深圳市一众显示科技有限公司

SHEN ZHEN TEAM SOURCE DISPLAY TECH. CO, LTD.

TFT-LCD Module Specification

Module NO.: TST350MLQZ-06C

Version: V1.0

☐ APPROVAL FOR SPECIFICATION ☐ APPROVAL FOR SAMPLE

For Customer's Acceptance:	
Approved by	Comment

Team Source Display:		
Presented by	Reviewed by	Organized by

Version No.	Date	Content	Remark
V1.0	2018-4-21	Initial Release	

Records of Revision

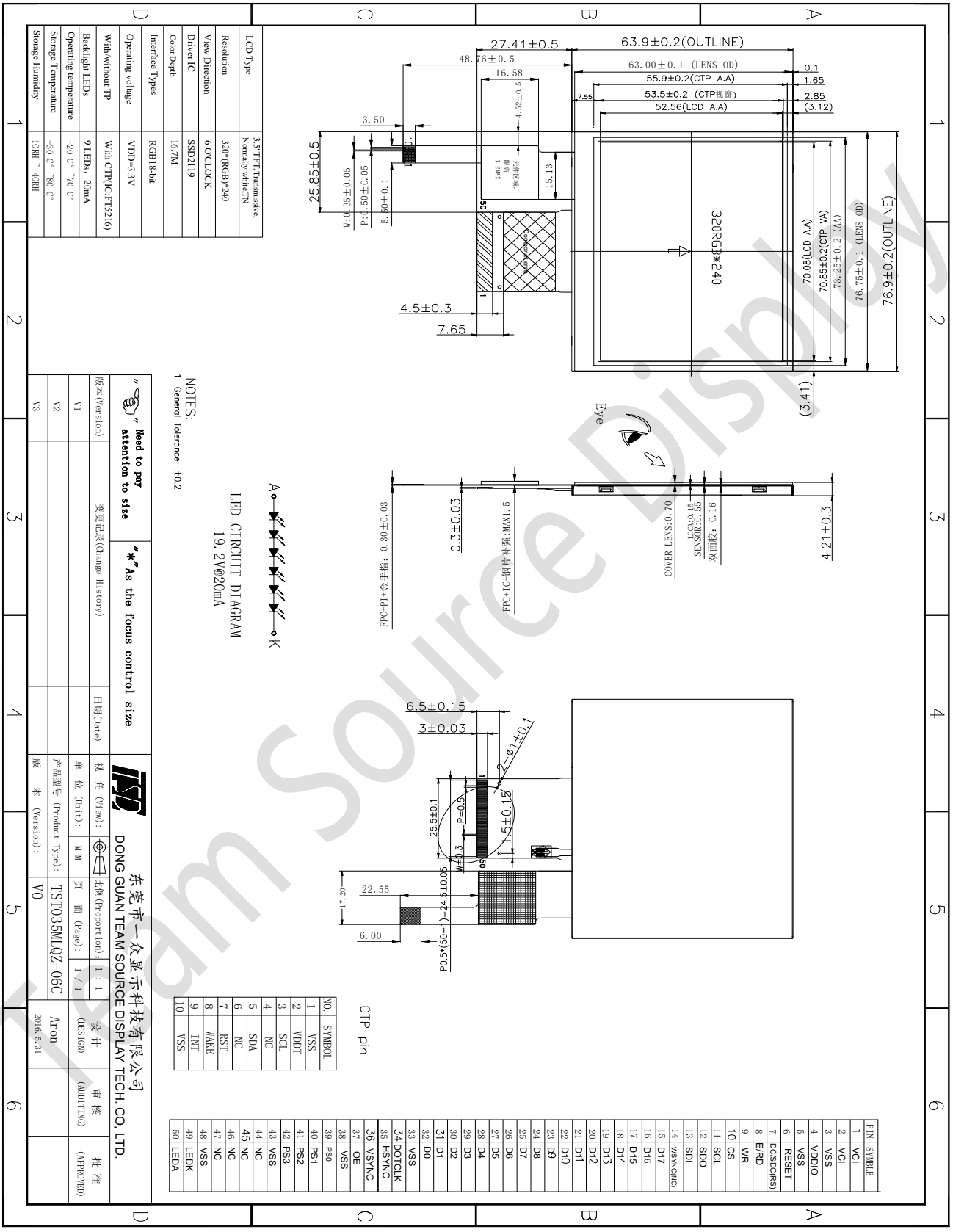
DATE	REF.PAGE PARAGRAPH DRAWING No.	REVISED No.	SUMMARY	REMARK
2018-4-21		V1.0	First Issue	

Contents

1. General Specification

Item	Contents	Unit
LCD TYPE	TFT/TRANSMISSIVE	
MODULE SIZE (W*H*T)	76.90*63.90*4.21	MM
ACTIVE SIZE (W*H)	70.08*52.56	MM
PIXEL PITCH (W*H)	0.219*0.219	MM
NUMBER OF DOTS	320*240	
DIVER IC	SSD2119	
INTERFACE TYPE	18BIT RGB+SPI	
TOP POLARIZER TYPE	ANTI-GLARE	
RECOMMEND VIEWING DIRECTION	12	O'CLOCK
GRAY SCALE INVERSION DIRECTION	6	O'CLOCK
COLORS	262K	
BACKLIGHT TYPE	6-DIES WHITE LED	
TOUCH PANEL TYPE	WithCTP(FT5216)	

