东莞市方胜电子有限公司
DONGGUAN FANGSHENG ELECTRONIC., LTD

SPECIFICATION

COG-FT177MEHS-04

■ Preliminary Specification

☐ Final Specification

FANGSHENG ELECTROIC CO., LTD.

CUSTOMER:

Made By:
Checked By:
Approved By:
Quality:
Date:
Note:

Approved By:
Date:
Note:

Records of Revision

DATE	REF.PAGE PARAGRAPH DRAWING No.	REVISED No.	SUMMARY	REMARK
2019-10-23		V01	First Issue	

Contents

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1. General Specification

Item	Contents	Unit
LCD TYPE	TFT/TRANSMISSIVE	
MODULE SIZE (W*H*T)	34.7*46.7*2.7	MM
ACTIVE SIZE (W*H)	28.03*35.04	MM
PIXEL PITCH (W*H)	0.219*0.219	MM
NUMBER OF DOTS	128*160	
DRIVER IC	ST7735S-G4-1	
INTERFACE TYPE	MCU	
TOP POLARIZER TYPE	ANTI-GLARE	
RECOMMEND VIEWING DIRECTION	12	O'CLOCK
GRAY SCALE INVERSION DIRECTION	--	O'CLOCK
BACKLIGHT TYPE	TFT	
TOUCH PANEL TYPE	--	

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COG-TF177MEHS-04 VER.01

PIN DESCRIPTION

PIN NO	SYMBOL
1	LED-K
2	LED-A
3	GND
4	VDD
5	NC
6	NC
7	/CS
8	/RESET
9	RS
10	/WR
11	/RD
12	DB7
13	DB6
14	DB5
15	DB4
16	DB3
17	DB2
18	DB1
19	DB0
20	GND

VIEWING DIRECTION 12:00

128RGBX160 DOTS

34.7(LCM)
31.832(LCD)
28.032(A.A)
(1.434)
(1.90)
(1.675)
(1.815)
35.040(A.A)
41.420(LCD)
46.7(LCM)
50.00±0.5
12.10±0.5
5.00±0.5
3.00±0.5
0.50±0.1
W:0.30±0.05
P0.5*19=9.50±0.05
10.50±0.1

REMOVE TAPE
18*8MM

2.70
3~0.60
33.50
31.30
3~0.80
3~0.80

BL_FPC

Black tape

Conductive side   Stiffener
0.30±0.03

0.219
0.219
Detail:A

LED+   LED-

CIRCUIT DIAGRAM
(40mA@2.8V~3.4V)

NOTES:
1. General Tolerance: ±0.2
2. ( )reference dimension.
3. ROHS and REACH MUST BE COMPLIANT

Display Type	Century TFT
	TRANSMISSIVE
Optimum Viewing Direction	12 O'CLOCK
Upper Ploarizer Type	ANTI-GLARE
LCD Driver IC	ST7735S-G4-1
Operating Voltage	VDD=3.0V
Operation Temperature	-10℃ TO 60℃
Storage Temperature	-20℃ TO 70℃
Interface	MCU
Backlight	2-CHIP WHITE LED
Surface luminance(With CTP)	300 cd/m² MIN)
White X/Y	----

DRAWN	
ME. CHECKED	
EE. CHECKED	
APPROVED	

TITLE

MODULE SPEC.

DRAWING NO.	
COG-FT177MEHS	
UNIT	mm	SCALE	FIT
3rd Angle		SHEET 01F	1

V00				
VER.	First issue	Town	20191023	CUSTOMER'S APPROVAL
SYMBOL	AMENDMENT	SIGN	DATE	

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3. Block Diagram

4. Interface Pin Function

Pin No.	Symbol	Description
1	LED-K	Power Voltage for digital circuit
2	LED-A	Power Voltage for digital circuit
3	GND	Power ground
4	VDD	Power Supply for Analog, Digital System and Booster Circuit.
5	NC	
6	NC	
7	CS	-Chip Selection Pin -Low Enable.
8	RESET	Global Reset Pin
9	RS	-This signal will reset the device and it must be applied to properly initialize the chip. -Signal is active low.
10	WR	-Write Enable in MCU Parallel Interface. -In 4-line SPI, this pin is used as D/CX (data/ command selection). -If not used, please fix this pin at VDDI or DGND level.
11	RD	-Read Enable in 8080 MCU Parallel Interface. -If not used, please fix this pin at VDDI or DGND level.
12	DB7	DATE BUSS
13	DB6	DATE BUSS
14	DB5	DATE BUSS
15	DB4	DATE BUSS
16	DB3	DATE BUSS
17	DB2	DATE BUSS
18	DB1	DATE BUSS
19	DB0	DATE BUSS
20	GND	Power ground

5. Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage For Logic	DVDD	-0.3	3.96	V
Supply Voltage For Analog	AVDD	-0.5	14.85	V
Power supply	VGH	-0.3	40	V
Power supply	VGL	-20	0.3	V
Power supply	VGH - VGL	-	40	V
Supply current (One LED)	I_{LED}		--	mA
Operating temperature	T_{OP}	-20	+70	C
Storage temperature	T_{ST}	-30	+80	C

Note: The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

6. Electrical Characteristics

Input Power

Item	Symbol	Min	Typ.	Max	Unit	Applicable terminal
Supply Voltage For Logic	DVDD	2.3	3.3	3.6	V	
Supply Voltage For Analog	AVDD	8.9	9	9.1	V	
Power supply	VGH	17	18	19	V	
Power supply	VGL	-6.5	-6.0	-5.5	V	
Power supply	VCOM	3.0	3.15	3.3	V	
Input Voltage	V_{IL}	0	-	0.3DVDD	V	
	V_{IH}	0.7 DVDD	-	DVDD		
Input leakage Current	I_{LKG}	-		-	µA	

