Specification for Approval

Customer:_____

Model Name:_____

Supplier Approval			Customer approval
R&D Designed	R&D Approved	QC Approved	
Peter	Peng Jun		

Revision Record

REV NO.	REV DATE	CONTENTS	Note
A	2016-04-21	NEW ISSUE	

Table of Contents

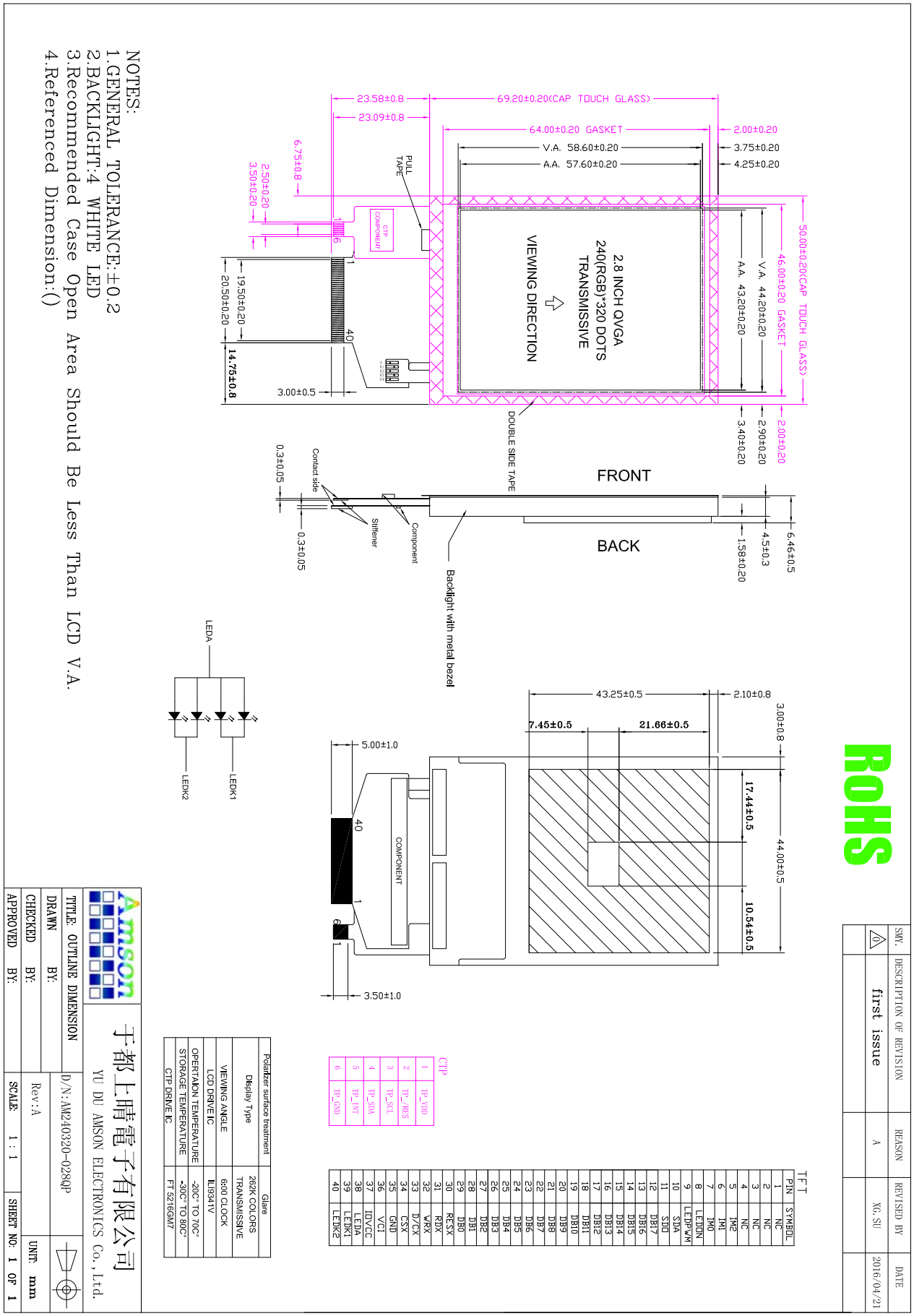
1. Scope

This specification defines general provisions as well as inspection standards for TFT module supplied by AMSON electronics.
If the event of unforeseen problem or unspecified items may occur, naturally shall negotiate and agree to solution.

2. General Information

ITEM	STANDARD VALUES	UNITS
LCD type	2.8”TFT	--
Dot arrangement	240(RGB)×320	dots
Color filter array	RGB vertical stripe	--
Display mode	TN / Transmission / Normally White	--
Gray scale inversion Direction	12 o’clock	--
Viewing Direction	6 o’clock	--
TFT Driver IC	ILI9341V	--
CTP Driver IC	FT5216GM7	
Module size	50.0(W)×69.2(H)×6.46Max(T)	mm
Active area	43.2(W)×57.6(H)	mm
Dot pitch	0.18(W)×0.18(H)	mm
Interface	4-lines_8bit / 3-lines_9bit SPI 8-/ 9-/16-/18-bit 8080-series system interface	--
Operating temperature	-20 ~ +70	°C
Storage temperature	-30 ~ +80	°C
Back Light	4 White LED In Parallel	--

3. External Dimensions



4. Interface Description

LCM

<table>
<tr><th>Pin</th><th>Symbol</th><th>Description.</th></tr>
<tr><td>1</td><td>NC</td><td rowspan="4">No connection.</td></tr>
<tr><td>2</td><td>NC</td></tr>
<tr><td>3</td><td>NC</td></tr>
<tr><td>4</td><td>NC</td></tr>
<tr><td>5</td><td>IM2</td><td rowspan="3">System interface Mode
<table>
<tr><th>IM2</th><th>IM1</th><th>IM0</th><th>Interface mode</th><th>DB Pin</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>i80-system 16-bit interface Ⅱ</td><td>DB[17:10],DB[8:1]</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>i80-system 8-bit interface Ⅱ</td><td>DB[17:10]</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>i80-system 18-bit interface Ⅱ</td><td>DB[17:0]</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>i80-system 9-bit interface Ⅱ</td><td>DB[17:9]</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>3-wires_9-bit SPI Ⅱ</td><td>CSX,SDI,SDO,SCL</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>4-wires_8-bit SPI Ⅱ</td><td>CSX,D/CX,SDI,SDO,SCL</td></tr>
</table></td></tr>
<tr><td>6</td><td>IM1</td></tr>
<tr><td>7</td><td>IM0</td></tr>
<tr><td>8</td><td>LEDON</td><td>Output pin for enabling LED driving.
If not used, open this pad.</td></tr>
<tr><td>9</td><td>LEDPWM</td><td>Output pin for PWM (Pulse Width Modulation) signal of LED driving.
If not used, open this pad.</td></tr>
<tr><td>10</td><td>SDI_SDA</td><td>Serial input signal in SPI I/F.</td></tr>
<tr><td>11</td><td>SDO</td><td>Serial output signal in SPI I/F.</td></tr>
<tr><td>12</td><td>D17</td><td rowspan="18">18-bit parallel bi-directional data bus for MPU-Ⅰsystem:
8-bit I/F: DB [7:0] is used.
9-bit I/F: DB [8:0] is used.
16-bit I/F: DB [15:10] is used.
18-bit I/F: DB [17:0] is used.

