Gold Fame Technology Limited

SPECIFICATION

GOLD FAME MODEL NO. : GF-M40XGF20416-01

CUSTOMER NAME : _____

CUSTOMER MODEL NO. : _____

DOC VERSION : V1.0

SAMPLE DATE : _____

CUSTOMER APPROVAL FOR SAMPLE & MASS PRODUCTION:

APPROVED BY: _____

DATE: _____

INTERNAL APPROVAL:		
WRITTEN BY	CHECKED BY	APPROVED BY
Shilin Li	Jincai Yang	Fei Liu

Revision record

VEV NO.	REV DATE	CONTENTS	Note
V1.0	2024-12-12	Preliminary Specification was first released	

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1. General Information

The GF-20416 5-inch RGBW TFT LCD from Gold Fame Technology is designed for outdoor applications requiring sunlight readability and low power consumption. By adding a white sub-pixel to the traditional RGB structure, the display achieves up to 50–80% higher brightness or 38.6% power savings under comparable conditions. The white sub-pixel can also be independently controlled through software, enabling it to be switched off in low-light environments to function as a traditional RGB display with improved contrast.

With a resolution of 800(RGBW) x 480, a typical brightness of 1200 cd/m², and an operating temperature range of -30°C to 80°C, the GF-20416 delivers reliable performance in demanding outdoor environments. Additional features such as an EMI-shielded FPC and optional capacitive touch with Atmel-mxT288UD-AMB controller make this display well-suited for rugged embedded applications.

NO	Item	Contents	Unit
(1)	Screen size	5.0	inch
(2)	LCD type	TFT	-
(3)	Display resolution	800(H)×(RGBW)×480(V)	dot
(4)	Driver IC	FL58202DA	-
(5)	Viewing direction	ALL	-
(6)	Pixel Pitch(mm)	0.03375(H) ×0.135 (V)	mm
(7)	Module outsize（mm）	130(H)×84.70(W)×6.26(T)	mm
(8)	Lcd active aera（mm）	108(H)×64.80(V)	mm
(9)	Color configuration	RGBW Vertical Stripe	-
(10)	Display mode	Normally black	-
(11)	Weight	96	g
(12)	Touch IC	mxT288UD-AMB	-
(13)	LENS	AGC	-
(14)	Interface Type	MIPI	-

2. External Dimensions

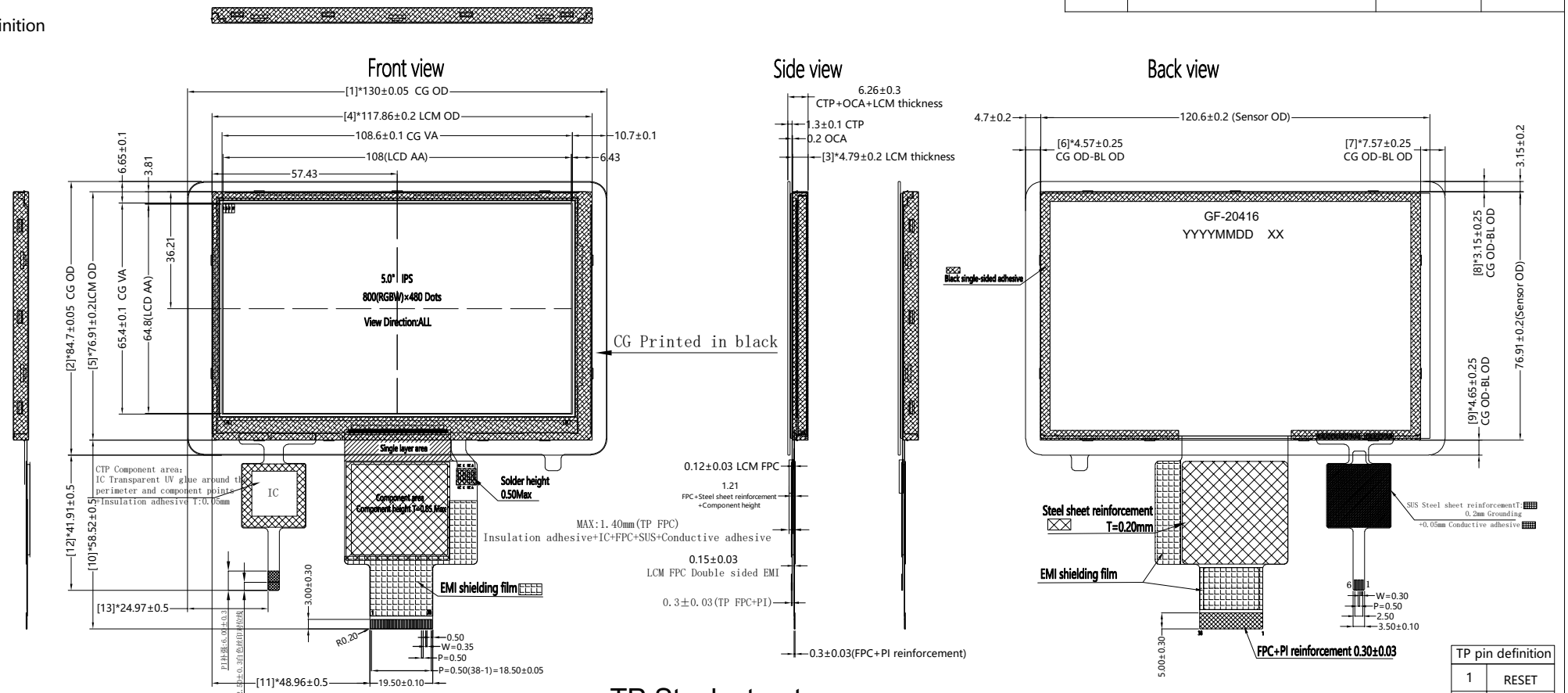
All Pages Of This Edition Approved			
Signature:		Date:	