Item	Symbol	Value	Unit
Power supply voltage	VDD	2.8-3.3	V
I/O digital voltage	IOVCC	2.8-3.3	V
Operating temperature	Topr	-20 ~ +70	℃
Storage temperature	Tstg	-30 ~ +80	℃

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7. Optical Characteristics

ITEM		SYMBOL	CONDITIONS	SPECIFICATIONS			UNIT	NOTE
				MIN	TYP.	MAX		
Luminance		L	I_L =--mA	300	360	500	Cd/m^2	
Contrast Ratio		CR	θ=0°	600	800			
Response Time		T_{ON}	25℃		13	20	ms	
		T_{OFF}			15	25		
CIE Color Coordinate	Red	X_R	Viewing normal angle					
		Y_R						
	Green	X_G						
		Y_G						
	Blue	X_B						
		Y_B						
	White	X_W						
		Y_W						
Viewing Angle	Hor.	θ_{X+}	CR≥10	80	85		Degree	Gray scale inversion
		θ_{X-}		80	85			
	Ver.	θ_{Y+}		80	85			
		θ_{Y-}		80	85			
Uniformity		Un		80			%	

Note 1: Definition of Viewing Angle θx and θy:
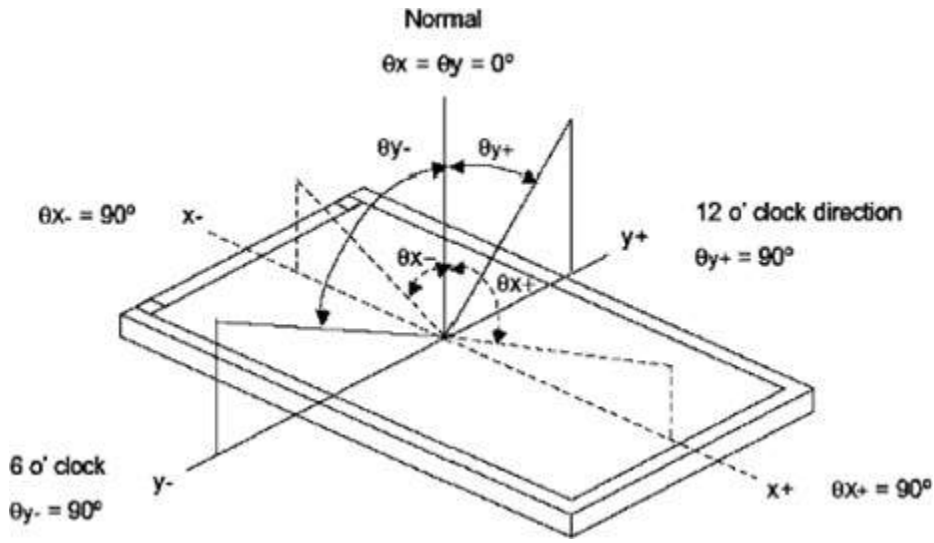
Note 2: Definition of contrast ratio CR:

$$CR = \frac{\text{Luminance of white state}}{\text{Luminance of black state}}$$

Note 3: Definition of Response Time(Tr,Tf)
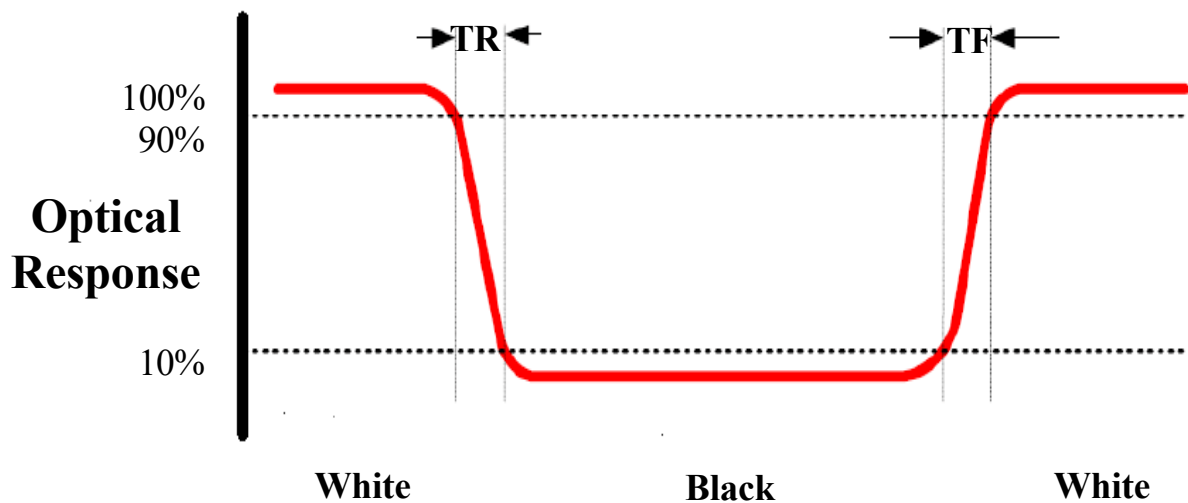
Note 4: Definition of Luminance
①The Brightness Test Equipment Setup
Field=2°(As measuring "black" image, field=2°is the best testing condition)