18-bit parallel bi-directional data bus for MPU-Ⅱsystem:
8-bit I/F: DB [17:10] is used.
9-bit I/F: DB [17:9] is used.
16-bit I/F: DB [17:10] and DB [8:1] is used.
18-bit I/F: DB [17:0] is used.

18-bit input data bus for RGB I/F.
6-bit/pixel: DB[5:0] is used;
16-bit/pixel: DB[17:13]=R[4:0], DB[11:6]=G[5:0] and DB[5:1]=B[4:0];
18-bit/pixel: DB[17:12]=R[5:0], DB[11:6]=G[5:0] and DB[5:0]=B[5:0];
Connect unused pins to GND.</td></tr>
<tr><td>13</td><td>D16</td></tr>
<tr><td>14</td><td>D15</td></tr>
<tr><td>15</td><td>D14</td></tr>
<tr><td>16</td><td>D13</td></tr>
<tr><td>17</td><td>D12</td></tr>
<tr><td>18</td><td>D11</td></tr>
<tr><td>19</td><td>D10</td></tr>
<tr><td>20</td><td>D9</td></tr>
<tr><td>21</td><td>D8</td></tr>
<tr><td>22</td><td>D7</td></tr>
<tr><td>23</td><td>D6</td></tr>
<tr><td>24</td><td>D5</td></tr>
<tr><td>25</td><td>D4</td></tr>
<tr><td>26</td><td>D3</td></tr>
<tr><td>27</td><td>D2</td></tr>
<tr><td>28</td><td>D1</td></tr>
<tr><td>29</td><td>D0</td></tr>
</table>

30	RESX	This signal will reset the device and must be applied to properly Initialize the chip. Signal is active low.
31	RDX	8080Ⅰ/8080Ⅱ system (RDX): Serves as a read signal and MCU read data at the rising edge.
32	WRX (D/CX)	(WRX) 8080Ⅰ/8080Ⅱ system: Serves as a write signal and writes data at the rising edge. (D/CX) 4line system: Serves as the selector of command or parameter.
33	D/CX (SCL)	(D/CX): This pin is used to select “Data or Command” in the parallel interface. When DCX = 1, data is selected. When DCX = 0, command is selected. (SCL): This pin is used as the serial interface clock in 3wire 9bit/4wire 8bit serial data interface. If not used, this pin should be connected to VDDI or VSS.
34	CSX	Chip select input pin (“Low” enable). This pin can be permanently fixed “Low” in MPU interface mode only.
35	GND	Power ground
36	VCI	System power supply.
37	IOVCC	I/O power supply.
38	LEDA	LED backlight (Anode).
39	LEDK1	LED backlight (Cathode).
40	LEDK2	LED backlight (Cathode).

CTP

PIN NO.	PIN NAME	
1	TP_VDD(	CTP Digital Power.
2	TP_RESET	CTP reset pin. Active low to enter reset state.
3	TP_SCL	CTP I^2C_clock.
4	TP_SDA	CTP I^2C_data
5	TP_INT	CTP interruption signal.
6	TPGND	CTP Power ground

5. Absolute Maximum Ratings

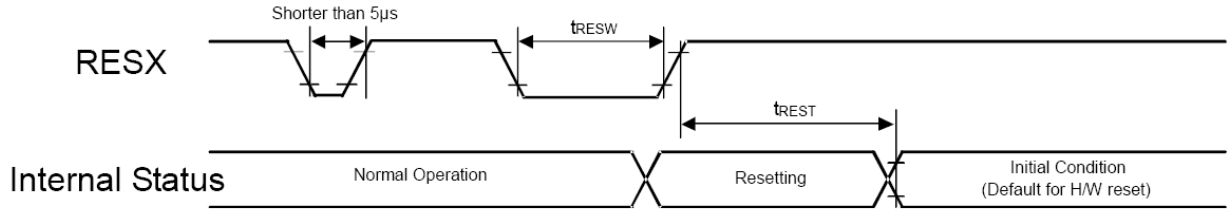
Item	Symbol	Min.	Max.	Unit
Logic Supply Voltage	IOVCC	-0.3	4.6	V
Analog Supply Voltage	VCI	-0.3	4.6	V
CTP Digital Power.	TP_VDD	1.8	3.6	
Input Voltage	Vin	-0.3	IOVCC+0.3	V
Operating Temperature	TOP	-20	70	°C
Storage Temperature	TST	-30	80	°C
Storage Humidity	HD	20	90	%RH

6. DC Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Logic Supply Voltage	IOVCC	1.65	1.8/2.8	3.3	V	-
Analog Supply Voltage	VCI	2.5	2.8	3.3	V	-
CTP Digital Power.	TP_VDD	2.8	3.0	3.3		
Input High Voltage	V_{IH}	0.7IOVCC	-	IOVCC	V	Digital input pins
Input Low Voltage	V_{IL}	GND	-	0.3IOVCC	V	Digital input pins
Output High Voltage	V_{OH}	0.8IOVCC	-	IOVCC	V	Digital output pins
Output Low Voltage	V_{OL}	GND	-	0.2IOVCC	V	Digital output pins
I/O Leak Current	ILI	-0.1	-	0.1	uA	-

