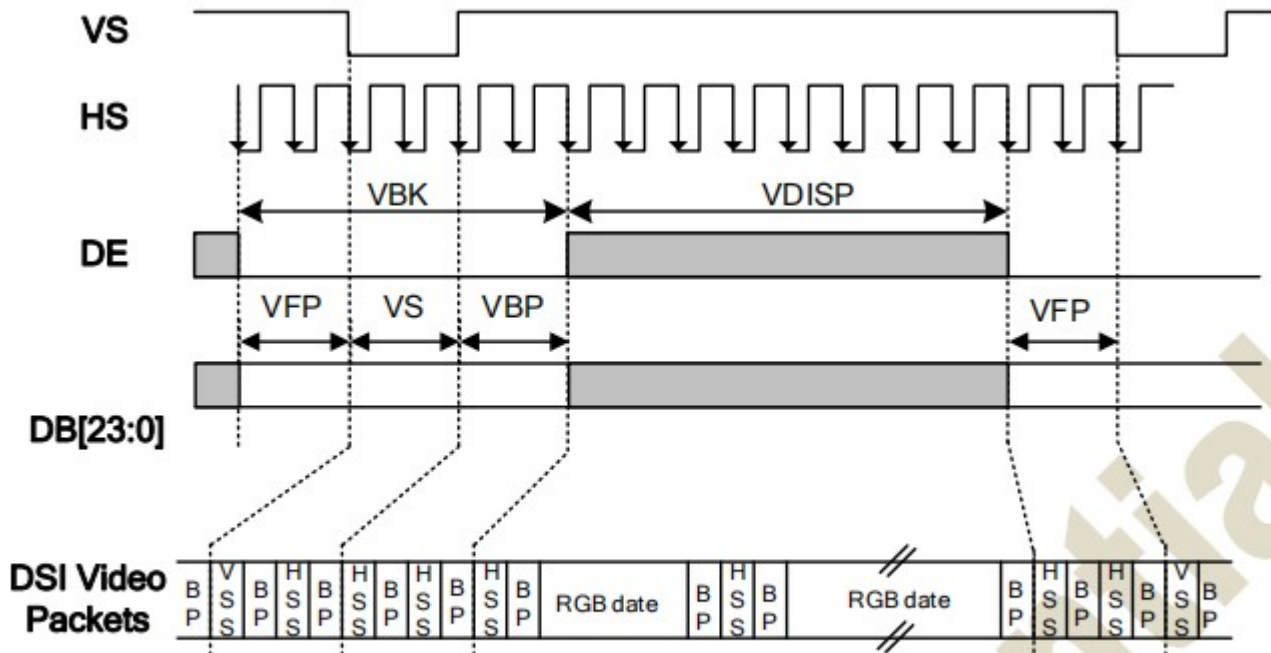


Figure 11.9: Vertical Timings for DPI I/F



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6.0 Reliability test items

Test Item	Test Conditions	Notes
High temperature Operation	Ta= +70°C, 96hrs	
Low temperature Operation	Ta= -20°C, 96hrs	
High Temperature Storage	Ta= +80°C, 96hrs	
Low Temperature Storage	Ta= -30°C, 96hrs	
Humidity Test	60°C ,Humidity 90% ,96hrs	
Thermal Shock Test	-20°C,30min ~ +70°C,30min (30 cycle)	
Vibration Test(Packing)	Sine Wave 1.04G, 5~500Hz, XYZ 30min/each direction	
Static Electricity	Half-Sine, 100G, 6ms, ±XYZ, 3 cycle	



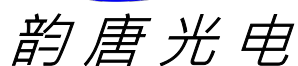
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7.0 INTERFACE PIN CONNECTION