BM-7

Field=2°

TFT-LCD Panel

50cm

The center of the screen
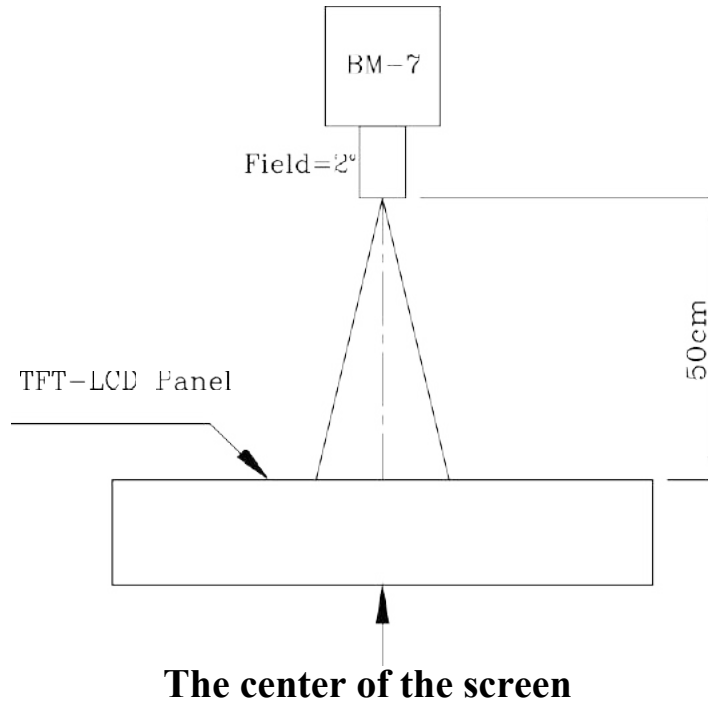
②The Brightness Test Point Setup

Unit: mm

Active area
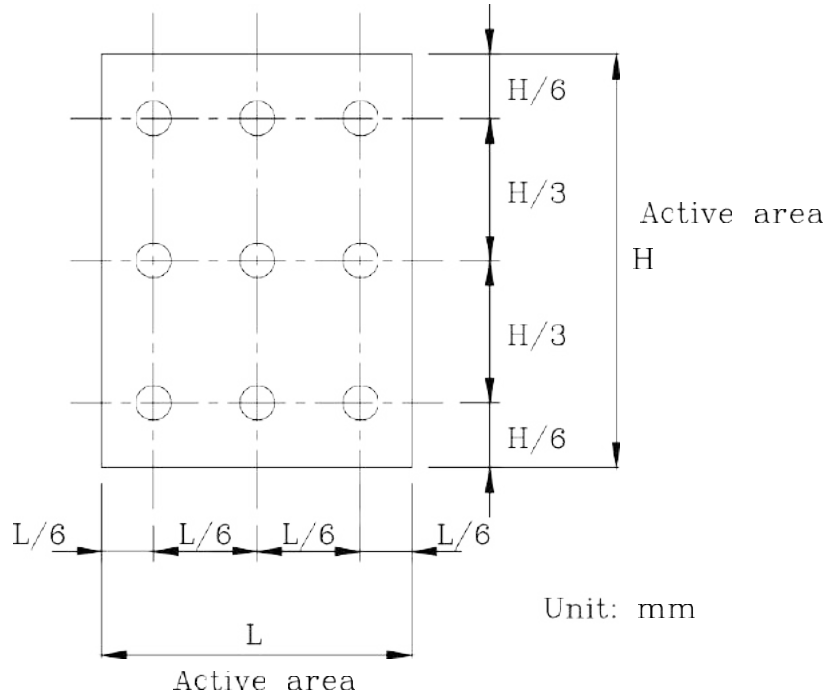
8. Timing Characteristics

LVDS Timing Diagram
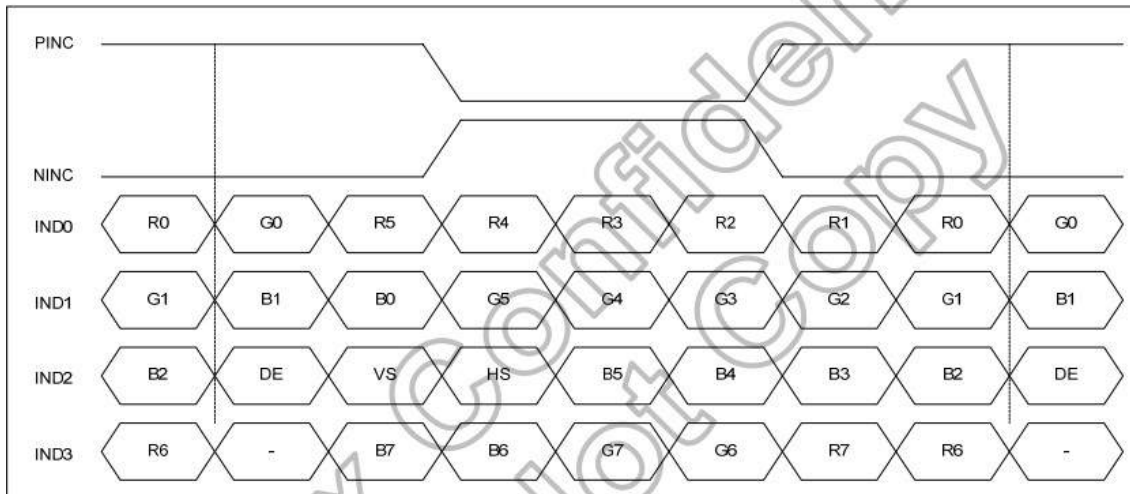
Figure 10.5: 8-bit LVDS Input

