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SPECIFICATION

FS130MH2ZG-03

■ Preliminary Specification

☐ Final Specification

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Quality:

Date:

Note:

Customer:

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Date:

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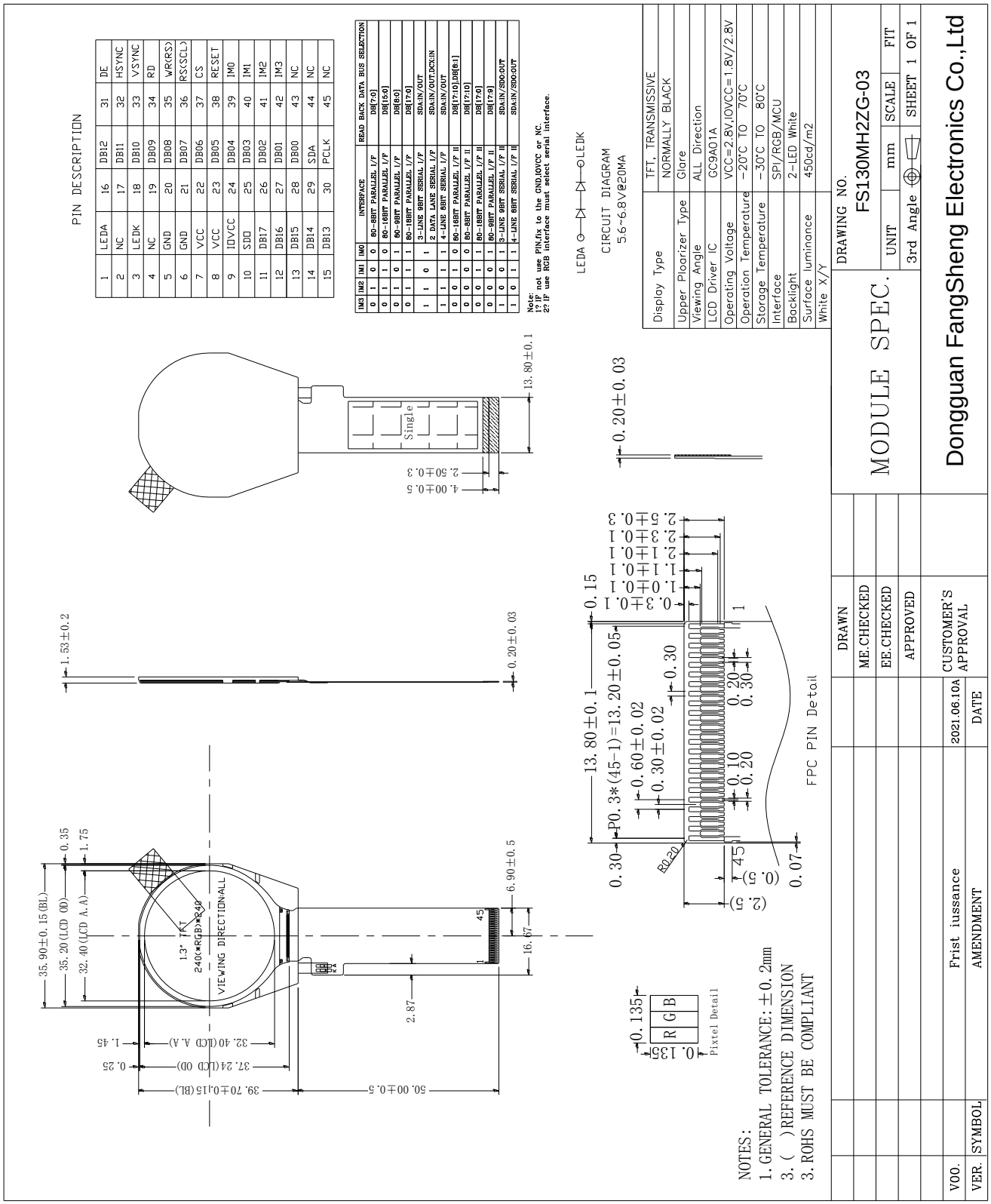
1. General Specification

Item	Contents	Unit
LCD TYPE	TFT/TRANSMISSIVE	
MODULE SIZE (W*H*T)	35.90*39.70*1.53	MM
ACTIVE SIZE (W*H)	23.40*23.40	MM
PIXEL PITCH (W*H)	0.135*0.135	MM
NUMBER OF DOTS	240*240	
DRIVER IC	GC9A01A	
INTERFACE TYPE	SPI/RGB/MCU	
TOP POLARIZER TYPE	ANTI-GLARE	
RECOMMEND VIEWING DIRECTION	ALL	O’CLOCK
GRAY SCALE INVERSION DIRECTION	-	O’CLOCK
BACKLIGHT TYPE	2-DIES WHITE LED	
TOUCH PANEL TYPE	WITHOUT	

2. Mechanical Drawing



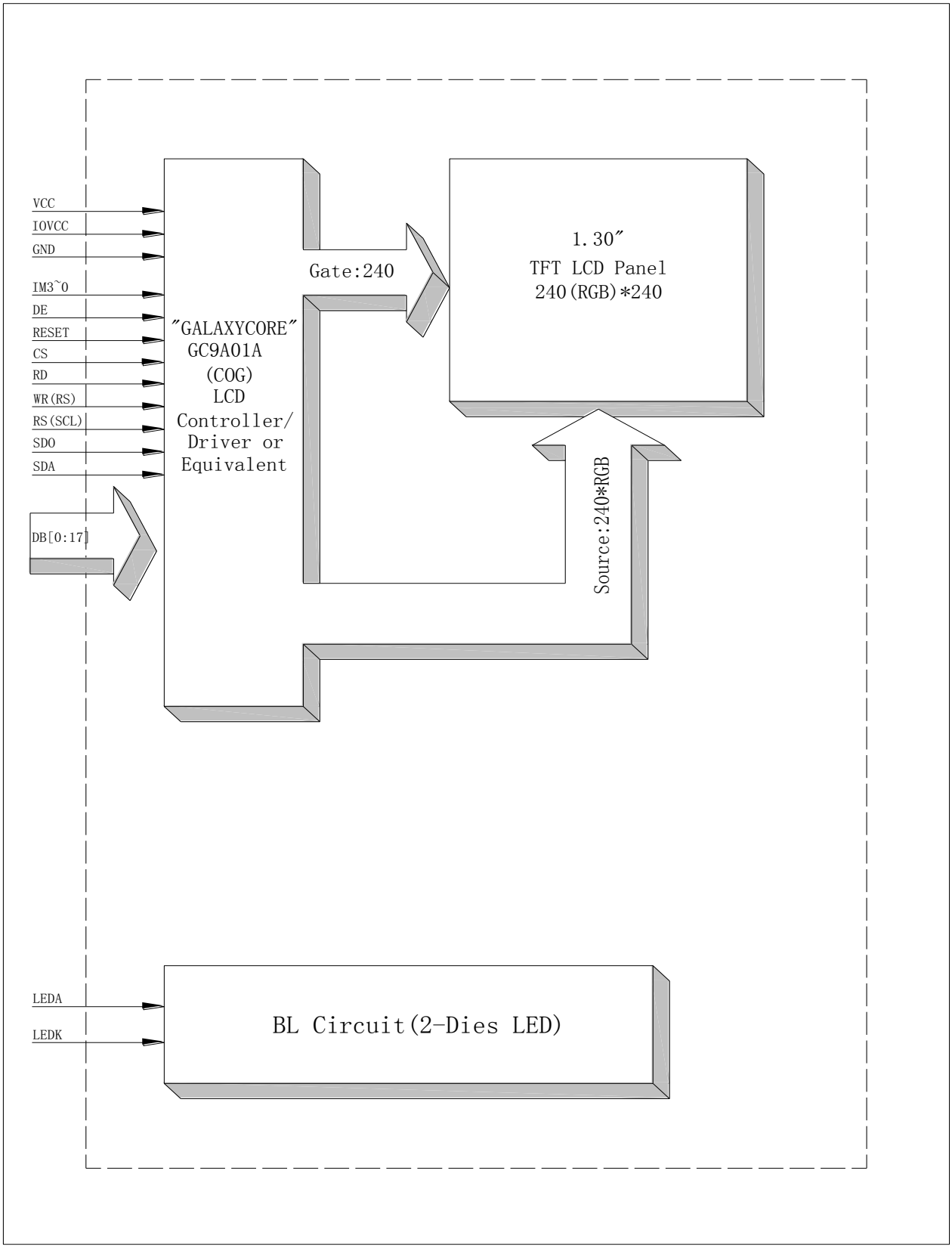
Display Type	TFT, TRANSMISSIVE
Upper Ploarizer Type	NORMALLY BLACK
Viewing Angle	Glare
LCD Driver IC	ALL Direction
Operating Voltage	GC9A01A
Operation Temperature	VCC=2.8V,IOVCC=1.8V/2.8V
Storage Temperature	-20°C TO 70°C
Interface	-30°C TO 80°C
Backlight	SPI/RGB/MCU
Surface luminance	2-LED White
White X/Y	450cd/m2

