

- Preliminary Specification
- Final Specification

Customer Approve:

QC 品质 : _____

R&D 研发 : _____

Approved 批准: _____

产品型号(Description): YH090TH6001-CLA01

Compile by 编制	Quality/Engineer 品质/工程	Checked 审核	Approved 批准
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REVISION RECORD

REV NO	REV DATE	CONTENTS	REMARKS
V.0	2023-11-18	First Release	

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1.0 General description

1.1 Introduction

YH090TH6001-CLA01 is 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 (16:9) inch diagonally measured active display area with 720p(1280 horizontal by 720 vertical pixel array) is adapted for a low reflection and higher color type.

resolution. The TFT-LCD panel used for this module

1.2 Features

- 4 lanes LVDS 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		210.7(H) x 126.5(V) x 4.9(body)	mm	Tolerance: ±0.3mm
Display area		198.912(W) x 111.888(H)	mm	
Number of Pixel		1280(H) x RGB x 720(V)	pixels	
Pixel pitch		0.1554(H) x 0.1554(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		*EK79202		*Using IC
Polarizer		Up: 0° sand surface Down 90° smooth surface	pcs	

1.4 Mechanical Information

Item		Min.	Typ.	Max.	Unit
Module Size	Horizontal(H)	210.5	210.7	210.9	mm
	Vertical(V)	126.3	126.5	126.7	mm
	Depth(D)	4.6	4.9	5.2	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	-30	-	+80	°C	
Storage Temperature	TSTG	-30	-	+80	°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
Power Supply Voltage	DVDD	3.2	3.3	3.4	V
	VGH	16.5	17.5	18.5	V
	VGL	-12.5	-11.5	-10.5	V
Power Supply Current	IDVDD	120	160	200	mA

2.3 Back-light Unit

Parameter	Symbol	Min	Typ	Max.	Unit	Note
LED Current	I _L	-	140	170	mA	Ta=25°C
LED Voltage	V _L	-	19.6	-	V	Ta=25°C
LED Life-time	h	30000	-	-	V	Ta=25°C , If=20mA

2.4 Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Operating Temperature	Topa	-30	80	°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	85	--	Deg	Note (1,2)
		θ_R		75	85			
	Vertical	θ_U		75	85	--	Deg	
		θ_D		75	85			
Luminance Contrast ratio	CR		$\theta = 0^\circ$	900	1200	--	--	Note (1,2)
Brightness	YL			400	450	--	Cd/cm ²	Note (4,5)
Transmittance	T(%)		$\theta = 0^\circ$	--	4.1	--	%	
Color Gamut (C light)				--	70	--	%	
Reproduction of color (C-light)	White	Xw	$\theta = 0^\circ$	-0.03	+0.03			Note (1,4)
		Yw						
	Red	Rx						
		Ry						
	Green	Gx						
		Gy						
	Blue	Bx						
		By						
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

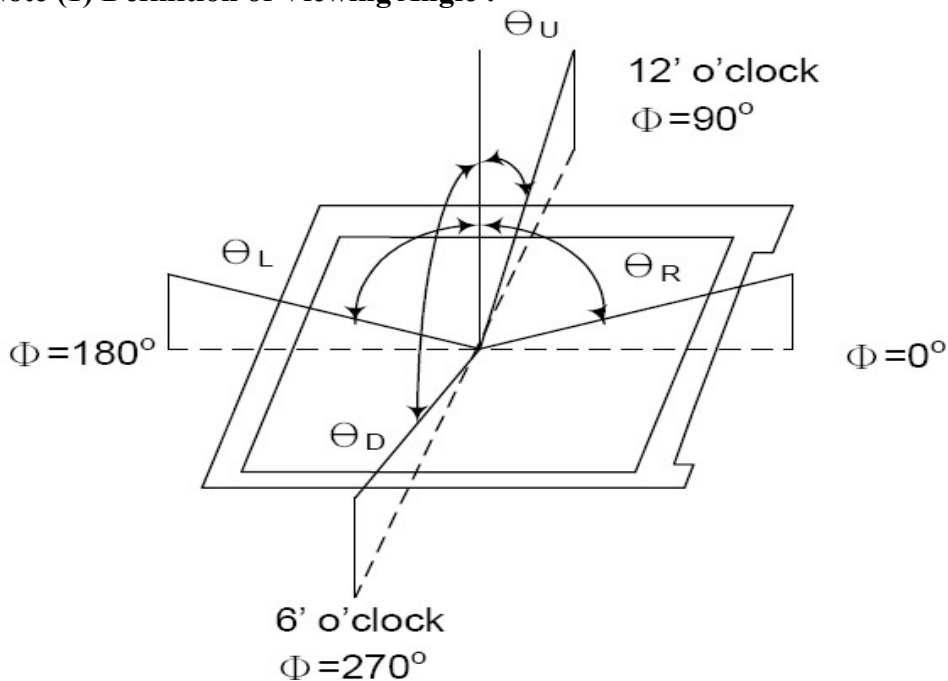
Ambient temperature: 25±2°C

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

Note (1) Definition of Viewing Angle :

