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SPECIFICATION

VXT350LQZ-01P

☐ Preliminary Specification

☐ Final Specification



CUSTOMER:

Made By:

Checked By:

Approved By:

Quality:

Date:

Note:

Approved By:

Date:

Note:

Records of Revision

[illegible]

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1. Introduction

1.1 Scope of application

This specification applies to the Negative type TFT transmissive dot matrix LCD module. This LCD module should be designed for mobile phone use.

LCD specification: Dots 320xRGBx240.

As to basic specification of the driver IC, refer to the IC (SSD2119) specification and datasheet.

1.2 Structure:

Double display structure:

TFT Module + FPC +BL+TP;

FULL 262k Color3.5 inch TFT LCD size for main LCD;

One bare chip with gold bump (COG) TECH;

1.3 TFT features:

Structure: TFT PANNEL+IC+FPC+BL+TP;

Transmissive Type LCD;

320 dot-source and 240 dot-gate outputs;

262k Color can be selected by software;

White LED back light;

1.4 Applications:

Mobile phone

PSP

PDA

GPS

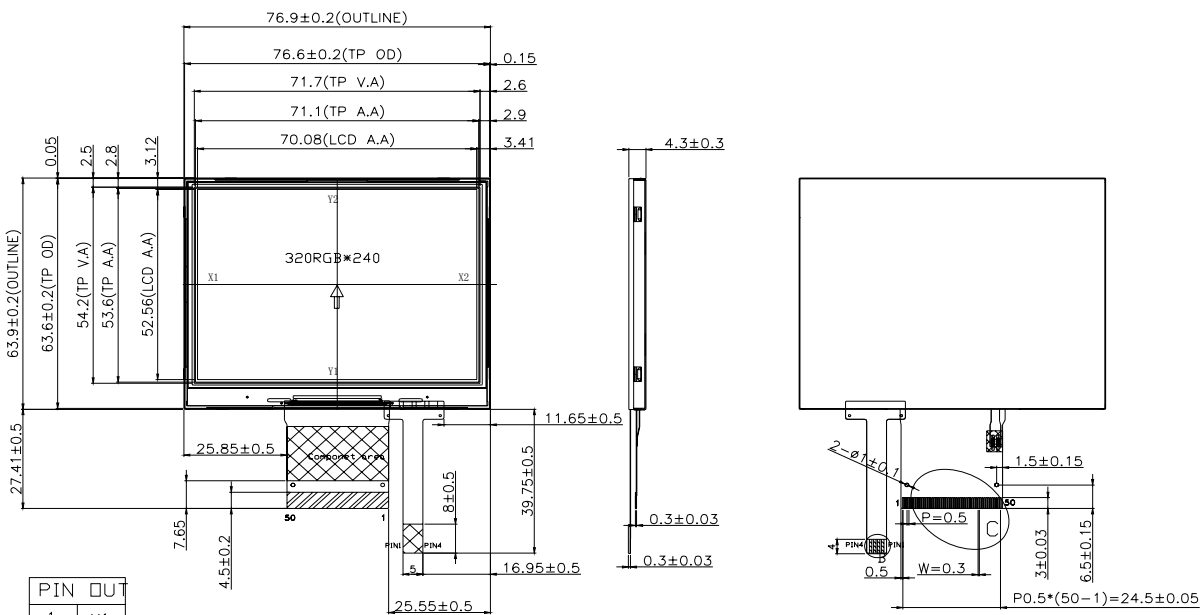
Etc...

2. General specification

ITEM	Standard value	UNIT
LCD Type	TFT Transmissive	---
Driver element	a-Si TFT Active matrix	
Number of Dots	320*(RGB)*240	Dots
Pixel Arrangement	RGB Vertical Stripe	
Active Area	70.08 *52.56	mm
Viewing Direction	6 O'clock	
Driver IC	SSD2119	
Module Size(W*H*T)	76.9x63.9x4.3	mm
Approx. Weight	TBD	g
Back Light	White LED	
System interface	1. 8/ 9/ 16/ 18-bit 6800-series / 8080-series Parallel Interface 2. Serial Peripheral Interface (SPI) 3. 18-/6-bit RGB interface (DE, DOTCLK, HSYNC, VSYNC, DB[17:0]) 4. WSYNC interface (system interface + WSYNC)	

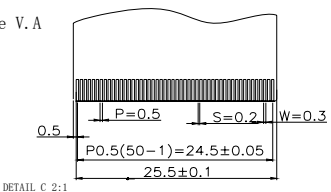
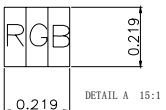
	PIN	SYMBL
	1	VCC
	2	VCC
	3	VSS
	4	VDDIO
	5	VSS
	6	RESET
	7	DC/SPC(RS)
	8	E/RD
	9	WR
	10	CS
	11	SCL
	12	SDO
	13	SDI
	14	WSYNC
	15	D17
	16	D16
	17	D15
	18	D14
	19	D13
	20	D12
36	VSYN	D11
37	OE	D10
38	VSS	D9
39	PS0	D8
40	PS1	D7
41	PS2	D6
42	PS3	D5
43	VSS	D4
44	NC	D3
45	NC	D2
46	NC	D1
47	NC	D0
48	VSS	VSS
49	LEDB	DOTCLK
50	FDA	HSYN

2K COLOR TFT
NORMALLY WHITE TN
ANSI/CEA-92C COMPLIANT
NO BURN-IN TEST REQUIRED
100,000 HOURS
0°C TO 70°C
100,000 HOURS
0°C TO 80°C
100,000 HOURS
16bit/18bit MCU interface; 1806bit
CMOS interface; SPI interface; WS2812B interface.
LED WHITE
350cd/m ²
0.32±0.02/ Y0.36±0.02



PIN	OUT
1	X1
2	Y1
3	X2
4	Y2

1. GENERAL TOLERANCE: ± 0.2
2. Recommended Case Open Area Should Be Less Than Module V.A
3. recommended cushion adherent area: TP V.A+1.6mm
4. Accord with RoHS
5. () REFERENCE DIMENSION



			DRAWN		TITLE MODULE SPEC.	DRAWING NO. VXT350LQZ-01P			
			CHECKED			UNIT	mm	SCALE	FIT
			APPROVED			3rd Angle		SHEET	1 OF 1
V00 VER.	Frist issuance AMENDMENT	2013.12.6 DATE	CUSTOMER'S APPROVAL		Victronix Tecenstar INT'L Co., LTD				

4. ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit
Supply voltage for logic	VDDIO	-0.3	4.0	V
Supply voltage for analog	VCI	-0.5	5.0	V
Supply current (One LED)	I _{LED}		30	mA
Operating temperature	T _{OP}	-20	+70	°C
Storage temperature	T _{ST}	-30	+80	°C