1	LEDA	16	DB12	31	DE
2	NC	17	DB11	32	HSYNC
3	LEDK	18	DB10	33	VSYNC
4	NC	19	DB09	34	RD
5	GND	20	DB08	35	WR(RS)
6	GND	21	DB07	36	RS(SCL)
7	VCC	22	DB06	37	CS
8	VCC	23	DB05	38	RESET
9	IOVCC	24	DB04	39	IM0
10	SDD	25	DB03	40	IM1
11	DB17	26	DB02	41	IM2
12	DB16	27	DB01	42	IM3
13	DB15	28	DB00	43	NC
14	DB14	29	SDA	44	NC
15	DB13	30	PCLK	45	NC

IM3	IM2	IM1	IM0	INTERFACE	READ BACK DATA BUS SELECTION
0	1	0	0	80-8BIT PARALLEL I/F	DB[7:0]
0	1	1	0	80-16BIT PARALLEL I/F	DB[16:0]
0	1	0	1	80-9BIT PARALLEL I/F	DB[8:0]
0	1	1	1	80-18BIT PARALLEL I/F	DB[17:0]
1	1	0	1	3-LINE 9BIT SERIAL I/F	SDA/IN/OUT
1	1	1	1	2 DATA LANE SERIAL I/F	SDA/IN/OUT,DCX/IN
1	1	1	0	4-LINE 8BIT SERIAL I/F	SDA/IN/OUT
0	0	1	0	80-16BIT PARALLEL I/F II	DB[17:10],DB[8:1]
0	0	0	0	80-8BIT PARALLEL I/F II	DB[17:10]
0	0	1	1	80-18BIT PARALLEL I/F II	DB[17:0]
0	0	0	1	80-9BIT PARALLEL I/F II	DB[17:9]
1	0	0	1	3-LINE 9BIT SERIAL I/F II	SDA/IN/SDO/OUT
1	0	1	1	4-LINE 8BIT SERIAL I/F II	SDA/IN/SDO/OUT

Note:
1) If not use PIN,fix to the GND,IOVCC or NC.
2) If use RGB interface must select serial interface.

3. Block Diagram



4. Interface Pin Function

Pin No.	Symbol	Description
1	LEDA	Anode of LED backlight.
2	NC	No connection.
3	LEDK	Cathode of LED backlight.
4	NC	No connection.
5	GND	Power ground.
6	GND	Power ground.
7	VCC	Supply Voltage.
8	VCC	Supply Voltage.
9	IOVCC	IO Voltage.
10	SDO	Serial output signal. The data is outputted on the falling edge of the SCL signal.
11	DB17	Data bus.
12	DB16	Data bus.
13	DB15	Data bus.
14	DB14	Data bus.
15	DB13	Data bus.
16	DB12	Data bus.
17	DB11	Data bus.
18	DB10	Data bus.
19	DB09	Data bus.
20	DB08	Data bus.
21	DB07	Data bus.
22	DB06	Data bus.
23	DB05	Data bus.
24	DB04	Data bus.
25	DB03	Data bus.
26	DB02	Data bus.
27	DB01	Data bus.
28	DB00	Data bus.
29	SDA	When IM[3]:Low, Serial in/out signal in 3-wire 9-bit/4-wire 8-bit serial data interface. When IM[3]:High, Serial input signal in 3-wire 9-bit/4-wire 8-bit serial data interface. The data is applied on the rising edge of the SCL signal.
30	PCLK	Dot clock signal for RGB interface operation.
31	DE	Data enable signal for RGB interface operation.
32	HSYNC	Line synchronizing signal for RGB interface operation.
33	VSYNC	Frame synchronizing signal for RGB interface operation.
34	RD	8080-I/8080-II system (RDX): Serves as a read signal and MCU read data at the rising edge.
35	WR(RS)	8080-I/8080-II system (WRX): Serves as a write signal and writes data at the rising edge. 4-line system (D/CX): Serves as command or parameter select.
36	RS(SCL)	This pin is used to select "Data or Command" in the parallel interface. This pin is used serial interface clock in 3-wire 9-bit / 4-wire 8-bit serial data interface.
37	CS	Chip select input pin("Low" enable).
38	RESET	This signal will reset the device and must be applied to properly initialize the chip. Signal is active low.

39	IM0	Select the MCU interface mode
40	IM1	Select the MCU interface mode
41	IM2	Select the MCU interface mode
42	IM3	Select the MCU interface mode
43	NC	No connection.
44	NC	No connection.
45	NC	No connection.

Note:Select the MCU interface mode MPU Parallel interface bus and serial interface select If use RGB Interface must select serial interface.

IM3	IM2	IM1	IM0	MCU-Interface	Pins in use	
					Register	GRAM
0	1	0	0	8080 MCU 8-bit bus interface I	D[7:0]	D[7:0]
0	1	1	0	8080 MCU16-bit bus interface I	D[7:0]	D[15:0]
0	1	0	1	8080 MCU 9-bit bus interface I	D[7:0]	D[8:0]
0	1	1	1	8080 MCU18-bit bus interface I	D[7:0]	D[17:0]
1	1	0	1	3-wire 9-bit data serial interface I	SDA: In/OUT	
				2 data line serial interface I	SDA: In/OUT DCX:In	
1	1	1	1	4-wire 8-bit data serial interface I	SDA: In/OUT	
0	0	1	0	8080 MCU 16-bit bus interface II	D[8:1]	D[17:10] ,D[8:1]
0	0	0	0	8080 MCU 8-bit bus interface II	D[17:10]	D[17:10]
0	0	1	1	8080 MCU 18-bit bus interface II	D[8:1]	D[17:0]
0	0	0	1	8080 MCU 9-bit bus interface II	D[17:10]	D[17:9]
1	0	0	1	3-wire 9-bit data serial interface II	SDA: In/SDO:OUT	
1	0	1	1	4-wire 8-bit data serial interface II	SDA: In/SDO:OUT	

5. Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply voltage for analog	VDD	-0.3	4.6	V
Supply voltage for logic	VDD	-0.3	4.6	V
Supply current (One LED)	I_{LED}		30	mA
Operating temperature	T_{OP}	-20	+70	℃
Storage temperature	T_{ST}	-30	+80	℃

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

6.1 Input Power

Item	Symbol	Min	Typ.	Max	Unit	Applicable terminal
Supply Voltage for Analog	VDD	2.5	2.8	3.3	V	
Supply Voltage for Logic	VDDIO	1.65	1.8/2.8	3.3	V	
Input Voltage	V_{IL}	GND	-	0.3VDD	V	
	V_{IH}	0.7 VDD	-	VDD		
Input leakage Current	I_{LKG}	-1		1	μA	