Signal of interface

Terminal No.	Symbol	I/O	Functions
1	VCOM	P	Common voltage (NC)
2	DVDD	P	Power for Digital Circuit (3.3 V)
3	DVDD	P	Power for Digital Circuit (3.3 V)
4	NC	O	No connection
5	RESET	P	Global reset pin. Active Low to enter Reset State. Normally pull high. Connecting with an RC reset circuit for stability (NC)
6	STBYB	I	Standby mode, normally pull high STBYB="1", normally operation STBYB="0", timing control, source driver will turn off (NC)
7	GND	P	Ground
8	MIPI_D0-	I	Negative MIPI differential data inputs0-
9	MIPI_D0+	I	Positive MIPI differential data inputs0+
10	GND	P	Ground
11	MIPI_D1-	I	Negative MIPI differential data inputs1-
12	MIPI_D1+	I	Positive MIPI differential data inputs1+
13	GND	P	Ground
14	MIPI_CLK-	I	Negative MIPI differential clock inputs
15	MIPI_CLK+	I	Positive MIPI differential clock inputs
16	GND	P	Ground
17	MIPI_D2-	I	Negative MIPI differential data inputs2-
18	MIPI_D2+	I	Positive MIPI differential data inputs2+
19	GND	P	Ground
20	MIPI_D3-	I	Negative MIPI differential data inputs3-
21	MIPI_D3+	I	Positive MIPI differential data inputs3+
22	GND	P	Ground
23	NC	O	No connection
24	AVDD	P	Power for Analog Circuit (9-13V)
25	NC	O	No connection
26	VGL	P	Gate OFF Voltage (NC)
27	NC	O	No connection
28	VGH	P	Gate ON Voltage (NC)
29	NC	O	No connection
30	GND	P	Ground



8.0 OUTLINE DIMENSION





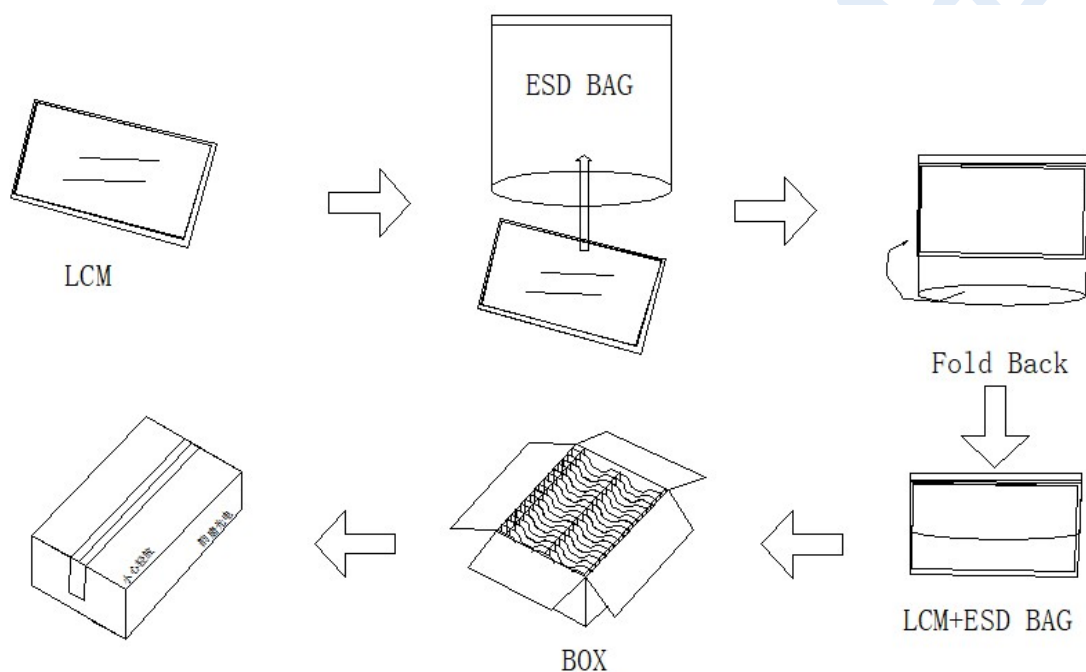
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9.0 Package Specification

9.1 Packing form

LCM Moudle	LCM Qty. in the box	Box size	Note
YT097IBEXL001-A	50 pcs/box		

9.2 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	



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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. YT 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.

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 mouting 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.