5. ELECTRICAL CHARACTERISTICS

Item	Symbol	Min	Typ	Max	Unit	Applicable terminal
Supply voltage for logic	ADDIO	1.8	-	3.3	V	V _{DD}
Supply voltage for analog	VCI	2.5	3.3	3.6		
Input voltage	V _{IL}	-0.3	-	0.2 V _{CC}	V	
	V _{IH}	0.8 V _{CC}	-	V _{CC}	V	
Input leakage current	I _{LKG}	-	-	-	μA	
LED Forward voltage	V _f	3.0	3.2	3.4	V	With One LED
Input backlight current	I _{LED}	-	20	25	mA	With One LED

Backlight driving conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED backlight	V _L	18	19.2	20.4	V	
Current for LED backlight	I _L	-	20	25	mA	
LED life time	-	20,000	-	-	Hr	

6. TOUCH PANEL SPECIFICATIONS

6.1 Electrical Characteristics

ITEM	SPECIFICATIONS			UNIT	REMARK
	MIN.	TYP.	MAX		
Linearity	-1.5	-	1.5	%	After environment & life test
Terminal Resistance	200	-	900	ohm	X(Film side)
	150	-	600	ohm	Y(Glass side)
Insulation Resistance	20	-	-	Mohm	DC 25V 1min
Operating Voltage	-	-	10	V	DC

6.2 Optical Characteristics

ITEM	SPECIFICATIONS			UNIT	REMARK
	MIN.	TYP.	MAX		
Response Time	-	-	10	ms	100kohm pull-up
Light Transparency	78	-	-	%	

6.3 Mechanical Characteristics

ITEM	SPECIFICATIONS			UNIT	REMARK
	MIN.	TYP.	MAX		
Operation Force	-	80	-	gf	Note1
Surface Hardness	3	-	-	H	
Pen Sliding Durability	100,000			times	Note2
Hitting Durability	1,000,000			times	Note3

Note 1: Do not operate it with a thing except a polyacetal pen (tip R0.8mm or less) or a finger, especially those with hard or sharp tips such as a ball point pen or a mechanical pencil.

Depending on the pitch & the dimension of the spacer dots in between.

Note 2: Measurement for surface area.

-Scratch 100,000 times straight line on the film with a stylus change every 20,000 times.

-Force: **100gf.**

-Speed: **60mm/sec.**

-Stylus: R0.8 polyacetal tip.

Note 3: Hit 1,000,000 times on the film with an **R12.5mm** tip.

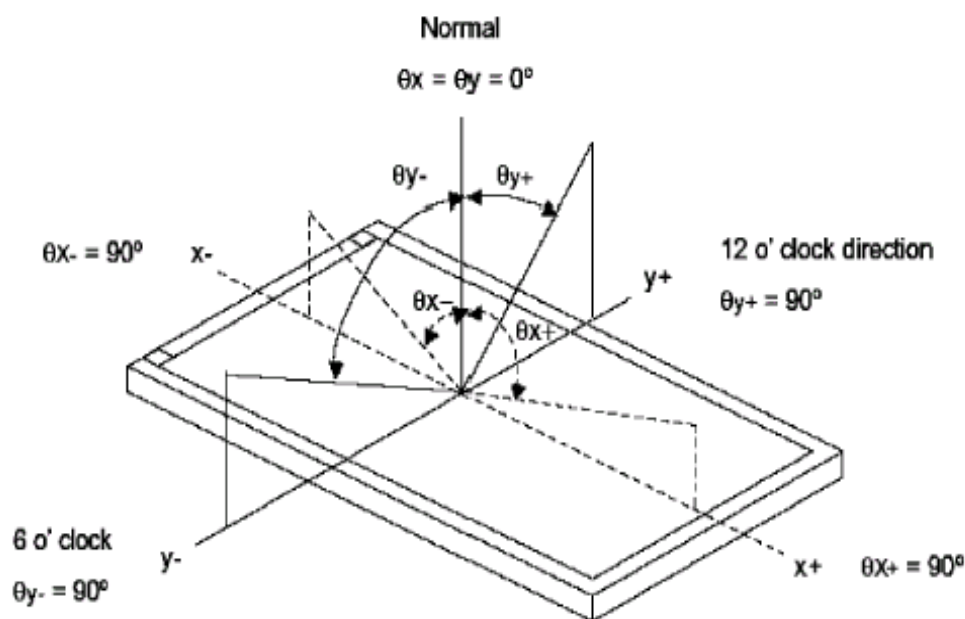
-Force: 250gf.

-Speed: **2 times/sec.**

7. OPTICAL CHARACTERISTICS

ITEM		SYMBOL	CONDITIONS	SPECIFICATIONS			UNIT	NOTE
				MIN.	TYP.	MAX		
Brightness		B	Viewing normal angle	280	350	420	Cd/m ²	All left side data are based on LAIBAO's product reference only
Contrast Ratio		CR		320	400	--	--	
Response Time		Tr+Tf		--	25	35	ms	
CIE Color coordinate	Red	X _R		--	0.633			
		Y _R			0.329			
	Green	X _G		--	0.297			
		Y _G			0.577			
	Blue	X _B		--	0.133			
		Y _B			0.129			
	White	X _W		--	0.320			
		Y _W			0.360			
Viewing Angle	Hor.	θ_{x+}	Center CR>=10	15	25	--	Deg.	
		θ_{x-}		35	45	--		
	Ver.	θ_{y+}		35	45	--		
		θ_{y-}		35	45			
Uniformity	Un			80	85		%	

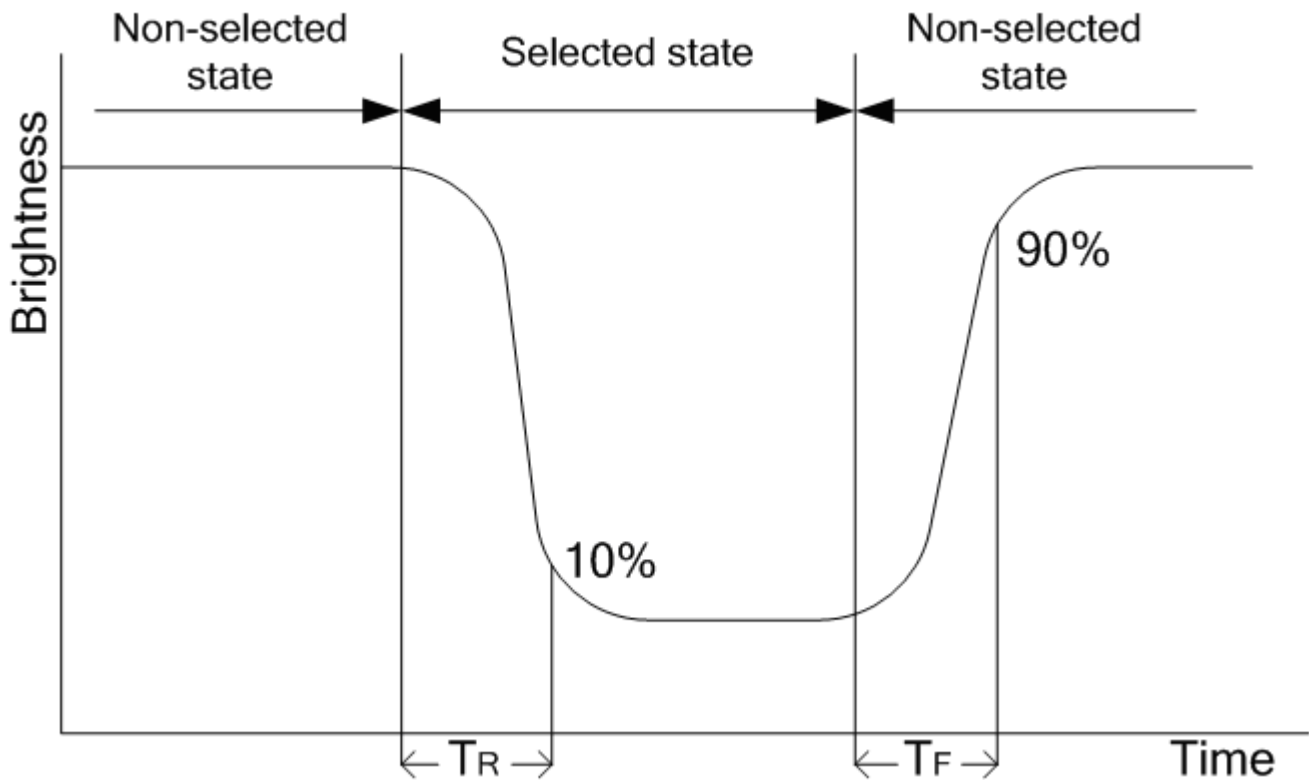
Note 1 : Definition of Viewing Angle θ_x and θ_y :