6.2 Backlight Driving Conditions

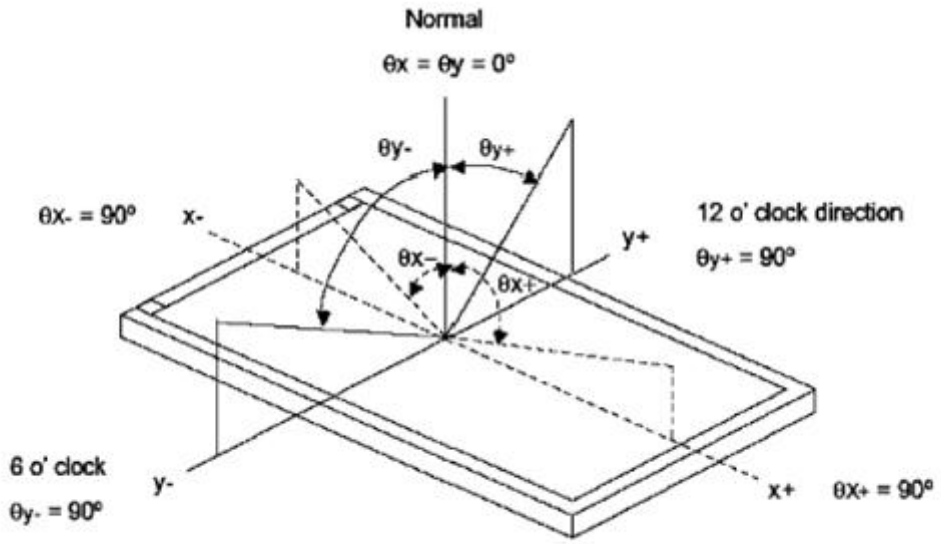
Item	Symbol	Value			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED Backlight	V_F	5.6	6	6.8	V	I_L =20mA
Current for LED Backlight	I_L		20	-	mA	
Power Consumption	P		0.12		W	
LED Life Time		30,000	50,000		Hr	Note

Note: Brightness to be decreased to 50% of the initial value at ambient temperature TA=25℃

7. Optical Characteristics

ITEM		SYMBOL	CONDITIONS	SPECIFICATIONS			UNIT	NOTE
				MIN	TYP.	MAX		
Luminance		L	I_L =20mA	340	450	630	Cd/m^2	
Contrast Ratio		CR	θ=0°	900	1100	-		
Response Time		T_{ON}	25℃	-	30	35	ms	
		T_{OFF}						
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	
		θ_{X-}		80	85			
	Ver.	θ_{Y+}		80	85			
		θ_{Y-}		80	85			
Uniformity	Un			80			%	

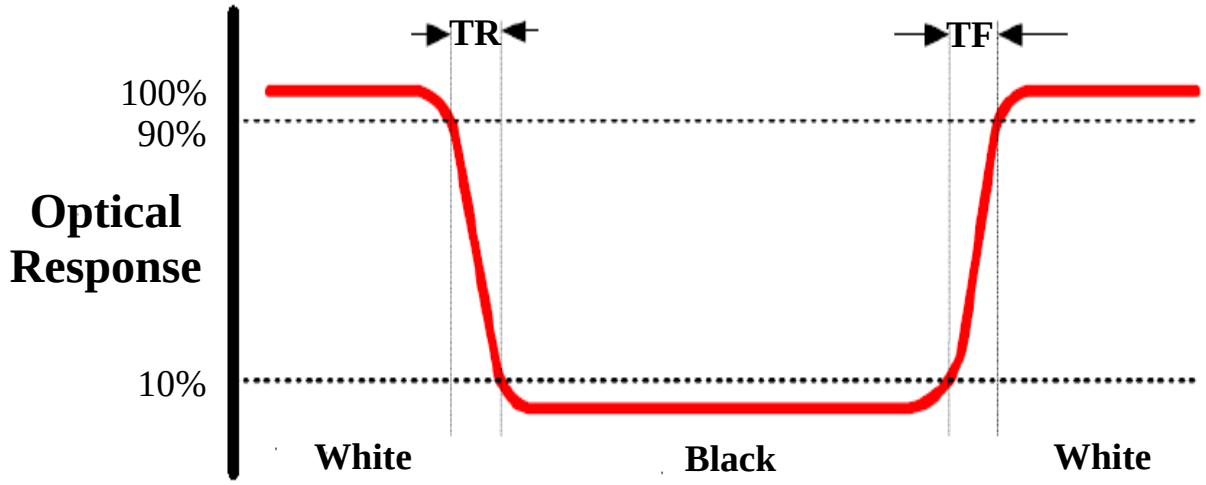
Note 1: Definition of Viewing Angle θx and θy:



Note 2: Definition of contrast ratio CR:

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

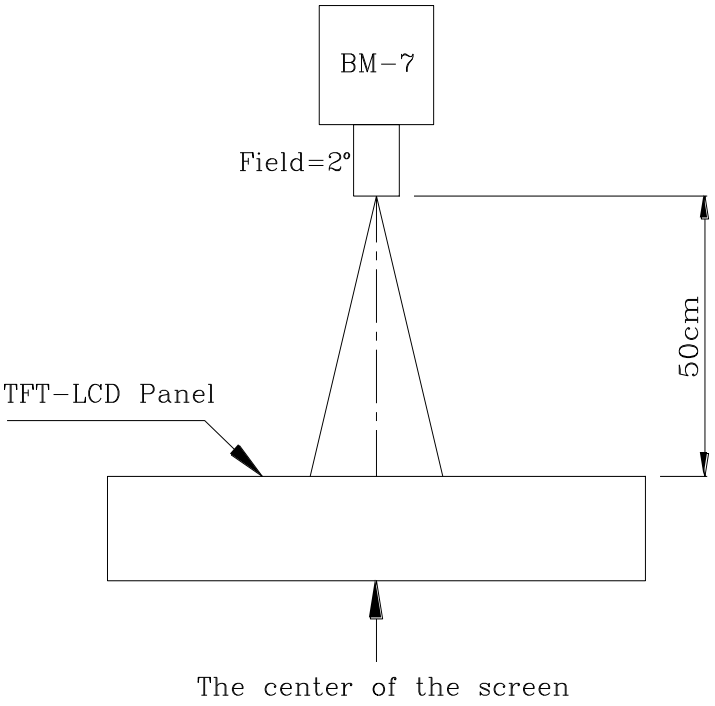
Note 3: Definition of Response Time(Tr,Tf)



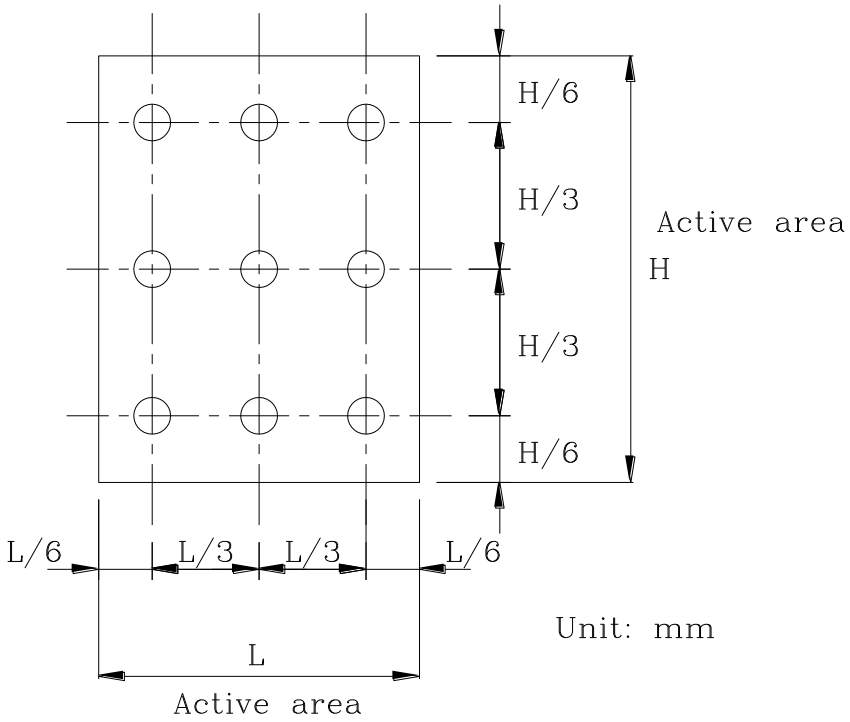
Note 4: Definition of Luminance

①The Brightness Test Equipment Setup

Field=2° (As measuring "black" image, field=2° is the best testing condition)