二级保密

REV.	DESCRIPTION	REVISER	DATE
A0	New Drawing	LSL	2024/11/29

LCM Interface definition

PIN	SYMBLE
1	VDD
2	VDD
3	RSTB
4	STBYB
5	VDD_OTP
6	SPI_CS
7	SPI_SCL
8	SPI_SDAI
9	SPI_SDAO
10	I2C_SCL
11	I2C_SDA
12	UD
13	LR
14	BIST
15	HW_CTRL
16	ROM_RLD
17	ERR
18	GND
19	D0N
20	D0P
21	GND
22	D1N
23	D1P
24	GND
25	DCLKN
26	DCLKP
27	GND
28	D2N
29	D2P
30	GND
31	D3N
32	D3P
33	GND
34	NC
35	LED_A
36	NC
37	LED_K
38	NC



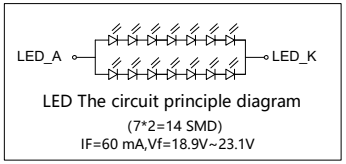
TP pin definition	
1	RESET
2	INT
3	SDA(3.3V)
4	SCL(3.3V)
5	GND
6	VDD(3.3V)

TP Stack structure

GG

COVER GLASS 0.7mm
SCA（抗UV）0.2mm
ITO GLASS 0.4mm

Property	Requirement
IC	mxT288UD-AMB
Glass Thickness	0.7mm AGC
ITO sensor	0.4mm
Surface Hardness	6H(750g)
Light Transmission	≥85%



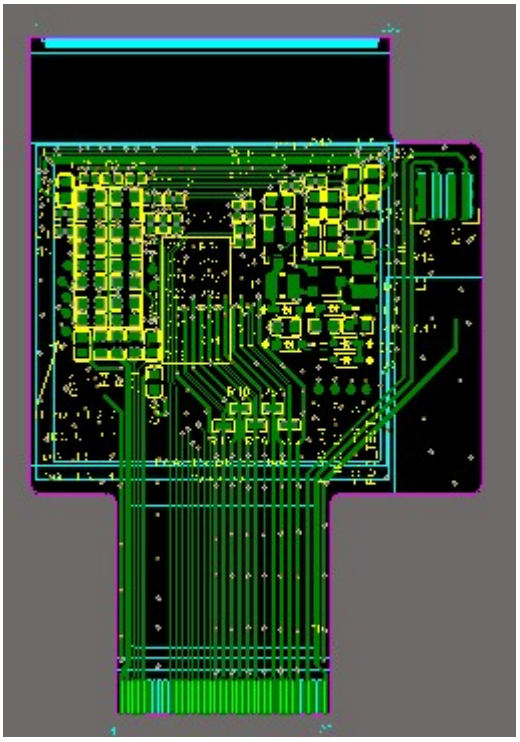
LED The circuit principle diagram
(7*2=14 SMD)
IF=60 mA,Vf=18.9V~23.1V