2. Mechanical Drawing



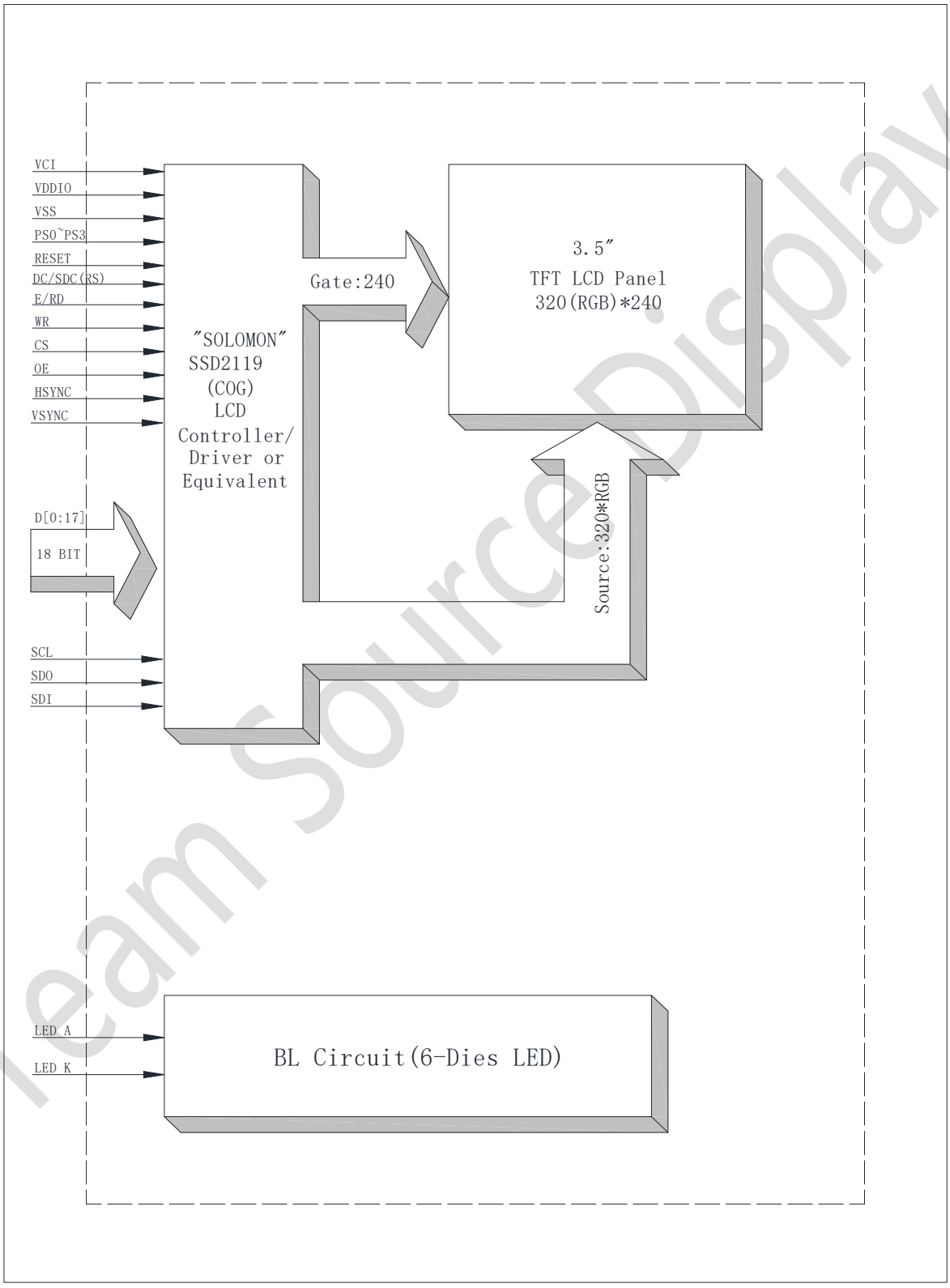
LCD Type	3.5"TFT,Transmissive, Normally white,TN
Resolution	320*(RGB)*240
View Direction	6 O'CLOCK
Driver IC	SSD2119
Color Depth	16.7M
Interface Types	RGB18-bit
Operating voltage	VDD=3.3V
With/without TP	With CTP(IC:FT5216)
Backlight LEDs	9 LEDs, 20mA
Operating temperature	-20 C° ~70 C°
Storage Temperature	-30 C° ~80 C°
Storage Humidity	10RH ~ 40RH

NO.	SYMBOL
1	VSS
2	VDDT
3	SCL
4	NC
5	SDA
6	NC
7	RST
8	WAKE
9	INT
10	VSS

CTP pin

PIN	SYMBLE
1	VCI
2	VCI
3	VSS
4	VDDIO
5	VSS
6	RESET
7	DCS/SCK(RS)
8	E/RD
9	WR
10	CS
11	SCL
12	SDO
13	SDI
14	WSYNC(NC)
15	D17
16	D16
17	D15
18	D14
19	D13
20	D12
21	D11
22	D10
23	D9
24	D8
25	D7
26	D6
27	D5
28	D4
29	D3
30	D2
31	D1
32	D0
33	VSS
34	DOTCLK
35	HSYNC
36	VSYNC
37	OE
38	VSS
39	PS0
40	PS1
41	PS2
42	PS3
43	VSS
44	NC
45	NC
46	NC
47	NC
48	VSS
49	LEDK
50	LEDA

3. Block Diagram



4. Interface Pin Function

Pin No.	Symbol	Description
1~2	VCI	Power supply for analog
3	VSS	Ground.
4	VDDIO	Voltage input pin for logic I/O
5	VSS	Ground.
6	RESB	System reset pin. - An active low pulse at this pin will reset the IC, Connect to VDDIO in normal operation
7	DC/SDC (RS)	A register select signal. Low: select an index or status register, High: select a control register.
8	E/$\overline{RD}$	6800-system : **E** (enable signal) 8080-system : **RD** (read strobe signal) Serial mode : Not used and should be connected to VDDIO or Vss
9	WR	8080-system : **WR** (write strobe signal)
10	CS	**CS** : Chip select pin
11	SCL	Serial clock input
12	SDO	Data output pin in serial interface
13	SDI	Data input pin in serial interface
14	WSYNC	Ram Write Synchronization output -Leave it OPEN when not used
15~32	DB17~DB0	Data bus.
33	VSS	Ground.
34	DOTCLK	Dot-clock signal and oscillator source.
35	HSYNC	Line Synchronization input
36	VSYNC	Frame/Ram Write Synchronization input
37	OE	Display enable pin from controller.
38	VSS	Ground.
39	PS0	Refer of Table1
40	PS1	
41	PS2	
42	PS3	
43	VSS	Ground.
44~47	NC	Not Connection
48	VSS	Ground.
49	LEDK	Cathode of LED backlight.
50	LEDA	Anode of LED backlight.