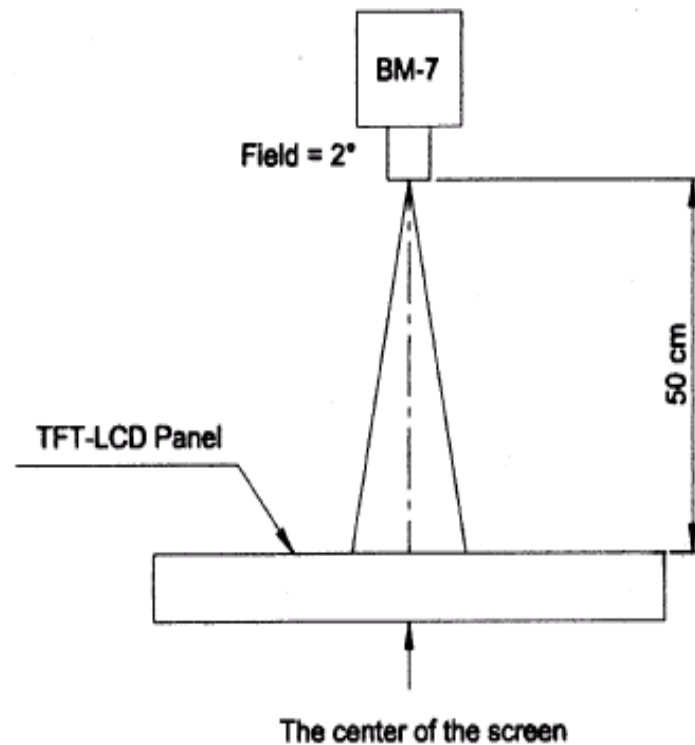
Note 2: Definition of contrast ratio CR:

$$CR = \frac{\text{Brightness of non-selected dots (white)}}{\text{Brightness of selected dots (black)}}$$

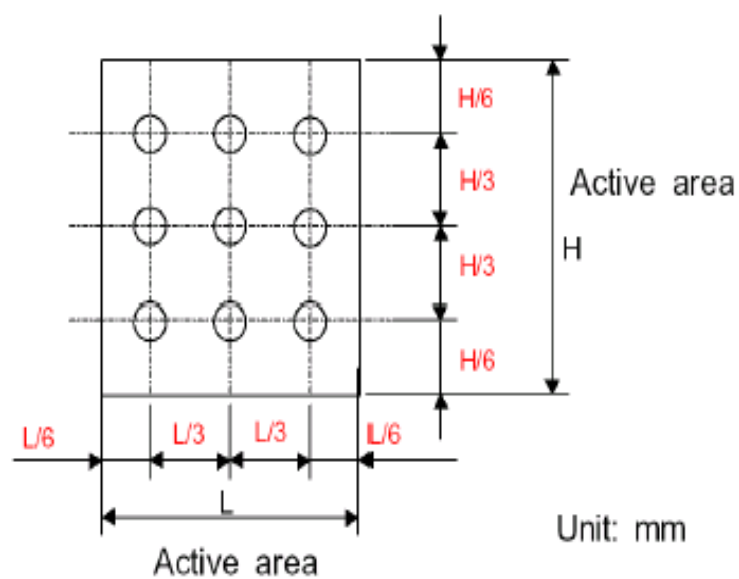
Note 3: Definition of response time (T_R , T_F)



: The brightness test equipment setup
20mA Field=2° (As measuring "black" image, field=2° is the best testing condition)



Note 4 :



8. MCU Interface Pin Function

. Table 2: Pin assignment

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/ $\overline{\text{RD}}$	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	VSNC	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.