NOTES:
1.DISPLAY TYPE: 5.0 TFT-LCD;
2.DISPLAY MODE:FFS (Normally BLACK);
3.Display resolution: 800(RGBW)×480
4.VIEWING DIRECTION: ALL
5.BACK LIGHT: 14 Chip-White LED, IF=60mA,VF: 18.9V~23.1V ;
6.LCM brightness: 1000cd/m^2(Min);1200cd/m^2(typ);
7.Color coordinates：X=0.300±0.04,Y=0.330±0.04
8.Brightness uniformity:75%(Min),80%(typ)。
9.Contrast ratio：1000:1 (Min),1500:1(typ)，NTSC:44%(Min), 49%(typ);
10. Warpage degree：0.40mm Max
11. Storage temperature：-40°C~85°C，Working temperature: -30°C~80°C ;
12. Key dimensions: " [ ]* " , Reference size:( ), No tolerance specified ±0.20;
13. Accord with RoHS2.0+HF+REACH+VOCs Environmental requirements;

GOLD FAME TECHNOLOGY LIMITED
高富科技有限公司

	UNITS: mm	DATE:	PART NUMBER :		SHEET:	1 of 4
DESIGN BY:	LSL	2024/11/29	GF-M40XGF20416-01		DRAWING DESCRIPTION:	MODEL
CHECKED BY:						
APPROVED BY:			DO NOT SCALE THIS DRAWING.	PROJECTION		

3.1 FPC Part list & Structure



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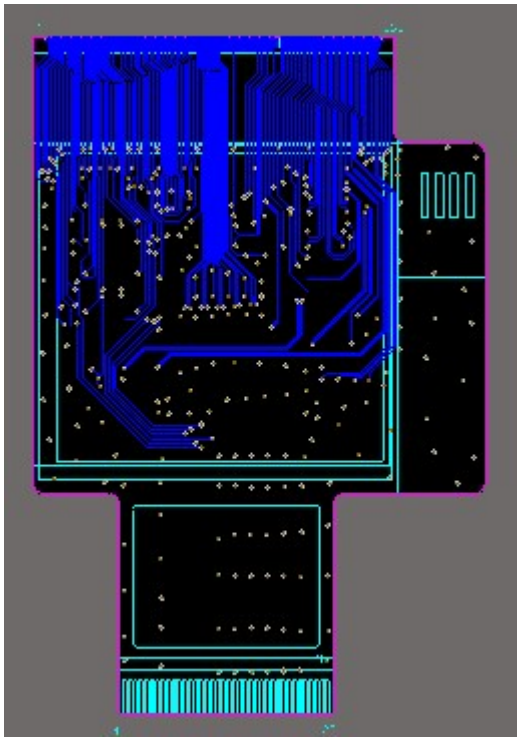


BOTTOM

Part List:

Capacitance	4.7UF/10V/0402	C0402	C1	1	
Capacitance	2.2UF/10V/0402	C0402	C2, C3, C4, C5, C6,	7	
Capacitance	10UF/10V/0402	C0402	C8, C25	2	
Capacitance	10UF/16V/0603	C0603	C9, C12	2	
Capacitance	4.7UF/16V/0402	C0402	C10, C11	2	
Capacitance	1UF/25V/0603	C0603	C14, C15, C18, C19,	5	
Capacitance	2.2UF/25V/0603	C0603	C16, C17	2	
Capacitance	0.47UF/10V/0603	C0603	C21	1	
Capacitance	10UF/10V/0603	C0603	C22	1	
Capacitance	2.2UF/10V/0603	C0603	C26	1	
MOSFET-N	ZXMN2F30FH	SOT-23	D1	2	
MOSFET-P	DMP2123	SOT-23	D3	2	
TVS	B5819WS_SOD323	SOD-323_L1.7-W1.3	D2, D4, D5, D6, D7	5	
inductor	NR252012-4R7M	1008	L1, L2	2	
resistance	0R/0402	R0402	R1	1	
resistance	0R/0603	R0603	R2, R3, R4, R5, R13	5	
resistance	47K/0603	R0603	R6	1	
resistance	4.7K/0402/1%	R0402	R7	1	
resistance	10K/0402/1%	R0402	R10, R11	2	
resistance	0.1R/0603/1%	r0603	R12, R14	2	
resistance	0R/0603/1%	R0603	R15	1	
resistance	4.7k/0603/1%	r0603	R18, R21, R23, R25	8	
resistance	100R/0402	R0402	R48, R49, R50, R51	5	
resistance	4.7k/0603/1%/NC	r0603	R19, R20, R22, R24		