Note :

PS3	PS2	PS1	PS0	Interface Mode
0	0	0	0	16-bit 6800 parallel interface
0	0	0	1	8-bit 6800 parallel interface
0	0	1	0	16-bit 8080 parallel interface
0	0	1	1	8-bit 8080 parallel interface
0	1	0	0	9-bit generic D[17:9] (262k colour) + 3-wire SPI If 65K color, D12 shorts to D17 internally
0	1	0	1	16-bit generic (262k colour)+ 3-wire SPI
0	1	1	0	18-bit generic (262k colour)+ 3-wire SPI
0	1	1	1	6-bit generic D[17:12] (262k colour) + 3-wire SPI
1	0	0	0	18-bits 6800 parallel interface
1	0	0	1	9-bits 6800 parallel interface
1	0	1	0	18-bit 8080 parallel interface
1	0	1	1	9-bit 8080 parallel interface
1	1	1	0	3-wire SPI
1	1	1	1	4-wire SPI

4.1 CTP Interface description

1	VSS	Ground
2	VDDT	Power supply 3.3V
3	SCL	I2C clock input
4	NC	
5	SDA	I2C data signal
6	NC	
7	RST	Reset pin
8	WAKE	NC
9	INT	Interrupt signal from CTP
10	VSS	Ground

5. Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply voltage for analog	VCI	-0.3	4.5	V
Supply voltage for logic	VDDIO	-0.3	4.5	V
Supply current (One LED)	I_{LED}		30	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

6.1 Input Power

Item	Symbol	Min	Typ.	Max	Unit	Applicable terminal
Supply Voltage for Analog	VCI	3.0	3.3	3.6	V	
Supply Voltage for Logic	VDDIO	3.0	3.3	3.6	V	
Input Voltage	V_{IL}	GND	-	0.3VCI	V	
	V_{IH}	0.7 VCI	-	VCI		
Input leakage Current	I_{LKG}	-1		1	μA	

6.2 Backlight Driving Conditions

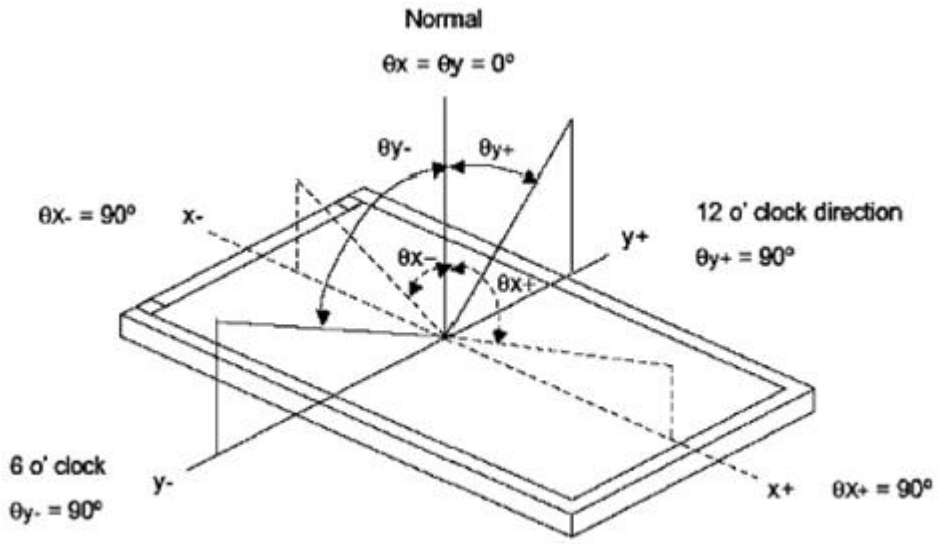
Item	Symbol	Value			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED Backlight	V_F	-	19.2	-	V	I_L =20mA
Current for LED Backlight	I_L		20	30	mA	
Power Consumption	P		0.384		W	
LED Life Time		30,000	50,000		Hr	Note

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	270	300	330	Cd/m^2	
Contrast Ratio		CR	θ=0°	150	300			
Response Time		T_{ON}	25℃		35	50	ms	
		T_{OFF}						
CIE Color Coordinate	Red	X_R	Viewing normal angle	0.603	0.633	0.663		
		Y_R		0.299	0.329	0.359		
	Green	X_G		0.267	0.297	0.327		
		Y_G		0.547	0.577	0.607		
	Blue	X_B		0.103	0.133	0.163		
		Y_B		0.099	0.129	0.159		
	White	X_W		0.293	0.323	0.353		
		Y_W		0.337	0.367	0.397		
Viewing Angle	Hor.	θ_{X+}	CR≥10	45	60	---	Degree	
		θ_{X-}		45	60	---		
	Ver.	θ_{Y+}		45	60	---		
		θ_{Y-}		25	40	---		
Uniformity	Un			80			%	

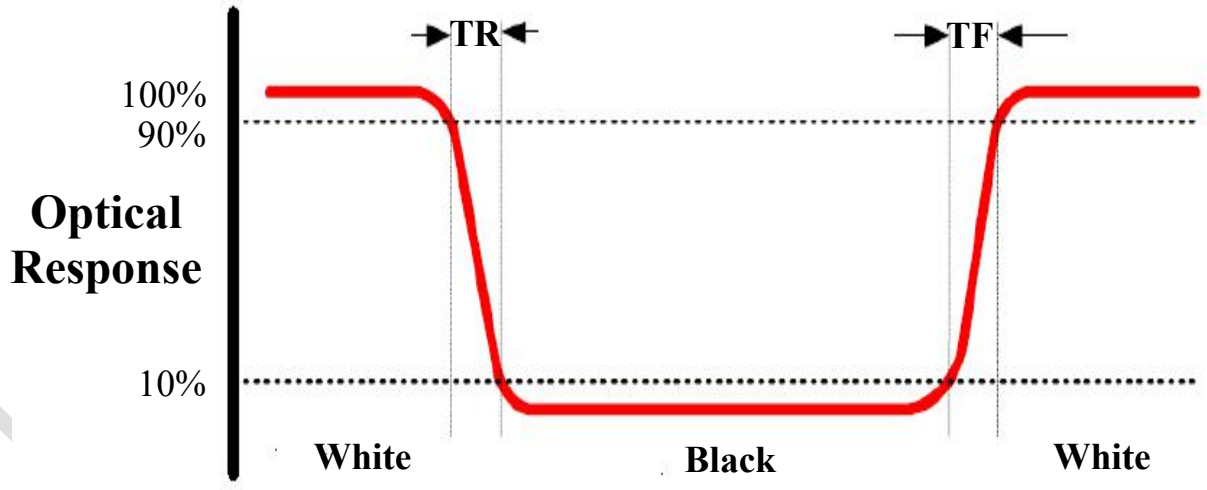
Note 1: Definition of Viewing Angle θx and θy:



Note 2: Definition of contrast ratio CR:

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

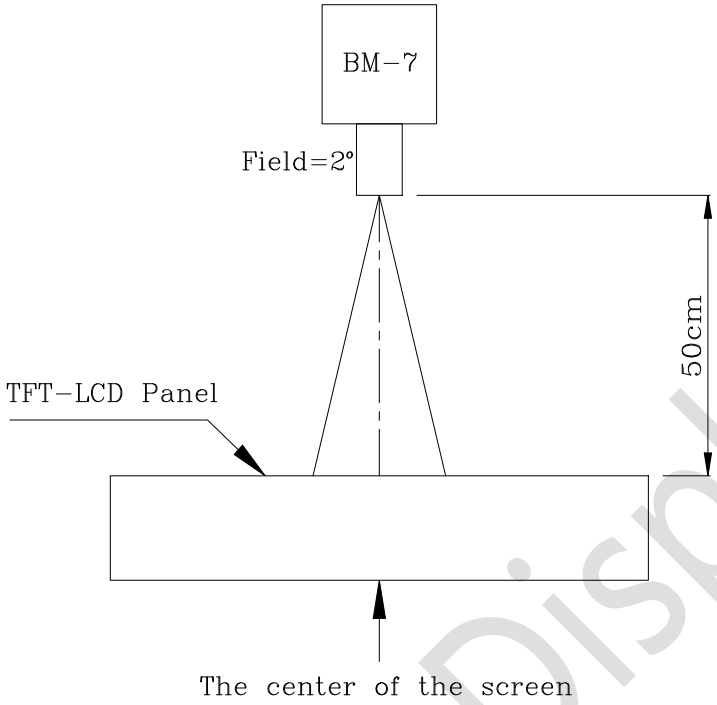
Note 3: Definition of Response Time(Tr,Tf)