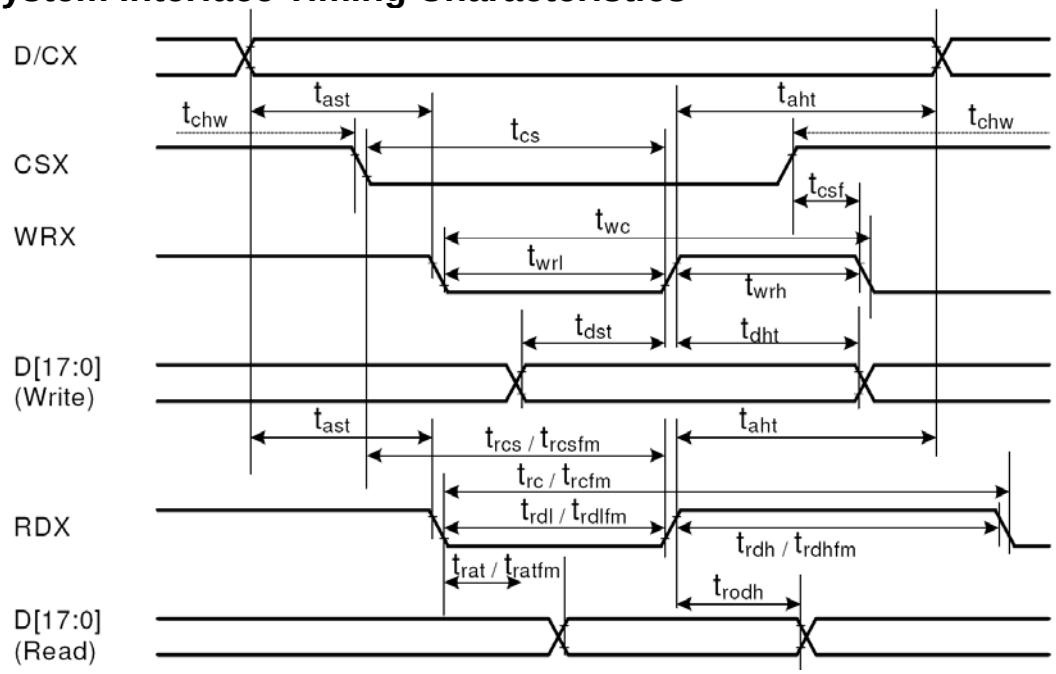
7. Timing Characteristics

7.1 Reset Timing Characteristics



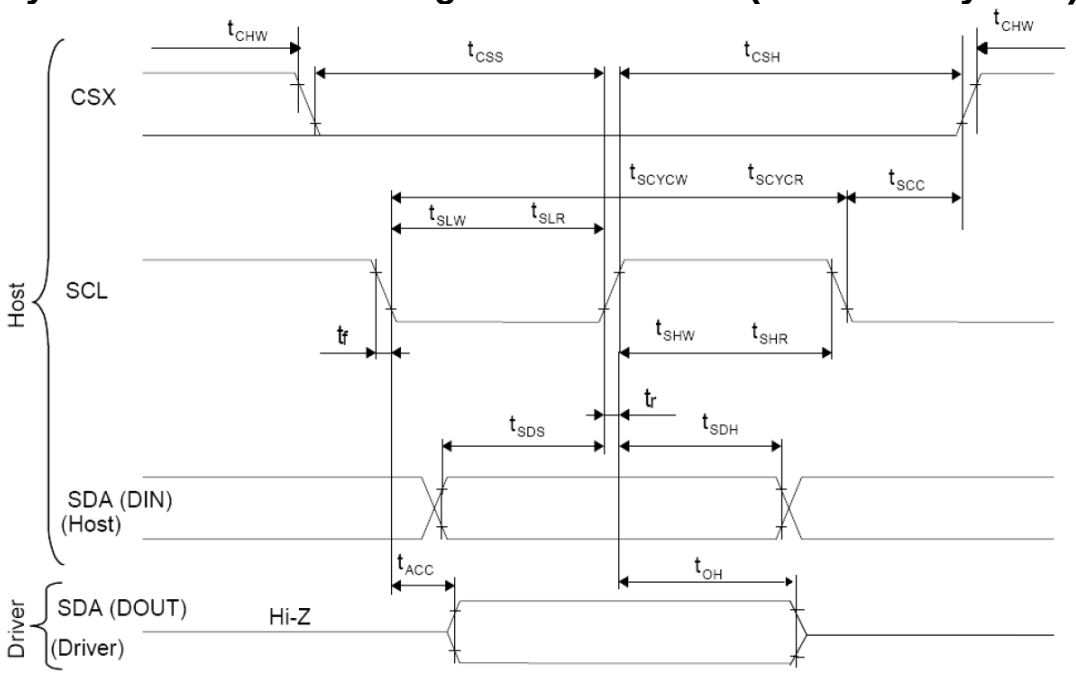
Symbol	Parameter	Related pins	Min.	Typ.	Max.	Note	Unit
t_{RESW}	Reset low pulse width(1)	RESX	10	-	-	-	µs
t_{REST}	Reset complete time(2)	-	5	-	-	When reset is applied during Sleep In mode	ms
		-	120	-	-	When reset is applied during Sleep Out mode	ms