3.2 LCM Interface Description

Pin No.	Symbol	Description
1	VDD	Power supply forlO system. Connect to a capacitor for stabilization.Please short VDDl, VDDl1, VDDRX and VDD PWR on the FPC/PCB
2	VDD	Power supply forlO system. Connect to a capacitor for stabilization.Please short VDDl, VDDl1, VDDRX and VDD PWR on the FPC/PCB
3	RSTB	Reset input pin H: Normal operation (Default) L: Reset state.
4	STBYB	Standby mode H: Normal operation (Default) L: Standby mode. TCON, source driver, power circuit will be turned off.
5	VDD_OTP	Power supply for build-in OTP programming. If it' s not used, please leave these pins open.
6	SPI_CS	NC
7	SPI_SCL	NC
8	SPI_SDAI	NC
9	SPI_SDAO	NC
10	I2C_SCL	Clock signal for I^2C interface. If I2C_SPI_SEL=L, please let these pins open.
11	I2C_SDA	Serial address and data input/output for I^2C interface. If I2C_SPI_SEL=L, please let these pins open. Note: A pull high resistance,4.7K~8K ohm, is needed for SDA pin when using I^2C interface.
12	UD	Gate driver Up or Down sequence control. H: Shift from up to down (Default)

		L: Shift from down to up
13	LR	Source driver Left or Right sequence control. H: Shift S[1]→S[2]→…→S[MS-1]→S[MS] (Default) L: Shift S[MS]→S[MS-1]→…→S[2]→S[1]
14	BIST	Built-in Self-Test function. H: Enable L: Disable (Default)
15	HW_CTRL	Function pin control by hardware or software selection: H: Hardware pin (H/W > S/W) (Default) L: Software register (S/W > H/W)
16	ROM_RLD	OTP reload per 32 frames: H: Enable auto-reload OTP L: Disable auto-reload OTP (Default)
17	ERR	Output pin for error detection H: No error detected L : Function error detected
18	GND	Ground pin
19	D0N	That the COG resistance is less than 10 ohm.
20	D0P	MIPI DSI differential data pair.
21	GND	Ground pin
22	D1N	That the COG resistance is less than 10 ohm.
23	D1P	MIPI DSI differential data pair.
24	GND	Ground pin
25	DCLKN	That the COG resistance is less than 10 ohm.
26	DCLKP	MIPI DSI differential clock pair.
27	GND	Ground pin
28	D2N	That the COG resistance is less than 10 ohm.
29	D2P	MIPI DSI differential data pair.

30	GND	Ground pin
31	D3N	That the COG resistance is less than 10 ohm.
32	D3P	MIPI DSI differential data pair.
33	GND	Ground pin
34	NC	NC
35	LED_A	Backlight LED anode
36	NC	NC
37	LED_K	Backlight LED cathode
38	NC	NC

4. Absolute Maximum Ratings

Item	Symbol	Min	Max	Unit	Note
LC Operating Voltage	VOP	--	3.3	V	*1*2
Operating Temperature	Top	-35	80	℃	---
Storage Temperature	Tst	-40	85	℃	---
Operating Ambient Humidity	RH		90	%(RH)	*3
Storage Humidity	RH		90	%(RH)	*3

Note:

*1.At 25+5℃

*2. Due to the characteristics oflC Material,

the iquid Crystal driving voltage varieswith environmental temperature.

*3.Non-condensation.

*4. Temp.≤ 60℃,90%RH Max.