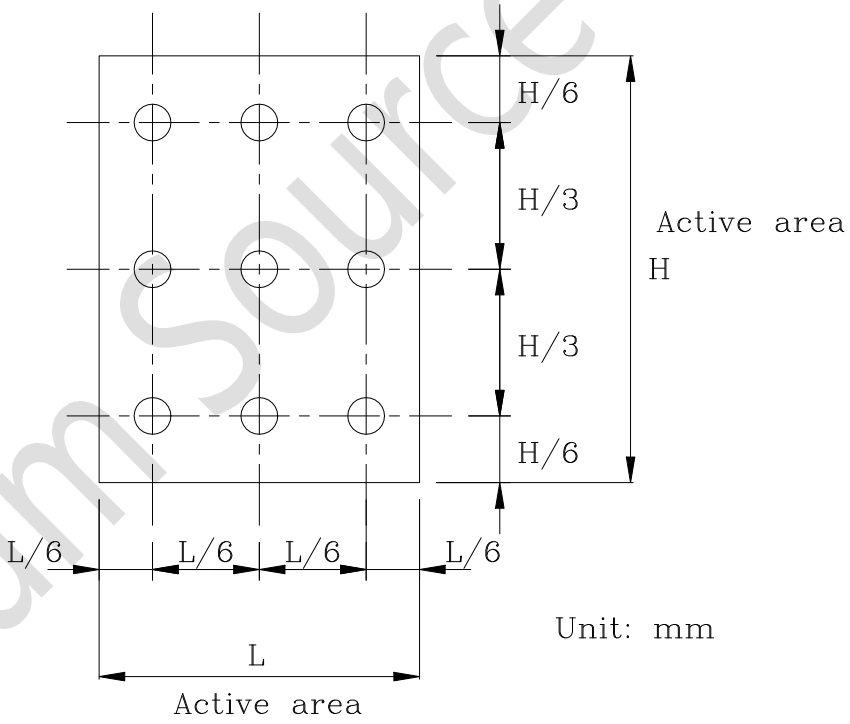
Note 4: Definition of Luminance

①The Brightness Test Equipment Setup

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

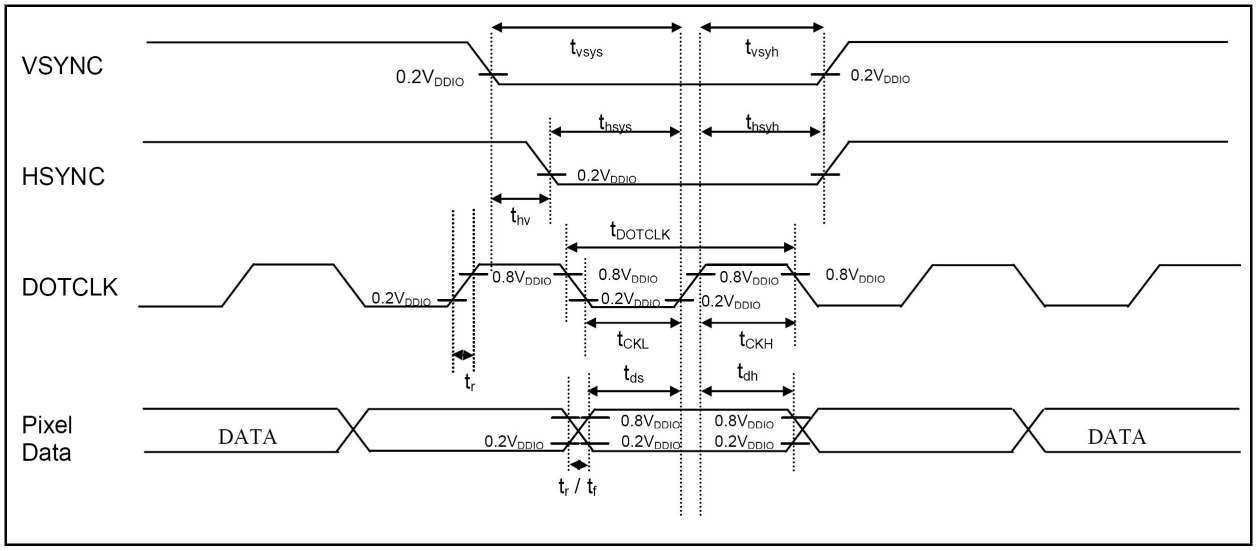


②The Brightness Test Point Setup



8. Timing Characteristics

8.1 RGB Timing Diagram

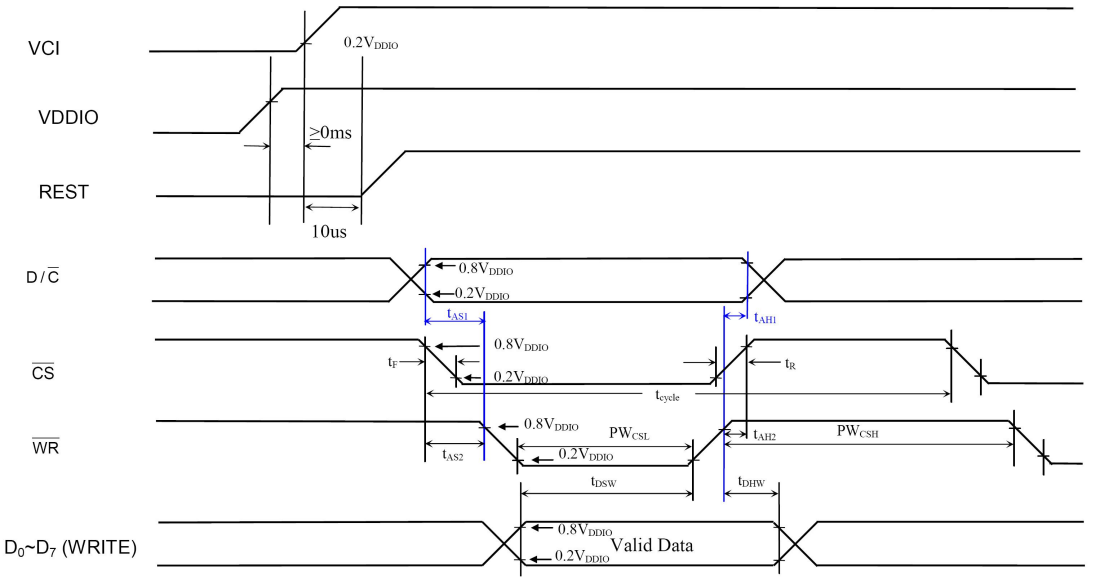


Symbol	Parameter	Min	Typ	Max	Unit
f_{DOTCLK}	DOTCLK Frequency (70Hz frame rate)	1	5.5	8.2	MHz
t_{DOTCLK}	DOTCLK Period	122	182	1000	ns
t_{VSYS}	Vertical Sync Setup Time	20	-	-	ns
t_{VSYH}	Vertical Sync Hold Time	20	-	-	ns
t_{HSYS}	Horizontal Sync Setup Time	20	-	-	ns
t_{HSYH}	Horizontal Sync Hold Time	20	-	-	ns
t_{HV}	Phase difference of Sync Signal Falling Edge	0	-	320	t_{DOTCLK}
t_{CLK}	DOTCLK Low Period	61	-	-	ns
t_{CKH}	DOTCLK High Period	61	-	-	ns
t_{DS}	Data Setup Time	25	-	-	ns
t_{DH}	Data hold Time	25	-	-	ns

Note: External clock source must be provided to DOTCLK pin of SSD2119. The driver will not operate in absence of the clocking signal.

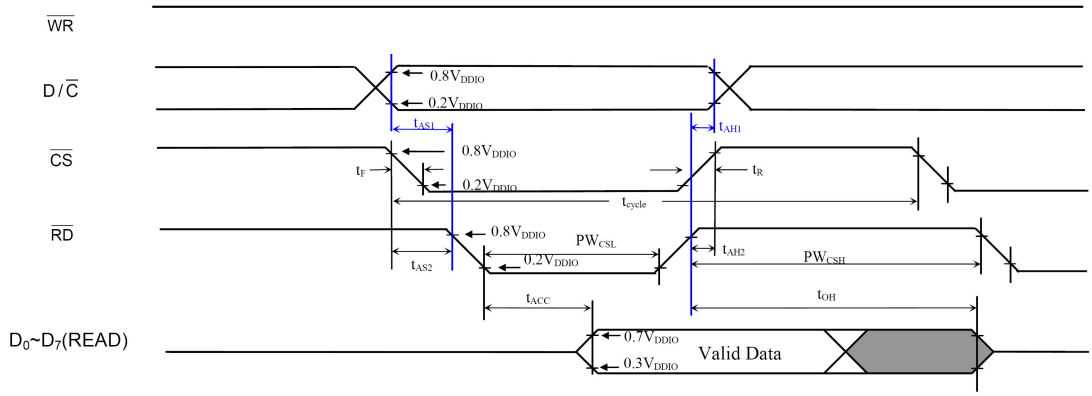
8.2 MCU mode Timing Diagram

Write Cycle



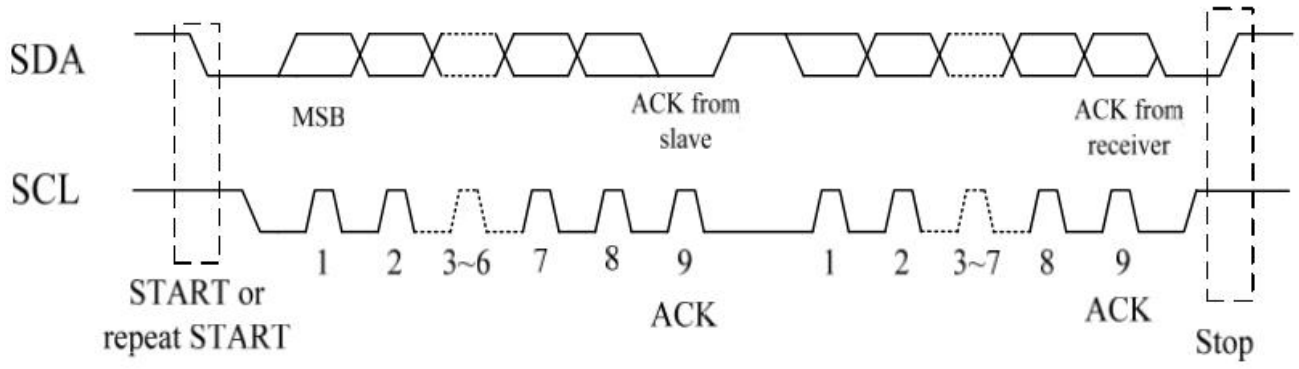
Remark: It's highly recommended that $\overline{RD}$ remains high for the whole write cycle