Parameter	Symbol	Spec.			Unit	Condition
		Min.	Typ.	Max.		
Clock frequency	R_{XFCLK}	20	-	71	MHz	-
Input data skew margin	T_{RSKM}	500		-	pS	$|V_{ID}|$=400mV R_{XVCM}=1.2V R_{XFCLK}=71MHz
Clock high time	T_{LVCH}	-	$4/(7*R_{XFCLK})$	-	ns	-
Clock low time	T_{LVCL}	-	$3/(7*R_{XFCLK})$	-	ns	-
PLL wake-up time	T_{emPLL}	-	-	150	µs	-

Table 10.2: LVDS mode AC electrical characteristics

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Power on/off
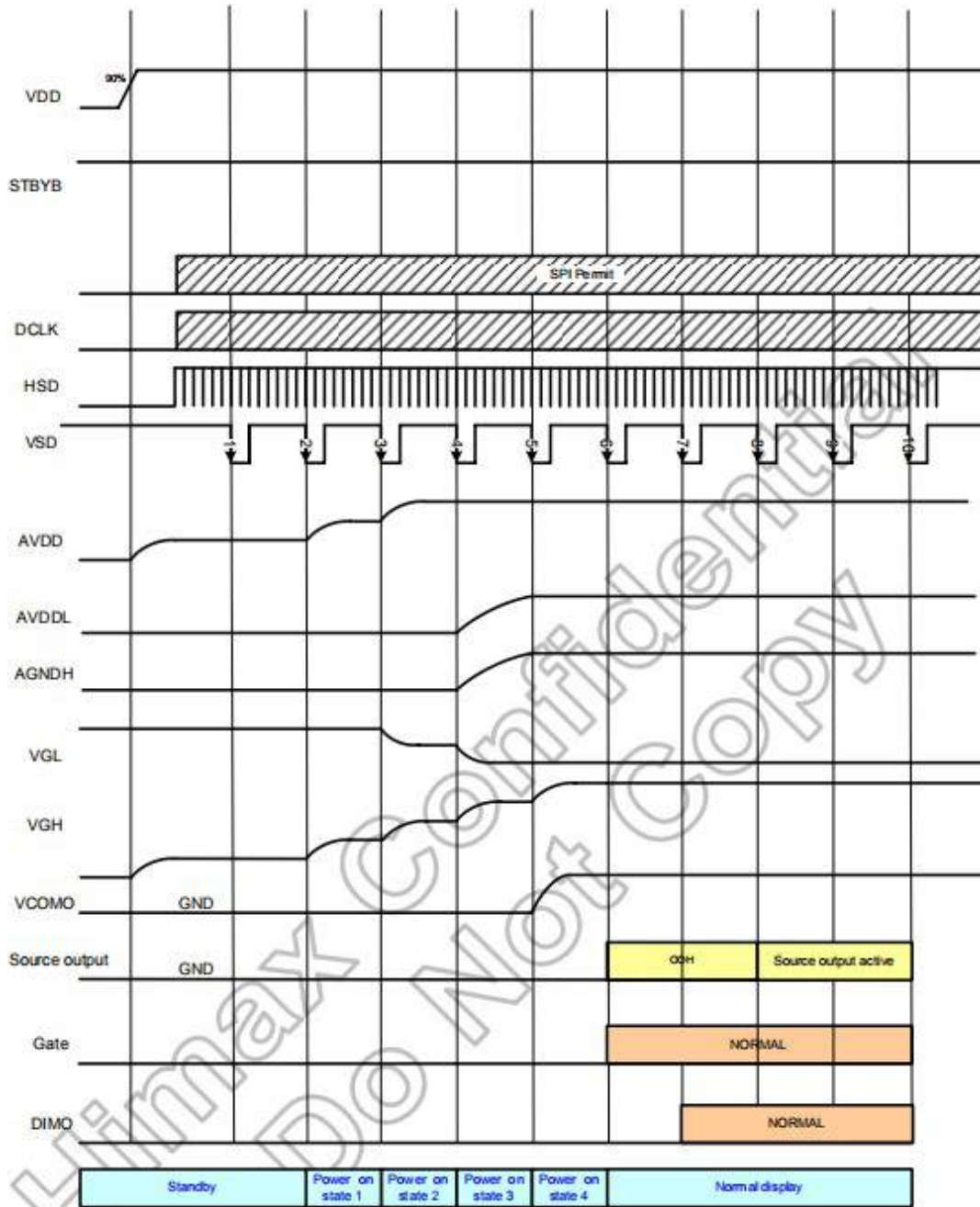
Figure 8.1: Power on timing sequence