Table1

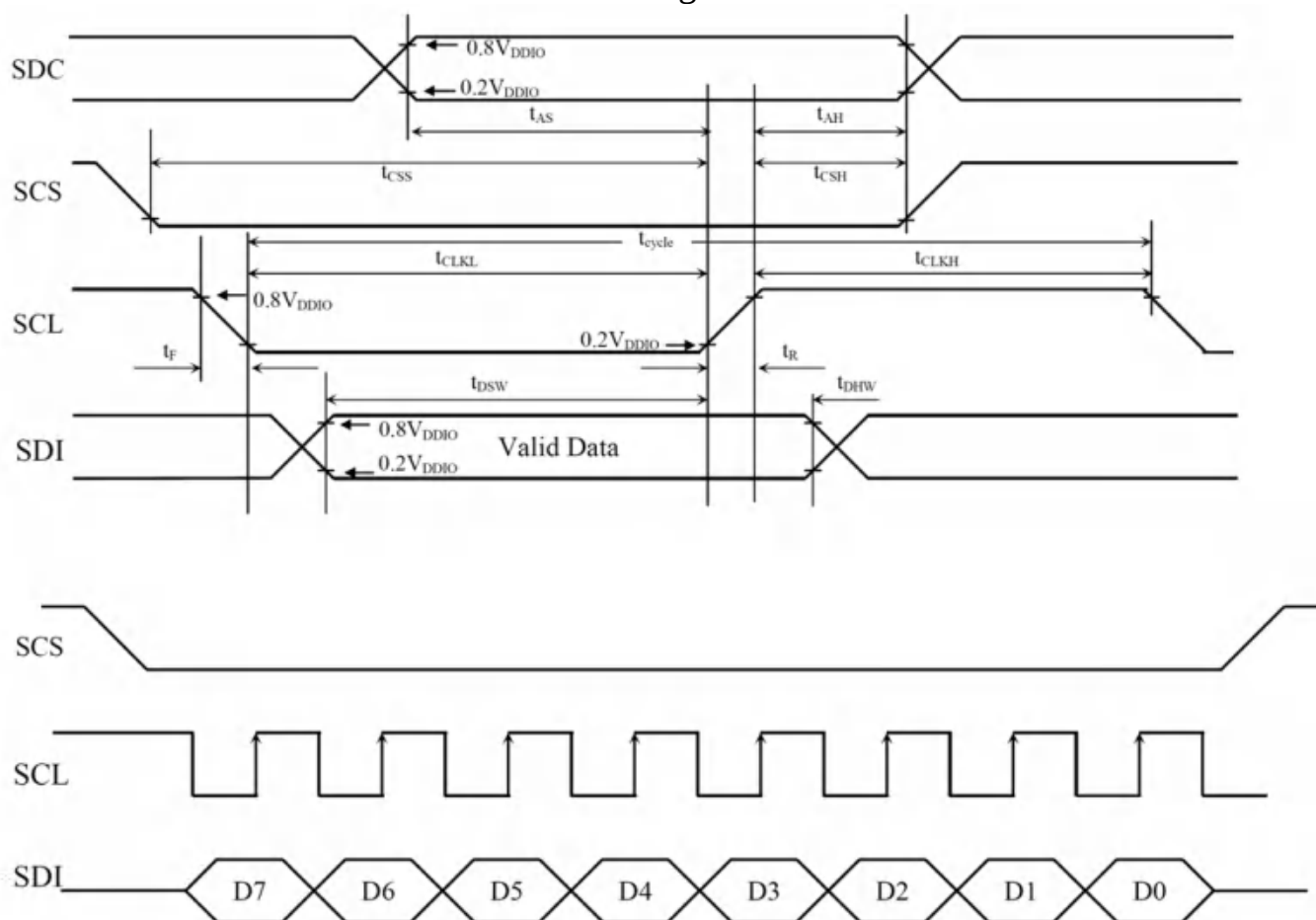
PS 3	PS2	PS1	PS0	Interface Mode
0	0	0	0	16-bit 6800 parallel interface
0	0	0	1	8-bit 6800 parallel interface
0	0	1	0	16-bit 8080 parallel interface
0	0	1	1	8-bit 8080 parallel interface
0	1	0	0	9-bit generic D[17:9] (262k colour) + 3-wire SPI If 65K color, D12 shorts to D17 internally
0	1	0	1	16-bit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

8.1 Timing characteristics

8.1.1. Serial timing characteristics

Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time	77	-	-	ns
f_{CLK}	Serial Clock Cycle Time SPI Clock tolerance = +/- 2 ppm	-	-	15	MHz
t_{AS}	Register select Setup Time	4	-	-	ns
t_{AH}	Register select Hold Time	5	-	-	ns
t_{CSS}	Chip Select Setup Time	2	-	-	ns
t_{CSH}	Chip Select Hold Time	10	-	-	ns
t_{DSW}	Write Data Setup Time	5	-	-	ns
t_{DHW}	Write Data Hold Time	10	-	-	ns
t_{CLKL}	Clock Low Time	38	-	-	ns
t_{CLKH}	Clock High Time	38	-	-	ns
t_R	Rise time	-	-	4	ns
t_F	Fall time	-	-	4	ns

4 wire serial timing characteristics

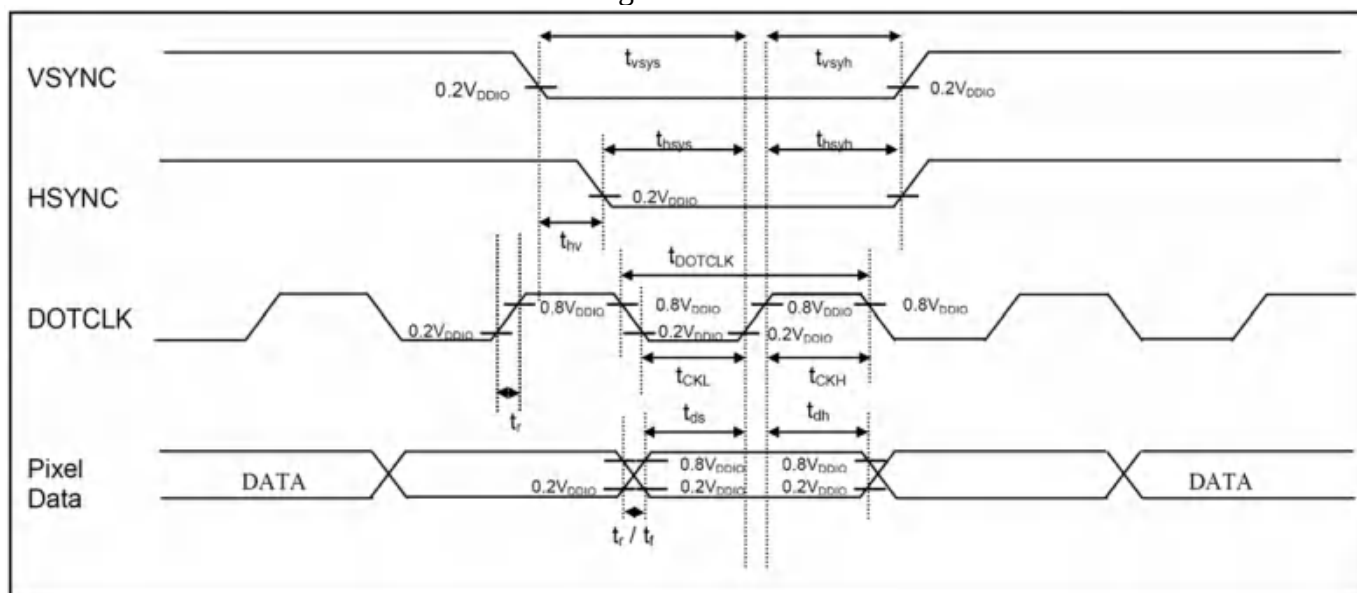


8.1.2. RGB timing characteristics

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.