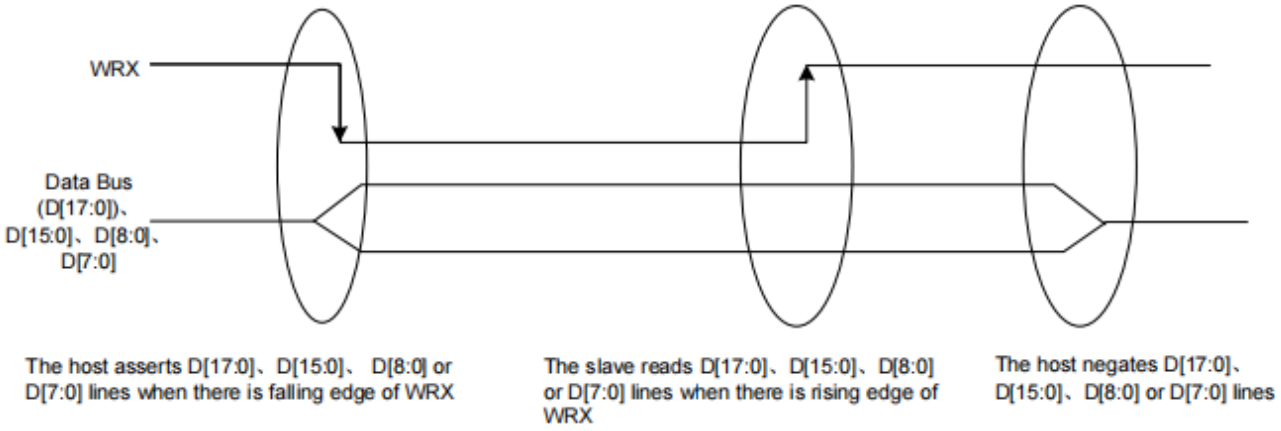
②The Brightness Test Point Setup

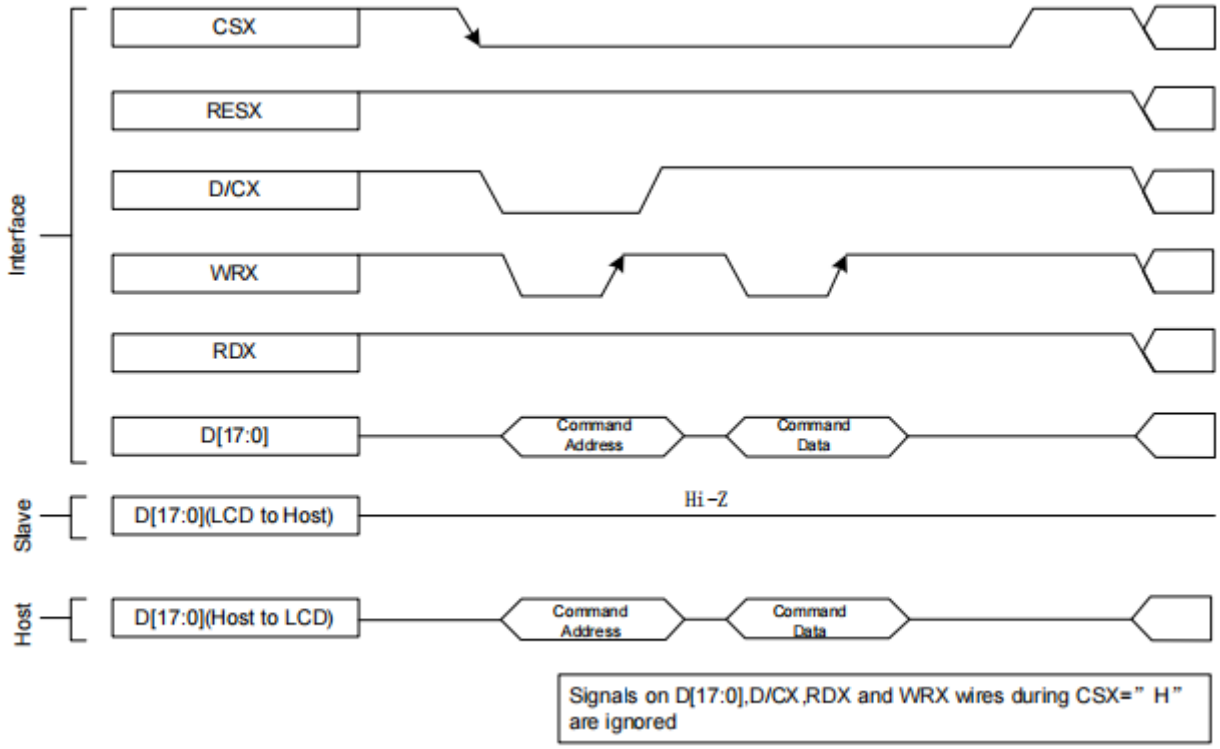


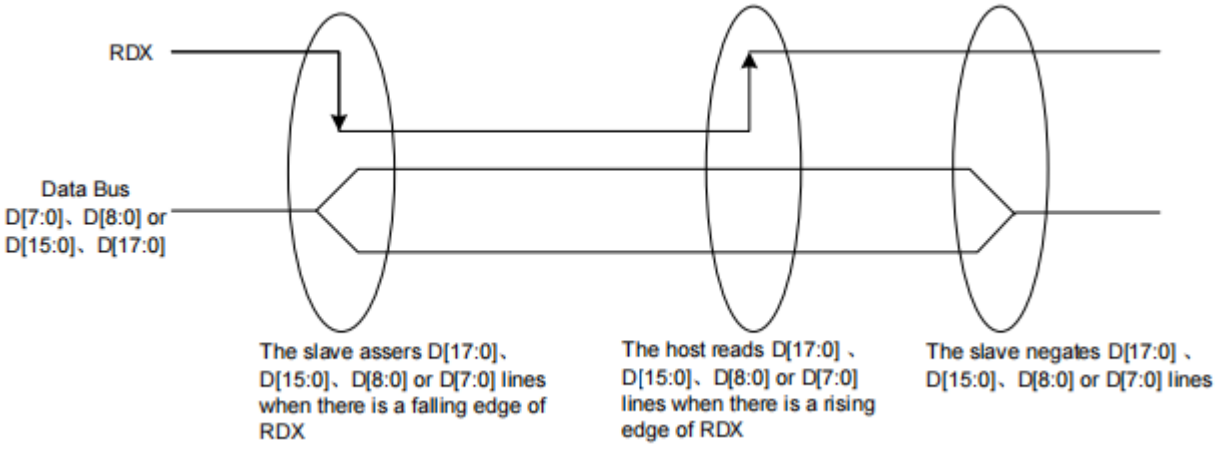
8. Timing Characteristics

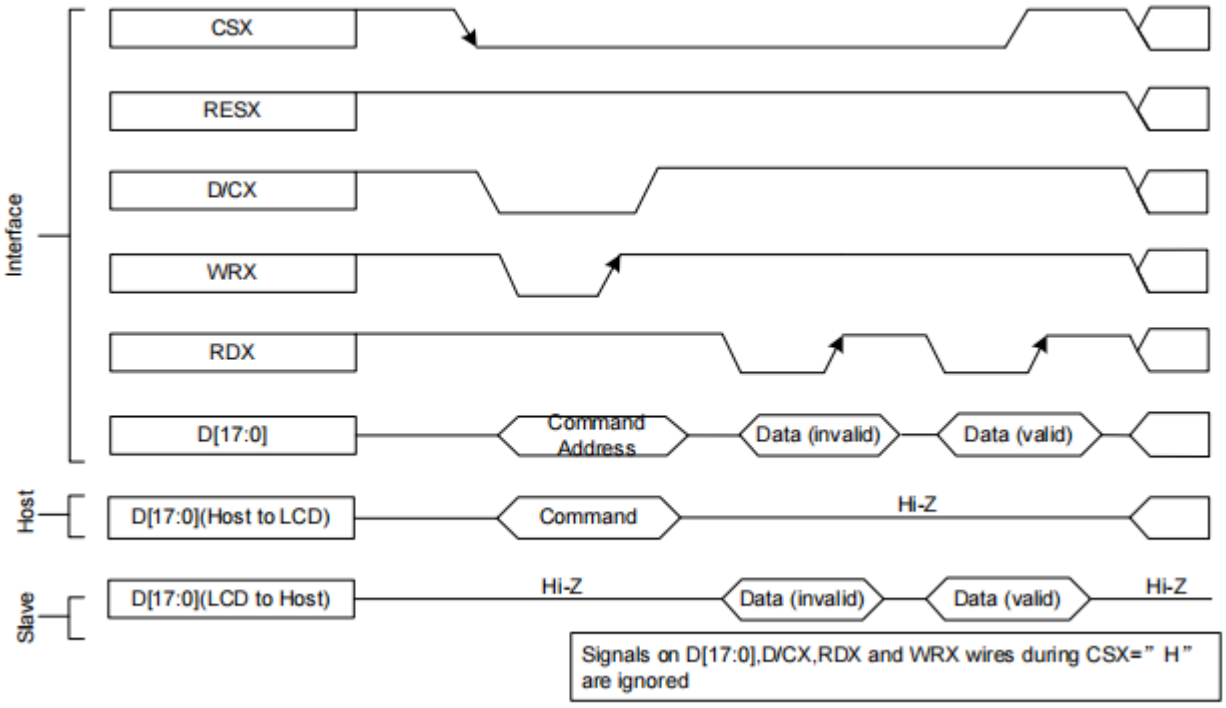
8.1 MCU Characteristics

The following figure shows a write cycle for the 8080-I MCU interface

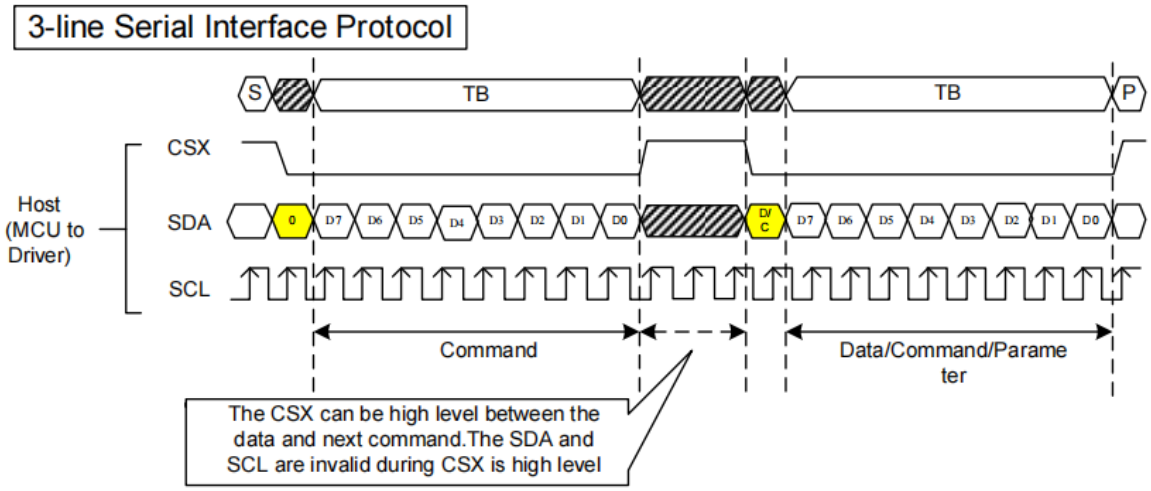