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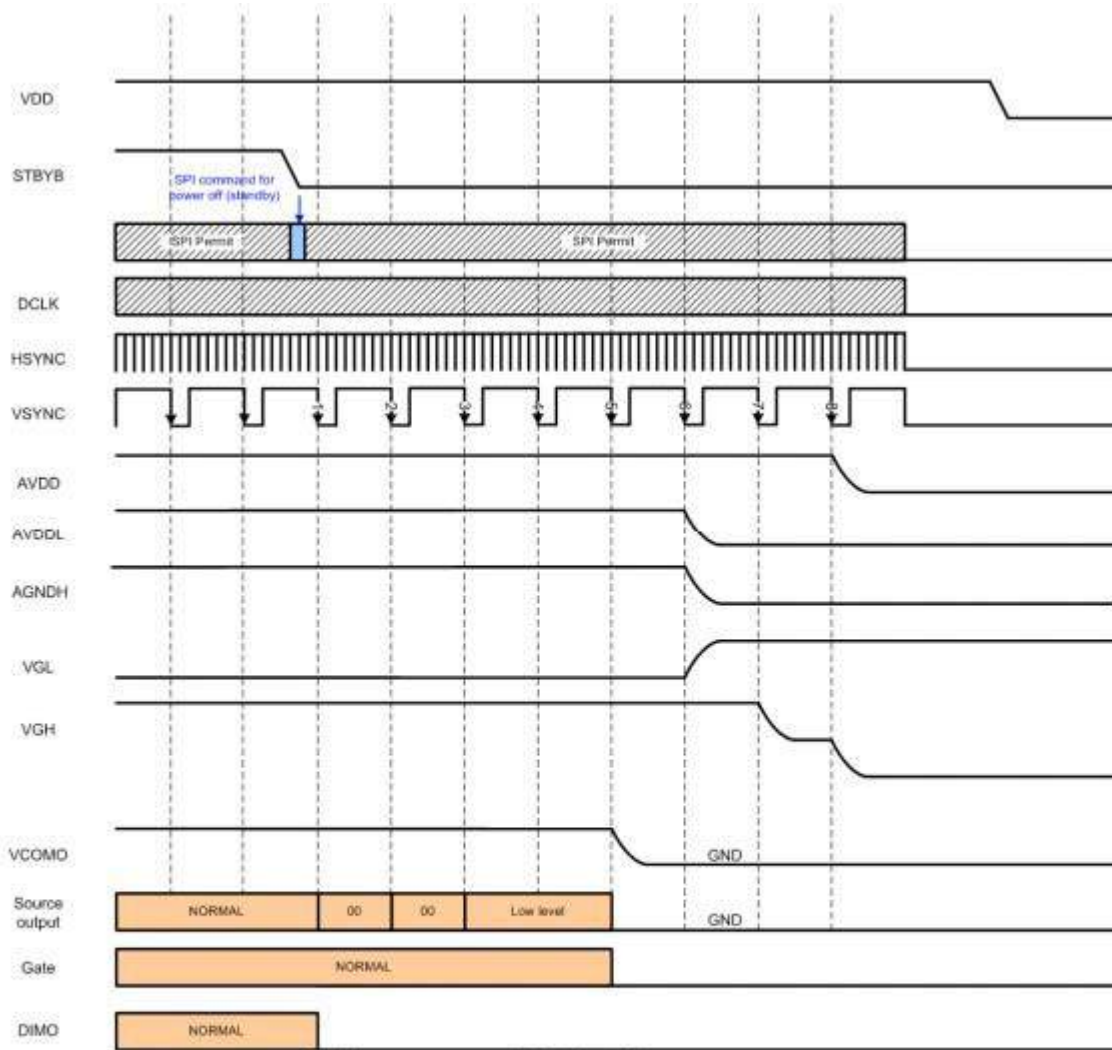
Figure 8.2: Power off timing sequence

Note: Low level=3FH, when NBW=L (Normally white)
Low level=00H, when NBW=H (Normally black)

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9.Standard Specification for Reliability
Standard Specification for Reliability of LCD Module

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts = +70℃, 240 hours	IEC60068-21:2007 GB2423.2-2008
2	Low Temperature Operation	Ta = -20℃, 240 hours	IEC60068-2-1:2007 GB/2423.1-2008
3	High Temperature Storage	Ta = +80℃, 240 hours	IEC60068-21:2007 GB/2423.2-2008
4	Low Temperature Storage	Ta = -30℃, 240 hours	IEC60068-21:2007 GB/2423.1-2008
5	Storage at High Temperature and Humidity	Ta = +60℃, 90% RH max,240hours	IEC60068-2-78 :2001 GB/T2423.3—2006
6	Thermal Shock (non-operation)	-30℃ 30 min~+80℃ 30 min, Change time:5min, 20 Cycle	Start with cold temperature, End with high temperature, IEC60068-214:1984, GB/2423.22-2002
7	ESD	C=150pF,R=330Ω,5point/panel Air:±8Kv,5times; Contact:±4Kv,5times (Environment:15℃~35℃, 30%~60%.86Kpa~106Kpa)	IEC61000-42:2001 GB/T17626.2-2006
8	Vibration Test	Frequency range:10~55Hz Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z (6 hours for total)	IEC60068-2-6:1982 GB/T2423.101995
9	Mechanical Shock (Non Op)	Half Sine Wave60G 6ms, ±X,±Y,±Z 3times for each direction	IEC60068-2-27:1987 GB/T2423.5—1995
10	Package Drop Test	Height:80cm, 1corner,3 edges,6 surfaces	IEC60068-2-32:1990 GB/T2423.8—1995

Note1: Ts is the temperature of panel's surface.
Note2: Ta is the ambient temperature of sample.

Testing Conditions and Inspection Criteria

For the final test, the testing sample must be stored at room temperature for 24 hours. After the tests listed in Table 9.2, standard specifications for reliability will be executed in order to ensure stability.

No.	Item	Test Model	In section Criteria
01	Current Consumption	Refer To Specification	The current consumption should conform to the product specification.
02	Contrast	Refer To Specification	After the tests have been executed, the contrast must be larger than half of its initial value prior to the tests.
03	Appearance	Visual inspection	Defect free.

MTBF

MTBF	Functions, performance, appearance, etc. shall be free from remarkable deterioration within 50,000 hours under ordinary operating and storage conditions room temperature ($25\pm5℃$), normal humidity ($50\pm10\%$ RH), and in area not exposed to direct sun light.

10.Specification of Quality Assurance

This standard of Quality Assurance confirms to the quality of LCD module products supplied by Tecenstar.

Quality Test

Before delivering, the supplier should conduct the following tests to confirm the quality of products.

- Electrical-Optical Characteristics: According to the individual specification to test the product.
- Appearance Characteristics: According to the individual specification to test the product.
- Reliability Characteristics: According to the definition of reliability on the specification for testing products.