RGB timing characteristics

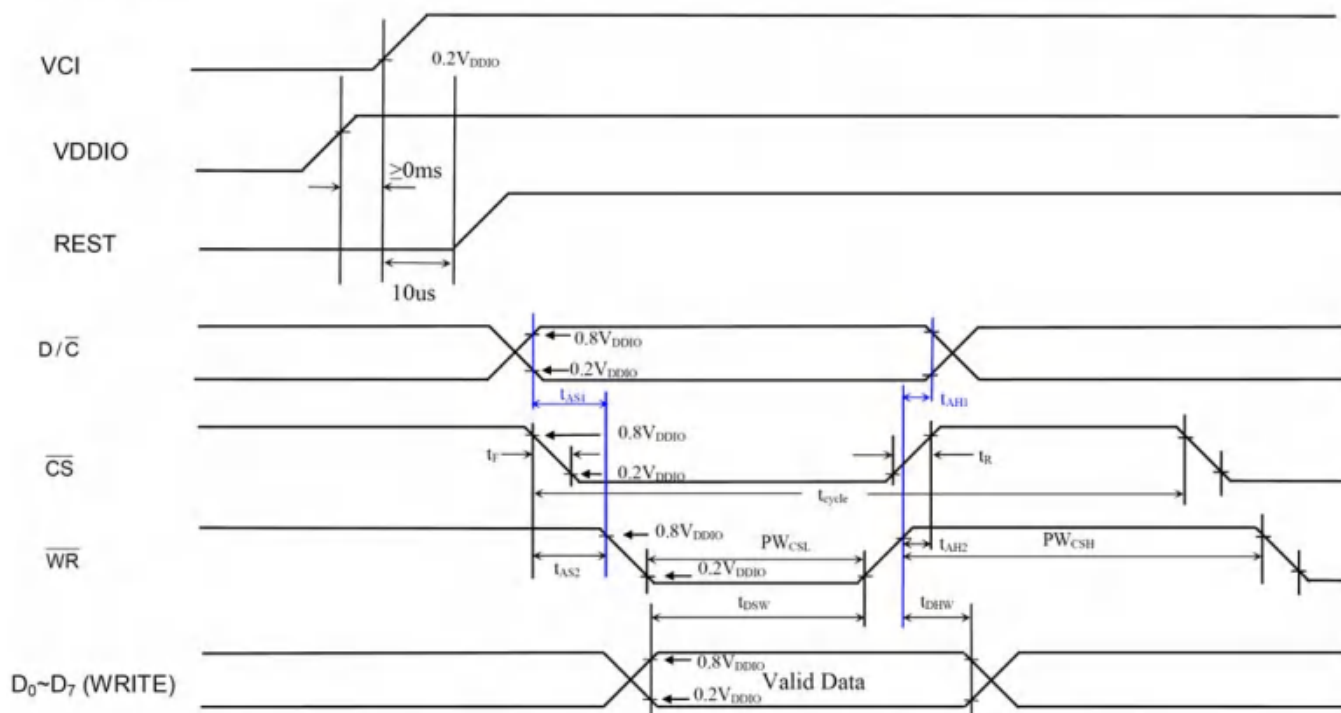


8.1.3. parallel 8080 MCU interface

Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time (write cycle)	75	+	+	ns
t_{cycle}	Clock Cycle Time (read cycle) (Based on $V_{OL}/V_{OH} = 0.3 \cdot V_{DDIO}/0.7 \cdot V_{DDIO}$)	450	+	+	ns
t_{AS1}	Address Setup Time between $(R/\bar{W})$ and $D/\bar{C}$	0	+	+	ns
t_{AH1}	Address Hold Time between $(R/\bar{W})$ and $D/\bar{C}$	0	-	-	ns
t_{AS2}	Address Setup Time between $(R/\bar{W})$ and $\bar{CS}$	0	+	+	ns
t_{AH2}	Address Hold Time between $(R/\bar{W})$ and $\bar{CS}$	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

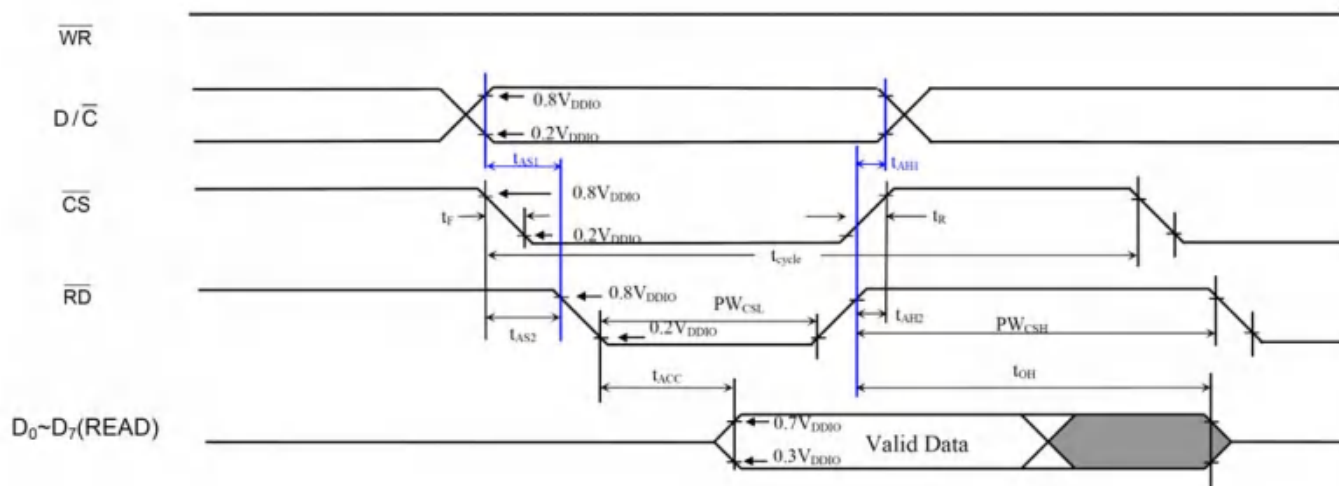
parallel 8080 MCU interface timing characteristics