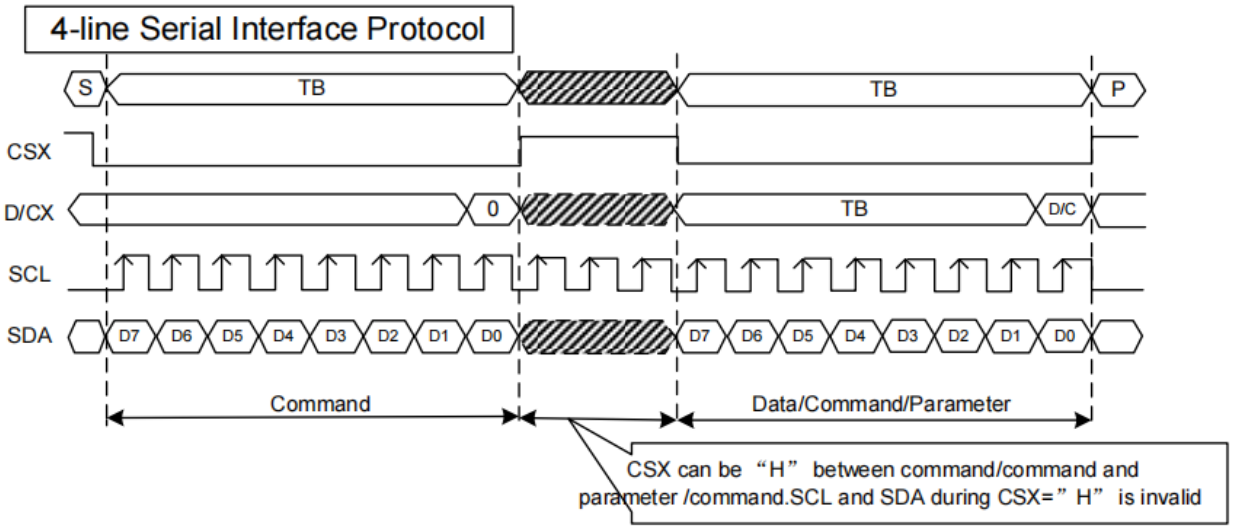



RDX
Data Bus
D[7:0]、D[8:0] or
D[15:0]、D[17:0]
The slave assers D[17:0]、D[15:0]、D[8:0] or D[7:0] lines when there is a falling edge of RDX
The host reads D[17:0] 、D[15:0]、D[8:0] or D[7:0] lines when there is a rising edge of RDX
The slave negates D[17:0] 、D[15:0]、D[8:0] or D[7:0] lines