Temp.> 60℃,Absolute humidity shal be less than 90%RH

5. Electrical Characteristics

Item	Symbol	Min	Typ	Max	Unit	Remarks
TFT Gate ON Voltage	VGH	--	17v	--	V	Note1
TFT Gate OFF Voltage	VGL	--	-12v	--	V	Note 2
TFT Common Electrode Voltage Vcom	Vcom	--	-0.5	--	V	Note 3
Interface Supply Voltage	IOVCC	--	1.8	--	V	
Positive Voltage input	VSP	--	6.1v	--	V	
Negative Voltage input	VSN	--	-6.1	--	V	

Note:

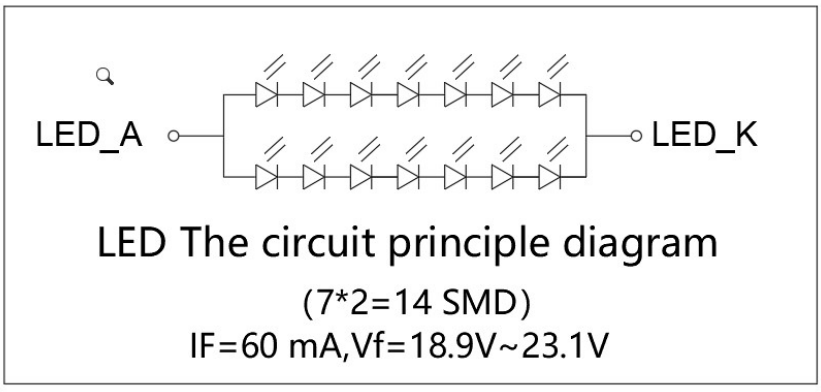
*1. VGH is TFT Gate operating Voltage.

*2. VGL is TFT Gate operating Voltage.

The storage structure of this model is CST (Storage on Common)

*3. Vcom must be adjusted to optimize display quality _Crosstalk, Contrast Ratio and etc.

6. Backlight Characteristics



LED The circuit principle diagram

(7*2=14 SMD)

IF=60 mA,Vf=18.9V~23.1V

Item	Symbol	MIN	TYP	MAX	UNIT	Test Condition	Note
Supply Voltage	Vf	18.9	--	23.1	V	If=60mA	-
Supply Current	If	-	60	-	mA		-
Luminous Intensity for LCM	-	1000	1200	--	Cd/m^2		-
Uniformity for LCM	-	75	80	-	%		-
Number of LED	-		14	-	Piece		-
Backlight Color	White						

7. Optical Characteristics

Item of electro-optical characteristics	Symbol		Condition	Min	Typ	Max	Unit	Remark
Contrast ratio	CR		Ø=Ψ=o² Ta=25℃ I_f=60mA	1000	1500	--	-	
Response time	Tr+Tf			--		30	Ms	Note1
Viewing angle range	Ø (CR≥10)		Up(12H)	80	85	--	Deg	Note2
			Down(6H)	80	85	--	Deg	
			Left(9H)	80	85	--	Deg	
			Right(3H)	80	85	--	Deg	
Module Chromaticity CIE(x,y)	White	x	¢ =Ψ=o2 Ta=25℃	-0.04	0.290	+0.04	-	
		y			0.320			
	Red	x		-0.02	0.602	+0.02		
		y			0.311			
	Green	x			0.264			
		y			0.520			
	Blue	x			0.141			
		y			0.139			
	CT			--	--	--	%	
	-				--	--	dB	
	G			--	--	--	-	
NTSC Ratio	S		--	44	49		%	Note3

Note1.Response time is the time required for the display to transition from White to black(Rise Time Tr) and from black to white(Decay Time Tf) For additional information see FIG 1.

Note2.Viewing angle is the angle at which the contrast ratio is greater than 2.For TFT module the contrast ratio is greater than 10.The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface For more information see FIG 2.