Write Cycle



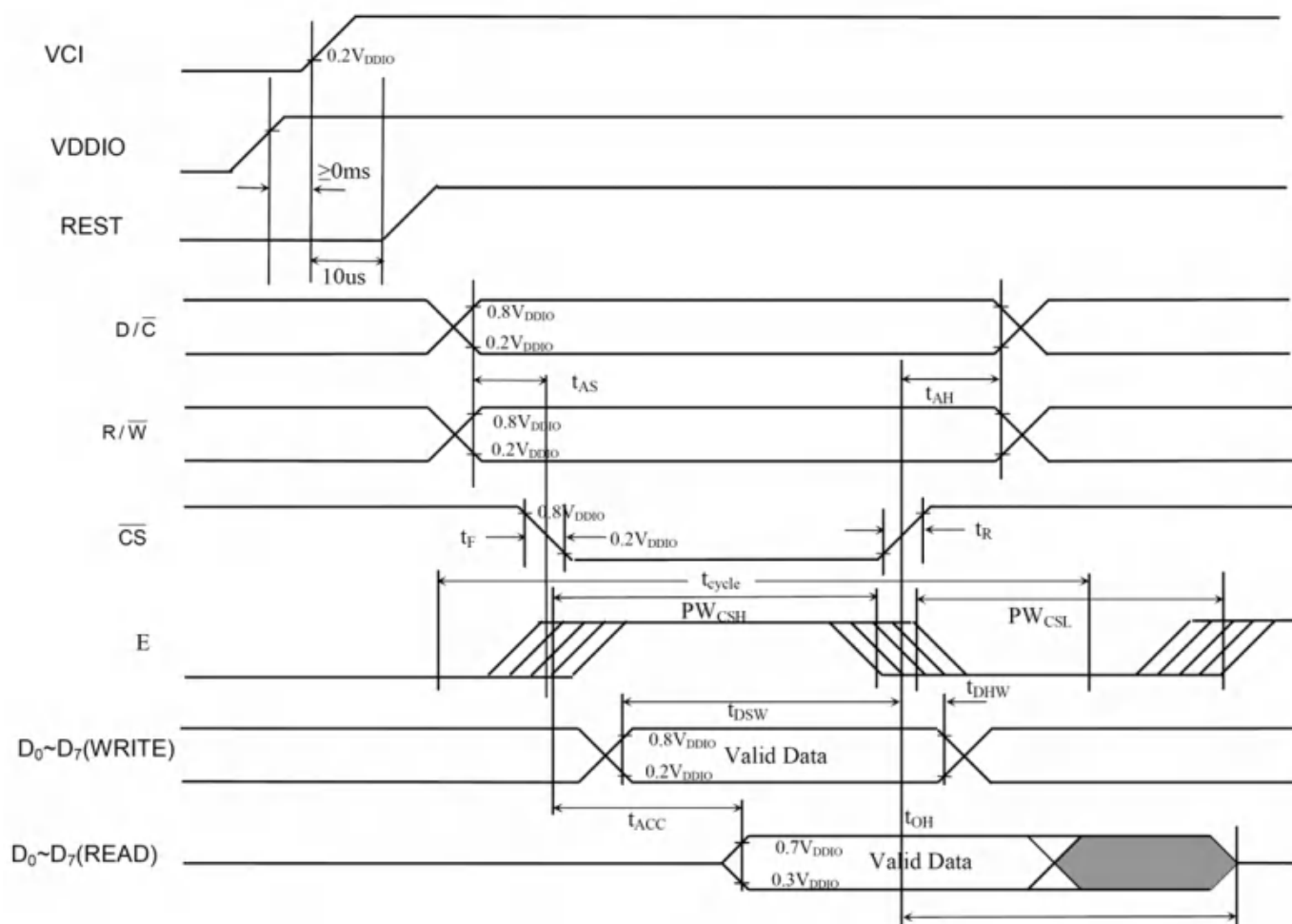
Remark: It's highly recommended that $\overline{RD}$ remains high for the whole write cycle

Read Cycle

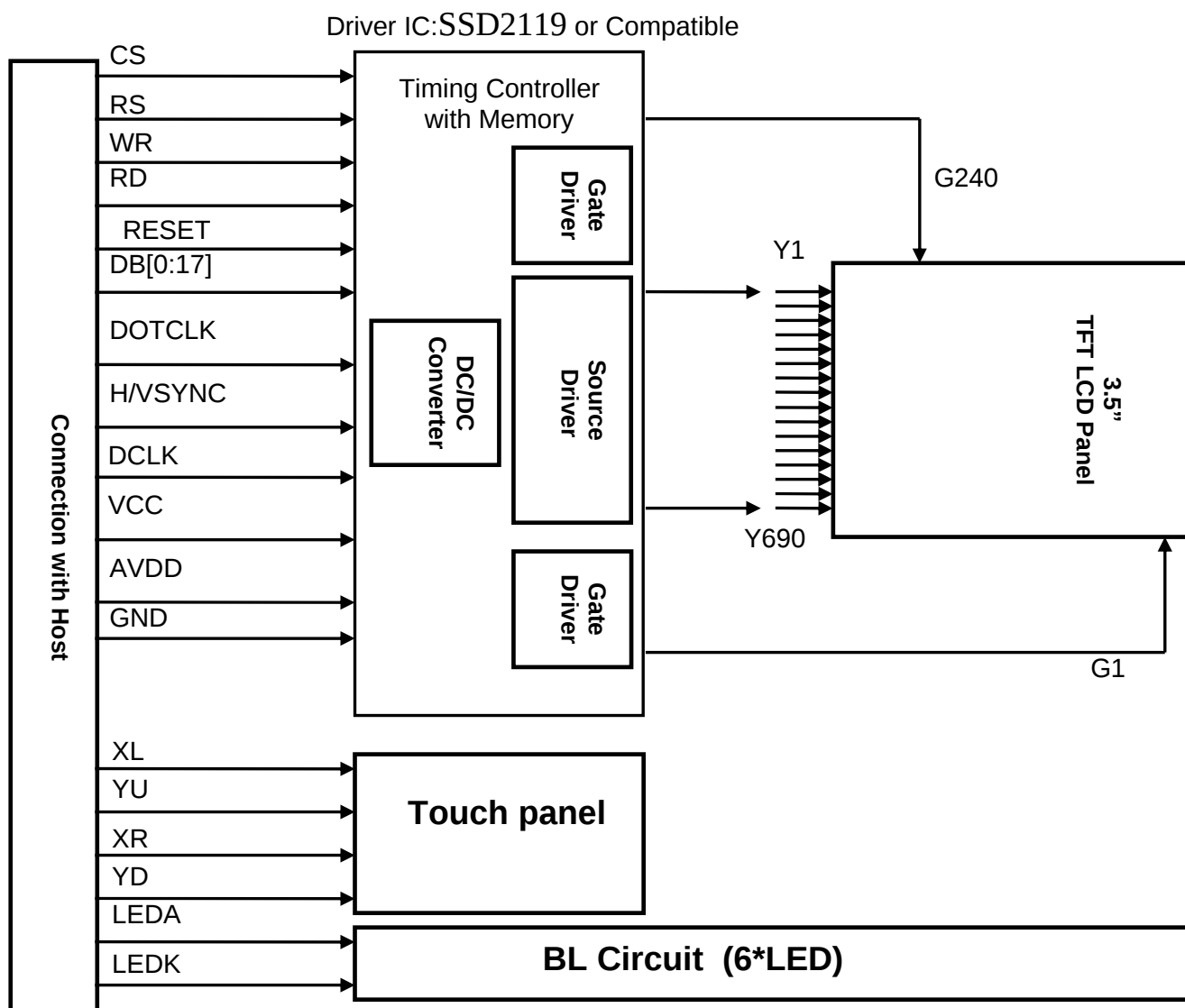


8.3.4 parallel 6800 interface

Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time (write cycle)	75	-	-	ns
t_{cycle}	Clock Cycle Time (read cycle) (Based on $V_{OL}/V_{OH} = 0.3 \cdot V_{DDIO}/0.7 \cdot V_{DDIO}$)	450	-	-	ns
t_{AS}	Address Setup Time (R/W)	0	-	-	ns
t_{AH}	Address Hold Time (R/W)	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



9. BLOCK DIAGRAM



10. LCM Quality Criteria

10.1 VISUAL & FUNCTION INSPECTION STANDARD

10.1.1 Inspection conditions

Inspection performed under the following conditions is recommended.