7.2 i80-System Interface Timing Characteristics



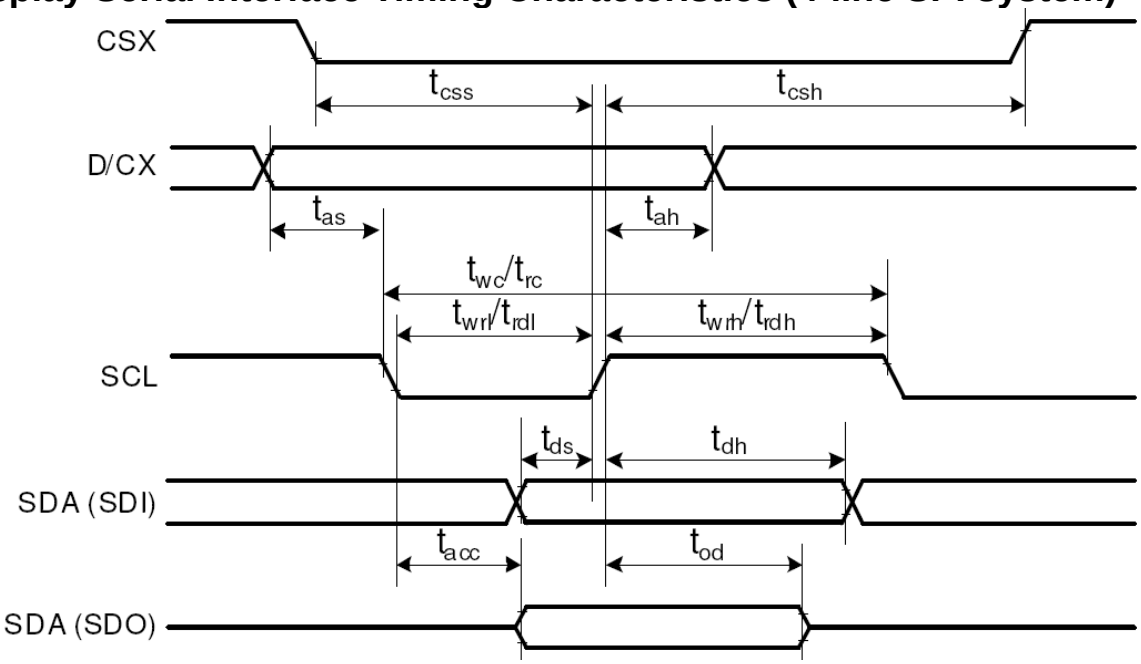
Signal	Symbol	Parameter	min	max	Unit	Description
DCX	tast	Address setup time	0	-	ns	
	taht	Address hold time (Write/Read)	0	-	ns	
CSX	tchw	CSX "H" pulse width	0	-	ns	
	tcs	Chip Select setup time (Write)	15	-	ns	
	trcs	Chip Select setup time (Read ID)	45	-	ns	
	trcsfm	Chip Select setup time (Read FM)	355	-	ns	
	tcsf	Chip Select Wait time (Write/Read)	10	-	ns	
WRX	twc	Write cycle	66	-	ns	
	twrh	Write Control pulse H duration	15	-	ns	
	twrl	Write Control pulse L duration	15	-	ns	
RDX (FM)	trcfm	Read Cycle (FM)	450	-	ns	
	trdhfm	Read Control H duration (FM)	90	-	ns	
	trdlfm	Read Control L duration (FM)	355	-	ns	
RDX (ID)	trc	Read cycle (ID)	160	-	ns	
	trdh	Read Control pulse H duration	90	-	ns	
	trdl	Read Control pulse L duration	45	-	ns	
D[17:0], D[17:10]&D[8:1], D[17:10], D[17:9]	tdst	Write data setup time	10	-	ns	For maximum CL=30pF For minimum CL=8pF
	tdht	Write data hold time	10	-	ns	
	trat	Read access time	-	40	ns	
	tratfm	Read access time	-	340	ns	
	trod	Read output disable time	20	80	ns	

7.3 Display Serial Interface Timing Characteristics (3-line SPI system)



Signal	Symbol	Parameter	min	max	Unit	Description
SCL	tscycw	Serial Clock Cycle (Write)	100	-	ns	
	tshw	SCL “H” Pulse Width (Write)	40	-	ns	
	tslw	SCL “L” Pulse Width (Write)	40	-	ns	
	tscycr	Serial Clock Cycle (Read)	150	-	ns	
	tshr	SCL “H” Pulse Width (Read)	60	-	ns	
	tslr	SCL “L” Pulse Width (Read)	60	-	ns	
SDA / SDI (Input)	tsds	Data setup time (Write)	30	-	ns	
	tsdh	Data hold time (Write)	30	-	ns	
SDA / SDO (Output)	tacc	Access time (Read)	10	-	ns	
	toh	Output disable time (Read)	10	50	ns	
CSX	tscc	SCL-CSX	20	-	ns	
	tchw	CSX “H” Pulse Width	40	-	ns	
	tcss	CSX-SCL Time	60	-	ns	
	tcsh		65	-	ns	

7.4 Display Serial Interface Timing Characteristics (4-line SPI system)

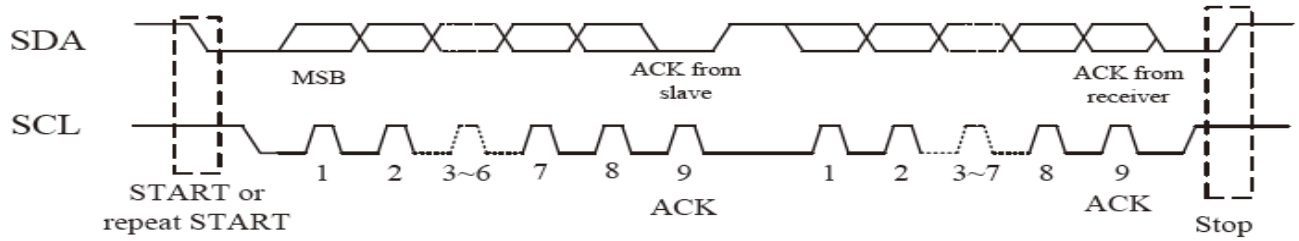


Signal	Symbol	Parameter	min	max	Unit	Description
CSX	tcss	Chip select time (Write)	40	-	ns	
	tcsh	Chip select hold time (Read)	40	-	ns	
SCL	twc	Serial clock cycle (Write)	100	-	ns	
	twrh	SCL “H” pulse width (Write)	40	-	ns	
	twrl	SCL “L” pulse width (Write)	40	-	ns	
	trc	Serial clock cycle (Read)	150	-	ns	
	trdh	SCL “H” pulse width (Read)	60	-	ns	
	trdl	SCL “L” pulse width (Read)	60	-	ns	
D/CX	tas	D/CX setup time	10	-		
	tah	D/CX hold time (Write / Read)	10	-		
SDA / SDI (Input)	tds	Data setup time (Write)	30	-	ns	
	tdh	Data hold time (Write)	30	-	ns	
SDA / SDO (Output)	tacc	Access time (Read)	10	-	ns	For maximum CL=30pF
	tod	Output disable time (Read)	10	50	ns	For minimum CL=8pF