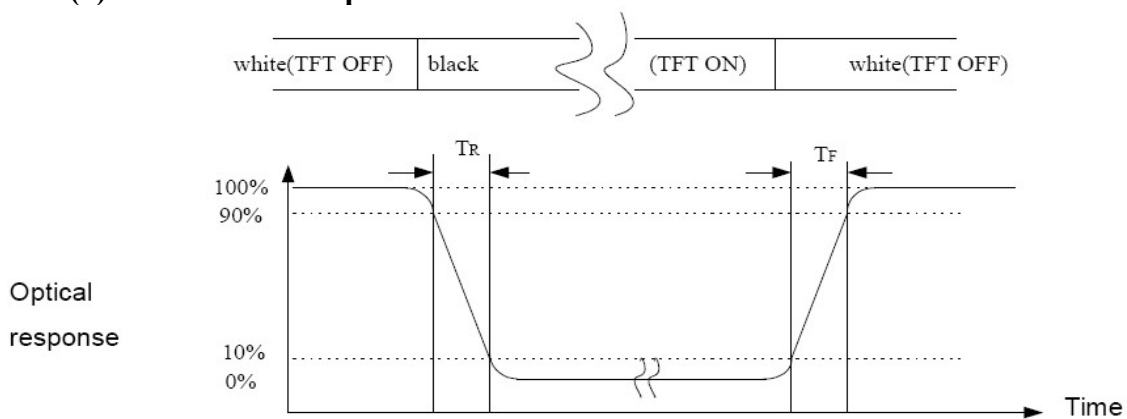


Note (2) Definition of Contrast Ratio (CR):

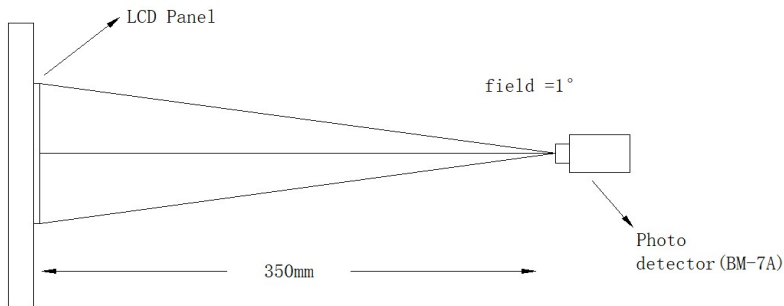
Measured at the center point of panel

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

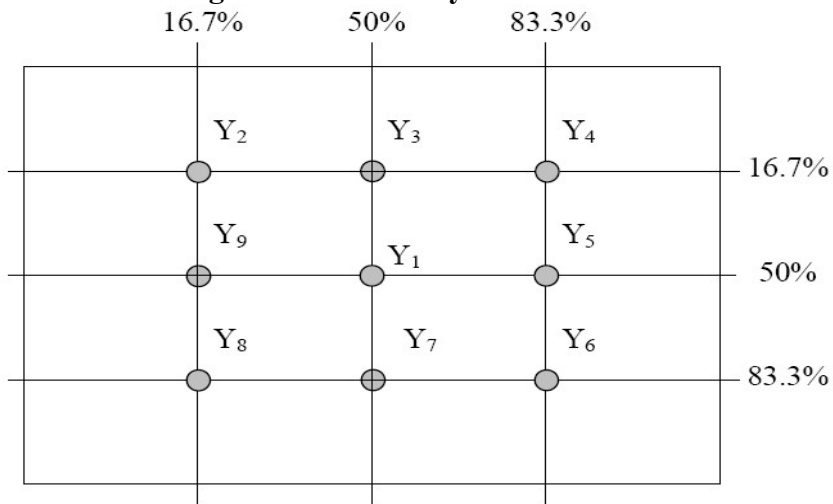
Note (3) Definition of Response Time: Sum of TR and TF