Delivery Test

Before delivering, the supplier should conduct the delivery test.

- Test method: According to MIL-STD105E.General Inspection Level Ⅱ take a single Time.
- The defects classify of AQL as following:
  Major defect: AQL = 0.65
  Minor defect: AQL = 1.5
  Total defects: AQL = 1.5

Non-conforming Analysis & Deal With Manners

Non-conforming Analysis

- Purchaser should provide the data detail of non-conforming sample and the non-conforming.
- After receiving the data detail from purchaser, the analysis of non-conforming should be finished within two weeks.
- If the analysis can't be finished on time, supplier must notice purchaser 3 days in advance.

Disposition of non-conforming

- If any product defect be found during assembling, supplier must change the good for every defect after confirmation.
- Both supplier and customer should analyze the reason and discuss the disposition of non-conforming when the reason of nonconforming is not sure.

Agreement items

Both parties should negotiate together when the following problems happen.

- There is any problem of standard of quality assurance, and both sides should agree that it must be modified.
- There is any argument item which does not record in the standard of quality assurance.
- Any other special problem.

Standard of The Product Appearance Test

Manner of appearance test

- The test must be under 20W × 2 or 40W fluorescent light, and the distance of view must be at 30±5cm.
- When test the model of transmissive product must add the reflective plate.
- The test direction is base on around 10° of vertical line.
- Temperature: 25±5℃   Humidity: 60±10%RH

● Definition of area:
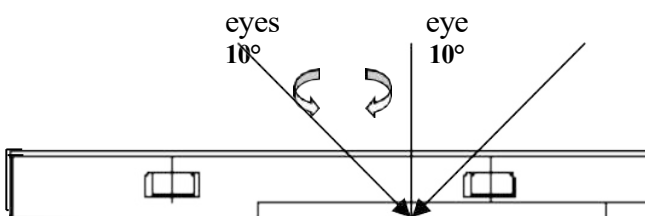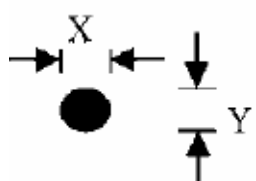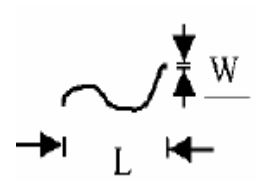
A: Viewing area B: Outside viewing area
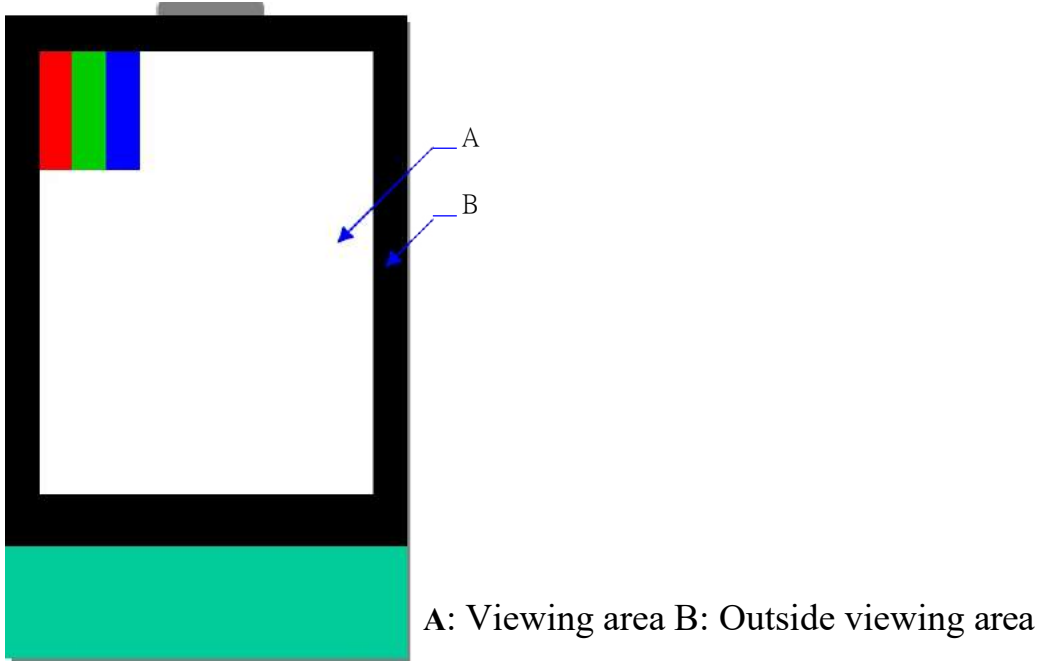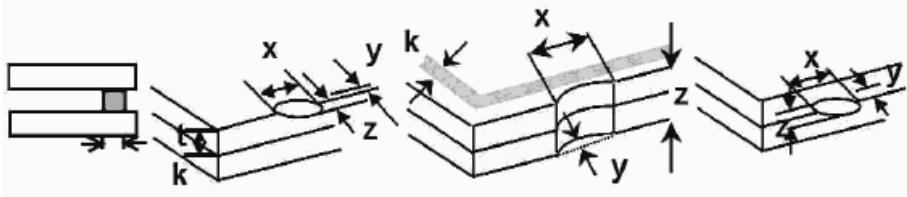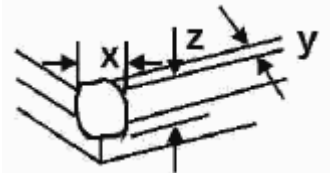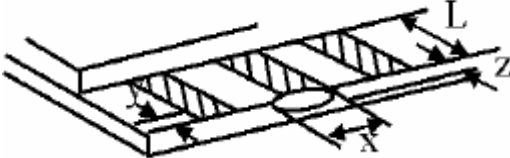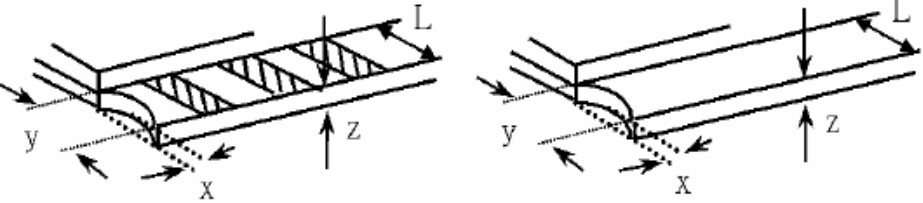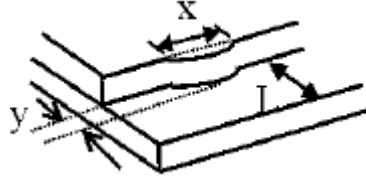
10.5.2 Basic principle