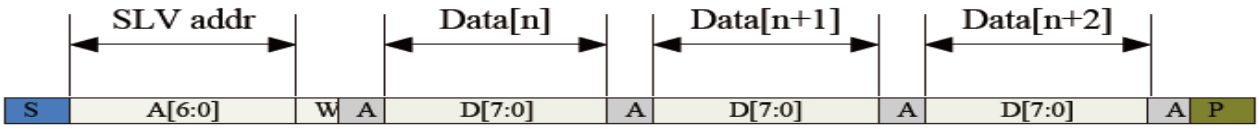
7.5 CTP Timing characteristics

7.5.1 Serial Interface

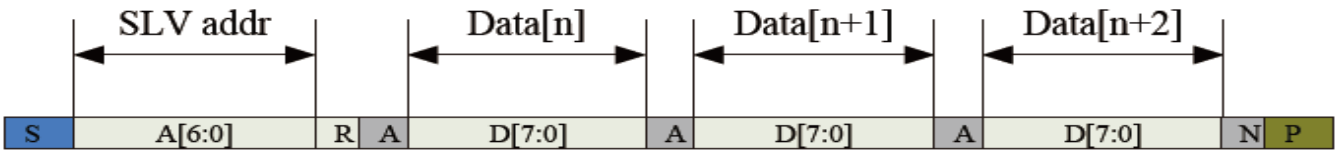
I^2C



I2C Serial Data Transfer Format



I2C master write, slave read



I2C master read, slave write

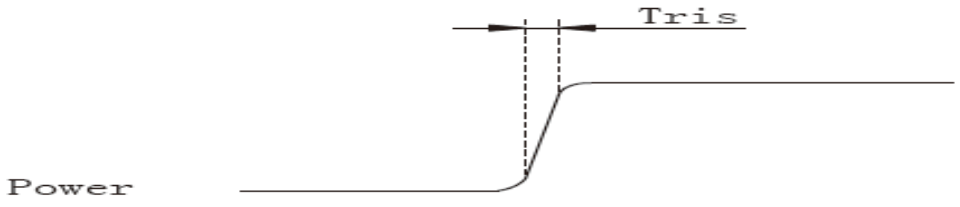
Mnemonics Description

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)

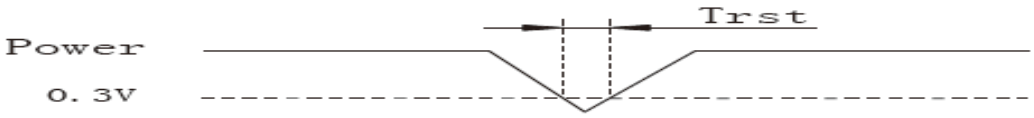
I2C Timing Characteristics

Parameter	Unit	Min	Max
SCL frequency	KHz	0	400
Bus free time between a STOP and START condition	us	4.7	\
Hold time (repeated) START condition	us	4.0	\
Data setup time	ns	250	\
Setup time for a repeated START condition	us	4.7	\
Setup Time for STOP condition	us	4.0	\

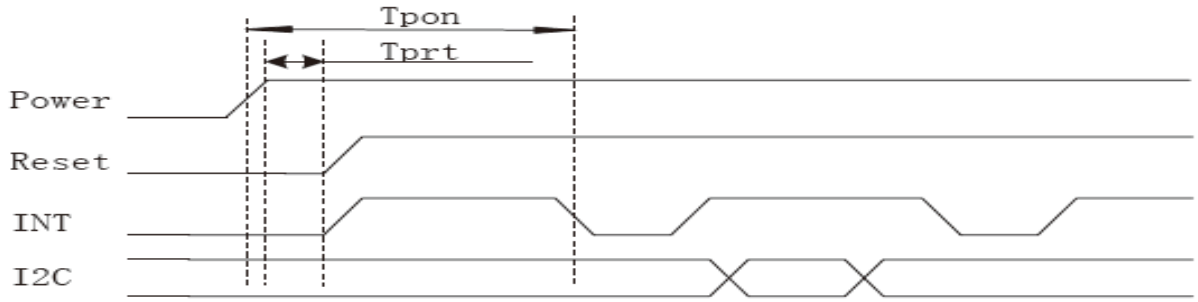
7.5.2 POWER NO /Reset/Wake Sequence



Power on time

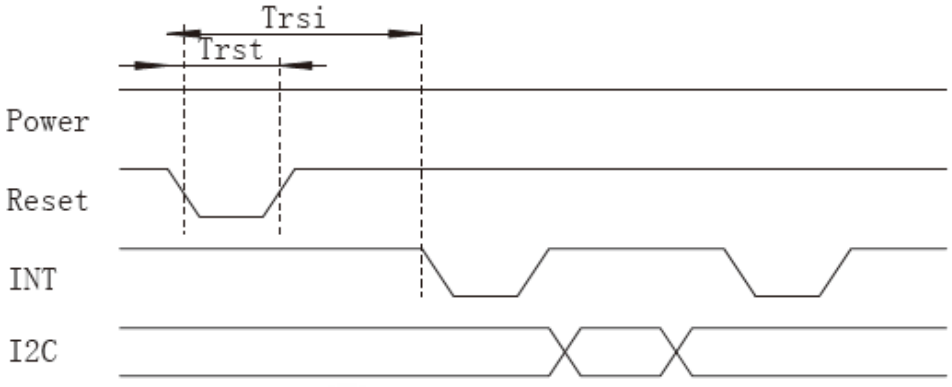


Power Cycle requirement



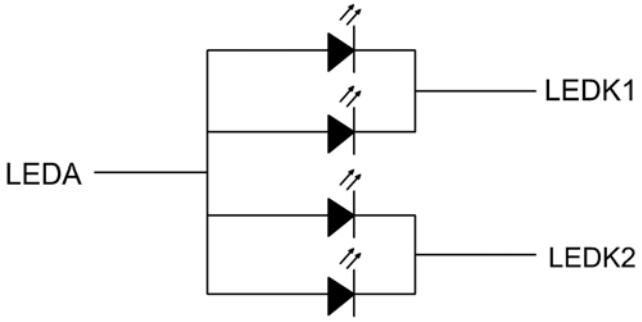
Power on Sequence

Reset time must be enough to guarantee reliable reset, the time of starting to report point after resetting approach to the time of starting to report point after powering on.