Note (4) Definition of optical measurement setup



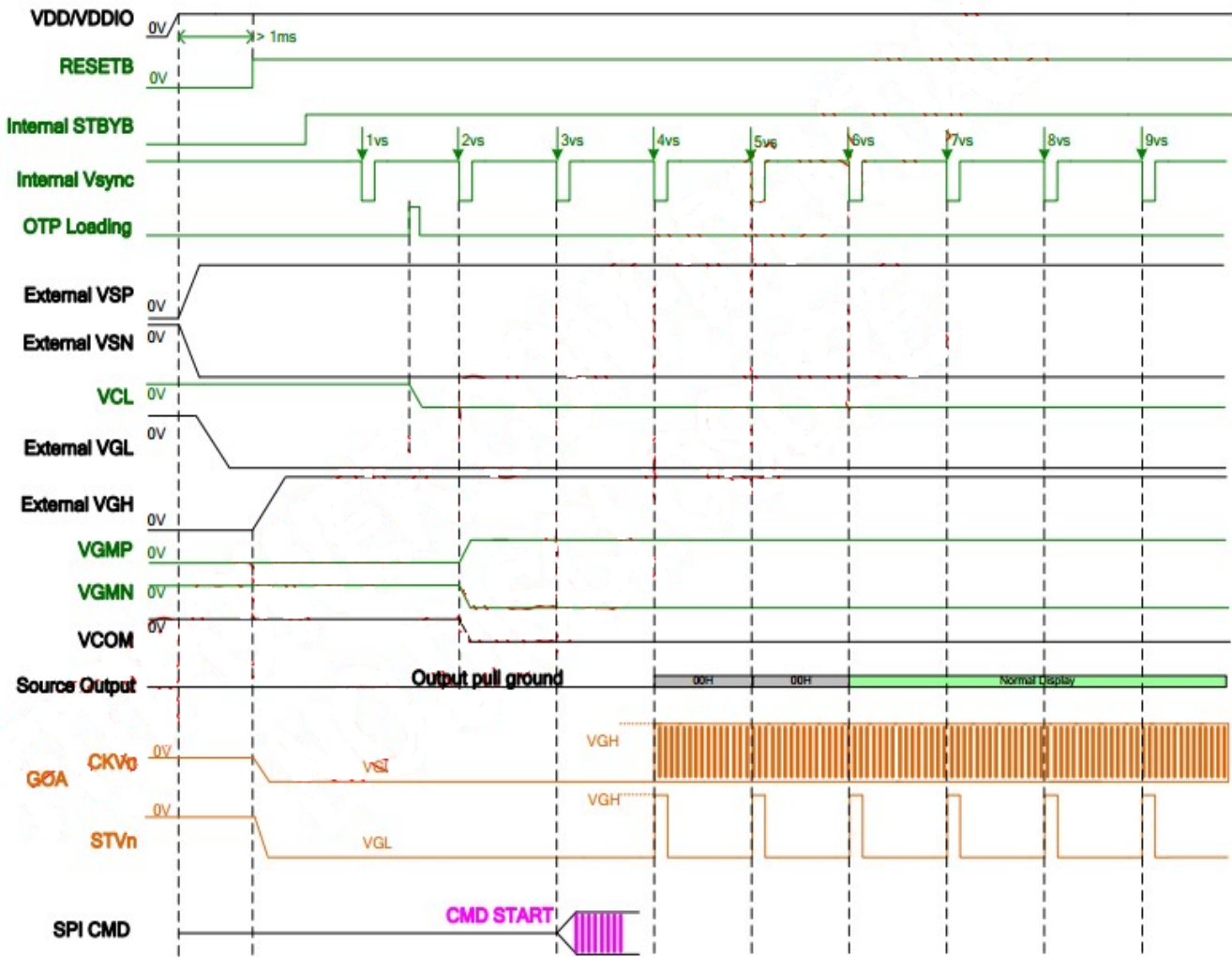
Note (5) Definition of brightness uniformity



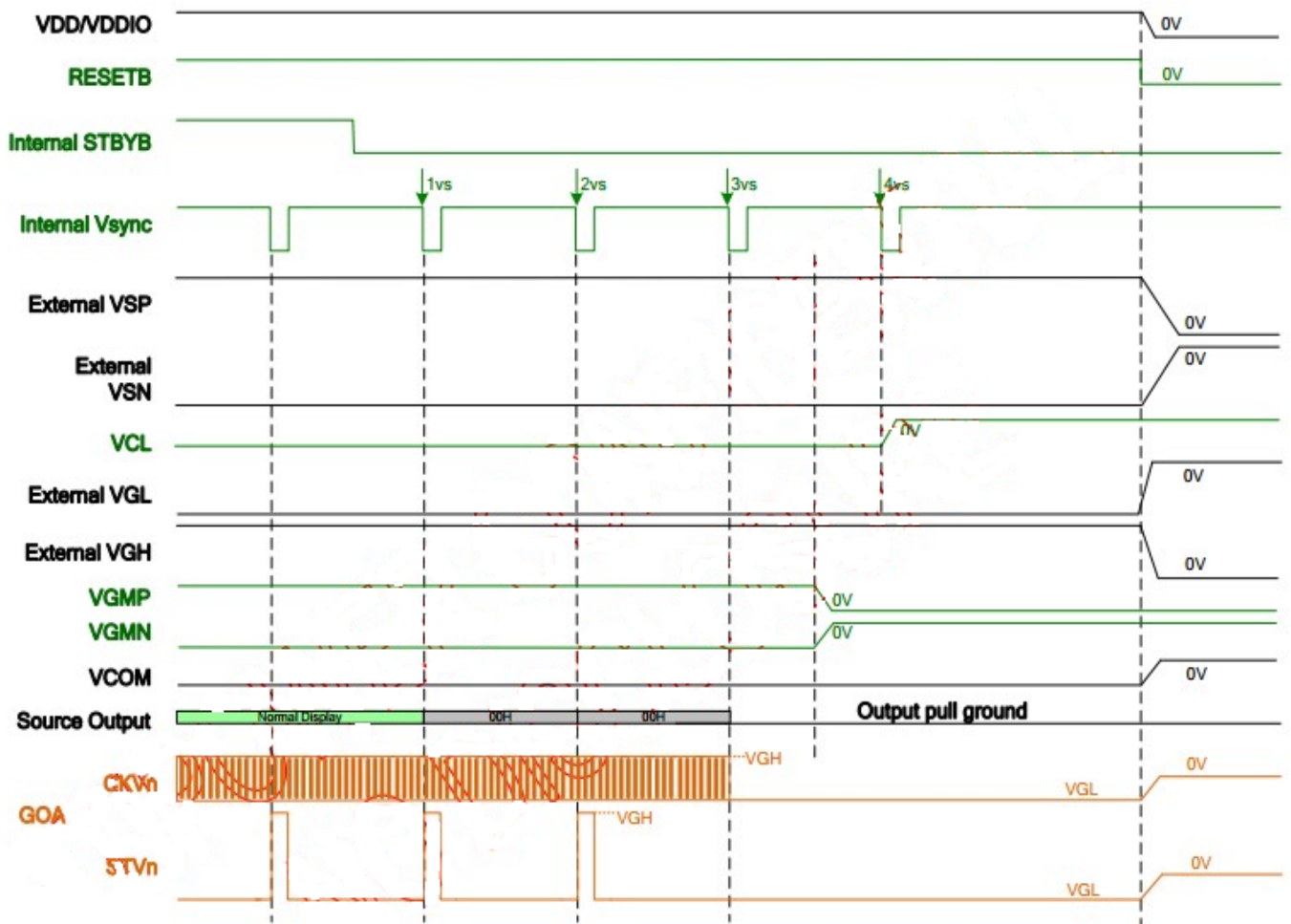
$$\text{Luminance uniformity} = \frac{(\text{Min Luminance of 9 points})}{(\text{Max Luminance of 9 points})} \times 100\%$$