Note3. NTSC ratio; For more information see FIG 3.

$$\text{NTSC ratio} = \frac{\text{Area of RGB triangle}}{\text{Area of NTSC triangle}}$$

FIG. 1. Definition of Response Time : Sum of Tr and Tf

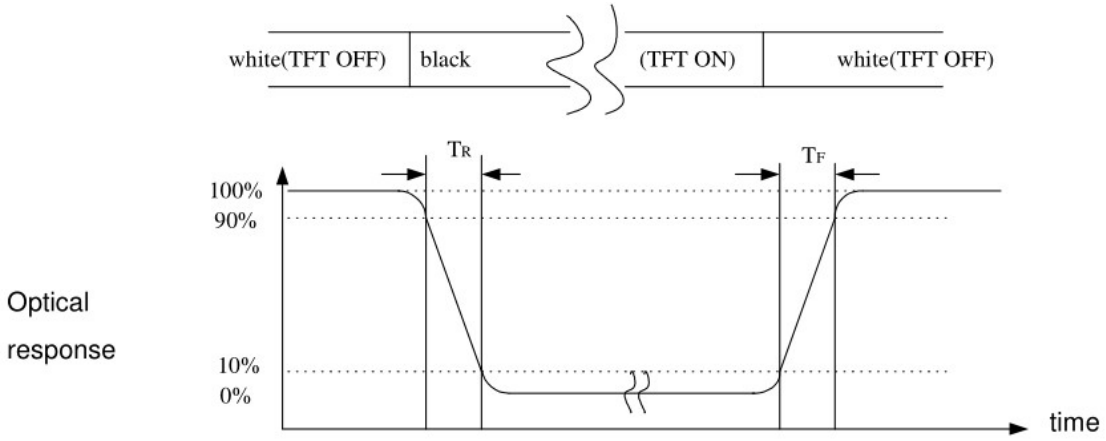


FIG.2. The definition of viewing angle

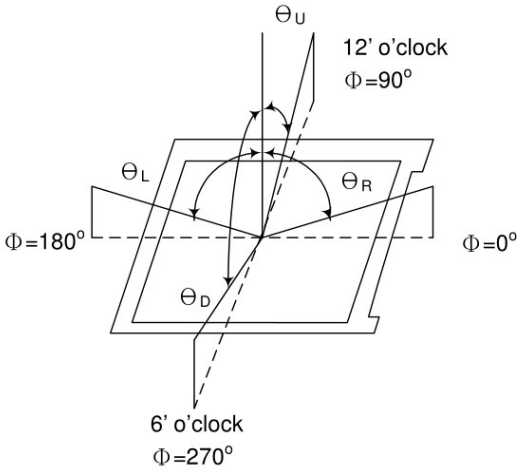
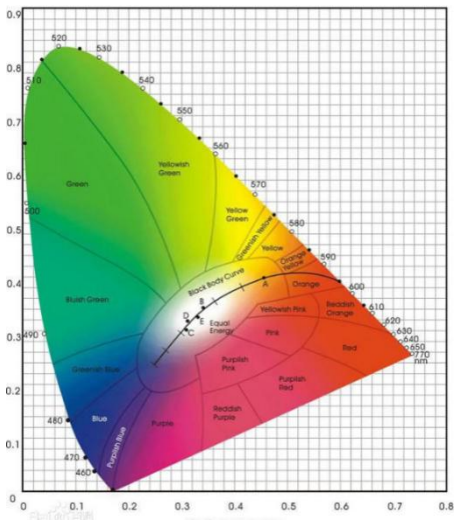


FIG.3. The definition of viewing angle



8. Timing Characteristics

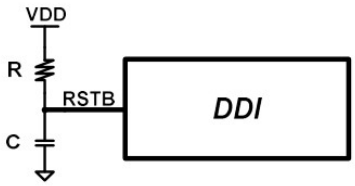
8.1 Power on/off sequence

Power on sequence:

Power on Reset

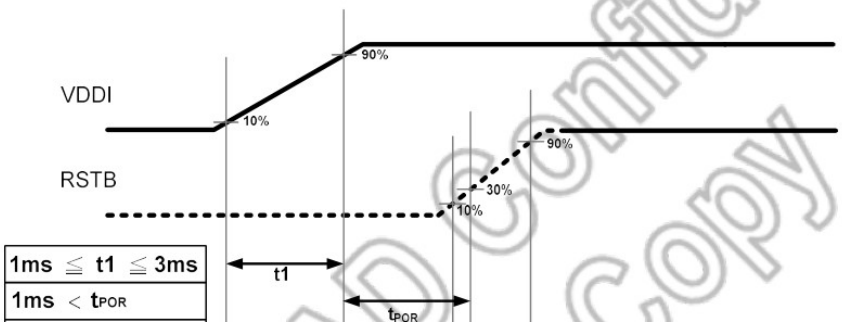
We recommend connecting an external RC circuit with RSTB pin for digital circuit initial state stability.