Reset Sequence

8. Backlight Characteristics

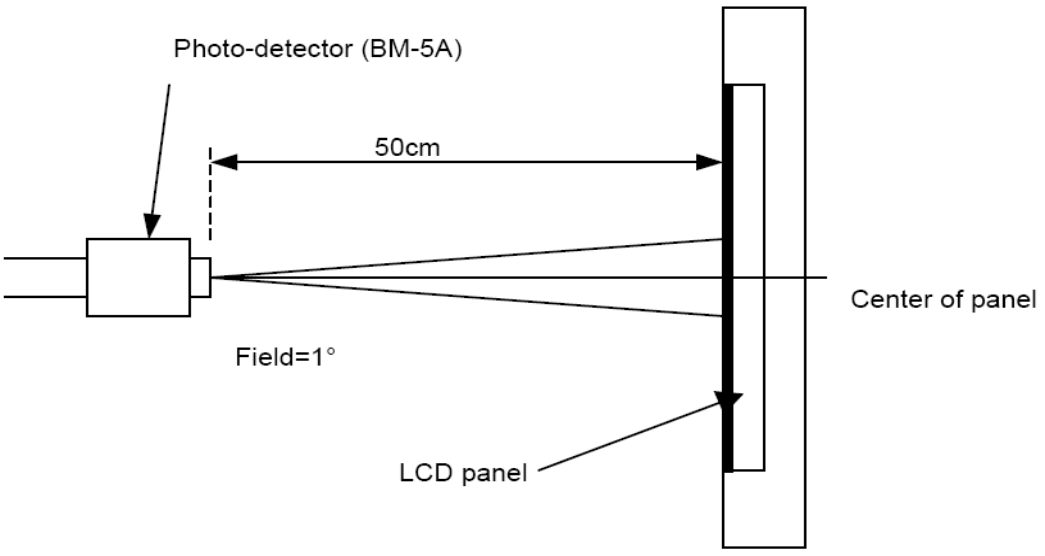


Item	Symbol	MIN	TYP	MAX	UNIT	Test Condition
Supply Voltage	Vf	--	3.2	--	V	If=80mA
Supply Current	If	--	80	--	mA	--
Luminous Intensity for LCM	--	180	220	--	Cd/m^2	If=80mA
Uniformity for LCM	--	80	--	--	%	If=80mA
Life Time	--	20000	--	--	Hr	If=80mA
Backlight Color	White					

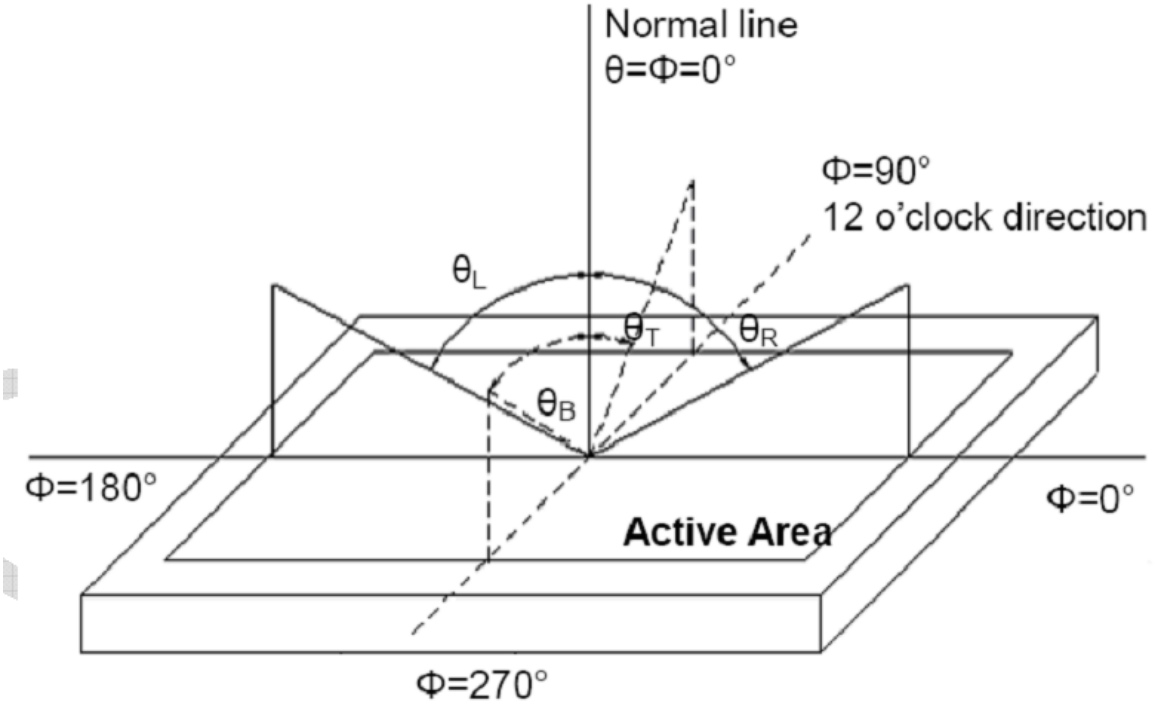
9. Optical Characteristics

Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle (CR>10)	Horizontal	θ_L	35	45	-	degree	(1),(2),(6)
		θ_R	35	45	-		
	Vertical	θ_T	40	50	-		
		θ_B	10	20	-		
Contrast Ratio	Center		400	500	-	-	(1),(3),(6)
Response Time	Rising		-	4	8	ms	(1),(4),(6)
	Falling		-	12	24		
CF Color Chromaticity (CIE1931)	Red x		Typ. -0.05	0.626	Typ. +0.05	-	(1), (6)
	Red y			0.334		-	
	Green x			0.277		-	
	Green y			0.549		-	
	Blue x			0.142		-	
	Blue y			0.122		-	
	White x			0.303		-	
	White y			0.325		-	

Note (1) Measurement Setup: The LCD module should be stabilized at given temp. 25°C for 15 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 15 minutes in a windless room.