Read Cycle



Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time (write cycle)	75	-	-	ns
t_{cycle}	Clock Cycle Time (read cycle) (Based on VOL/VOH = 0.3*VDDIO/0.7*VDDIO)	450	-	-	ns
t_{AS1}	Address Setup Time between (R/$\overline{W}$) and D/$\overline{C}$	0	-	-	ns
t_{AH1}	Address Hold Time between (R/$\overline{W}$) and D/$\overline{C}$	0	-	-	ns
t_{AS2}	Address Setup Time between (R/$\overline{W}$) and $\overline{CS}$	0	-	-	ns
t_{AH2}	Address Hold Time between (R/$\overline{W}$) and $\overline{CS}$	0	-	-	ns
t_{DSW}	Data Setup Time (D0~D7, WRITE)	5	-	-	ns
t_{DHW}	Data Hold Time (D0~D7, WRITE))	5	-	-	ns
t_{ACC}	Data Access Time (D0~D7, READ)	250	-	-	ns
t_{OH}	Output Hold time (D0~D7, READ)	100	-	-	ns
PW_{CSL}	Pulse width /CS low (write cycle)	40	-	-	ns
PW_{CSH}	Pulse width /CS high (write cycle)	25	-	-	ns
PW_{CSL}	Pulse width /CS low (read cycle)	500	-	-	ns
PW_{CSH}	Pulse width /CS high (read cycle)	500	-	-	ns
t_R	Rise time	-	-	4	ns
t_F	Fall time	-	-	4	ns

8.3 I2C Interface timing characteristics



The I2C is always configured in the Slave mode

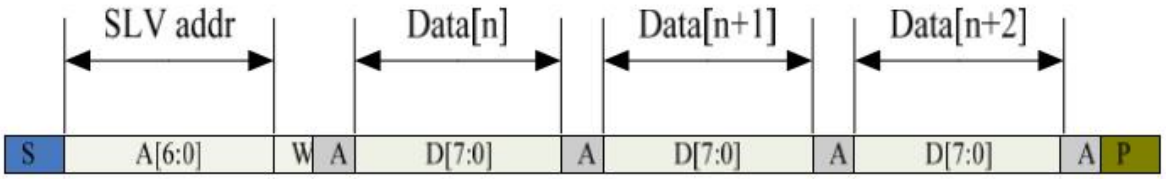
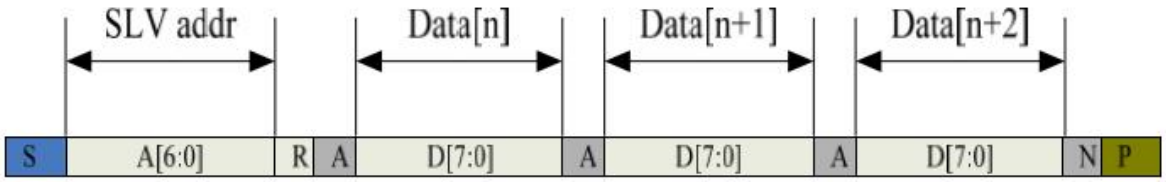


Figure 2-5 I2C master write, slave read



I2C master read, slave write

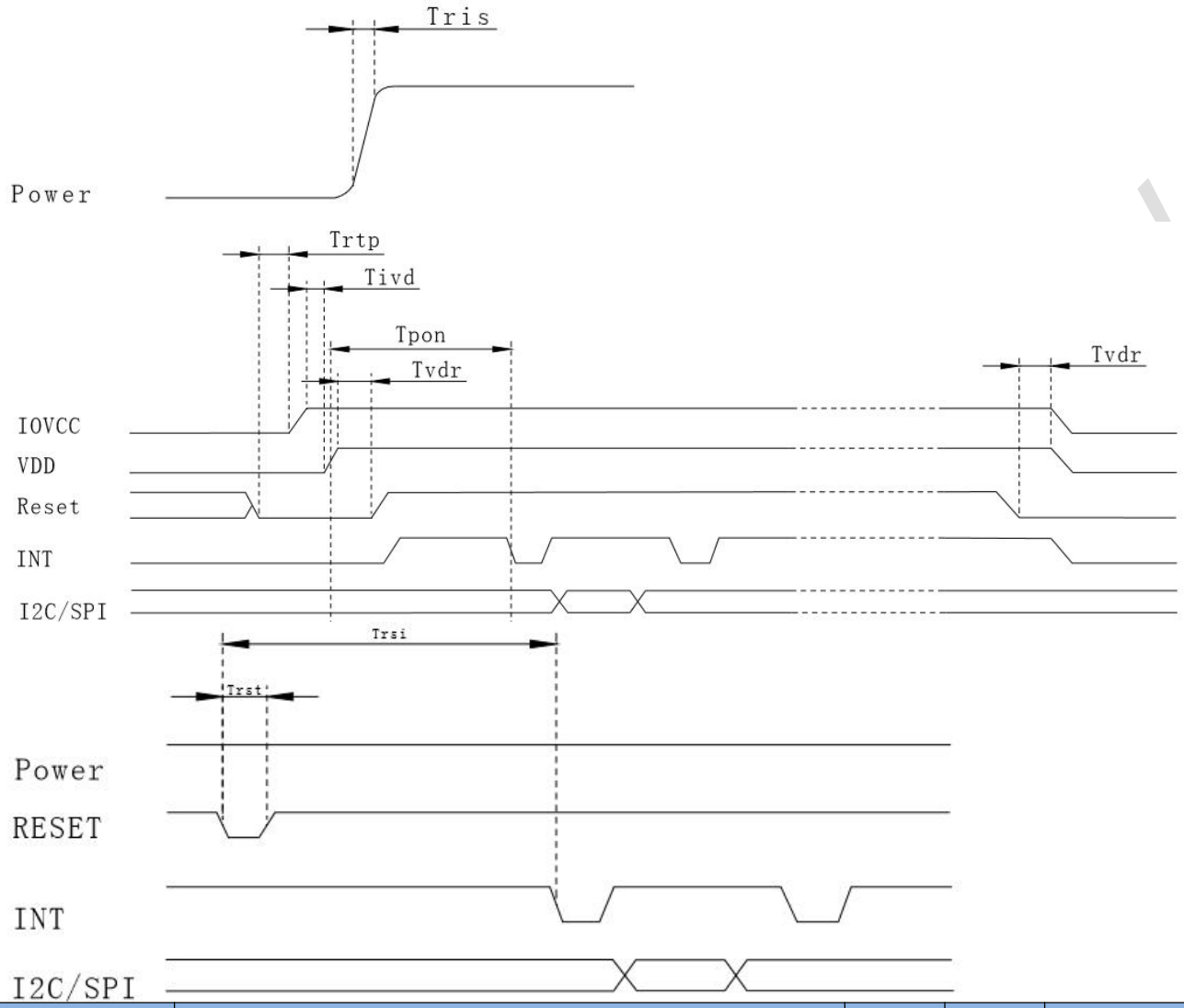
Mnemonics	Description
S	I2C Start or I2C Restart
A[6:0]	Slave address A[6:0]: address bits are identical to those of I2CADDR [7:1] register.
R/W	‘1’ for read, ‘0’ for write
A(N)	ACK(NACK)
P	STOP: the indication of the end of a packet (if this bit is missing, S will indicate the end of the current packet and the beginning of the next packet)