4.0 Power On/Off Sequence

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



Power on sequence



Power off sequence

5.0 ELECTRICAL CHARACTERISTICS

5.1 DC characteristics

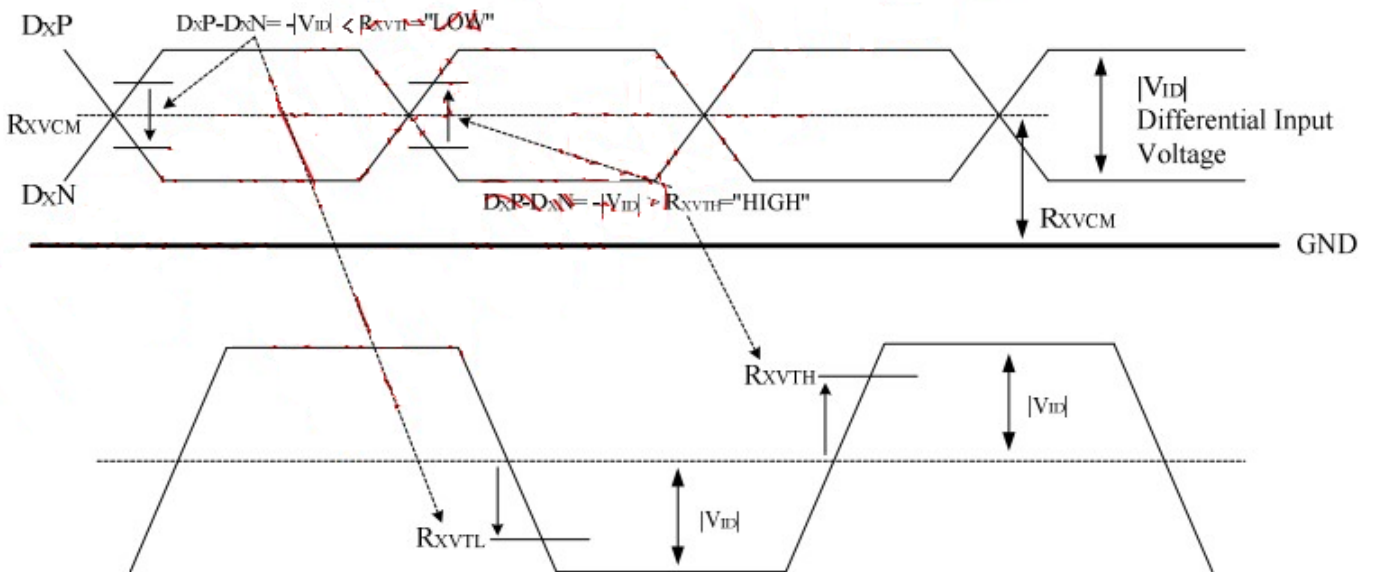
(Test condition: VDD=VDDIO=VDDIF=2.3~3.6V, TA=-20°C~+85°C, VSS=VSSA=0V)