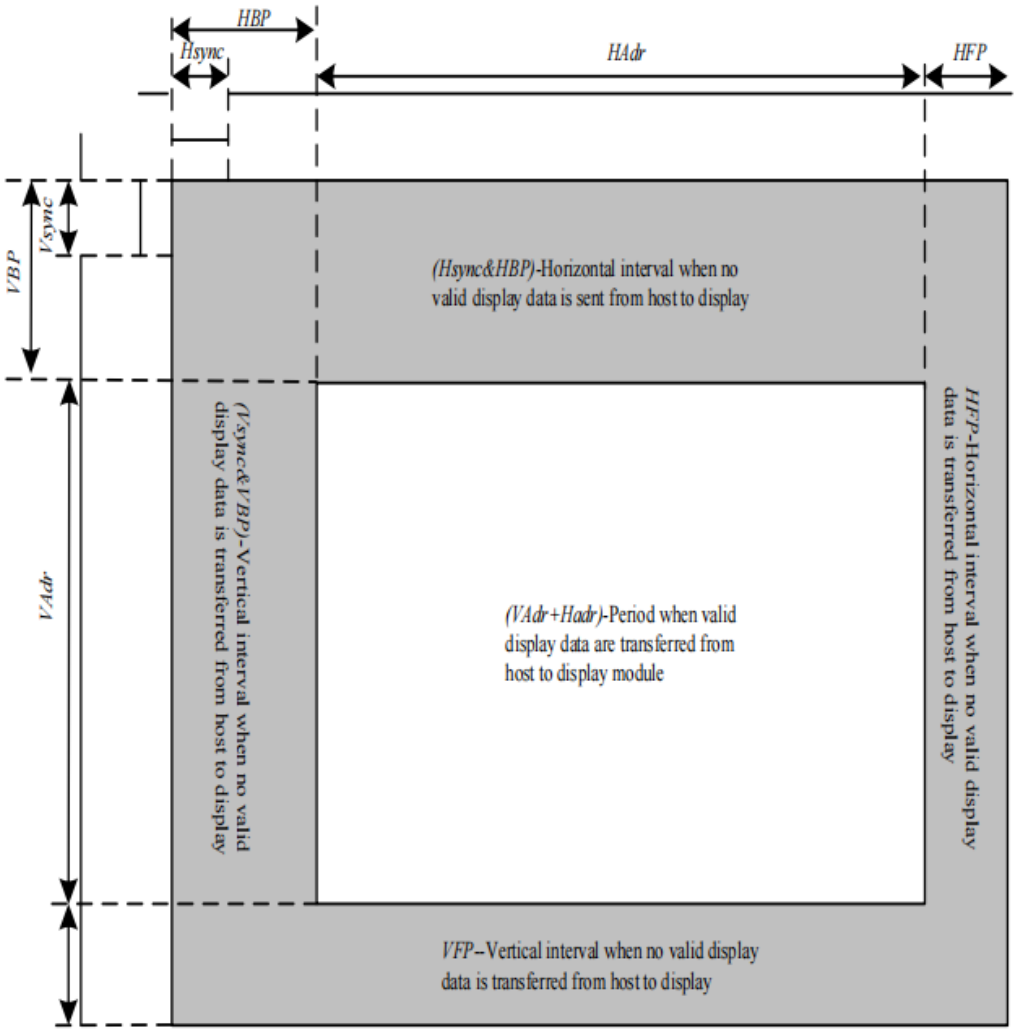

Interface
CSX
RESX
D/CX
WRX
RDX
D[17:0]
Command
Address
Data (invalid)
Data (valid)
Host
D[17:0](Host to LCD)
Command
Hi-Z
Slave
D[17:0](LCD to Host)
Hi-Z
Data (invalid)
Data (valid)
Hi-Z
Signals on D[17:0],D/CX,RDX and WRX wires during CSX=" H" are ignored

8.2 3/4line-SPI Characteristics





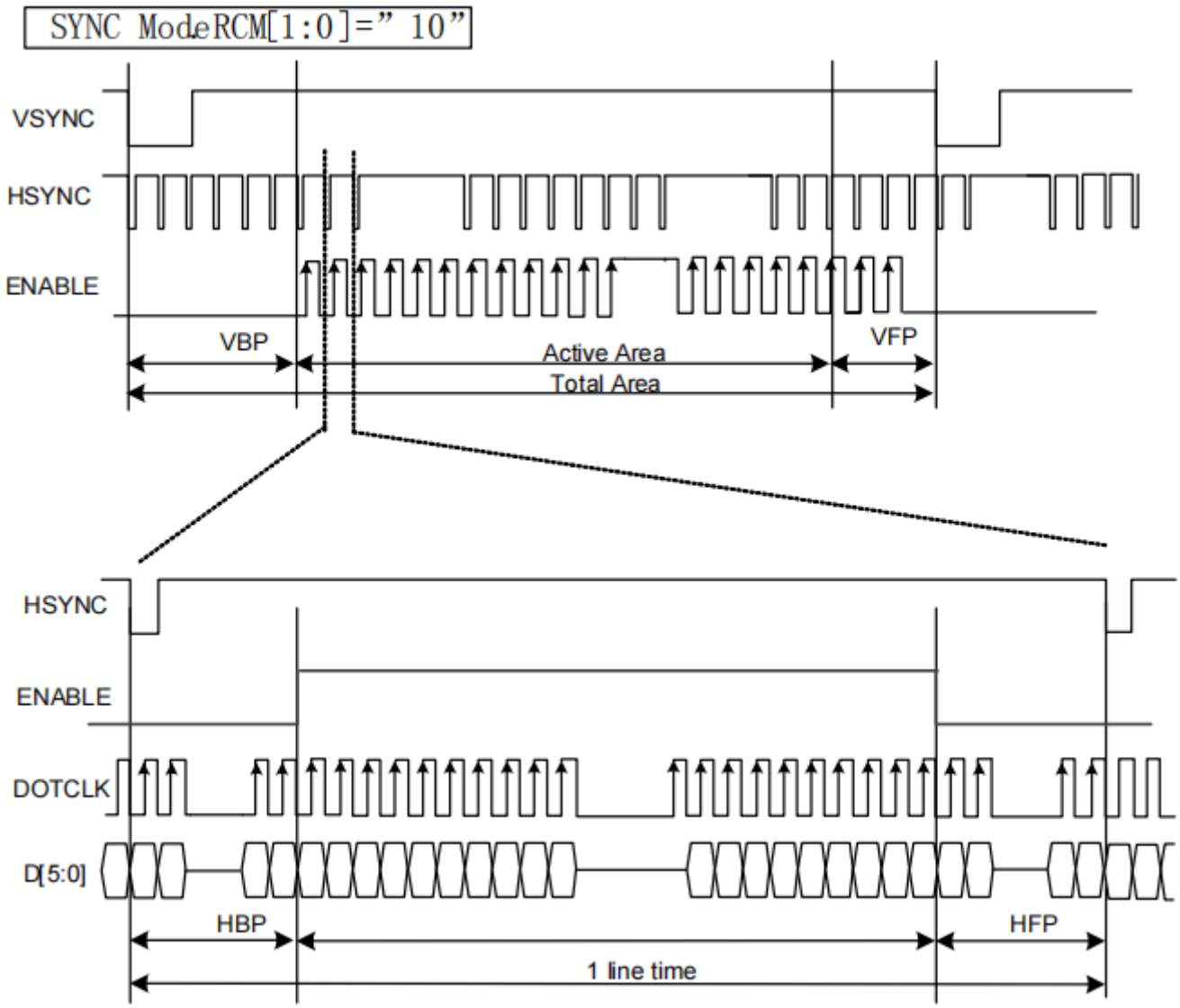
8.3 RGB interface Selection



Parameters	Symbols	Condition	Min.	Typ.	Max.	Units
Horizontal Synchronization	Hsync		2	10	16	DOTCLK
Horizontal Back Porch	HBP		2	20	24	DOTCLK
Horizontal Address	HAdr		-	320	-	DOTCLK
Horizontal Front Porch	HFP		2	10	16	DOTCLK
Vertical Synchronization	Vsync		1	2	4	Line
Vertical Back Porch	VBP		1	2	-	Line
Vertical Address	VAdr		-	240	-	Line
Vertical Front Porch	VFP		3	4	-	Line

Note:*1. Vertical period (one frame) shall be equal to the sum of VBP + VAdr + VFP.*
2. Horizontal period (one line) shall be equal to the sum of HBP + HAdr + HFP.
3. Control signals Hsync shall be transmitted as specified at all times while valid pixels are transferred between the host processor and the display module.

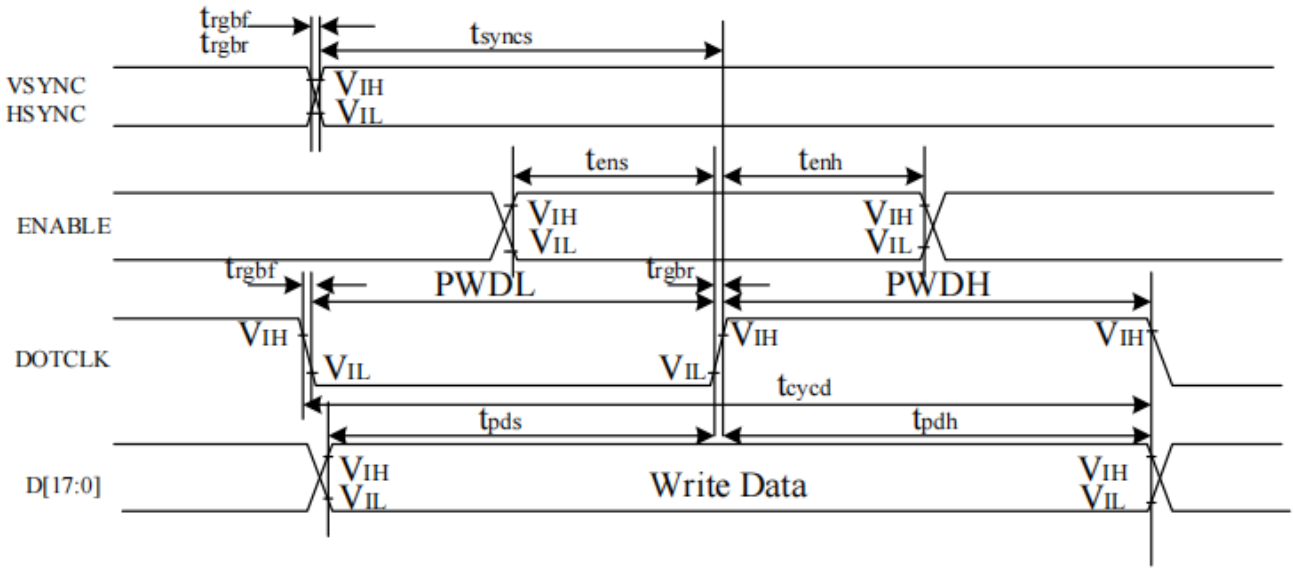
The timing chart of 18/16-bit RGB interface mode1 and mode 2 is shown as below.