I2C Interface Timing Characteristics is shown in Table

PARAMETER	MIN	MAX	UNIT
SCL Frequency	-	400K	Hz
Bus Free Time Between a STOP and START Condition	4.7	-	uS
Hold Time (repeated) START Condition	4.0	-	uS
Data Setup Time	250	-	nS
Setup Time for Repeated START Condition	4.7	-	uS
Setup Time for STOP Condition	4.0	-	uS

8.4 CTP Power on Sequence

Reset should be pulled down to be low before powering on and powering down. INT signal will be sent to the host after initializing all parameters and then start to report points to the host.



Parameter	Description	MIN	MAX	UNIT
Tris	Rise time from 0.1VDD to 0.9VDD	-	5	mS
Trtp	Time of resetting to be low before powering on	100	-	uS
Tivd	Delay time of VDD powering on after IOVCC powering on	10	-	uS
Tpon	Time of starting to report point after powering on	200	-	nS
Tvdr	Reset time after VDD powering on	1	-	uS
Trsi	Time of starting to report point after resetting	200	-	uS
Trst	Reset time	1	-	uS

9. Standard Specification for Reliability

9.1 Standard Specification for Reliability of LCD Module

No.	Item	Description
01	High temperature operation	The sample should be allowed to stand at 70℃ for 120 hours under driving condition and then returning it to normal temperature condition, and allowing it stand for 2 hours.
02	Low temperature operation	The sample should be allowed to stand at -20℃ for 120 hours under driving condition and then returning it to normal temperature condition, and allowing it stand for 2 hours.
03	High temperature storage	The sample should be allowed to stand at 80℃ for 240 hours under no-load condition, and then returning it to normal temperature condition, and allowing it stand for 2 hours.
04	Low temperature storage	The sample should be allowed to stand at -30℃ for 240 hours under no-load condition, then returning it to normal temperature condition, and allowing it stand for 2 hours.
05	Moisture storage	The sample should be allowed to stand at 60℃,90%RH MAX for 240 hours under no-load condition, then taking it out and drying it at normal temperature for 2 hours.
06	Thermal shock storage	The sample should be allowed to stand the following 10 cycles : -30℃ for 30 minutes → normal temperature for 5 minutes → +80℃ for 30 minutes → normal temperature for 5 minutes, as one cycle.
07	Packing vibration	Frequency range : 10Hz ~ 55Hz Amplitude of vibration : 1.5mm Sweep time: 12 min X,Y,Z 2 hours for each direction.
08	Packing drop test	According to ASTM-D-5327.
09	Electrical Static Discharge	Air: ±4KV 150pF/330Ω 5 times
		Contact: ±2KV 150pF/330Ω 5 time

*Sample size for each test item is 3~5pcs

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°C), 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 Tecenstar.

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 = 2.5
  Total defects: AQL = 2.5

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

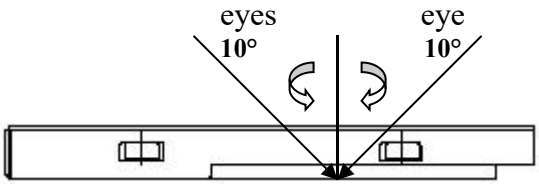
agree that it must be modified.

- There is any argument item which does not record in the standard of quality assurance.
- Any other special problem.

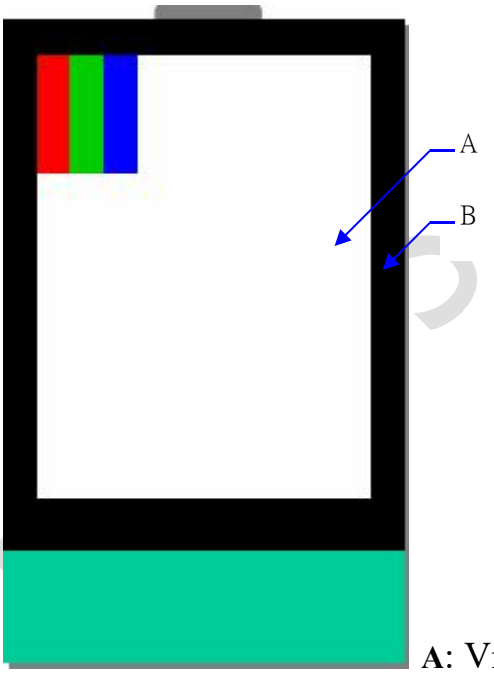
10.5 Standard of The Product Appearance Test

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:

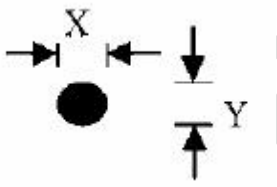


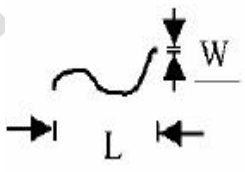
A: Viewing area B: Outside viewing area

10.5.2 Basic principle

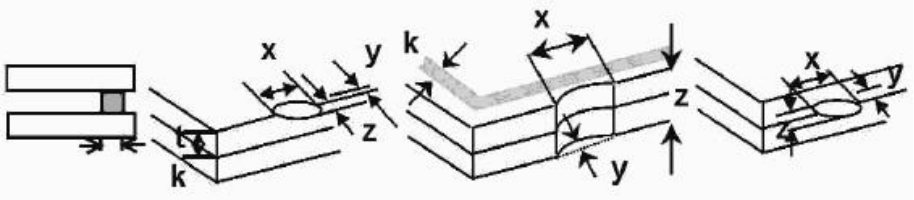
- When the standard can not be described, AQL will be applied.
- The sample of the lowest acceptable quality level must be negotiated by both supplier and customer when any dispute happened.
- New item must be added on time when it is necessary.