Parameter	Symbol	Spec.			Unit	Note
		Min.	Typ.	Max.		
VDDIO Input high level voltage	VIH	0.8 x VDDIO		VDDIO	V	
VDDIO input low level voltage	VIL	VSS		0.2 x VDDIO	V	
Input Leakage Current	Ileak	(-1)		(+1)	μA	
VGH_REG output voltage	VGH_REG	9	16	22	V	
VGL_REG output voltage	VGL_REG	-15	-10	-4.5	V	
VGMP output voltage	VGMP	3.5	4.24	5.8	V	
VGMN output voltage	VGMN	-5.8	-4.64	-3.5	V	
VGL output voltage	VGL	-17	-12	-6	V	
VGH output voltage	VGH	11	18	24	V	
VCL output voltage	VCL	-3	-2.8	-2.1	V	
VCOM output voltage	VCOM	-2.405	-1.5	-0.5	V	
Input terminal resistance	ZID		100		ohm	
Source output level deviation	Graycode = 0 ~ 14 Graycode = 241 ~ 255		TBD		mV	
	Graycode = 15 ~ 31 Graycode = 208 ~ 240		TBD		mV	
	Graycode = 32 ~ 207		TBD		mV	
Source output offset deviation	Graycode = 0 ~ 14 Graycode = 241 ~ 255	-	TBD		mV	
	Graycode = 15 ~ 31 Graycode = 208 ~ 240	-	TBD		mV	
	Graycode = 32 ~ 207	-	TBD		mV	
Current consumption	Analog Operating	IAOP		TBD	mA	
	Analog Stand-by	IAST		TBD	mA	
Rush current		Ivddpeak		TBD	mA	

(VDD=VDDIO=VDDIF=2.3 to 3.6V, VSS=VSSA=VSS_IF=0V, TA=-20 to +85°C)

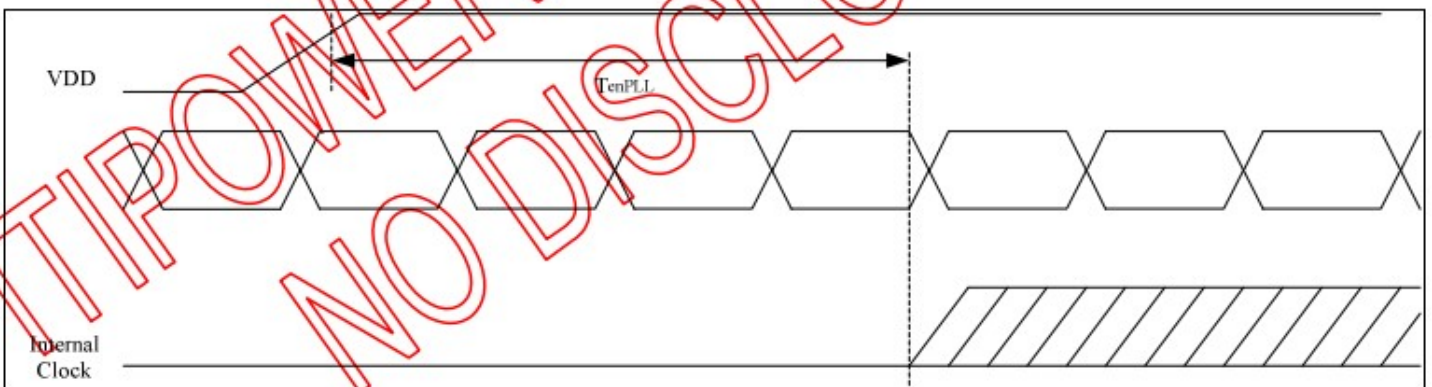
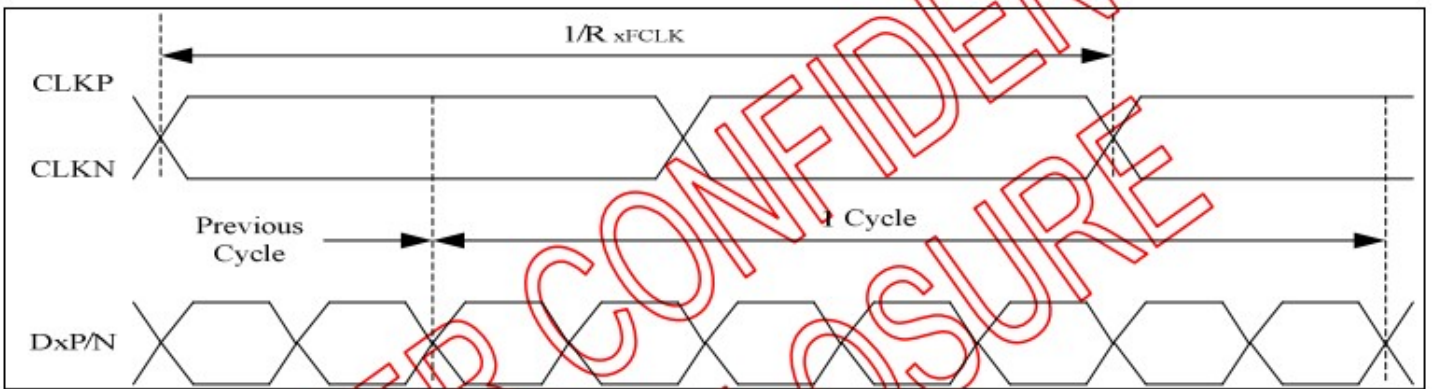
Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Differential input high threshold voltage	R_{XVTH}	+0.1	0.2	0.3	V	$R_{XVCM}=1.2V$
Differential input low threshold voltage	R_{XVTL}	-0.3	-0.2	-0.1	V	
Input voltage range (singled-end)	R_{XVIN}	0.7	-	1.7	V	
Differential input common mode voltage	R_{XVCM}	1	1.2	1.4	V	$ V_{ID} =0.2$
Differential input impedance	Z_{ID}	80	100	125	ohm	
Differential input voltage	$ V_{ID} $	0.2	-	0.6	V	
Differential input leakage current	I_{LCLVDS}	-10	-	+10	uA	
LVDS Digital Operating Current	$I_{VDDMIPI}$	-	15	20	mA	$F_{DCLK}=80MHz, VDD=3.3V,$ Input pattern: 55h->Aah->55h->Aah
LVDS Digital Stand-by Current	I_{STMIPI}	-	-	250	uA	Clock & all Functions are stopped