Note (2) Definition of Viewing Angle

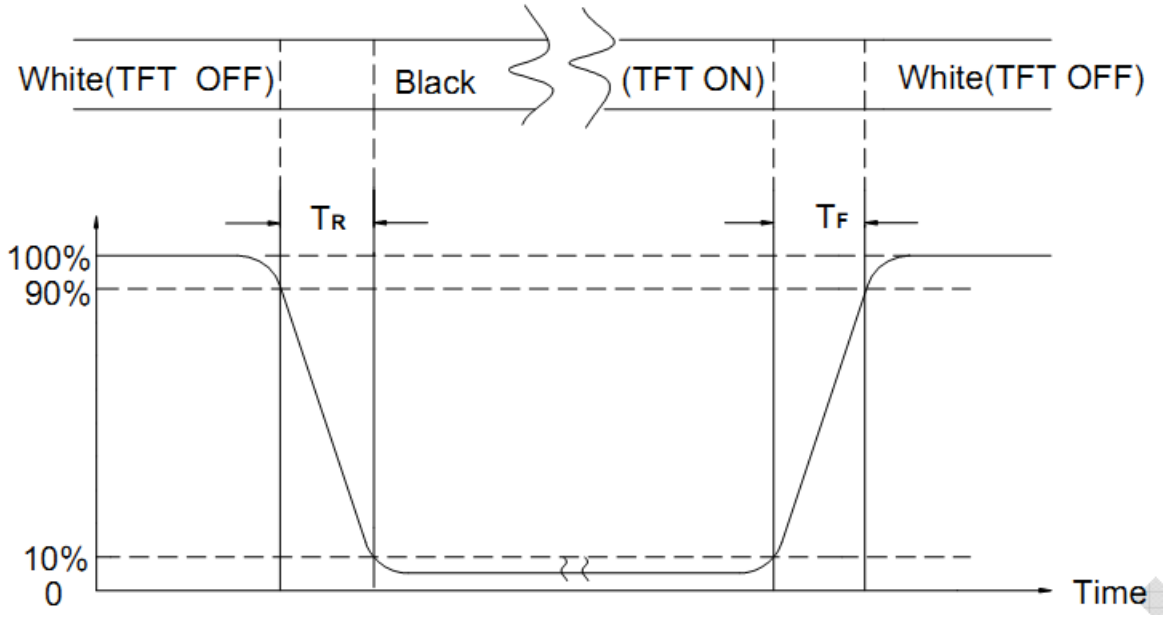


Note (3) Definition Of Contrast Ratio (CR)

The contrast ratio can be calculated by the following expression
Contrast Ratio (CR) = L63 / L0

L63: Luminance of gray level 63, L0: Luminance of gray level 0

Note (4) Definition of response time



Note (5) Definition of Transmittance (Module is without signal input)

Transmittance = Center Luminance of LCD / Center Luminance of Back Light x 100%

Note (6) Definition of color chromaticity (CIE1931)

Color coordinates measured at the center point of LCD

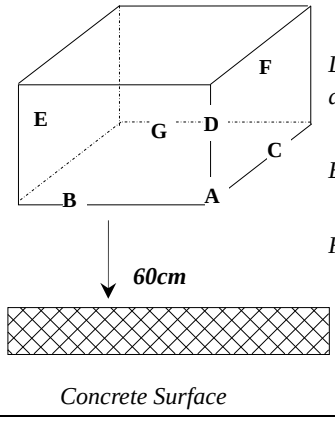
10. Reliability Test Conditions and Methods

No change on display and in operation under the following test condition.

Condition: Unless otherwise specified, tests will be conducted under the following condition.

Temperature: 20±5°C Humidity: 65±5%RH

Tests will be not conducted under functioning state.

No.	Parameter	Condition	Notes
1	High Temperature Operating	70°C±2°C, 240hrs (Operation state)	--
2	Low Temperature Operating	-20°C±2°C, 240hrs (Operation state)	--
3	High Temperature Storage	80°C±2°C, 240hrs	--
4	Low Temperature Storage	-30°C±2°C, 240hrs	--
5	High Temperature and High Humidity Operation Test	60°C±2°C, 90%, 240hrs	--
6	Vibration Test	Total fixed amplitude: 1.5mm Vibration Frequency: 10~55Hz One cycle 60 seconds to 3 direction of X, Y, Z each 15 minutes.	--
7.	Drop Test	To be measured after dropping from 60cm high on the concrete surface in packing state.  *Dropping method corner dropping* *A corner: once* *Edge dropping* *B, C, D edge: once* *Face dropping* *E, F, G face: once*	--

Notes: 1. No dew condensation to be observed.

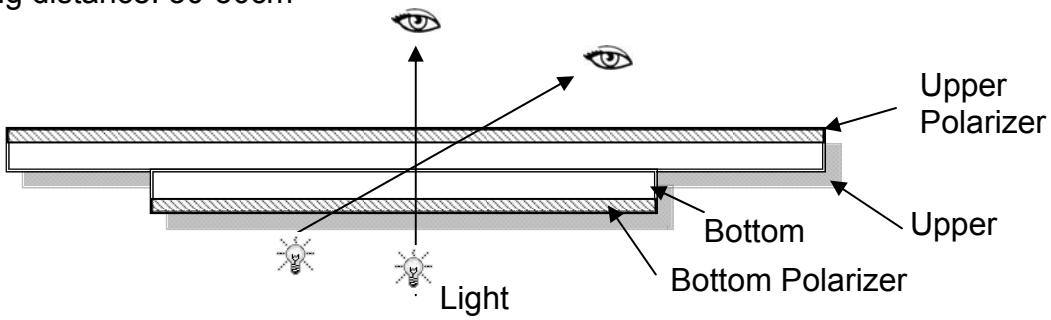
2. The function test shall be conducted after 4 hours storage at the normal temperature and humidity after removed from the test chamber.

3. Vibration test will be conducted to the product itself without putting I in a container.

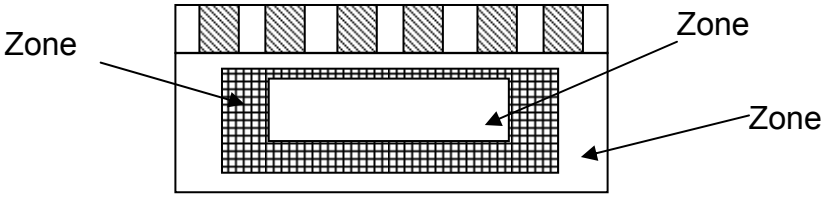
11. Inspection Standard

11.1.1 Inspection conditions

Inspection performed under the following conditions is recommended.
Temperature: 25±5℃
Humidity: 65%±10%RH
Viewing Angle: Normal viewing Angle.
Illumination: Single fluorescent lamp (300 to 700Lux)
Viewing distance: 30-50cm



11.1.2 Definition



Zone A: Effective Viewing Area (Character or Digit can be seen)
Zone B: Viewing Area except Zone A
Zone C: Outside (Zone A + Zone B) which cannot be seen after assembly by customer.)
Note:
As a general rule, visual defects in Zone C can be ignored when it doesn't effect product function or appearance after assembly by customer.