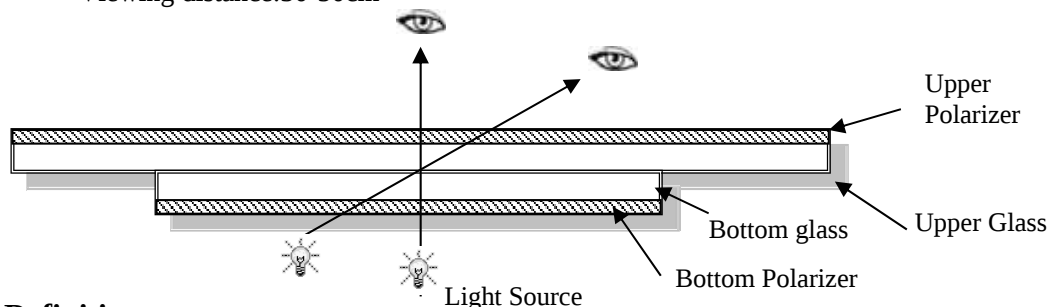
Temperature : 25±5℃

Humidity : 65%±10%RH

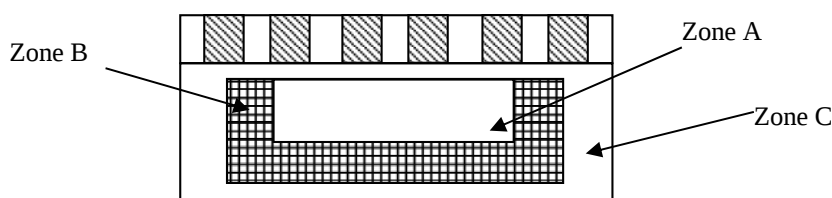
Viewing Angle : Normal viewing Angle.

Illumination: Single fluorescent lamp (300 to 700Lux)

Viewing distance:30-50cm



10.1.2 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 can not 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.

10.1.3 Sampling Plan

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

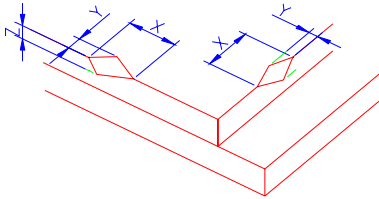
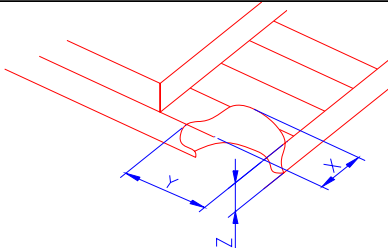
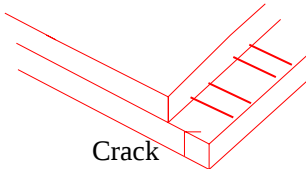
AQL:

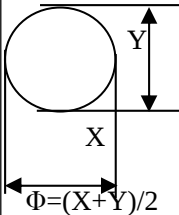
Major defect	Minor defect
0.65	1.5

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.	

10.1.4 Criteria (Visual)

Number	Items	Criteria(mm)						
1.0 LCD Crack/Broken								
	(1) The edge of LCD broken	<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>	X	Y	Z	≤3.0mm	<Inner border line of the seal	≤T
	X	Y	Z					
≤3.0mm	<Inner border line of the seal	≤T						
	(2)LCD corner broken	 <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>	X	Y	Z	≤3.0mm	≤L	≤T
X	Y	Z						
≤3.0mm	≤L	≤T						
	(3) LCD crack	 Crack Not allowed						

Number	Items	Criteria (mm)																														
2.0	Spot defect 	① light dot (LCD/TP/Polarizer black/white spot , light dot, pinhole, dent, stain)																														
		Zone Size (mm)		Acceptable Qty																												
				A	B	C																										
		Φ≤0.10		Ignore		Ignore																										
		0.10<Φ≤0.15		3(distance ≥ 10mm)																												
		0.15<Φ≤0.2		1																												
		0.2<Φ		0																												
		②Dim spot (LCD/TP/Polarizer dim dot, light leakage、dark spot)																														
		Zone Size (mm)		Acceptable Qty																												
				A	B	C																										
		Φ≤0.1		Ignore		Ignore																										
		0.1<Φ≤0.2		2(distance ≥ 10mm)																												
		0.2<Φ≤0.3		1																												
		Φ>0.3		0																												
		③ Polarizer accidented spot																														
		Zone Size (mm)		Acceptable Qty																												
				A	B	C																										
		Φ≤0.2		Ignore		Ignore																										
		0.2<Φ≤0.5		2(distance ≥ 10mm)																												
		Φ>0.5		0																												
	Line defect (LCD/TP /Polarizer black/white line, scratch, stain)	<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>					Width(mm)	Length(mm)	Acceptable Qty			A	B	C	Φ≤0.03	Ignore	Ignore		Ignore	0.03<W≤0.05	L≤3.0	N≤2		0.05<W≤0.08	L≤2.0	N≤2		0.08<W	Define as spot defect			
		Width(mm)	Length(mm)	Acceptable Qty																												
				A	B	C																										
		Φ≤0.03	Ignore	Ignore		Ignore																										
		0.03<W≤0.05	L≤3.0	N≤2																												
		0.05<W≤0.08	L≤2.0	N≤2																												
0.08<W		Define as spot defect																														

3.0	Polarizer Bubble	<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>$\Phi \leq 0.2$</td><td colspan="3">Ignore</td></tr><tr><td>$0.2 < \Phi \leq 0.4$</td><td colspan="3">2(distance $\geq 10\text{mm}$)</td></tr><tr><td>$0.4 < \Phi \leq 0.6$</td><td colspan="3">1</td></tr><tr><td>$0.6 < \Phi$</td><td colspan="3">0</td></tr></table>	Zone Size (mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.2$	Ignore			$0.2 < \Phi \leq 0.4$	2(distance $\geq 10\text{mm}$)			$0.4 < \Phi \leq 0.6$	1			$0.6 < \Phi$	0															
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4.0	SMT	According to IPC-A-610C class II standard . Function defect and missing part are major defect ,the others are minor defect.																																				
5.0	TP Related	<table><tr><td rowspan="5">TP bubble/ accident spot</td><td>Size $\Phi(\text{mm})$</td><td colspan="3">Acceptable Qty</td></tr><tr><td></td><td>A</td><td>B</td><td>C</td></tr><tr><td>$\Phi \leq 0.1$</td><td colspan="3">Ignore</td></tr><tr><td>$0.1 < \Phi \leq 0.2$</td><td colspan="3">2</td></tr><tr><td>$0.2 < \Phi \leq 0.3$</td><td colspan="3">1</td></tr><tr><td></td><td>$0.3 < \Phi$</td><td colspan="3">0</td></tr></table> <table><tr><td>Assembly deflection</td><td colspan="3">beyond the edge of backlight $\leq 0.15\text{mm}$</td></tr></table> <table><tr><td rowspan="2">Newton Ring</td><td>Newton Ring area$>1/3$ TP area</td><td>NG</td><td rowspan="2">  </td></tr><tr><td>Newton Ring area$\leq 1/3$ TP area</td><td>OK</td></tr></table>	TP bubble/ accident spot	Size $\Phi(\text{mm})$	Acceptable Qty				A	B	C	$\Phi \leq 0.1$	Ignore			$0.1 < \Phi \leq 0.2$	2			$0.2 < \Phi \leq 0.3$	1				$0.3 < \Phi$	0			Assembly deflection	beyond the edge of backlight $\leq 0.15\text{mm}$			Newton Ring	Newton Ring area $>1/3$ TP area	NG	  	Newton Ring area $\leq 1/3$ TP area	OK
TP bubble/ accident spot	Size $\Phi(\text{mm})$	Acceptable Qty																																				
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		TP corner broken X: length Y: width Z: height	<table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>X≤3.0mm</td><td>Y≤3.0mm</td><td>Z<LCD thickness</td></tr></table> * Circuitry broken is not allowed.	X	Y	Z	X≤3.0mm	Y≤3.0mm	Z<LCD thickness	
X	Y	Z								
X≤3.0mm	Y≤3.0mm	Z<LCD thickness								
		TP edge broken X: length Y: width Z: height	<table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>X≤6.0mm</td><td>Y≤2.0mm</td><td>Z<LCD thickness</td></tr></table> * Circuitry broken is not allowed.	X	Y	Z	X≤6.0mm	Y≤2.0mm	Z<LCD thickness	
X	Y	Z								
X≤6.0mm	Y≤2.0mm	Z<LCD thickness								