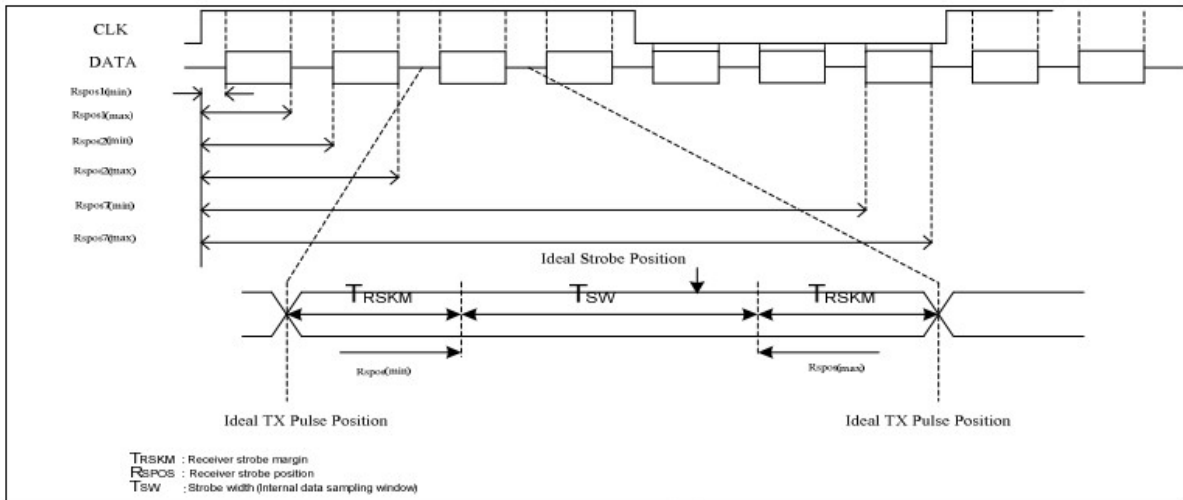
Single-end Signals



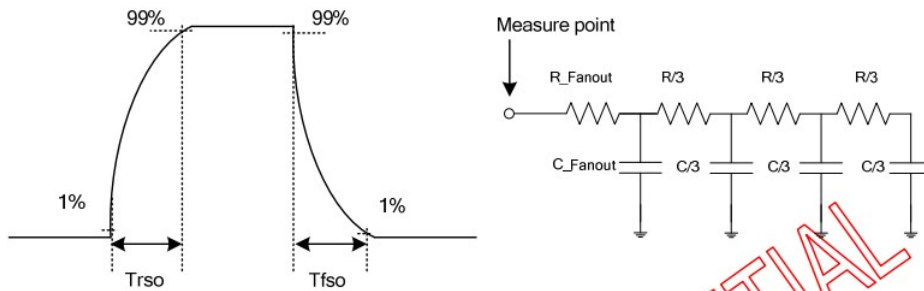
5.2 LVDS AC characteristics

Parameter	Symbol	Spec.			Unit	Condition
		Min.	Typ.	Max.		
Clock frequency	R _x FCLK	30	-	TBD	MHz	Refer to input timing table for each display resolution
Input data skew margin	T _{RSKM}	500	-	-	ps	VID = 200mV RxVCM = 1.2V RxFCLK = 81MHz
Clock high time	T _{LVCH}	-	4/(7* R _x FCLK)	-	ns	
Clock low time	T _{LVCL}	-	3/(7* R _x FCLK)	-	ns	
PLL wake-up time	T _{enPLL}	-	-	150	us	





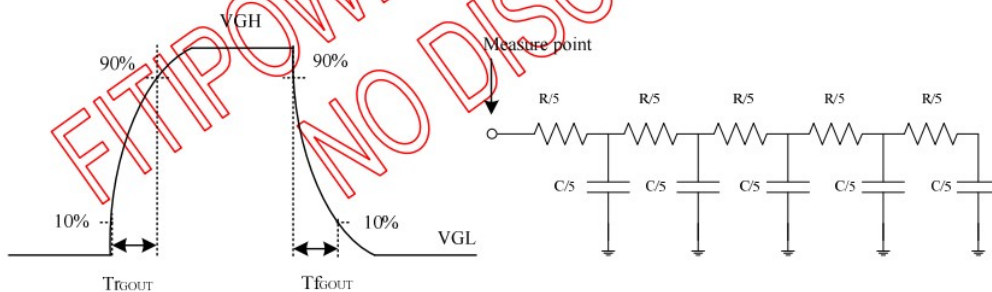
5.3 OUTPUT TIMING



Rdata_total = 25.072k(ohm)
Cdata_total = 83 pF

Parameter	Symbol	Condition	Spec.			Unit
			Min.	Typ.	Max	
Source driver rising time	Trso			3.52		μs
Source driver falling time	Tfso			2.8		μs