RGB SYNC+DE mode

Note 1: The DE signal is not needed when RGB interface SYNC mode is selected.
Note 2: VSPL='0', HSPL='0', DPL='0' and EPL='0' of "Interface Mode Control (B0h)" command.

Parallel 18/16/6-bit RGB Interface Timing Characteristics



Signal	Symbol	Parameter	min	max	Unit	Description
VSYNC/HSYNC	tsyncs	VSYNC/HSYNC setup time	15	-	ns	18/16-bit bus RGB interface mode
	tsynch	VSYNC/HSYNC hold time	15	-	ns	
DE	tens	DE setup time	15	-	ns	
	tenh	DE hold time	15	-	ns	
D[17:0]	tpos	Data setup time	15	-	ns	
	tpdh	Date hold time	15	-	ns	
DOTCLK	PWDH	DOTCLK high-level period	15	-	ns	
	PWDL	DOTCLK low-level period	15	-	ns	
	tcycd	DOTCLK cycle time	100	-	ns	
	trgbr,trgbf	DOTCLK,HSYNC,VSYNC rise/fall time	-	15	ns	
VSYNC/HSYNC	tsyncs	VSYNC/HSYNC setup time	15	-	ns	6-bit bus RGB interface mode
	tsynch	VSYNC/HSYNC hold time	15	-	ns	
DE	tens	DE setup time	15	-	ns	
	tenh	DE hold time	15	-	ns	
D[17:0]	tpos	Data setup time	15	-	ns	
	tpdh	Date hold time	15	-	ns	
DOTCLK	PWDH	DOTCLK high-level pulse period	15	-	ns	
	PWDL	DOTCLK low-level pulse period	15	-	ns	
	tcycd	DOTCLK cycle time	100	-	ns	
	trgbr,trgbf	DOTCLK,HSYNC,VSYNC rise/fall time	-	15	ns	

9. Standard Specification for Reliability

9.1 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.

9.2 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.

9.3 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±5℃), normal humidity (50±10% 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 Fangsheng.

10.1 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.

10.2 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

10.3 Non-conforming Analysis & Deal With Manners

10.3.1 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.

10.3.2 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.

10.4 Agreement items

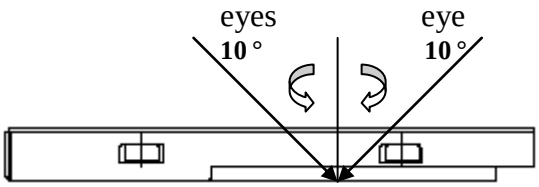
Both parties should negotiate together when the following problems happen.

- 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.

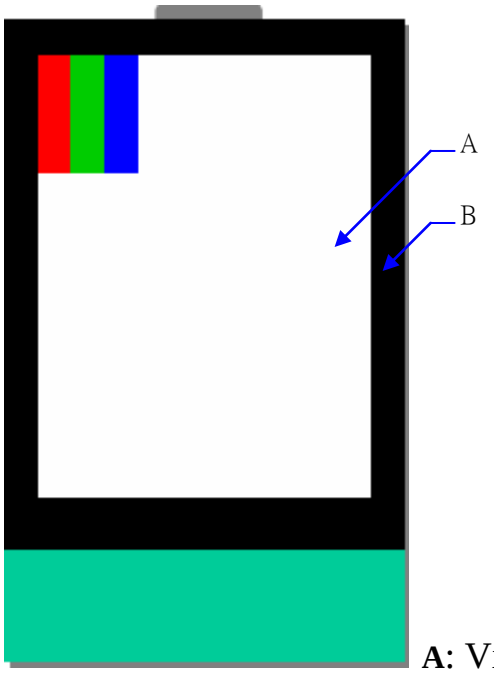
10.5 Standard of The Product Appearance Test

10.5.1 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:

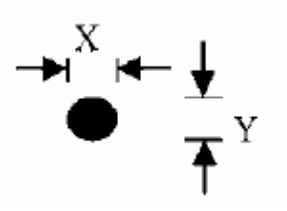


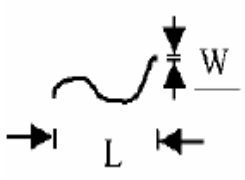
A: Viewing area B: Outside viewing area

10.5.2 Basic principle

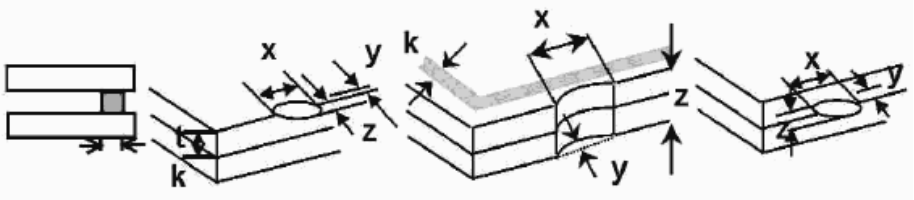
- When the standard can not be described, AQL will be applied.
- The sample of the lowest acceptable quality level must be negotiated by both supplier and customer when any dispute happened.
- New item must be added on time when it is necessary.

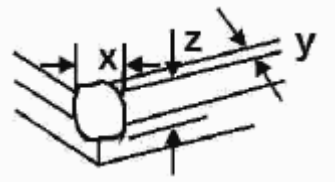
10.6 Inspection Specification

<table>
<tr><th>NO.</th><th>Item</th><th>Criterion</th><th>AQL</th></tr>
<tr><td>01</td><td>Electrical Testing</td><td>1.1 Missing vertical, horizontal segment, segment contrast defect.
1.2 Missing character, dot or icon.
1.3 Display malfunction.
1.4 No function or no display.
1.5 Current consumption exceeds product specifications.
1.6 LCD viewing angle defect.
1.7 Mixed product types.
1.8 Flicker</td><td>0.65</td></tr>
<tr><td>02</td><td>Black or White spots or Bright spots or Color spots on LCD (Display only)</td><td>2.1 White and black or color spots on display ≦ 0.25mm, no more than Five spots.
2.2 Densely spaced: No more than three spots within 3mm.</td><td>1.5</td></tr>
<tr><td rowspan="2">03</td><td rowspan="2">LCD and Touch Panel black spots, white spots, contamination (non – display)</td><td>3.1 Round type: As following drawing
Φ = (X+Y) / 2
 

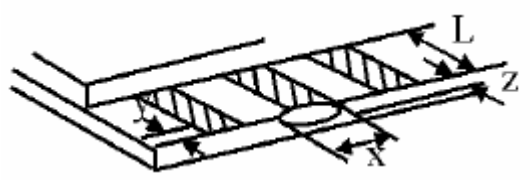
<table><tr><th>Size(mm)</th><th>Acceptable Q'ty</th></tr><tr><td>Φ≦0.10</td><td>Accept no dense</td></tr><tr><td>0.10< Φ≦0.20</td><td>2</td></tr><tr><td>0.20< Φ≦0.25</td><td>2</td></tr><tr><td>0.25< Φ≦0.30</td><td>1</td></tr><tr><td>0.30< Φ</td><td>0</td></tr></table>* Densely spaced: No more than two spots within 3mm.</td><td>1.5</td></tr>
<tr><td>3.2 Line type: (As following drawing)
 