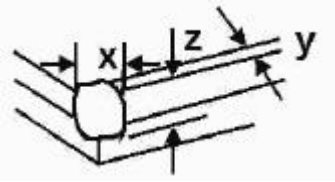
10.6 Inspection Specification

<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>2.5</td></tr>
<tr><td rowspan="2">03</td><td rowspan="2">LCD and Touch Panel black spots, white spots, contaminati on (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>2.5</td></tr>
<tr><td>3.2 Line type: (As following drawing)
 

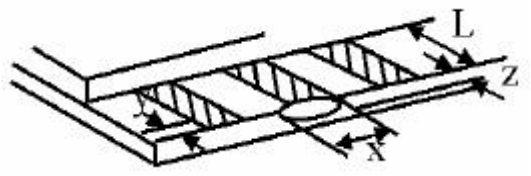
<table><tr><th>Length(mm)</th><th>Width(mm)</th><th>Acceptable Q'ty</th></tr><tr><td>---</td><td>W≦0.02</td><td>Accept no dense</td></tr><tr><td>L≦3.0</td><td>0.02<W≦0.05</td><td rowspan="2">2</td></tr><tr><td>L≦2.5</td><td>0.03<W≦0.08</td></tr><tr><td>---</td><td>0.08<W</td><td>Rejection</td></tr></table>*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

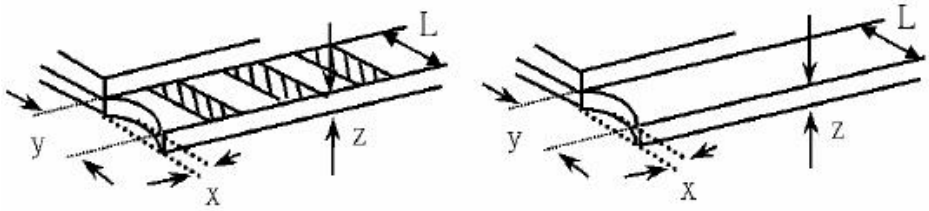
<table>
<tr><th>NO.</th><th>Item</th><th>Criterion</th><th>AQL</th></tr>
<tr><td>04</td><td>Polarizer bubbles</td><td>If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction
<table>
<tr><td>Size Φ(mm)</td><td>Acceptable Q'ty</td></tr>
<tr><td>Φ≦0.20</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>2.5</td></tr>
<tr><td>05</td><td>Scratches</td><td>Follow NO.3 -2 Line Type.</td><td></td></tr>
<tr><td>06</td><td>Chipped glass</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
6.1 General glass chip:
6.1.1 Chip on panel surface and crack between panels:
 

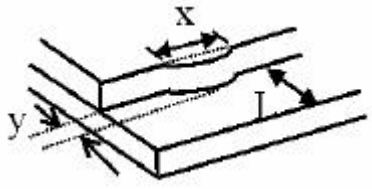
<table>
<tr><td>z: Chip thickness</td><td>y: Chip width</td><td>x: Chip length</td></tr>
<tr><td>Z≦1/2t</td><td>Not over viewing area</td><td>x≦1/8a</td></tr>
<tr><td>1/2t< z≦2t</td><td>Not exceed 1/3k</td><td>x≦1/8a</td></tr>
</table>
⊙ Unit: mm
⊙ If there are 2 or more chips, x is the total length 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>2.5</td></tr>
</table>

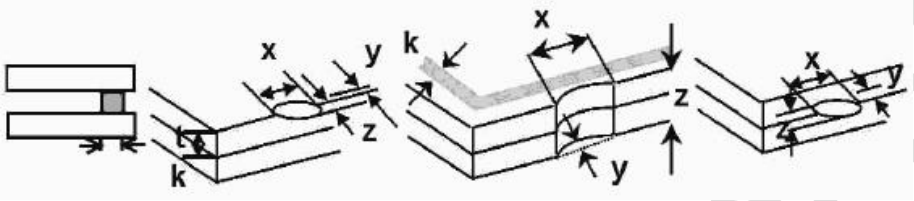
NO.	Item	Criterion	AQL
08	Cracked glass	The LCD with extensive crack is not acceptable.	2.5
09	Backlight elements	9.1 Illumination source flickers when lit. 9.2 Spots or scratches that appear when lit must be judged. Using LCD spot, lines and contamination standards. 9.3 Backlight doesn't light or color is wrong.	2.5 2.5 0.65
10	Bezel	Bezel must comply with product specifications.	2.5
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.	2.5 2.5 2.5 2.5 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.	2.5 2.5
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.	2.5 0.65

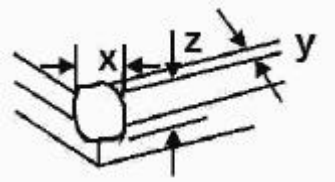
<table>
<tr><th>NO.</th><th>Item</th><th>Criterion</th><th>AQL</th></tr>
<tr><td>07</td><td>Glass crack</td><td>
Symbols:
x: Chip length y: Chip width z: Chip thickness
k: Seal width t: Glass thickness a: LCD side length
L: Electrode pad length
7.2 Protrusion over terminal:
7.2.1 Chip on electrode pad:


<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:


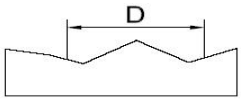
<table>
<tr><td>y: Chip width</td><td>x: Chip length</td><td>z: Chip thickness</td></tr>
<tr><td>y≦L</td><td>x≦1/8a</td><td>0< z≦t</td></tr>
</table>
⊙ If there chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications.
⊙ If the product will be heat sealed by the customer, the alignment mark must mot be damaged.
7.2.3 Substrate protuberance and internal crack


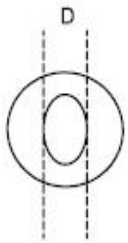
<table>
<tr><td>y: width</td><td>x: length</td></tr>
<tr><td>y≦1/3L</td><td>X≦a</td></tr>
</table>
</td><td>2.5</td></tr>
</table>

<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>2.5</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>2.5</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>2.5</td></tr>
<tr><td>17</td><td>Touch Panel Linearity</td><td>Less than 2.5% is acceptable.</td><td>2.5</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>2.5</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