Panel control signal output (GOUTL[1]~GOUTL[22] , GOUTR[1]~GOUTR[22])



Parameter	Symbol	Condition	Spec.			Unit
			Min.	Typ.	Max	
Panel control signal rising time	T _{rGOUT}	TBD	-	-	TBD	μs
Panel control signal falling time	T _{fGOUT}	TBD	-	-	TBD	μs

Parameter	Symbol	Min.	Typ.	Max	Unit	Note
Horizontal Display Area	thd		1280		DCLK	
DCLK frequency	fclk	-	66.2	-	MHz	
HSD Period	th	-	1320	-	DCLK	
HS pulse width	thpw	-	2	-	DCLK	
HS Back Porch(Blanking)	thbp		23		DCLK	
HS Front Porch	thfp	-	15	-	DCLK	

Parameter	Symbol	Min.	Typ.	Max	Unit	Note
Vertical Display Area	tvd		720		T _H	
VS period time	tv	-	890	-	T _H	
VS pulse width	tvpw	-	10	-	T _H	
VS Back Porch(Blanking)	tvbp		88		T _H	
HS Front Porch	tvfp	-	72	-	T _H	

6.0 Reliability test items

Test Item	Test Conditions	Notes
High temperature Operation	Ta= +80°C, 240hrs	
Low temperature Operation	Ta= -30°C, 240hrs	
High Temperature Storage	Ta= +80°C, 240hrs	
Low Temperature Storage	Ta= -30°C, 240hrs	
Humidity Test	60°C ,Humidity 90% ,240hrs	
Thermal Shock Test	-30°C,30min ~ +80°C,30min (30 cycle)	
Vibration Test(Packing)	Sine Wave 2G, 10Hz~55Hz~10Hz, XYZ 2 hours/each direction	
Static Electricity	Contact: ±4KV; Air: ±8KV (R=330 Ω , C=150pF) , 1sec, 9point, 10times/point	

7.0 INTERFACE PIN CONNECTION

Signal of interface

Terminal No.	Symbol	I/O	Functions
1	AGND	P	Analog Ground
2	NC	I	No connection
3	DVDD	P	Power for Digital Circuit
4	GND	P	Ground
5	NC	I	No connection
6	DVDD	P	Power for Digital Circuit
7	GND	P	Ground
8	NC	I	No connection
9	NC	I	No connection
10	NC	I	No connection
11	NC	I	No connection
12	NC	I	No connection
13	NC	I	No connection
14	NC	I	No connection
15	GND	P	Ground
16	DVDD_LVDS	P	LVDS Power
17	GND	P	Ground
18	RXIN3+	I	Positive LVDS differential data inputs
19	RXIN3-	I	Negative LVDS differential data inputs
20	GND	P	Ground
21	RXCLKIN+	I	Positive LVDS differential clock inputs
22	RXCLKIN-	I	Negative LVDS differential clock inputs
23	GND	P	Ground
24	RXIN2+	I	Positive LVDS differential data inputs
25	RXIN2-	I	Negative LVDS differential data inputs
26	GND	P	Ground
27	RXIN1+	I	Positive LVDS differential data inputs
28	RXIN1-	I	Negative LVDS differential data inputs
29	GND	P	Ground
30	RXIN0+	I	Positive LVDS differential data inputs
31	RXIN0-	I	Negative LVDS differential data inputs
32	GND	P	Ground
33	GND_LVDS	P	LVDS Ground
34	RESET	I	Global reset pin.
35	STBYB	I	Standby mode, normally pull high STBYB="1", normally operation STBYB="0", timing control, source driver will turn off
36	L/R	I	Left / right selection
37	DVDD	P	Power for Digital Circuit
38	NC	I	No connection
39	AGND	P	Analog Ground
40	NC	I	No connection
41	NC	I	No connection
42	NC	I	No connection

43	GND	P	Ground
44	DVDD	P	Power for Digital Circuit
45	GND	P	Ground
46	NC	I	No connection
47	NC	I	No connection
48	NC	I	No connection
49	NC	I	No connection
50	NC	I	No connection
51	GND	P	Ground
52	NC	I	No connection
53	GND	P	Ground
54	DVDD	P	Power for Digital Circuit
55	SELB	P	6bit/8bit mode select SELB="1", input data is 8bit, SELB="0", input data is 6bit,
56	VGH	P	Gate ON Voltage
57	DVDD	P	Power for Digital Circuit
58	VGL	P	Gate OFF Voltage
59	GND	P	Ground
60	BIST_NC	N	No connection