● When the standard can not be described, AQL will be applied.
● The sample of the lowest acceptable quality level must be negotiated by both supplier and customer when any dispute happened.
● New item must be added on time when it is necessary.

Inspection Specification
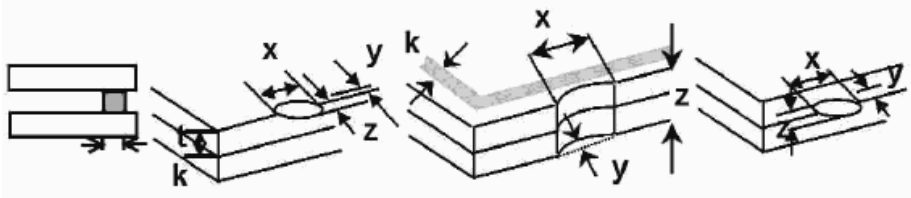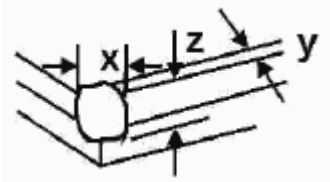
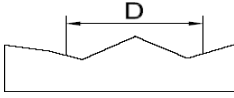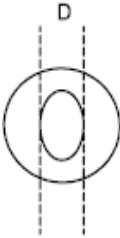| NO.	Item	Criterion	AQL
01	Electrical Testing	Missing vertical, horizontal segment, segment contrast defect. Missing character, dot or icon. Display malfunction. No function or no display. Current consumption exceeds product specifications. LCD viewing angle defect. Mixed product types. Flicker	0.65
02	Black or White spots or Bright spots or Color spots on LCD (Display only)	White and black or color spots on display $\leqq$ 0.25mm, no more than Five spots. 　Densely spaced: No more than three spots within 3mm.	1.5
03	LCD and Touch Panel black spots, white spots, contamination (non – display)	3.1 Round type: As following drawing $\Phi = (X+Y) / 2$ | Size(mm)	Acceptable Q'ty
---	---
$\Phi \leqq 0.10$	Accept no dense
$0.10 < \Phi \leqq 0.20$	1
$0.20 < \Phi \leqq 0.25$	1
$0.25 < \Phi \leqq 0.30$	0
$0.30 < \Phi$	0	 * Densely spaced: No more than two spots within 3mm.	1.5
		3.2 Line type: (As following drawing) | Length(mm)	Width(mm)	Acceptable Q'ty
---	---	---
---	$W \leqq 0.02$	Accept no dense
L<2.5	W<0.08	1
---	$0.08 \leqq W$	Rejection | * Densely spaced: No more than two lines within 3mm.	1.5

NO.	Item	Criterion			AQL
04	Polarizer bubbles	If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction	Size Φ(mm)	Acceptable Q'ty	1.5
			Φ≦0.30	Accept no dense	
			0.30< Φ≦0.50	0	
			0.50< Φ≦1.00	0	
			1.00< Φ	0	
			Total Q'ty	0	
05	Scratches	Follow NO.3 -2 Line Type.			
06	Chipped glass	Symbols: x: Chip length y: Chip width z: Chip thickness k: Seal width t: Glass thickness a: LCD side length L: Electrode pad length General glass chip: Chip on panel surface and crack between panels: (see content below)			1.5

Symbols:
x: Chip length   y: Chip width   z: Chip thickness
k: Seal width   t: Glass thickness a: LCD side length
L: Electrode pad length
   General glass chip:
   Chip on panel surface and crack between panels:

z: Chip thickness	y: Chip width	x: Chip length
Z≦1/2t	Not over viewing area	x≦2MM
1/2t< z≦2t	Not exceed 1/3k	x≦2MM

⊙ Unit: mm
⊙ If there are 2 or more chips, x is the total length of each chip
6.1.2 Corner crack:

z: Chip thickness	y: Chip width	x: Chip length
Z≦1/2t	Not over viewing area	x≦2MM
1/2t< z≦2t	Not exceed 1/3k	x≦2MM

⊙ Unit: mm
⊙ If there are 2 or more chips, x is the total length of each chip

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NO.	Item	Criterion	AQL

07	Glass crack	Symbols:
		x: Chip length y: Chip width z: Chip thickness
		k: Seal width t: Glass thickness a: LCD side length
		L: Electrode pad length
		  Protrusion over terminal:
		  Chip on electrode pad:
		
		(figure)
		
		| y: Chip width
			x: Chip length	z: Chip thickness |
				|---|---|---|
				| y≦0.5mm | x≦2MM | 0< z≦t |
				