Criteria (functional items)

Number	Items	Criteria (mm)
1	No display	Not allowed
2	Missing segment	Not allowed
3	Short	Not allowed
4	Backlight no lighting	Not allowed
5	TP no function	Not allowed

10.2 RELIABILITY TEST

NO	ITEM	CONDTTION	STANDARD
1	High Temp. Storage	80℃, 240 hours	1. Functional test is OK. Missing Segment, short, unclear segment, non-display, display abnormally and liquid crystal leak are un-allowed. 2. No low temperature bubbles, end seal loose and fall, frame rainbow.
2	Low Temp. Storage	-30℃, 240 hours	
3	High Temp. Operation	70℃, 240 hours	
4	Low Temp. Operation	-20℃, 240 hours	
5	High temperature and high Humidity storage	40℃,90%RH , 240 hours	
6	Thermal and cold shock	Static state, -20℃ (30 Min) ~70℃ (30 Min) ~ -20℃ (30Min) , packaging, 10 cycles	1. Function test is OK. 2. No glass crack, chipped glass, end seal loose and fall, epoxy frame crack and so on. 3. No structure loose and fall.
7	Vibration test	Packaging, Frequency : 10-55Hz Amplitude : 1.0mm, Each direction on X,Y axe 0.5 heure, circle 2 hours	
8	Dropping test	Pack products into the carton box. Drop it from 80cm height to ground. Once for each side of the carton	

NOTE:

10.2.1 The reliability items will be fully performed in new sample qualification,

10.2.2 The reliability status will be tested as monitor during mass production. Individual reliability test shall be performed by lot , Moreover, the individual reliability item shall be decided according to reliability plan.

- 10.2.3 All samples are inspected after keeping in the room with normal temperature and humidity for 2 hours or above.
- 10.2.4 Vibration test: It is not necessary to test for those products without assembly frame, back light, PCB and so on.
- 10.2.5 Dropping test: It is necessary for affirming new package.
- 10.2.6 For the high temperature and high humidity test, pure water of over 10 MΩ.cm should be used.
- 10.2.7 Each test item applies for test LCM only once. Then tested LCM cannot be used again in any other test item.
- 10.2.8 The quantity of LCM examination for each test item is 5pcs to 10pcs.

10.3 Safety instructions

- 10.3.1 If the LCD panel breaks, be careful not to get any liquid crystal substance in your mouth.
- 10.3.2 If the liquid crystal substance touches your skin or clothes, please wash it off immediately by using soap and water.

10.4 Handling Precautions

- 10.4.1 Avoid static electricity damaging the LSI.
- 10.4.2 Do not remove the panel or frame from the module.
- 10.4.3 The polarizing plate of the display is very fragile. So, please handle it very carefully.
- 10.4.4 Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of the plate.
- 10.4.5 The color tone of display and background of LCM has the possibility to be changed in the storage temperature range.
- 10.4.6 Pay attention to the working environment, as the element may be destroyed by static electricity.
 - Be sure to ground human body and electric appliance during work.
 - Avoid working in a dry environment to minimize the generations of static electricity.
 - Static electricity may be generated when the protective film is fast peeled off.
- 10.4.7 When soldering the terminal of LCM, make certain the AC power source of soldering iron does not leak.
- 10.4.8 If the display surface becomes contaminated, breathe on the surface and gently wipe it with a soft-dry-clean cloth. If it is heavily contaminated, moisten cloth with the following solvent(ex: Ethyl alcohol). Solvents other than those above-mentioned may damage the polarizer(Especially, do not use them. ex: Water / Ketone)

10.5 Operation instructions

- 10.5.1 It is recommended to drive the LCD within the specified voltage limits, try to adjust the operating voltage for the optimal contrast, the color and contrast of LCD panel will vary at different temperature.
- 10.5.2 Response time is greatly delayed at low operating temperature range. However, this does not mean the LCD will be out of the order, It will recover when it returns to the specified temperature range.
- 10.5.3 If the display area is pushed hard during operation, the display will become abnormal.
- 10.5.4 Do not operate the LCD at the environments over the specified conditions, this may cause damage on the LCD and shorten the lifetime.

10.6 Storage instructions:

- 10.6.1 Store LCDs in a sealed polyethylene bag.
- 10.6.2 Store LCDs in a dark place, Do not expose to sunlight or fluorescent light. Keep the temperature between 0°C and 35°C.
- 10.6.3 Avoid the polarizer touch any other object, (It is recommended to store them in the container in which they were shipped.)

10.7 Limited Warranty

- 10.7.1 will replace or repair any of its LCD modules, which are found to be defective, when inspected in accordance with LCM acceptance standards (copies available upon request) for a period of 12 months from ink- print date on product
- 10.7.2 Any defects must be returned to within 60 days since ship-out. Confirmation of such date shall be based on freight documents. The warranty liability of wasam limited to repair and/or replacement on defects above (7.1,7.2)
- 10.7.3 No warranty can be granted if the precautions stated above have been disregarded. The typical samples are as below:
 - LCD glass crack/break
 - PCB outlet is damaged or modified.
 - PCB conductors damaged.
 - Circuit modified with by grinding, engraving or painting varnish.

--FPC crack

10.7.4 Modules must be returned with sufficient description of the failures or defects. Any connectors or cable installed by the customer must be removed completely without damaging the PCB outlet, conductors and terminals. Modules must be packed with the container in which they were shipped.



11. Packing method

-----TBD