8.0 OUTLINE DIMENSION

1	2	3	4	5	6	7	8
DESIGN: (设计)		CHECKED: (检查)		APPROVED: (批准)		规格	
Date: (日期) 2023-11-14		Page: (页数) 1/1		图纸视角:		SPECIFICATION FOR BACKLIGHT	
Date: (日期) 2023-11-14		Page: (页数) 1/1		图纸视角:		CUSTOMER'S CODE: (客户型号)	
Date: (日期) 2023-11-14		Page: (页数) 1/1		图纸视角:		Z. B. MODEL NO.: (中型号)	
Date: (日期) 2023-11-14		Page: (页数) 1/1		图纸视角:		GMC23024090LQM-A03	
Date: (日期) 2023-11-14		Page: (页数) 1/1		图纸视角:		EDITION: (版本号)	
Date: (日期) 2023-11-14		Page: (页数) 1/1		图纸视角:		EDITION: (版本号)	
Date: (日期) 2023-11-14		Page: (页数) 1/1		图纸视角:		A03	

9点测试位指示图:
测试仪器: BM-7
Distance=500±50mm, Field=1°
均一性要求: 500MHT/8531TP

环保要求: RoHS 2.0 REACH H/F

TM LCD+天钰IC
标签信息:
二维码内容与明码内容相同

电路原理图: 6*7=42PDS

弯折出货示意图

备注:
1. * 重要尺寸, () 参考尺寸, " 安全特性, " ▽ " 特殊特性;
" ▽ " 表示PR管控项, CRK ≥ 1.33, PRK ≥ 1.67, 共 0 处;
2. 未标注公差尺寸按照 ±0.3, 未标注圆角按照 R=0.2;
3. 符合环保要求;
4. 产品使用温度: -20~70°C; 储存温度: -30~80°C;
5. 标示 △ 处为修改位置, 需客户确认;

项目 Item	符号 Symbol	最小值 min	典型值	最大值 max	单位 Unit	测定条件 Condition
中心点亮度 (CEN)	Lv	/	400	/	cd/m ²	1. I _F =140 mA (恒定电流测试)
平均点亮度 (AVG)	Lv	/	440	/	cd/m ²	2. V _F =5V/LED
均匀性 Uniformity	Avg	80%	85%	--	%	3. The measurement instrument: IQC BM-7
色温坐标 (中心点) Colour Coordinate	X	0.290	0.275	0.300		
	Y	0.260	0.275	0.300		
正向电压 Forward Voltage	Vf	16.8	18	19.2	V	

RA要求:

- 冷热冲击实验 (-30°C (1H) - 80°C (1H) 100Cycles);
- 低温存储实验 (-30°C ± 5°C 96H);
- 高温存储实验 (80°C ± 5°C 96H);
- 低温工作实验 (-20°C ± 5°C 96H);
- 高温工作实验 (70°C ± 5°C 96H);
- 高温潮湿实验 (60°C ± 5°C / 90%RH 96H);

客户名称: _____

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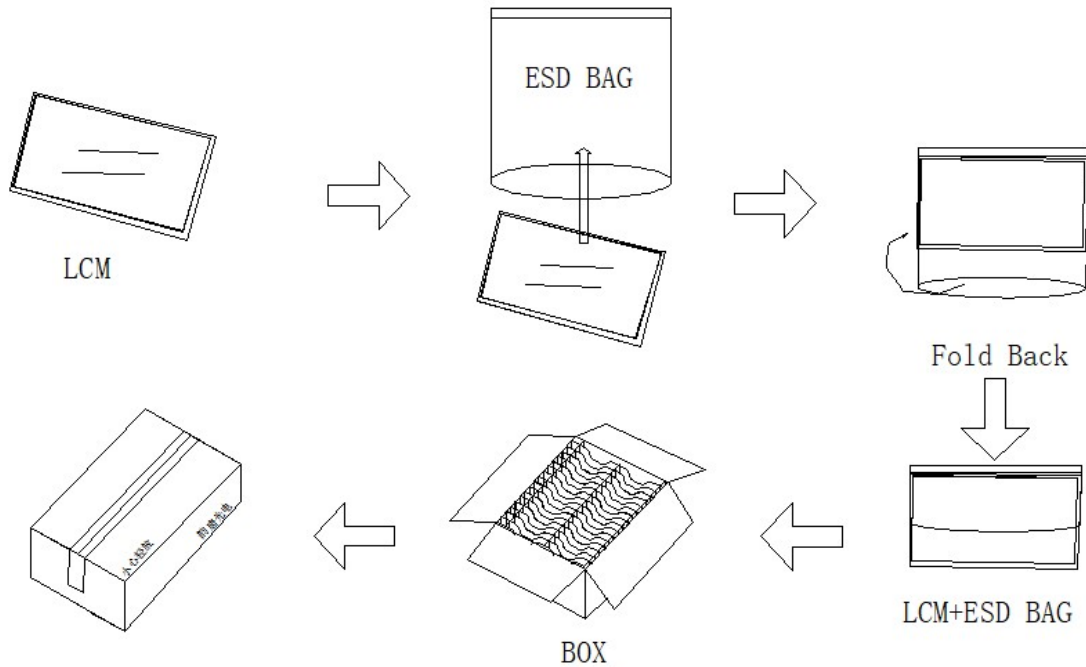
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9.0 Package Specification

9.1 Packing form

LCM Moudle	LCM Qty. in the box	Box size	Note
GMC090TIGE6001-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	

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. GM 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.