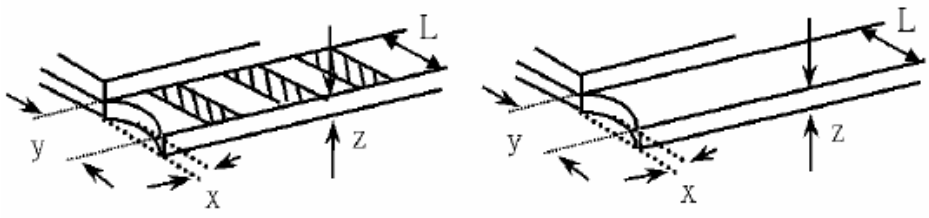
<table><tr><th>Length(mm)</th><th>Width(mm)</th><th>Acceptable Q'ty</th></tr><tr><td>---</td><td>W≦0.02</td><td>Accept no dense</td></tr><tr><td>L≦3.0</td><td>0.02<W≦0.05</td><td rowspan="2">2</td></tr><tr><td>L≦2.5</td><td>0.03<W≦0.08</td></tr><tr><td>---</td><td>0.08<W</td><td>Rejection</td></tr></table>* Densely spaced: No more than two lines within 3mm.</td><td>1.5</td></tr>
</table>

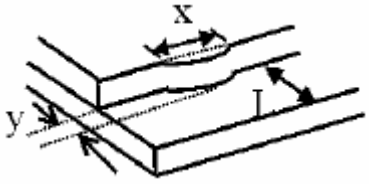
<table>
<tr><th>NO.</th><th>Item</th><th colspan="3">Criterion</th><th>AQL</th></tr>
<tr><td>04</td><td>Polarizer bubbles</td><td colspan="2">If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction
<table><tr><td>Size Φ(mm)</td><td>Acceptable Q'ty</td></tr><tr><td>Φ≦0.20</td><td>Accept no dense</td></tr><tr><td>0.20< Φ≦0.50</td><td>3</td></tr><tr><td>0.50< Φ≦1.00</td><td>2</td></tr><tr><td>1.00< Φ</td><td>0</td></tr><tr><td>Total Q’ty</td><td>3</td></tr></table></td><td>1.5</td></tr>
<tr><td>05</td><td>Scratches</td><td colspan="3">Follow NO.3 -2 Line Type.</td><td></td></tr>
<tr><td>06</td><td>Chipped glass</td><td colspan="3">Symbols:
x: Chip length y: Chip width z: Chip thickness
k: Seal width t: Glass thickness a: LCD side length
L: Electrode pad length
6.1 General glass chip:
6.1.1 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≦1/2t</td><td>Not over viewing area</td><td>x≦1/8a</td></tr><tr><td>1/2t< z≦2t</td><td>Not exceed 1/3k</td><td>x≦1/8a</td></tr></table>⊙ Unit: mm
⊙ If there are 2 or more chips, x is the total length of each chip
6.1.2 Corner crack:
 

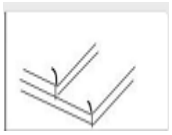
<table><tr><td>z: Chip thickness</td><td>y: Chip width</td><td>x: Chip length</td></tr><tr><td>Z≦1/2t</td><td>Not over viewing area</td><td>x≦1/8a</td></tr><tr><td>1/2t< z≦2t</td><td>Not exceed 1/3k</td><td>x≦1/8a</td></tr></table>⊙ Unit: mm
⊙ If there are 2 or more chips, x is the total length of each chip</td><td>1.5</td></tr>
</table>

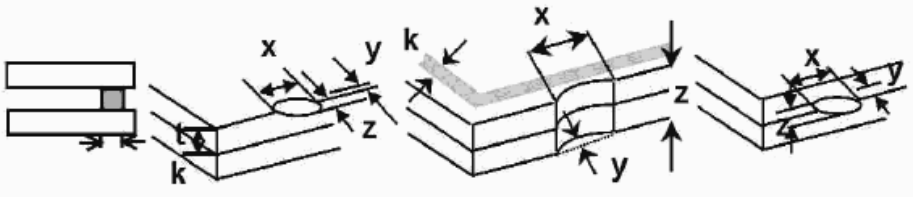
<table>
<tr><th>NO.</th><th>Item</th><th>Criterion</th><th>AQL</th></tr>
<tr><td>07</td><td>Glass crack</td><td>
Symbols:
x: Chip length y: Chip width z: Chip thickness
k: Seal width t: Glass thickness a: LCD side length
L: Electrode pad length
7.2 Protrusion over terminal:
7.2.1 Chip on electrode pad:


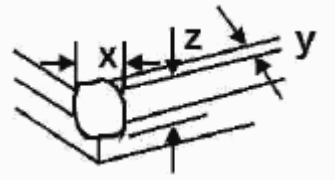
<table>
<tr><td>y: Chip width</td><td>x: Chip length</td><td>z: Chip thickness</td></tr>
<tr><td>y≦0.5mm</td><td>x≦1/8a</td><td>0< z≦t</td></tr>
</table>
7.2.2
Non-conductive portion:


<table>
<tr><td>y: Chip width</td><td>x: Chip length</td><td>z: Chip thickness</td></tr>
<tr><td>y≦L</td><td>x≦1/8a</td><td>0< z≦t</td></tr>
</table>
⊙ 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


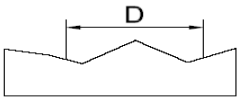
<table>
<tr><td>y: width</td><td>x: length</td></tr>
<tr><td>y≦1/3L</td><td>X≦a</td></tr>
</table>
</td><td>1.5</td></tr>
</table>

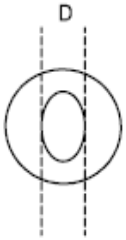
NO.	Item	Criterion	AQL
08	Cracked glass	The LCD with any extensive crack is not acceptable. 	1.5
09	Backlight elements	9.1 Illumination source flickers when lit. 9.2 Spots or scratches that appear when lit must be judged. Using LCD spot, lines and contamination standards. 9.3 Backlight doesn't light or color is wrong.	1.5 1.5 0.65
10	Bezel	Bezel must comply with product specifications.	1.5
11	PCB、COB	11.1 COB seal may not have pinholes larger than 0.2mm or contamination. 11.2 COB seal surface may not have pinholes through to the IC. 11.3 The height of the COB should not exceed the height indicated in the assembly diagram. 11.4 There may not be more than 2mm of sealant outside the seal area on PCB. And there should be no more than three places. 11.5 Parts on PCB must be the same as on the production characteristic chart, There should be no wrong parts, missing parts or excess parts. 11.6 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	12.1 FPC terminal damage ≦ 1/2 FPC terminal width and can not affect the function , we judge accept. 12.2 FPC alignment hole damage ≦ 1/2 alignment area and can not affect the function , we judge accept.	1.5 1.5
13	Soldering	13.1 No cold solder joints, missing solder connections, oxidation or icicle. 13.2 No short circuits in components on PCB or FPC.	1.5 0.65

<table>
<tr><th>NO.</th><th>Item</th><th>Criterion</th><th>AQL</th></tr>
<tr><td>14</td><td>Touch Panel
Chipped
glass</td><td>
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
14.1 General glass chip:
14.1.1 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≦1/8a</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≦1/8a</td></tr>
</table>
⊙ Unit: mm
⊙ If there are 2 or more chips, x is the total length of each chip
</td><td>1.5</td></tr>
</table>

<table>
<tr><th>NO.</th><th>Item</th><th>Criterion</th><th>AQL</th></tr>
<tr><td>15</td><td>Touch Panel(Fish eye、dent and bubble on film)</td><td>
<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>




</td><td>1.5</td></tr>
<tr><td>16</td><td>Touch Panel Newton ring</td><td>Newton ring dimension ≦ 1/2 touch panel area and not affect font and line distortion(≦2.5%) , it is acceptable.</td><td>1.5</td></tr>
<tr><td>17</td><td>Touch Panel Linearity</td><td>Less than 2.5% is acceptable.</td><td>1.5</td></tr>
<tr><td>18</td><td>LCD Ripple</td><td>Touch the touch panel , can not see the LCD ripple.
Pen: R 1.0mm silicon rubber.
Operation Force: 80g</td><td>1.5</td></tr>
<tr><td>19</td><td>General appearance</td><td>19.1 Pin type must match type in specification sheet.
19.2 LCD pin loose or missing pins.
19.3 Product packaging must the same as specified on packaging specification sheet.
19.4 Product dimension and structure must conform to product specification sheet.</td><td>0.65
0.65
0.65
0.65</td></tr>
</table>

11. Handling Precaution

11.1 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.

11.2 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.

11.3 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

----------TBD