				7.2.2
				Non-conductive portion:
				
				(figure)
				
				| y: Chip width
					x: Chip length	z: Chip thickness |
						|---|---|---|
						| y≦L | x≦2MM | 0< z≦t |
						
						◉ If there chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications.
						◉ If the product will be heat sealed by the customer, the alignment mark must mot be damaged.
						7.2.3 Substrate protuberance and internal crack
						
						(figure)
						
						| y: width
							x: length |
							|---|---|
							| y≦1/3L | X≦2MM |
								1.5

NO.	Item	Criterion	AQL
08	Cracked glass	No crack is allowed.	1.5
09	Backlight elements	Illumination source flickers when lit. Spots or scratches that appear when lit must be judged. Using LCD spot, lines and contamination standards. Backlight doesn't light or color is wrong.	1.5 1.5 0.65
10	Bezel	No scratches with W>0.1 and Length>2.5mm.	1.5
11	PCB、COB	COB seal may not have pinholes larger than 0.2mm or contamination. COB seal surface may not have pinholes through to the IC. The height of the COB should not exceed the height indicated in the assembly diagram. There may not be more than 2mm of sealant outside the seal area on PCB. And there should be no more than three places. Parts on PCB must be the same as on the production characteristic chart, There should be no wrong parts, missing parts or excess parts. The jumper on the PCB should conform to the product characteristic chart.	1.5 1.5 1.5 1.5 0.65 0.65
12	FPC	FPC damage per IPC guidelines.(IPC-A-610) Nicks or damage along the edges of the flexible printed cir-cuitry and cutouts,providing the penetration does not exceed 50% of the distance from the edge to the nearest conductor to 2.5mm[0.1in], Whichever is less.	1.5
13	Soldering	No cold solder joints, missing solder connections, oxidation or icicle. No short circuits in components on PCB or FPC. Soldering per IPC guidelines.(IPC-A-610)	1.5 0.65

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NO.	Item	Criterion	AQL
14	Touch Panel Chipped glass	Symbols: x: Chip length y: Chip width z: Chip thickness k: Seal width t: Touch Panel Total thickness a: LCD side length L: Electrode pad length General glass chip: Chip on panel surface and crack between panels: <table><tr><td>z: Chip thickness</td><td>y: Chip width</td><td>x: Chip length</td></tr><tr><td>Z≦t</td><td>≦1/2 k and not over viewing area</td><td>x≦2MM</td></tr></table> ⊙ Unit: mm ⊙ If there are 2 or more chips, x is the total length of each chip 14.1.2 Corner crack: <table><tr><td>z: Chip thickness</td><td>y: Chip width</td><td>x: Chip length</td></tr><tr><td>z≦t</td><td>≦1/2 k and not over viewing area</td><td>x≦2MM</td></tr></table> ⊙ Unit: mm ⊙ If there are 2 or more chips, x is the total length of each chip	1.5

NO.	Item	Criterion	AQL
15	Touch Panel(Fish eye、dent and bubble on film)	<table><tr><td>SIZE(mm)</td><td>Acceptable Q'ty</td></tr><tr><td>Φ≦0.2</td><td>Accept no dense</td></tr><tr><td>0.2< D ≦0.4</td><td>5</td></tr><tr><td>0.4< D ≦0.5</td><td>2</td></tr><tr><td>0.5< D</td><td>0</td></tr></table>	1.5
16	Touch Panel Newton ring	Newton ring dimension ≦ 1/2 touch panel area and not affect font and line distortion(≦2.5%) , it is acceptable.	1.5
17	Touch Panel Linearity	Less than 2.5% is acceptable.	1.5
18	LCD Ripple	Touch the touch panel , can not see the LCD ripple. Pen: R 1.0mm silicon rubber. Operation Force: 80g	1.5
19	General appearance	Pin type must match type in specification sheet. LCD pin loose or missing pins. Product packaging must the same as specified on packaging specification sheet. Product dimension and structure must conform to product specification sheet. product packaging shall be by trays sized to protect tft and fpc cable, cable shall not be bent during transportation. 19.7top tray must be empty.	0.65 0.65 0.65 0.65

11. Handling Precaution

Handling of LCM

- Avoid external shock.
- Don't apply excessive force on the surface.
- Liquid in LCD is hazardous substance, do not lick or swallow. When the liquid is attaching to your hand, skin, cloth, etc., wash it thoroughly and immediately.
- Don't operate it above the absolute maximum rating.
- Don't disassemble the LCM.
- The operators should wear protections whenever he/she comes into contact with the module. Never touch any of the conductive parts such as the LSI pads, the copper leads on the PCB and the interface terminals with any parts of the human body.
- The modules should be kept in antistatic bags or other containers resistant to static for storage.
- The module is coated with a film to protect the display surface, be careful when peeling off this protective film since static electricity may be generated.

Storage

- Store it in an ambient temperature of 25±10℃, and in a relative humidity of 50±10%RH. Don't expose to sunlight or fluorescent light.
- Store it in a clean environment, free from dust, active gas, and solvent.
- Store it in anti-static electricity container.
- Store it without any physical load.

Soldering

- Use only soldering irons with proper grounding and no leakage.
- Iron: no higher than 280±10℃ and less than 3 sec during hand soldering.
- Rewiring: no more than 2 times.
-

12.Packing Method

No.	Item	Dimensions(mm)	Quantity	Remark
1	LCM Module	31.83*41.42*1.34	560PCS	
2	TRAY	375*330*21 (include 28pcs products/onetray)	21PCS	
	LARGE CARTON	405*355*250 (include 560pcs products/one carton)	1PCS	