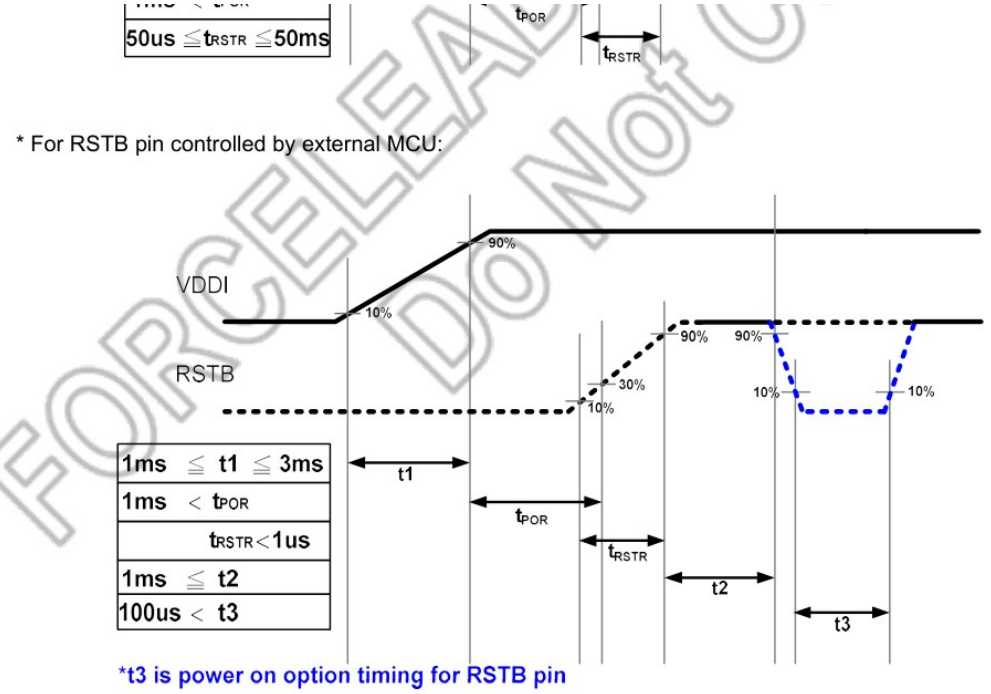
Recommend RC circuit is 47KΩ + 0.47uF. (For 1ms ≤ t1≤3ms)



Recommend power on reset timing is shown as below.

* For RSTB pin +RC:





9. Reliability Test Conditions And Methods

NO.	TEST ITEMS	TEST CONDITION	INSPECTION AFTER TEST
①	High Temperature Storage	85±2℃,240 h; Sample power off during testing	1.After testing, the product should be placed at room temperature for 2 hours before checking the product 2.The function of the display screen is normal, and the sample of the display screen should meet the normal performance defined in its specifications. No appearance, mechanical or functional defects are allowed. Reduced performance and fatal defects must be documented
②	Low Temperature Storage	-40±2℃,240 h; Sample power off during testing	
③	High Temperature	Conditions:80±2℃,240h	
④	Low Temperature	Conditions:-30±2℃,240h	
⑤	Temperature Cycle (Storage)	conditions:-30~80℃,50cycles, Sample power off;Residence at high and low temperatures was 0.5 Hours;The switching time between high and low temperature is less than 5 minutes;testing5 piece.	

⑥	Damp Proof Test (Storage)	conditions:60±2℃,90±3%RH,240h;	
⑦	ESD Test	Discharge module:100pF +1500Ω Environmental;Conditions: Humidity: 30%-50%,Temperature:15-35℃ ; Discharge voltage: contact discharge :±2kV (except chip position); air discharge ±4 kV (except chip position);	

REMARK:
1,The Test samples should be applied to only one test item.
2,Sample side for each test item is 5pcs.
3,EL evaluation should be excepted from reliability test with humidity and temperature:Some defects such as black spot/blemish can happen by natural chemical reaction with humidity and Fluorescence EL has.
4, Failure Judgment Criterion:Basic Specification Electrical Characteristic, Mechanical Characteristic , Optical Characteristic.
5. Due to the failure of the product caused by ESD injury test, if the test is restored to OK after resetting, the final determination of the test is OK.