11.1.3 Sampling Plan

According to GB/T 2828-2003; normal inspection, Class Ⅱ
AQL:

Major defect	Minor defect
0.65	1.5

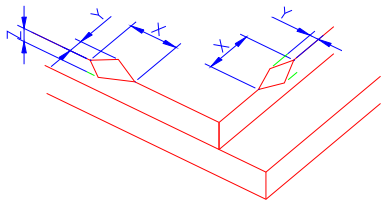
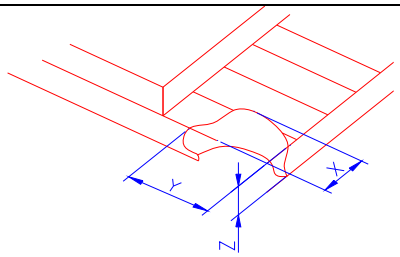
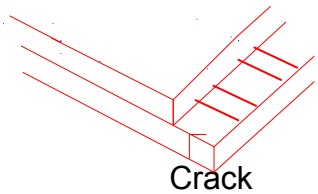
LCD: Liquid Crystal Display, TP: Touch Panel, LCM: Liquid Crystal Module

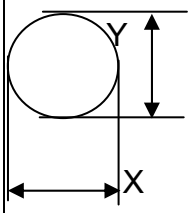
No	Items to be inspected	Criteria	Classification of defects
1	Functional defects	1) No display, Open or miss line 2) Display abnormally, Short 3) Backlight no lighting, abnormal lighting. 4) TP no function	Major
2	Missing	Missing component	
3	Outline dimension	Overall outline dimension beyond the drawing is not allowed	

4	Color tone	Color unevenness, refer to limited sample	Minor
5	Soldering appearance	Good soldering, Peeling off is not allowed.	
6	LCD/Polarizer/TP	Black/White spot/line, scratch, crack, etc.	

11.1.4 Criteria (Visual)

<table>
<tr><th>Number</th><th>Items</th><th>Criteria(mm)</th></tr>
<tr><td rowspan="3">1.0
LCD Crack / Broken

NOTE:
X: Length
Y: Width
Z: Height
L: Length of ITO,
T: Height of LCD</td><td>(1) The edge of LCD broken</td><td> 
<table><tr><th>X</th><th>Y</th><th>Z</th></tr><tr><td>≤3.0mm</td><td><Inner border line of the seal</td><td>≤T</td></tr></table></td></tr>
<tr><td>(2)LCD corner broken</td><td> 
<table><tr><th>X</th><th>Y</th><th>Z</th></tr><tr><td>≤3.0mm</td><td>≤L</td><td>≤T</td></tr></table></td></tr>
<tr><td>(3) LCD crack</td><td> 
Crack
Not allowed</td></tr>
</table>

<table>
<tr><th>Number</th><th>Items</th><th>Criteria (mm)</th></tr>
<tr><td rowspan="2">2.0</td><td>Spot defect
 

Φ=(X+Y)/2</td><td>① light dot（LCD/TP/Polarizer black/white spot , light dot, pinhole, dent, stain）
<table>
<tr><th rowspan="2">Zone
Size (mm)</th><th colspan="3">Acceptable Qty</th></tr>
<tr><th>A</th><th>B</th><th>C</th></tr>
<tr><td>Φ≤0.10</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>0.10<Φ≤0.15</td><td colspan="2">3(distance≧10mm)</td></tr>
<tr><td>0.15<Φ≤0.2</td><td colspan="2">1</td></tr>
<tr><td>0.2<Φ</td><td colspan="2">0</td></tr>
</table>
②Dim spot（LCD/TP/Polarizer dim dot, light leakage、dark spot）
<table>
<tr><th rowspan="2">Zone
Size (mm)</th><th colspan="3">Acceptable Qty</th></tr>
<tr><th>A</th><th>B</th><th>C</th></tr>
<tr><td>Φ≤0.1</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>0.1<Φ≤0.2</td><td colspan="2">2(distance≧10mm)</td></tr>
<tr><td>0.2<Φ≤0.3</td><td colspan="2">1</td></tr>
<tr><td>Φ＞0.3</td><td colspan="2">0</td></tr>
</table>
③ Polarizer accidented spot
<table>
<tr><th rowspan="2">Zone
Size (mm)</th><th colspan="3">Acceptable Qty</th></tr>
<tr><th>A</th><th>B</th><th>C</th></tr>
<tr><td>Φ≤0.2</td><td colspan="2">Ignore</td><td rowspan="3">Ignore</td></tr>
<tr><td>0.2<Φ≤0.5</td><td colspan="2">2(distance≧10mm)</td></tr>
<tr><td>Φ>0.5</td><td colspan="2">0</td></tr>
</table></td></tr>
<tr><td>Line defect (LCD/TP /Polarizer black/white line, scratch, stain)</td><td>
<table>
<tr><th rowspan="2">Width(mm)</th><th rowspan="2">Length(mm)</th><th colspan="3">Acceptable Qty</th></tr>
<tr><th>A</th><th>B</th><th>C</th></tr>
<tr><td>Φ≤0.03</td><td>Ignore</td><td colspan="2">Ignore</td><td rowspan="3">Ignore</td></tr>
<tr><td>0.03<W≤0.05</td><td>L≤3.0</td><td colspan="2">N≤2</td></tr>
<tr><td>0.05<W≤0.08</td><td>L≤2.0</td><td colspan="2">N≤2</td></tr>
<tr><td>0.08<W</td><td colspan="4">Define as spot defect</td></tr>
</table></td></tr>
</table>

<table>
<tr>
<td>3.0</td>
<td>Polarizer Bubble</td>
<td>
<table>
<tr><td rowspan="2">Zone
Size (mm)</td><td colspan="3">Acceptable Qty</td></tr>
<tr><td>A</td><td>B</td><td>C</td></tr>
<tr><td>Φ≤0.2</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>0.2<Φ≤0.4</td><td colspan="2">2(distance≧10mm)</td></tr>
<tr><td>0.4<Φ≤0.6</td><td colspan="2">1</td></tr>
<tr><td>0.6<Φ</td><td colspan="2">0</td></tr>
</table>
</td>
</tr>
<tr>
<td>4.0</td>
<td>SMT</td>
<td>According to IPC-A-610C class Ⅱ standard. Function defect and missing part are major defect, the others are minor defect.</td>
</tr>
</table>

12. Handling Precautions

12.1 Mounting method

The LCD panel of AMSON TFT 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 LCD modules.

12.2 Caution of LCD 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) , Sulfur (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), Sulfur (S) from customer, Responsibility is on customer.

12.3 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 GND, do not input any signals before power is turned on, and ground your body, work/assembly areas, and assembly equipment to protect against static electricity.

12.4 packing

- Module employs 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

12.5 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.
- 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.

12.6 storing

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.

12.7 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.

13. Precaution for Use

13.1

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.

13.2

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 this is not specified in this specification.
- When an inspection specifications change or operating condition change in customer is reported to AMSON TFT 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.

14. Packing Method

TBD