10. Handling Precautions

10.1 Mounting method

The LCD panel of quality Co.,ltd module consists of two thin glass plates with polarizes which easily be damaged. And since the module in so constructed as to be fixed by utilizing fitting holes in the printed circuit board.

Extreme care should be needed when handling the modules.

10.2 Caution of modules handling and cleaning

When cleaning the display surface, Use soft cloth with solvent [recommended below] and wipe lightly.

- Isopropyl alcohol
- Ethyl alcohol

Do not wipe the display surface with dry or hard materials that will damage the polarizer surface.

Do not use the following solvent:

- Water
- Aromatics

Do not wipe ITO pad area with the dry or hard materials that will damage the ITO patterns

Do not use the following solvent on the pad or prevent it from being contaminated:

- Soldering flux
- Chlorine (Cl) , Salfur (S)

If goods were sent without being sili8con coated on the pad, ITO patterns could be damaged due to the corrosion as time goes on.

If ITO corrosion happen by miss-handling or using some materials such as Chlorine (Cl), Salfur (S) from customer, Responsibility is on customer.

10.3 Caution against static charge

The LCD module use C-MOS LSI drivers, so we recommended that you:

Connect any unused input terminal to Vdd or Vss, do not input any signals before power is turned on, and ground your body, work/assembly areas, assembly equipment to protect against static electricity.

10.4 packing

Module employ LCD elements and must be treated as such.

- Avoid intense shock and falls from a height.
- To prevent modules from degradation, do not operate or store them exposed direct to sunshine or high temperature/humidity.

10.5 Caution for operation

- It is an indispensable condition to drive LCD’ s within the specified voltage limit since the higher voltage then the limit cause the shorter LCD life.
- An electrochemical reaction due to direct current causes LCD’ s undesirable deterioration, so that the use of direct current drive should be avoided.
- Response time will be extremely delayed at lower temperature then the operating temperature range and on the other hand at higher temperature LCD’ s how dark color in them. However those phenomena do not mean malfunction or out of order with LCD’ s, which will come back in the specified operation temperature.

- If the display area is pushed hard during operation, some font will be abnormally displayed but it resumes normal condition after turning off once.

- A slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit.Usage under the maximum operating temperature, 50%Rh or less is required.

10.6 Storage

In the case of storing for a long period of time for instance, for years for the purpose or replacement use, the following ways are recommended.

- Storage in a polyethylene bag with the opening sealed so as not to enter fresh air outside in it . And with no desiccant.
- Placing in a dark place where neither exposure to direct sunlight nor light’ s keeping the storage temperature range.
- Storing with no touch on polarizer surface by the anything else.
- It is recommended to store them as they have been contained in the inner container at the time of delivery from us

10.7 Safety

- It is recommendable to crash damaged or unnecessary LCD’ s into pieces and wash off liquid crystal by either of solvents such as acetone and ethanol, which should be burned up later.
- When any liquid leaked out of a damaged glass cell comes in contact with your hands, please wash it off well with soap and water

11. Precaution For Fse

- 11.1 A limit sample should be provided by the both parties on an occasion when the both parties agreed its necessity. Judgment by a limit sample shall take effect after the limit sample has been established and confirmed by the both parties.
- 11.2 On the following occasions, the handing of problem should be decided through discussion and agreement between responsible of the both parties.
- When a question is arisen in this specification
- When a new problem is arisen which is not specified in this specifications
- When an inspection specifications change or operating condition change in customer is reported to quality Co.,ltd , and some problem is arisen in this specification due to the change
- When a new problem is arisen at the customer’ s operating set for sample evaluation in the customer site.

12. Packing method

TBD

13. Inspection standards

TBD

14. Contact

GOLD FAME TECHNOLOGY LIMITED

Address: Rm 6, 21/F., Laurels Industrial Centre, No. 32 Tai Yau Street, San Po Kong, Kowloon, Hong Kong.
Tel: (852) 2330 8319
Email: gftech@goldfame.com
Website: www.goldfame.com